

Passport 15000, 20000

Hardware Installation, Maintenance, and Upgrade

241-1501-240

Passport 15000, 20000

Hardware Installation, Maintenance, and Upgrade

Publication: 241-1501-240

Document status: Standard

Document version: 5.2S1

Document date: November 2003

Copyright © 2003 Nortel Networks.
All Rights Reserved.

Printed in Canada

NORTEL, NORTEL NETWORKS, the globemark design, the NORTEL NETWORKS corporate logo, DPN, and PASSPORT are trademarks of Nortel Networks.

ADC is a registered trademark of ADC Telecommunications, Inc.

AMP, MATE-N-LOK, and Z-PACK are registered trademarks of Tyco Electronics of Canada, Ltd.

Astec, Helios, MFA150, and Advanced Power Systems are trademarks of Astec Advanced Power Systems. EdgeLink is a trademark of Telco Systems.

Pozidriv is a registered trademark of Phillips Screw Company.

VT100 is a trademark of Digital Equipment Corporation.

Publication history

November 2003

5.2S1 Standard

General availability. Contains information on Passport 15000 and Passport 20000 for the PCR5.2 GA release.

Contents

About this document 27

Who should read this document and why 27

How to use this document 28

What's new in this document 28

16-port OC-3/STM-1 POS and ATM FP with PEC NTHW44 33

An additional version of the lower and upper cooling units 34

Related documents 35

How to get more help 36

Chapter 1

Overview of hardware tasks 37

Chapter 2

Safety considerations and best practices 41

Risk of personal injury 42

Risk of service loss 44

Risk of equipment damage 45

Fastening captive screws 46

Fastening termination panels 46

Avoiding damage from ESD 47

Choosing slots for FPs 49

Equipment maintenance 51

Air filter replacement 51

Vacuuming equipment 52

Fiber cable cleaning 52

SFP optical module cleaning 52

Monitoring equipment status LEDs 53

Storing and transporting circuit cards	53
Handling cables	54
Power cables	54
Processor card cables	54
Hot-swapping hardware parts	55
Packing and unpacking a processor card or module	55
Processor card compatibility	55

Chapter 3	
Alarm hardware	57
BIP alarm module replacement	58
BIP external alarm cable replacement	59

Chapter 4	
Alarm/BITS module	61
Alarm/BITS module replacement	62
Timing cable installation	65
Timing cable replacement	68

Chapter 5	
CP and FP cables	71
Cable routing	72
FP cable replacement	75
SFP module replacement	78

Chapter 6	
Control processors	81
CP upgrade	82
Failed CP replacement	84

Chapter 7	
Cooling units	85
Cooling unit replacement	86
Fan controller replacement	88
Fan replacement	90
Temperature sensor replacement	92
Temperature sensor bracket assembly replacement	95

Chapter 8	
Fabrics	97
Fabric replacement	97

Chapter 9	
Function processors	101
FP addition	102
FP decommissioning	105
FP upgrade	107
Replacement of a failed FP	112
Replacement of an FP with one of a different card type	115

Chapter 10	
Initial installations	117
Installation of a second switch in a NEBS 2000 frame	118
NEBS 2000 frame installation	122
Parts installation in a Passport 15000 in a NEBS 2000 frame	126
Parts installation in a Passport 20000 in a NEBS 2000 frame	129
Passport 15000-VSS installation	132
Passport 15000 or 20000 switch installation into an EIA rack	134

Chapter 11	
MAC address module	139
MAC address module replacement	139

Chapter 12	
Peripheral equipment	143
Modem installation	144
Multiport aggregate device installation	146
Multiport aggregate device replacement	148
Shasta 5000 installation	150

Chapter 13	
Power-and-ground hardware of a Passport 15000 or 20000	153
BIM replacement	154
BIP power-and-ground cable installation	157

BIP power input cable replacement	161
BIP replacement	164
Power-and-ground cable assembly replacement	167
Powerup of a Passport 15000 or 20000	170
PIM replacement	174

Chapter 14

Shelf assembly 175

Shelf assembly replacement	176

Chapter 15

Sparing and fanout panels 181

Sparing panel replacement	182
Fanout panel replacement	185

Chapter 16

Hardware procedures 187

Anchoring the NEBS 2000 frame	188
Additional information for installing the frame anchors	193
Assembling a BIP external alarm cable	195
Assembling sparing panel NTQS31	207
Bundling FP cables	209
Cabling the second cooling unit	213
Checking the backplane pins	216
Checking power input cables to the BIP	219
Checking power output from a system of ac rectifiers	222
Checking power output connections from the BIP	228
Checking the connectivity between FPs and sparing panels	230
Checking the final status of all LEDs	232
Checking the operation of external alarms	234
Cleaning an SFP optical module	236
Cleaning LC or SC connectors	240
Cleaning MT-RJ connectors	245
Cleaning the bore of a transceiver	248
Configuring modem software	249
Connecting a CP Ethernet cable	251

Connecting a CP local operator terminal cable	254
Connecting a CP modem cable	255
Connecting a Passport 15000 or 20000 to an EdgeLink 100	257
Connecting a PIM cable	260
Connecting a power input cable to a terminal block	262
Connecting a temperature sensor cable assembly	265
Connecting alarm cables to the alarm/BITS module	268
Connecting an FP cable	273
Connecting other cables to a BIP	282
Connecting power input cables to the BIP	283
Connecting power output cables to a system of ac rectifiers	292
Determining if you need to use inline attenuators with optical FPs	298
Disconnecting a power input cable from a terminal block	300
Disconnecting power input cables from the BIP	301
Disconnecting other cables from a BIP	305
Fastening adjacent frames together	307
Grounding a Passport 15000-VSS	310
Grounding a Shasta 5000 to a NEBS 2000 frame	313
Grounding the NEBS 2000 frame	316
Installing a 19-inch sparing panel	320
Installing a BIM	322
Installing a BIP alarm module	326
Installing a BIP external alarm cable	327
Installing a BIP external alarm cable to an MFA150	329
Installing a BIP onto a NEBS 2000 frame	334
Installing a BITS cable	336
Installing a blank processor card	338
Installing a CP	341
Installing a fabric card into a Passport 15000	344
Installing a fabric card into a Passport 20000	349
Installing a fan	355
Installing a fan controller	361
Installing a fanout panel	372
Installing a fiber management unit	374
Installing a lower cooling unit	377

Installing a multiport aggregate device	382
Installing a PIM	389
Installing a PIM cable	391
Installing a power-and-ground cable assembly	393
Installing a Shasta 5000 air-flow grill	399
Installing a Shasta 5000 cable management assembly	402
Installing a Shasta 5000 filler panel	404
Installing a Shasta 5000 shelf assembly	406
Installing a shelf assembly	407
Installing a shelf assembly onto adapter brackets	409
Installing a shelf filler panel	413
Installing a shelf-based BIP	416
Installing a shelf-based cooling unit	418
Installing a side frame panel	422
Installing a sparing panel	431
Installing a strain-relief bar	434
Installing a temperature sensor bracket assembly	435
Installing a temperature sensor for an upper cooling unit	441
Installing a temperature sensor inside a lower cooling unit	445
Installing a timing cable adaptor NTPN81	450
Installing a timing cable DS1 wire-wrap NTHW75	453
Installing a timing cable for E1 unbalanced NTHR75	457
Installing adapter brackets onto a Shasta 5000	460
Installing an FP	462
Installing an SFP optical module	466
Installing an upper cooling unit	470
Installing cable management brackets	475
Installing EMI filters on the alarm/BITS module	477
Installing extended cable management brackets	479
Installing fiber cables through the fiber management unit	483
Installing front adapter brackets	488
Installing front or rear frame panels	490
Installing grounding tape on rack uprights	494
Installing high-density cable management brackets	495
Installing NEBS 2000 frame-to-EIA adapter brackets	498

Installing short adapter brackets on the rear of the rack	500
Installing short adapter brackets on the front of the rack	504
Levelling the frame or frame pair	505
Loading cards in sequence with software	508
Making a BITS cable	510
Moving a frame into its anchoring position	514
Packing a processor card or module	518
Placing the NEBS 2000 frame onto the footprint	519
Powering down a BIM	521
Powering up a system of ac rectifiers	524
Preparing the NEBS 2000 frame for installing adapter brackets	526
Removing a BIM	528
Removing a BIP	531
Removing a BIP alarm module	532
Removing a BITS cable	534
Removing a blank processor card	536
Removing a CP	537
Removing a fabric card from a Passport 15000	539
Removing a fabric card from a Passport 20000	541
Removing a fan	544
Removing a fan controller	549
Removing a fanout panel	555
Removing a horizontal frame from the pallet	556
Removing a lower cooling unit	559
Removing a multiport aggregate device	562
Removing a PIM	565
Removing a power-and-ground cable assembly	567
Removing a shelf assembly	570
Removing a shelf filler panel	577
Removing a side frame panel	580
Removing a sparing panel	582
Removing a temperature sensor bracket assembly	584
Removing a temperature sensor for an upper cooling unit	587
Removing a temperature sensor from a lower cooling unit	591
Removing a timing cable adapter NTPN81	596

Removing a timing cable for DS1 NTHW75	597
Removing a timing cable for E1 unbalanced NTHR75	599
Removing a vertical frame from the pallet	601
Removing an FP	604
Removing an FP cable	609
Removing an SFP optical module	612
Removing an upper cooling unit	615
Removing fiber cables from the fiber management unit	618
Removing front or rear frame panels	619
Removing the packaging from a Passport in a frame	621
Replacing a BIP external alarm cable	623
Replacing a BIP external alarm cable to an MFA150	625
Replacing a CP Ethernet cable	627
Replacing a cable management channel cover	629
Replacing a cooling unit alarm cable	631
Replacing a cooling unit power cable	633
Replacing a fiber cable in a fiber management unit	636
Replacing a local operator terminal cable	639
Replacing a PIM cable	640
Replacing a Shasta 5000 interface cable	643
Replacing an air filter	644
Replacing an alarm cable assembly to the alarm/BITS module	648
Replacing an EdgeLink 100 interface cable	650
Replacing the alarm/BITS module in a Passport 15000	653
Replacing the alarm/BITS module in a Passport 20000	658
Replacing the MAC address module in a Passport 15000	661
Replacing the MAC address module in a Passport 20000	664
Routing FP cables	666
Routing power cables from overhead to the BIP	670
Routing power cables from under the floor to the BIP	672
Seating cards from the transportation position	676
Seating fabrics from the transportation position	679
Setting modem dip switches	683
Switching on the BIP circuit breakers	685
Testing sparing panel connectivity	688

Testing the power output from a system of ac rectifiers	690
Testing the power to the BIP	691
Unpacking a processor card or module	696
Unpacking a shelf assembly	697
Unpacking the Shasta 5000	698
Vacuuming equipment	699

List of figures

- Figure 1 Overview of Passport 15000 or 20000 hardware, front view 38
- Figure 2 Overview of Passport 15000 or 20000 hardware, rear view 39
- Figure 3 Location of ESD jacks, front lower (shown) or upper shelf 48
- Figure 4 Task flow of a BIP alarm module replacement 58
- Figure 5 Task flow of a BIP external alarm cable installation 60
- Figure 6 Task flow of an alarm/BITS module replacement 63
- Figure 7 Task flow of a timing cable installation 66
- Figure 8 Task flow of a timing cable replacement 69
- Figure 9 Task flow of cable routing 73
- Figure 10 Task flow of FP cable replacement 76
- Figure 11 Task flow of an SFP module replacement 78
- Figure 12 Task flow of a CP upgrade 83
- Figure 13 Task flow of a failed CP replacement 84
- Figure 14 Task flow of a cooling unit replacement 87
- Figure 15 Task flow of a fan controller replacement 89
- Figure 16 Task flow of a fan replacement 91
- Figure 17 Task flow of a temperature sensor replacement 93
- Figure 18 Task flow of a temperature sensor bracket assembly replacement 96
- Figure 19 Task flow of a fabric replacement 99
- Figure 20 Task flow of an FP addition 103
- Figure 21 Task flow of an FP decommissioning 105
- Figure 22 Task flow of an electrical FP upgrade 109
- Figure 23 Task flow of an optical FP upgrade 110
- Figure 24 Task flow of a replacement of a failed FP 113
- Figure 25 Task flow of a replacement of an FP with one of a different type 116
- Figure 26 Task flow of an installation of a second switch in a NEBS 2000 frame 120
- Figure 27 Task flow of NEBS 2000 frame installation 124
- Figure 28 Task flow of parts installation in a Passport 15000 in a NEBS 2000 frame 127
- Figure 29 Task flow of parts installation in a Passport 20000 in a NEBS 2000 frame 130
- Figure 30 Task flow of a Passport 15000-VSS installation 133

Figure 31	Task flow of a Passport 15000 or 20000 switch installation into a 23-inch EIA rack 136
Figure 32	Task flow of a MAC address module replacement 141
Figure 33	Task flow of a modem installation 145
Figure 34	Task flow of a multiport aggregate device installation 147
Figure 35	task flow of a multiport aggregate device replacement 149
Figure 36	Task flow of a Shasta 5000 installation 151
Figure 37	Task flow of a BIM replacement 155
Figure 38	Task flow of a BIP power-and-ground cable installation 159
Figure 39	Task flow of a BIP power input cable replacement 162
Figure 40	Task flow of a BIP replacement 165
Figure 41	Task flow of a power-and-ground cable assembly replacement 168
Figure 42	Task flow of a power-up of a Passport 15000 or 20000 172
Figure 43	PIM replacement task flow 174
Figure 44	Task flow of a shelf assembly replacement 178
Figure 45	Task flow of a sparing panel replacement 183
Figure 46	task flow of a fanout panel replacement 186
Figure 47	M12 anchor assembly 192
Figure 48	Anchoring to a raised floor 193
Figure 49	Cable for BIP connector J3 to the external LED board 205
Figure 50	A 12-port DS3 or E3 one-for-six sparing panel NTQS31, fully assembled 208
Figure 51	Mini-coax cables bundled onto extended brackets 212
Figure 52	Power and alarm cable paths between the BIP and cooling units 215
Figure 53	An empty shelf assembly of a Passport 15000, front view 217
Figure 54	Front of an MFA150 power system of five ac rectifiers 224
Figure 55	Power cable connections at the breakers inside an MFA150 controller, side view 226
Figure 56	Power cable connections at the ground busbar inside an MFA150 controller 227
Figure 57	Power cable paths between the BIP and two shelves 229

Figure 58	The open end of an SFP optical module	238
Figure 59	The LC connector end of an SFP optical module	239
Figure 60	LC fiber connectors	243
Figure 61	SC fiber connector	244
Figure 62	MT-RJ fiber connector	247
Figure 63	Route of a CP cable	253
Figure 64	Connection points of the PIM cables	261
Figure 65	Power input cables connected to a polyvalent power-and-ground assembly A0834143	264
Figure 66	Location of upper temperature sensors	266
Figure 67	Cable assembly connector on a temperature sensor bracket assembly	267
Figure 68	Locations of the alarm cable connectors and paths	270
Figure 69	Connection points of the cables for an alarm/BITS module in a Passport 15000	271
Figure 70	Connection points of the cables for an alarm/BITS module in a Passport 20000	272
Figure 71	Types of connectors on Passport FP cables	276
Figure 72	The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW21)	279
Figure 73	The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW31)	280
Figure 74	The transmit and receive orientation on a 16-port OC-3/STM-1 POS and ATM FP (NTHW44)	281
Figure 75	Power input cable connected to the BIP stud labelled B1+	289
Figure 76	Overhead power input cables for the lower shelf connected to the BIP	290
Figure 77	Insulating boots and clamps at the rear of the BIP	291
Figure 78	Power cable connections at the rear of an MFA150 system of ac rectifiers	295
Figure 79	Power cable connections at the breakers inside an MFA150 controller, side view	296
Figure 80	Power cable connections at the ground busbar inside an MFA150 controller	297
Figure 81	Cable connections at the rear of a BIP	306
Figure 82	Frame-to-frame joining brackets in kit numbers NTRU0365 and NTHR0370	309
Figure 83	Passport 7480 shelf assembly grounding stud	311
Figure 84	Location of the grounding strip at the top of NEBS 2000 frame	312

Figure 85	Shasta 5000 shelf assembly grounding studs	314
Figure 86	Location of the grounding strip at the top of NEBS 2000 frame	315
Figure 87	Top grounding for CBN, side view	318
Figure 88	Top grounding for IBN, side view	319
Figure 89	Physical characteristics of a BIM in a BIP	325
Figure 90	Locations of the alarm cable connectors and paths	328
Figure 91	Connection path of the external alarm cable between the BIP and an MFA150	332
Figure 92	Cable connection points of the alarm cable at the BIP and an MFA150	333
Figure 93	Blank processor card NTHR64	340
Figure 94	Location of CPs in a lower switch	343
Figure 95	A fabric of a Passport 15000, front view	346
Figure 96	A fabric of a Passport 15000, rear view	347
Figure 97	Location of the curved channels for the Passport 15000 fabric hinge pins	348
Figure 98	A fabric of a Passport 20000, rear view	352
Figure 99	A fabric of a Passport 20000, front view	353
Figure 100	Locations of notches for fabric hinge bushings on Passport 20000 shelf assembly	354
Figure 101	Location and orientation of the fans on any version of cooling unit	358
Figure 102	A side fan A0522182 for a cooling unit NTHR51AB or NTHR52AB	359
Figure 103	A middle fan A0522179 for a cooling unit NTHR51AB or NTHR52AB	360
Figure 104	Location of the fan controllers inside a cooling unit NTHR51AA or NTHR52AA	365
Figure 105	Location of the fan controllers inside a cooling unit NTHR51AB or NTHR52AB	366
Figure 106	A fan controller for inside a cooling unit NTHR51AA or NTHR52AA	367
Figure 107	A fan controller for inside a cooling unit NTHR51AB or NTHR52AB	368
Figure 108	Cable connections inside a lower cooling unit NTHR51AB	369
Figure 109	Cable connections inside an upper cooling unit NTHR52AB	370
Figure 110	Cable connections inside a cooling unit NTHR51AA or NTHR52AA	371

Figure 111	A 12-port DS3 or E3 fanout panel	373
Figure 112	A dual-drawer fiber management unit NTHW50	376
Figure 113	A lower cooling unit NTHR51AA	379
Figure 114	A lower cooling unit NTHR51AB	380
Figure 115	Location of a lower (rear) cooling unit	381
Figure 116	Installing mounting ears on a multiport aggregate device	384
Figure 117	Connecting power wires to the terminal connector	386
Figure 118	Connecting the terminal connector	387
Figure 119	A PIM NTPN15 of a Passport 20000	390
Figure 120	Connection points of the PIM cables	392
Figure 121	The polyvalent power-and-ground assembly A0834143	397
Figure 122	The ETSI power-and-ground assembly A0834149	398
Figure 123	Location of the grill for a Shasta 5000 in a NEBS 2000 frame	401
Figure 124	Location of the cable management assembly for a Shasta 5000 in a NEBS 2000 frame	403
Figure 125	Location of the filler panel for a Shasta 5000 in a NEBS 2000 frame	405
Figure 126	An empty shelf assembly, front isometric view	411
Figure 127	A shelf assembly in a 23-inch EIA rack, isometric front view	412
Figure 128	Location of the front shelf filler panel	415
Figure 129	The BIP, front view	417
Figure 130	The upper cooling unit, front and rear views	420
Figure 131	Position and orientation of the upper cooling unit NTHR52 in a 23-inch wide rack	421
Figure 132	Side panels, exploded view	424
Figure 133	Installed front, rear, and side panels	425
Figure 134	Location of brackets for installing panels	426
Figure 135	Assembly of a side panel bracket, left and right, upper or lower	427
Figure 136	Upper brackets for frame panels	428
Figure 137	Lower brackets for frame panels	429
Figure 138	Side panel grounding cable	430
Figure 139	A 12-port DS3 or E3 one-for-six sparing panel NTQS31, fully assembled	433
Figure 140	A temperature sensor bracket assembly NTHR68AA for a cooling unit NTHR52AA	437

Figure 141	A temperature sensor bracket assembly NTHR68AB for a cooling unit NTHR52AB	438
Figure 142	Location of the temperature sensor bracket assembly on a NEBS 2000 frame or a rack	439
Figure 143	Location of the temperature sensor bracket assembly on a 23-inch wide EIA rack	440
Figure 144	Location of the temperature sensors on a bracket assembly	442
Figure 145	A temperature sensor on the bracket assembly NTHR68AA for a cooling unit NTHR52AA	443
Figure 146	A temperature sensor on the bracket assembly NTHR68AB for a cooling unit NTHR52AB	444
Figure 147	Location of the temperature sensors inside a lower cooling unit NTHR51AA	447
Figure 148	Cable connections inside a cooling unit NTHR51AA or NTHR52AA	448
Figure 149	Location of the temperature sensors inside a lower cooling unit NTHR51AB	449
Figure 150	A timing cable assembly from kit NTPN81	452
Figure 151	A timing cable assembly NTHW75	456
Figure 152	An inline EMI filter on a connector of an E1 alarm/BITS module in a Passport 15000	458
Figure 153	A timing cable assembly NTHR75	459
Figure 154	Location of shelf hardware for a Shasta 5000 in a NEBS 2000 frame	461
Figure 155	Open card latches on a CP, FP, or blank processor card	464
Figure 156	Closed card latches on a CP, FP, or blank processor card	465
Figure 157	A typical SFP optical module	468
Figure 158	Orientation to install an SFP module in an NTHW49	469
Figure 159	An upper cooling unit NTHR52AA	472
Figure 160	An upper cooling unit NTHR52AB	473
Figure 161	Location of an upper (front) cooling unit	474
Figure 162	Mounted cable management brackets onto rear adapter brackets	476
Figure 163	An EMI filter on an alarm/BITS connector of a Passport 15000	478
Figure 164	Cable management bracket kits on a frame	481
Figure 165	Cable management extended brackets on a frame	482

Figure 166	Routing a cable through a fiber management unit NTHW50	487
Figure 167	A front adapter bracket	489
Figure 168	Location of front and rear panels, exploded view	492
Figure 169	Installed front, rear, and side panels	493
Figure 170	Aligned pair of plastic cable management brackets	496
Figure 171	High-density cable management brackets installed on a NEBS 2000 frame	497
Figure 172	A short adapter bracket	501
Figure 173	A shelf assembly of a Passport 15000 in a rack, rear view	502
Figure 174	A shelf assembly of a Passport 20000 in a rack, rear view	503
Figure 175	Location of the frame levelers and anchor openings	507
Figure 176	D-sub pinout for J3 and J4 BITS cables for DS1 or E1 balanced	513
Figure 177	Fridge cart to move a NEBS 2000 frame	517
Figure 178	BIMs for specific shelf nodes	523
Figure 179	Location of shelf hardware for a Shasta 5000 in a NEBS 2000 frame	527
Figure 180	Locations of modules in a BIP	530
Figure 181	Location of a BIP alarm module	533
Figure 182	Physical characteristics on a Passport 15000 fabric, covers closed	540
Figure 183	Physical characteristics on a Passport 20000 fabric, covers closed	542
Figure 184	A protection cover for the fabric backplane connectors	543
Figure 185	Location and orientation of the fans on an upper (front) or lower (rear) cooling unit	547
Figure 186	Location of the fuse on fan controller NTHR10AA	548
Figure 187	Location of the fan controllers inside an NTHR51AA or NTHR52AA cooling unit	551
Figure 188	Location of the fan controllers inside a cooling unit NTHR52AB	552
Figure 189	Location of the fan controllers inside a cooling unit NTHR51AB	553
Figure 190	Fan controller connections on an NTHR10AB	554
Figure 191	Location of the mounting screws of a lower (front) cooling unit	561

Figure 192	Balanced multiport aggregate device NT0486	563
Figure 193	Unbalanced multiport aggregate device NT0421	564
Figure 194	Location of the rear plug-in hardware	573
Figure 195	An upper shelf assembly of a Passport 15000, front isometric view	574
Figure 196	An upper shelf assembly of a Passport 20000, front isometric view	575
Figure 197	An upper shelf assembly of a Passport 20000, rear isometric view	576
Figure 198	Physical characteristics of a front shelf filler panel	579
Figure 199	Side panels, exploded view	581
Figure 200	Location of the temperature sensor bracket assembly	585
Figure 201	A temperature sensor bracket assembly	586
Figure 202	Location of upper temperature sensors	588
Figure 203	A temperature sensor on the bracket assembly NTHR68AA for a cooling unit NTHR52AA	589
Figure 204	A temperature sensor on the bracket assembly NTHR68AB for a cooling unit NTHR52AB	590
Figure 205	Location of temperature sensors inside a lower cooling unit NTHR51AA	594
Figure 206	Location of temperature sensors inside a lower cooling unit NTHR51AB	595
Figure 207	A timing cable assembly NTHW75 and terminal connections	598
Figure 208	A timing cable assembly NTHR75	600
Figure 209	Locations of FPs	607
Figure 210	Fully opened card latches	608
Figure 211	Route of an FP cable	611
Figure 212	A typical SFP optical module	613
Figure 213	Orientation of an installed SFP module in an NTHW49	614
Figure 214	Location of the mounting screws of an upper cooling unit	617
Figure 215	Locations of front and rear frame panels, exploded view	620
Figure 216	Unpacking a horizontal Passport 15000 or 20000 in a frame	622
Figure 217	Locations of the alarm cable connectors and paths	624
Figure 218	Connections for external alarm cable P0940531 at an MFA150	626

Figure 219	Route of a CP cable	628
Figure 220	Location of cable management channel covers, lower shelf	630
Figure 221	Connection paths of the shelf alarm cables	632
Figure 222	Connection paths of the power cables	635
Figure 223	Locating a fiber cable in a fiber management unit NTHW50	638
Figure 224	Connection points of the PIM cables	642
Figure 225	Location of the lower air filter	646
Figure 226	Location of the upper air filter	647
Figure 227	A typical alarm cable assembly	649
Figure 228	Proper alignment of an alarm/BITS module in a Passport 15000	655
Figure 229	Location of the alarm/BITS module and cable connections in a Passport 15000	657
Figure 230	Location of the alarm/BITS module and cable connections in a Passport 20000	660
Figure 231	Location of the MAC address module in a Passport 15000	663
Figure 232	Location of the MAC address module in a Passport 20000	665
Figure 233	FP cable paths, front view, lower shelf	669
Figure 234	Power cabling to the BIP from the floor	675
Figure 235	Upper transportation pockets for card latches	677
Figure 236	Lower transportation pockets for card latches	678
Figure 237	Location of protective tape over fabric airflow opening	681
Figure 238	Straps retaining Passport 20000 fabrics in the transportation position	682
Figure 239	Circuit breakers on the front of the BIP	687
Figure 240	Location of BIM status LEDs	694
Figure 241	Location of alarm module status LEDs	695

List of tables

Table 1	Combinations of BIMs in a BIP	155
Table 2	Pinout of the BIP female D-sub 15-pin connector P1	196
Table 3	Pinout of the BIP female D-sub 25-pin connectors P2 and P4	197
Table 4	Pinout of the BIP female D-sub 25-pin connector P3	199
Table 5	Pinout of the BIP female D-sub high-density 26-pin connectors P7 through P10	201
Table 6	Pinout of the BIP female 1x2 MATE-N-LOK connector J1	203
Table 7	Pinout of the BIP male 1x4 Berg connector J2	203
Table 8	Pinout of the BIP male 2x4 Berg connector J3	203
Table 9	Pinout of the cable between BIP connector J3 and the LED board	204
Table 10	Pin-to-pin connections between an MFA150 controller card and a BIP	206
Table 11	Position of each FP cable bundle on right-side extended cable brackets	211
Table 12	Position of each FP cable bundle on left-side extended cable brackets	211
Table 13	Connection mapping between the BIP and the MFA150 controller	225
Table 14	Cleaning tools and supplies for fiber connectors	242
Table 15	Pinout for the Passport DB 9-pin connecting to the modem DB 25-pin	256
Table 16	Interface cables between a Passport 15000 or 20000 and an EdgeLink 100	258
Table 17	Pinout of the alarm cable assembly from NTHR57	269
Table 18	Actions to engage types of FP connectors	277
Table 19	Combinations of BIMs in a BIP	324
Table 20	Pin-to-pin connections between an MFA150 controller card and a BIP	330
Table 21	Pinout of the timing cable assembly from NTPN81	452
Table 22	Wiring pinout for J3 of cable assembly NTHW75	454
Table 23	Wiring pinout for J4 of cable assembly NTHW75	454
Table 24	Pinouts of the J3 and J4 connectors for DS1 or E1 balanced	511

Table 25	Pinouts of the J3 and J4 connectors for E1 unbalanced	512
Table 26	Location of cooling unit breakers on the front of the BIP	560
Table 27	Interface cables between an EdgeLink 100 and a Passport 15000 or 20000	651
Table 28	Modem settings of the hardware dip switches	683

About this document

This document contains the procedures that are called up in sequence by specific task flows. Task flows identify at a high level what is to be done to get a unit or series of units of Passport 15000 or 20000 hardware installed or replaced.

The following topics are discussed in this section:

- “Who should read this document and why” (page 27)
- “How to use this document” (page 28)
- “What’s new in this document” (page 28)
- “Related documents” (page 35)
- “How to get more help” (page 36)

Who should read this document and why

This document is intended for use by field technicians who:

- are qualified to work on the dc electrical power feeds to the Passport 15000 or 20000 according to local electrical codes for the kind of power hookup required
- are qualified to handle cards or modules that plug into a Passport 15000 or 20000 without accidentally affecting service or to handle, install, or replace mechanical switch hardware and associated equipment without causing personal injury or damage to equipment
- have experience and knowledge of the safe and practical operation of the specialty tools and methods required to do the tasks identified in the procedures throughout this document

How to use this document

The “Overview of hardware tasks” (page 37) contains references to all the hardware tasks required to install, maintain, and upgrade Passport 15000 and 20000.

Some of the procedures required by a task can be located in another NTP, for example software configuration procedures will be found in 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

For more details about how to use the Passport suite of documents, see 241-5701-002 *Passport 7400, 15000, 20000 Using New Task-based Documentation*.

What's new in this document

The following hardware features are added to this document:

- “16-port OC-3/STM-1 POS and ATM FP with PEC NTHW44” (page 33)
- “An additional version of the lower and upper cooling units” (page 34)

Other changes made to this document include the following:

- for CR Q00742719, added a warning to the section “Risk of service loss” (page 44)
- changed the installation of power cables for a Passport 15000 or 20000 to first connecting them at the BIP and then routing towards the power source instead of the opposite
- updated the figure “The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW31)” (page 280) with the correct orientation of the transmit and receive ports
- added the effect of power cycling to “Risk of equipment damage” (page 45)
- updated “Avoiding damage from ESD” (page 47) to include how handling any non-electronic or non-conductive hardware part can cause damage by ESD, for example, to an SFP module

- added criteria to consider when grouping FPs in a shelf in “Choosing slots for FPs” (page 49)
- added the sections:
 - “Fastening screws to a frame or rack” (page 45)
 - “Fastening captive screws” (page 46)
 - “Fastening termination panels” (page 46)
- added the section “Monitoring equipment status LEDs” (page 53)
- added the section “Storing and transporting circuit cards” (page 53)
- added definitions of compatible and equivalent FPs in “Processor card compatibility” (page 55)
- added the section “Hot-swapping hardware parts” (page 55)
- added how to identify a Passport 15000 or 20000 for the task “Alarm/ BITS module replacement” (page 62)
- added the new task flow “Cable routing” (page 72) and included the procedure “Routing FP cables” (page 666) as part of it
- updated the purpose statement of “FP addition” (page 102) and added a reference to aid choosing a card slot
- updated the task “FP decommissioning” (page 105) to include the reason for having a card fill the empty slot
- added to the Prerequisites of these tasks a cross-reference to understanding the use of a compatible or an equivalent FP:
 - “FP upgrade” (page 107)
 - “Replacement of a failed FP” (page 112)
 - “Replacement of an FP with one of a different card type” (page 115)
- added the Prerequisite about the BIP to the task flow “Installation of a second switch in a NEBS 2000 frame” (page 118)
- added CP cabling procedures that were missing from these task flows:
 - “Installation of a second switch in a NEBS 2000 frame” (page 118)

- “Parts installation in a Passport 15000 in a NEBS 2000 frame” (page 126)
- “Parts installation in a Passport 20000 in a NEBS 2000 frame” (page 129)
- “Passport 15000 or 20000 switch installation into an EIA rack” (page 134)
- added the procedure “Removing a shelf filler panel” (page 577) to the task flow “Installation of a second switch in a NEBS 2000 frame” (page 118)
- added the switch package numbers to “Passport 15000 or 20000 switch installation into an EIA rack” (page 134)
- added the missing CP cable procedures to the task flow “Installation of a second switch in a NEBS 2000 frame” (page 118)
- updated the Prerequisites to the task flow “MAC address module replacement” (page 139)
- changed the requirements for matching BIMs to a BIP version in:
 - “Prerequisites to installation of a second switch in a NEBS 2000 frame” (page 118)
 - “Installing a BIM” (page 322)
- added “Testing the power to the BIP” (page 691) to the task flow “BIP power input cable replacement” (page 161)
- updated these task flows to include handling the hardware for higher cable densities:
 - “Installation of a second switch in a NEBS 2000 frame” (page 118)
 - “NEBS 2000 frame installation” (page 122)
 - “Passport 15000 or 20000 switch installation into an EIA rack” (page 134)
- updated these task flows to include the handling of front, rear, and side panels on a NEBS 2000 frame:
 - “Installation of a second switch in a NEBS 2000 frame” (page 118)

- “Parts installation in a Passport 15000 in a NEBS 2000 frame” (page 126)
- “Parts installation in a Passport 20000 in a NEBS 2000 frame” (page 129)
- “Passport 15000 or 20000 switch installation into an EIA rack” (page 134)
- “BIP power-and-ground cable installation” (page 157)
- “BIP power input cable replacement” (page 161)
- corrected the figure “Task flow of a shelf assembly replacement” (page 178) to change the name of the temperature assembly procedures and remove irrelevant procedures
- revised the procedure “Anchoring the NEBS 2000 frame” (page 188) to add accurate cutting of the threaded rod and the need to align the rod with the cone to thread it
- changed the length of the cable neck and connector in the figure “LC fiber connectors” (page 243)
- revised the procedure “Connecting an FP cable” (page 273)
- moved the step to check the LED status of an FP from the procedure “Installing an FP” (page 462) to the procedure “Connecting an FP cable” (page 273)
- added the figure “The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW21)” (page 279) to the procedure “Connecting an FP cable” (page 273)
- in the table “Actions to engage types of FP connectors” (page 277):
 - removed NTHW31 from the LC simplex cables
 - removed the 4-port GigE from the RJ-45 connectors to the LC duplex connectors
 - added FPs that have the RJ-45 connectors
 - added the use and handling of an SFP optical module
- updated these procedures especially to add a Caution about latching cards:

- “Installing a blank processor card” (page 338)
- “Installing a CP” (page 341) which also includes the updated figure “Location of CPs in a lower switch” (page 343)
- “Installing an FP” (page 462) which also includes the new figures “Open card latches on a CP, FP, or blank processor card” (page 464) and “Closed card latches on a CP, FP, or blank processor card” (page 465)
- updated the figure “Location of the front shelf filler panel” (page 415) for the procedure “Installing a shelf filler panel” (page 413)
- for the procedure “Installing a side frame panel” (page 422), replaced the figure “Location of front, rear, and side panels, exploded view” with “Side panels, exploded view” (page 424)
- for the procedure “Installing front or rear frame panels” (page 490), replaced the figure “Location of front, rear, and side panels, exploded view” with “Location of front and rear panels, exploded view” (page 492)
- for small form-factor pluggable (SFP) optical transceiver modules:
 - added the section “SFP optical module cleaning” (page 52)
 - added the procedure “Configuring a port to use an SFP optical module” to the task flows “FP addition” (page 102) and “FP upgrade” (page 107)
 - updated the use and handling one in “Installing an SFP optical module” (page 466)
 - updated the figure “A typical SFP optical module” (page 468) and corrected the orientation of an SFP module in the figure, “Orientation to install an SFP module in an NTHW49” (page 469) which was renamed from figure “Installing an SFP module”
 - added to the procedure “Removing an SFP optical module” (page 612) the figures “A typical SFP optical module” (page 613) and “Orientation of an installed SFP module in an NTHW49” (page 614)
- clarified that the procedure “Installing extended cable management brackets” (page 479) applies only to electrical FPs with coax cables

- added the procedure “Installing high-density cable management brackets” (page 495)
- replaced the figure “Location of front, rear, and side panels, exploded view” with “Locations of front and rear frame panels, exploded view” (page 620) in the procedure “Removing front or rear frame panels” (page 619)
- added the figure “Side panels, exploded view” (page 581) to the procedure “Removing a side frame panel” (page 580)
- added the procedure “Removing a shelf filler panel” (page 577)
- added the procedure “Removing a side frame panel” (page 580) in context of accessing cables on the side of a NEBS 2000 frame, or to replace a damaged one
- added dust boots to the procedure “Removing an FP” (page 604) and added the figure “Fully opened card latches” (page 608)
- deleted the step to power down a cooling unit in the procedure “Replacing a cooling unit alarm cable” (page 631)
- updated the Prerequisites of the procedure “Routing FP cables” (page 666) to clarify the cable management criteria for the direction of electrical and optical cables
- revised the procedure “Routing FP cables” (page 666) to accommodate labels, all cables of an FP, and all FPs in a shelf

16-port OC-3/STM-1 POS and ATM FP with PEC NTHW44

The function processor (FP) 16-port OC-3/STM-1 packet over SONET (POS) and asynchronous transfer mode (ATM) is added to the list of available Passport 15000 or 20000 FPs. These changes were made to this document:

- added the section “SFP optical module cleaning” (page 52) as a best practice
- added the procedure “Cleaning an SFP optical module” (page 236)
- updated the Prerequisites to the procedure “Connecting an FP cable” (page 273)

- updated the table “Actions to engage types of FP connectors” (page 277) to add handling an SFP module and to clarify plugging LC connectors into an SFP
- updated the procedure “Installing an SFP optical module” (page 466) to include the SFP module PECs and improve the installation steps
- added what to do with SFP modules in the procedures “Removing an FP” (page 604) and “Removing an FP cable” (page 609)
- updated the procedure “Removing an SFP optical module” (page 612)

An additional version of the lower and upper cooling units

An additional version of the lower (rear) and upper (front) cooling units is available. The following are updated to distinguish one from the other:

- added new cooling units and replacement parts to these tasks and procedures:
 - “Cooling unit replacement” (page 86)
 - “Fan controller replacement” (page 88)
 - “Fan replacement” (page 90)
 - “Temperature sensor replacement” (page 92)
 - “Temperature sensor bracket assembly replacement” (page 95)
 - “Task flow of a shelf assembly replacement” (page 178)
- changed the headings of procedures for the cooling units and their replacement parts in these task flows, and added procedures that were missing:
 - “Installation of a second switch in a NEBS 2000 frame” (page 118)
 - “Passport 15000 or 20000 switch installation into an EIA rack” (page 134)
- added new cooling units and replacement parts to these procedures:
 - “Connecting a temperature sensor cable assembly” (page 265)
 - “Installing a fan” (page 355)
 - “Installing a fan controller” (page 361)

- “Installing a lower cooling unit” (page 377)
- “Installing a shelf-based cooling unit” (page 418)
- “Installing a temperature sensor bracket assembly” (page 435)
- “Installing a temperature sensor for an upper cooling unit” (page 441)
- “Installing a temperature sensor inside a lower cooling unit” (page 445)
- “Installing an upper cooling unit” (page 470)
- “Removing a fan” (page 544)
- “Removing a fan controller” (page 549)
- “Removing a lower cooling unit” (page 559)
- “Removing a temperature sensor bracket assembly” (page 584)
- “Removing a temperature sensor for an upper cooling unit” (page 587)
- “Removing a temperature sensor from a lower cooling unit” (page 591)
- “Removing an upper cooling unit” (page 615)
- “Replacing a cooling unit alarm cable” (page 631)
- “Replacing a cooling unit power cable” (page 633)

Related documents

See the following documents for related information:

- 241-1501-200 *Passport 15000, 20000 Hardware*, which indicates the integrated purpose and operational behavior of switch hardware and all supported interworking hardware
- 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*, which specifies all requirements, recommendations, and considerations for planning the installation of all hardware associated with a Passport

- 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting*, which contains test descriptions and verification procedures
- 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*, which contains software tasks and procedures used by hardware tasks
- 241-5701-615 *Passport 7400, 15000, 20000 FP Configuration Reference*, which contains the descriptions and capabilities of each type of function processor (FP) card
- If you received an MFA150 system of ac rectifiers, the document 167-9021-133 *Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual* is included in the shipping container or provided from Astec Advanced Power Systems.
- If you received a Shasta 5000 switch in package NTHW85, the document S-623-01 *Shasta 5000 BSN Installation and Maintenance Manual* is included to complete the installation of the Shasta 5000 (for example, installing cards and cables, power and alarm cabling, and powering up) and to operate it.
- If you received an EdgeLink DS3 mux, the document *EdgeLink 100 Digital Multiplexer General Description*, section 825-102-001 is included in the shipping container or provided from Telco Systems.

How to get more help

For information on training, problem reporting, and technical support, see the “Nortel Networks support services” section in the *product overview document*.

Chapter 1

Overview of hardware tasks

The tasks in this book are organized under the following hardware subjects:

- “Alarm/BITS module” (page 61)
- “Alarm hardware” (page 57)
- “Control processors” (page 81)
- “Cooling units” (page 85)
- “Fabrics” (page 97)
- “Function processors” (page 101)
- “Initial installations” (page 117)
- “MAC address module” (page 139)
- “Peripheral equipment” (page 143)
- “Power-and-ground hardware of a Passport 15000 or 20000” (page 153)
- “CP and FP cables” (page 71)
- “Shelf assembly” (page 175)
- “Sparing and fanout panels” (page 181)

For a view of installed hardware parts, see the figures:

- “Overview of Passport 15000 or 20000 hardware, front view” (page 38)
- “Overview of Passport 15000 or 20000 hardware, rear view” (page 39)

Figure 1
Overview of Passport 15000 or 20000 hardware, front view

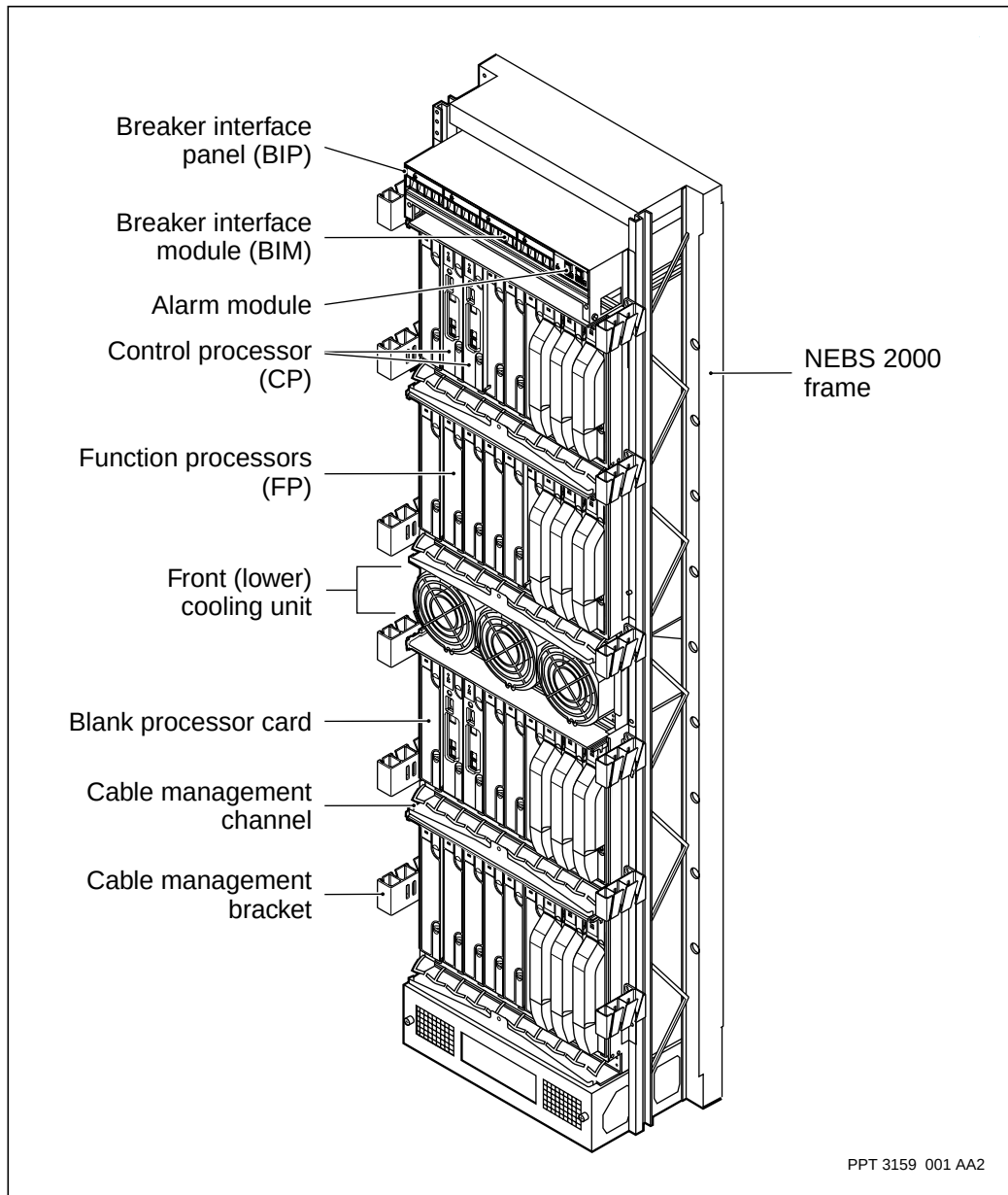
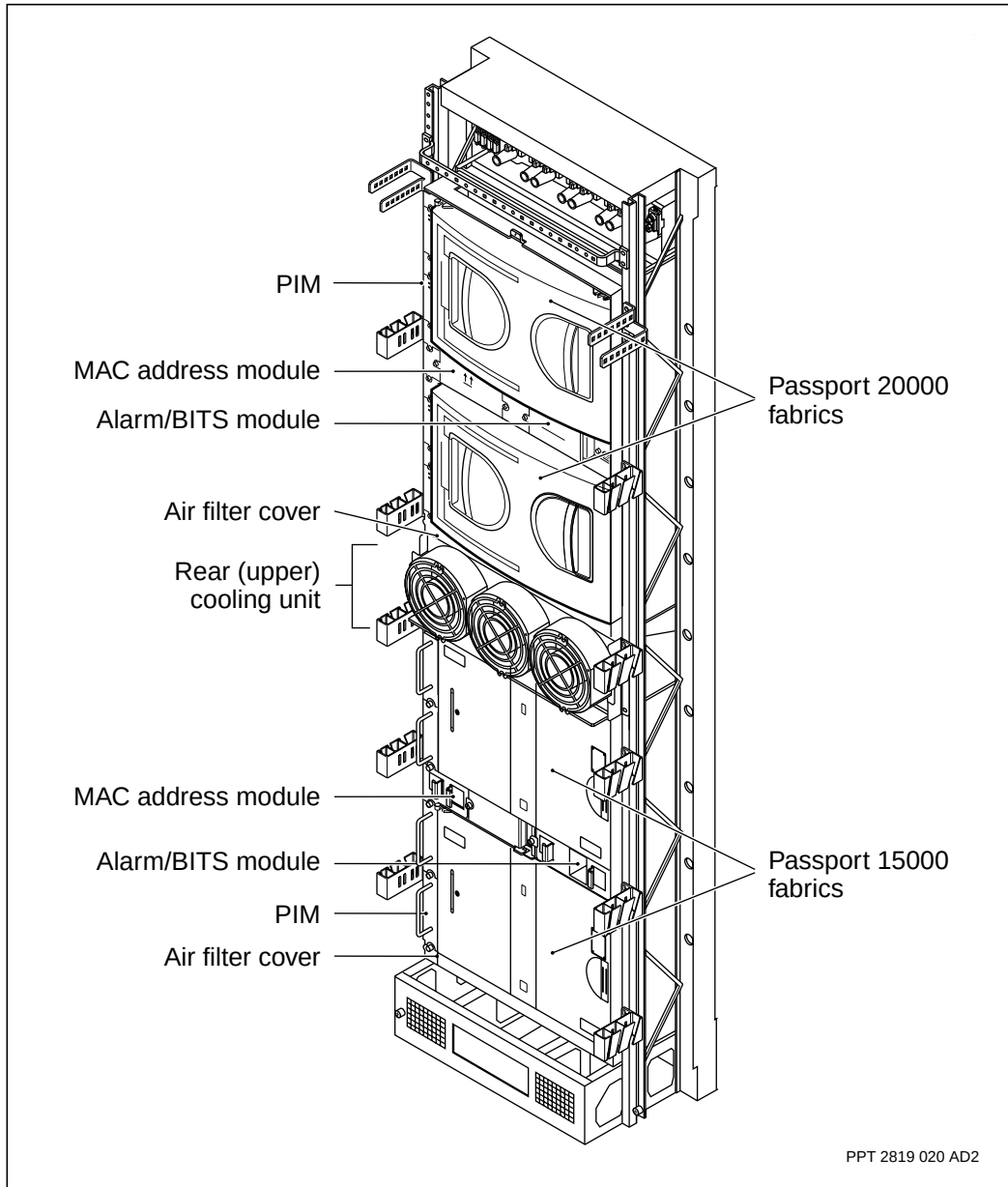


Figure 2
Overview of Passport 15000 or 20000 hardware, rear view



Chapter 2

Safety considerations and best practices

You must be familiar with all of the safety considerations and best practices before attempting the tasks included in this document:

- “Risk of personal injury” (page 42)
- “Risk of service loss” (page 44)
- “Risk of equipment damage” (page 45)
- “Avoiding damage from ESD” (page 47)
- “Choosing slots for FPs” (page 49)
- “Equipment maintenance” (page 51)
- “Handling cables” (page 54)
- “Hot-swapping hardware parts” (page 55)
- “Packing and unpacking a processor card or module” (page 55)
- “Processor card compatibility” (page 55)

Risk of personal injury

The following items provide an overview of common personal safety considerations when working with a Passport switch.



WARNING

Risk of injury by fan blades

While working on any equipment near cooling unit fans, be continuously aware that the rpm of a live fan can suck loose clothing, hair, or jewelry into the fan blades or amputate a finger. Do not touch a rotating fan with anything.



WARNUNG

Verletzungsgefahr durch Lüfterblätter

Beim Arbeiten in der Nähe der Lüfter des Kühlaggregats besteht die Gefahr, daß ein rotierender Lüfter lose Kleidung, Haare oder Schmuck in die Lüfterblätter saugt oder einen Finger abtrennt. Berühren Sie einen Lüfter niemals, weder direkt noch indirekt.



WARNING

Risk of injury when handling a frame

Never place a foot or a hand under any part of the frame while it is being tilted or moved. Always move it with three or four people. The weight of a shipped frame with one Passport 15000 or 20000 is approximately 419 kg (926 lbs); with two switches the weight is approximately 612 kg (1,344 lbs). For additional protection, wear safety boots with steel toes.

**WARNUNG****Verletzungsgefahr beim Gestelltransport**

Stellen Sie niemals einen Fuß unter das Gestell, wenn dieses bewegt oder gekippt wird, und greifen Sie nicht unter das Gestell. Die Einheit muß mit vier Personen von der Transportpalette genommen werden. Ein Gestell wiegt mit einem Passport 15000 or 20000 ca. 420 kg, mit zwei Passport-Einheiten ca. 610 kg. Tragen Sie zu Ihrem zusätzlichen Schutz Sicherheitsschuhe mit Stahlkappen.

**WARNING****Risk of eye injury by laser**

Never look directly into the end of a fiber cable, let an end pass in front of your eyes, or use an optical device to look at the end of an optical fiber unless you are certain the other end is not connected. The LASER travelling through a fiber cable can injure the human retina.

**WARNUNG****Gefahr von Augenverletzungen durch Laserstrahlen**

Blicken Sie nie direkt auf das Ende eines Glasfaserkabels, und überprüfen Sie auch einzelne Faserenden nicht mit einem optischen Gerät, wenn Sie nicht sicher sind, daß das andere Kabelende nicht angeschlossen ist. Der über die Glasfasern übertragene Laser kann die menschliche Netzhaut verletzen.

**WARNING****Risk of injury or damage by electricity**

When switching off power breakers on a breaker interface module (BIM) or in the circuit up to it, or removing a fuse from the circuit up to it, always put tape over the breaker or fuse cavity. The tape indicates it was manually switched off, and not tripped by the system. This prevents accidental activation of the power circuit, especially if power cables are being handled.

**WARNUNG****Schäden oder Verletzungen durch Elektrizität**

Wenn die Leistungstrennschalter an einem Trennschalterkopplungsmodul (BIM) oder im zuführenden Stromkreis geöffnet bzw. Sicherungen aus dem Stromkreis entfernt werden, decken Sie den Trennschalter oder den Sicherungssteckplatz mit Klebeband ab. Das Klebeband signalisiert, daß er/sie manuell ausgeschaltet und nicht vom System ausgelöst wurde. Damit verhindern Sie eine versehentliche Aktivierung der Stromversorgung, besonders beim Hantieren mit Netzkabeln.

- Passport hardware parts can be unexpectedly heavy and awkward to install. Personal injury or equipment damage can occur if the equipment is dropped or bumped.

Risk of service loss

The following items provide an overview of common service loss risks when working with a Passport switch:

- If a card is moved between rooms with very different levels of temperature and humidity, allow the card to acclimatize for at least one hour before installation. Condensation on a card can cause card failure.
- Unspared FPs, including FPs configured with intra-card LAPS (port-to-port sparing on a single FP), will experience a loss of service on any active ports for the time it takes to replace the FP.
- Whenever you install an FP that uses a control cable, in a sparing configuration, you must always insert the FP into a slot on the shelf before you connect the control cable. If you connect the control cable between the FP and the termination or sparing panel before you insert the FP in the shelf, you can disrupt service to the other FP(s) in the sparing configuration.
- Before seating an FP in its slot or removing it from the slot, ensure that the cables on the faceplate are disconnected. Otherwise seating a cabled FP may cause a traffic loss on the active FP.

Risk of equipment damage

This section provides an overview of common equipment damage risks when working with a Passport switch.

- When an FP receives a LASER signal that exceeds its range of receive sensitivity, the FP can be damaged or fail. The ranges for transmit and receive are not always the same on an optical FP. Always check whether each FP signaling connection requires an attenuator.
- The protection covers on fabric cards are to prevent accidental bending of any connector pins. Once a cover is removed, ensure that nothing contacts the rows of exposed pins. Use the procedure “Checking the backplane pins” (page 216) to ensure there are no bent pins on the backplane of the Passport 15000.
- Where compliance with local electrical specifications, guidelines, or standards conflicts with a Nortel Networks procedure, contact your Nortel Networks service representative.
- Power cycling the breakers can be done on a Passport 15000 or 20000 without damaging equipment. Power cycling can cause a loss of switch traffic depending on the hardware and software configurations for redundancy and on the amount of traffic throughput as each breaker is toggled.

Fastening screws to a frame or rack

When fastening screws for the first time into the front surface of the vertical uprights of a NEBS 2000 frame or a mounting apparatus that requires self-tapping (thread-forming) screws, ensure the flat-tipped screw is perpendicular to the hole. On the uprights of a NEBS 2000 frame, dimples in the silvery grounding strip indicate where the unthreaded screw holes are located. To see dimples, run and press your finger along the strip. When turning a thread-forming (self-tapping) screw into a dimple for the first time, exert enough force to puncture the strip.

When fastening screws back into threaded holes, especially in the front surface of a frame upright, fully seat the fastener threads perpendicularly in the hole before turning it. The tapered tip of the fastener should allow you to gently start threading by using your fingers.

Unless otherwise specified, all screws are unfastened counter-clockwise and fastened clockwise. Some screws require a hand tool to fasten or unfasten them (for example, an air filter cover).

**CAUTION****Risk of equipment damage and service loss**

Do not use any kind of power tool on a captive screw. The screw is necessary to keep the card, module, or cover properly seated. If the screw is overtightened (stripping it or its hole), the hardware cannot operate correctly.

Fastening captive screws

Most screws on Passport 15000 or 20000 plug-in field replaceable units (FRUs) or service replaceable units (SRUs) are captive. A captive fastener means the fastener stays attached to the unit after it is unfastened.

Do not use any kind of power tool on a captive screw. The screw is necessary to keep the card, module, or cover properly seated. If the screw is overtightened by stripping it or its hole:

- the hardware assembly that accommodates the unit will need to be replaced (for example, a cooling unit for a fan controller or a BIP for a BIM)
- the unit with the captive screw will need to be replaced (for example, a fabric for its cover)
- if the unit or what it fastens to is not replaced, the hardware will not likely operate correctly (for example, the reset button on a Passport 20000 fabric would not be engaged) and EMI containment is jeopardized

Fastening termination panels

When fastening a fanout panel or a sparing panel to a Passport 7400 cabinet, you will need EIA screws instead of the 10-mm (3/8-inch) screws that were provided with the sparing panel.

When fastening a Passport 15000 or 20000 fanout panel or sparing panel to a Passport 7400 cabinet (for example, an NTQS31), you must ground the panel by fastening a No. 6 AWG (13.3 mm²) cable between the screw head and the

mounting ear, and at the designated grounding points on the cabinet uprights. Ensure that the grounding point is a bare, clean bond and that the ground window is shared by the Passport to which the sparing panel is connected.

Avoiding damage from ESD

Electrostatic discharge (ESD) is a discharge of stored static electricity that can damage equipment and impair electrical circuitry. ESD damage can cause complete or intermittent failure of electronic components. The transfer of ESD occurs when any hardware part is handled by a person who is not protected from ESD. When the part has electronic components, it can be damaged by the ESD transfer. When the part has no electronic components, installing it into other hardware will transfer the ESD it carries to the ESD-sensitive hardware that is already present.

Handling processor cables for a CP or an FP can also transfer ESD, even when the cable itself is not electrically conductive. For example, connecting a fiber optic cable to an FP faceplate connector or a small-form pluggable (SFP) module can enable the ESD from yourself to transfer to the part you are plugging into.



CAUTION

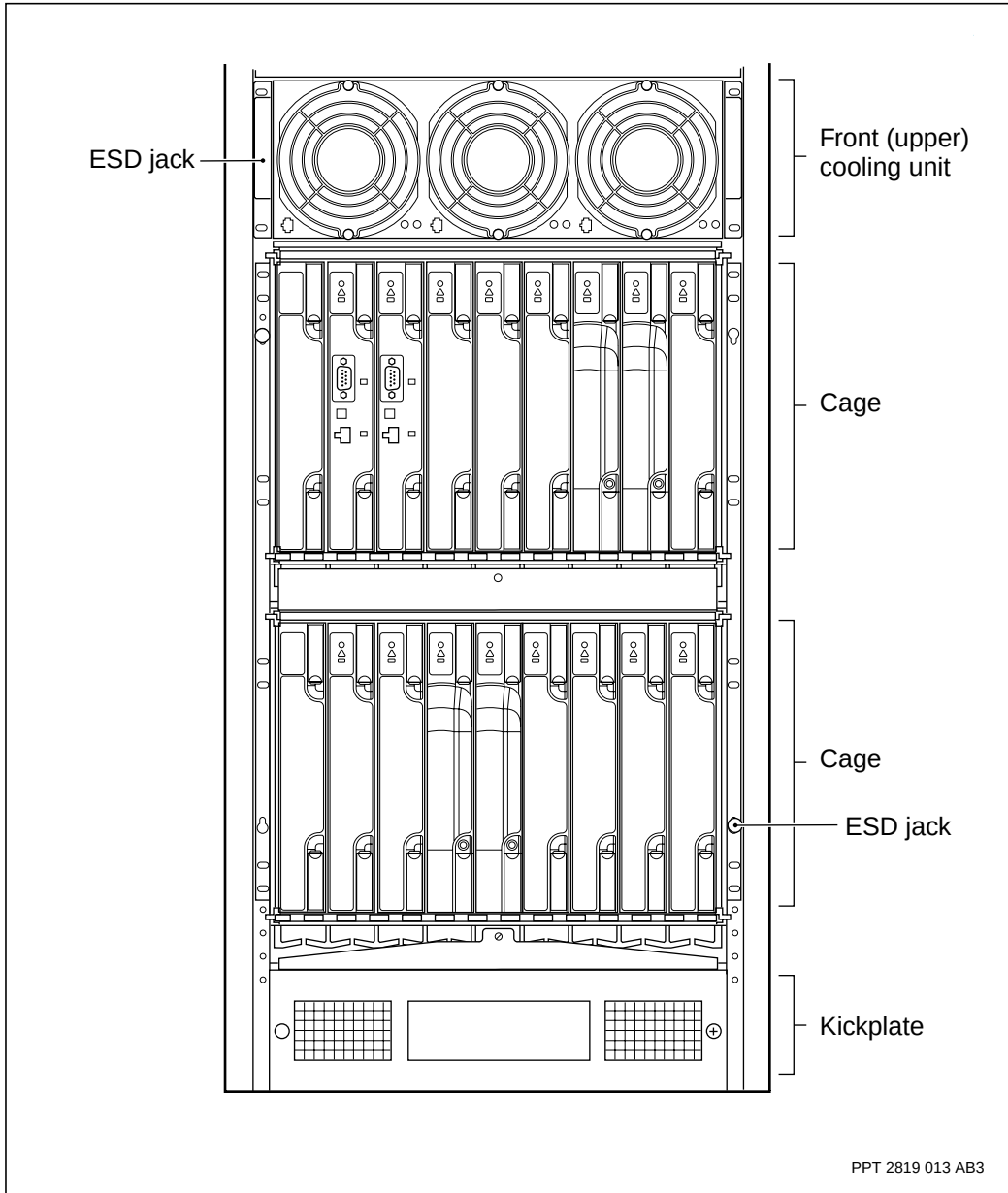
Risk of equipment damage by ESD

Always ground yourself by an approved anti-ESD method before and while handling any tools or hardware on or near the switch. You can plug the provided wrist strap (part number A0378999) into an anti-ESD jack on the lower left mounting ear of either cooling unit (row of fans) of a Passport 15000 or 20000.

When handling any part of a Passport, including parts with or without electronic components, at least wear a wrist strap (part number A0378999). Nortel Networks recommends also using conductive carpet, conductive shoes, and heel grounders in the room where the equipment is anchored.

See the figure “Location of ESD jacks, front lower (shown) or upper shelf” (page 48).

Figure 3
Location of ESD jacks, front lower (shown) or upper shelf



Choosing slots for FPs

Determine whether a site record already specifies the slot number of each type and version of FP for each Passport 15000 or 20000 switch. Otherwise, consider the following criteria for choosing the slots for FPs before installing the FPs.

- FPs are installed in slots 1 to 15. Slot 1 can accommodate either the second CP for redundant (backup) operation or an FP.
- Record the position of each card in your site records by including the location of the switch, switch identifier, slot number, the FP type as indicated on the faceplate of the FP itself, and the PEC with vintage.
- When combining DS3 or E3, and OC-n or STM-n FPs, consider separating them into separate cages of the same switch. If they can not be separated, install blank processor cards (NTHR64) in any empty slots between them.
- Since the electrical current from power cables can interfere with the transmission of signals over coax cable, route coax cables to the right side of the frame (facing the front) opposite where the power cables can be when routed under the floor.
- If equipment sparing of optical cards is planned but not being implemented, install FPs into even-numbered slots first. If equipment sparing of optical cards is being implemented, install the main FP into an even-numbered slot other than slot 0 and the spare FP in the adjacent slot with the next higher number. For more information about main FPs, refer to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.)
- Dual-FP line automatic protection switching (LAPS) protects both the external line and equipment from failure. To use the LAPS functionality, spared FPs need to be installed in adjacent slots.
- For a Passport that combines sparing of optical cards with one-for-n (1:n) sparing of electrical cards, select the slots for all the main and spare optical cards first. Then use the remaining slots to provide one-for-n sparing of the electrical cards. This ensures that the electrical cards do not occupy slots that are needed to provide optical card sparing.

- Providing PVG with hot equipment protection (HEP) requires a configuration with a Hot 1 + 1 standby OC-3 STM-1 TDM FP, a Hot 1+1 standby VSP FP, and a Hot 1 + 1 standby ATM FP. Providing hitless software migration for PVG services requires all the cards involved in a call (OC-3 STM-1 TDM FP, VSP FP, and ATM FP) to support this feature, including the mechanisms for synchronizing the call states between cards across the fabric interface. HSM and HEP as defined here apply to PVG services supported by cards in the same shelf.
- A VSP3 card can spare up to nn cards in the same Passport 15000 or 20000 shelf, where nn is 14 FP slots minus however many TDM cards share the shelf, and the far-end supports sparing that many VSP3s. At least one TDM card is required to operate with the VSP3s to enable PVG. The number of TDM cards varies according to the capacities you choose. Consider how to group the VSP3s in paired slots. For more information on the sparing setup of VSP3 cards, see 241-1501-200 *Passport 15000, 20000 Hardware*.
- Keep all fiber optical (OC-n or STM-n) and electrical (DSn or En) FPs grouped together (for example, all OC-3/STM-1s grouped beside all OC-12c/STM-4s and separate from DS3s).
- Add DS3 or E3s starting at the right side of a cage so that coax cables are routed to the right side of the frame, that is, to the side that is opposite the input power cables. If the power cables are fastened to the side of the frame from the floor up to the BIP, and coax cables are fastened to the cable management brackets next to the power cables, the EMI from the power cables will interfere with signals on the coax cables.

Note: The power input cables do not interfere with the signals on fiber cables.

- Since fiber cables are to be routed to the left side of the switch and since the optional extended cable management brackets accommodate up to 7 FPs, reserve slot 8 for the OC-n or STM-n card from the network; the extended brackets are intended mostly for the density of mini-coax cables from DS3s or E3s and it is assumed that a switch will have at least one OC-n or STM-n card when provisioning with DS3s or E3s.
- Add OC-n or STM-n cards starting at the left side of a cage, keeping similar cards grouped together (for example, OC-48/STM-16s and OC-12/STM-4s are in separate groups).

- Decide which slot in the cage is to house the spare (redundant) FP for the other FPs in that cage. To support sparing, optical FPs must be paired (for example, slot 4 to slot 5, slot 6 to slot 7, etc.).
- For a Passport 20000, consider that slots 6, 7, 14, and 15 can each contain a 10 Gbit/s FP when the cards become available, or a 2.5 Gbit/s FP now.

Equipment maintenance

See the following sections for an overview of common maintenance tasks:

- “Air filter replacement” (page 51)
- “Vacuuming equipment” (page 52)
- “Fiber cable cleaning” (page 52)
- “SFP optical module cleaning” (page 52)
- “Monitoring equipment status LEDs” (page 53)
- “Storing and transporting circuit cards” (page 53)-

Air filter replacement

The air filter must be replaced every 3 months or according to the effects of your local environmental conditions. The rate of airflow with a Passport 15000 or 20000 switch is different than other products, and the lower air filter is likely to need replacement more often than the upper filter.

A clogged air filter may cause alarm 7002 0003. It is recommended you periodically check the air filters to establish a routine replacement rather than depend on the alarm.

Never re-use an air filter because its effectiveness is reduced regardless of the method of cleaning it.

Use the procedure “Replacing an air filter” (page 644) as a part of regular Passport maintenance.

Vacuuming equipment

Vacuum your equipment periodically to reduce the frequency of replacing the air filter of a Passport 15000 or 20000. You must determine your own period of vacuuming equipment based on the environmental conditions surrounding your equipment.

Use the procedure “Vacuuming equipment” (page 699), which includes the criteria for specific vacuum equipment.

Fiber cable cleaning

Cleaning the ends of optical fiber cables is necessary to maintain optimum connectivity between the end of a fiber cable and its connection. Dirt in an alignment sleeve, along the side of a ferrule, in an adaptor sleeve, or in a transceiver bore can cause a misalignment of the optical fiber. Dirt on the endface of a ferrule can damage the optical fiber or cause a non-contacting connection.

Use the following procedures to clean fiber cables to maintain optimum connectivity:

- “Cleaning LC or SC connectors” (page 240)
- “Cleaning MT-RJ connectors” (page 245)
- “Cleaning the bore of a transceiver” (page 248)

SFP optical module cleaning

Cleaning a small-form pluggable (SFP) optical transceiver module is necessary to maintain optimum connectivity between the FP socket (port) and its interfacing fiber cable. Ensure that an SFP optical module is clean each time you are about to insert it into an optical module socket on the faceplate of an FP.

When you store an SFP for re-use, keep it in a container that prevents contamination by dust, moisture, and electrostatic discharge (ESD).

Use the procedure “Cleaning an SFP optical module” (page 236) as required.

Monitoring equipment status LEDs

Plug-in Passport processor cards (and some Passport 15000 or 20000 plug-in modules) and screw-on peripheral equipment such as sparing panels have lit colored LEDs to indicate operational status. Some control processor (CP) cards and function processor (FP) cards have additional LEDs to indicate the operational status of specific ports on their faceplates. Not all hardware parts have the same number, combination, or orientation of LEDs. The pattern of LED behavior can be different for each type of hardware part when you

- initially install each plug-in part while the system is under power but not yet in service
- add a card or module to an in-service switch
- remove a card, cable, module, or other equipment from an

When handling equipment, be familiar with the behavior of the LEDs for each hardware part as described in the chapter on using status indicator LEDs and sounds in 241-1501-200 *Passport 15000, 20000 Hardware*. Knowing what each LED pattern is supposed to be will enable you to know when there is a problem with newly installed equipment. For example, a red LED can be transitory and does not necessarily mean a failure has occurred.

Storing and transporting circuit cards

Care is required to store or transport circuit cards or modules.

Store each card or module in its own antistatic material and transportation package to avoid physical or ESD damage or the accumulation of dust on contacts. Be careful not to bump the card or module while packaging it.

Store packaged cards or modules in areas where the relative humidity is less than 95% and the temperature is less than 70 degrees Celsius (158 degrees Fahrenheit). This significantly reduces the chances of warping the circuit board and corrosion of electrical contacts. The nominal storage humidity is 55% and the nominal storage temperature is 20 degrees Celsius (68 degrees Fahrenheit).

Handling cables

See the following sections for information about handling power and processor card cables:

- “Power cables” (page 54)
- “Processor card cables” (page 54)

Power cables

A Passport 15000 or 20000 requires input power cables that are installed on the site up to where the mounting apparatus of the switch will be anchored. Planning and installing the power cables in readiness for connecting to the breaker interface panel (BIP) after the NEBS 2000 frame is anchored is typically done during the site preparation for the installation. The cables that distribute power from the input feeds at the BIP to hardware parts in the frame are pre-installed at the time the frame is shipped. The power distribution cables for a second switch are provided even if the second one is not yet installed.

Mount the power cables against the NEBS 2000 frame in bundles on different paths than the signaling cables from the front of the switch. The current from power cables can interfere with the transmission of signals over coax. Route power cables at the rear of the frame.

When routing the power cables, keep the battery return (positive) and battery (negative) cable pairs together. Otherwise, the cables can behave like antennas that transmit electromagnetic interference (EMI).

See 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* for information about routing power cables to the Passport.

Processor card cables

Keep FPs that use coax cables on the opposite side of the shelf from FPs that use fiber cables. Mixing FP cable types can cause entangled cables, affect signal quality, and may cause service failure. Keep coax cable clusters separate from power cables to avoid interference.

Hot-swapping hardware parts

Most Passport 15000 or 20000 powered components are hot-swappable, which means a plug-in card or module can be replaced while it is powered. No physical damage is caused by the removal or the insertion. The impact of hot-swapping on traffic is determined by the preparation you are instructed to do in software according to the part's replacement procedure.

With the power interface modules (PIMs) that distribute power from the BIP to the shelves, each module must be unplugged before it can be removed. This is a personal safety action because of the amount of voltage that feeds each PIM. Since each cage of a shelf has a pair of redundant PIMs, unplugging one does not affect power to the cage.

Although a fan must be unplugged before removing it to replace it or to access its controller, it is considered hot-swappable because the power to the cooling unit remains on.

Packing and unpacking a processor card or module

Use the procedure “Unpacking a processor card or module” (page 696) for a new or re-deployed card immediately prior to the installation procedure, or to verify a shipment. If you unpack to verify a shipment, always re-pack the item. Repackaging protects the item, especially from ESD.

Use the procedure “Packing a processor card or module” (page 518) for a failed or re-deployed card immediately following a removal procedure.

Processor card compatibility

When choosing a processor card to replace, upgrade, or downgrade another card in a slot, the card (new or redeployed) must have a compatible or equivalent product engineering code (PEC). In general, for control processors (CPs) to be considered compatible, all eight alphanumerical characters of the PECs must match. For function processors (FPs) to be considered compatible, the first six alphanumerical characters of the PECs must match.

A compatible card or module

- has a PEC with the same first six alphanumerical characters

- typically has more or less functionality distinguished by version increments (for example, an AB card can have more capacity than its AA version)
- usually can be replaced only one way, that is, from an older to a newer vintage (for example, AA to AB) or lower to higher performance specifications (for example, AA to CA), especially if the card slot requires additional software configuration for optimum operation

An equivalent card

- has the same root PEC or a different PEC with the same card type
- supports the same features and services
- operates at different rates of performance
- usually can be replaced either way, that is, interchanged in the same slot without a decrease in services or functionality

The 241-5701-615 *Passport 7400, 15000, 20000 FP Configuration Reference* identifies for each card type the compatible and equivalent FPs that can be used to replace the FP with the same or increased functionality.

Processor cards also have minimum software requirements. For FP minimum software requirements, see 241-5701-615 *Passport 7400, 15000, 20000 FP Configuration Reference*. For CP minimum software requirements, see 241-1501-200 *Passport 15000, 20000 Hardware*.

If you are in doubt about the compatibility or equivalence of your replacement card, contact your Nortel Networks sales or support representative for assistance. If you must use a card with a different card type or an earlier vintage as a temporary replacement, you must consult Nortel Networks to understand the consequences of the deficiency.

In Passport documentation, downgrading a card slot by replacing the card with one of less or different capabilities is treated as a redeployment that involves decommissioning an FP and configuring or re-configuring an empty slot.

The same applies to the rear plug-in modules of a Passport 15000 or 20000, except that modules do not have configurable software.

Chapter 3

Alarm hardware

Select from the following tasks and procedures:

- “BIP alarm module replacement” (page 58)
- “BIP external alarm cable replacement” (page 59)
- “Installing a BIP external alarm cable” (page 327)

BIP alarm module replacement

Replace a BIP alarm module if it fails.

- “Prerequisites to BIP alarm module replacement” (page 58)
- “BIP alarm module replacement task flow” (page 58)

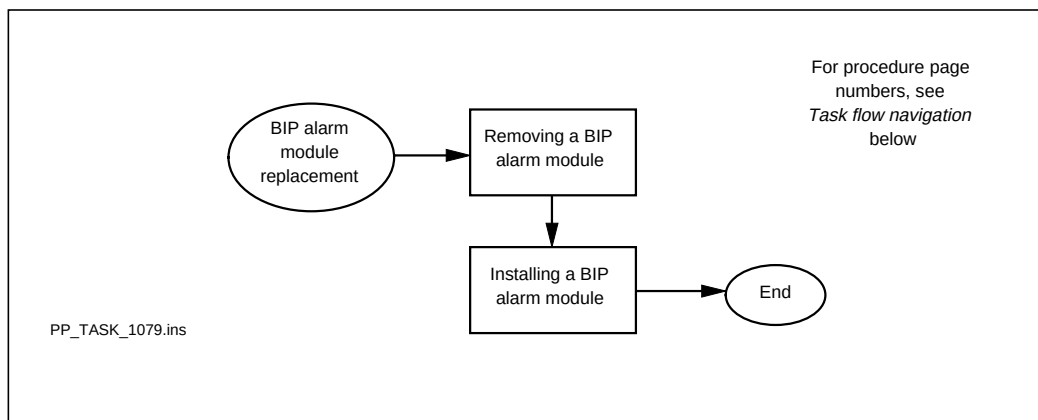
Prerequisites to BIP alarm module replacement

- While the BIP alarm module is removed, the reporting of alarms to the CP are temporarily suspended.

BIP alarm module replacement task flow

This task flow shows the sequence of procedures you do to replace a BIP alarm module in your Passport switch. To link to any procedure, go to “Task flow navigation” (page 58).

Figure 4
Task flow of a BIP alarm module replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a BIP alarm module” (page 326)
- “Removing a BIP alarm module” (page 532)

BIP external alarm cable replacement

Replace an external alarm cable that runs from the BIP to a piece of customer to set up external alarm reporting. You can also use this task flow for an alarm cable installation.

- “Prerequisites to BIP external alarm cable replacement” (page 59)
- “BIP external alarm cable replacement task flow” (page 59)

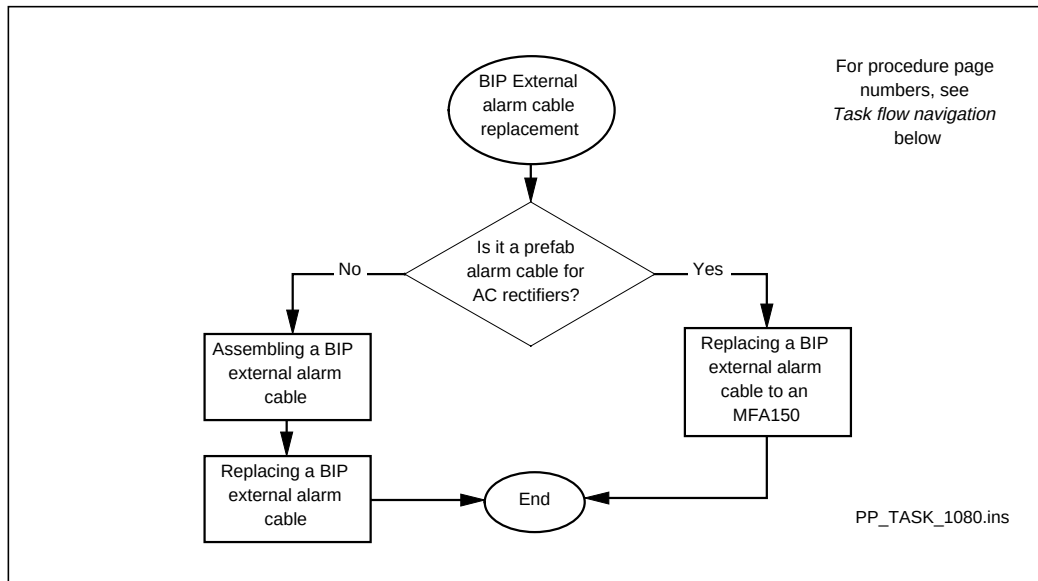
Prerequisites to BIP external alarm cable replacement

- You must assemble your own cable to replace an external alarm cable. If the BIP is powered by an MFA150 system of ac rectifiers, the external alarm cable may be prefabricated and can be ordered as a field replaceable unit with part number P0940531.
- For a complete list of BIP alarm connections and their features, refer to 241-1501-200 *Passport 15000, 20000 Hardware*.

BIP external alarm cable replacement task flow

This task flow shows the sequence of procedures you do to install or replace an external alarm cable in your Passport switch. To link to any procedure, go to “Task flow navigation” (page 60).

Figure 5
Task flow of a BIP external alarm cable installation



Task flow navigation

The following references are listed alphabetically:

- “Assembling a BIP external alarm cable” (page 195)
- “Replacing a BIP external alarm cable” (page 623)
- “Replacing a BIP external alarm cable to an MFA150” (page 625)

Chapter 4

Alarm/BITS module

Select from the following tasks and procedures:

- “Alarm/BITS module replacement” (page 62)
- “Timing cable installation” (page 65)
- “Timing cable replacement” (page 68)
- “Replacing an alarm cable assembly to the alarm/BITS module” (page 648)

Alarm/BITS module replacement

Replace an alarm/BITS module to restore monitoring for alarms and sending the building integrated timing supply (BITS) signal to the CPs. Do not replace an alarm/BITS module on a Passport 15000 without first contacting Nortel Networks technical support.

- “Prerequisites to alarm/BITS module replacement” (page 62)
- “Alarm/BITS module replacement task flow” (page 62)

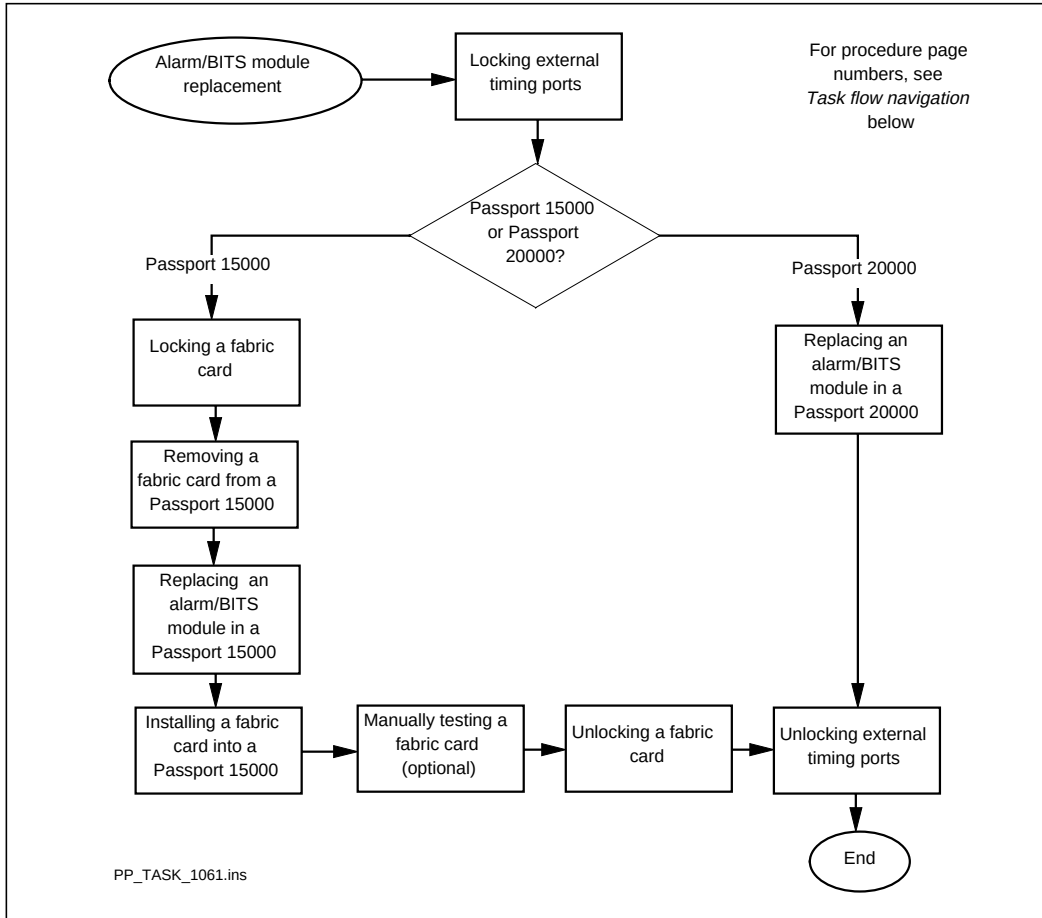
Prerequisites to alarm/BITS module replacement

- Some of the procedures in this task are not located in this NTP. Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* and 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting*.
- The task of replacing an alarm/BITS module is different for Passport 15000 and Passport 20000. Passport 15000 requires that you remove the top fabric card (fabric X) to allow you to properly align the connectors of the replacement alarm/BITS module.
- The name of a Passport 15000 or 20000 is identified on the front of the switch hardware. The front of an older Passport 15000 is blank.
- Following the replacement, have the software operator restore the former timing setup and verify that the network synchronized timing is restarted.
- While the alarm/BITS module has failed or is removed, there is no:
 - BITS timing signal sent to the control processors (CPs)
 - reporting of fabric LED status to the software
 - reporting of any cooling unit alarms to the CPs
 - reporting of any CP alarms to the breaker interface panel (BIP)

Alarm/BITS module replacement task flow

This task flow shows the sequence of procedures and tasks to replace an alarm/BITS module in your Passport 15000 or 20000 switch. To link to any procedure or task, go to “Task flow navigation” (page 63).

Figure 6
Task flow of an alarm/BITS module replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a fabric card into a Passport 15000” (page 344)
- “Locking a fabric card”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Locking external timing ports” See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*

- “Manually testing a fabric card”. See 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting*.
- “Removing a fabric card from a Passport 15000” (page 539)
- “Replacing the alarm/BITS module in a Passport 15000” (page 653)
- “Replacing the alarm/BITS module in a Passport 20000” (page 658)
- “Unlocking a fabric card”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Unlocking external timing ports” See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Timing cable installation

Install the required timing cables after initial installation to enable external timing functionality on a Passport 15000 or 20000.

- “Prerequisites to timing cable installation” (page 65)
- “Timing cable installation task flow” (page 65)

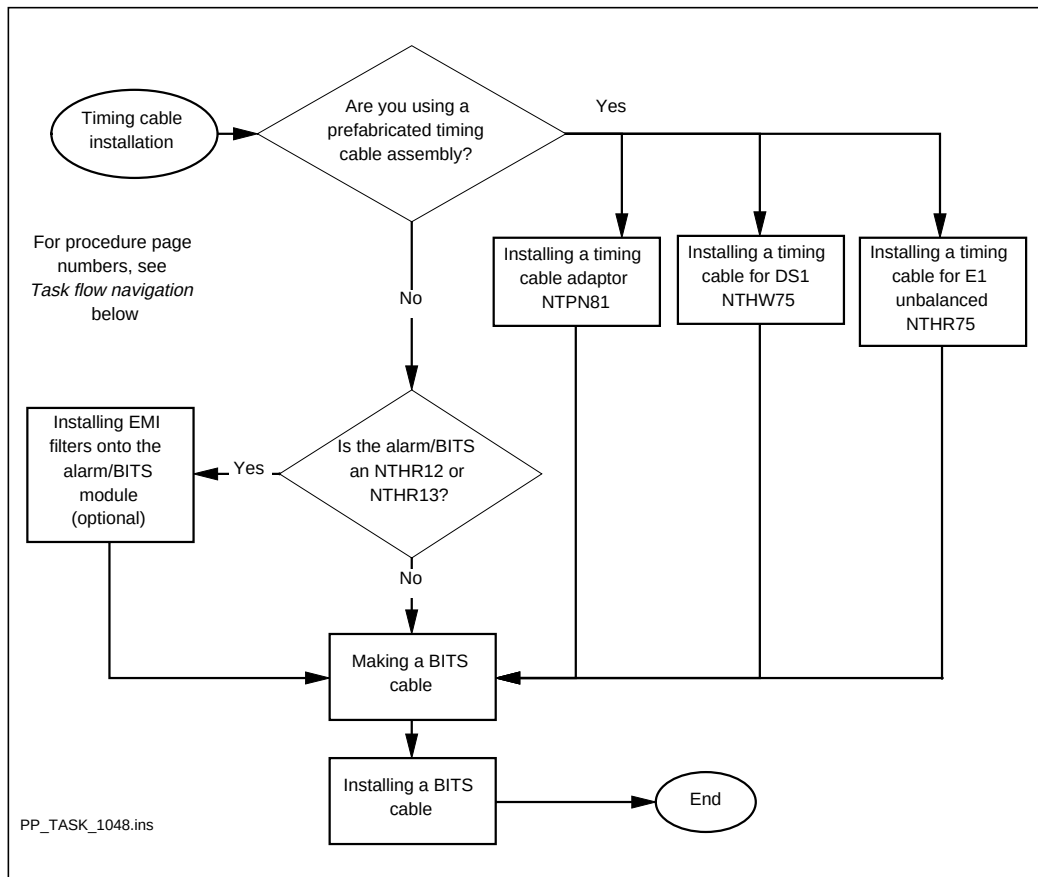
Prerequisites to timing cable installation

- A timing cable refers to the cable that runs from the external timing source to the alarm/BITS module or to one of the prefabricated cable assemblies connected to the module.
- Your choices for timing cable installation include:
 - two pairs of wires from the site BITS source, one pair to each connector on the alarm/BITS module, providing full redundancy
 - one pair of wires from the site BITS source split to each connector on the alarm/BITS module, providing redundancy only inside the switch
 - one pair of wires from the site BITS source to one connector on the alarm/BITS module, providing no redundancy
- You need one of the following cable assemblies:
- Some versions of the alarm/BITS module on either a Passport 15000 or 20000 have prefabricated cable assemblies that connect to the module at one end and connect to the site BITS timing source at the other end. Since the alarm/BITS module is pre-installed at the factory, so are its prefabricated cable assemblies. There are two cable assemblies per module for redundant timing signal input.

Timing cable installation task flow

This task flow shows the sequence of procedures to install a timing cable. To link to any procedure, go to “Task flow navigation” (page 66).

Figure 7
Task flow of a timing cable installation



Task flow navigation

The following references are listed alphabetically:

- “Making a BITS cable” (page 510)
- “Installing a timing cable DS1 wire-wrap NTHW75” (page 453)
- “Installing a timing cable for E1 unbalanced NTHR75” (page 457)
- “Installing a timing cable adaptor NTPN81” (page 450)
- “Installing EMI filters on the alarm/BITS module” (page 477)

- “Making a BITS cable” (page 510)

Timing cable replacement

Replace a timing cable, if it fails, to restore the main or redundant external timing reference.

- “Prerequisites to timing cable replacement” (page 68)
- “Timing cable replacement task flow” (page 68)

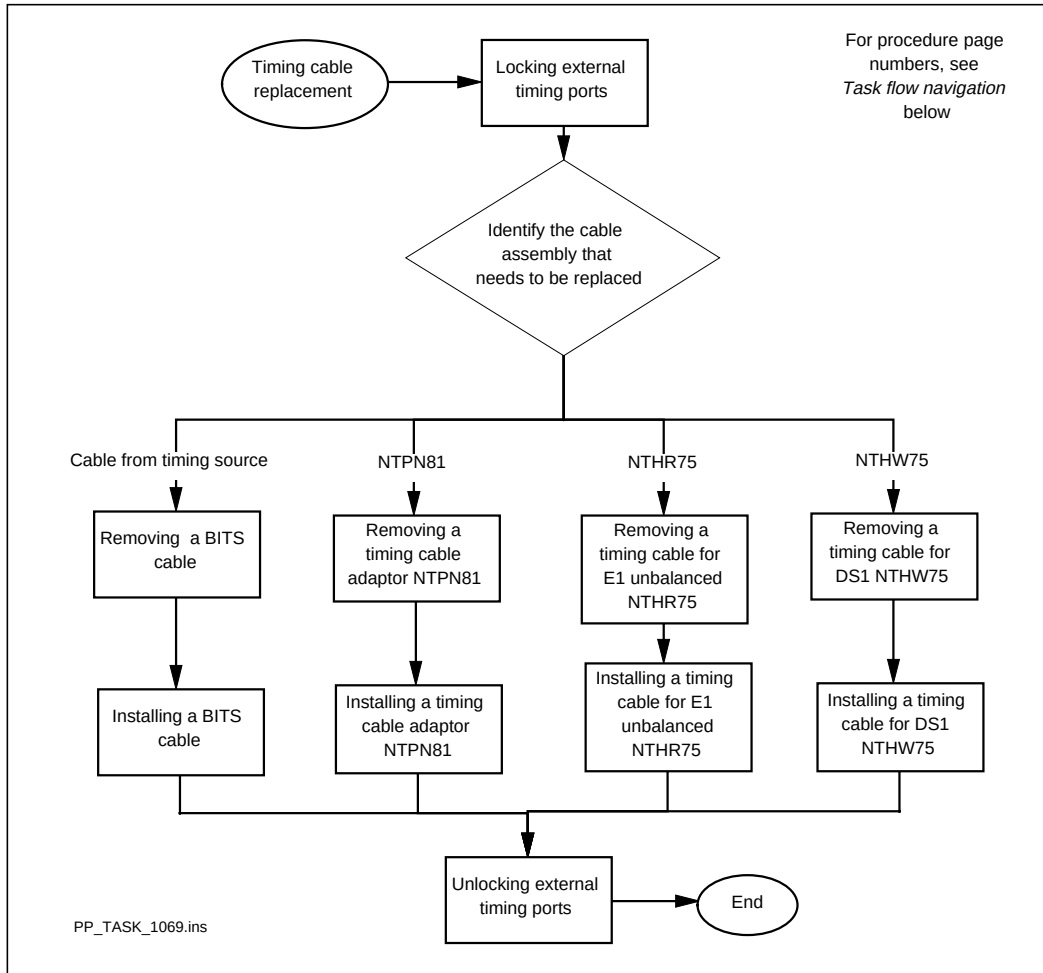
Prerequisites to timing cable replacement

- Some of the procedures in this task are not located in this NTP. Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- A timing cable refers to the cable that runs from the external timing source to the alarm/BITS module or to one of the prefabricated cable assemblies connected to the module.
- As soon as the replacement is completed, the former timing activity of this connection is automatically restored. For example, if the connection provided the primary reference, then it becomes the primary again.

Timing cable replacement task flow

This task flow shows the sequence of procedures to replace any of the timing cables. To link to any procedure, go to “Task flow navigation” (page 69).

Figure 8
Task flow of a timing cable replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a BITS cable” (page 336)
- “Installing a timing cable adaptor NTPN81” (page 450)
- “Installing a timing cable DS1 wire-wrap NTHW75” (page 453)

- “Installing a timing cable for E1 unbalanced NTHR75” (page 457)
- “Locking external timing ports” See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*
- “Removing a BITS cable” (page 534)
- “Removing a timing cable adapter NTPN81” (page 596)
- “Removing a timing cable for DS1 NTHW75” (page 597)
- “Removing a timing cable for E1 unbalanced NTHR75” (page 599)
- “Unlocking external timing ports” See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*

Chapter 5

CP and FP cables

Select from the following tasks and procedures:

- “Cable routing” (page 72)
- “Connecting a CP Ethernet cable” (page 251)
- “Connecting a CP local operator terminal cable” (page 254)
- “Connecting a CP modem cable” (page 255)
- “Connecting an FP cable” (page 273)
- “FP cable replacement” (page 75)
- “SFP module replacement” (page 78)
- “Replacing a CP Ethernet cable” (page 627)

Cable routing

Route cables between equipment to prepare for connecting the cables.

- “Prerequisites to cable routing” (page 72)
- “Cable routing task flow” (page 72)

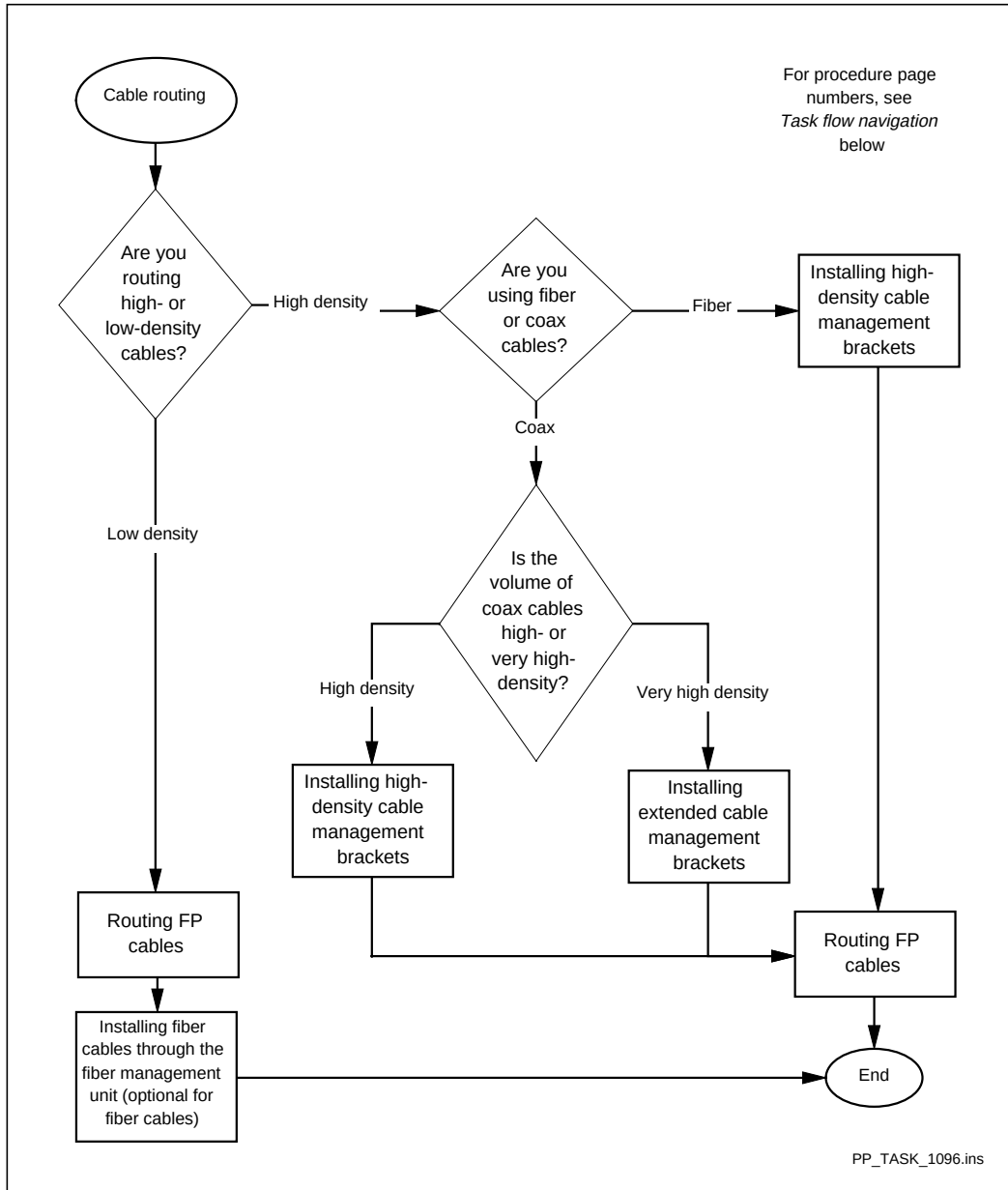
Prerequisites to cable routing

- See 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* to determine whether you need low-density, high-density, or very high-density cable management hardware. Be familiar with the functional differences between the extended cable management brackets, the standard plastic (or metal) brackets, and the paired plastic brackets.
- When the extended cable management brackets are needed to accommodate very high-density coax cables, you must have ensured that the footprint of the NEBS 2000 frame has 8.0 cm (3.25 in.) for the required additional space, or that the brackets were already installed according to the task flow “NEBS 2000 frame installation” (page 122). You should already have addressed the location and spacing of the footprint as part of your site planning as described in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.
- You can install both the high-density cable management paired brackets and the extended cable management brackets on either side of the frame or on the same side.

Cable routing task flow

This task flow shows the sequence of procedures you do to route high- or low-density cables. To link to any procedure, go to “Task flow navigation” (page 74).

Figure 9
Task flow of cable routing



Task flow navigation

The following references are listed alphabetically:

- “Installing extended cable management brackets” (page 479)
- “Installing fiber cables through the fiber management unit” (page 483)
- “Installing high-density cable management brackets” (page 495)
- “Routing FP cables” (page 666)

FP cable replacement

Replace an FP cable promptly, if it fails, or as part of a cable or FP upgrade, to restore delivery of configured services.

- “Prerequisites to replacement of a failed FP cable” (page 75)
- “Replacement of a failed FP cable task flow” (page 75)

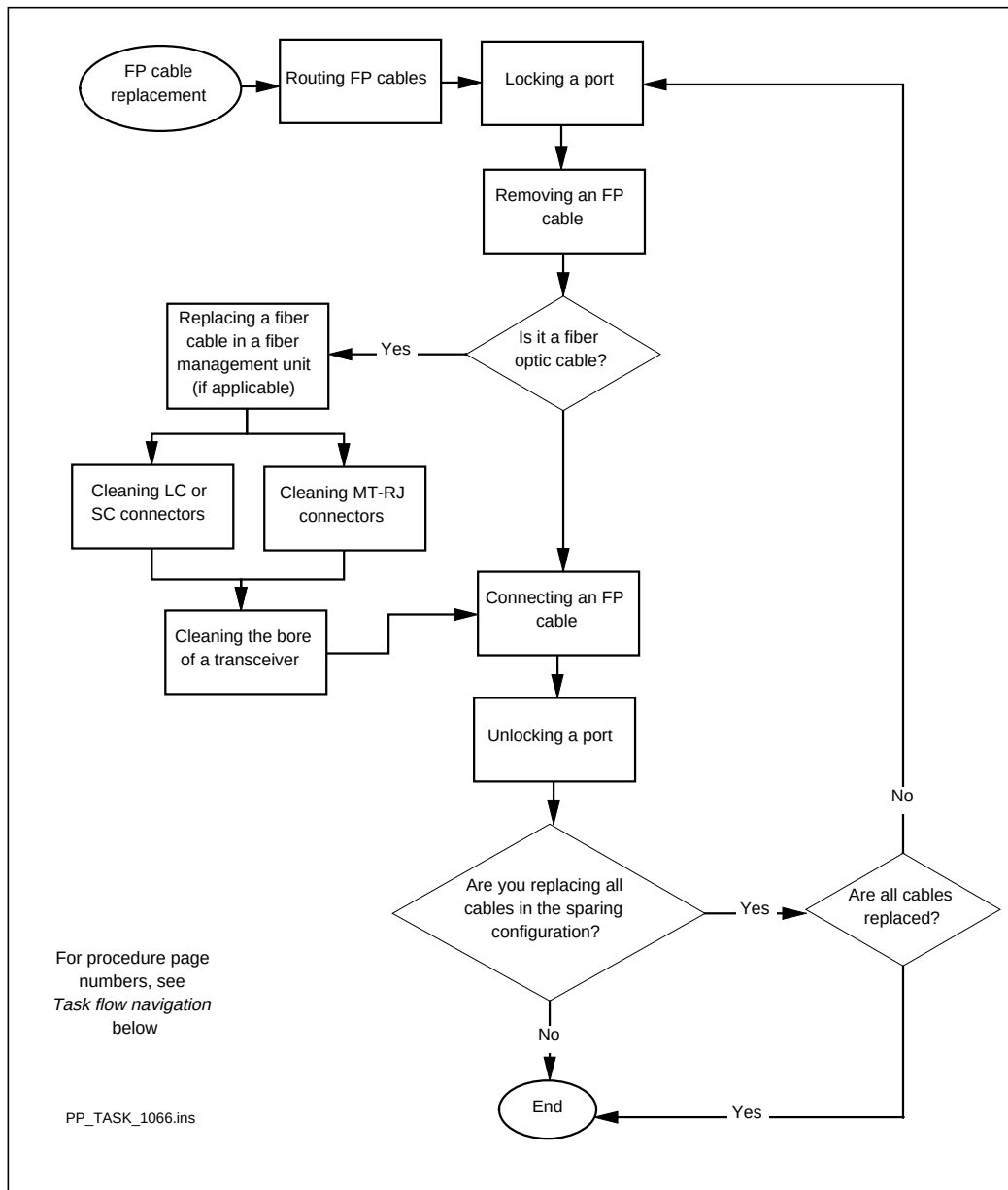
Prerequisites to replacement of a failed FP cable

- Some of the procedures in this task are not located in this NTP. Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- Unless prefabricated cable assemblies are available from Nortel Networks, you must provide a custom-made replacement cable assembly. For cable specifications refer to 241-1501-200 *Passport 15000, 20000 Hardware*.
- Replacing an FP cable has no effect on Passport 15000 or 20000 performance provided the FP has an in-service redundant FP configured for equipment protection.

Replacement of a failed FP cable task flow

This task flow shows the sequence of procedures you do to replace a failed FP cable. To link to any procedure, go to “Task flow navigation” (page 77).

Figure 10
Task flow of FP cable replacement



Task flow navigation

The following references are listed alphabetically:

- “Cleaning LC or SC connectors” (page 240)
- “Cleaning MT-RJ connectors” (page 245)
- “Cleaning the bore of a transceiver” (page 248)
- “Connecting an FP cable” (page 273)
- “Locking a port”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*
- “Replacing a fiber cable in a fiber management unit” (page 636)
- “Removing an FP cable” (page 609)
- “Routing FP cables” (page 666)
- “Unlocking a port”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*

SFP module replacement

Replace an SFP module if it fails, or if you need to change the type of module being used.

- “Prerequisites to SFP module replacement” (page 78)
- “SFP module task flow” (page 78)

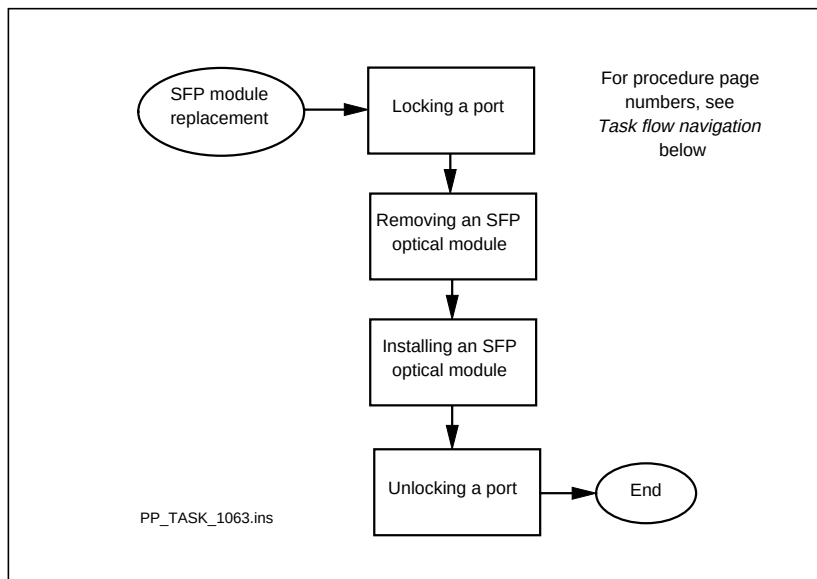
Prerequisites to SFP module replacement

- Some of the procedures in this task are not located in this NTP. Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

SFP module task flow

This task flow shows the sequence of procedures you must do to replace an SFP module. To link to any procedure, go to “Task flow navigation” (page 79).

Figure 11
Task flow of an SFP module replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing an SFP optical module” (page 466)
- “Locking a port”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Removing an SFP optical module” (page 612)
- “Unlocking a port”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Chapter 6

Control processors

Select from the following tasks and procedures:

- “CP upgrade” (page 82)
- “Failed CP replacement” (page 84)

For CP cabling tasks see “CP and FP cables” (page 71).

CP upgrade

Upgrade the CPs in your switch to increase functionality. Upgrading means replacing a CP that is already installed with one of a higher PEC version.

- “Prerequisites to CP upgrade” (page 82)
- “CP upgrade task flow” (page 83)

Prerequisites to CP upgrade

**CAUTION****Risk of service loss from inappropriate firmware**

On Passport 15000 a CP3 card supports only release 1.3 software or later. Upgrade the software, if necessary, before inserting a CP3. If the CP3 card is loaded with firmware from pre-1.3 software, it will crash. In this particular situation, a crashed CP3 cannot be recovered on site because its flash memory for firmware must be reprogrammed at Nortel Networks.

**CAUTION****Risk of service loss from shelf reset**

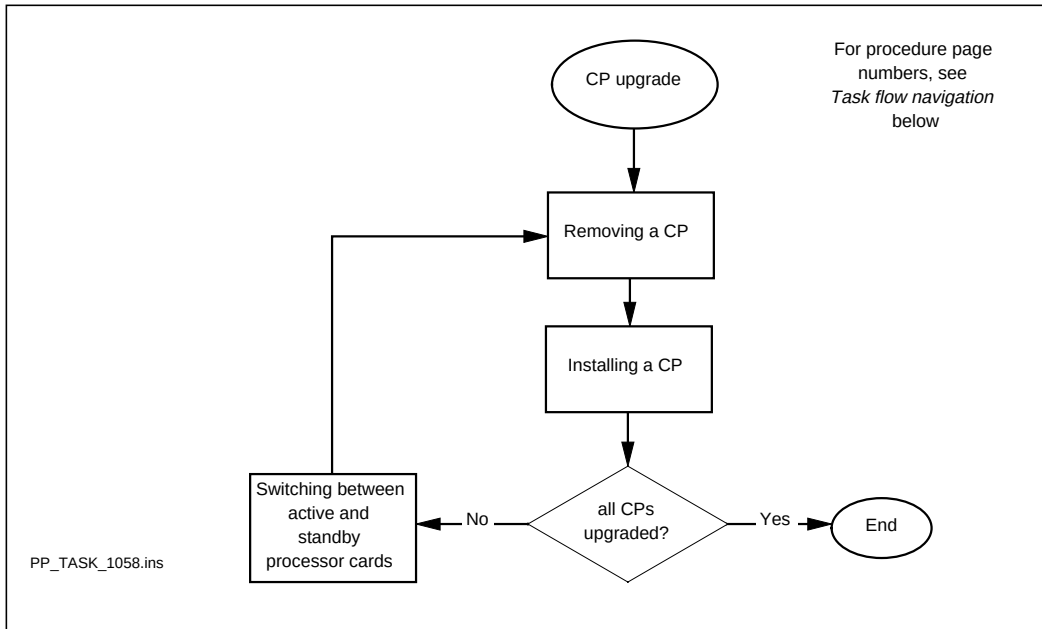
If you attempt to switch the activity of the CPs while the backup is not available (in-service and connected), the Passport 15000 or 20000 switch undergoes a reset to try resolving not being able to find the backup.

- A Passport 20000 only supports CP3s with PEC NTHW06 or NTHW08.
- Ensure that the appropriate level of software is installed. To verify the minimum software requirements of the CPs, see 241-1501-200 *Passport 15000, 20000 Hardware*.
- When upgrading an unspared CP, the entire node will be out of service while the CP is replaced and the replacement is configured in software.
- Ensure the file system is synchronized

CP upgrade task flow

This task flow shows the sequence of procedures you do to upgrade CPs in your Passport switch. To link to any procedure, go to “Task flow navigation” (page 83).

Figure 12
Task flow of a CP upgrade



Task flow navigation

The following references are listed alphabetically:

- “Installing a CP” (page 341)
- “Removing a CP” (page 537)
- “Switching between active and standby processor cards” See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Failed CP replacement

Replace a failed CP to restore services and redundancy.

- “Prerequisites to failed CP replacement” (page 84)
- “Failed CP replacement task flow” (page 84)

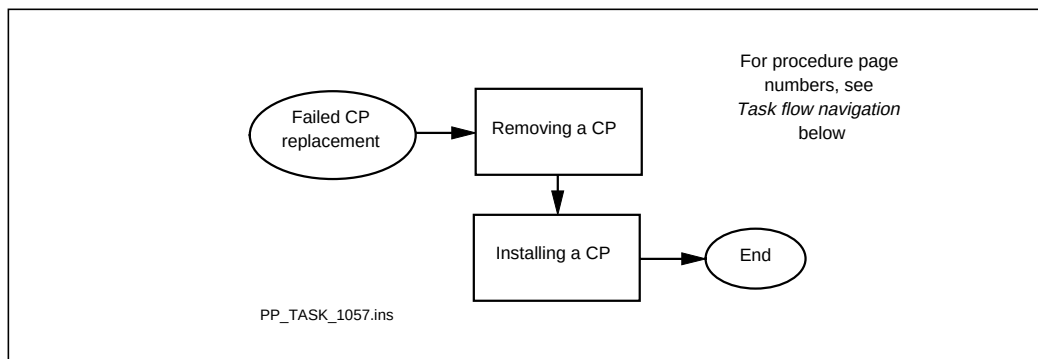
Prerequisites to failed CP replacement

- A Passport 20000 supports using only CP3s with PEC NTHW06 or NTHW08.
- When you are redeploying a CP, the software on it must be the same as the software running on your Passport. When redeploying a CP from a Passport 15000 into a Passport 20000, only CP3s loaded with PCR 3.1 software level or later will operate.

Failed CP replacement task flow

This task flow shows the sequence of procedures you do to replace a failed CP in your Passport switch. To link to any procedure, go to “Task flow navigation” (page 84).

Figure 13
Task flow of a failed CP replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a CP” (page 341)
- “Removing a CP” (page 537)

Chapter 7

Cooling units

Select from the following tasks and procedures:

- “Cooling unit replacement” (page 86)
- “Fan controller replacement” (page 88)
- “Fan replacement” (page 90)
- “Replacing a cooling unit alarm cable” (page 631)
- “Replacing a cooling unit power cable” (page 633)
- “Replacing an air filter” (page 644)
- “Temperature sensor replacement” (page 92)
- “Temperature sensor bracket assembly replacement” (page 95)

When you have a cooling unit to install, see the task flow “Installation of a second switch in a NEBS 2000 frame” (page 118) or “Passport 15000 or 20000 switch installation into an EIA rack” (page 134).

Cooling unit replacement

Replace a cooling unit if it fails or to facilitate the replacement of cooling unit parts.

- “Prerequisites to cooling unit replacement” (page 86)
- “Cooling unit replacement task flow” (page 87)

Prerequisites to cooling unit replacement

**CAUTION****Service degradation or interruption by heat**

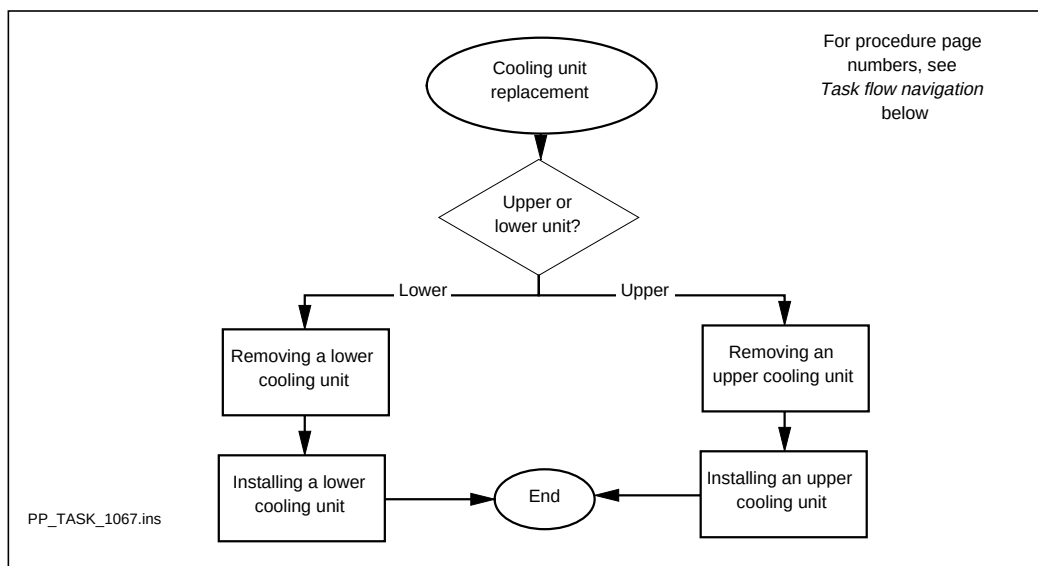
When the cooling unit of an in-service Passport 15000 or 20000 loses power, the air temperature inside the shelf rises rapidly. When the temperature inside a fabric exceeds 70 degrees Celsius (158 degrees Fahrenheit), that fabric will automatically shut down until the temperature drops below the threshold.

- You need one of the following versions of the cooling unit:
 - NTHR51AA or NTHR51AB for a lower (rear) cooling unit
 - NTHR52AA or NTHR52AB for an upper (front) cooling unit
- The PEC of the cooling units NTHR51AB and NTHR52AB is visible on its mounting ear. The mounting ears are blank for the NTHR51AA and NTHR52AA versions. To distinguish a lower cooling unit NTHR51AA from an upper unit NTHR52AA, observe the cable connectors that are only on the mounting ear of a lower cooling unit.
- The AA and AB versions of the cooling units are interchangeable, but their parts are not.
- Get a helper to assist the removal and insertion of a cooling unit because it weighs 9.1 kg (20 lbs) and has a tendency to slide out of position when it is unfastened.
- Replacing an entire cooling unit is not necessary because of a part failure, however, the task might be considered a safer method of working around live fan blades or inside tight spaces or both. It should take less than 5 minutes to replace an entire cooling unit.

Cooling unit replacement task flow

This task flow shows the sequence of procedures you do to replace a cooling unit. To link to any procedure, go to “Task flow navigation” (page 87).

Figure 14
Task flow of a cooling unit replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a lower cooling unit” (page 377)
- “Installing an upper cooling unit” (page 470)
- “Removing a lower cooling unit” (page 559)
- “Removing an upper cooling unit” (page 615)

Fan controller replacement

Replace a fan controller module to restore fan operation.

- “Prerequisites to fan controller replacement” (page 88)
- “Fan controller replacement task flow” (page 88)

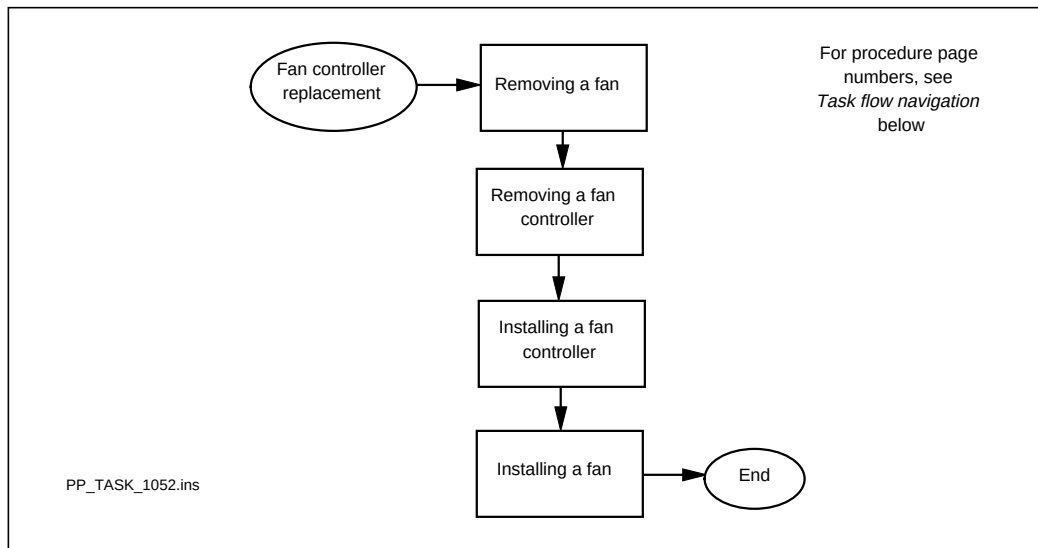
Prerequisites to fan controller replacement

- You need the appropriate version of a fan controller:
 - NTHR10AA for an NTHR51AA lower (rear) cooling unit
 - NTHR10AB for an NTHR51AB lower (rear) cooling unit
 - NTHR10AA for an NTHR52AB for an upper (front) cooling unit
 - NTHR10AB for an NTHR52AB for an upper (front) cooling unit
- The PEC of the cooling units NTHR51AB and NTHR52AB is visible on its mounting ear. The mounting ears are blank for the NTHR51AA and NTHR52AA versions. To distinguish a lower cooling unit NTHR51AA from an upper unit NTHR52AA, observe the cable connectors that are only on the mounting ear of a lower cooling unit.
- The AA and AB versions of the cooling units are interchangeable, but their parts are not.
- When a fan still does not operate after replacing the fan and its controller, replace the cooling unit as indicated in “Cooling unit replacement” (page 86).

Fan controller replacement task flow

This task flow shows the sequence of procedures you do to replace a fan controller. To link to any procedure, go to “Task flow navigation” (page 89).

Figure 15
Task flow of a fan controller replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a fan” (page 355)
- “Installing a fan controller” (page 361)
- “Removing a fan” (page 544)
- “Removing a fan controller” (page 549)

Fan replacement

Replace a fan promptly, if it fails, to maintain the required temperature in the Passport switch.

- “Prerequisites to fan replacement” (page 90)
- “Fan replacement task flow” (page 91)

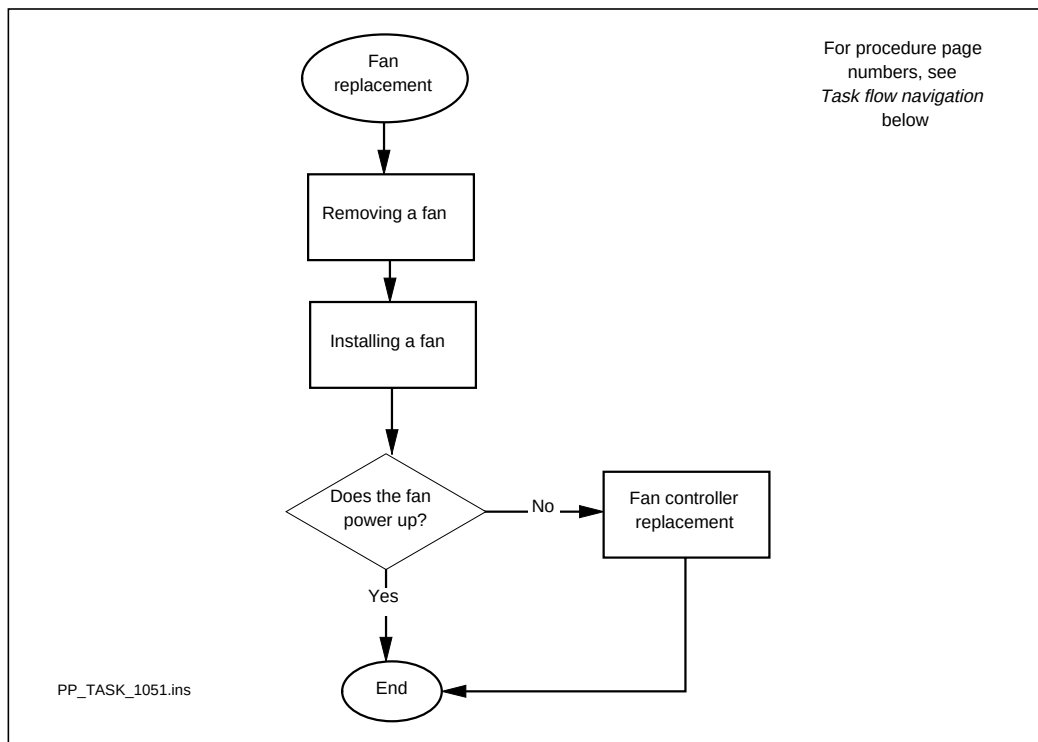
Prerequisites to fan replacement

- You need the appropriate version of a fan:
 - A0758423 for any fan in an NTHR51AA lower (rear) cooling unit or an NTHR52AA upper (front) cooling unit
 - A0522179 for the middle fan of an NTHR51AB lower (rear) cooling unit or an NTHR52AB upper (front) cooling unit
 - A0522182 for either side fan of an NTHR51AB lower (rear) cooling unit or an NTHR52AB upper (front) cooling unit
- The PEC of the cooling units NTHR51AB and NTHR52AB is visible on its mounting ear. The mounting ears are blank for the NTHR51AA and NTHR52AA versions. To distinguish a lower cooling unit NTHR51AA from an upper unit NTHR52AA, observe the cable connectors that are only on the mounting ear of a lower cooling unit.
- The AA and AB versions of the cooling units are interchangeable, but their parts are not.
- Single-fan failures are indicated by both a minor and a major alarm. You should attend to single-fan failures as soon as possible and within 48 hours. You must attend to multiple fan failures immediately before the fabrics’ shut-down threshold is reached.
- Minimize the impact or risk of having a fan out of service by always replacing only one fan at a time.
- When a fan still does not operate after replacing the fan and its controller, replace the cooling unit as indicated in “Cooling unit replacement” (page 86).

Fan replacement task flow

This task flow shows the sequence of procedures you do to replace a fan. To link to any procedure, go to “Task flow navigation” (page 91).

Figure 16
Task flow of a fan replacement



Task flow navigation

The following references are listed alphabetically:

- “Fan controller replacement” (page 88)
- “Installing a fan” (page 355)
- “Removing a fan” (page 544)

Temperature sensor replacement

Replace a temperature sensor if it fails.

- “Prerequisites to temperature sensor replacement” (page 92)
- “Temperature sensor replacement task flow” (page 92)

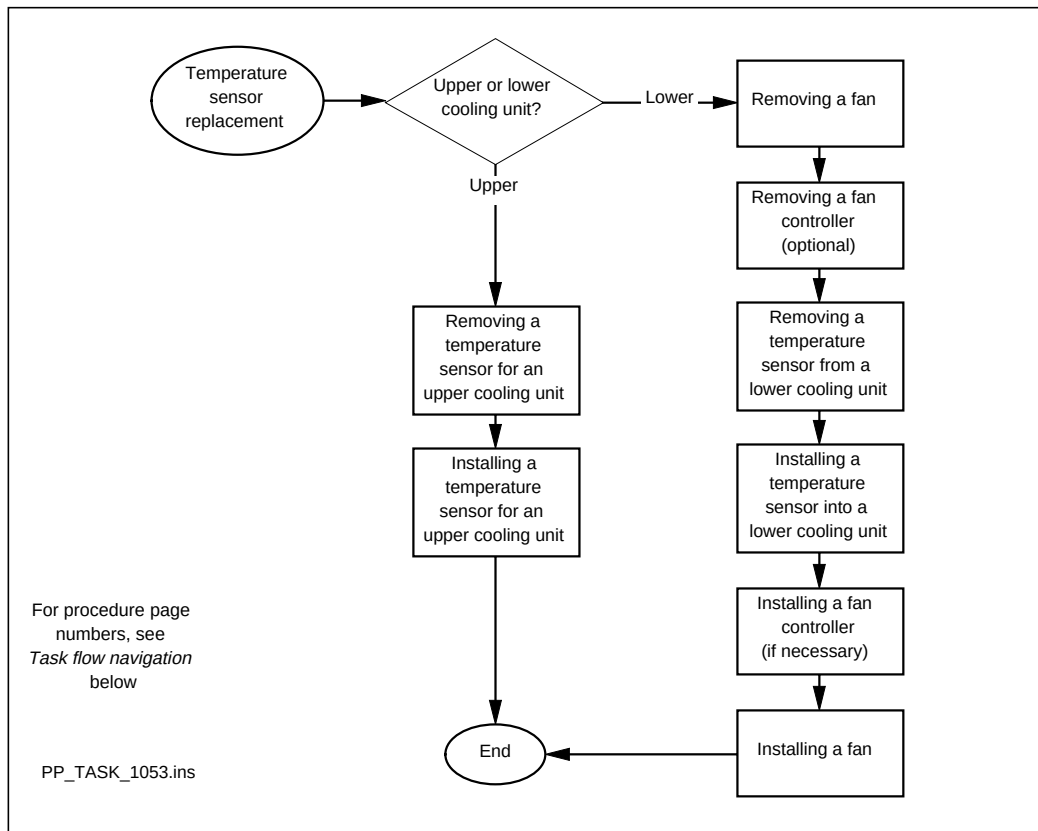
Prerequisites to temperature sensor replacement

- You need the appropriate version of temperature sensor:
 - A0647397 for the temperature sensor inside an NTHR51AA lower (rear) cooling unit
 - A0521940 for the temperature sensor inside an NTHR51AB lower (rear) cooling unit
 - A0647397 for the temperature sensor on the bracket assembly NTHR68AA used with an NTHR52AA upper (front) cooling unit
 - A0521944 for the temperature sensor on the bracket assembly NTHR68AB used with an NTHR52AB upper (front) cooling unit
- The A0647397 and A0521944 temperature sensors are not interchangeable and can only be used with the indicated equipment.
- The PEC of the cooling units NTHR51AB and NTHR52AB is visible on its mounting ear. The mounting ears are blank for the NTHR51AA and NTHR52AA versions. To distinguish a lower cooling unit NTHR51AA from an upper unit NTHR52AA, observe the cable connectors that are only on the mounting ear of a lower cooling unit.
- The PEC of the temperature sensor bracket assembly with version AB is visible on the installed bracket. The AA version is not visible.

Temperature sensor replacement task flow

This task flow shows the sequence of procedures you do to replace a temperature sensor. To link to any procedure, go to “Task flow navigation” (page 93).

Figure 17
Task flow of a temperature sensor replacement



Task flow navigation

The following references are listed alphabetically:

- “Connecting a temperature sensor cable assembly” (page 265)
- “Installing a fan” (page 355)
- “Installing a fan controller” (page 361)
- “Installing a temperature sensor for an upper cooling unit” (page 441)
- “Installing a temperature sensor inside a lower cooling unit” (page 445)
- “Removing a fan” (page 544)

- “Removing a fan controller” (page 549)
- “Removing a temperature sensor for an upper cooling unit” (page 587)
- “Removing a temperature sensor from a lower cooling unit” (page 591)

Temperature sensor bracket assembly replacement

Replace an upper cooling unit temperature sensor bracket assembly to restore optimum cooling by the fans.

- “Prerequisites to temperature sensor bracket assembly replacement” (page 95)
- “Temperature sensor bracket assembly replacement task flow” (page 95)

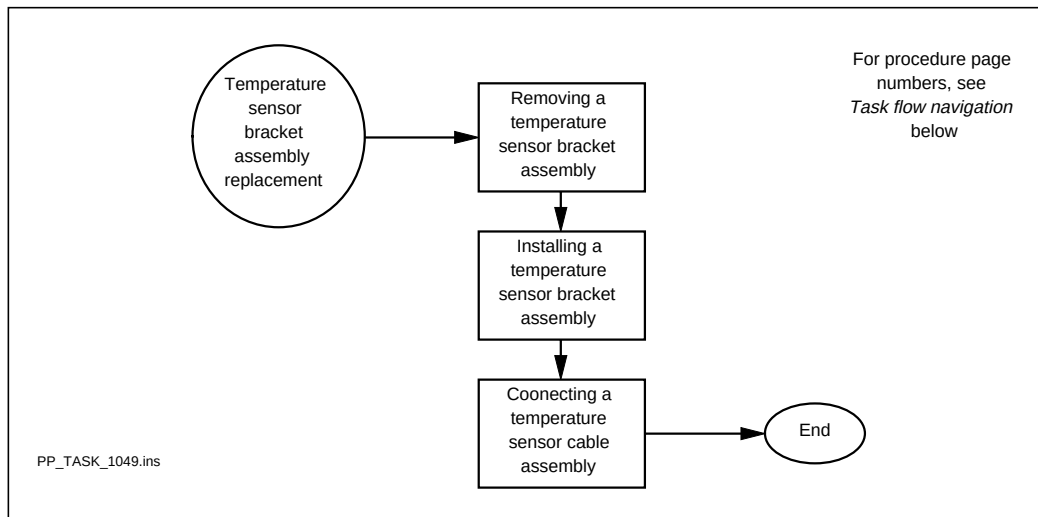
Prerequisites to temperature sensor bracket assembly replacement

- You need the appropriate version of temperature sensor assembly bracket:
 - NTHR68AA used with an NTHR52AA upper (front) cooling unit
 - NTHR68AB used with an NTHR52AB upper (front) cooling unit
- The A0647397 and temperature sensors are not interchangeable on the bracket assembly and can only be used with the indicated equipment.
- The PEC of the cooling units NTHR51AB and NTHR52AB is visible on its mounting ear. The mounting ears are blank for the NTHR51AA and NTHR52AA versions. To distinguish a lower cooling unit NTHR51AA from an upper unit NTHR52AA, observe the cable connectors that are only on the mounting ear of a lower cooling unit.
- The PEC of the temperature sensor bracket assembly with version AB is visible on the installed bracket. The AA version is not visible.
- The lower cooling unit does not have a temperature sensor bracket assembly that can be removed.

Temperature sensor bracket assembly replacement task flow

This task flow shows the sequence of procedures you do to replace a temperature sensor bracket assembly. To link to any procedure, go to “Task flow navigation” (page 93).

Figure 18
Task flow of a temperature sensor bracket assembly replacement



Task flow navigation

The following references are listed alphabetically:

- “Connecting a temperature sensor cable assembly” (page 265)
- “Installing a temperature sensor bracket assembly” (page 435)
- “Removing a temperature sensor bracket assembly” (page 584)

Chapter 8

Fabrics

Use the following task to handle the fabric cards of a Passport 15000 or 20000.

Fabric replacement

Replace a fabric card to restore load-sharing of traffic after having been removed from service by the system or to upgrade to a new hardware version.

- “Prerequisites to fabric replacement” (page 97)
- “Fabric replacement task flow” (page 98)

Prerequisites to fabric replacement

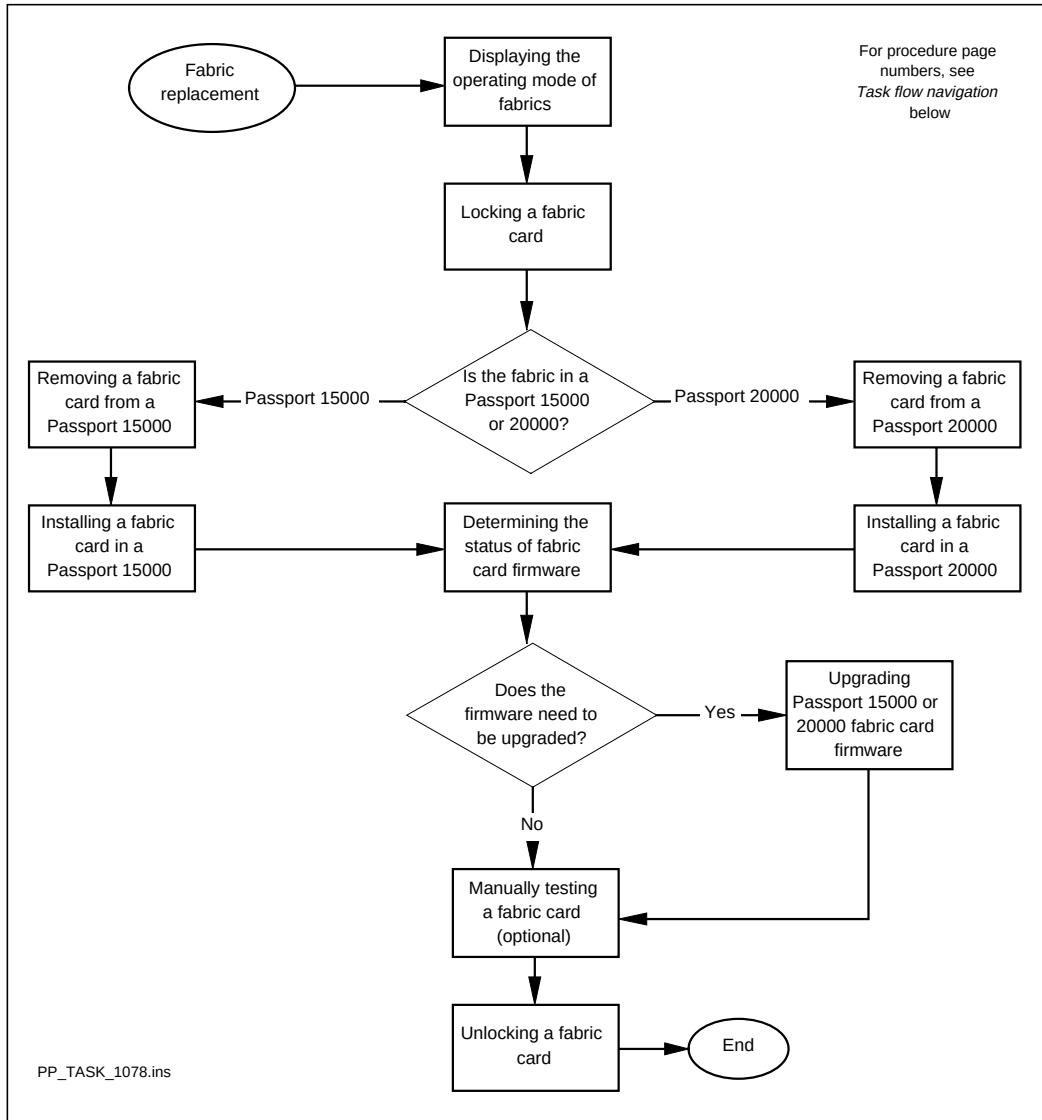
- Replacing a fabric is a time-sensitive task.
- Seating a fabric is a relatively complex series of actions. If a fabric is not properly seated, it may not operate correctly and EMI containment is jeopardized.
- When the system has automatically disabled the fabric (removed it from service) because it exceeds a temperature threshold, alarm 7002 0003 is generated. The solid red LED status is the same for a failed fabric as for a fabric undergoing a temperature shutdown. Ensure that you are replacing a failed fabric.
- Once the writable bank is loaded with fabric firmware, it automatically becomes the active bank, controlling the operation of the fabric card. When a download succeeds, the system commits the writable bank,

ensuring that the new firmware is used thereafter by a shelf reset. If the download fails, the writable bank retains the firmware that was present before the download.

Fabric replacement task flow

This task flow shows the sequence of procedures you do to replace a fabric in a Passport 15000 or 20000. To link any procedure, go to “Task flow navigation” (page 100).

Figure 19
Task flow of a fabric replacement



Task flow navigation

The following references are listed alphabetically:

- “Determining the status of fabric card firmware”. See 241-5701-272 *Passport 7400, 15000, 20000 Upgrading Software*.
- “Displaying the operating mode of fabrics”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*
- “Installing a fabric card into a Passport 15000” (page 344)
- “Installing a fabric card into a Passport 20000” (page 349)
- “Locking a fabric card”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Manually testing a fabric card”. See 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting*.
- “Removing a fabric card from a Passport 15000” (page 539)
- “Removing a fabric card from a Passport 20000” (page 541)
- “Unlocking a fabric card”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Upgrading Passport 15000 or 20000 fabric card firmware”. See 241-5701-272 *Passport 7400, 15000, 20000 Upgrading Software*.

Chapter 9

Function processors

Select from the following tasks to manage the function processors (FPs) on your Passport switch:

- “FP addition” (page 102)
- “FP decommissioning” (page 105)
- “FP upgrade” (page 107)
- “Replacement of a failed FP” (page 112)
- “Replacement of an FP with one of a different card type” (page 115)

For FP cabling tasks, see “CP and FP cables” (page 71).

FP addition

Add an FP to an unconfigured slot in a Passport shelf to add services or introduce sparing.

- “Prerequisites to FP addition” (page 102)
- “FP addition task flow” (page 102)

Prerequisites to FP addition

**CAUTION****Risk of damage to equipment from software**

An incompatible software load can damage an FP beyond a field repair. Ensure that the software running on the switch meets the minimum software requirement for a replacement FP. For information on minimum software requirements see 241-5701-615 *Passport 7400, 15000, 20000 FP Configuration Reference*.

**CAUTION****Risk of service loss or degradation**

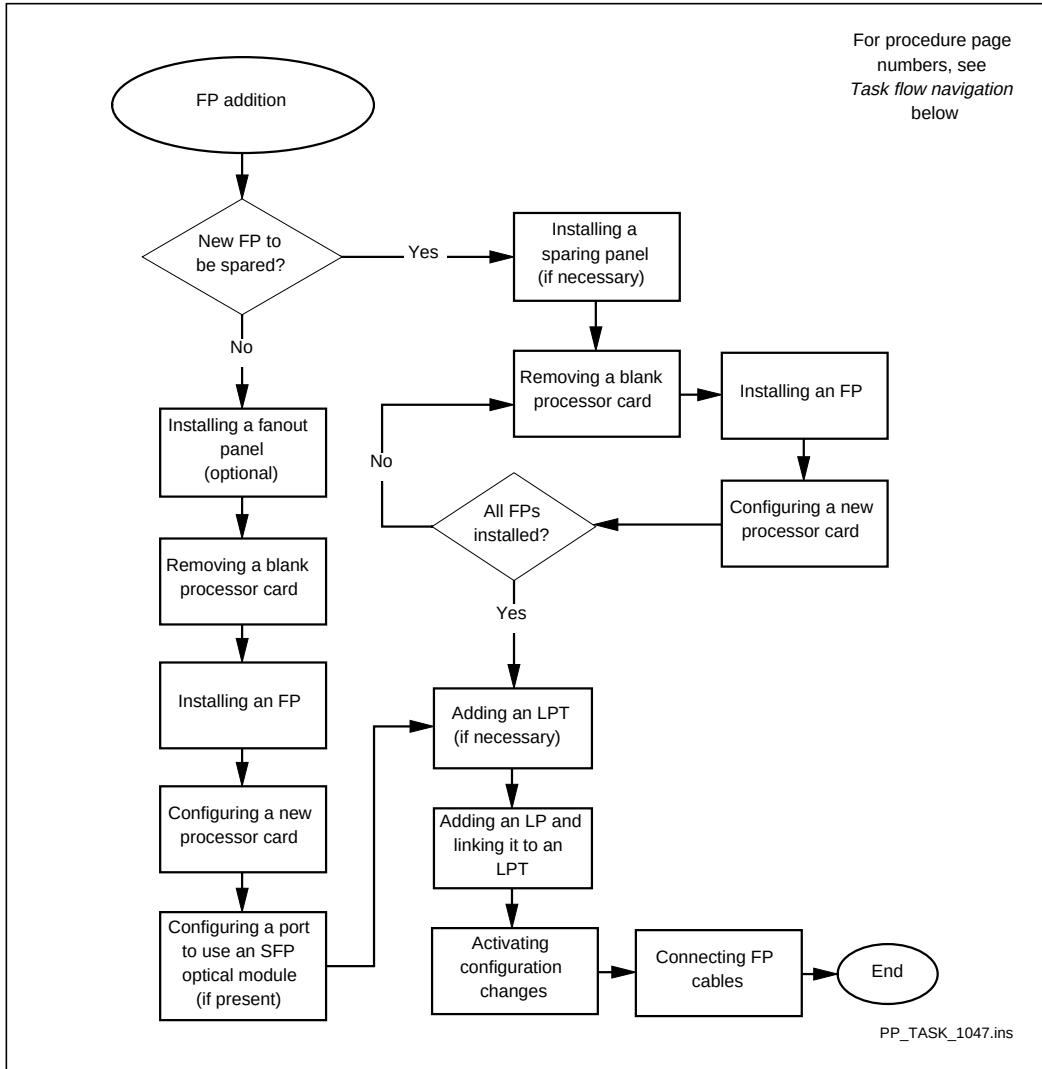
Install FPs of the same kind side by side. Mixing FPs that use coax cables with FPs that use fiber cables causes entangled cables that can drop service.

- Ensure that you are familiar with “Choosing slots for FPs” (page 49).
- Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* so that you can follow the software procedures used by this task.
- Optical sparing requires FPs to be located side by side in the shelf assembly.
- Route and label all required cables. See “Routing FP cables” (page 666)

FP addition task flow

This task flow shows the sequence of procedures to add an FP to a blank slot in the switch. To link to any procedure, go to “Task flow navigation” (page 103).

Figure 20
Task flow of an FP addition



Task flow navigation

The following references are listed alphabetically:

- “Activating configuration changes”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

- “Adding an LP and linking it to an LPT”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*
- “Adding an LPT”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Configuring a new processor card”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Configuring a port to use an SFP optical module”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Connecting an FP cable” (page 273)
- “Installing a fanout panel” (page 372)
- “Installing a sparing panel” (page 431)
- “Installing an FP” (page 462)
- “Removing a blank processor card” (page 536)

FP decommissioning

Decommission an FP by nullifying the existing slot configuration and replacing the card with a blank processor card.

- “Prerequisites for FP decommissioning” (page 105)
- “FP decommissioning task flow” (page 105)

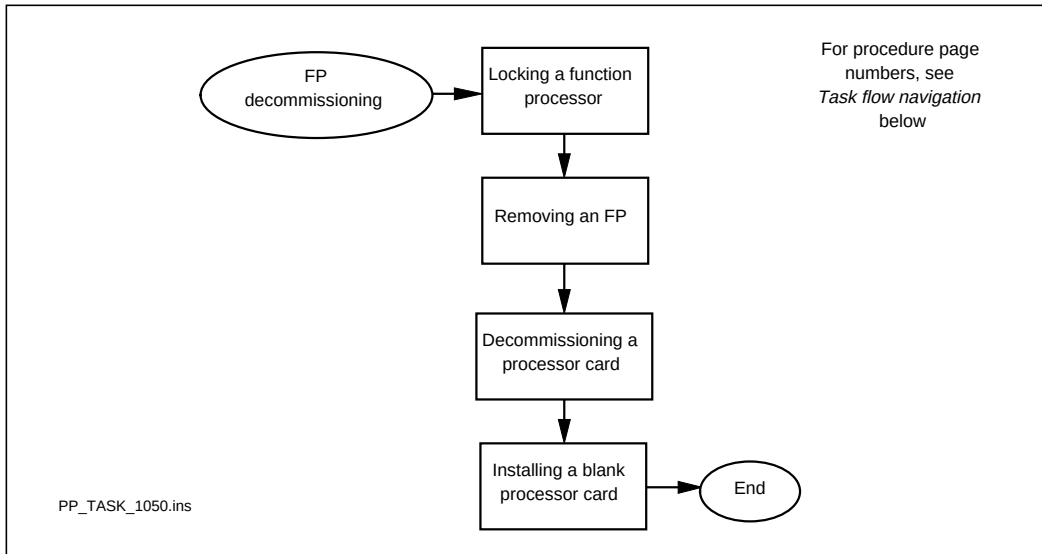
Prerequisites for FP decommissioning

- Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* so that you can follow the software procedures used by this task.
- You must have a replacement card to fill the empty slot so that system cooling and EMI protection are maintained. A blank processor card has PEC NTHR64. This card is also referred to as a filler module.

FP decommissioning task flow

This task flow shows the sequence of procedures to decommission an FP. To link to any procedure, go to “Task flow navigation” (page 106).

Figure 21
Task flow of an FP decommissioning



Task flow navigation

The following references are listed alphabetically:

- “Decommissioning an FP”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Installing a blank processor card” (page 338)
- “Locking a function processor”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Removing an FP” (page 604)

FP upgrade

Upgrade an FP in the shelf with one of the same cardtype but a different PEC or version to enable the enhancement of configured services.

- “Prerequisites to FP upgrade” (page 107)
- “FP upgrade task flows” (page 108)

Prerequisites to FP upgrade

**CAUTION****Risk of damage to equipment from software**

An incompatible software load can damage an FP beyond a field repair. Ensure that the software running on the switch meets the minimum software requirement for a replacement FP. For information on minimum software requirements see 241-5701-615 *Passport 7400, 15000, 20000 FP Configuration Reference*.

- Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* so that you can follow the software procedures used by this task.
- Use an FP with a compatible or equivalent PEC as defined in “Processor card compatibility” (page 55).
- Choose a period of low average traffic for upgrading cards to minimize the impact of removing the standby card from service.
- Determine if any cabling changes are required by the new FP(s). If you are replacing only a few FPs and there are not many new cables required, you can route new cables and leave the existing cables in place. If you are replacing a large number of FPs with many cables, you will need to consider removing some of the existing cables to make room in the cable management path.

For example: If you are replacing all of the 16-port OC-3/STM-1 MT-RJ cards in your shelf with the newer LC version, the volume of cables will require that you remove the existing cables from the cable trough in order

to make room.

Refer to “FP cable replacement” (page 75).

- Use the appropriate task flow for optical or electrical FPs. Optical FPs use fiber cables, for example, OC-n. Electrical FPs use coax or mini-coax (copper-based) cables, for example, Dsn or En FPs.
- When you upgrade an FP you must also upgrade all other FPs in the same sparing configuration.

FP upgrade task flows

These task flows show you the sequence of procedures to upgrade an FP.

- “Task flow of an electrical FP upgrade” (page 109)
- “Task flow of an optical FP upgrade” (page 110)

To link to any procedure, go to “Task flow navigation” (page 111)

Figure 22
Task flow of an electrical FP upgrade

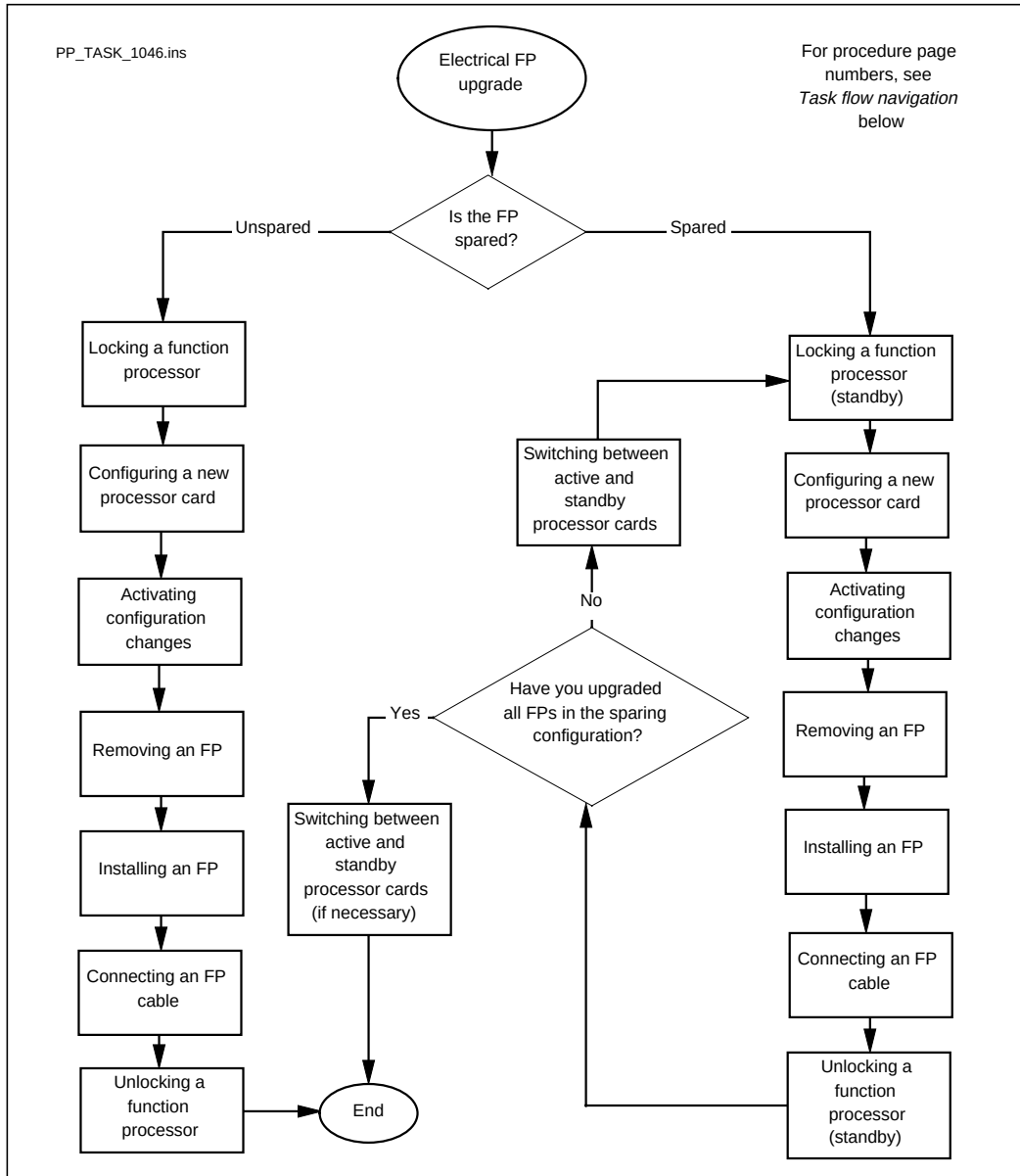
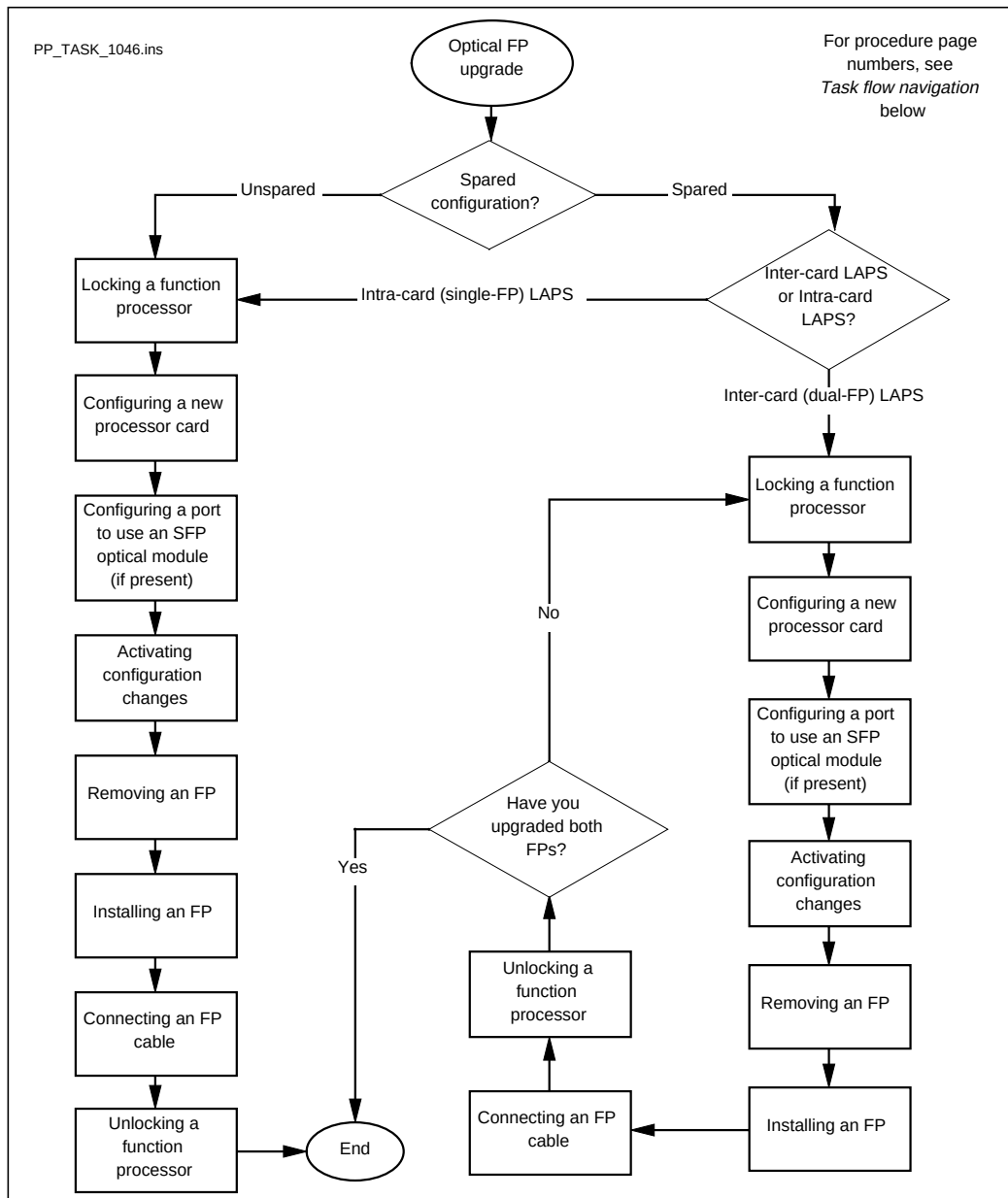


Figure 23
Task flow of an optical FP upgrade



Task flow navigation

The following references are listed alphabetically:

- “Activating configuration changes”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Card testing”. See 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting*.
- “Configuring a new processor card”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Configuring a port to use an SFP optical module”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Connecting an FP cable” (page 273)
- “Installing an FP” (page 462)
- “Locking a function processor”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Removing an FP” (page 604)
- “Switching between active and standby processor cards”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Unlocking a function processor”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Replacement of a failed FP

Replace a failed FP or an FP with at least one failed port to restore or maintain delivery of configured services.

- “Prerequisites to failed FP replacement” (page 112)
- “Failed FP replacement task flow” (page 112)

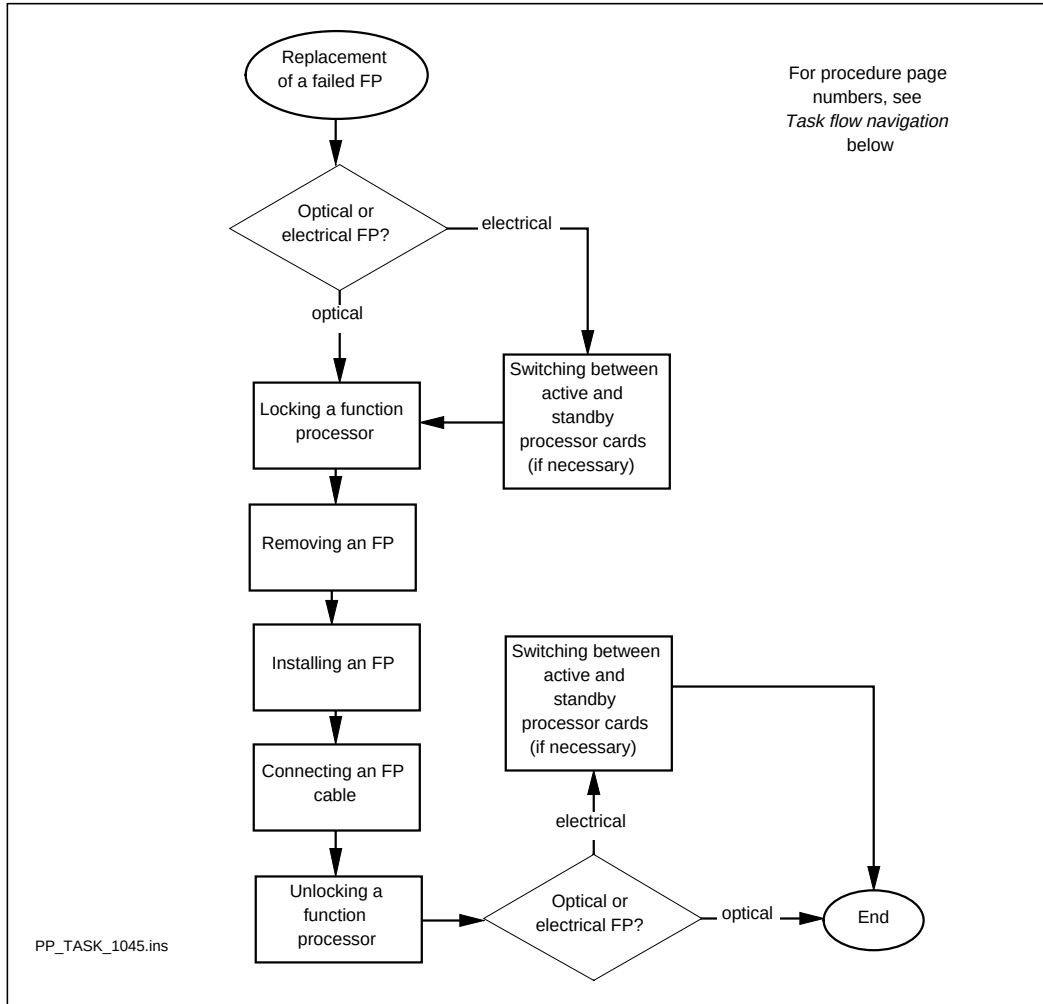
Prerequisites to failed FP replacement

- Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* so that you can follow the software procedures used by this task.
- Use a replacement FP with a compatible or equivalent PEC as defined in “Processor card compatibility” (page 55).
- This task assumes a compatible replacement will be used, that is, one that maintains the same card services, capacities, and performance capabilities. When using a compatible FP with increased functionality or capability, you must configure the slot for the change. When the replacement FP is a mate card in a sparing configuration, ensure that the pair can still operate with the lowest existing common functionality, capacity, and capabilities.

Failed FP replacement task flow

This task flow shows the sequence of procedures to replace a failed FP. To link to any procedure, go to “Task flow navigation” (page 113).

Figure 24
Task flow of a replacement of a failed FP



Task flow navigation

The following references are listed alphabetically:

- “Connecting an FP cable” (page 273)
- “Installing an FP” (page 462)

- “Locking a function processor”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Removing an FP” (page 604)
- “Switching between active and standby processor cards”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Unlocking a function processor”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Replacement of an FP with one of a different card type

Replace an FP with one of a different card type to change the type of services provided by that card slot.

Prerequisites to replacement of an FP with one of a different card type

**CAUTION****Risk of damage to equipment from software**

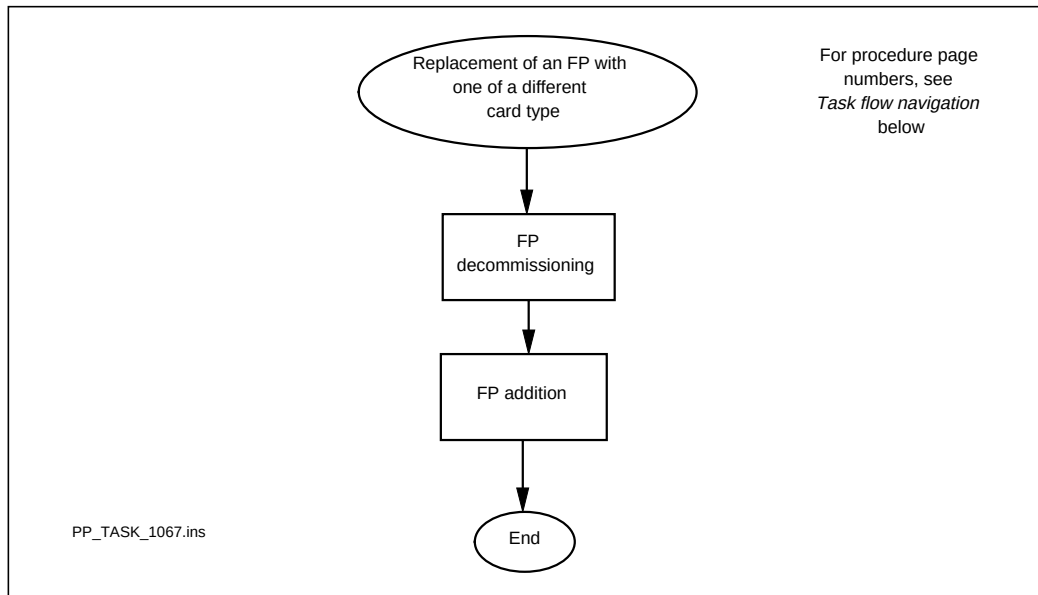
An incompatible software load can damage an FP beyond a field repair. Ensure that the software running on the switch meets the minimum software requirement for a replacement FP. For information on minimum software requirements see 241-5701-615 *Passport 7400, 15000, 20000 FP Configuration Reference*.

- You must first decommission the slot of the existing FP before installing the replacement.

Replacement of an FP with one of a different type task flow

This task flow shows the two tasks you can do to replace an FP with one of a different type. To link to either task, go to “Task flow navigation” (page 116).

Figure 25
Task flow of a replacement of an FP with one of a different type



Task flow navigation

The following references are listed alphabetically:

- “FP addition” (page 102)
- “FP decommissioning” (page 105)

Chapter 10

Initial installations

Select from the following tasks to complete initial installation of an empty NEBS 2000 frame, Passport 15000, Passport 20000, or Passport 15000-VSS:

- “Installation of a second switch in a NEBS 2000 frame” (page 118)
- “NEBS 2000 frame installation” (page 122)
- “Parts installation in a Passport 15000 in a NEBS 2000 frame” (page 126)
- “Parts installation in a Passport 20000 in a NEBS 2000 frame” (page 129)
- “Passport 15000-VSS installation” (page 132)
- “Passport 15000 or 20000 switch installation into an EIA rack” (page 134)

For other initial installations of equipment that is used with Passport in a NEBS 2000 frame, see “Peripheral equipment” (page 143).

Installation of a second switch in a NEBS 2000 frame

Install a second switch in a NEBS 2000 frame to maximize traffic capacity for the same footprint area.

- “Prerequisites to installation of a second switch in a NEBS 2000 frame” (page 118)
- “Installation of a second switch in a NEBS 2000 frame task flow” (page 119)

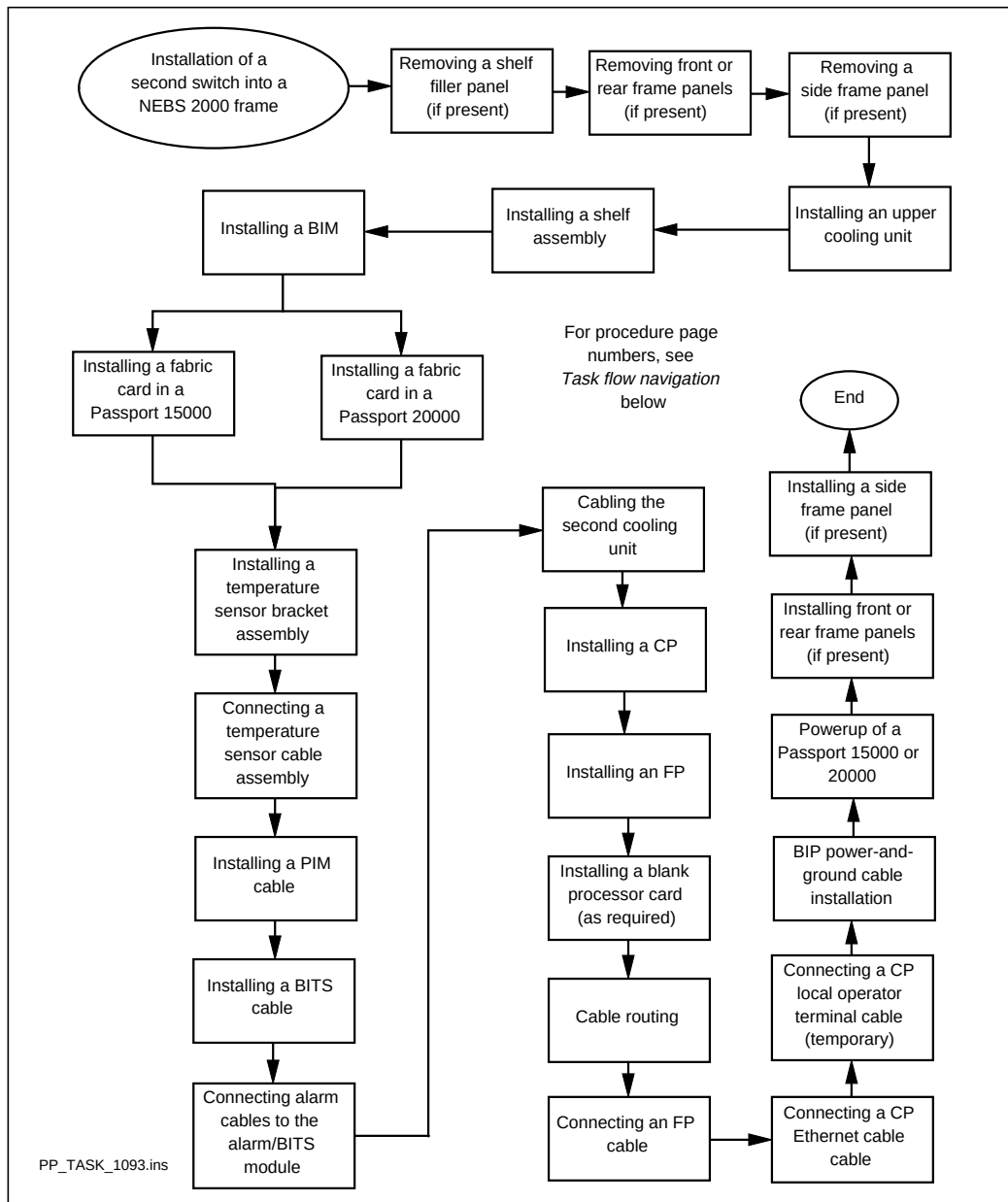
Prerequisites to installation of a second switch in a NEBS 2000 frame

- The switch in the bottom of the NEBS 2000 frame must be completely installed. You can add the second switch without affecting the service.
- You need one of these switch hardware packages:
 - NTQS10 for a Passport 15000
 - NTQH10 for a Passport 20000
- To power the second switch, you can safely use the BIM pair for that switch in either version of BIP. That is, you can use a pair of 25-amp BIMs (AP6C67PA) of a Passport 20000 in a Passport 15000 BIP (NT6C62). Or you can use a pair of 20-amp BIMs (NT6C60PA) of a Passport 15000 in a Passport 20000 BIP (AP6C68). Each BIM pair must be installed to power the appropriate Passport switch.
- Adding a second switch to a frame increases the cable density that is supported by the cable management brackets on the frame. The total number and type of FPs in the two switches can increase the cable density such that you must use the extended cable management brackets. Unless you planned for the brackets as described in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* by ensuring that there is enough space around the frame footprint or by installing them according to the task flow “NEBS 2000 frame installation” (page 122), you cannot add the brackets without moving the frame.

Installation of a second switch in a NEBS 2000 frame task flow

This task flow shows the sequence of procedures you do to install a second switch in a NEBS 2000 frame. To link to any procedure, go to “Task flow navigation” (page 121).

Figure 26
Task flow of an installation of a second switch in a NEBS 2000 frame



Task flow navigation

The following references are listed alphabetically:

- “BIP power-and-ground cable installation” (page 157)
- “Cable routing” (page 72)
- “Cabling the second cooling unit” (page 213)
- “Connecting a CP Ethernet cable” (page 251)
- “Connecting a CP local operator terminal cable” (page 254)
- “Connecting a temperature sensor cable assembly” (page 265)
- “Connecting alarm cables to the alarm/BITS module” (page 268)
- “Connecting an FP cable” (page 273)
- “Installing a BIM” (page 322)
- “Installing a BITS cable” (page 336)
- “Installing a blank processor card” (page 338)
- “Installing a CP” (page 341)
- “Installing a fabric card into a Passport 15000” (page 344)
- “Installing a fabric card into a Passport 20000” (page 349)
- “Installing a PIM cable” (page 391)
- “Installing a shelf assembly” (page 407)
- “Installing a side frame panel” (page 422)
- “Installing a temperature sensor bracket assembly” (page 435)
- “Installing an FP” (page 462)
- “Installing an upper cooling unit” (page 470)
- “Installing front or rear frame panels” (page 490)
- “Powerup of a Passport 15000 or 20000” (page 170)
- “Removing a side frame panel” (page 580)
- “Removing a shelf filler panel” (page 577)
- “Removing front or rear frame panels” (page 619)

NEBS 2000 frame installation

Install a NEBS 2000 frame to unpack, place, and anchor it onto its footprint.

- “Prerequisites to NEBS 2000 frame installation” (page 122)
- “NEBS 2000 frame installation task flow” (page 123)

Prerequisites to NEBS 2000 frame installation

- In 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*, ensure that you have addressed all of the planning considerations, especially:
 - where to locate the frame and any peripheral equipment that will be connected to the switch hardware
 - whether the frame will be joined to an adjacent frame with or without the optional extended management brackets
 - which cable management brackets you need to install to accommodate high density combinations of fiber, coax, and/or mini-coax cables, or very high cable densities of coax and/or mini-coax cables
 - how to mark the footprint on the floor
 - power-and-ground requirements, and routing power-and-ground cables to the Passport
- You can install both the high-density cable management paired brackets and the extended cable management brackets on either side of the frame or on the same side.
- A NEBS 2000 frame is also known as a PTE 2000 frame.



WARNING

Risk of injury or damage by an unanchored rack

Mounting equipment into or onto a frame can make it top heavy. To prevent a frame from tipping over, possibly causing a serious injury, always anchor it to the floor.

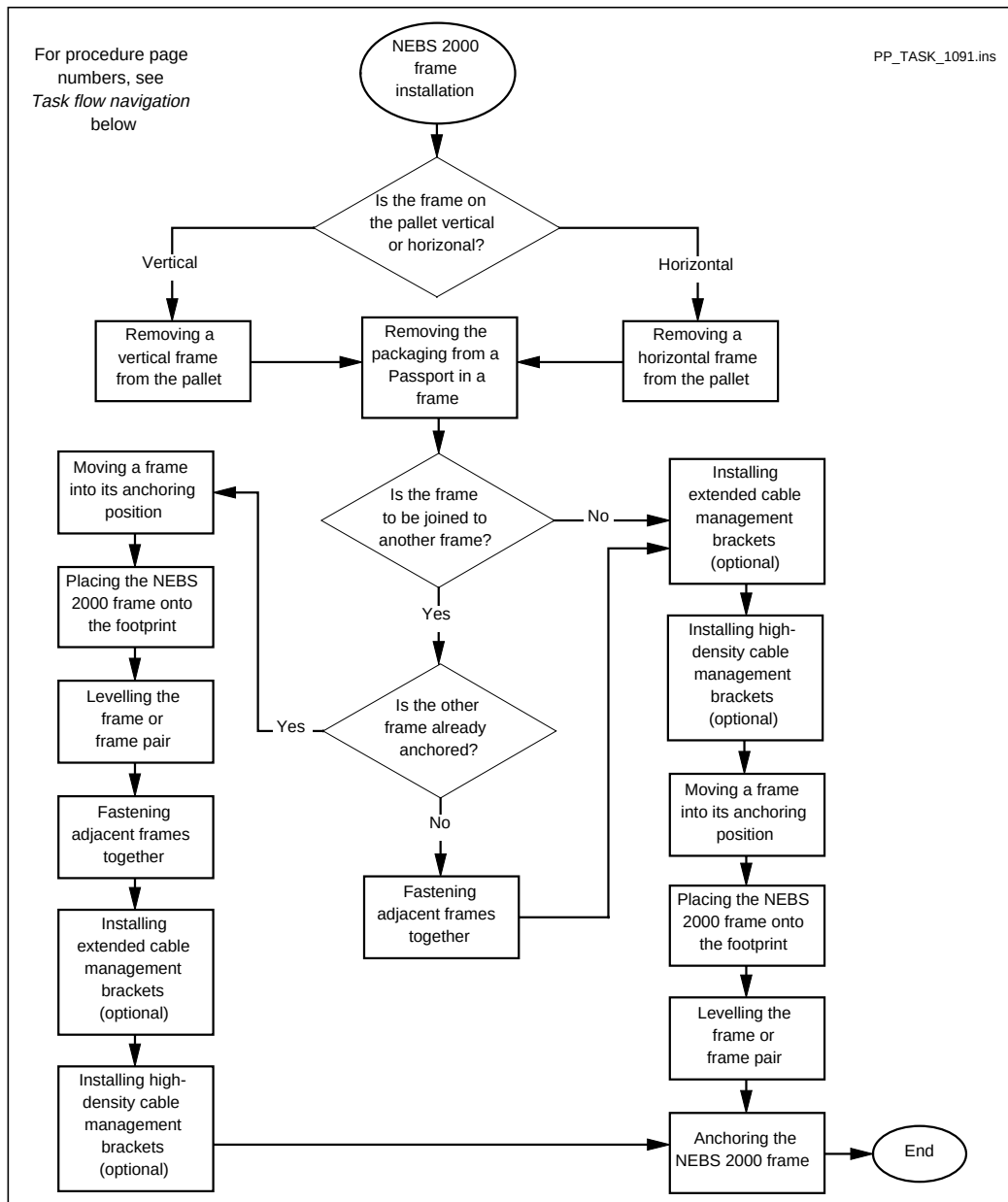
**WARNUNG****Verletzungs- oder Beschädigungsrisiko durch ein unverankertes Rack**

Beim Montieren von Geräten in oder auf einem Rack besteht die Gefahr der Kopflastigkeit. Verankern Sie ein Rack immer am Boden, um ein Umkippen und dadurch verursachte mögliche Verletzungen zu vermeiden.

NEBS 2000 frame installation task flow

This task flow shows the sequence of procedures you do to install a NEBS 2000 frame. To link to any procedure, go to “Task flow navigation” (page 125).

Figure 27
Task flow of NEBS 2000 frame installation



Task flow navigation

The following references are listed alphabetically:

- “Anchoring the NEBS 2000 frame” (page 188)
- “Fastening adjacent frames together” (page 307)
- “Installing extended cable management brackets” (page 479)
- “Installing high-density cable management brackets” (page 495)
- “Levelling the frame or frame pair” (page 505)
- “Moving a frame into its anchoring position” (page 514)
- “Placing the NEBS 2000 frame onto the footprint” (page 519)
- “Removing a horizontal frame from the pallet” (page 556)
- “Removing a vertical frame from the pallet” (page 601)
- “Removing the packaging from a Passport in a frame” (page 621)

Parts installation in a Passport 15000 in a NEBS 2000 frame

Install the parts of a Passport 15000 that is mounted in a NEBS 2000 frame to enable the switch to be put into service.

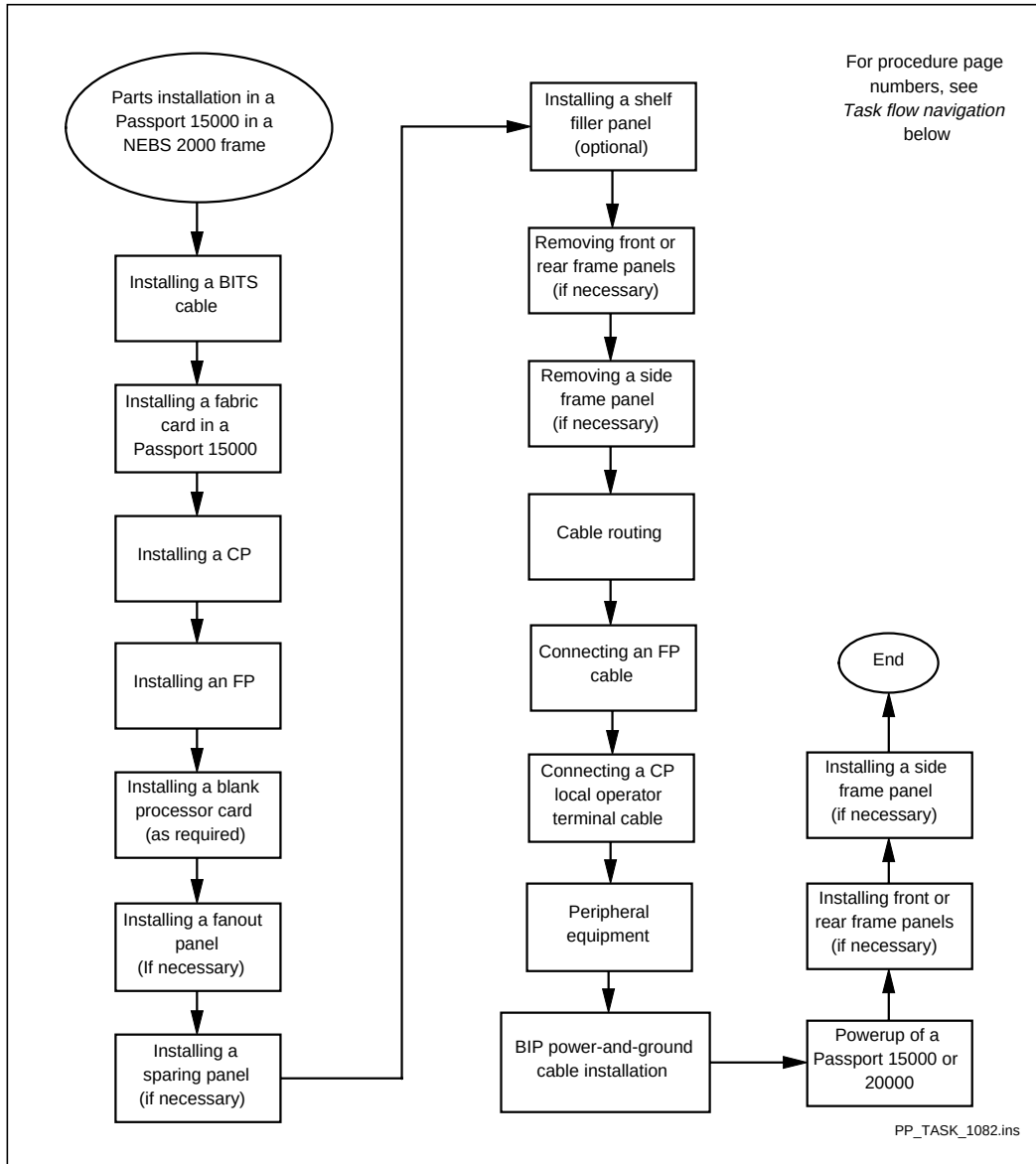
- “Prerequisites to parts installation in a Passport 15000 in a NEBS 2000 frame” (page 126)
- “Parts installation in a Passport 15000 in a NEBS 2000 frame task flow” (page 126)

Prerequisites to parts installation in a Passport 15000 in a NEBS 2000 frame

- The NEBS 2000 frame must already be installed as indicated by “NEBS 2000 frame installation” (page 122).
- Power and ground cables must be routed to the planned location of the Passport prior to beginning this task. See the 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.

Parts installation in a Passport 15000 in a NEBS 2000 frame task flow

This task flow shows the sequence of procedures you do to install the parts of a Passport 15000 that is mounted in a NEBS 2000 frame. To link to any procedure, go to “Task flow navigation” (page 128).

Figure 28**Task flow of parts installation in a Passport 15000 in a NEBS 2000 frame**

Task flow navigation

The following references are listed alphabetically:

- “BIP power-and-ground cable installation” (page 157)
- “Cable routing” (page 72)
- “Connecting a CP local operator terminal cable” (page 254)
- “Connecting an FP cable” (page 273)
- “Installing a BITS cable” (page 336)
- “Installing a blank processor card” (page 338)
- “Installing a CP” (page 341)
- “Installing a fabric card into a Passport 15000” (page 344)
- “Installing a fanout panel” (page 372)
- “Installing a shelf filler panel” (page 413)
- “Installing a side frame panel” (page 422)
- “Installing a sparing panel” (page 431)
- “Installing an FP” (page 462)
- “Installing front or rear frame panels” (page 490)
- “Peripheral equipment” (page 143)
- “Powerup of a Passport 15000 or 20000” (page 170)
- “Removing a side frame panel” (page 580)
- “Removing front or rear frame panels” (page 619)

Parts installation in a Passport 20000 in a NEBS 2000 frame

Install the parts of a Passport 20000 that is mounted in a NEBS 2000 frame to enable the switch to be put into service.

- “Prerequisites to parts installation Passport 20000 into a NEBS 2000 frame” (page 129)
- “Parts installation of a Passport 20000 in a NEBS 2000 frame task flow” (page 129)

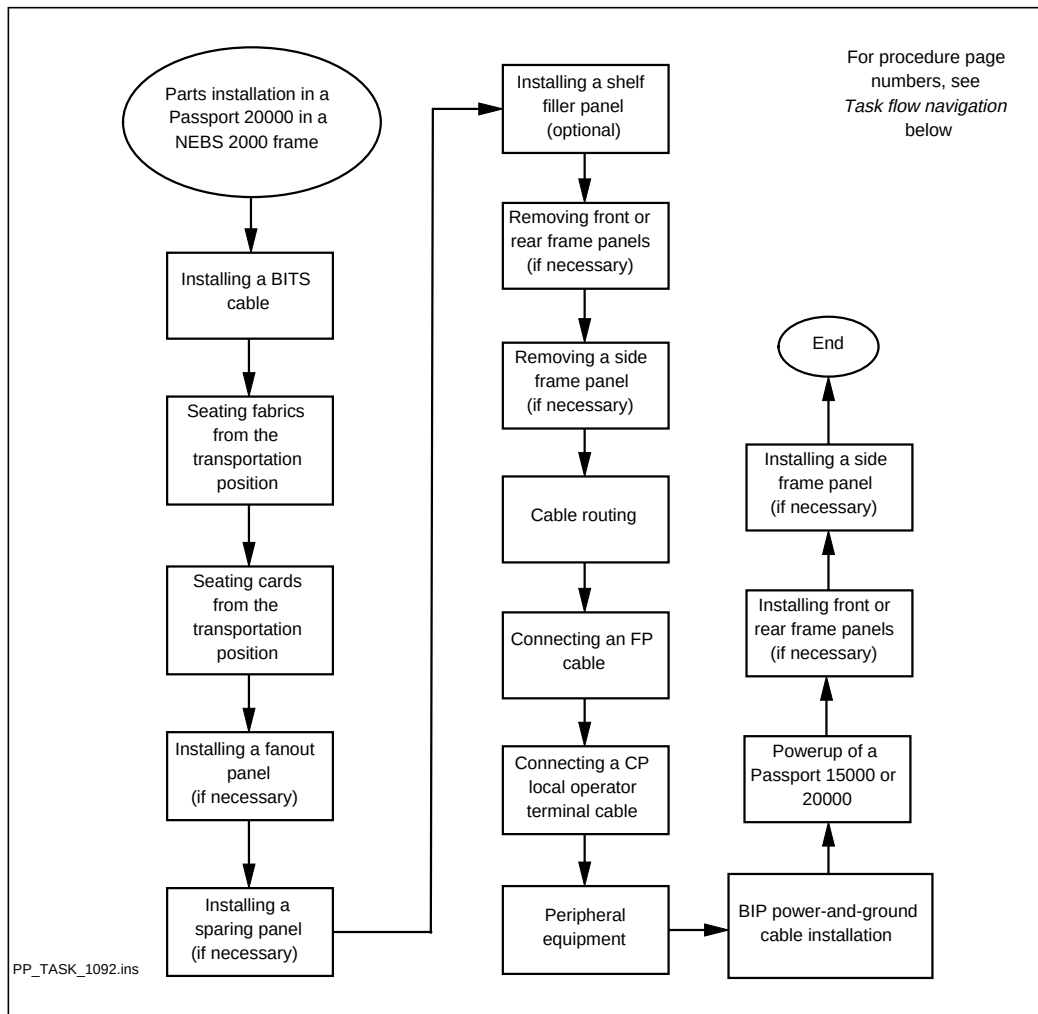
Prerequisites to parts installation Passport 20000 into a NEBS 2000 frame

- The NEBS 2000 frame must already be installed as indicated by “NEBS 2000 frame installation” (page 122).
- Power and ground cables must be routed to the planned location of the Passport prior to beginning this task. See the 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.

Parts installation of a Passport 20000 in a NEBS 2000 frame task flow

This task flow shows the sequence of procedures you do to install a Passport 20000. To link to any procedure, go to “Task flow navigation” (page 130).

Figure 29
Task flow of parts installation in a Passport 20000 in a NEBS 2000 frame



Task flow navigation

The following references are listed alphabetically:

- “BIP power-and-ground cable installation” (page 157)
- “Cable routing” (page 72)

- “Connecting a CP local operator terminal cable” (page 254)
- “Connecting an FP cable” (page 273)
- “Installing a BITS cable” (page 336)
- “Installing a fanout panel” (page 372)
- “Installing a shelf filler panel” (page 413)
- “Installing a side frame panel” (page 422)
- “Installing a sparing panel” (page 431)
- “Peripheral equipment” (page 143)
- “Installing front or rear frame panels” (page 490)
- “Powerup of a Passport 15000 or 20000” (page 170)
- “Removing a side frame panel” (page 580)
- “Removing front or rear frame panels” (page 619)
- “Seating cards from the transportation position” (page 676)
- “Seating fabrics from the transportation position” (page 679)

Passport 15000-VSS installation

Install the Passport 15000-VSS to enable putting into service the Passport 7480 and Passport 15000 that are mounted together in a NEBS 2000 frame.

- “Prerequisites to Passport 15000-VSS installation” (page 132)
- “Passport 15000-VSS installation task flow” (page 132)

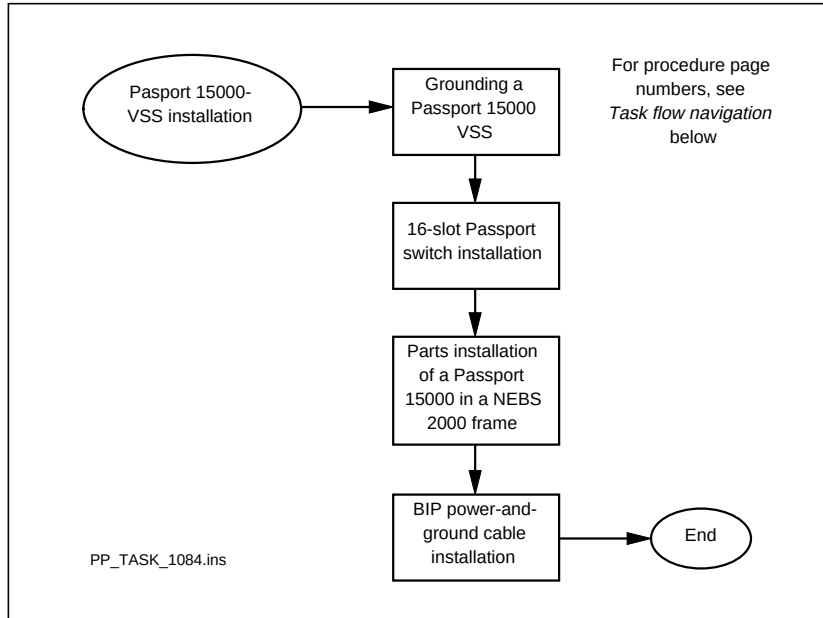
Prerequisites to Passport 15000-VSS installation

- The NEBS 2000 frame must already be installed as indicated by “NEBS 2000 frame installation” (page 122).
- The power source of the Passport 7400 must not be the breaker interface panel (BIP) of the Passport 15000, but both switches must share the same ground window.
- Power and ground cables must be routed to the planned location of the Passport prior to beginning this task. See the 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.
- The fiber link between the Passport 15000 and the Passport 7480 in a Passport 15000-Variable Speed Switch (VSS) can be made using an external OC-3 connection between OC-3 single-mode or multimode function processors (FPs). The fiber cable requires SC connectors at each end. You must provide the customized fiber cable and connectors.
- When the OC-3 card pair has different laser reaches (SR, IR, or LR), you may need to use in-line attenuators. See the procedure “Determining if you need to use inline attenuators with optical FPs” (page 298).

Passport 15000-VSS installation task flow

This task flow shows the sequence of tasks you do to install a Passport 15000-VSS. To link to any task, go to “Task flow navigation” (page 133).

Figure 30
Task flow of a Passport 15000-VSS installation



Task flow navigation

The following references are listed alphabetically:

- “16-slot Passport switch installation”. See 241-7401-240 *Passport 7400 Hardware Installation, Maintenance and Upgrade*.
- “BIP power-and-ground cable installation” (page 157)
- “Grounding a Passport 15000-VSS” (page 310)
- “Parts installation in a Passport 15000 in a NEBS 2000 frame” (page 126)

Passport 15000 or 20000 switch installation into an EIA rack

Install Passport 15000 or 20000 switch hardware into a standard 23-inch EIA frame, equipment rack, or enclosed cabinet.

- “Prerequisites to Passport 15000 or 20000 switch installation into a 23-inch EIA rack” (page 134)
- “Passport 15000 or 20000 switch installation into a 23-inch EIA rack task flow” (page 135)

Prerequisites to Passport 15000 or 20000 switch installation into a 23-inch EIA rack

**WARNING****Risk of injury or damage by an unanchored rack**

Mounting equipment into or onto a rack can make it top heavy. To prevent a rack from tipping over, possibly causing a serious injury, always anchor it to the floor. Follow the methods prescribed by Zone 2 or 4 anchoring.

**WARNUNG****Verletzungs- oder Beschädigungsrisiko durch ein unverankertes Rack**

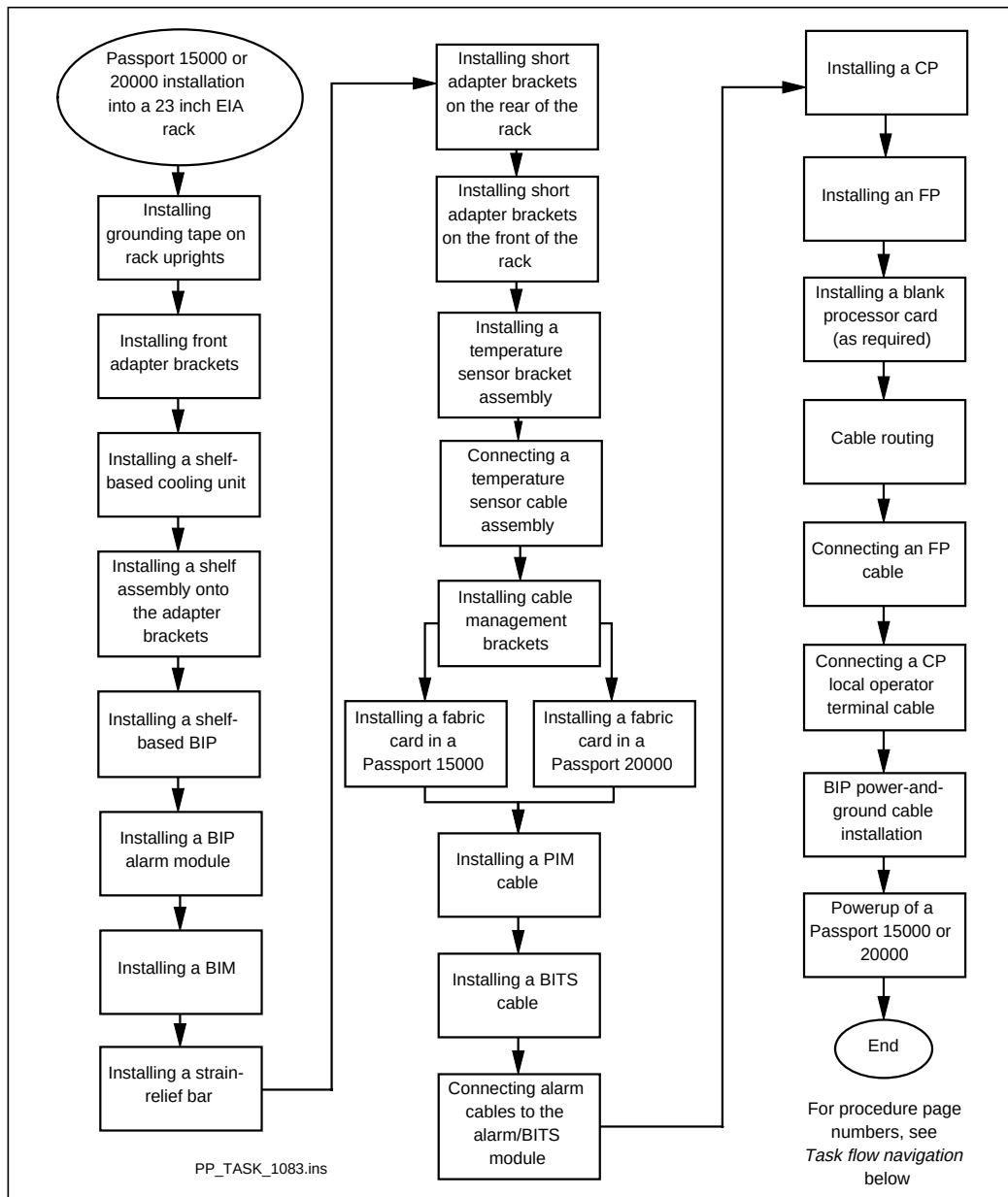
Beim Montieren von Geräten in oder auf einem Rack besteht die Gefahr der Kopflastigkeit. Verankern Sie ein Rack immer am Boden, um ein Umkippen und dadurch verursachte mögliche Verletzungen zu vermeiden. Folgen Sie den Anweisungen zur Verankerung in Zone 2 oder 4.

- You need one of these switch hardware packages:
 - NTQS04 for a Passport 15000
 - NTQH04 for a Passport 20000
- When you install Passport 15000 or 20000 switch in a mounting apparatus other than a NEBS 2000 frame, you are responsible for making the setup compliant to earthquake standards. Refer to the rack manufacturer’s installation instructions.

- For the installation of the Passport 15000 or 20000 switch to begin, the 23-inch EIA rack must already be completely installed and anchored.
- Typically, the weight of a fully provisioned and fully installed Passport 15000 prohibits adding other equipment to a rack. Install the equipment that connects to the switch hardware in a different mounting apparatus as described in:
 - “Installing a fanout panel” (page 372)
 - “Installing a sparing panel” (page 431)
 - “Peripheral equipment” (page 143)
- You must not install a second switch in a mounting apparatus other than a NEBS 2000 frame because of the total installed weight or cooling requirements. See 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* for the criteria involved with installing a shelf-based switch.
- The Passport 15000 or 20000 switch must always be positioned in the lowest possible part of your rack.
- The optional extended cable management brackets cannot be used with the adapter brackets.
- See “Planning for the use of an equivalent mounting apparatus” in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* for additional information.

Passport 15000 or 20000 switch installation into a 23-inch EIA rack task flow

This task flow shows the sequence of procedures and tasks you do to install a Passport 15000 or 20000 into a 23-inch EIA rack. To link to any procedure or task, go to “Task flow navigation” (page 137).

Figure 31**Task flow of a Passport 15000 or 20000 switch installation into a 23-inch EIA rack**

Task flow navigation

The following references are listed alphabetically:

- “Cable routing” (page 72)
- “BIP power-and-ground cable installation” (page 157)
- “Connecting alarm cables to the alarm/BITS module” (page 268)
- “Connecting a CP local operator terminal cable” (page 254)
- “Connecting a temperature sensor cable assembly” (page 265)
- “Connecting an FP cable” (page 273)
- “Installing a BIM” (page 322)
- “Installing a BIP alarm module” (page 326)
- “Installing a BITS cable” (page 336)
- “Installing a blank processor card” (page 338)
- “Installing a CP” (page 341)
- “Installing a fabric card into a Passport 15000” (page 344)
- “Installing a fabric card into a Passport 20000” (page 349)
- “Installing a PIM cable” (page 391)
- “Installing a shelf assembly onto adapter brackets” (page 409)
- “Installing a shelf-based BIP” (page 416)
- “Installing a shelf-based cooling unit” (page 418)
- “Installing a strain-relief bar” (page 434)
- “Installing a temperature sensor bracket assembly” (page 435)
- “Installing an FP” (page 462)
- “Installing cable management brackets” (page 475)
- “Installing front adapter brackets” (page 488)
- “Installing grounding tape on rack uprights” (page 494)
- “Installing short adapter brackets on the rear of the rack” (page 500)
- “Installing short adapter brackets on the front of the rack” (page 504)

- “Powerup of a Passport 15000 or 20000” (page 170)

Chapter 11

MAC address module

Use the following task to handle the MAC address module of a Passport 15000 or 20000.

MAC address module replacement

Replace a MAC address module if it fails. Although it is improbable that a MAC address module will fail, its failure or removal means some services cannot operate should the switch reset.

- “Prerequisites to MAC address module replacement” (page 139)
- “MAC address module replacement task flow” (page 140)

Prerequisites to MAC address module replacement

**CAUTION****Possible service loss by invalidating all configuration**

Replacing the MAC address module means a different address will be read by the system at a startup, restart, reset, or reboot. Reading a different address invalidates all previous software configuration. After installing a replacement module, always re-configure the switch software and reset it.

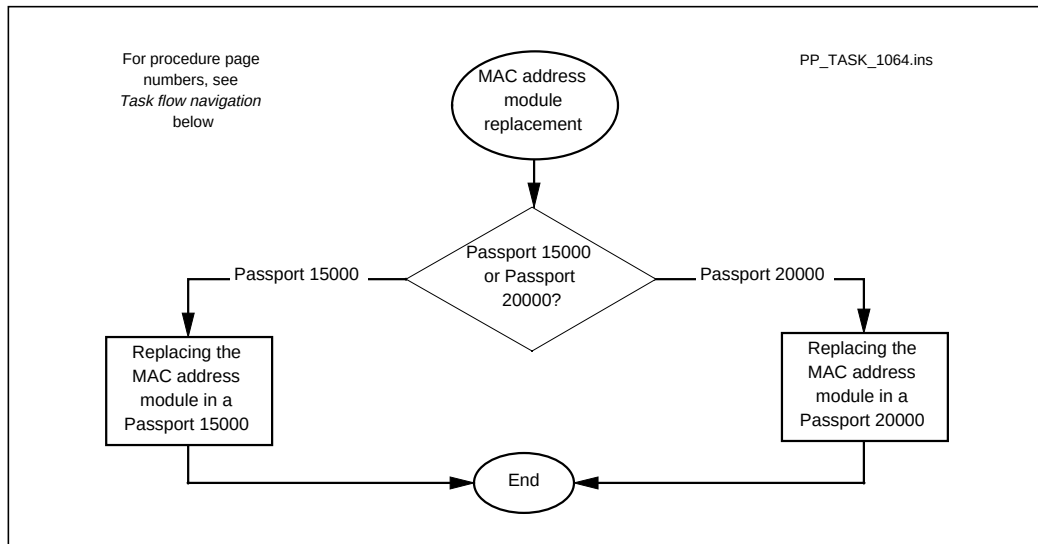
- The procedure for replacing the MAC address module is different for Passport 15000 and Passport 20000.

- The MAC address module provides the unique node identification within a network. Its address is read by the system only at initial power up, after power cycling, or a software startup, restart, reboot, or reset.
- Duplicated addresses can occur when:
 - a MAC address module is replaced in a switch (for example, switch A) and switch A does not undergo a manual or a system reset
 - the MAC address module from switch A replaces the one in switch B
 - as soon as switch B undergoes a manual or a system reset, restart, or reboot before switch A does, then switch B's new address is the same as switch A's former address because the former address itself had not actually been replaced yet
- Unlike most other hardware parts of the system, there is no software command associated with preparing the MAC address module for removal.
- There is no software or hardware alarm for removing the MAC address module itself or leaving its slot empty.

MAC address module replacement task flow

This task flow shows the procedures you do to replace the MAC address module. To link to any procedure, go to “Task flow navigation” (page 141).

Figure 32
Task flow of a MAC address module replacement



Task flow navigation

- “Replacing the MAC address module in a Passport 15000” (page 661)
- “Replacing the MAC address module in a Passport 20000” (page 664)

Chapter 12

Peripheral equipment

Select from the following tasks and procedures:

- “Connecting a CP local operator terminal cable” (page 254)
- “Connecting a Passport 15000 or 20000 to an EdgeLink 100” (page 257)
- “Modem installation” (page 144)
- “Multiport aggregate device installation” (page 146)
- “Multiport aggregate device replacement” (page 148)
- “Replacing a Shasta 5000 interface cable” (page 643)
- “Replacing an EdgeLink 100 interface cable” (page 650)
- “Shasta 5000 installation” (page 150)

Modem installation

Install a modem to enable a remote user to connect to the Passport switch for entering and receiving local operator software commands.

- “Prerequisites to modem installation” (page 144)
- “Modem installation task flow” (page 145)

Prerequisites to modem installation

**CAUTION****Risk of service loss by leaving a modem live**

The operator port to which you connect the modem is intended for temporary access. Use the modem to communicate with the Passport only for as long as you need to, then drop the dialup. You can leave the hardware and cables in place, but the link must not be left live between login sessions.

**CAUTION****Risk of service loss by incorrectly setting a modem**

Unless the hardware settings, the custom cable, and the software configuration of a modem is done correctly, the CP may crash and fail to reboot.

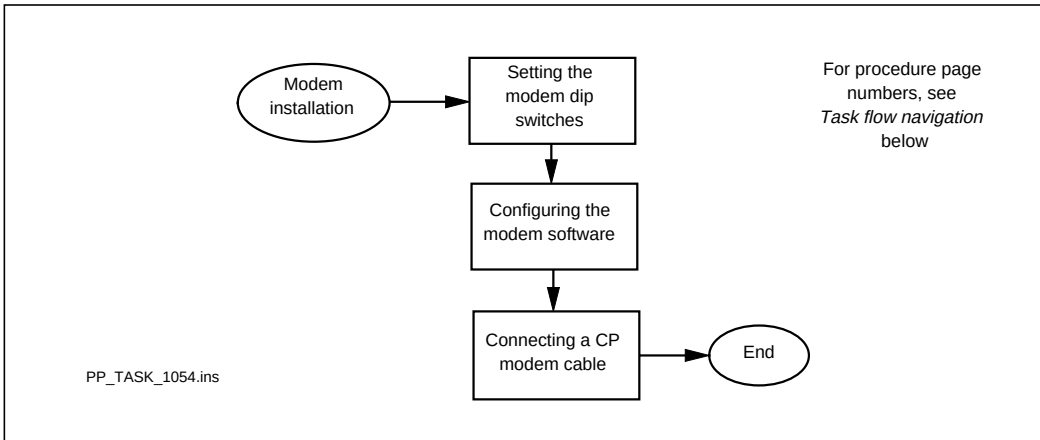
- An asynchronous modem can be connected to the local operator port on a Passport control processor (CP). The optional connection enables a remote user to dial up to the Passport to enter and receive local operator software commands. You must supply the modem and follow all instructions in this section.
- There is no software configuration of the Passport to enable using a modem connected to the CP. The hardware setup of the Passport requires a specific modem setup.
- Mount the modem according to its manufacturer’s instructions. Ensure that the distance between the modem and the CP of the Passport is within the modem’s recommended transmission distances in either direction of the connection path.

- Have a dedicated ac power outlet available to operate the modem while it is connected to the Passport.

Modem installation task flow

This task flow shows the sequence of procedures you do to install a modem in your Passport switch. To link to any procedure, go to “Task flow navigation” (page 145).

Figure 33
Task flow of a modem installation



Task flow navigation

The following references are listed alphabetically:

- “Configuring modem software” (page 249)
- “Connecting a CP modem cable” (page 255)
- “Setting modem dip switches” (page 683)

Multiport aggregate device installation

Install a multiport aggregate device to break out the ports of a 32-port E1 TDM FP.

- “Prerequisites to multiport aggregate device installation” (page 146)
- “Multiport aggregate device installation task flow” (page 146)

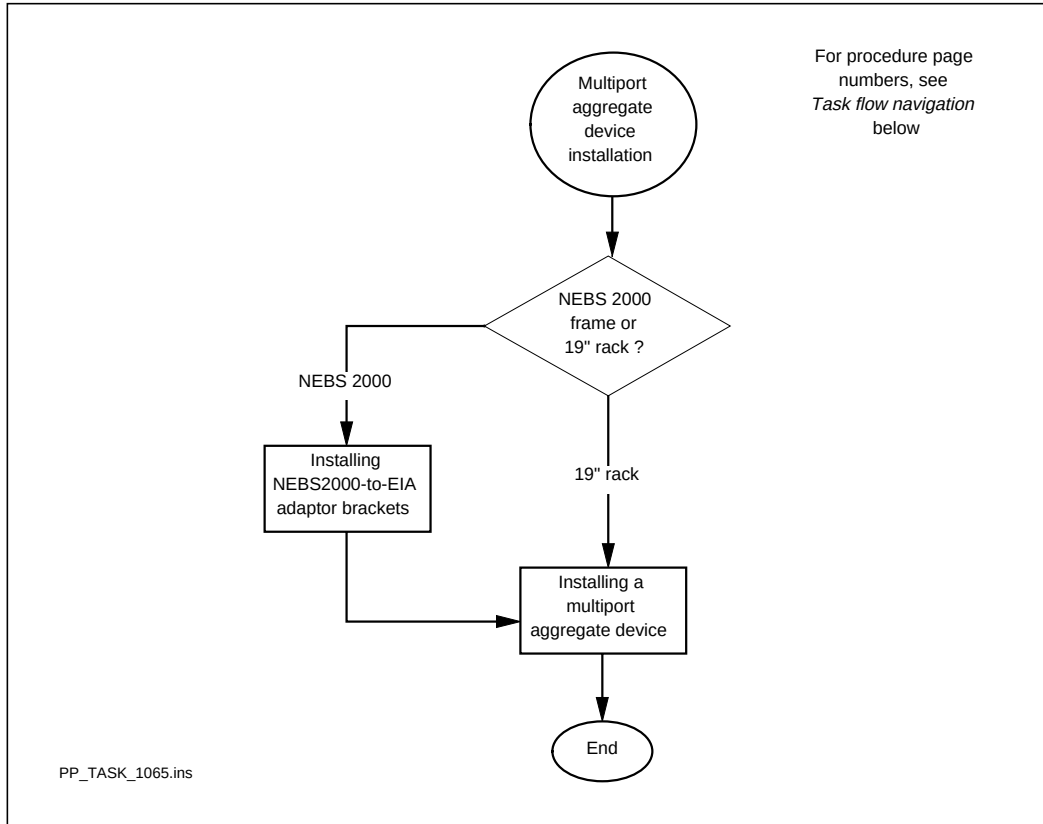
Prerequisites to multiport aggregate device installation

- You must be familiar with “Safety considerations and best practices” (page 41).
- You will need a multiport aggregate devices with one of the following PECs:
 - NT0486 for the balanced
 - NT0421 for the unbalanced
- The multiport aggregate device installs in a 19-inch rack or requires one pair of the adapter brackets from kit NTHW14 to be installed in a NEBS 2000 frame.

Multiport aggregate device installation task flow

This task flow shows the sequence of procedures you do to install a multiport aggregate device. To link to any procedure, go to “Task flow navigation” (page 149).

Figure 34
Task flow of a multiport aggregate device installation



Task flow navigation

The following references are listed alphabetically:

- “Installing a multiport aggregate device” (page 382)
- “Installing NEBS 2000 frame-to-EIA adapter brackets” (page 498)

Multiport aggregate device replacement

Replace a multiport aggregate device, if it fails.

- “Prerequisites to multiport aggregate device replacement” (page 148)
- “Multiport aggregate device task flow” (page 148)

Prerequisites to multiport aggregate device replacement



CAUTION

Service loss on active ports

Replacing a multiport aggregate device requires you to remove all the E1 ports connected to the device from service for the duration of the replacement. Minimize the impact of the switch outage by rerouting traffic to other switches in the network before locking the ports.



CAUTION

Service interruption by powering down

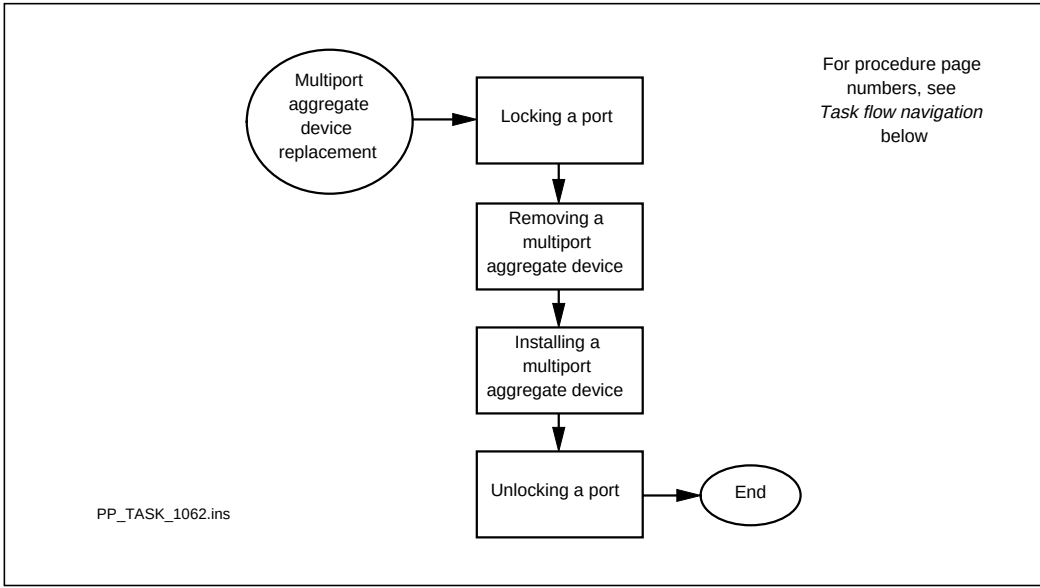
Before you power down a multiport aggregate device, inform appropriate personnel that service will be interrupted.

- You must be familiar with “Safety considerations and best practices” (page 41).
- Some of the procedures in this task are not located in this NTP. Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Multiport aggregate device task flow

This task flow shows the sequence of procedures you do to replace a multiport aggregate device in your Passport switch. To link to any procedure, go to “Task flow navigation” (page 149).

Figure 35
task flow of a multiport aggregate device replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a multiport aggregate device” (page 382)
- “Locking a port”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Removing a multiport aggregate device” (page 562)
- “Unlocking a port”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Shasta 5000 installation

Install a Shasta 5000 into a NEBS 2000 frame for interworking with Passport 15000 or 20000.

- “Prerequisites to Shasta 5000 installation” (page 150)
- “Shasta 5000 installation task flow” (page 151)

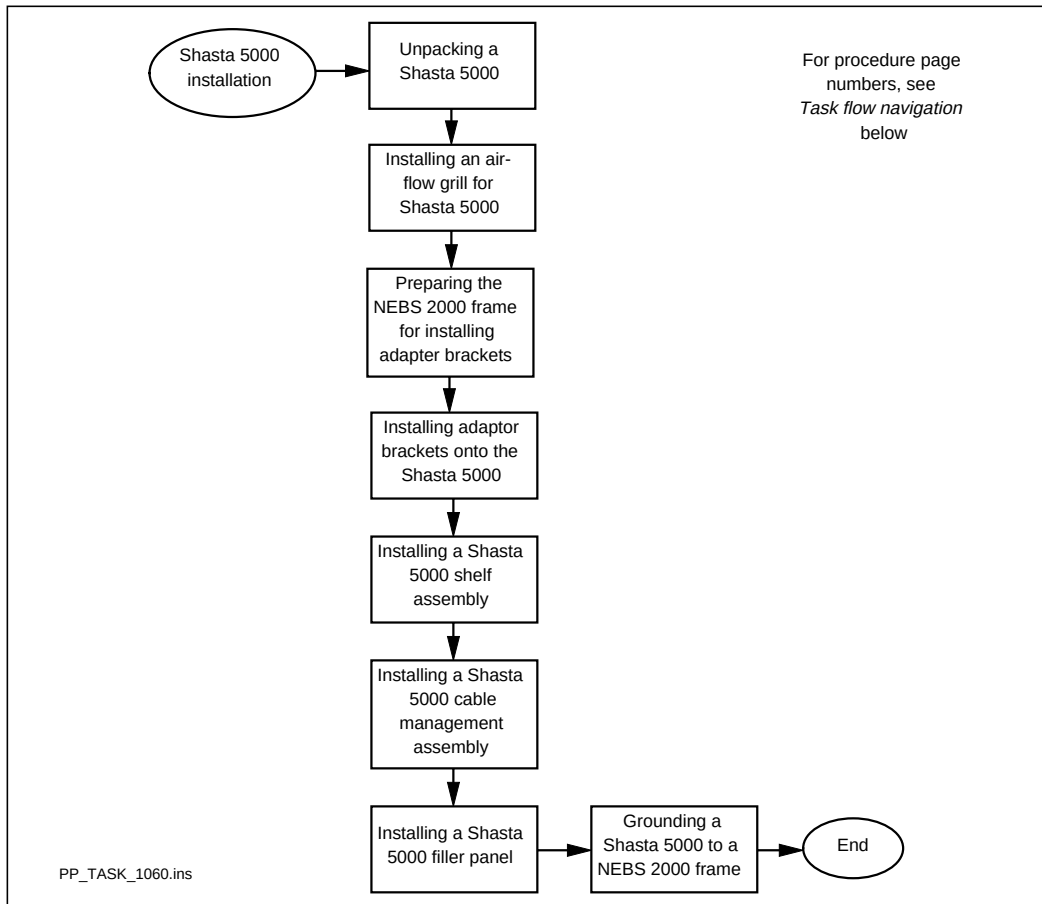
Prerequisites to Shasta 5000 installation

- Determine if the floor can accommodate the combined weight of both the Shasta 5000 and the Passport 15000 or 20000. The combined weight of two fully provisioned nodes will be approximately 568 kg (1,252 lbs). Aside from this consideration, the normal site preparations of a Shasta 5000 apply to the installation.
- You will need the hardware kit NTHW85 required to add a Shasta 5000 to a NEBS 2000 frame. The kit contains
 - a pair of adapter brackets (P0914660 for the right and P0914659 for the left) to mount a Shasta 5000 onto a NEBS 2000 frame
 - an air-flow grill (P0914658) for the front space between the two nodes
 - a cable management assembly to be installed above the Shasta 5000
 - self-tapping mounting screws with 10-mm (3/8-inch) hex heads
- You will require drivers for 10-mm (3/8-inch) hex-head screws.
- Before installing a Shasta 5000 switch into a NEBS 2000 frame (NTRU04), the frame must already be installed and anchored to the floor, with a Passport 15000 or 20000 switch in its lower half.
- You must supply power and ground cables, and any signalling cables.
- After installing the Shasta 5000 hardware into the NEBS 2000 frame, follow the appropriate procedures in S-623-01 *Shasta 5000 BSN Installation and Maintenance Manual* to complete the installation of the Shasta 5000 (for example, installing cards and cables, power and alarm cabling, and powering up).

Shasta 5000 installation task flow

This task flow shows the sequence of procedures you do to install a Shasta 5000 in your Passport switch. To link to any procedure, go to “Task flow navigation” (page 151).

Figure 36
Task flow of a Shasta 5000 installation



Task flow navigation

The following references are listed alphabetically:

- “Grounding a Shasta 5000 to a NEBS 2000 frame” (page 313)

- “Installing a Shasta 5000 air-flow grill” (page 399)
- “Installing a Shasta 5000 cable management assembly” (page 402)
- “Installing a Shasta 5000 filler panel” (page 404)
- “Installing a Shasta 5000 shelf assembly” (page 406)
- “Installing adapter brackets onto a Shasta 5000” (page 460)
- “Preparing the NEBS 2000 frame for installing adapter brackets” (page 526)
- “Unpacking the Shasta 5000” (page 698)

Chapter 13

Power-and-ground hardware of a Passport 15000 or 20000

Select from the following tasks or procedures to install or replace power and ground hardware:

- “BIM replacement” (page 154)
- “BIP power-and-ground cable installation” (page 157)
- “BIP power input cable replacement” (page 161)
- “BIP replacement” (page 164)
- “Power-and-ground cable assembly replacement” (page 167)
- “Powerup of a Passport 15000 or 20000” (page 170)
- “PIM replacement” (page 174)
- “Replacing a PIM cable” (page 640)

BIM replacement

Replace a breaker interface module (BIM) to restore power from a breaker interface panel (BIP) to its half of the shelf assembly or to accommodate replacing an upper shelf Passport 15000 with a Passport 20000 in a NEBS 2000 frame.

- “Prerequisites to BIM replacement” (page 154)
- “BIM replacement task flow” (page 155)

Prerequisites to BIM replacement

- You need a BIM with one of the appropriate PECs identified in the table “Combinations of BIMs in a BIP” (page 155).
 - When using a new BIM, identify the PEC from its shipping container.
 - When redeploying one or both BIMs from another BIP, you must identify the PEC of each from your site records.
- Since the PEC of a BIP is not visible on it and there are no exterior features to distinguish an AP6C62 from an AP6C68, you must verify which BIP you have from
 - the cover of the upper cable management channel on the front of the lower shelf assembly, which has a label identifying the shelf node as a Passport 15000 or a Passport 20000. On older models of a Passport 15000, the cover is blank.
 - your site records
- The BIP for a Passport 20000 accommodates BIMs with higher power ratings than the BIP of a Passport 20000. A BIM pair for a Passport 15000 can operate in the BIP of a Passport 20000 to power a Passport 15000. The BIM pair for a Passport 20000 must not be operated in the BIP of a Passport 15000 to power a Passport 20000. The PECs of BIM pairs must always match exactly. For the safe mix of BIMs, see the table “Combinations of BIMs in a BIP” (page 155).

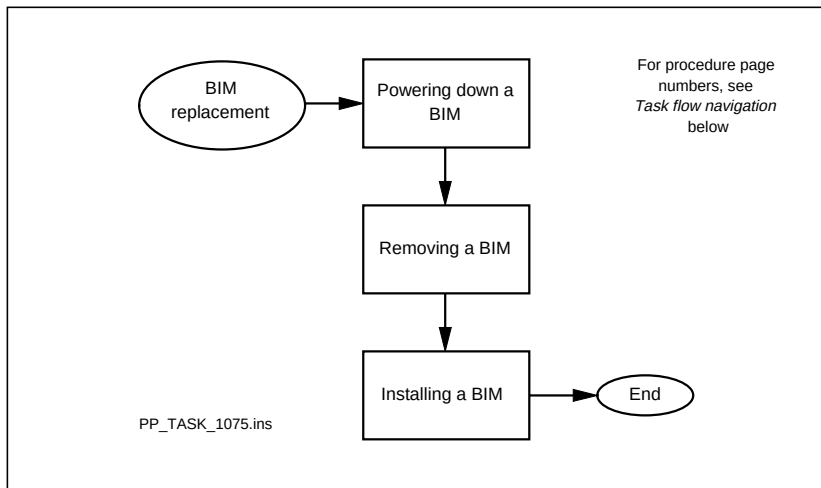
Table 1
Combinations of BIMs in a BIP

Shelf type	PEC of a BIP with 2 BIMs	PEC of the BIM pairs that can be added
Passport 20000	AP6C68	two or four AP6C67PA, or two AP6C67PA and two NT6C60PA
Passport 15000	NT6C62	two or four NT6C60PA, or two NT6C60PA and two AP6C67PA

BIM replacement task flow

This task flow shows the sequence of procedures you do to replace a BIM. To link any procedure, go to “Task flow navigation” (page 155).

Figure 37
Task flow of a BIM replacement



Task flow navigation

The following references are listed alphabetically:

- “Installing a BIM” (page 322)

- “Powering down a BIM” (page 521)
- “Removing a BIM” (page 528)

BIP power-and-ground cable installation

Install BIP power-and-ground cables to provide power from a site power source or system of ac rectifiers to the breaker interface panel (BIP), and to ground the Passport 15000 or 20000 to the site ground window.

- “Prerequisites to BIP power-and-ground cable installation” (page 157)
- “BIP power-and-ground cable installation task flow” (page 158)

Prerequisites to BIP power-and-ground cable installation

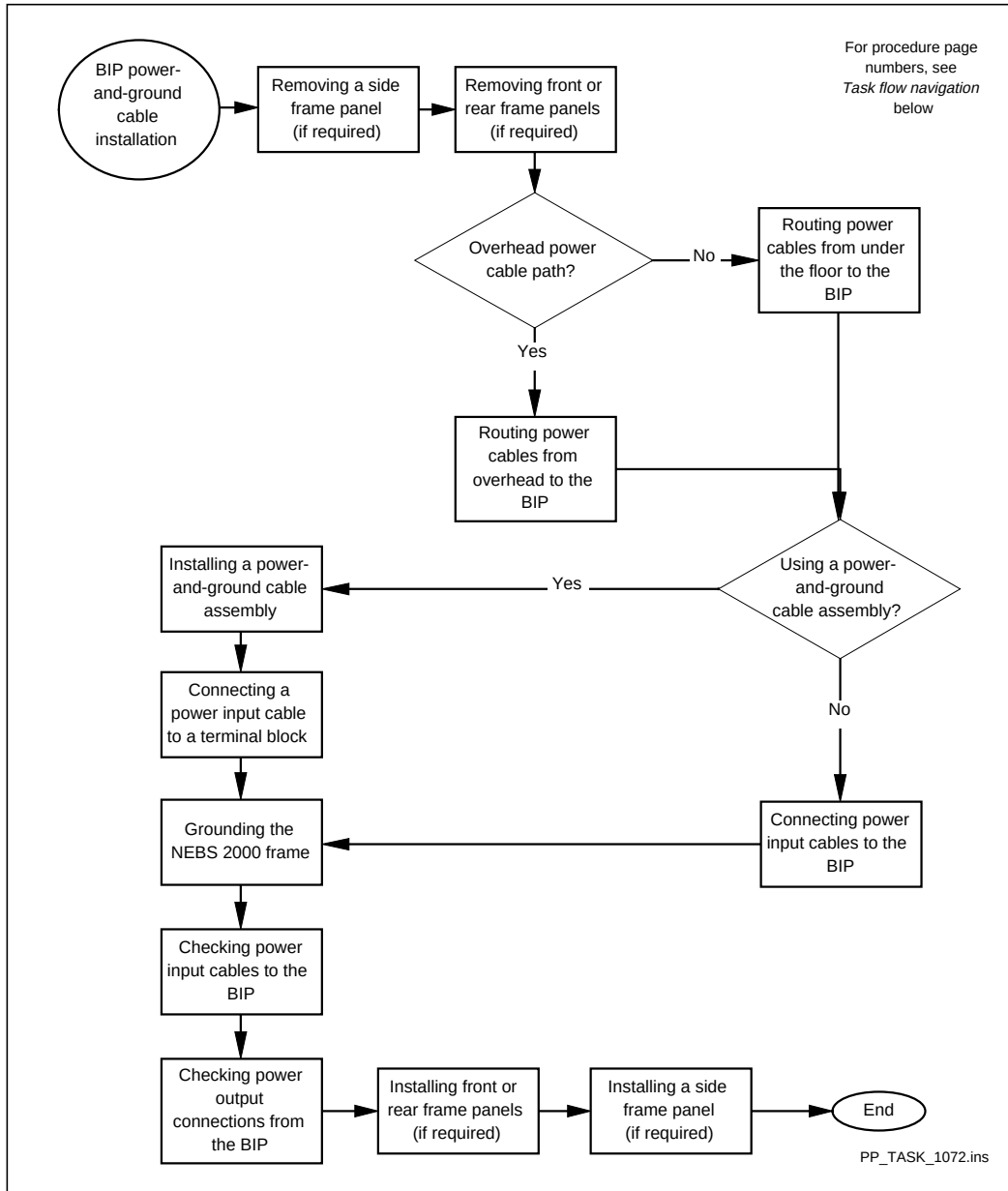
- Determine the types, ratings, size, length, and current capacity for the power and ground cables from site planning in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.
- Install the power cabling with or without conduit between the source of power and the BIP according to your local electrical standards. Leave enough cable slack at each end to accommodate the approximate final position of the terminal connections. Label both ends of each cable to indicate the mapping of the power source connection points to the studs at the rear of the BIP. Map the feeds according to “Prerequisites to installing dc power input cables” in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.
- Record the electrical hookup information as you install the cables for both your site records and on each junction of a cable. Include such information as
 - the grounding method and the available grounding points for all hardware that will interwork with the Passport 15000 or 20000 and therefore share the same ground window
 - the type of power source as dc from the site power plant or from a system of ac rectifiers
 - if used, any particulars about the system of ac rectifiers
 - the A1, A2, B1, and B2 feed cables relative to the specific BIM connections
 - which upstream breakers or fuses control which feeds at the BIP
 - the cable path from the power source to the BIP

- the size and distance of each leg of power cables
- any non-typical hookup or hookup that exceeds your local electrical standards

BIP power-and-ground cable installation task flow

This task flow shows the sequence of procedures you do to install the BIP power-and-ground cable. To link any procedure, go to “Task flow navigation” (page 160).

Figure 38
Task flow of a BIP power-and-ground cable installation



Task flow navigation

The following references are listed alphabetically:

- “Checking power input cables to the BIP” (page 219)
- “Checking power output connections from the BIP” (page 228)
- “Connecting a power input cable to a terminal block” (page 262)
- “Connecting power input cables to the BIP” (page 283)
- “Grounding the NEBS 2000 frame” (page 316)
- “Installing a side frame panel” (page 422)
- “Installing front or rear frame panels” (page 490)
- “Installing a power-and-ground cable assembly” (page 393)
- “Removing a side frame panel” (page 580)
- “Removing front or rear frame panels” (page 619)
- “Routing power cables from overhead to the BIP” (page 670)
- “Routing power cables from under the floor to the BIP” (page 672)

BIP power input cable replacement

Replace a breaker interface panel (BIP) power input cable to restore power to a BIM of the BIP.

- “Prerequisites to power input cable replacement” (page 161)
- “Power input cable replacement task flow” (page 161)

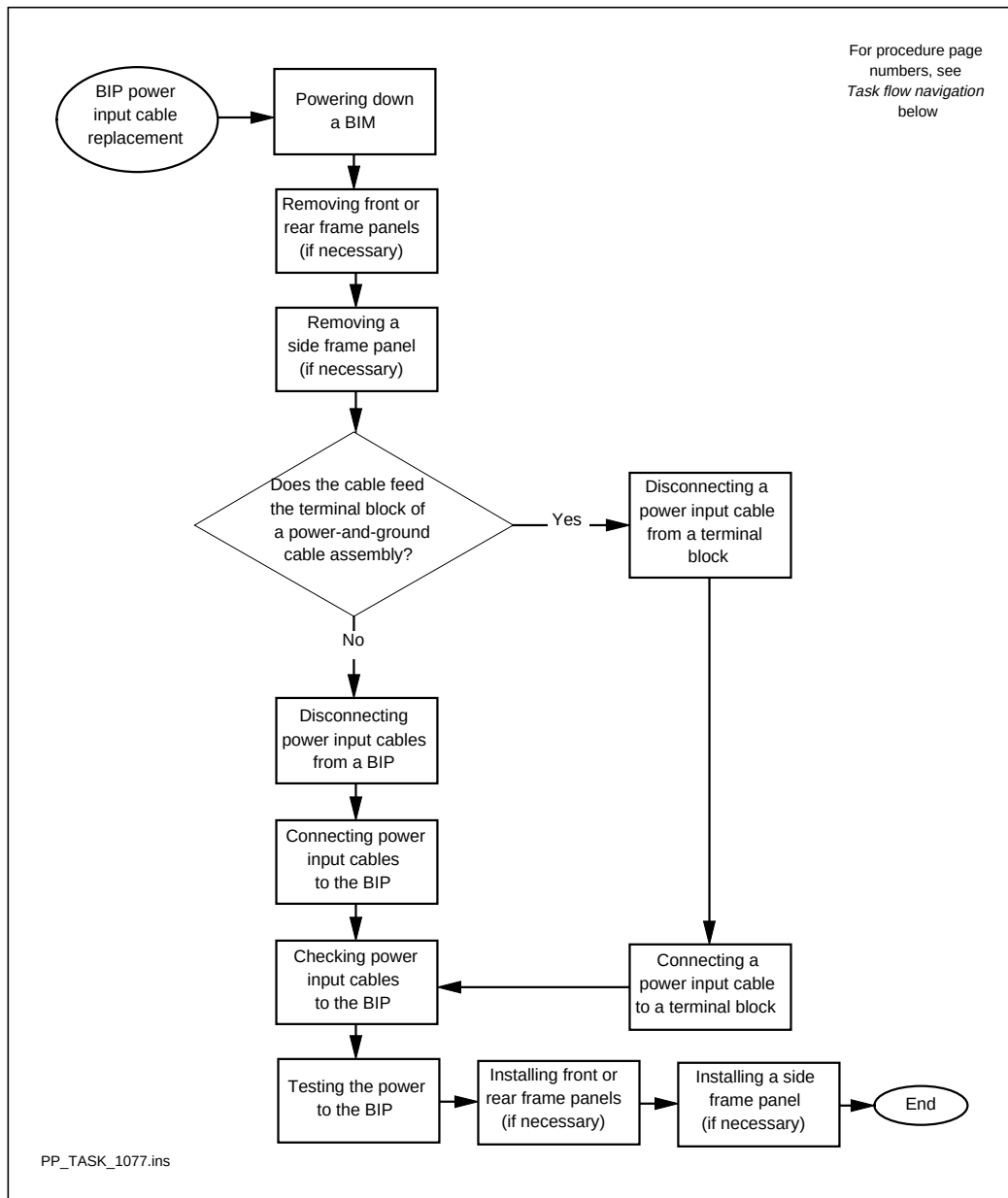
Prerequisites to power input cable replacement

- You need a replacement cable with the same ratings, gauge, length, and quality or better.

Power input cable replacement task flow

This task flow shows the sequence of procedures you do to replace a BIP power input cable. To link any procedure, go to “Task flow navigation” (page 163).

Figure 39
Task flow of a BIP power input cable replacement



Task flow navigation

The following references are listed alphabetically:

- “Checking power input cables to the BIP” (page 219)
- “Connecting power input cables to the BIP” (page 283)
- “Connecting a power input cable to a terminal block” (page 262)
- “Disconnecting a power input cable from a terminal block” (page 300)
- “Disconnecting power input cables from the BIP” (page 301)
- “Installing a side frame panel” (page 422)
- “Installing front or rear frame panels” (page 490)
- “Powering down a BIM” (page 521)
- “Removing a side frame panel” (page 580)
- “Removing front or rear frame panels” (page 619)
- “Testing the power to the BIP” (page 691)

BIP replacement

Replace a breaker interface panel (BIP) to increase the power input capability of a dual-shelf frame setup that includes adding a Passport 20000, or to correct a hardware failure of a non-modular part of the unit.

- “Prerequisites to BIP replacement” (page 164)
- “BIP replacement task flow” (page 164)

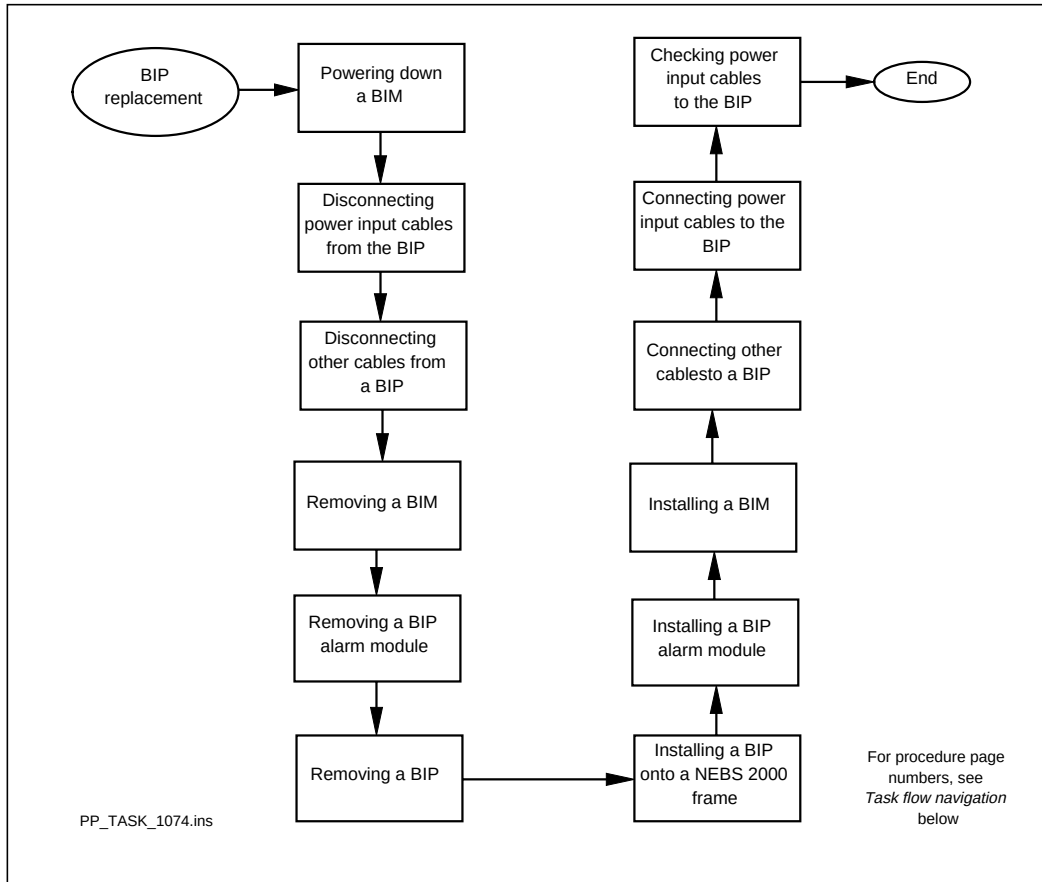
Prerequisites to BIP replacement

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a BIP with one of the following PECs:
 - NT6C61 with four BIMs for two Passport 15000s
 - NT6C62 with two BIMs for one Passport 15000
 - AP6C67 with four BIMs for two Passport 20000s or a combination of one Passport 15000 and one Passport 20000
 - AP6C68 with two BIMs for a Passport 20000
- Have a helper assist you in handling the BIPs. A BIP weighs up to 16 kg (35 lbs) if four BIMs and the alarm module are already installed.
- Removing a BIP means disconnecting power to it. With no power, the Passport 15000 or 20000 switch or switches that it feeds are out of service until the BIP is re-connected and the system is powered up. Choose a maintenance window with the lowest average amount of traffic to the node.

BIP replacement task flow

This task flow shows the sequence of procedures you do to replace the BIP. To link any procedure, go to “Task flow navigation” (page 165).

Figure 40
Task flow of a BIP replacement



Task flow navigation

The following references are listed alphabetically:

- “Checking power input cables to the BIP” (page 219)
- “Connecting other cables to a BIP” (page 282)
- “Connecting power input cables to the BIP” (page 283)
- “Disconnecting power input cables from the BIP” (page 301)
- “Disconnecting other cables from a BIP” (page 305)

- “Installing a BIM” (page 322)
- “Installing a BIP alarm module” (page 326)
- “Installing a BIP onto a NEBS 2000 frame” (page 334)
- “Powering down a BIM” (page 521)
- “Removing a BIM” (page 528)
- “Removing a BIP” (page 531)
- “Removing a BIP alarm module” (page 532)

Power-and-ground cable assembly replacement

Replace a power-and-ground cable assembly to restore full power to the breaker interface panel (BIP).

- “Prerequisites to power-and-ground cable assembly replacement” (page 167)
- “Power-and-ground assembly replacement task flow” (page 167)

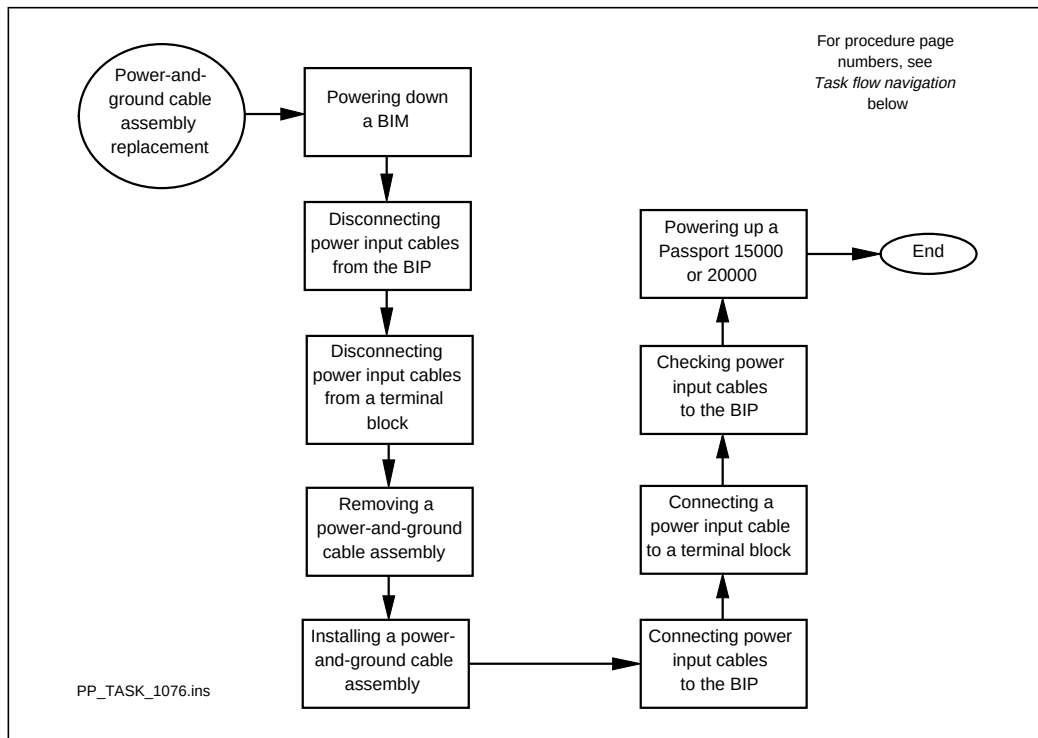
Prerequisites to power-and-ground cable assembly replacement

- The power-and-ground kit for the polyvalent assembly is A0834143 and for the European Telecommunications Standards Institutes (ETSI) assembly is A0834149.
- Minimize the down time of the system by reviewing all procedures and planning to do all consecutively without delays in between. Also do the procedures during a period of lowest average traffic for each Passport 15000 or 20000 switch.

Power-and-ground assembly replacement task flow

This task flow shows the sequence of procedures you do to replace the power-and-ground cable assembly. To link any procedure, go to “Task flow navigation” (page 168).

Figure 41
Task flow of a power-and-ground cable assembly replacement



Task flow navigation

The following references are listed alphabetically:

- “Checking power input cables to the BIP” (page 219)
- “Connecting a power input cable to a terminal block” (page 262)
- “Connecting power input cables to the BIP” (page 283)
- “Disconnecting a power input cable from a terminal block” (page 300)
- “Disconnecting power input cables from the BIP” (page 301)
- “Installing a power-and-ground cable assembly” (page 393)
- “Powering down a BIM” (page 521)
- “Powerup of a Passport 15000 or 20000” (page 170)

- “Removing a power-and-ground cable assembly” (page 567)

Powerup of a Passport 15000 or 20000

Power up a Passport 15000 or 20000 to enable the switch hardware to be downloaded with software for initial operation or to return the system to operation.

- “Prerequisites to powerup of a Passport 15000 or 20000” (page 170)
- “Powerup of a Passport 15000 or 20000 task flow” (page 171)

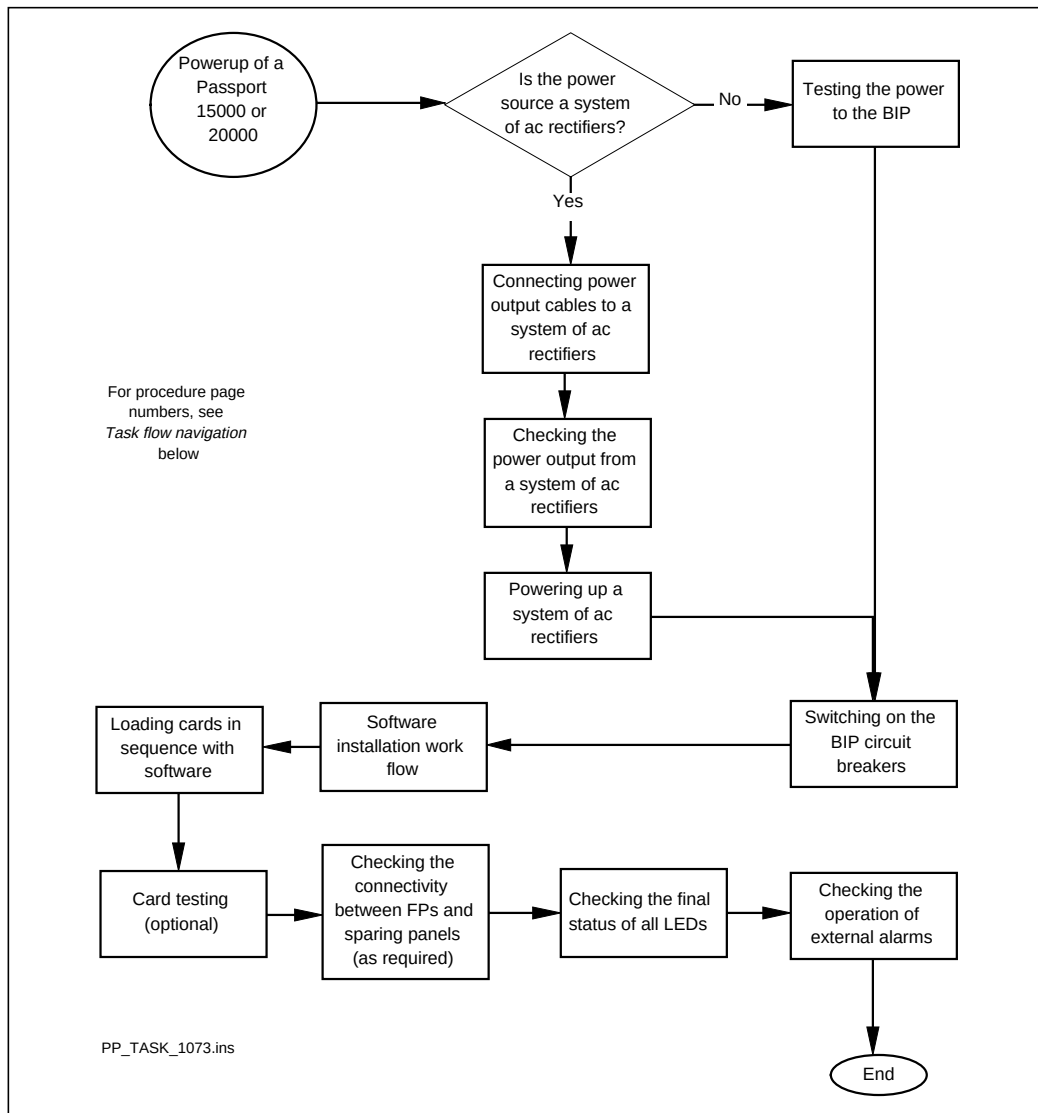
Prerequisites to powerup of a Passport 15000 or 20000

- You need access to 241-5701-270 *Passport 7400, 15000, 20000 Software Installation*.
- All cables must be installed for interworking equipment, signalling (traffic), timing, and alarms.
- All power cables must be installed from the breaker interface panel (BIP) up to the power source without being connected and must have passed the checks with the power off.
- All equipment that is connected to or interworking with the Passport 15000 or 20000 must share the same site ground window.
- Each Passport sparing panel will be powered up from the function processor (FP) cards through the control port cable when at least one FP is powered up.
- The following interworking equipment can be powered up independently from the BIP, but needs to be on to verify operation of the system:
 - an EdgeLink 100 DS3 multiplexor
 - the hardware of a Preside Multiservice Data Manager (MDM)
 - a local operator terminal and its modem (if present)
 - a multiport aggregate device
 - the Passport 7400 of a Passport 15000-VSS
 - a Shasta 5000 that shares a NEBS 2000 frame with a Passport 15000 or 20000

Powerup of a Passport 15000 or 20000 task flow

This task flow shows the sequence of tasks to power up a Passport 15000 or 20000. To link any procedure, go to “Task flow navigation” (page 173).

Figure 42
Task flow of a power-up of a Passport 15000 or 20000



Task flow navigation

The following references are listed alphabetically:

- “Card testing”. See 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting*.
- “Checking power output from a system of ac rectifiers” (page 222)
- “Checking the connectivity between FPs and sparing panels” (page 230)
- “Checking the final status of all LEDs” (page 232)
- “Checking the operation of external alarms” (page 234)
- “Connecting power output cables to a system of ac rectifiers” (page 292)
- “Loading cards in sequence with software” (page 508)
- “Powering up a system of ac rectifiers” (page 524)
- “Software installation work flow”. See 241-5701-270 *Passport 7400, 15000, 20000 Software Installation*.
- “Switching on the BIP circuit breakers” (page 685)
- “Testing the power output from a system of ac rectifiers” (page 690)
- “Testing the power to the BIP” (page 691)

PIM replacement

Replace a power interface module (PIM) to restore back-up power to a shelf cage.

- “Prerequisites to PIM replacement” (page 174)
- “PIM replacement task flow” (page 174)

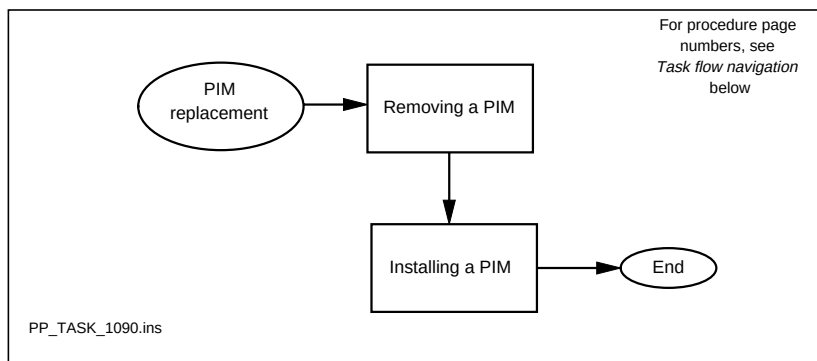
Prerequisites to PIM replacement

- Each PIM has terminations for the SCB (HSCX bus) and clock distribution such that disconnecting a PIM can affect the software system. Terminations are spread across the PIMs to ensure that removing one will not affect the redundant pairs. Replace the PIM during a period of lowest traffic to minimize the impact on clock distribution.

PIM replacement task flow

This task flow shows the sequence of procedures you do to replace a PIM. To link any procedure, go to “Task flow navigation” (page 173).

Figure 43
PIM replacement task flow



Task flow navigation

The following references are listed alphabetically:

- “Installing a PIM” (page 389)
- “Removing a PIM” (page 565)

Chapter 14

Shelf assembly

Use the following task to replace the shelf assembly.

- “Shelf assembly replacement” (page 176)

Shelf assembly replacement

Replace a shelf assembly to restore the operation of a card or module slot that is out of service because of one or more bent pins.

- “Prerequisites to shelf assembly replacement” (page 176)
- “Shelf assembly replacement task flow” (page 177)

Prerequisites to shelf assembly replacement

- Replacing a shelf assembly requires the Passport 15000 or 20000 to be removed from service. The minimum estimated down time from power-down to power-up for a Passport 15000 and 20000 is 1 hour and 15 minutes. Anticipate a 2-hour window of activities to allow a sufficient margin to handle all hardware. The estimate excludes the time to power up the system. The duration depends on:
 - one person doing most of the activities and is experienced working on a Passport 15000 or 20000
 - a helper assisting with the steps to remove and insert an empty shelf assembly itself because a Passport 15000 weighs about 99 kg (218 lbs) and a Passport 20000 weighs about 34 kg (74 lbs)
 - having all temporary ESD-protection storage containers at hand
 - having no delays or problems with any of the procedure steps
- Minimize the impact of downtime by beginning the replacement during the period of lowest average traffic for the node.
- When returning a Passport 15000 or 20000, the rear modules must remain installed. A replacement shelf assembly includes the following rear modules installed at the factory:
 - the alarm/BITS module
 - the MAC address module
 - the four power interface modules (PIMs)
- Ensure that all front and rear cable ends are labeled with specific connection information. This will enable a quicker re-connection of each cable to the same connection. At the rear, the 4 cables connecting to the alarm/BITS module should be labeled J1, J2, J3, and J4 as on the module itself.

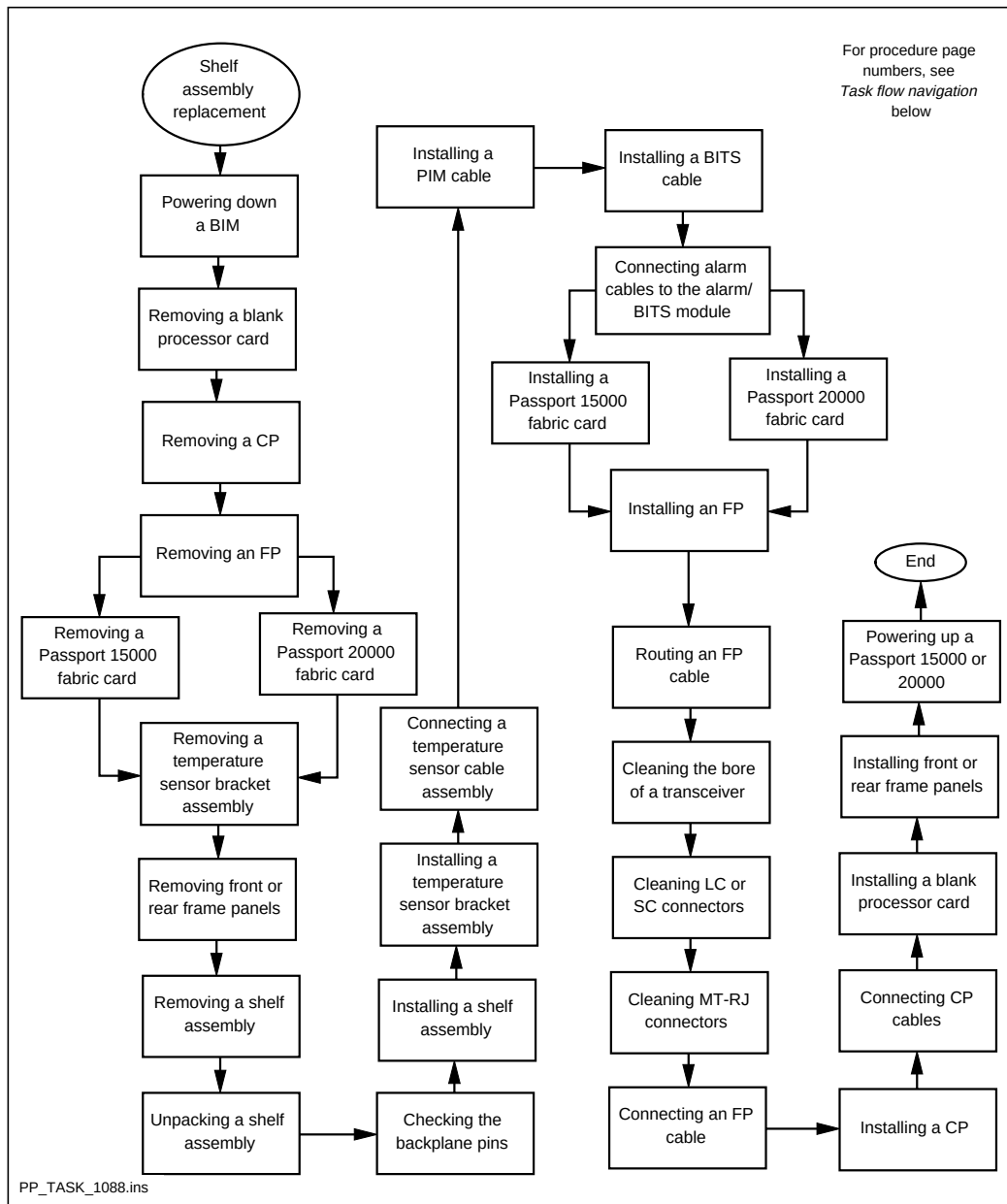
**CAUTION****Risk of prevented service**

The CPs and FPs are configured in software according to specific slot numbers. For the software to operate again, each card must be returned to the same slot it came from. Otherwise, the Passport 15000 or 20000 or portions of it may not return to service. Record your card locations.

Shelf assembly replacement task flow

This task flow shows the sequence of tasks you do to replace a shelf assembly in a Passport 15000 or 20000. To link any procedure, go to “Task flow navigation” (page 179).

Figure 44
Task flow of a shelf assembly replacement



Task flow navigation

The following references are listed alphabetically:

- “Checking the backplane pins” (page 216)
- “Cleaning LC or SC connectors” (page 240)
- “Cleaning MT-RJ connectors” (page 245)
- “Cleaning the bore of a transceiver” (page 248)
- “Connecting a temperature sensor cable assembly” (page 265)
- “Connecting alarm cables to the alarm/BITS module” (page 268)
- “Connecting an FP cable” (page 273)
- “Installing a BITS cable” (page 336)
- “Installing a blank processor card” (page 338)
- “Installing a CP” (page 341)
- “Installing a fabric card into a Passport 15000” (page 344)
- “Installing a fabric card into a Passport 20000” (page 349)
- “Installing a PIM cable” (page 391)
- “Installing a shelf assembly” (page 407)
- “Installing a temperature sensor bracket assembly” (page 435)
- “Installing an FP” (page 462)
- “Installing front or rear frame panels” (page 490)
- “Powering down a BIM” (page 521)
- “Powerup of a Passport 15000 or 20000” (page 170)
- “Removing a blank processor card” (page 536)
- “Removing a CP” (page 537)
- “Removing a fabric card from a Passport 15000” (page 539)
- “Removing a fabric card from a Passport 20000” (page 541)
- “Removing a PIM” (page 565)
- “Removing a shelf assembly” (page 570)

- “Removing a temperature sensor bracket assembly” (page 584)
- “Removing an FP” (page 604)
- “Removing front or rear frame panels” (page 619)
- “Routing FP cables” (page 666)
- “Unpacking a shelf assembly” (page 697)

Chapter 15

Sparing and fanout panels

Select from the following tasks:

- “Sparing panel replacement” (page 182)
- “Fanout panel replacement” (page 185)

Sparing panel replacement

Replace a sparing panel, if it fails, to restore connectivity between FPs and customer premises equipment and sparing functionality.

- “Prerequisites to sparing panel replacement” (page 182)
- “Sparing panel replacement task flow” (page 182)

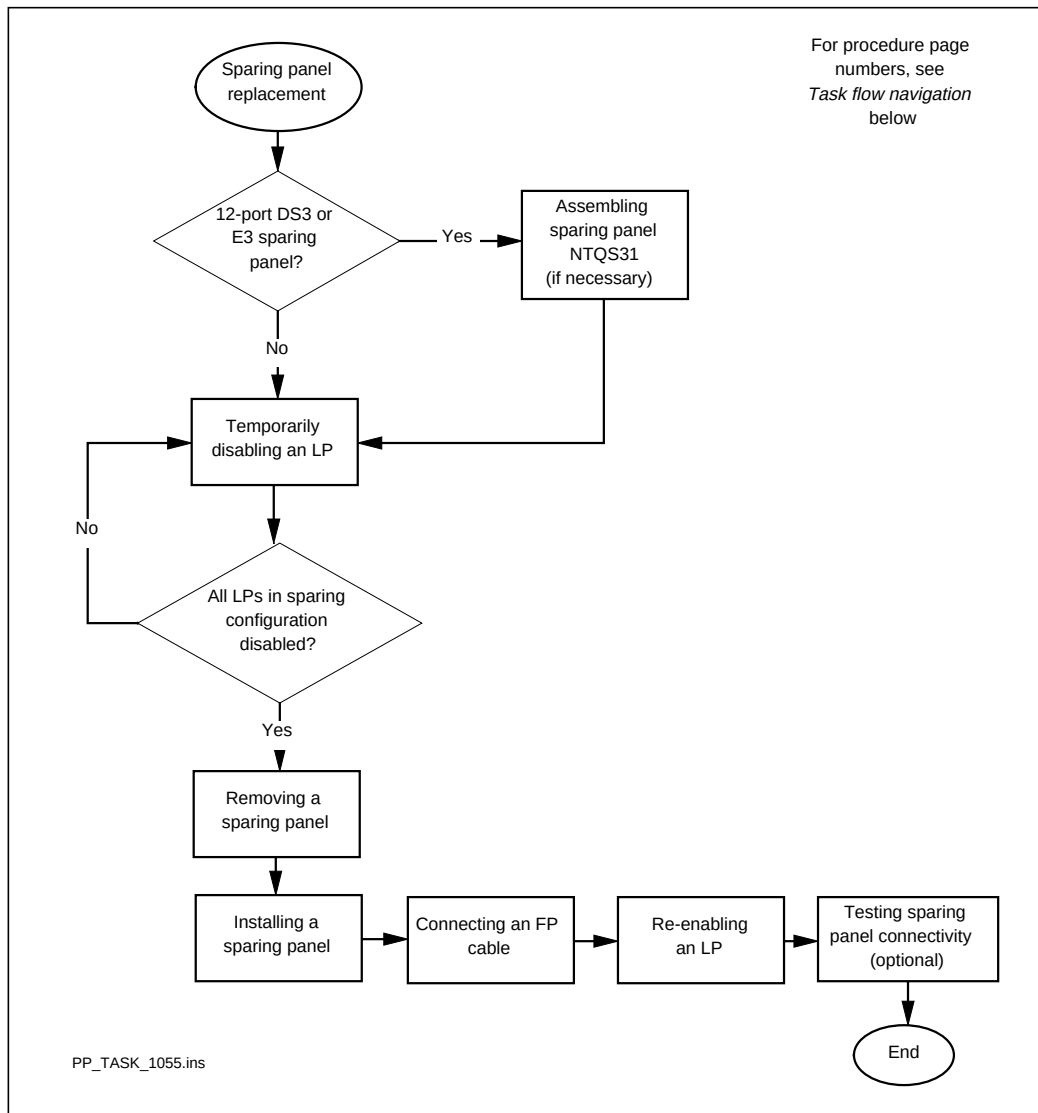
Prerequisites to sparing panel replacement

- Some of the procedures in this task are not located in this NTP. Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- When replacing a sparing panel, all traffic passing through it is dropped.

Sparing panel replacement task flow

This task flow shows the sequence of procedures you do to replace a sparing panel or fanout panel. To link to any procedure, go to “Task flow navigation” (page 184).

Figure 45
Task flow of a sparing panel replacement



Task flow navigation

The following references are listed alphabetically:

- “Assembling sparing panel NTQS31” (page 207)
- “Connecting an FP cable” (page 273)
- “Installing a sparing panel” (page 431)
- “Re-enabling an LP”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Removing a sparing panel” (page 582)
- “Temporarily disabling an LP”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Testing sparing panel connectivity” (page 688)

Fanout panel replacement

Replace a fanout panel, if it fails, to restore the connections of the DS3 or E3 FPs to customer premises equipment.

- “Prerequisites to fanout panel replacement” (page 185)
- “Fanout panel replacement task flow” (page 185)

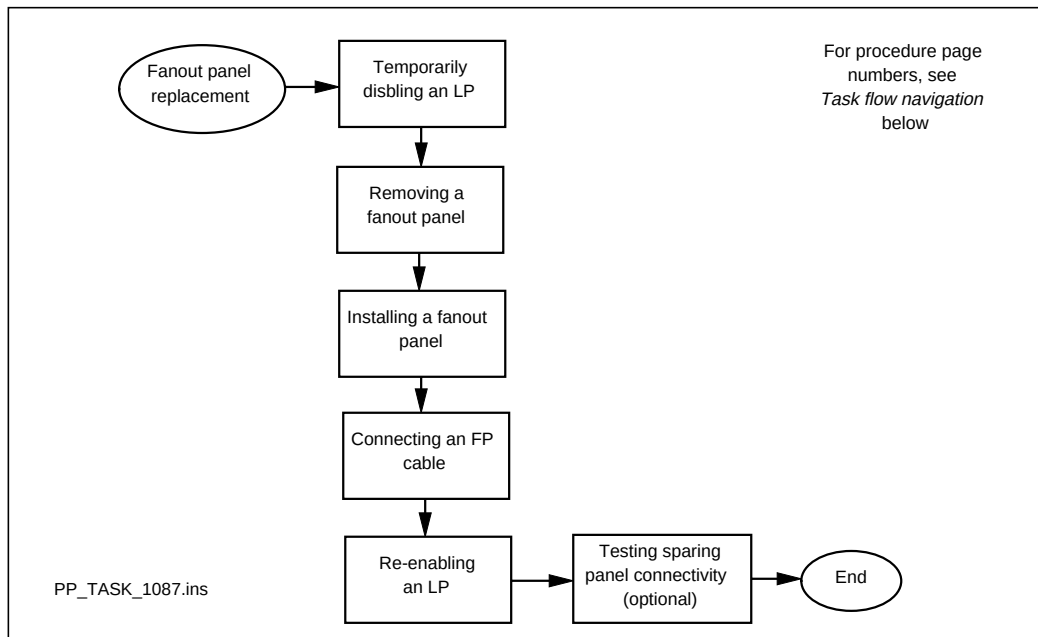
Prerequisites to fanout panel replacement

- Ensure you have access to 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* for procedures in this task that are not located in this NTP.
- You will need a fanout panel with PEC NTHW52.
- When replacing a fanout panel, all traffic passing through it is dropped.

Fanout panel replacement task flow

This task flow shows the sequence of procedures you do to replace a fanout panel. To link to any procedure, go to “Task flow navigation” (page 186).

Figure 46
task flow of a fanout panel replacement



Task flow navigation

The following references are listed alphabetically:

- “Connecting an FP cable” (page 273)
- “Installing a fanout panel” (page 372)
- “Re-enabling an LP”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Removing a fanout panel” (page 555)
- “Temporarily disabling an LP”. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- “Testing sparing panel connectivity” (page 688)

Chapter 16

Hardware procedures

This chapter contains all of the hardware-specific procedures that are invoked in sequence by Passport 15000 or 20000 hardware tasks. The name of the procedure in this chapter matches the name used in the box of each task flow figure that invokes it. The procedures are listed here alphabetically.

Anchoring the NEBS 2000 frame

Anchor the NEBS 2000 frame to the floor to prevent it from tipping over.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need these parts:
 - a frame with PEC NTRU04 (other names for the frame include PTE 2000 and NEBS 2000 frame).
 - the hardware parts that arrived with the frame, for example, the triangular plates that cover the oval openings
 - anchor kits with part number NTRU0327 or NTRU0325, each containing 4 anchors plus accessory hardware per kit; the NEBS 2000 frame passes zone 4 compliance using 4 anchors from NTRU04
- The footprint of the frame must already be marked on the floor and the anchor holes should already have been drilled as described in *241-1501-205 Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*, the chapter on site preparation.
- Installing the frame anchors one at a time until all can be tightened in sequence. A minimum of four anchors are required at the corners of the frame for any installation. The anchor kit NTRU0327 is rated for zone 4, earthquake tolerance. Four anchors can withstand an earthquake. Adding two more anchor rods increases resistance to earthquakes and increases the distribution of frame weight within the NEBS footprint.
- For anchoring to a cement floor, refer to the figure “M12 anchor assembly” (page 192). The anchor kit may include one or more shims as shown in the figure (item 7), however, shims are not used for a Passport 15000 or 20000 because the NEBS 2000 frame (NTRU04) should already be levelled on its levelling feet.
- This procedure involves anchoring to a raised floor. Installing an anchor assembly into a cement floor is similar.
- Refer to “Additional information for installing the frame anchors” (page 193).

**CAUTION****Risk of damage by fire**

In the bottom rear center of the frame, each removable plate (drip tray, part number P0870734) may have two knockout disks. Each knockout disk must remain intact and unbent unless a power conduit from a raised floor will be routed through it. Leaving an opening reduces the fire-proofing of the Passport 15000 or 20000.

Procedure steps

- 1 The parts of each anchor are loosely assembled in the anchor kit. Put one aside to use as the example to fasten the others to the frame.
- 2 Remove from the threaded rod anchor assembly the items 1 to 6 in the figure "M12 anchor assembly" (page 192). Lay them out in sequence. If present, shims are not used.
- 3 Unfasten the 2 captive screws of each kick plate at the front and rear of the frame base. This enables easier access above the frame base.
- 4 Remove the tape from covering the anchor holes.
- 5 For each threaded rod to be installed, it must be measured and cut as follows.
 - From an uncut end of each threaded rod, mark a length to accommodate the anchor, for example, 10 cm (4 in.) as shown in the figure "M12 anchor assembly" (page 192). If the anchor holes are deeper than this measurement, you must plan to either have the anchor sit flush with the floor or at the bottom of the hole. If you choose the bottom, you must measure the depth of the hole and mark the difference on the rod.
 - From a specific hole intended for the rod, measure the perpendicular distance between the floor at the hole and the base of the frame at the oval opening. Mark the same distance on the rod above the mark for the anchor length.
 - Add 7.5 cm (3 in.) above the second mark to indicate the length that the rod is to pass above the base of the frame into the kick-plate cavity.
 - Cut the rod at the last mark. File the thread pitch so that its nut can thread onto the rod easily.

- 6 Place an anchor assembly into each anchor hole and seat it flush with the floor or at the bottom of the hole, whichever one you measured for.
- 7 This is an optional step. Add an extra 18-mm (23/32-in.) nut and a 10-cm (4-in.) wide by 0.5-cm (3/16-in.) thick washer onto the rod to help support the frame weight on a raised floor. (Nut and washer may not be included in the anchor kit.) Thread the nut to about 28 cm (11 in.) from the cut end of the rod, or at least enough to clear the raised floor structure when the rod will be threaded into the anchor. Add the washer on top of the nut from the cut end.

**CAUTION****Risk of damage by tilting**

When tilting a NEBS 2000 frame with one or two Passport 15000 or 20000 switches in it, its levelling feet are likely to break off from the weight of the equipment. If you must tilt the frame to get it over threaded rods, first thread the 4 levelling feet all the way in.

- 8 From under the raised floor, insert the cut end of the threaded rod up through the oval opening in the base of the frame and then thread the uncut end of the rod into the anchor. For non-raised floors, reach through the kick-plate cavity. To thread the rod, you must first align the rod with the free-moving cone at the bottom of the anchor. Do this by feel until the rod starts to thread into the cone. Tighten the rod into the cone so that 10 cm (4 in.) of rod is inside the anchor as shown in the figure "M12 anchor assembly" (page 192).
- 9 Ensure that the frame is still level. If not, refer to the procedure "Levelling the frame or frame pair" (page 505).
- 10 For each anchor rod placed through an oval opening in the base of the frame, do the following.
 - From kit A0682225, place a plate over the oval opening so that the threaded rod passes through its hole, the cut-off corner allows room for the weldnut of the nearest levelling foot, and no gap is visible.
 - Add the remaining parts of the anchor assembly onto the rod in sequence, as shown in the figure "M12 anchor assembly" (page 192).
 - Holding the rod vertical, center it and all washers through the oval opening, while finger-tightening the nut (item 2). If you have to tilt the rod away from being right-angled relative to the frame base in order

to center the rod in the oval opening, then keeping the rod vertical is more important.

- 11** For each remaining oval opening that does not have an anchor rod passing through it, fasten a plate over the opening so that no gap appears. The plates are square with a screw hole in one corner. The frame base has a screw hole beside the inner oval openings. Fasten each plate using a provided thread-forming 10-mm (3/8-in.) hex-head screw.
- 12** Starting at a middle anchor (if any) and moving outwards in a spiral, tighten all nuts.

For M12 anchors, torque each nut to 78 Nm (58 lbs-ft) using an 18-mm (23/32-in.) 6-point deep socket.

For 10-mm (3/8-in.) anchors, torque each nut to 48 Nm (36 lbs-ft) using a 16-mm (41/64-in.) 6-point deep socket.
- 13** After fastening the anchors, the levelling feet may no longer touch the floor. Check each levelling foot to ensure it touches the floor. If not, tighten each until it touches, then tighten a 1/4 turn more.

You may need to level the frame again by unfastening the anchor nuts, adjusting the levelling feet, and re-fastening the anchor nuts.
- 14** Under the floor tiles, thread each 18-mm (23/32-in.) nut up the rods until the washer is snugly against the underside of the floor tile, as shown in the figure "Anchoring to a raised floor" (page 193). Then tighten each nut another 1/4 turn.
- 15** Fasten each kick plate back on the frame base.

Procedure job aid

Figure 47
M12 anchor assembly

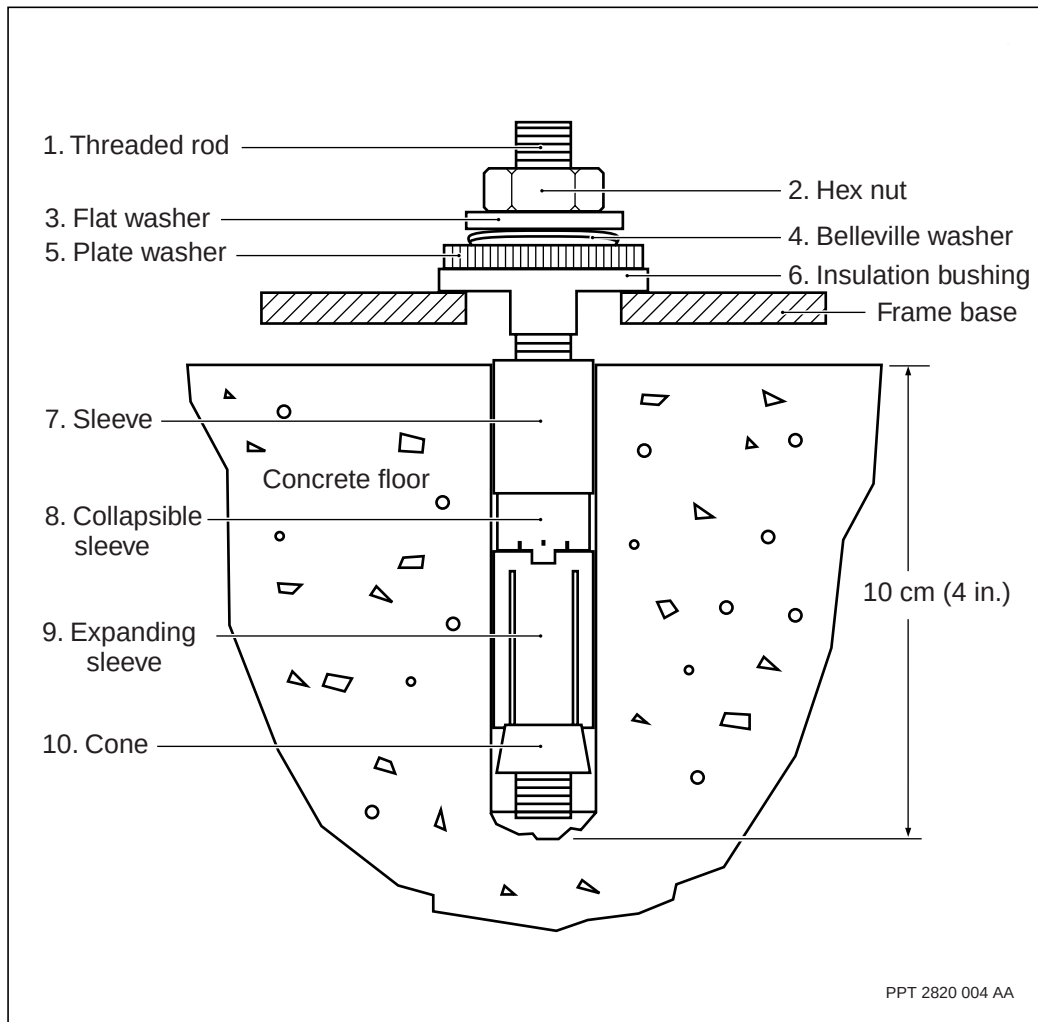
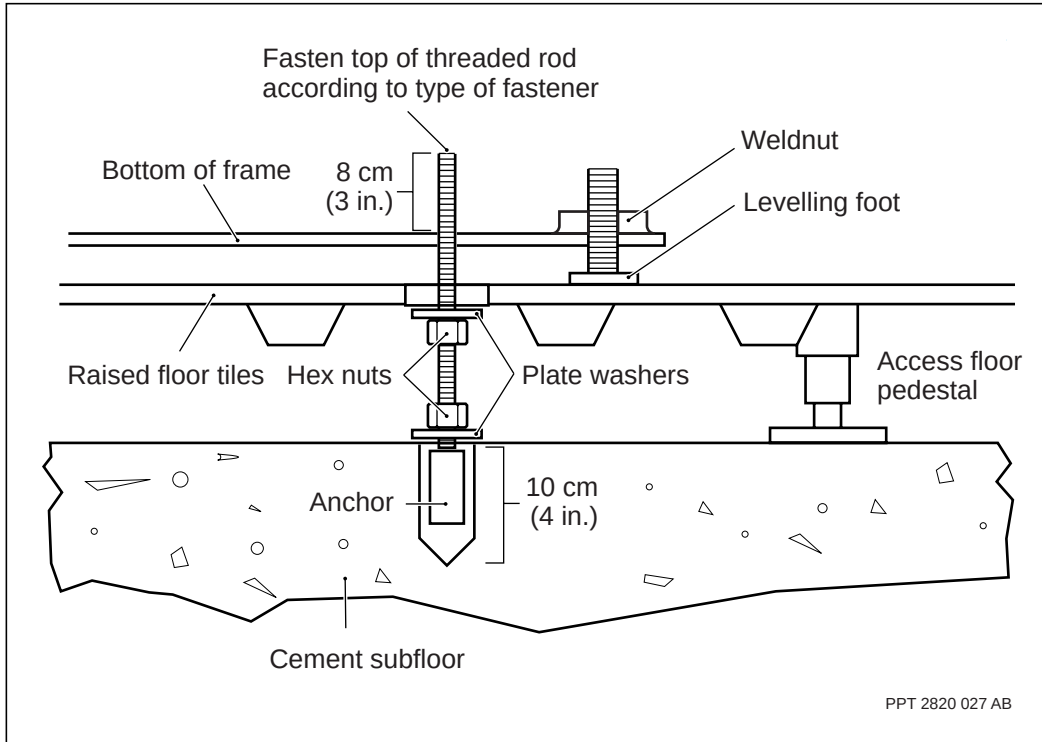


Figure 48
Anchoring to a raised floor



Additional information for installing the frame anchors

After a frame with two fully provisioned switches is completely installed with all plug-ins and cabling, the footprint holds a worst-case weight of up to 725 kg (1,600 lbs). (No practical hardware setup would ever reach this weight because it is based on having only 12-port DS3s in the switch plus every possible optional heavier add-on.) For installations on a raised floor, the M12 anchor rods to help support the weight. Add an extra 18-mm (23/32-in.) nut and a 10-cm (4-in.) wide by 0.5-cm (3/16-in.) thick washer to each M12 threaded rod before the rod is inserted in the floor holes. The nuts and washers are to help support the weight from underneath the frame base. The washer must be wide enough to span inches evenly beyond an anchor opening and thick enough not to bend from the weight. Once the frame is anchored, the optional nuts and washers cannot be added.

When anchoring to a raised floor, refer to the figure “Anchoring to a raised floor” (page 193). Notice the nut and washer on the underside of the raised floor. These may not be included in the anchor kit, but they are recommended when anchoring a NEBS 2000 frame with two fully provisioned switches. Also, the short M12 anchoring kit is not recommended for raised floor anchoring. Use the kit NTRU0327 with the long threaded rods because they anchor to the cement subfloor underneath the raised floor. By adding the nut and washer on each rod flush against the bottom of the raised floor, the rods accommodate some of the weight of the frame and switches.

Assembling a BIP external alarm cable

Assemble a BIP external alarm cable to connect the BIP to a customer premises external alarm indicator.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- To connect the external alarms, you must provide the cables with D-sub connectors with the appropriate number of male or female wired pins ready to be plugged in. In preparation for assembling the cable, do the following:
 - identify which BIP connector you are replacing to a CPE alarm; for the types of alarms and their purposes, refer to 241-1501-200 *Passport 15000, 20000 Hardware*
 - locate the table in “Procedure job aid” (page 196) that corresponds to the BIP connector so that you can identify the orientation and type of connector to be used on the cable
 - get the appropriate connector for the BIP connection
 - measure the path between the alarm cable endpoints and match the gauge of wire to use; 22 or 24 AWG wire is typical, however, the gauge of wire can vary according to local electrical codes, the distance between endpoints, and the amount of power required to operate whichever terminal device is to be used (for example, a lamp or a LED).

Procedure steps

- 1 Refer to the site's record of alarm connections to verify where the endpoints occur. Locate the endpoints of the alarm cable between the BIP connector at the rear of the BIP and the CPE connection.
- 2 Measure the distance between the endpoints and match the gauge of wire to be soldered to the connector pins.
- 3 Strip the wire and solder it to the connector using prescribed methods for the type of connector.
- 4 Repeat step 3 for each additional wire for the BIP connector assembly. You may need to refer to the pinout tables in “Procedure job aid” (page 196)

- 5 Using an ohmmeter, test the connectivity through the cable one pin after the other. Verify the readings are acceptable for the type of CPE terminal. Record which connections fail.
- 6 Fix any failed connections and repeat the connectivity test.

Procedure job aid

The position of pin numbers on the Pn D-sub connectors follows the standard D-sub configuration. The pinouts for each external alarm connector are listed in these tables:

- “Pinout of the BIP female D-sub 15-pin connector P1” (page 196)
- “Pinout of the BIP female D-sub 25-pin connectors P2 and P4” (page 197)
- “Pinout of the BIP female D-sub 25-pin connector P3” (page 199) for empowered contacts
- “Pinout of the BIP female D-sub high-density 26-pin connectors P7 through P10” (page 201)
- “Pinout of the BIP female 1x2 MATE-N-LOK connector J1” (page 203)
- “Pinout of the BIP male 2x4 Berg connector J3” (page 203)
- “Pinout of the BIP male 1x4 Berg connector J2” (page 203)
- “Pin-to-pin connections between an MFA150 controller card and a BIP” (page 206)

Note: BIP connectors P5 and P6 are 110-pin and 55-pin connectors inside the alarm module. These connectors are not used for cabling by a customer.

Table 2
Pinout of the BIP female D-sub 15-pin connector P1

Pin	Signal	Function	Description
1	TTA	input or output	voice communication from telephone jacks for TEL tip A
2	none	none	none
(Sheet 1 of 2)			

Table 2 (continued)
Pinout of the BIP female D-sub 15-pin connector P1

Pin	Signal	Function	Description
3	TTB	input or output	data communication from data jacks for TEL tip B
4	D1A	input or output	data communication from data jacks
5	D1B	input or output	data communication from data jacks
6	none	none	none
7	none	none	none
8	none	none	none
9	none	none	none
10	none	none	none
11	TRA	input or output	voice communication from telephone jacks for TEL ring A
12	none	none	none
13	TRB	input or output	voice communication from telephone jacks for TEL ring B
14	D2A	input or output	data communication from data jacks
15	D2B	input or output	data communication from data jacks
(Sheet 2 of 2)			

Table 3
Pinout of the BIP female D-sub 25-pin connectors P2 and P4

Pin	Signal	Function	Description
1	TTA	input or output	voice communication from telephone jacks for TEL tip A
2	TRB	input or output	voice communication from telephone jacks for TEL ring B
(Sheet 1 of 3)			

Table 3 (continued)
Pinout of the BIP female D-sub 25-pin connectors P2 and P4

Pin	Signal	Function	Description
3	D2A	input or output	data communication from data jacks
4	SPARE1B	output	signal provided for office alarm connectivity
5	SPARE3A	output	signal provided for office alarm connectivity
6	SPARE4B	output	signal provided for office alarm connectivity
7	none	none	none
8	none	none	none
9	none	none	none
10	AISALM2	output	normally open circuit (O/C); switches to AISALM1 on aisle alarm activation (follow me)
11	TTB	input or output	voice communication from telephone jacks for TEL tip B
12	D1A	input or output	data communication from data jacks
13	D2B	input or output	data communication from data jacks
14	SPARE2A	output	signal provided for office alarm connectivity
15	SPARE3B	output	signal provided for office alarm connectivity
16	SPARE5A	output	signal provided for office alarm connectivity
17	none	none	none
18	none	none	none
19	AISALM1	output	externally tied to the battery return (BR) at the office alarm cross-connect panel
20	TRA	input or output	voice communication from telephone jacks for TEL ring A
21	D1B	input or output	data communication from data jacks
(Sheet 2 of 3)			

Table 3 (continued)
Pinout of the BIP female D-sub 25-pin connectors P2 and P4

Pin	Signal	Function	Description
22	SPARE1A	output	signal provided for office alarm connectivity
23	SPARE2B	output	signal provided for office alarm connectivity
24	SPARE4A	output	signal provided for office alarm connectivity
25	SPARE5B	output	signal provided for office alarm connectivity
(Sheet 3 of 3)			

Table 4
Pinout of the BIP female D-sub 25-pin connector P3

Pin	Signal	Function	Description
1	CRITVNC	output	critical visual alarm contact; NC of form C isolated contact, normally closed on alarm
2	MAJVNC	output	major visual alarm contact; NC of form C isolated contact, normally closed on alarm
3	MINVNC	output	minor visual alarm contact; NC of form C isolated contact, normally closed on alarm
4	CRITANC	output	critical audible alarm contact; NC of form C isolated contact, normally closed on alarm
5	MAJANC	output	major audible alarm contact; NC of form C isolated contact, normally closed on alarm
6	MINANC	output	minor audible alarm contact; NC of form C isolated contact, normally closed on alarm
7	EXTALMNC	output	aisle alarm contact; NC of form C isolated contact, normally closed on alarm
8	none	none	none
9	none	none	none
10	CRITVC	output	critical visual alarm contact; C of form C isolated contact, common connection on alarm
(Sheet 1 of 3)			

Table 4 (continued)
Pinout of the BIP female D-sub 25-pin connector P3

Pin	Signal	Function	Description
11	MAJVC	output	major visual alarm contact; C of form C isolated contact, common connection on alarm
12	MINVC	output	minor visual alarm contact; C of form C isolated contact, common connection on alarm
13	CRITAC	output	critical audible alarm contact; C of form C isolated contact, common connection on alarm
14	MAJAC	output	major audible alarm contact; C of form C isolated contact, common connection on alarm
15	MINAC	output	minor audible alarm contact; C of form C isolated contact, common connection on alarm
16	EXTALMC	output	aisle alarm contact; C of form C isolated contact, common connection on alarm
17	none	none	none
18	none	none	none
19	CRITVNO	output	critical visual alarm contact; NO of form C isolated contact, normally open on alarm
20	MAJVNO	output	major visual alarm contact; NO of form C isolated contact, normally open on alarm
21	MINVNO	output	minor visual alarm contact; NO of form C isolated contact, normally open on alarm
22	CRITANO	output	critical audible alarm contact; NO of form C isolated contact, normally open on alarm
23	MAJANO	output	major audible alarm contact; NO of form C isolated contact, normally open on alarm
(Sheet 2 of 3)			

Table 4 (continued)
Pinout of the BIP female D-sub 25-pin connector P3

Pin	Signal	Function	Description
24	MINANO	output	minor audible alarm contact; NO of form C isolated contact, normally open on alarm
25	EXTALMNO	output	aisle alarm contact; NO of form C isolated contact, normally open on alarm
(Sheet 3 of 3)			

Table 5
Pinout of the BIP female D-sub high-density 26-pin connectors P7 through P10

Pin	Signal	Function	Description
1	MINA	input	minor audible alarm input from the shelf; normally open circuit (O/C) to LGND to activate
2	MAJA	input	major audible alarm input from the shelf; normally O/C to LGND to activate
3	CRITA	input	critical audible alarm input from the shelf; normally O/C to LGND to activate
4	SHID4	output	shelf identification, switch 2, bit 2; 10 mA maximum for O/C or LGND
5	LGND	input	is LGND at 0 V dc for the shelf-provided reference for all BIP and shelf alarms
6	+5 V	input	+5 V of secondary power from the shelf with a 70 mA maximum is needed to run the LED portion of the optocouplers for the shelf-to-BIP interface (an optocoupler is a transistor triggered by light, used to separate primary and secondary alarm circuits inside the BIP)
7	ALMFAIL	output	signal to the shelf that the alarm module has a failure or has lost input power; normally LGND to O/C on report of a failure
8	FOLLOW	input	method by which the shelf can activate the frame level follow me indicator and an aisle alarm; normally O/C to LGND to activate
9	LEDTEST	output	report to the shelf that testing the LEDs (LEDTEST) has been requested; upon receipt of the signal, all the LEDs light for about 5 seconds; O/C or LGND at 50 mA to test
10	MINV	input	minor visible alarm input from the shelf; normally O/C to LGND to activate
(Sheet 1 of 2)			

Table 5 (continued)**Pinout of the BIP female D-sub high-density 26-pin connectors P7 through P10**

Pin	Signal	Function	Description
11	MAJV	input	major visible alarm input from the shelf; normally O/C to LGND to activate
12	CRITV	input	critical visible alarm input from the shelf; normally O/C to LGND to activate
13	SHID3	output	shelf identification, switch 2, bit 1; 10 mA maximum for O/C or LGND
14	LGND	input	is LGND at 0 V dc for the shelf-provided reference for all BIP and shelf alarms
15	+5 V	input	+5 V of secondary power from the shelf with a 70 mA maximum is needed to run the LED portion of the optocouplers for the shelf-to-BIP interface
16	BKRFAILB	output	signal to the shelf that the BIM B has a failure or has lost input power; normally O/C to LGND on report of a failure
17	EXTPWR	output	report to the shelf any failure of power equipment monitored by BIP connection J2 that is external to the BIP; 50 mA maximum for O/C or LGND on alarm
18	ACO	output	signal to the shelf requesting shelves to reset all active audible alarms; normally O/C to LGND for the cutoff request
19	SHID0	output	shelf identification, switch 1, bit 1; 10 mA maximum for O/C or LGND
20	SHID1	output	shelf identification, switch 1, bit 2; 10 mA maximum for O/C or LGND
21	SHID2	output	shelf identification, switch 1, bit 3; 10 mA maximum for O/C or LGND
22	SHID5	output	shelf identification, switch 2, bit 3; 10 mA maximum for O/C or LGND
23	BKRTRIPA	output	signal to the shelf that the BIM A has one or more tripped breakers; normally O/C to LGND on report of a trip
24	BKRFAILA	output	signal to the shelf that the BIM A has a failure or has lost input power; normally O/C to LGND on report of a failure
25	BKRTRIPB	output	signal to the shelf that the BIM B has one or more tripped breakers; normally O/C to LGND on report of a trip
26	BIPFAIL	output	report to the shelf a failure in the BIP (an ORing of BKRTRIP, BKRFAIL, and ALMFAIL; LGND has a 50 mA maximum or O/C on alarm (report to shelf)
(Sheet 2 of 2)			

Table 6
Pinout of the BIP female 1x2 MATE-N-LOK connector J1

Pin	Signal	Function	Limitations
1	L -(ABS)	output	-75 V dc
2	AISALM2	output	open circuit (O/C) to 0 V dc on the alarm

Table 7
Pinout of the BIP male 1x4 Berg connector J2

Pin	Signal	Function	Description
1	L +(ABS)	output	is the source is 0 V dc for ALM1; connect it to the common of the external equipment's isolated contacts
2	ALM1	input	is the scan point for the first piece of power equipment; connect it to normally closed on the alarm of the external equipment's isolated contacts; open circuit (O/C) to 0 V dc with 20 mA to activate the alarm
3	L +(ABS)	output	is the source is 0 V dc for ALM2; connect it to the common of the external equipment's isolated contacts
4	ALM2	input	is the scan point for the second piece of power equipment; connect it to normally closed on the alarm of the external equipment's isolated contacts; O/C to 0 V dc with 20 mA to activate the alarm

Table 8
Pinout of the BIP male 2x4 Berg connector J3

Pin	Signal	Function	Description
1	L +(ABS)	output	0 V dc for the front LED board (NTRU09)
2	L +(ABS)	output	0 V dc for the front LED board
(Sheet 1 of 2)			

Table 8 (continued)
Pinout of the BIP male 2x4 Berg connector J3

Pin	Signal	Function	Description
3	EXFRMFLF	output	open circuit (O/C) to 20 mA dc on the follow me activation for the front LED board
4	EXFRMFLF	output	O/C to 20 mA dc on the follow me activation for the front LED board
5	L +(ABS)	input	0 V dc for the front LED board
6	L +(ABS)	output	0 V dc for the front LED board
7	EXFRMFLR	output	O/C to 20 mA dc on the follow me activation for the rear LED board
8	EXFRMFLR	output	O/C to 20 mA dc on the follow me activation for the rear LED board
(Sheet 2 of 2)			

The cable from BIP connector J3 to the external LED board has product engineering code (PEC) NTRU09. The pin numbers of the cable connectors are shown in the figure “Cable for BIP connector J3 to the external LED board” (page 205). The pinouts are listed in the table “Pinout of the cable between BIP connector J3 and the LED board” (page 204).

Table 9
Pinout of the cable between BIP connector J3 and the LED board

Connector	Pin	Connector	Pin	Signal
P1	1	P2	1	L +(ABS)
	2		3	L +(ABS)
	3		4	EXFRMFLF
	4	not used	na	not used
	5	P3	1	L +(ABS)
	6		3	L +(ABS)
	7		4	EXFRMFLR
	8	not used	na	not used

Figure 49
Cable for BIP connector J3 to the external LED board

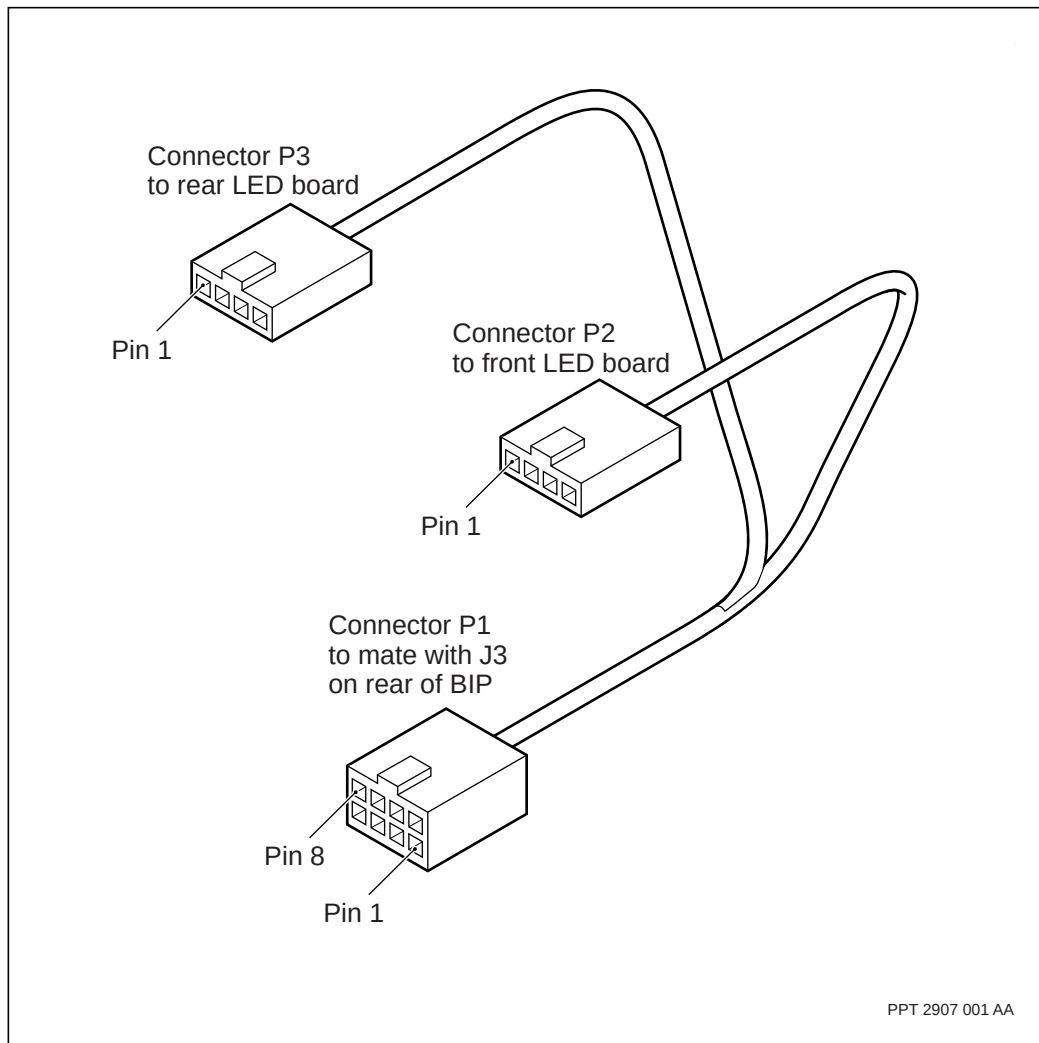


Table 10
Pin-to-pin connections between an MFA150 controller card and a BIP

At the MFA150	At the BIP	Type of alarm
terminal block TB2: pin 1 for the black wire, pins 2 and 4 for the red wire, no connection (NC) for the white and the green wires	J2, pin 2, L-	major

Assembling sparing panel NTQS31

Assemble an NTQS31 sparing panel prior to installing the panel on a frame.

Prerequisites

- A sparing panel with PEC NTQS31 may arrive unassembled in these main parts:
 - NTHR37 for the sparing panel module
 - NTHR39 for the sparing panel relay module, one relay per DS3 or E3 port that will be connected to the panel
 - NTHR42 for the sparing panel control module

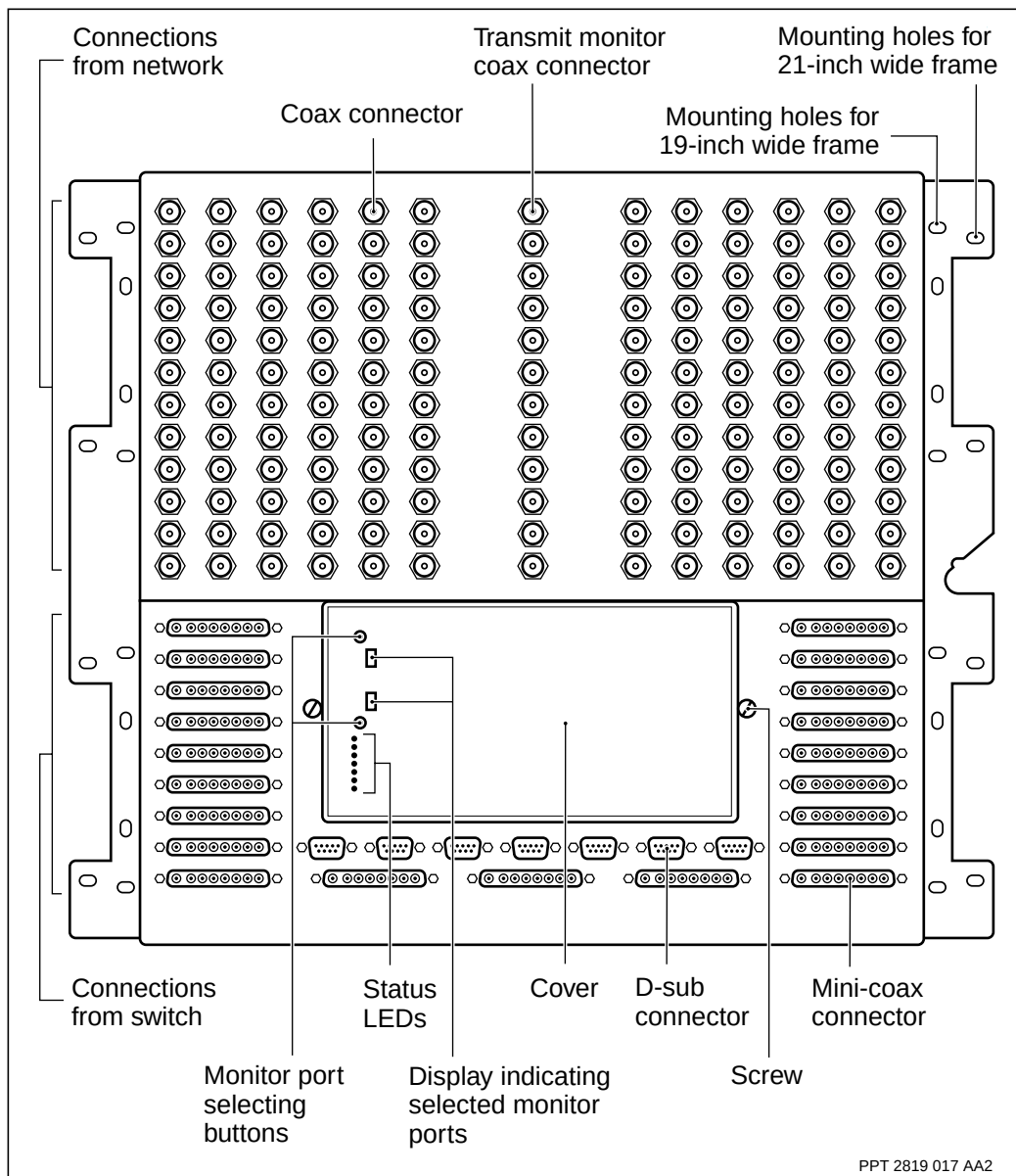
Procedure steps

- 1 On the sparing panel module (NTHRU37), unfasten the 2 captive screws by hand and put them aside for re-use.
- 2 Lift the front panel cover off the chassis and put the cover aside for re-use.
- 3 Insert the control module (NTHR42) into the leftmost slot and press in the retention studs in the module guides. The control module mates with the panel in only one slot.
- 4 Insert the relay modules (NTHR39) into the remaining slots, ensuring each is held in position by the retention studs. A relay module will not fit in the slot for the control module. Use 1 relay per DS3 or E3 port.
- 5 Place the panel cover back onto the sparing panel.
- 6 Align the 2 captive screws and fasten them by hand to snug plus a 1/5 turn. Do not overtighten because the panel will not operate properly.
- 7 The assembled result should look like the figure “A 12-port DS3 or E3 one-for-six sparing panel NTQS31, fully assembled” (page 208).

Procedure job aid

Figure 50

A 12-port DS3 or E3 one-for-six sparing panel NTQS31, fully assembled



PPT 2819 017 AA2

Bundling FP cables

Bundle FP cables to make cable management easier and to evenly distribute the weight of the coax cables in the extended cable management brackets.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Bundle cables in groups of four or six.
- The cables for each FP must be connected, labeled, bundled together, and tie-wrapped along the entire cable path before the cables of another FP are connected. To maintain sequential organization of cable bundles, the FP adjacent to the connected FP must be cabled and bundled next.
- Ensure that you have addressed the criteria in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* for assessing cable management. See “Cable routing” (page 72) to determine the cable management strategy that is appropriate for your situation.

Procedure steps

- 1 When all the transmitting cables from the same FP are connected to the termination panel, use tie-wraps to bundle them together. For example, with 12 transmitting cables coming from half of the faceplate of a 12-port DS3, bundle the first sequential 6 in one cluster, then the second 6 in another. (The mini-coax cables for each 8w8 connector may already be sheathed into a bundle.) Repeat the same pattern for the 12 receiving cables on the same faceplate. For a 4-port DS3, bundle the 4 transmitting cables together, then the 4 receiving cables. Include the control port cable in one of the bundles for the FP, keeping the cable at the outside of the cluster.
- 2 Tighten the tie-wraps of each bundle snugly, but not tightly. The cables must not be crimped by the tie-wraps. Do not tie-wrap the portion of the cable bundle that is under the FP faceplates to the cable channel. This enables the card to be unseated without stressing the cable connections.
- 3 When using the extended cable management brackets, fasten the adjacent FP's cables to the finger beside this one, until the row fills. Fasten the next FP's cables to the inner finger of the next nearest row. The rows and columns in the table map directly onto the finger and arm

pattern of each extended bracket. For the pattern of cable bundles per finger, see

- the table “Position of each FP cable bundle on right-side extended cable brackets” (page 211)
- the table “Position of each FP cable bundle on left-side extended cable brackets” (page 211)
- the figure “Mini-coax cables bundled onto extended brackets” (page 212)

Slot 8 is omitted from the tables because it is intended to house an OC or STM card. OC or STM fiber cables are routed to the left side of the frame. To understand logical card positioning, refer to “Choosing slots for FPs” (page 49).

- 4** Fasten the cable bundle to the bracket by
 - looping the tie-wrap around behind the cable
 - sliding the loop down past the tabs into the space around the bracket finger
 - connecting the tie-wrap ends and pulling the tail until the loop holds the bundle snugly (though not tightly) against the finger
- 5** Use tie-wraps to snugly fasten the remainder of the cable bundle to whatever cable support routes the cables to the termination panel.
- 6** Label the FP cable bundle on the bracket that is nearest the cable management channel. Put the label on the flat surface nearest the bundle. Identify the FP’s slot number and the termination panel ports that this FP is connected to. For terminations to a sparing panel, see also assigning sparing panel connections for a 12-port DS3 or E3 FP in 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure job aid

Table 11

Position of each FP cable bundle on right-side extended cable brackets

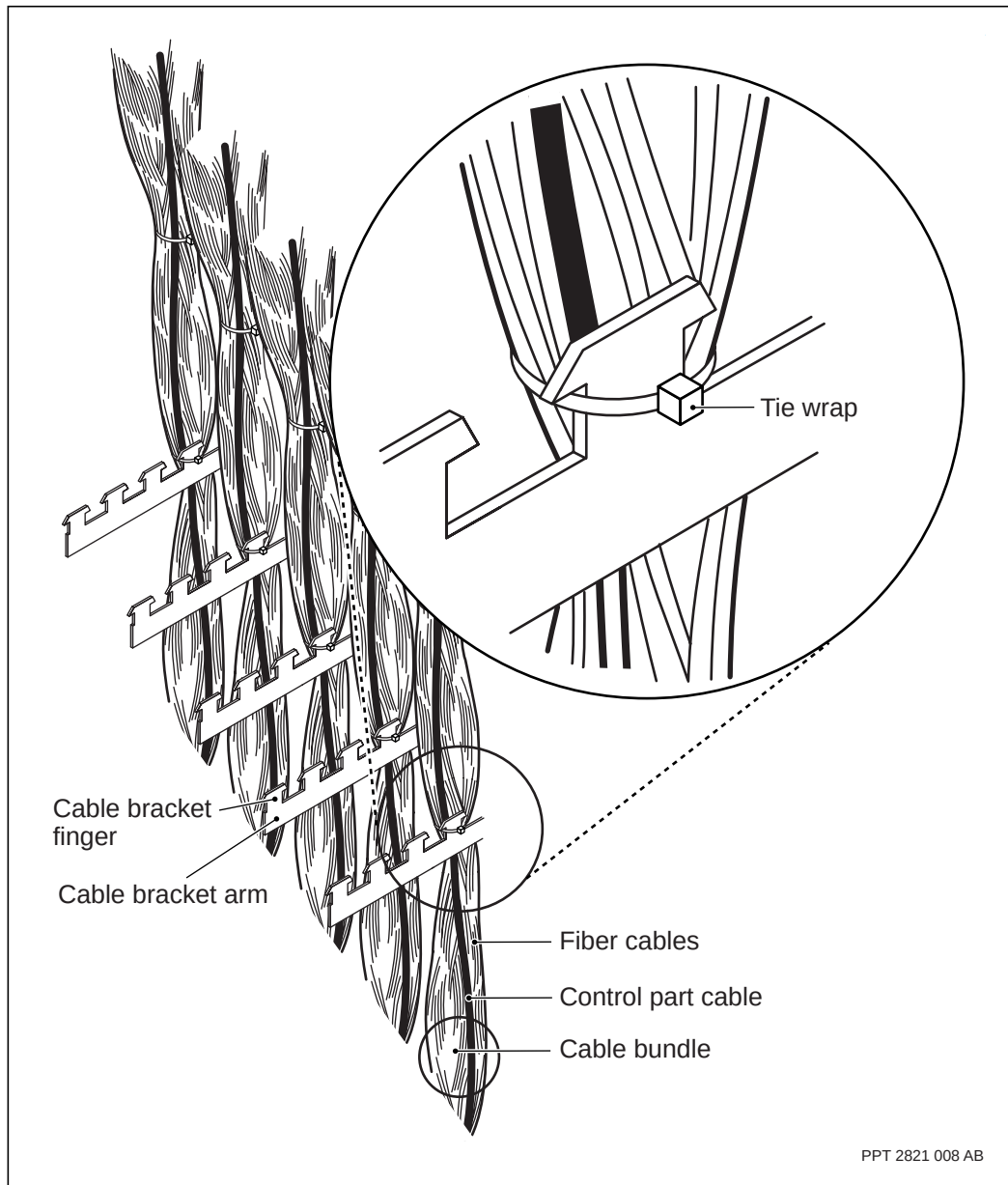
Lower shelf slot numbers	Lower shelf slot numbers	Upper shelf slot numbers	Upper shelf slot numbers
15	7	15	7
14	6	14	6
13	5	13	5
12	4	12	4
11	3	11	3
10	2	10	2
9	1	9	1
Note: slot 1 may contain a CP instead of an FP. Slot 8 is not shown.			

Table 12

Position of each FP cable bundle on left-side extended cable brackets

Upper shelf slot numbers	Upper shelf slot numbers	Lower shelf slot numbers	Lower shelf slot numbers
15	7	15	7
14	6	14	6
13	5	13	5
12	4	12	4
11	3	11	3
10	2	10	2
9	1	9	1
Note: slot 1 may contain a CP instead of an FP. Slot 8 is not shown.			

Figure 51
Mini-coax cables bundled onto extended brackets



Cabling the second cooling unit

Cable a second cooling unit to complete the installation when a second Passport 15000 or 20000 switch is added to a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Before connecting the cables at the second cooling unit, the cooling unit and the second shelf assembly must already be installed.
- The cable assemblies for the second cooling unit are installed at the factory whether the second cooling unit is present in the NEBS 2000 frame or not. The cable connectors at the BIP end are already plugged in. The cable connectors for the second cooling unit are located at the rear of the BIP, left side. Notice that the tie-wraps loosely hold the cables in place.
- The second cooling unit power cable assemblies include:
 - NTHR66 for the A and B power cables
 - NTHR55 for the BIP alarm cable for the upper shelf
 - NTHR57 for the cooling unit alarm cables
 - NTHR5250 for the upper temperature sensors
- Cabling the second cooling unit involves plugging in the cables in the appropriate connections on both the lower (front) and upper (rear) cooling units. The second cooling unit has the same pattern of cables as the lower (front) cooling unit. Use the lower cooling unit as an example to cable the second (upper) cooling unit. See the figure “Power and alarm cable paths between the BIP and cooling units” (page 215).
- Mount the alarm cable assembly for the second cooling unit even if the second unit will be installed at a later date. Otherwise, the fans of the lower cooling unit will run on high speed and the CP will receive a high temperature alarm.

Procedure steps

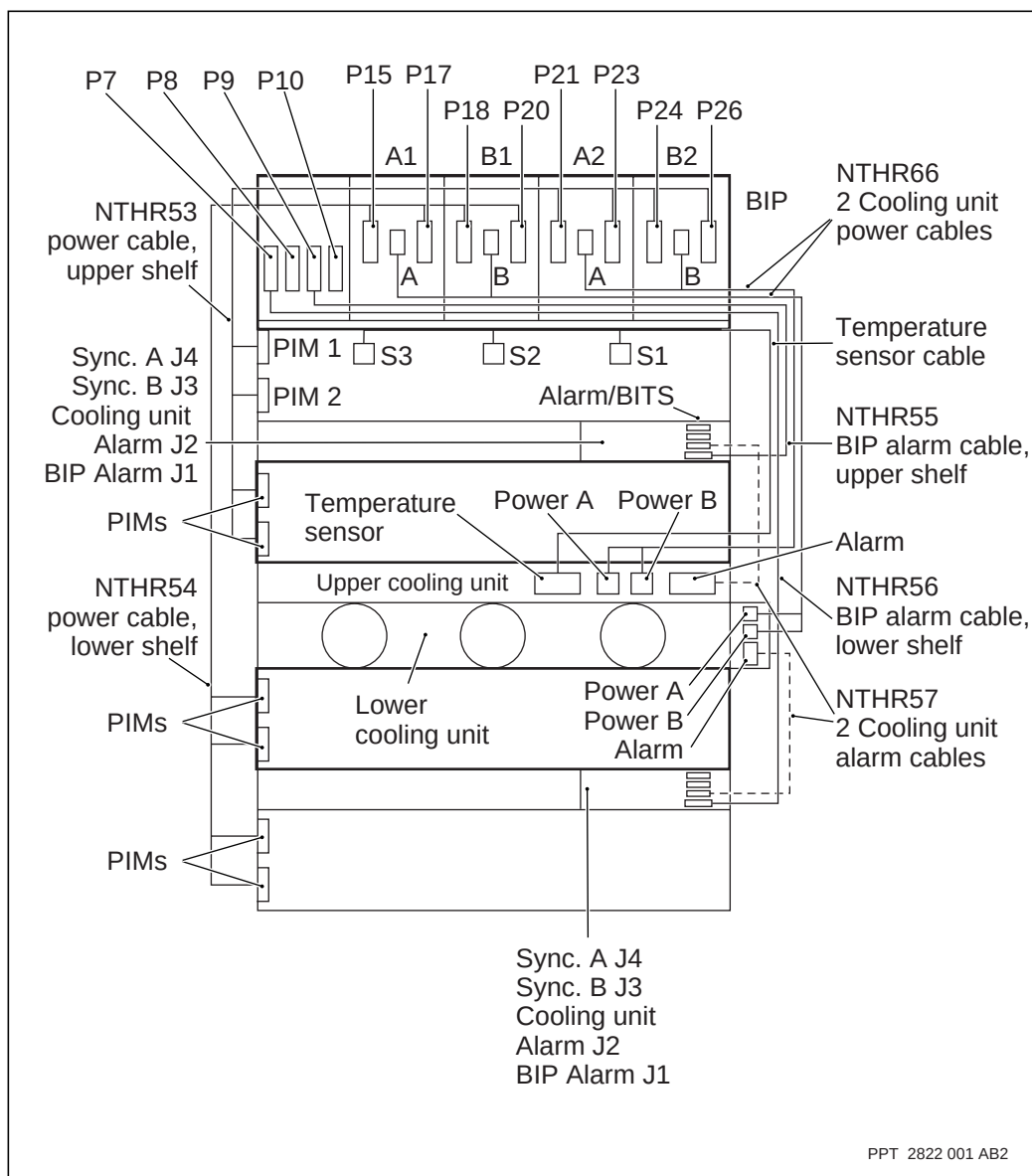
- 1 Facing the front of the BIP, ensure the middle breakers of BIMs A1 and B1 on the left half are off (O is pressed in).

- 2** At the rear of the BIP on BIM A2, from the connection labeled A, trace the individual cable down to the loose connector at the other end. The cable assembly may be labelled NTHR66. See the figure “Power and alarm cable paths between the BIP and cooling units” (page 215).
- 3** Plug the loose connector into the receptacle labelled PWR A on the second (upper) cooling unit at the front of the NEBS 2000 frame. A tab on the connector engages when fully plugged in.
- 4** At the rear of the BIP on BIM B2, from the connection labelled B, trace the cable down to its other connector and plug it into the receptacle labelled PWR B on the second (upper) cooling unit at the front of the frame.
- 5** From the 3 upper temperature sensors labelled S1, S2, and S3, trace the cable down to its other connector and plug it into the receptacle labelled TEMP. SENS. on the second (upper) cooling unit at the front of the frame.
- 6** From the alarm/BITS module of the upper shelf assembly (the second switch) at the connection labeled J5, trace the cable (NTHR57) down to its other connector and plug it into the receptacle labeled ALARM on the lower (front) cooling unit. A tab on the connector engages when fully plugged in.

Procedure job aid

Figure 52

Power and alarm cable paths between the BIP and cooling units



Checking the backplane pins

Check the backplane pins after unpacking a Passport 15000 shelf assembly and before any processor cards are installed to ensure there are no bent pins.

Prerequisites

- Do not check the pins of a Passport 20000 shelf assembly unless cards have been accidentally unlatched by impact, inadvertently removed, or at least one slot was shipped empty.



CAUTION

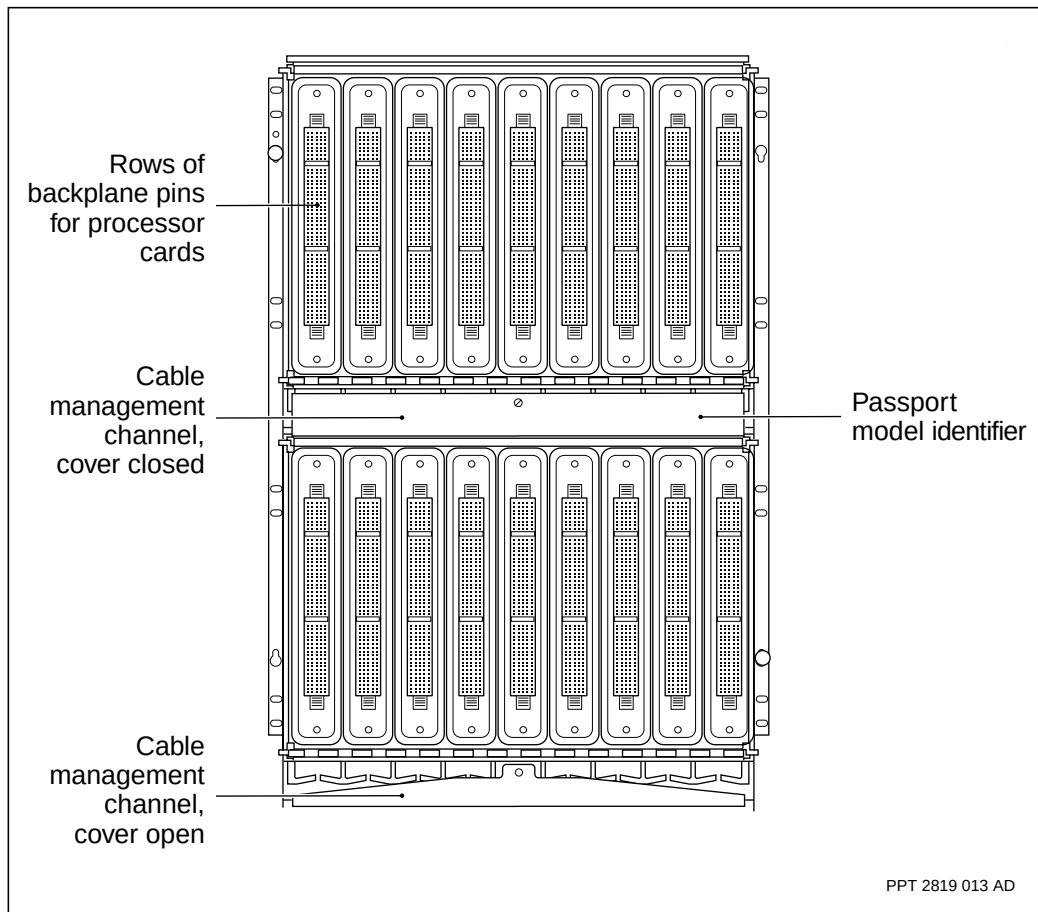
Risk of equipment damage and service loss by bent pins

While checking for bent backplane pins, especially if you are wielding a flashlight or mirror inside the shelf assembly, ensure that you do not contact any pins. Contacting the pins with a sideways force can easily bend them.

Procedure steps

- 1 Look inside the shelf assembly at each row of pins at the rear. Refer to the figure “An empty shelf assembly of a Passport 15000, front view” (page 217). You may need a flashlight to see the patterns of pins. Do not allow the flashlight to contact anything inside the shelf assembly.

Figure 53
An empty shelf assembly of a Passport 15000, front view



- 2 Check each row of pins to see whether any pin seems visibly bent, that is, even slightly out of pattern or worse. Slightly bent means you notice a change in the pattern of pins.

**CAUTION****Risk of equipment damage and service loss by bent pins**

When at least one backplane pin is bent, attempting to seat a processor card risks damaging the backplane connector and the card such that neither the card nor the slot can be used. If you have any doubts about the straightness of the pins on the backplane, contact your local Nortel Networks technical support representative to decide whether the shelf assembly should be replaced.

- 3** If no pins are bent, proceed with the installation of the switch hardware.

If at least one pin is bent slightly or worse, abort the installation of the switch hardware and contact your local Nortel Networks technical support prime to arrange having the shelf assembly replaced. You must identify the PEC that is labelled on the shelf assembly as one of the following:

- NTHR50 or NTHW99 for a Passport 15000
- NTPN70 or NTPN77 for a Passport 20000

- 4** If replacing an unmounted and empty shelf assembly, put it back in its shipping container.

If replacing a mounted shelf assembly, wait for the replacement and then replace it according the shelf replacement procedure in 241-1501-240 *Passport 15000, 20000 Hardware Installation, Maintenance and Upgrade*.

When returning a shelf assembly, always leave the pre-installed PIMs, MAC address module, and alarm/BITS module in the assembly. The replacement shelf assembly always includes these modules.

Checking power input cables to the BIP

Check the dc power input cable connections to the BIP or power-and-ground cable assembly to verify matching end labels, polarity, and firm connectivity to prevent injury or equipment damage before powering up the BIP or after a reconnecting a power input cable.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the following specialty tools
 - a medium Pozidriv screwdriver, for example a number 2 (do not substitute a Phillips) for an insulation boot clamp
 - a crimper for lugs up to 1/0 AWG (53.5 mm²), depending on the size of cable feeding the BIP
 - an 11-mm (7/16-in.) deep socket with a properly calibrated torque wrench capable of 6.5 Nm (57.5 in.-lbs) and a 20-cm (8-in.) extender for the lug nuts
- All four or eight power cables must be connected to the BIP and visibly labelled with the power feed connection information prescribed by dc cable installation in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.



WARNING

Risk of injury or equipment damage by electricity

When checking power input cables at the BIP, ensure that the source of power at the other ends of the cables (feeds) is off (disconnected), fuses are removed, or the breakers are off). Also ensure that all BIP breakers are off (the O is pressed in).

**WARNUNG****Verletzungsgefahr oder Geräteschäden durch Elektrizität**

Vergewissern Sie sich bei der Überprüfung der Netzkabel am Trennschalterkopplungsmodul (BIP), daß die Stromversorgung an den anderen Kabelenden (Speisestromzuführungen) getrennt ist oder daß die Sicherungen entfernt bzw. die Trennschalter ausgeschaltet sind. Stellen Sie außerdem sicher, daß alle BIP-Trennschalter ausgeschaltet sind (O ist gedrückt).

**CAUTION****Risk of equipment damage by reversed polarity**

Use the plus (+) and minus (-) symbols on the rear of the breaker interface panel (BIP) to ensure that the polarity of each A and B battery (-48/-60 V dc) and battery return for the input power feeds is correct. When powering up the BIP, reversed polarity will damage circuits inside it. The BIP would have to be replaced.

Procedure steps

- 1 On the rear of the BIP, ensure that the cables to the insulation boots are labelled from left to right as indicated in the figure "Overhead power input cables for the lower shelf connected to the BIP" (page 290).

If the cables to the studs come from a power-and-ground assembly (part number A0834143 or A0834149), ensure that the labels on the assembly or on each cable near the terminal blocks has the correct label.

If any label does not match, correct the label or the change the connection, and trace all connections back to the power source to confirm an end-to-end match.

**CAUTION****Risk of damage to power connections**

The metal of the top stud of each pair is softer than the bottom lug because of increased electrical conductivity. Ensure that you do not overtighten either stud, nor leave one too loose. Damaging a stud means its BIM cannot be powered up until the BIP is replaced.

- 2 Check the security of the cable fastening by gently but firmly wiggling the cable between the insulating boot and the first tie-wrap.
 - If the cable moves, ensure that the nearest tie-wrap is snug enough.
 - If the cable still moves, unfasten the Pozidriv screw that retains the boot clamp, slide the boot away from the lug, and wiggle the cable again. Determine if the cable moves because the lug crimp is insufficient or the lug is not tight enough. Re-crimp the lug or re-torque the nuts to 6.5 Nm (57.5 in.-lbs).
- 3 When a power-and-ground cable assembly is installed, check the security of each cable entering a terminal block. If any cable wiggles, tighten the clamping screw until the wiggling stops. If the wiggling persists, determine why and fix it.
- 4 Trace each cable away from the BIP to its next terminations up to the power source. At each junction or panel, ensure both halves of the connection are labelled and match the BIP end.

If any label does not match, correct the label or the change the connection, and trace all connections back to the BIP to confirm an end-to-end match.

Procedure job aid

Refer to the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290).

Checking power output from a system of ac rectifiers

Check power output cable connections from a system of ac rectifiers to the BIP to verify matching end labels, polarity, and firm connectivity to prevent injury or equipment damage before powering up the BIP or a circuit breaker from a replaced power cable.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Test the power output connections from a system of ac rectifiers by following the instructions provided by that product. When the system of ac rectifiers is an Astec MFA150, do this procedure and then follow the testing instructions provided in the Astec document 167-9021-133 *Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual*.



WARNING

Risk of injury or equipment damage by electricity

When using an MFA150 and you cause a short circuit of the A or B feed to the BIP, it impacts the other feed and resets all of the rectifiers without tripping their circuit breakers. There is still enough power to prevent tripping the breakers, but that power output can cause damage to the Passport 15000 or 20000.



WARNUNG

Verletzungs- oder Gerätebeschädigungsgefahr durch Elektrizität

Wenn Sie einen MFA 150 verwenden und einen Kurzschluss der A oder B-Versorgungsanschlusses am BIP auslösen, so hat dies Auswirkungen auf den anderen Versorgungsanschluss und setzt alle Gleichrichter zurück, ohne die Schutzschaltung auszulösen. Es ist immer noch genügend Strom vorhanden, um ein Auslösen der Schutzschaltung zu verhindern, aber die Stromausgabe kann den Passport 15000 or 20000 beschädigen.

Procedure steps

- 1 Ensure that all mid-trip circuit breakers on the front of the MFA150 system are off, that is, fully down and OFF is visible. This includes the breakers on the controller and each rectifier. See the figure “Front of an MFA150 power system of five ac rectifiers” (page 224).
- 2 Place a step ladder in front of the controller (top unit) so that you can access its top.
- 3 Access the inside of the controller by unfastening the small Phillips screws at the top edges of its cover. Remove the cover. Put the screws and cover aside temporarily.
- 4 At the back of the controller, locate the cable pair entering on the left side. Confirm that the inside collar nut for the pair's conduit elbow is tight against the back panel.
- 5 On the faceplate of the controller, confirm that all cabled circuit breakers labelled CBn are rated 60 A.
- 6 Confirm that the red cable
 - connects to the BIP stud labelled A1+
 - is labelled the same as the BIP stud
 - is screwed to circuit breaker CB1 and the connection is tight; see the figure “Power cable connections at the rear of an MFA150 system of ac rectifiers” (page 295)
- 7 Confirm that its mate black cable
 - connects to the BIP stud labelled A1-
 - is labelled the same as the BIP stud
 - is screwed to the ground busbar and the connection is tight; see the figure “Power cable connections at the ground busbar inside an MFA150 controller” (page 227)
- 8 Correct any incorrect label or connection inside the controller.
- 9 Repeat step 4 to step 8 for each other cable pair moving from left to right across the rear of the controller. The cables to the BIP must be grouped together. While viewing the rear of the BIP and the front of the controller, the cable pair mappings are identified in the table “Connection mapping between the BIP and the MFA150 controller” (page 225).
- 10 Fasten the cover back on top of the controller.

Procedure job aid

Figure 54
Front of an MFA150 power system of five ac rectifiers

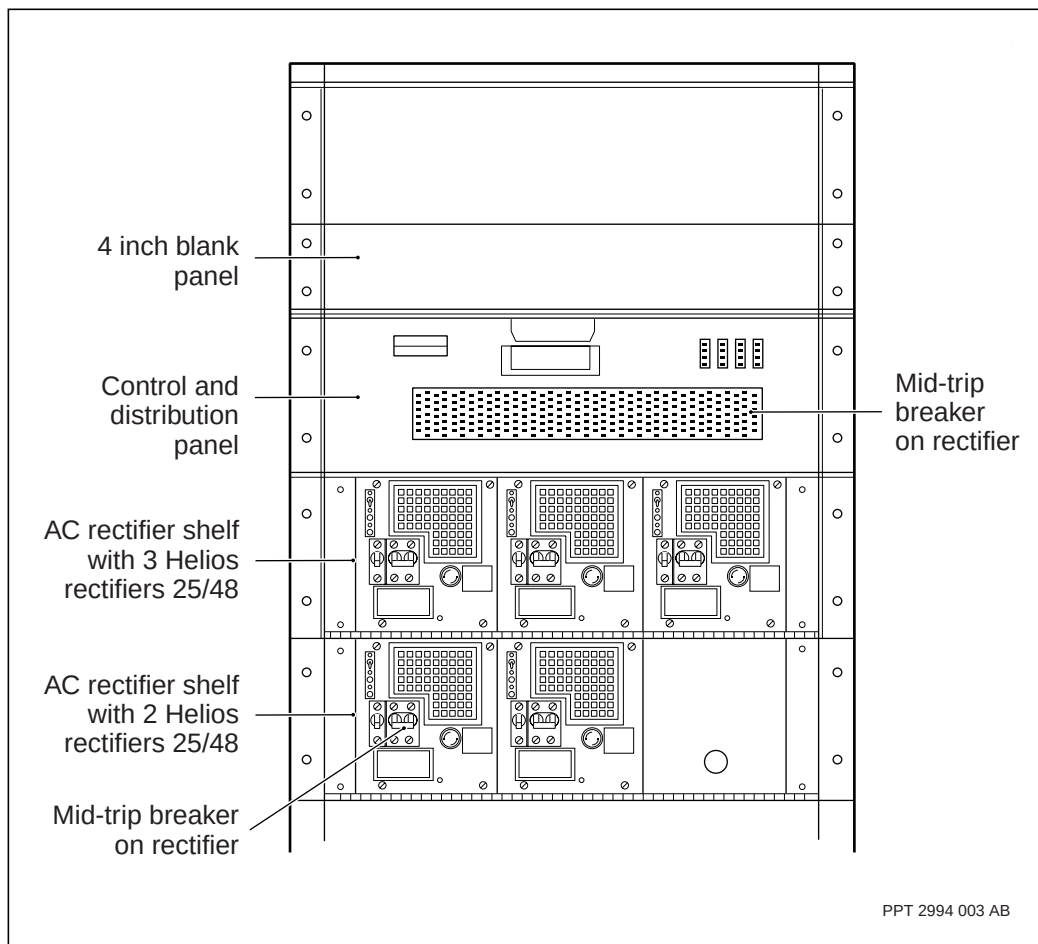


Table 13
Connection mapping between the BIP and the MFA150 controller

Position of switch	Label of BIM cable	Location of connection on BIM while facing the rear of the BIP	Cable color	Label of MFA150 cable	Location of MFA150 connection
lower shelf	A1-	left BIM, left pair of studs	black	A1-	ground busbar
lower shelf	A1+	left BIM, right pair of studs	red	A1+	CB1
lower shelf	B1-	middle left BIM, left pair of studs	black	B1-	ground busbar
lower shelf	B1+	middle left BIM, right pair of studs	red	B1+	CB2
upper shelf	A2-	middle right BIM, left pair of studs	black	A2-	ground busbar
upper shelf	A2+	right BIM, right pair of studs	red	A2+	CB3
upper shelf	B2-	right BIM, left pair of studs	black	B2-	ground busbar
upper shelf	B2+	right BIM, right pair of studs	red	B2+	CB4

Figure 55
Power cable connections at the breakers inside an MFA150 controller, side view

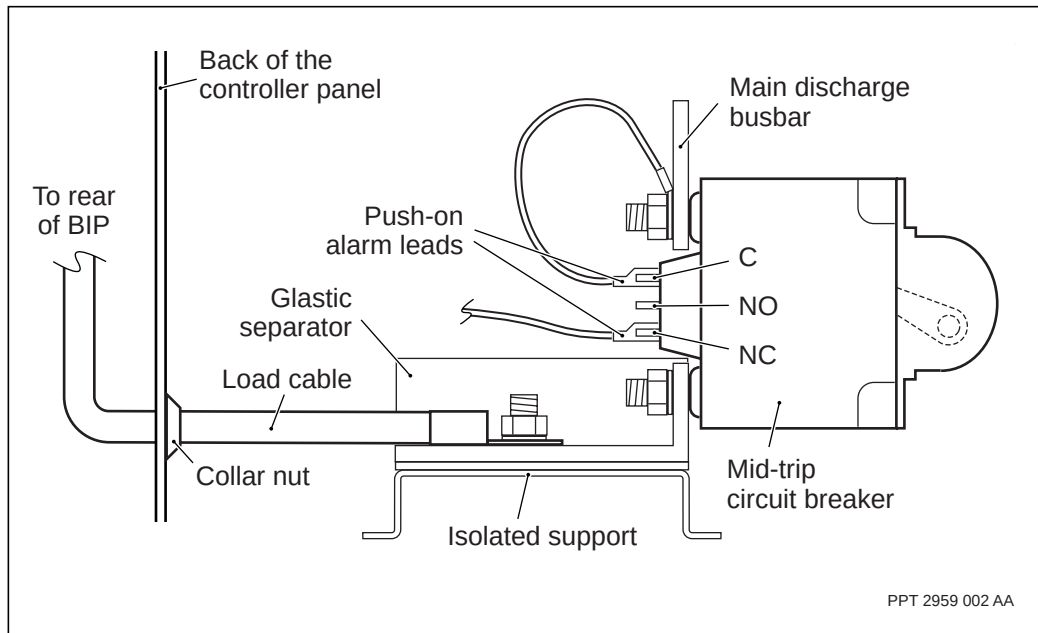
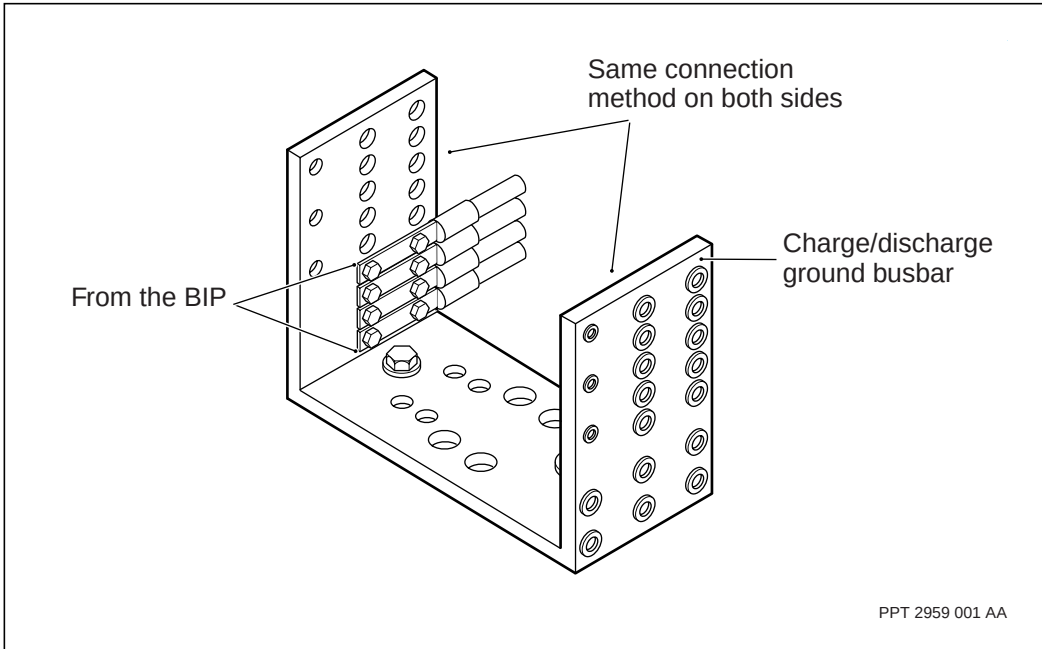


Figure 56
Power cable connections at the ground busbar inside an MFA150 controller



Checking power output connections from the BIP

Check the power output cable connections from the BIP to the shelf assembly hardware to verify firm connectivity for power distribution before powering up the BIP or after replacing a power interface module (PIM) cable.

Transporting a Passport 15000 or 20000 or installing hardware onto it can loosen a power connection between the breaker interface panel (BIP) and the other parts of the switch hardware. Before powering up the BIP, check each power output connection from the BIP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

Procedure steps

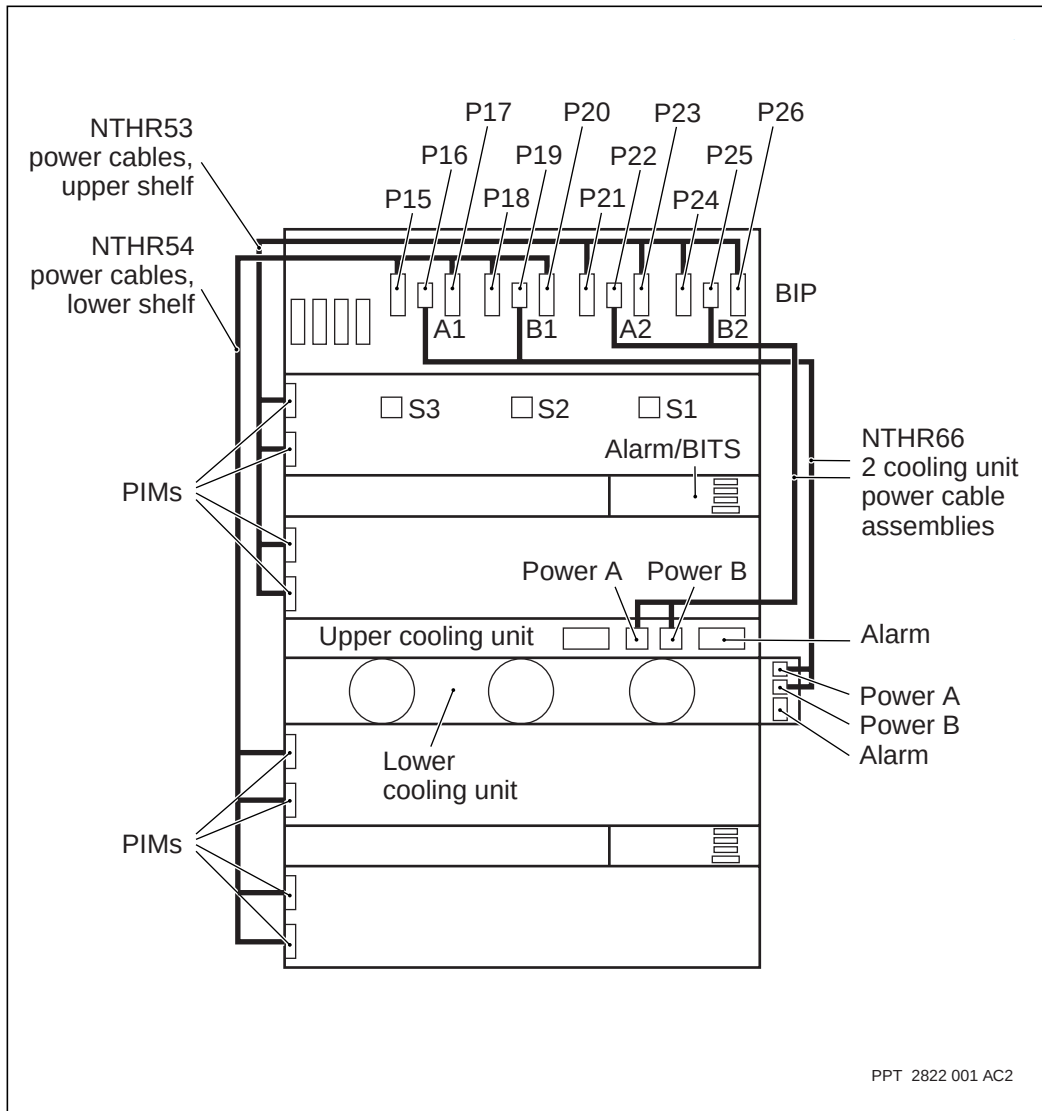
- 1 Facing the rear of the BIP, locate the left-most cable connection. Refer to the figure “Power cable paths between the BIP and two shelves” (page 229).
- 2 Using your fingers, firmly push the connector of the cable in towards the BIP. Decide if the connection is fully seated.

If fully seated, proceed.

If not, remove the connector and install it again until it is fully seated. D-sub connectors usually have small slotted screws. If re-seating cannot be done, record why and proceed.
- 3 Repeat step 2 for each cable connection across the rear of the BIP up to but not including the power input cables. The black and white cables are power output cables, while the red are alarm cables. Check each connector.
- 4 Locate the next lower batch of connectors down the left rear of the switch. The black and white connectors have locking tabs. Ensure that the tabs are engaged.
- 5 Methodically check the connector of each rear cable until all have been done, or record any that cannot be fully seated.
- 6 Return to the connector or connectors that could not be fully seated, and fix the problem. Otherwise, do not power up the BIP and contact your next higher level of technical support.

Procedure job aid

Figure 57
Power cable paths between the BIP and two shelves



Checking the connectivity between FPs and sparing panels

Check the connectivity between spared (redundant) electrical FPs and their sparing panel to verify the panel has powered up and indicates the appropriate operational status.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Electrical FPs include DS1s, DS3s, E1s, and E3s.
- The FPs must be:
 - fully cabled to the sparing panel
 - powered up and loaded
 - running traffic through the active connections
- A sparing panel receives power through each control port cable.
- When power initially reaches the sparing panel, the status LED of the Main connections lights first. Depending on which FP is configured to be the active one, the LED status on the sparing panel may change to indicate the standby FP is active.
- When a sparing panel has connectors for monitoring the transmit signal on any port of a specific FP, use your own testing equipment to verify the transmission. The monitoring signal of the 12-port DS3 or E3 sparing panel NTQS31 is 25 dB lower than the transmit signal so that the transmission is insignificantly affected. Ports of the same number cannot be monitored on different FPs at the same time.

Procedure steps

- 1 Coordinate with the software operator of the switch to ensure traffic is running through the FPs that are connected to the sparing panel.
- 2 Have the software operator check for occurrences of any of these alarms that are associated with spared electrical FPs:
 - 7054 0100, indicating is not connected to a sparing panel
 - 7054 0101, indicating an incorrect connection or a configuration (provisioning) error, for example, the FP is connected to the wrong sparing panel

- 7054 0102, indicating an FP port is connected to the wrong sparing panel port
- 7054 0103, indicating the sparing panel is not responding

Do whatever remedial action is required to get rid of the alarms.

- 3 On an NTQS31 sparing panel, press the FP selection button until the numeral 1 appears in the LED display beside it. The button is the upper one of the pair.
- 4 Press the port selection button until the hexadecimal number for one appears in the LED display beside the button. The button is the lower one of the pair.
- 5 Connect the test equipment according to the equipment manufacturer's instructions.
- 6 Run the test equipment to verify connectivity according to the equipment manufacturer's instructions.
- 7 Record the test result for the FP to sparing panel path.
- 8 Repeat step 1 to step 7 until you cycle through all of the ports of each FP connected to the sparing panel and test each one.
- 9 For each port that failed the transmit connectivity test, check the cable connectors, cable, and cable connections, then test the FP. Re-test each as you check. If any port still fails the test, contact your administration to decide what to replace.

Checking the final status of all LEDs

Check the final status of all LEDs to verify the equipment is operating before putting the Passport 15000 or 20000 and all interworking equipment into service.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- When a LED stays solid red after loading is attempted, the card is
 - an incompatible vintage
 - was previously loaded with software that is incompatible with the current software running on the switch
 - has failed
- The 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting* can help you with identifying possible reasons why the hardware is not initiating properly.

Procedure steps

- 1 On the Passport 15000 or 20000, verify that at least one LED is lit on each hardware part that has LEDs. If no LED is lit on a part after powering up, then one or more of the following conditions prevails:
 - the green LED is burned out and software can verify if the part is actually operational
 - there is a problem in a cable assembly or a connection between the BIP and the PIMs
 - there is a problem with one of the power feeds to the BIP, but this means a series of hardware LEDs would not be lit
 - there is a problem in the backplane of the shelf
- 2 On a Passport 20000, press the LED Test button on the front of the alarm module. Verify that all LEDs on the following hardware parts light up for approximately ten seconds:
 - the BIMs and alarm module of the BIP
 - the cooling unit or units

- the fabrics in one or both switches
- 3** Repeat the LED test as required until you verify the operational status of all LEDs.
 - 4** LEDs may show lit amber if the switch startup software has not yet been initiated or if the CP or FP has not been configured.

If a combination of some CPs and FPs are amber, re-seat each module.

If only the CPs are amber, wait for the software to be started. Re-seat them without powering down any part of the system.

Checking the operation of external alarms

Check the operation of external alarms between the BIP and the terminal indicators to confirm the alarms are working and all equipment is operating normally.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The external alarm indicators are typically non-Passport terminations, for example, an aisle lamp or LED, or an audible alarm for a system of ac rectifiers as the power source. Know what external alarms have been connected to the BIP.

Procedure steps

- 1 Test the operation of each external alarm connection by simulating the failure conditions before putting the Passport 15000 or 20000 switch into service.
- 2 When the power source of the BIP is an MFA150 system of ac rectifiers, test the external alarm connection between them by powering off and disengaging two of the rectifiers in the same rectifier shelf. This simulates a failed rectifier.

The amber test LEDs of the alarm module light up and critical alarm number 7012 0050 indicates a rectifier failure. When the rectifiers are engaged into the shelf and powered up, the LEDs extinguish and alarm 7012 0050 indicates the failure is cleared. A status change can take up to two minutes to be shown.

- 3 For any external alarm that is not operating, reseal the connectors at both ends and repeat the test.
- 4 For any external alarm that is still not operating, contact your next level of technical support.
- 5 For any alarm that is operating properly and indicates a problem, fix the problem.

Procedure job aids

For a list of all the possible external alarm connections, refer to the tables:

- “Pinout of the BIP female D-sub 15-pin connector P1” (page 196)

- “Pinout of the BIP female D-sub 25-pin connectors P2 and P4” (page 197)
- “Pinout of the BIP female D-sub 25-pin connector P3” (page 199) for empowered contacts
- “Pinout of the BIP female D-sub high-density 26-pin connectors P7 through P10” (page 201)
- “Pinout of the BIP female 1x2 MATE-N-LOK connector J1” (page 203)
- “Pinout of the BIP male 2x4 Berg connector J3” (page 203)
- “Pinout of the BIP male 1x4 Berg connector J2” (page 203)
- “Pin-to-pin connections between an MFA150 controller card and a BIP” (page 206)

Cleaning an SFP optical module

Clean a small form pluggable (SFP) optical module to remove a contamination and to restore optimum signal throughput between an interfacing LC fiber cable and its optical transceiver of the module socket (port) in the FP faceplate.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The procedure applies to an SFP optical module with any of the following PECs:
 - NTTP01AB for multimode (MM) fiber cables for an NTHW49
 - NTTP01CB for single-mode (SM) fiber cables for an NTHW49
 - NTTP02AD for MM fiber cables for an NTHW44
 - NTTP02CD for SM fiber cables for an NTHW44
 - NTTP02ED for SM fiber cables for an NTHW44
- To avoid contamination, clean an SFP module only when there is evidence of contamination or performance is reduced through the module socket (port).
- You need clean dust caps for the connector ends of each SFP module, and a clean anti-electrostatic discharge bag.
- You need a microscope with at least 40x magnification to inspect the pair of lenses on each SFP module.
- You need these supplies:
 - optical fiber cleaning swabs (such as those made by Cletop) with a 1.25 mm diameter or other equivalent swabs that are rated to not shed material (for example, a cotton swab sheds and must not be used)
 - 3M’s HFE-7100 cleaning fluid or iso-propyl alcohol (IPA)
 - low pressure clean nitrogen or air

- The SFP module must not be installed when cleaning it. Remove, clean, and insert each module one at a time to avoid installing it back in the wrong socket module (port).
- Do not touch the circuitry inside the large open end of an SFP optical module or you may cause the unit to malfunction. This end does not get cleaned. See the figure “The open end of an SFP optical module” (page 238).
- The procedure steps are based on the Application Note by Agilent Technologies called “Inspection and Cleaning of Fiber Optic Transceiver Ports”, May 2, 2002, revision 1.2.

Procedure steps

- 1 Remove the dust cap (if present) from the LC connector end of the SFP module, as shown in the figure “The LC connector end of an SFP optical module” (page 239). Store the dust cap in a clean anti-ESD bag.
- 2 Place the LC connector-end of the SFP module under the microscope so that 1 of the 2 lenses is viewed.
- 3 Inspect the lens, then inspect the other lens.
- 4 On each lens that appears to be contaminated, press a dry swab gently against the lens surface and rotate it 3 times in the same direction. Use a new clean swab on each lens and discard the swab after 1 use.
- 5 Inspect the lenses with the microscope again.

If the lenses are clean, install the dust cap or proceed immediately with installing the SFP module.

If a lens still shows contamination, continue to the next step.
- 6 Soak a swab in the cleaning fluid or IPA. Press it gently against the surface of the lens and rotate it 3 times in the same direction. Repeat for the second lens, as required, using a new swab. Discard a swab after 1 use.
- 7 Blow low pressure clean nitrogen or air onto the lens to remove solvent residues. Do not use your breath.
- 8 Inspect the lenses with the microscope again.

If the lenses are clean, install the dust cap or proceed immediately with installing the SFP module.

If a lens still shows contamination, use a different SFP module.

Procedure job aid

Figure 58
The open end of an SFP optical module

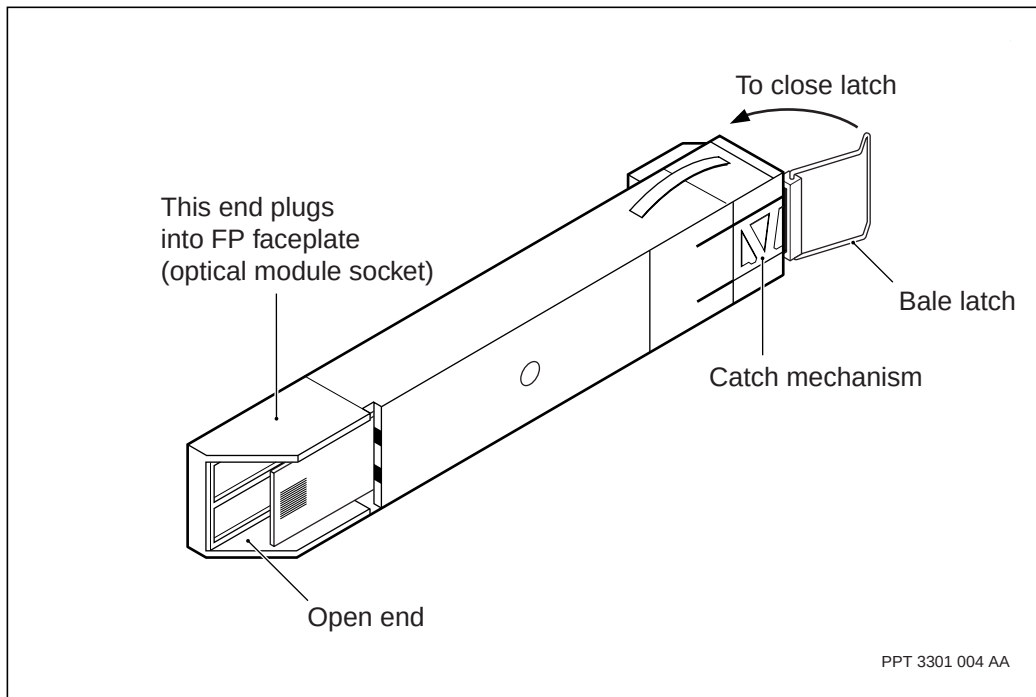
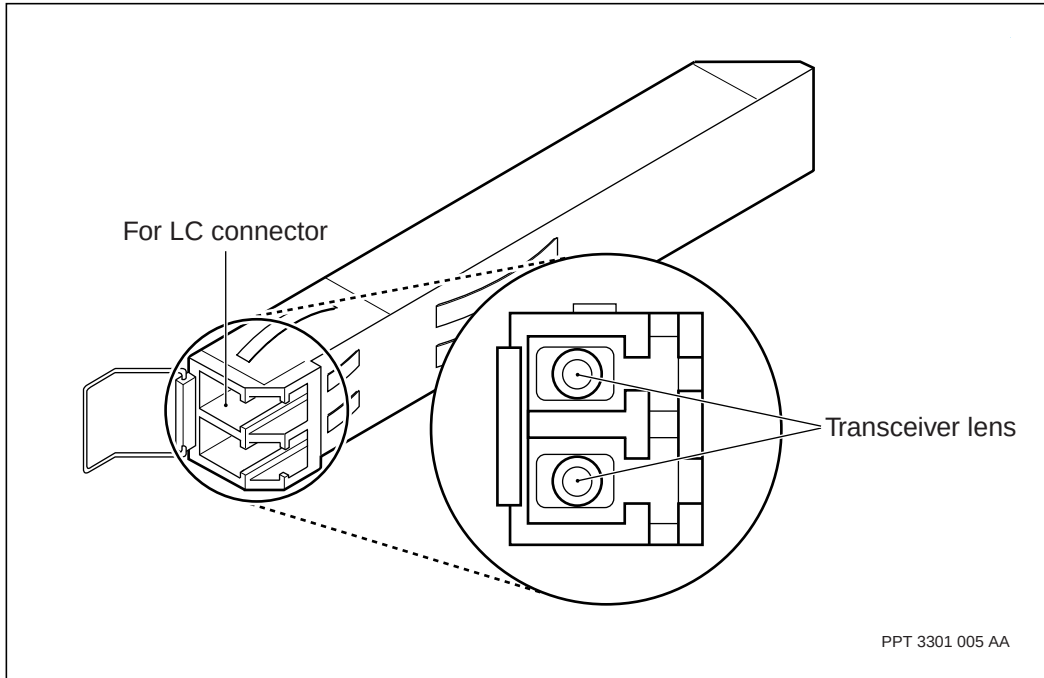


Figure 59
The LC connector end of an SFP optical module



Cleaning LC or SC connectors

Clean LC or SC connectors to maintain optimum connectivity between the end of a fiber cable and its connection or to stop an intermittent transmission error.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- With Passport 15000 or 20000 FPs, each fiber cable connection either directly plugs into a transceiver or into an adapter on the faceplate. A dust cap on the end of a fiber connector, in a transceiver, or an adapter is synonymous with any form of plug-in protection cap.
- Avoid direct skin contact with the part of the connector, ferrules, or transceiver being cleaned.
- Protect your eyes with safety goggles during cleaning.
- Work in a well-ventilated area. Use small amounts of cleaning alcohol and avoid breathing the vapors.
- Once a fiber cable is plugged into an FP, it does not require cleaning until it is unplugged. A fiber cable connector must be cleaned immediately prior to plugging it into an FP or a test device.
- Refer to the figures “LC fiber connectors” (page 243) and “SC fiber connector” (page 244). The ferrule and endface of an LC connector is the same shape as an SC connector but is a different diameter.
- The ferrule is the rigid stem at the connector that contains the optical fiber. Only clean one ferrule at a time. Wear vinyl gloves to avoid contaminating the ferrule or the cleaning cloth with skin oil.
- Clean the transceiver (or adapter) before cleaning the connector that was or is to be plugged into it. See “Cleaning the bore of a transceiver” (page 248).

**WARNING****Risk of eye injury by laser**

Never look directly into the end of a fiber cable, let an end pass in front of your eyes, or use an optical device to look at the end of an optical fiber unless you are certain the other end is not connected. The laser travelling through a fiber cable can injure the human retina.

**WARNUNG****Gefahr von Augenverletzungen durch Laserstrahlen**

Blicken Sie nie direkt auf das Ende eines Glasfaserkabels, und überprüfen Sie auch einzelne Faserenden nicht mit einem optischen Gerät, wenn Sie nicht sicher sind, daß andere Kabelende nicht angeschlossen ist. Der über die Glasfasern übertragene Laser kann die menschliche Netzhaut verletzen.

Procedure steps

- 1 If the connector is in use, disconnect it from the function processor (FP).
If the connector is not in use, slide the protective dust cap off the end to expose the ferrule.
If an inline attenuator is used for the connection at the FP end, the receptacles of the attenuator and the connectors that plug into it must also be cleaned according to its manufacturer's instructions.
- 2 Holding a can of compressed gas upright, blow into the cavity surrounding the ferrule. Avoid having propellant fluid coat the connector.
Do not blow onto the ferrule with your breath. Moisture from your breath will contaminate the surface.
- 3 Use the plastic squeeze bottle to apply 1 drop of isopropyl alcohol on the ferrule.
- 4 While the ferrule is wet, use a new dry TEXWIPE cloth to firmly wipe its endface and lateral surface. Do not allow the alcohol to dry on the ferrule because it will leave a residual film on the adaptor. If the ferrule is visibly dirty, use figure-eight motions when wiping the endface.
Dirt on the ferrule may not be visible to the human eye. Use a new cloth for each ferrule so that dirt is not transferred from one ferrule to the next.

- 5 Assess the cleanliness of the ferrule endface through an appropriate microscope.

If it is not satisfactory, repeat step 2 to step 5.

If it is satisfactory, replace the dust cap on the connector or immediately plug the connector to an adapter or a transceiver that has already been cleaned.

Procedure job aid

The recommended cleaning material for fiber optics is in the table “Cleaning tools and supplies for fiber connectors” (page 242).

Table 14
Cleaning tools and supplies for fiber connectors

Tool or supply	Vendor	Comment
pipe cleaners	any	lint free, for cleaning alignment sleeves
vinyl gloves	any	comfortable fit for your hand
Optimate Fiber scope, 602970- 1/2	AMP of Canada or equivalent	microscope kit at 100X or 200X magnification for inspecting fiber optic cores
plastic squeeze bottle	Chemtronics	rated to handle isopropyl alcohol
isopropyl alcohol, reagent grade	Hunt or other chemical supplier	certified particle grade (filtered at 0.2 um) for semiconductors
TX409 Absorbond	TEXWIPE or equivalent	lint-free, fiber-free, 100% polyester wiper, clean-room certified
TX2510 AccuDuster III	TEXWIPE or equivalent	compressed gas for precision cleaning (tetrachlorethane)
mini foam swabs (48040)	Coventry (division of Chemtronics)	for cleaning transceivers that have a fiber connected at the back end
adapter cleaning tips (AlcoaFL ACT-1)	any	for cleaning adapters that have a fiber connected at the back end
(Sheet 1 of 2)		

Table 14 (continued)
Cleaning tools and supplies for fiber connectors

Tool or supply	Vendor	Comment
plastic bags, approximately 15 cm by 15 cm (6-in. by 6-in.)	any	must be sealable, for storing dust caps of connection adaptors
Universal cleaning cassette	Corning Cable Systems	a special tool used to clean MT-RJ connectors with or without pins
(Sheet 2 of 2)		

Figure 60
LC fiber connectors

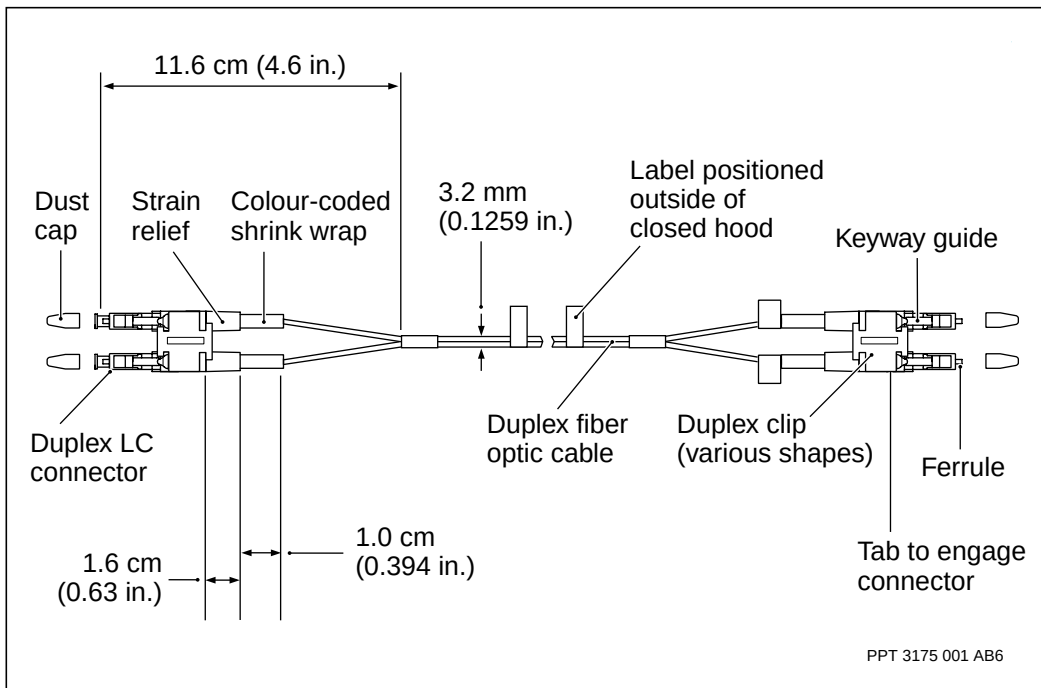
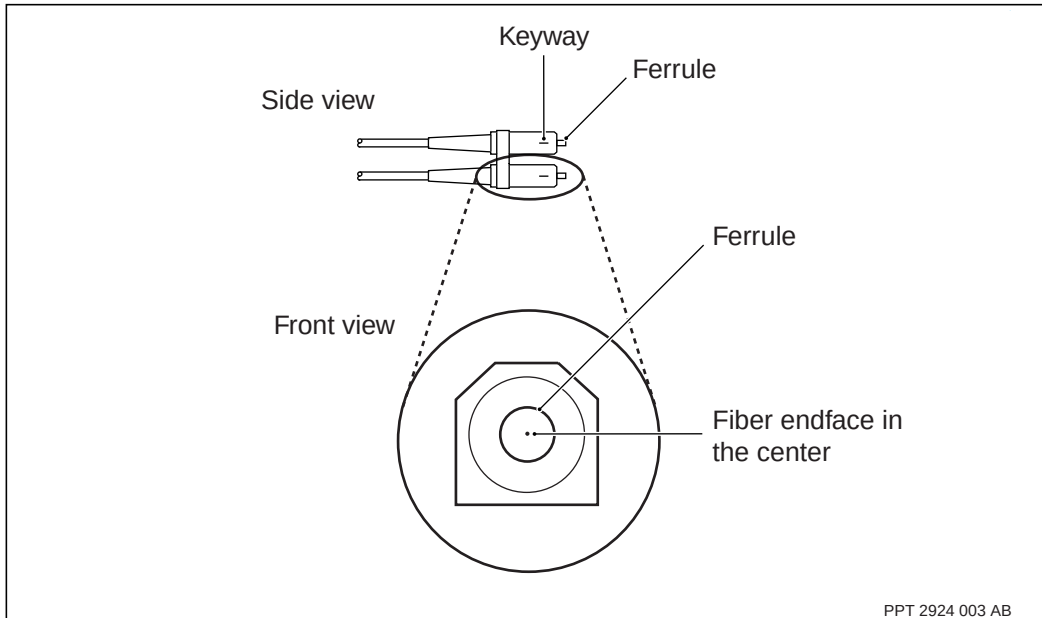


Figure 61
SC fiber connector



Cleaning MT-RJ connectors

Clean MT-RJ connectors to maintain optimum connectivity between the end of a fiber cable and its connection, or to stop an intermittent transmission error.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Refer to the table “Cleaning tools and supplies for fiber connectors” (page 242)
- Avoid direct skin contact with the part of the connector, ferrules, or transceiver being cleaned.
- Protect your eyes with safety goggles during cleaning.
- Work in a well-ventilated area. Use small amounts of cleaning alcohol and avoid breathing the vapors.
- MT-RJ connectors should only be cleaned when they are suspected to be dirty. Excessive contact can damage the fiber and cause full or partial signal loss.
- The figure “MT-RJ fiber connector” (page 247) shows the location of the fiber ends on a MT-RJ connector. These are not likely to be visible to your eye.
- The ferrule is the rigid stem at the connector that contains the optical fiber. Only clean one ferrule at a time. Wear vinyl gloves to avoid contaminating the ferrule or the cleaning surface with skin oil.
- Clean the transceiver (or adapter) before cleaning the connector that is to be plugged into it. See “Cleaning the bore of a transceiver” (page 248).



WARNING

Risk of eye injury by laser

Never look directly into the end of a fiber cable, let an end pass in front of your eyes, or use an optical device to look at the end of an optical fiber unless you are certain the other end is not connected. The laser travelling through a fiber cable can injure the human retina.

**WARNUNG****Gefahr von Augenverletzungen durch Laserstrahlen**

Blicken Sie nie direkt auf das Ende eines Glasfaserkabels, und überprüfen Sie auch einzelne Faserenden nicht mit einem optischen Gerät, wenn Sie nicht sicher sind, daß das andere Kabelende nicht angeschlossen ist. Der über die Glasfasern übertragene Laser kann die menschliche Netzhaut verletzen.

Procedure steps

- 1 If the connector is in use, disconnect it from the function processor (FP).

If the connector is not in use, remove the dust cap to expose the ferrule. The cap is removed by pushing the cap and the ferrule together, squeezing the release tab and then pulling off the cap.

If an inline attenuator is used for the connection at the FP end, the receptacles of the attenuator and the connectors that plug into it must also be cleaned according to its manufacturer's instructions.
- 2 Holding a can of compressed clean-room grade gas upright, blow the surface of the ferrule. Avoid having propellant fluid coat the connector.

Do not blow onto the ferrule with your breath. Moisture from your breath will contaminate the surface.
- 3 Inspect the fiber endface with an appropriate microscope. Replace the cap if the ferrule is clean. If particles are still present proceed with step 4.
- 4 Use the plastic squeeze bottle to apply 1 drop of isopropyl alcohol on a ferrule.

Do not allow the alcohol to dry on the connector because it will leave a residual film on the ferrule.
- 5 While the ferrule is wet, use a Corning Cable Systems, universal connector cleaning cassette. Do not use a substitute. Flip up the flap of the cassette to expose the cleaning surface. Position the ferrule so the fiber ends are in contact with the cleaning surface. The ferrule should be perpendicular to the cassette so it creates a "T" with the cleaning surface.

The cleaning cassette can be used for MT-RJ connectors that have pins or are pinless. Use the appropriate cleaning surface for the ferrule you are cleaning.
- 6 Turn the cogwheel on the cleaning cassette to advance the cleaning surface.

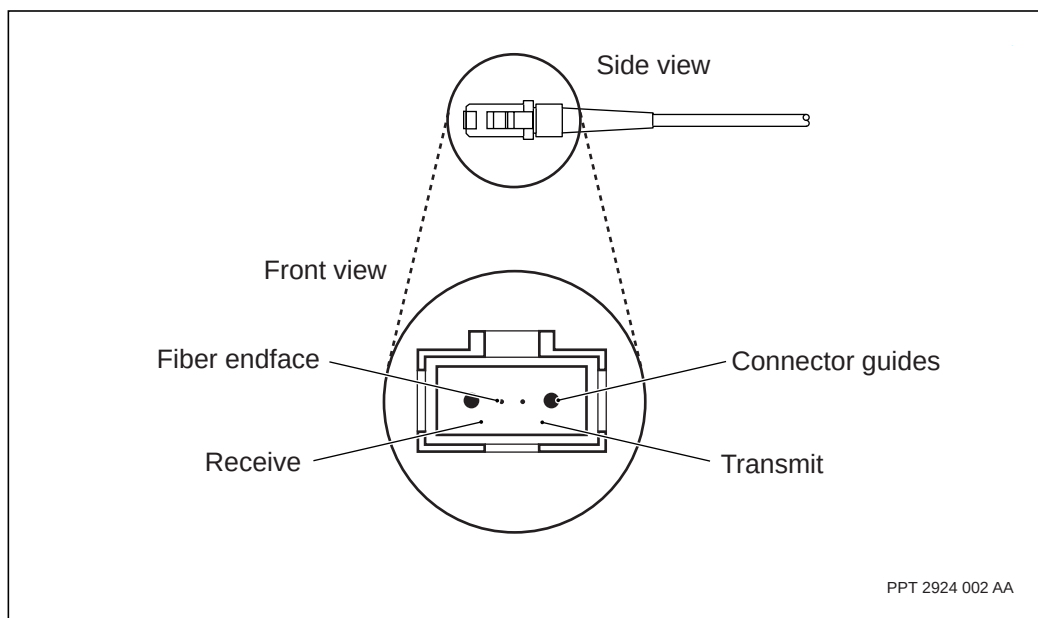
- 7 Blow dry the ferrule end with clean-room grade air. Do not blow breath or use in-house air to dry the ferrule.
- 8 Assess the cleanliness of the ferrule endface through an appropriate microscope.

If it is not satisfactory, repeat steps 2 through 7.

If it is satisfactory, replace the dust cap on the connector or immediately plug the connector to an adapter or a transceiver that has already been cleaned.

Procedure job aid

Figure 62
MT-RJ fiber connector



Cleaning the bore of a transceiver

Clean the bore of a transceiver to maintain optimum connectivity between the end of a fiber cable and its connection.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The bore is the opening in the transceiver which accepts a fiber optic connector. Passport FPs have either LC, MT-RJ, or SC connector bores. With LC or SC transceivers the transmit portion of the device aligns the ceramic ferrule of the laser with a split sleeve. Any dirt in this sleeve can compromise the quality of the optical connection. With MT-RJ connectors the fibers are aligned to the transceiver with internal metal pins which mate to the MT-RJ fiber connector. Any dirt on the pins, or on the endface of the ferrules can prevent proper alignment and compromise the quality of the optical connection.
- Wear vinyl gloves to avoid contaminating the sleeve or the cleaning tools with skin oil.
- Refer to “Cleaning tools and supplies for fiber connectors” (page 242).

Procedure steps

- 1 Remove the connector from the transceiver by pressing the tab fully down and pulling straight away from it, or remove the dust cap by pulling straight away from it. Put the cable aside for cleaning, or put the dust cap aside for re-use.
- 2 Using a can of compressed gas, blow one or two short bursts to remove any large contaminants from the sleeve or pins.

Do not blow onto the ferrule with your breath. Moisture from your breath will contaminate the surface.
- 3 Moisten a lint-free foam swab with alcohol. Shake off any excess alcohol.
- 4 Carefully insert the swab into the port. When it bottoms out, slowly rotate the stick once or twice in one direction only. Discard the swab after each use.
- 5 Repeat step 4 with a new swab to ensure that the alcohol has fully evaporated.

Configuring modem software

Configure modem software after setting the modem dip switches to enable a remote operator connection.

Prerequisites

- Ensure you have a computer or terminal with an RS-232 port that you can temporarily connect to the modem while you adjust the modem settings. The RS-232 port must be capable of running at 9600 BPS; otherwise, the modem will not be able to communicate with the Passport switch local operator port.
- Complete the procedure “Setting modem dip switches” (page 683)

Procedure steps

- 1 On the modem, set dip switch 8 for the smart mode to on (down).
- 2 Switch the modem power off, then on again.
- 3 Get a computer or terminal with an RS-232 port to temporarily connect the modem to while settings are adjusted.

The RS-232 port must be capable of running at 9600 BPS. Otherwise the modem will not be able to communicate with the Passport local operator port.
- 4 Set the computer or terminal to use software flow control, also referred to as the data leads only mode. Otherwise the modem may not be able to communicate with the computer or terminal.
- 5 Connect the modem to the RS-232 port of a computer or terminal using a standard straight-through serial cable. Typically the cable has a 9-pin D-sub female connector at one end and a 25-pin D-sub male connector at the other end.

Do not use the V.24 DCE cable (PEC NTBP25 or custom-length equivalent) provided with the Passport. Use a custom-made cable that complies with the specifications identified in the Procedure job aid of “Connecting a CP modem cable” (page 255).
- 6 Enter the following one-word commands. Explanations are provided for each one.
 - ATQ0 (with a zero, displays result codes so that the modem responds with OK after this command and whenever an attention command (AT) is entered)

- ATZ4 (loads a generic hardware flow control configuration when the cable from “Assembling the custom connection cable” (page 568) is to be used. Otherwise enter ATZ5. Some functionality will be disabled)
 - ATQ0 (with a zero, displays result codes and OK)
 - AT&M0 (optional command) (with a zero, disables error control; use only if the dialing modem does not support error control)
 - AT&W0 (with a zero, writes the current configuration to non-volatile memory, NVRAM 0)
 - ATY0 (with a zero, uses NVRAM 0 as the default configuration)
- 7 Disconnect the modem from the computer or terminal.
 - 8 While the modem is still powered, return its operation to dumb mode by setting dip switch 8 back to off (up).
 - 9 Turn the modem off and on again to load the changes.

Connecting a CP Ethernet cable

Replace a CP Ethernet cable if it is faulty or as part of a CP replacement procedure.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a kit with PEC NT0479, which contains:
 - CP Ethernet cables for 10Base-T or 100Base-T connections (NT0460). Used with CP2, CP2E, or CP3 and extends 1.2 m (4 ft.)
 - CP2 Ethernet crossover cable (NT0477), used with CP2 or CP2E and extends 3 m (9.8 ft.)
 - CP2 10-Base-T transceiver (928A), used only with CP2
 - CP2 Ethernet cable assembly guide
- If you are using a custom-made cable, it should conform to the standards available from Nortel Networks. For information on cable specifications, 241-1501-200 *Passport 15000, 20000 Hardware*.
- The expected behavior when an Ethernet cable fails, or is pulled from the active CP, is that a CP switchover will occur. You can change this behavior by disabling the *SwitchoveronFailure* attribute. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*

Procedure steps

- 1 Measure the exact path the cable will follow from port P0 on the faceplate of the CP, through the cable management channel, out the left side of the frame and up or down the side of the frame to the other termination. Choose a path that avoids placing the cable next to an input power cable. See the figure “Route of a CP cable” (page 253).
- 2 Open the kit NT0479.
- 3 While holding the cable NT0460, plug the 45-degree D-sub connector (the end with the cable label) into the P0 D-sub receptacle on the front of the CP.
- 4 Route the cable down to the cable management channel and out the left side of the frame. The cable is 1.2 m (4 feet) long.

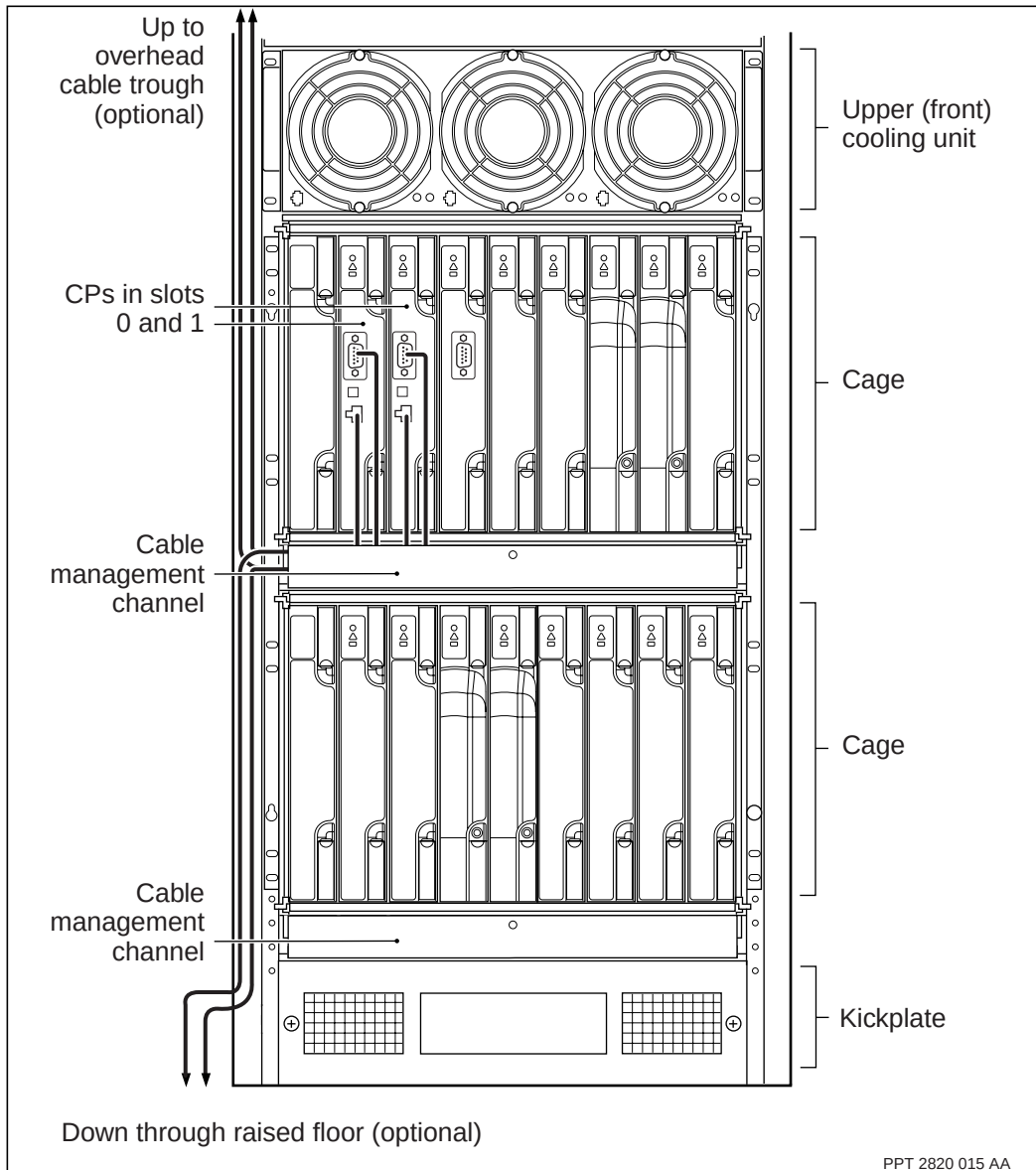
- 5 Optionally for CP2, connect the other end of cable NT0460 into the D-sub of the inline transceiver (part number 928A). While holding the cable NT0477, plug the RJ45 connector with the ferrite bead into the inline transceiver.
- 6 Route the cable NT0477 to the connection on the hub or router through which the Preside Multiservice Data Manager or CPE connectivity is established. The cable is 3.0 m (9.8 feet) long. Plug the RJ45 connector into the hub or router.
- 7 Fasten the cable in place with tie-wraps except along or inside the cable channel under the CP faceplate. Avoid resting the cable against a power cable. Ensure that the LEDs of the transceiver remain visible.

Management of slack cable must be done at the non-CP end of the connection or through the fiber management unit described in *241-1501-200 Passport 15000, 20000 Hardware*.

- 8 Label the cable at the hub or router end as a CP cable with its node identifier (from site records) and slot number.
- 9 Label the cable near the CP with information identifying which termination port this CP is connected to.
- 10 Once one or both CPs are confirmed to seat properly, pull each CP out far enough for the latches to engage the transportation ridge. Close the latches flush with each faceplate. CPs must remain unseated until the powering up of the Passport 15000 or 20000.

Procedure job aid

Figure 63
Route of a CP cable



Connecting a CP local operator terminal cable

Connect a local operator terminal to a Passport 15000 or 20000 to enable local communication with the switch during commissioning. You can use this terminal to set up a connection to your network management system.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The operator cable is intended only for commissioning the switch and must not remain hooked up permanently.
- The operator terminal must be installed and located in the same room as the node. Refer to preparing the site and selecting the type of operator terminal in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.
- You need a computer terminal interface cable with PEC NTBP25 or alternatively have a spool of interface cable and the appropriate end point connectors at hand before starting the procedure.

Procedure steps

- 1 Ensure the settings on the terminal match the output of the CP module at 9600 bit/s, 1 stop bit, and no parity. Refer to the terminal manufacturer's instructions on how to do this.
- 2 Unpack the RS232 CP cable with PEC NTBP25. Otherwise, at the end of the spool of RS232 interface cable, attach a V.24 DCE connector according to the instructions that came with the connector.
- 3 Connect the V.24 DCE connector into the active CP faceplate at the RS232 connector labeled P1.
- 4 Route the interface cable from the CP faceplate up to the connector on the terminal.
- 5 At the terminal end of the interface cable, cut the interface cable so that it can accommodate a connector and plug into the terminal without straining the connection.
- 6 At the terminal end of the interface cable, attach a 9-pin D-sub connector to the cable according to the instructions that came with the connector.
- 7 Connect the D-sub connector into the terminal. Ensure there is no stress on the cable or connector, nor a right-angle bend.

Connecting a CP modem cable

Connect a CP modem cable between the modem and a Passport switch after you have configured the modem software, to enable a remote user to dial up to the Passport and have a local operator connection.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Do not use the DCE V.24 cable assembly (PEC NTBP25) to connect a modem to port 1 of the CP in a Passport. The connector on the faceplate is for a customized DB-9 cable. Ensure the modem cable complies with the specifications in “Procedure job aid” (page 255).

Procedure steps

- 1 At the front of the Passport where the cards plug in, locate the CP in slot 0 or 1.
- 2 Locate the 9-pin D-sub connection on the faceplate labeled port 1.
- 3 Plug the 9-pin connector on the cable into the connector on the faceplate.
- 4 Route the other end of the cable up through the cable organizer, over the top, and down to the rear of the Passport shelf. Leave the remainder of the cable hanging loosely.
- 5 Place the modem at the rear of the Passport shelf. Find a way to fasten it to the cable guide on the side that is nearest to where the cable passes over the top of the shelf.
- 6 Plug the modem into its own power outlet. Follow the instructions provided by the manufacturer of the modem.
- 7 Connect the remaining end of the custom cable into the modem.

Procedure job aid

Assemble the custom modem cable using:

- a V.24 serial interface cable; to determine the length, trace the cable path from either CP at the front of the Passport up through the cable organizer, over the top, and down to the rear of the shelf where the modem can be located inside the cabinet and optionally fastened to the cable management guides

- a male 25-pin D-sub connector to connect to the modem
- a male 9-pin D-sub connector to connect to port 1 on the faceplate of the CP in the Passport

The cable and its connectors must be custom-made according to the table “Pinout for the Passport DB 9-pin connecting to the modem DB 25-pin” (page 256).

Table 15
Pinout for the Passport DB 9-pin connecting to the modem DB 25-pin

DB 9-pin	DB 25-pin	Signal name of the Passport to modem	Direction at the Passport
2	3	transmitted data [TXD] / received data (Rx)	input
3	2	received data [RXD] / transmitted data (Tx)	output
4	8	data terminal ready [DTR] / data carrier detect (CD)	input
5	7	signal ground [GND]	not applicable
6	20	data carrier detect [DCD] / data terminal ready (DTR)	output
7	5	request to send [RTS] / clear to send (CTS)	input
8	4	clear to send [CTS] / request to send (RTS)	output
Note: Text in square brackets [] indicates the signal terminology used in Passport documents. Text in parenthesis () indicates the signal terminology commonly used by modem vendors.			

The modem used as an example hookup is a 56K modem manufactured by US Robotics, which includes their older Sportster series modems. Choose a modem that supports the same dip switch settings and AT software commands. The modem must also support the dumb mode so that the Passport will not reconfigure the modem while it is on-hook.

Connecting a Passport 15000 or 20000 to an EdgeLink 100

Connect a Passport 15000 or 20000 to an EdgeLink 100 to enable DS3 FPs to communicate with a DS1 and DS3 multiplexor.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Before installing the interface cables and connecting them, the EdgeLink 100 multiplexor must be mounted and the DS3 function processor (FP) with BNC connectors must already be installed.
- The EdgeLink interfaces to a DS3 function processor (FP) with BNC connectors in the Passport 15000 or 20000 and to an RJ48 termination through an access panel. The RJ48 connections are either:
 - 64-pin Cinch or wirewrap to an RJ48 T1 access panel with monitor jacks (part number A0718812)
 - 64-pin Cinch or wirewrap to an RJ48 T1 access panel (part number A0718813)
- The interface cables that connect an EdgeLink 100 to the Passport or the Ethernet hub of a Preside Multiservice Data Manager are listed in the table “Interface cables between a Passport 15000 or 20000 and an EdgeLink 100” (page 258). Two cables are required, one for transmitting and one for receiving.
- Configuring the software for the EdgeLink can be done before or after the interface cable is connected. There is no software configuration for the Passport 15000 or 20000 to interwork with the EdgeLink.

Procedure steps

- 1 Identify the cable path between the rear of the EdgeLink and the front of the DS3 card in the switch.
- 2 Measure the exact distance of the cable path from end to end and record it. Whether the DS3 interface cable is custom-made or prefabricated, ensure that the cable is long enough and can be fastened safely along the path.
- 3 Route the cable along the path and loosely fasten it with tie-wraps.

- 4 If the cable is to be a custom-made DS3, attach the BNC connectors to each end of an appropriate length of coax cable.
- 5 Plug the cable connector into the receptacle labelled IN at the rear of the EdgeLink.
- 6 Route the cable to the FP in the switch.
- 7 Plug the cable into the faceplate at a female BNC connector labelled Tx.
- 8 Label the cable at each end point to identify its other end and direction of signaling.
- 9 Manage any cable slack so that it is away from the switch.
- 10 Fasten the cable tie-wraps snugly along the path between the EdgeLink and the switch.
- 11 Repeat step 1 to step 10 for the second DS3 cable at the connectors labelled OUT and Rx.
- 12 When both DS3 interface cables are connected, the software of the EdgeLink establishes the links with the switch or Preside Multiservice Data Manager (or both). Coordinate with the software operator of the EdgeLink to activate its software. Ensure that the configuring is done and there is connectivity.

Procedure job aid

Table 16

Interface cables between a Passport 15000 or 20000 and an EdgeLink 100

Type and quantity	Part number	Length	Type of connector at EdgeLink	Type of connector at other end
DS1, two	A0718801, Telco Systems' AWX432G5	1.5 m (5 ft)	90-degree male 64-pin to 64-pin Amphenol/Cinch	RJ48 termination or wirewrap
DS1, two	A0718802, Telco Systems' AWX432G15	4.6 m (15 ft)	90-degree male 64-pin to 64-pin Amphenol/Cinch	RJ48 termination or wirewrap
DS1, two	A0718803, Telco Systems' AWX432G30	9.1 m (30 ft)	90-degree male 64-pin to 64-pin Amphenol/Cinch	RJ48 termination or wirewrap
DS1, set of two	A0718779, Telco Systems' AXX432G5	1.5 m (5 ft)	90-degree male 64-pin Amphenol/Cinch to wirewrap	wirewrap at RJ48 termination
(Sheet 1 of 2)				

Table 16 (continued)**Interface cables between a Passport 15000 or 20000 and an EdgeLink 100**

Type and quantity	Part number	Length	Type of connector at EdgeLink	Type of connector at other end
DS1, set of two	A0718780, Telco Systems' AXX432G25	7.6 m (25 ft)	90-degree male 64-pin Amphenol/Cinch to wirewrap	wirewrap at RJ48 termination
DS1, set of two	A0718781, Telco Systems' AXX432G50	15.2 m (50 ft)	90-degree male 64-pin Amphenol/Cinch to wirewrap	wirewrap at RJ48 termination
DS3, two	rated as 728A RG-6U or equivalent	custom	90-degree male-to-female BNC adapter for standard BNC male connector	male BNC on a DS3 FP
DS3, two	NTPF19AC	1 m (3.2 ft)	male BNC	male BNC on a DS3 FP
DS3, two	NTPF19AA	3 m (9.8 ft)	male BNC	male BNC on a DS3 FP
DS3, two	NTPF19AB	15 m (48.2 ft)	male BNC	male BNC on a DS3 FP
Ethernet	Telco Systems' AWX454G10 for standard LAN trunk cable IEEE 802.3	3 m (10 ft)	male RJ-45, eight-position modular	a male RJ45 connector for a female connector on the hub that is linked to Preside Multiservice Data Manager
(Sheet 2 of 2)				

Connecting a PIM cable

Connect a PIM cable to power a second switch.

Prerequisites

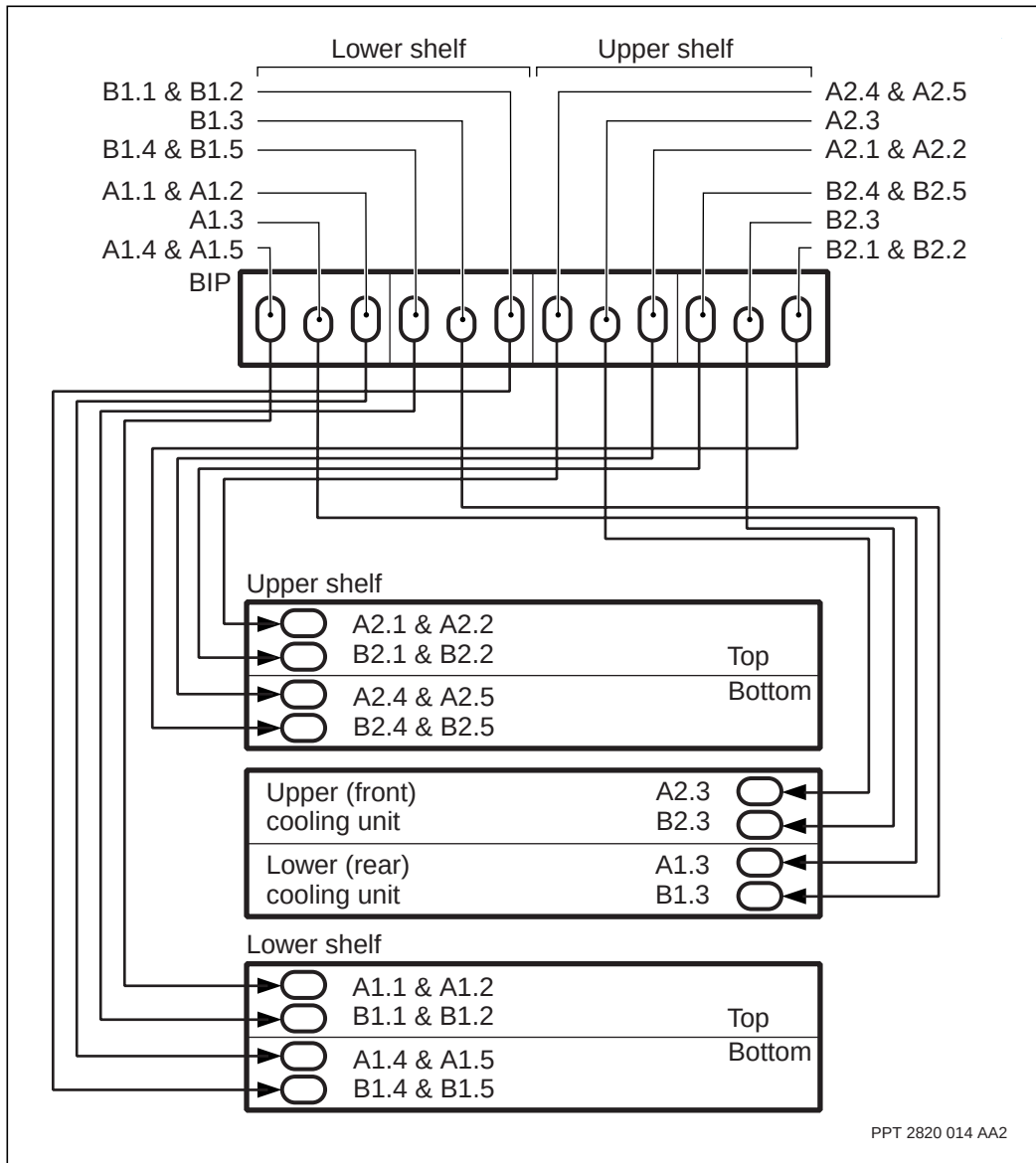
- You must be familiar with “Safety considerations and best practices” (page 41).
- PIM cables are pre-installed in a NEBS 2000 frame for both upper and lower Passport switches.

Procedure steps

- 1 At the front of the BIP, ensure that the BIM breaker for the PIM you are about to connect is switched off (O symbol). The mapping of breakers to PIMs is labelled on the rear of the BIM captive screw cover.
- 2 Locate the pre-installed PIM cable to be connected. Refer to the cable path for each PIM as shown in the figure “Connection points of the PIM cables” (page 642).
- 3 At the PIM, press the cable connector in until both tabs click. The connector mates only one way.
- 4 Switch on the BIM breaker for that PIM (I symbol).
- 5 For a Passport 20000, confirm the PIM LED is lit, indicating it is powered.
- 6 Dress the cable slack and fasten with tie-wraps. Cut off the tie-wrap tails.

Procedure job aid

Figure 64
Connection points of the PIM cables



Connecting a power input cable to a terminal block

Connect a power input cable to a terminal block of a polyvalent or ETSI power-and-ground assembly to provide power to the assembly which feeds the breaker interface panel (BIP).

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an installed polyvalent power-and-ground assembly with part number A0834143 or an ETSI power-and-ground assembly with part number A0843149.
- You need power input cables rated to the hardware configuration of the Passport 15000 or 20000.
- You need a cutter for up to 1/0 AWG (53.5 mm²) cable.
- Grounding the assembly is provided when the NEBS 2000 frame is cabled to the site ground window.



WARNING

Risk of injury or equipment damage by electricity

When connecting power input cables at the BIP, ensure that the source of power at the other ends of the cables (feeds) is off (disconnected), fuses are removed, or the breakers are off). Also ensure that all BIP breakers are off (the O is pressed in).



WARNUNG

Verletzungsgefahr oder Geräteschäden durch Elektrizität

Vergewissern Sie sich beim Verbinden der Netzkabel am Trennschalterkopplungsmodul (BIP), daß die Stromversorgung an den anderen Kabelenden (Speisestromzuführungen) getrennt ist oder daß die Sicherungen entfernt bzw. die Trennschalter ausgeschaltet sind. Stellen Sie außerdem sicher, daß alle BIP-Trennschalter ausgeschaltet sind (O ist gedrückt).

**CAUTION****Risk of equipment damage by reversed polarity**

Use the plus (+) and minus (-) symbols on the rear of the breaker interface panel (BIP) to ensure that the polarity of each A and B battery (-48/-60 V dc) and battery return for the input power feeds is correct. When powering up the BIP, reversed polarity will damage circuits inside it.

Procedure steps

- 1 At the front of the BIP, ensure that all breakers are switched off (the O is pressed in).
- 2 Near the rear of the BIP, locate the power input cable labelled A1+. All of the power input cables should have been labelled according to the figure "Overhead power input cables for the lower shelf connected to the BIP" (page 290).
- 3 Route the cable up to the terminal block that aligns with the appropriate BIP connection, and dress the cable above for permanent suspension.
- 4 Cut the cable so that it can be stripped to fit into the block and hang unstressed but not sagging.
- 5 Strip 2.5 cm (1 in.) of insulation from the end of the cable.
- 6 On the rear of the BIP, locate the right cable from the rightmost pair of studs. It has a + sign beside it.
- 7 Trace the cable from the BIP to the bottom of the terminal block. Note which side of the block that the cable connects to.
- 8 Locate the screw hole on the side of the noted block facing you, unfasten it, and put it aside momentarily. If complete removal is resisted, unfasten the screw as far as it will go without forcing it.
- 9 Insert the end of the cable into the top opening in the block so that:
 - the cable aligns with the traced bottom cable
 - the exposed wires stop at the bottom of the screw hole
 - the edge of cut insulation is flush with the top of the terminal block; you may have to strip more insulation or shorten the wires
- 10 Remove the cable and coat the exposed wire with anti-oxidizing grease, unless your local electrical codes specify otherwise.
- 11 Insert the cable back into the top opening in the block.

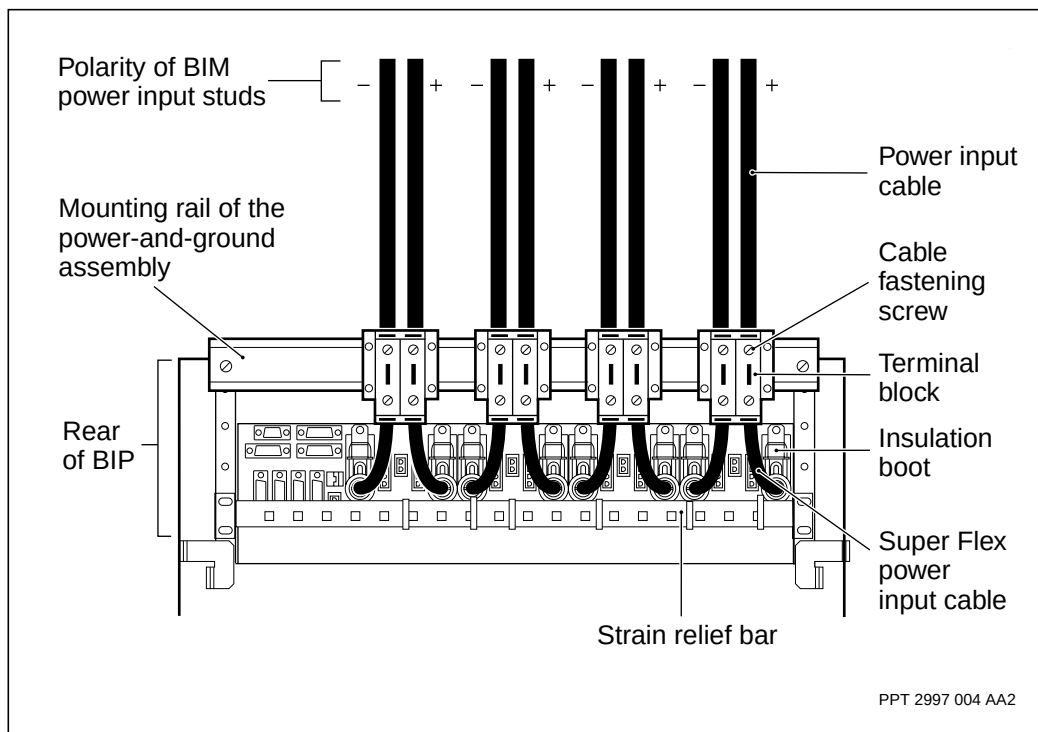
- 12 Fasten the screw back into its opening until it firmly clamps the end of the cable. The cable sheath must be flush against the block so that no wire is exposed.
- 13 For each remaining power cable, repeat step 2 to step 12. Identify the next cable by its label according to the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290).

Procedure job aids

Refer to the figure that matches your hardware:

- “Power input cables connected to a polyvalent power-and-ground assembly A0834143” (page 264)
- “The ETSI power-and-ground assembly A0834149” (page 398)

Figure 65
Power input cables connected to a polyvalent power-and-ground assembly A0834143



Connecting a temperature sensor cable assembly

Connect the upper temperature sensor cable assembly to enable monitoring of the air flow temperature from the upper (front) cooling unit.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a step ladder to see the top of an upper shelf assembly that is mounted in a NEBS 2000 frame or other mounting apparatus.

Procedure steps

- 1 While facing the rear of the Passport 15000 or 20000, locate the temperature sensor assembly under the BIP and on top of the shelf. See the figure “Location of upper temperature sensors” (page 266).
- 2 Trace the cluster of red cables from the 3 sensors to the right side down to the connector at the end. See the figure “Cable assembly connector on a temperature sensor bracket assembly” (page 267).
- 3 Align the connector with the D-sub of the nearest red cable assembly from the upper cooling unit. The cable assembly is labeled NTHR55.
- 4 Engage the D-sub connectors and fasten the small slotted captive screws.

When the Passport Passport 15000 or 20000 is already powered, all 3 fans of the upper (front) cooling unit should start rotating at the lower (normal) rpm speed.

- 5 Fasten the cable cluster with the provided tie-wraps to the inside of each cable management bracket along the route. If there is any slack cable, loop the cluster and fasten the loop closed without crimping the cable. Have the loop occur in the middle of the vertical leg of cables.

Procedure job aid

Figure 66
Location of upper temperature sensors

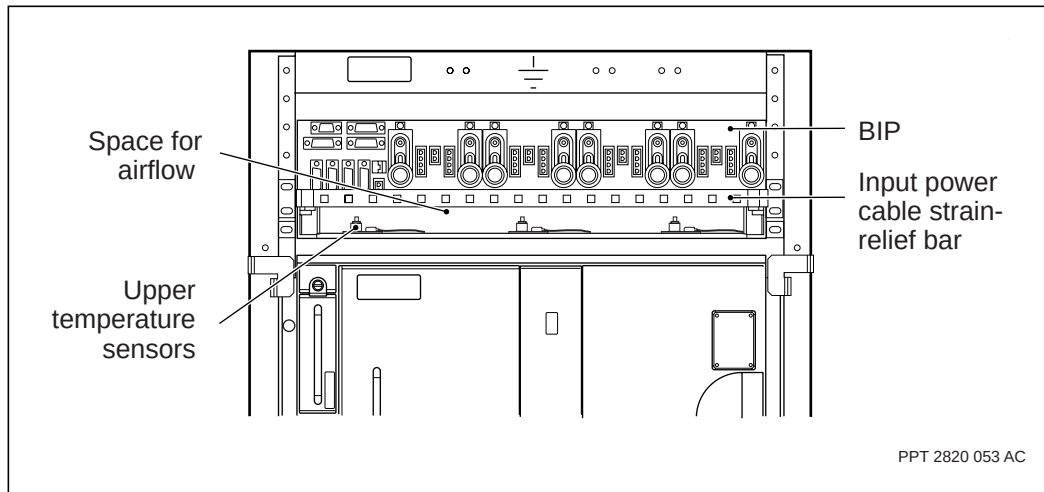
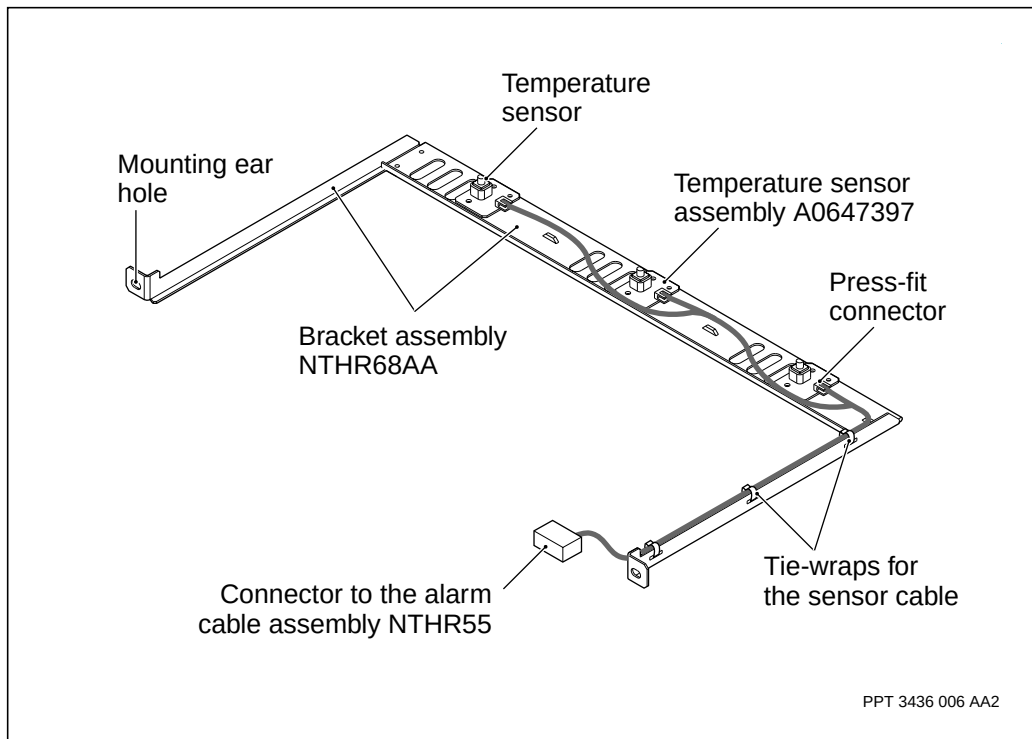


Figure 67
Cable assembly connector on a temperature sensor bracket assembly



Connecting alarm cables to the alarm/BITS module

Connect alarm cables to the alarm/BITS module to enable the BIP alarm and cooling unit alarm.

Prerequisites

- The cable assemblies may already be installed. If not, they must be added.
- The PECs for the alarm cable assemblies are
 - NTHR55 for the BIP alarm to the upper alarms/BITS module
 - NTHR56 for the BIP alarm to the lower alarms/BITS module
 - NTHR57 for each cooling unit alarm to the alarms/BITS module
- The cable assembly NTHR57 has eight wires between connectors. A Passport 15000 uses four of the wires while a Passport 20000 uses all eight. The former version of the cable assembly had four wires. Both versions have the same connectors and cable length. The cable assembly with eight wires can replace one with four wires with no effect on performance or operation. The 4-wire version cannot replace the 8-wire version. For connection information, see the table “Pinout of the alarm cable assembly from NTHR57” (page 269).
- See the location of the cable connections in the figure “Connection points of the cables for an alarm/BITS module in a Passport 15000” (page 271) and “Connection points of the cables for an alarm/BITS module in a Passport 20000” (page 272).

Procedure steps

- 1 At the rear of the BIP, locate the 26-pin female D-sub connector labeled P7 (for lower unit) or P9 (for upper unit). See the figure “Locations of the alarm cable connectors and paths” (page 270).
- 2 Connect one end of the BIP alarm cable to that D-sub connector.
- 3 Route the cable to the right along the strain-relief bar, fastening snugly with tie-wraps every 15 cm (6 in.).
- 4 Route the cable down the right side of the frame against the cable management brackets.

- 5 Connect the other end of the cable to the female D-sub connector beside the label J1. The connection already has an inline EMI filter plugged in, so connect the cable to the filter.
- 6 Fasten the cable with tie-wraps to the cable management brackets.
- 7 At the connector labeled J2, connect one end of the cable identified as NTHR57. The connection already has an inline EMI filter plugged in, so connect the cable to the filter.
- 8 Route the cable out to the right side of the frame (facing the rear) and down the frame against the cable management brackets to the front of the lower (rear) cooling unit.
- 9 Connect the remaining D-sub connector of the cable to the connection on the cooling unit labeled ALARM.
- 10 Fasten the cable with tie-wraps to the cable management brackets.

Procedure job aid

Table 17

Pinout of the alarm cable assembly from NTHR57

Pin number at J1 end	Pin number at the P1 end	Signal on the connection for the Passport 15000 or 20000
2	2	FAN TEMP
4	4	GND
7	7	GND
8	8	FAN FAIL
1	1	LED TEST
3	3	LED TEST
5	5	LED TEST
9	9	GND

Figure 68
Locations of the alarm cable connectors and paths

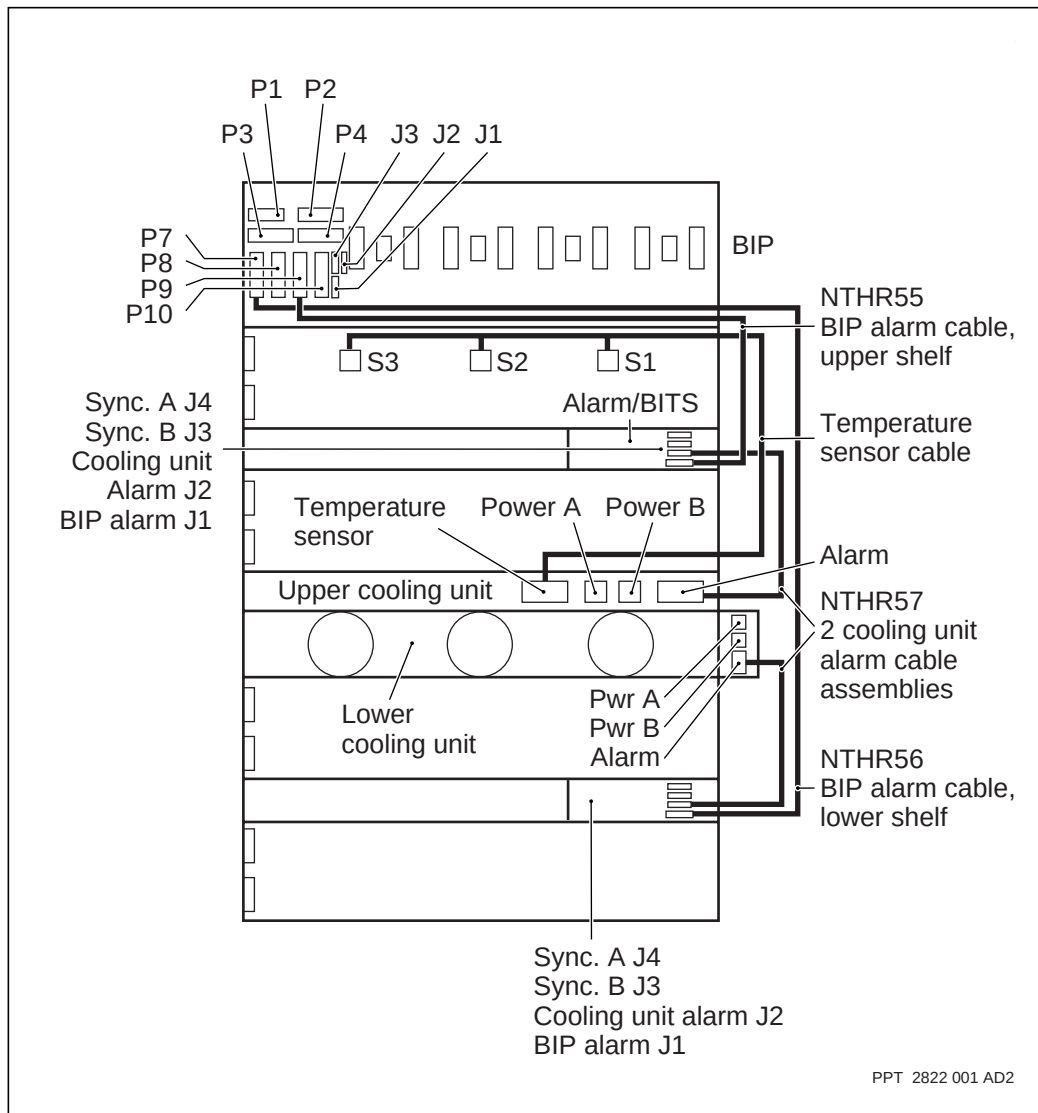


Figure 69
Connection points of the cables for an alarm/BITS module in a Passport 15000

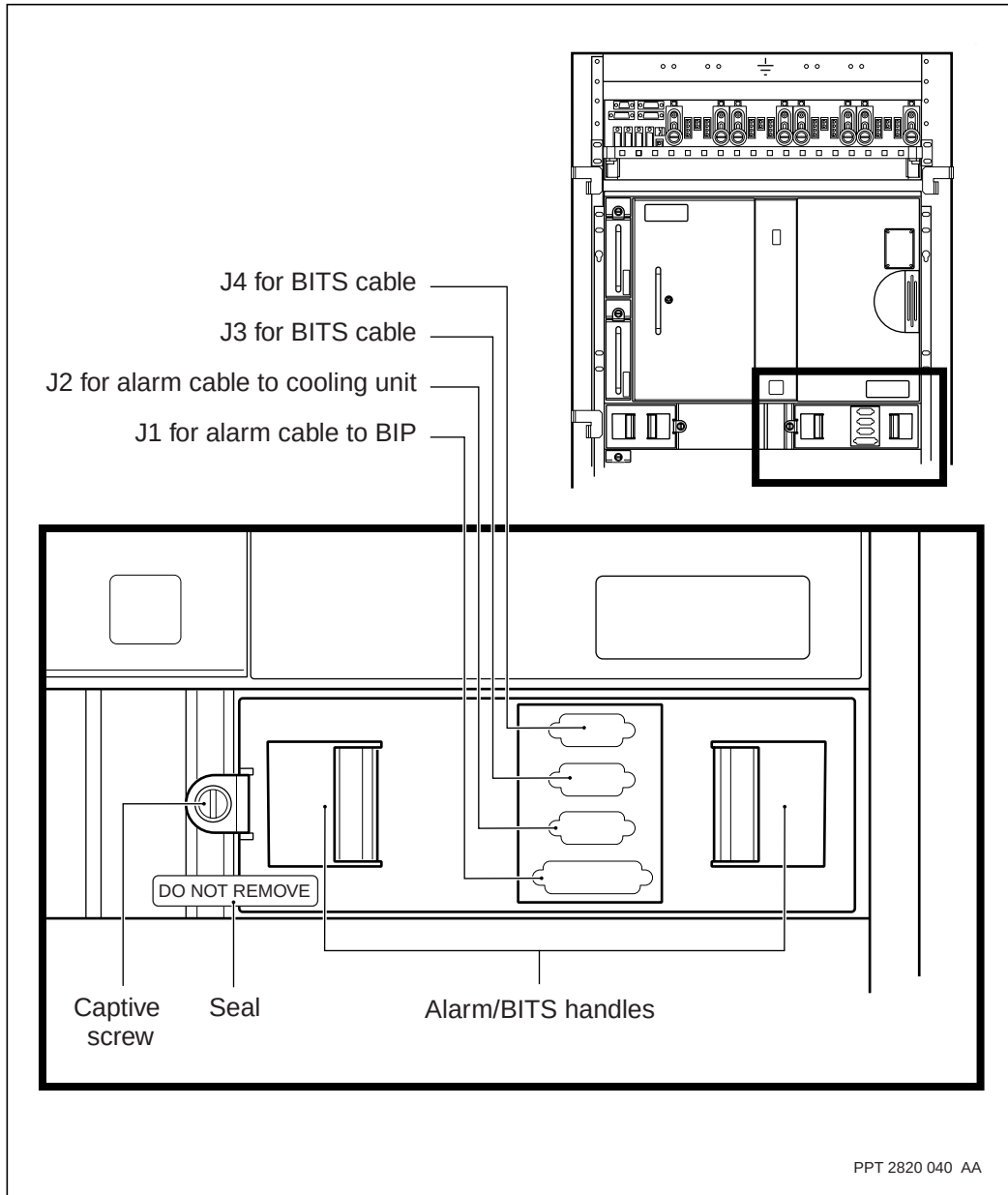
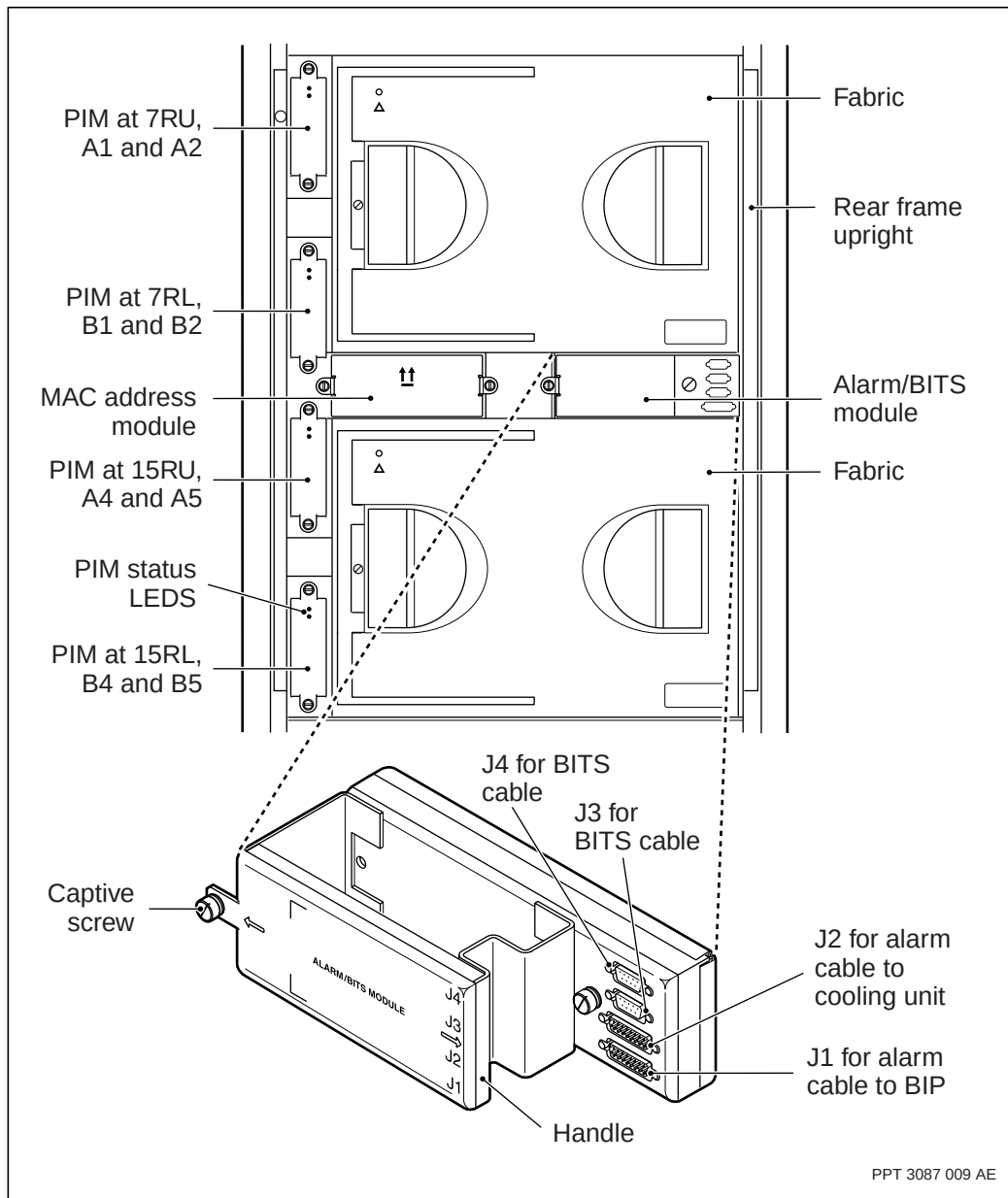


Figure 70
Connection points of the cables for an alarm/BITS module in a Passport 20000



Connecting an FP cable

Connect an FP cable to enable an installed or replaced FP to transmit and receive traffic signals, and connect all cables in sequence for an initial installation to minimize cable congestion on the front of the Passport 15000 or 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You must ensure that all FP cables are routed and labelled as described in “Routing FP cables” (page 666).
- You must install all attenuators that are required by an optical FP, as described in “Determining if you need to use inline attenuators with optical FPs” (page 298).
- For FPs requiring small-form pluggable (SFP) optical transceiver modules on the faceplate sockets (ports), you must ensure that the part is installed according to “Installing an SFP optical module” (page 466).
- To determine the operational status of a port that has an SFP plugged into it, especially if a LED is unlit, use the procedure 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* to display the status of an installed SFP optical module.
- When connecting cables in a spared configuration, complete the main connections first, and then the spare connections. Many sparing panels automatically start operating through the main connections.
- For coax cables between an FP and a sparing panel or a fanout panel, connect the transmit (Tx) at the FP to the Tx at the panel, and the receive (Rx) to Rx.
- For more information about cable management refer to 241-1501-200 *Passport 15000, 20000 Hardware*.

**CAUTION****Risk of service loss**

Before connecting any cables to an FP, ensure it is properly seated. Seating a cabled FP can cause a traffic loss on the other FPs in the sparing configuration.

**CAUTION****Risk of damage to the fiber transceivers on the FPs**

When engaging or disengaging a fiber optical cable connector to the connector on the FP faceplate (the transceiver), you can damage the nose shield on the connector or the optic transceiver by improper coupling. This especially applies to MT-RJ connectors.

Refer to the table “Actions to engage types of FP connectors” (page 277)

Procedure steps

- 1 Match the label on the connector or connectors of the fiber cable to the port on the faceplate of the FP.

For an initial switch installation, always start cabling from the rightmost FP and move left. The intent is to have the FP cable cluster nearest

For each FP, always start at the bottom right port and move upwards. If the FP has two columns of ports, continue down to the bottom left. This facilitates efficient cable management especially when port densities are high (for example, with 16-port OC-3/STM-1 FPs).

- 2 On the fiber cable, ensure that its label will reside outside the faceplate hood when it is closed, especially for the 16-port OC-3/STM-1 FPs.
- 3 Remove the dust plug or boot from the transceiver or connector on the port connection of the FP. Put them aside for re-use in another procedure.
- 4 Remove the dust boot or cover from the end of the cable connector. If the connector is duplex, also remove the boot from its mate. Put the boots aside for re-use in another procedure.
- 5 Connect the cable as indicated in the figure “Types of connectors on Passport FP cables” (page 276) and in the table “Actions to engage types of FP connectors” (page 277).

- 6 Repeat step 1 to step 5 for each other cable on the faceplate moving from the bottom right up to the top, then down to the bottom left, as required.
- 7 For any electrical FP with a control port cable connecting to a sparing panel, fasten the D-sub connector of the cable to the labelled receptacle on the faceplate. Refer to the figure "Types of connectors on Passport FP cables" (page 276) and in the table "Actions to engage types of FP connectors" (page 277). Run the control port cable parallel to its mate cables from the same FP.
- 8 Repeat step 1 to step 7 for each other FP in the shelf moving from left to right.
- 9 When all FPs in the shelf are connected, methodically check each connection one after the other by repeating the engagement action. Avoid bumping adjacent connectors. Never pull on the cable to confirm that it is engaged.
- 10 If the shelf is powered, wait until the FP LEDs cycle to eventually become solid or fast flashing green to indicate in service.

If a LED is any other color after 5 minutes, there is a problem with the FP. See 241-1501-200 *Passport 15000, 20000 Hardware* to understand LED behaviors as described in the chapter on using status indicators, then see 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting* to diagnose and fix the FP problem.

If a Tx or Rx LED on an NTHW49 is unlit, determine why by doing the procedure in 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals* to display the status of an installed SFP optical module.

Procedure job aid

Figure 71
Types of connectors on Passport FP cables

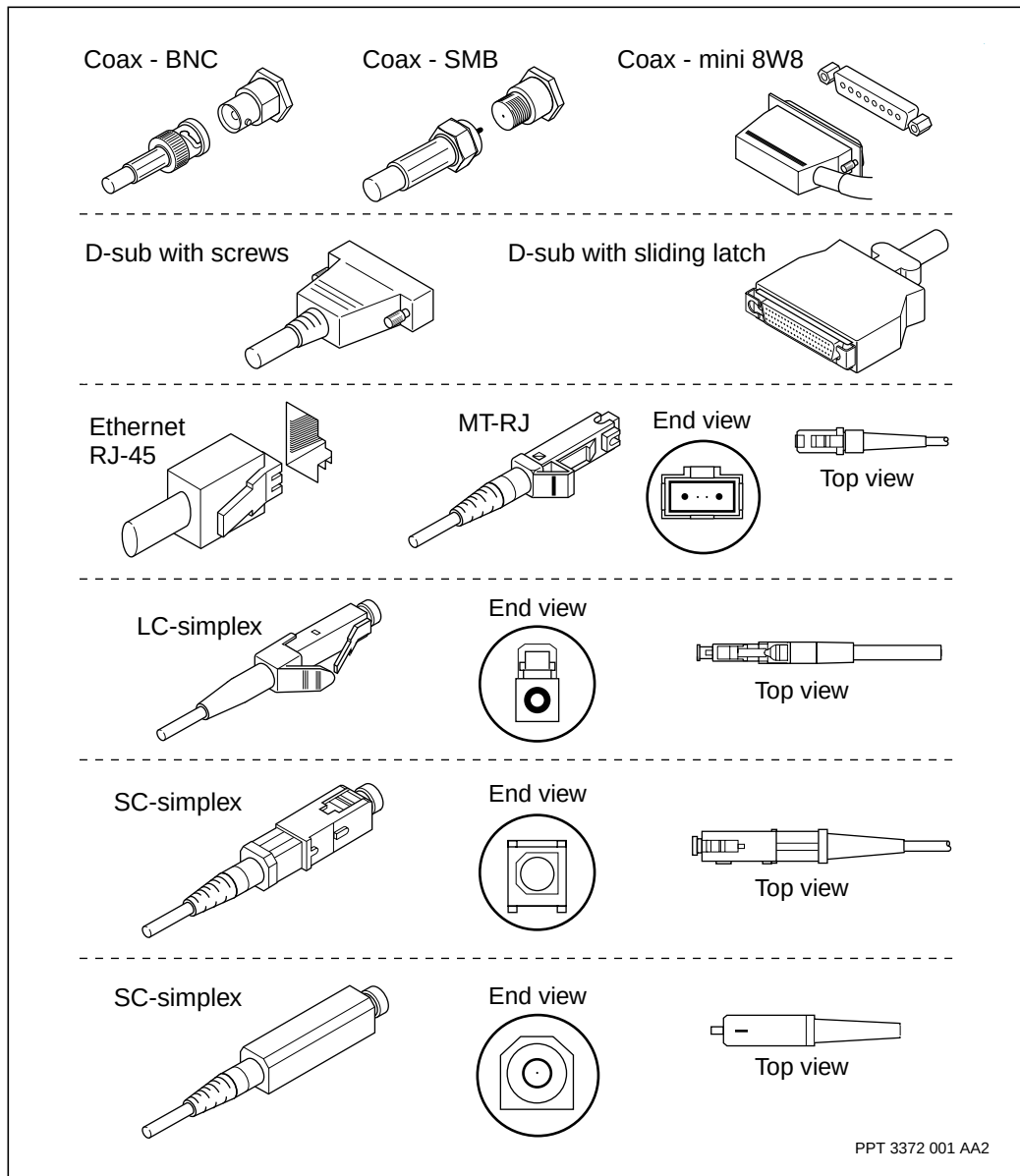


Table 18
Actions to engage types of FP connectors

Type of connector	Type of FP	Connection action
coax, BNC	DSn, En	Press each male connector onto the female connector combined with a counter-clockwise twist until the peg on the male connector reaches the detent at the end of the groove on the female connector.
coax, mini (8W8)	DSn, En	Ensure the threads of the slotted screws are disengaged from the connector shroud. Align the connector with the mate and press firmly and steadily together. Avoid rocking. Fasten the slotted screws to ensure that the connectors are fully and evenly engaged and cannot be bumped into becoming an intermittent contact. Each 8W8 cable connector is labelled P0, P1, or P2. Each has the same pattern of 4 ports repeated to accommodate the 4-port or 12-port FPs. Use only P3 when connecting a control port cable from a one-for-n (1:n) sparing panel.
coax, SMB	DSn, En	Align the copper wire with the hole on the mate connector and press them together until the cable stops.
D-sub with screws (DB9)	DSn, En	Ensure the threads of the slotted screws are disengaged from the connector shroud. Align the connector with the mate and press firmly and steadily together. Avoid rocking. Fasten the slotted screws to ensure that the connectors are fully and evenly engaged and cannot be bumped into becoming an intermittent contact.
D-sub with sliding latch	DSn, En	Open the sliding latch by pushing the smaller crescent away from the shroud. Align the connector with the mate and press firmly and steadily together. Avoid rocking. Slide the latch to the other side to engage it to the D-sub stud.
RJ-45 (Ethernet)	2-port GPDsk, VPN extender	Align the shape of the connector with the shape of the receptacle. Insert the connector until the tab clicks. Some RJ-45 connectors have guide ridges to prevent them from being plugged into other devices.
(Sheet 1 of 2)		

Table 18 (continued)
Actions to engage types of FP connectors

Type of connector	Type of FP	Connection action
LC, duplex	4-port GigE, OC-3, STM-1, VSP3	Align the pair of ridges on the connectors with the pair of keyways on the optical transceiver. Gently and smoothly push the connector in until feeling very slight resistance up to the tab clicking.
		With SFP optical modules, the bale latch must be closed against the body of the module before plugging in the connector. The latch prevents removing the SFP without first disconnecting the LC cables. See the figure "A typical SFP optical module" (page 468).
		With NTHW24 or NTHW31 FPs, the transmit (Tx) is oriented above the receive (Rx) for ports 0-7 and below the Rx for ports 8-15. The two columns of ports also have opposite keyway orientations, and the P is omitted from port numbers 10 to 15. See the figure "The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW31)" (page 280).
		With NTHW44 FPs, the transmit (Tx) is oriented to the left of the receive (Rx) on each transceiver. See the figure "The transmit and receive orientation on a 16-port OC-3/STM-1 POS and ATM FP (NTHW44)" (page 281).
		With NTHW49 and NTHW84 FPs, the transmit (Tx) is oriented below the receive (Rx) on the transceiver. See the figures of the faceplates in 241-1501-200 <i>Passport 15000, 20000 Hardware</i> .
LC, simplex	4-port GigE, OC-3, STM-1	Align the ridge on the connector with the keyway on the optical transceiver. Gently and smoothly push the connector in until the tab clicks.
MT-RJ	OC-3, STM-1, 16-port	Align the ridge on the connector with the keyway on the faceplate. Gently and smoothly push the connector in until you feel the tab engage or hear it click.
		The Tx and Rx pairs have opposed keyway orientations on each side of the faceplate, and the P is committed from port numbers 10 to 15. See the figure "The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW21)" (page 279).
SC, simplex or duplex	OC-n, STM-n	Align the ridge on each connector with each keyway on the faceplate. Gently and smoothly push the connector in until the tab or tabs click.
(Sheet 2 of 2)		

Figure 72
The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW21)

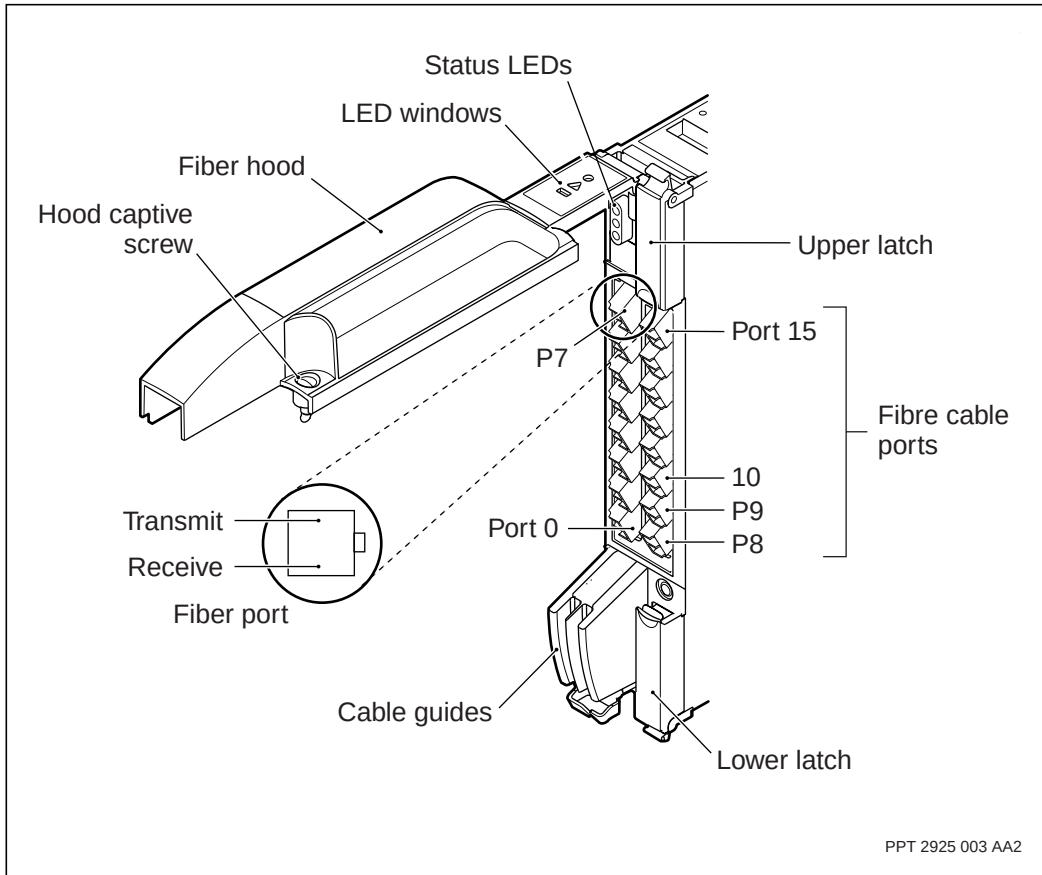


Figure 73
The transmit and receive orientation on a 16-port OC-3/STM-1 FP (NTHW31)

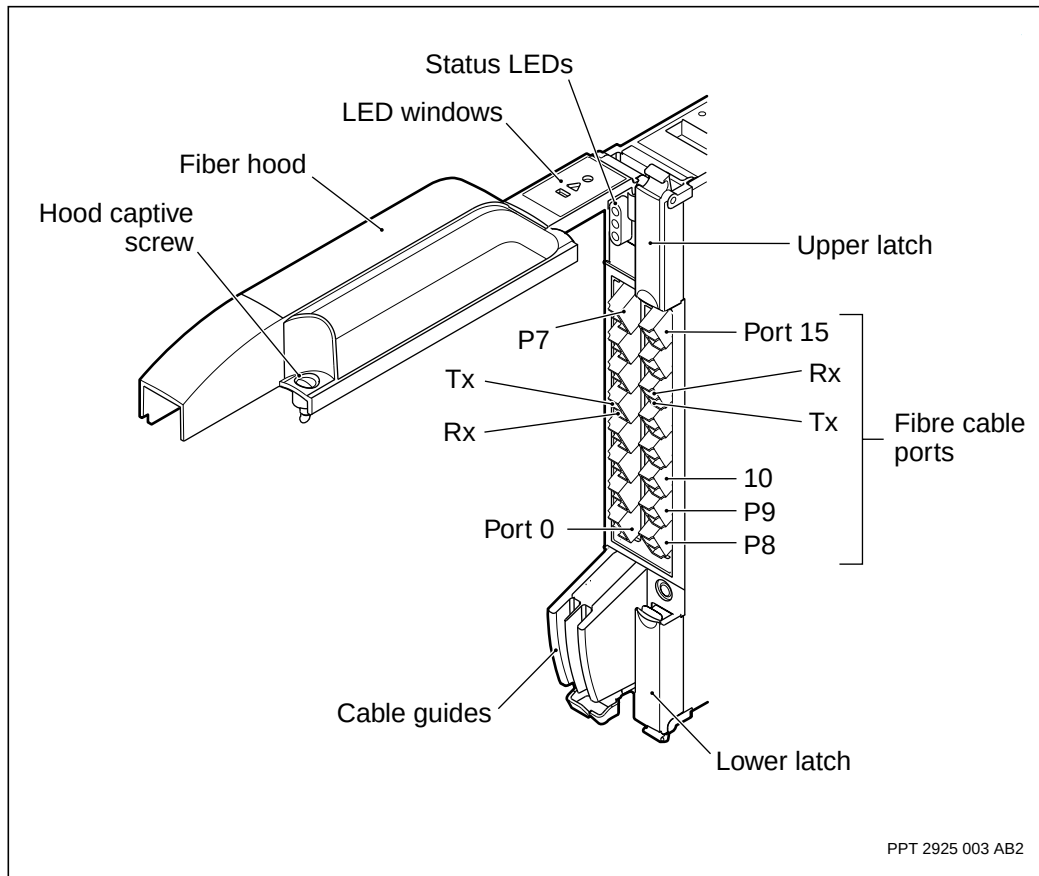
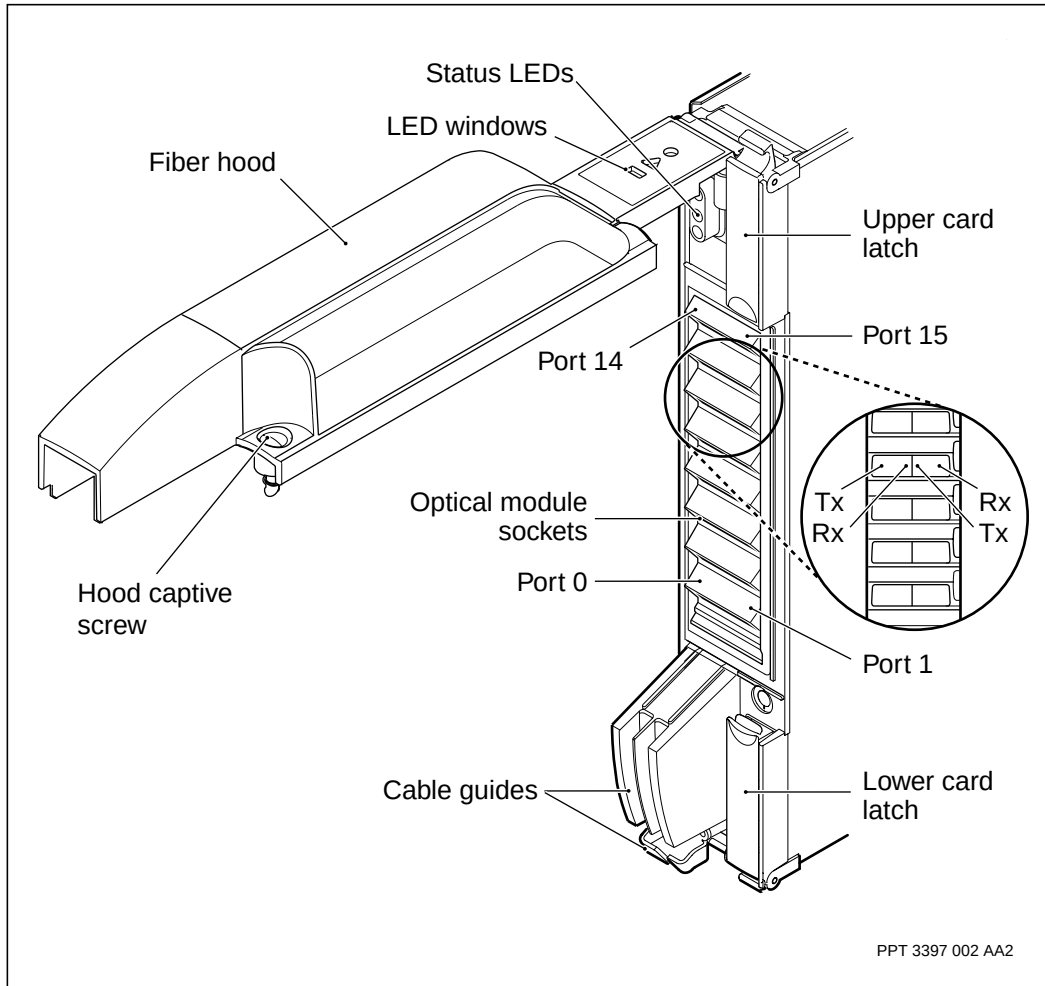


Figure 74
The transmit and receive orientation on a 16-port OC-3/STM-1 POS and ATM FP (NTHW44)



Connecting other cables to a BIP

Connect other cables to a BIP to enable its normal power distribution and shelf alarms after installing a BIP from an upgrade or replacement.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

Procedure steps

- 1 One at a time, use the label on each black-and-white power output cable from a PIM or a cooling unit to reconnect it to the rear of the BIP. Pinch the tabs on the sides of the connector together and push to engage it.
- 2 One at a time, use the label on each red power and alarm cable to reconnect it by engaging the D-sub connector and fastening its 2 small slotted screws.
- 3 One at a time, use the label on each external alarm cable (all of the remaining cables) to reconnect them as follows.
 - for a D-sub connector, engage the connector and fasten its 2 small slotted screws
 - for a Berg connector, engage it while lifting the tab on the side
 - for a MATE-N-LOK connector, engage it while lifting the tabs on the either end

Procedure job aid

The labels on the cables correspond to the labels on the rear of the BIP as shown in the figure “Cable connections at the rear of a BIP” (page 306).

Connecting power input cables to the BIP

Connect power input cables to the BIP to enable powering one or two Passport 15000 or 20000 switches that are installed in a NEBS 2000 frame, or powering one switch mounted in an equivalent mounting apparatus.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an installed BIP with PEC NT6C61 or NT6C62 for a Passport 15000, or NT6C67 or NT6C68 for a Passport 20000.
- You need the following specialty tools:
 - a cutter for up to 1/0 AWG (53.5 mm²) cable
 - a crimper for lugs up 1/0 AWG (53.5 mm²), depending on the size of cable feeding the BIP
 - a medium Pozidriv screwdriver, for example a number 2 (do not substitute a Phillips) for the insulation boot clamp
 - an 11-mm (7/16-in.) deep socket with a properly calibrated torque wrench capable of 6.5 Nm (57.5 in.-lbs) and a 20-cm (8-in.) extender for the lug nuts
- When the feed cables are any size less than 1/0 AWG (53.5 mm²), you must either provide 90-degree offset 2-hole lugs that fit under the insulation boots on the BIP and match the cable size, or use an optional power-and-ground cable assembly.



WARNING

Risk of injury or equipment damage by electricity

When connecting power input cables at the BIP, ensure that the source of power at the other ends of the cables (feeds) is off (disconnected), fuses are removed, or the breakers are off). Also ensure that all BIP breakers are off (the O is pressed in).

**WARNUNG****Verletzungsgefahr oder Geräteschäden durch Elektrizität**

Vergewissern Sie sich beim Verbinden der Netzkabel am Trennschalterkopplungsmodul (BIP), daß die Stromversorgung an den anderen Kabelenden (Speisestromzuführungen) getrennt ist oder daß die Sicherungen entfernt bzw. die Trennschalter ausgeschaltet sind. Stellen Sie außerdem sicher, daß alle BIP-Trennschalter ausgeschaltet sind (O ist gedrückt).

**CAUTION****Risk of equipment damage by reversed polarity**

Use the plus (+) and minus (-) symbols on the rear of the breaker interface panel (BIP) to ensure that the polarity of each A and B battery (-48/-60 V dc) and battery return for the input power feeds is correct. When powering up the BIP, reversed polarity will damage circuits inside it.

**CAUTION****Risk of damage to power connections by weight**

Use tie-wraps every 10 cm (4 in.) to fasten the cables to the 7-mm (0.25-in.) thick strain-relief bracket (part number P0891284 or P0911981) at the rear of the BIP. Use tie-wraps every 15 cm (6 in.) to fasten the cables to the cable ladder from an overhead cable trough or down the side of the NEBS 2000 frame or equivalent. Fastening the power cables provides strain relief from the weight of the cables on the power input lugs at the rear of the BIP.

Procedure steps

- 1 At the front of the BIP, ensure that all breakers are switched off (the O is pressed in).
- 2 At the rear of the BIP, locate the stud for the B1+ connection as identified in the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290). See also the figure “Power input cable connected to the BIP stud labelled B1+” (page 289).

- 3 Loosen the clamp of the insulation boot by using a medium Pozidriv bit that fits snugly. Loosen the clamp until you can pivot it easily with your finger.
- 4 Slide the insulation boot onto the power input cable, narrow opening first. The larger opening of the boot must face the end of the cable so that it can overlap the cable lug when fastened.
- 5 Unfasten the lug retaining nuts from the stud using an 11-mm (7/16-in.) deep socket with a 20-cm (8-in.) extender. Put the nuts aside temporarily.

If the thread pitch of the 2 studs is different, remember which one goes where.
- 6 Remove the 2 Belleville washers from the studs. A Belleville washer is a dome-shaped spring washer. Put the washers aside temporarily.
- 7 Run the power input cable labelled B1+ along the strain relief bar. At a right angle to the pair of studs, run the cable up to the studs. Estimate where to cut the cable.
- 8 Cut the cable so that it can reach the studs without stress. Cut the cable in stages so that the cable stays long enough.
- 9 Put the cable end through the narrowest part of the insulation boot and past the wide opening. See the figure "Insulating boots and clamps at the rear of the BIP" (page 291).

**WARNING****Risk of injury or equipment damage by electricity**

The insulation boot is designed to fit 1/0 AWG (53.49 mm²) cable. When connecting power input cables that are a size smaller, use the insulation boots anyway. Where the cable passes through the neck of the boot, wrap electrical tape around the cable at the neck to snugly fill the gap between the outside of the cable and the inside of the boot.

**WARNUNG****Verletzungsgefahr oder Geräteschäden durch Elektrizität**

Die Isoliermuffe ist passend für 1/0 AWG-Kabel (53,49 mm²), sollte jedoch auch beim Anschließen von Speisestromkabeln verwendet werden, die eine Größe kleiner sind. Umwickeln Sie das Kabelstück, das durch den Hals der Muffe geführt wird, mit Isolierband, um den Zwischenraum zwischen Kabelaußen- und Muffeninnenseite auszufüllen.

- 10 Strip enough insulation off the end of the cable to be 0.5 cm (3/16 in.) longer than the length of the lug barrel or below the clamping screw of the terminal block.
- 11 Loosely fit the lug (part number A0757391) over the end of the cable and bend the cable to where it is to rest. Note the approximate position of the lug relative to markings on the cable. When the cable will be screwed to the BIP, the stud barrel must be nearest the bottom stud.

**WARNING****Risk of injury or equipment damage by electricity**

The lugs that are provided with the BIP are for 1/0 AWG (53.49 mm²) cable. For each power cable to the BIP that is smaller, then you must replace the provided lug with an appropriately sized lug barrel with the same 2-hole size and spacing on a 90-degree offset narrow-tongued lug.

**WARNUNG****Verletzungsgefahr oder Geräteschäden durch Elektrizität**

Die mit dem BIP gelieferten Kabelschuhe sind passend für 1/0 AWG-Kabel (53,49 mm²). Ersetzen Sie bei dünneren Kabeln den mitgelieferten Kabelschuh durch eine passende Kabelschuhhülse mit der gleichen Doppellochgröße und dem gleichen Lochabstand auf einem schmallaschigen Winkelkabelschuh.

- 12 Put the lug aside and fully cover the bare wire with anti-oxidizing grease or equivalent if your local electrical code allows it.
- 13 Crimp the lug firmly onto the cable.
- 14 Wipe off the excess grease and wipe the lug clean.
- 15 Wrap electrical tape over the joint between the barrel and the insulation.
- 16 When the power input cable is less than 1/0 AWG (53.49 mm²), wrap electrical tape around the cable where the neck of the insulation boot will reside. Wrap enough tape to snugly close the gap.
- 17 Permanently label the cable near the lug as B1+. Position the label so it can be easily read and traced to termination after all cables are installed. After the first cable, label the others according to the figure "Overhead power input cables for the lower shelf connected to the BIP" (page 290).
- 18 Put the lug of the cable onto the studs, barrel at the bottom, and flush against the rear of the BIP.
- 19 Put a Belleville washer back onto each stud, convex upwards. The high part of the washer must be furthest from the lug.
- 20 Finger-fasten the nuts back onto each stud. The nuts thread easily, so if there is resistance, check
 - that the thread pitch of the nut matches the thread pitch of the stud (since the 2 studs may have different pitches)
 - that you are not cross-threading

**CAUTION****Risk of damage to power connections**

The metal of the top stud of each pair is softer than the bottom stud because of increased electrical conductivity. Ensure that you do not overtighten either stud, nor leave one too loose. Damaging a stud means its BIM cannot be powered up until the BIP is replaced.

**CAUTION****Risk of damage to power connections**

At the rear of the BIP, the top stud of each pair carries the power. The bottom stud prevents rotation of the lug from the weight of the power cable. To avoid arcing and rotation, ensure both studs are fastened securely with the provided 2-hole lug.

- 21** Tighten each stud nut to 6.5 Nm (57.5 in.-lbs). Use a properly calibrated torque wrench with the measurement near the middle of wrench's range.
- 22** Slide the insulating boot to the BIP end of the cable and align it with the shape of the lug (toe upwards). Rest the boot flush against the rear of the BIP. The boot retainer clamp will be fastened in a later procedure after testing the installation of the power cables.
- 23** Dress the cable by
 - fastening it to the strain relief bar at the point perpendicular to the insulation boot; consider that other cables will be nesting against the cable and bar
 - balancing the slack up to the other end
 - tightening the tie-wraps up to the other end
 - cutting off the tie-wrap tails
- 24** Locate the adjacent cable by its label as indicated in the figure "Overhead power input cables for the lower shelf connected to the BIP" (page 290).
- 25** Repeat step 1 to step 24 for each of the remaining 3 or 7 power input cables. Adjust each cable label.

Procedure job aid

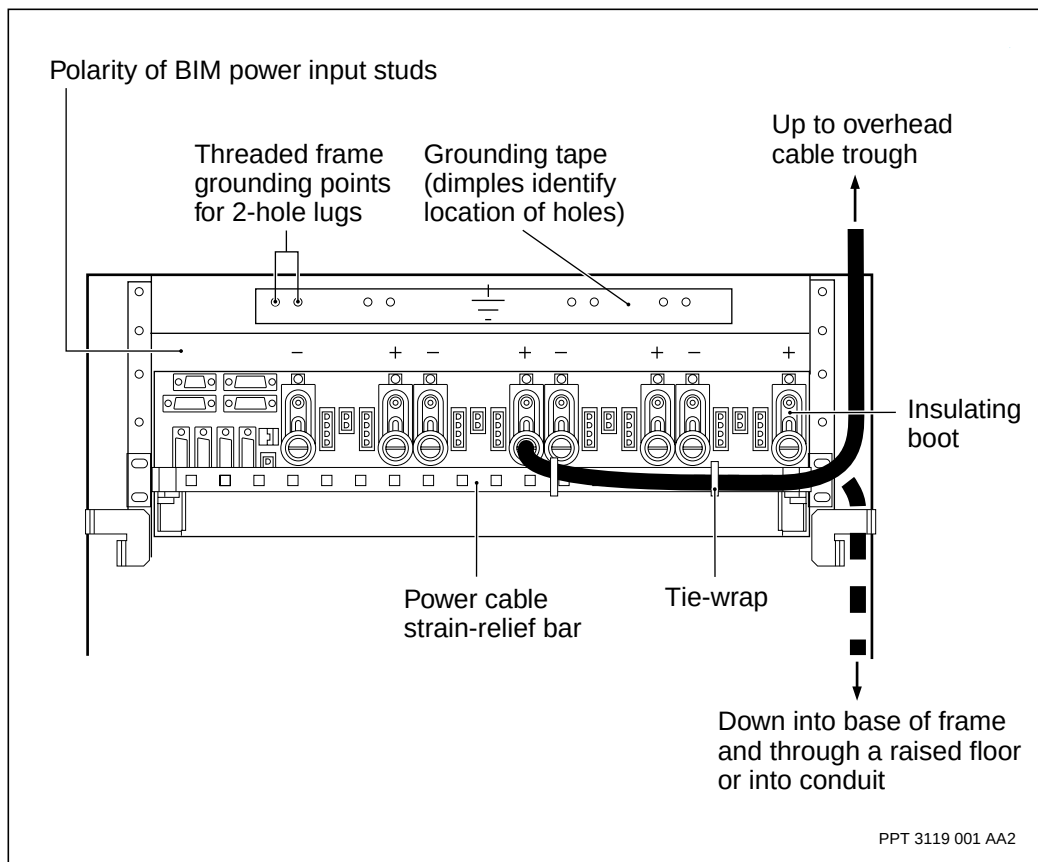
Figure 75**Power input cable connected to the BIP stud labelled B1+**

Figure 76
Overhead power input cables for the lower shelf connected to the BIP

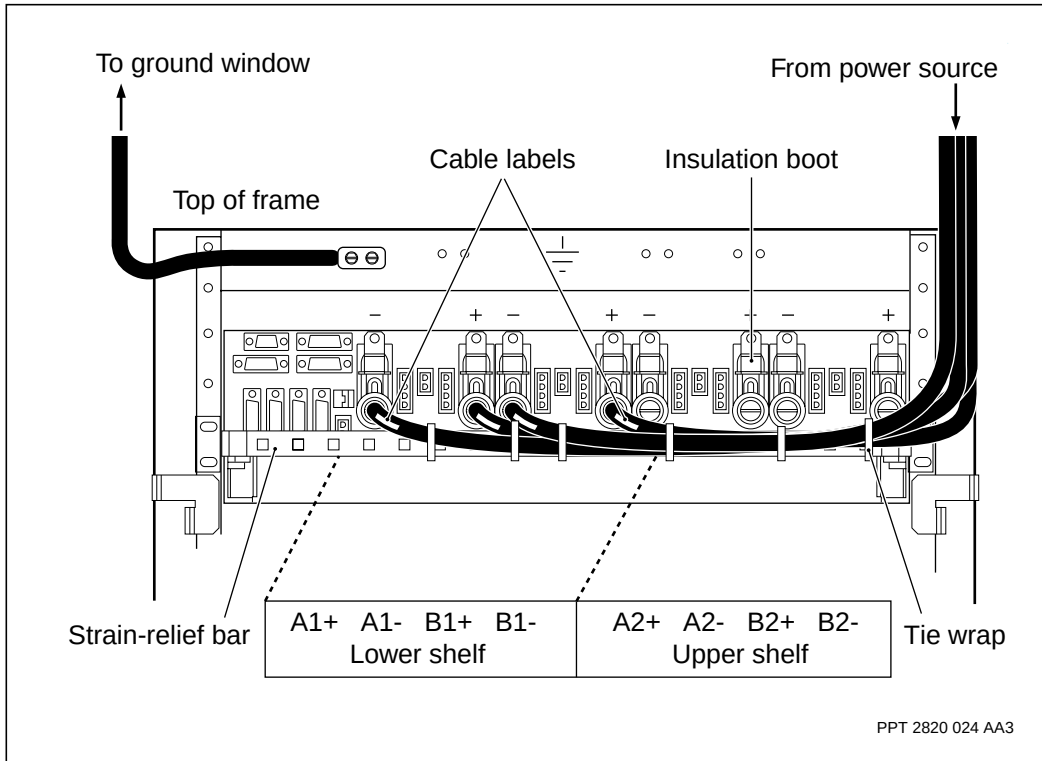
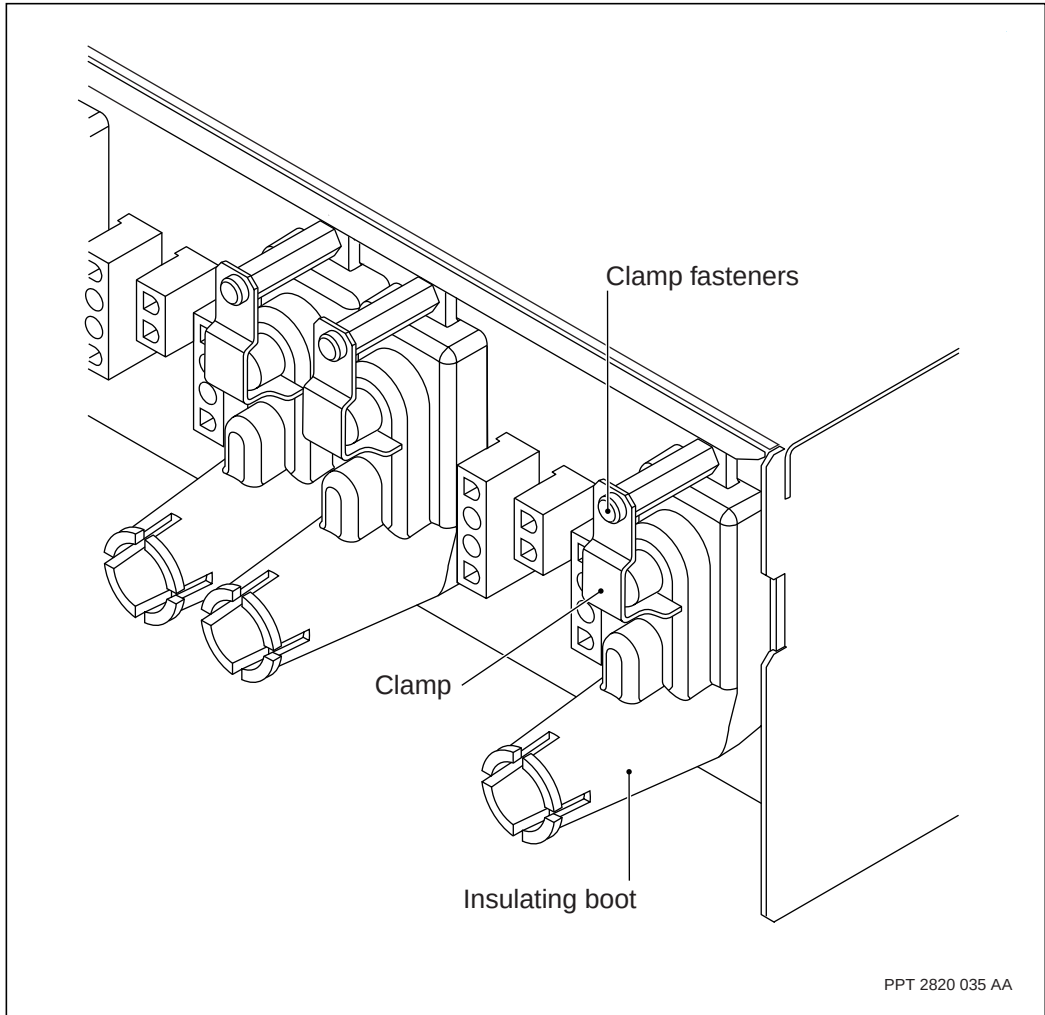


Figure 77
Insulating boots and clamps at the rear of the BIP



Connecting power output cables to a system of ac rectifiers

Connect dc power output cables to a system of ac rectifiers to provide the source of power to the breaker interface panel (BIP) of a Passport 15000 or 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The power input cables from the BIP must already have been installed and labelled up to the system of ac rectifiers.
- The system of ac rectifiers must already be installed according to the product’s own hardware instructions. When the system of ac rectifiers is an Astec MFA150, follow the installation instructions in the Astec document 167-9021-133 Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual. The power and alarm cabling between the MFA150 and the BIP is covered in this document.
- When the system is an MFA150, you need cable kit AP5C90FJ, which includes
 - 100 m (328 ft) of No. 2 AWG (33.62 mm²) cable, to be cut equally for the input cables
 - for the MFA150, five 1-hole 2 AWG lugs and six 2-hole 5/8-in. lugs
- Any system of ac rectifiers must be grounded to the same ground window as the Passport 15000 or 20000. When using an MFA150 power system of ac rectifiers, follow the ac power requirements for the rectifiers and the system grounding procedure in the Astec document 167-9021-133 Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual.
- The MFA150 rectifier shelves are labelled A and B at the front of the hardware setup. These designations have no relationship to individual circuit breakers on the controller or to the A and B power feeds connecting the MFA150 to a Passport 15000 or 20000.

Procedure steps

- 1 Ensure that all mid-trip circuit breakers on the front of the MFA150 system are off, that is, fully down and OFF is visible. Include the breakers on the controller and each rectifier.
- 2 Access the inside of the controller by unfastening the small Phillips screws at the top edges of its cover. Put the screws and cover aside temporarily. See the figure “Power cable connections at the rear of an MFA150 system of ac rectifiers” (page 295).
- 3 At the inside back of the controller, locate the larger knockout disks that are nearest the 60 A circuit breakers labelled CB1 to CB4. If you are powering a single Passport 15000 or 20000, remove the disks aligned with CB1 and CB2. If you are powering a second node, for example, another Passport or a Shasta 5000, also remove the disks aligned with CB2 and CB3.
- 4 Through each hole where a knockout disk was, insert a conduit elbow provided with the MFA150, and fasten it with a collar nut. See the figure “Power cable connections at the breakers inside an MFA150 controller, side view” (page 226). For more information, refer to the Astec document 167-9021-133 Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual.



CAUTION

Risk of equipment damage by reversed polarity

Use the plus (+) and minus (-) symbols on the cables from rear of the breaker interface panel (BIP) to ensure that the polarity of each A and B battery (-48/-60 V dc) and battery return for the input power feeds is correct. When powering up the BIP, reversed polarity will damage circuits inside it.

- 5 Locate the power cable from the BIP that has the 2-wire pair labelled A1+ and A1- and insert it through the conduit elbow that is aligned with CB1. Insert the cable far enough so that the red cable can easily connect with the circuit breaker.
- 6 Using the large slotted screw, fasten the conduit elbow clamp onto the cable so that there will be no strain on either cable connection inside the controller.
- 7 Place the lug of the red cable onto the stud at CB1 and fasten the 11-mm (7/16-in.) nut. Use the example shown in the figure “Power cable connections at the breakers inside an MFA150 controller, side view” (page 226).

- 8** Place the 2-hole lug of the black cable against the ground busbar and fasten the 11-mm (7/16-in.) pan-head screws. Use the example shown in the figure “Power cable connections at the ground busbar inside an MFA150 controller” (page 297).
- 9** Repeat step 5 to step 8 for each other cable pair moving from left to right across the back of the controller. The cables to the BIP must be grouped together. While viewing the rear of the BIP and the front of the controller, the cable pair mappings are identified in the table “Connection mapping between the BIP and the MFA150 controller” (page 225).
- 10** Record the connection mapping for your site records.
- 11** Fasten the cover back on top of the controller.

Procedure job aid

Figure 78

Power cable connections at the rear of an MFA150 system of ac rectifiers

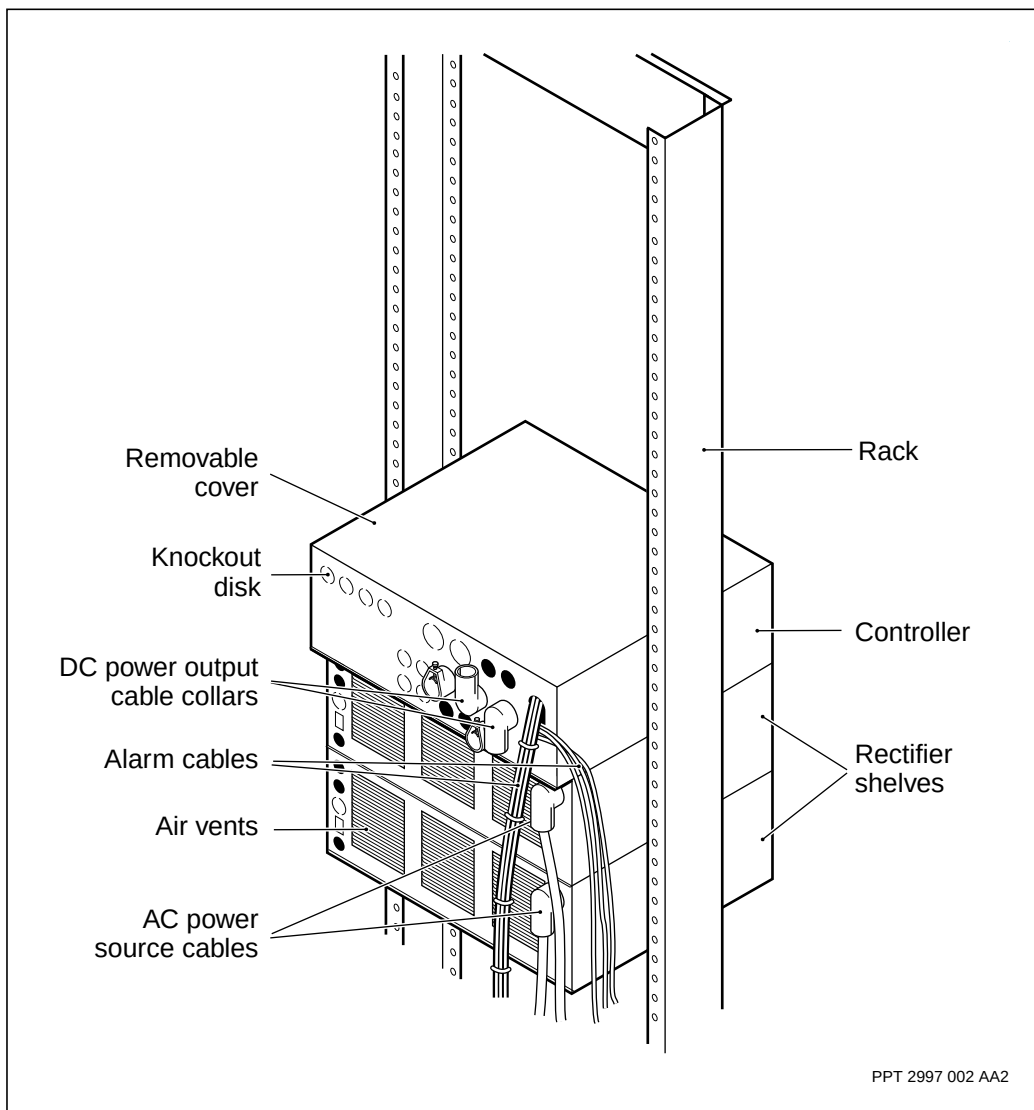


Figure 79
Power cable connections at the breakers inside an MFA150 controller, side view

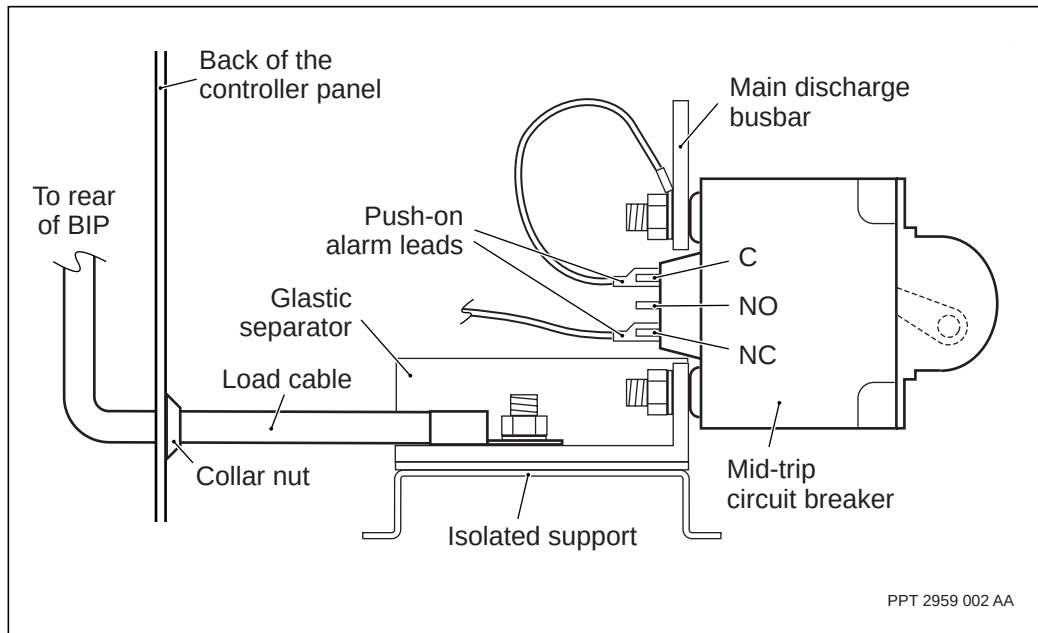
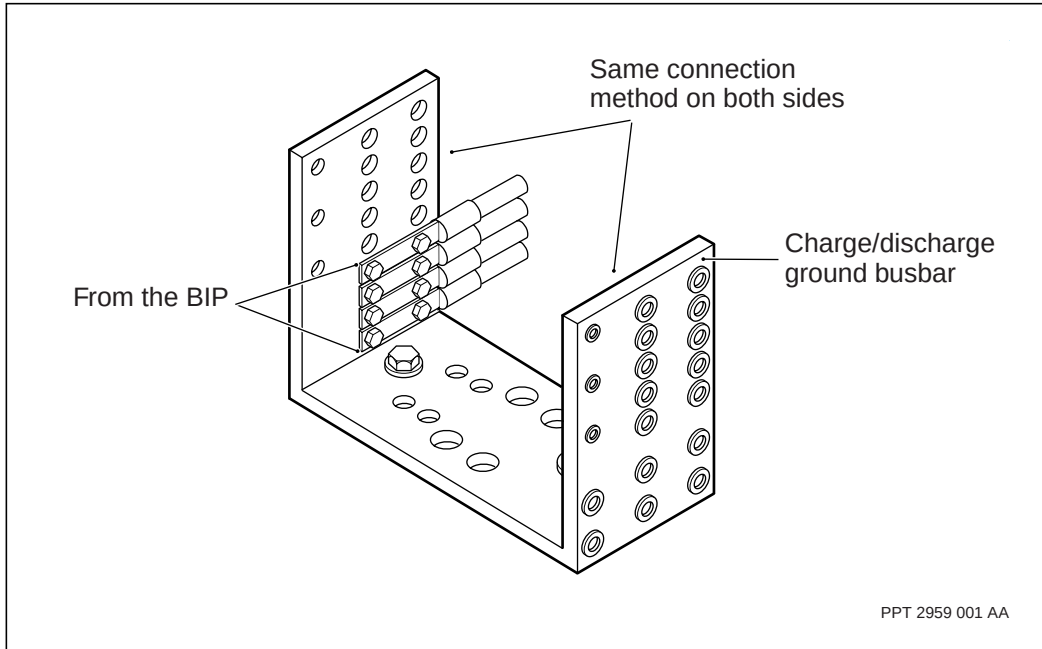


Figure 80
Power cable connections at the ground busbar inside an MFA150 controller



Determining if you need to use inline attenuators with optical FPs

Determine if you need to use inline attenuators with optical FPs prior to cabling the FPs. Perform this procedure for every pair of optical FPs.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Optical function processors (FPs) have different transmit and receive strengths for short reach (SR), intermediate reach (IR), and long reach (LR) capabilities. When the maximum transmit (Tx) power is higher than the maximum receive (Rx) sensitivity, an inline optical attenuator is required to reduce the signal strength to an acceptable level. Adding an optical attenuator with the appropriate amount of signal reduction at either the input or output end of the shared signal cable reduces the transmit signal strength to be within the range of acceptable receive sensitivity.
- When connected optical FPs are the same type and have the same reach, that is, SR, IR, or LR, an attenuator may still be required. For example, the 1-port OC-12 (NTHR29) requires an attenuator for a loopback.



CAUTION

Risk of damage to equipment by laser strength

When an FP receives a laser signal that exceeds its range of receive sensitivity, the FP can be damaged or fail. The ranges for transmit and receive are not always the same on an optical FP. Always check whether each FP signaling connection requires an attenuator.

Procedure steps

- 1 Identify a pair of optical cards that are intended to be a connected pair, for example, FP-to-FP or FP to another vendor's equivalent optical card of the same type of signaling.
- 2 Record the location of each pair, that is, floor number, room, aisle number, node id, slot numbers of the pair.

- 3 Compare the transmit laser range (launch power budget) and the receive sensitivity range (overload sensitivity) of each card in the pair. For any Passport FP
 - the type of FP is labelled on the faceplate
 - the specifications are listed in the characteristics tables for each type of FP in 241-1501-200 *Passport 15000, 20000 Hardware*

For any non-Nortel Networks optical card, refer to its documentation.

- 4 Determine the combined signal loss caused by the anticipated length of each fiber cable, its end connectors and receptacles, and any fiber-to-fiber connectors in a patch panel that lies between the optical cards.
- 5 Calculate the difference between each transmit and receive direction for all connections to and from the FP.
- 6 Use the difference and the loss to determine the amount of signal reduction an attenuator must do for each cable. Ensure that each connection has enough transmit power to overcome the path attenuation from fiber, connectors, splices, and whatever else affects the signal, or has enough path attenuation to avoid receiving an overload.
- 7 If an attenuator is required, determine a location for it to be installed. Consider whether they will fit behind the cable channel cover, on a frame upright, or on a cable management bracket. Record the planned location.
- 8 Obtain any required attenuators before the FPs are cabled.

Disconnecting a power input cable from a terminal block

Disconnect a power input cable to a terminal block of a polyvalent or an ETSI power-and-ground assembly from the power source to replace the cable or as part of replacing the assembly.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- When disconnecting a power input cable to replace it, you need one of equal specifications or better. Install the cable in parallel to the existing cable from the source up to the power-and-ground assembly.

Procedure steps

- 1 Switch off all breakers or remove all fuses that enable power to that branch of cable. Put tape over the breakers or fuse openings to indicate deliberate disablement.
- 2 Switch off all breakers (press O in) on the BIM that is fed by that cable. Refer to the figures “Overhead power input cables for the lower shelf connected to the BIP” (page 290) and “BIMs for specific shelf nodes” (page 523). Switching a breaker off generates a software alarm. This is normal during a replacement.
- 3 Unfasten the large slotted captive screw in the terminal block in which the cable is connected.
- 4 Ensure that the power input cable is labelled to enable its appropriate re-connection or the connection of a replacement cable.
- 5 Repeat step 1 to step 4 for each other power cable that is to be disconnected.

Procedure job aids

For the mapping of BIM breakers to the power input cables, see the figures:

- “Overhead power input cables for the lower shelf connected to the BIP” (page 290)
- “The polyvalent power-and-ground assembly A0834143” (page 397)
- “The ETSI power-and-ground assembly A0834149” (page 398)
- “BIMs for specific shelf nodes” (page 523)

Disconnecting power input cables from the BIP

Disconnect power input cables from the BIP to enable removing the BIP for an upgrade or a replacement due to failure, or to enable replacing the cable.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the following specialty tools:
 - a medium Pozidriv screwdriver bit, for example, a number 2. Do not use a Phillips bit.
 - an 11-mm (7/16-in.) deep socket with a properly calibrated torque wrench capable of 6.5 Nm (57.5 in.-lbs) and a 20-cm (8-in.) extender for the lug nuts
- Disconnecting the cables at the BIP is the same procedure for any of these power sources:
 - a power-and-ground assembly (with part numbers A0834143 for the polyvalent version or A0834149 for the ETSI)
 - a system of ac rectifiers, including an MFA150
 - a site dc power cable or branch panel



WARNING

Risk of injury by electrocution

Each power input feed to a breaker interface module (BIM) is rated up to 100 A. All breakers on the BIMs must be switched off (the O is pressed in) and power to the BIP must be switched off to the BIP.



WARNUNG

Gefahr durch elektrischen Schlag

Alle Speisestromzuführungen am Trennschalterkopplungsmodul (BIM) sind auf 100 A ausgelegt. Alle Trennschalter an den BIMs müssen ausgeschaltet sein (O ist gedrückt) und die Stromversorgung zum BIP muß getrennt sein.



WARNING

Risk of injury or damage by electricity

When switching off power breakers on a breaker interface module (BIM) or in the circuit up to it, or removing a fuse from the circuit up to it, always put tape over the breaker or fuse cavity. The tape indicates it was manually switched off, and not tripped by the system. This prevents accidental activation of the power circuit, especially when power cables are being handled.



WARNUNG

Schäden oder Verletzungen durch Elektrizität

Wenn die Leistungstrennschalter an einem Trennschalterkopplungsmodul (BIM) oder im zuführenden Stromkreis geöffnet bzw. Sicherungen aus dem Stromkreis entfernt werden, decken Sie den Trennschalter oder den Sicherungssteckplatz mit Klebeband ab. Das Klebeband signalisiert, daß er/sie manuell ausgeschaltet und nicht vom System ausgelöst wurde. Damit verhindern Sie eine versehentliche Aktivierung der Stromversorgung, besonders beim Hantieren mit Netzkabeln.

Procedure steps

- 1 At the front of the BIP, ensure that all of the breakers are switched off (the O is pressed in) and tape covers each breaker to indicate it is off deliberately.

When you are replacing a power input cable, do the following steps that apply only to that cable.

- 2 Switch off the appropriate power source feeds to the BIP and put tape over the fuses or breakers to indicate that off is deliberate as opposed to tripped.

If your power source is a system of ac rectifiers, power down the system according to that product's instructions. When using an Astec MFA150 power system of ac rectifiers, power down the system according to the Astec document 167-9021-102 *Advanced Power Systems MFA150 Modular Front Access Power System Description, Operation and Maintenance User Manual*.

- 3 Across the horizontal strain-relief bar near the rear of the BIP, remove the tie-wraps that fasten cables to the top and bottom sides of the bar. Let the red cables hang loosely under the bar.
- 4 Locate a cable at the far right or left side of the rear of the BIP, whichever is easiest to access.
- 5 At the rear of the BIP, loosen the clamp of the insulation boot by using a medium Pozidriv bit that fits snugly. Loosen the clamp until you can pivot it easily with your finger.
- 6 Unfasten the lug retaining nuts from the stud using a 11-mm (7/16-in.) deep socket with a 20-cm (8-in.) extender. Put the nuts aside temporarily.

If the thread pitch of the studs is different, remember which nut matches each stud.
- 7 Remove the 2 Belleville washers from the studs. A Belleville washer is a dome-shaped spring washer. Put the washers aside temporarily.
- 8 Pull the lug straight off the studs.
- 9 Ensure that the power input cable is labeled with a plus (+) or minus (-) A or B at the BIP end. If the label is or was on the tie-wrap, transfer its information to the cable itself.

If there is no label, refer to the figure "Overhead power input cables for the lower shelf connected to the BIP" (page 290).

If the cable is being replaced, transfer the connection information to the replacement cable.
- 10 Let the cable hang freely away from the BIP.
- 11 Loosely fasten a Belleville washer and nut back onto each stud.
- 12 Put an insulation boot over each stud pair and lightly clamp it back on.
- 13 For each remaining power input cable at the rear of the BIP, repeat step 4 to step 12.

Procedure job aid

For power cable labels, refer to the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290).

Disconnecting other cables from a BIP

Disconnect other cables from a BIP to enable its removal for an upgrade or a replacement due to failure.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need temporary labels for cables.

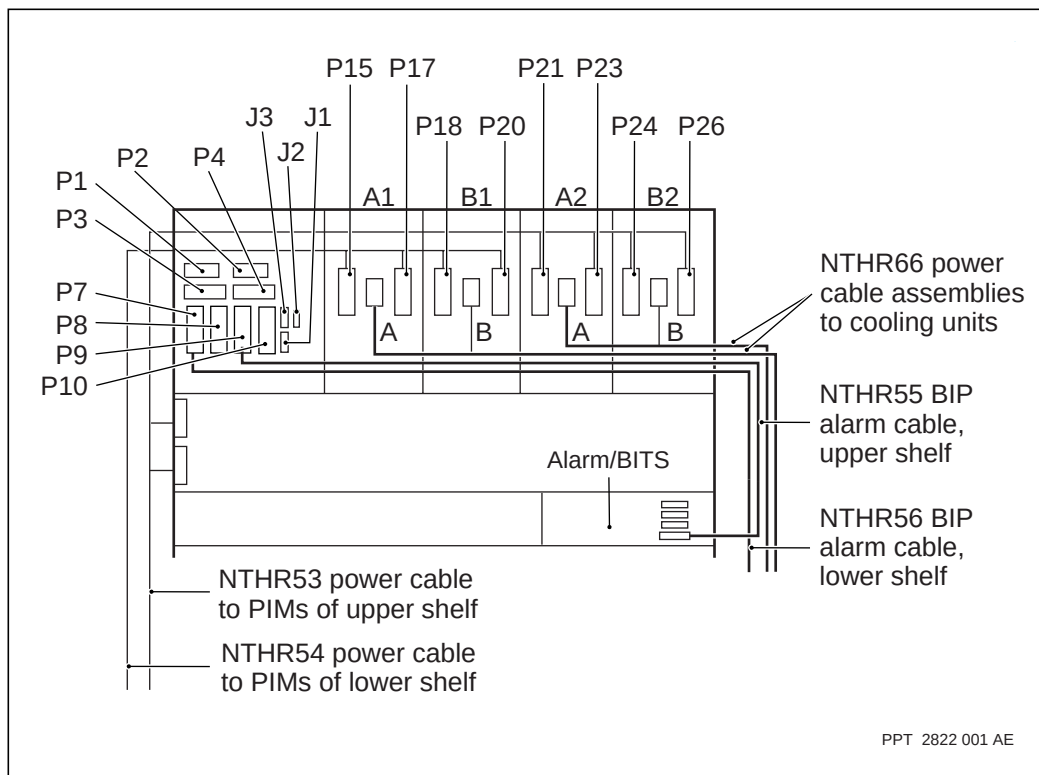
Procedure steps

- 1 One at a time, label each black-and-white power output cable to a PIM or a cooling unit with its relative position at the BIP, and disconnect it by pinching the tabs on the sides of the connector together and pulling. For label identifiers, refer to the figure “Cable connections at the rear of a BIP” (page 306).
- 2 One at a time, label each red power and alarm cable with its relative position at the BIP, and disconnect it by unfastening the small slotted screws of the D-sub connector and pulling.
- 3 One at a time, label each external alarm cable (all of the remaining cables) with its relative position at the BIP, and disconnect them as follows.
 - for a D-sub connector, unfasten the 2 small slotted screws on either side of the connector
 - for a Berg connector, unplug it while lifting the tab on the side
 - for a MATE-N-LOK connector, unplug it while lifting the tabs on the either end

Procedure job aid

Figure 81

Cable connections at the rear of a BIP



Fastening adjacent frames together

Fasten adjacent NEBS 2000 frames together to maximize the use of floor space between frames with the optional extended cable management brackets.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You must be familiar with the criteria for joining frames as described in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.
- You need kits numbered NTRU0365 and NTHR0370. NTRU0365 keeps the frames apart the minimum space to allow the optional extended cable management brackets (kit number NTRU0368 or NTRU0369) to be mounted on each side between the frames.
- When joining a pair of NEBS 2000 frames, you must either join them first and position them for levelling together and anchoring, or position one beside a frame that is already anchored, then level and join the added one relative to it.
- When adjacent NEBS 2000 frames are fastened together using the frame joining kits, the space between frames accommodates having the larger optional extended cable management brackets on each frame and 1 cm (3/8 in.) between each pair of brackets to enable cabling. Once the frames are fastened together and installed (anchored and cabled), a frame would have to be disconnected, moved, and re-installed in order to fit the extended cable management brackets in between.

Procedure steps

- 1 Ensure the frames are positioned side by side and touching on the footprints where they are to be anchored.
- 2 Remove the packaging from the contents of kits NTRU0365 and NTHR0370. Keep the contents separate.
- 3 See the figure “Frame-to-frame joining brackets in kit numbers NTRU0365 and NTHR0370” (page 309). Observe the position of the upper and lower pairs of brackets. The upper pair of brackets has the same orientation as

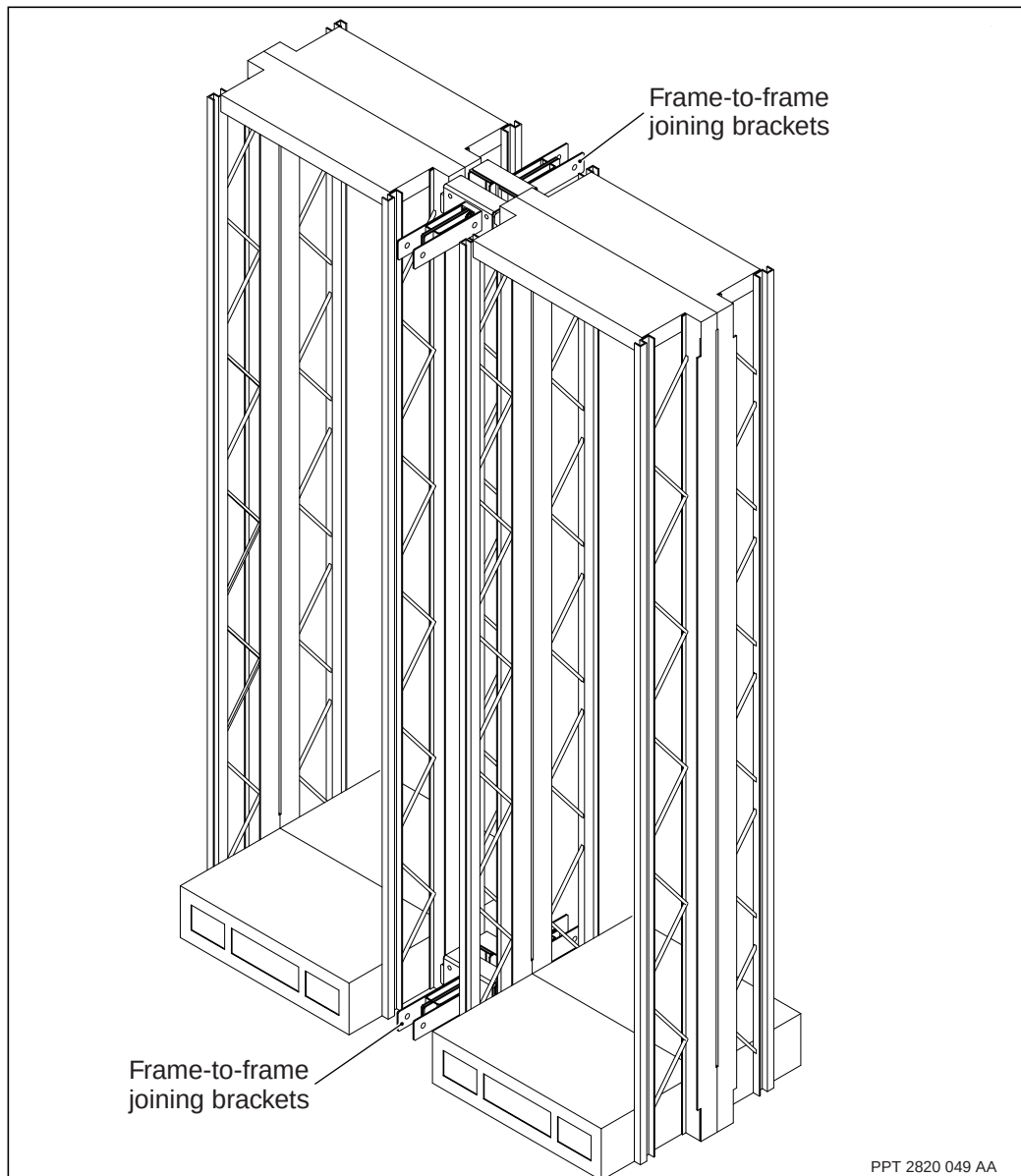
the lower pair, and there is a pair at the front and rear where the frames are joined.

- 4** From NTRU0365, align an L-shaped bracket (part number P902817) on the middle upper left front according to the figure (long arm outwards).
- 5** Fasten the bracket to the frame using the 4 thread-forming 6-mm (1/4-in.) screws provided. Ensure the screws are fully seated perpendicularly to the hole before turning. Tighten to snug plus a 1/5 turn.
- 6** Repeat step 4 and step 5 for the upper right bracket.
- 7** From NTHR0370, place the U-shaped bracket (part number P0902826) over the arm created from the left and right brackets. Fasten it to both frames using the 4 provided screws and washers. You may need to temporarily shim some frame feet to align both the left and right bracket holes.
- 8** From NTRU0365, align an L-shaped bracket (part number P902817) on the middle upper right front according to the figure (long arm outwards).
- 9** Fasten the bracket to the frame using 4 screws and washers.
- 10** Repeat step 8 and step 9 for the lower right bracket.
- 11** From NTHR0370, place the U-shaped bracket (part number P0902826) over the arm created from the left and right brackets. Fasten it to both frames using the 4 screws and washers. You may need to temporarily shim some frame feet to align both the left and right bracket holes.
- 12** Repeat step 4 to step 11 for the upper and lower rear joining brackets.
- 13** Remove any shims under the frame feet that were used to align bracket holes for fastening.

Procedure job aid

Figure 82

Frame-to-frame joining brackets in kit numbers NTRU0365 and NTHR0370



Grounding a Passport 15000-VSS

Ground a Passport 15000-VSS to have both the Passport 15000 and the Passport 7480 share the same ground window.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Before grounding the Passport 15000-Variable Speed Switch (VSS) be sure you have performed the steps in “Grounding the NEBS 2000 frame” (page 316).

Procedure steps

- 1 At the rear of the on the Passport 7480, unfasten the 9-mm (11/32-in.) nut on the grounding stud and put it aside temporarily. See the figure “Passport 7480 shelf assembly grounding stud” (page 311).
- 2 At one end of the grounding cable (#6 AWG min.), crimp on a 1-hole lug according to your local electrical code.
- 3 Place the 1-hole lug onto the grounding stud and fasten the nut back onto it. Tighten to snug plus a 1/4 turn. Avoid stripping the nut or the stud.
- 4 Strip the sheath off the end of the cable to accommodate the lug barrel, coat the strands in anti-oxidizing grease if your local electrical code allows it, and crimp on an appropriately sized straight 2-hole lug.
- 5 Place the end of the cable with the 2-hole lug at the top of the NEBS 2000 frame against the silvery grounding strip. Avoid pinching or kinking the cable. See the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290).
- 6 Fasten the lug to the frame using 2 thread-forming 10-mm (3/8-in.) hex-head screws.

Some dc-powered shelves have an extra lug on the right-hand side of the terminal block labelled GND. Do not use this extra lug and leave it unconnected.

Figure 83
Passport 7480 shelf assembly grounding stud

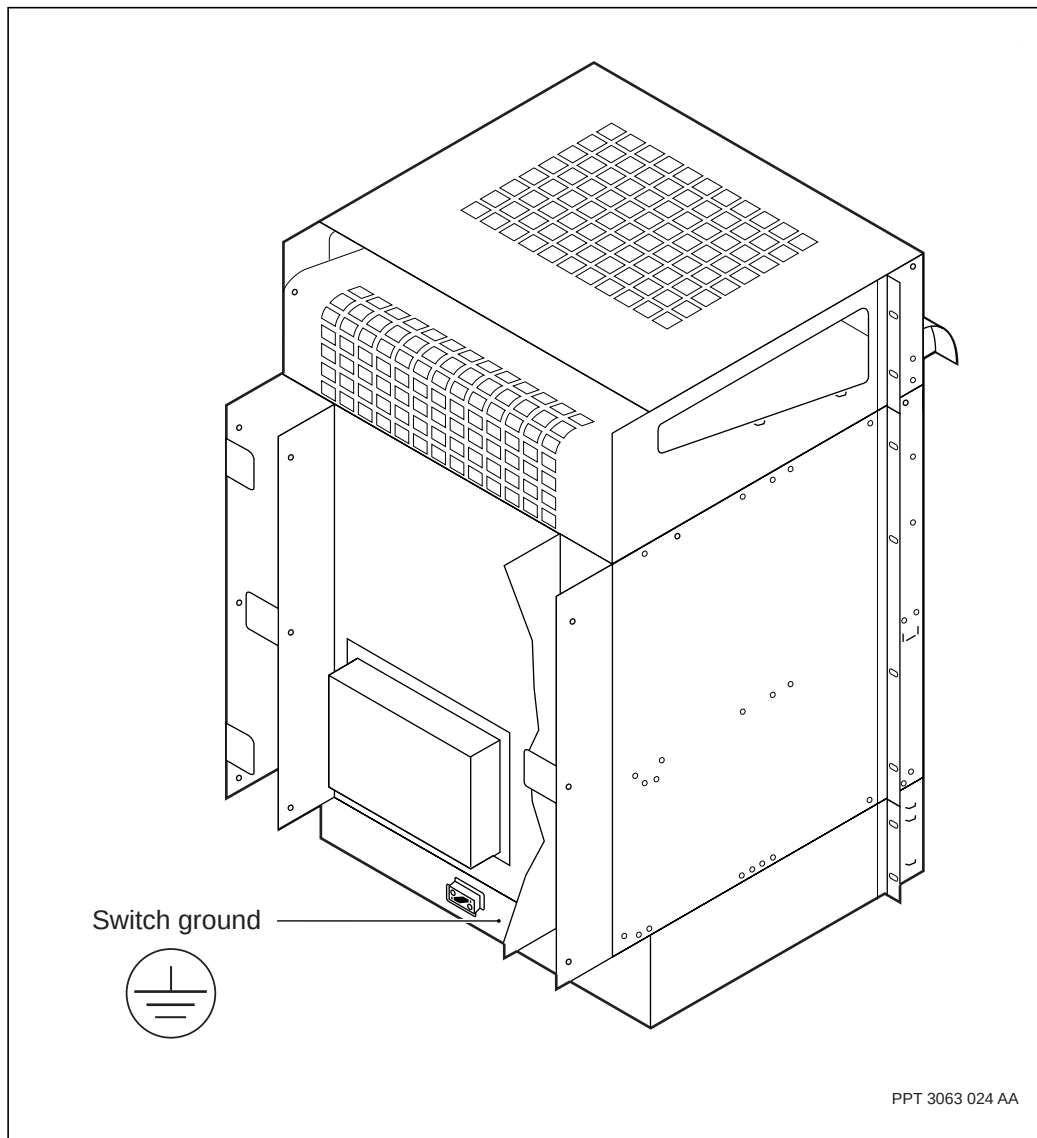
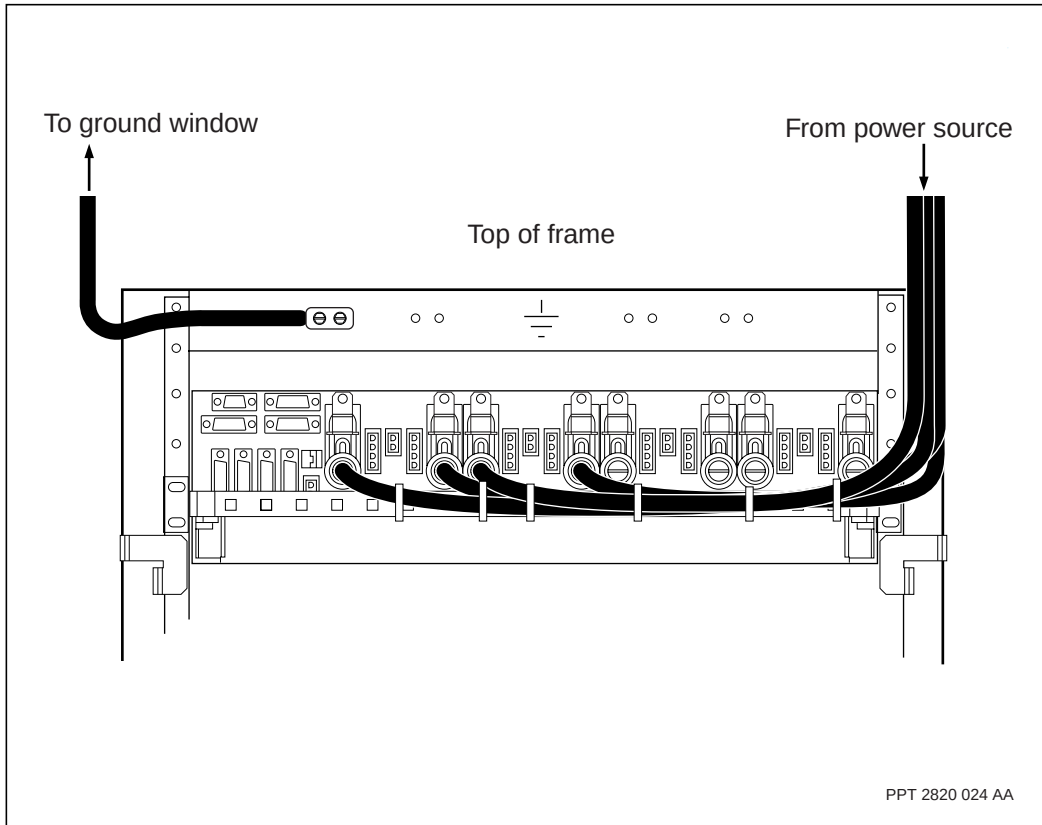


Figure 84
Location of the grounding strip at the top of NEBS 2000 frame



Grounding a Shasta 5000 to a NEBS 2000 frame

Ground a Shasta 5000 to a NEBS 2000 frame to ensure that the setup shares the same ground window.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Before grounding the Shasta 5000, ensure that you have done the procedure “Grounding the NEBS 2000 frame” (page 316).

Procedure steps

- 1 Cut 152 cm (5 ft.) of No. 6 AWG (13 mm²) cable for grounding.
- 2 As shown the figure “Shasta 5000 shelf assembly grounding studs” (page 314), use a straight 2-hole lug to connect one end of the grounding cable to both grounding studs on the rear of the shelf assembly.
- 3 Route the grounding cable from the Shasta 5000 to the nearest upright.
- 4 Route the cable along the upright up to the top of the frame where the silvery grounding strip is located. To locate the grounding strip, see the figure “Location of the grounding strip at the top of NEBS 2000 frame” (page 315). Use tie-wraps to loosely fasten the cable to the cable management brackets.
- 5 Choose a pair of dimples in the silvery grounding strip across the top rear of the frame where the 2-hole lug of the grounding cable will fasten. Each dimple pair covers unthreaded screw holes. Puncture the dimples at the 2 holes.

Do not use the grounding holes behind the safety label.

- 6 At the point of the dimple pair, cut off any excess cable, strip the sheath off the end to accommodate the lug barrel, coat the exposed strands in anti-oxidizing grease, and crimp on a straight No. 6 AWG (13 mm²) 2-hole lug. The lug holes must align with the dimple pair without causing the cable to exceed the maximum bend radius and without looping any cable slack.
- 7 Fasten the lug to the frame using 2 thread-forming 10-mm (3/8-in.) hex-head screws from the hardware kit NTHW85. Tighten to snug plus a 1/3 turn.
- 8 Tighten the tie-wraps along the cable path.

Figure 85
Shasta 5000 shelf assembly grounding studs

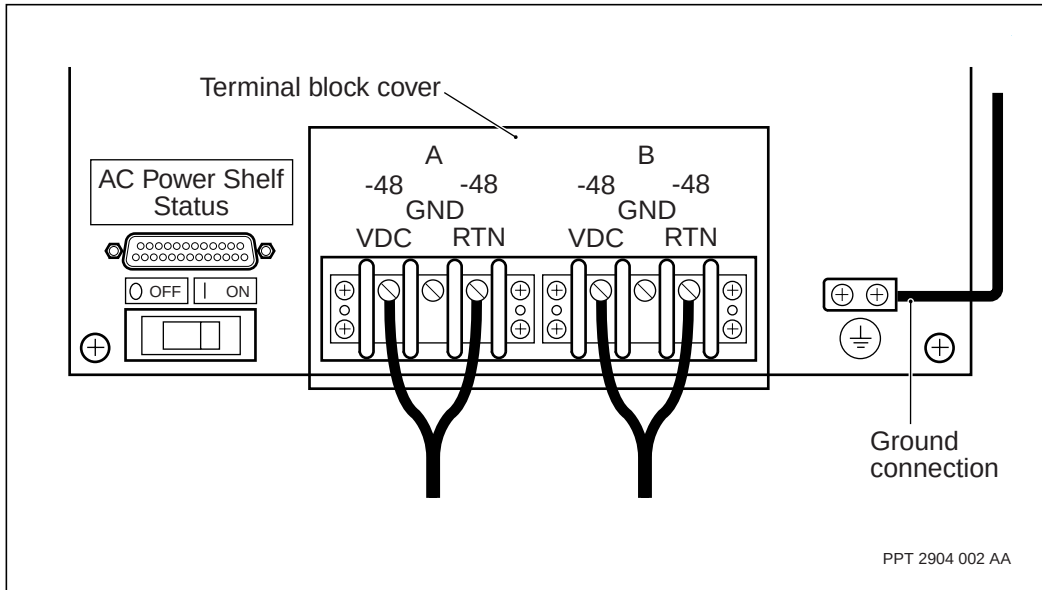
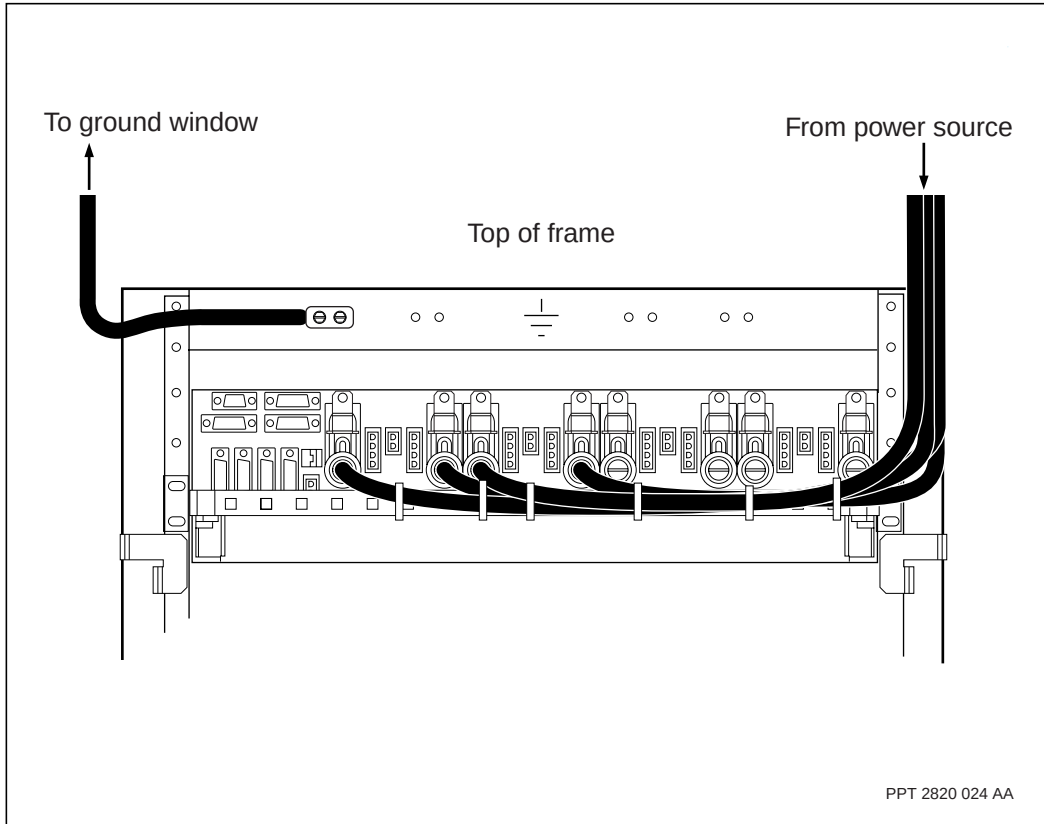


Figure 86
Location of the grounding strip at the top of NEBS 2000 frame



Grounding the NEBS 2000 frame

Install a cable onto the top front or rear of a NEBS 2000 frame to ground all equipment in the frame to the site ground window, or onto the mounting apparatus of a shelf-based Passport 15000 or 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the kit A0682225 which includes a straight 2-hole lug for a No. 6 AWG (13.3 mm²) cable and 2 thread-forming 10-mm (3/8-in.) hex-head screws or green pan-head machine screws. If you use a thicker grounding cable, provide your own lug and fasteners.
- For top or bottom grounding to a common bonding network (CBN) or an isolated bonding network (IBN), meet the following criteria, especially when using a common power plant to feed both IBN and co-located small CBN equipment.
 - Locate all IBN equipment within one floor of the power plant.
 - Use only one single point ground (SPG) for all IBN equipment fed from the power plant. That is, use a non-current-carrying section of the insulated battery return (BR) bar of the power plant.
 - Insulate the BR bar of the power plant from the Passport 15000 or 20000 and bond to the frame ground bar (FGB) for CBN or to the SPG for IBN.
 - Bond the framework of the power plant to the FGB overhead or under the floor.
 - Grounding conductors are not designed to carry current under normal operating conditions.
- Routing a ground cable under the floor up to the NEBS 2000 frame has the same grounding point as routing the ground cable from an overhead trough. There is an alternative grounding point on frames equipped with the optional side panel brackets from kit number NTRU0128. A ground cable can also be screwed against the silvery grounding tape on the outside face of a frame upright.

- When the polyvalent power-and-ground assembly (part number A0834149) is to be installed, the frame ground cable to the site ground window must be located on or re-located to the silvery grounding strip at the top front of the frame.
- When using an equivalent mounting apparatus to house a Passport 15000 or 20000, ground the apparatus to the site ground window because the hardware is grounded through the adapter brackets to the apparatus.

Procedure steps

- 1 Cut the ground cable to run from the silvery strip at the top of the front or the rear of the NEBS 2000 frame. Leave an extra 20 cm (8 in.).
- 2 Attach one end of the grounding cable to the main ground reference cable as required by your local electrical codes. Ensure that the connection is secure and weather-proofed.
- 3 On the top front or top rear of the NEBS 2000 frame, choose a pair of screw holes behind the silvery grounding strip by pressing and running a finger along the length of the strip. Any pair accommodates the provided 2-hole lug of the grounding cable. Puncture the strip at the 2 holes.

Do not use the pair of holes behind the safety label.

- 4 Route the other end of the grounding cable to the pair of holes on the frame.

When the cable comes from overhead and spans more than 0.6 m (2 feet) of air, then an insulated fixed cable ladder (or equivalent immovable structure) must be run down so that the cable can be attached to it.

When the cable comes from under the floor, route it on the right side facing the front of the frame.

- 5 Fasten the lug to the cable according to your local electrical code.
- 6 Fasten the lug to the frame using 2 thread-forming 10-mm (3/8-in.) hex-head screws or the green pan-head screws. Tighten to snug plus a 1/3 turn.

Procedure job aid

Figure 87

Top grounding for CBN, side view

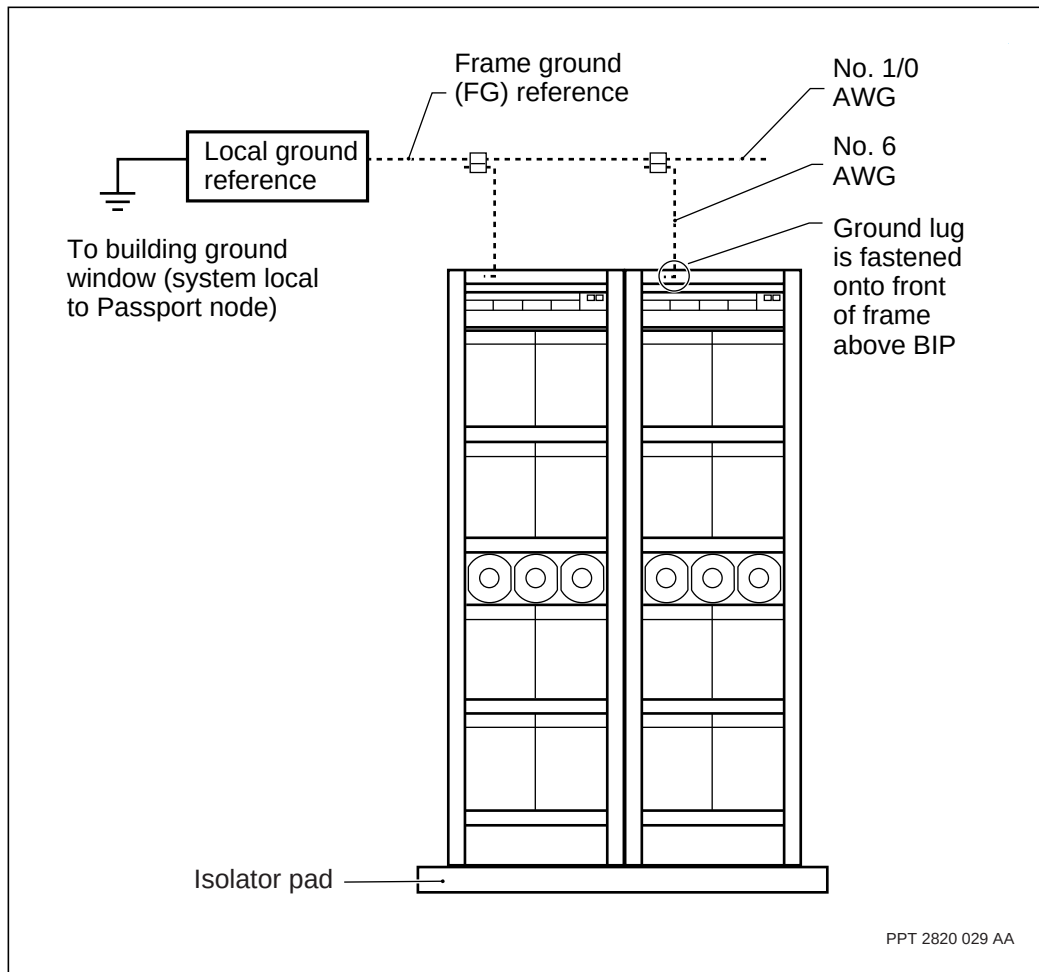
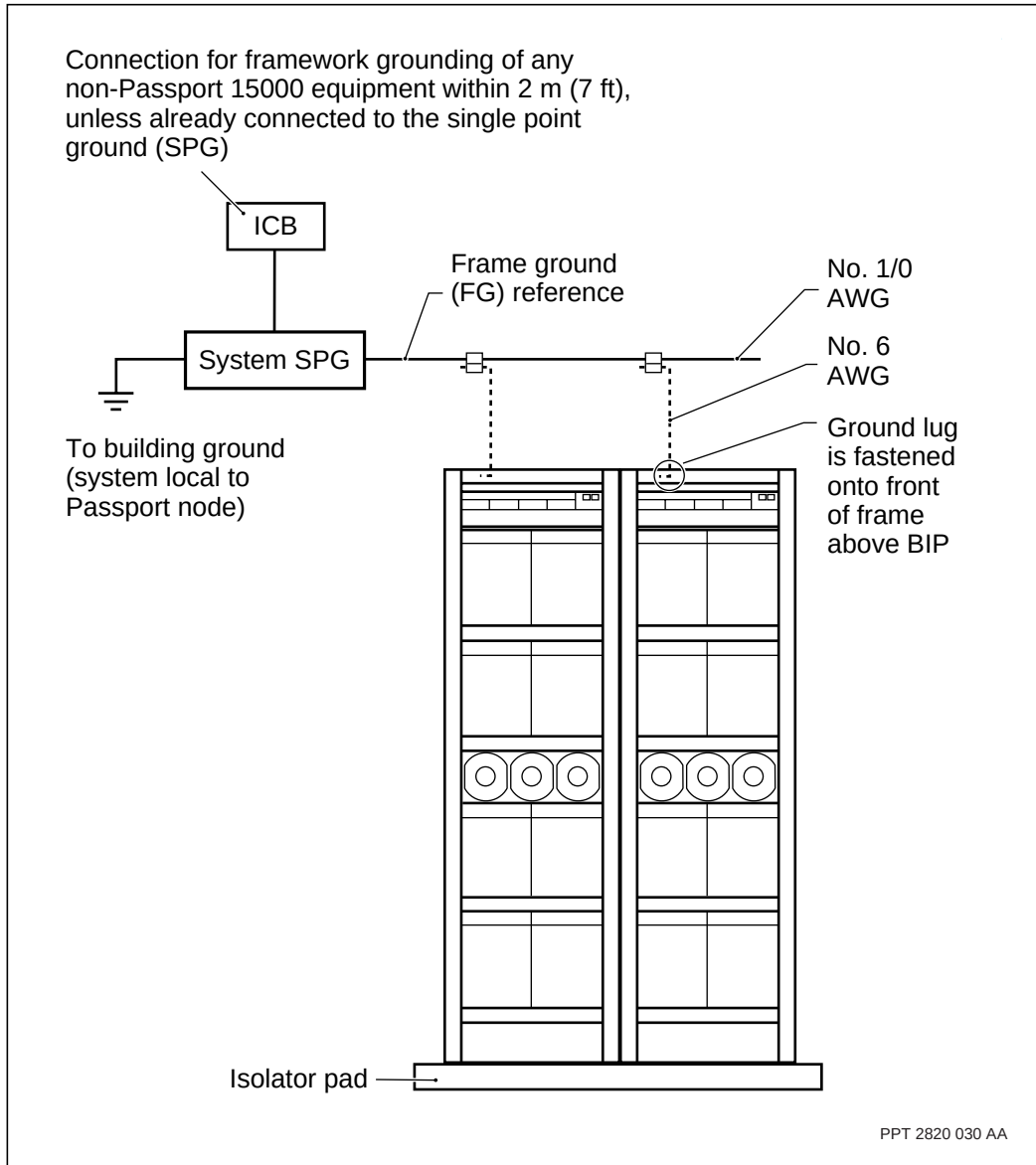


Figure 88
Top grounding for IBN, side view



Installing a 19-inch sparing panel

Install a 19-inch sparing panel into a NEBS 2000 frame to make use of the Passport 7400 selection of sparing panels, which are all 19" wide.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You must install the appropriate adaptor brackets as described in “Installing NEBS 2000 frame-to-EIA adapter brackets” (page 498).
- This section applies to these sparing panels:
 - NTFP99, the 3-port DS3 or E3 sparing panel
 - NTHR79, the 4-port DS3 sparing panel
 - any of the DS1 or E1 19-inch sparing panels used with packet voice gateway (PVG) FPs
- Before installing a sparing panel into a NEBS 2000 frame, consider the following criteria for choosing an efficient and practical location of the panel within the frame.
 - For frames with one switch, install the sparing or fanout panels on only the rear uprights and facing inwards.
 - Determine whether the panel will face into the frame or out of it. For example, outwardly facing panels with coax cables that have straight connectors will exceed the perimeter of the NEBS 2000 footprint. When adding sparing panels to a frame that already has a switch in it, mounting the sparing panels at the rear and facing inwards enables easier connection access for maintenance or redeployment of cables.
 - For one or more panels, determine the impact of the cable density that will be connected to each faceplate. Determine the accessibility to the faceplate especially to read cable connection information and if panels are to be installed on both sides of the frame. Confirm the routing path that the cables must follow to the FPs and the other end of the FP connection can safely accommodate the density of cables. Choose an optimum access and the least congested route.

Procedure steps

- 1** Unpack the sparing panel from its container.
- 2** At the front or rear of the NEBS 2000 frame, determine where on the 2 NTHW14 adapter brackets that the top mounting holes of the panel are to be. Count holes from the top or bottom (whichever is shorter) on both brackets to ensure a level installation. Mark the holes.
- 3** Hold the panel in one hand so that:
 - the faceplate lettering reads right to left and top to bottom
 - the connections face into or out of the frame as desired
- 4** Position the sparing panel against the brackets and align the mounting holes.
- 5** Thread an EIA thread-forming screw through the upper left and the upper right mounting ear holes of the sparing panel. Leave the fastener almost seated. Use the fasteners that were included with the panel because the 10-mm (3/8-in.) frame fasteners are too wide for thread-forming into the adapter brackets.

When turning a thread-forming screw into a hole for the first time, ensure that the screw is perpendicular to the hole.

On any other mounting apparatus, use whatever screws were provided and follow whatever instructions are provided with it.
- 6** Align the remaining mounting holes on the panel with the holes on the brackets and loosely tighten the remaining 2 screws.
- 7** Tighten all screws to snug plus a 1/4 turn. If you strip a hole or a fastener, you must move the sparing panel so that it has 4 firm fastenings.

Installing a BIM

Install a breaker interface module (BIM) to control the power supply to the power interface modules (PIMs) and to the cooling unit or units.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a BIM with PEC AP6C67PA for a Passport 20000 or NT6C60PA for a Passport 15000. The PEC of a replacement BIM must match the PEC of the previous BIM. When adding a second switch to a NEBS 2000 frame, you need a pair of BIMs matched with the same PEC and matched to the switch hardware they will power. Refer to 241-1501-200 *Passport 15000, 20000 Hardware* for the safe combinations of BIMs within a BIP.
- A BIP can contain the BIMs for a second switch before the switch is installed in the same NEBS 2000 frame. That is, the BIP may have been shipped with the second pair already installed.



CAUTION

Risk of equipment damage by mixing BIMs

You must never mix a 20-amp BIM (NT6C60PA) and a 25-amp (AP6C67PA) together to power the same shelf. Mixing BIMs in a pair will damage the equipment.

Procedure steps

- 1 When adding a pair of BIMs to power a second switch, the 2 left-hand BIM slots are likely to be covered by BIM filler plates (P0887704) at the front of the BIP. When the filler plates are present, you must:
 - unfasten the 2 slotted captive screws of the cover of the BIM captive screws as shown in the figure “Physical characteristics of a BIM in a BIP” (page 325) and let the cover swing down
 - remove each BIM filler plate by unfastening the large slotted captive screw at the front of the BIP
 - put the plates aside for re-use on another BIP

- 2** At the front of the BIP, grip the replacement BIM with the fingers and thumb of one hand on the lower front lip (the screw end) and use the other hand to align the rear of the module with the slot in the BIP.
- 3** Push the module gently but firmly straight in until you feel it engage. Stop pushing when the front of the module is flush with the front of the BIP.
- 4** Align and fasten the large slotted captive screw of the module. Do not strip the threads or the hole because safety regulations require that the BIM be secured. Tighten the screw to snug plus a 1/5 turn.
- 5** Switch all of the breakers on one at a time by pushing the bar symbol (I) in on each breaker.
- 6** Check the BIM status LEDs.
 - If the color is other than green, have the network operator confirm the status in software.
 - If the color is still other than green, contact your next higher level of technical support to identify what to do, replace the module or contact Nortel Networks.
- 7** Close the BIP screw cover upwards.
- 8** Fasten each of the 2 slotted captive screws on the cover about a 1/4 turn each until it stops.

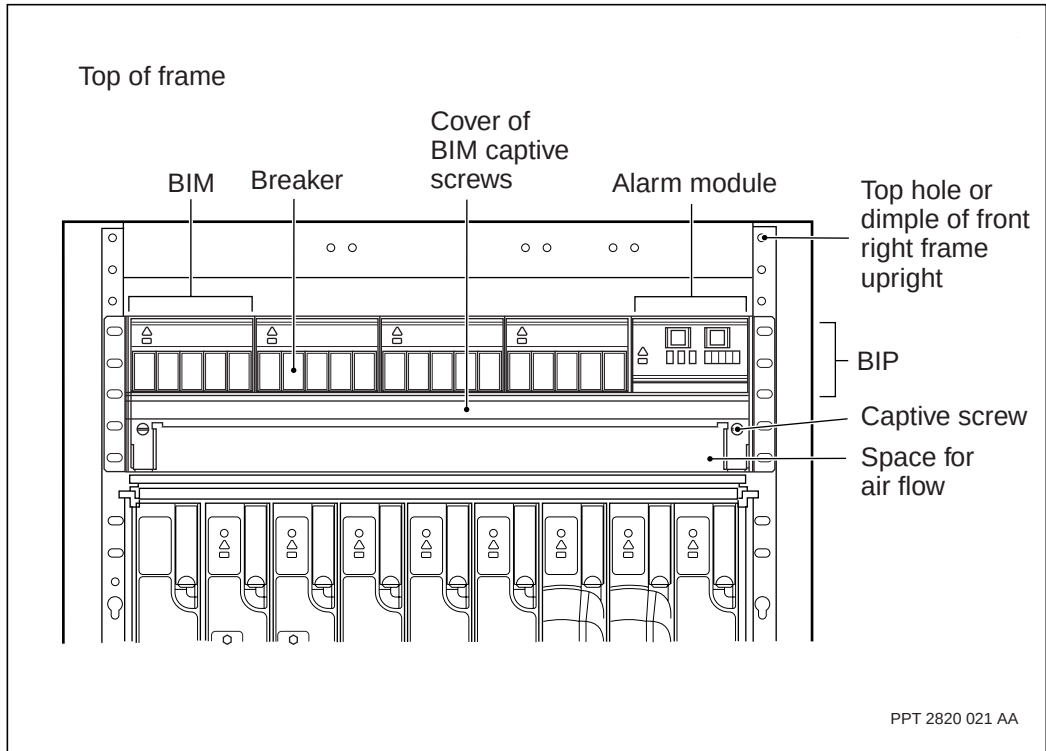
Procedure job aid

Table 19

Combinations of BIMs in a BIP

Shelf type	PEC of a BIP with 2 BIMs	PECs of the BIM pairs that can be installed
Passport 15000	NT6C62	two or four 20-amp NT6C60PA for one or two Passport 15000s or two 20-amp NT6C60PA for the Passport 15000 in the lower half of the NEBS 2000 frame and two 25-amp AP6C67PA for a Passport 20000 in the upper half of the NEBS 2000 frame
Passport 20000	AP6C68	two or four 25-amp AP6C67PA for one or two Passport 20000s or two 25-amp AP6C67PA for the Passport 20000 in the lower half of the NEBS 2000 frame and two 20-amp NT6C60PA for a Passport 15000 in the upper half of the NEBS 2000 frame

Figure 89
Physical characteristics of a BIM in a BIP



Installing a BIP alarm module

Install a BIP alarm module as part of a replacement or initial installation task. The BIP alarm module indicates hardware alarms, drives the alarm LED board and monitors the state of the power breakers.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41)
- You will need a BIP alarm module with PEC NT6C60PB.
- To minimize the effect of removing an alarm module, insert the replacement immediately. Once the alarm module is installed, the software alarms will soon stop.

Procedure steps

- 1 At the front of the BIP, grip the replacement alarm module with the fingers and thumb of one hand on the lower front lip (the screw end) and use the other hand to align the rear of the module with the opening in the BIP.
- 2 Push the module gently but firmly straight in until you feel it engage. Stop pushing when the front of the module is flush with the front of the BIP.
- 3 Engage and fasten the large slotted captive screw of the alarm module. Do not strip the threads or the hole because the module cannot seat properly.
- 4 Check the alarm module status LEDs.
 - a. If the color is other than green, have the network operator confirm the status in software.
 - b. If the color is still other than green, troubleshoot the problem.
- 5 Close the BIP screw cover upwards.
- 6 Align and fasten the slotted captive screws of the cover.

Installing a BIP external alarm cable

Install a BIP external alarm cable from the BIP to a custom alarm indicator to enable the reporting of a hardware failure.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You must provide the appropriate BIP external alarm cable according to “Assembling a BIP external alarm cable” (page 195).
- To install an external alarm cable between the BIP and an MFA150 system of ac rectifiers, see “Installing a BIP external alarm cable to an MFA150” (page 329).
- For a complete list of BIP alarm connections and their features, refer to 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure steps

- 1 Locate the BIP connector at the rear of the BIP. For assistance, refer to the figure “Locations of the alarm cable connectors and paths” (page 328).
- 2 While holding the cable, align the appropriate connector on the cable with the connector on the BIP. Any connector fits only one way.
- 3 Press the connectors together firmly but gently so that the lip of the cable connector is even with the base of the BIP connector.

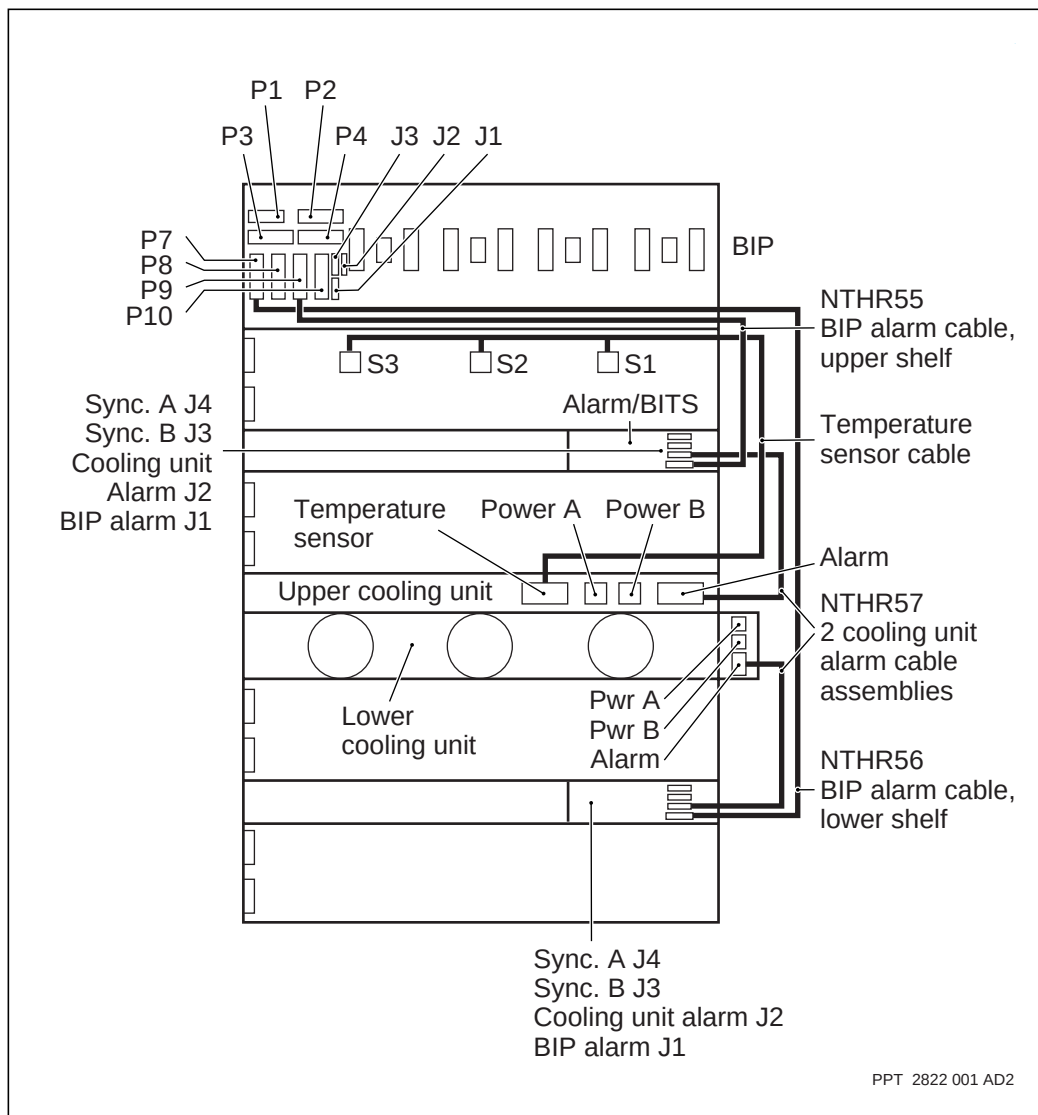
For a D-sub connector, use a screw driver to fasten the 2 screws on either side of the connector. Tighten to snug (no extra turns).

For a Berg connector, press until the tab on the side engages.

For a MATE-N-LOK connector, press until the tabs on either end engage.
- 4 Route the cable from the BIP to the connector on the hardware at the other end.
- 5 Connect the other end of the cable to the appropriate connector.
- 6 Use tie-wraps to fasten the cable along the path between the endpoints.

Procedure job aid

Figure 90
Locations of the alarm cable connectors and paths



Installing a BIP external alarm cable to an MFA150

Install an external alarm cable from a BIP to an MFA150 to enable a failure in the power source to be indicated by BIP LEDs and reported to the Preside MDM software.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an external alarm cable with part number P0940531.
- Before installing the cable at the MFA150 system, consider the safety information provided in Astec’s document 167-9021-133 *Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual*. Observe the requirements for electrical safety when connecting to the terminal blocks (TBn).
- The connection path is shown in the figure “Connection path of the external alarm cable between the BIP and an MFA150” (page 332). The connection points of the cable assembly are shown in the figure “Cable connection points of the alarm cable at the BIP and an MFA150” (page 333).

Procedure steps

- 1 Locate the BIP connector labelled J2 at the rear of the BIP. For assistance, refer to the figure “Locations of the alarm cable connectors and paths” (page 363).

The connection end points of the alarm cable are identified in the table “Pin-to-pin connections between an MFA150 controller card and a BIP” (page 330).

Table 20
Pin-to-pin connections between an MFA150 controller card and a BIP

At the MFA150	At the BIP	Type of alarm
terminal block TB2: pin 1 for the black wire, pins 2 and 4 for the red wire, no connection (NC) for the white and the green wires	J2, pin 2, L-	major

- 2 While holding the cable P0940531, align the Berg connector on the cable with the connector on the BIP. The connectors fit only one way.
- 3 Press the connectors together firmly but gently until the tab on the side engages. See the J2 inset in the figure “Cable connection points of the alarm cable at the BIP and an MFA150” (page 333).
- 4 Route the cable from the BIP up to the controller of feed A at the MFA150. Loosely fasten tie-wraps to secure the cable assembly along the path.
- 5 Determine the distance between TB2 for feed A and TB2 for feed B in the same controller. Cut 2 wires of 22 AWG (0.326 mm²) to be used for daisy chaining between the TB2s. See the wiring of the terminal blocks in the figure “Cable connection points of the alarm cable at the BIP and an MFA150” (page 333).
- 6 Prepare the ends of the black and the red wires in the cable assembly and the 2 daisy-chain wires for insertion into TB2 according to Astec's document 167-9021-133 *Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual*. For example, twist the wire strands of both wires together or solder them. Ensure that the resulting connections can each fit the TB2 receptacles.
- 7 Cut the ends of the green and white wires in the cable assembly and cover the ends with electrical tape to safely insulate each one from contact.
- 8 Pass the cluster of wires into the controller up to the controller card for power feed A. To identify the point of access, refer to Astec's installation document.
- 9 Connect the wires of the cable assembly to the TB2 terminal blocks of the controller cards for power feeds A and B as shown in the figure “Cable connection points of the alarm cable at the BIP and an MFA150” (page 333).

- 10** When more than one controller is used (that is, for more than one Passport 15000 or 20000), daisy chain the TB2 terminal blocks between controllers with 22 AWG (0.326 mm²) wire.
- 11** Check each wire connection at the TB2 terminal blocks and grounding points to ensure a firm contact.
- 12** Tighten the tie-wraps along the cable path.

Procedure job aid

Figure 91

Connection path of the external alarm cable between the BIP and an MFA150

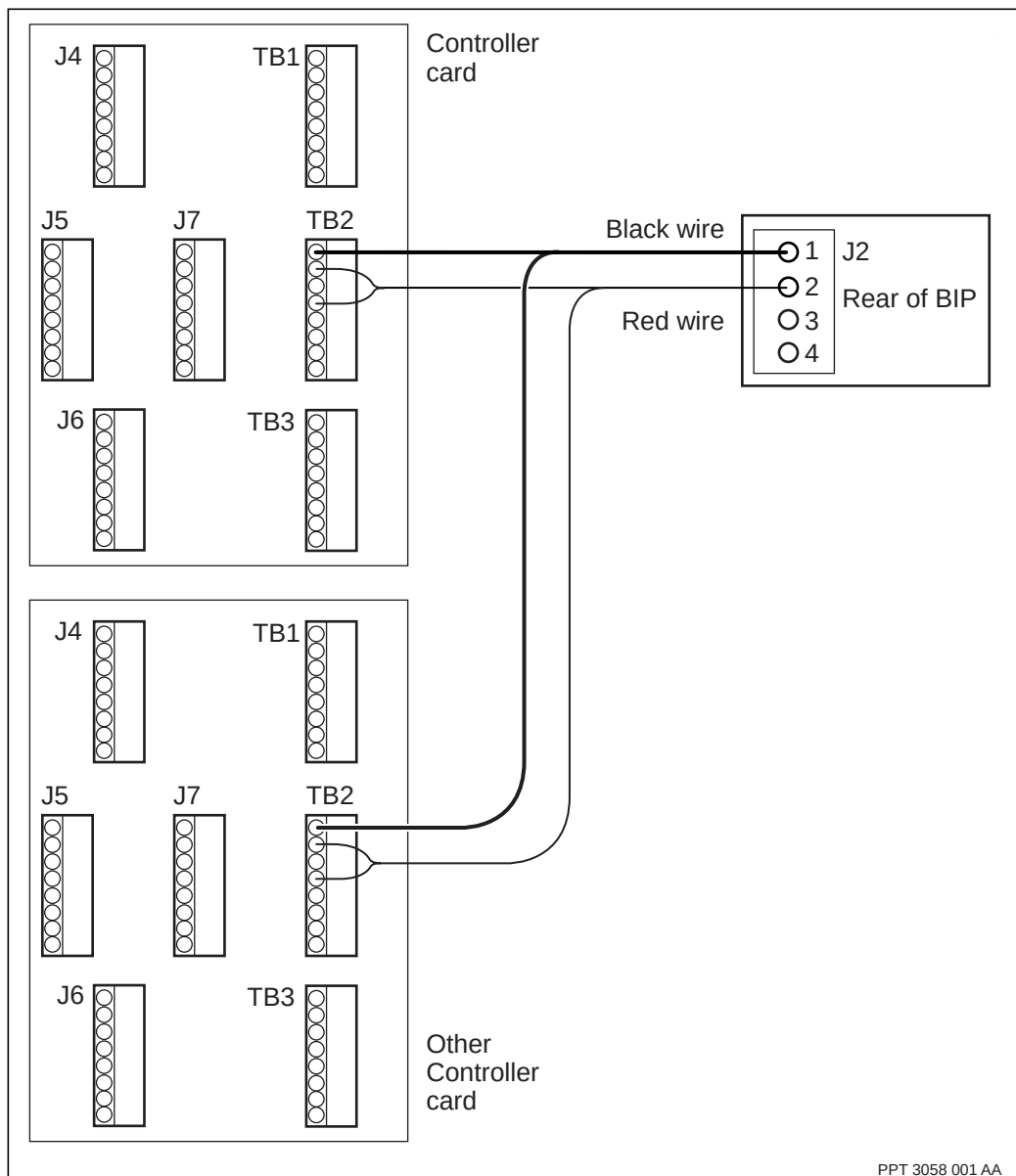
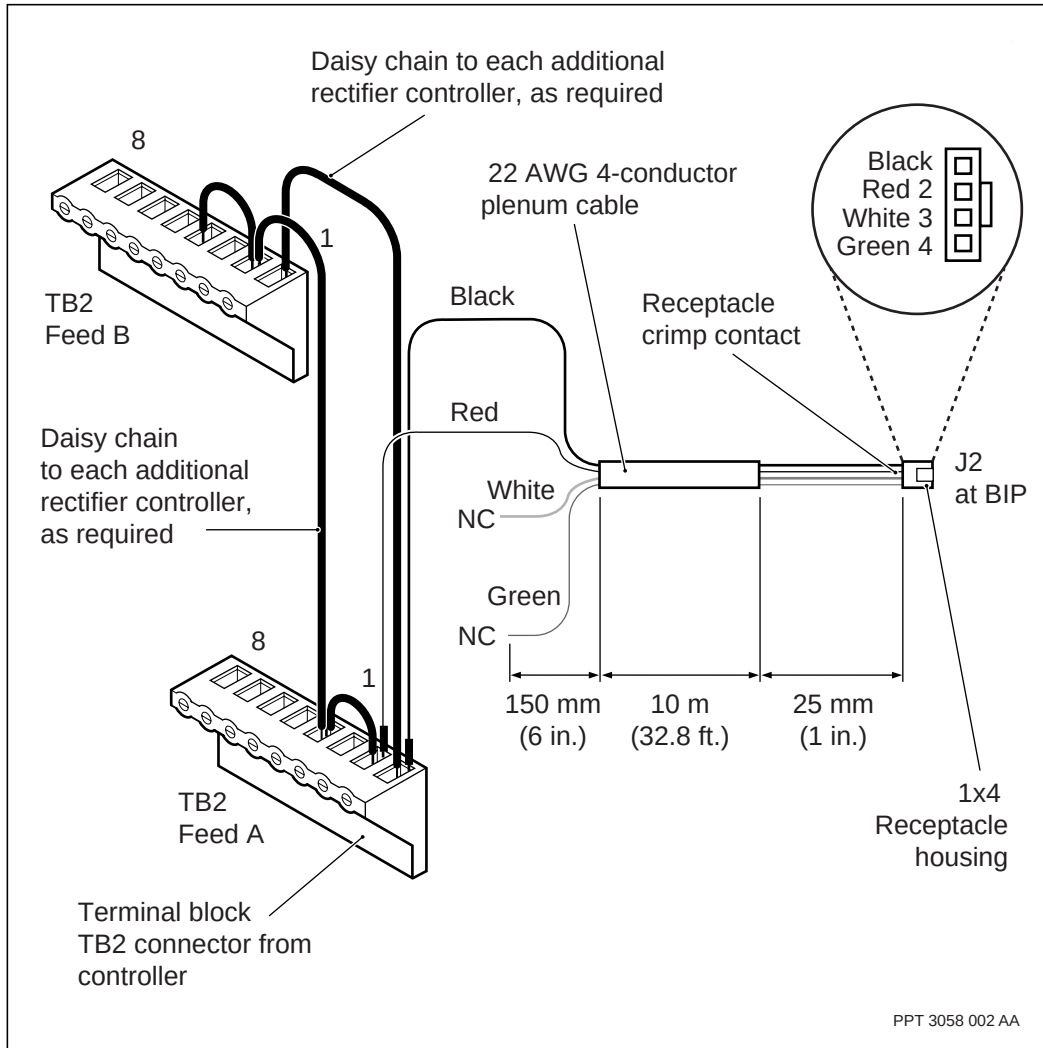


Figure 92**Cable connection points of the alarm cable at the BIP and an MFA150**

Installing a BIP onto a NEBS 2000 frame

Install a BIP onto a NEBS 2000 frame to enable powering up one or two shelf nodes.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a BIP with a PEC NT6C62 for a frame with one or two Passport 15000s or NT6C62 for a frame with one or two Passport 20000s or a Passport 15000 and a Passport 20000.
- You need a helper to support the weight of the BIP until it is fastened into position.



CAUTION

Risk of equipment damage from dropping

The various BIPs weigh up to about 16 kg (36 lbs). The weight of a free-falling BIP can damage it. As the mounting screws of the BIP are being unfastened, do not allow the BIP to drop onto the shelf assembly.

Procedure steps

- 1 Hold the BIP so that the side with the openings faces you. If the BIMs and the alarm module were shipped or stored inside the BIP, remove them. Remember where to put them back in case there is a mix of BIM pairs.
- 2 While facing the front of the mounting apparatus, insert the BIP between the uprights of a NEBS 2000 frame or the adapter brackets on a 23-inch EIA rack and above the shelf.
- 3 Gently lower the BIP until the bottom edge of its mounting ears touch the top edge of the shelf mounting ears. Prevent the weight of the BIP from resting on the shelf.
- 4 Align the screw holes on the 2 mounting ears with the nearest holes on the outside face of the uprights or the adapter brackets. Loosely fasten a 10-mm (3/8-in.) screw from through the upper left mounting-ear hole.
- 5 Loosely fasten another screw through the lower right mounting-ear hole, then the remaining 2.
- 6 Center the unit, then tighten all 4 screws to snug plus a 1/4 turn.

- 7** If the BIP is installed in a mounting apparatus other than a NEBS 2000 frame, ground the BIP chassis to the apparatus by firmly attaching a ground of minimum size 6 AWG cable E/W (13.3 mm²) between the studs and the common grounding point. The stud nuts on the chassis are number 10-32 unc and are provided with star washers on the studs. There is no metric equivalent to the stud nuts. Use the star washers between the lug and the grounding point. Do not overtighten the nuts.

Installing a BITS cable

Install a BITS cable from the timing source directly to the alarm/BITS module or to a prefabricated cable assembly to enable network synchronization with the node.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The prefabricated alarm/BITS timing cables that you can connect to include:
 - NTHR75
 - NTHW75
 - NTPN81
- When your timing connection requires a cable that connects directly to the alarm/BITS module or connects to one of the prefabricated timing cable assemblies, you need a custom-made BITS cable. See “Making a BITS cable” (page 510).
- The BITS wire pairs from the site’s B reference timing source plug into the J3 receptacle and the A reference timing source plug into the J4 receptacle. J3 and J4 are located on the alarm/BITS module at the rear of the NEBS 2000 frame. The alarm/BITS module receptacle connects to a male 9-pin D-sub (DB9) connector directly from a site source or as part of the prefabricated cable assemblies. For a redundant timing setup (using both the A and the B timing references), a DB9 connector is needed for each reference at J3 and J4

Procedure steps

- 1 Test the signal strength of the site source at the end of the cable before connecting it to J 3 and J4 of the alarm/BITS module. The signal strength must be within the range indicated in “Making a BITS cable” (page 510).

If the signal is not within the range, fix the problem between the point of test and the site source. Depending on the length of cable from the site source, you may need a thicker gauge cable to ensure the signal strength.

- 2 At the alarm/BITS module, plug the female D-sub connector of the timing wire labeled reference B into the connector beside the label J3. See the figure “Location of the alarm/BITS module and cable connections in a Passport 15000” (page 657) and “Location of the alarm/BITS module and cable connections in a Passport 20000” (page 660).

If the alarm/BITS module on a Passport 15000 is either an NTHR12 or NTHR13, it has factory-installed inline EMI filters attached to the J3 and J4 connectors as shown in the figure “An EMI filter on an alarm/BITS connector of a Passport 15000” (page 478). If the EMI filters are missing, add them as described in “Installing EMI filters on the alarm/BITS module” (page 477).

- 3 Fasten the 2 small slotted screws of the D-sub connector to the alarm/BITS module.
- 4 For a Passport 15000 or 20000 using the redundant timing setup, plug the female D-sub connector of the timing wire labeled reference A into the connector beside the label J4.
- 5 Fasten the 2 small slotted screws of the other D-sub connector to the alarm/BITS module.

The operation of the timing signals inside the switch hardware will be verified when the network synchronization is configured and the timing tests pass.

Installing a blank processor card

Install a blank processor card into an empty slot to ensure the effectiveness of the cooling air flow and to maximize containment of electromagnetic interference (EMI).

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You will need a blank processor card with PEC NTHR64. The faceplate is labeled BLANK. See the figure “Blank processor card NTHR64” (page 340). This card is also referred to as a filler module.
- Slots 0E and 1E are reserved for later development and must contain blank cards in the meantime. Blank processor cards for these slots are typically installed before a shelf is shipped.



CAUTION

Risk of service degradation or equipment damage

Always have a blank processor card (labeled BLANK) in a slot that does not house another card. The blank cards enable efficient performance of the fans for temperature control and also facilitate fire protection and EMI containment.

Procedure steps

- 1 Locate an empty CP or FP slot in any cage.
- 2 At the ends of the faceplate, swing each latch fully open by pinching the inner edge of the latch and lifting away from the faceplate. Refer to the figure “Open card latches on a CP, FP, or blank processor card” (page 464).
- 3 While holding each latch open horizontally, gently slide the card inwards until it stops and the faceplate is flush with the shelf edges above and below it.

**CAUTION****Risk of damage to the backplane from seating a card**

When latching a card into its final seating position, the card latches must be closed simultaneously to ensure that the card evenly engages the gaskets and pins on the backplane. Otherwise, improperly seating a card can damage the backplane hardware such that the slot becomes unusable. Restoring a slot to service from this kind of damage means replacing the shelf assembly.

- 4 Close both latches simultaneously until they are flush against the faceplate as shown in the figure "Blank processor card NTHR64" (page 340).

When a latch will not sit flush against the faceplate, do not force it. Fully open both latches, slide the card out to disengage contact from the backplane, and return to step 3.

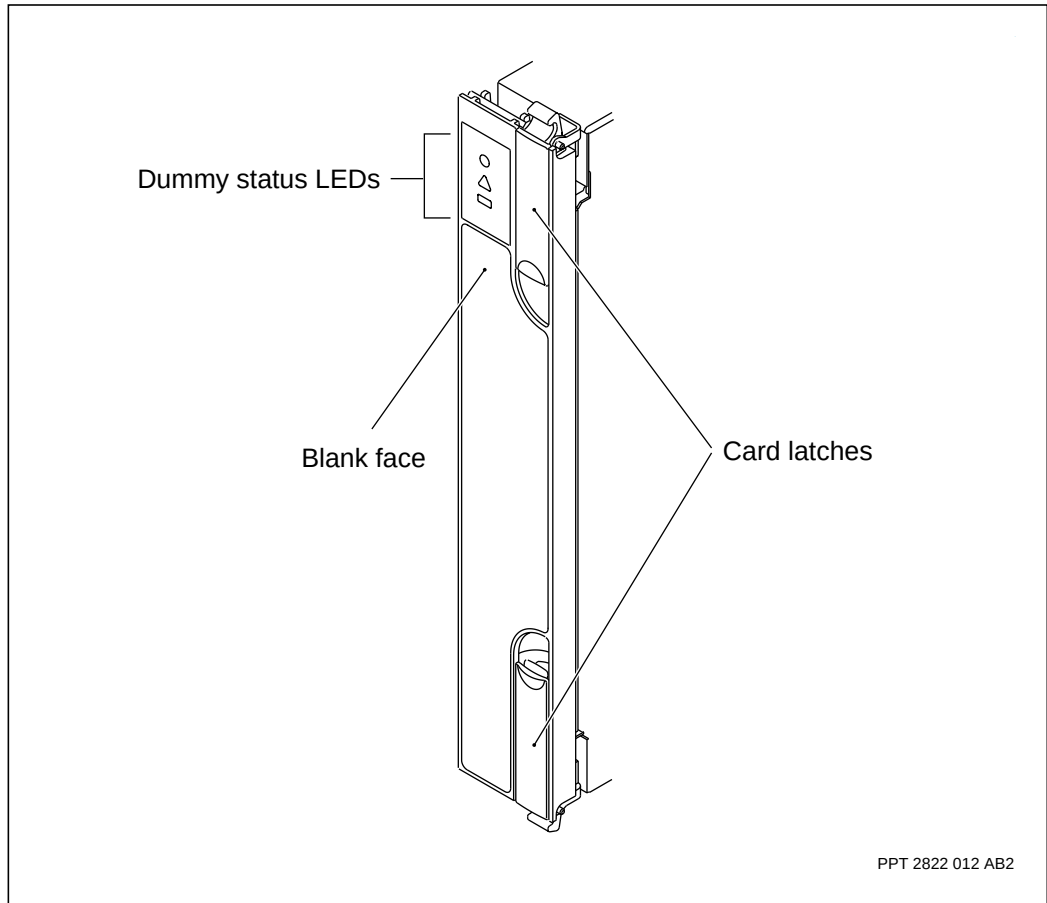
When a latch does not sit flush after a second attempt, abort the seating and contact your next higher level of technical support.

- 5 Repeat step 1 to step 4 for each remaining empty CP or FP slot.

Procedure job aid

Figure 93

Blank processor card NTHR64



Installing a CP

Install a CP into an empty CP slot to enable switch operation or to resume backing up the active CP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a CP with one of the following PECs:
 - NTHR06 for a DS1 CP2E BITS interface
 - NTHR35 for an E1 CP2E BITS interface
 - NTHW06 for a DS1 CP3 BITS interface
 - NTHW08 for an E1 CP3 BITS interface
- For a Passport 15000 or 20000, install the first CP in slot 0 and the second in slot 1. Refer to the figure “Location of CPs in a lower switch” (page 343). (Slots 0E and 1E are reserved for later development.)

Procedure steps

- 1 If there is a blank processor card in slot 0 (zero) or 1 (one) where the CP is to be installed, remove it according to “Removing a blank processor card” (page 536).
- 2 At the ends of the faceplate, swing each latch fully open by pinching the inner edge of the latch and lifting away from the faceplate. Refer to the figure “Open card latches on a CP, FP, or blank processor card” (page 464).
- 3 While holding the CP by its top and bottom edges with the latches on the right side of the faceplate, align the end with the backplane pins to the tracks in the slot.
- 4 Gently slide the CP into the slot until the CP stops moving. There are keyways and guide pins to ensure that the CP aligns with the connections at the backplane (inside at the rear of the shelf). If you feel resistance, do not force the CP in. Remove it, and check the backplane at the rear of the slot for bent pins. You may need a flashlight to see into the slot. If no pins are bent, re-seat the CP. If any pin is bent, do not insert a CP and contact your technical support representative of Nortel Networks.

**CAUTION****Risk of damage to the backplane from seating a card**

When latching a card into its final seating position, the card latches must be closed simultaneously to ensure that the card evenly engages the gaskets and pins on the backplane. Otherwise, improperly seating a card can damage the backplane hardware such that the slot becomes unusable. Restoring a slot to service from this kind of damage means replacing the shelf assembly.

- 5 Close both latches simultaneously until they are flush against the faceplate. Refer to the figure “Closed card latches on a CP, FP, or blank processor card” (page 465).

When a latch will not sit flush against the faceplate, do not force it. Fully open both latches, slide the card out to disengage contact from the backplane, and return to step 3.

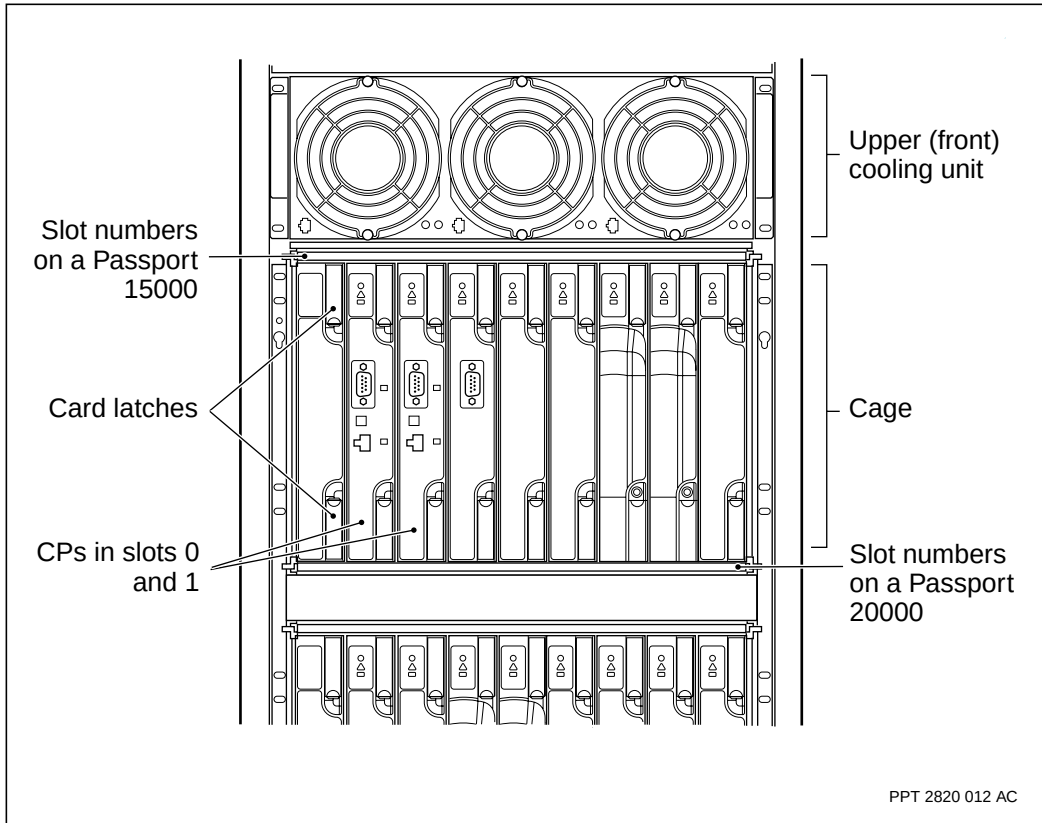
When a latch does not sit flush after a second attempt, abort the seating and contact your next higher level of technical support.

- 6 If the shelf is powered, wait until the LEDs cycle to eventually become solid or fast flashing green to indicate in service.

If the LED is any other colour after 5 minutes, there is a problem with the CP. Refer to 241-5701-520 *Passport 7400, 15000, 20000 Fault and Performance Management: Troubleshooting* to diagnose and fix the CP problem.

Procedure job aid

Figure 94
Location of CPs in a lower switch



Installing a fabric card into a Passport 15000

Install a fabric card into the rear of a Passport 15000 to

- complete a fabric replacement and restore the load-sharing mode of operation
- initially install it in preparation for powering up the system
- complete an alarm/BITS replacement

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a Passport 15000 fabric with PEC NTHR16.

Procedure steps

- 1 Hold the fabric so that you have one hand on the handle and one on the lever as indicated in the figure “A fabric of a Passport 15000, front view” (page 346).
- 2 Check each row of backplane connector pins to see whether any pin seems visibly bent, that is, even slightly out of pattern or worse. If at least one pin is slightly bent or worse, use another fabric with straight rows of pins. The pins are shown in the figure “A fabric of a Passport 15000, rear view” (page 347).



CAUTION

Risk of equipment damage and service loss by bent pins

Attempting to seat a fabric with at least one bent connector pin risks damaging the backplane connectors such that another fabric with straight pins cannot be seated, risks a short across other pins, and risks bending more pins. The field replacement for any damaged backplane connector is to replace the shelf assembly. If you have any doubts about the straightness of the pins on the fabric, use another fabric with straight pins or contact your next level of technical support.

- 3 Orient the fabric such that the black alignment arrow on the fabric casing points to the arrow on the shelf. See the arrow in the figure “A fabric of a Passport 15000, front view” (page 346).
- 4 Align the 4 guide pins on the backplane with the 4 keyway holes in the rear of the fabric. See the keyway holes in the figure “A fabric of a Passport 15000, rear view” (page 347). The keyway hole pattern is asymmetrical in only 1 orientation so that either fabric is installed in only 1 way.
- 5 Insert the hinge pegs of the pair of covers into the curved channels at the center. See these characteristics in the figure “Location of the curved channels for the Passport 15000 fabric hinge pins” (page 348). Ensure that the top and bottom pegs are seated all the way in; otherwise, damage can occur to the fabric when the casing is closed. You may have to jiggle the pins very gently into place.
- 6 Slowly move the fabric to engage the keyways over the guide pins.
- 7 While holding the fabric against the curved channels, unfasten the Phillips captive screw on the fabric cover and open the casing by pulling the fabric lever towards yourself. Stop when the lever touches the casing on the opposite side.
- 8 Seat the fabric onto the backplane using gentle, even force, and simultaneously close the casing by closing the lever. The closing action seats 1 side of the fabric sooner than the other.

**CAUTION****Risk of equipment damage**

If you feel resistance against the fabric while seating it, do not force it. Re-align it and if there is still more resistance, remove the fabric and look for an obstruction, a bent guide pin, or a bent hinge pin.

- 9 Close the casing flush with the surrounding perimeter (shelf assembly).
- 10 Align and fasten the captive screw until snug plus a 1/5 turn.

Procedure job aids

Figure 95
A fabric of a Passport 15000, front view

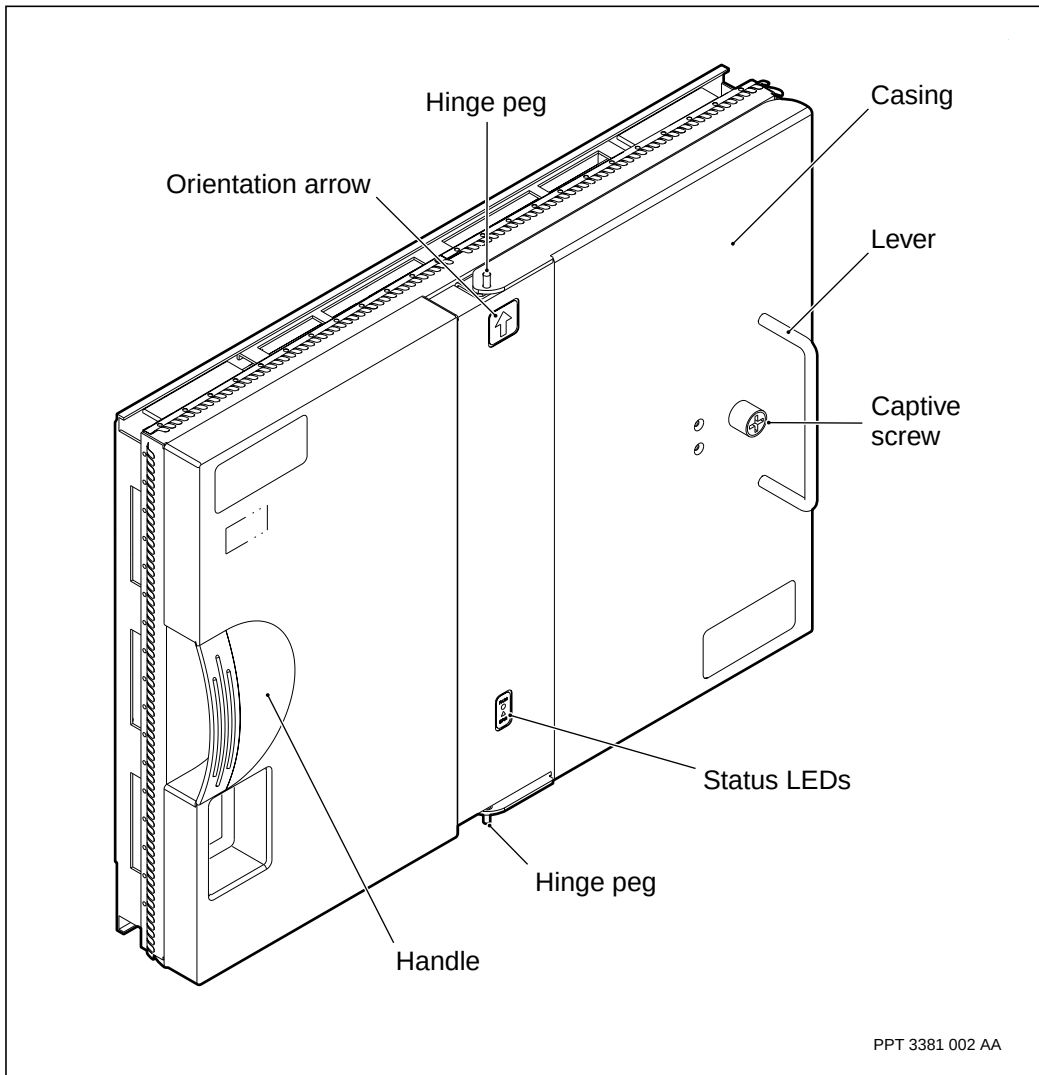


Figure 96
A fabric of a Passport 15000, rear view

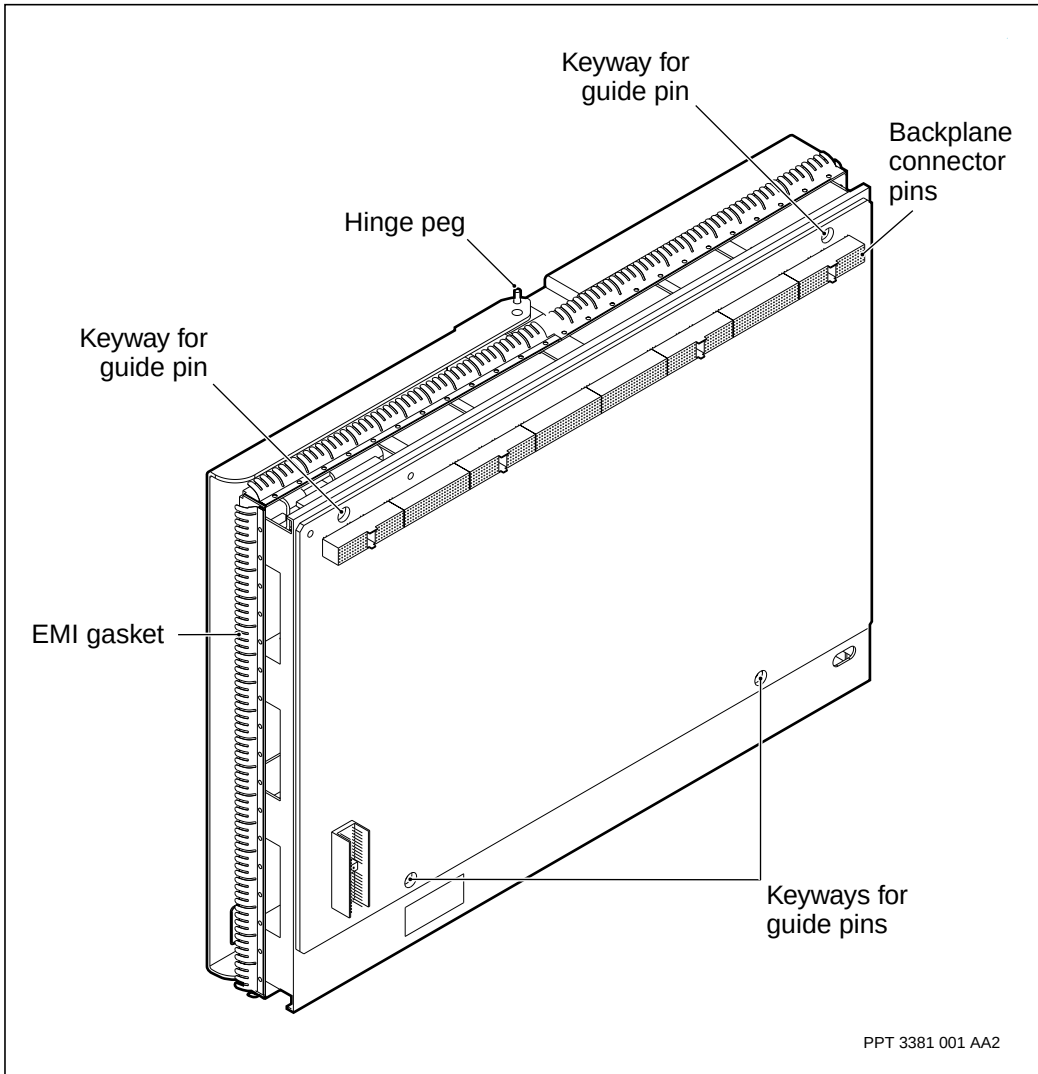
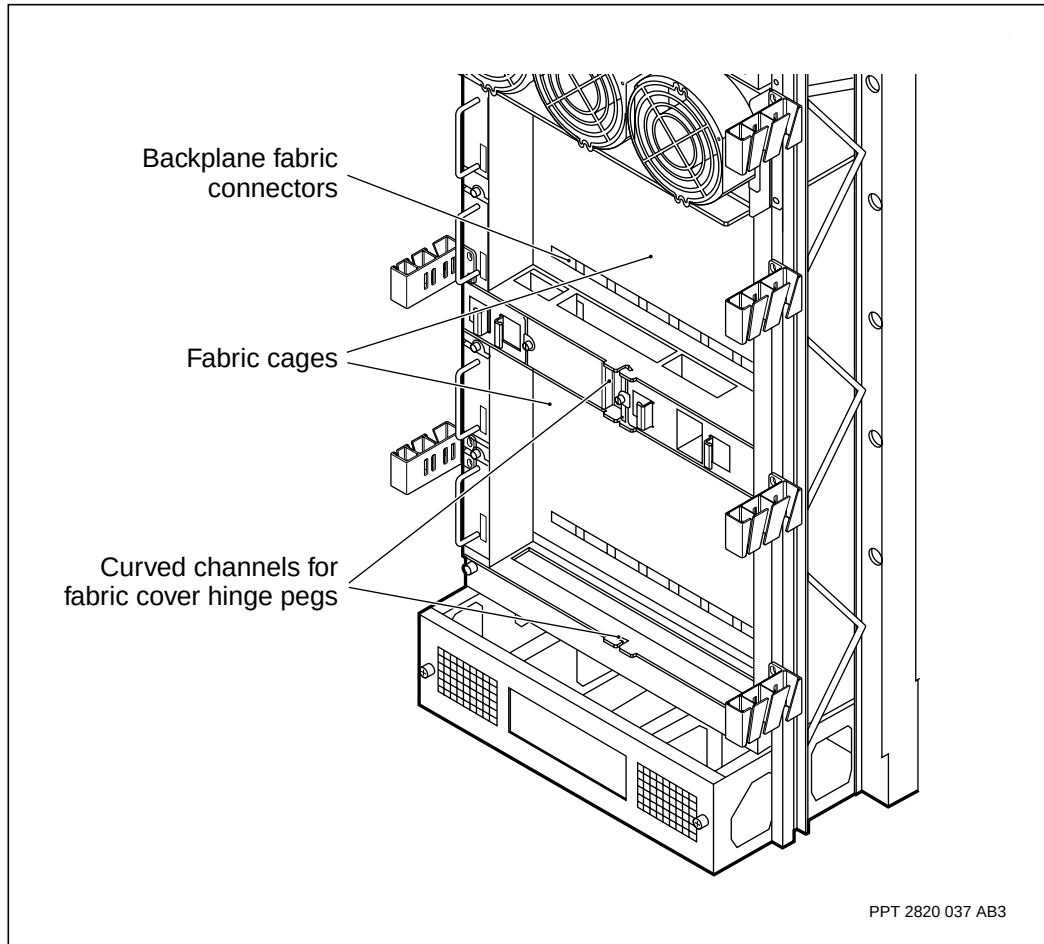


Figure 97
Location of the curved channels for the Passport 15000 fabric hinge pins



Installing a fabric card into a Passport 20000

Install a fabric card into the rear of a Passport 20000 to complete a fabric replacement and restore the load-sharing mode of operation, or to initially install it from a shipping container in preparation for powering up the system.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a Passport 20000 fabric with PEC NTPN02.
- When pressed in, the fabric reset button enables the fabric to be loaded with firmware when the switch is powered. Whenever the fabric reset button is not fully depressed, the fabric cannot be put into service.



CAUTION

Risk of service degradation or damage by heat

The tape covering the gap at the top of an upper fabric card cage in the upper frame position prevents foreign objects from entering the cavity behind the fabric during transportation. The tape must be completely removed as part of an initial fabric installation.

Procedure steps

- 1 For an initial installation, peel off the tape (if present) covering the air vent at the top outside of the top fabric card cage of an upper shelf assembly. See the location of the vent in the figure “Location of protective tape over fabric airflow opening” (page 681). The vent must be completely cleared of tape.
- 2 Hold the fabric so that
 - you have a hand on each handle shown in the figure “A fabric of a Passport 20000, front view” (page 353)
 - the lever is closed and fastened at the left side
- 3 Check each row of backplane connector pins to see whether any pin seems visibly bent, that is, even slightly out of pattern or worse. If at least one pin is slightly bent or worse, use another fabric with straight rows of pins.

**CAUTION****Risk of equipment damage and service loss by bent pins**

Attempting to seat a fabric with at least one bent connector pin risks damaging the backplane connectors such that another fabric with straight pins cannot be seated, risks a short across other pins, and risks bending more pins. The field replacement for any damaged backplane connector is to replace the shelf assembly. If you have any doubts about the straightness of the pins on the fabric, use another fabric with straight pins or contact your next level of technical support.

- 4 Stand the fabric on its bottom and unfasten the Phillips captive screw on the handle. It is normal for the handle to open slightly.
- 5 Align the fabric bushings at the 4 corners of the fabric chassis on the shelf assembly with the nearest transportation notch (identified in the figure "Locations of notches for fabric hinge bushings on Passport 20000 shelf assembly" (page 354).
- 6 Place the alignment bushings into the 4 transportation notches as shown in the figure "Locations of notches for fabric hinge bushings on Passport 20000 shelf assembly" (page 354).
- 7 While holding the fabric by one handle, pull the fabric lever slowly towards you until it stops perpendicular to the face of the fabric. While the lever opens, the alignment bushings at the 4 corners of the fabric move inwards. The transportation notches are angled so that opening the fabric lever rolls the alignment bushings out of the notch and into the opening of the alignment grooves. See the figure "Locations of notches for fabric hinge bushings on Passport 20000 shelf assembly" (page 354).

If the lever does not move or any of the 4 alignment bushings is catching, close the lever and re-align the fabric by very gently jiggling it. Try opening the lever again.
- 8 Once the 4 bushings are at the start of the alignment grooves, place a hand in each fabric handle and gently push the fabric into the shelf such that
 - the fabric lever remains fully open as shown in the figure "A fabric of a Passport 20000, front view" (page 353)

- each rolling alignment bushing at the outside corners evenly enters the 4 alignment grooves shown in the inset of the figure “Locations of notches for fabric hinge bushings on Passport 20000 shelf assembly” (page 354)
 - the 4 guide pin keyways at the rear corners of the fabric align with the 4 guide pins on the backplane (inside the shelf); see the figure “A fabric of a Passport 20000, rear view” (page 352)
- 9** Hold the fabric in place with one hand and close the fabric lever. Moving the lever starts seating the fabric and requires a firm, steady motion to the left against variable resistance. When the lever is almost closed, the tension on it will lessen noticeably.
- Seating the NTPN02 requires slightly more force than an NTHR16 of a Passport 20000. If the NTPN02 hinge bushings squeak during seating, this is normal.
- If inserting the fabric is stopped by a blockage, typically you can feel it but not see it. When you feel blockage, stop the insertion. Move the fabric away from the shelf to check for foreign objects. If you cannot find the cause of the blockage, return to step 5 to re-align the fabric hinge pins. If the blockage persists, contact your Nortel Networks technical support representative.
- 10** When the alignment bushings reach the end of the groove, the fabric lever is almost fully closed. Fully seat the fabric and depress the reset button by closing the fabric lever flush with the cover of the fabric.
- 11** Align and tighten the captive screw on the lever to snug plus a 1/5 turn when
- all 4 alignment bushings are at the end of the alignment grooves
 - the 4 corners of the fabric cover are evenly aligned with the surrounding edges of the shelf assembly
 - the fabric lever is closed flush

Avoid stripping the screw.

Procedure job aids

Figure 98

A fabric of a Passport 20000, rear view

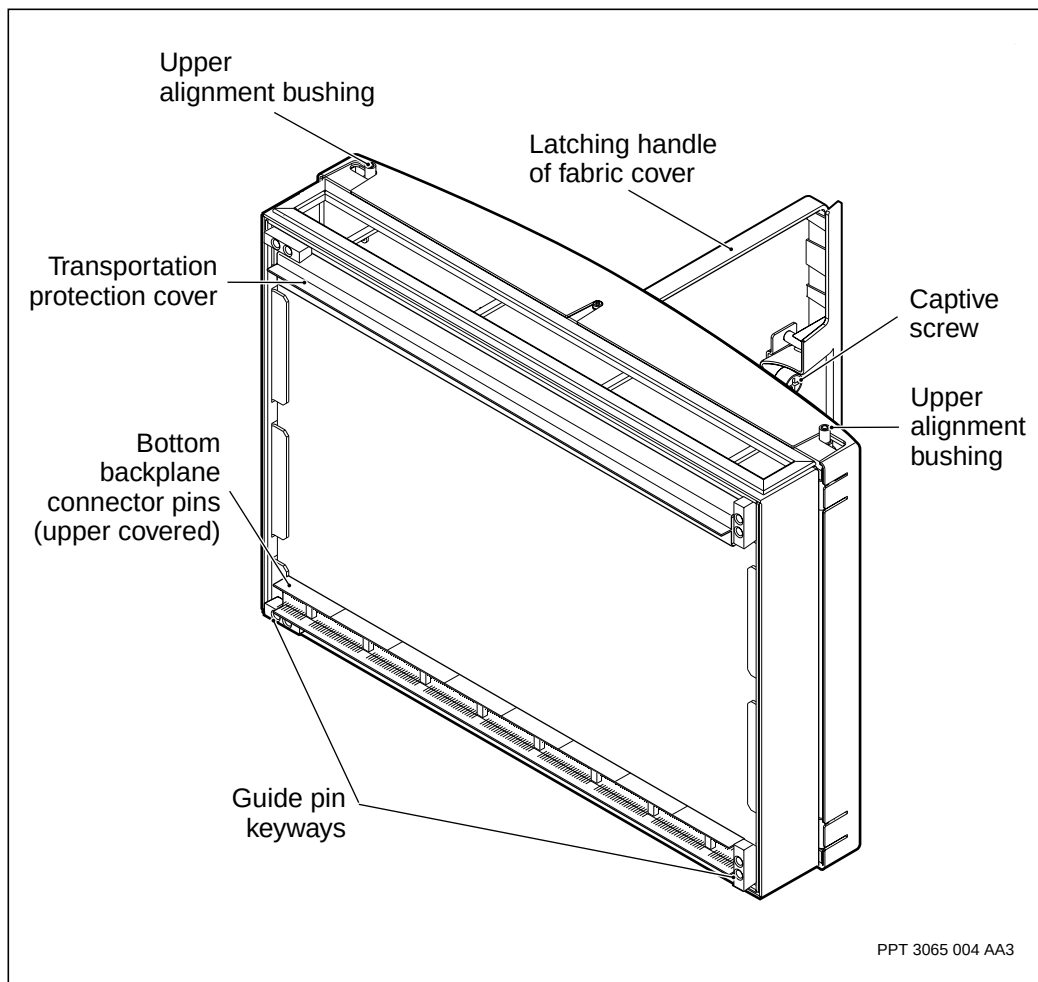


Figure 99
A fabric of a Passport 20000, front view

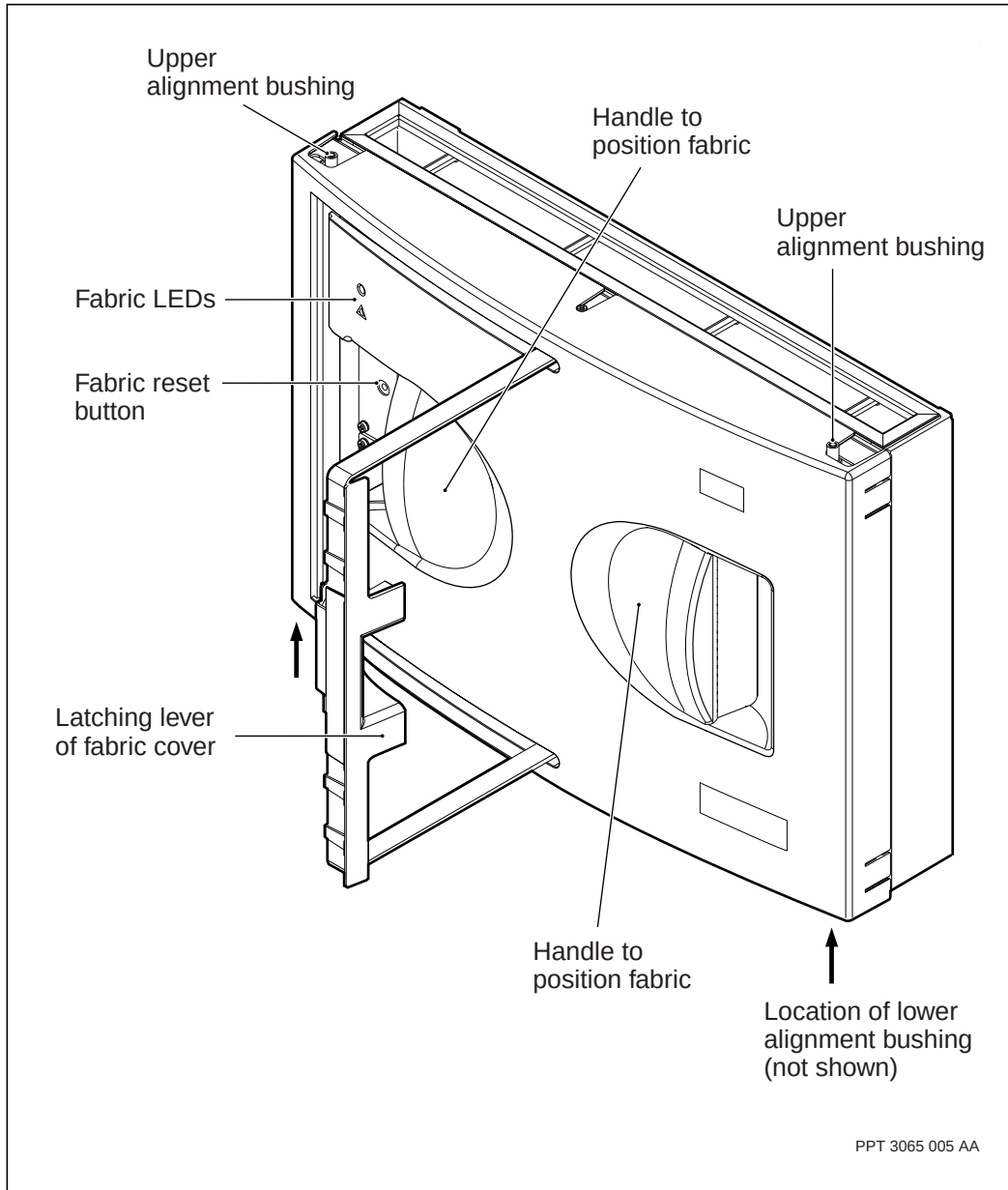
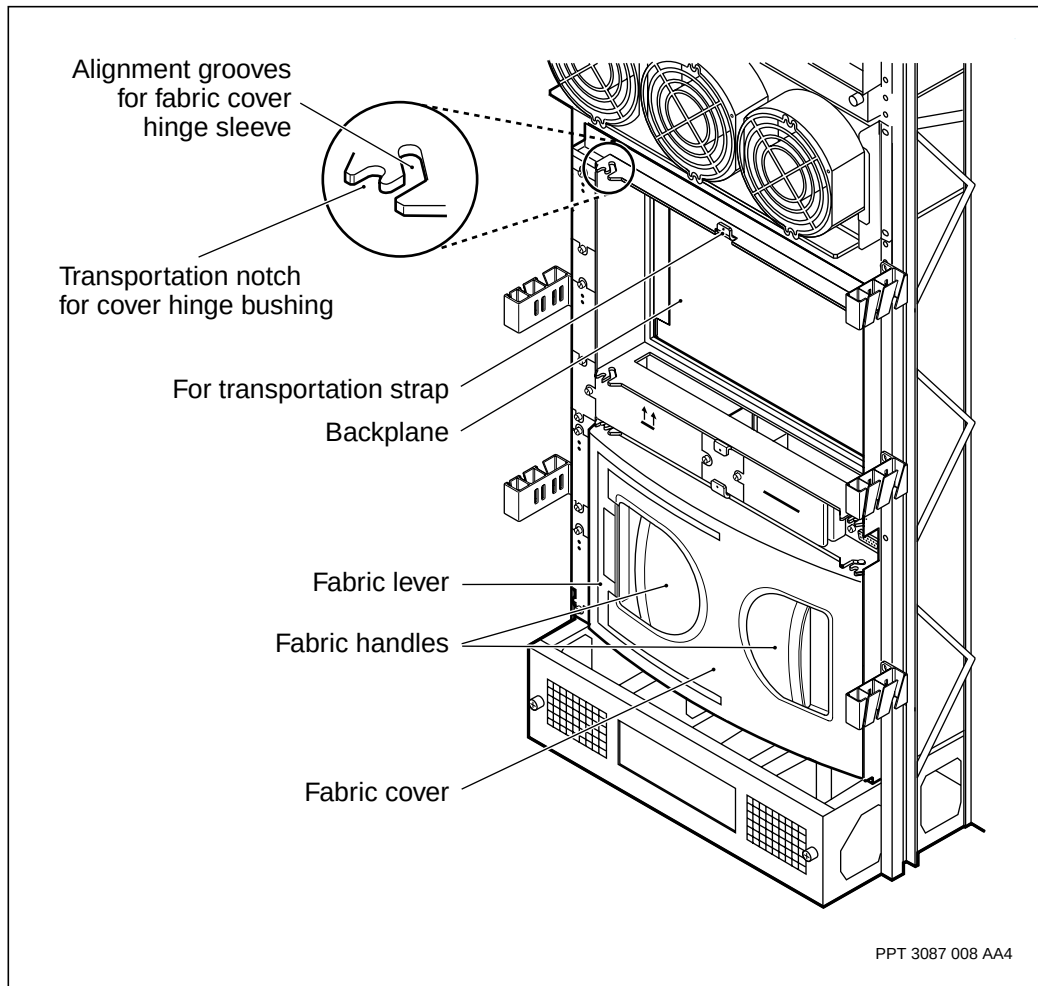


Figure 100
Locations of notches for fabric hinge bushings on Passport 20000 shelf assembly



Installing a fan

Install a fan to increase the cooling efficiency of the cooling unit.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the appropriate version of a fan:
 - A0758423 for any fan in a lower (rear) cooling unit NTHR51AA or a upper (front) cooling unit NTHR52AA
 - A0522179 for the middle fan of a lower (rear) cooling unit NTHR51AB or a upper (front) cooling unit NTHR52AB
 - A0522182 for either side fan of a lower (rear) cooling unit NTHR51AB or a upper (front) cooling unit NTHR52AB
- For any version of a fan, you need a driver for the 4-mm (11/64-in.) screws that fasten the fan and its grill to the cooling unit. The screws are 65-mm long for an A0758423 in an NTHR51AA or an NTHR52AA. The screws are 60-mm long for an A0522179 or an A0522182 in an NTHR51AB or an NTHR52AB.
- A fan in an NTHR51AA or an NTHR52AA is the same for all installed positions. The middle fan in an NTHR51AB or an NTHR52AB is a different shape than the side fans that are adjacent to it. To distinguish one fan unit from another, see these figures:
 - “Location and orientation of the fans on any version of cooling unit” (page 358)
 - “A side fan A0522182 for a cooling unit NTHR51AB or NTHR52AB” (page 359)
 - “A middle fan A0522179 for a cooling unit NTHR51AB or NTHR52AB” (page 360)
- The system must provide a minimum of -48 V dc as the start-up power for either an A0522179 or A0522182.
- Minimize the impact of removing a fan by inserting the replacement immediately.

- When the fan was removed to gain access to a fan controller module or a temperature sensor, insert the same fan.

Procedure steps

- 1 Put tape on the fan blades to temporarily prevent them from spinning freely when the airflow from the other fans reaches the replacement as it is being installed. When power is applied to fan blades that are freely spinning in the opposite direction from operation, the reversal under power strains the fan motor.
- 2 Orient the fan with the vacant cavity on the cooling unit so that you:
 - aim the nose of the fan blades towards yourself
 - position the power cable (indicated in the figures) relatively the same as the others
 - align the 2 holes of the shroud with the 2 holes on the face of the cooling unit
 - can read the words on the central hub of the fan shroud
- 3 Gently and evenly slide the fan assembly straight into the opening. Stop when the rear of the shroud touches the front face of the cooling unit.
- 4 Loosely fasten an M4 screw through the fan shroud into the face of the cooling unit.
- 5 Insert one notch of the finger guard grill under the M4 screw head so that the caution label on the grill:
 - is horizontal
 - faces where it can be read
- 6 Align the second grill notch with the other hole in the fan shroud and thread the remaining M4 screw through the notch and shroud into the cooling unit.

Ensure that the rungs of the grill notches are centered under the screw heads for maximum grip.
- 7 Tighten the screws to snug plus a 1/5 turn. Snug means the screw head, grill rung, and shroud are all touching. If you over tighten the screws, you risk having to replace the entire cooling unit. If you under tighten the screws, vibrations from the fans can free the grill and then risk having a loose fan fail prematurely.

- 8** Gently remove the tape from the fan blades. Ensure no tape or glue remains. Do not bend the blades to wipe off glue.
- 9** Plug the power cable connector from the fan back into F1, F2, or F3. The connector mates only one way and clicks when fully engaged.

The fan motor starts immediately. The major software alarm and both the major and minor hardware alarms are cleared. The status LED should be green to indicate the fan is operating normally.

- 10** Within seconds of powering the fan:
 - ensure that you hear the other 2 fans reduce rpm to the lower (normal) speed
 - ensure that the alarm 7012_0051 has cleared

Procedure job aid

Figure 101

Location and orientation of the fans on any version of cooling unit

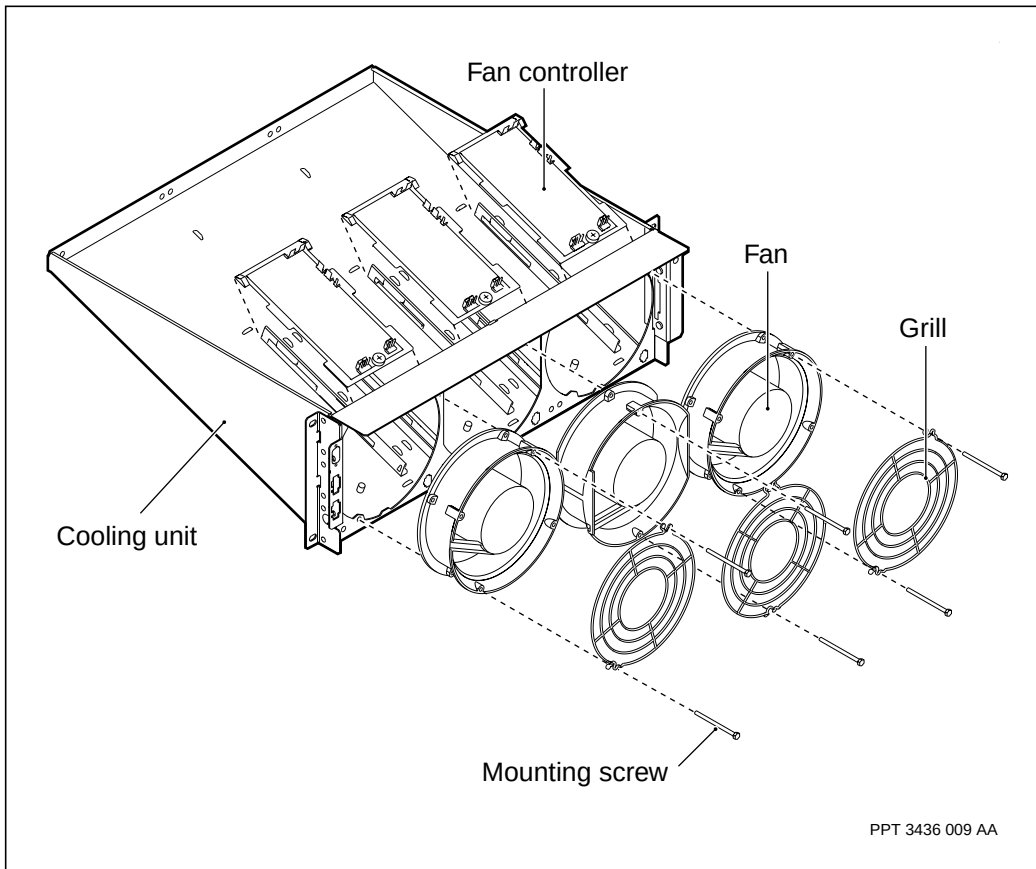


Figure 102
A side fan A0522182 for a cooling unit NTHR51AB or NTHR52AB

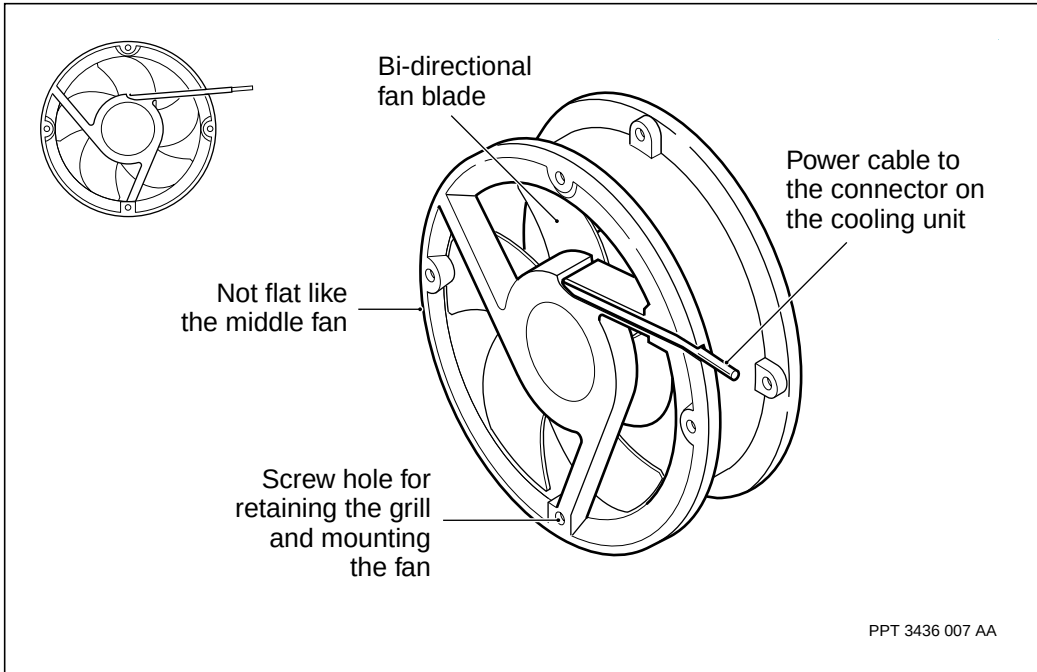
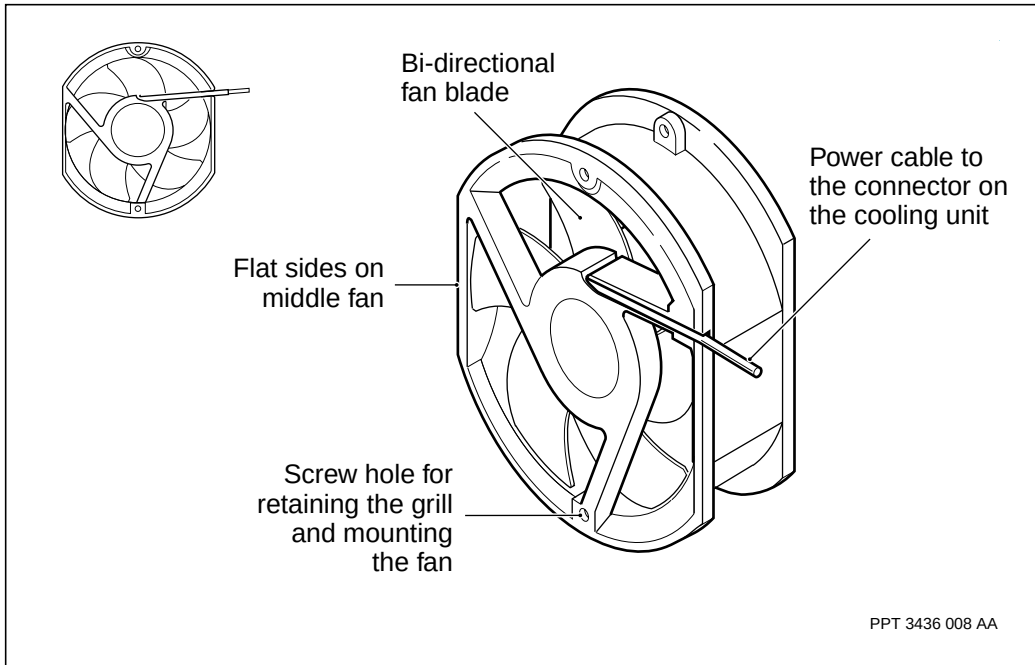


Figure 103
A middle fan A0522179 for a cooling unit NTHR51AB or NTHR52AB



Installing a fan controller

Install a fan controller to restore the operation of a fan.

Prerequisites



WARNING

Risk of injury by fan blades

While working on any equipment near cooling unit fans, be continuously aware that the rpm of a live fan can suck loose clothing, hair, or jewelry into the fan blades or amputate a finger. Do not touch a rotating fan with anything.



WARNUNG

Verletzungsgefahr durch Lüfterblätter

Beim Arbeiten in der Nähe der Lüfter des Kühlaggregats besteht die Gefahr, daß ein rotierender Lüfter lose Kleidung, Haare oder Schmuck in die Lüfterblätter saugt oder einen Finger abtrennt. Berühren Sie einen Lüfter niemals, weder direkt noch indirekt.

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an appropriate fan controller for the version of cooling unit:
 - NTHR10AA for a lower (rear) cooling unit NTHR51AA
 - NTHR10AB for a lower (rear) cooling unit NTHR51AB
 - NTHR10AA for a for an upper (front) cooling unit NTHR52AB
 - NTHR10AB for a for an upper (front) cooling unit NTHR52AB
- For controller NTHR10AA, you need a non-magnetic one-piece short-shafted screwdriver to fasten the very large slotted captive screw.
- For controller NTHR10AB, you need:
 - a non-magnetic one-piece screwdriver to fasten the very large Phillips captive screw

- a flashlight to see inside the cooling unit while using one hand to put electrical tape on the temperature sensor connector
- The location of the mounting screw is different for each version of the lower and upper cooling units. Refer to these figures:
 - “Location of the fan controllers inside a cooling unit NTHR51AA or NTHR52AA” (page 365)
 - “Location of the fan controllers inside a cooling unit NTHR51AB or NTHR52AB” (page 366)
 - “A fan controller for inside a cooling unit NTHR51AA or NTHR52AA” (page 367)
 - “A fan controller for inside a cooling unit NTHR51AB or NTHR52AB” (page 368)
- When a fan controller is removed to increase access to removing a temperature sensor, insert the same controller instead of a replacement. This ensures that a working controller operates with the replaced part.

Procedure steps

- 1 For an NTHR10AA fan controller as shown in the figure “A fan controller for inside a cooling unit NTHR51AA or NTHR52AA” (page 367), examine the replacement fan controller to determine if it is already mounted onto a carriage plate.
 - If the controller is, continue.
 - If the controller is not, remove the faulty controller from the carriage plate by unfastening its 6 M3 screws. Mount the replacement controller in its place using the same screws. Tighten the screws to snug (no extra turn). Tightening beyond snug can crack the carriage plate.
- 2 When installing an NTHR10AB into an upper (front) cooling unit NTHR52AB, you must unplug the temperature sensor that is on the module as shown in the figures “A fan controller for inside a cooling unit NTHR51AB or NTHR52AB” (page 368) and “Cable connections inside an upper cooling unit NTHR52AB” (page 370). This also applies to the fan controller of the upper cooling unit that is used in the lower position of a shelf-based (rack-mounted) Passport 15000 or 20000 in switch packages NTQS04 or NTQH04.

Keep the sensor as a spare part for the temperature sensor bracket assembly NTHR68AB. Store the part in an anti-ESD pouch.

- 3** When installing an NTHR10AB into an upper (front) cooling unit NTHR52AB, you must also ensure that the temperature sensor cable connector remains disconnected from the module, is taped, and is fastened aside. Refer to the figure “Cable connections inside an upper cooling unit NTHR52AB” (page 370). If the connector has not already been fastened aside, securely put a strip of electrical tape over the connector or tuck the connector aside so that the pins on the module will not contact the metal in the connector, and the air flow from the fans will not remove the tape or move the connector. Use a flashlight to do it and check your work.
- 4** While facing the cooling unit, hold the controller so that the captive screw is nearest you and:
 - on the left with an NTHR10AA
 - centered with an NTHR10AB
- 5** Since the orientation of the controller is opposite between a lower (rear) and an upper (front) cooling unit, always keep the captive screw accessible. Orient the controller for a lower or an upper unit.
- 6** Look inside the cooling unit so that you can see where the captive screw is to be fastened. Once the controller is positioned inside the cooling unit, you will not be able to see the screw hole.
- 7** Slide the controller between the rails inside the cooling unit.
- 8** With an NTHR10AA, refer to the figure “Location of the fan controllers inside a cooling unit NTHR51AA or NTHR52AA” (page 365). Align the far-end connector on the board with the connector on the cooling unit and slide the controller along the cooling unit housing to engage the connectors. While engaging, ensure that the connectors are straight. If the controller is being installed in a lower (front) cooling unit, you must continue to hold the controller in position.

With an NTHR10AB, refer to the figure “Location of the fan controllers inside a cooling unit NTHR51AB or NTHR52AB” (page 366). Slide the corner feet to the ends of the rails on the cooling unit housing. If the controller is being installed in a lower (front) cooling unit, you must continue to hold the controller in position.
- 9** Fasten the captive screw on the controller to the cooling unit housing by using your fingers. You will have to find the hole by feeling it through the

screw. You may have to re-seat the controller to align the screw with the hole in the housing.

- 10** When your fingers can no longer turn the screw, use the appropriate driver to tighten the screw to snug plus a 1/5 turn. If you overtighten the captive screw, you will have to replace the controller or the entire cooling unit.
- 11** With an NTHR10AB, you must connect 5 cable assemblies to the controller when in an NTHR51AB or 4 cable assemblies when in an NTHR52AB as shown in these figures:
 - “A fan controller for inside a cooling unit NTHR51AB or NTHR52AB” (page 368)
 - “Cable connections inside a lower cooling unit NTHR51AB” (page 369)
 - “Cable connections inside an upper cooling unit NTHR52AB” (page 370)

Press the keyed Molex connector of each cable assembly onto the connector of the controller. Stop pressing when the pins of each controller connector can no longer be seen. There is no tab on each Molex connector to indicate a fully engaged connection.

Procedure job aid

Figure 104

Location of the fan controllers inside a cooling unit NTHR51AA or NTHR52AA

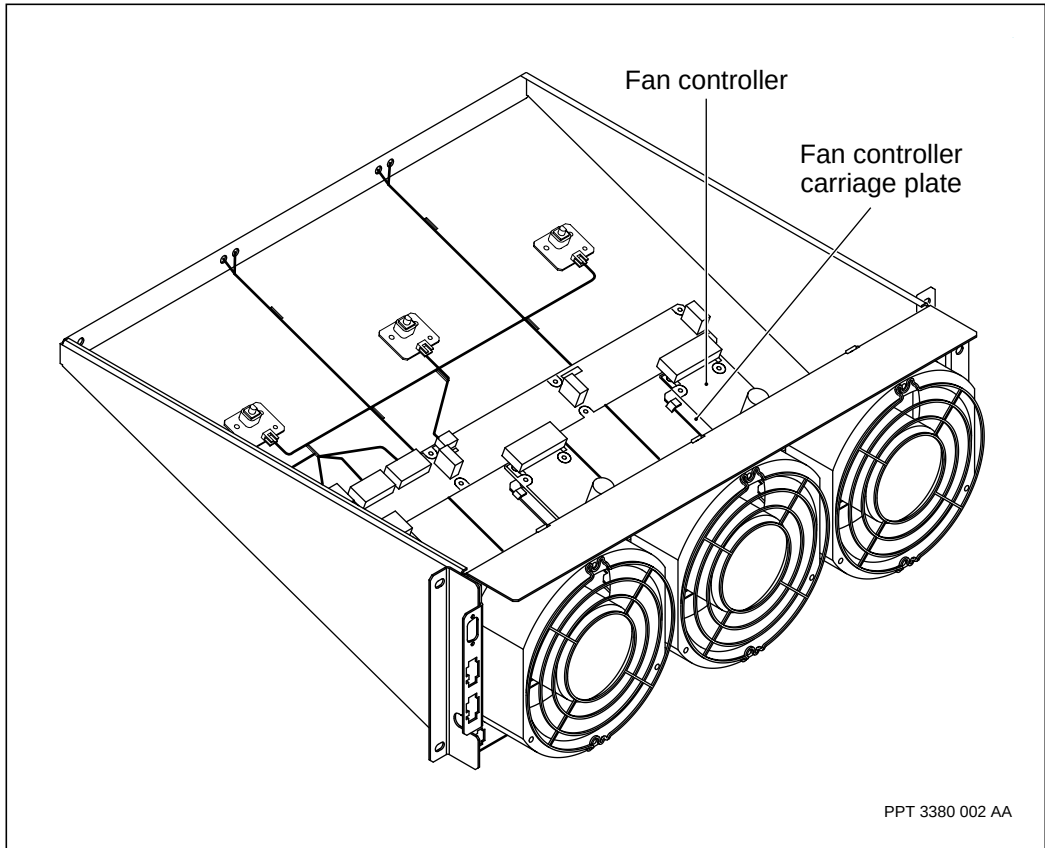


Figure 105
Location of the fan controllers inside a cooling unit NTHR51AB or NTHR52AB

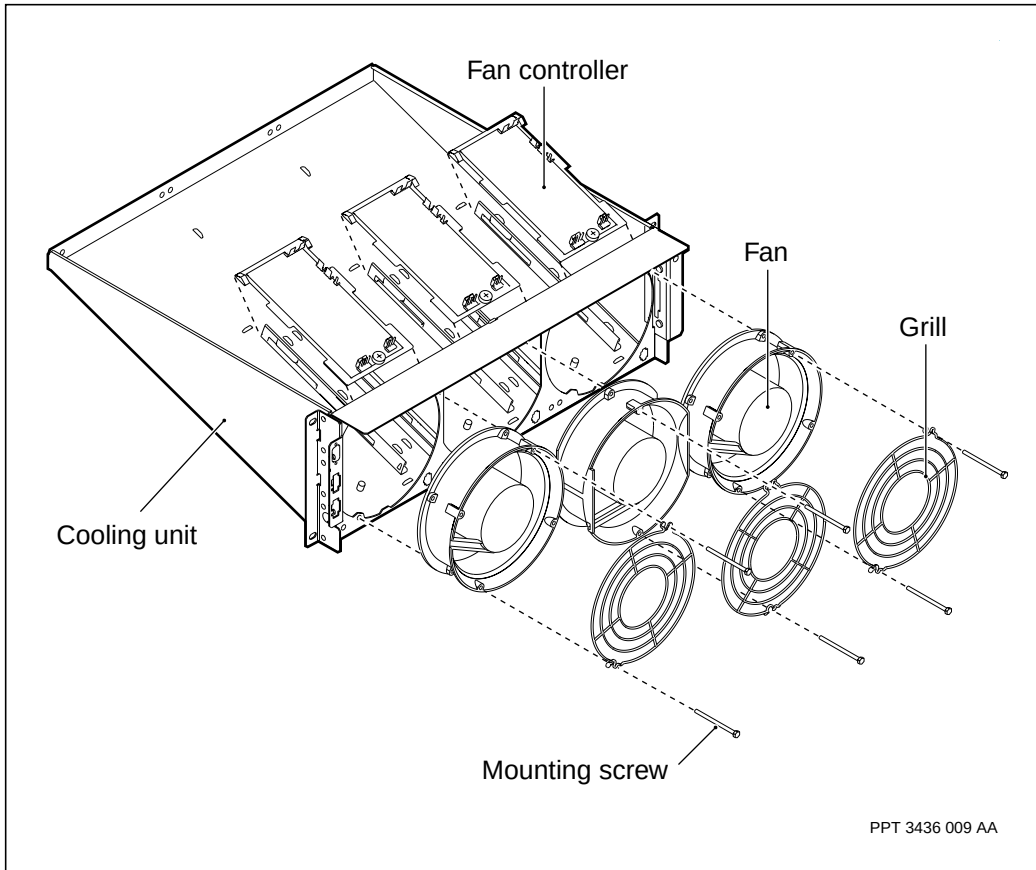


Figure 106
A fan controller for inside a cooling unit NTHR51AA or NTHR52AA

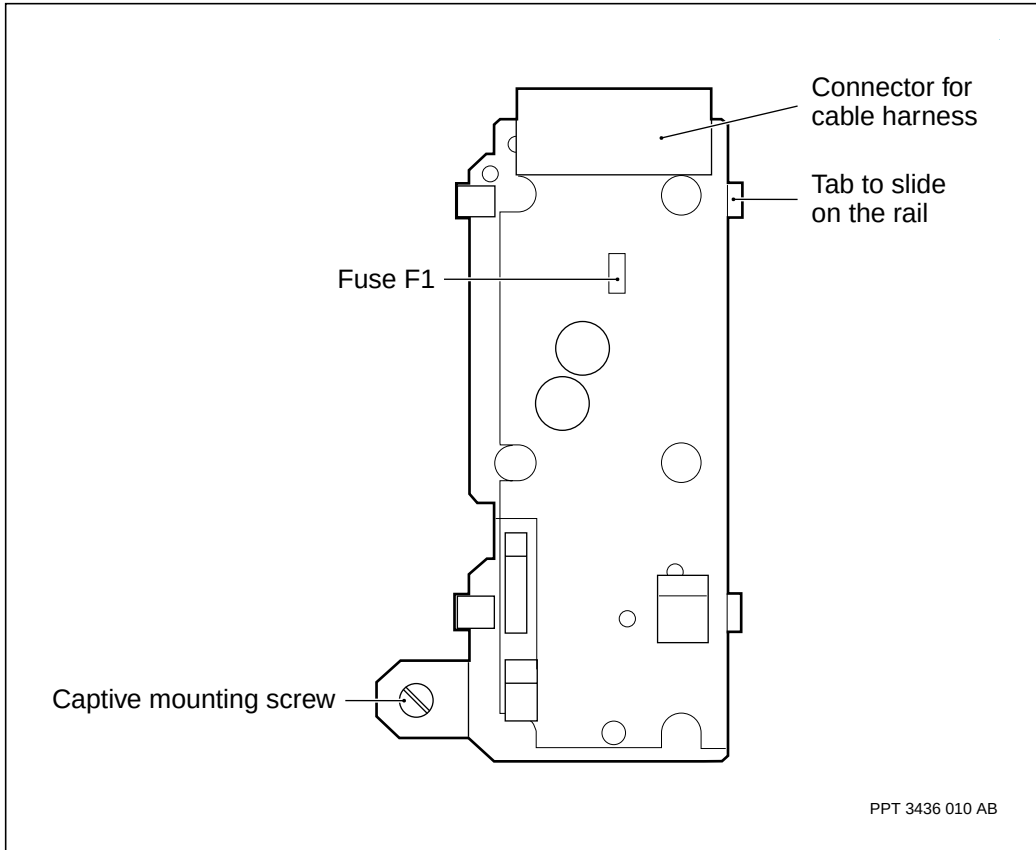


Figure 107
A fan controller for inside a cooling unit NTHR51AB or NTHR52AB

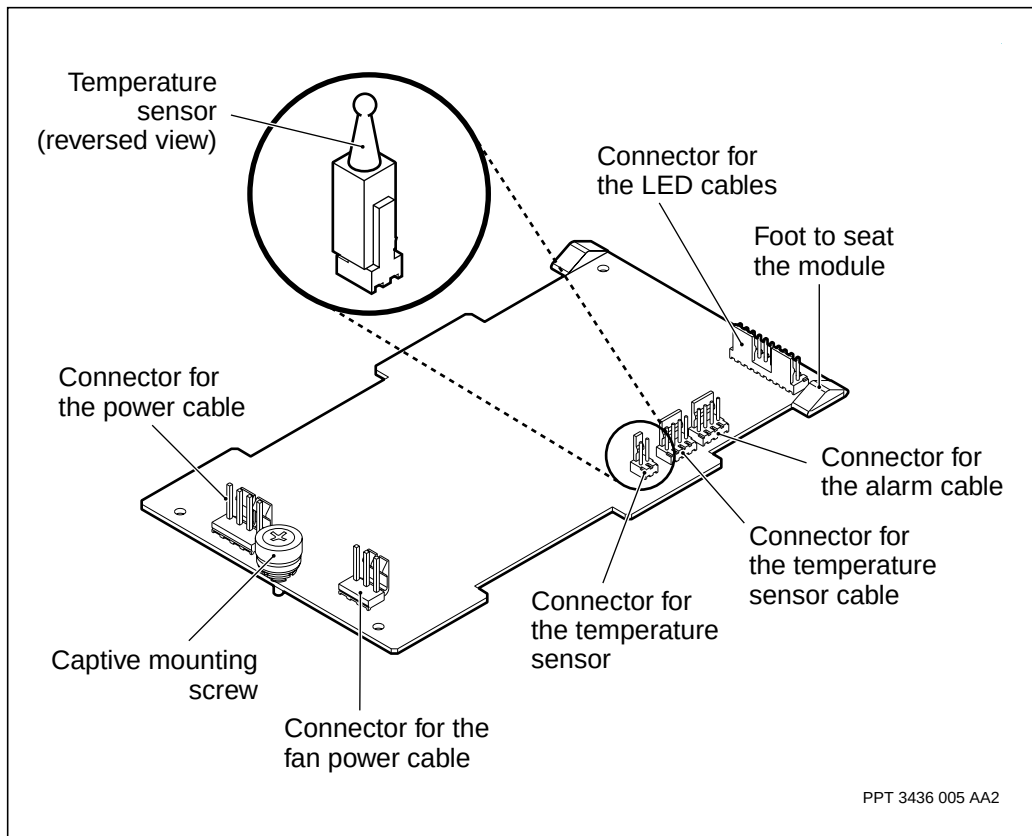


Figure 108
Cable connections inside a lower cooling unit NTHR51AB

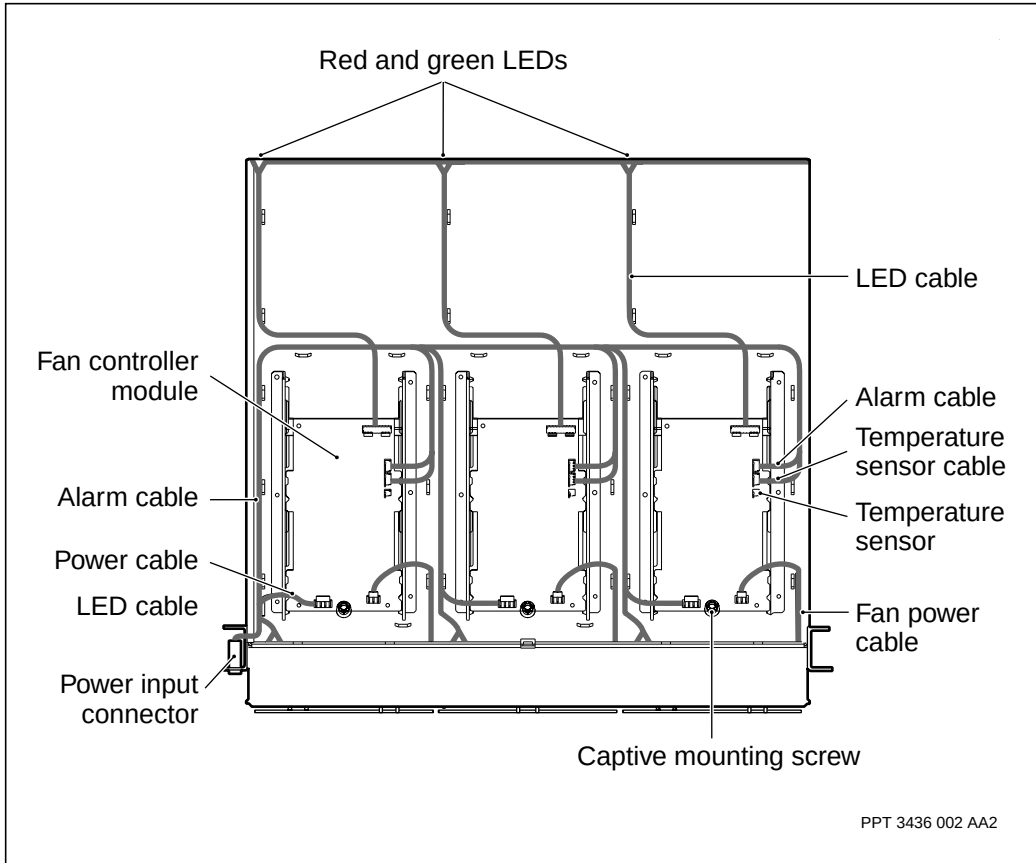


Figure 109
Cable connections inside an upper cooling unit NTHR52AB

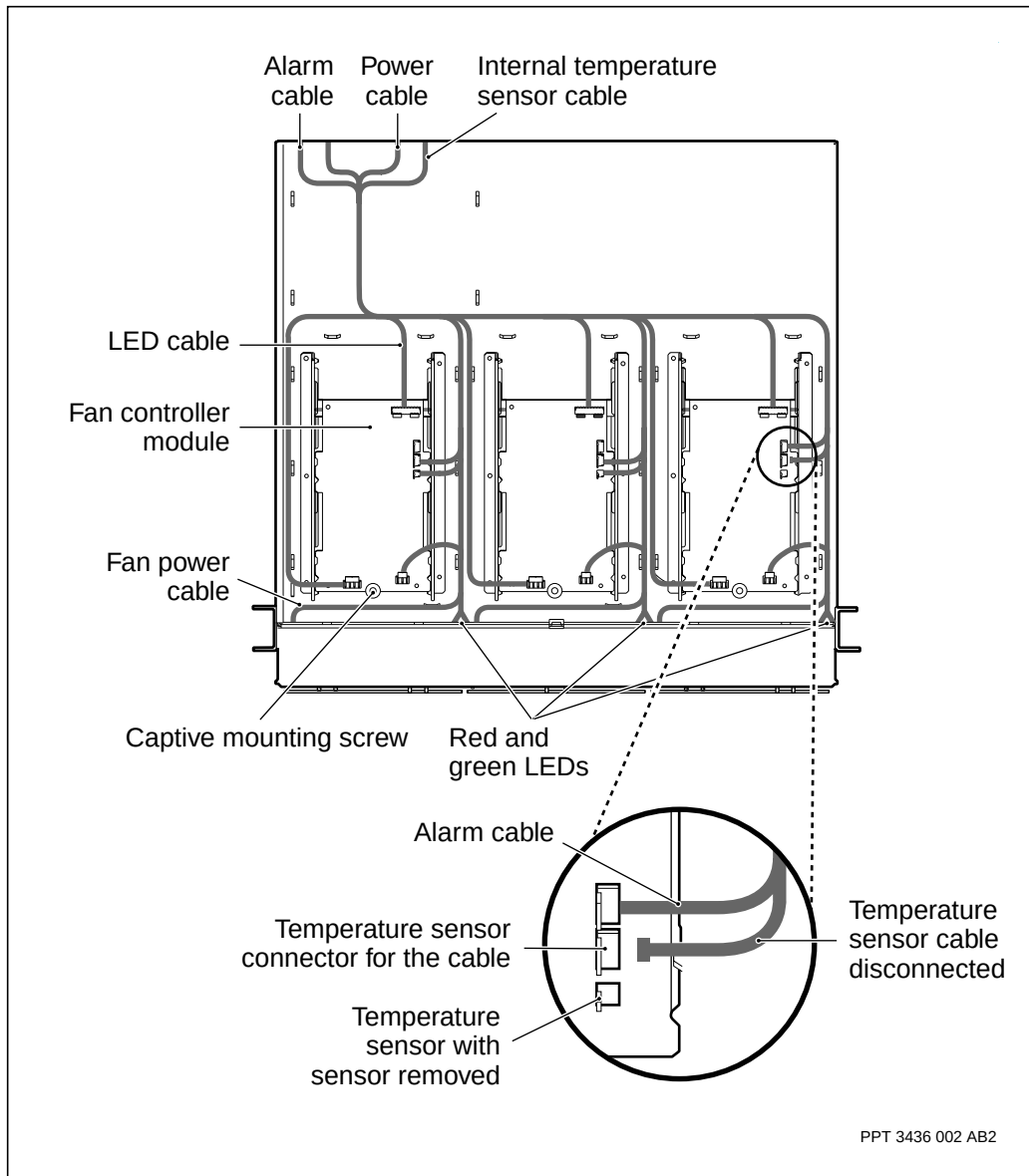
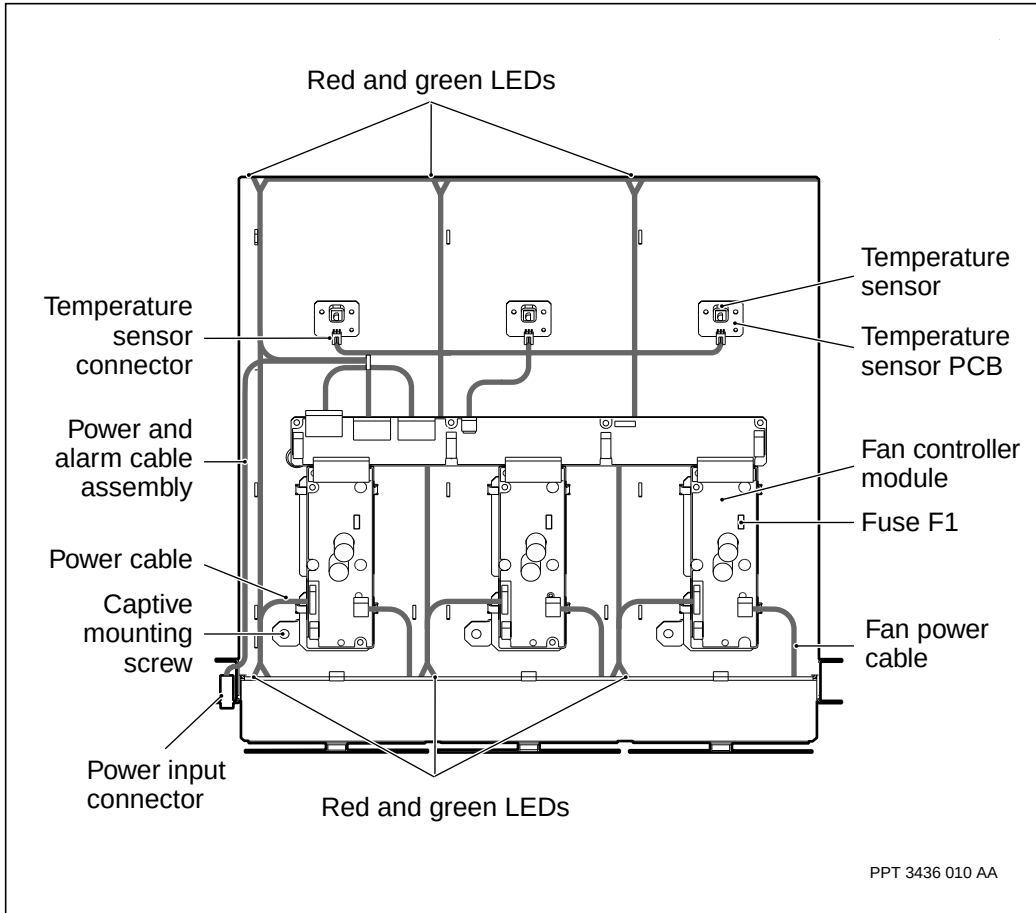


Figure 110
Cable connections inside a cooling unit NTHR51AA or NTHR52AA



Installing a fanout panel

Install a fanout panel in a frame or rack to connect a 12-port DS3 or E3 FP to customer premises signalling equipment.

Prerequisites

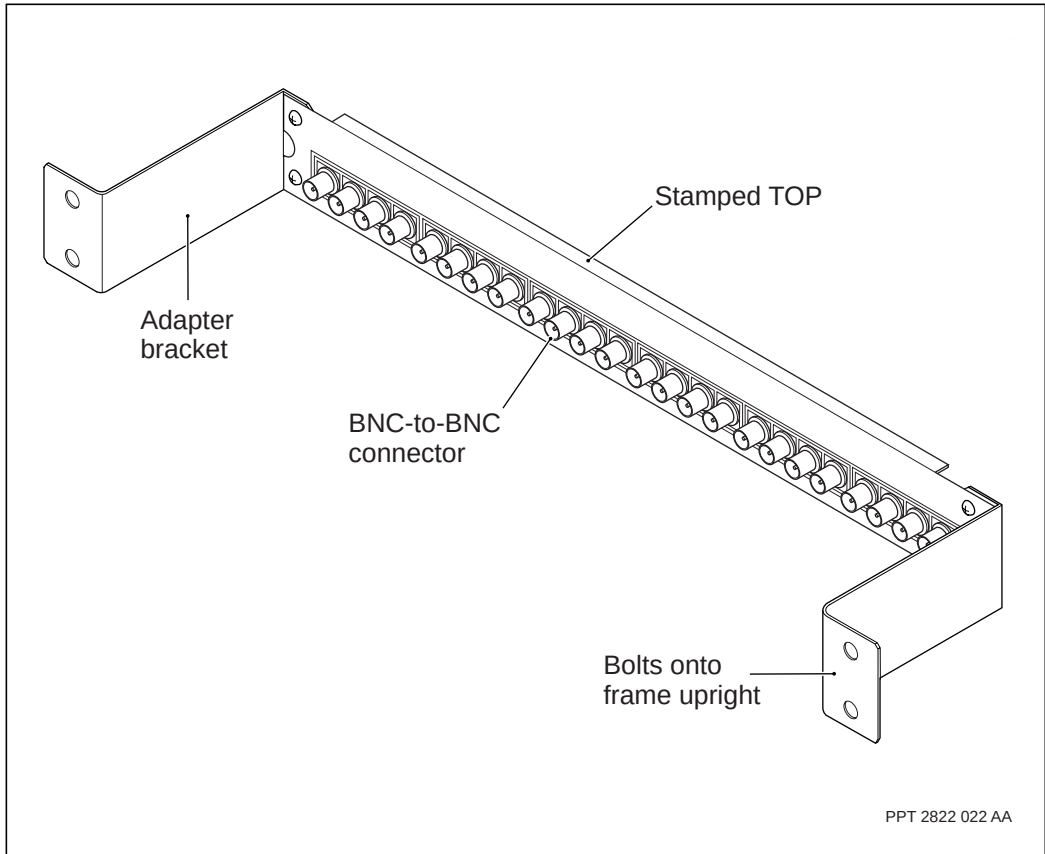
- You must be familiar with “Safety considerations and best practices” (page 41).
- You will need a fanout panel with PEC NTHW52. The NTHW52 is pre-assembled, including two adapter brackets fastened by four Phillips screws to the panel mounting ears. See “A 12-port DS3 or E3 fanout panel” (page 373).
- For fanout panel connections refer to 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure steps

- 1 Unpack the fanout panel from the container.
- 2 Place the front of the panel against the frame uprights so that it aligns with the previous top holes in the brackets with the holes in the frame. The panel has key-hole pins that align with the holes in the frame.
- 3 Hold the panel in one hand so that:
 - the label TOP is at the top of the panel
 - the Phillips screw heads of the adapter brackets face you
 - the bracket holes are nearest you on the left and right and the BNC connectors are farthest from you
- 4 While holding the panel in position, fasten a thread-forming 10-mm (3/8-in.) hex-head screw through the upper left and the upper right mounting holes. Leave the screws close to being seated.
- 5 Align the other bracket holes on the panel with the frame holes under the grounding strip.
- 6 Loosely tighten the remaining 2 screws.
- 7 Tighten all screws to snug plus a 1/4 turn.

Procedure job aid

Figure 111
A 12-port DS3 or E3 fanout panel



Installing a fiber management unit

Install a fiber management unit to help manage fiber cables near the Passport 15000 or 20000 switch.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the optional hardware identified by PEC NTHW50. See the figure “A dual-drawer fiber management unit NTHW50” (page 376).
- You need a NEBS 2000 frame or equivalent mounting apparatus that is already installed with a space large enough to house the fiber management unit.
- You need a helper to hold a fiber management unit until it is fastened because it weighs 8.25 kg (18.2 lbs).
- The fiber management units do not require a deliberate gap between them when installed one above the other.
- A fiber management unit does not require electrical grounding. When mounted in a NEBS 2000 frame according to the installation procedure, the unit is automatically grounded. When the fiber unit is installed in any other mounting apparatus, follow its telecommunications grounding rules.
- When installing the fiber unit in a 21-in. (53.34-cm) mounting apparatus other than a NEBS 2000 frame, the 10-mm (3/8-in.) screws that are provided with the fiber unit are likely to be inappropriate. You will need to use mounting screws to match the mounting holes of the other mounting apparatus.
- When the fiber management unit is to be installed in a NEBS 2000 frame that has a switch in the bottom position, there is usually a shelf filler panel at the upper front (NTHR76), rear (NTHR77), or both faces of the frame. Before installing the fiber management unit, remove whichever filler panel covers the position where you want the fiber management unit (or units) to be installed. See the procedure “Removing a shelf filler panel” (page 577). The 10-mm (3/8-in.) screws and the panel are no longer needed for this installation.

Procedure steps

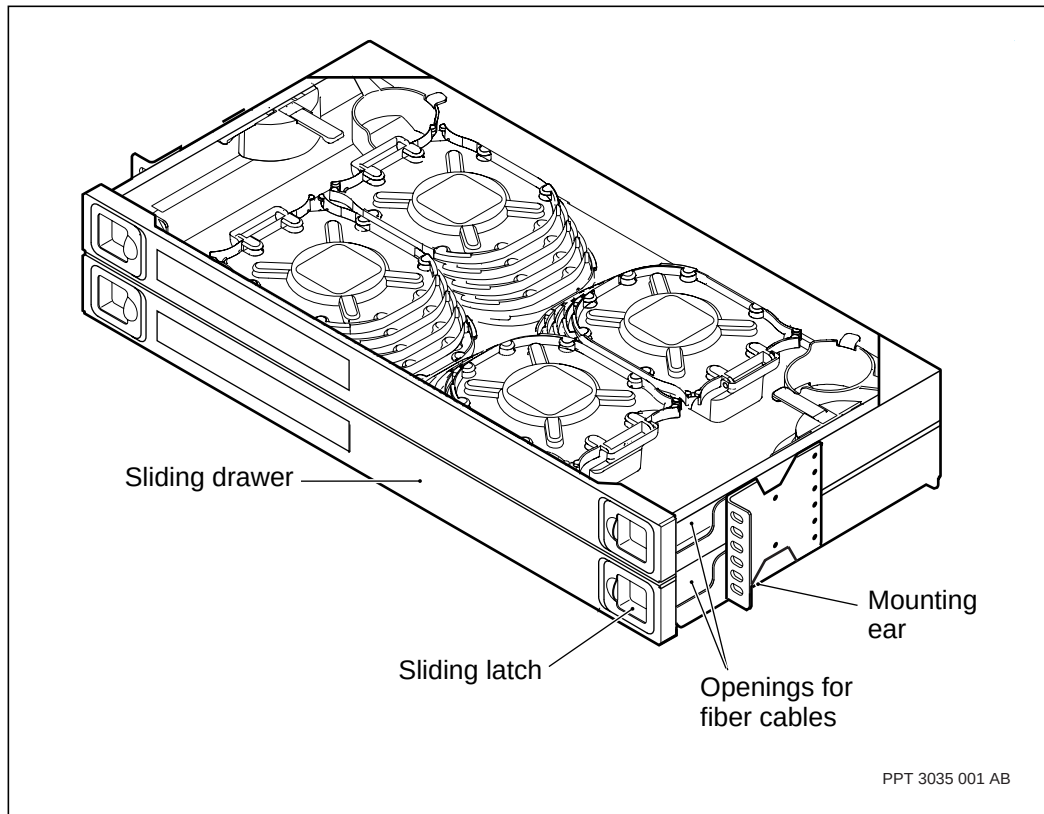
- 1** At the front or rear of the NEBS 2000 frame or equivalent, locate where the top mounting holes of the fiber unit are to be on the 2 frame uprights. Count holes from the top or bottom (whichever is shorter) of the left and right uprights to ensure that a level installation. Mark the holes.
- 2** Unpack the fiber management unit from the container labelled NTHW50.
- 3** Hold the fiber unit so that the drawers face you and are closed, and the labels on the drawers read the normal way.
- 4** Position the fiber unit between the uprights, and align the 2 top holes of the mounting ears with the marked holes on the uprights.
- 5** While a helper holds the unit in position, thread a thread-forming 10-mm (3/8-in.) hex-head screw through the top left and right mounting holes. Leave the screws almost seated.

When installing the fiber unit in a 21-inch (53.34-cm) wide mounting apparatus (that is, in other than a NEBS 2000 frame), you will likely need to add mounting screws of a different size.

- 6** Align the bottom mounting-ear holes of the fiber unit with the holes on the uprights.
- 7** Add the remaining 2 screws in the lowest left and right mounting holes. Use a middle mounting hole only if the nearest corner hole strips.
- 8** Tighten all screws to snug plus a 1/4 turn.

Procedure job aid

Figure 112
A dual-drawer fiber management unit NTHW50



Installing a lower cooling unit

Install a lower (rear) cooling unit to enable temperature control of the Passport switch hardware in the lower position of a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an NTHR51AA or NTHR51AB version of a lower (rear) cooling unit. Since the fans of the unit are on the rear face of the switch hardware, that is, on the same side that the fabric cards plug into, the lower cooling unit is also the rear cooling unit.
- You need a driver for the 10-mm (3/8-in.) screws that fasten each cooling unit to the frame or rack.
- A lower cooling unit is accessed from the rear of the NEBS 2000 frame or equivalent.

Procedure steps

- 1 While referring to the figures “A lower cooling unit NTHR51AA” (page 379) and “A lower cooling unit NTHR51AB” (page 380), hold the ends of the cooling unit so that
 - you face the fans
 - the open side is at the bottom
 - a hand holds the narrow rear end
 - a hand holds the fan end
- 2 Facing the rear of the Passport 15000 or 20000 switch, insert the narrow end of the cooling unit between the uprights of the NEBS 2000 frame and along the top of the shelf assembly.
- 3 Slide the cooling unit inwards until the mounting ears at the fan end touch the frame uprights.
- 4 Align the mounting-ear holes with the screw holes on the frame uprights. The cooling unit should be in position as shown in the figure “Location of a lower (rear) cooling unit” (page 381).
- 5 While holding the cooling unit in position, loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw through an upper mounting-ear hole.

- 6 Loosely fasten another screw through the other upper mounting-ear hole, then the bottom 2. While turning a screw, ensure that it is perpendicular to the hole to prevent cross-threading.
- 7 Tighten all screws to snug plus a 1/4 turn.
- 8 If any cable for the F1, F2, or F3 connectors on the front of the unit is unplugged, plug it in. The connectors fit only one way. Ensure the tab on the side engages.
- 9 Using the labels from the removal, plug in the A and B power cable assembly connectors into the appropriate connector on the unit. Each connector fits only one way. Ensure that the tab on each side of a connector fully engages.
- 10 Restore power to the unit at the BIP by removing the tape from the cooling unit breakers (in the middle) in each BIM and switching the breakers back on by pressing the bar symbol (|) in.
- 11 Check the LEDs on the cooling unit to verify that each fan is operating. Normal operation is indicated by a lit green LED. If any LEDs are red, disconnect and re-connect the F1, F2, or F3 cable that is nearest the fan unit that is nearest the LED.

At the front of the NEBS 2000 frame or equivalent, the LEDs of both cooling units are visible together. Ensure that you check the F1, F2, or F3 connector that is associated with the lit red LED.

- 12 Pack the removed cooling unit in the container from the replacement unit. Ensure that you change the PEC on the container to match the PEC on the unit.

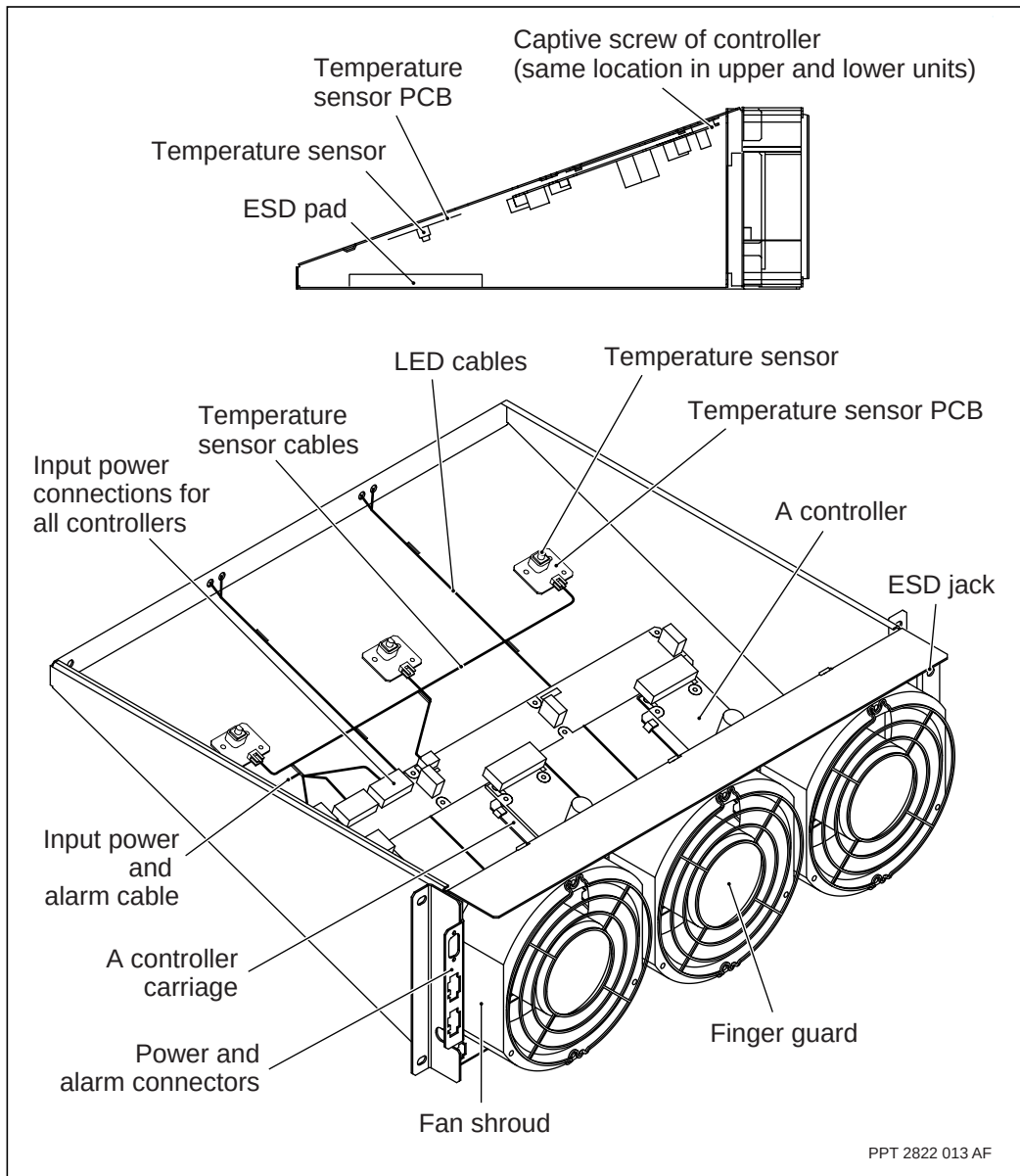
Procedure job aid**Figure 113****A lower cooling unit NTHR51AA**

Figure 114
A lower cooling unit NTHR51AB

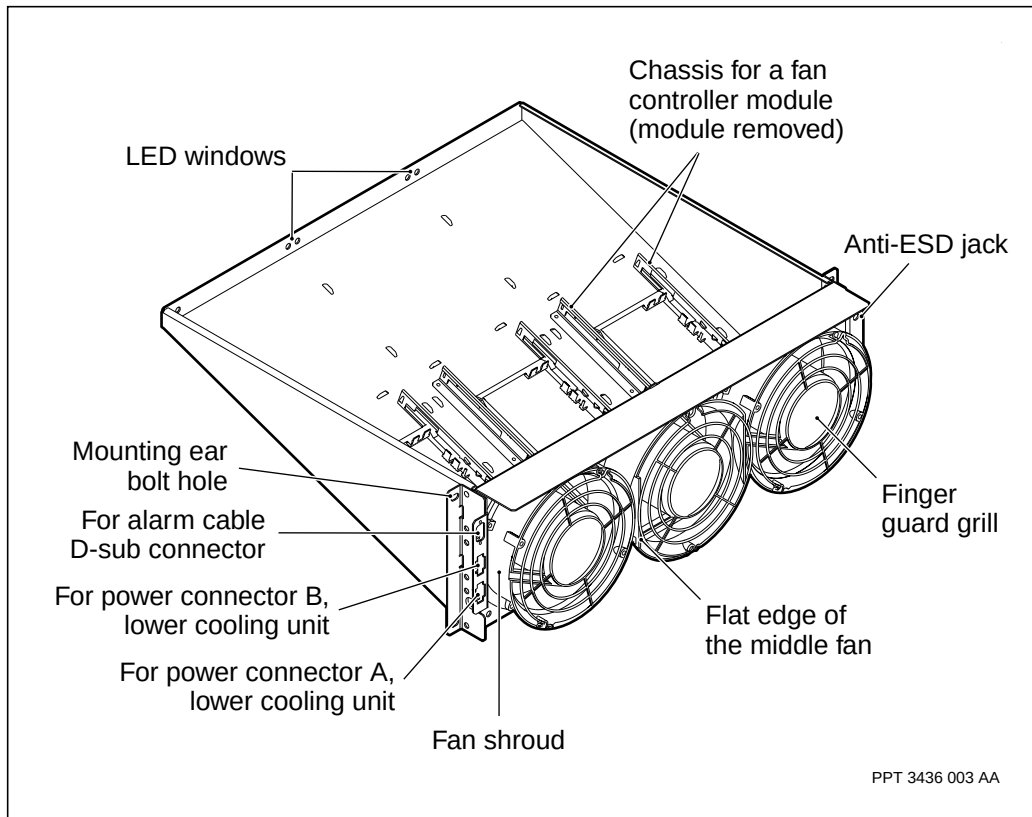
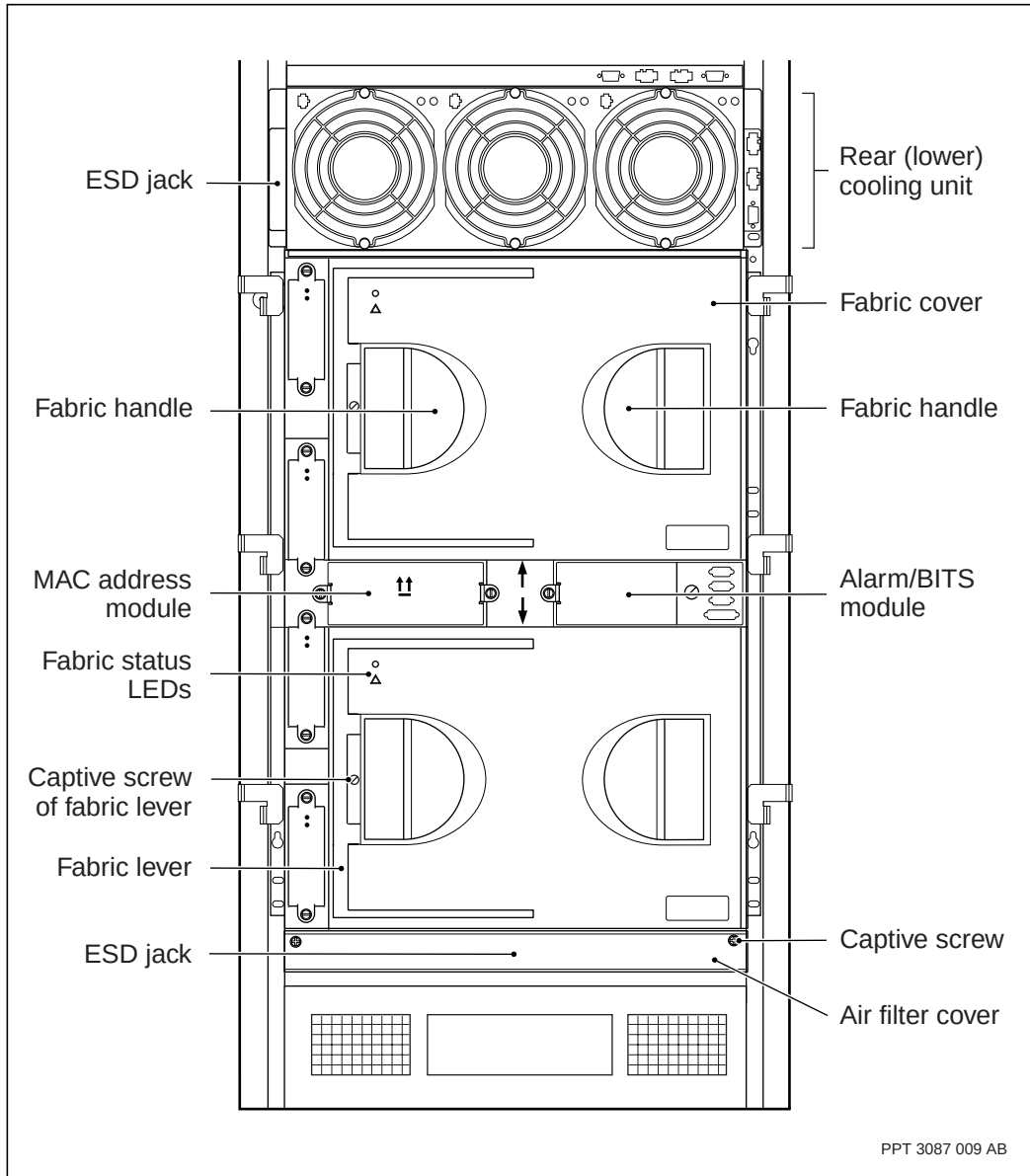


Figure 115
Location of a lower (rear) cooling unit



Installing a multiport aggregate device

Install a multiport aggregate device to break out the ports of a 32-port E1 TDM FP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You will need a multiport aggregate device with one of the following PECs:
 - NT0486 for the balanced version
 - NT0421 for the unbalanced version



WARNING

Risk of personal injury

Connect multiport aggregate device interfaces to safety extra-low voltage (SELV) circuits only. Connections to telephone network voltage (TNV) circuits must be through an external device that provides current protection and isolation, such as an approved channel service unit (CSU). All such devices must meet the equipment safety standards of the country of installation.



WARNUNG

Verletzungsgefahr

Schließen Sie Schnittstellengeräte für Mehrfachanschlussaggregate zur eigenen Sicherheit nur an Schaltkreise mit Niederspannung an. Anschlüsse an Telefonnetze müssen über ein Außengerät erfolgen, das den Stromfluss schützt und isoliert, wie z.B. ein Kanal-Servicegerät. Alle diese Geräte müssen den Sicherheitsbestimmungen des jeweiligen Landes entsprechen.

**WARNING****Risk of injury or equipment damage by electricity**

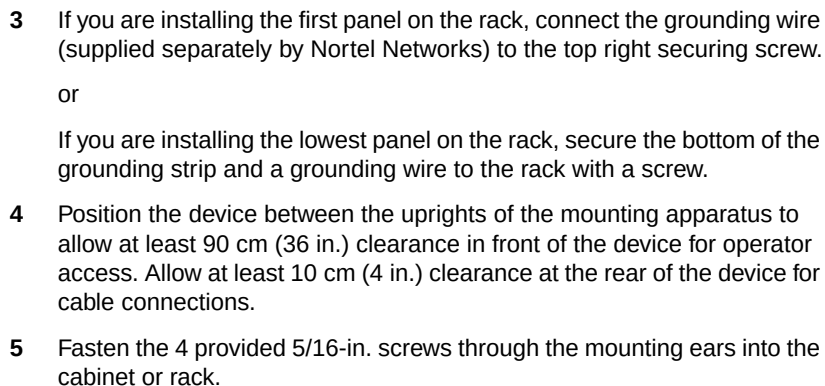
Before connecting cables or turning on power, ensure that the device is properly grounded. Failure to provide a proper ground may result in electrical shock causing equipment damage or personal injury. For information, see 241-1501-200 *Passport 15000, 20000 Hardware*.

**WARNUNG****Verletzungs- oder Gerätebeschädigungsgefahr durch Elektrizität**

Bevor Sie Kabel anschließen oder das Gerät anschalten, vergewissern Sie sich, dass das Gerät ordnungsgemäß geerdet ist. Ohne eine Erdung können durch Elektroschocks Geräte beschädigt oder Personen verletzt werden. Für weitere Informationen siehe 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure steps

- 1** Ensure that all cables, including the power cables, are disconnected from the unit.
- 2** Fasten the provided mounting ears to each side of the multiport aggregate device using 2 screws and flat washers. See the figure "Installing mounting ears on a multiport aggregate device" (page 384)

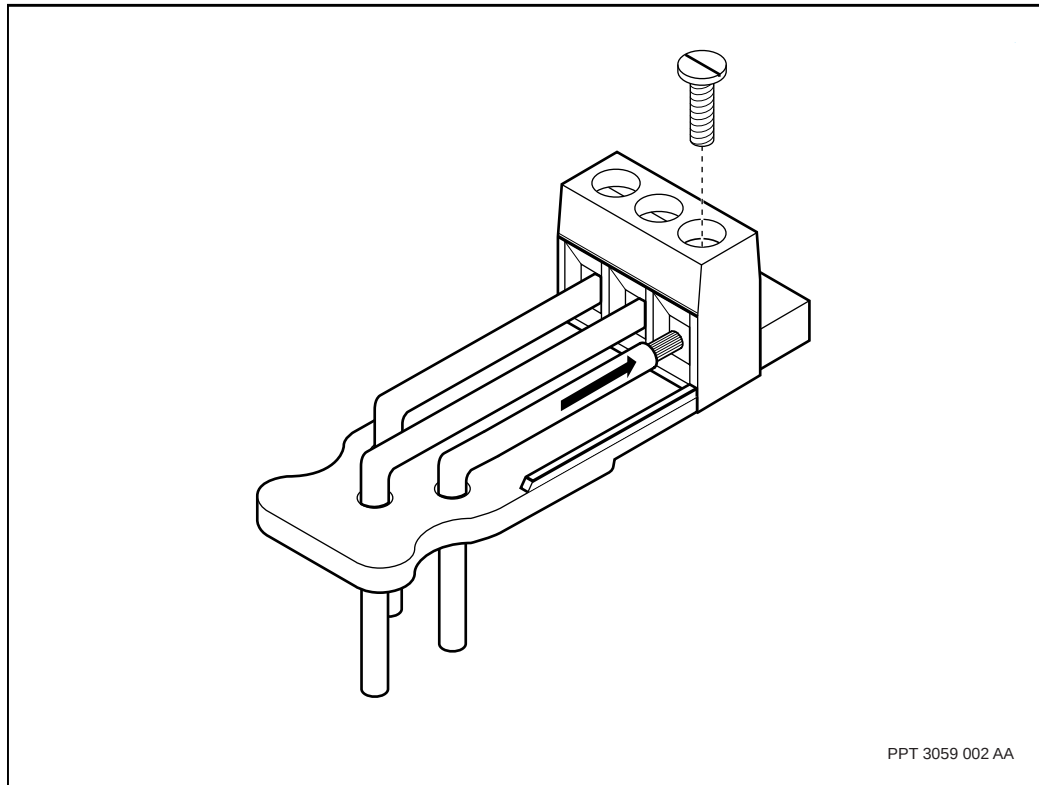


- 6** Attach the cable management panel to the cabinet or rack between the multiport aggregate device and other equipment using 4 of the provided screws.

For proper cooling, you must also allow at least one vertical unit of space between the multiport aggregate device and other equipment. The cable management panel provides the required space. You can route cables through the panel as appropriate.

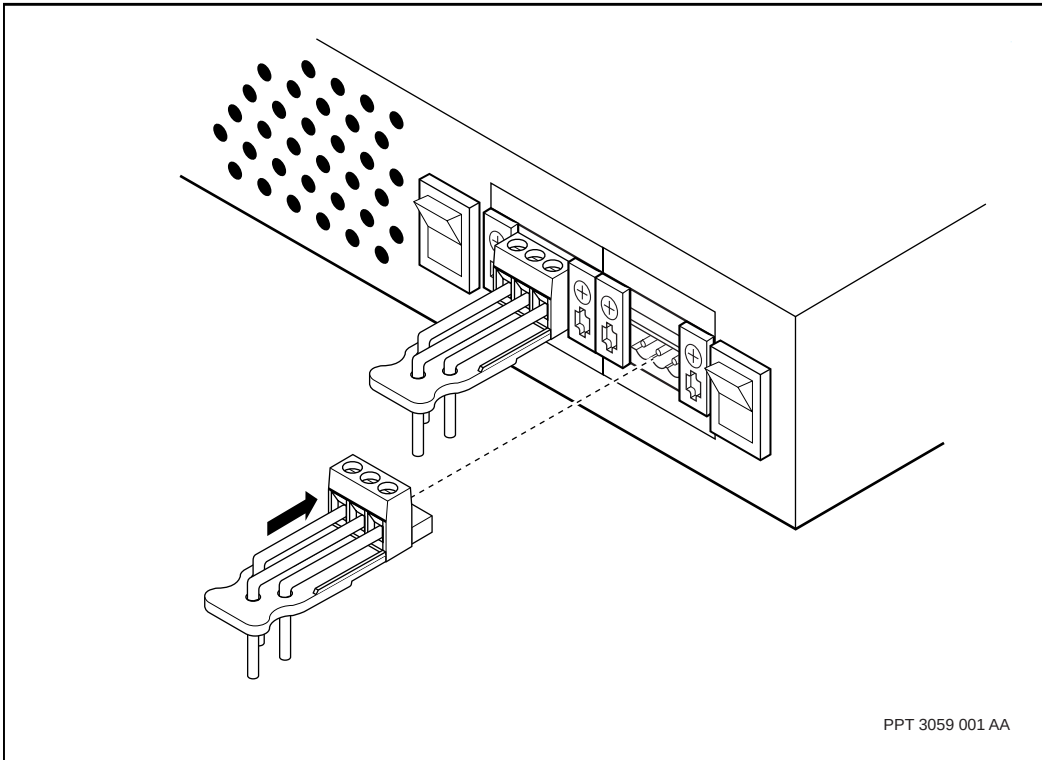
- 7** Connect the dc power cable for each power supply to the output terminals of the disconnect device.
- 8** Route the dc power cables into the cabinet or rack through the knockout.
- 9** Attach the terminal connector to the ends of the wires. Each cable contains 3 wires: a positive, a negative, and a ground. Each connector has 3 openings: a positive, a negative, and a ground. Insert each wire into the opening that it matches and fasten it in place by tightening the screw on the top of the connector. See the figure “Connecting power wires to the terminal connector” (page 386).

Figure 117
Connecting power wires to the terminal connector



- 10** Connect the terminal connectors to the terminal block for one of the power supplies (on the rear of the unit); connect the second cable to the other terminal block. Push the connector into the terminal block until it clicks and feels secure. See the figure “Connecting the terminal connector” (page 387).

Figure 118
Connecting the terminal connector



- 11** Connect the power cables from the disconnect device to the power source.
- 12** Attach the appropriate cables to the multiport aggregate device.
- 13** At the rear of the device, turn on the power switch beside each power supply outlet.
- 14** Verify the state of the following LEDs
 - The PWR A and B LEDs should be green.
 - The TST LED should be yellow when power is first turned on during the time in which the device runs a self test.
 - The SIG LED for link A (on the back) should be green if the cabling to the FP or termination panel is installed and the Passport switch is

powered. A green LED indicates the device detects the receive signal.

If the FLT LED is red, the device has failed the self test and needs to be replaced. If the SYNC LOSS or AIS LEDs are lit, check the cabling to the device. If necessary, you can run loopback tests to determine whether the problem is with an external device.

Installing a PIM

Install a PIM to restore back-up power to the shelf cage.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a replacement PIM with the PEC:
 - NTHR15 for a Passport 15000
 - NTPN15 for a Passport 20000

Procedure steps

- 1 Hold the PIM so that the side with the connector is at the left. An NTHR15 has a large slotted captive screw on the upper edge of the PIM faceplate.

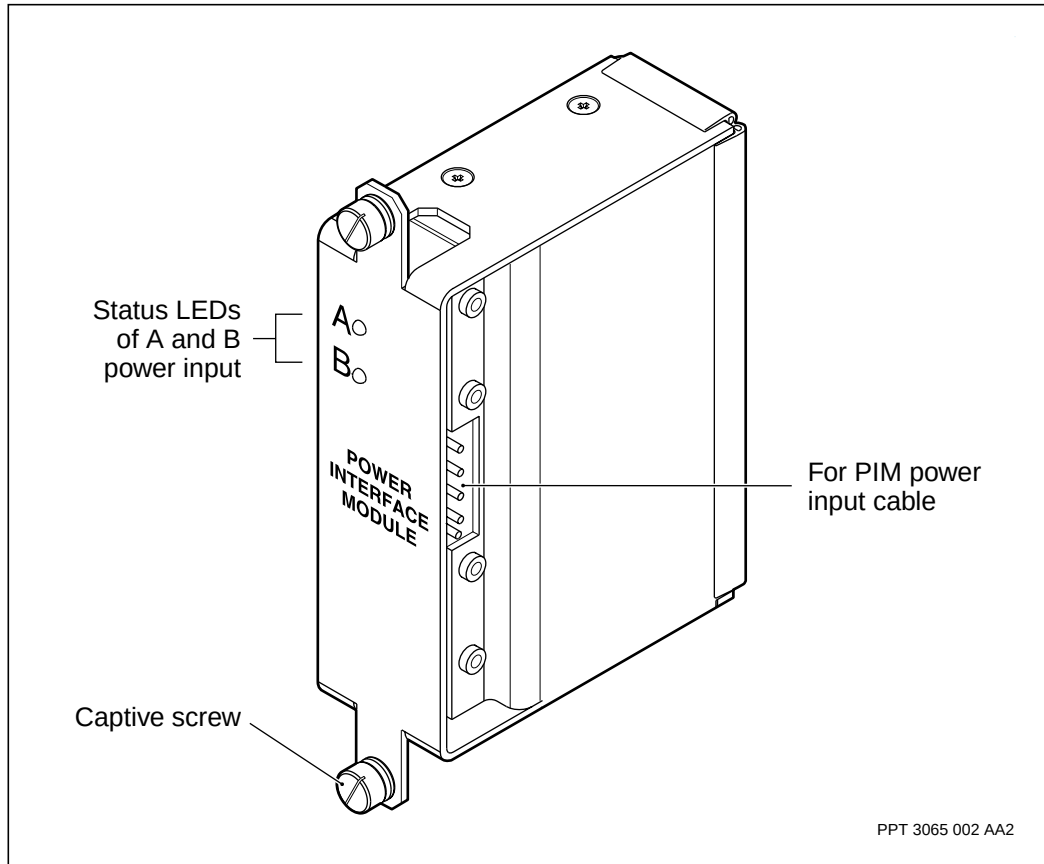
An NTPN15 has 2 large slotted captive screws, as shown in the figure “A PIM NTPN15 of a Passport 20000” (page 390).
- 2 Plug the PIM into the slot, holding both the left and the right sides even and pressing gently but firmly inwards. Ensure that the faceplate is flush with the surrounding surfaces.
- 3 Align and turn the captive screw or screws on the PIM with your fingers until you cannot turn any further. Ensure that you do not strip the threads or the hole because the module will not seat properly.
- 4 Plug the power cable connector back into the PIM until both tabs click. The connector mates only one way.
- 5 Remove the tape from the BIM breakers and switch them back on (pressing | in). The triggered alarm stops.

The A and B LEDs of a PIM in a Passport 20000 are lit solid green when power is restored to them.

Procedure job aid

Refer to the figure “Connection points of the PIM cables” (page 392).

Figure 119
A PIM NTPN15 of a Passport 20000



Installing a PIM cable

Install a PIM cable to provide the power connection to the BIP.

Prerequisites

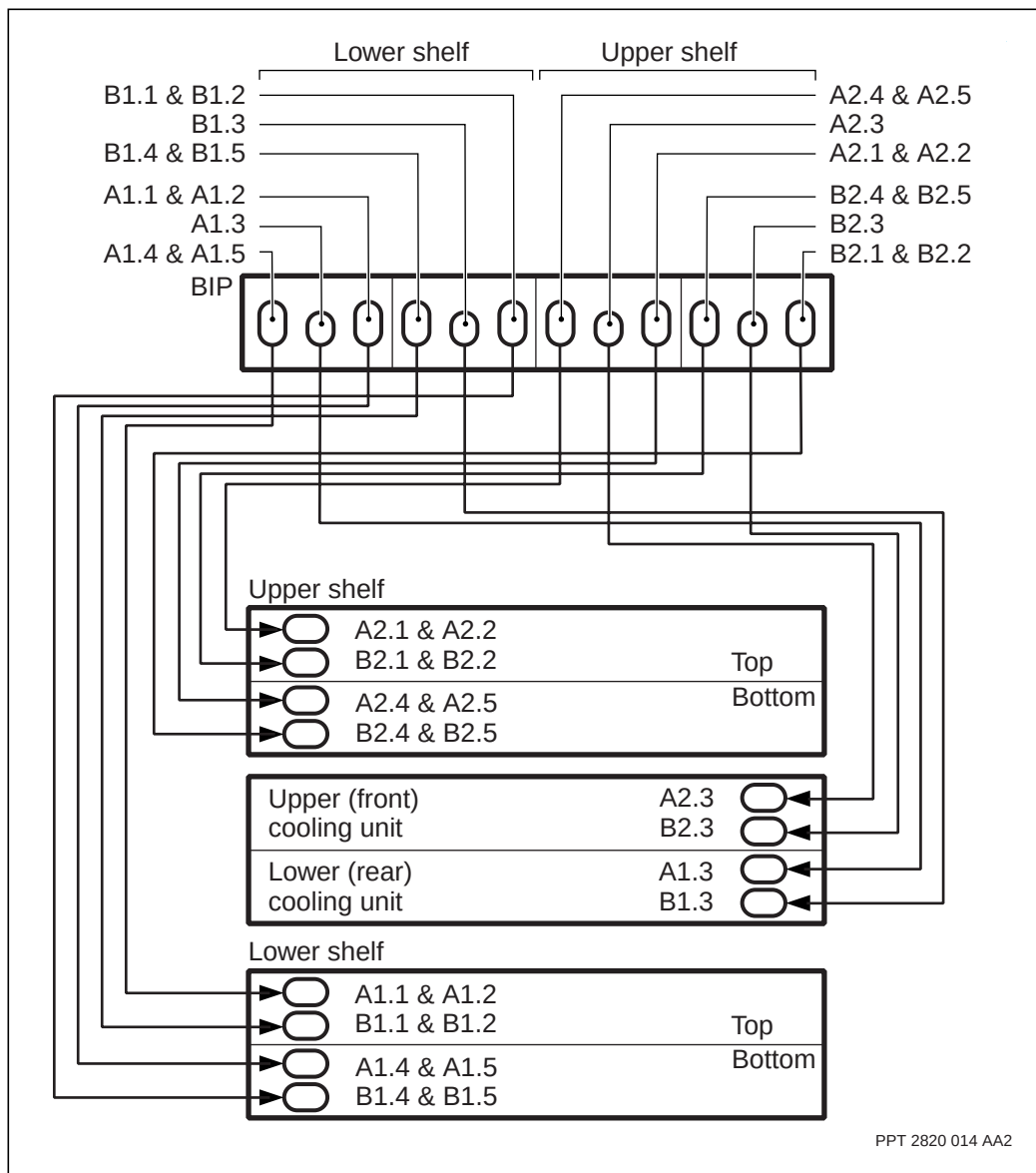
- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a PIM cable assembly identified by one of these PECs (labelled at each end of the cable assembly near the connectors):
 - NTHR54 for the cables to the PIMs in the lower shelf
 - NTHR53 for the cables to the PIMs in the upper shelf
 - NTHR55 for both upper and lower shelves
- The original PIM cable assemblies have been replaced by single cable assemblies, and the amount of cable slack is less on the newer versions. Although the PECs are similar, you may receive either version as a replacement. Both versions perform the same. All versions have a MATE-N-LOK II connector with louvertec contacts at each end.

Procedure steps

- 1** At the PIM, press the connector in until both tabs click. The connector mates only one way.
- 2** If the PIM cable is not already routed, route the cable up to the BIP through the cable management brackets and up the BIP connector. The cable path for each PIM is shown in the figure “Connection points of the PIM cables” (page 392).
- 3** Plug the other end of the PIM cable into the BIP.
- 4** Dress the cable slack and fasten with tie-wraps. Cut off the tie-wrap tails.

Procedure job aid

Figure 120
Connection points of the PIM cables



Installing a power-and-ground cable assembly

Install a power-and-ground cable assembly to enable using power input cables smaller than 1/0 AWG (53.5 mm²) or less flexible than Super Flex cables to feed the breaker interface panel (BIP).

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a polyvalent power-and-ground assembly with part number A0834143 or an ETSI power-and-ground assembly with part number A0843149. The ETSI kit contains large green pan-head slotted machine screws or 10-mm (3/8-in.) thread-forming hex-head screws for fastening the frame ground cables.
- You need the following specialty tools:
 - a medium Pozidriv screwdriver, for example a number 2 (do not substitute a Phillips bit)
 - an 11-mm (7/16-in.) deep socket with a properly calibrated torque wrench capable of 6.5 Nm (57.5 in.-lbs) and a 20-cm (8-in.) extender for the lug nuts
- You need a helper to hold the power-and-ground assembly until it is fastened to the mounting apparatus.
- The terminal blocks on the assembly rail approximately align with the pairs of battery and battery return studs at the rear of the BIP. Their uneven spacing is normal.

Procedure steps

- 1 At the rear of the BIP, unfasten any cables dressed along the horizontal strain-relief bar. These are likely to be the red power output and alarm cables from the BIP to other hardware parts. Leave the cables connected at both ends.
- 2 Note the orientation of the strain-relief bar at the uprights and remove its four 10-mm (3/8-in.) screws, as shown in the figure “The polyvalent power-and-ground assembly A0834143” (page 397). Put the screws and bar aside temporarily.
- 3 Hold the power-and-ground assembly in the air so that:

- the rail is horizontal
 - the labels on the terminal blocks face you
 - the connected cables point downwards
- 4 Have a helper hold the assembly behind the BIP where the strain relief bar was.
 - 5 For the ETSI assembly only, locate the terminal block on the right end. Fasten the 2-hole lug of the middle cable to the grounding strip using the provided screws or green screws. Bend the cable in a loop to the right so that the barrel side of the lug points to the right. Refer to the figure “The ETSI power-and-ground assembly A0834149” (page 398).
 - 6 Repeat step 5 for the remaining middle cables of each ETSI terminal block set. Work from 1 end to the other for ease of access. Fasten all 4 ground cables even if the frame houses only 1 switch.
 - 7 Press your finger along the silvery grounding strips at the top left and right rear of the frame uprights so that dimples appear to indicate where the screw holes are located. The uprights are indicated in the figures “The polyvalent power-and-ground assembly A0834143” (page 397) and “The ETSI power-and-ground assembly A0834149” (page 398).
 - 8 Using the provided 10-mm (3/8-in.) screws, fasten the rail to the uprights at the top or second dimple (or hole) from the top of each upright. Tighten to snug plus a 1/4 turn.
 - 9 On the rear of the BIP, loosen the clamp of the rightmost insulation boot by using a medium Pozidriv bit that fits snugly. Loosen the clamp until you can pivot it easily with your finger. The clamp may already have been loosened.

**WARNING****Risk of injury or equipment damage by electricity**

Any feed cable that is connected to the rear of the BIP must be shielded by the provided insulation boot. If you strip the head of the screw that fastens the clamp against the boot, you cannot fasten the boot securely to the BIP. You must not operate the BIP unless you replace a stripped screw to secure the boot.

**WARNUNG****Verletzungsgefahr oder Geräteschäden durch Elektrizität**

Alle Speisestromzuführungen, die mit der Rückseite des BIP verbunden sind, müssen mit der mitgelieferten Isoliermuffe abgeschildert werden. Wenn Sie den Kopf der Schraube abtrennen, mit der die Klemme an der Isoliermuffe befestigt wird, kann die Muffe nicht sicher am BIP befestigt werden. Betätigen Sie das BIP nur, nachdem Sie eine Schraube mit abgetrenntem Kopf zum Befestigen der Muffe ersetzt haben.

- 10 Remove the insulation boot and put it aside temporarily. Removing the boot reveals the power input studs.
- 11 Using an 11-mm (7/16-in.) deep socket with a 20-cm (8-in.) extender, remove the nuts and Belleville washers from the studs and put them aside temporarily. If the thread pitch of the studs is different, remember which nut goes to each stud.
- 12 Slip the lower power cable from rightmost terminal block through the narrow neck of the insulation boot and slide it along the cable away from the lug.
- 13 Put the lug onto the studs, barrel at the bottom. Ensure that the lug is flush against the rear of the BIP.
- 14 Put a Belleville washer onto each stud, convex upwards. A Belleville washer is a dome-shaped spring washer. The high part of the washer must be away from the lug.

**CAUTION****Risk of damage to power connections**

At the rear of the BIP, the top stud of each pair carries the power. The bottom stud prevents rotation of the lug from the weight of the power cable. To avoid arcing and rotation, ensure that both studs are fastened securely with an appropriate 2-hole lug.

- 15 Finger-fasten the nuts back onto each stud. The nuts thread easily, so check for cross-threading or mismatched thread pitches if there is resistance.



CAUTION

Risk of damage to power connections

The metal of the top stud of each pair is softer than the bottom lug because of increased electrical conductivity. Ensure that you do not overtighten either stud, nor leave one too loose. Damaging a stud can mean the BIP must be replaced.

- 16** Tighten each stud nut to 6.5 Nm (57.5 in.-lbs) using a properly calibrated torque wrench with the measurement near the middle of wrench's range.
- 17** Slide the insulating boot to the BIP end of the cable, and align it with the shape of the lug (toe upwards). Rest the boot flush against the rear of the BIP.
- 18** Fasten the boot retainer clamp over the stud.
- 19** For each remaining power cable, working from right to left, repeat step 9 to step 18 for the 7 remaining cables.
- 20** Fasten the strain-relief bar back onto the frame uprights.
- 21** Use tie-wraps to fasten the black-and-white and red cables along the underside of the strain-relief bar and to the lower half.

Procedure job aid

Figure 121
The polyvalent power-and-ground assembly A0834143

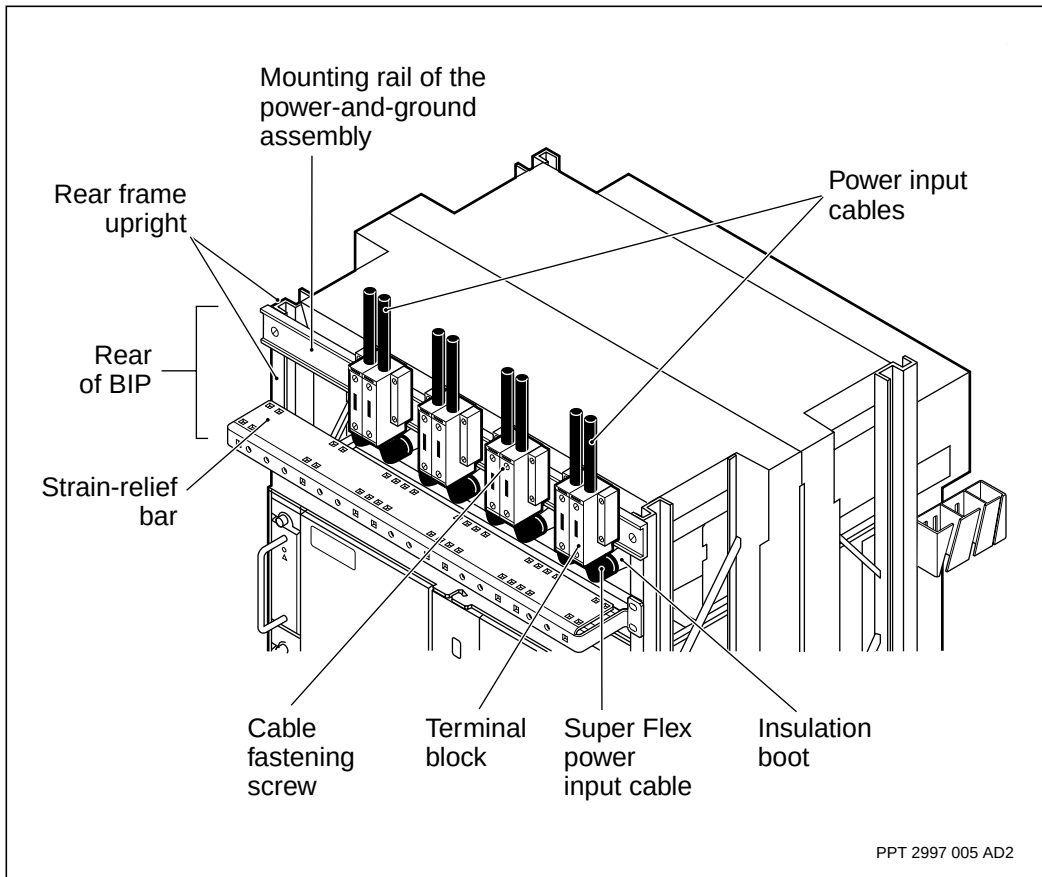
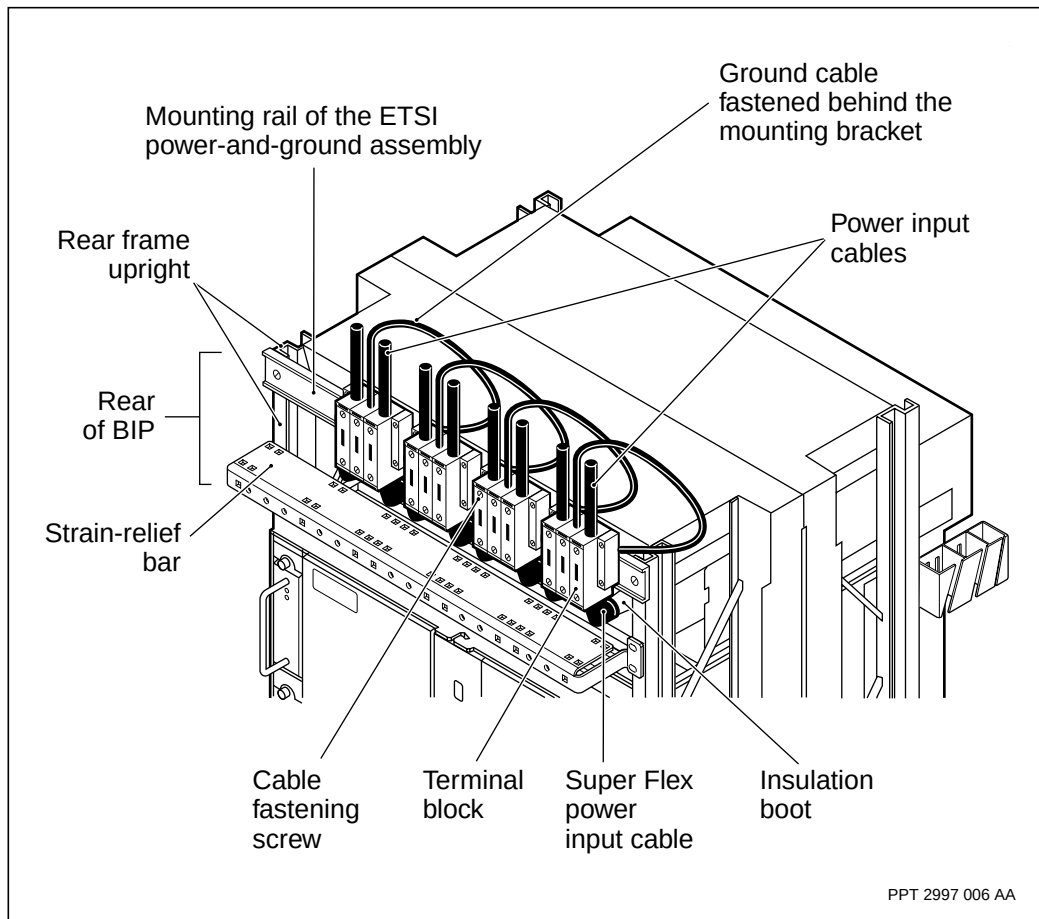


Figure 122
The ETSI power-and-ground assembly A0834149



Installing a Shasta 5000 air-flow grill

Install a Shasta 5000 air-flow grill to maintain the ability to cool the switch hardware when it is installed in a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You will need an air-flow grill with part number P0914658, from the hardware kit with PEC NTHW85.

Procedure steps

- 1 If the upper half of the NEBS 2000 frame has front or rear shelf filler panels, remove them. Store the panels and 10-mm (3/9-in.) screws for an alternate use of your choosing.
- 2 Unpack the air-flow grill with part number P0914658 from the hardware kit NTHW85.
- 3 For orientation, refer to the figure “Location of the grill for a Shasta 5000 in a NEBS 2000 frame” (page 401). Hold the grill in the air so that
 - the mounting-ear screw holes are left and right
 - the open edge of the grill is at the bottom facing you
- 4 Place the top flange of the grill between the NEBS 2000 frame uprights until the mounting ears are flush against silvery grounding strip. The front surface of the frame uprights is covered with a silvery strip of metal tape for grounding. Dimples in the strip indicate where screw holes are located. To see the dimples clearly, run your finger firmly along the upright.
- 5 Align and center the 4 holes of the mounting ears with dimples or holes on the silvery strip.

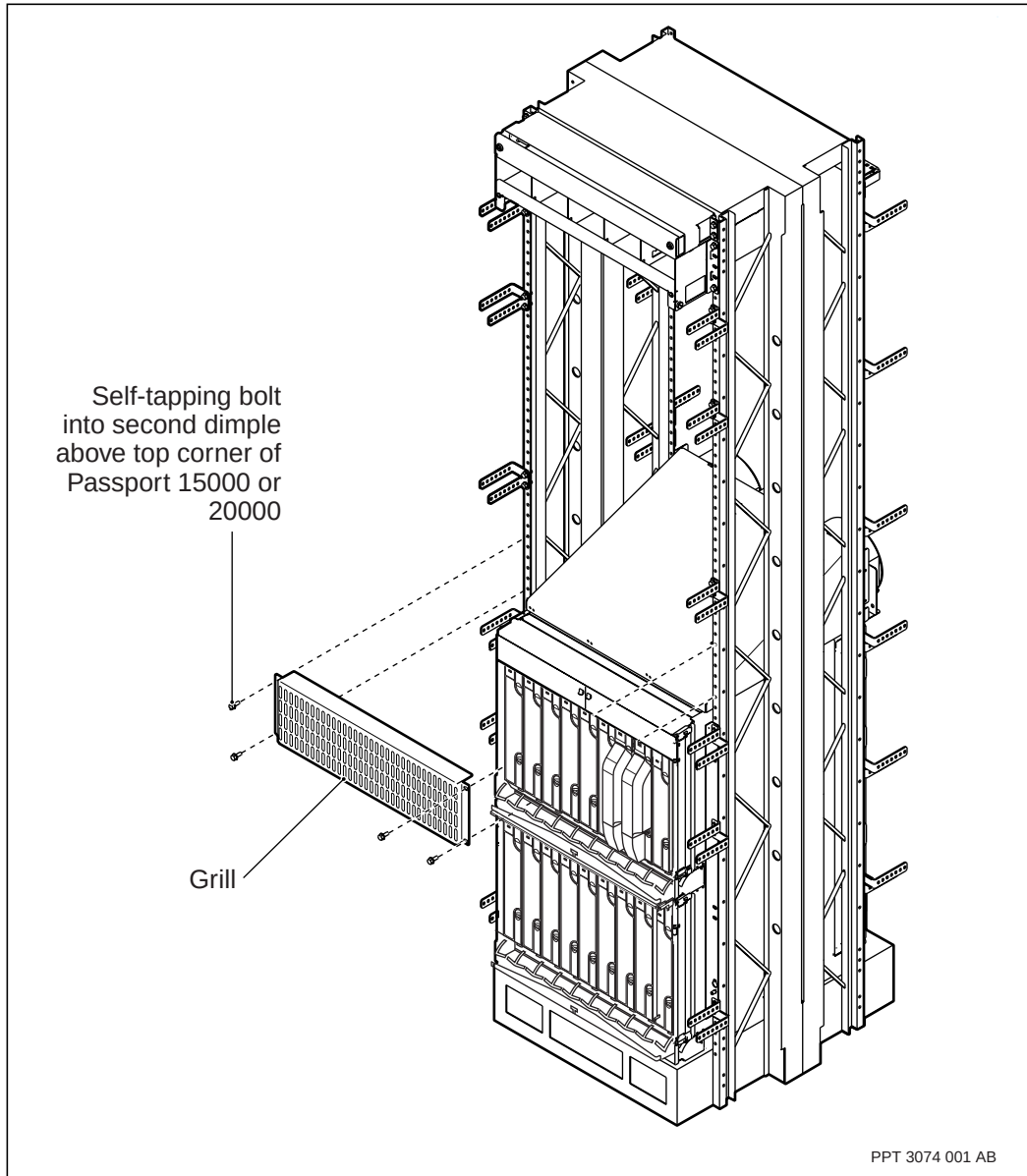
The air-flow grill is correctly positioned when each bottom hole of the mounting ears aligns with the second dimple in the frame upright that occurs above the top edge of the Passport 15000 or 20000 cooling unit.
- 6 While holding the grill in position, fasten a thread-forming 10-mm (3/8-in.) hex-head screw from the kit through each the mounting ear into the frame uprights.
- 7 Fasten the 2 remaining screws through the other holes of the mounting ears.

- 8 Tighten the screws to snug plus a 1/4-turn.

Procedure job aid

Figure 123

Location of the grill for a Shasta 5000 in a NEBS 2000 frame



Installing a Shasta 5000 cable management assembly

Install a Shasta 5000 cable management assembly to enable organizing its processor card interfacing cables when the switch hardware is installed in a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You will need a cable management assembly with PEC NTHR94, from the hardware kit NTHW85.
- To identify the cable management assembly, see the figure “Location of the cable management assembly for a Shasta 5000 in a NEBS 2000 frame” (page 403).

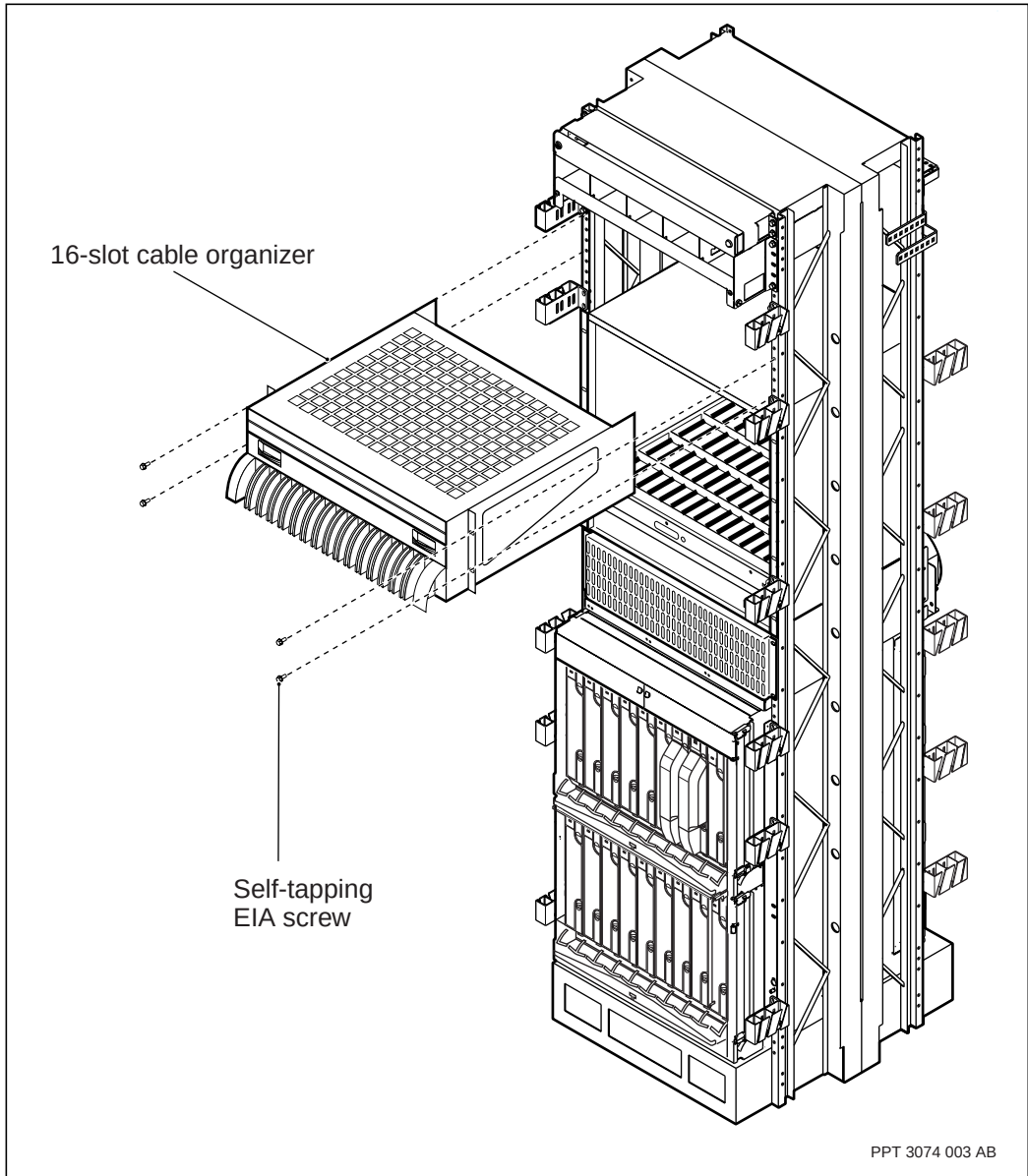
Procedure steps

- 1 Unpack the cable management assembly.
- 2 Position the assembly between the adapter brackets and above the Shasta 5000 shelf so that
 - the cable channels face you and are at the bottom of the assembly
 - each mounting-ear hole is flush against the uprights
 - the bottom edge of each mounting ear on the assembly rests against the top edge of each mounting ear on the shelf
 - each bottom mounting-ear hole aligns with the next available screw hole above the shelf on the adapter bracket
- 3 While holding the cable management assembly in position, loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw through one mounting ear hole, then a second screw through a hole in the other mounting ear.
- 4 Loosely fasten the remaining 2 screws.
- 5 Tighten all screws to snug plus a 1/4-turn.

Procedure job aid

Figure 124

Location of the cable management assembly for a Shasta 5000 in a NEBS 2000 frame



Installing a Shasta 5000 filler panel

Install a Shasta 5000 filler panel to maintain proper air flow through the NEBS 2000 frame and to comply with NEBS 2000 equipment containment.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You will need a filler panel with part number P0914657, from the hardware kit NTHW85.

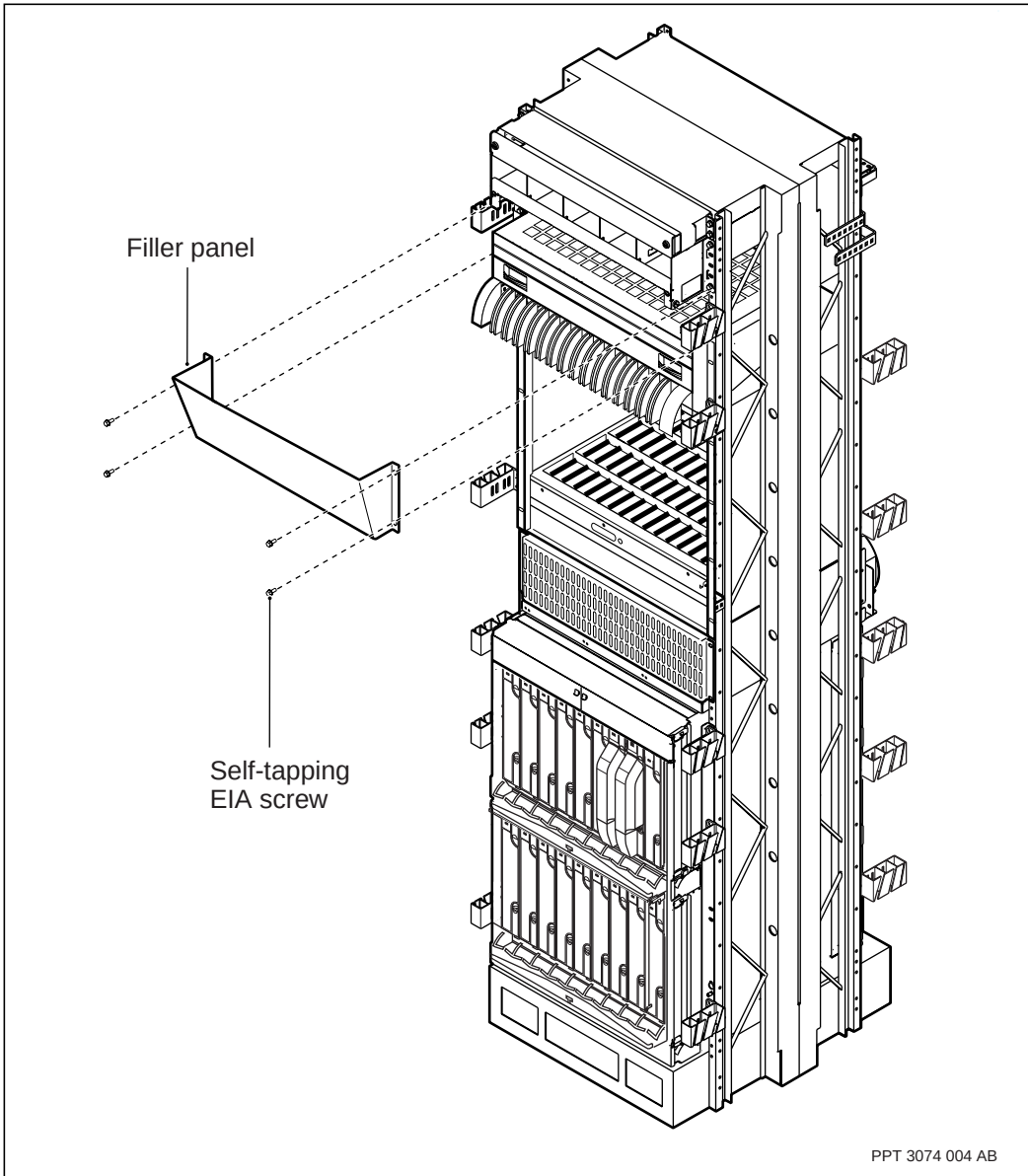
Procedure steps

- 1 Unpack the filler panel.
- 2 Position the filler panel between the frame uprights below the breaker interface panel (BIP) and above the cable management assembly. See the figure “Location of the filler panel for a Shasta 5000 in a NEBS 2000 frame” (page 405).
- 3 Using four 10-mm (3/8-in.) screws, fasten the filler panel to the frame uprights.
- 4 Tighten all screws to snug plus a 1/4-turn.

Procedure job aid

Figure 125

Location of the filler panel for a Shasta 5000 in a NEBS 2000 frame



Installing a Shasta 5000 shelf assembly

Install a Shasta 5000 shelf assembly in a NEBS 2000 frame above a Passport 15000 or 20000 to enable the interworking of VPN traffic.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need hardware kit with PEC NTHW85.
- You need two helpers capable of lifting and holding the Shasta 5000 (18-kg or 39 lbs without cards) until it is fastened to the adapter brackets.

Procedure steps

- 1 Separate and lay out the parts from the kit NTHW85.
- 2 On the silvery strip on the front surface of the left and right uprights, locate the next available screw hole or dimple above each mounting ear of the grill. Puncture each hole to mark where it is. For orientation, refer to the figure “Location of shelf hardware for a Shasta 5000 in a NEBS 2000 frame” (page 461).
- 3 Move the Shasta 5000 shelf to the front of Passport 15000 or 20000 switch.
- 4 Have 2 helpers lift and position the Shasta 5000 above the grill and between the uprights in the NEBS 2000 frame.
- 5 Carefully lower the shelf until the bottom adapter bracket holes align with the marked holes on each upright.
- 6 Fasten a thread-forming 10-mm (3/8-in.) hex-head screw through the bracket into each marked hole in the upright, then through each top hole of the bracket into the upright. The top holes of the bracket align with the first hole or dimple below the BIP’s mounting ear. Do not let go of the shelf until the four screws are fully seated.
- 7 Fasten 14 more screws through the adapter brackets into the uprights, 7 per side. Space the screws apart leaving 3 empty holes. Tighten all screws to snug plus a 1/4-turn.
- 8 Re-install the cable management brackets in their original positions.
- 9 Store the crate in case the shelf must be returned to the manufacturer.

Installing a shelf assembly

Install a shelf assembly to enable adding all of the plug-in cards that enable a Passport 15000 or 20000 to be operational.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a shelf assembly with one of the following PECs:
 - For a Passport 15000, an NTHW99CA with DS1timing
 - For a Passport 15000, an NTHW99DA with E1 balanced timing
 - For a Passport 15000, an NTHW99EA with E1 unbalanced timing
 - For a Passport 20000, an NTPN77BA with DS1timing
 - For a Passport 20000, an NTPN77CA with E1 balanced or unbalanced timing
- You need two helpers to prevent the shelf assembly from falling while it is being fastened. An empty shelf assembly weighs 99 kg (218 lbs).



CAUTION

Risk of equipment damage and service loss by bent pins

While handling a shelf assembly or working near it, ensure that nothing contacts the backplane pins inside the shelf assembly. Contacting a pin with a sideways force can easily bend it, thereby rendering the card slot unusable.

Procedure steps

- 1 Have the helpers hold the replacement shelf assembly in front of the frame or rack so that the large deeper opening is facing you and the cable management channel is at the bottom. This is the same orientation as the removed shelf assembly.
- 2 Insert the shelf above the cooling unit and between the frame uprights. Do not let the shelf rest against the cooling unit.
- 3 While holding the shelf, align its 16 screw holes (8 per vertical side) on the 2 mounting ears with the previous holes on the frame uprights or rack's

adapter brackets. Ensure that the bottom holes are as close to the cooling unit as possible without touching it.

- 4 Loosely fasten a screw through 1 of the top mounting holes on 1 upright or adapter bracket. Loosely fasten the top screw on the other side.

If you use a pair of the eye holes that allows threading 2 screws before placing the shelf assembly against the uprights, and then passing the mounting ears over the screws to hang there until other screws are fastened, you must use only the top two, thread at least four-fifths of the each screw into the upright, and hang the shelf assembly on both screws simultaneously. Otherwise the weight of the assembly can bend the mounting ear.

- 5 Orient, place, and loosely fasten each cable mounting bracket back where it was on top of the mounting ears of the shelf assembly.
- 6 Check that all remaining mounting ear holes are still aligned with the previous upright or adapter bracket holes, then loosely fasten the remaining screws through the shelf mounting ears.
- 7 From bottom to top, tighten all screws to snug plus a 1/4 turn.

Installing a shelf assembly onto adapter brackets

Install the shelf assembly onto the adapter brackets to place the Passport 15000 or 20000 into a 23-inch EIA rack or cabinet.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41)
- You need one of these shelf assembly kits:
 - NTQS04 for a Passport 15000
 - NTQH04 for a Passport 20000
- You need two helpers to prevent the shelf assembly from falling while it is being fastened. An empty shelf assembly weighs 99 kg (218 lbs).



CAUTION

Risk of equipment damage and service loss by bent pins

While handling a shelf assembly or working near it, ensure that nothing contacts the backplane pins inside the shelf assembly. Contacting a pin with a sideways force can easily bend it, thereby rendering the card slot unusable.

Procedure steps

- 1 While facing the front of the rack, insert the shelf between the adapter brackets and above the cooling unit.
- 2 Gently lower the shelf until the bottom edge of its mounting ears touch the top edge of the cooling unit mounting ears. Prevent the weight of the shelf from resting on the unit.

If you use a pair of the eye holes that allows threading 2 screws before placing the shelf assembly against the uprights, and then passing the mounting ears over the screws to hang there until other screws are fastened, you must use only the top two, thread at least 4/5s of each screw into the upright, and hang on both screws simultaneously. Otherwise the weight of the assembly can bend the mounting ear.
- 3 Align the screw holes on the 2 mounting ears with the nearest holes on the outside face of the adapter brackets.

- 4** Loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw from pack P0601478 through one of the top mounting-ear holes on one bracket, then another screw through the opposite bracket and hole.
- 5** Loosely fasten a screw through one of the bottom mounting-ear holes on one bracket, then another screw on the opposite bracket and hole.
- 6** Loosely fasten the remaining 4 screws (2 per vertical side) through the mounting-ear holes into the rack uprights. Evenly space the screws between the top and bottom screws, and mirror the positions on both sides.
- 7** Center the shelf between the adapter brackets, then from bottom to top, tighten all 8 screws to snug plus a 1/4 turn.

Procedure job aid

Figure 126
An empty shelf assembly, front isometric view

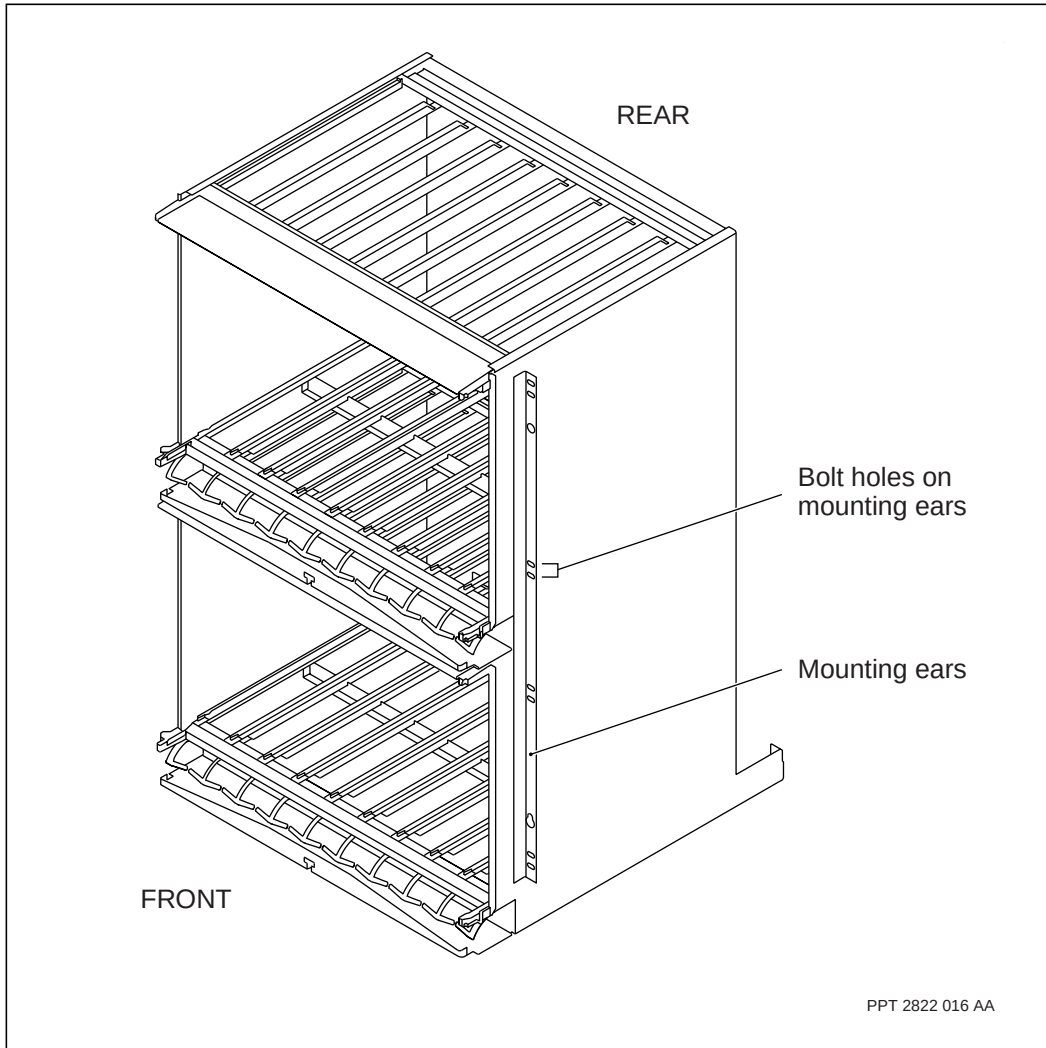
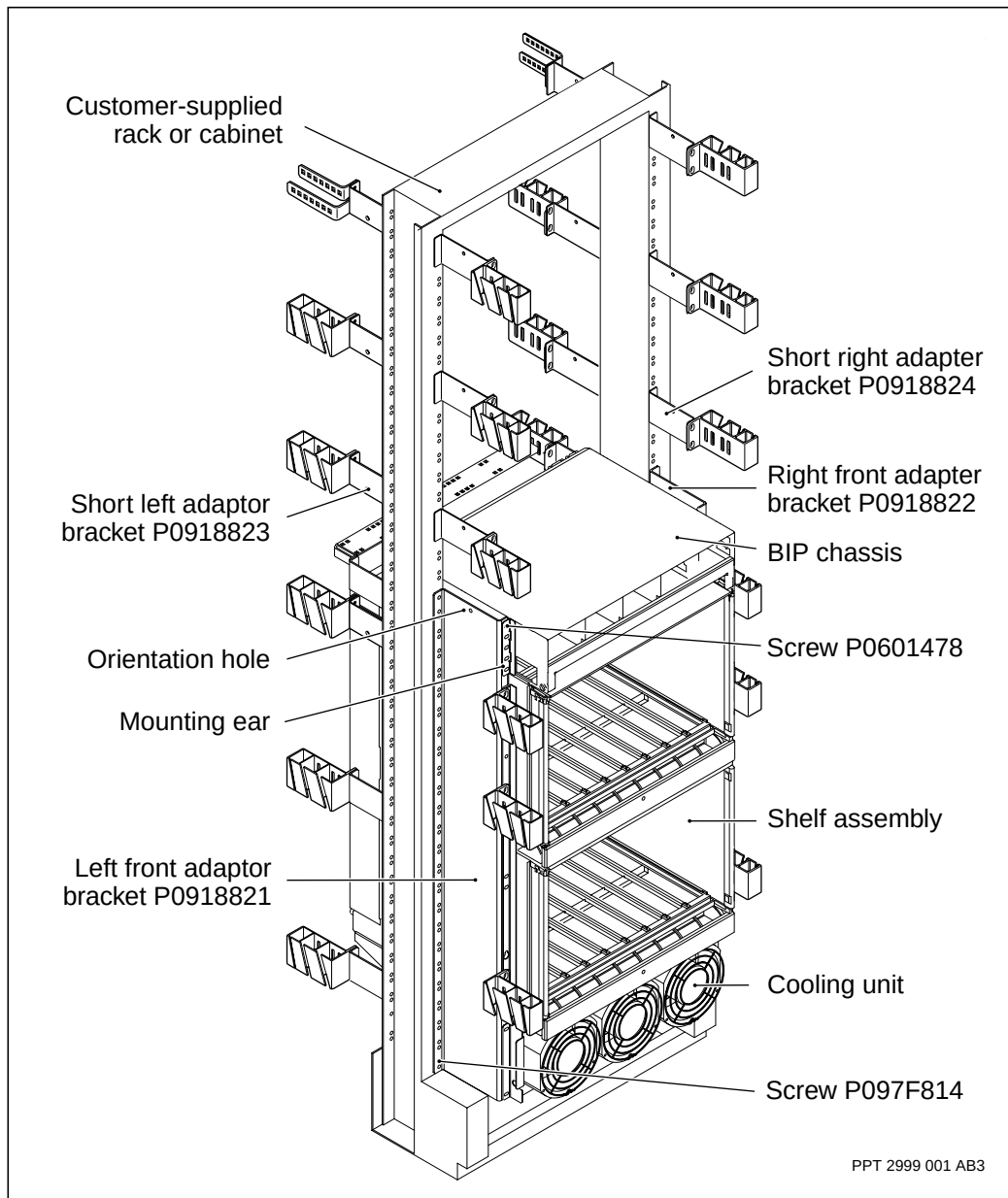


Figure 127
A shelf assembly in a 23-inch EIA rack, isometric front view



Installing a shelf filler panel

Install a shelf filler panel to cover an opening in the upper half of the front or rear of a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need one or both of these parts:
 - front filler panel with PEC NTHR76 (1 m or 3.3 ft)
 - rear filler panel with PEC NTHR77 (800 mm or 2.6 ft)
- When a sparing panel or fanout panel is to be or is already mounted onto the upper half of a NEBS 2000 frame, the termination panel must be mounted between the frame and the filler panel. The termination panel and the filler panel can share the same mounting screws, but you will need at least one helper to hold the parts until they are fastened.
- You may need a helper to hold a panel until the first 2 mounting screws are fastened.

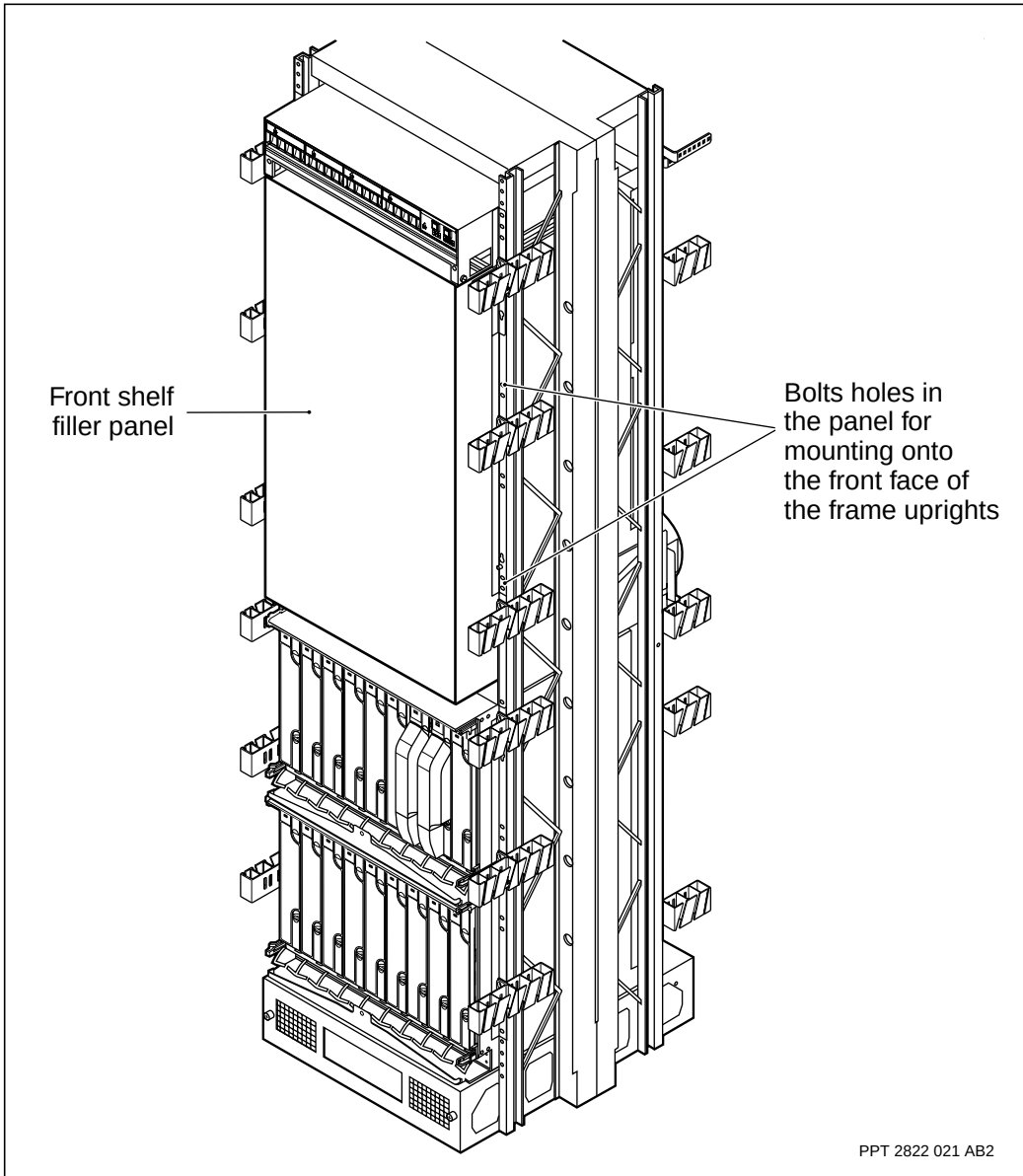
Procedure steps

- 1 Open the kit and unpack the filler panel and thread-forming screws.
- 2 Count 4 dimples or holes or both in the grounding strip on the outside face of the right front frame upright starting below the top cable management bracket. The dimples cover holes in the uprights. Count downwards and mark the hole (or poke through the dimple). Mark its mate on the opposite upright.
- 3 Hold the panel against the front (or rear) face of the frame uprights as in the figure “Location of the front shelf filler panel” (page 415) so that
 - the edge labeled TOP is pointing upwards
 - the hollow space between the sides faces inwards to the front of the frame
 - the top two holes in the sides of the panel align with the 2 holes marked on the frame uprights
 - the cut-ins at the sides of the panel surround the cable management brackets, that is, the panel does not overlap any bracket

- 4** While a helper holds the panel while the top 2 screws are fastened. While still holding the panel, loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw through each of the 2 holes so that the panel is supported.
- 5** Align and loosely fasten a screw through the 6 remaining panel holes, starting at a bottom corner.
- 6** Tighten all screws to snug plus a 1/4 turn.

Procedure job aid

Figure 128
Location of the front shelf filler panel



Installing a shelf-based BIP

Install the shelf-based breaker interface panel (BIP) into a mounting apparatus other than a NEBS 2000 frame to distribute power to the Passport switch hardware.

Prerequisites

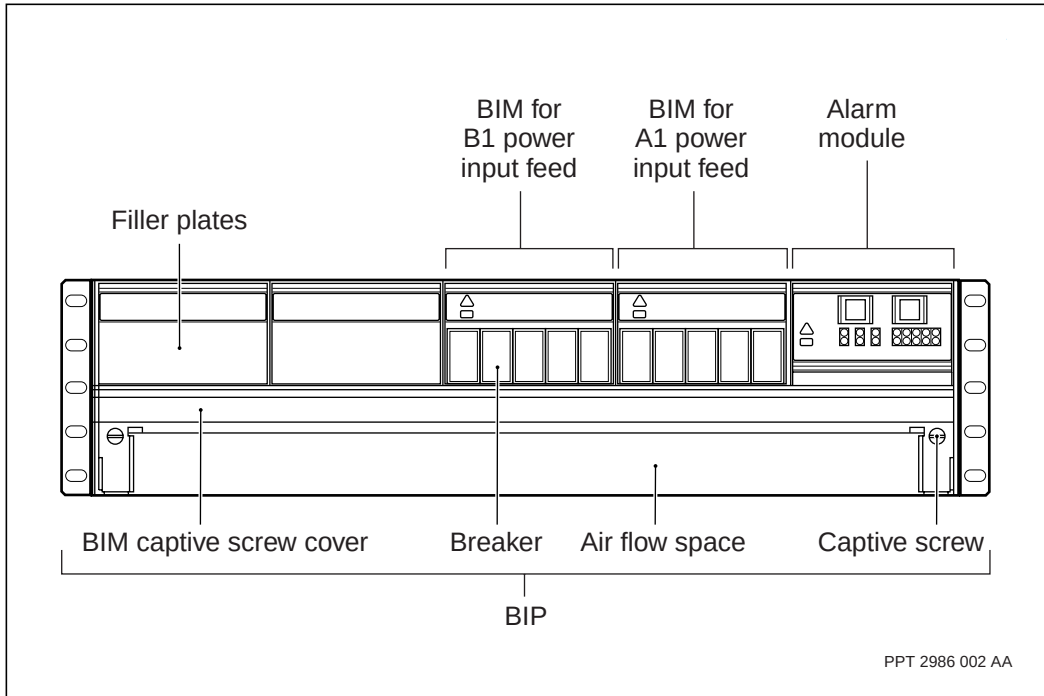
- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a BIP with one of the following PECs:
 - NT6C62 for a Passport 15000
 - AP6C68 for a Passport 20000
- When installing the BIP in a rack other than a NEBS 2000 frame, a secondary grounding point is provided in the BIP chassis. There are two studs at the rear lower right of the chassis. Use two straight 2-hole lugs, one to the chassis and the other to the rack ground bonding point. Ground the BIP chassis to the rack by firmly attaching a ground of minimum size 6 AWG cable E/W (13.3 mm²) between the studs and a common grounding point. The stud nuts on the chassis are number 10-32 unc and are included with washers on the studs. Use star washers between the lug and the rack. Do not overtighten the nuts.

Procedure steps

- 1 Hold the BIP so that the side with the openings faces you.
- 2 While facing the front of the rack, insert the BIP between the adapter brackets and above the shelf.
- 3 Gently lower the BIP until the bottom edge of its mounting ears touch the top edge of the shelf mounting ears. Prevent the weight of the BIP from resting on the shelf.
- 4 Align the screw holes on the 2 mounting ears with the nearest holes on the outside face of the adapter brackets. Loosely fasten a thread-forming 10-mm (3/8-in.) head-hex screw from pack P0601478 through the upper left mounting-ear hole.
- 5 Loosely fasten another screw through the lower right mounting-ear hole, then the remaining 2.
- 6 Center the unit, then tighten all 4 screws to snug plus a 1/4 turn.

Procedure job aid

Figure 129
The BIP, front view



Installing a shelf-based cooling unit

Install the shelf-based cooling unit into a mounting apparatus other than a NEBS 2000 frame to ensure that ambient temperature inside the Passport can be maintained.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The shelf-based cooling unit is included in the shelf-based kits NTQS04 for a Passport 15000 or NTQH04 for a Passport 20000. To install the shelf-based cooling unit, you need these parts:
 - NTHR52AA or NTHR52AB, Passport 15000 or 20000 upper cooling unit assembly
- You need a helper to hold the cooling unit until it is fastened because it weighs about 9 kg (20 lbs) and tends to slide out of position before it is fastened to the rack.
- As shown in the figure “Position and orientation of the upper cooling unit NTHR52 in a 23-inch wide rack” (page 421), the cooling unit must be mounted in the lowest equipment position on the mounting apparatus. Enough room must remain above it to install:
 - the shelf assembly flush against it
 - the upper temperature sensor bracket assembly
 - about 10 cm (4 in.) of ventilation space
 - the strain relief bar
 - the BIP
- The front of the rack is the side that faces or will face the same way as the front of the Passport 15000 or 20000.

Procedure steps

- 1 Hold the ends of the cooling unit so that
 - you face the fans
 - the open side is at the top

- a hand holds the narrow rear end
 - a hand holds the fan end
- 2** Facing the front of the rack, insert the narrow end of the cooling unit between the adapter brackets fastened to the rack uprights.
 - 3** Slide the cooling unit inwards until the mounting ears at the fan end touch the adapter brackets as shown in the figure “Position and orientation of the upper cooling unit NTHR52 in a 23-inch wide rack” (page 421).
 - 4** Align the mounting-ear holes to the screw holes on the brackets.
 - 5** While holding the unit in position, loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw (P0601478) through an upper mounting-ear hole. See the figure “The upper cooling unit, front and rear views” (page 420).
 - 6** Loosely fasten another screw through a lower mounting-ear hole on the opposite side of the unit, then the remaining 2 screws.
 - 7** Center the unit between the brackets and tighten all 4 screws to snug plus a 1/4 turn.

Procedure job aid

Figure 130

The upper cooling unit, front and rear views

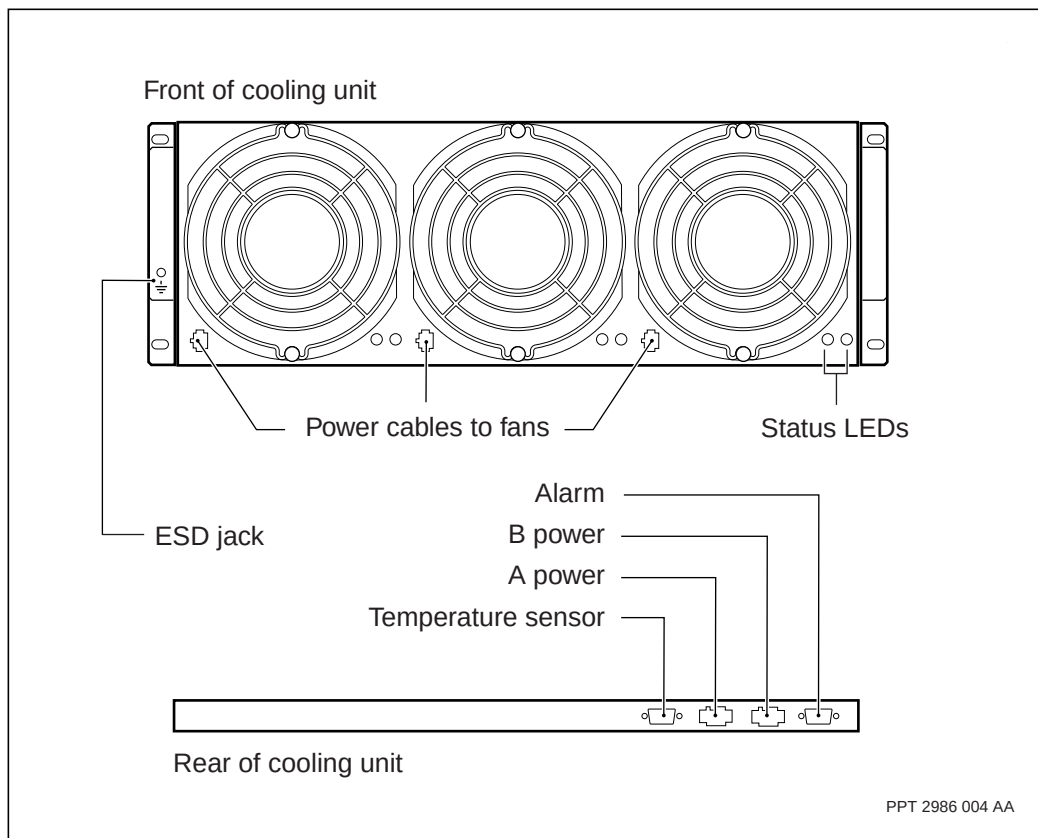
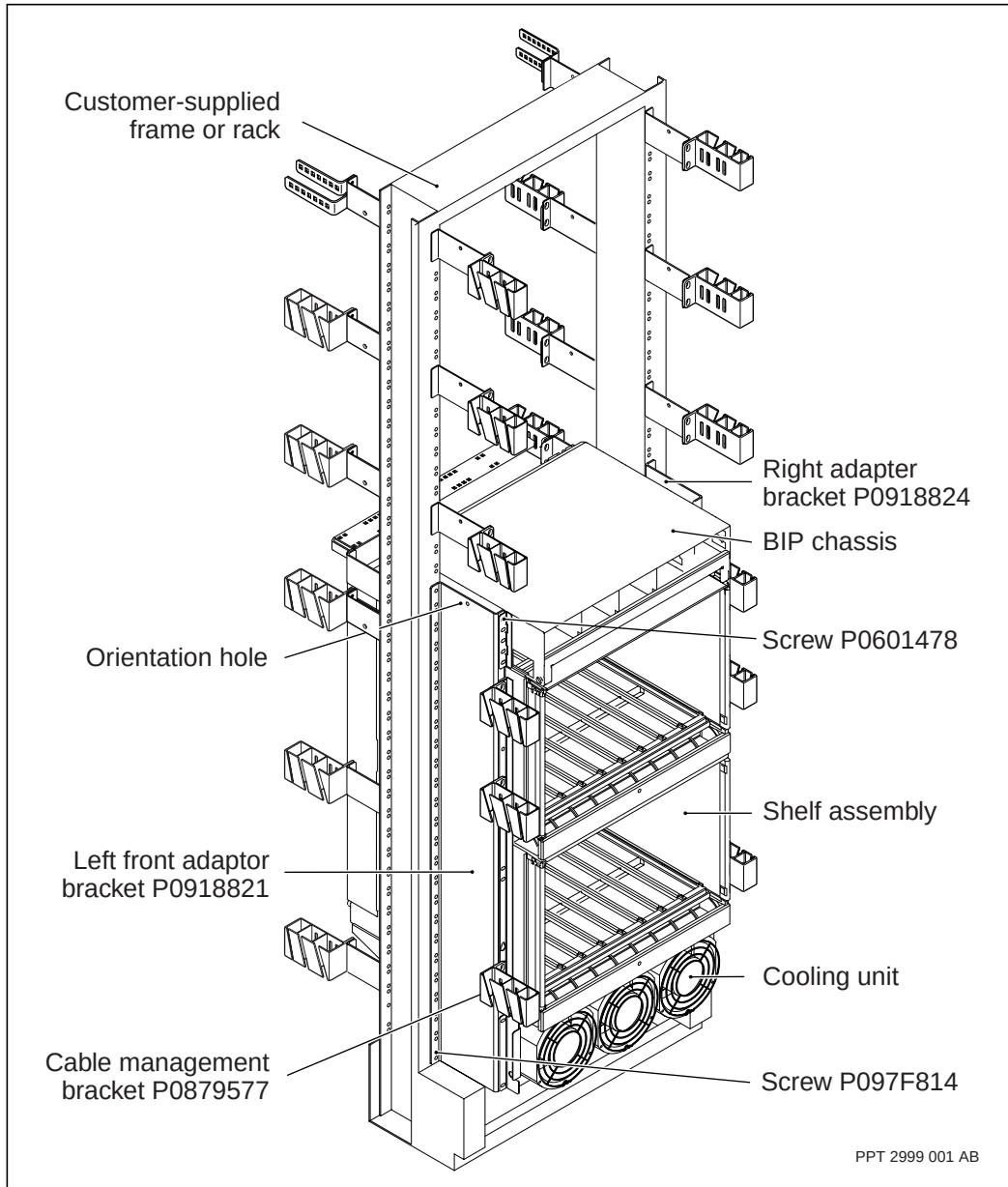


Figure 131
Position and orientation of the upper cooling unit NTHR52 in a 23-inch wide rack



Installing a side frame panel

Install a side frame panel to protect exposed cabling that runs up or down the side of a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need kit number NTRU0128 for each side panel to be installed. If the frame has the extended cable management brackets, you also need kit NTRU0365 present.
- You need a helper to hold the side panel until it is fastened because it weighs approximately 13 kg (28 lbs) and its size can be awkward.
- Fastening the ground cable assembly (NTRU0102) from kit NTRU0128 provides additional grounding because the side panel brackets are fastened to painted surfaces. The cable is 1 foot (30.5 cm) long and size 10 AWG (5.26 mm²).

Procedure steps

- 1 If the frame has the extended cable management brackets, open the kit NTRU0365. There are 4 spacer brackets for the panel brackets to fasten to.
- 2 Open the kit NTRU0128 and unpack the mounting brackets and screws. There are 4 panel brackets per side panel.
- 3 See the figures “Side panels, exploded view” (page 424) and “Installed front, rear, and side panels” (page 425). Observe the position of the upper and lower pairs of brackets. Align a bracket according to the figure. A side bracket pointing frontwards (facing the side of the frame) and a side bracket pointing rearwards have the same part number.
- 4 From NTRU0365, if required, fasten the spacer bracket (P0902817) to the frame using the 3 provided thread-forming 6-mm (15/64-in.) hex-head screws. Tighten the screws to snug plus a 1/5 turn. See the figure “Lower brackets for frame panels” (page 429).
- 5 Repeat step 4 for the other 3 spacer brackets, moving sideways. After the second bracket, temporarily position the panel beside the pair of brackets to verify if the mounting holes align. If not, reposition the brackets until they align.

- 6** From NTRU0128, fasten the panel brackets onto the spacer brackets using the 4 provided thread-forming counter-sunk 6-mm (15/64-in.) screws. Tighten the screws to snug plus a 1/5 turn. See the figures "Assembly of a side panel bracket, left and right, upper or lower" (page 427) and "Lower brackets for frame panels" (page 429). The upper brackets are oriented the same way as the lower. See "Upper brackets for frame panels" (page 428).

If the spacer brackets from NTRU0365 are not required, fasten the panel brackets from NTRU0128 directly to the upper and lower frame in the holes provided.

With or without the spacer brackets, ensure all 4 panel brackets extend away from the frame on an even vertical plane.

- 7** From NTRU0128, using 2 of the provided 10-mm (3/8-in.) hex-head screws and lock washers, fasten the grounding cable assembly (NTRU0102) from the frame upright to an upper bracket. Position a toothed lock washer between each end-cable eye loop and the upright or the bracket. Use the third hole from the top of the upright at one end of the cable, and a lower middle hole on the side of the upper bracket nearest the upright. For the position of the cable, refer to the figure "Side panel grounding cable" (page 430).
- 8** Position the side panel against the 4 brackets with the smooth side facing outwards as shown in the figure. Have a helper hold the panel off the floor until two top screws are fastened. Dropping the panel will bend a corner.
- 9** Align the 4 upper holes in the side panel with the 4 holes in the upper brackets.
- 10** While holding the panel aligned in position (off the floor), loosely fasten a screw (A0377259) and special washer (A0377315) through a corner hole. Loosely fasten another screw and washer through the opposite end hole so that the panel is evenly supported.
- 11** Align and loosely fasten a screw and washer through the remaining 6 panel holes, starting at a bottom corner.
- 12** Tighten all screws to snug plus a 1/5 turn.
- 13** Lightly tap a plastic cap onto each special washer.

Procedure job aid

Figure 132
Side panels, exploded view

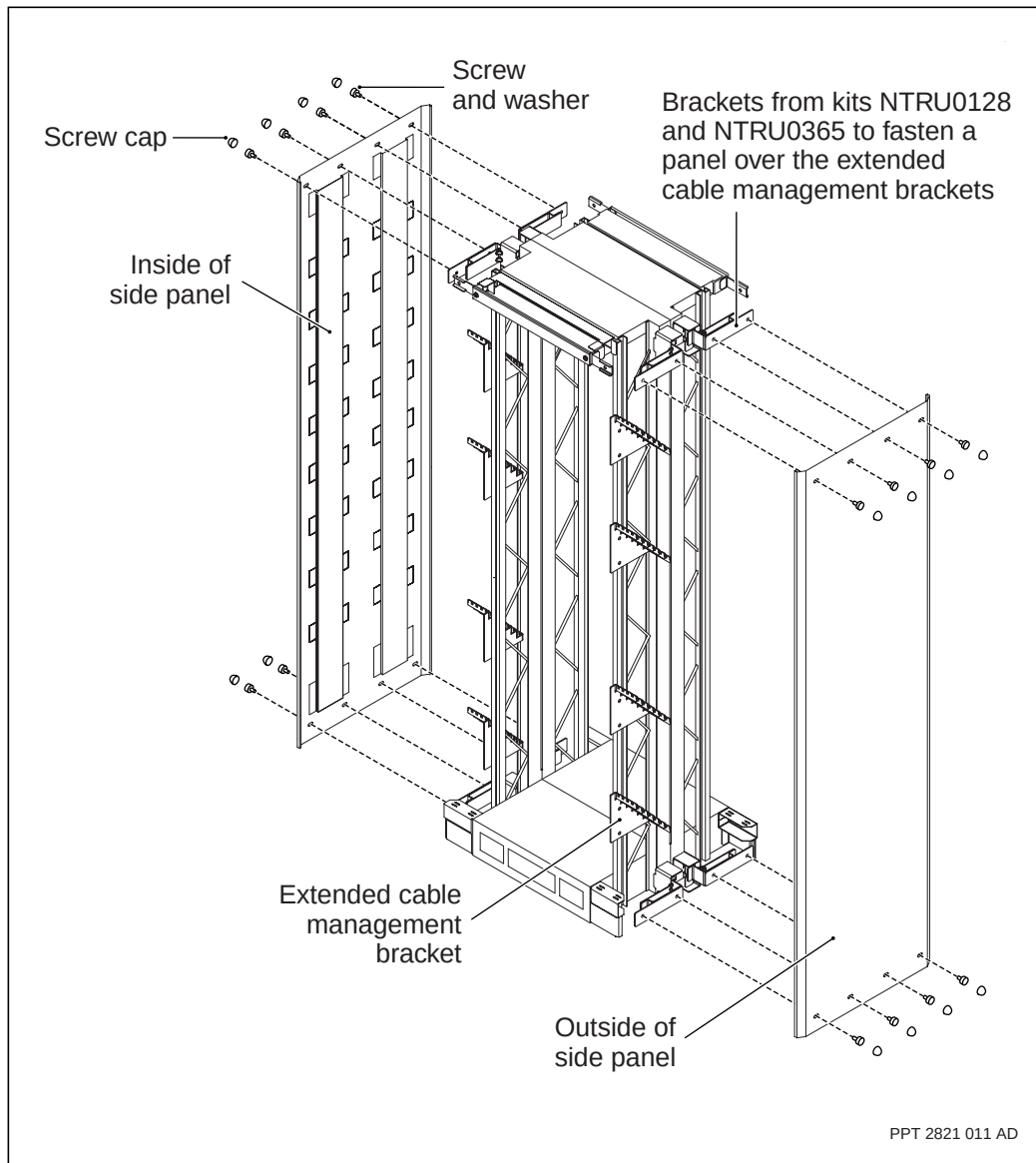


Figure 133
Installed front, rear, and side panels

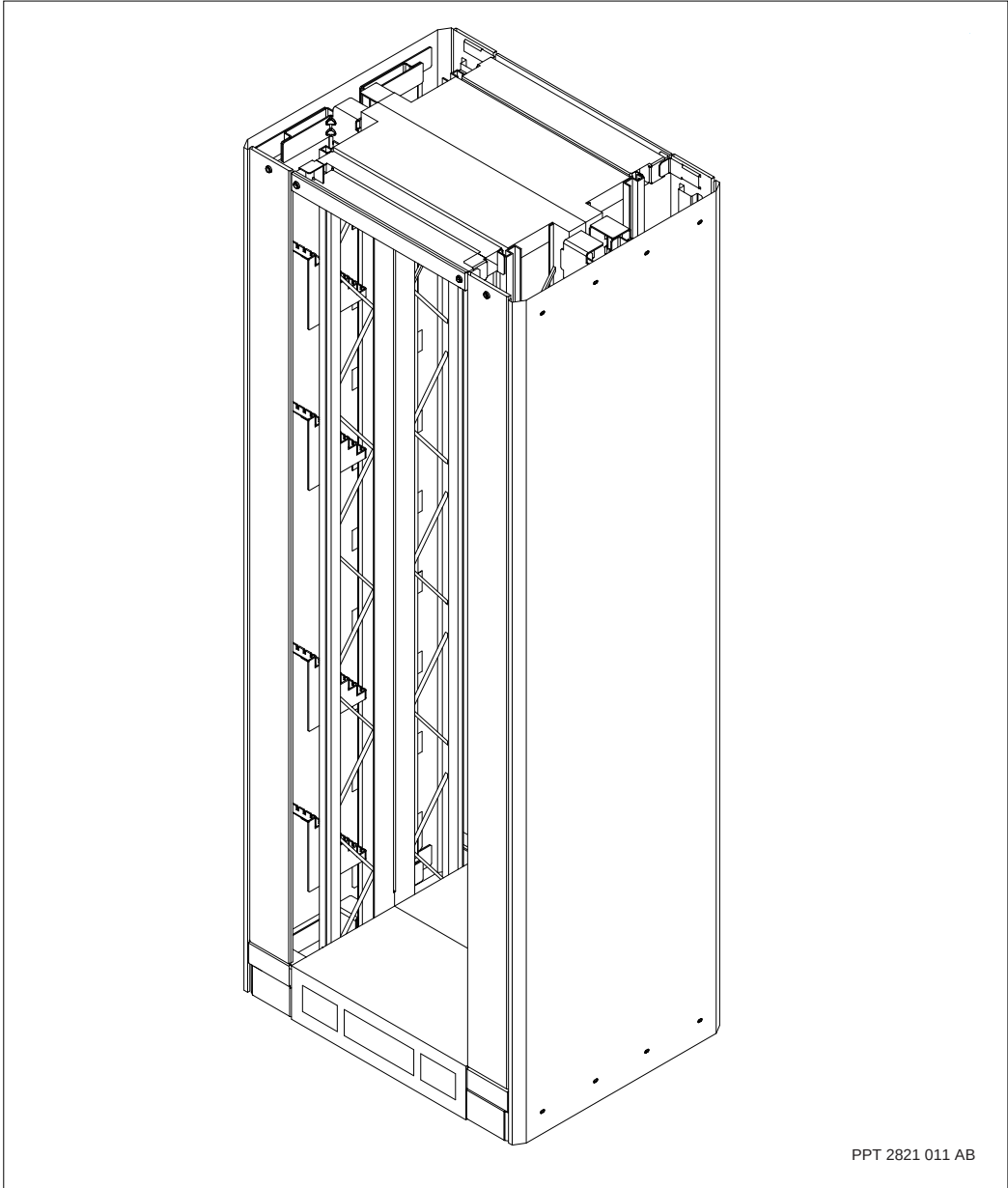


Figure 134
Location of brackets for installing panels

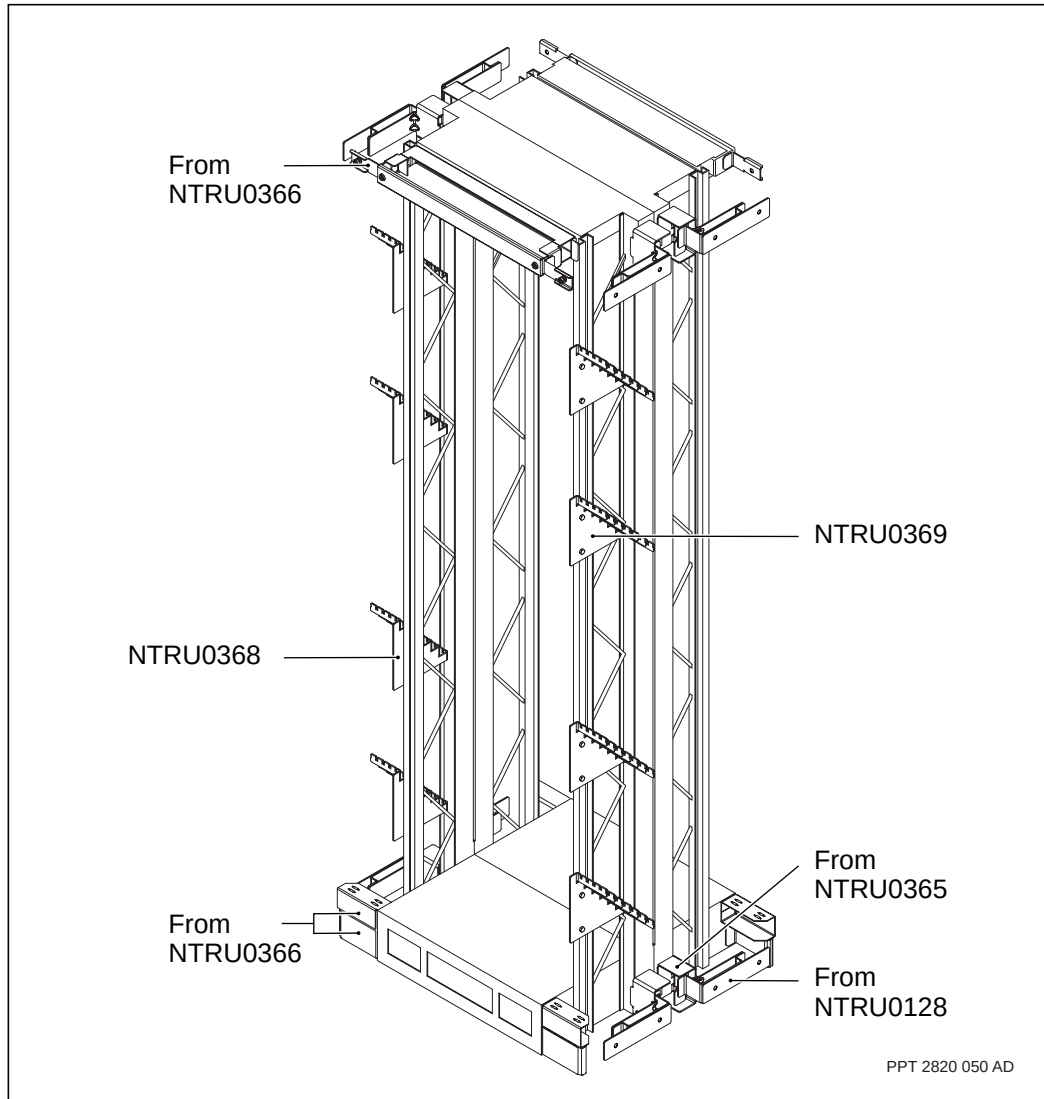


Figure 135
Assembly of a side panel bracket, left and right, upper or lower

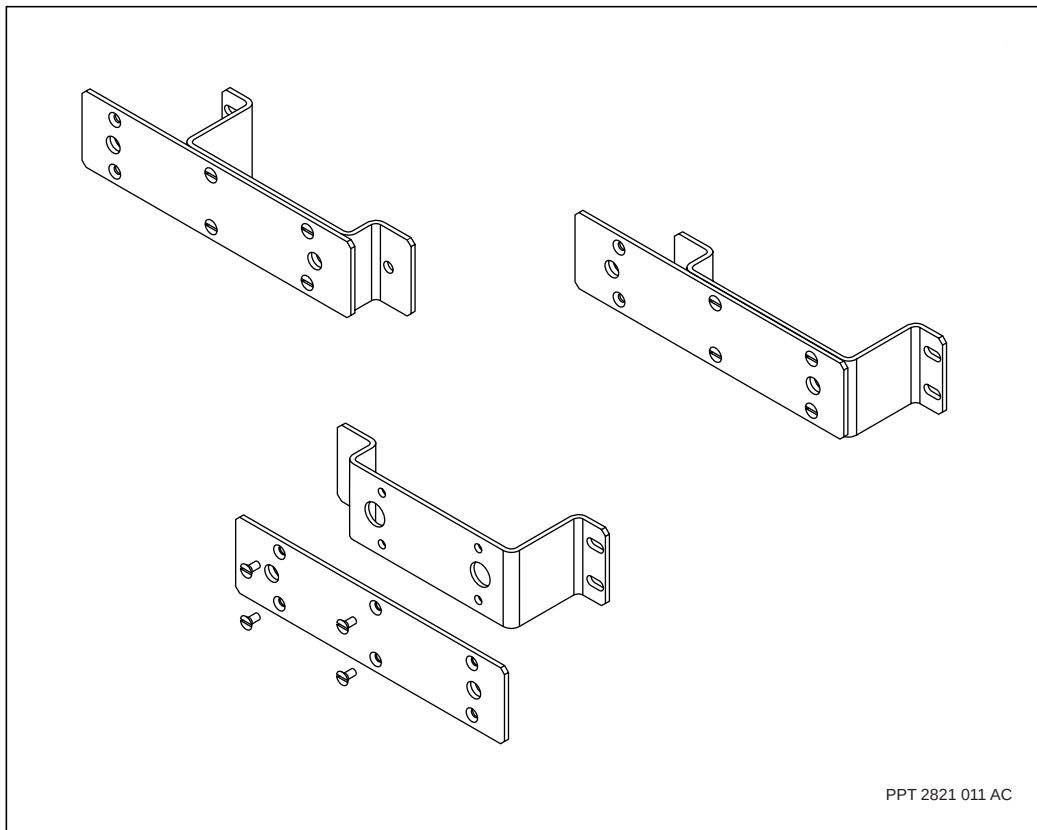


Figure 136
Upper brackets for frame panels

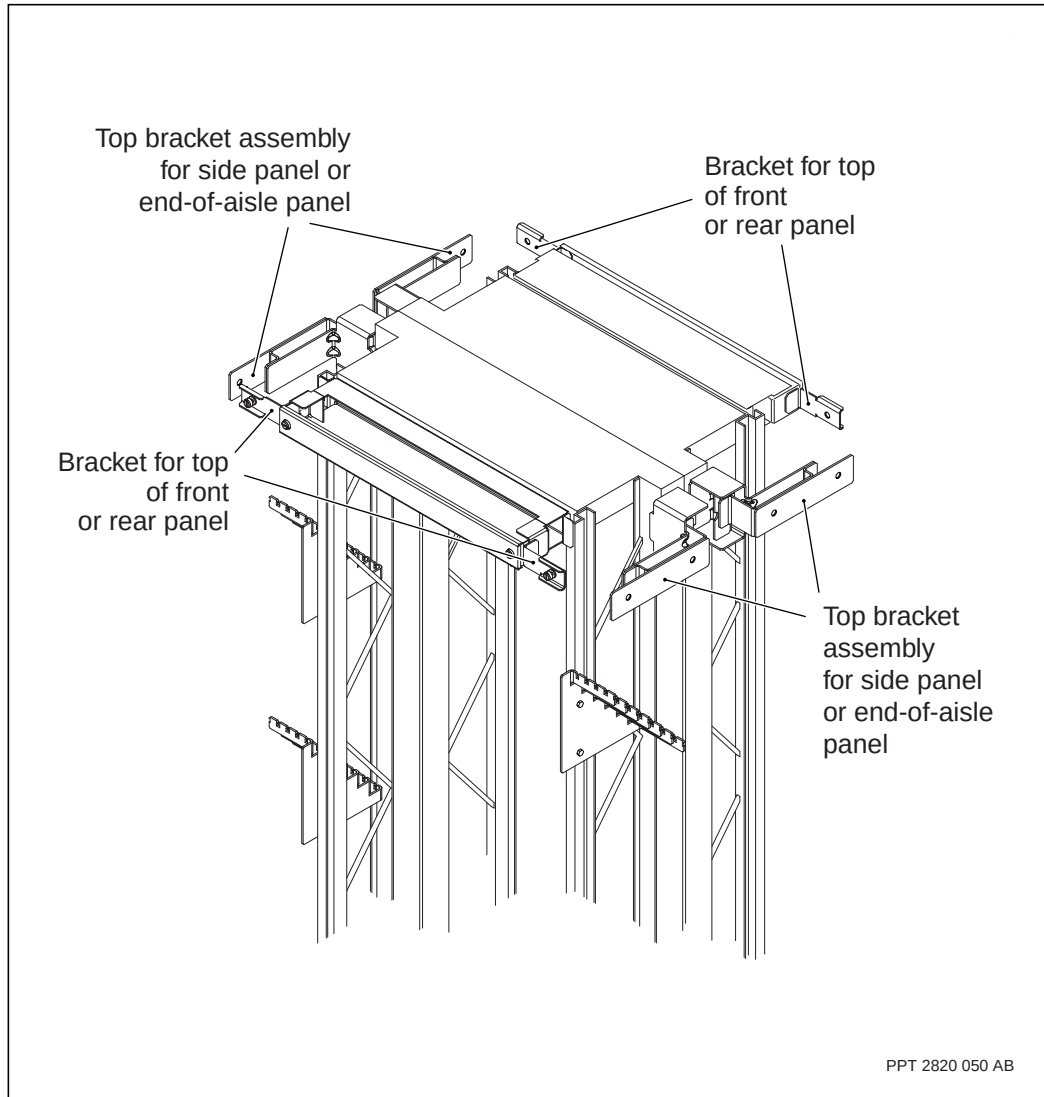


Figure 137
Lower brackets for frame panels

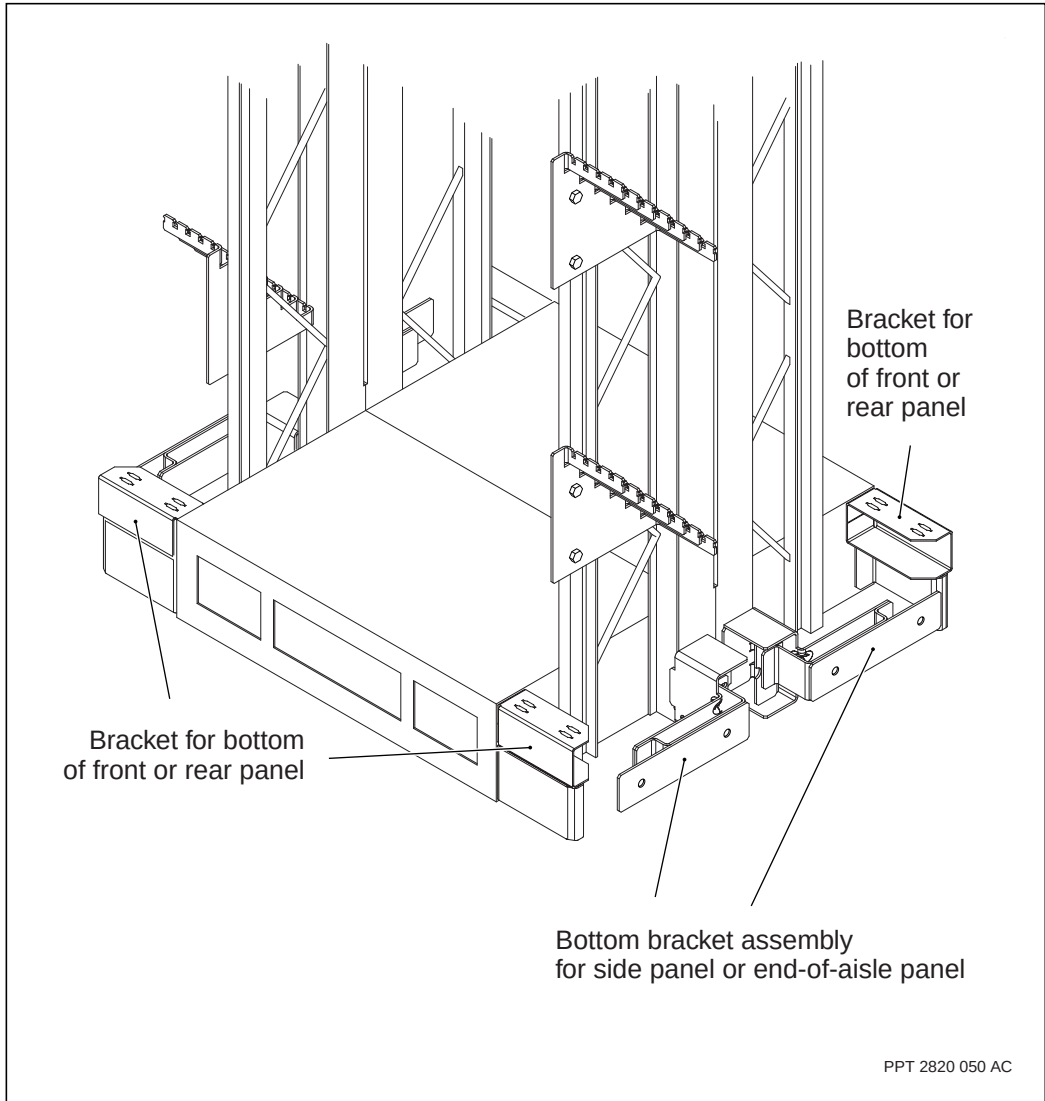
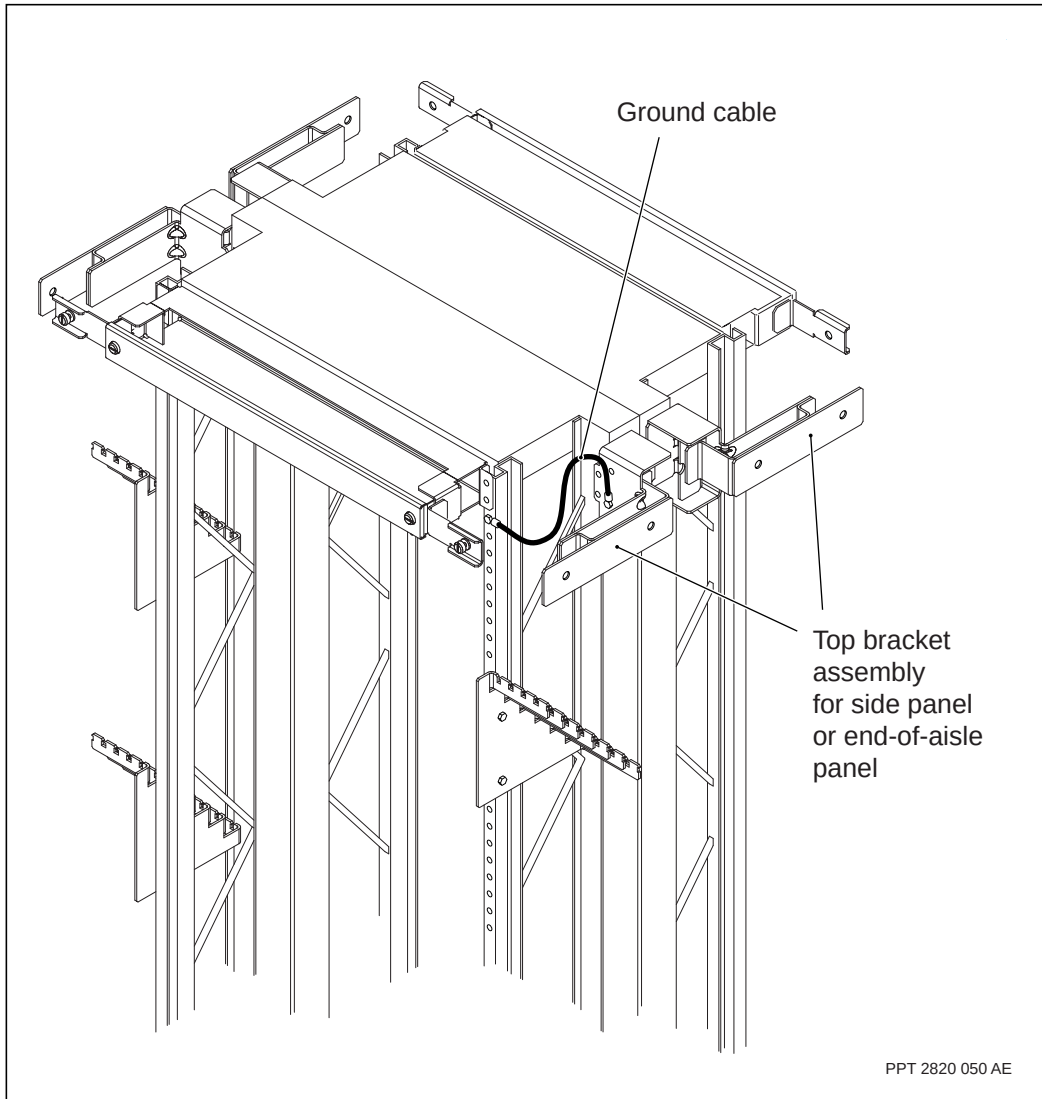


Figure 138
Side panel grounding cable



Installing a sparing panel

Install sparing panel in a frame, rack, or cabinet to enable sparing configuration as part of an initial installation or as part of a replacement.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You may need to assemble the NTQS31 sparing panel prior to mounting. See “Assembling sparing panel NTQS31” (page 207).

Procedure steps

- 1 At the Passport 15000 or 20000 switch, unpack the sparing panel from its container.
- 2 Orient the sparing panel as shown in the figure “A 12-port DS3 or E3 one-for-six sparing panel NTQS31, fully assembled” (page 433).
- 3 With a helper holding an end of the new sparing panel with the connectors facing into the frame and the standard coax connectors at the top, Place the replacement panel against the mounting apparatus so that it aligns with the appropriate mounting holes.

With the 12-port NTQS31, have a helper hold the panel in position for fastening. The sparing panel has key-hole pins that align with the holes in the frame.

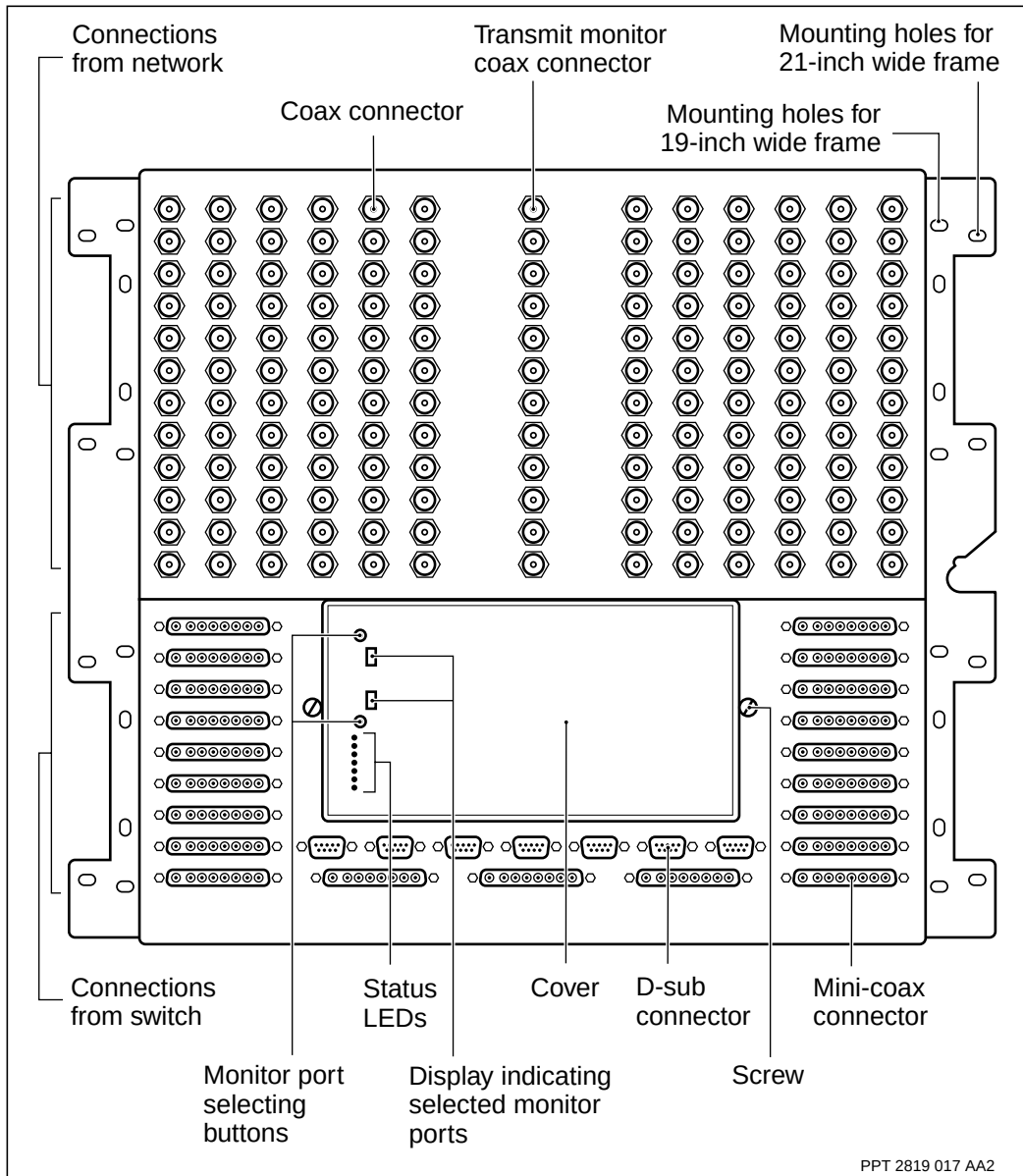
- 4 While the helper continues to hold an end of the panel in position, fasten a thread-forming 10-mm (3/8-in.) hex-head screw through the upper left and the upper right mounting holes. Leave the screws close to being seated.
- 5 Align the centers of the remaining mounting holes on the panel with the holes on the mounting apparatus.
- 6 If the sparing panel is rack-mounted, fasten the grounding cable to the panel where it was before.
- 7 Add the remaining fasteners, starting with a lower corner. Finger-tighten all screws.
- 8 Tighten all screws to snug plus a 1/4 turn.
- 9 If you strip any of the fasteners
 - with a 12-port 21-inch wide sparing panel NTQS31, you must use one of the unused mounting holes or move the panel

- with a 4-port 19-inch wide sparing panel, you must reposition the panel
- 10** While waiting to confirm whether the LED status of each connected FP shows solid or flashing green, pack the old panel in the container.
- If the Spare path through the sparing panel was active before the panel was unpowered, it will become the active path again. The Main LED will light first and then only the Spare LED.

Procedure job aid

Figure 139

A 12-port DS3 or E3 one-for-six sparing panel NTQS31, fully assembled



PPT 2819 017 AA2

Installing a strain-relief bar

Install the strain-relief bar to support the weight of the power input cables and the BIP-to-shelf cable assemblies.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a strain relief bar with the part number P0911981.

Procedure steps

- 1 While facing the rear of the BIP, hold the bar so that:
 - the long flat side is at the top
 - the short flat side faces you
 - the mounting ears point away from you
- 2 Locate the top rear adapter brackets mounted to the rack.
- 3 Position the mounting ears of the bar against the top adapter brackets so that the ear holes align with the remaining 4 adapter holes. The temperature sensor bracket and the strain-relief bar share the same adapter brackets. See the figure “Location of the temperature sensor bracket assembly on a NEBS 2000 frame or a rack” (page 439).
- 4 While holding the bar in position, loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw from pack P0601478 through each upper mounting-ear hole.
- 5 Loosely fasten the remaining 2 screws.
- 6 Center the bar and tighten all 4 screws to snug plus a 1/4 turn.

Installing a temperature sensor bracket assembly

Install a temperature sensor bracket assembly for an upper cooling unit to monitor the temperature of the air flow exiting the top of the shelf assembly.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need either version of a temperature sensor assembly bracket:
 - NTHR68AA used with an upper (front) cooling unit NTHR52AA or NTHR52AB
 - NTHR68AB used with an upper (front) cooling unit NTHR52AA or NTHR52AB
- You need a driver for the thread-forming 10-mm (3/8-in.) hex-head screws that fasten the bracket to the frame or rack.
- You need a step ladder to see the top of an upper shelf assembly that is mounted in a NEBS 2000 frame or other mounting apparatus.
- You must install the temperature sensor bracket when you have these hardware kits:
 - upper shelf upgrade NTQS03 for Passport 15000 or NTQH03 for Passport 20000
 - shelf-based NTQS04 for Passport 15000 or NTQH04 for Passport 20000

Procedure steps

- 1 If not already assembled, fasten each of 3 sensors to the NTHR68 bracket with a circuit board in between them. Use the small Phillips screws. Ensure that the wire connectors point to the right along the axis of the bracket as shown in the figure “A temperature sensor bracket assembly NTHR68AA for a cooling unit NTHR52AA” (page 437). The sensors may be different on the NTHR68AA version as shown in the figures “A temperature sensor bracket assembly NTHR68AA for a cooling unit NTHR52AA” (page 437) and “A temperature sensor bracket assembly NTHR68AB for a cooling unit NTHR52AB” (page 438).
- 2 While facing the rear of the BIP, hold the bracket assembly so that:
 - the sensors point upwards

- the 3-prong wire connectors point to the right side
 - the mounting ears are above the flat span of the bracket
- 3 Locate the nearest mounting holes on the uprights of the NEBS 2000 frame as shown in the figure “Location of the temperature sensor bracket assembly on a NEBS 2000 frame or a rack” (page 439) or on the adapter brackets that are already fastened to a 23-in. wide EIA rack as shown in the figure “Location of the temperature sensor bracket assembly on a 23-inch wide EIA rack” (page 440).
 - 4 Insert the bracket assembly between the frame uprights or the rack adapter brackets, below the BIP, and above the shelf until the mounting ears touch the uprights or the adapter brackets.
 - 5 Align the mounting-ear screw holes (shown in the figures) with the lowest holes on the brackets.
 - 6 Loosely fasten a threading-forming 10-mm (3/8-in.) hex-head screw from pack P0601478 through the 2 mounting-ear holes.
 - 7 Center the sensor bracket and tighten both screws to snug plus a 1/4 turn.
 - 8 At the end of the cable assembly with the 3 connectors occurring at different lengths, connect the longest one to the left sensor, the middle one to the middle sensor, and the shortest the right. Ensure that you plug in each connector, with gentle, even, steady, straight force.
 - 9 Route the rest of the cable assembly to the right side of the rack and down to the rear of the cooling unit. Leave it hanging loosely for now.

Procedure job aid

Figure 140

A temperature sensor bracket assembly NTHR68AA for a cooling unit NTHR52AA

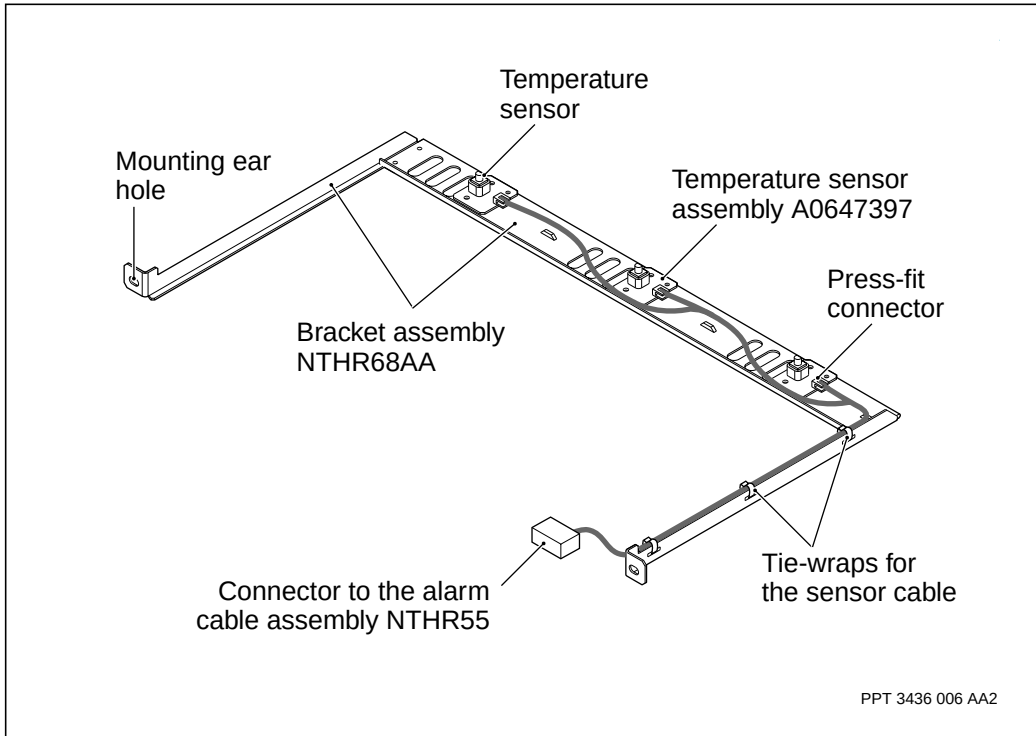


Figure 141
A temperature sensor bracket assembly NTHR68AB for a cooling unit NTHR52AB

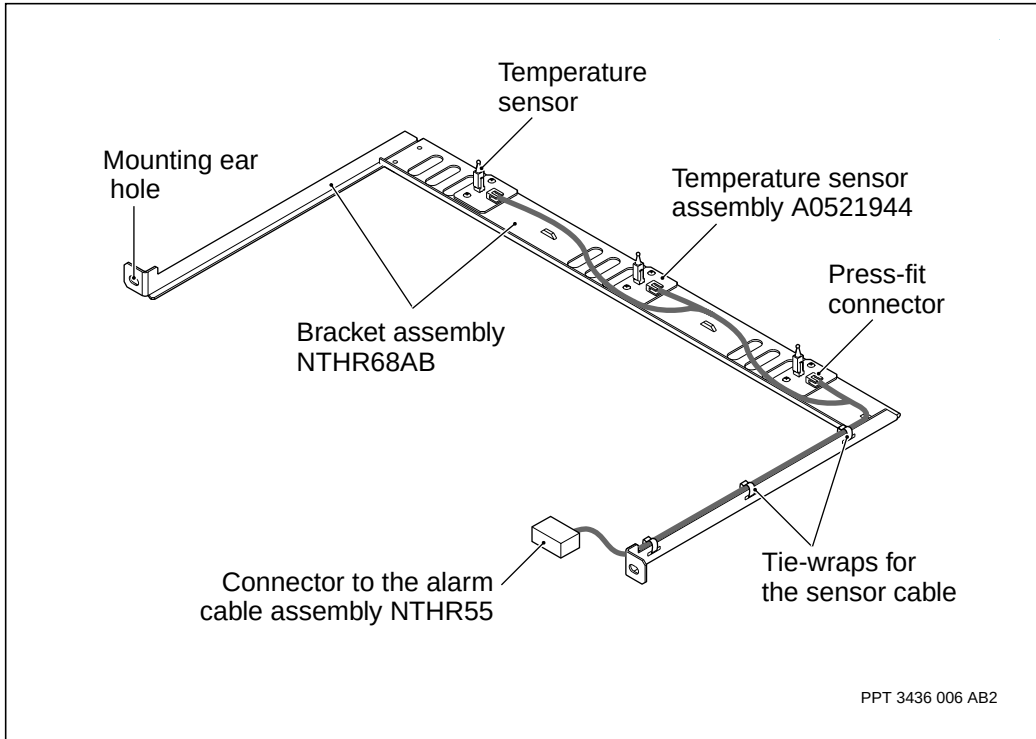


Figure 142
Location of the temperature sensor bracket assembly on a NEBS 2000 frame or a rack

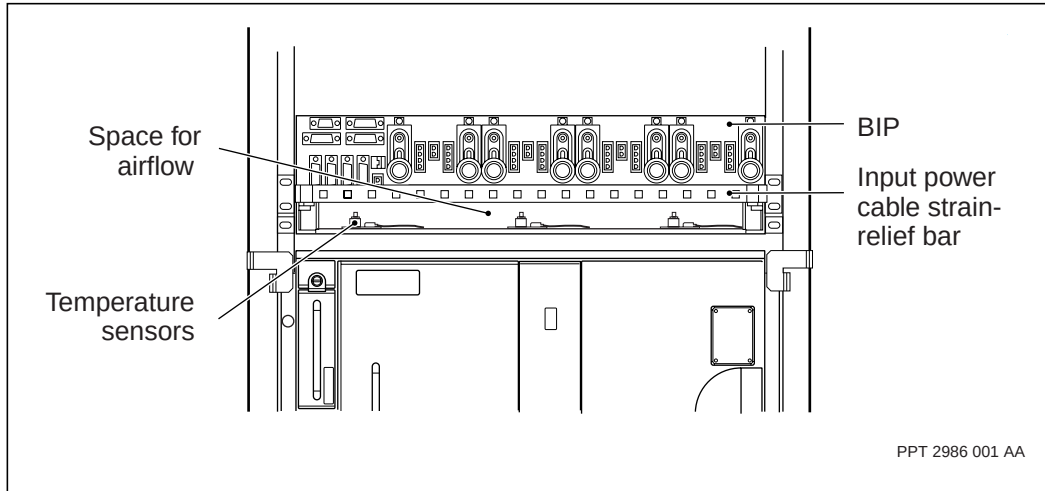
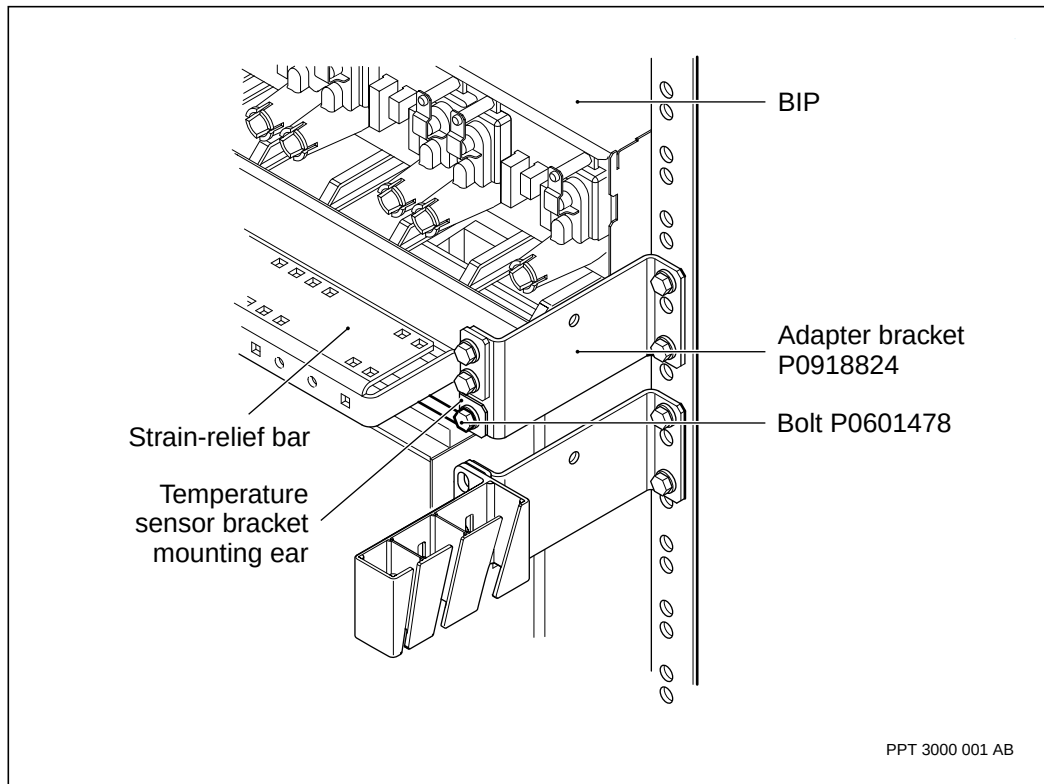


Figure 143
Location of the temperature sensor bracket assembly on a 23-inch wide EIA rack



Installing a temperature sensor for an upper cooling unit

Install an upper cooling unit temperature sensor to restore optimum cooling and to reduce the rpm of the fans to normal speed.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the appropriate version of temperature sensor:
 - A0647397 for the temperature sensor in the bracket assembly NTHR68AA used with an upper (front) cooling unit NTHR52AA; all sensors on a bracket assembly must have the same part number
 - A0521944 or A0647397 for the temperature sensor in the bracket assembly NTHR68AB used with an upper (front) cooling unit NTHR52AB
- You need a very short-shafted screwdriver for a small Phillips screw and a step ladder to see onto the top of an upper shelf in a NEBS 2000 frame or other mounting apparatus.

Procedure steps

- 1 At the rear top of the upper shelf, align the replacement temperature sensor and circuit board with the 2 screw holes. Refer to the figure “Location of the temperature sensors on a bracket assembly” (page 442). Avoid dropping the sensor assembly.
- 2 Fasten the sensor assembly using the 2 M6 Phillips screws from the removal. Tighten the screws to snug plus a 1/5 turn. If you drop a screw, you must retrieve it to prevent equipment damage. See the orientation of the sensors in the figures:
 - “A temperature sensor on the bracket assembly NTHR68AA for a cooling unit NTHR52AA” (page 443)
 - “A temperature sensor on the bracket assembly NTHR68AB for a cooling unit NTHR52AB” (page 444)
- 3 Plug the unplugged cable connector into the new sensor assembly. Apply gentle, even, steady, and straight force.
- 4 Verify the operation of the replaced sensor by waiting:
 - for the fan LED to change from lit red to lit green

- a few minutes to hear the fans reduce rpm
- for the software alarm 7012 0051 with FANFAIL to clear

Procedure job aid

Figure 144

Location of the temperature sensors on a bracket assembly

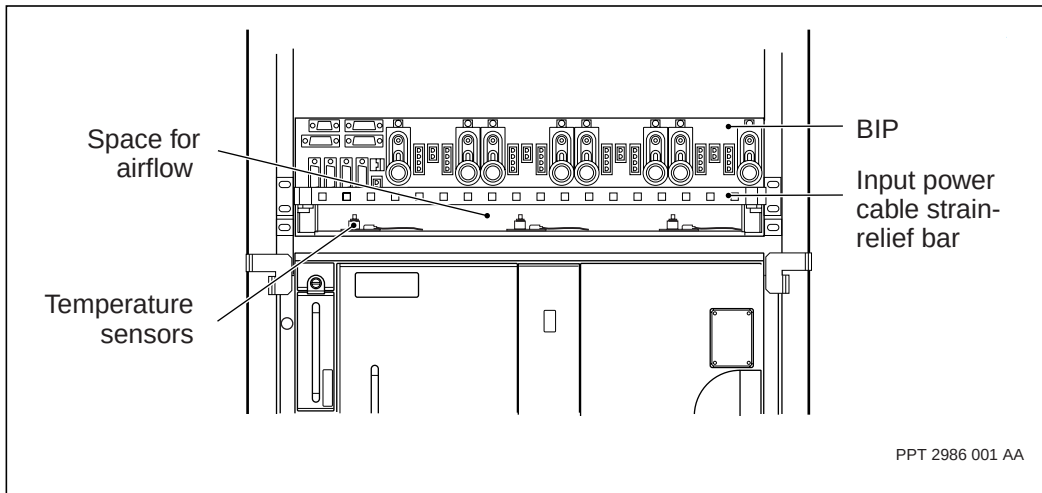


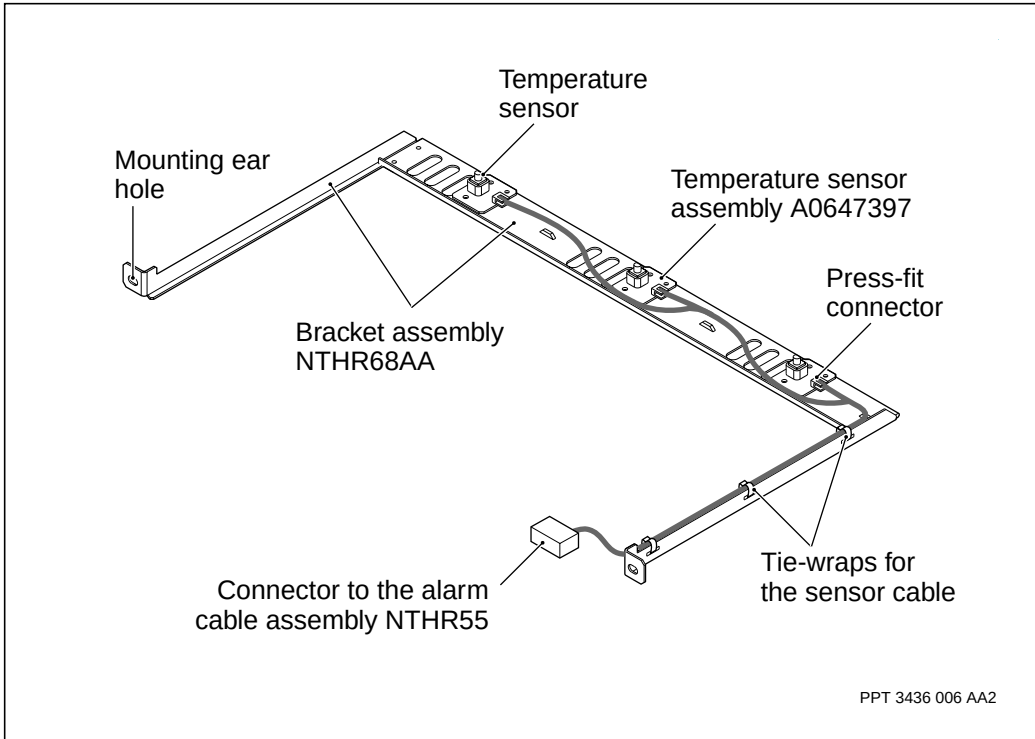
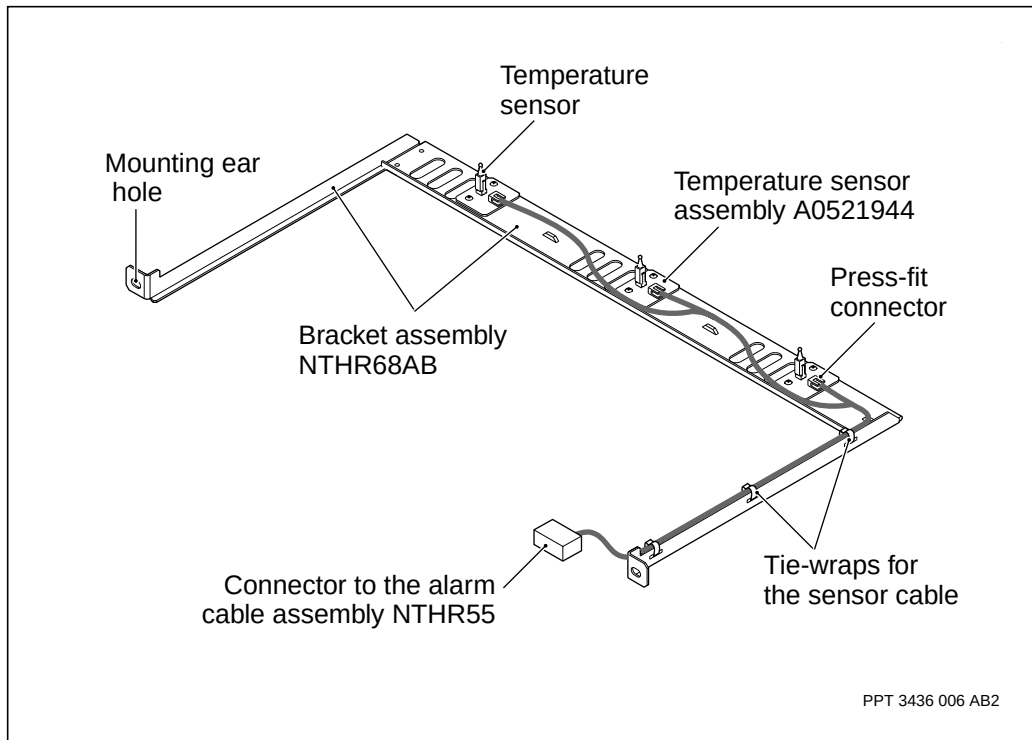
Figure 145**A temperature sensor on the bracket assembly NTHR68AA for a cooling unit NTHR52AA**

Figure 146
A temperature sensor on the bracket assembly NTHR68AB for a cooling unit NTHR52AB



Installing a temperature sensor inside a lower cooling unit

Install a lower (rear) cooling unit temperature sensor to restore optimum cooling and to reduce the rpm of the fans to normal speed.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the appropriate version of temperature sensor:
 - A0647397 for the temperature sensor inside a lower (rear) cooling unit NTHR51AA
 - A0521940 or A0647397 for the temperature sensor inside a lower (rear) cooling unit NTHR51AB
- You need these specialty tools:
 - a medium non-magnetic one-piece Phillips screwdriver with a very short shaft
 - a flashlight to see through the spinning fan blades at what your hand is touching inside the cooling unit
- The air filter will prevent a dropped screw or tool from reaching the powered processor cards below the cooling unit.
- The temperature sensors for the lower (rear) cooling unit are located inside the cooling unit.



WARNING

Risk of injury or equipment damage by electricity

While installing a temperature sensor inside a cooling unit, less than -48/-60 V dc is still live on the controllers and other two fans. Do not drop a screw, and because of the exposed electronics inside the unit, do not use a magnetic screwdriver. A dropped screw must be retrieved. Also, do not touch anything other than the sensor, its screws, or its wires.

**WARNUNG****Verletzungsgefahr oder Geräteschäden durch Elektrizität**

Beachten Sie beim Austauschen eines Temperaturfühlers in einem Kühlaggregat, daß die Steuerungen und verbleibenden beiden Lüfter immer noch eine Spannung von bis zu -48/-60 V führen. Lassen Sie keine Schrauben fallen, und arbeiten Sie aufgrund der freiliegenden Elektronikbauteile in der Einheit nicht mit einem Magnetschraubendreher. Heben Sie fallengelassene Schrauben auf. Berühren Sie nur den Temperaturfühler, seine Schrauben und Verdrahtungen.

Procedure steps

- 1 Put the replacement temperature sensor above the circuit board, and put them inside the cooling unit where the old one was removed. Note the orientation of the screw holes in the figures "Location of the temperature sensors inside a lower cooling unit NTHR51AA" (page 447) and "Location of the temperature sensors inside a lower cooling unit NTHR51AB" (page 449). Avoid dropping the parts.

To see what your hand is doing, look through the spinning blades of the adjacent fan. You may need a flashlight to increase visibility. The plug-in of the right sensor is hidden behind a cluster of wires which cannot be moved. Find the plug-in by touch.

- 2 Fasten the sensor and circuit board using the 2 M6 Phillips screws from the removal. Tighten the screws to snug plus a 1/5 turn. If you drop a screw, you must retrieve it to prevent equipment damage.
- 3 Remove the ESD mat.
- 4 Plug the unplugged red cable connector into the new sensor assembly as shown in the figures "Cable connections inside a cooling unit NTHR51AA or NTHR52AA" (page 448) and "Location of the temperature sensors inside a lower cooling unit NTHR51AB" (page 449).
- 5 Re-install the fan controller according to the procedure "Installing a fan controller" (page 361).
- 6 Re-install the fan according to the procedure "Installing a fan" (page 355).
- 7 Verify the operation of the replaced sensor by waiting
 - for the fan LED to change from lit red to lit green

- a few minutes to hear the fans reduce rpm
- for the software alarm 7012 0051 with FANFAIL to clear

Procedure job aid

Figure 147

Location of the temperature sensors inside a lower cooling unit NTHR51AA

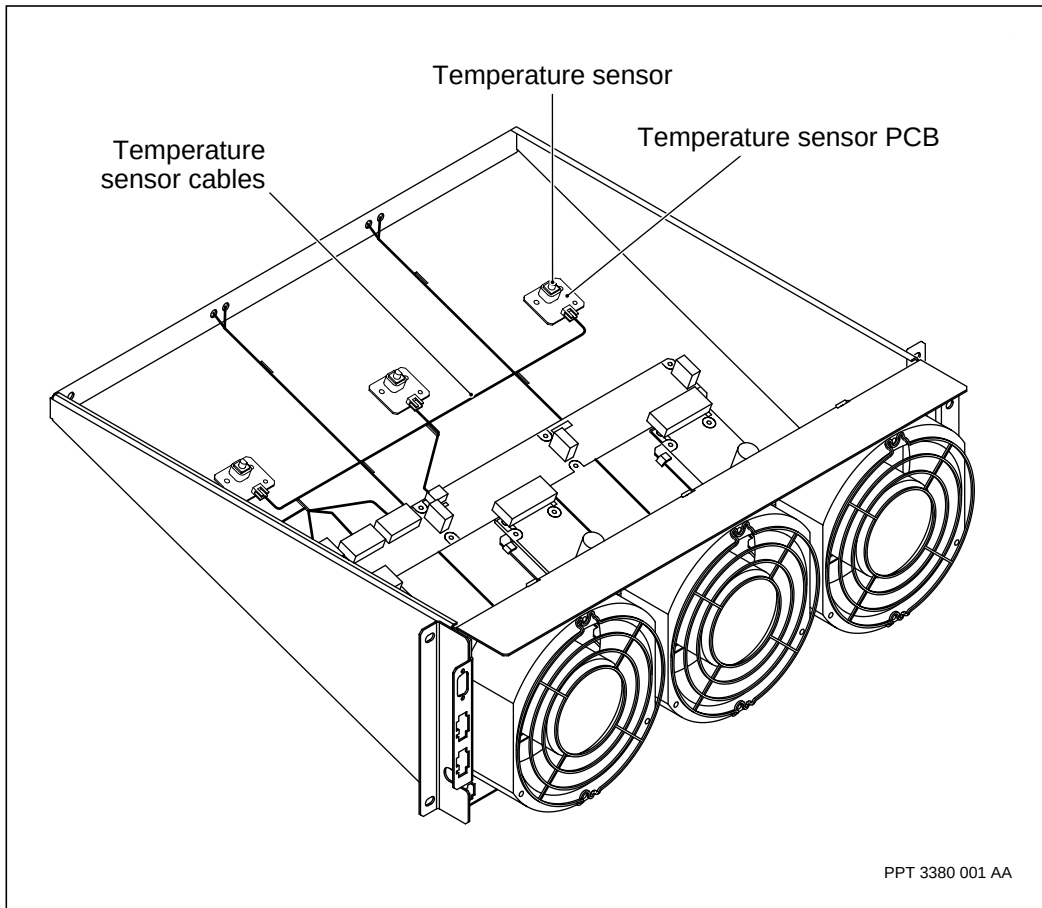


Figure 148
Cable connections inside a cooling unit NTHR51AA or NTHR52AA

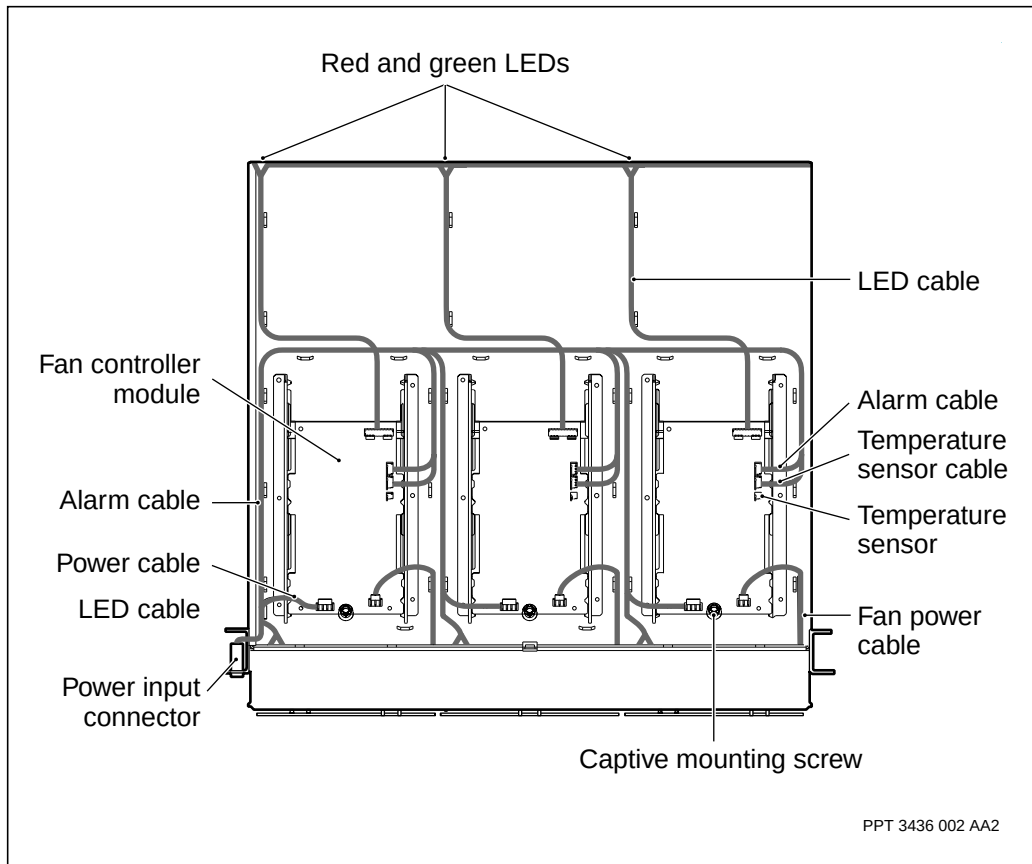
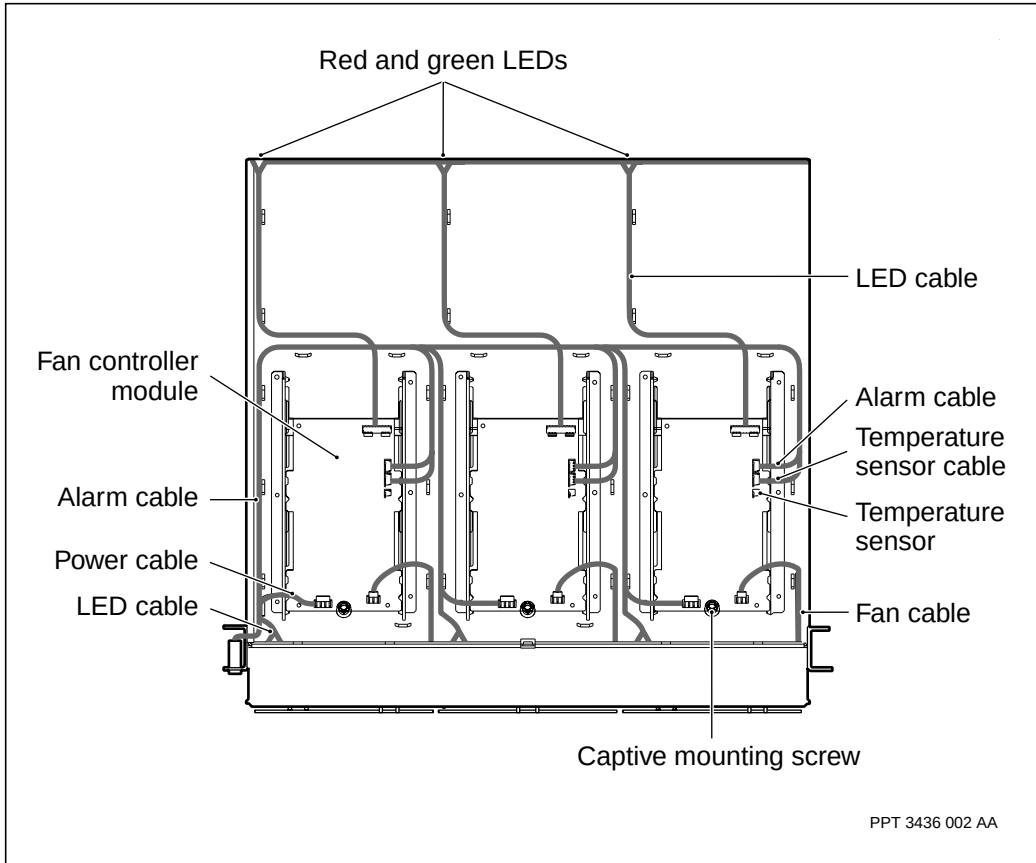


Figure 149
Location of the temperature sensors inside a lower cooling unit NTHR51AB



Installing a timing cable adaptor NTPN81

Install a balanced-to-unbalanced timing cable adaptor (NTPN81) to convert an E1 alarm/BITS module into an unbalanced version on Passport 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a hardware kit with PEC NTPN81. The kit provides a cable assembly and a balun adapter to convert an NTPN13 alarm/BITS module into an unbalanced version. For a redundant timing configuration, two kits are required. The kit includes:
 - a 38-cm (15-in.) E1 timing cable assembly with a DB-9 connector at one end and an RJ-45 at the other
 - a balun adapter unit, G.703 model 460 series manufactured by Patton Electronics Co.
- The cable assembly and the adapter provide a balanced-to-unbalanced coax-to-twisted-pair connection. The cable allows 75-ohm coax hardware to communicate with 120-ohm twisted pair hardware through standard unshielded category 3 cable. See the figure “A timing cable assembly from kit NTPN81” (page 452) and the figures in the User Manual provided with the 460.
- The cable assembly NTPN81 does not require EMI filters on the J3 or J4 connections.
- The balun cable connection is designed for common bond grounding. The cable is always grounded on a Passport 15000 or 20000 unless you alter it for the receive (Rx) end of the connection. The transmit (Tx) end of the connection is ungrounded for a Passport 15000 or 20000 because that connection is unused. When you choose to not ground the timing cable, jumper JP2 must be removed to break the shield connection. The instructions to remove it are included in the User Manual of the model 460.

Procedure steps

- 1 At the alarm/BITS module, plug the male D-sub connector of the cable into the connector labelled J3.

- 2** Fasten the 2 small slotted screws of the D-sub connector to the alarm/BITS module. Tighten to snug plus a 1/5 turn.
- 3** At the other end of the cable, plug the RJ-45 connector into the model 460 adapter. Press them together until the tab engages.
- 4** Fasten a coax cable to the output of the site timing source and route it to the receive (Rx) coax connector on the model 460 adapter. Ensure that there is enough slack to fasten the cable and adapter to structures with tie-wraps.
- 5** Connect the coax cable to the adapter. Let the adapter hang freely or tie-wrap it to the switch's mounting apparatus. Ensure that the adapter is positioned out of the way from personnel or equipment passing at the rear of the Passport.
- 6** Cover the transmit (Tx) coax connector on the model 460 adapter with electrical tape. The Tx connection is not used for a Passport 20000.
- 7** Label the coax cable at the site BITS source to identify the switch receiving the timing signal.
- 8** Use a line analyzer to determine the signal strength for the timing signals at the J3 and J4 connections from the site source. The signal strength must be within the range indicated in "Making a BITS cable" (page 510).

If each signal is not within the range, fix the problem between the point of test and the site source. Depending on the length of cable from the site source, you may need a thicker gauge cable to provide the signal strength.
- 9** Repeat this procedure for the redundant timing setup. Connect the second timing cable into the alarm/BITS connector labelled J4.

Procedure job aid

Figure 150

A timing cable assembly from kit NTPN81

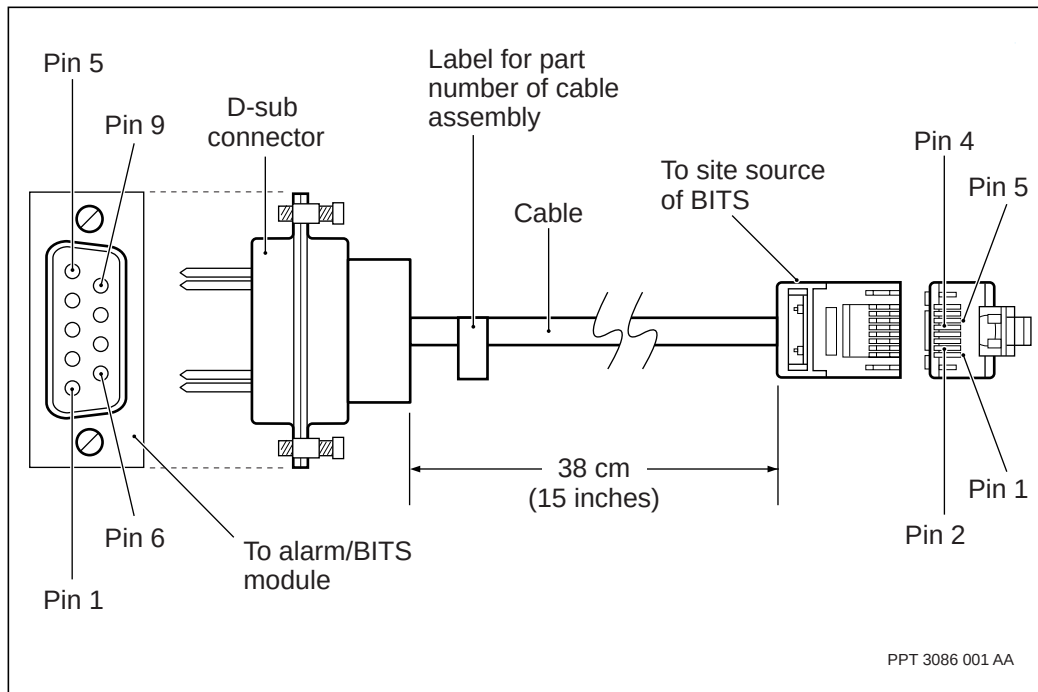


Table 21

Pinout of the timing cable assembly from NTPN81

Pin number at J3 or J4 end	Pin number at timing source	Signal on the connection for the Passport 15000 or 20000	Description of signal
1	2	BITSTXAP	BITS transmit BIT A, positive
5	4	BITSRXAP	BITS receive BIT A, positive
6	1	BITSTXAN	BITS transmit BIT A, negative
9	5	BITSRXAN	BITS receive BIT A, negative

Installing a timing cable DS1 wire-wrap NTHW75

Install a wire-wrap timing cable assembly to use with a DS1 alarm/BITS module when required to comply with GR-1244 and where an external 8-kHz BITS timing source signal is used.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The module and cable assembly are typically factory-installed. In case of a retrofit, the cable assembly and termination block are also available in the kit NTHW74.
- You need a timing cable assembly with PEC NTHW75. This optional external sync cable assembly is a 2-pair tightly twisted wire-wrap cable connecting J3 and J4 on the alarm/BITS module to an externally mounted termination block. See the figure “A timing cable assembly NTHW75” (page 456).
- The external sync wire-wrap cable assembly NTHW75 can only be used with the DS1 alarm/BITS module NTHW76 for Passport 15000 or NTPN78 for Passport 20000.
- You need a driver for the 10-mm (3/8-in.) hex screws that has at least a 10-cm (4-in.) reach to get past the terminal block.
- For custom-made cables, see cable specifications in the 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure steps

- 1 Use 2 thread-forming 10-mm (3/8-in.) hex-head screws to fasten the wire-wrap terminal block to the rear of the NEBS 2000 frame uprights within 63.5 cm (25 in.) of the alarm/BITS module. The mounting ears are shown in the figure “A timing cable assembly NTHW75” (page 456).
- 2 Run the cable assembly down the side of the NEBS 2000 frame until the alarm/BITS module is within reach.
- 3 Use tie-wraps to loosely dress the cables to the side of the frame.
- 4 Run the customer-supplied BITS cables from the site timing source to the terminal block of the NTHW75.

If you currently have a site timing cable connected to J3 and J4, you can use the existing timing cable by removing the DB9 connectors from the cable assembly and stripping the wires back in order to terminate onto the terminal block.

- 5 Remove the terminal cover from the wire-wrap terminal block. The cover is shown in the figure "A timing cable assembly NTHW75" (page 456).
- 6 Using hook-up wire and a ring lug, jumper the shield pins S5, S8, S9, S11 together and connect to the frame stiffener. The pin designations are labeled on the terminal block.
- 7 Strip back the timing cable approximately 15 cm (6 in.).
- 8 Route the timing cable into the terminal block.
- 9 Wire wrap the timing cable to the pins identified in the tables
 - "Wiring pinout for J3 of cable assembly NTHW75" (page 454)
 - "Wiring pinout for J4 of cable assembly NTHW75" (page 454)

Table 22
Wiring pinout for J3 of cable assembly NTHW75

Wire wrap	Wire color	DB9 connector A0329608	Description of signal	Termination required?
T4	black	5	BITSRXBP BITS I/F receive +(pos)	yes
R4	black and red	9	BITSRXBN BITS I/F receive -(neg)	yes

Table 23
Wiring pinout for J4 of cable assembly NTHW75

Wire wrap	Wire color	DB9 connector A0329608	Description of signal	Termination required?
T1	black	5	BITSRXAP BITS I/F receive +(pos)	yes
R1	black and red	9	BITSRXAN BITS I/F receive -(neg)	yes

- 10** The timing cable shield needs to be grounded on one end. Normally, do this on the site's BITS shelf of the timing source generator.
- 11** Determine the signal strength of the timing signals for the alarm/BITS module by connecting a line analyzer at the wire-wrap terminals on the terminal block, then at the DB9 connector pins of the cable assembly. The pins to test are identified in:
 - the table "Wiring pinout for J3 of cable assembly NTHW75" (page 454)
 - the table "Wiring pinout for J4 of cable assembly NTHW75" (page 454)
 - the figure "A timing cable assembly NTHW75" (page 456)

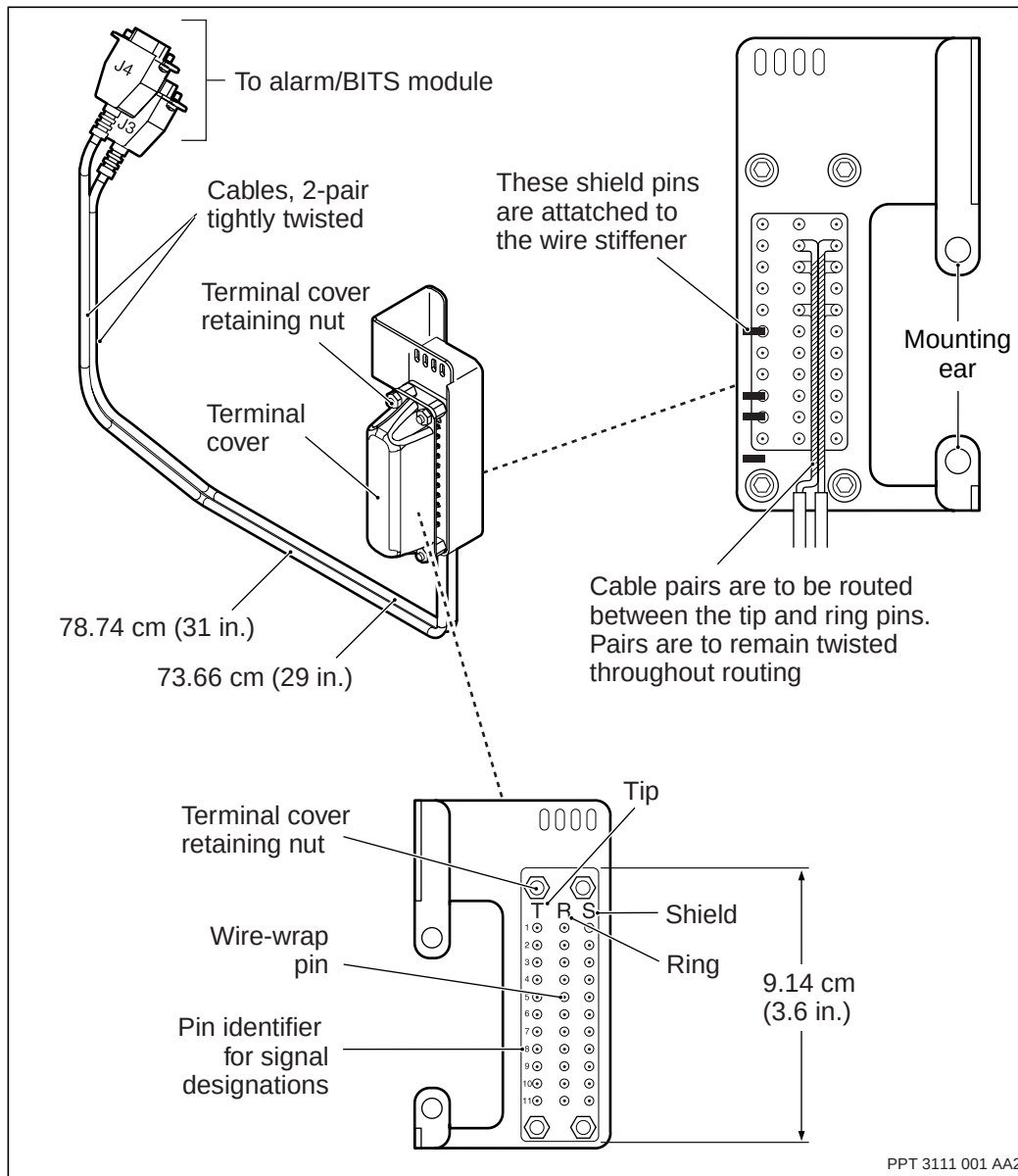
The range of DS1 signal strengths are identified in 241-1501-200 *Passport 15000, 20000 Hardware*. Depending on the length of cable from the site source, you may need a thicker gauge cable to provide adequate signal strength.

- 12** Connect the DB9 connector labelled J3 on the cable assembly to the J3 connection on the alarm/BITS module. Repeat for the J4 connection.

Procedure job aid

Figure 151

A timing cable assembly NTHW75



PPT 3111 001 AA2

Installing a timing cable for E1 unbalanced NTHR75

Install a timing cable assembly for E1 unbalanced in Passport 15000 to connect an E1 unbalanced timing signal from the site source to the alarm/BITS module with PEC NTHR14.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a timing cable assembly with PEC NTHR75. This timing cable is a 46-cm (18-in.) red cable assembly that converts the site coax BNC connector to a 2W2 interface at the BITS module for E1 unbalanced applications. See the figure “A timing cable assembly NTHR75” (page 459).
- For custom-made cables, see cable specifications in the 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure steps

- 1 Connect the cable end labeled Rx to the Tx of the site timing source. Do not use the end labelled Tx. Wrap electrical tape around the Tx end to prevent metal-to-metal contact.
- 2 Use a line analyzer to determine the signal strength for the timing signals at the J3 and J4 connections from the site source. The signal strength must be within the range indicated in 241-1501-200 *Passport 15000, 20000 Hardware*.

If the signal is not within the range, fix the problem between the point of test and the site source. Depending on the length of cable from the site source, you may need a thicker gauge cable to provide the signal strength.
- 3 At the alarm/BITS module, plug the male D-sub connector of the cable into the connector labelled J3.
- 4 Fasten the 2 small slotted screws of the D-sub connector to the alarm/BITS module. Tighten to snug plus a 1/5 turn.
- 5 Repeat this procedure for the redundant timing setup. Connect the second timing cable into the alarm/BITS connector labelled J4.

Procedure job aid

Figure 152

An inline EMI filter on a connector of an E1 alarm/BITS module in a Passport 15000

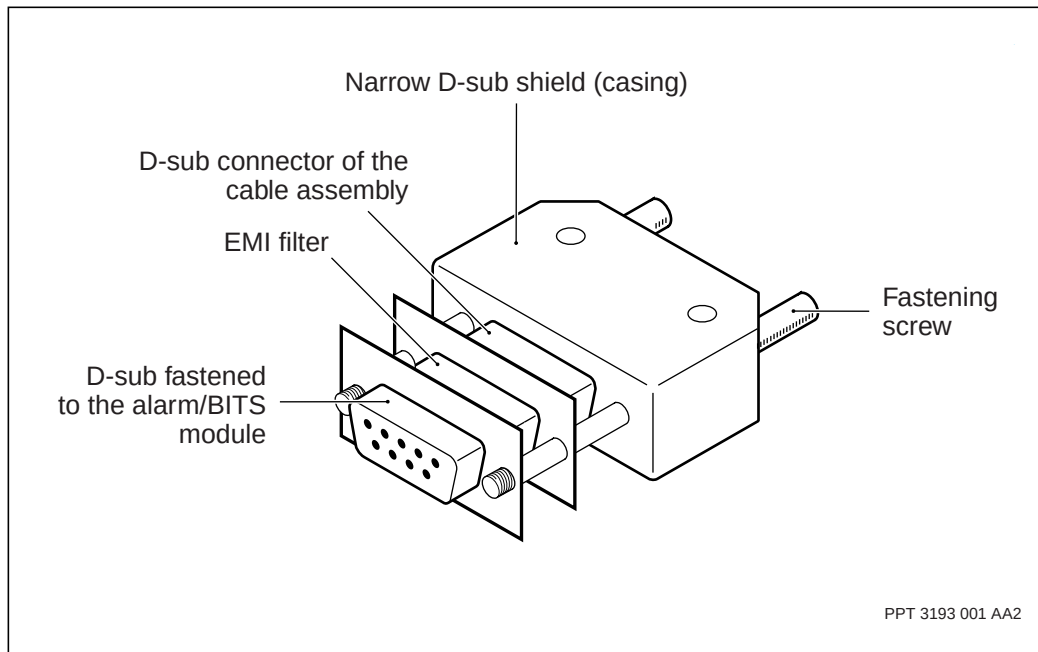
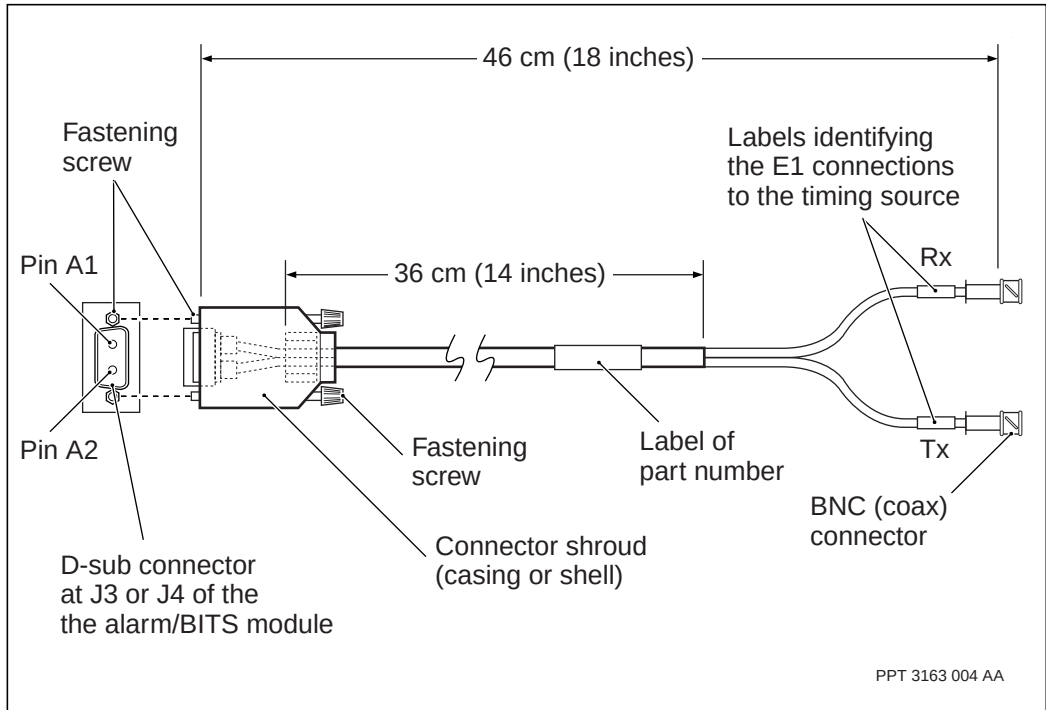


Figure 153
A timing cable assembly NTHR75



Installing adapter brackets onto a Shasta 5000

Install adaptor brackets onto a Shasta 5000 to prepare it for mounting onto the NEBS 2000 frame.

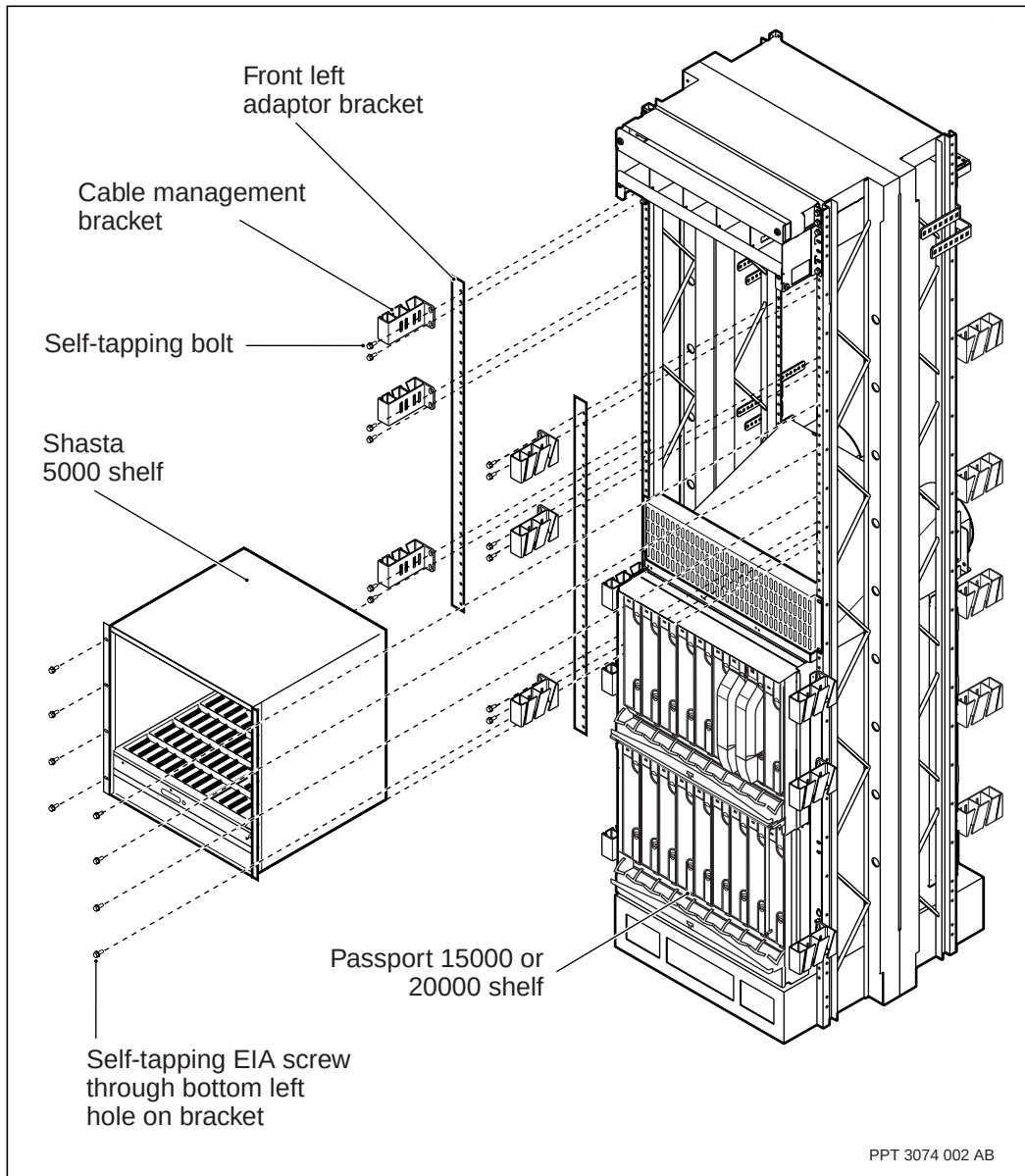
Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need adapter brackets with the following part numbers, from the hardware kit NTHW85:
 - P0914659, left adapter bracket
 - P0914660, right adapter bracket

Procedure steps

- 1 Hold the left bracket so that
 - a. it is vertical and two columns of holes face you
 - b. the label TOP faces you and is at the top
 - c. the wider spaced holes are at the left side
- 2 While facing the front of the Shasta 5000 (at the open cavity), position the surface of the bracket that is facing you against the rear of the left mounting ear on the Shasta 5000. For orientation, see the figure “Location of shelf hardware for a Shasta 5000 in a NEBS 2000 frame” (page 461).
- 3 The column of narrower holes are intended to fasten to the mounting ear. Align the bottom mounting ear hole with the left hole second from the bottom on the adapter bracket. A portion of each adapter bracket extends above the Shasta 5000 shelf.
- 4 Fasten the bracket to the mounting ear using 4 thread-forming 10-mm (3/8-in.) hex-head screws from the kit NTHW85. Thread the screws from the front towards the rear.
- 5 Tighten all screws to snug plus a 1/4-turn. Avoid stripping by over-tightening.
- 6 Repeat step 1 to step 5 for the right adapter bracket. Ensure the column of wider holes is at the right side and not attached to the mounting ears of the shelf.

Procedure job aid

Figure 154**Location of shelf hardware for a Shasta 5000 in a NEBS 2000 frame**

Installing an FP

Install an FP into an empty slot on a Passport shelf to enable a switch to provide configured services, or to resume backing up the active FP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The list of FPs supported by this procedure are in the chapter “Field replaceable units” in 241-1501-200 *Passport 15000, 20000 Hardware*.



CAUTION

Risk of damage to equipment from software

An incompatible software load can damage an FP beyond a field repair. Ensure that the software running on the switch meets the minimum software requirement for a replacement FP. For information on minimum software requirements see 241-5701-615 *Passport 7400, 15000, 20000 FP Configuration Reference*.

Procedure steps

- 1 If there is a blank processor card in the slot where the FP is to be installed, remove it according to “Removing a blank processor card” (page 536).
- 2 At the ends of the faceplate, swing each latch fully open by pinching the inner edge of the latch and lifting away from the faceplate. Refer to the figure “Open card latches on a CP, FP, or blank processor card” (page 464).
- 3 While holding the FP by its edges with the latches on the right side of the faceplate, align the end with the pins to the channels in the slot. Avoid touching anything on the FP.
- 4 Gently slide the FP into the slot until the FP stops moving. There are keyways and guide pins to ensure that the FP aligns with the connections at the backplane (inside at the rear of the shelf). If you feel resistance, do not force the FP in. Remove it, and check the backplane at the rear of the slot for bent pins. You may need a flashlight to see into the slot. If no pins are bent, re-seat the FP. If any pin is bent, do not insert an FP and contact your technical support representative of Nortel Networks.

**CAUTION****Risk of damage to the backplane from seating a card**

When latching a card into its final seating position, the card latches must be closed simultaneously to ensure that the card evenly engages the gaskets and pins on the backplane. Otherwise, improperly seating a card can damage the backplane hardware such that the slot becomes unusable. Restoring a slot to service from this kind of damage means replacing the shelf assembly.

- 5 Close both latches simultaneously until they are flush against the faceplate. Refer to the figure “Closed card latches on a CP, FP, or blank processor card” (page 465).

When a latch will not sit flush against the faceplate, do not force it. Fully open both latches, slide the card out to disengage contact from the backplane, and return to step 4.

When a latch does not sit flush after a second attempt, abort the seating and contact your next higher level of technical support.

Procedure job aid

Figure 155
Open card latches on a CP, FP, or blank processor card

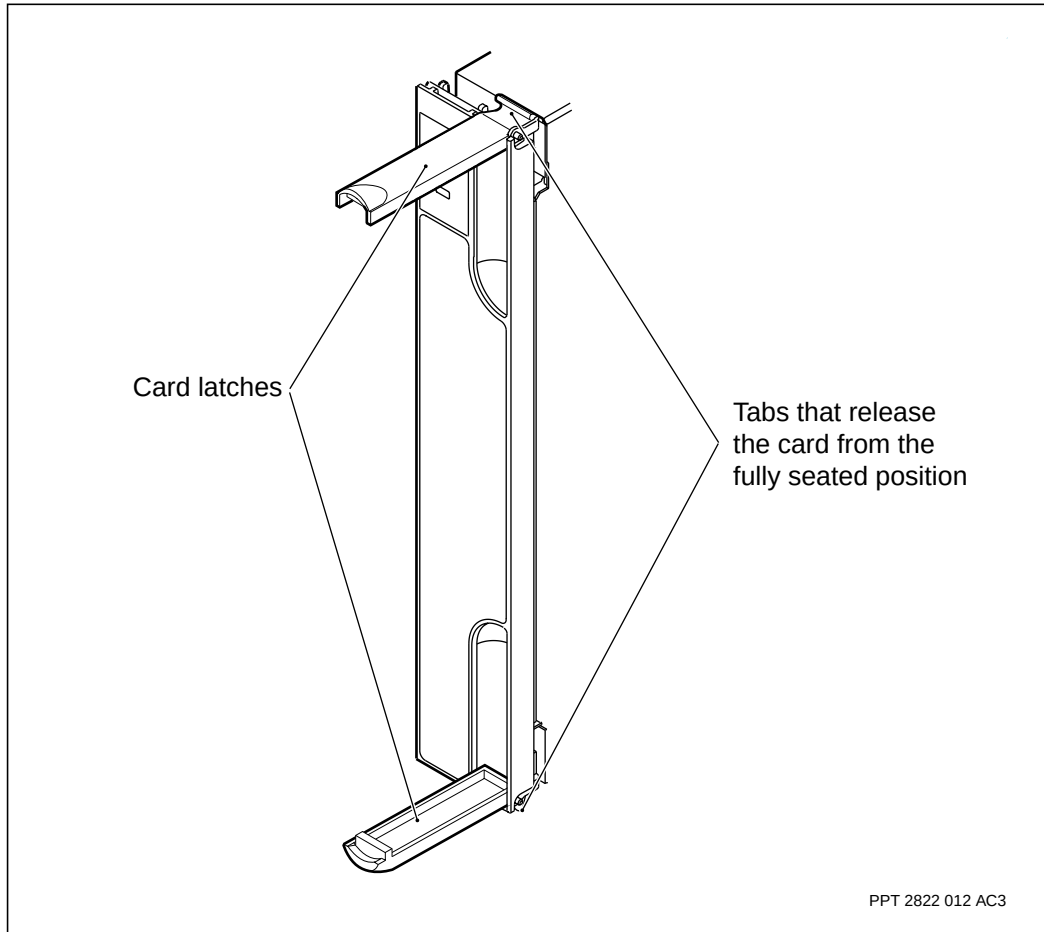
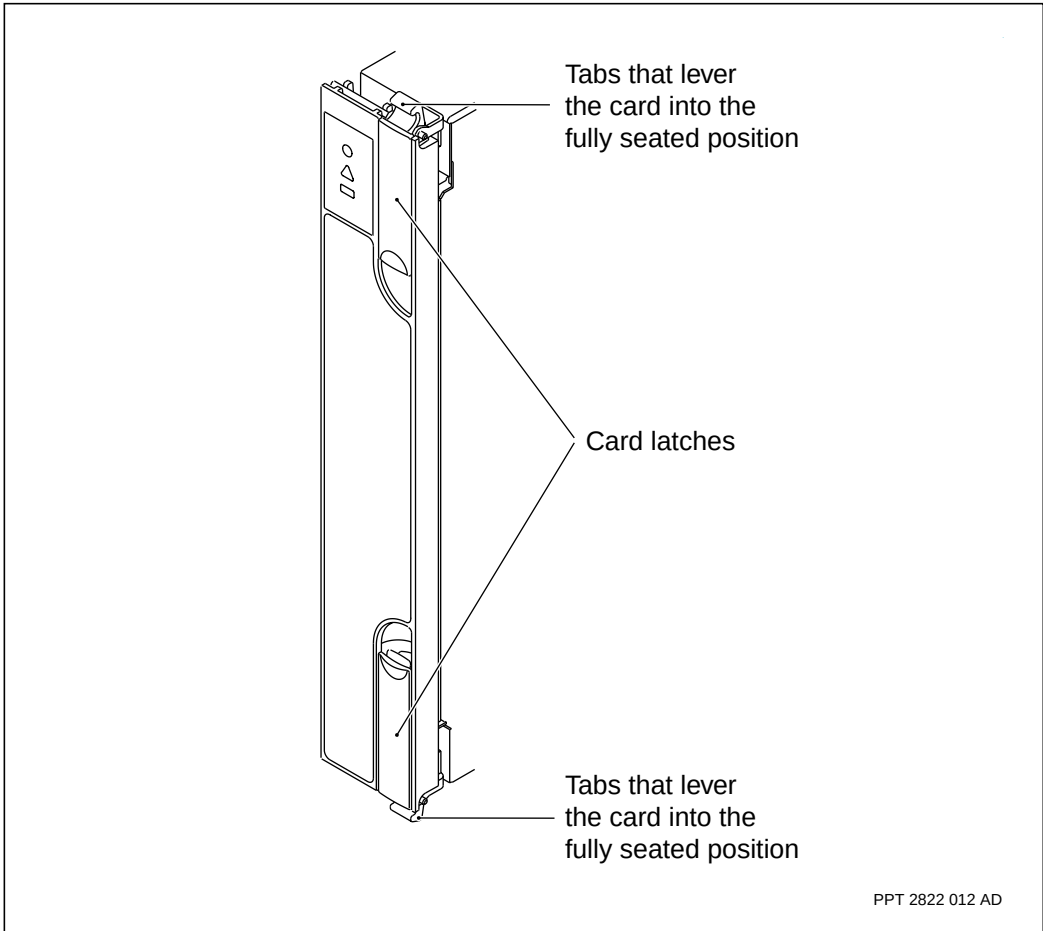


Figure 156
Closed card latches on a CP, FP, or blank processor card



Installing an SFP optical module

Install a small-form pluggable (SFP) optical transceiver module into an optical FP socket (port) to use a specific type of interface connector.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- With an NTHW49 FP, you need an SFP optical module with one of these PECs:
 - NTTP01AB for a 1000Base-SX multimode (MM) fiber cables for short reach (SR) up to 0.55 km (0.31 miles) using 50/125 fiber or up to 0.275 km (0.17 mi.) using 62.5/125 fiber and with a nominal wavelength of 850 nm
 - NTTP01CB for a 1000Base-LX single-mode (SM) fiber cables for intermediate reach (IR) up to 10 km (6.25 mi.) and with a nominal wavelength of 1310 nm
- With an NTHW44 FP, you need an SFP optical module with one of these PECs:
 - NTTP02AD for MM fiber cables for short reach (SR-0) up to 2 km (1.2 mi.) and with a nominal wavelength of 1310 nm
 - NTTP02CD for SM fiber cables for intermediate reach (IR-1/S-1.1) up to 15 km (9.3 mi.) and with a nominal wavelength of 1310 nm
 - NTTP02ED for SM fiber cables for long reach (LR-1/L-1.1) up to 40 km (24.8 mi.) and with a nominal wavelength of 1310 nm
- Do not touch the circuitry inside the large open end of an SFP optical module or you may cause the unit to malfunction.
- The FP port must be locked in software. For information on locking a port, see *241-5701-600 Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- Alarm 7011 5480 is generated to indicate the installed SFP optical module is not operating because:
 - it fails diagnostics after insertion
 - it mismatches the software configuration of the SFP for the port

- it is not a Nortel Networks part
- For information on configuring the optical module or verifying its operation by displaying its installed status, see 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- For information about the hardware of an optical module, see 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure steps

- 1 Ensure that the bale latch is closed, that is, engaged against the end of the module. Refer to the figure “A typical SFP optical module” (page 468).
- 2 Hold the module so that:
 - the end with the latch faces you
 - the large open end faces downwards for an NTHW44 and to the right for an NTHW49
- 3 At about a 45-degree angle to the faceplate, gently slide the module into the socket on the faceplate until you feel or hear a click confirm that the module is engaged. The edge of the end of the module with the pair of connector openings should be almost flush with the surface of the faceplate.

Procedure job aid

Figure 157
A typical SFP optical module

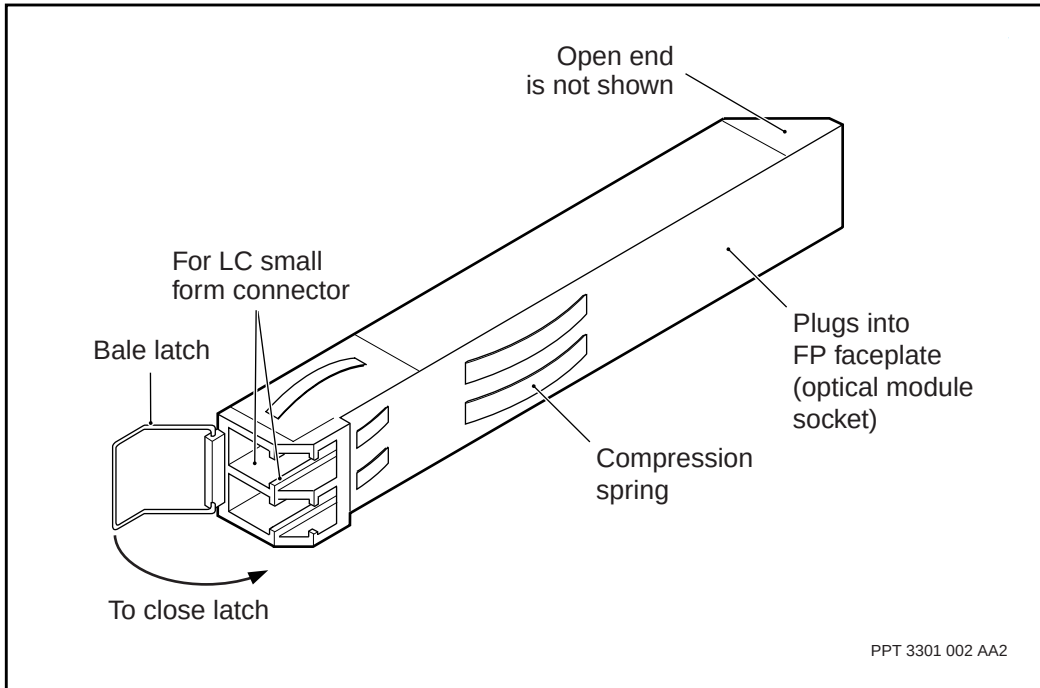
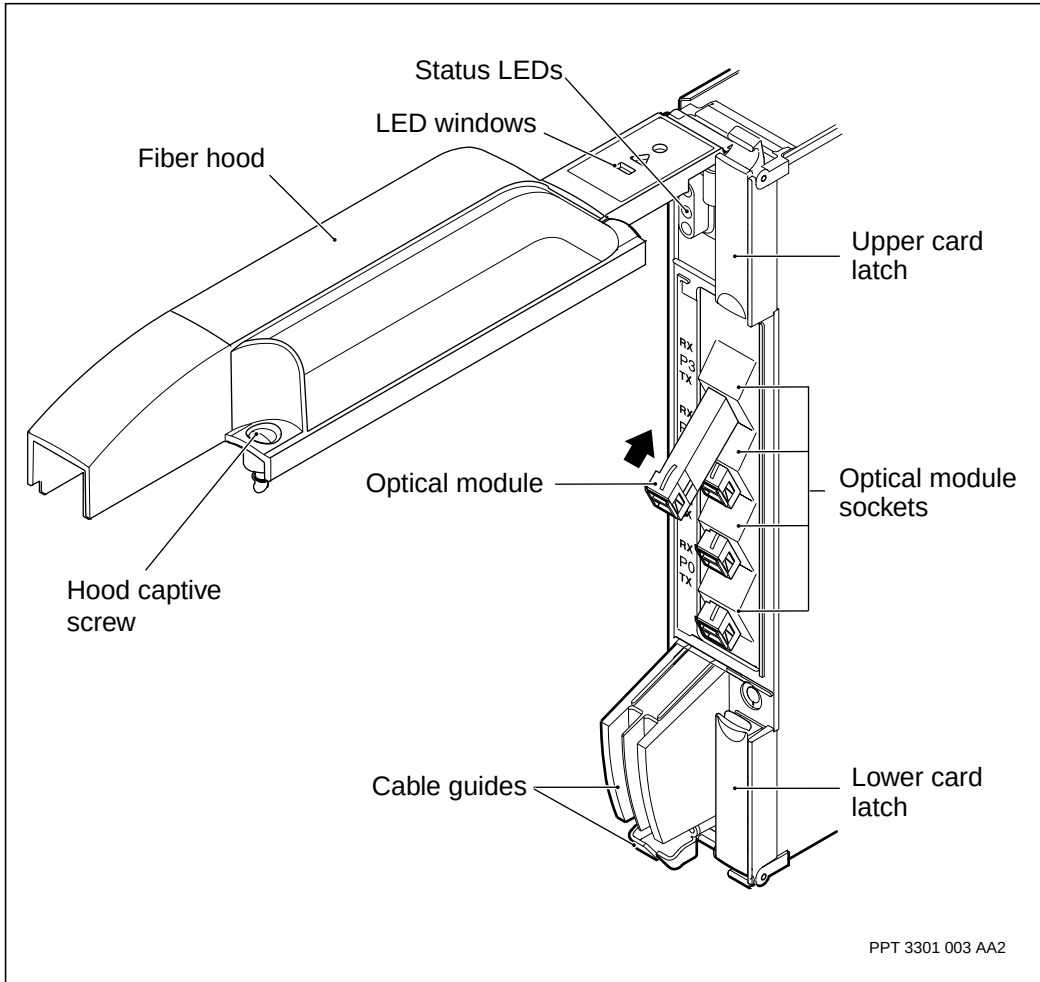


Figure 158
Orientation to install an SFP module in an NTHW49



Installing an upper cooling unit

Install an upper (front) cooling unit to enable temperature control of the Passport switch hardware in the upper position of a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an NTHR52AA or NTHR52AB version of an upper (front) cooling unit. Since the fans of the unit are on the front face of the switch hardware, that is, on the same side that the processor cards plug into, the upper cooling unit is also the front cooling unit.
- You need a driver for the thread-forming 10-mm (3/8-in.) hex-head screws that fasten each cooling unit to the frame or rack.
- You need a helper to hold the unit until it is fastened because it weighs (9.1 kg or 20 lbs) and tends to slide out of position when it is unfastened.

Procedure steps

- 1 Open the container identifying the cooling unit as NTHR52 and remove the unit.
- 2 While referring to the figures “An upper cooling unit NTHR52AA” (page 472) and “An upper cooling unit NTHR52AB” (page 473), hold the ends of the cooling unit so that
 - the open side is at the top
 - a hand holds the narrow rear end
 - a hand holds the fan end
- 3 Facing the rear of the Passport 15000 or 20000 switch, insert the narrow end of the cooling unit between the uprights of the NEBS 2000 frame and above the lower (rear) cooling unit.
- 4 Rest the narrow end of the cooling unit on the top of the lower cooling unit.
- 5 Slowly slide the cooling unit inwards until the mounting ears at the fan end touch the frame uprights.
- 6 Align the mounting-ear holes with the screw holes on the frame uprights. The cooling unit should be in position as shown in the figure “Location of an upper (front) cooling unit” (page 474).

- 7** While holding the cooling unit in position, loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw through an upper mounting-ear hole.
- 8** Loosely fasten another screw through the other upper mounting-ear hole, then the bottom 2. While turning a screw, ensure that it is perpendicular to the hole to prevent cross-threading.
- 9** Tighten all screws to snug plus a 1/4 turn.
- 10** If any cable for the F1, F2, or F3 connectors is unplugged, plug it in. A connector fits only one way. Ensure the tab on the side engages.
- 11** Using the labels from the removal, plug in the A and B power cable assembly connectors into the appropriate connector on the unit. Each connector fits only one way. Ensure that the tab on each side of a connector fully engages.
- 12** Restore power to the unit at the BIP by removing the tape from the cooling unit breakers (in the middle) in each BIM and switching the breakers back on (I is pressed in).
- 13** Check the LEDs on the cooling unit to verify that each fan is operating. Normal operation is indicated by a lit green LED. If any LEDs are red, disconnect and re-connect the F1, F2, or F3 cable that is nearest the fan unit that is nearest the LED.

At the front of the NEBS 2000 frame or equivalent, the LEDs of both cooling units are visible together. Ensure that you check the F1, F2, or F3 connector that is associated with the lit red LED.

- 14** Pack the removed cooling unit in the container from the replacement unit. Ensure that you change the PEC on the container to match the PEC on the unit.

Procedure job aid

Figure 159

An upper cooling unit NTHR52AA

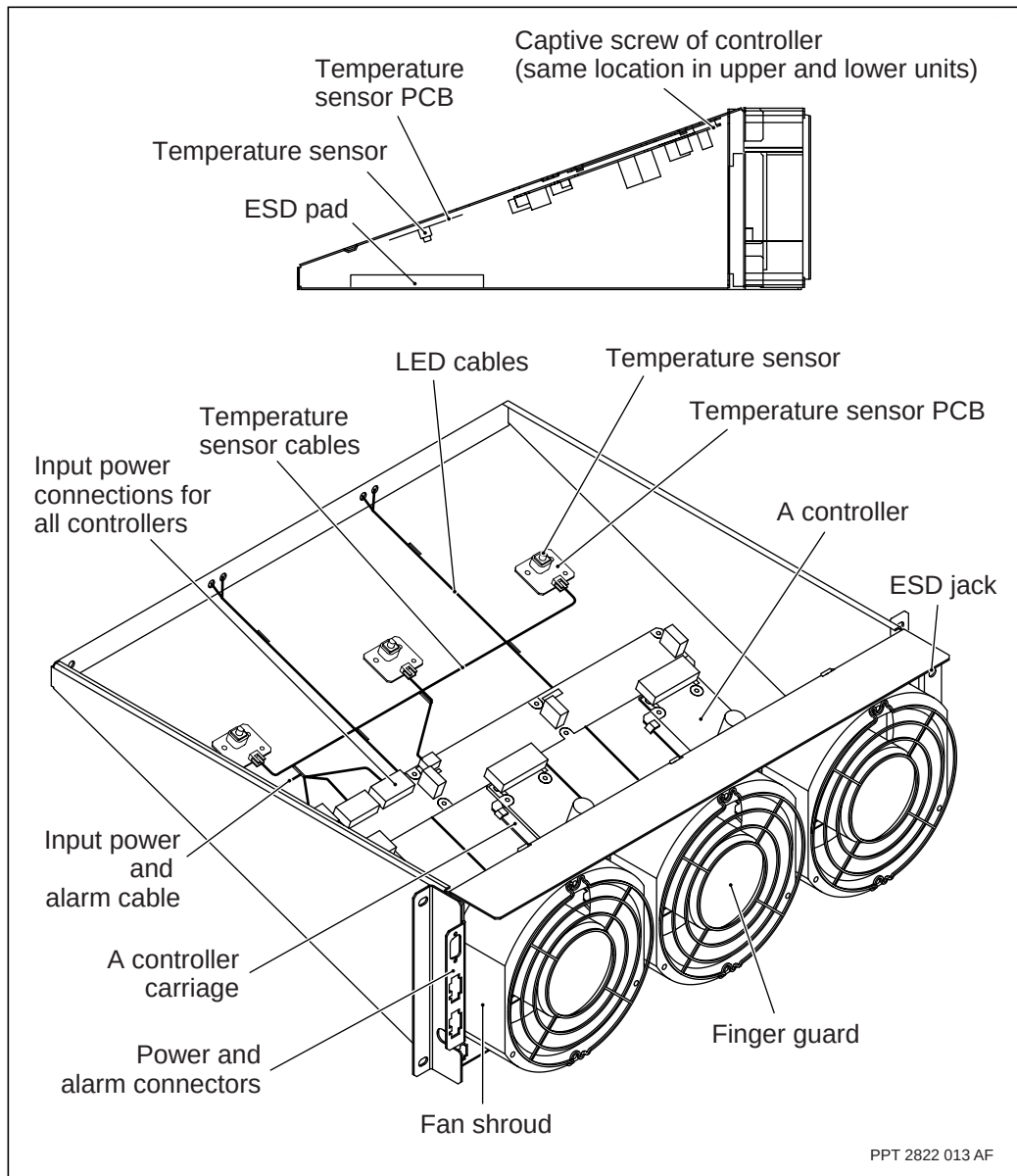


Figure 160
An upper cooling unit NTHR52AB

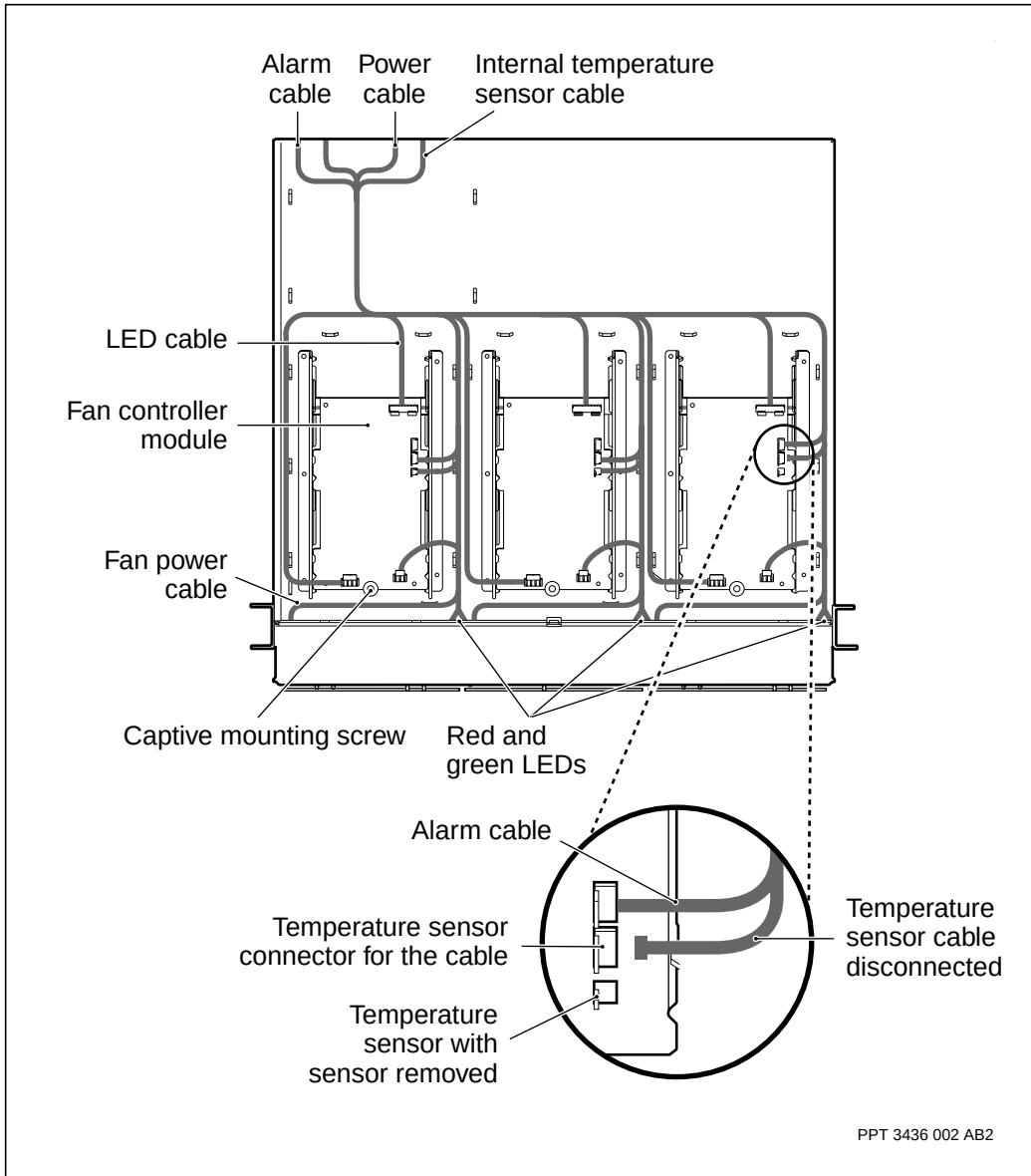
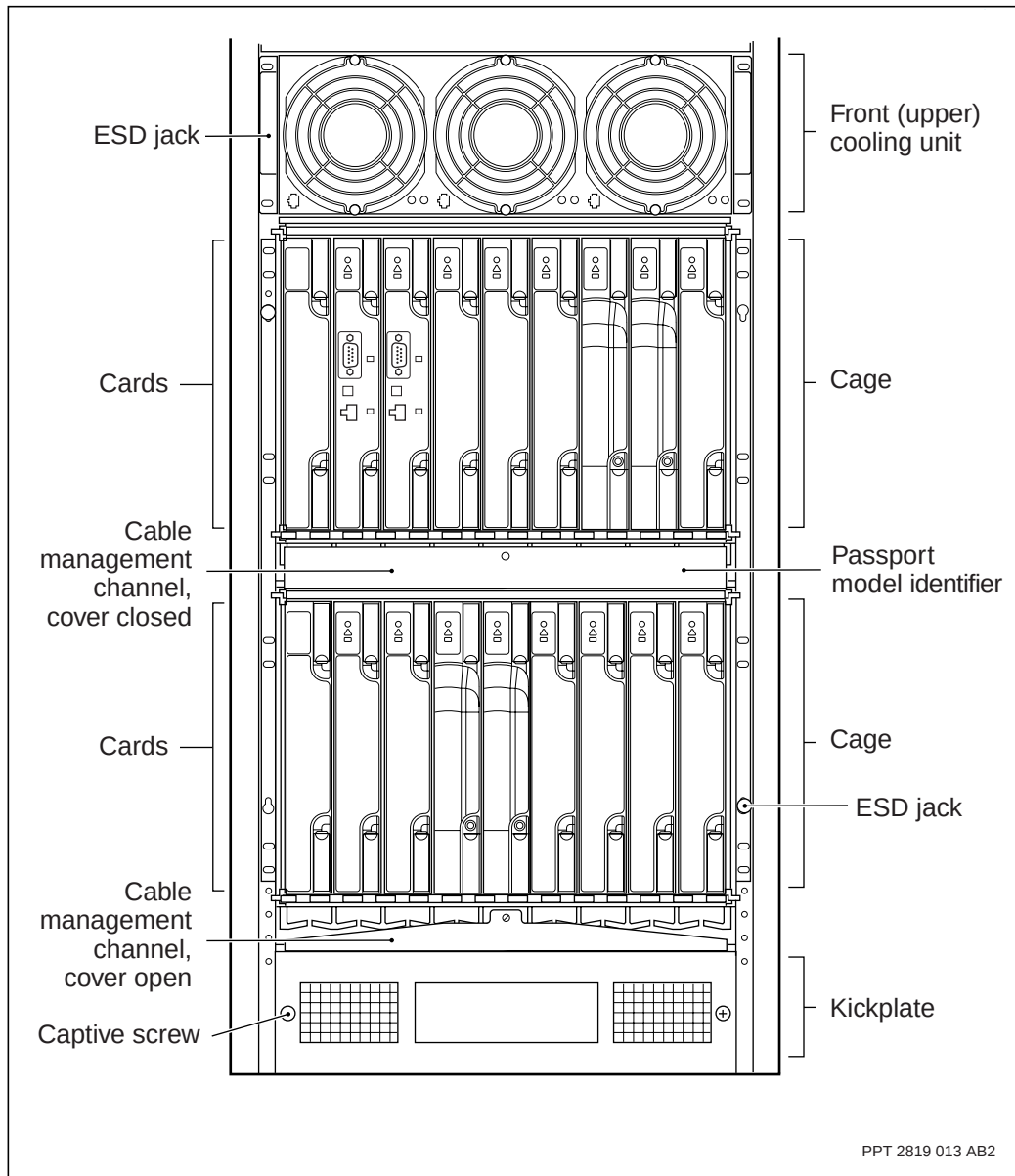


Figure 161
Location of an upper (front) cooling unit



Installing cable management brackets

Install cable management brackets onto the adapter brackets of a 23 inch rack to enable cable management.

Prerequisites

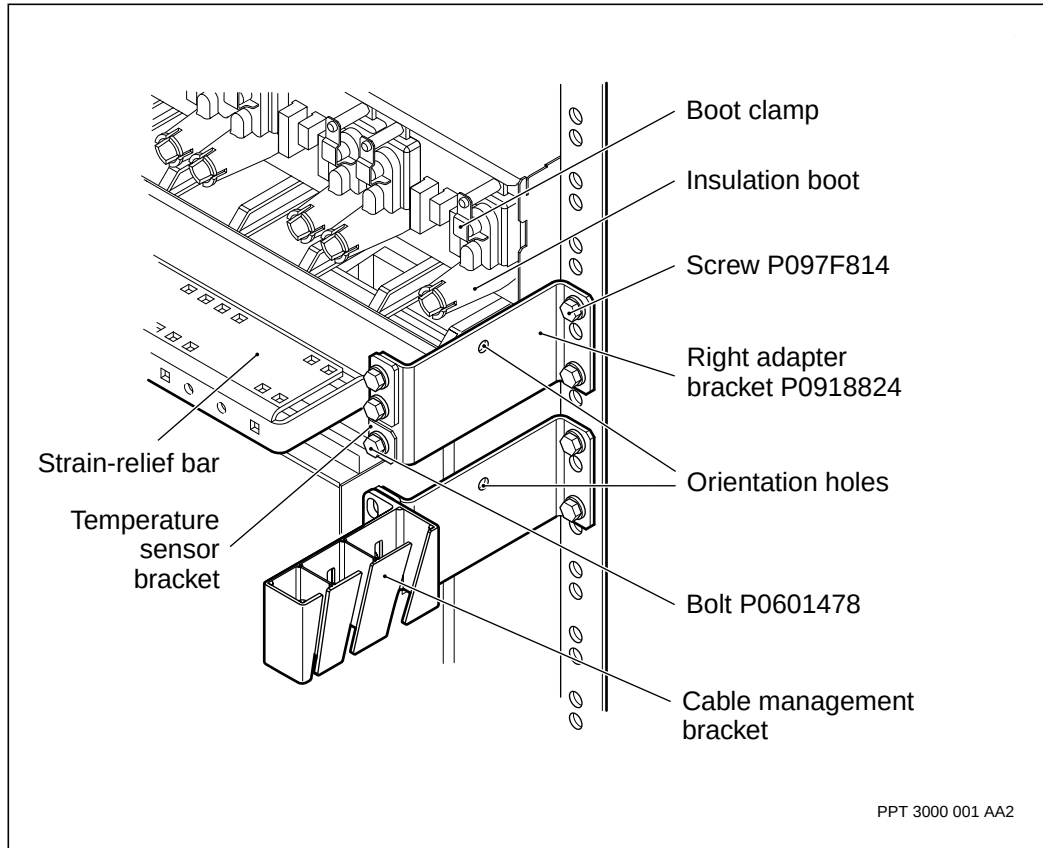
- You must be familiar with “Safety considerations and best practices” (page 41).
- The cable management brackets to mount a shelf onto a 23-inch wide rack are included in switch hardware packages NTQS04 for a Passport 15000 or NTQH04 for a Passport 20000. To install cable management brackets, you need these parts:
 - 2 metal cable management brackets (part number P0879577)
 - 28 plastic brackets (part number P0937935)

Procedure steps

- 1 While facing the rear of the rack, locate the left and right short adapter brackets that have the strain-relief bar and the temperature sensors fastened to them. These are the only short brackets that will not have cable management brackets fastened to them.
- 2 Loosely fasten a cable management bracket to each remaining short adapter bracket on the rear uprights. Use the thread-forming 10-mm (3/8-in.) hex-head screws from pack P0601478 through each mounting-ear hole. Notice the orientation of the cable management brackets in the figure “Mounted cable management brackets onto rear adapter brackets” (page 476). The top 8 cable management brackets (4 per side) are metal, while the bottom 2 or 4 (1 or 2 per side) are plastic.
- 3 Tighten all rear cable management bracket screws to snug plus a 1/4 turn.
- 4 While facing the front of the rack, loosely fasten a plastic cable management bracket in the positions shown by the figure “Mounted cable management brackets onto rear adapter brackets” (page 476).
- 5 Tighten all front cable management bracket screws to snug plus a 1/4 turn.

Procedure job aid

Figure 162
Mounted cable management brackets onto rear adapter brackets



Installing EMI filters on the alarm/BITS module

Install EMI filters on the timing connectors of a Passport 15000 alarm/BITS module with the PEC NTHR12 or NTHR13 to shield the emission of electromagnetic interference (EMI).

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need 2 inline EMI filters per alarm/BITS module each with part number A066557. Some alarm/BITS modules have factory-installed inline EMI filters.
- The J3 and J4 timing connectors on newer versions of the Passport 15000 alarm/BITS modules NTHR12 and NTHR13 have factory-installed inline EMI filters. If your Passport 15000 alarm/BITS module requires these filters, do the following procedure. (This does not apply to any Passport 20000 alarm/BITS modules.) Contact your Nortel Networks service representative to obtain the required parts.

Procedure steps

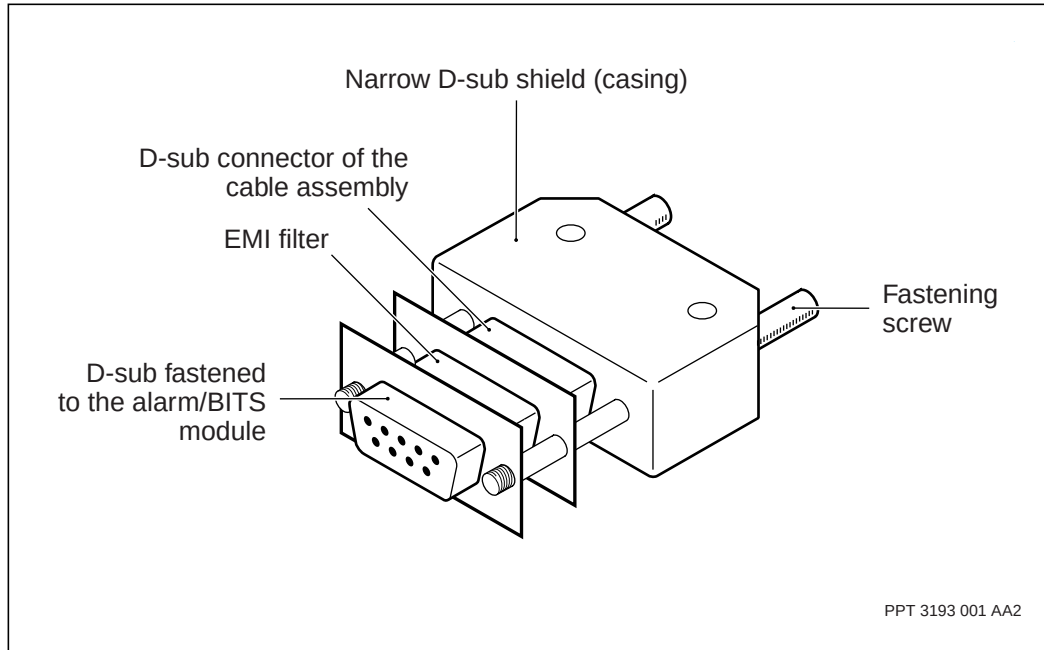
- 1 Examine the figure “An EMI filter on an alarm/BITS connector of a Passport 15000” (page 478) to see how the EMI filters are to be fitted to the alarm/BITS module connector.
- 2 Inject Loctite RD112D06 into the threaded standoffs on the J3 and J4 connectors.
- 3 Install an EMI filter onto each of the J3 and J4 connectors.
- 4 Install 2 Jack screws P0991106 to secure each EMI filter to the J3 and J4 connectors.

When you are connecting timing cables to J3 and J4, the screws of the timing cable D-sub connectors are fastened into the threaded tops of the Jack screws.

Procedure job aid

Figure 163

An EMI filter on an alarm/BITS connector of a Passport 15000



Installing extended cable management brackets

Install extended cable management brackets on a NEBS 2000 frame to accommodate high-density cabling for electrical FPs. The extended cable management brackets can only be used with coax cables.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need four extended cable management brackets per side of a frame with these part numbers:
 - NTHRU0368 for the left side facing the front of the frame
 - NTHRU0369 for the right side facing the front of the frame
- Each kit contains all of the hardware to mount one bracket. You will need up to four for each side of the frame, depending on how you are handling the cable management. For example, if FP cables are routed overhead of the frame from the upper cage of the lower shelf, you need three brackets.
- The NEBS 2000 frame arrives with standard cable management brackets already screwed to the uprights at the front and rear sides of the frame. When a cage is provisioned with a specific type and quantity of FPs, the standard cable management brackets must be replaced by the optional extended brackets in kits. Refer to the criteria for using extended cable management brackets in assessing cable management in 241-1501-200 *Passport 15000, 20000 Hardware*.
- To accommodate high-density fiber optical FP cables, use the procedure “Installing high-density cable management brackets” (page 495).

Procedure steps

- 1 Open the kit NTHRU0369 and remove all packaging.
- 2 Cut the tie-wraps off the cables on the pre-installed cable management brackets on the front right upright of the frame. Be careful not to cut any of the cables.
- 3 Unfasten the 6-mm (15/64-in.) hex-head screws of each cable bracket up the front and put the brackets aside. Also put the screws and washers aside for re-use. Leave the cables connected and hanging loosely.

- 4 See the figures “Cable management bracket kits on a frame” (page 481) and “Cable management extended brackets on a frame” (page 482). Observe the orientation and spacing of the four brackets on the side.
- 5 Position the cable bracket the way it is in the figure so that
 - a. the flat surface is against the frame upright and the arms extend outwards from the frame
 - b. the 2 holes in the bracket align with the holes along the side of the frame upright
 - c. the lower arm of the bracket is nearest the rear of the frame and the upper arm is nearest the front of the frame
- 6 Align its bottom mounting hole with the 6th hole, counted from the bottom side of the frame upright.
- 7 While holding the bracket in position, fasten a thread-forming 6-mm (15/64-in.) hex-head screw and a washer through each hole. Tighten the screws to snug plus a 1/4 turn.
- 8 Counting three holes along the side of the frame upright upwards from the top edge of the cable bracket, align the bottom hole of the next cable bracket.
- 9 While holding the bracket in position, fasten a screw and washer through each hole. Always ensure that a screw is fully seated perpendicularly to the hole before tuning it.
- 10 Counting 5 holes along the side of the frame upright upwards from the top edge of the previous cable bracket, align the bottom hole of the next cable bracket.
- 11 While holding the bracket in position, fasten a screw and washer through each hole.
- 12 Counting 3 holes along the side of the frame upright upwards from the top edge of the previous cable bracket, align the bottom hole of the next cable bracket.
- 13 While holding the bracket in position, fasten a screw and washer through each hole.
- 14 Repeat the steps for the left side of the frame with kit NTRU0368, if required.

Procedure job aid

Figure 164
Cable management bracket kits on a frame

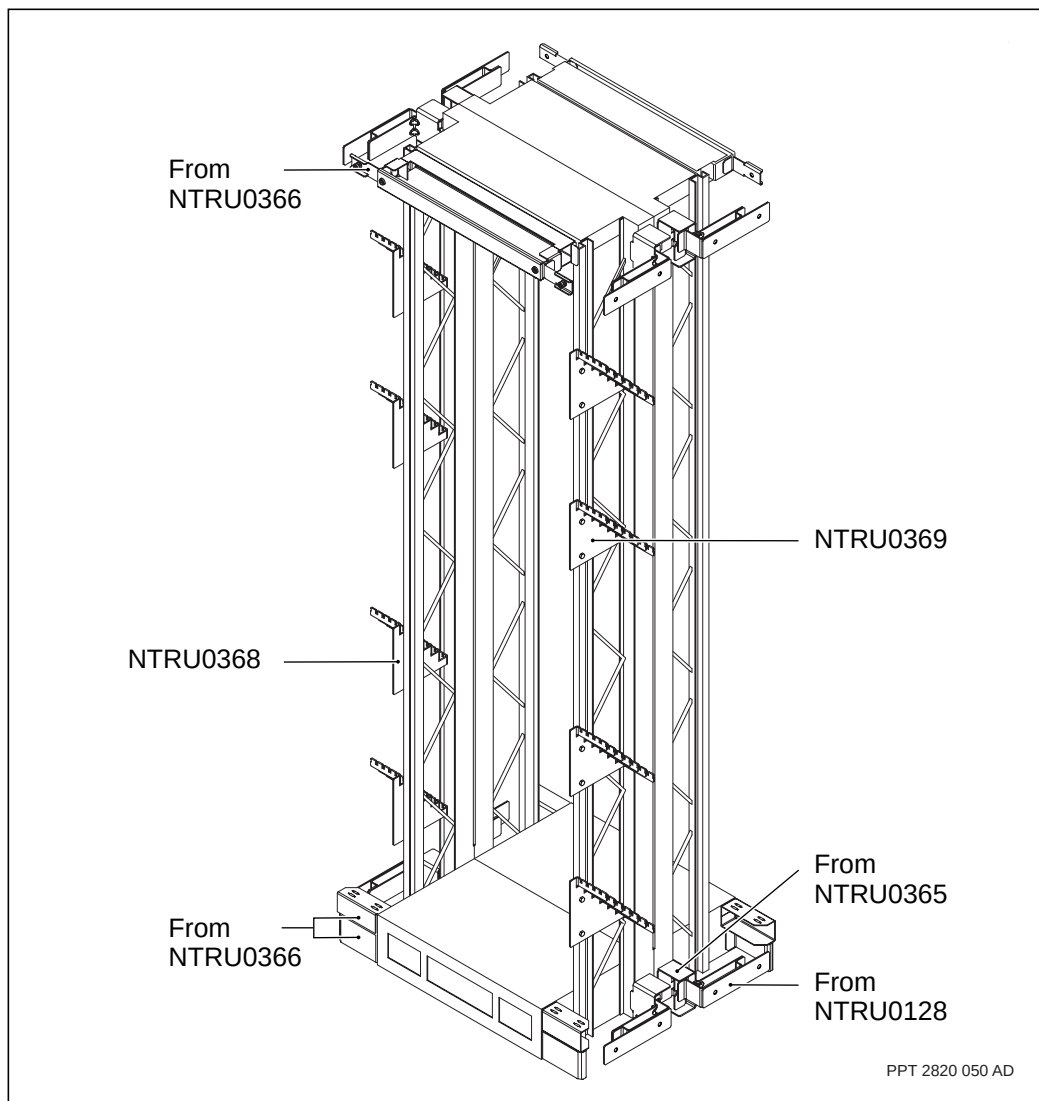
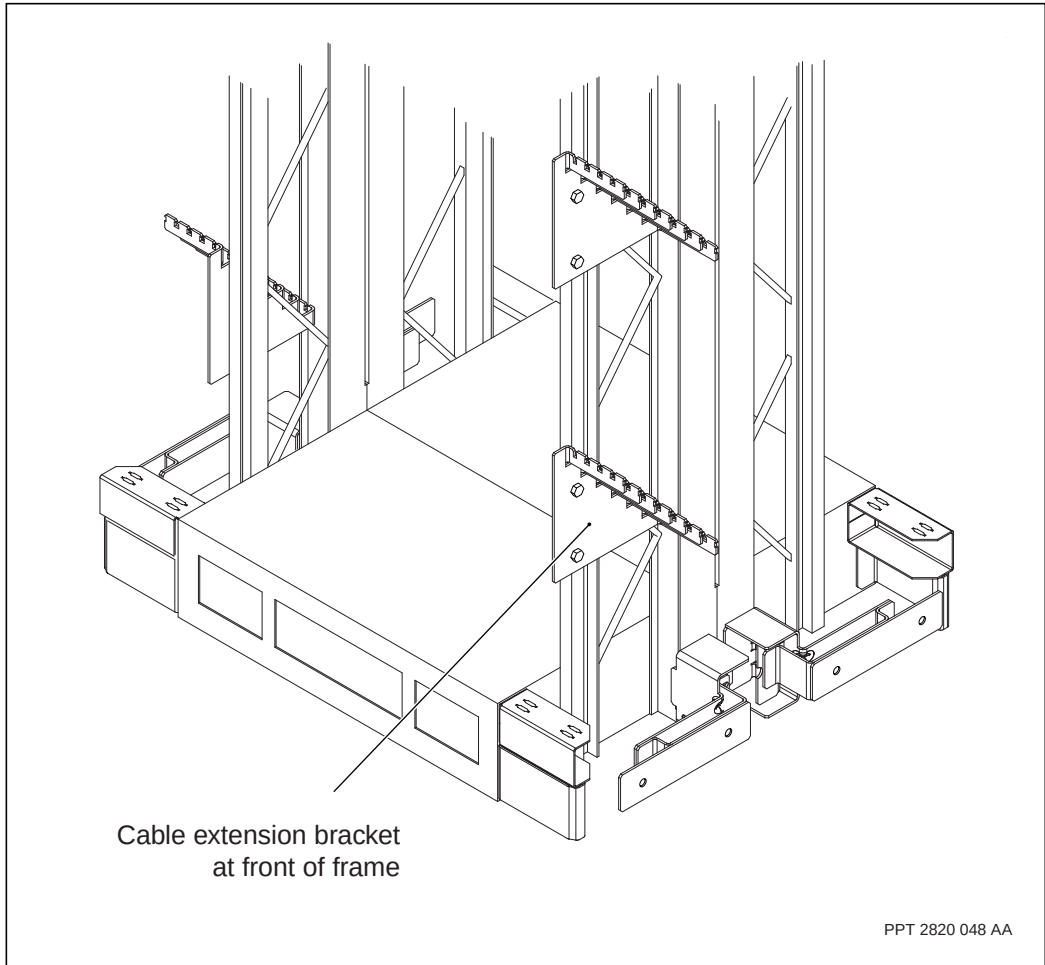


Figure 165
Cable management extended brackets on a frame



Installing fiber cables through the fiber management unit

Install fiber cables through the fiber management unit to manage cable slack in the connection path between FPs and their next connection.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The fiber management unit (NTHW50) must already be installed into a NEBS 2000 frame or equivalent.
- FPs must already be installed (not necessarily powered up).
- Ensure easier installing, load balancing, and planning for maintenance by following this logical method of cabling the fiber management unit:
 - install each fiber cable one at a time completely from end to end
 - route all cables from each FP faceplate one after another from bottom to top
 - route the fiber cables from the optical FP closest to the fiber unit, then continuing with each further optical FP
 - start at the bottom drawer of the fiber unit and continue upwards
 - use the trays front to rear on the same side, then the other side, and always from the bottom to the top tray
 - route each cable into a tray at the rear corner and exit the same corner (the trays are symmetrical to accommodate left and right access at the rear)
 - record the same connection information at the FP end and the other end onto the label on the tray
 - route all fiber cables into one side of the fiber management unit and out the same side to the connections at the other end
- Since the NTHW50 accommodates 20 fiber cables per drawer, you may wish to route the fiber cables of each cage into a separate drawer or set of drawers. Use the bottom drawer or drawers for the bottom cage. There is space on the drawer faceplate to add your own labels to indicate, for example, the type of FP and its location information.

- When a cage has empty slots covered by blank processor cards that may eventually contain optical FPs, you may wish to leave a series of vacant trays in the middle of the overall sequence of routing.
- A ladder-rackable fiber cable will not likely ravel onto a tray because either the cable is too stiff (cannot meet the required bend radius) or its diameter is too thick. Supported fiber cable specifications for the unit are identified per FP type in 241-1501-200 *Passport 15000, 20000 Hardware*.

**CAUTION****Risk of damage to fiber cables**

Connecting the ends of a fiber cable to its terminations and then looping the middle portion of the cable into the fiber management unit causes twisting of the fiber cable. Twisting a fiber cable can break the fiber inside. Avoid this by using the unidirectional method of installation in the following procedure.

Procedure steps

- 1 Measure the exact path that the fiber cable is intended to be routed from the fiber management unit to the next hop connection towards the far end. Measure from the side of the fiber unit where the fiber cable will exit.
- 2 Using a piece of electrical tape, temporarily mark that distance on the fiber cable from the unconnected end. Ensure that the tape can be easily removed later, but will not move during minor handling.
- 3 At the fiber unit, open the drawer by sliding the latches towards each other, holding them inwards, and pulling slowly towards yourself. Stop pulling when the rear of the drawer is at the front of the fiber unit. As the drawer opens, half-spools at the sides of the drawer will move with it towards the front. If a half-spool does not reach the front of the drawer, move it manually. The rear half-spools are fixed.

If the drawer already contains fiber cables, ensure that no cable is snagged or pinched as the drawer opens.
- 4 Route the cable from the FP faceplate towards the fiber management unit. Use tie-wraps to very loosely fasten the cable at bends in the path. Leave the tie-wraps open enough to accommodate more fiber cable connectors.

- 5** At the side of the fiber unit that is nearest the FP, route the cable through the opening and around the half-spools as shown in the figure “A dual-drawer fiber management unit NTHW50” (page 376).
- 6** Pull up the slack on the cable outside the fiber unit.
- 7** Inside the drawer, locate the tray to contain the fiber cable. To access a tray in a stack, flip up the ones above it from the center of the drawer towards the nearest side.
- 8** At the tray, route the cable through the slot in the rear corner, then under the tabs and around the center, and finally out the same corner of the tray. For a view of a fiber on a tray, refer to the figure “A dual-drawer fiber management unit NTHW50” (page 376). Notice the position of the crossover point of the cable. Ensure that the electrical tape on the cable is not ravelled onto the tray.
- 9** From the tray corner, route the cable along the same path as it entered the fiber unit. Adjust the slack on the tray and outside the fiber unit so that the electrical tape resides at the opening outside the unit.
- 10** Lower the tray or trays. Ensure that no cable is pinched between trays.
- 11** On the tray label, record the connection information of the FP (node identifier, FP slot number, port number, signal direction). Decide whether this is To or From information. Be consistent with all cables.
- 12** Slowly close the drawer to test the slackness of the cable cluster.
- 13** Route the cable to the other end connection. Use tie-wraps to very loosely fasten the cable at bends in the path. Leave the tie-wrap open enough to easily accommodate more fiber cable connectors.

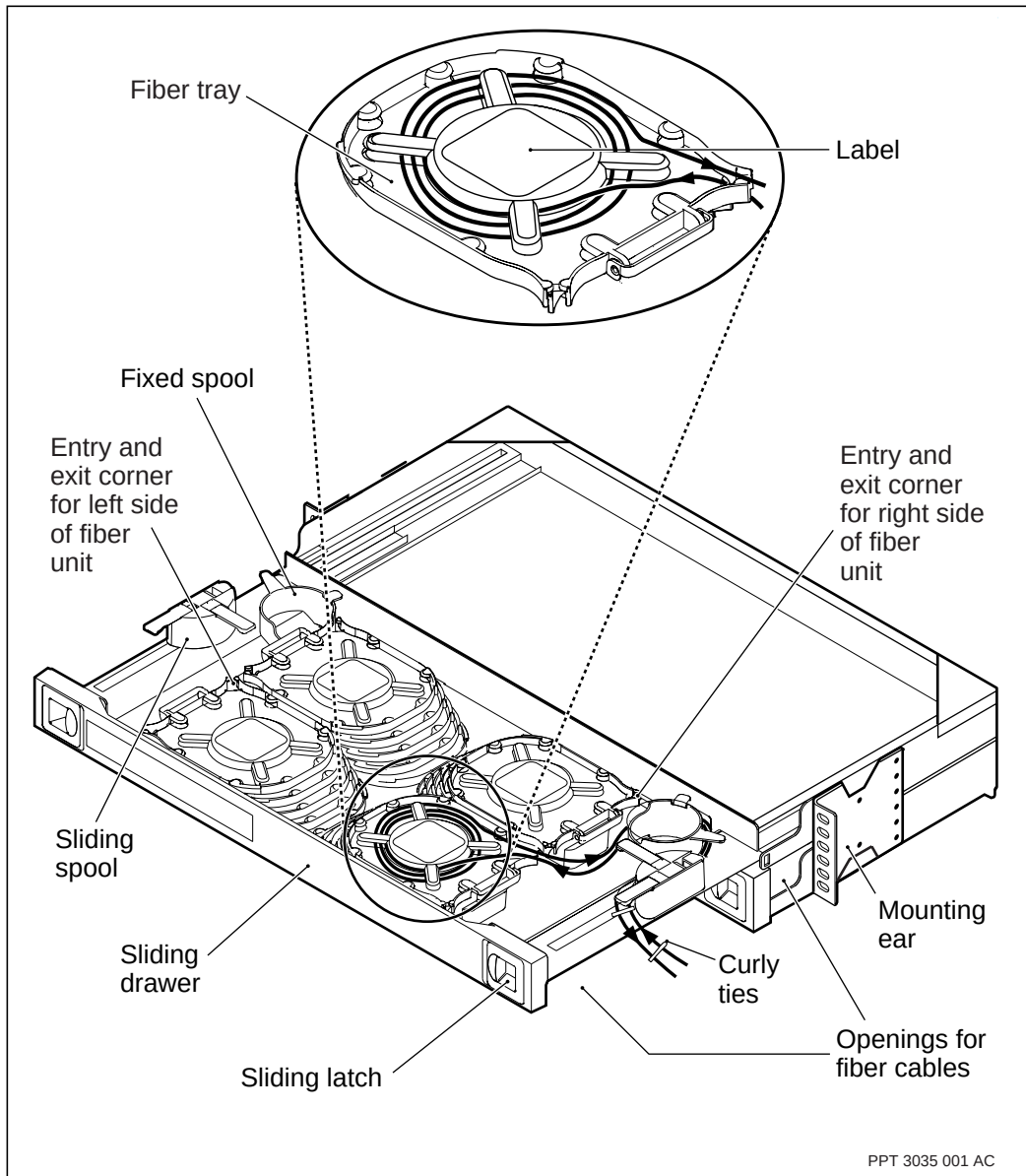
If the entire cable path and the tray cannot accommodate all of the cable slack, you must use a shorter cable.
- 14** Connect the cable. Record the connection information.
- 15** On the tray label, record the connection information of the other end (node identifier, type of node, port number, signal direction).
- 16** Carefully remove the temporary electrical tape from the cable. Avoid cutting or nicking the cable sheath. Avoid crimping or pinching the cable during its removal.
- 17** Repeat for each fiber cable that must pass through the fiber unit drawer.
- 18** Bundle the fiber cable slack outside the drawer using the provided curlie ties. There are 4 curlie ties per drawer.

- 19 Slowly close the drawer to test the slackness of the cable cluster. Closure is indicated by a click sound and the faceplate is flush with the other drawer's faceplate. Adjust the slackness of any cable showing tension.

Procedure job aid

Figure 166

Routing a cable through a fiber management unit NTHW50



Installing front adapter brackets

Install the front adapter brackets onto a 23-inch wide EIA rack to mount a 21-inch wide Passport 15000 or 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The front adapter brackets for mounting a shelf onto a 23-inch wide rack are included in switch hardware packages NTQS04 for a Passport 15000 or NTQH04 for a Passport 20000. To install front adapter brackets, you need these parts:
 - the left front (long) adapter bracket (part number P0918821)
 - the right front (long) adapter bracket (part number P0918822)
 - the thread-forming 10-mm (3/8-in.) hex-head screws in a pack labelled P097F814
- Hex head screws (from P097F814) remaining at the end of this procedure are needed for the rear adapter brackets.

Procedures steps

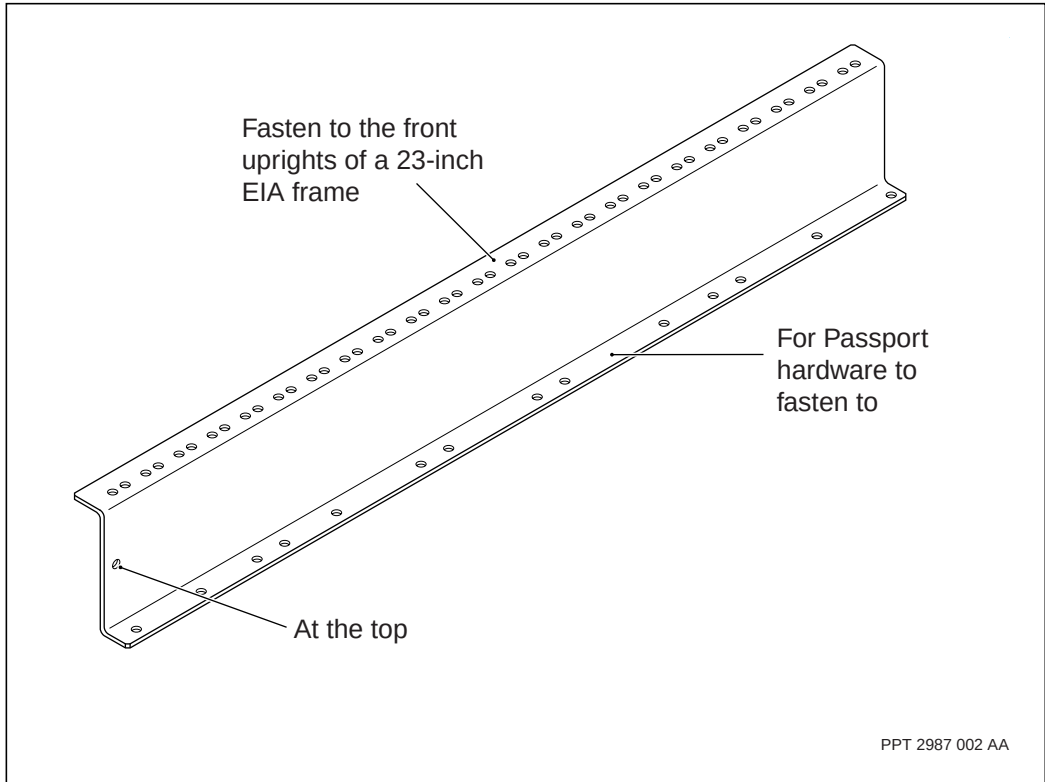
- 1 Hold the right bracket so that:
 - the center-hole at one end is at the top
 - the edge with the paired holes that are covered on one side by a strip of silvery grounding tape points away from you
- 2 At the front of the rack, position the edge with the paired holes against the front face of the rack upright. (The left bracket is for the left upright.)
- 3 Align the bottom hole of the bracket with the bottom hole on the rack upright. Slide the bracket up to the next hole and loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw through it.
- 4 Align the top hole of the bracket with the top hole on the rack upright. Loosely fasten a screw through the hole.
- 5 At equal lengths apart from the top and bottom screws, loosely fasten 2 more screws.
- 6 Tighten all 4 screws to snug plus a 1/4 turn.

- 7 Repeat this procedure for the left adapter bracket on the left upright.

Procedure job aid

Figure 167

A front adapter bracket



Installing front or rear frame panels

Install the front or rear panels on a NEBS 2000 frame to protect and hide the cable installations up and down the sides.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need kit numbers NTRU0185 and NTRU0366. Kit NTRU0185 includes the panel that spans across the top edge of the NEBS 2000 frame, and has threaded screw holes at each end to fasten the panel of kit NTRU0366. Kit NTRU0366 contains a vertical panel that can be installed in a front or rear location at the left or right side of the frame. The panel brackets differ for front and rear fastenings, but the procedure to mount either is the same. Kit NTHW51 is the same as NTRU0185 except it includes an equipment label. A panel with the label is intended for the top front of a NEBS 2000 frame.

Procedure steps

- 1 Separate the contents of the kits.
- 2 See the figures “Location of front and rear panels, exploded view” (page 492) and “Installed front, rear, and side panels” (page 493). Observe the position of the upper and lower pairs of brackets. The upper brackets differ in shape from the lower brackets. The upper brackets fasten to the top cover assembly from kit NTRU0185.
- 3 From the kit NTRU0185, place the top bracket in position according to the figure “Location of front and rear panels, exploded view” (page 492).
- 4 Fasten the top bracket using the provided thread-forming 6-mm (15/64-in.) hex-head screws. Tighten the screws to snug plus a 1/5 turn.
- 5 Fasten the top cover to the top bracket to complete the top cover assembly.
- 6 From the kit NTRU0366, align an upper bracket (P0902814) according to the figure “Upper brackets for frame panels” (page 428).
- 7 Fasten the bracket to the cover using the 2 provided thread-forming 6-mm hex-head screws.
- 8 Repeat step 6 and step 7 for the other 3 upper brackets.

- 9** From the kit NTRU0366, align a lower bracket (P0902815) according to the figure “Lower brackets for frame panels” (page 429).
- 10** Fasten the bracket to the kick plate using the 2 provided 6-mm screws.
- 11** Repeat step 6 and step 7 for the other 3 lower brackets.
- 12** Hold a panel (P0902812) so that
 - the smooth surface faces you
 - the end hole is at the top
 - the two tabs are at the bottom
- 13** Place the two tabs into the slots in a lower bracket and swing the panel against the upper bracket.
- 14** Align the screw hole on the panel with the hole in the upper bracket and fasten a large-slotted screw through them both. Hand tighten the screw to snug plus a 1/5 turn.
- 15** Repeat step 12 to step 14 for the remaining panels so that 2 are installed on the front of the frame and 2 on the rear.
- 16** Fasten the filler (P0902816) as shown using the 2 provided thread-forming 6-mm (15/64-in.) hex-head screws.

Procedure job aid

Figure 168
Location of front and rear panels, exploded view

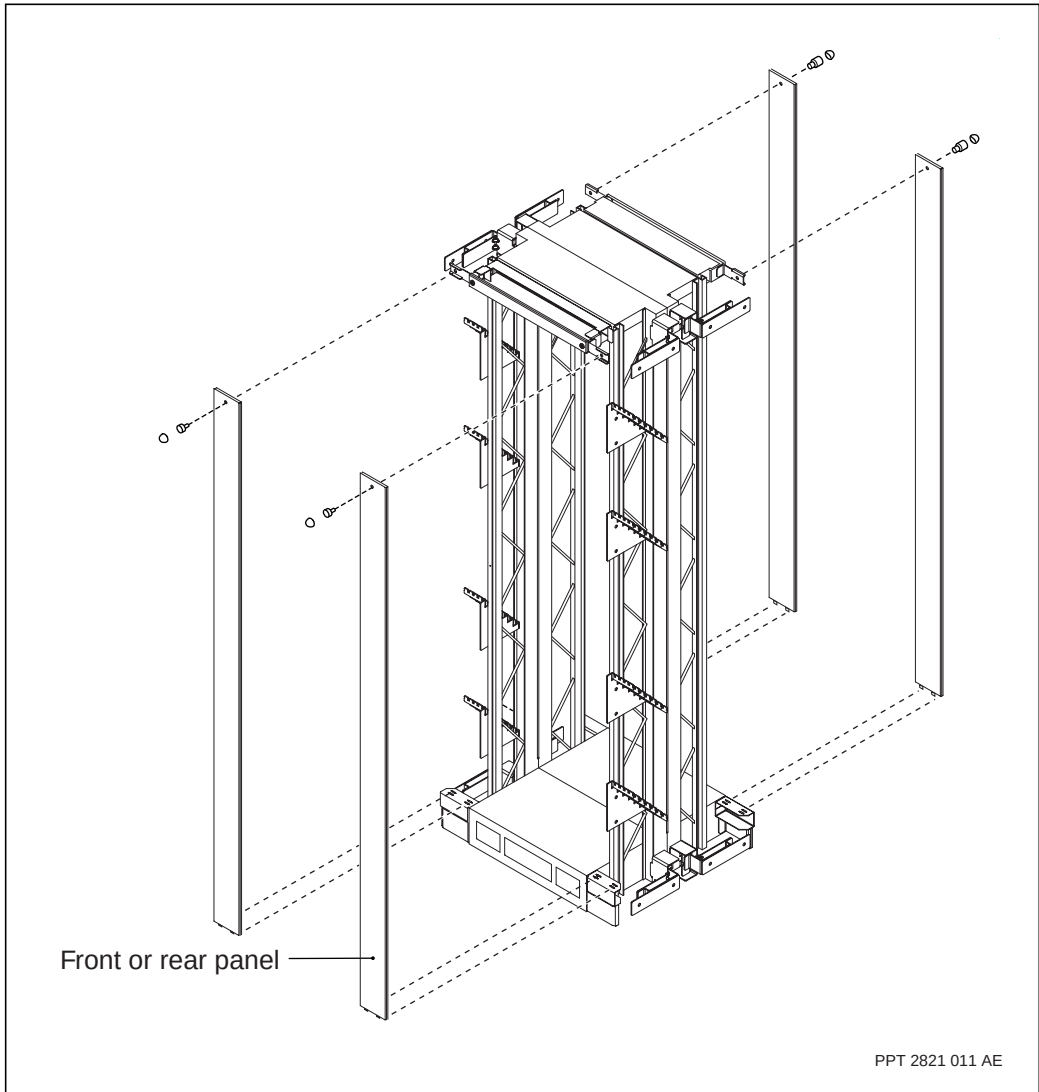
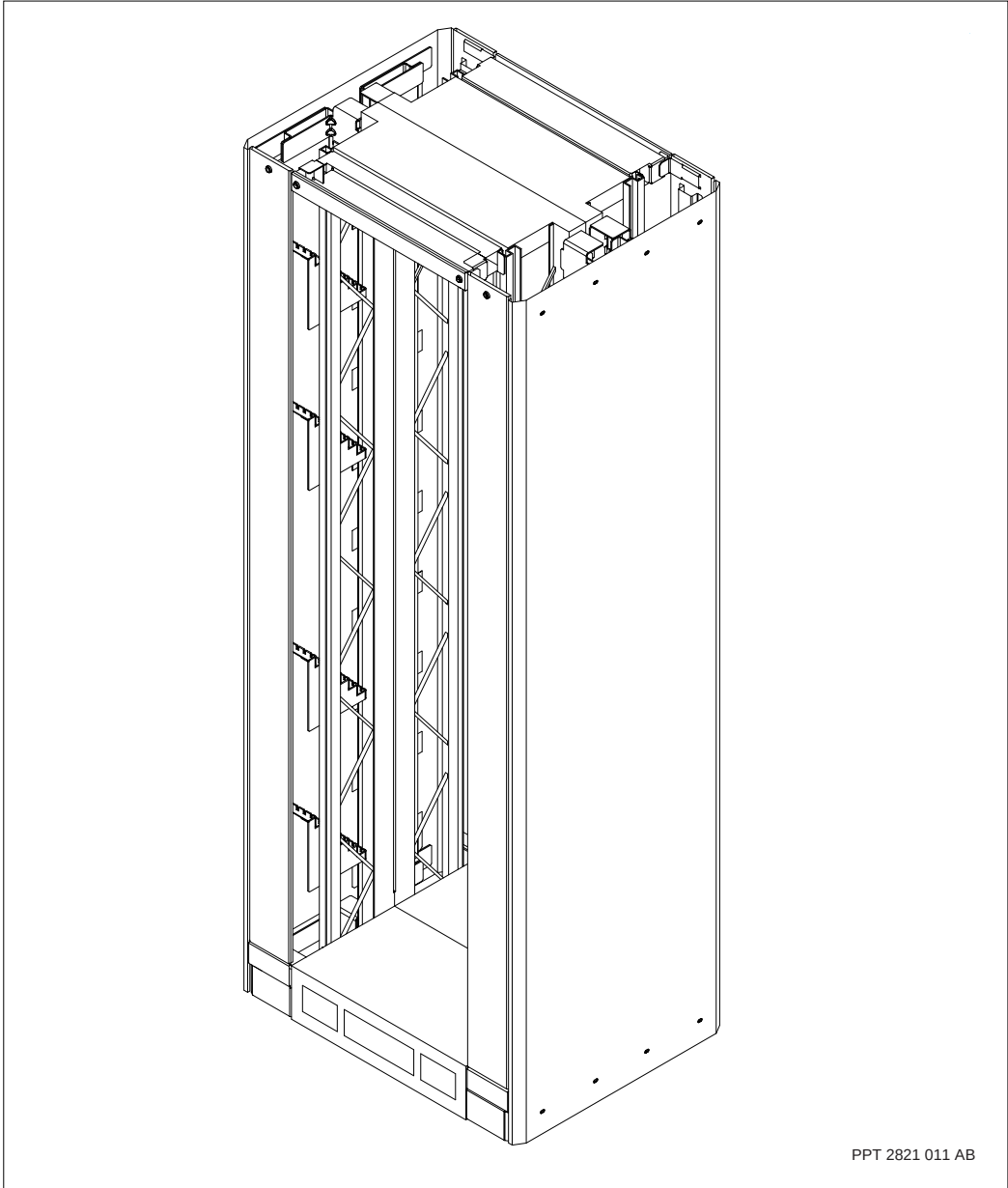


Figure 169
Installed front, rear, and side panels



Installing grounding tape on rack uprights

Install grounding tape on the front faces of a rack to ensure a proper grounding connection for all hardware parts fastened to the rack.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a roll of tape identified by C-HT108-0625.
- To increase the surface area of grounding, the face of the adapter brackets that contacts the rack has a strip of silvery grounding tape. For the grounding strip to be effective, the mounting holes on the outward face of the uprights must be clean, bare (unpainted) metal.

Procedure steps

- 1 Expose the bare metal of the outward face of both front and both rear uprights. Remove the paint and any undercoating by using a finely abrasive hand tool, for example, a drill with a clean wire wheel. Avoid removing the paint on the sides of the upright.
- 2 Wipe the bare metal with a non-residual solvent to ensure that the metal is clean.
- 3 From the container identified as Box 1, remove the roll or rolls of silvery grounding tape. A roll is identified by C-HT108-0625.
- 4 Peel the backing off the adhesive side of the tape for about 15 cm (6 in.).
- 5 Apply the sticky side of the tape to the bottom of any upright face and continue up to the top of the edge of the upright. Peel the backing off as you progress. Ensure that the tape is centered on the face.
- 6 At the top edge of the upright, cut the tape.
- 7 Run a finger along the length of tape on the upright. Press hard enough for dimples in the tape to indicate where the screw holes are located. Avoid tearing the tape.
- 8 Repeat step 4 to step 7 for the remaining 3 uprights.

Installing high-density cable management brackets

Install high-density cable management brackets to double the capacity of cables on a NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need these parts:
 - 34 plastic brackets (part number P0937935)
 - 2 thread-forming 10-mm (3/8-in.) hex-head screws per bracket
- See 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* to determine whether your cabling requirements are high-density.
- The NEBS 2000 frame arrives with standard cable management brackets already screwed to the uprights at the front and rear sides of the frame. When the types and quantities of FPs in a shelf require high-density cabling, the standard cable management brackets must be doubled or changed as follows.
 - To accommodate high-density fiber optical FP cables, use pairs of the plastic cable management brackets (P0937935) as described in this procedure.
 - To accommodate high-density coax FP cables, use pairs of the plastic cable management brackets (P0937935), or for very high density, follow the procedure “Installing extended cable management brackets” (page 479).

Procedure steps

- 1 Remove the pre-installed cable management brackets on the frame uprights at the front of the shelf by unfastening the 10-mm (3/8-in.) screws.

If the left or right frame upright has unused holes in the silvery strip, note where the cable management brackets were installed so that you ensure re-using their screw holes.
- 2 Add another bracket to the removed one to make a pair as shown in the figure “Aligned pair of plastic cable management brackets” (page 496).

- 3 Loosely fasten each pair of plastic cable management brackets back onto the front uprights using their previous screw holes. See the figure “High-density cable management brackets installed on a NEBS 2000 frame” (page 497).
- 4 Tighten all front cable management bracket screws to snug plus a 1/4 turn.

Procedure job aid

Figure 170
Aligned pair of plastic cable management brackets

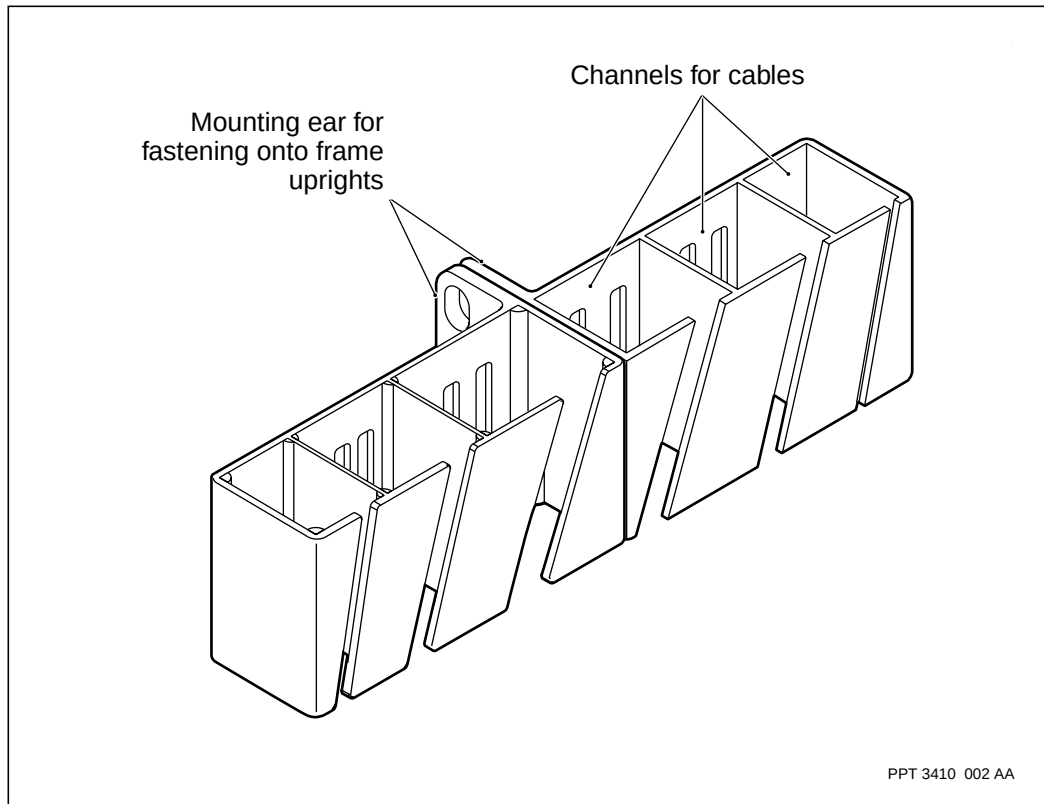
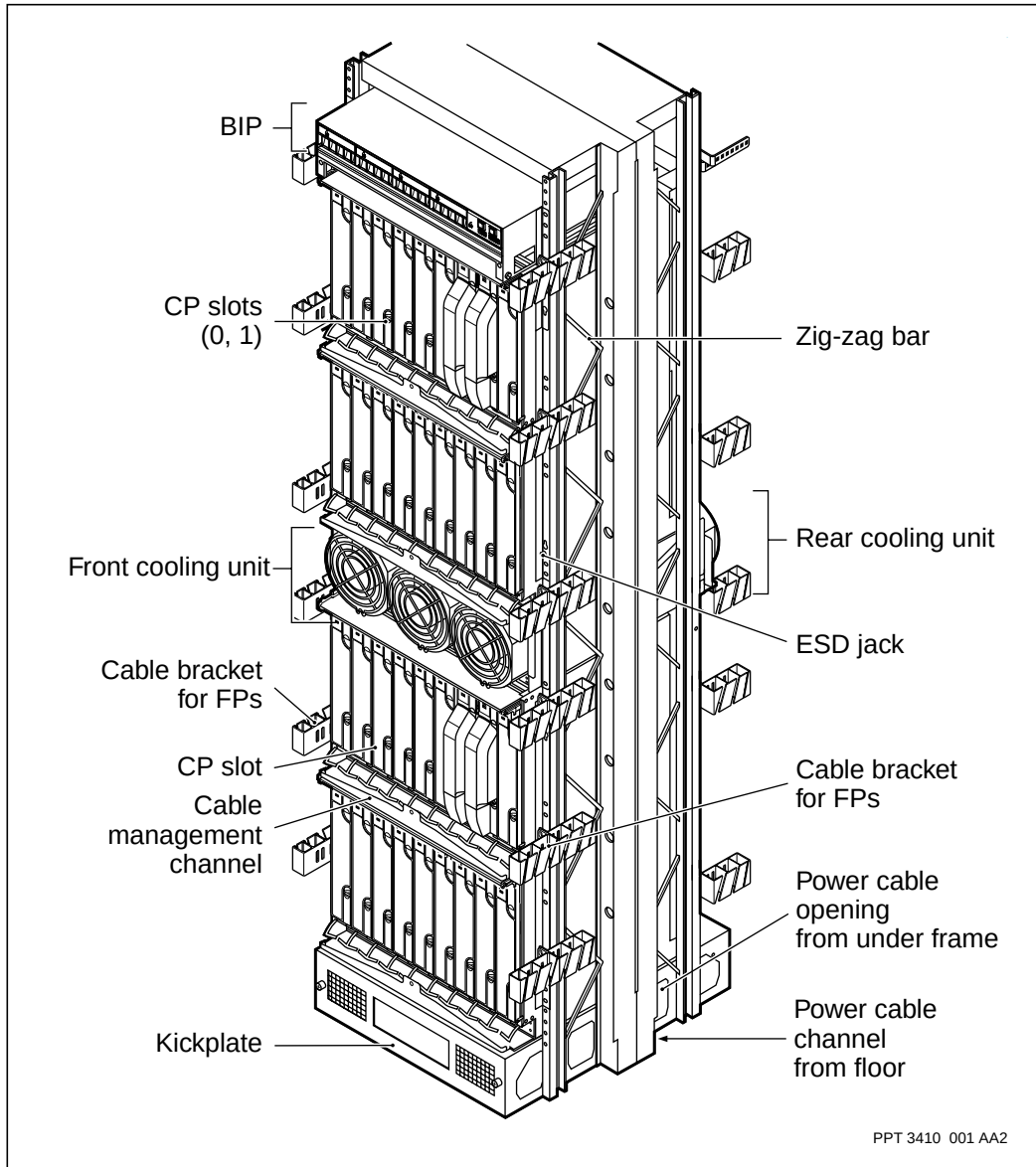


Figure 171
High-density cable management brackets installed on a NEBS 2000 frame



Installing NEBS 2000 frame-to-EIA adapter brackets

Install NEBS 2000 frame-to-EIA adaptor brackets to the uprights of a NEBS 2000 frame to allow 19-inch wide equipment to be mounted in the 21-inch wide NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a hardware kit with PEC NTHW14.
- The NEBS-to-EIA adapter brackets are required to mount 19-inch wide equipment onto the 21-inch wide NEBS 2000 frame.

Procedure steps

- 1 While facing the front of the switch, unfasten the pairs of thread-forming 10-mm (3/8-in.) hex-head screws of the top 3 brackets on each side of the frame. Put the screws and brackets aside to be re-installed later.
- 2 On the front of the NEBS 2000 frame, locate the first screw hole or dimple below the mounting ear of the breaker interface panel.
- 3 Locate any cable management brackets at the rear of the frame. Record the location and whether the arms point forwards or rearwards of any bracket in the top half of the frame.
- 4 Unfasten the 10-mm (3/8-in.) screws of the cable brackets on the back of the frame. Put the screws and brackets aside to be re-installed later.
- 5 Remove the left and the right adapter brackets (part number P0905867) from the hardware kit NTHW14.
- 6 Hold the left bracket so that
 - a. it is vertical and two columns of holes face you
 - b. the label TOP faces you and is at the top
 - c. the wider spaced holes are at the left side
- 7 The column of wider spaced holes are intended to fasten to the frame upright. Align the top hole of the bracket with the dimple immediately below the BIP.
- 8 Fasten a 10-mm (3/8-in.) screw through the bracket into the marked hole in the upright. The top holes of the bracket align with the first hole or dimple below the BIP's mounting ear.

- 9** Repeat step 2 to step 4 for the right adapter bracket. Ensure the column of wider holes is at the right side.
- 10** Fasten 14 more screws through the adapter brackets into the uprights, 7 per side. Space the screws apart leaving 3 empty holes. Tighten all screws to snug plus a 1/4-turn.
- 11** Re-install the cable management brackets in their original positions.
- 12** Remove the rear adapter bracket (part number P0907006) from the hardware kit NTHW14.
- 13** Hold the bracket so that
 - the large square hole is at the bottom
 - the screw holes are to the left and right
 - the bent lips of the bracket are pointed away from you
- 14** Locate the 16th hole from the top on the two rear frame uprights.
- 15** Fasten a 10-mm (3/8-in.) screw through the top left hole of the bracket into the marked hole in the upright (hole 16).
- 16** Fasten a 10-mm (3/8-in.) screw through the top right hole of the bracket into the marked hole in the upright (hole 16).
- 17** Fasten 10 more screws through the adapter bracket into the uprights, 5 per side. Tighten all screws to snug plus a 1/4-turn.
- 18** Re-install the cable management brackets in their original positions.

Installing short adapter brackets on the rear of the rack

Install short adapter brackets on the rear of a 23 inch wide rack to accommodate the cable management brackets of a 21 inch wide Passport 15000 or 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The short adapter brackets are included in switch hardware kits NTQS04 for a Passport 15000 or NTQH04 for a Passport 20000. To install short adapter brackets, you need these parts:
 - 12 left short adapter brackets (P0918823)
 - 12 right short adapter brackets (P0918824)
 - two thread-forming 10-mm (3/8-in.) hex-head screws per adapter bracket (from a pack labelled P097F814)

Procedure steps

- 1 See the figure “A short adapter bracket” (page 501). Hold a right bracket so that:
 - the center-hole at one end is at the top
 - the edge with the paired holes that are covered on one side by a strip of silvery grounding tape points away from you
- 2 At the rear of the rack, counting from the bottom of the right upright, locate the 24th pair of holes. Mark their location on the inside of the upright.
- 3 Position the edge of the adapter bracket with the paired holes against the 24th pair of the upright. (The left brackets are for the left upright.)
- 4 Align the pairs of holes and loosely fasten a thread-forming 10-mm (3/8-in.) hex-head screw through each of the holes.
- 5 Repeat to install a bracket at the 2nd and 11th hole-pairs below the newly installed bracket. Refer to the figure
 - “A shelf assembly of a Passport 15000 in a rack, rear view” (page 502)
 - “A shelf assembly of a Passport 20000 in a rack, rear view” (page 503)

- 6 Repeat step 4 and step 5 to install a bracket at the 2nd pair of holes from the top of the upright.
- 7 Between the top bracket and the one at the 24th hole-pair, loosely fasten 2 more adapter brackets so that all 4 are evenly spaced. Repeat step 4 and step 5 to install the brackets.
- 8 Repeat step 2 to step 7 for the left adapter brackets on the left upright.
- 9 Tighten all screws to snug plus a 1/4 turn.

Procedure job aid

Figure 172

A short adapter bracket

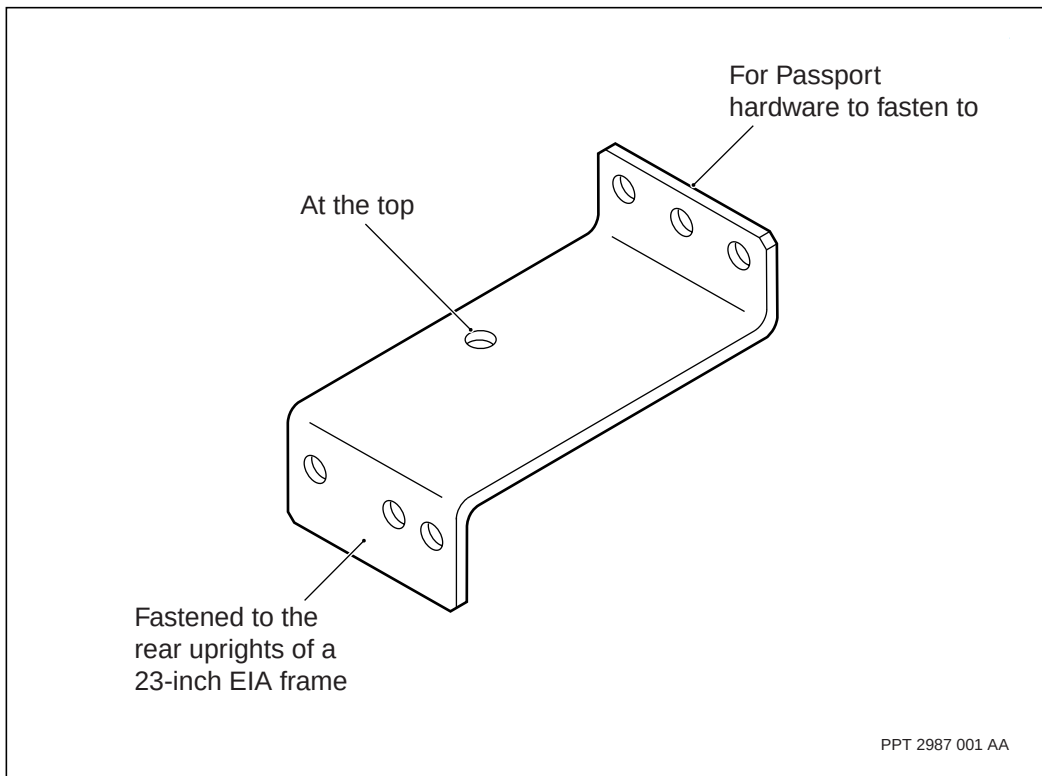


Figure 173
A shelf assembly of a Passport 15000 in a rack, rear view

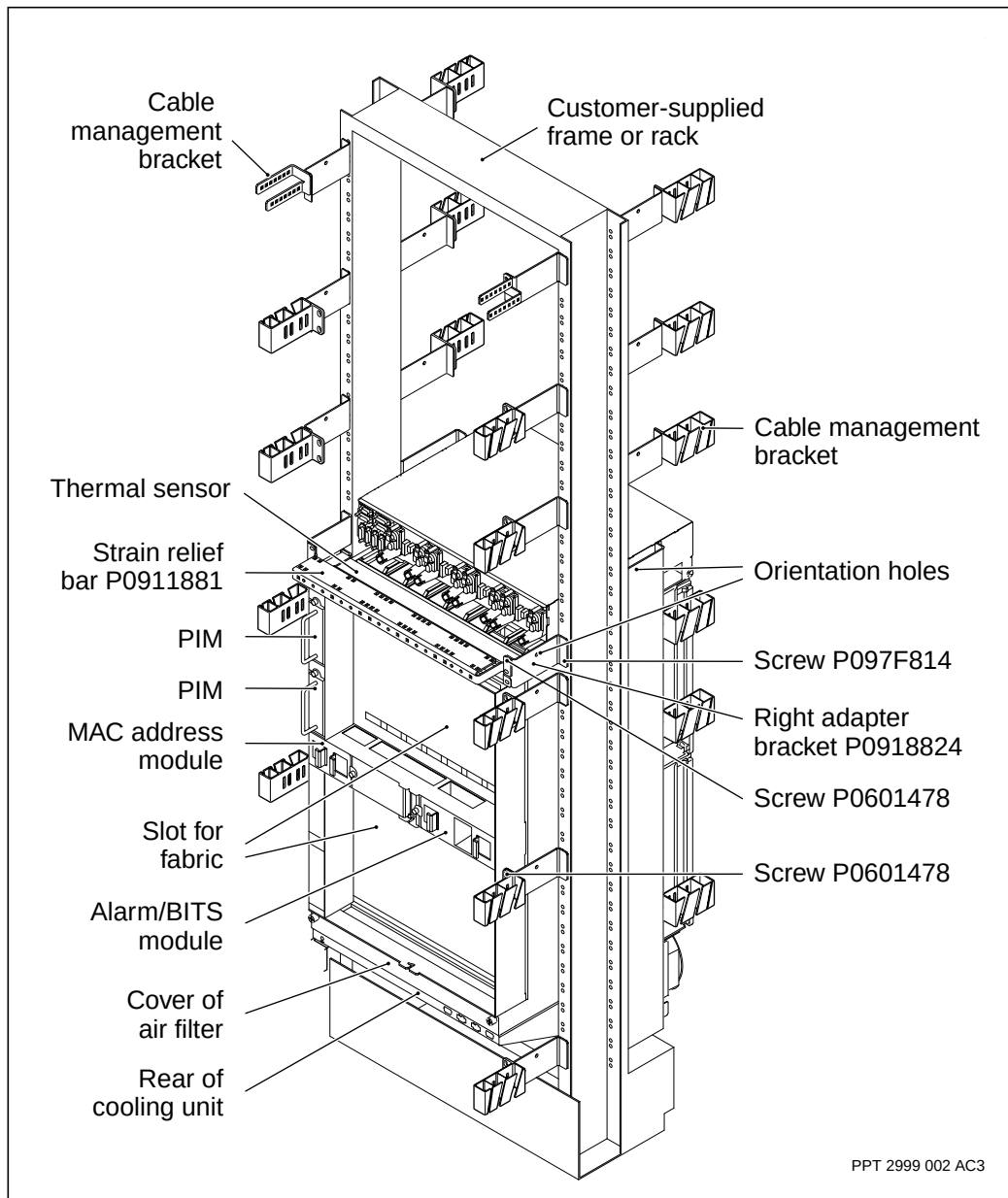
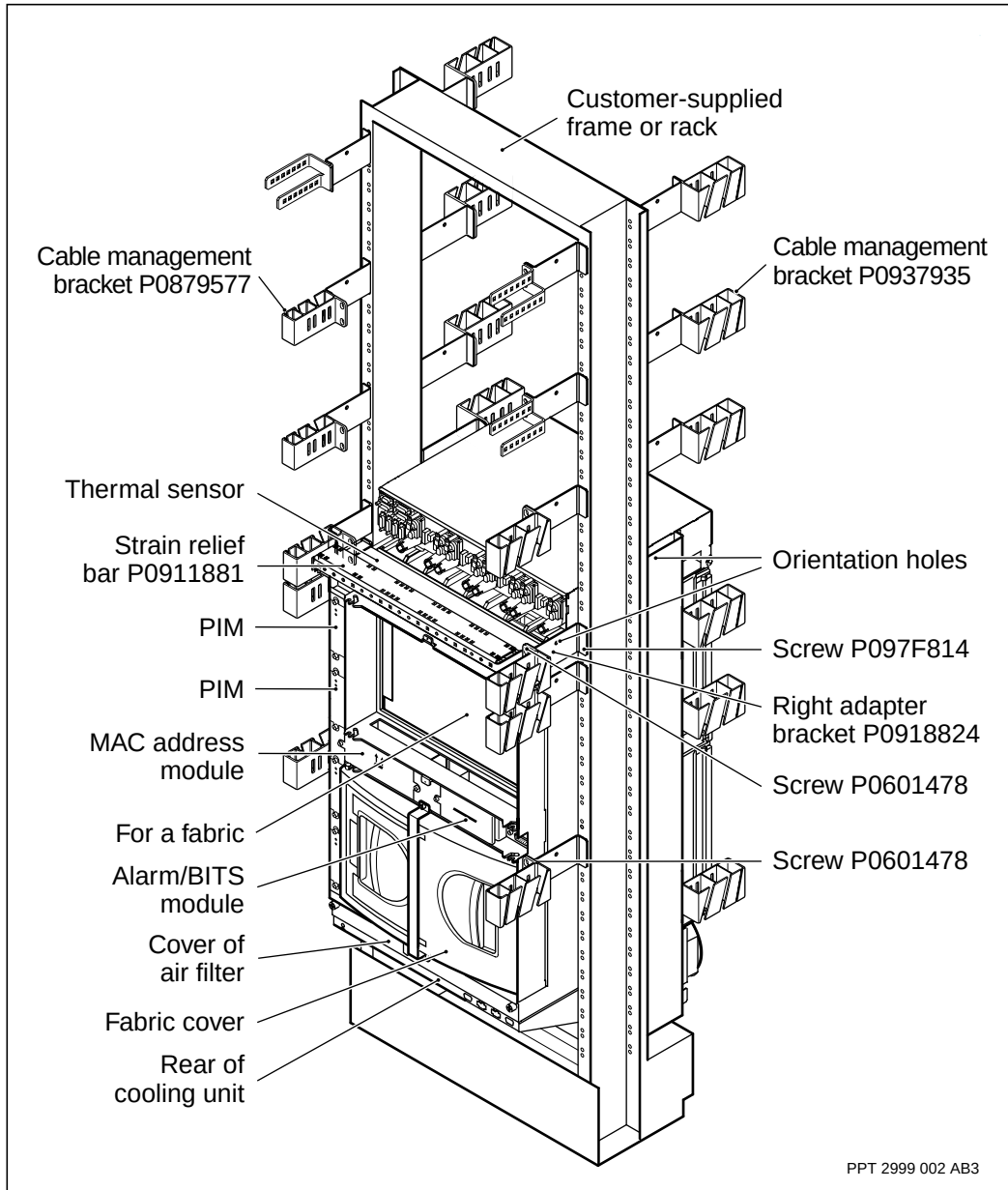


Figure 174
A shelf assembly of a Passport 20000 in a rack, rear view



Installing short adapter brackets on the front of the rack

Install short adapter brackets on the front uprights of a 23-inch EIA rack to maintain the cable path to the top of the rack for a Passport 15000 or 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The short adapter brackets are included in switch hardware kits NTQS04 for a Passport 15000 or NTQH04 for a Passport 20000. To install short adapter brackets on the front uprights, you need these parts:
 - 3 left short adapter brackets with part number P0918823
 - 3 right short adapter brackets with part number P0918824)
 - 2 thread-forming 10-mm (3/8-in.) hex-head screws per adapter bracket (from a pack labelled P097F814)
- Rear adapter brackets must be mounted on the front of the rack uprights above the BIP.

Procedure steps

- 1 On the front of the rack upright, locate the pairs of holes that align with the top 3 short adapter brackets that are already installed on the rear uprights as shown in the figure “A shelf assembly of a Passport 20000 in a rack, rear view” (page 503).
- 2 Loosely fasten the 3 left and 3 right short adapter brackets onto the front of the rack uprights at these mirrored positions. Use the thread-forming 10-mm (3/8-in.) hex-head screws from pack P097F814 through each of the holes.
- 3 Tighten all screws to snug plus a 1/4 turn.

Levelling the frame or frame pair

Level the frame or frame pair to level the frame or connected pair of frames after they have been aligned over the anchor openings.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a frame with PEC NTRU04. Other names for the frame include PTE 2000 and NEBS 2000 frame.

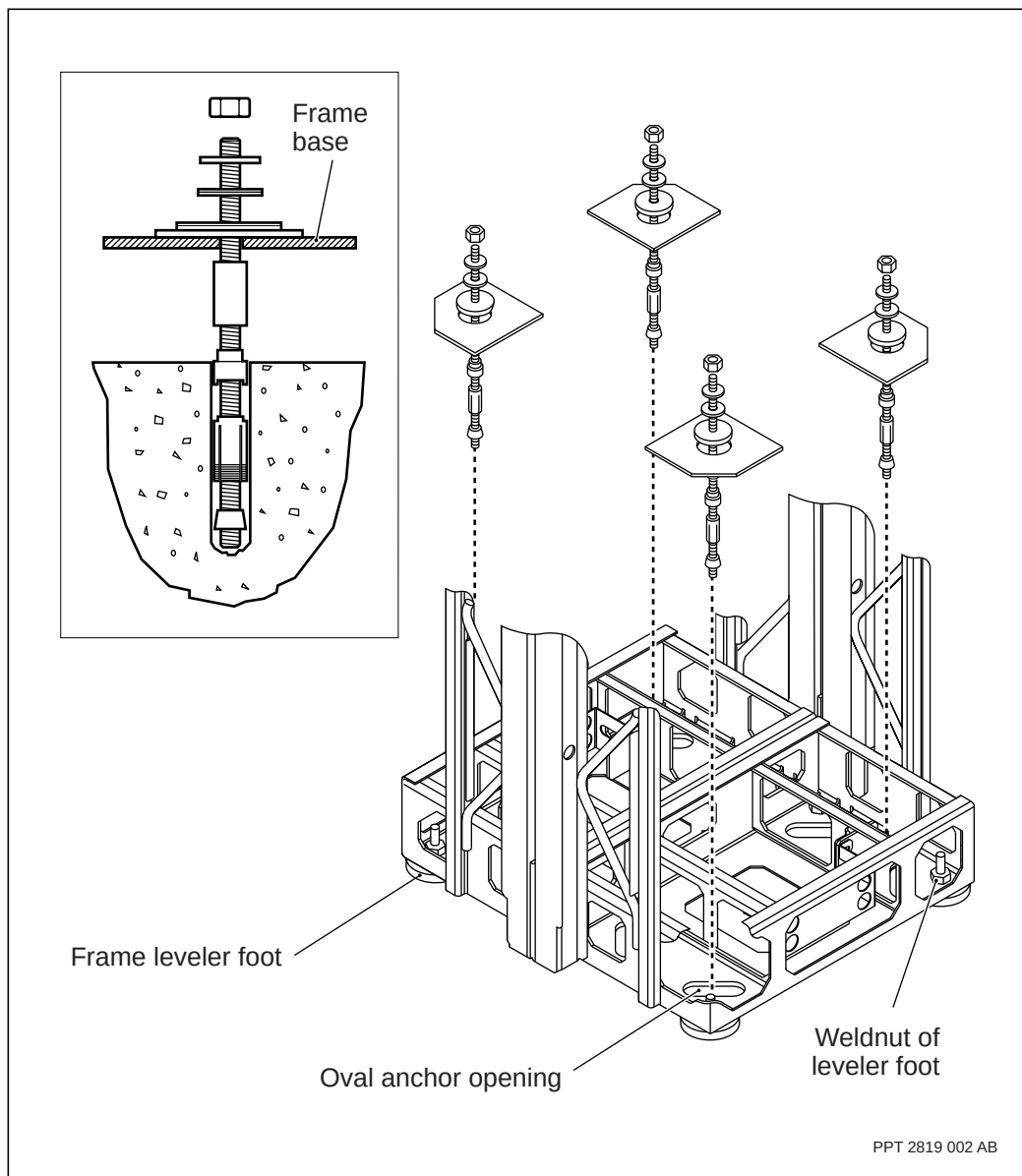
Procedure steps

- 1 Unfasten the 2 slotted captive screws per kick plate at both the front and the rear bottoms of the frame or frame pair.
- 2 See the figure “Location of the frame levelers and anchor openings” (page 507). The frame feet are the levelers.
- 3 Reach through the side openings of the frame (or front, depending on ease of access) to adjust the middle levelers so that each foot is away from the floor. Adjust a leveler by turning the threaded shaft counter-clockwise. If your fingers cannot turn the shaft, use an 8-cm (5/16-in.) hex driver at the top of the threaded shaft.
- 4 Place a level vertically against the side of a middle frame upright at the side of a frame or frame pair to determine which side of the frame is highest.
- 5 Reach past a kick plate opening to adjust the foot downwards at the highest side of the frame. Adjust each foot by an 8-cm (5/16-in.) hex driver at the top of the threaded shaft. Monitor the level while adjusting. Stop when that face of the frame is level.
- 6 Place the level vertically against the front of the middle frame upright to determine which is highest, the front or the rear of the frame.
- 7 Adjust the highest corner feet downwards until the frame or frame pair is level from all sides.
- 8 Reach through the side openings of the frame (or front, depending on ease of access) to adjust the middle levelers so that each foot touches the floor. Adjust each leveler by turning the threaded shaft clockwise. If your fingers cannot turn the shaft, use an 8-cm (5/16-in.) hex driver at the top of the threaded shaft. After the levelers touch the floor, turn each with the hex driver 1/8 turn clockwise.

- 9 The frame is ready to be anchored. See “Anchoring the NEBS 2000 frame” (page 188).

Procedure job aid

Figure 175
Location of the frame levelers and anchor openings



Loading cards in sequence with software

Load cards in sequence with software to confirm each card's ability to successfully accept the software.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need access to 241-5701-270 *Passport 7400, 15000, 20000 Software Installation*.
- Cards that were shipped installed but unseated (in the transportation position) at the factory have already been loaded with basic software.
- The LEDs of seated cards prior to loading software are green for the fabrics or amber for the CPs and FPs.

Procedure steps

- 1 Lift the latches of the CP in slot 0 and slide it gently into the slot until you feel it engage the backplane. Once engaged, powering up the CP begins.
- 2 Observe the CP's LEDs complete the following cycle:
 - a. solid red (a final state), indicating powering up or after power-up, or is being reset or restarted; during solid red, the hardware and fabric backplane is tested and initialized; if there is a problem, the CP reboots and remains solid red
 - b. flashing red (an intermediate state), indicating that initializing and testing the fabric backplane has passed and the CP software is loading
 - c. solid amber (a final state), indicating the software is not yet loaded or configured for that CP, that is, the slot is unconfigured
 - d. slow flashing green (an intermediate state), indicating the software has been loaded and the applications are being initialized
 - e. solid green (a final state), indicating power is on, software is loaded, the CP is in service operating normally, and is the active CP.

If the LED stays red, remove the CP and use a flashlight to inspect the pins inside the slot at the backplane. If any are bent, contact your local Nortel Networks support representative. If none are bent, gently insert a replacement CP and observe the LED cycle again.

- 3 When the CP LED in slot 0 is green, start seating the FPs one at a time. As each FP is seated, observe its LED completing the following cycle.
 - a. solid green, confirming initial power up
 - b. solid red (a final state), indicating a reset or restart to test hardware; if there is a problem, the FP reboots
 - c. flashing red (an intermediate state), indicating the software is initializing for a reset or is loading
 - d. slow flashing green (an intermediate state), indicating the software has been loaded and the FP is being initialized
 - e. solid green (a final state), indicating power is on, software is loaded, and the card is in service operating normally.
- 4 After all the FPs are seated and showing solid or flashing green LEDs, locate the spare (redundant mate) CP in slot 1 and repeat step 2. The LED of the second CP cycles to fast flashing green, indicating it is on standby as the redundant (spare, back-up, or inactive) mate.
- 5 Verify successful loading of each CP and FP by checking the status LEDs for each card one at a time. Record the node number and slot number of any CP or FP that does not have a solid or fast flashing green LED. Report the problem to your local Nortel Networks technical support representative.

If the LED stays solid amber, the FP software is improperly configured or not configured.

If the LED stays flashing red, the FP card type is configured for the slot, but the for the card itself

If the LED stays solid red, the FP has failed.
- 6 If present, remove the label on any faceplate that indicates the former PCR software version.

Procedure job aid

For the locations of the status LEDs, refer to these figures:

- “A fabric of a Passport 15000, rear view” (page 347)
- “A fabric of a Passport 20000, rear view” (page 352)
- “Circuit breakers on the front of the BIP” (page 687)
- “Location of BIM status LEDs” (page 694)
- “Location of alarm module status LEDs” (page 695)

Making a BITS cable

Make a BITS cable to connect from the timing source directly to the alarm/BITS module or to one of the prefabricated timing cables to enable external timing.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- For cable specifications refer to the section on alarm/BITS module in 241-1501-200 *Passport 15000, 20000 Hardware*.

Procedure steps

- 1 Each timing connection requires 2 wires. When connecting both the A and the B timing references, select color-coded twisted pair wires to distinguish between the 2 (this does not apply to E1 unbalanced connections).
- 2 Ensure the size of wire (for example, 22 AWG or 6 mm²) can be soldered to the DB9 connector pins. The wire size depends on the length between the end points.
- 3 Locate the CPE timing source at your site.
- 4 Lay the wires from the timing source up to the connectors J3 and J4 on the alarm/BITS module at the rear of the Passport 15000 or 20000. Route the wires up or down the right side of the frame against the cable management brackets.
- 5 Connect the wires at the source, using whatever method of connection is required.
- 6 Label each timing wire pair at both end points to distinguish which is reference A and which is reference B.
- 7 Fasten the wires snugly with tie-wraps to whatever CPE wire support system leads to the cable management brackets on the switch mounting apparatus. Leave enough length at the Passport 15000 or 20000 end of the wire to attach the D-sub connectors.
- 8 From the DB9 connector kit, insert the rubber grommet over the wires, wider end first. Repeat on the second pair of timing wires if the redundant reference is being used. Slide the grommet away from the ends.
- 9 In preparation for soldering, cut two lengths of wire, approximately 2 cm (3/4 in.) each. Use the same type and size wire as the timing wire pairs.

- 10 Strip 3 mm (1/8 in.) off both ends of the two pieces of wire and off the Passport 15000 or 20000 end of the timing wire pair. Twist the exposed wire ends, and dip the twists in flux.
- 11 As shown in the figure “D-sub pinout for J3 and J4 BITS cables for DS1 or E1 balanced” (page 513), solder each wire onto the appropriate DB9 pin. For the appropriate wire-to-pin connections, see the tables
 - “Pinouts of the J3 and J4 connectors for DS1 or E1 balanced” (page 511)
 - “Pinouts of the J3 and J4 connectors for E1 unbalanced” (page 512)

The minimum connection between the BITS site timing source and the D-sub, DS1, or E1 balanced uses pins 5 and 9 with the ground, while E1 unbalanced uses pins 1-1 and 1-2 with the ground. A minimum connection has no backup signal for any part of the timing path to the CP.
- 12 Assemble the D-sub jacket halves with the grommet in the grooves of the halves. Ensure the jumper wires are not snagged by the jacket.

Procedure job aid

Table 24

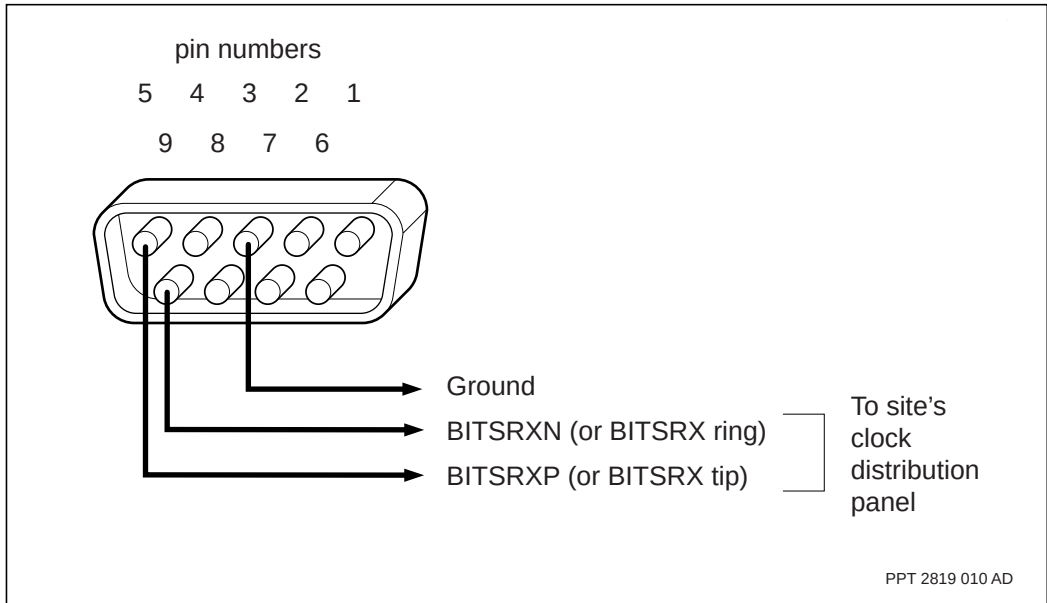
Pinouts of the J3 and J4 connectors for DS1 or E1 balanced

Pin	DS1/E1 for J3	DS1/E1 for J4	Description of the connection
1	no connection	no connection	no connection
2	no connection	no connection	no connection
3	GND	GND	ground
4	no connection	no connection	no connection
5	BITSRXBP	BITSRXAP	BITS receive (signal is from the external clock into the BITS interface) reference B (or 2) or A (or 1), positive (for balanced means tip)
6	no connection	no connection	no connection
7	no connection	no connection	no connection
8	no connection	no connection	no connection
9	BITSRXBN	BITSRXAN	BITS receive (signal is from the external clock into the BITS interface) reference B (or 2) or A (or 1), negative (for balanced means ring)

Table 25
Pinouts of the J3 and J4 connectors for E1 unbalanced

Pin	J3 E1 signal, unbalanced	J4 E1 signal, unbalanced	Description of the connection
1-1	BITSRXBN	BITSRXAN	BITS receive (signal is from the external clock into the BITS interface) reference B (or 2) or A (or 1), negative (for unbalanced means ground)
2-1	no connection	no connection	no connection
1-2	BITSRXBP	BITSRXAP	BITS receive (signal is from the external clock into the BITS interface) reference B (or 2) or A (or 1), positive (for unbalanced means signal)
2-2	no connection	no connection	no connection
1-3	no connection	no connection	no connection
2-3	no connection	no connection	no connection
Note: E1 unbalanced uses D-sub coax cables.			

Figure 176
D-sub pinout for J3 and J4 BITS cables for DS1 or E1 balanced



Moving a frame into its anchoring position

Move a frame into its anchoring position to prepare the NEBS 2000 frame for anchoring.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a frame with PEC NTRU04. Other names for the frame include PTE 2000 and NEBS 2000 frame.
- You need a machine or hand tool rated for an overall load capacity of 600 kg (approximately 1,300 lbs) to move the frame to its final footprint. Nortel Networks recommends using a four-wheeled 2-m (7-foot) fridge cart equipped with a foot-plate and two tie-down straps. Notice in the figure “Fridge cart to move a NEBS 2000 frame” (page 517) that the frame of the cart rests on top of the secondary wheels (see insert) to ensure that the weight of the load keeps the wheels in position, and that no wheels pivot. Another name for a fridge cart is appliance cart. Using a fridge cart to move the frame means it can
 - be handled safely by two people (although three is best)
 - ride on four non-pivoting wheels, which means the cart carries the full weight
 - be moved while tilted, which means it is less likely to hit the top of a doorway; in the upright position, a NEBS 2000 frame is about 2.3 m (7.5 feet) tall
 - be tilted in motion over obstacles on the floor (for example, cables on the floor or a raised or sunken doorway threshold)

**WARNING****Risk of injury when handling a frame**

Never place a foot or a hand under any part of the frame while it is being tilted or moved. Always move it with at least four people. The weight of a shipped frame with one Passport 15000 or 20000 switch is approximately from 330 kg (730 lbs) to 355 kg (780 lbs); with two switches the weight is from approximately 480 kg (1052 lbs) to 490 kg (1076 lbs). For additional protection, wear safety boots with steel toes and gripping soles.

**WARNUNG****Verletzungsgefahr beim Gestelltransport**

Stellen Sie niemals einen Fuß unter das Gestell, wenn dieses bewegt oder gekippt wird, und greifen Sie nicht unter das Gestell. Zum Bewegen des Gestells sind mindestens vier Personen erforderlich. Ein Gestell mit einem Passport 15000 oder 20000 wiegt ca. 330 kg und mit zwei Passport-Einheiten ca. 490 kg. Tragen Sie zu Ihrem zusätzlichen Schutz Sicherheitsschuhe mit Stahlkappen und griffigen Sohlen.

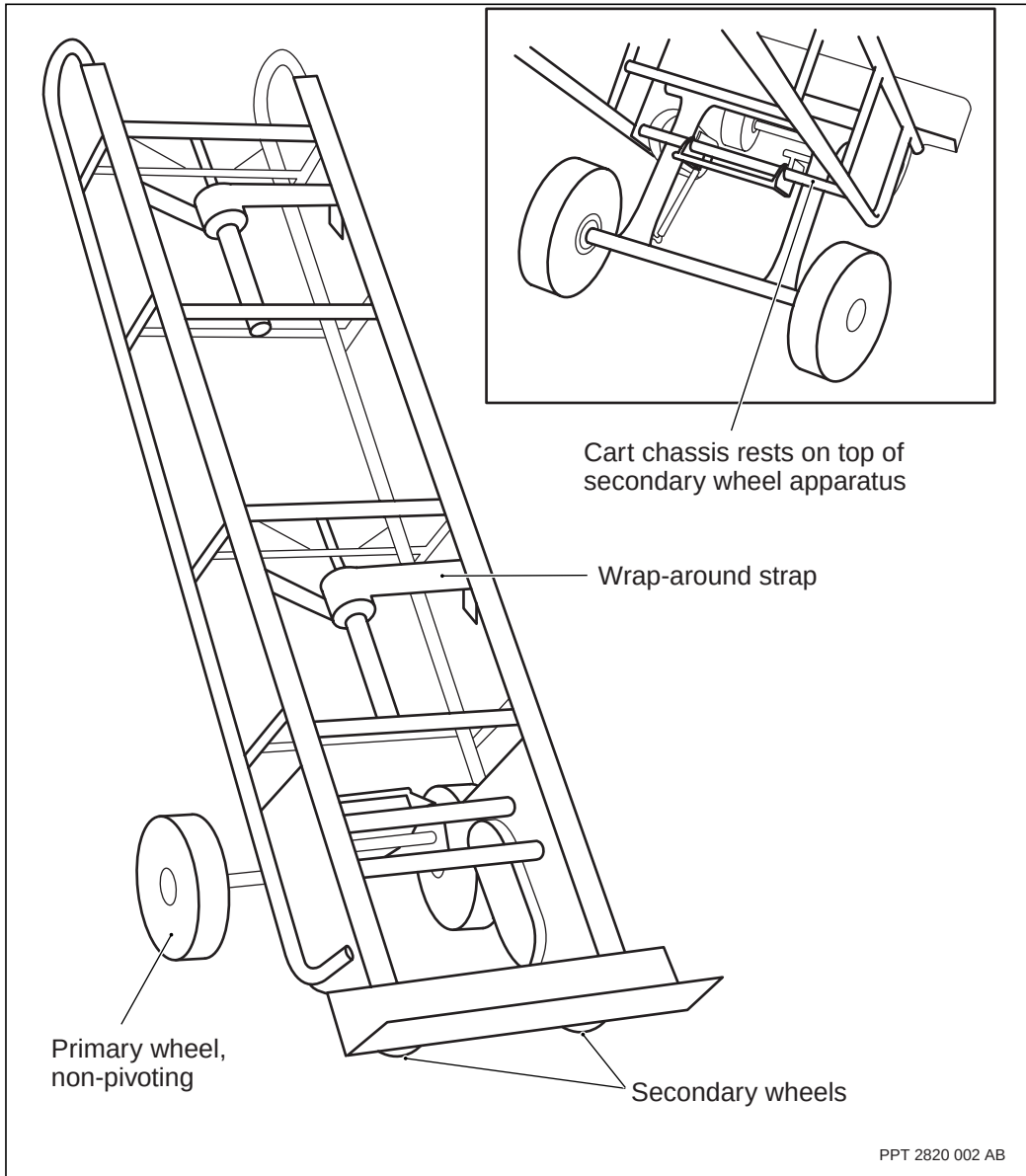
Procedure steps

- 1 From where the frame is positioned on the floor, determine how far it can be moved by machine towards the footprint where the frame is to be located. The frame dimensions are 60 cm (23.62 in.) wide by 60 cm (23.62 in.) deep by 212.5 cm (83.66 in.) tall.
- 2 Move the fridge cart as close as possible to the footprint where the frame is to be anchored to the floor. At least 2 people should move the cart. When the loaded cart must be tilted over an obstacle (such as a cable or doorway threshold), at least one other person must help control the tilting.
- 3 Unload the frame from the fridge cart by getting two or three helpers to tilt the frame away from the fridge cart enough to slide the foot plate out from underneath.
- 4 Slide the frame by hand to its pre-marked position on the floor. Use two or three helpers to push and pull in unison while holding the uprights of the frame.

- 5 If the frame will be anchored to the floor later, wrap and tape the original plastic sheet around it. The sheet minimizes contamination by dust.

Procedure job aid

Figure 177
Fridge cart to move a NEBS 2000 frame



Packing a processor card or module

Pack a processor card, fabric card, or module in its original container to protect it from damage while it is being stored or returned.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Prevent damage to card electronics from electrostatic discharge (ESD) by using effective anti-ESD gear that is appropriately grounded. A Passport 15000 or 20000 antistatic wrist strap has part number A0378999. Work near the Passport 15000 or 20000 switch so that you can reach the package while wearing a wrist strap that is plugged into an ESD jack on the switch hardware.
- For a Passport 20000 in a NEBS 2000 frame (NTRU04), there are no separate shipping containers for the CPs, FPs, or fabrics because they are shipped in the transportation positions (latched but not seated) in each shelf assembly. The plug-in modules of the breaker interface panel (BIP) are also shipped in a transportation position. There are no original containers for these cards or modules. When returning a failed card or module from a frame-based Passport 20000, you must pack it in anti-ESD protective material so that further damage does not occur to the unit.

Procedure steps

- 1 Get the original packaging and container, or equivalent anti-ESD packing materials. If using a non-original container, put the PEC of the card or module on the outside of the container.
- 2 Label the pouch and container with the operational status of the card, fabric, or module at the time of its removal. For example, use failed or spare (for re-deployment).
- 3 Insert the card or module into the antistatic ESD protection pouch and put the pouch into the container, or put it directly into the container lined with antistatic foam slots.
- 4 Seal the container with packing tape.

Placing the NEBS 2000 frame onto the footprint

Place the NEBS 2000 frame onto the footprint to install the frame above the isolator pad before leveling.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a frame with PEC NTRU04. Other names for the frame include PTE 2000 and NEBS 2000 frame.
- The location of the NEBS 2000 frame footprint must already have been prepared and marked on the floor according to the criteria in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements*.



WARNING

Risk of injury when handling a frame

Never place a foot or a hand under any part of the frame while it is being tilted or moved. Always move it with three or four people. The weight of a shipped frame with one Passport 15000 or 20000 is approximately 419 kg (926 lbs); with two switches the weight is approximately 612 kg (1,344 lbs). For additional protection, wear safety boots with steel toes.



WARNUNG

Verletzungsgefahr beim Gestelltransport

Stellen Sie niemals einen Fuß unter das Gestell, wenn dieses bewegt oder gekippt wird, und greifen Sie nicht unter das Gestell. Die Einheit muß mit vier Personen von der Transportpalette genommen werden. Ein Gestell wiegt mit einem Passport 15000 or 20000 ca. 420 kg, mit zwei Passport-Einheiten ca. 610 kg. Tragen Sie zu Ihrem zusätzlichen Schutz Sicherheitsschuhe mit Stahlkappen.

Procedure steps

- 1 Place the isolator pad (footprint template) on the footprint marked on the floor and align the two. The isolator pad helps insulate the NEBS 2000 frame from electrical current.
- 2 Tape the isolator pad to the floor to keep it from moving when the frame is placed on it. Keep the tape off the spots where the levelling feet will go.
- 3 With 3 or 4 helpers, slide the frame on its feet over the footprint template so that the edges and all anchor openings in the floor align with the oval openings in the bottom of the frame. To slide the frame on its feet, push in unison on one side of the frame.
- 4 For installations where the power cabling is routed upwards from the floor, remove the plate (part number P0870734) in the bottom of the frame nearest where the cable comes through the floor. The plate screws are 10 mm (3/8 in.). Ensure the alignment of the knock-out disks for conduit in the bottom of the frame is close enough to the power cable opening to prevent right-angle bends.
- 5 While 3 or 4 helpers tilt and hold the frame at a slight angle, slide the isolator pad under the raised feet and push it against the other feet. Holding the pad in position by stepping on it, slide the frame away from the pad on the side with the feet on the floor. Move it only the distance of one frame foot.
- 6 Slide the isolator pad over the footprint and align the edges and openings.
- 7 While 2 or 3 helpers tilt and hold the frame at a slight angle, slide the frame feet onto the isolator pad. While sliding, hold the pad in position by stepping on it. Align all three sets of openings: those on the frame, isolator pad, and anchor holes.

Powering down a BIM

Power down a BIM to accommodate safe activities involving any hardware or cables that are connected to it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Prepare the far-end traffic for the impact of taking one or two Passport 15000 or 20000 nodes out of service.
- Switching off the breakers in sequence protects the equipment from damage.



CAUTION

Service interruption from power interruption

Switching off the BIP means that the one or two switches cannot operate. To minimize the impact on traffic of powering down, choose a period of lowest average traffic for the affected nodes.



WARNING

Risk of injury or damage by electricity

When switching off power breakers on a breaker interface module (BIM) or in the circuit up to it, or removing a fuse from the circuit up to it, always put tape over the breaker or fuse cavity. The tape indicates it was manually switched off, and not tripped by the system. This prevents accidental activation of the power circuit, especially if power cables are being handled.

**WARNUNG****Schäden oder Verletzungen durch Elektrizität**

Wenn die Leistungstrennschalter an einem Trennschalterkopplungsmodul (BIM) oder im zuführenden Stromkreis geöffnet bzw. Sicherungen aus dem Stromkreis entfernt werden, decken Sie den Trennschalter oder den Sicherungssteckplatz mit Klebeband ab. Das Klebeband signalisiert, daß er/sie manuell ausgeschaltet und nicht vom System ausgelöst wurde. Damit verhindern Sie eine versehentliche Aktivierung der Stromversorgung, besonders beim Hantieren mit Netzkabeln.

Procedure steps

- 1 Locate the BIM to be powered off.

When powering down an entire Passport 15000 or 20000 node, locate the mate BIM for the switch.

- 2 Switch off each breaker one at a time from left to right, excluding the middle breaker. Switch off a breaker by pressing in the O symbol.
- 3 When the mate BIM is also to be powered down, switch off each breaker one at a time from left to right, excluding the middle breaker.
- 4 When two nodes are to be powered down, repeat step 1 to step 3.
- 5 When the entire BIP is powered down to enable work on switch hardware units (for example, removing a shelf assembly), wait 10 minutes for the fans to continue cooling down the unpowered circuit cards.
- 6 Switch off the middle breakers one at a time from left to right. The fan blades in the cooling units take a while to slow down.

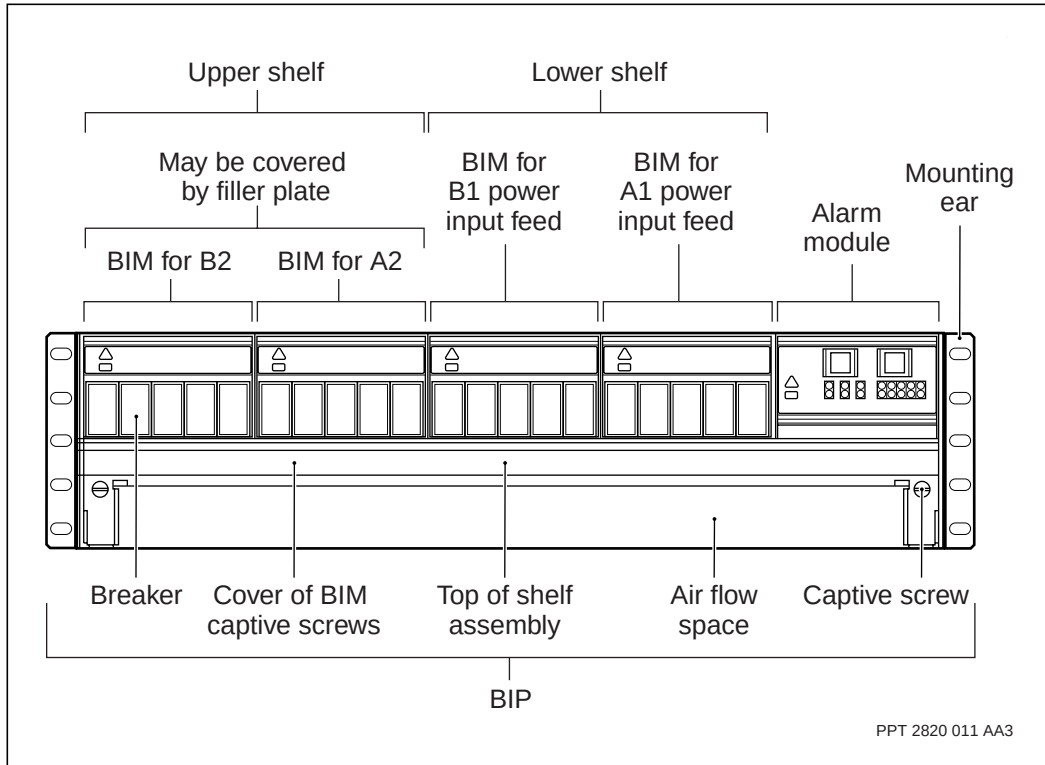
When all BIM breakers off and the input feeds are still powered to the BIP, the BIM LEDs are still lit.

- 7 Check the status LEDs of all plug-ins of the shelf assembly. Ensure that no LEDs are lit on:
 - both CPs and all FPs at the front
 - the 2 fabrics at the rear
 - the 4 PIMs at the rear of a Passport 20000 (a Passport 15000 does not have PIM LEDs)

Procedure job aid

Figure 178

BIMs for specific shelf nodes



Powering up a system of ac rectifiers

Power up a system of ac rectifiers to provide power to the breaker interface panel (BIP).

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- When the source of power to the BIP is a system of ac rectifiers, follow the powering up instructions provided by the product. When the system is an Astec MFA150 power system, have the Astec document 167-9021-133 Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual available to coordinate with the following procedure.

Procedure steps

- 1 At the front of the BIP, ensure that all of the breakers are off (O is pressed in).
- 2 At the front of the MFA150 system, ensure that all of the mid-trip circuit breakers labelled CB1 to CB4 on the front of the controller are switched to OFF (fully down).
- 3 Locate the one or two shelves of ac rectifiers. Starting from left to right, top to bottom, switch the circuit breaker on each rectifier to ON (fully up). There are 3 or 5 rectifiers.
- 4 Locate the circuit breakers labelled CB1 to CB4 on the front of the controller (top unit). Starting from left to right, switch the circuit breakers CB1 and CB2 to ON (fully up). Switch on CB3 and CB4 if a second Passport node is being powered from the controller.
- 5 Check each rectifier to verify that:
 - the LED beside the label RFA on the faceplate is solid green
 - the fan may not activate immediately, therefore the red LED stays unlit
- 6 On the front of the controller, set the toggle switch to VOLTS. A nominal reading at startup for the Passport 15000 or 20000 is around -52 V. A reading below -46 V or above -59.5 indicates a problem.

- 7** Set the controller toggle switch to AMPS. With the BIP off, the reading is zero since there is no load. Otherwise, a reading of 5 amps or more indicates there is a fault with the setup.
- 8** Do the testing and adjustments to the system as prescribed by the Astec document 167-9021-133 Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual.
- 9** Trouble-shoot and replace any MFA150 hardware part that is not supplying a nominal range of power to the Passport 15000 or 20000.

Preparing the NEBS 2000 frame for installing adapter brackets

Prepare the NEBS 2000 frame to accommodate installing NEBS 2000 frame-to-EIA adapter brackets.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The NEBS-to-EIA adapter brackets are required to mount 19-inch wide equipment onto the 21-inch wide NEBS 2000 frame.

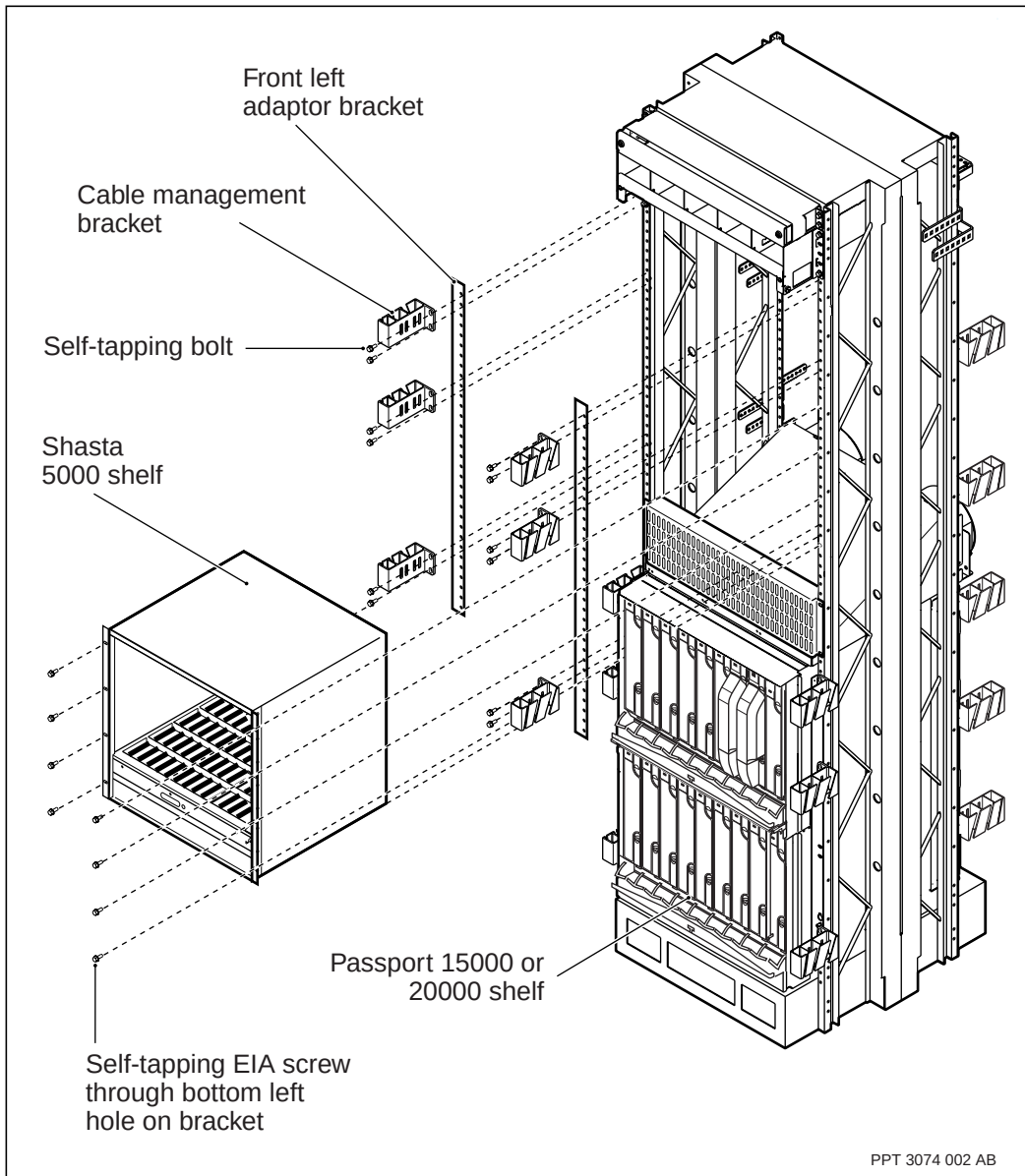
Procedure steps

- 1 When a NEBS 2000 frame has a Passport 15000 or 20000 switch installed in it, cable management brackets are installed on the front of the frame uprights, on the side of the uprights near the front, or both. If any brackets are on the front surface of the frame uprights, record their location and whether their arms point frontwards or rearwards.
- 2 While facing the front of the switch, unfasten the pairs of thread-forming 10-mm (3/8-in.) hex-head screws of the top 3 brackets on each side of the frame.
- 3 Put the screws and brackets aside to be re-installed later.
- 4 On the front of the NEBS 2000 frame, locate the first screw hole or dimple above the mounting ear of the air-flow grill. The air-flow grill is located immediately above the Passport 15000 or 20000 cooling unit.
- 5 Locate any cable management brackets at the rear of the frame. Record the location and whether the arms point forwards or rearwards of any bracket in the top half of the frame.
- 6 Unfasten the 10-mm (3/8-in.) screws of the cable brackets on the back of the frame.
- 7 Put the screws and brackets aside to be re-installed later.

Procedure job aid

Figure 179

Location of shelf hardware for a Shasta 5000 in a NEBS 2000 frame



Removing a BIM

Remove a BIM to replace it due to a failure or to enable safer removal of the BIP.

Prerequisites

**WARNING****Risk of injury by electrocution**

Each power input feed to a breaker interface module (BIM) is rated up to 100 A. Prior to removing a BIM, power to the BIM must be switched off for the last leg of site power up to the BIM, and all breakers on the BIM must be switched off (the O is pressed in).

**WARNUNG****Lebensgefahr**

Die Speisestromzuführungen zu jedem Trennschalterkopplungsmodul (BIM) sind für bis zu 100 A ausgelegt. Bevor ein BIM ausgebaut wird, muß unbedingt die gesamte Stromversorgung für das BIM abgeschaltet werden und sämtliche Trennschalter auf dem BIM müssen ausgelöst werden (O ist gedrückt).

- You must be familiar with “Safety considerations and best practices” (page 41).
- Removing a BIP BIM causes hardware parts in the Passport 15000 or 20000 switch to lose their backup power when its mate BIM remains powered. While one BIM of a pair is disengaged, the software reports major alarms for the shelf and cooling unit powered by that BIM. The label on the back of the cover of the captive screws indicates which parts of the shelf assembly are powered by each breaker of each BIM.

Procedure steps

- 1 At the front of the BIP, unfasten the slotted captive screws of the BIP screw cover (do not use power tools), as indicated in the figure “Locations of modules in a BIP” (page 530).
- 2 Swing the cover downwards.

- 3 Identify which of the 4 BIMs is to be removed. A failed BIM indicates a red LED.
- 4 On the BIM, switch all of the breakers off one at a time by pushing the symbol  in.
- 5 Manually unfasten the large slotted captive screw of the BIM.

**WARNING****Risk of injury by electrocution**

When a breaker interface module (BIM) is unseated, regardless of switching breakers on or off, the capacitors inside a BIM need time to discharge. Wait 15 seconds before re-seating the BIM or removing it from the breaker interface panel (BIP). Otherwise, damage to the BIM can occur.

**WARNUNG****Lebensgefahr**

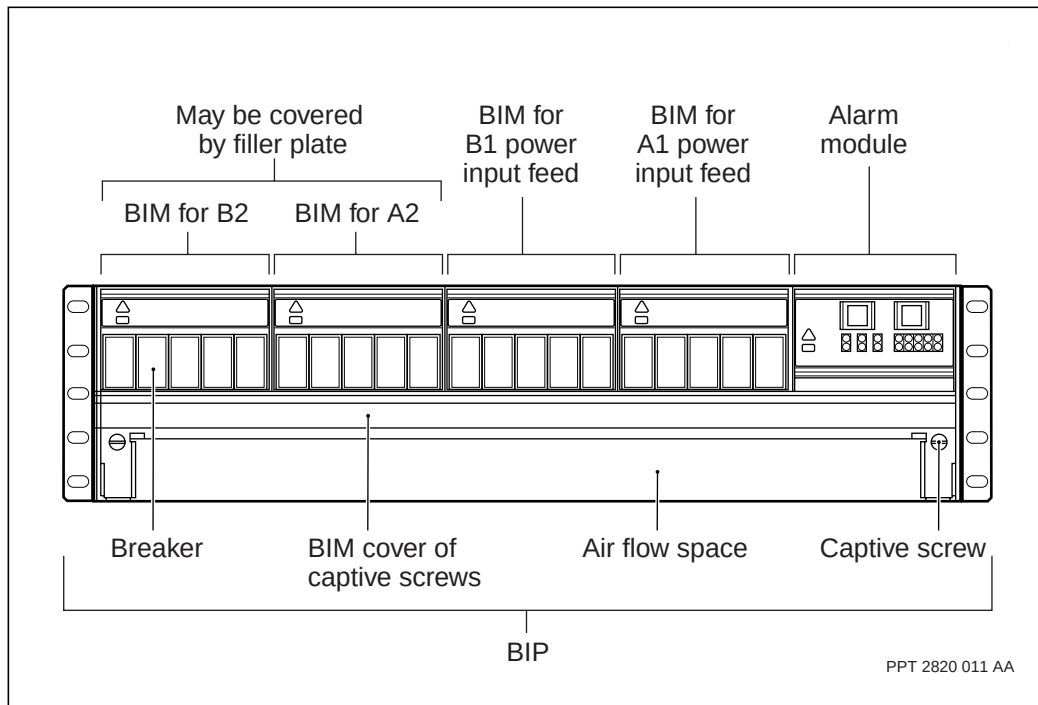
Wenn ein Trennschalterkopplungsmodul (BIM) ausgebaut wird, unabhängig von der Stellung der Trenn- oder Hauptschalter, benötigen die Kondensatoren im BIM Zeit zur Entladung. Warten Sie 15 Sekunden, bevor Sie das BIM wieder einsetzen oder vom BIP trennen. Andernfalls kann das BIM beschädigt werden.

- 6 Pinching the lower front lip of the module with your thumb and finger tips, pull gently but firmly straight out until you feel it disengage. Stop pulling when the front of the module is past the front of the BIP.
- 7 Leave the module disengaged for 15 seconds before removing it from the BIP. This safely allows the inside power capacitors to discharge. The BIM LED remains red until the capacitors have discharged.
- 8 If you are removing BIMs in preparation to removing the BIP, repeat step 4 to step 7 for the remaining three BIMs.

Remember which BIM goes into which opening.
- 9 If you are upgrading a pair of BIMs, repeat step 4 to step 7 for the mate BIM. For example, BIMs A2 and B2 are mates shown in the figure "Locations of modules in a BIP" (page 530).

Procedure job aid

Figure 180
Locations of modules in a BIP



Removing a BIP

Remove a BIP to replace it for a failure or to upgrade a NEBS 2000 frame with a Passport 15000 to accommodate a Passport 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a helper to support the BIP while it is unfastened.



CAUTION

Risk of equipment damage from dropping

The various BIPs weigh up to about 16 kg (36 lbs). The weight of a free-falling BIP can damage it. As the mounting screws of the BIP are being unfastened, do not allow the BIP to drop onto the shelf assembly.

Procedure steps

- 1 At the front of the BIP, close the cover of the BIM captive screws by engaging the 2 slotted captive screws.
- 2 If the two studs at the rear lower right of the BIP chassis have a cable fastened to them, unfasten the number 10-32 unc nuts. (It is a secondary ground bonding point.) Disconnect the cable and put the nuts back on the studs.
- 3 Unfasten the 4 thread-forming 10-mm (3/8-in.) hex-head screws that hold the mounting ears against the frame uprights or adapter brackets. Put the screws aside for re-use.

While the mounting screws are being unfastened, have a helper be ready to hold the BIP. Once you begin to loosen the top screws, the rear of the BIP starts to sag downwards onto the top of the shelf assembly.

- 4 Remove the BIP by sliding it out the front of the frame or rack.

Procedure job aid

For the location of the mounting screws, refer to the figure “Locations of modules in a BIP” (page 530).

Removing a BIP alarm module

Remove a BIP alarm module to replace it due to a failure or to enable safe removal of the BIP.

Prerequisites

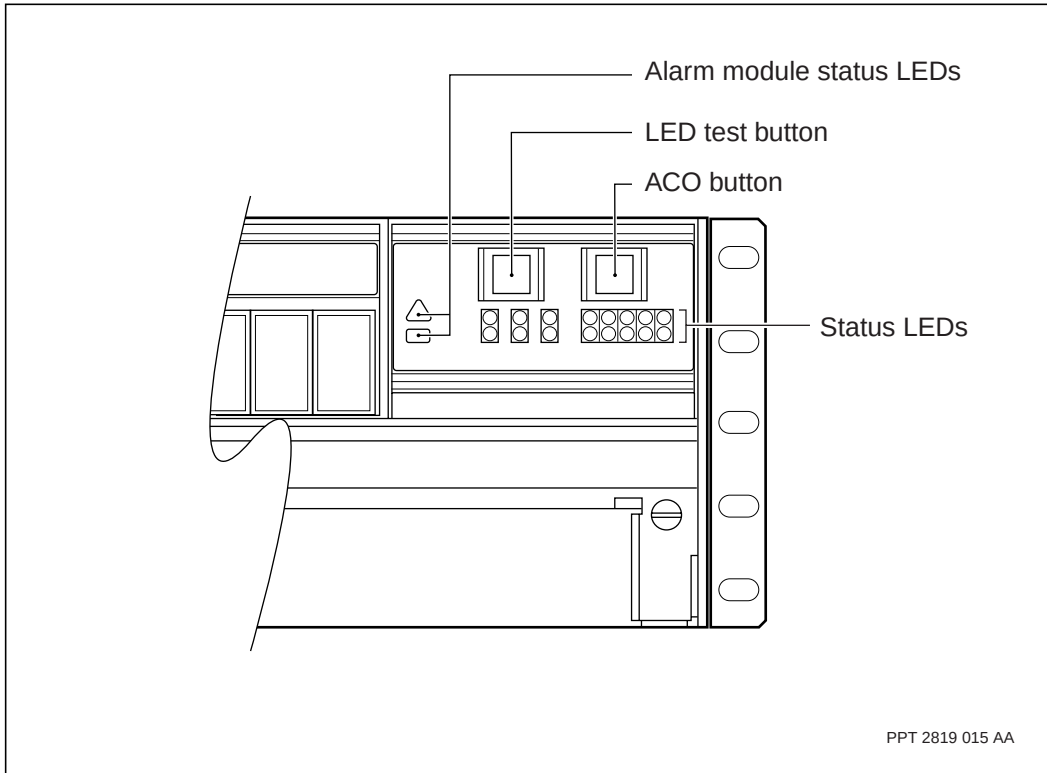
- You must be familiar with “Safety considerations and best practices” (page 41).
- While the module is removed, the reporting of alarms to the CP is temporarily suspended.
- The module is located at the front right side of the BIP. See “Location of a BIP alarm module” (page 533)

Procedure steps

- 1 At the front of the BIP, unfasten the slotted captive screws of the BIP screw cover. The screws are shown in the figure “Locations of modules in a BIP” (page 530).
- 2 Swing the cover downwards.
- 3 Unfasten the large captive screw of the BIP alarm module.
- 4 Pinching the lower front lip of the module with your thumb and finger tips, pull gently but firmly straight out until you feel it disengage. Stop pulling when the front of the module is past the front of the BIP.
- 5 Pull the module straight out of the BIP.

Procedure job aid

Figure 181
Location of a BIP alarm module



Removing a BITS cable

Remove an alarm/BITS cable to complete a cable replacement.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The timing port must be locked for the cable you are about to remove.

Procedure steps

- 1 At the rear of the frame, locate the alarm/BITS module. See the figure
 - “Location of the alarm/BITS module and cable connections in a Passport 15000” (page 657)
 - “Location of the alarm/BITS module and cable connections in a Passport 20000” (page 660)
- 2 Record which cable connects to which J number. Label them if they are not already labeled.
- 3 Unfasten and remove the D-sub cable connectors. Unplugging the cable (at either end) generates software alarms for the cooling unit and high temperature. This is normal during a replacement.

Examples of some of the generated alarms include:

- SET major equipment equipmentFailure
- ADMIN: unlocked OPER: enabled USAGE: active
- AVAIL: PROC: CNTRL:
- ALARM: STBY: notSet UNKNW: false
- Id: 010000EF Rel: Lp/0
- Com: The hardware reports a fan failure.
- Int: 1/0/2/24083; pcsShelfMgr.cc; 722; PCR2.3.73
- SET warning equipment equipmentFailure
- ADMIN: unlocked OPER: enabled USAGE: active
- AVAIL: PROC: CNTRL:
- ALARM: STBY: notSet UNKNW: false

- Id: 010000F0 Rel: Lp/0
- Com: The cooling unit exhaust air temperature exceeds the specific range.
- Int: 1/0/2/24083; pcsShelfMgr.cc; 722; PCR2.3.73

Removing a blank processor card

Remove a blank processor card to replace it with an FP or CP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- A blank processor card has PEC NTHR64 and is labeled with BLANK on the faceplate.



CAUTION

Risk of service degradation or equipment damage

Always have a blank processor card (labeled BLANK) in a slot that does not house another card. The blank cards enable efficient performance of the fans for temperature control and also facilitate fire protection and EMI containment.

Procedure steps

- 1 At the front of the Passport 15000 or 20000, locate the blank card to be removed. See the figure “Locations of FPs” (page 607). Blank cards are labeled with BLANK.
- 2 On the faceplate of the blank card, fully swing out the upper and lower latches until they stop. See the figure “Fully opened card latches” (page 608).
- 3 Place fingers on the exposed tabs to gently but firmly slide the card out of its slot.
- 4 Put the card aside into the spare anti-ESD package and pack it later.
- 5 Store any removed blank card for re-use in another slot. No slot of a Passport 15000 or 20000 is to remain empty for more than a few minutes while the switch is powered up, especially if it is operating at full service.

Removing a CP

Remove a CP from a Passport switch to replace it or upgrade it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- When upgrading (or downgrading) CP2 and CP3 card pairs, ensure that you have followed the criteria identified in 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.

Procedure steps

- 1 At the front of the Passport 15000 or 20000, locate the CP to be removed. The slot numbers are labeled on the shelf below the cards.
- 2 To ensure that proper connection of cables at the faceplate, verify that each cable has a label matching the faceplate receptacle label or that its connector is a unique size and shape for that its receptacle. If a label is missing, add it.



CAUTION

Risk of shelf reset by disconnecting an active cable

If the Ethernet cable is disconnected from the active CP, the shelf undergoes a switchover to the spare provided the mate is in-service. The status LED of an active CP is solid green. Only one CP can be active.

- 3 Wait in readiness until the software operator confirms that the CP is offline, that is, out of service and ready to be replaced. The CP LED indicates solid red for only a few seconds. While the LED is solid red, unseat the CP by fully swinging out the upper and lower card latches until they stop horizontally, then pull the card at the faceplate to remove it about 10 cm (4 in.).

After a few seconds of being offline, the CP is automatically reloaded. The LED changes from solid red to flashing red to indicate loading has begun. If reloading begins, do not remove the CP. You must wait until loading completes. Otherwise, traffic on other hardware parts such as a fabric or an active CP can be degraded or dropped by the subsequent steps.

- 4 While the CP is unseated, carefully unplug the cable connectors on the faceplate of the CP, and let them hang aside. Avoid touching any part of the card behind the faceplate.
- 5 On the faceplate of the card, fully swing out the upper and lower latches until they stop. See the figure "Fully opened card latches" (page 608).
- 6 Place fingers on the exposed tabs to gently but firmly slide the CP out of its slot. Hold only the edges of the CP. Be careful because a CP weighs about 5 kg (11 lbs).
- 7 Put the CP aside onto its original packaging. Packing it after the replacement CP is installed minimizes the amount of time the CP is out of service.

Removing a fabric card from a Passport 15000

Remove a fabric card from the rear of a Passport 15000 switch to replace it because of a failure or an upgrade, or to assist in replacing an alarm/BITS module.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

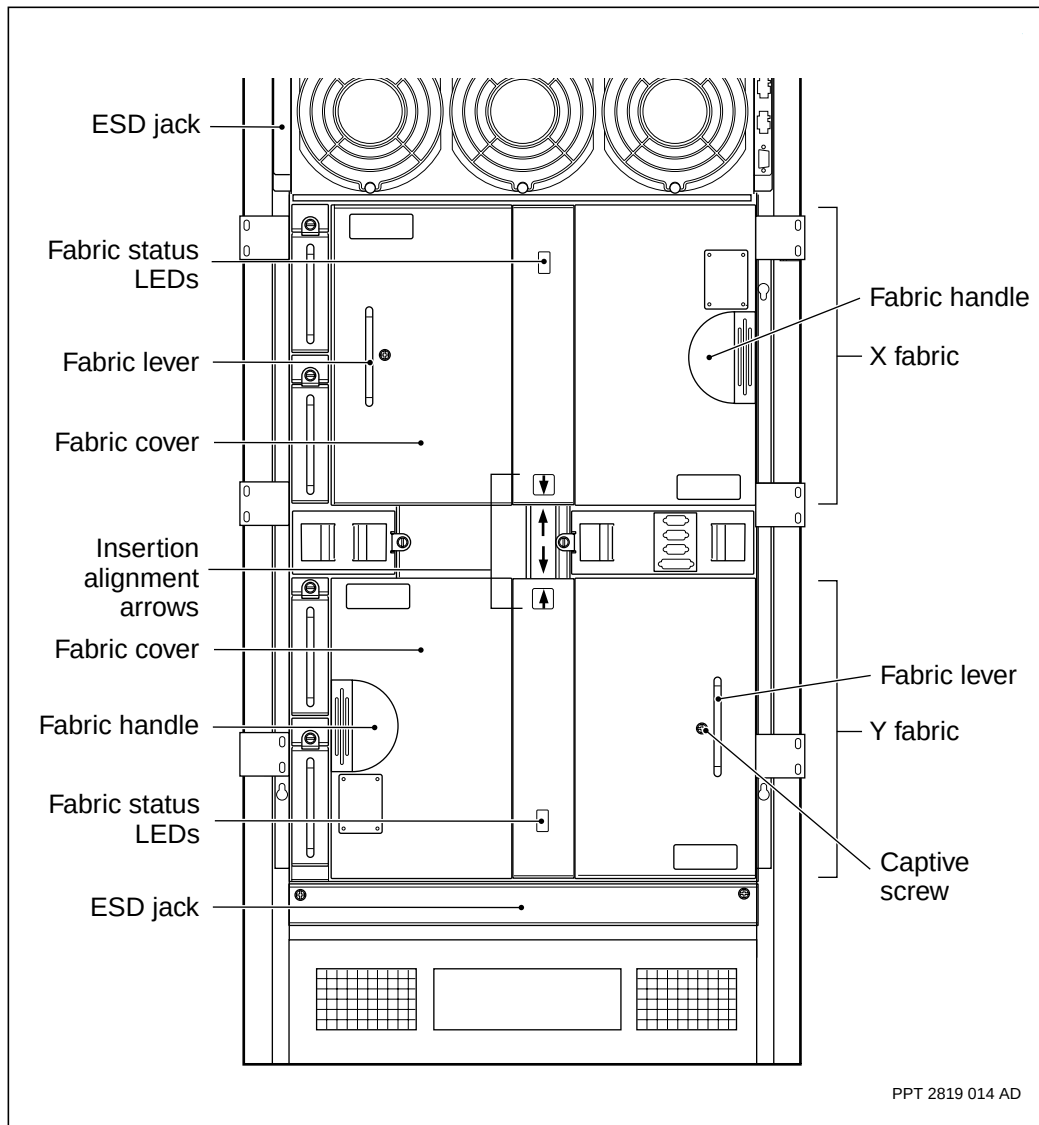
Procedure steps

- 1 Unfasten the Phillips captive screw beside the fabric lever.
- 2 Put one hand into the fabric handle and the other hand on the fabric lever.
- 3 Start removing the fabric by gently pulling the lever towards you. Pulling the lever opens the casing and unseats the fabric. The uneven tension on the lever is normal.
- 4 Stop at full extension of the lever. Keep holding the fabric in position. A fabric card is surprisingly heavy.
- 5 Gently slide the 2 hinge pins together out of the upper and lower middle hinge grooves until the fabric is completely disengaged.
- 6 Pack the fabric in its original anti-ESD protection packaging.

Procedure job aid

Figure 182

Physical characteristics on a Passport 15000 fabric, covers closed



Removing a fabric card from a Passport 20000

Remove a fabric card from the rear of a Passport 20000 switch to replace it because of a failure or an upgrade.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Have two protection covers for the fabric connectors present. You should find them in the original packaging of the fabric. If the fabric was shipped in the transportation position, use the protection covers from the replacement fabric.

Procedure steps

- 1 Unfasten the Phillips captive screw on the fabric lever.
As the screw is unfastened, the fabric reset button is released, which slightly pushes out the lever, and the fabric LED turns solid red unless it is not already solid red.
- 2 Put one hand into the fabric handle and the other hand on the fabric lever.
- 3 Start removing the fabric by gently pulling the lever towards you. Pulling the lever opens the casing and unseats the fabric. The uneven tension on the lever is normal.
- 4 Stop at full extension of the lever. Keep holding the fabric in position. Its weight may surprise you.
- 5 Gently slide the hinge pins together out of the 2 upper and 2 lower middle hinge grooves until the fabric is completely disengaged.
- 6 Pack the fabric in anti-ESD protection packaging. A shipped-in-place fabric has no packaging, so use whatever can protect the fabric.

Procedure job aids

Figure 183

Physical characteristics on a Passport 20000 fabric, covers closed

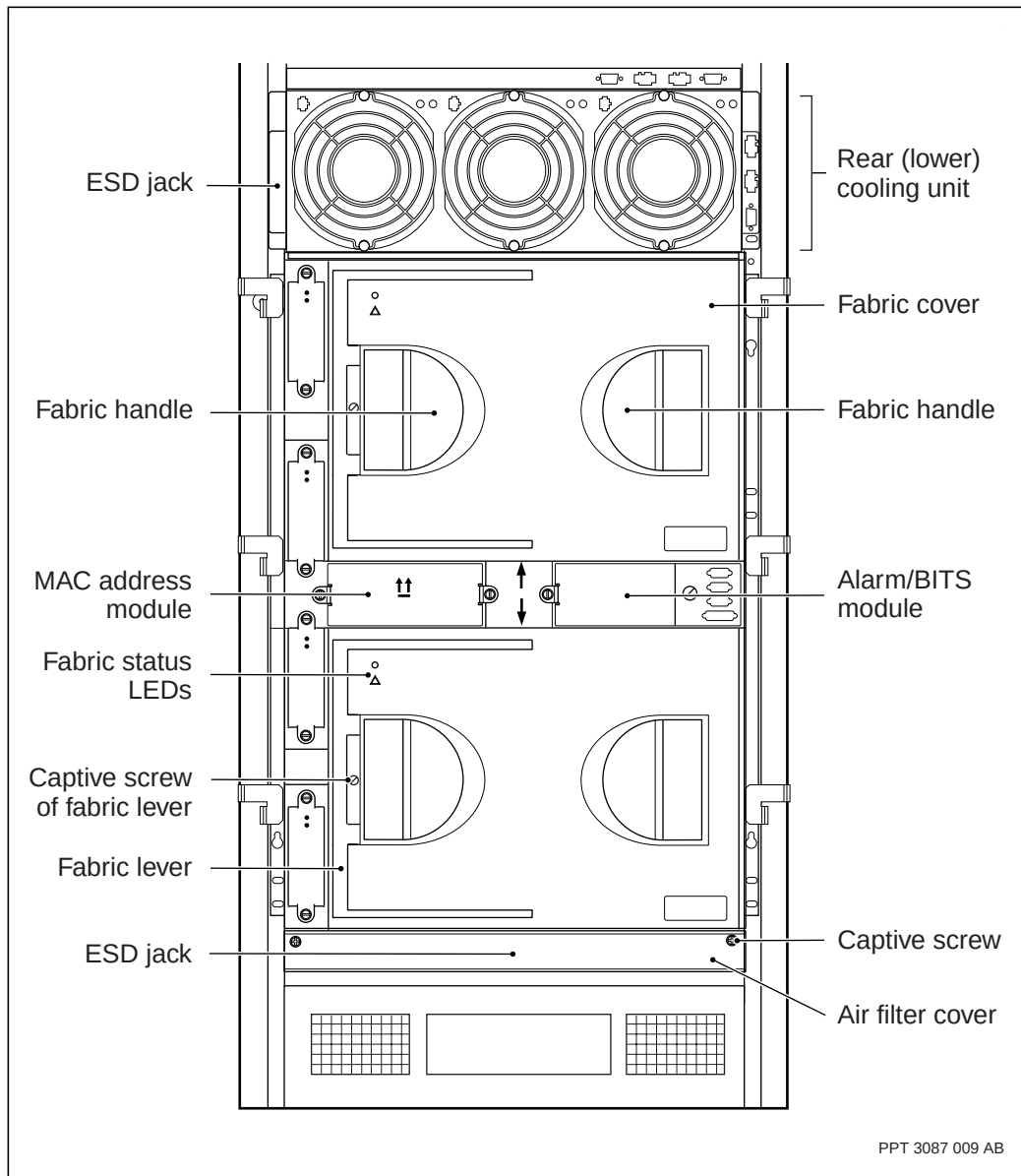
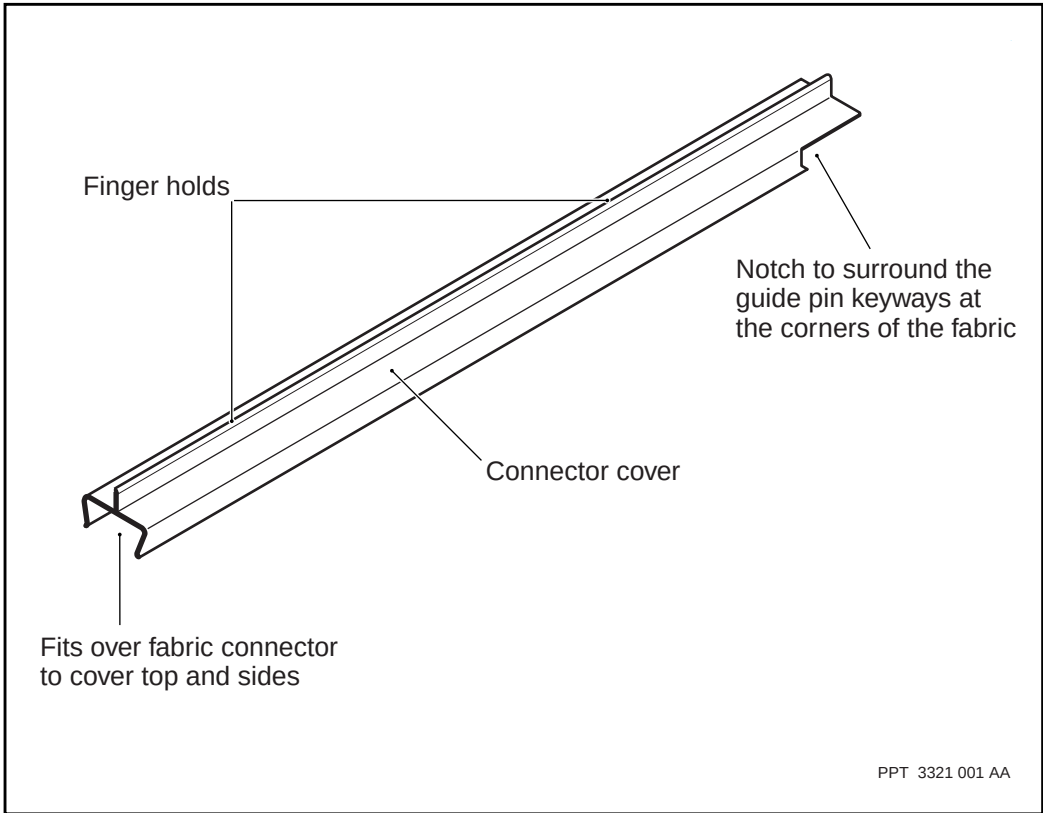


Figure 184
A protection cover for the fabric backplane connectors



Removing a fan

Remove a fan to replace it if it fails, or to gain access to the cooling unit assembly for replacing the fan controller or the temperature sensors.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- For any version of a fan, you need a driver for the 4-mm (11/64-in.) hex-head screws that fasten the fan and its grill to the cooling unit. The screws are 65-mm long for an A0758423 in an NTHR51AA or an NTHR52AA. The screws are 60-mm long for an A0522179 or an A0522182 in an NTHR51AB or an NTHR52AB.
- You need a flashlight and a hand-mirror to clearly see a fuse inside the cooling unit on the fan controller.
- The cause of a fan not operating can be a blown fuse on the fan controller module. The fuse on an NTHR10AA is a 4-amp fast-acting surface-mount technology (SMT) device, while an NTHR10AB has a 5-amp fast-acting SMT device. The fuse is soldered to the circuit board and is not resettable. The fuse’s in-rush circuit has an electronic over-current protection which prevents the fuse from blowing under normal operation or limited-duration short circuits. The fuse will blow only under unusual electrical circumstances.



WARNING

Risk of electrocution from a fan cable

When replacing a fan or a fan controller, the first action to the fan assembly is to unplug the appropriate power cable connector at the left labelled F1, F2, or F3. Temporarily tie it aside loosely and tape over the end. Remember the cable still has power.

**WARNUNG****Verletzungsgefahr durch Lüfterkabel**

Beim Austauschen von Lüftern oder Lüftersteuerungen muß immer zuerst die Stromversorgungsleitung der Lüfterbaugruppe abgezogen werden. Der Anschluß befindet sich auf der linken Seite und ist mit F1, F2 oder F3 beschriftet. Binden Sie das Kabel vorübergehend zur Seite, damit es nicht im Weg hängt. Denken Sie daran, daß das Kabel noch Spannung führt.

Procedure steps

- 1 Locate the fan with a lit red LED, which indicates the fan is out of service. The lower (front) cooling unit also has duplicate LEDs for the upper (rear) cooling unit, as shown in the figure "Location and orientation of the fans on an upper (front) or lower (rear) cooling unit" (page 547). If more than one is lit red, give priority to any on the lower (rear) cooling unit. The fan closest to the lit red LED is the one to be replaced.

- 2 Unplug the power cable to the fan. A power cable connection is labeled F1, F2, or F3.

When the cable is unplugged:

- the red LED turns on (may already be on) and the green LED turns off
- software alarm 7012 0051 is generated to indicate a fan failure
- the BIP alarm module indicates a minor cooling unit alarm
- the remaining 2 fans increase rpm speed to compensate an out-of-service fan unless they have already done so due to a fan or fan controller failure

- 3 Watch for the fan blades to stop.

When the fan blades stop, put tape on a blade to temporarily fasten it securely to the shroud. Otherwise, the blades will automatically reverse direction and spin freely because of the airflow from the other fans. Injury or damage can occur when removing free-spinning fan blades. The direction of blade rotation is opposite for front and rear fans. The direction under power is indicated on the top outside lip of each fan shroud.

- 4 At the front of the fan, unfasten the two M4 hex-head screws at the sides. Put the screws and the finger guard grill aside for re-use.

- 5 Grip the outside of the fan shroud, and using firmly even force, pull the fan assembly straight out of the cooling unit. Put the fan aside.
- 6 While looking into the opening where the fan was removed, on the fan controller NTHR10 behind and below or above the opening, check the fuse for evidence of blackening. Refer to the figure "Location of the fuse on fan controller NTHR10AA" (page 548). You may need a flashlight and a hand mirror to see the fuse clearly.
 - If the fuse is blown, the controller is the cause of the apparent fan failure. Do the task "Fan controller replacement" (page 88) and then put the same fan back in place.
 - If the fuse is not blown, the fan has failed. Continue replacing the fan.
- 7 Unless your Passport 15000 or 20000 is still covered by a replacement warranty for hardware, a failed fan is not returned to Nortel Networks.

Procedure job aid

Figure 185

Location and orientation of the fans on an upper (front) or lower (rear) cooling unit

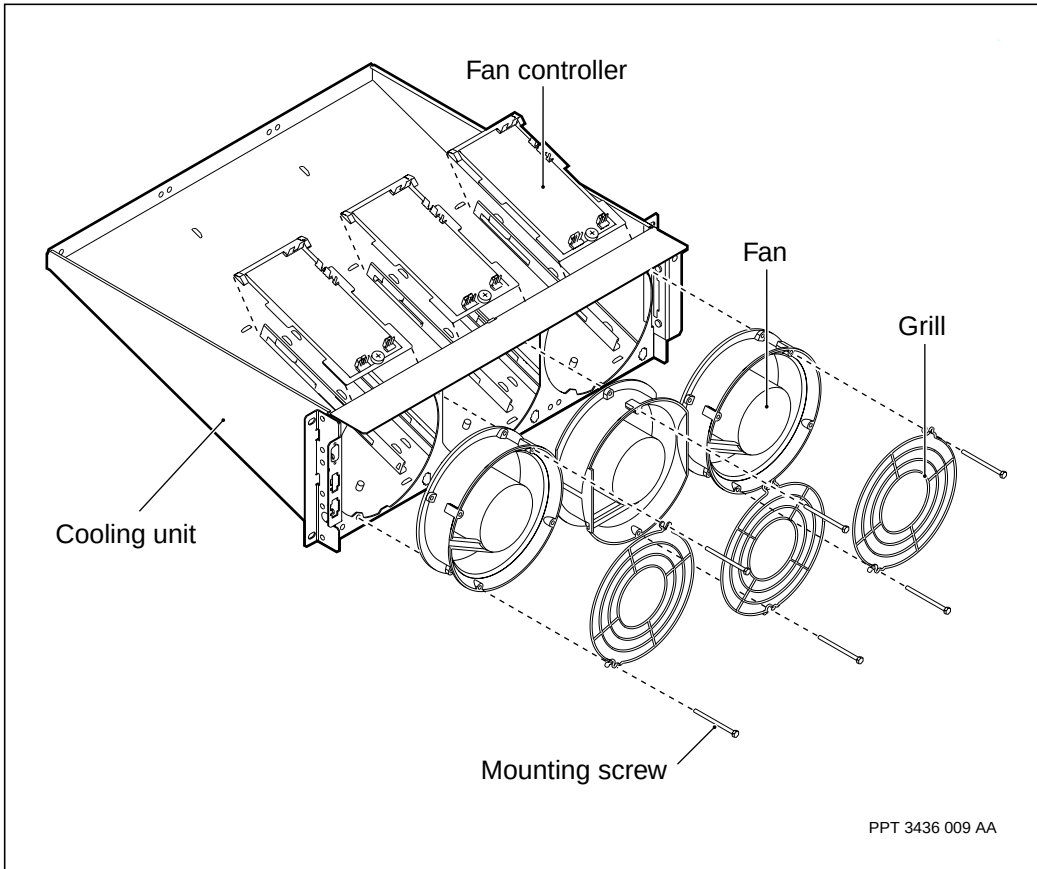
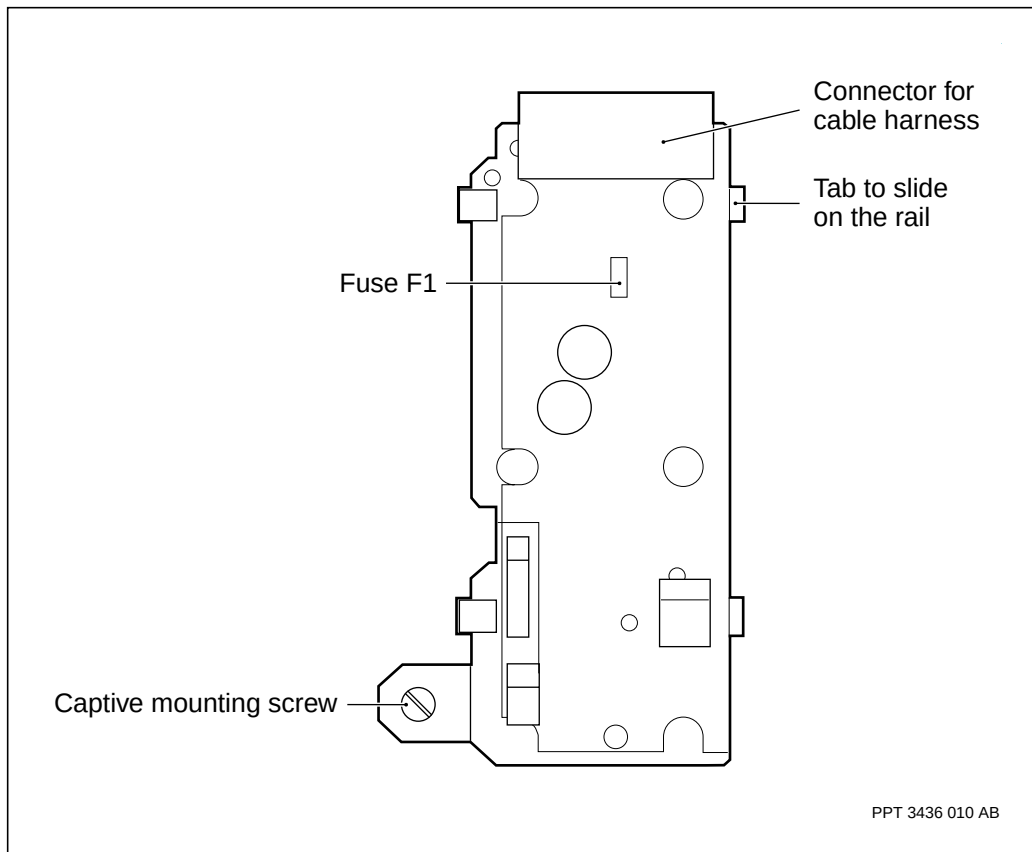


Figure 186
Location of the fuse on fan controller NTHR10AA



Removing a fan controller

Remove a fan controller if it fails and replace it immediately prior to re-inserting the fan.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Each controller is mounted on a carriage plate inside the cooling unit and behind the fan it controls. Before removing a fan controller, you must do the procedure “Removing a fan” (page 544).
- For controller NTHR10AA in a lower cooling unit NTHR51AA or an upper cooling unit NTHR52AA, you need a one-piece short-shafted large-bladed slotted screwdriver to unfasten the captive screw.
- For controller NTHR10AB in a lower cooling unit NTHR51AB or an upper cooling unit NTHR52AB, you need a one-piece large Phillips screwdriver to unfasten the captive screw.
- You may need a bright flashlight to see through the spinning fan blades at what your hand is touching inside the cooling unit.

Procedure steps

- 1 With the fan removed, look inside the cooling unit to find where the wires are connected to the controller and where the large captive screw is. The number of connectors vary between the AA and AB versions of the controller, as shown in these figures:
 - “Location of the fan controllers inside an NTHR51AA or NTHR52AA cooling unit” (page 551)
 - “Location of the fan controllers inside a cooling unit NTHR52AB” (page 552)
 - “Location of the fan controllers inside a cooling unit NTHR51AB” (page 553)
 - “Fan controller connections on an NTHR10AB” (page 554)
- 2 Reaching inside the cooling unit through the opening where the fan was, unplug the cable connectors from the controller. While pressing tabs inwards on the sides of each connector, pull upwards perpendicularly to

the controller. The Molex connectors of the NTHR10AB do not have tabs that secure the connector.

To see what your hand is doing inside the cooling unit, look through the spinning blades of the adjacent fan. You may need a flashlight to see clearly.

- 3 Unfasten the large slotted captive screw using the appropriate screwdriver. Do not drop any tool inside the cooling unit. The impact or a metal-to-metal cross-connection can damage a controller or a live fan blade.
- 4 Use the captive screw to pull the controller towards the opening. Move the controller past the guide tabs on the cooling unit housing until the tabs or feet on the controller disengage from the housing.
- 5 Pull the controller out of the cooling unit.

Procedure job aid

Figure 187

Location of the fan controllers inside an NTHR51AA or NTHR52AA cooling unit

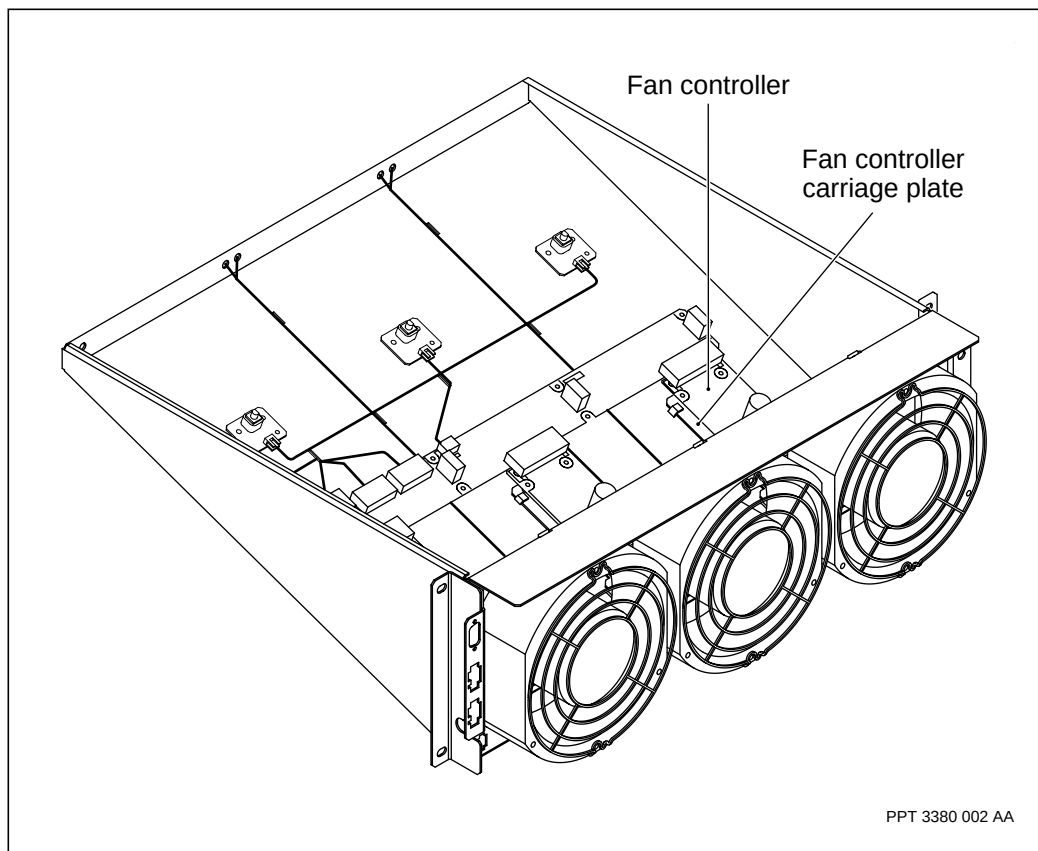


Figure 188
Location of the fan controllers inside a cooling unit NTHR52AB

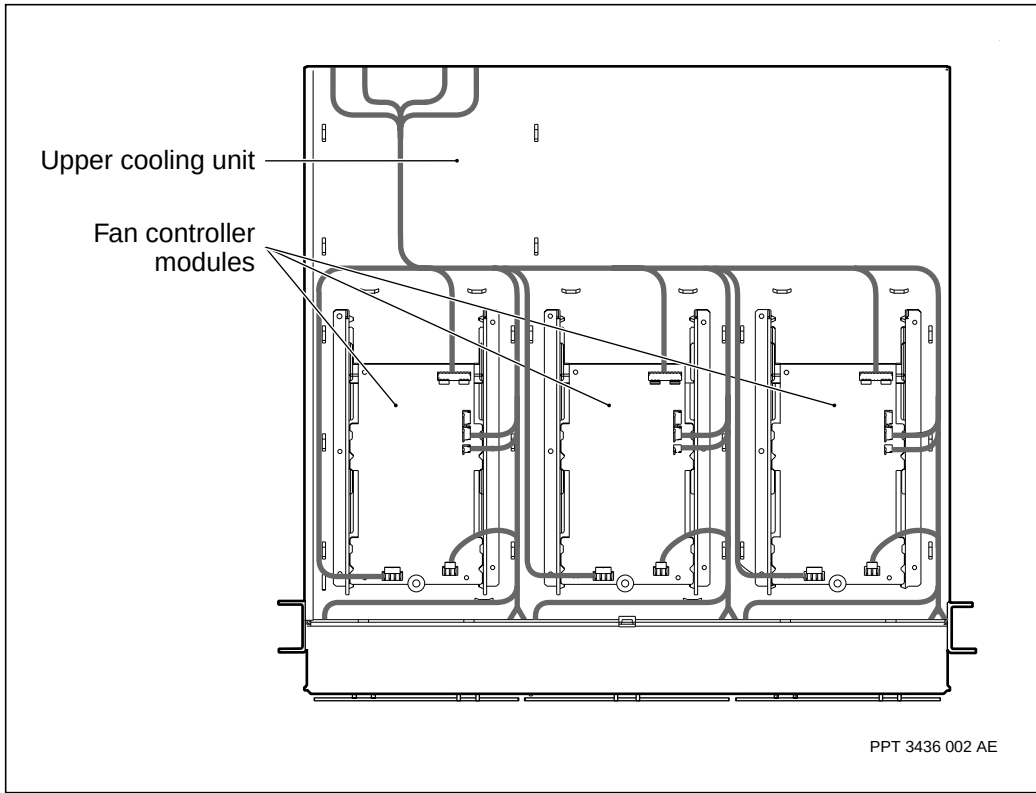


Figure 189
Location of the fan controllers inside a cooling unit NTHR51AB

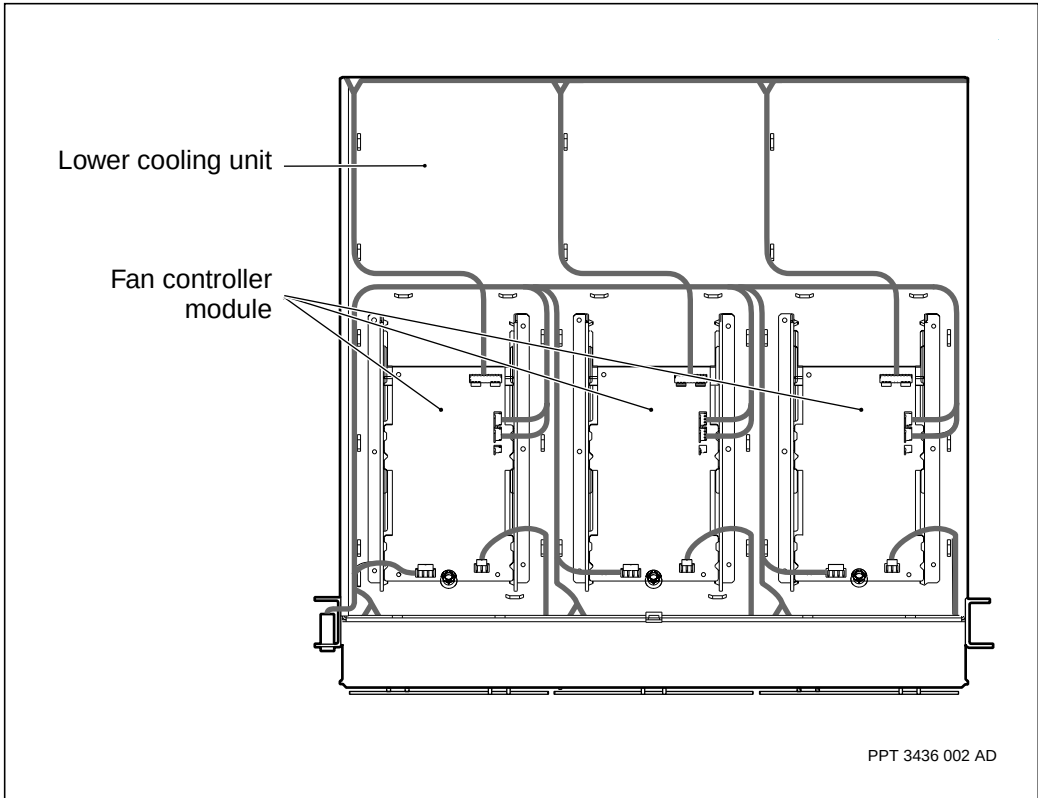
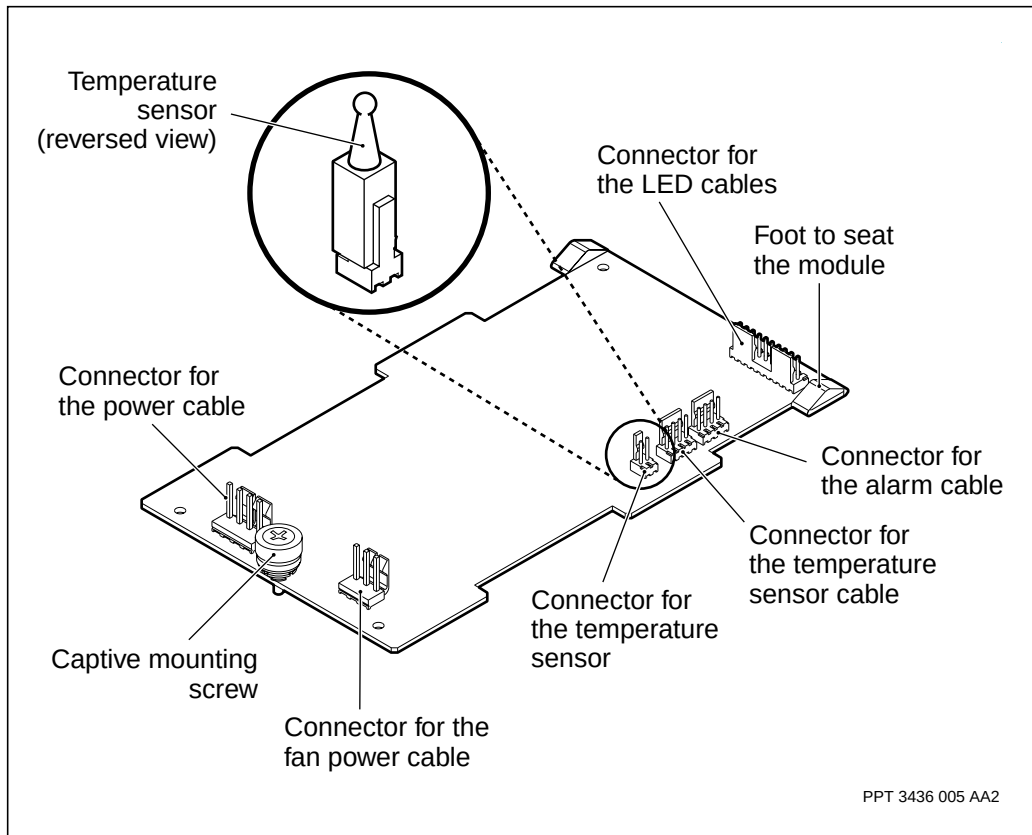


Figure 190
Fan controller connections on an NTHR10AB



Removing a fanout panel

Remove a fanout panel to replace it or if you are decommissioning the FP that requires it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

Procedure steps

- 1 Obtain the site record of the fanout panel connections. Otherwise, label each cable and record the connection of each relative to the panel.
- 2 Unplug all of the cable connections. (A fanout panel is unpowered.)
- 3 If the fanout panel is rack-mounted, remove the grounding cable where it is attached to the panel. Put the screw aside for re-use.
- 4 Note where the top screw holes are on the frame (or rack).
- 5 Unfasten the 10-mm (3/8-in.) mounting screws at the sides of the panel, progressing from bottom to top. Put the screws aside for re-use.
- 6 Put the panel aside for packing later.

Removing a horizontal frame from the pallet

Remove a horizontal NEBS 2000 frame from the shipping pallet after removing the packaging.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need three to four helpers to safely lift the frame off the pallet.
- The frame is not attached to the bottom of the crate or the pallet, and will slide off if tilted enough.

Procedure steps

- 1 Slit the plastic wrap open so that it can be taped closed while the frame is being stored before being anchored to the floor. Be careful not to contact anything under the plastic, especially wires or cables.
- 2 Latch any cards inside the shelf that may have become unlatched. Ensure that you latch each card to the transportation position. Refer to the figures “Upper transportation pockets for card latches” (page 677) and “Lower transportation pockets for card latches” (page 678).
- 3 Cut any straps that fasten the frame to the pallet.
- 4 Remove the plastic sheet around the frame by cutting it. Do it neatly without pulling it off. Removing the plastic enables firm grips on the hardware to tilt it upright.
- 5 Ensure each levelling foot at the bottom end of the frame is threaded all the way inwards until it touches the base of the frame. You may need an 8-mm (5/16-in.) allen key to turn the shafts from the inside end. For the location of the feet, see the figure “Unpacking a horizontal Passport 15000 or 20000 in a frame” (page 622).

**WARNING****Risk of injury when handling a frame**

Never place a foot or a hand under any part of the frame while it is being tilted or moved. Always move it with at least four people. The weight of a shipped frame with one Passport 15000 or 20000 switch is approximately from 330 kg (730 lbs) to 355 kg (780 lbs); with two switches the weight is from approximately 480 kg (1052 lbs) to 490 kg (1076 lbs). For additional protection, wear safety boots with steel toes and gripping soles.

**WARNUNG****Verletzungsgefahr beim Gestelltransport**

Stellen Sie niemals einen Fuß unter das Gestell, wenn dieses bewegt oder gekippt wird, und greifen Sie nicht unter das Gestell. Zum Bewegen des Gestells sind mindestens vier Personen erforderlich. Ein Gestell mit einem Passport 15000 oder 20000 wiegt ca. 330 kg und mit zwei Passport-Einheiten ca. 490 kg. Tragen Sie zu Ihrem zusätzlichen Schutz Sicherheitsschuhe mit Stahlkappen und griffigen Sohlen.

- 6 With 4 helpers, lift the top of the frame until the frame feet touch the floor. While tilting:
 - ensure neither the frame feet nor the pallet slides along the floor
 - avoid allowing the full weight of the frame to sit on the levelling feet
 - ensure the feet gently touch the floor
- 7 When the frame is vertical, move the fridge cart beside one side of the frame so that the foot plate touches the frame feet. Put the cart at the side of the frame with the least amount of cabling. A side is a full-height flat metal surface. Ensure the secondary feet are extended and locked into position.
- 8 If the frame has panels fastened over the sides, remove one by prying the 8 screw caps off and unfastening the large slotted screws. Put the panel, caps, and screws aside for re-use later.

- 9 While the 4 helpers tilt the frame enough to enable the foot-plate to slide under the frame feet, push the cart flush against the side of the frame that does not have a side panel.
- 10 Lower the frame gently onto the foot-plate. Ensure no cables are pinched between the frame and the cart.
- 11 Strap the frame snugly to the fridge cart. Place the straps around the frame and cabinets. Prevent the straps from pinching any cables or overlapping any handles. The module handles and cables are not designed to withstand pulling from the weight of the frame.
- 12 Strap the frame snugly to the fridge cart. Place the straps around the frame and cabinets. Prevent the straps from pinching any cables or overlapping anything protruding from the frame. The module handles of a Passport 15000 are not designed to withstand pulling from the weight of the frame.
- 13 Keep the packaging, pallet, and any re-usable fasteners in case the frame must be returned.

Removing a lower cooling unit

Remove a lower cooling unit to replace it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a 65 cm by 65 cm (2 ft, 2 in. square) anti-ESD pad to protect the cooling unit and other Passport 15000 or 20000 hardware from damage by transferred ESD until the unit is either installed or packaged. You also need a driver for the thread-forming 10-mm (3/8-in.) hex-head screws that fasten each cooling unit to the frame or rack.
- As soon as the cooling unit is unplugged, software alarm 7012 0051 will be generated.



WARNING

Risk of injury by fan blades

While working on any equipment near the cooling unit fans, be continuously aware that the rpm of a live fan can suck loose clothing, hair, or jewelry into the fan blades or amputate a finger. Do not touch a live fan with anything.



WARNUNG

Verletzungsgefahr durch Lüfterblätter

Beim Arbeiten in der Nähe der Lüfter des Kühlaggregats besteht die Gefahr, daß ein rotierender Lüfter lose Kleidung, Haare oder Schmuck in die Lüfterblätter saugt oder einen Finger abtrennt. Berühren Sie einen Lüfter niemals, weder direkt noch indirekt.

Procedure steps

- 1 Switch off both cooling unit breakers and put tape on them to indicate neither was tripped. To ensure that you switch off the correct breakers, refer to the table “Location of cooling unit breakers on the front of the BIP” (page 560).

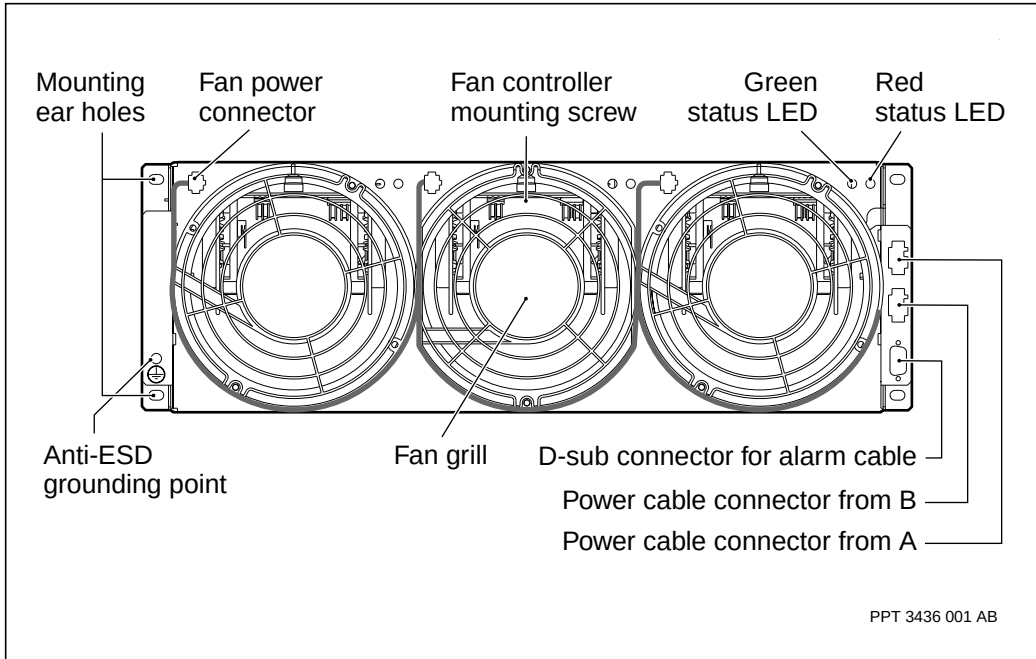
- 2 Facing the fans, check the LEDs of the cooling unit to ensure that none are lit. This confirms that power is off since the fan blades can still be rotating freely while slowing down.
- 3 At the right side of the lower cooling unit, disconnect power cable A by pressing and holding the tabs on the side of the connector and pulling straight out. (If A and B cables are above the lower cooling unit, they are for the upper cooling unit.)
- 4 Label the cable to identify which connector it plugs into (for example, with LA for lower unit, power connector A).
- 5 Repeat step 3 to step 4 for power cable B, using LB for the label.
- 6 Unfasten the 2 small slotted captive screws on the D-sub connector below the A and B power connectors.
- 7 Leave the F1, F2, and F3 cables connected on the fan side of the cooling unit.
- 8 Unfasten the 4 thread-forming 10-mm (3/8-in.) hex-head mounting screws through the 2 mounting ears as shown in the figure “Location of the mounting screws of a lower (front) cooling unit” (page 561). Put the screws aside for re-use.
- 9 By gripping the mounting ears at either side of the unit, slide it straight out and away from the frame. Be ready to support its weight of 9 kg (20 lbs).
- 10 Put the cooling unit on an anti-ESD protection pad or container.

Procedure job aid

Table 26
Location of cooling unit breakers on the front of the BIP

Cooling unit	Position of BIM in the BIP	BIP slot number	Cooling unit breaker
lower	right BIM	4	middle
lower	middle right BIM	3	middle
upper	middle left BIM	2	middle
upper	left BIM	1	middle

Figure 191
Location of the mounting screws of a lower (front) cooling unit



Removing a multiport aggregate device

Remove a multiport aggregate device from a Passport cabinet, frame or non-Passport mounting apparatus to replace a failed device or to decommission the device.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Lock any affected ports before removing a multiport aggregate device.

Procedure steps

- 1 On the rear of the unit, turn the power switch for each power supply to the off position.
- 2 Turn off the power source to the outlet that feeds the device. Put electrical tape on the breaker or over the fuse hole to indicate deliberate action.
- 3 Label the cables connected to the device.
- 4 Remove all of the cables from the device and coil them out of the way.
- 5 Remove the 5/16-in. screws that fasten the device's brackets to the adapter brackets of a frame or the uprights of its mounting apparatus. Support the device while the last screws are unfastened, and remove the device. The device weighs 2 kg (4.4 lbs).
- 6 If you are returning the device to Nortel Networks for repair, label the device. Include the failure time, date, fault, your name, organization, department, telephone number, and the multiport aggregate device part and serial number. Then, pack the device in its original packaging.

Procedure job aid

Figure 192
Balanced multiport aggregate device NT0486

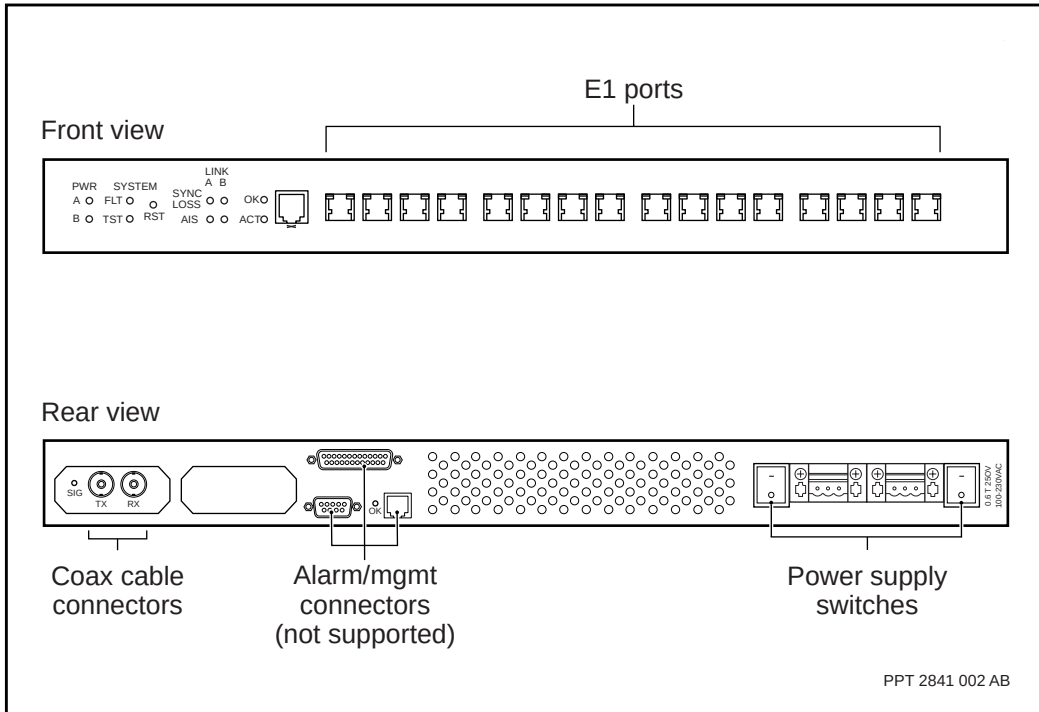
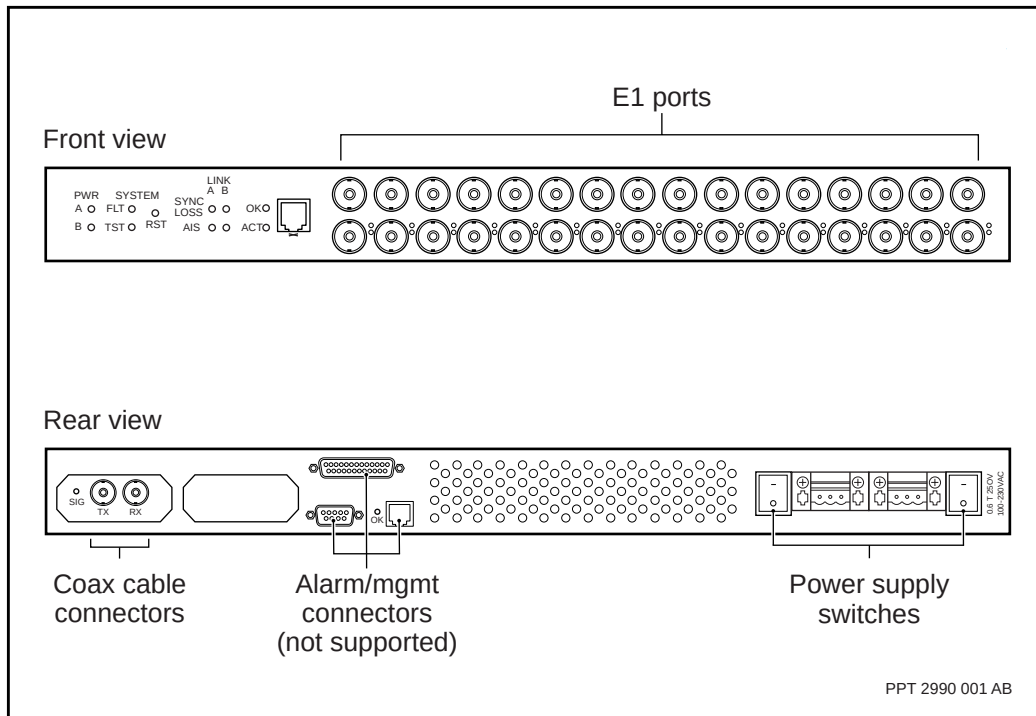


Figure 193
Unbalanced multiport aggregate device NT0421



Removing a PIM

Remove a PIM to replace it to restore back-up power to the shelf cage.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- PIMs are labeled top to bottom on a frame as 7RU, 7RL, 15 RU, and 15 RL. 7RU means rear upper PIM behind slot 7 of the shelf assembly.
- Replacing a PIM will temporarily affect the SCB (HSCX bus) and clock distribution unless it has an installed and operating mate.



WARNING

Risk of injury or equipment damage

Power interface modules (PIMs) are not hot swappable. The power breaker on the BIM that is connected to the PIM must be switched off before unplugging the power cables at the PIM. Wait 15 seconds for the capacitors in the BIM to discharge before unplugging the PIM cable. The power cable must be unplugged before the PIM can be removed for replacement. If the mate PIM is present and in service, it maintains power to the shelf so that service is uninterrupted.



WARNUNG

Verletzungsgefahr oder Geräteschäden

Die PIMs (Power Interface Modules) können nicht während des Betriebs ausgetauscht werden. Bevor die Netzkabel am PIM abgezogen werden, muß der Trennschalter an dem BIM, das an das PIM angeschlossen ist, ausgelöst werden. Warten Sie dann 15 Sekunden, bis sich die Kondensatoren entladen haben, bevor Sie die PIM-Kabel abziehen. Das Netzkabel muß abgezogen sein, bevor das PIM zum Austausch ausgebaut wird. Wenn das redundante PIM bestückt und in Betrieb ist, übernimmt dieses die Stromversorgung des Baugruppenträgers, so daß der Anlagendienst nicht unterbrochen wird.

Procedure steps

- 1 At the rear of the BIP, identify the PIM to be replaced. Note the label indicating which breaker it is part of. The breakers are listed in the figure "Connection points of the PIM cables" (page 392).
- 2 Facing the front of the BIP, locate the 2 breakers controlling the feeds of the PIM. A label on the front of the screw cover indicates which slots each breaker feeds. From top to bottom, the 4 PIMs of a switch are:

7RU for rear upper PIM behind slot 7 of the shelf assembly
7RL for rear lower PIM behind slot 7 of the shelf assembly
15RU for rear upper PIM behind slot 15 of the shelf assembly
15RL for rear lower PIM behind slot 15 of the shelf assembly
- 3 Switch off the 2 breakers (pushing O in) and put tape on each to indicate it has not been tripped. An alarm is triggered while the breaker is off.

The A and B LEDs on the PIM of a Passport 20000 both extinguish when power to them is switched off.
- 4 Unfasten the captive screw or screws on the faceplate.
- 5 Unplug the cable by pinching the connector tabs and pulling away from the PIM.
- 6 Remove the PIM by pulling it firmly and evenly away from shelf. Avoid jerking the pull or applying lateral movement. The PIM of a Passport 15000 has handles.
- 7 Put the PIM aside.

Removing a power-and-ground cable assembly

Remove a power-and-ground cable assembly to replace it to restore full power to the BIP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the following specialty tools:
 - a medium Pozidriv screwdriver, for example a number 2 (do not substitute a Phillips) for an insulation boot clamp
 - an 11-mm (7/16-in.) deep socket with a properly calibrated torque wrench capable of 6.5 Nm (57.5 in.-lbs) and a 20-cm (8-in.) extender for the lug nuts



WARNING

Risk of injury by electrocution

Each power input feed to a breaker interface module (BIM) is rated up to 100 A. Prior to removing a power-and-ground assembly, power to the BIP must be switched off, and all breakers on the BIM must be switched off (the O is pressed in).



WARNUNG

Lebensgefahr

Die Speisestromzuführungen zu jedem Trennschalterkopplungsmodul (BIM) sind für bis zu 100 A ausgelegt. Bevor ein BIM ausgebaut wird, muß unbedingt die gesamte Stromversorgung für das BIM abgeschaltet werden und sämtliche Trennschalter auf dem BIM müssen ausgelöst werden (O ist gedrückt).



CAUTION

Service interruption from power interruption

Switching off the power input to a BIP means that the one or two Passport 15000 or 20000 switches cannot operate. To minimize the impact on traffic of powering down, disconnect the dc power input cables at the beginning of a period of lowest traffic over the network or node.



WARNING

Risk of injury or damage by electricity

When switching off power breakers on a breaker interface module (BIM) or in the circuit up to it, or removing a fuse from the circuit up to it, always put tape over the breaker or fuse cavity. The tape indicates it was manually switched off, and not tripped by the system. This prevents accidental activation of the power circuit, especially if power cables are being handled.



WARNUNG

Schäden oder Verletzungen durch Elektrizität

Wenn die Leistungstrennschalter an einem Trennschalterkopplungsmodul (BIM) oder im zuführenden Stromkreis geöffnet bzw. Sicherungen aus dem Stromkreis entfernt werden, decken Sie den Trennschalter oder den Sicherungssteckplatz mit Klebeband ab. Das Klebeband signalisiert, daß er/sie manuell ausgeschaltet und nicht vom System ausgelöst wurde. Damit verhindern Sie eine versehentliche Aktivierung der Stromversorgung, besonders beim Hantieren mit Netzkabeln.

Procedure steps

- 1 Hold the assembly rail or a terminal block with one hand.
- 2 Unfasten the 2 thread-forming 10-mm (3/8-in.) hex-head screws at the ends of the rail.

Procedure job aid

For the cable connections to and from a power-and-assembly, refer to the figures:

- “The polyvalent power-and-ground assembly A0834143” (page 397)
- “The ETSI power-and-ground assembly A0834149” (page 398)

Removing a shelf assembly

Remove a shelf assembly to replace it or re-locate it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need two helpers to prevent the shelf assembly from falling while it is being unfastened. An empty shelf assembly weighs 99 kg (218 lbs).
- The procedure applies to a NEBS 2000 frame, but the steps involving the frame uprights are equivalent to a rack’s uprights with the adapter brackets.
- Recognize the size and shape of a shelf assembly by these figures:
 - “An upper shelf assembly of a Passport 15000, front isometric view” (page 574)
 - “An upper shelf assembly of a Passport 20000, front isometric view” (page 575)
 - “An upper shelf assembly of a Passport 20000, rear isometric view” (page 576)



WARNING

Risk of injury or equipment damage

The power breaker on the BIM that is connected to the PIM must be switched off before unplugging the power cables at the PIM. Wait 15 seconds for the capacitors in the BIM to discharge before unplugging the PIM cable.



WARNUNG

Verletzungsgefahr oder Geräteschäden

Bevor die Netzkabel am PIM (Power Interface Module) abgezogen werden, muß der Trennschalter an dem BIM, das an das PIM angeschlossen ist, ausgelöst werden. Warten Sie dann 15 Sekunden, bis sich die Kondensatoren entladen haben, bevor Sie die PIM-Kabel abziehen.

**CAUTION****Risk of equipment damage and service loss by bent pins**

While handling a shelf assembly or working near it, ensure that nothing contacts the backplane pins inside the shelf assembly. Contacting a pin with a sideways force can easily bend it, thereby rendering the card slot unusable.

Procedure steps

- 1** At the rear of the shelf assembly, unplug the black-and-white power cabling from all 4 PIMs on the left side of the shelf by pinching the tabs on the connectors. Move the loose cable ends aside. Refer to the figure "Location of the rear plug-in hardware" (page 573).
- 2** Unfasten the D-sub connectors on the alarm/BITS module, unplug them, and move the loose cable ends aside.
- 3** At the front of the shelf assembly, open the 2 cable channel covers by turning their medium slotted captive screws 1/4 turn counter-clockwise.
- 4** Remove all disconnected cabling from the cable channels and cable management brackets that are fastened on top of the shelf assembly mounting ears along the frame uprights or along the adapter brackets used with a rack. Avoid tangling the clusters of cables.
- 5** Tie the loose cable ends aside so that the shelf assembly can be slid out the front without snagging a cable.
- 6** Record the position and orientation of each cable management bracket that overlaps a mounting ear of the shelf assembly so that they can be put back the same way later.
- 7** Remove the thread-forming 10-mm (3/8-in.) hex-head screws of all overlapping cable management brackets at the sides of the shelf assembly and from the mounting ears. Start from the bottom screws on both sides and work upwards. Put the screws aside for re-use.

When removing the last 2 screws, have the helpers grip the shelf at the sidewalls where the cable channel openings are and at the top cross member of the shelf assembly.



CAUTION

Risk of equipment damage

Do not grip any plastic parts as a means to supporting the weight of the unfastened shelf assembly. These parts will break, especially the card tracks (rails) or cable guides.

- 8 Pull the shelf assembly straight out and away from the frame or rack. Change your grip as required to the bottom of the shelf assembly to support its weight.
- 9 Put the shelf assembly into the container of the replacement shelf assembly and add the packing material as it was before.

Procedure job aid

Figure 194
Location of the rear plug-in hardware

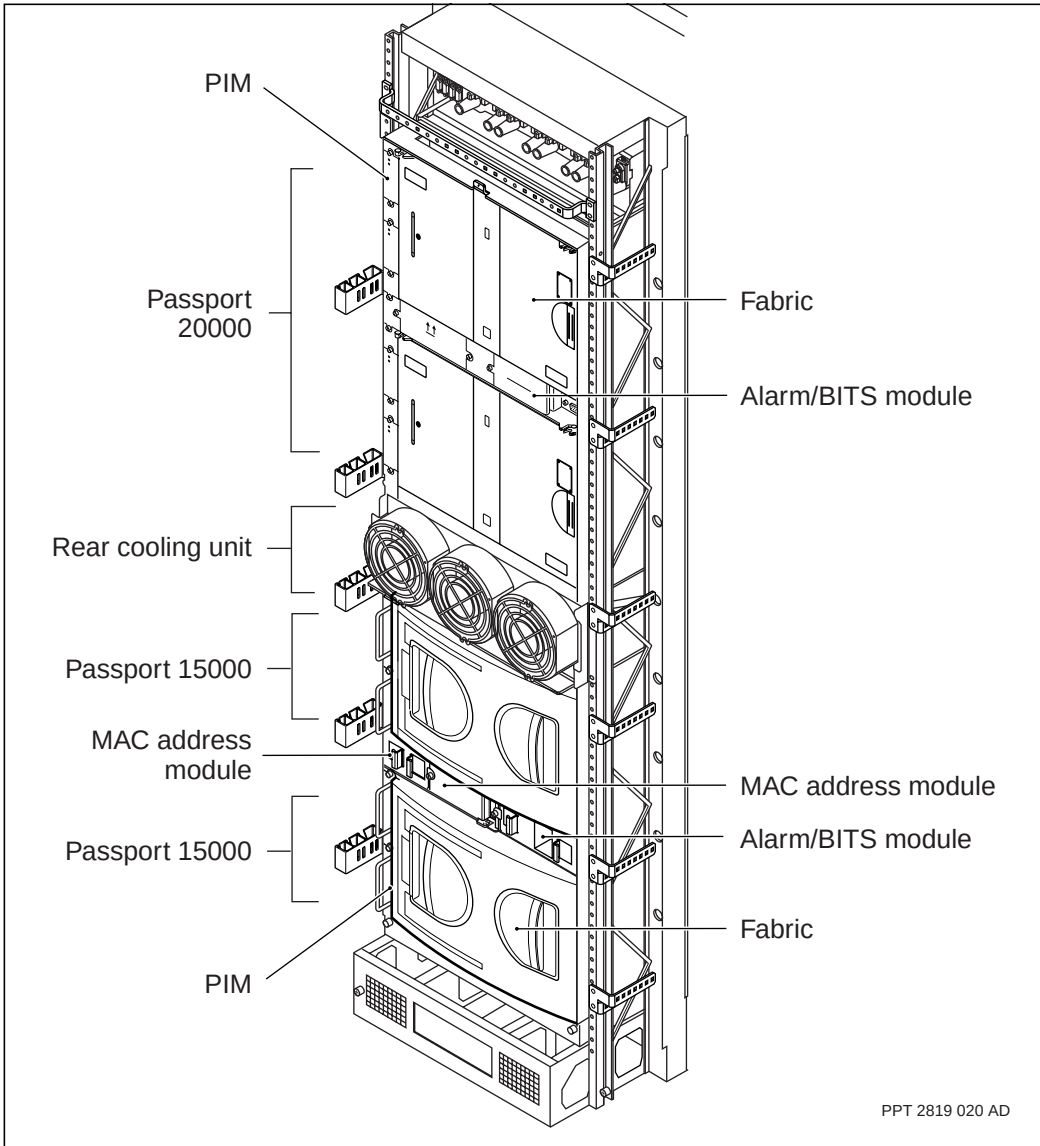


Figure 195
An upper shelf assembly of a Passport 15000, front isometric view

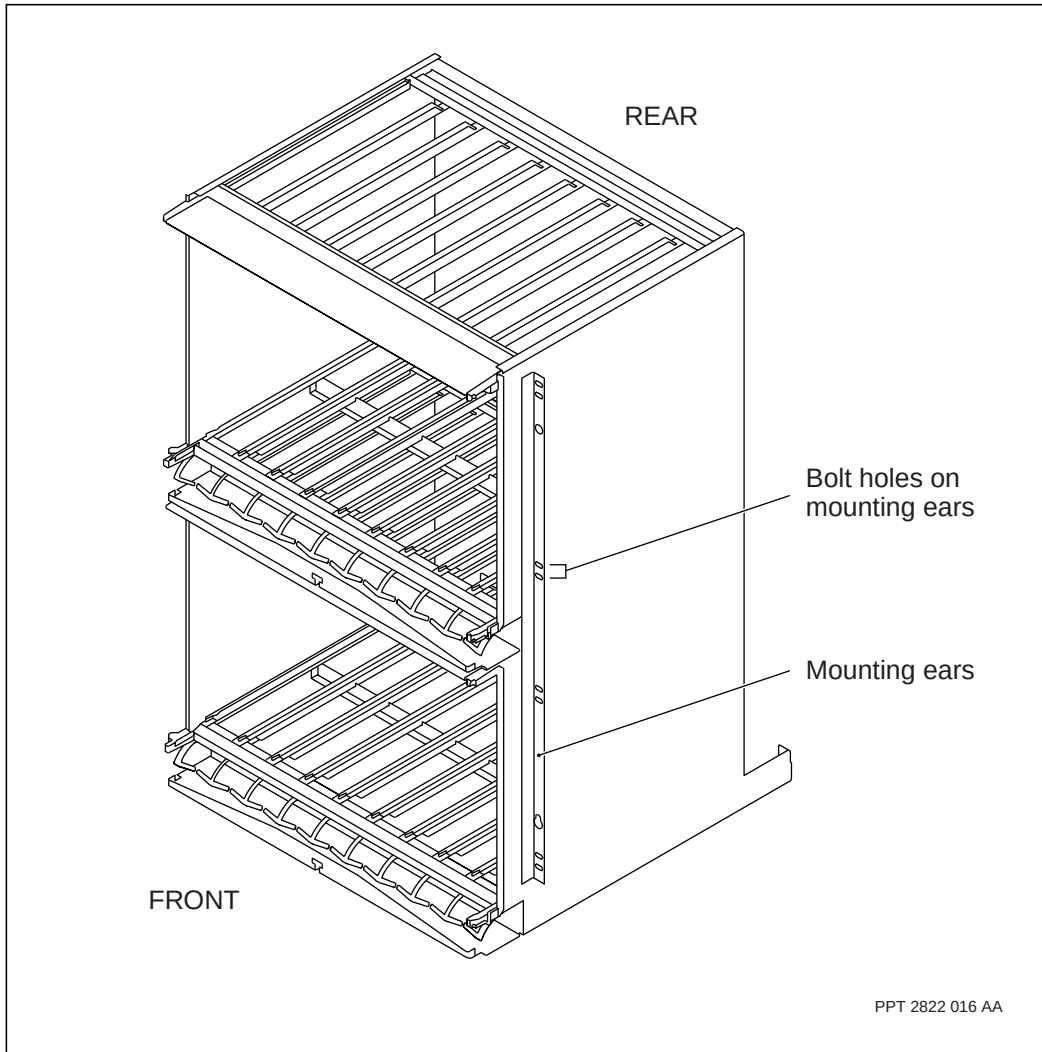


Figure 196
An upper shelf assembly of a Passport 20000, front isometric view

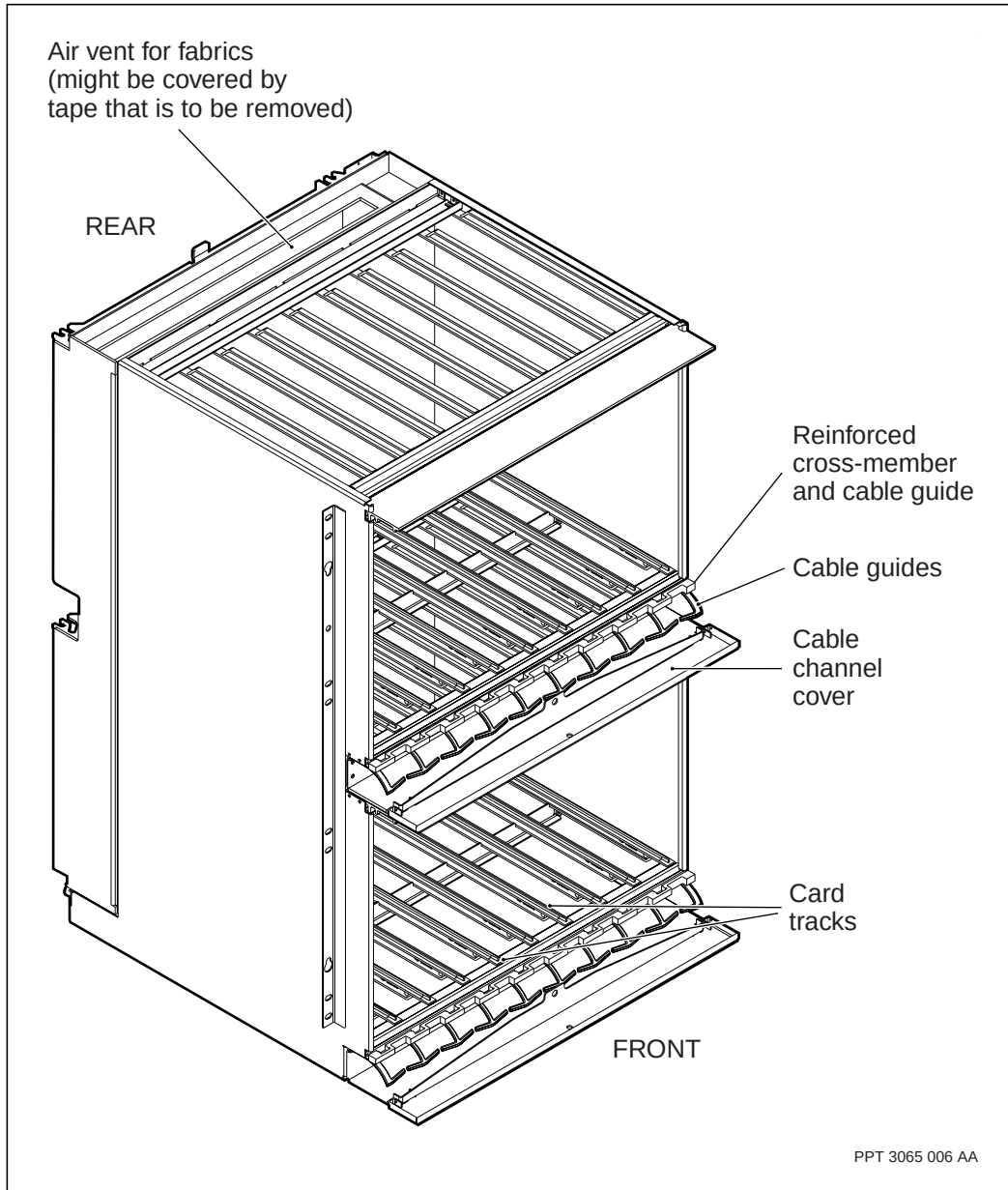
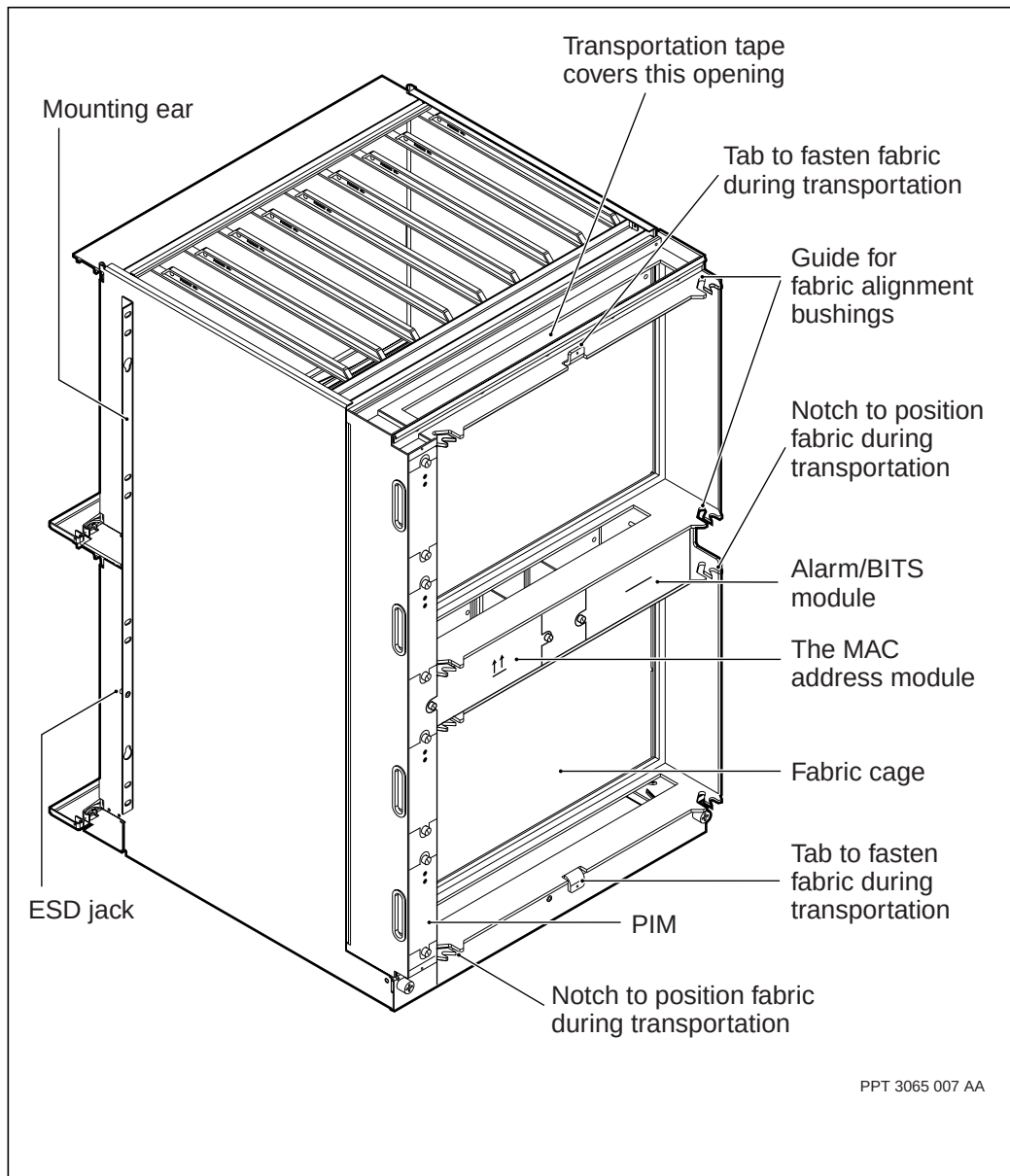


Figure 197
An upper shelf assembly of a Passport 20000, rear isometric view



Removing a shelf filler panel

Remove a shelf filler panel from the front and/or rear of a NEBS 2000 frame to enable installing other equipment onto or between the frame uprights.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a helper to support:
 - the weight of the panel when it is unfastened because it weighs about 6.8 kg (15 lbs) and can be awkward by its size
 - any other equipment that shares the same mounting screws, for example, an NTQS31 sparing panel
- When removing a filler panel that shares mounting screws with other equipment (other than cable management brackets), you may have to remove its opposite filler panel to enable easier access to the other equipment. Other equipment includes sparing panels or fanout panels (termination panels).

Procedure steps

- 1 Behind the filler panel, determine whether any termination panel shares screws with the filler panel. If so, you must decide how to remove the termination panel before removing the filler panel. If the opposite side of the frame also has a filler panel, you must decide whether removing the opposite panel enables easier access with less risk of dropping the shared equipment.
- 2 If decided, remove the opposite filler panel. Have a helper hold the panel while unfastening the 2 remaining 10-mm (3/8-inch) screws. Put the panel and screws aside temporarily.
- 3 If the filler panel shares screws with a termination panel, unfasten the bottom 10-mm (3/8-inch) shared screws. Have a helper hold the termination panel from the other side of the frame while you unfasten the last 2 screws. Put the termination panel and screws aside temporarily.
- 4 Repeat step 3 for each other termination panel or other equipment except cable management brackets.
- 5 On the outside face of the filler panel mounting ears, determine whether any cable management bracket shares screws with the panel. Refer to the figure “Physical characteristics of a front shelf filler panel” (page 579). If

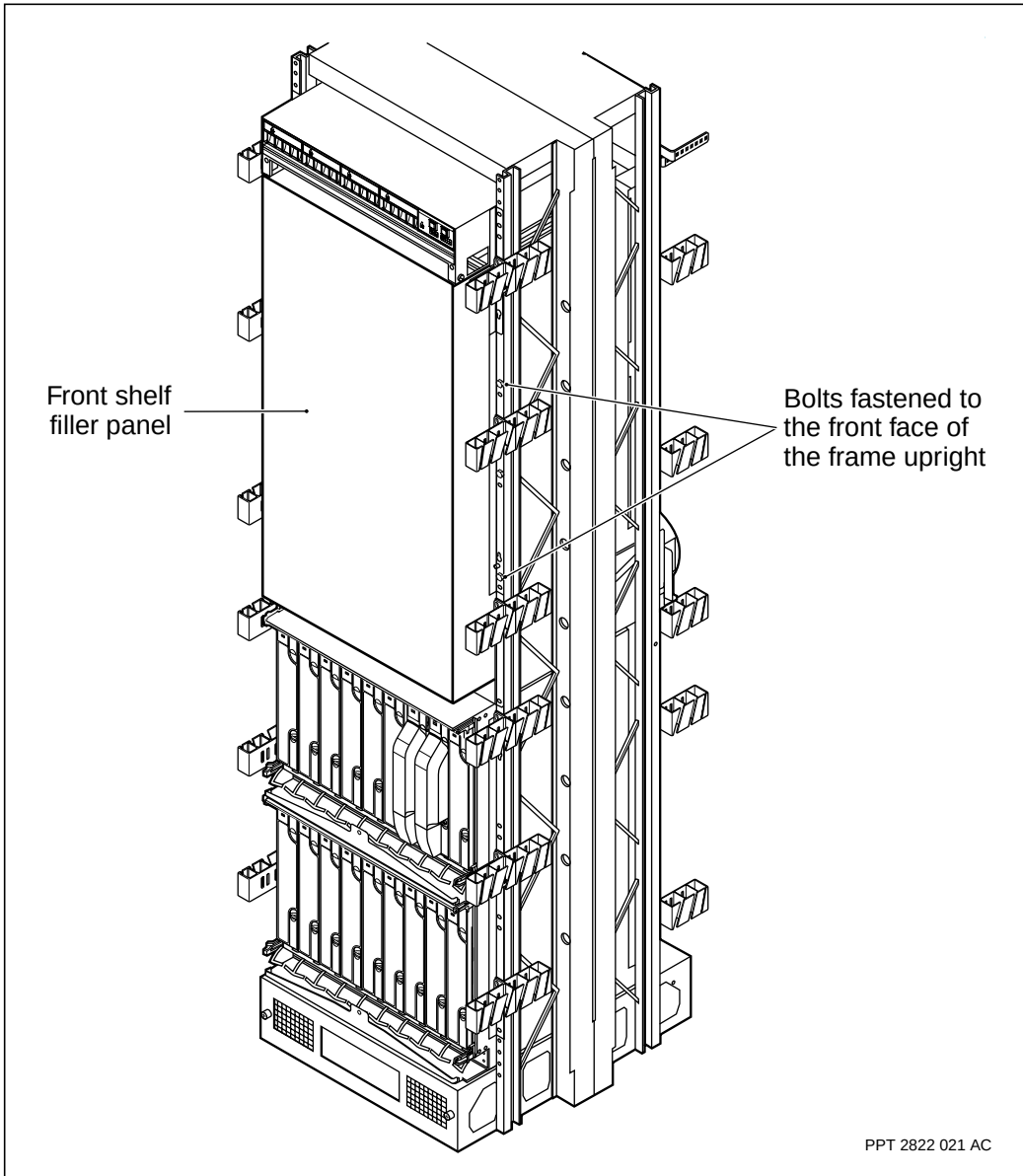
you cannot access the 2 screws of each bracket without stressing the cables that are fastened to it, you must unfasten the cables.

The filler panel also has cuts in each mounting ear to surround cable management brackets without sharing the bracket screws.

- 6 For any bracket or pair of brackets that shares screws with the filler panel, note the position and orientation of each bracket. Unfasten the 10-mm (3/8-inch) screws, remove the bracket, and put them aside temporarily.
- 7 Unfasten the remaining screws of the filler panel. When unfastening the last 2 screws of the filler panel, have the helper hold the panel to prevent it from falling.
- 8 If the opposite filler panel was removed, install it back where it was.
- 9 If the filler panel is not being replaced, you must either
 - re-install the equipment that formerly shared mounting screws with the filler panel, especially since a termination panel should not be operated while it is unmounted
 - install the equipment somewhere else because a second shelf is being installed where the filler panel was
- 10 If the filler panel is not being replaced, you must re-install the cable management brackets and fasten the cables back onto them.

Procedure job aid

Figure 198
Physical characteristics of a front shelf filler panel



Removing a side frame panel

Remove a side frame panel to access power or signaling cables that run up or down the side of the NEBS 2000 frame, or to replace a damaged panel.

Prerequisites

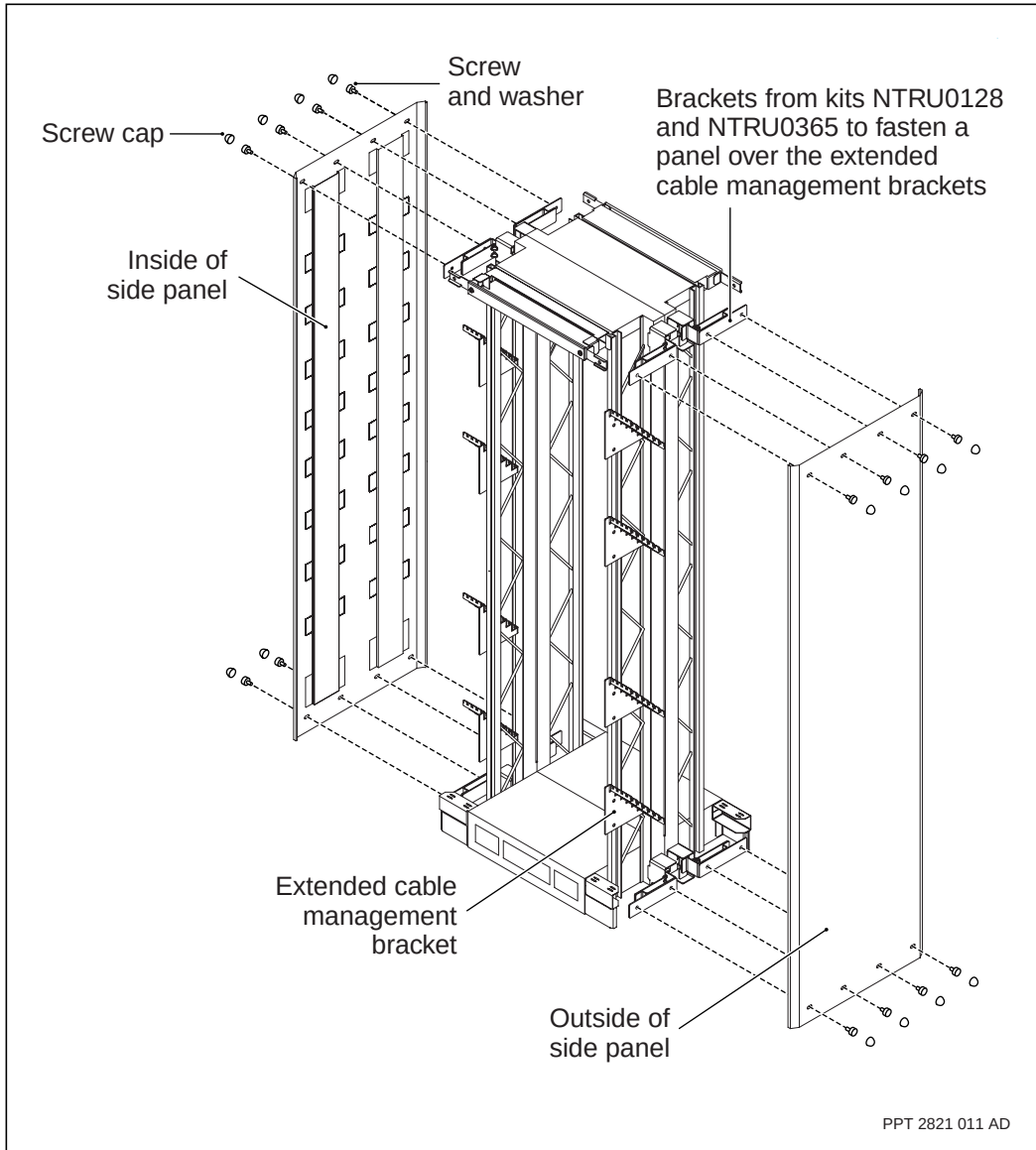
- You must be familiar with “Safety considerations and best practices” (page 41).
- You need hardware kit NTRU0128 when replacing the side panel.
- You need a helper to support the weight of the panel when it is unfastened because it weighs about 13 kg (28 lbs).
- You need a thin strong blade to pry plastic caps off the fasteners.

Procedure steps

- 1 See the positions of the upper and lower pairs of mounting brackets as shown in the figure “Side panels, exploded view” (page 581).
- 2 On the outside face of the panel, pry the 8 plastic caps off of the fasteners. Put the caps aside for re-use.
- 3 Starting at the bottom of the panel, unfasten all the screws except at the top corners.
- 4 Unfasten the last 2 screws while a helper prevents the panel from falling. Put all screws aside for re-use.

Procedure job aid

Figure 199
Side panels, exploded view



Removing a sparing panel

Remove a sparing panel if you are decommissioning the services that require it or if you are replacing or upgrading the sparing panel.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

**WARNING****Risk of injury or equipment damage by impact**

A sparing panel can be heavy and awkward for one person to install. Have a helper available at the start of the installation. Do not drop or bump the panel into anything, as injury or damage can occur.

**WARNUNG****Verletzungsgefahr oder Geräteschäden durch Stöße**

Ein Blindfeld hat ein hohes Gewicht und kann nur schlecht von einer einzigen Person angebracht werden. Führen Sie diese Arbeit zu zweit aus. Vermeiden Sie Stöße und stürzen Sie die Blindfelder nicht, da dadurch Verletzungen oder Geräteschäden verursacht werden können.

Procedure steps

- 1 Obtain the site record of the sparing panel connections. Label each cable and record the connection of each relative to the panel. (Labelling cables should already have been done during initial installation.)
- 2 On the sparing panel, unplug all of the cable connections starting with the control cables. Put the cables aside temporarily so that they are not snagged by the removal of the panel.

Disconnecting the second FP control port cable cuts off the power source for the sparing panel. Loss of power is indicated by no LEDs being lit.
- 3 If the sparing panel is rack-mounted, remove the grounding cable where it is attached to the panel. Put the screw aside for re-use.

If the sparing panel is mounted in a NEBS 2000 frame (NTRU04), the sparing panel is grounded through the mounting ears into the frame uprights.

- 4** Note the orientation of the sparing panel, for example, do the connectors face into the mounting apparatus or out of it.
- 5** Note where the sparing panel fasteners are located on the mounting apparatus.
- 6** Unfasten the sparing panel, progressing from bottom to top. Put the fasteners aside for re-use.

When you are removing a 12-port sparing panel NTQS31, as the top 2 thread-forming 10-mm (3/8-in.) hex-head screws are unfastened, have your helper hold the sparing panel. The helper must also wear a properly grounded anti-static wrist strap.

When you are removing a 19-inch wide sparing panel, and a ground cable shares one of the panel mounting fasteners (usually 8-mm or 5/16-in. EIA screws), loosely fasten the cable back in the same hole after the panel is removed.

- 7** Put the panel aside for packing later.

Removing a temperature sensor bracket assembly

Remove a temperature sensor bracket assembly for an upper cooling unit to replace it or to remove the upper shelf assembly.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a step ladder to see down onto the top of the upper shelf assembly and a driver for the thread-forming 10-mm (3/8-in.) hex-head screws that fasten the bracket to the frame or rack.
- See the figures:
 - “Location of the temperature sensor bracket assembly” (page 585)
 - “A temperature sensor bracket assembly” (page 586)
- Minimize the impact or risk of having an out-of-service temperature sensor by “Installing a temperature sensor for an upper cooling unit” (page 441) immediately.

Procedure steps

- 1 Standing on a step ladder at the rear top of the upper shelf assembly, identify which upper temperature sensor is to be replaced as shown in the figure “Location of the temperature sensor bracket assembly” (page 585).
- 2 Disconnect the D-sub connector of the wire cluster at the right end of the bracket as shown in the figure “A temperature sensor bracket assembly” (page 586). Apply gentle, even, steady, and straight force using a hand on each half of the connector.

When the temperature sensors on the bracket assembly are disconnected, the fans immediately speed up to their higher rpm.

- 3 Unfasten the 2 mounting screws, one at each end of the bracket. Put the screws aside for re-use. If you drop a screw, you must retrieve it to prevent equipment damage.
- 4 Pull the bracket assembly straight away from the shelf assembly.

Procedure job aid

Figure 200
Location of the temperature sensor bracket assembly

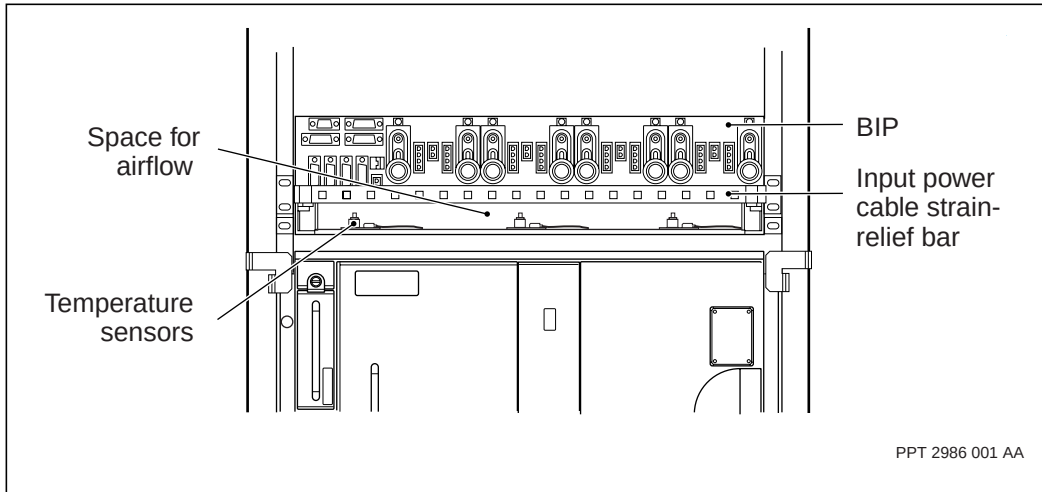
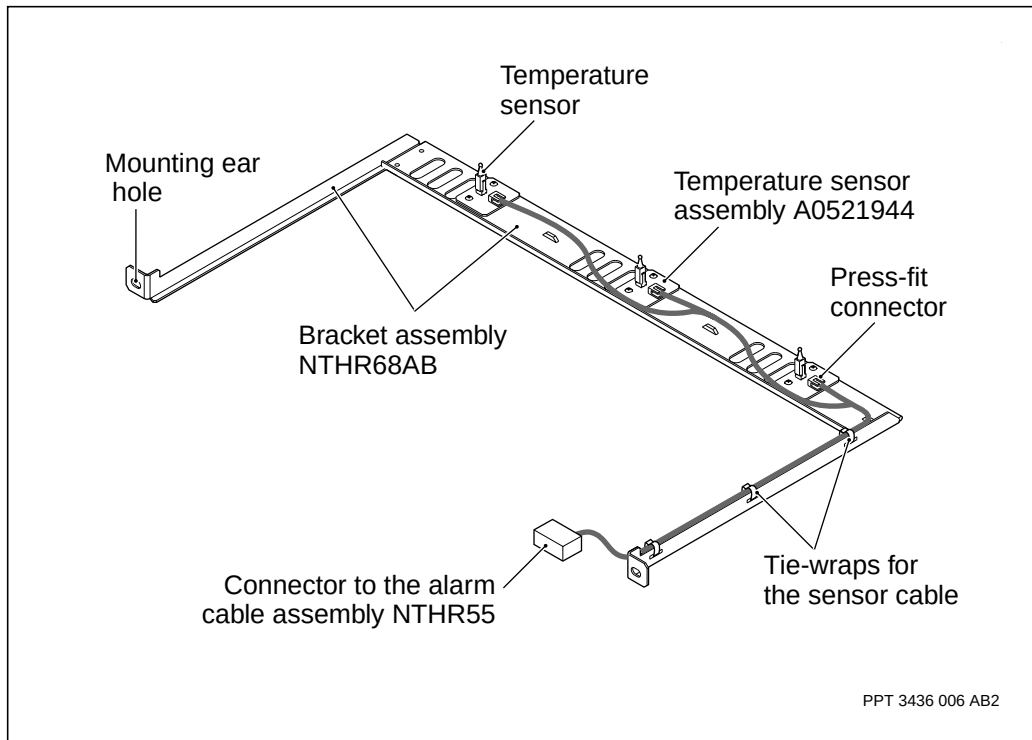


Figure 201
A temperature sensor bracket assembly



Removing a temperature sensor for an upper cooling unit

Remove an upper (front) cooling unit temperature sensor to replace it or as part of removing a shelf assembly.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The upper sensors are located in the airflow space beneath the rear of the breaker interface panel (BIP). The sensors are labeled S1, S2, and S3 from left to right looking at the rear of the BIP. See the figure “Location of upper temperature sensors” (page 588).
- Minimize the impact or risk of having an out-of-service temperature sensor by “Installing a temperature sensor for an upper cooling unit” (page 441) immediately.
- You need a step ladder to see the top of the upper shelf assembly and a medium non-magnetic one-piece Phillips screwdriver with a very short shaft.

Procedure steps

- 1 At the rear top of the upper shelf, locate the upper temperature sensor to be replaced.
- 2 Unplug the cable connector from the temperature sensor assembly. Apply gentle, even, steady, and straight force. There are no tabs on the connector to engage it. Refer to the figures:
 - “A temperature sensor on the bracket assembly NTHR68AA for a cooling unit NTHR52AA” (page 589)
 - “A temperature sensor on the bracket assembly NTHR68AB for a cooling unit NTHR52AB” (page 590)
- 3 Unfasten the sensor’s 2 Phillips retaining screws. If you drop a screw, you must retrieve it to prevent equipment damage.
- 4 Put the screws aside for re-use.

Procedure job aid

Figure 202
Location of upper temperature sensors

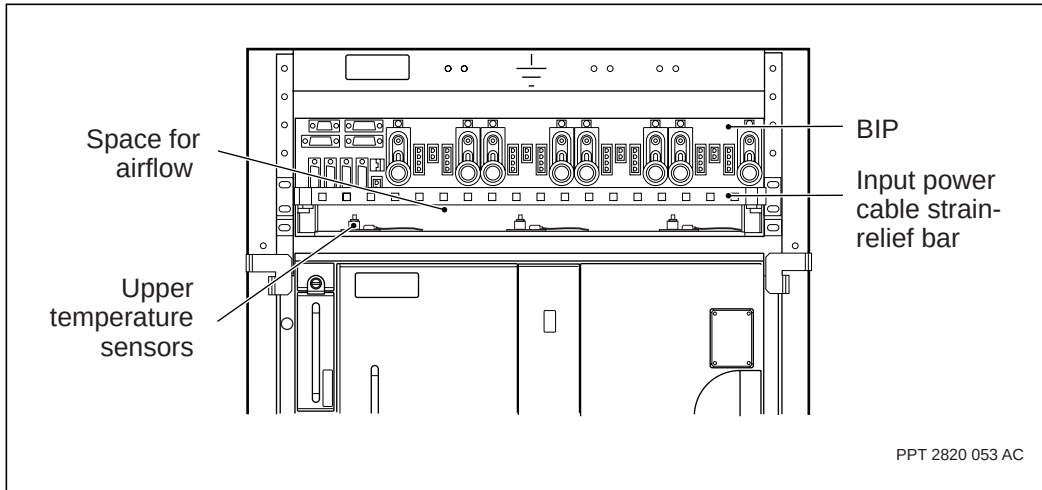


Figure 203
A temperature sensor on the bracket assembly NTHR68AA for a cooling unit NTHR52AA

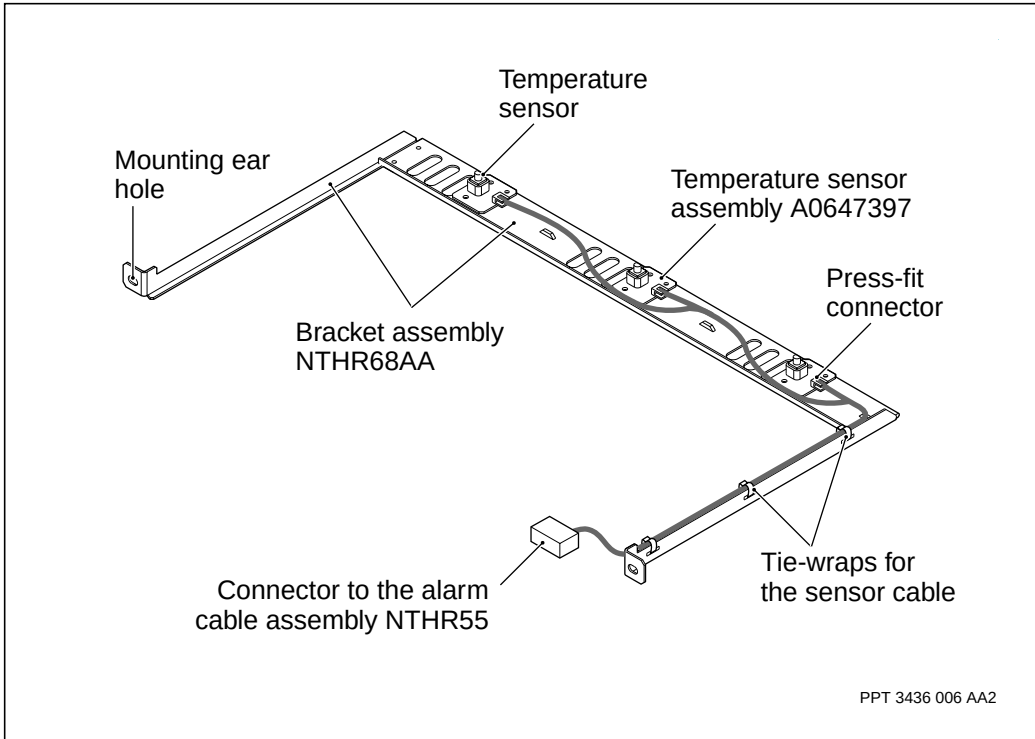
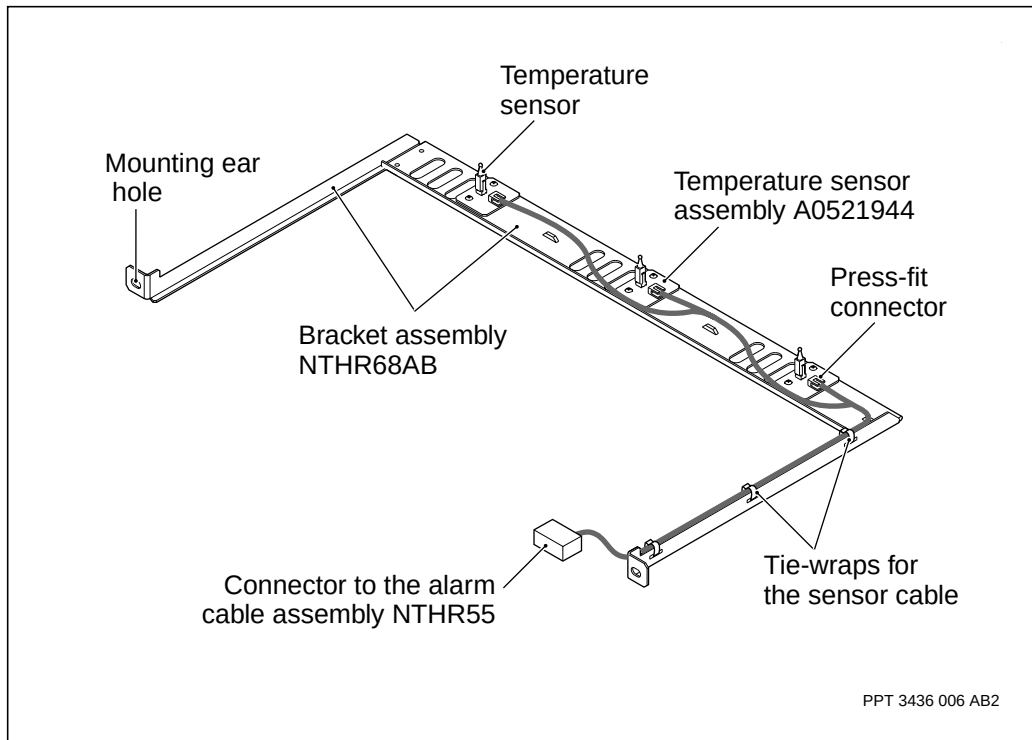


Figure 204
A temperature sensor on the bracket assembly NTHR68AB for a cooling unit NTHR52AB



Removing a temperature sensor from a lower cooling unit

Remove a lower (rear) cooling unit temperature sensor to replace it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The lower sensors are located inside the cooling unit and are labeled S1, S2, and S3 from left to right looking up into the cooling unit through the fan shroud past the fan blades. (For example, S1 aligns with F1.)
 - in an NTHR51AA, the sensor is located near the rear of the unit as shown in the figure “Location of temperature sensors inside a lower cooling unit NTHR51AA” (page 594) with a small separate PCB
 - in an NTHR51AB, the sensor is located on the fan controller module as shown in the figure “Location of temperature sensors inside a lower cooling unit NTHR51AB” (page 595) without a small separate PCB
- You need to remove the fan and the fan controller to access the temperature sensor.
- You need these specialty tools:
 - when the sensor is in an NTHR51AA, a medium non-magnetic one-piece Phillips screwdriver with a very short shaft
 - a flashlight to see through the spinning fan blades at what your hand is touching inside the cooling unit
- The air filter will prevent a dropped screw or tool from reaching the powered processor cards below the cooling unit.



WARNING

Risk of injury or equipment damage by electricity

While removing a temperature sensor inside a cooling unit, less than -48/-60 V dc is still live on the controllers and other two fans. Do not drop a screw, and because of the exposed electronics inside the unit, do not use a magnetic screwdriver. A dropped screw must be retrieved. Also, do not touch anything other than the sensor, its screws, or its wires.



WARNUNG

Verletzungsgefahr oder Geräteschäden durch Elektrizität

Beachten Sie beim Austauschen eines Temperatursensors in einem Kühlaggregat, daß die Steuerungen und verbleibenden beiden Lüfter immer noch eine Spannung von bis zu -48/-60 V führen. Lassen Sie keine Schrauben fallen, und arbeiten Sie aufgrund der freiliegenden Elektronikbauteile in der Einheit nicht mit einem Magnetschraubendreher. Heben Sie fallengelassene Schrauben auf. Berühren Sie nur den Sensor, seine Schrauben und Verdrahtungen.



WARNING

Risk of injury by fan blades

While working on any equipment near the cooling unit fans, be continuously aware that the rpm of a live fan can suck loose clothing, hair, or jewelry into the fan blades or amputate a finger. Do not touch a live fan with anything.

**WARNUNG****Verletzungsgefahr durch Lüfterblätter**

Beim Arbeiten in der Nähe der Lüfter des Kühlaggregats besteht die Gefahr, daß ein rotierender Lüfter lose Kleidung, Haare oder Schmuck in die Lüfterblätter saugt oder einen Finger abtrennt. Berühren Sie einen Lüfter niemals, weder direkt noch indirekt.

Procedure steps

- 1** Locate the red LED on the cooling unit. The position of the LED identifies which lower temperature sensor is to be replaced.
- 2** Reaching inside the cooling unit, unplug the red cable connector from the temperature sensor assembly. Apply gentle, even, steady, and straight force. The plug-in of the right sensor is hidden behind a cluster of wires which cannot be moved. Find the plug-in by touch. See the figures "Location of temperature sensors inside a lower cooling unit NTHR51AA" (page 594) and "Location of temperature sensors inside a lower cooling unit NTHR51AB" (page 595).

To see what your hand is doing inside the cooling unit, look through the spinning blades of the adjacent fan. You may need a flashlight to see clearly.
- 3** Unfasten the sensor's 2 Phillips retaining screws and remove them. If you drop a screw, you must retrieve it to prevent equipment damage. Put the screws aside for re-use.
- 4** Remove the sensor and circuit board.

Procedure job aid

Figure 205

Location of temperature sensors inside a lower cooling unit NTHR51AA

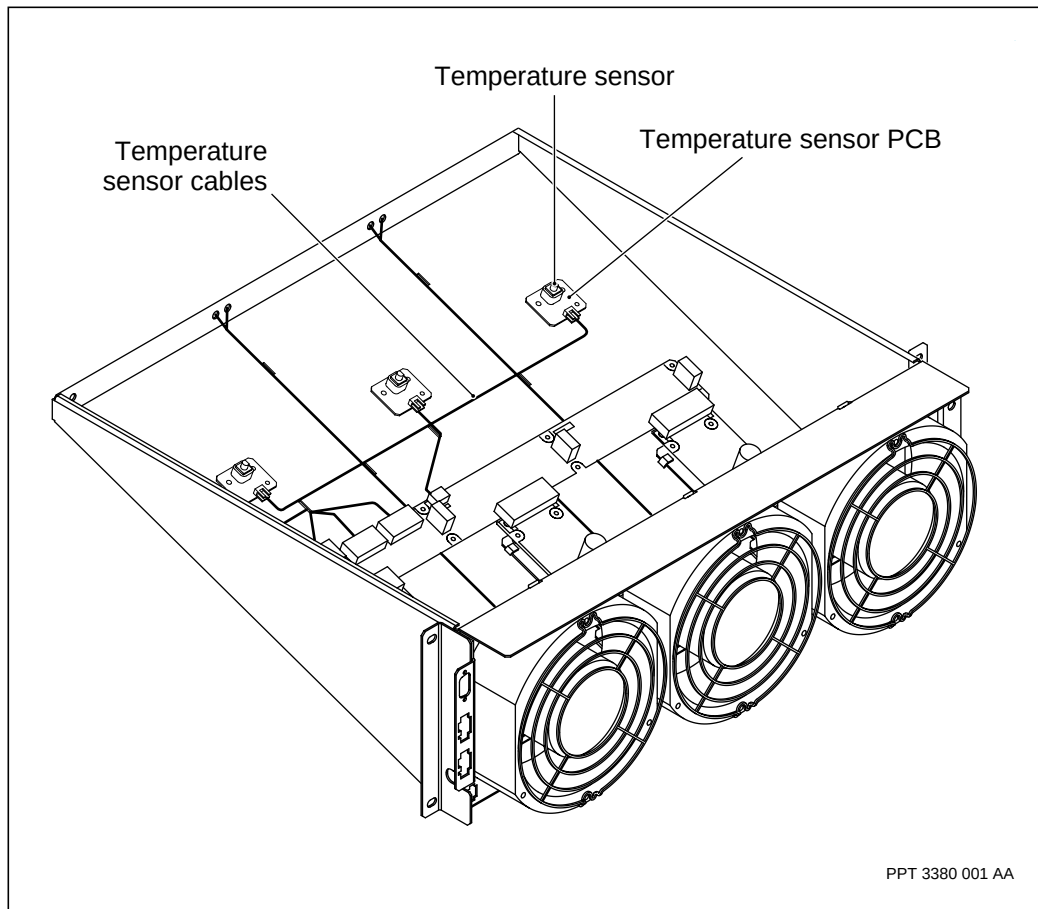
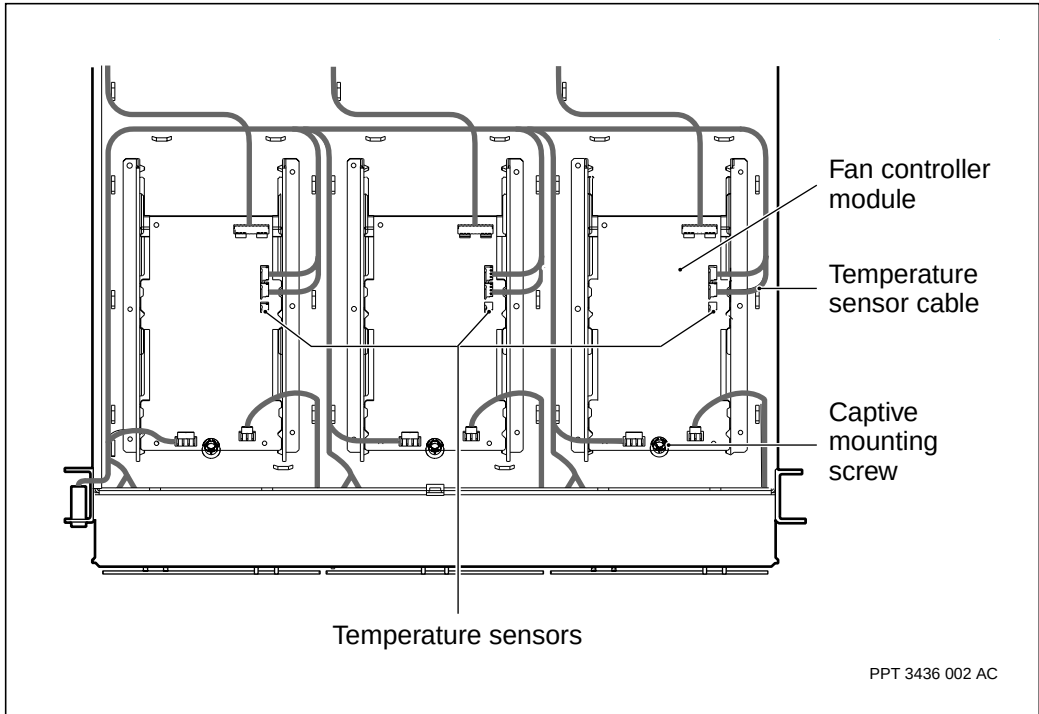


Figure 206
Location of temperature sensors inside a lower cooling unit NTHR51AB



Removing a timing cable adapter NTPN81

Remove a timing cable adapter NTPN81 to replace it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

Procedure steps

- 1 Locate the adapter to be removed at the rear of the Passport 20000.
- 2 Inform the software network operator that disconnecting the timing cable will generate software alarms for loss of primary timing signal and a switchover to the secondary (if configured and available), or a loss of the secondary as a backup timing reference. This is normal during a replacement. For information about BITS alarms, refer to 241-5701-500 *Passport 6400, 7400, 15000, 20000 Alarms Reference*.
- 3 At the adapter, unplug the coax connector and let the cable hang freely without allowing the end to contact other metal. It is still signaling.

Removing a timing cable for DS1 NTHW75

Remove a wire-wrap timing cable NTHW75 to replace it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Inform the software network operator that disconnecting the cable to replace it will generate software alarms.

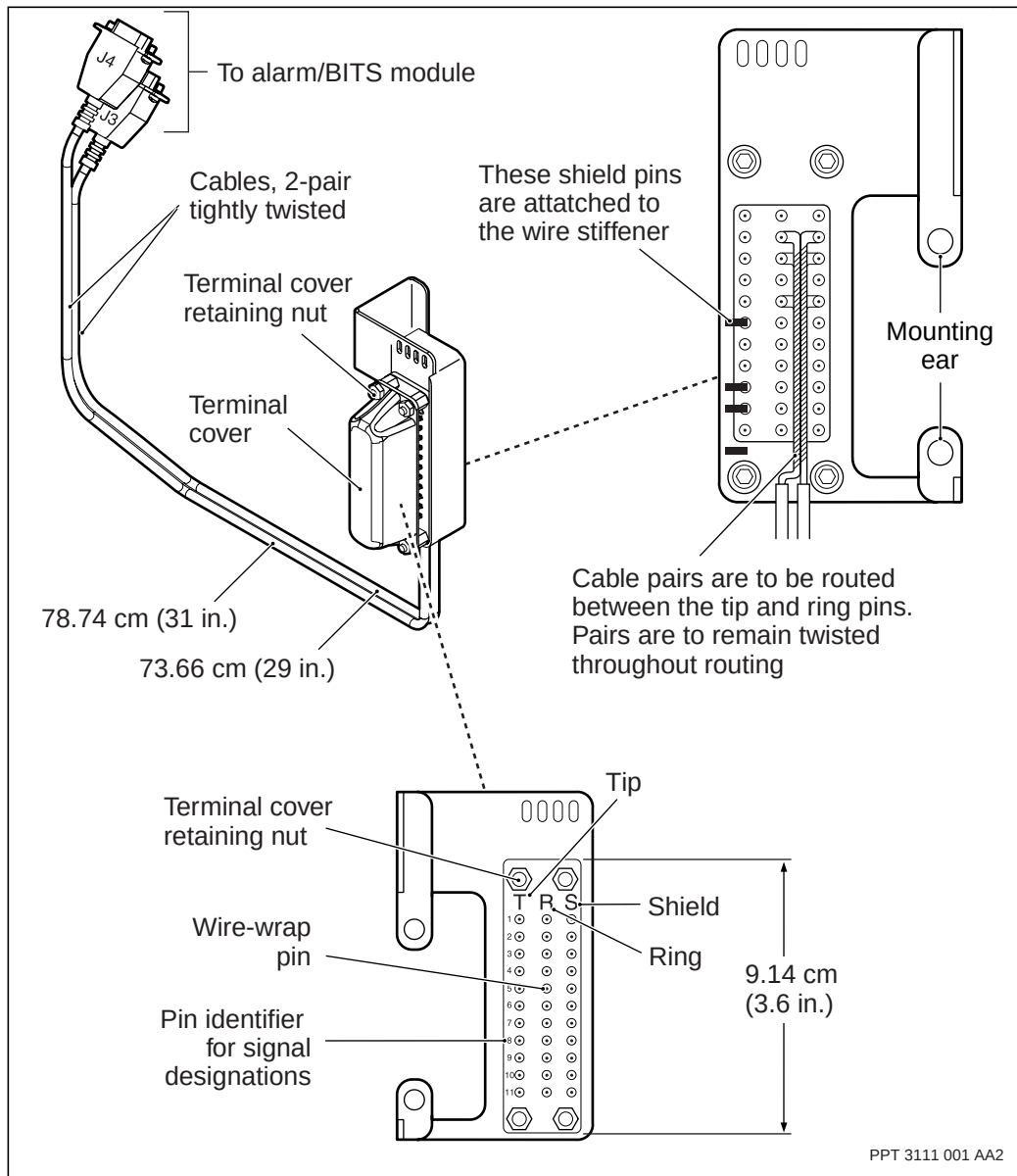
Procedure steps

- 1 Note the path of the old cable assembly.
- 2 Unplugging either end of the cables at J3 or J4 generates software alarms for loss of primary timing signal and a switchover to the secondary (if configured and available), or a loss of the secondary as a backup timing reference. For information about BITS alarms, refer to 241-5701-500 *Passport 6400, 7400, 15000, 20000 Alarms Reference*.
- 3 Unfasten the captive D-sub connector screws and unplug the ends of the old cable assembly from the alarm/BITS module.
- 4 Remove the terminal cover from the wire-wrap terminal block. See the figure “A timing cable assembly NTHW75 and terminal connections” (page 598).
- 5 Remove the wire wrapped ends of the old cable assembly from the pins on the terminal block, noting the pins that were used for the connections.
- 6 Remove the old cable assembly from any cable management brackets on the frame and put it aside.

Procedure job aid

Figure 207

A timing cable assembly NTHW75 and terminal connections



Removing a timing cable for E1 unbalanced NTHR75

Remove a timing cable for E1 unbalanced NTHR75 to replace it. The NTHR75 connects an unbalanced E1 Passport 15000 alarm/BITS module (NTHR14).

Prerequisites

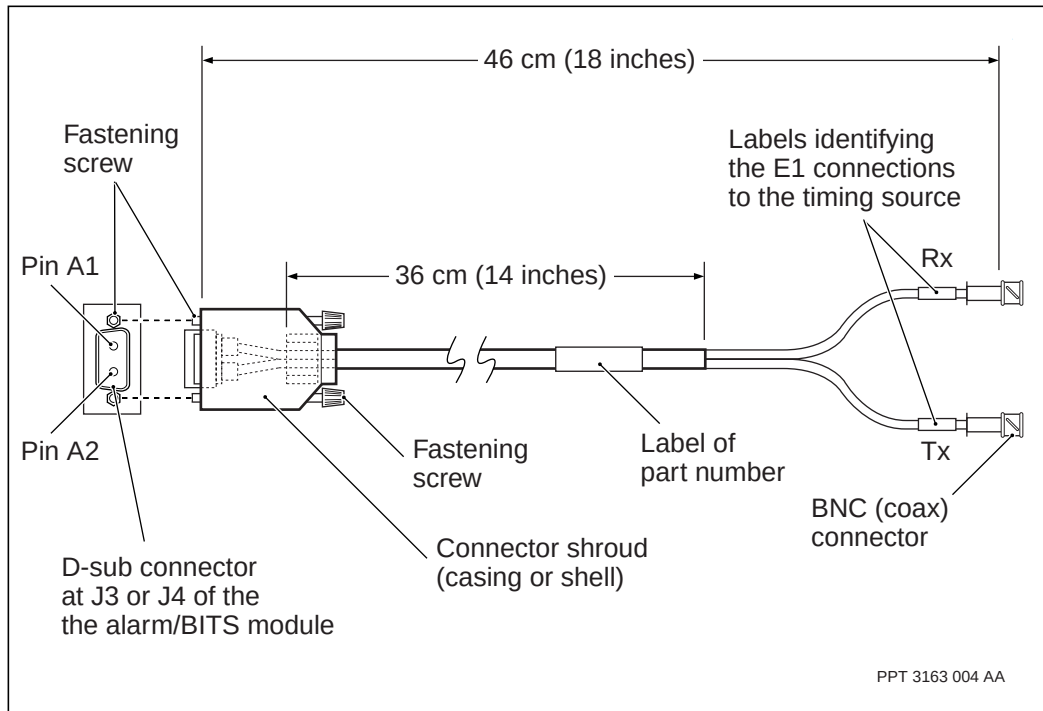
- You must be familiar with “Safety considerations and best practices” (page 41).
- Inform the software network operator that disconnecting the cable to replace it will generate software alarms.

Procedure steps

- 1 Note the path of the old cable assembly.
- 2 Remove the D-sub connector from J3 as shown in the figure “A timing cable assembly NTHR75” (page 600).
- 3 Remove the other end of the cable (Rx) from the Tx of the site timing source. The Tx end of the NTHR75 cable is not used.

Procedure job aid

Figure 208
A timing cable assembly NTHR75



Removing a vertical frame from the pallet

Remove a vertical NEBS 2000 frame from the shipping pallet after removing the packaging requires. Remove a vertical frame from the pallet directly onto the device for moving the frame to where it is to be anchored.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need three helpers to assist tilting the frame off of the pallet. A frame with two switches in it is top heavy and can fall over if tilted too much.

Procedure steps

- 1 Latch any cards inside the shelf that may have become unlatched. Ensure that you latch each card to the transportation position. Refer to the figures “Upper transportation pockets for card latches” (page 677) and “Lower transportation pockets for card latches” (page 678).
- 2 Remove the plastic sheet around the frame by cutting it. Since the foam padding is attached to the plastic, put it aside for re-use later.
- 3 Undo the four 14-mm (9/16-in.) screws in the pallet that fasten the frame-to-pallet shipping brackets.
- 4 Remove the shipping brackets from the frame feet. Gently tap with a hammer if required.
- 5 If the frame has panels fastened over the sides, remove one by prying the 8 screw caps off and unfastening the screws. Put the panel, caps, and screws aside for re-use later.



WARNING

Risk of injury when handling a frame

Never place a foot or a hand under any part of the frame while it is being tilted or moved. Always move it with at least four people. The weight of a shipped frame with one Passport 15000 or 20000 switch is approximately from 330 kg (730 lbs) to 355 kg (780 lbs); with two switches the weight is from approximately 480 kg (1052 lbs) to 490 kg (1076 lbs). For additional protection, wear safety boots with steel toes and gripping soles.

**WARNUNG****Verletzungsgefahr beim Gestelltransport**

Stellen Sie niemals einen Fuß unter das Gestell, wenn dieses bewegt oder gekippt wird, und greifen Sie nicht unter das Gestell. Zum Bewegen des Gestells sind mindestens vier Personen erforderlich. Ein Gestell mit einem Passport 15000 oder 20000 wiegt ca. 330 kg und mit zwei Passport-Einheiten ca. 490 kg. Tragen Sie zu Ihrem zusätzlichen Schutz Sicherheitsschuhe mit Stahlkappen und griffigen Sohlen.

- 6 Move the fridge cart beside the side of the frame without the side panel so that the foot plate touches the pallet. Ensure the secondary feet of the cart are extended and locked into position.
- 7 While 3 helpers slightly tilt and hold the frame to raise the side nearest the cart, ensure the 2 frame feet nearest the cart are threaded upwards until each touches the base of the frame.
- 8 While 3 helpers slightly tilt and hold the frame to raise the side nearest the cart, slide the foot-plate of the cart under the frame feet until the side of the frame is flush against the back of the cart.
- 9 Lower the frame gently onto the foot-plate. Ensure no cables are pinched between the frame and the cart.
- 10 Check the position of the cart wheels relative to the pallet. The wheels must be extended past the edge of the pallet so that they can be lowered directly onto the floor (that is, not onto the pallet). If not extended enough, remove the cart and carefully slide the frame closer to the edge of the pallet.
- 11 Strap the frame snugly to the fridge cart. Place the straps around the frame and cabinets. Prevent the straps from pinching any cables or overlapping anything protruding from the frame. The module handles of a Passport 15000 are not designed to withstand pulling from the weight of the frame.
- 12 With 3 helpers, tilt the frame and cart towards the wheels. Allow the extended wheels to touch the floor gently. While still holding the cart and frame from falling, pull the cart away from the pallet and lower the other set of wheels gently onto the floor.

- 13** When the cart is on the floor, ensure all of the frame feet are threaded snugly all the way inwards (upwards). You may need an 8-mm (5/16-in.) allen key to turn the shafts from the inside end.
- 14** Keep the screws, brackets, packing, and pallet in case the frame must be returned.

Removing an FP

Remove an FP from a shelf to empty the slot.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You must identify from the description of the FP in 241-1501-200 *Passport 15000, 20000 Hardware* whether the faceplate has small form pluggable (SFP) optical modules. When such an FP is removed due to a failure, its SFPs are to be removed and kept for re-use. When an FP that uses SFP modules is to be re-deployed, each optical module socket (port) on the FP must be re-configured to match the version of SFP that will be plugged into it.
- The FP to be removed must be locked in software.
- As each cable is disconnected between an electrical FP and its sparing panel, software alarm 7054 0100 is generated.

Procedure steps

- 1 At the front of the Passport 15000 or 20000 switch, locate the FP to be replaced. See the figure “Locations of FPs” (page 607).
- 2 Record the position of each cable connector relative to the label of the connector on the faceplate. Each cable should already have been labeled with port connection information that will enable you to quickly reconnect the cables to appropriate ports.
- 3 For fiber optic cards with cable hoods on the faceplate of the card, release the hood by turning the lower latching screw counter-clockwise a 1/4 turn with a slotted screw driver. Turn the screw by hand, not a power tool. Lift the hood upwards and hold it perpendicular to the faceplate.



CAUTION

Risk of service interruption

Unseating an FP while at least one traffic port cable is still connected to the faceplate means that any PNNI links and some services (for example, ATM) to that FP through that port will be dropped and will not recover when a replacement FP is returned to service. Always disconnect all cables after locking a card and before unseating it.

**CAUTION****Risk of equipment damage**

To prevent equipment damage, disconnect the cables attached to the ports of an FP before you disconnect the control cable that connects the FP to a termination panel.

- 4 Unplug the cable connectors on the faceplate of the FP. While unplugging, pull straight away from the faceplate connector. Different types of connectors have various disengaging mechanisms, as follows.

**CAUTION****Risk of damage to the fiber transceivers on the FPs**

When engaging or disengaging a fiber optical cable connector to the connector on the FP faceplate (the transceiver), you can damage the nose shield on the connector or the optic transceiver by improper coupling. This especially applies to MT-RJ connectors.

Before pulling the cable connector away from the transceiver, you must ensure that the tab (latch) on the cable connector is fully pinched against its side.

- a. For standard coax or BNC cables, twist the connector until the pin disengages the groove and pull.
 - b. For 8w8 mini-coax D-sub connectors, unfasten the captive screws and pull.
 - c. For any other type of D-sub connector, unfasten the captive screws and pull.
 - d. For FPs with Ethernet RJ-45 connectors, fully press down the tab on the connector and pull. (The VSP3 card has Ethernet LC connectors.)
 - e. For SC, LC, or MT-RJ fiber cable connectors, fully pinch the tab on the connector against its side and pull straight out. Cover the ferrule with an appropriate dust cap.
- 5 Allow the cables to hang aside temporarily.
 - 6 When the FP is being replaced due to a failure and the FP has SFP modules, record the PEC of each module relative to its position on the faceplate so that you can plug it into the same socket (port) on the

replacement FP. The SFP version must match the software configuration of it in the same port.

When the FP is being re-deployed and the FP has SFP modules, leave the modules in the faceplate until the card's new slot is configured for the FP, and the FP's ports are configured for the SFP modules. In the meantime, insert dust boots into the pair of LC connector openings on each SFP.

- 7 Remove each SFP by:
 - swinging the bale latch away from the body of the SFP until it is at about a 45-degree angle relative to the faceplate
 - pulling the latch along the axis of the 45-degree angle until the module is fully disengaged
- 8 On the faceplate of the FP, fully swing out the upper and lower latches until they stop as shown in the figure "Fully opened card latches" (page 608).
- 9 Place fingers on the exposed tabs to gently but firmly slide the FP out of its slot. Hold only the edges of the FP. Be careful because an FP weighs up to 5.4 kg (12 lbs).
- 10 Insert appropriate dust boots into the port transceivers or covers onto the faceplate connectors.
- 11 Pack the FP in appropriate packaging.

Procedure job aid

Figure 209
Locations of FPs

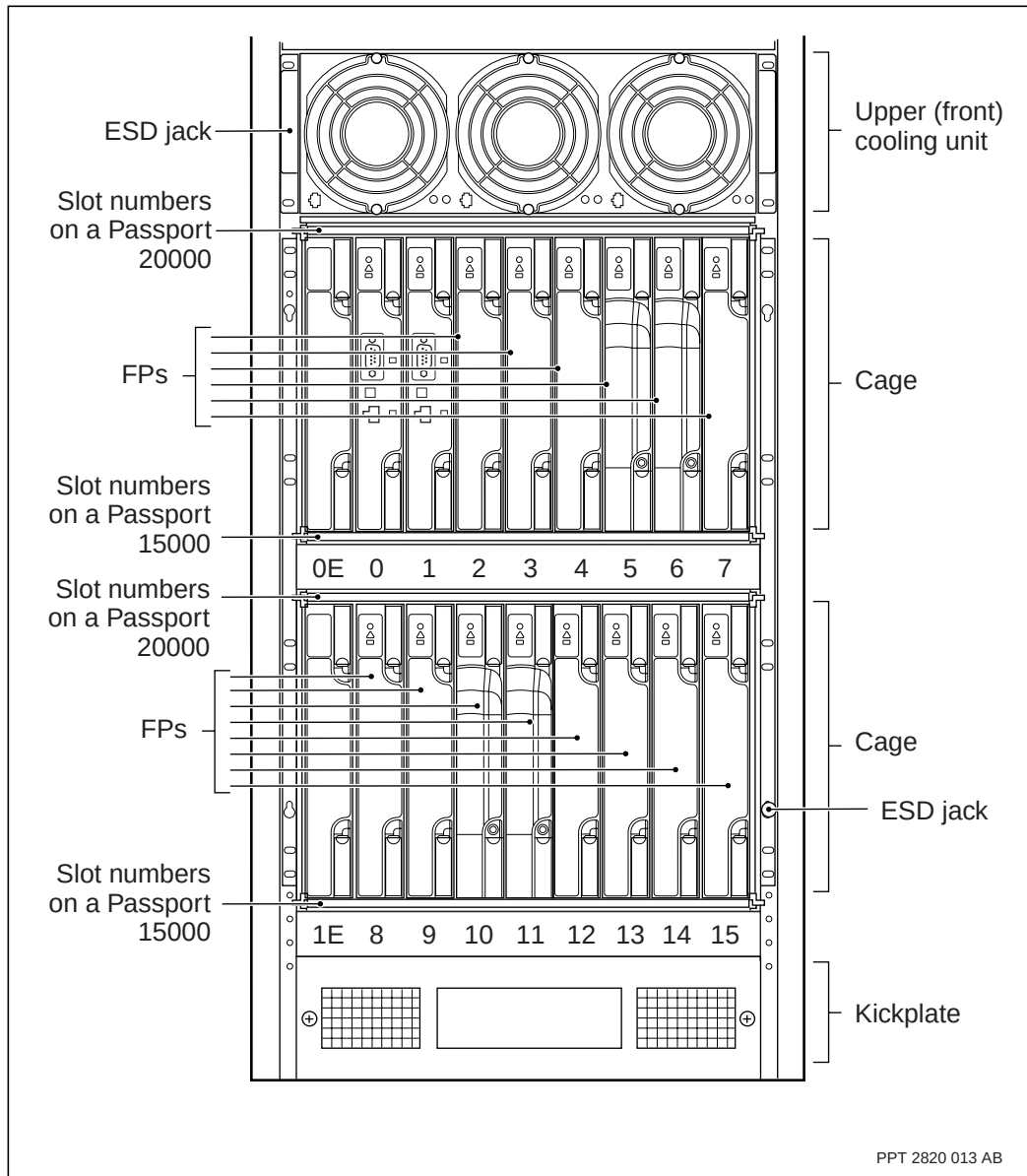
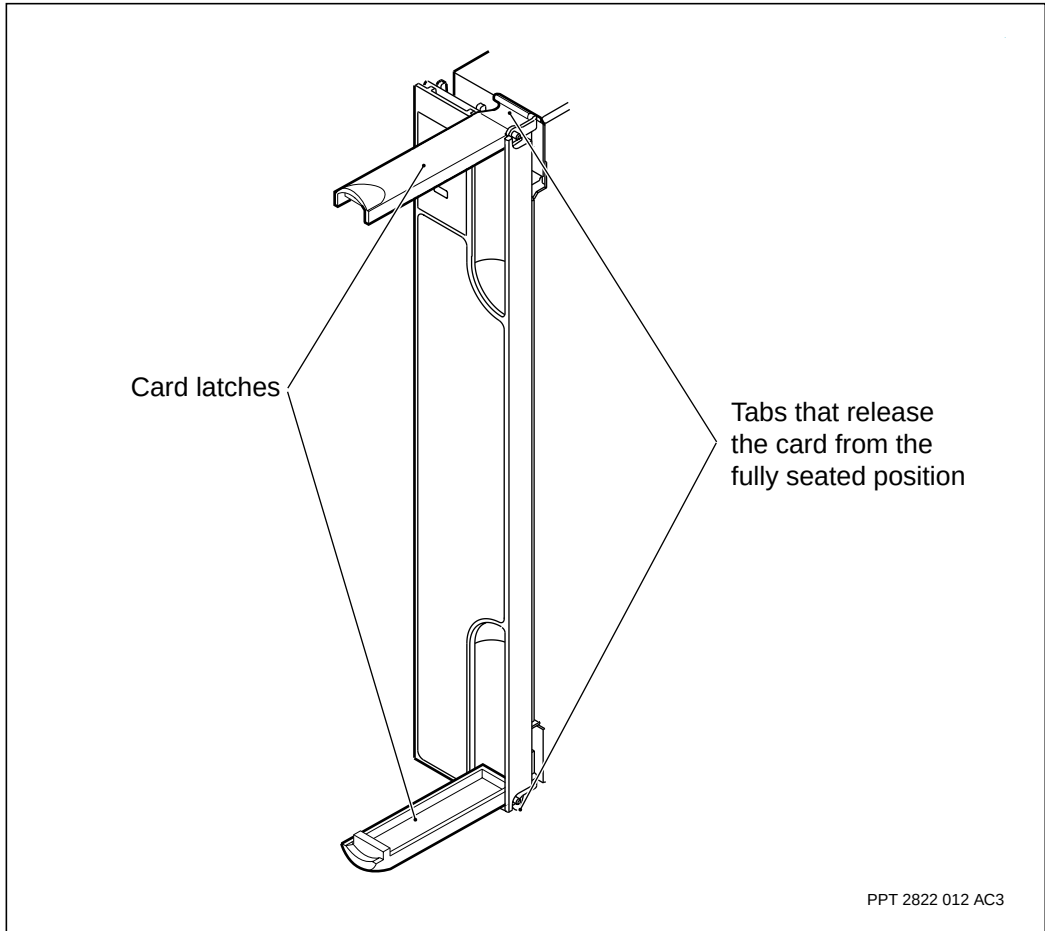


Figure 210
Fully opened card latches



Removing an FP cable

Remove an FP cable to replace it due to a fault, an upgrade, or a change (re-deployment).

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Unless prefabricated cable assemblies are available from Nortel Networks, you must provide a custom-made replacement cable assembly. Cable specifications are located in 241-1501-200 *Passport 15000, 20000 Hardware*.
- When you are replacing a cable from an FP that uses small-form pluggable (SFP) optical modules between the cable and the FP faceplate, leave the SFP module inserted in the faceplate.



CAUTION

Risk of service loss

Ensure that the cable being removed is not carrying traffic before you remove it.



CAUTION

Risk of equipment damage

To prevent equipment damage, disconnect the cables attached to the ports of an FP before you disconnect the control cable that connects the FP to a termination panel.

Procedure steps

- 1 Locate the cable to be removed.
- 2 Unplug the cable connector at the faceplate of the FP. While unplugging, pull straight away from the angle of the receptacle on the faceplate. If the cable connection includes an inline attenuator, re-use it. Fiber optic cards have cable hoods that must be propped open while disengaging connectors. Different types of connectors have various disengaging mechanisms, as follows.

- a. For standard coax or BNC cables, twist the connector until the pin disengages the groove and pull.
- b. For 8w8 mini-coax D-sub connectors, unfasten the captive screws and pull.
- c. For any other type of D-sub connector, unfasten the captive screws and pull.
- d. For FPs with Ethernet RJ-45 connectors, fully press down the tab on the connector and pull. (The VSP3 card has Ethernet LC connectors.)
- e. For SC, LC, and MT-RJ fiber cable connectors, fully pinch the tab on the connector against its side and pull straight out. Cover the ferrule with an appropriate dust cap.

**CAUTION****Risk of damage to the fiber transceivers on the FPs**

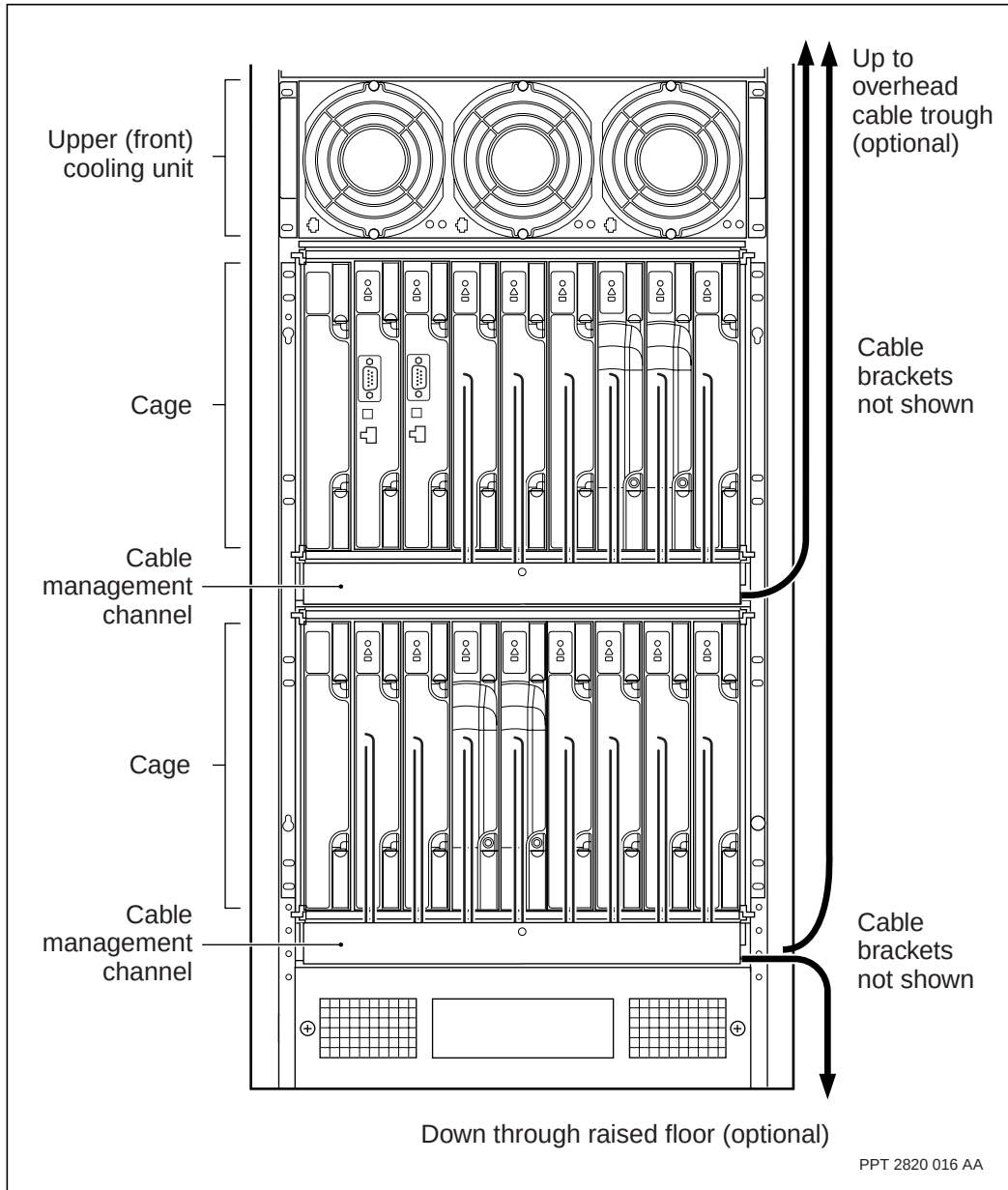
When engaging or disengaging a fiber optical cable connector to the connector on the FP faceplate (the transceiver), you can damage the nose shield on the connector or the optic transceiver by improper coupling. This especially applies to MT-RJ connectors.

Before pulling the cable connector away from the transceiver, you must ensure that the tab (latch) on the cable connector is fully pinched against its side.

- 3 Repeat these steps at the other end of the cable.
- 4 Cut the connector off the end of the old cable. There is a possibility that cutting tie-wraps and tugging or pulling on the old cable can affect the operation of any other cable. If possible, it is preferable to leave the old cable in position.

If necessary to make room in the cable management path, remove the cable completely.
- 5 If the cable being removed passes through a slack management unit, locate the original cable that was put aside. Open the curlic ties beside the fiber unit that it passes through. Carefully separate the cable from the cluster. Minimize your handling of fiber cables along the path. Cut the original cable at the next downstream and upstream tie-wraps so that the loop of slack cable is removed from the path. Leave the remainder of the old cable in position.

Figure 211
Route of an FP cable



Removing an SFP optical module

Remove an optical module to replace it or re-deploy it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The FP should already be installed in the shelf.
- The FP port of the SFP module must be locked in software. For the procedure on locking a port, see 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*.
- Do not touch the circuitry inside the large open end of an SFP optical module or you may cause the unit to malfunction. Refer to the figure “A typical SFP optical module” (page 613).
- A failed optical module generates alarm 7011 5480.

Procedure steps

- 1 Unplug each cable that is attached to the optical module by pressing on the release tab and gently pulling straight away until the fiber is fully disengaged.
- 2 Remove the SFP module by:
 - swinging the bale latch away from the body of the SFP until it is at about a 90-degree angle relative to the SFP
 - pulling the latch along the axis of the SFP until the module is fully disengaged

For an example, see the figure “Orientation of an installed SFP module in an NTHW49” (page 614).

Procedure job aid

Figure 212
A typical SFP optical module

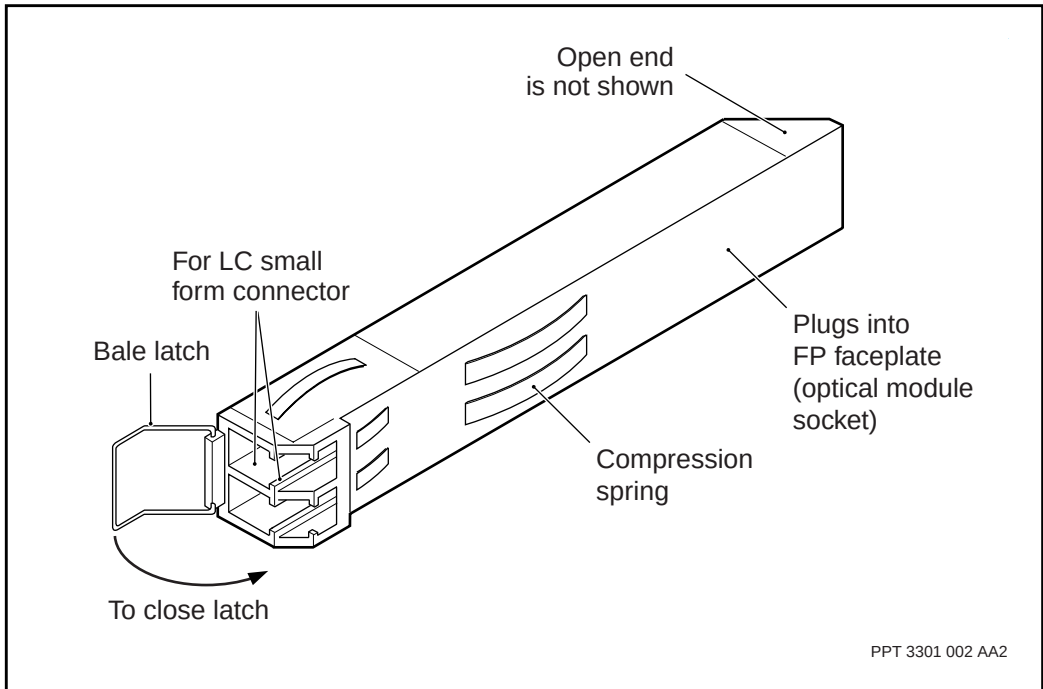
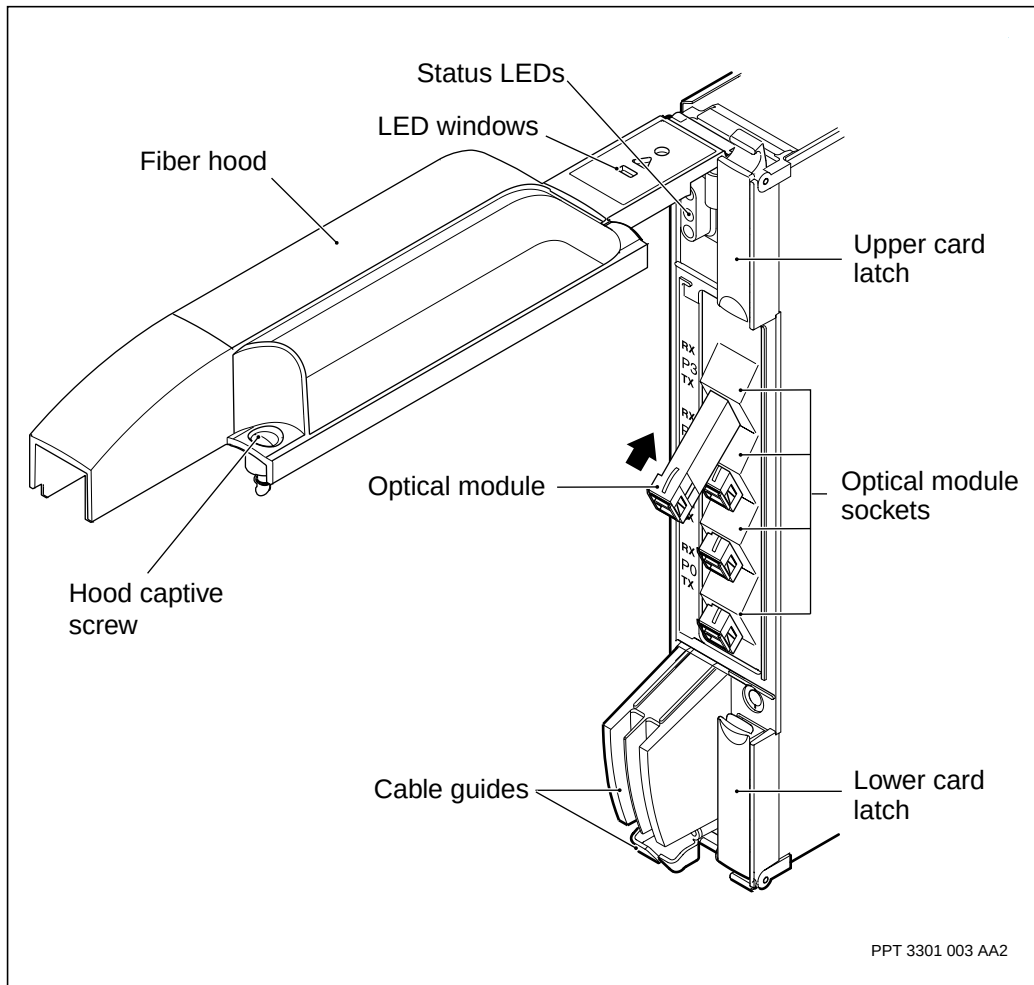


Figure 213
Orientation of an installed SFP module in an NTHW49



Removing an upper cooling unit

Remove an upper cooling unit to access the cooling unit parts for replacement, or to replace the entire cooling unit.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a driver for the thread-forming 10-mm (3/8-in.) hex-head screws that fasten each cooling unit to the frame or rack.
- You need a helper to hold the unit until it is fastened because it weighs (9.1 kg or 20 lbs) and tends to slide out of position when it is unfastened.



CAUTION

Service degradation or interruption by heat

When the cooling unit of an in-service Passport 15000 or 20000 loses power, the air temperature inside the shelf rises rapidly. When the temperature inside a fabric exceeds 70 degrees Celsius (158 degrees Fahrenheit), that fabric will automatically shut down until the temperature drops below the threshold.



WARNING

Risk of injury by fan blades

While working on any equipment near the cooling unit fans, be continuously aware that the rpm of a live fan can suck loose clothing, hair, or jewelry into the fan blades or amputate a finger. Do not touch a live fan with anything.



WARNUNG

Verletzungsgefahr durch Lüfterblätter

Beim Arbeiten in der Nähe der Lüfter des Kühlaggregats besteht die Gefahr, daß ein rotierender Lüfter lose Kleidung, Haare oder Schmuck in die Lüfterblätter saugt oder einen Finger abtrennt. Berühren Sie einen Lüfter niemals, weder direkt noch indirekt.

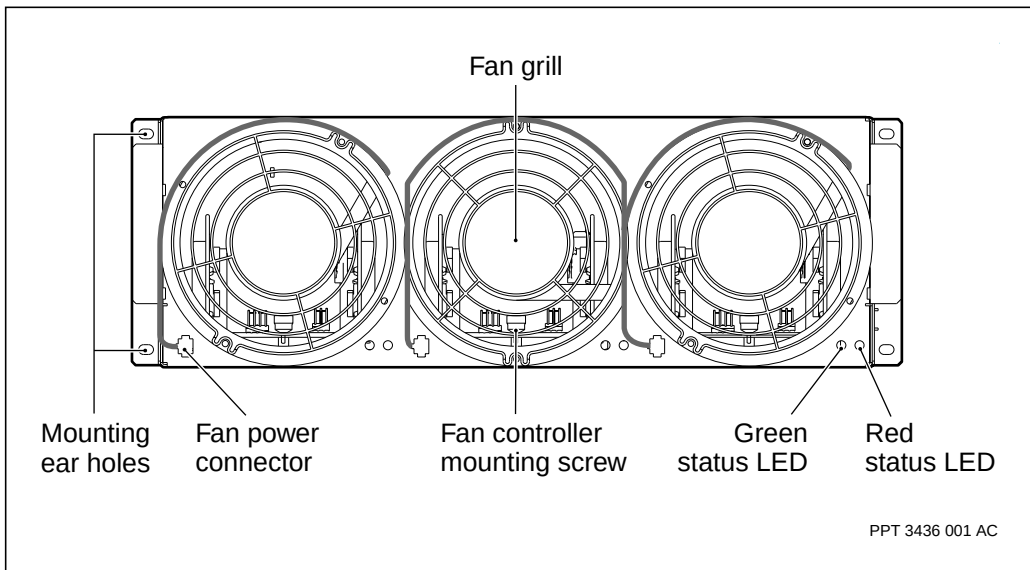
Procedure steps

- 1 Place a temporary anti-ESD pad or container near the NEBS 2000 frame or equivalent so that the removed cooling unit can sit on it while waiting for the packaging of the replacement unit. The pad needs to be a minimum of about 65 cm by 65 cm (2 feet, 2 in. square). Disregarding ESD protection can affect the results of diagnosing equipment failure.
- 2 Contact the software operator of the Passport 15000 or 20000 switch to inform that cooling unit alarms will be generated while the unit is being replaced.
- 3 Switch off both cooling unit breakers and put tape on them to indicate neither was tripped. To ensure that you switch off the correct breakers, refer to the table "Location of cooling unit breakers on the front of the BIP" (page 560).
- 4 At the rear of the NEBS 2000 frame or equivalent, check the LEDs of the cooling unit to ensure that none are lit. This confirms that power is off since the fan blades can still be rotating freely while slowing down.
- 5 Facing the rear of the upper cooling unit at the rear of the frame and above the fans of the lower (front) cooling unit, disconnect power cable A by pressing and holding the tabs on the side of the connector and pulling straight out. (The cables at the right side are for the lower cooling unit.)
- 6 Label the cable to identify which connector it plugs into (for example, with UA for upper unit, power connector A).
- 7 Repeat the two previous steps for power cable B, using UB for the label.
- 8 Unfasten the 2 small slotted captive screws on the D-sub connector below the A and B power connectors.
- 9 Leave the F1, F2, and F3 cables connected on the fan side of the cooling unit.
- 10 Unfasten the 4 thread-forming 10-mm (3/8-in.) hex-head mounting screws at both sides of the frame. Put the screws aside for re-use. Be ready for the unit to slide out on its own and to support its weight of 9 kg (20 lbs).
- 11 By gripping the mounting ears at either side of the unit, slide it straight out and away from the frame.
- 12 Put the cooling unit on the ESD protection pad or container.

Procedure job aid

Figure 214

Location of the mounting screws of an upper cooling unit



Removing fiber cables from the fiber management unit

Remove fiber cables from the fiber management unit in preparation for replacing the unit, or one or more cables.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

Procedure steps

- 1 Open the cable management unit drawer by sliding the latches towards each other, holding them inwards and pulling slowly. Stop pulling when the rear of the drawer is at the front of the fiber unit.
- 2 Ensure that the tray labels are complete.
- 3 Label the trays in the replacement fiber management unit to match the one to be replaced.
- 4 Beginning with the topmost trays, carefully unwind the fiber cables from around the half-spools.

If you are removing all the cables in order to replace the fiber management unit, be sure to temporarily label each cable, so that it can be matched to the appropriate tray in the replacement unit.

You may need to remove the tie-wraps or curlie-ties from around the bundle of fibers at the sides of the fiber management unit so that cable slack is increased enough to allow unstressed handling of all the cables.

Removing front or rear frame panels

Remove a front or rear panel to enable access to the cables on the cable management brackets that are installed on the sides of a NEBS 2000 frame.

Prerequisites

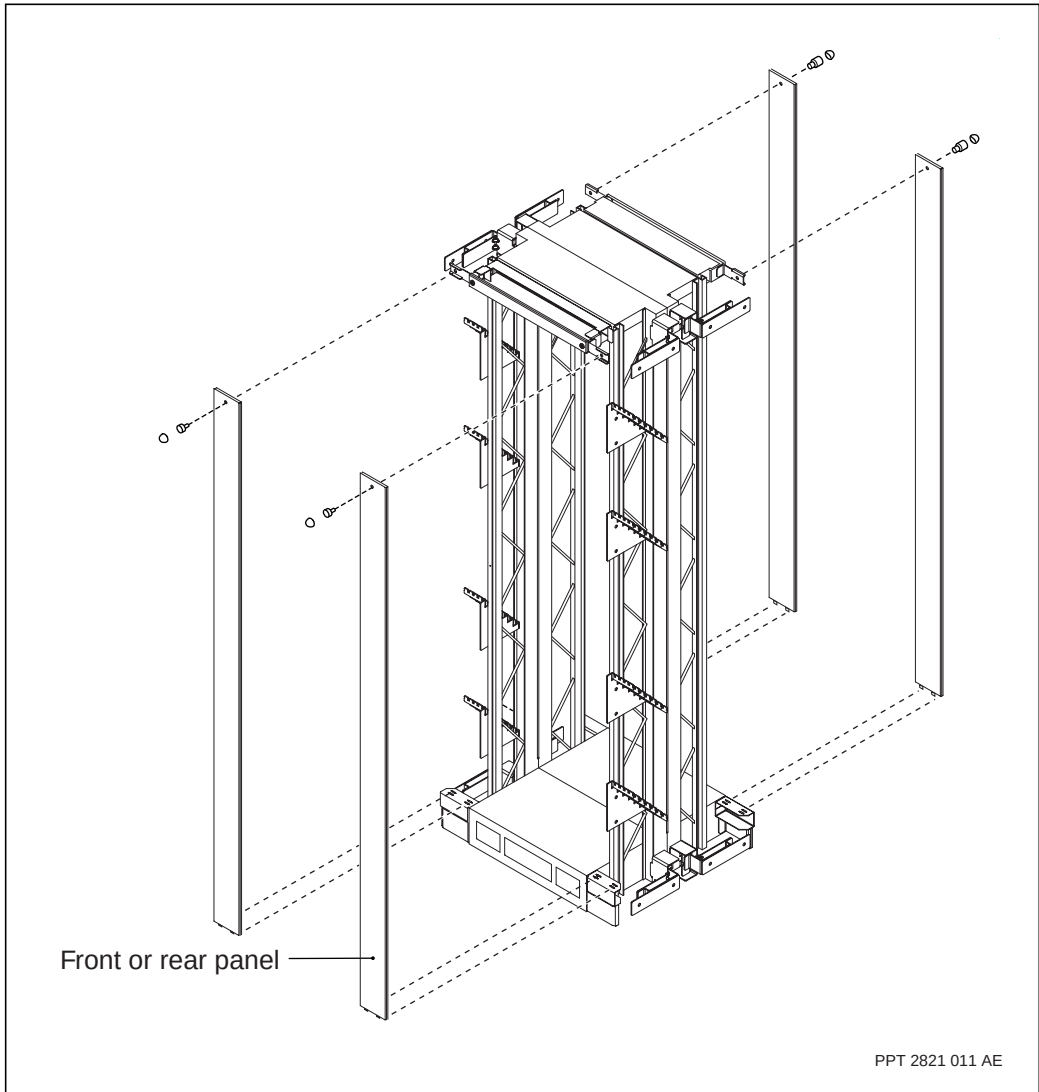
- You must be familiar with “Safety considerations and best practices” (page 41).

Procedure steps

- 1 See the figure “Locations of front and rear frame panels, exploded view” (page 620). Note whether the bottom of the panel has 2 slots visible or not.
- 2 Unfasten the captive screw at the top of the panel.
- 3 Pull the top of the panel away from the frame while pulling upwards until the bottom tabs disengage.

Procedure job aid

Figure 215
Locations of front and rear frame panels, exploded view



Removing the packaging from a Passport in a frame

Remove the packaging from a Passport in a frame before moving the switch off the pallet.

Prerequisites

- The packaging for a Passport 15000 or 20000 in a NEBS 2000 frame is typically a wooden crate surrounding it on a pallet.

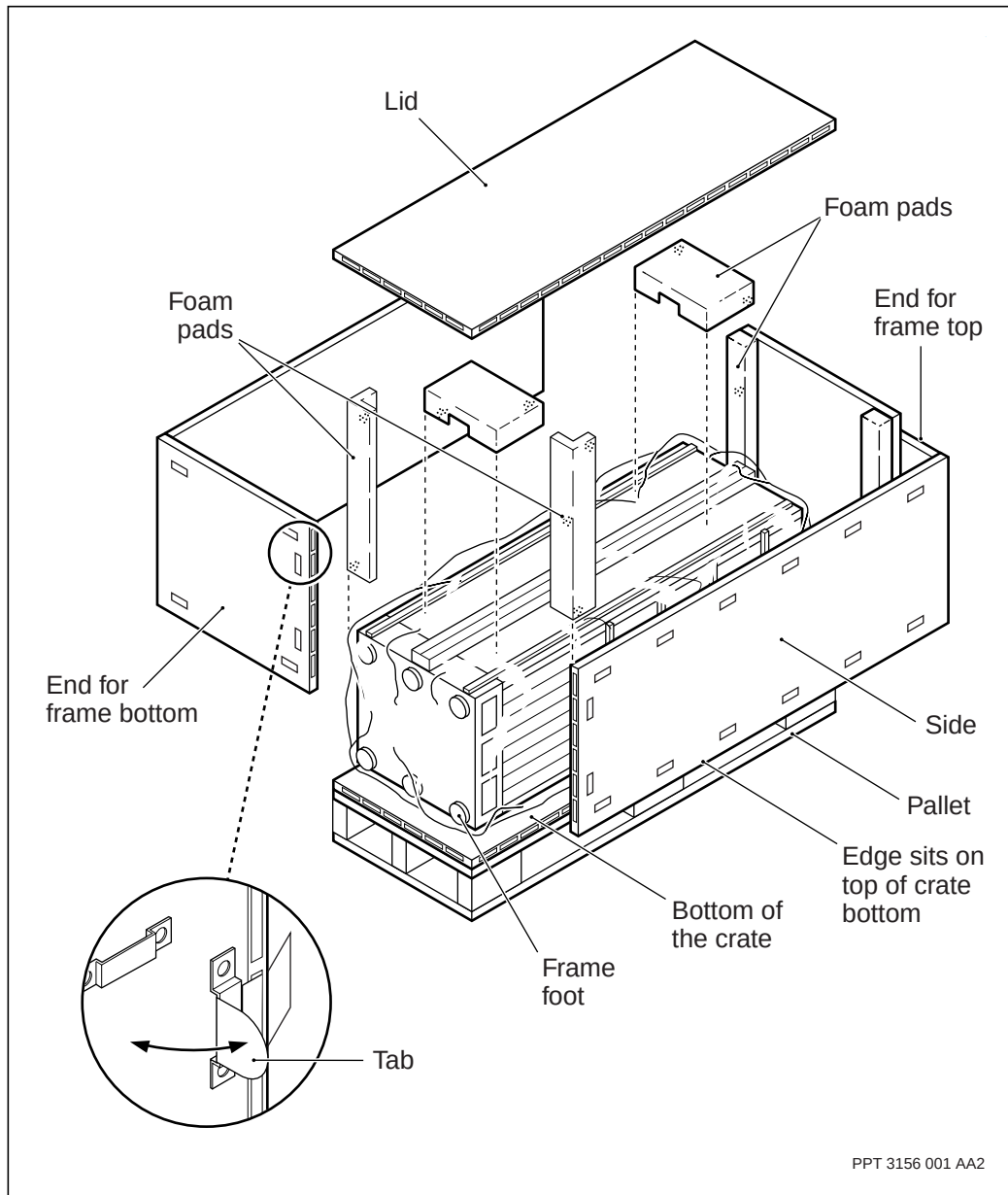
Procedure steps

- 1 Use a pair of pliers to straighten and remove the fastening tabs around the lid. Refer to the figure “Unpacking a horizontal Passport 15000 or 20000 in a frame” (page 622).
- 2 Lift the lid away from the crate.
- 3 Straighten and remove the fastening tabs along the base of the crate.
- 4 At each end of the crate, one corner is permanently joined to a side (without tabs). The joined corners are diagonally opposite each other. Straighten and remove the fastening tabs along the corner at each end of the crate, working from bottom to top.

After the tabs are unfastened, be prepared to catch the L-shaped panels if they fall away from the crate. Packing foam may fall with the panels.

- 5 Move the lid and panels away from the pallet so that there is enough room to safely stand the frame on end off the pallet.
- 6 Remove the foam packaging from around the frame.
- 7 Store all panels, padding materials, and tabs aside for re-use later.

Figure 216
Unpacking a horizontal Passport 15000 or 20000 in a frame



Replacing a BIP external alarm cable

Replace a BIP external alarm cable to restore enabling a customer premises indicator.

Prerequisites

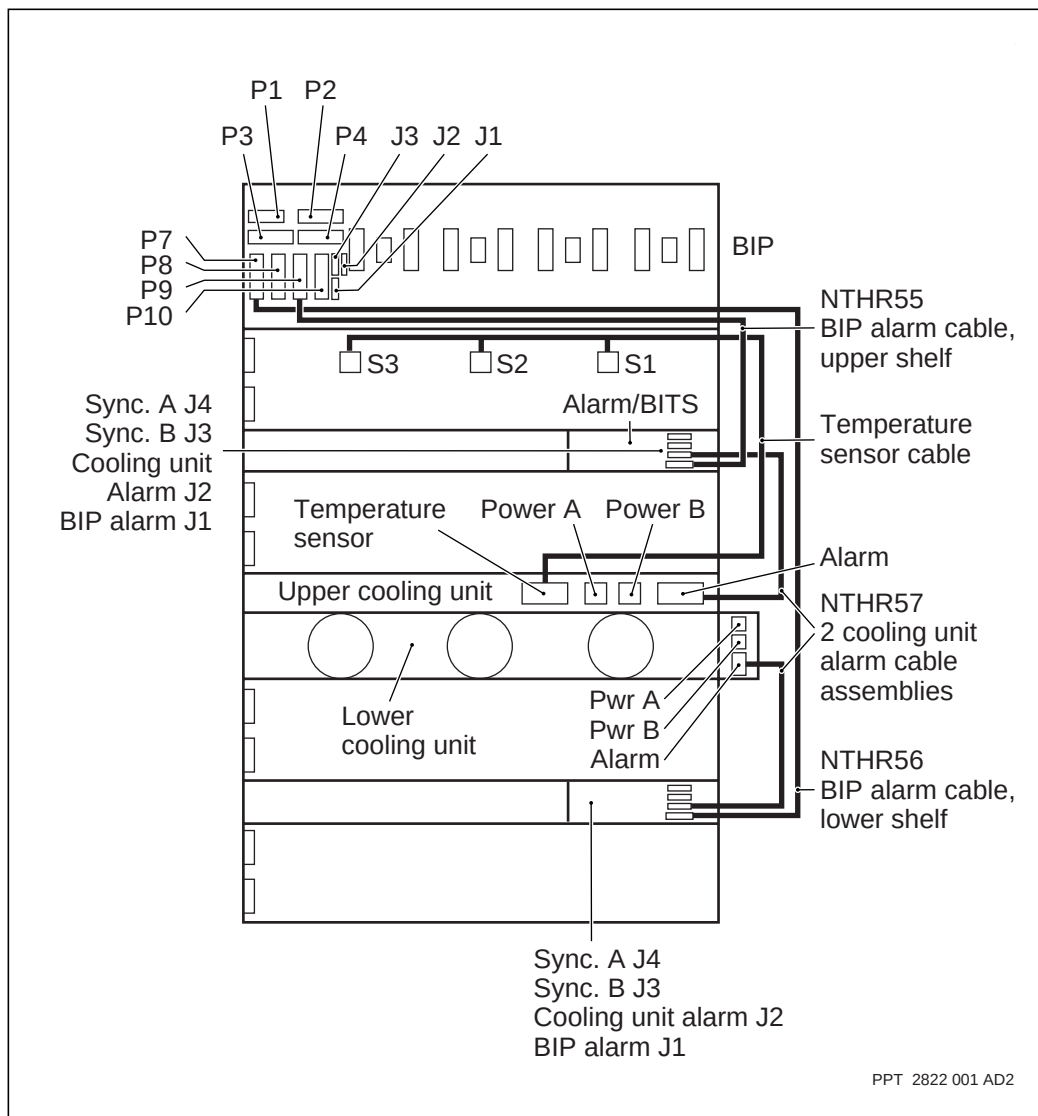
- You must be familiar with “Safety considerations and best practices” (page 41).
- For the complete list of BIP alarm connections and their features or purpose, refer to the 241-1501-200 *Passport 15000, 20000 Hardware*. (Avoid confusing the Jn connectors on the BIP with the Jn connectors on the alarm/BITS module because they have different functions.)
- When the cable connection is disrupted at either end, the reporting of the external alarm is suspended. If the alarm condition still exists after the cable is re-connected, the alarm is reported.
- For the paths of alarm cables, see the figure “Locations of the alarm cable connectors and paths” (page 624).

Procedure steps

- 1 Locate the BIP connector at the rear of the BIP.
- 2 Align the connector on the replacement cable with the connector on the BIP. Each connector fits only one way.
- 3 Unplug the connector on the BIP:
 - for a D-sub connector, use a screwdriver to unfasten the 2 screws on either side of the connector
 - for a Berg connector, unplug it while lifting the tab on the side
 - for a MATE-N-LOK connector, unplug it while lifting the tabs on the either end
- 4 Align the replacement cable connector with the BIP connector and press them together firmly but gently so that the lip of the cable connector is even with the base of the BIP connector.
- 5 Ensure that the connectors are appropriately engaged:
 - for a D-sub connector, use a screwdriver to fasten the 2 screws on either side of the connector; tighten to snug (no extra turns)
 - for a Berg connector, press together until the tab on the side engages

- for a MATE-N-LOK connector, press together until the tabs on the either end engage

Figure 217
Locations of the alarm cable connectors and paths



Replacing a BIP external alarm cable to an MFA150

Replace a BIP external alarm cable to an MFA150 system of ac rectifiers to have external alarm reporting.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- When the cable connection is disrupted, the reporting of alarm 70120050 is suspended. The alarm indicates a failed rectifier to the network management software of Preside Multiservice Data Manager. If the alarm condition still exists after the cable is re-connected, the alarm is reported.

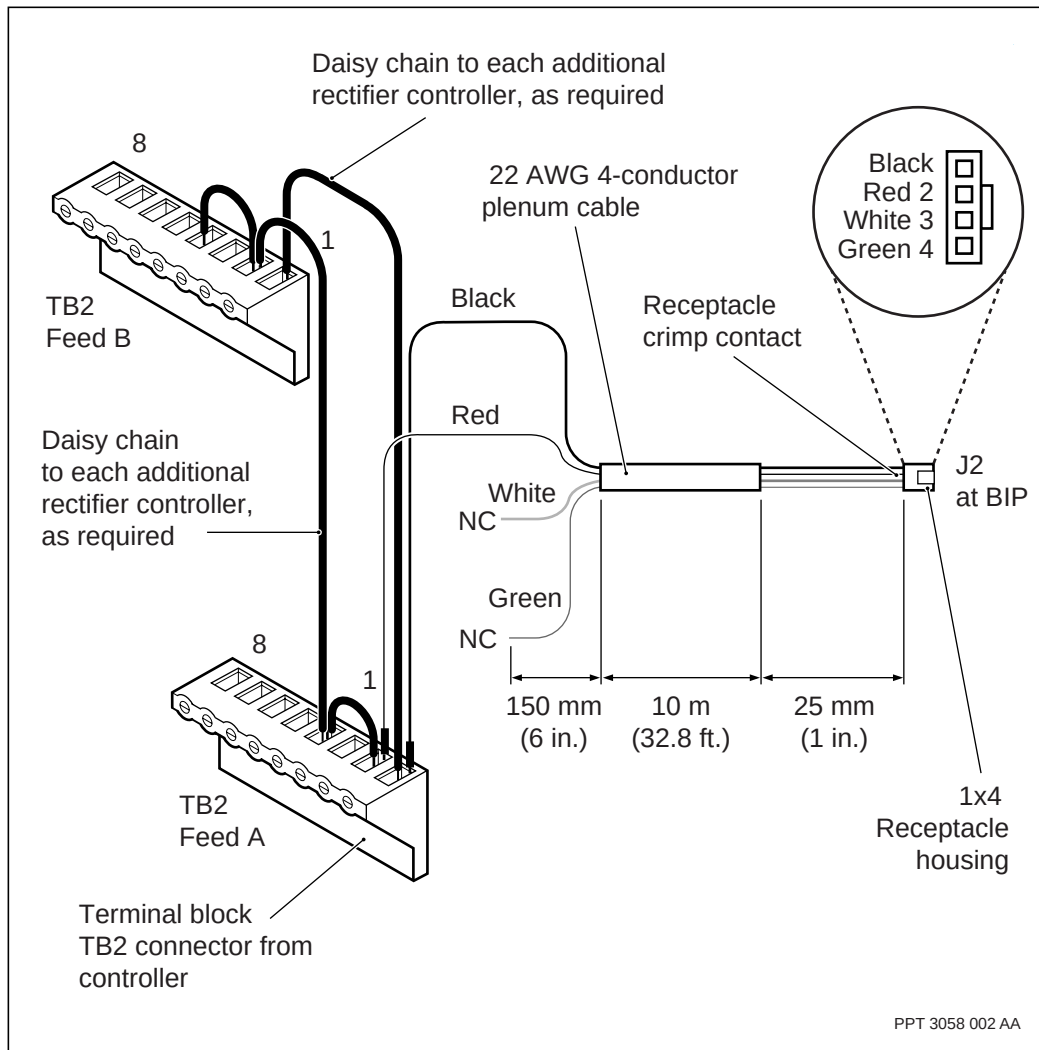
Procedure steps

- 1 Locate the BIP connector at the rear of the BIP.
- 2 Align the connector on the replacement cable with the connector on the BIP. Each connector fits only one way.
- 3 Unplug the Berg connector at J2 on the rear of the BIP.
- 4 Align the replacement cable connector with the BIP connector and press them together until the tab on the side engages.
- 5 Route the cable parallel to the existing cable's path. Fasten the cable loosely along the path. Decide whether to unfasten the old cable now or later, whichever is easier for adding the replacement.
- 6 At the controller of the MFA150, access the connection points of the cable inside. Copy the method of connection at the TB2 terminal blocks on the controller cards for power feeds A and B. For an example of the wire connections from the cable assembly, refer to the figure “Connections for external alarm cable P0940531 at an MFA150” (page 626).

Procedure job aid

Figure 218

Connections for external alarm cable P0940531 at an MFA150



Replacing a CP Ethernet cable

Replace a CP Ethernet cable if it is faulty or as part of a CP replacement procedure.

Prerequisites

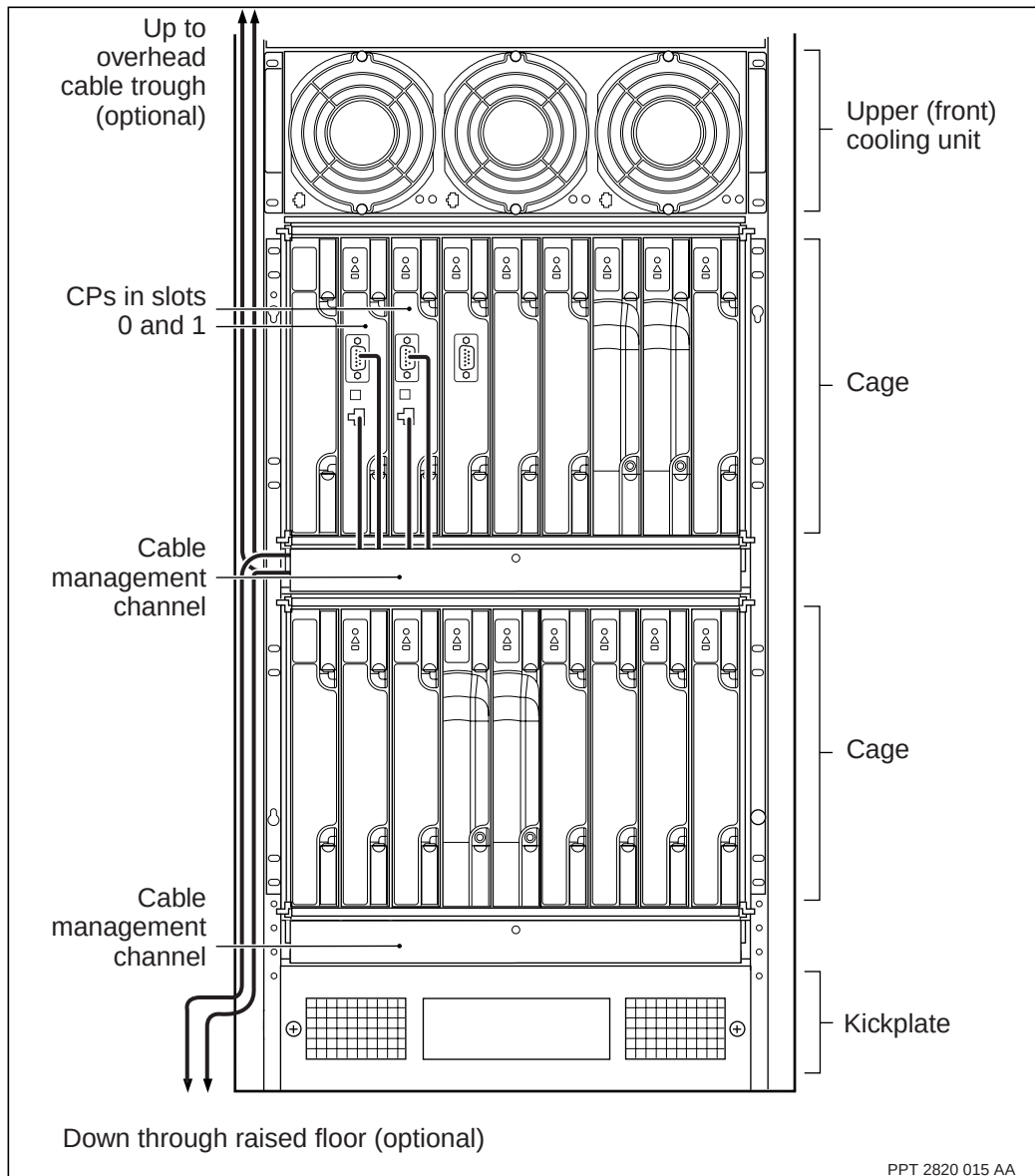
- You must be familiar with “Safety considerations and best practices” (page 41).
- If you using a custom-made cable, it should conform to the standards available from Nortel Networks. For information on cable specifications, 241-1501-200 *Passport 15000, 20000 Hardware*.
- The expected behavior when an Ethernet cable fails, or is pulled from the active CP, is that a CP switchover will occur. You can change this behavior by disabling the *SwitchoveronFailure* attribute. See 241-5701-600 *Passport 7400, 15000, 20000 Configuration Procedures and Fundamentals*

Procedure steps

- 1 On the faceplate of the CP, locate the cable to be replaced at port P0.
- 2 Measure the exact length of the cable to be replaced to ensure that the replacement will reach both terminations. See the figure “Route of a CP cable” (page 628).
- 3 Using the part number labels, match a duplicate of the old cable to a pre-assembled cable from Nortel Networks, or if making a cable, match quality, ratings, length, and the connectors at either end. The existing cable sheath has identification markings on it. If making the cable, add the connectors according to the manufacturer's instructions.
- 4 Route the replacement cable parallel to the cable bundle that has the older cable being replaced. Fasten the middle span of the replacement cable independently from the older cable.
- 5 Unplug the old cable at each end and immediately plug in the new cable.
- 6 Cut the connectors off the end of the old cable. If tugging or pulling on the older cable can affect the operation of any other cable, leave the old cable in position unless it can be easily removed.

Procedure job aid

Figure 219
Route of a CP cable



Replacing a cable management channel cover

Replace a cable management channel cover to restore protection to FP interface cables.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The cable management channel cover spans the width of the cage, and covers the CP and the FP cables. See the figure “Location of cable management channel covers, lower shelf” (page 630).

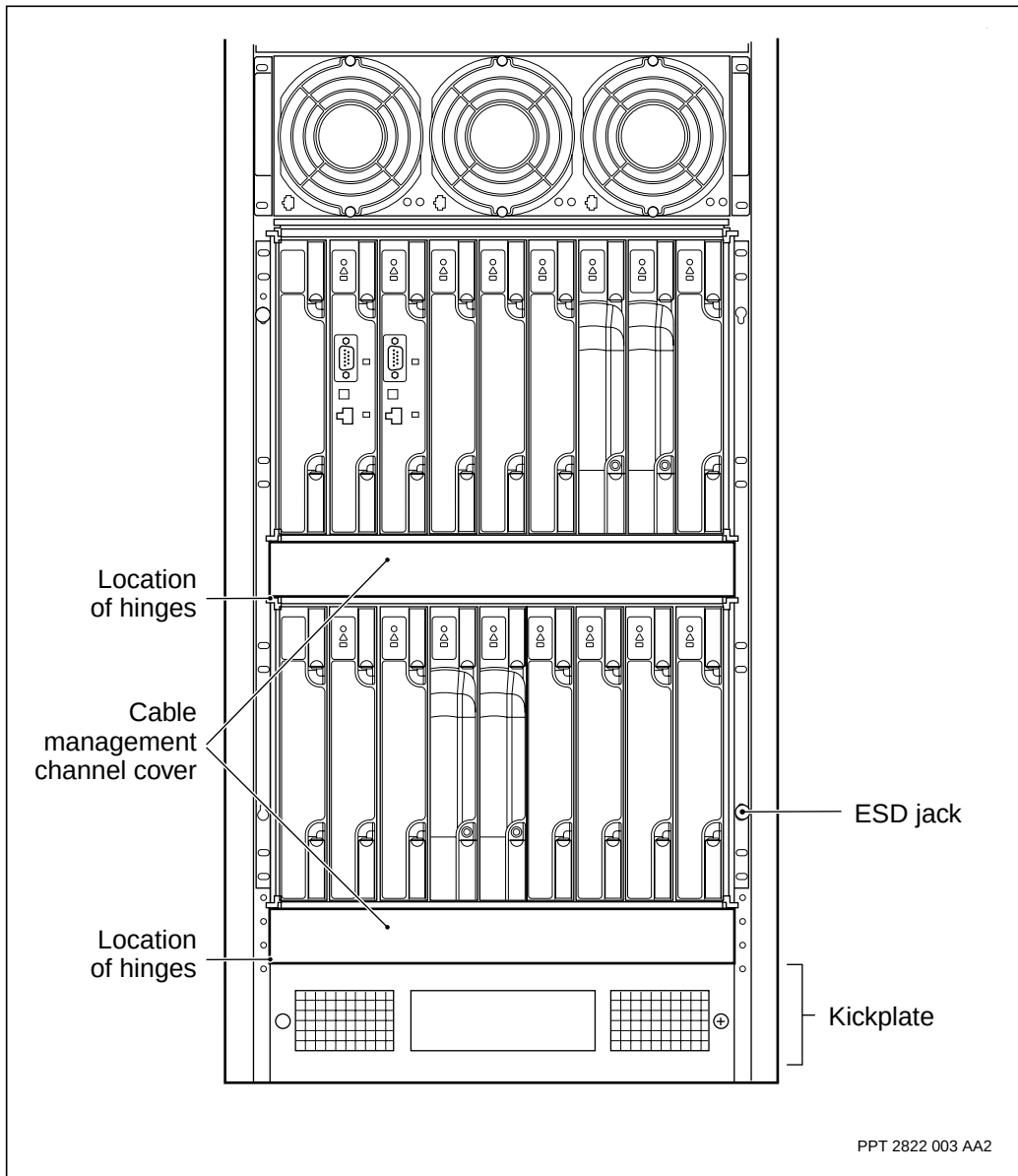
Procedure steps

- 1 Unlock the channel cover by turning the slotted lock counterclockwise. Do not use a power tool.
- 2 Swing the top of the cover out and towards you until it rests horizontally.
- 3 Disengage the hinge pins at opposite ends of the cover by gently bending the middle of the flat side of the cover towards yourself until one pin is free. Put the cover aside.
- 4 Engage the hinge pins of the replacement cover.
- 5 Swing the top of the cover towards the shelf until it rests against the slotted latch plate.
- 6 Align the lock through the slotted latch plate and turn the slotted screw gently clockwise. Do not use a power tool.

Procedure job aid

Figure 220

Location of cable management channel covers, lower shelf



Replacing a cooling unit alarm cable

Replace a cooling unit alarm cable to restore proper reporting of temperature-related alarms.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need cable assembly NTHR57 for the connection from either alarm/BITS module to any version of the upper or lower cooling unit.
- You need cable assembly NTHR55 for the connection from the BIP to any version of the upper or lower cooling unit.

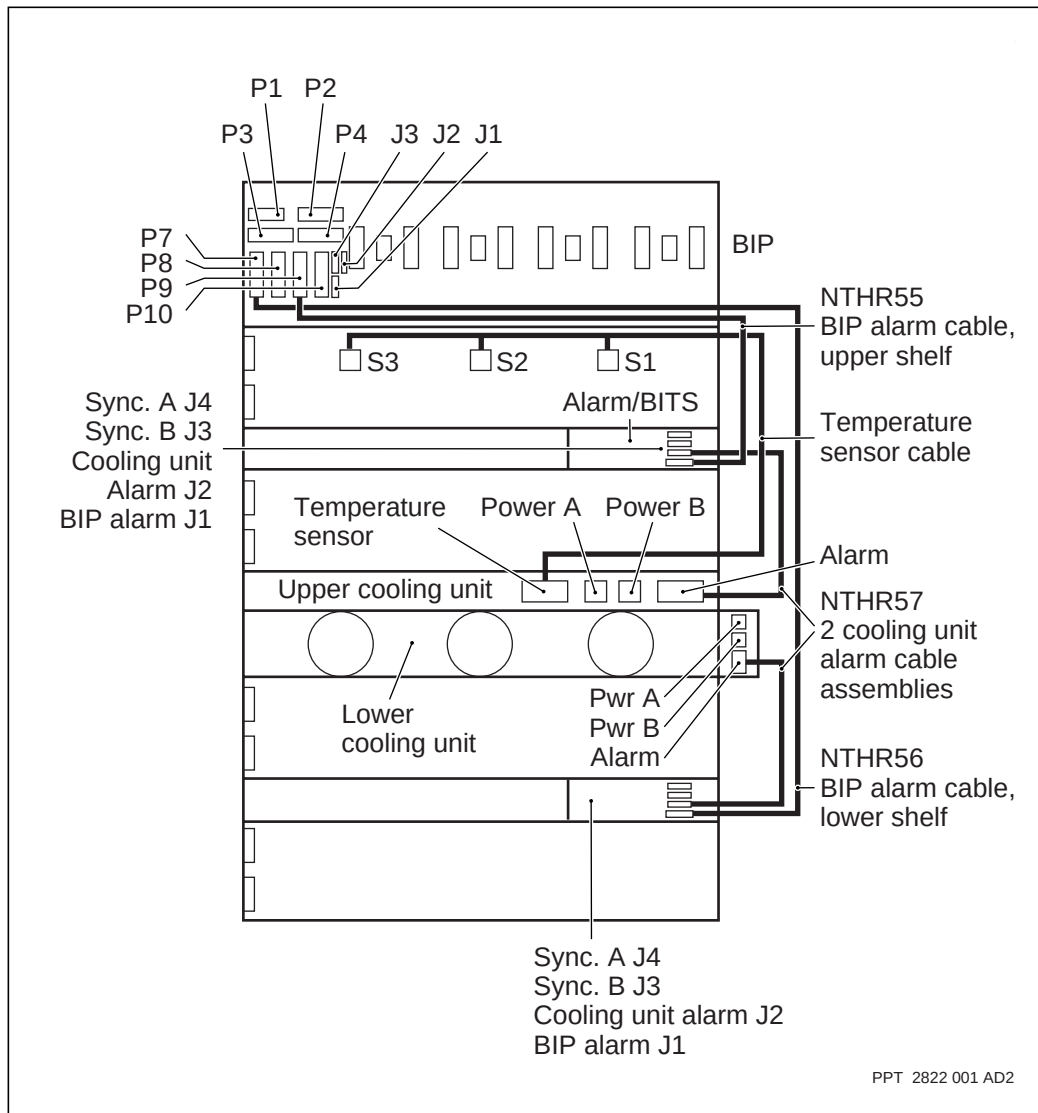
Procedure steps

- 1 Note the path of the old cable as indicated in the figure “Connection paths of the shelf alarm cables” (page 632).
- 2 Carefully cut the tie-wraps of the old cable assembly.
- 3 Using fingers only, unplug the ends of the old cable. Unplugging the cable at either end generates software alarm 7012 0051 for the fans and the temperature. This is normal during a replacement.
- 4 Plug in the lower connection of the new cable. The connector is keyed to fit only one way.
- 5 Route the cable along the noted path, loosely fastening tie-wraps.
- 6 Plug in the other end (also fits one way). Plugging in both ends of the cable ends the software alarms.
- 7 Balance the cable slack and tighten the tie-wraps. Cut off the tie-wrap tails.

Procedure job aid

Figure 221

Connection paths of the shelf alarm cables



Replacing a cooling unit power cable

Replace a BIP power output cable to restore power to the cooling unit.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need cable assembly NTHR66 for the connection from the BIP to any version of the upper or lower cooling unit.
- Replacing a BIP power output cable includes replacing a cooling unit power cable because they are part of the same power cable assembly. Replacing one power cable means also replacing the other cables of the assembly. Replacing one power cable at a time end-to-end until all cables of the assembly are replaced minimizes the impact of having a fan out of service.
- Switching off BIM breakers during the replacement will generate software alarm 7012 0050.

Procedure steps

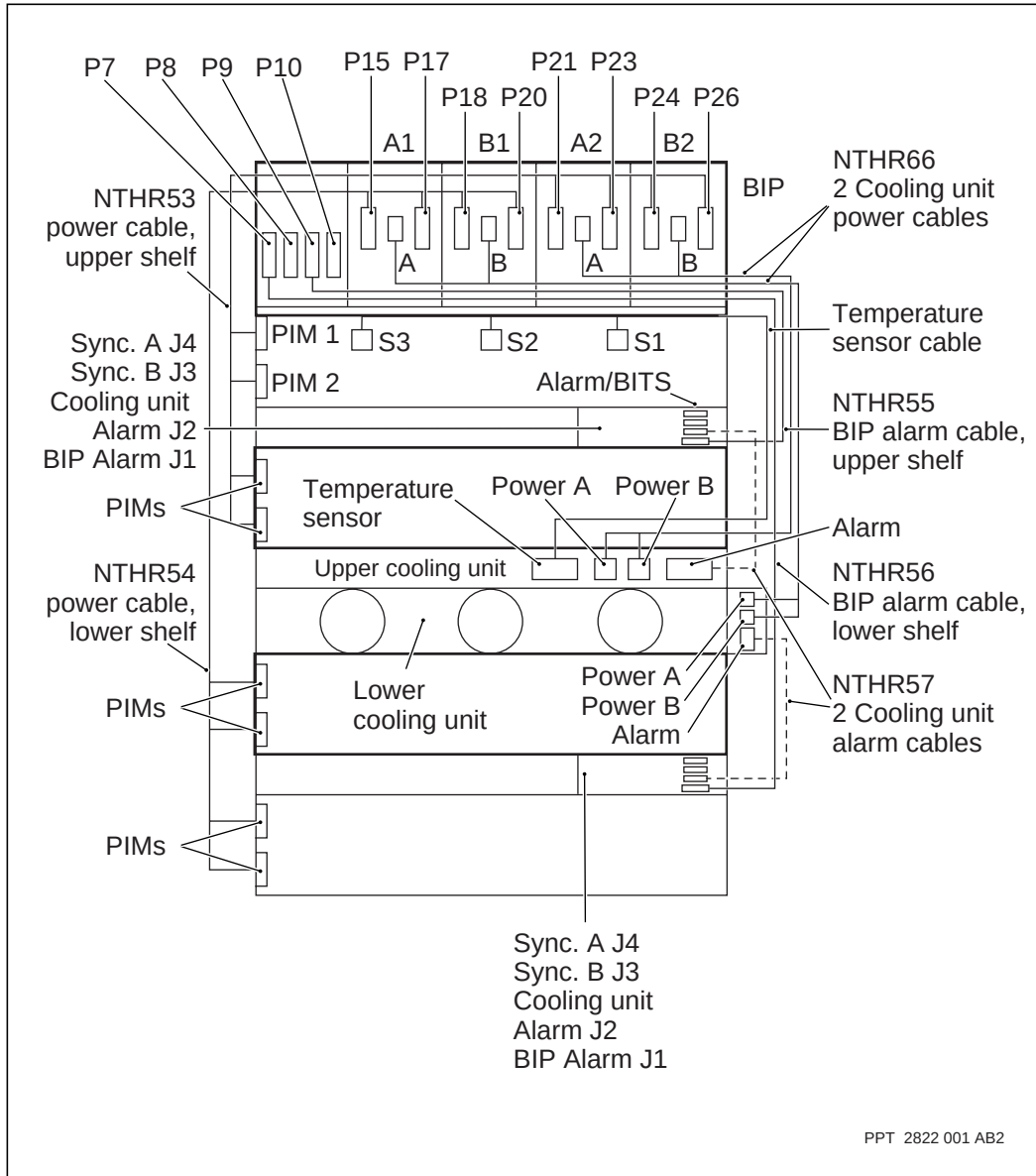
- 1 Note the path of the old cable as indicated in the figure “Connection paths of the power cables” (page 635).
- 2 Determine which BIM powers the cooling unit. Refer to 241-1501-200 *Passport 15000, 20000 Hardware*.
- 3 Switch off power to the cooling unit by pressing in the bar symbol (I) on each middle breaker of the 2 BIMs that power the cooling unit.
- 4 Put tape over the breakers to indicate they are deliberately off.
- 5 Carefully cut the tie-wraps of the old cable assembly.
- 6 Using fingers only, unplug both ends of the old cable assembly by pinching the tabs and pulling straight out.
- 7 Tracing from the disconnected ends, cut and discard the tie-wraps of all power cables from the cooling unit up to the BIP.

If tie-wraps were shared between the power input cables on top of the strain-relief bar and the cable assembly under the bar, replace the tie-wraps on the power input cables.
- 8 Plug in one end of the new cable in the new cable assembly. The connectors mate only one way.

- 9 Route the cable along the noted path.
- 10 Plug in the other end. Ensure the tabs on the connector have engaged. Leave the other cables of the new assembly temporarily hanging and disconnected.
- 11 Remove the tape and switch on the breaker for that PIM (press the | half in). The generated alarms end.
- 12 Repeat step 2 to step 11 for each other cooling unit cable until the new cable assembly completely replaces the old.
- 13 Balance all cable slack and fasten with tie-wraps. Cut off the tie-wrap tails.
- 14 Observe the LEDs of the cooling units fed by that cable. Green indicates normal operation.

Procedure job aid

Figure 222
Connection paths of the power cables



Replacing a fiber cable in a fiber management unit

Replace a fiber cable in a fiber management unit to repair a damaged fiber tray or drawer.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Replacing a fiber cable in a fiber management unit can be done by:
 - removing the cable from end to end and routing the replacement along the same path
 - routing the replacement cable parallel to the original except for using a vacant tray, and leaving the original installed with its connectors cut off



CAUTION

Risk of service loss or degradation

When fiber cables are clustered together, they typically become entangled. Removing a cable from the cluster can cause other cables to be pinched or crimped, which can cause traffic to be lost. When your fiber cable setup has space to route an additional cable, this method is preferred over removing the original cable.

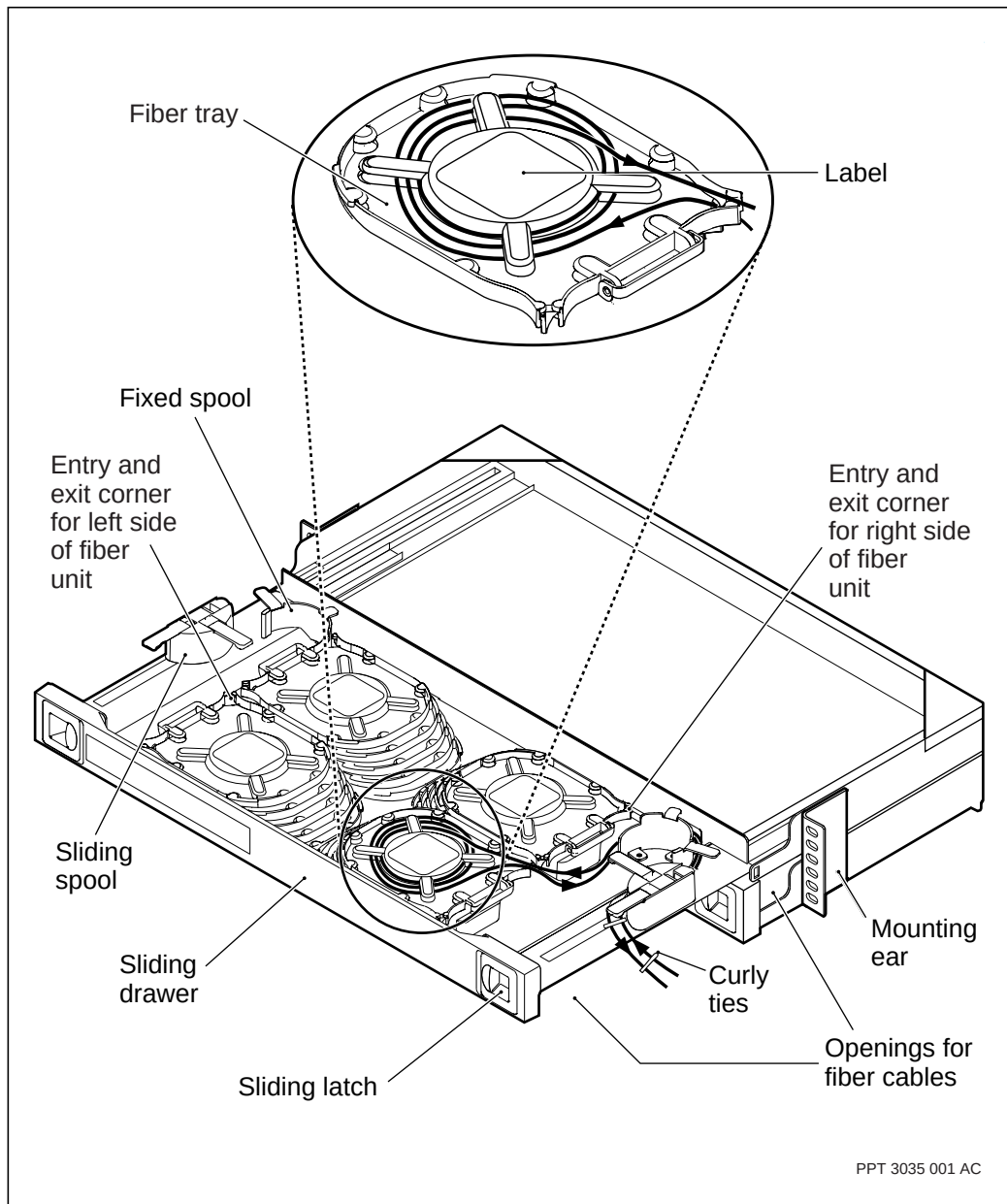
Procedure steps

- 1 After the replacement cable is routed up to the outside of the fiber management unit, measure the exact path that the fiber cable is intended to be routed from the fiber management unit to the other end (non-FP) connection. Measure from the side of the fiber unit where the fiber cable will exit.
- 2 Using a piece of electrical tape, temporarily mark that distance on the fiber cable from the unconnected end. Ensure that the tape can be easily removed later, but will not move during minor handling.
- 3 At the fiber unit, locate the drawer that houses the cable being replaced.
- 4 Carefully open the drawer by sliding the latches towards each other, and holding them there while pulling the drawer towards you. Stop pulling when the rear of the drawer is at the front of the fiber unit. As the drawer

opens, ensure that no cable is snagged or pinched. Also as the drawer opens, half-spools at the sides of the drawer will move with it towards the front. If a half-spool does not reach the front of the drawer, move it manually. The rear half-spools are fixed. Refer to the figure “Locating a fiber cable in a fiber management unit NTHW50” (page 638).

- 5** Locate the tray inside the drawer that contains the fiber cable being replaced. Access a lower tray by lifting the stack above it from the center edge up towards the nearest side.
- 6** Use the label information to confirm that you found the correct cable.
- 7** Unravel the fiber cable from the tray and loosely place it aside temporarily.
- 8** Ravel the replacement cable onto the tray in and out the rear corner, and route it along the same path as the other fiber cables on that side of the drawer.
- 9** After raveling and routing, ensure that the tape on the cable resides outside the drawer close to the fiber unit and with the same amount of cable slack as the other cables in the curlic ties. Adjust as required.
- 10** Slowly close the drawer to test the slackness of the replaced cable. Closure is indicated by a click sound and the faceplate is flush with the other drawer’s faceplate. Adjust the slackness if the cable shows tension.
- 11** Route the cable up to the other end connection. Follow a parallel path to the cable being replaced. Leave the cable unconnected.
- 12** Fasten the replacement cable in place. Ensure that no portion of the cable is stressed by a bend or a tie-wrap.
- 13** Carefully remove the temporary electrical tape from the cable. Avoid cutting or nicking the cable sheath. Avoid crimping or pinching the cable during its removal.

Figure 223
Locating a fiber cable in a fiber management unit NTHW50



Replacing a local operator terminal cable

Replace a local operator terminal cable to restore communication to the CP of a Passport 15000 or 20000.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The RS232 port on a CP2 or a CP3 connects the Passport 15000 or 20000 to a local operator terminal.
- For any CP, the PEC of the cable for the RS232 port is NTBP25.

Procedure steps

- 1 Locate the cable to be replaced at port P1.
- 2 Measure the exact length of the cable to be replaced to ensure that the replacement will reach both terminations. See the figure “Route of a CP cable” (page 628).
- 3 Using the part number labels, match a duplicate of the old cable to a pre-assembled cable from Nortel Networks, or if making a cable, match quality, ratings, length, and the connectors at either end. The existing cable sheath has identification markings on it. If making the cable, add the connectors according to the manufacturer's instructions.
- 4 Route the replacement cable parallel to the cable bundle that has the older cable being replaced. Fasten the middle span of the replacement cable independently from the older cable.
- 5 Coordinate with the operator of the local terminal that its communication is about to be dropped.
- 6 Unplug the old cable at each end and immediately plug in the new cable.
- 7 Cut the connectors off the end of the old cable. If tugging or pulling on the older cable can affect the operation of any other cable, leave the old cable in position unless it can be easily removed.

Replacing a PIM cable

Replace a PIM cable if it fails.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- If your replacement cable is part of a two-cable assembly, repeat this procedure. The intent is to have one PIM of the cage always powered.



WARNING

Risk of injury or equipment damage

Power interface modules (PIMs) are not hot swappable. The power breaker on the BIM that is connected to the PIM must be switched off before unplugging the power cables at the PIM. Wait 15 seconds for the capacitors in the BIM to discharge before unplugging the PIM cable. The power cable must be unplugged before the PIM can be removed for replacement. If the mate PIM is present and in service, it maintains power to the shelf so that service is uninterrupted.



WARNUNG

Verletzungsgefahr oder Geräteschäden

Die PIMs (Power Interface Modules) können nicht während des Betriebs ausgetauscht werden. Bevor die Netzkabel am PIM abgezogen werden, muß der Trennschalter an dem BIM, das an das PIM angeschlossen ist, ausgelöst werden. Warten Sie dann 15 Sekunden, bis sich die Kondensatoren entladen haben, bevor Sie die PIM-Kabel abziehen. Das Netzkabel muß abgezogen sein, bevor das PIM zum Austausch ausgebaut wird. Wenn das redundante PIM bestückt und in Betrieb ist, übernimmt dieses die Stromversorgung des Baugruppenträgers, so daß der Anlagendienst nicht unterbrochen wird.

Procedure steps

- 1 At the front of the BIP, switch off the BIM breaker that controls power to the PIM by pressing in the O symbol. The mapping of breakers to PIMs is labelled on the rear of the BIM captive screw cover.

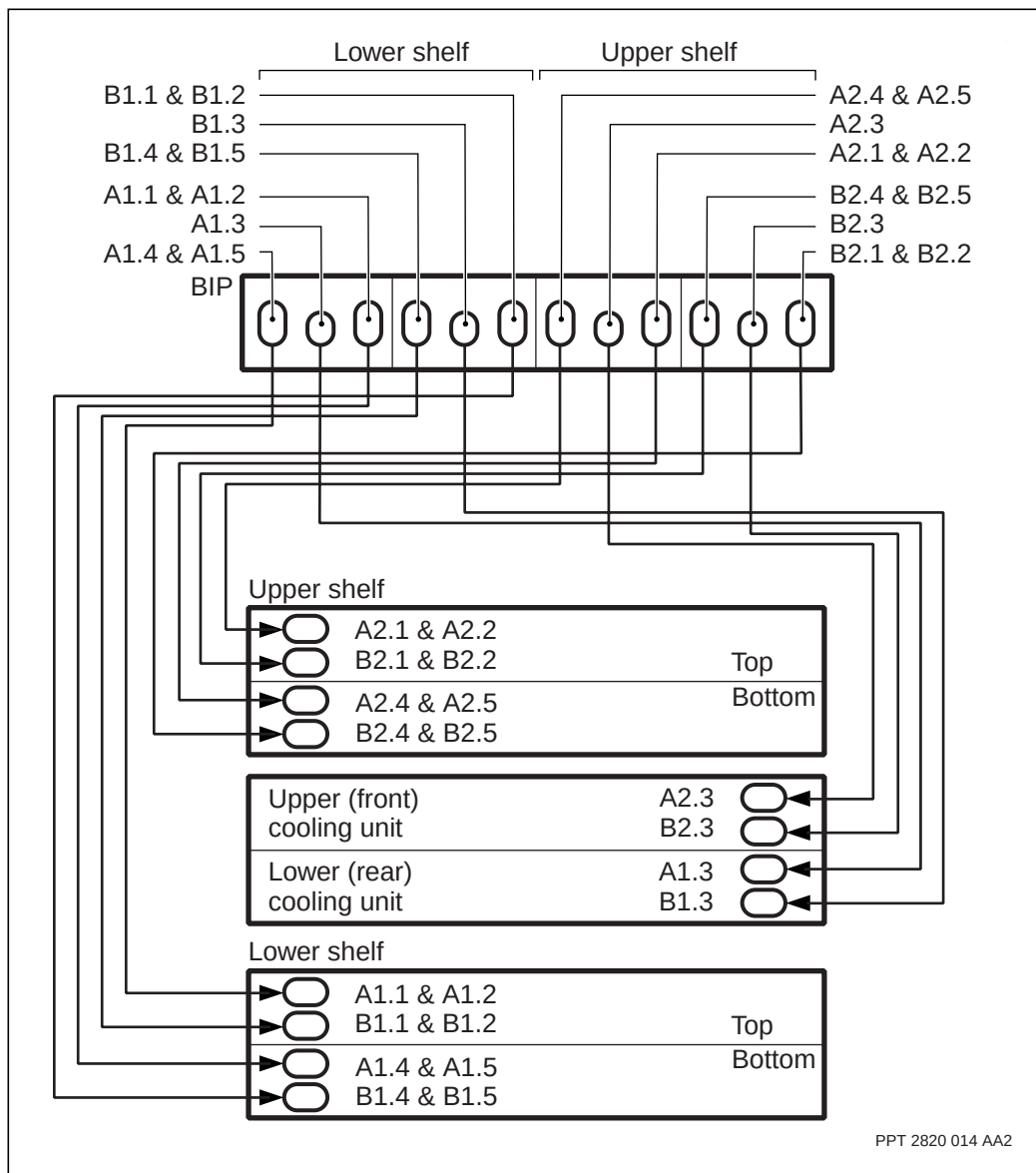
The A and B LEDs on the PIM of a Passport 20000 both extinguish when power to them is switched off.

Switching a breaker off generates a software alarm. This is normal for a replacement.

- 2 Put tape over the breaker to indicate it is deliberately off.
- 3 At the rear of the BIP, note the path of the old black-and-white cables to the PIM and its mate in the same cage.
- 4 Cut and discard the tie-wraps of all PIM cables from the PIM up to the BIP.
- 5 At the PIM, pinch the tabs on the side of the connector to unplug it. While pinching the tabs on the connector, pull straight out.
- 6 At the other end of the cable at the BIP, disconnect the cable the same way.
- 7 At the PIM, press the connector of the replacement cable in until both tabs click. The connector mates only one way.
- 8 Route the cable up to the BIP through the cable management brackets and up the BIP connector. The cable path for each PIM is shown in the figure "Connection points of the PIM cables" (page 642).
- 9 Plug the other end of the PIM cable into the BIP.
- 10 Remove the tape and switch on the BIM breaker for that PIM by pressing in the I symbol). The generated alarms end.
- 11 For a Passport 20000, confirm the PIM LED is lit, indicating it is powered.
- 12 If your replacement cable is part of a two-cable assembly, repeat this procedure.
- 13 Dress the cable slack and fasten with tie-wraps. Cut off the tie-wrap tails.

Procedure job aid

Figure 224
Connection points of the PIM cables



Replacing a Shasta 5000 interface cable

Replace a Shasta 5000 interface cable to restore interworking with the Passport 15000 that is below it in the same NEBS 2000 frame.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The interface cable that connects a Shasta 5000 to a Passport 15000 occurs between OC-3 cards. The fiber cable requires SC connectors at each end.

Procedure steps

- 1 Locate an end point of the cable path at either the Shasta 5000 or the Passport 15000 or 20000.
- 2 Trace the cable to the other end point to measure the actual length of it.
If the fiber cable passes through a fiber management unit such as an NTHW50, you may be able to use a shorter replacement cable.
- 3 Get or make a fiber cable the same length with the same type of connectors, that is, an SC on each end.
If an inline attenuator is present, keep it as part of the connection.
- 4 Without disconnecting the original cable, route the replacement cable to both end points and loosely tie-wrap it in place.
- 5 Duplicate the cable labels of the original cable onto the replacement.
- 6 At each end of the cable, unplug the cable to be replaced and plug in the replacement.
- 7 Manage any cable slack, as required.
- 8 You may wish to remove the old cable. If removal means tugging on or potentially crimping other in-service cables, leave it where is and cut off the connectors.
- 9 Tighten the cable with tie-wraps along the path between the Shasta 5000 and the Passport 15000 or 20000.
- 10 When the interface cable is connected, the software of the Shasta 5000 re-establishes awareness of the links with the Passport 15000 or 20000. Coordinate with the software operator of the Shasta 5000 to ensure that there is connectivity.

Replacing an air filter

Replace an air filter as part of regular maintenance to ensure proper air flow in the Passport switch.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an air filter with part number A0778937 (medium arrestance).
- Replace an air filter while the Passport 15000 or 20000 switch continues to operate. Remove and insert an air filter without delay to minimize the amount of time the switch operates without a filter.
- The air filter must be replaced approximately every 3 months or according to the effects of your local environmental conditions. The rate of airflow with a Passport 15000 or 20000 switch is different than other products, and the lower air filter is likely to need replacement more often than the upper filter. After the first switch is installed at your site, inspect each air filter frequently until an average period of replacement can be established. You can access both filters at the rear of the frame.
- A clogged air filter may also cause alarm 7002 0003 to be generated.



WARNING

Risk of injury by fan blades

While working on any equipment near the cooling unit fans, be continuously aware that the rpm of a live fan can suck loose clothing, hair, or jewelry into the fan blades or amputate a finger. Do not touch a live fan with anything.



WARNUNG

Verletzungsgefahr

Beim Arbeiten in der Nähe der Lüfter des Kühlaggregats besteht die Gefahr, daß ein rotierender Lüfter lose Kleidung, Haare oder Schmuck in die Lüfterblätter saugt oder einen Finger abtrennt. Berühren Sie einen Lüfter niemals, weder direkt noch indirekt.

**WARNING****Risk of injury, equipment damage, or service degradation**

Never operate the Passport 15000 or 20000 with the air filter removed or the cover off, except to replace the filter. The air filter and its screen prevent a hand or a hand-held tool from contacting the upper fan blades from above.

**WARNUNG****Verletzungsgefahr, Geräteschäden oder Leistungsbeeinträchtigung**

Betreiben Sie den Passport 15000 or 20000, außer zum Filterwechsel, niemals mit abgenommenem Luftfilter oder mit geöffneter Abdeckung. Der Luftfilter und dessen Gitter verhindern, daß ein handbetätigtes Werkzeug oder ein Körperteil von oben mit den oberen Lüfterblättern in Berührung kommen.

Procedure steps

- 1 Open the container of the new air filter.
- 2 Locate the air filter cover. See the figures "Location of the lower air filter" (page 646) and "Location of the upper air filter" (page 647).
- 3 Unfasten the 2 large Phillips or slotted captive screws of the air filter cover and put the cover aside. Do not use a power tool to unfasten the screw.
A Passport 20000 has a large slotted captive screw instead of a Phillips.
- 4 Remove the air filter from its housing and put it aside. If dust is visible on it, remove it to another area to prevent dust re-contamination.
- 5 Holding the new filter by its short sides with the airflow indicator pointing upwards, align it with the filter housing and slide it gently in using even force at both corners.
- 6 Put the air filter cover back on by engaging and turning the 2 Phillips captive screws until snug plus a 1/5 turn. Make sure you do not strip the threads of the hole because the cover cannot seat properly. Do not use a power tool to fasten the screw.
- 7 Repeat for other filters one at a time, if required.

Procedure job aid

Figure 225

Location of the lower air filter

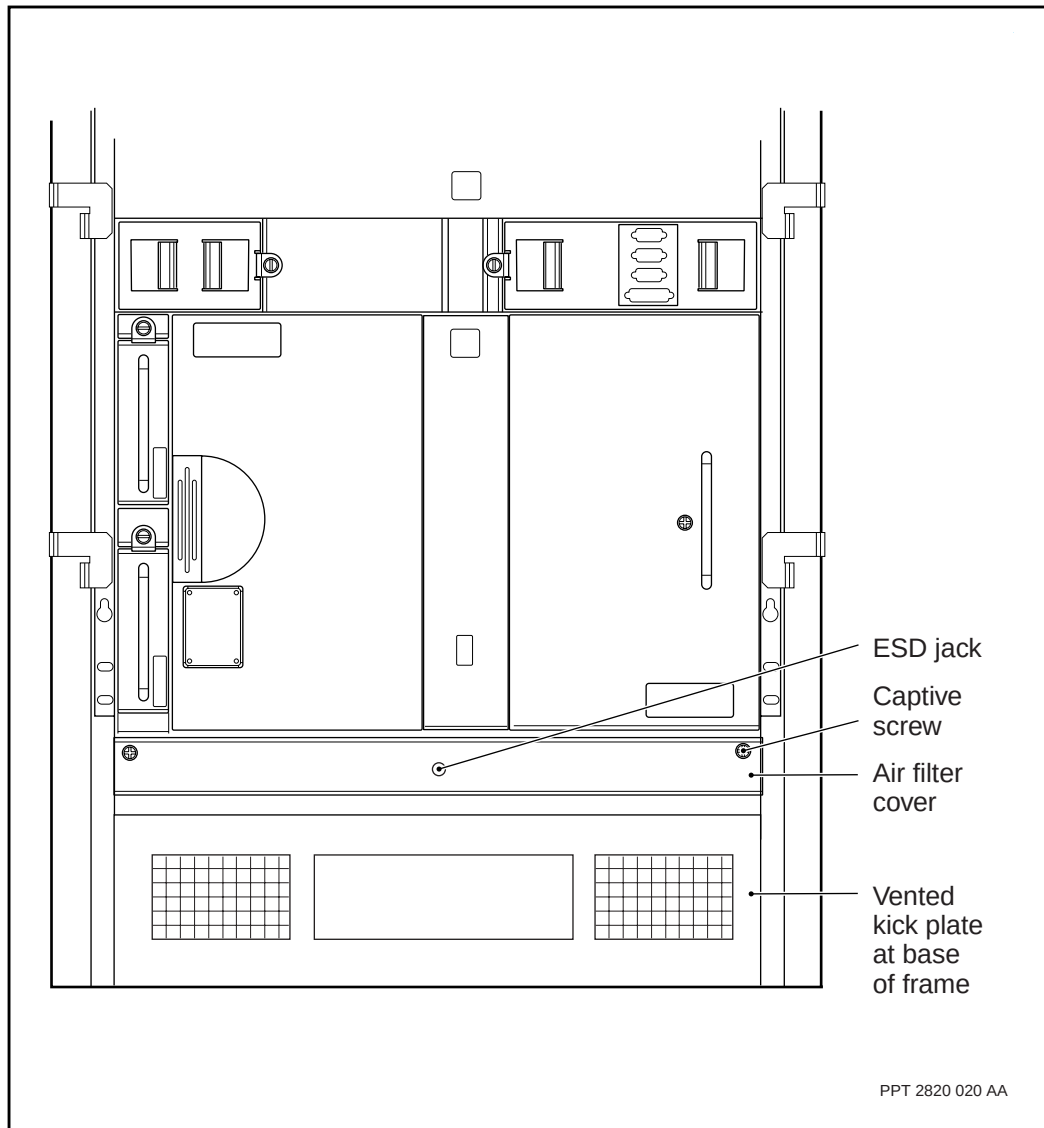
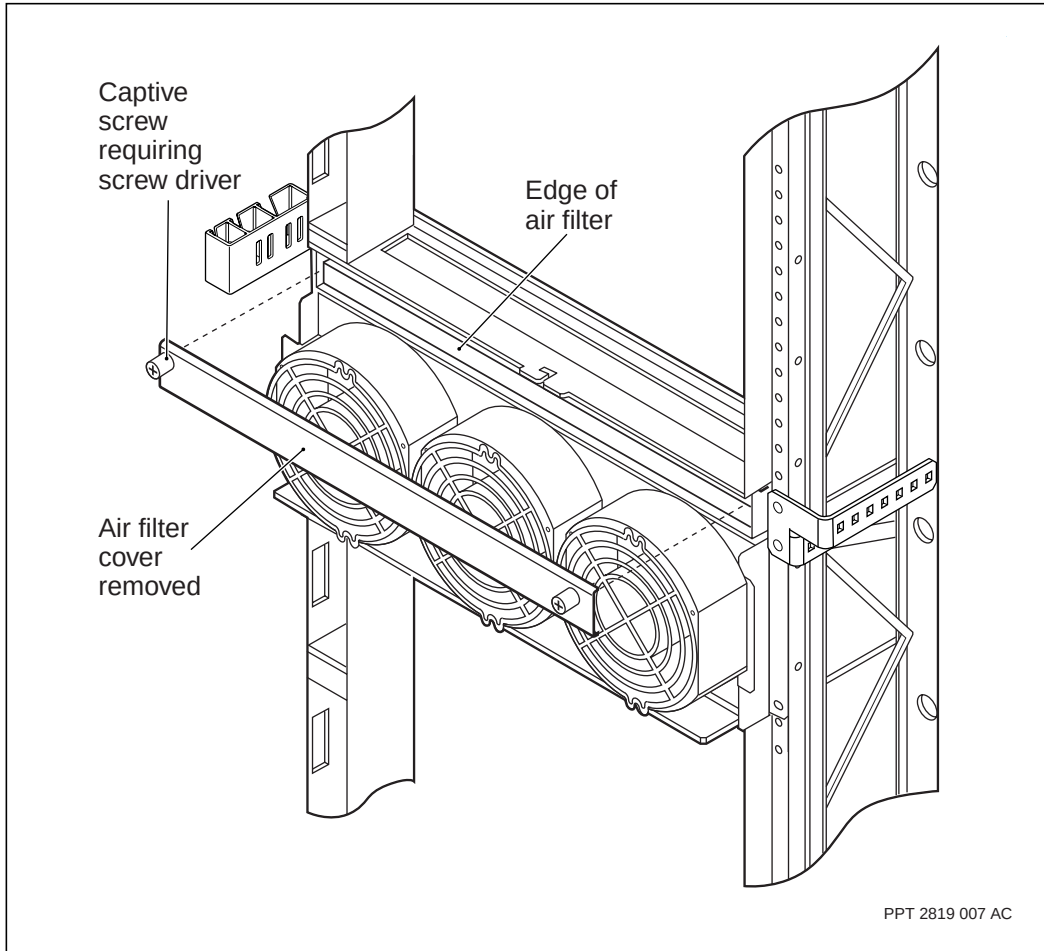


Figure 226
Location of the upper air filter



Replacing an alarm cable assembly to the alarm/BITS module

Replace an alarm cable assembly to the alarm/BITS module to restore reporting of shelf alarm data to the CPs.

Prerequisites

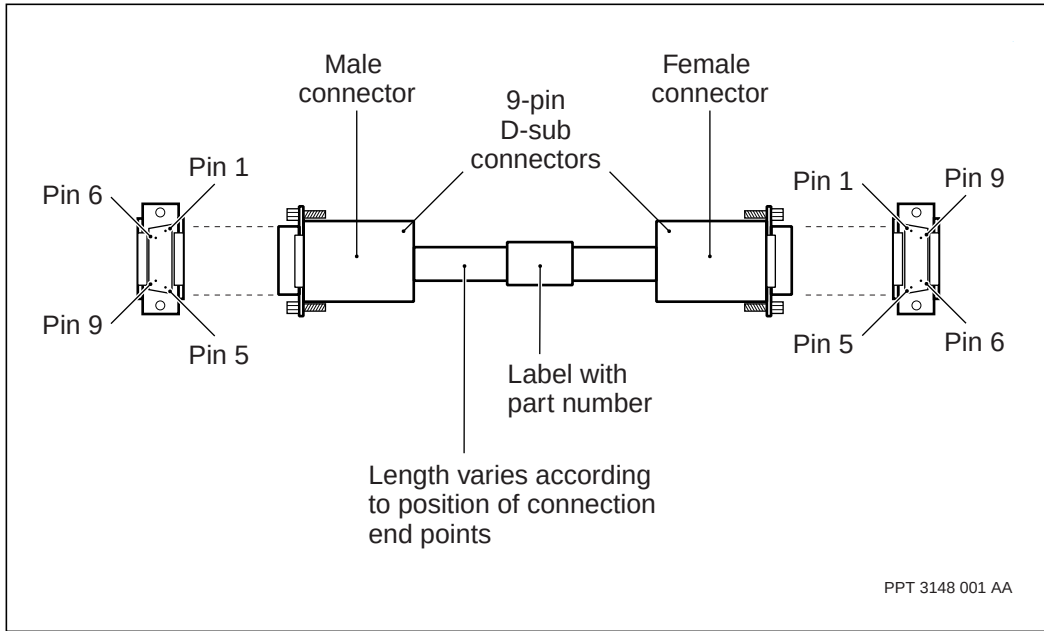
- You must be familiar with “Safety considerations and best practices” (page 41).
- The figure “A typical alarm cable assembly” (page 649) is typical for the cable assemblies NTHR55, NTHR56, and NTHR57. The pinouts of the cables differ but the method of replacement is the same.

Procedure steps

- 1 Note the path of the old cable. See the figure
 - “Connection points of the cables for an alarm/BITS module in a Passport 15000” (page 271)
 - “Connection points of the cables for an alarm/BITS module in a Passport 20000” (page 272)
- 2 Inform the software network operator that disconnecting the cable to replace it will temporarily generate software alarms. For information about BITS alarms, refer to 241-5701-500 *Passport 6400, 7400, 15000, 20000 Alarms Reference*.
- 3 Starting at the BIP, unplug the ends of the old cable. Unplugging either end of the cable at J2 generates software alarms for high temperature and a fan failure. No alarm is generated for unplugging J1. This is normal during a replacement.
- 4 Plug in the connector of the replacement cable and fasten the D-sub connector screws.
- 5 Route the cable along the noted path, loosely fastening tie-wraps.
- 6 Plug in the other end at the BIP. Plugging in both ends of the cable enables the reporting of the alarms to resume.
- 7 Balance the cable slack along the cable management brackets and snugly tighten the tie-wraps. Cut off the tie-wrap tails.

Procedure job aid

Figure 227
A typical alarm cable assembly



Replacing an EdgeLink 100 interface cable

Replace an EdgeLink 100 interface cable to restore communication with a port on a DS3 FP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The interface cables that connect an EdgeLink 100 to a Passport 15000 or 20000 or the Ethernet hub of a Preside Multiservice Data Manager are listed in the table “Interface cables between an EdgeLink 100 and a Passport 15000 or 20000” (page 651). Two cables are required, one for transmitting and one for receiving.

Procedure steps

- 1 Using the table “Interface cables between an EdgeLink 100 and a Passport 15000 or 20000” (page 651), and using the labels at the cable ends, locate the end points of a cable path.
- 2 If the interface cable is from a DS3, make a cable the same length with the same type of connectors. attach the appropriate connector to the cable according to the manufacturer’s instructions.

If the interface cable is from a DS1, use the prefabricated cables.
- 3 Route the replacement cable to both end points and loosely tie-wrap it in place.
- 4 Duplicate the cable labels of the original cable onto the replacement.
- 5 At both ends of the cable, unplug the cable to be replaced and plug in the replacement.
- 6 Manage any cable slack so that it is away from the Passport 15000 or 20000.
- 7 You may wish to remove the old cable. If removal means tugging on or potentially crimping other in-service cables, leave it where is and cut off the connectors.
- 8 Tighten the cable with tie-wraps along the path between the EdgeLink and the Passport 15000 or 20000.
- 9 When the interface cable is connected, the software of the EdgeLink re-establishes awareness of the links with the Passport 15000 or 20000 or

Preside Multiservice Data Manager (or both). Coordinate with the software operator of the EdgeLink to ensure that there is connectivity.

Procedure job aid

Table 27
Interface cables between an EdgeLink 100 and a Passport 15000 or 20000

Type and quantity	Part number	Length	Type of connector at EdgeLink	Type of connector at other end
DS1, two	A0718801, Telco Systems' AWX432G5	1.5 m (5 ft)	90-degree male 64-pin to 64-pin Amphenol/Cinch	RJ48 termination or wirewrap
DS1, two	A0718802, Telco Systems' AWX432G15	4.6 m (15 ft)	90-degree male 64-pin to 64-pin Amphenol/Cinch	RJ48 termination or wirewrap
DS1, two	A0718803, Telco Systems' AWX432G30	9.1 m (30 ft)	90-degree male 64-pin to 64-pin Amphenol/Cinch	RJ48 termination or wirewrap
DS1, set of two	A0718779, Telco Systems' AXX432G5	1.5 m (5 ft)	90-degree male 64-pin Amphenol/Cinch to wirewrap	wirewrap at RJ48 termination
DS1, set of two	A0718780, Telco Systems' AXX432G25	7.6 m (25 ft)	90-degree male 64-pin Amphenol/Cinch to wirewrap	wirewrap at RJ48 termination
DS1, set of two	A0718781, Telco Systems' AXX432G50	15.2 m (50 ft)	90-degree male 64-pin Amphenol/Cinch to wirewrap	wirewrap at RJ48 termination
DS3, two	rated as 728A RG-6U or equivalent	custom	90-degree male-to-female BNC adapter for standard BNC male connector	male BNC on a DS3 FP
DS3, two	NTPF19AC	1 m (3.2 ft)	male BNC	male BNC on a DS3 FP
DS3, two	NTPF19AA	3 m (9.8 ft)	male BNC	male BNC on a DS3 FP
(Sheet 1 of 2)				

Table 27 (continued)**Interface cables between an EdgeLink 100 and a Passport 15000 or 20000**

Type and quantity	Part number	Length	Type of connector at EdgeLink	Type of connector at other end
DS3, two	NFTP19AB	15 m (48.2 ft)	male BNC	male BNC on a DS3 FP
Ethernet	Telco Systems' AWX454G10 for standard LAN trunk cable IEEE 802.3	3 m (10 ft)	male RJ-45, eight-position modular	a male RJ45 connector for a female connector on the hub that is linked to Preside Multiservice Data Manager
(Sheet 2 of 2)				

Replacing the alarm/BITS module in a Passport 15000

Replace an alarm/BITS module in a Passport 15000 to restore external timing signals to the CPs or sending the shelf alarm data to the alarm module.

Replace the module only by instruction from Nortel Networks technical support.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Contact Nortel Networks technical support and obtain a case number for replacing the alarm/BITS module. Record the case number on the shelf near the replaced module. Once the timing is successfully restarted, contact Nortel Networks technical support to close the case number.
- The PEC for an alarm/BITS module in a Passport 15000 is one of:
 - NTHR12 for balanced DS1 (shielded twisted pair), matched with CP type NTHR06 or NTHW06
 - NTHW76, for the external sync cable wire-wrap assembly
NTHW75 (matched to the DS1 CP type NTHR06 or NTHW06)
 - NTHR13 for balanced E1 (shielded twisted pair), matched with CP type NTHR35 or NTHW08
 - NTHR14 for unbalanced E1 (coax), matched with CP type NTHR35



CAUTION

Risk of equipment damage or service loss

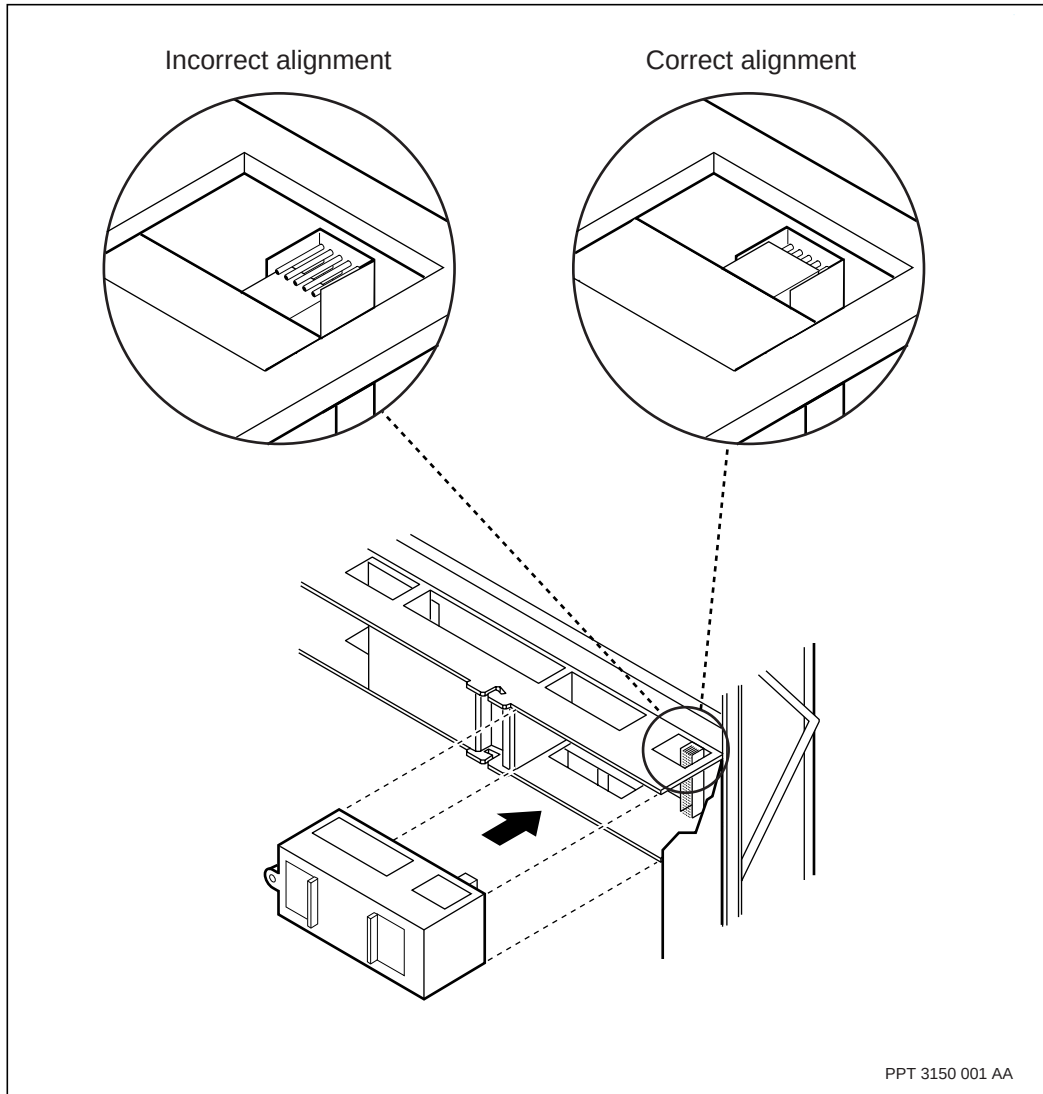
Inserting a replacement alarm/BITS module in a Passport 15000 can cause equipment damage to the switch. The modules have no serviceable parts. Cut the seal and remove the module only if you have been instructed to by Nortel Networks technical support.

Procedure steps

- 1 At the rear of the frame, locate the alarm/BITS module. See the figure “Location of the alarm/BITS module and cable connections in a Passport 15000” (page 657)
- 2 Disconnect the alarm and BITS cables from the alarm/BITS module.
- 3 Cut the seal when instructed by Nortel Networks technical support.
- 4 Unfasten the large slotted captive screw or screws on the alarm/BITS module.
- 5 Remove the module by firmly pinching the U-shaped handle and gently pulling straight away from the switch.
- 6 Put the module aside.
- 7 Hold the replacement module firmly so that the U-shaped handle is facing you and the captive screw is at your left.
- 8 Align the module with the vacant opening and then align the connector on the module with the connector at the rear of the opening.

Removing the Passport 15000 fabric X allows you to see the module connector by looking down through the chassis. See the figure “Proper alignment of an alarm/BITS module in a Passport 15000” (page 655). If the module is not aligned properly the connector on the module will not fit flush with the connector on the chassis.

Figure 228
Proper alignment of an alarm/BITS module in a Passport 15000

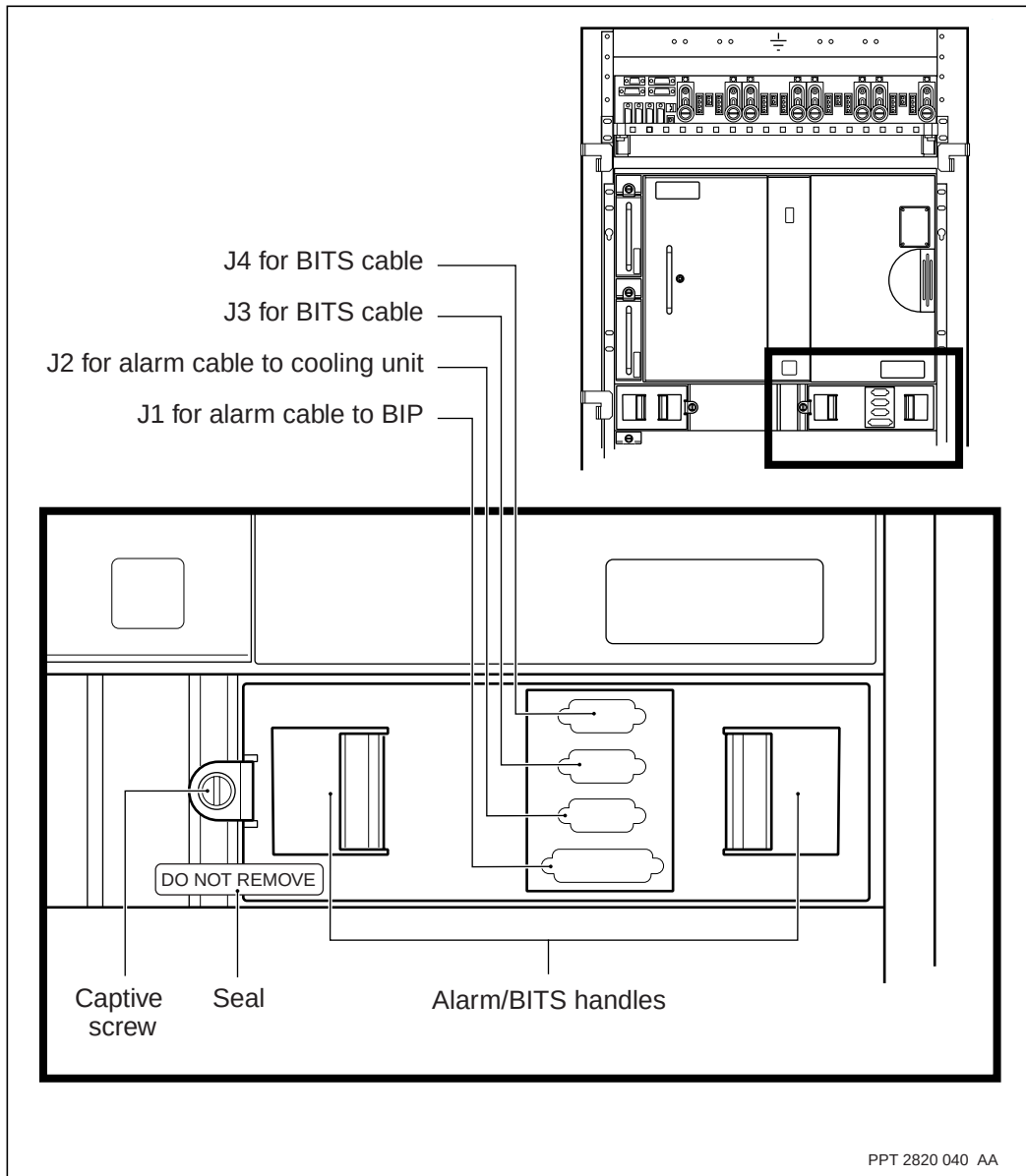


- 9 Gently push the module straight in until its faceplate is flush with the surrounding surfaces. Avoid bending any of the metal fingers or any of the connector pins.

- 10 Align and fasten the captive screw or screws. Tighten until snug plus a 1/5 turn. Do not over tighten.
- 11 Plug the cables back into the module. The connectors mate only one way. Plugging in the cable ends the alarms generated by the software for the cooling unit and temperature.

For Passport 15000 only, the J3 and J4 connectors on the replaced alarm/BITS module that has PEC NTHR12 or NTHR13 may have had inline EMI filters installed. The replacement alarm/BITS module does not require the old filters, since the unit is shipped with factory-installed filters. If the replacement Passport 15000 module does not have the filters, follow the procedure "Installing EMI filters on the alarm/BITS module" (page 477).

Procedure job aid

Figure 229**Location of the alarm/BITS module and cable connections in a Passport 15000**

Replacing the alarm/BITS module in a Passport 20000

Replace an alarm/BITS module in a Passport 20000 to restore external timing signals to the CPs or sending the shelf alarm data to the alarm module.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- The PEC for an alarm/BITS module in a Passport 20000 is one of:
 - NTPN12 for balanced DS1 (shielded twisted pair), matched with CP type NTHW06
 - NTPN78, for the external sync cable wire-wrap assembly NTHW75 (matched to the DS1 CP type NTHW06)
 - NTPN13 for balanced E1 (shielded twisted pair), matched with CP type NTHW08
 - NTPN13 for balanced E1 (coax) with kit NTPN81 which converts the signal to unbalanced E1, matched with CP type NTHW08

Procedure steps

- 1 At the rear of the frame, locate the alarm/BITS module. See the figure “Location of the alarm/BITS module and cable connections in a Passport 20000” (page 660).
- 2 Disconnect the alarm and BITS cables from the alarm/BITS module.
- 3 Unfasten the large slotted captive screw on the alarm/BITS module.
- 4 Remove the module by pinching the left captive screw with your left hand and place your right fingers behind the edge labelled with Jn at the middle right portion of the module. Pull the module straight away from the switch.
- 5 Put the module aside.
- 6 While still wearing a wrist strap, hold the replacement module firmly and pinch the left captive screw with your left hand and place your right fingers behind the edge labelled with Jn at the middle right portion of the module.
- 7 Align the module with the vacant opening and then align the connector on the module with the connector at the rear of the opening.
- 8 Gently push the module straight in until its faceplate is flush with the surrounding surfaces.

**CAUTION****Risk of equipment damage and service loss**

Do not use any kind of power tool on a captive screw. The screw is necessary to keep the card, module, or cover properly seated. If the screw is overtightened (stripping it or its hole), the hardware may not operate correctly and EMI containment is jeopardized.

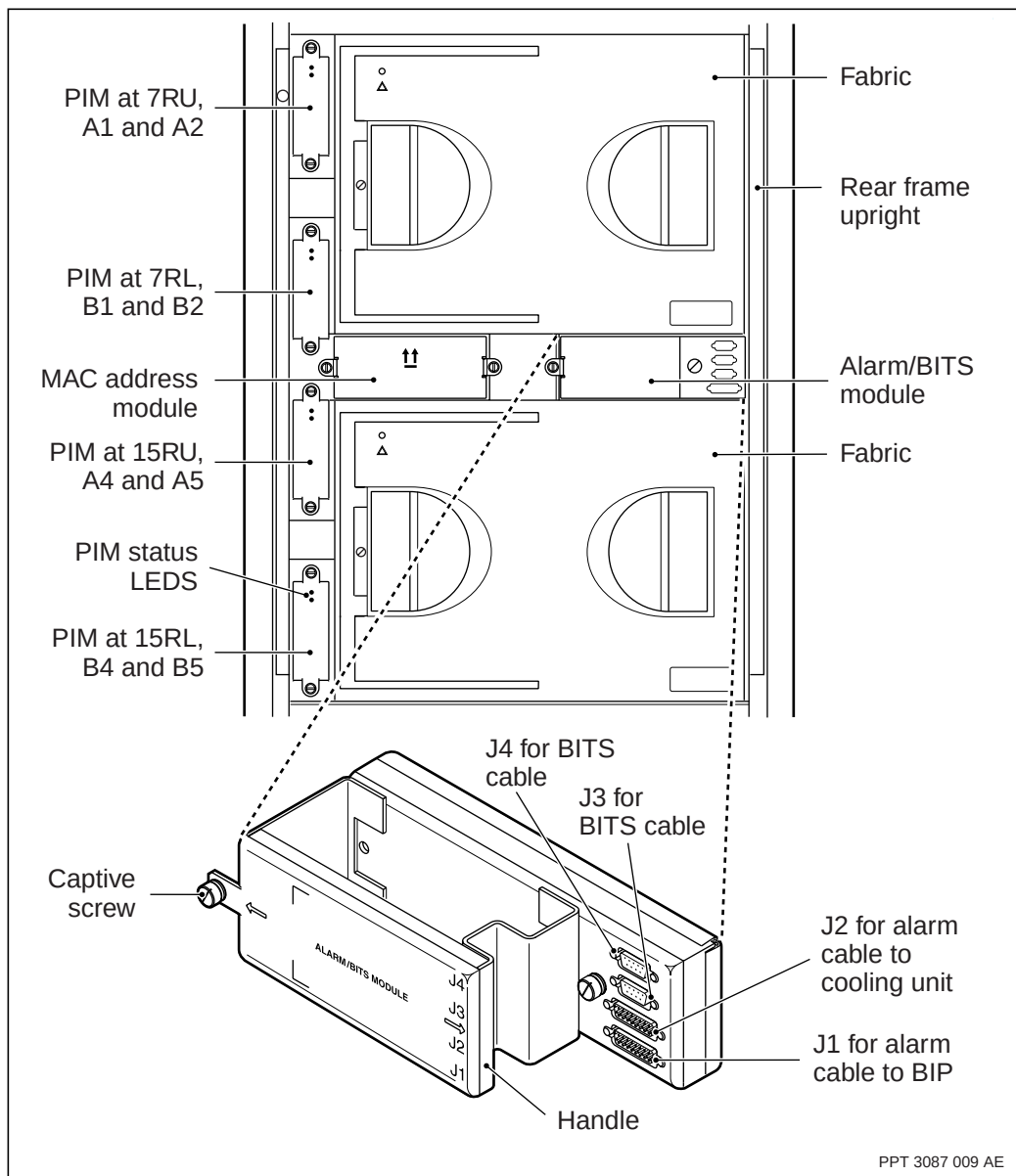
- 9** Align and fasten the captive screw or screws. Tighten until snug plus a 1/5 turn. Ensure that you do not strip the threads or hole because the module cannot seat properly.
- 10** Plug the cables back into the module. The connectors mate only one way. Plugging in the cable ends the alarms generated by the software for the cooling unit and temperature.

For Passport 15000 only, the J3 and J4 connectors on the replaced alarm/BITS module that has PEC NTHR12 or NTHR13 may have had inline EMI filters installed. (See the figure “An EMI filter on an alarm/BITS connector of a Passport 15000” (page 478).) The replacement alarm/BITS module does not require the old filters, since the unit is shipped with factory-installed filters. If the replacement Passport 15000 module does not have the filters, follow the procedure “Installing EMI filters on the alarm/BITS module” (page 477).

Procedure job aid

Figure 230

Location of the alarm/BITS module and cable connections in a Passport 20000



Replacing the MAC address module in a Passport 15000

Replace a failed MAC address module in a Passport 15000 to enable a network to recognize the node and to enable the node to restart. Replace it only on the instruction of a Nortel Networks support technician.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Contact Nortel Networks technical support to obtain a case number for removing the MAC address module before cutting the seal or removing the module. Record the case number on the shelf near the module.
- You need a Passport 15000 MAC address module with PEC NTHR11.



CAUTION

Risk of equipment damage or service loss

Inserting a replacement MAC address module in a Passport 15000 can cause equipment damage to a switch. The modules have no serviceable parts. Cut the seal and remove the module only if you have been instructed to by Nortel Networks technical support.

Procedure steps

- 1 At the rear of the switch, locate the MAC address module to be replaced. See the figure “Location of the MAC address module in a Passport 15000” (page 663).
- 2 Cut the seal when instructed by Nortel Networks technical support.
- 3 Unfasten the large slotted captive slotted screw.
- 4 Remove the module by pinching the U-shaped handle and pulling straight away from the switch.

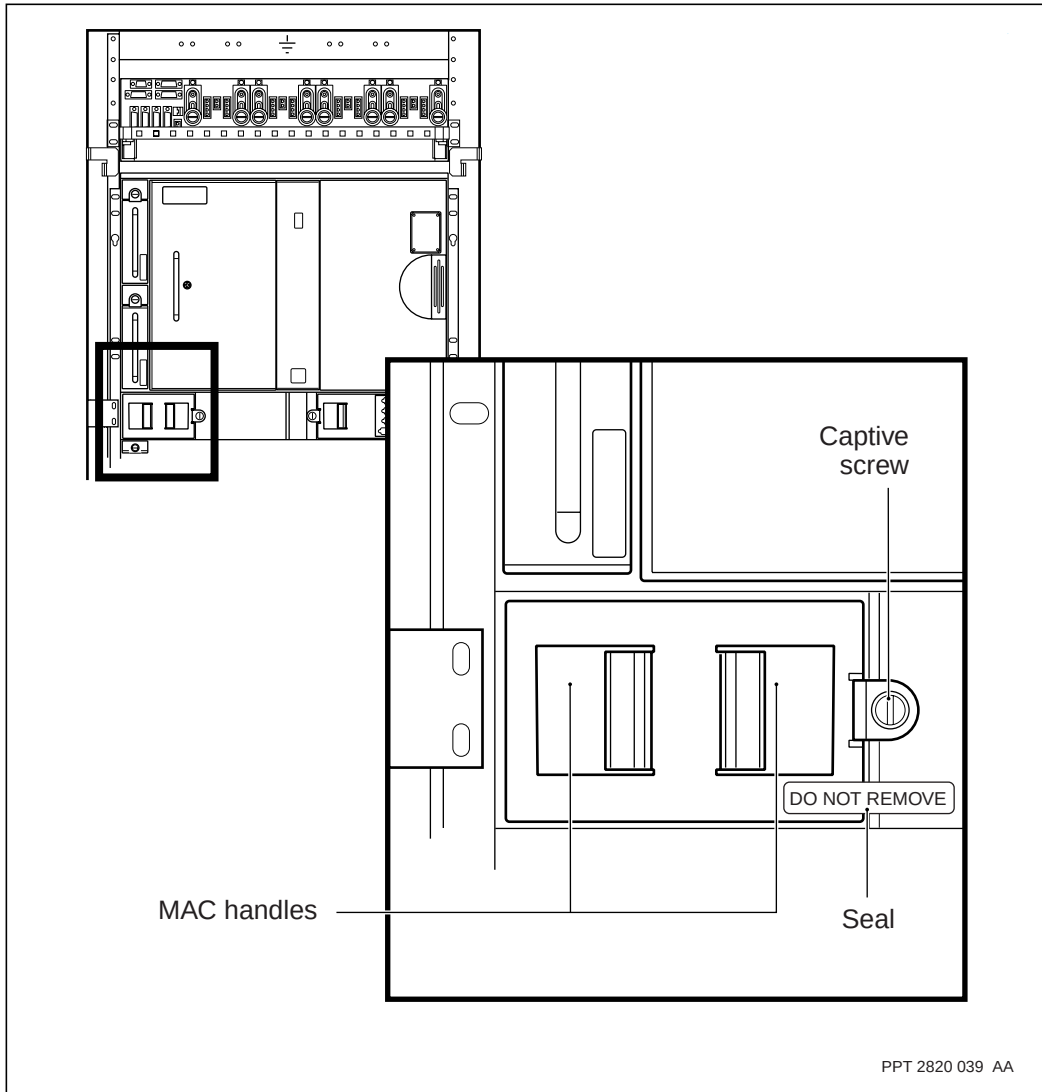
Removing the module does not generate a software or hardware alarm. This is normal.
- 5 Put the module aside.
- 6 Hold the replacement module so that the U-shaped handle is facing you and the captive screw is at your right.

- 7 Align the module with the vacant opening and then align the connector on the module with the connector at the rear of the opening.
- 8 Gently push the module straight in. Avoid bending any of the metal fingers (gasket) or any of the connector pins. If you feel resistance when pushing the module in, stop and re-align.
- 9 Align and fasten the captive screw. Tighten until snug plus a 1/5 turn. Ensure that you do not strip the threads or hole because the module cannot seat properly.
- 10 Contact your software operator of the switch to begin re-configuring the software.
- 11 Verify with the software operator that the re-configuration was successful and that the Passport 15000 reboots.
- 12 Contact Nortel Networks technical support to close the case for replacing the MAC address module.

Procedure job aid

Figure 231

Location of the MAC address module in a Passport 15000



Replacing the MAC address module in a Passport 20000

Replace a MAC address module in a Passport 20000 to enable a network to recognize the node and to enable the node to restart.

Prerequisites

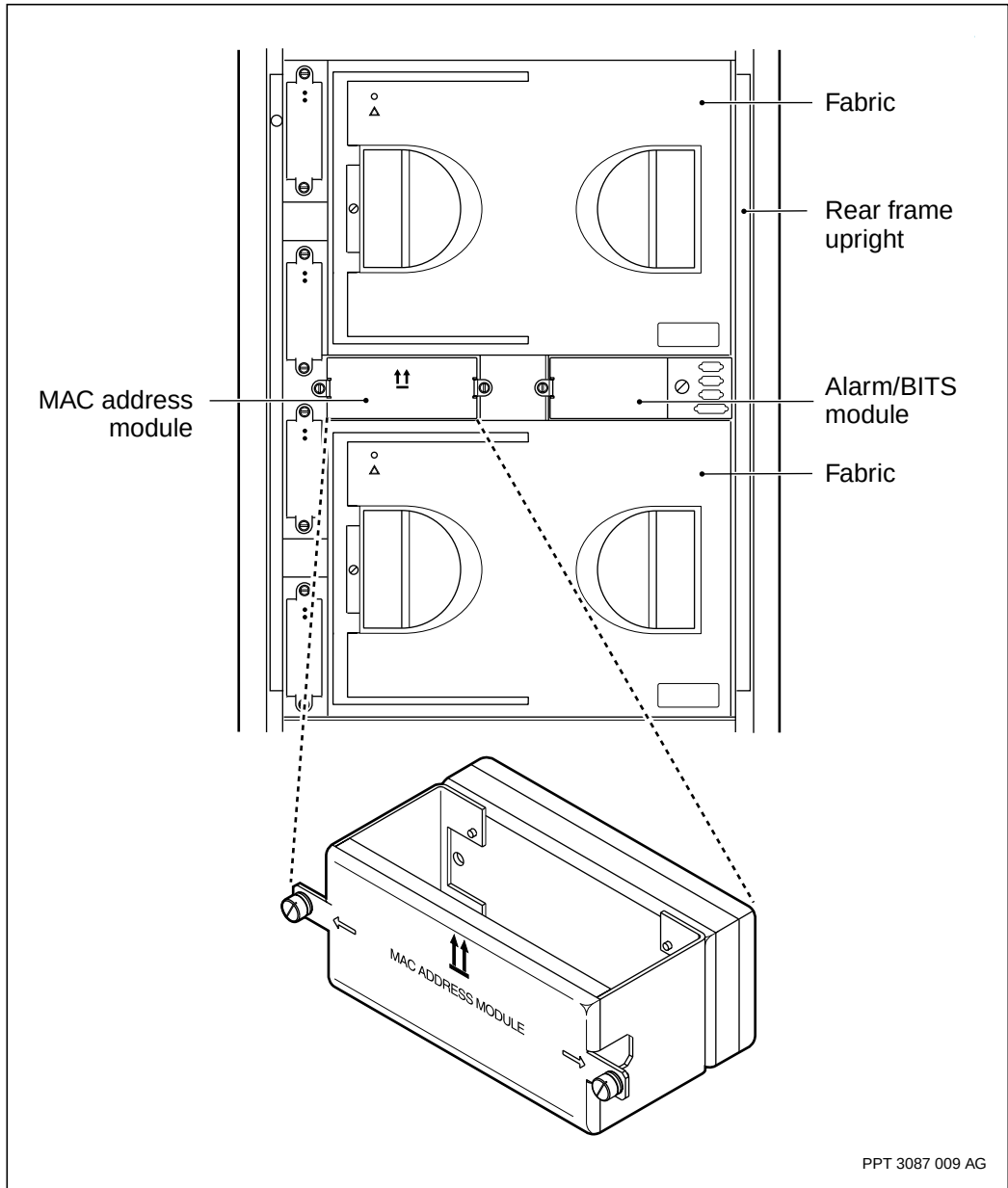
- You must be familiar with “Safety considerations and best practices” (page 41).
- You need a Passport 20000 MAC address module with PEC NTPN11.

Procedure steps

- 1 At the rear of the switch, locate the MAC address module to be replaced. See the figure “Location of the MAC address module in a Passport 20000” (page 665)
- 2 Unfasten the large slotted captive screws.
- 3 Remove the module by pinching a captive screw in each hand, and pulling straight out of the backplane using equal force on each screw.

Removing the module does not generate a software or hardware alarm. This is normal.
- 4 Put the module aside.
- 5 Hold the replacement module so that the label reads upright and the arrows point upwards.
- 6 Align the module with the vacant opening and then align the connector on the module with the connector at the rear of the opening and with the 2 guide pins inside the module cavity.
- 7 Gently push the module straight in.
- 8 Align and fasten the screws. Tighten until snug plus a 1/5 turn. Ensure that you do not strip the threads or hole because the module cannot seat properly.
- 9 Contact your software operator of the switch to begin re-configuring the software.
- 10 Verify with the software operator that the re-configuration was successful and that the Passport 20000 reboots.

Figure 232
Location of the MAC address module in a Passport 20000



Routing FP cables

Route FP cables to establish the cable connection path between FPs and the next hop device, which can be another FP or equivalent interface card, or a combination of a termination panel, intermediate interworking devices, and the far-end termination.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Ensure that you have addressed the criteria in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* for assessing cable management requirements.
- When routing FP cables under the floor, ensure that you have addressed the criteria in 241-1501-205 *Passport 15000, 20000 Planning and Engineering: Determining Site Requirements* for the diameter of a processor card cable passing through a raised floor opening.
- The stress allowance for bending a multimode (MM) fiber cable is the same as for a single-mode (SM) fiber cable. The typical bend radius allowance for handling a fiber cable is ten times its diameter, or 30.5 mm (1.2 in.). The typical bend radius allowance for installed (resting position) fiber cable is 20 times its diameter, or 61 mm (2.4 in.). When using the 1.6-mm (0.629 in.) duplex SM cable (for example, with small form LC connectors), the handling bend radius is 5.0 cm (1.97 in.) while its installed bend radius is 3.0 cm (1.18 in.).
- If you are routing cables through a fiber management unit, see “Installing fiber cables through the fiber management unit” (page 483)
- The mini-coax cables used to connect the DS3s have a 15-mm (0.6-in.) bend radius. The coax guides at the ends of the cable channel at the front of the Passport 15000 or 20000 have a 2-in. bend radius.
- “MT-RJ fiber connector” (page 247) has two fibers inside the cable. Over-rotating or twisting the duplex cable can cause a failure underneath the strain relief boot.

**WARNING****Risk of eye injury by laser**

Never look directly into the end of a fiber cable, let an end pass in front of your eyes, or use an optical device to look at the end of an optical fiber unless you are certain the other end is not connected. The laser travelling through a fiber cable can injure the human retina.

**WARNUNG****Gefahr von Augenverletzungen durch Laserstrahlen**

Blicken Sie nie direkt auf das Ende eines Glasfaserkabels, und überprüfen Sie auch einzelne Faserenden nicht mit einem optischen Gerät, wenn Sie nicht sicher sind, daß das andere Kabelende nicht angeschlossen ist. Der über die Glasfasern übertragene Laser kann die menschliche Netzhaut verletzen.

**CAUTION****Risk of damage to optical fiber cables from handling**

While handling optical fiber cables, do not crimp, kink, snag, or step on any part of a cable or its connectors. Do not exceed the bend radius recommended by Nortel Networks or the manufacturer of the fiber, whichever is wider. Fasten tie-wraps snugly around fiber cables without squeezing into the outer sheath.

Procedure steps

- 1 At the faceplate, label the cable with unique connection information so that the cable can be connected to the correct FP and the correct port on that FP. Include such information as node id, shelf position (upper or lower), slot number, port number, and whether it is the transmit (Tx) or receive (Rx) connection.

When a fiber FP has 16 ports, the label must reside on the cable outside the hood and in the cable management channel across the front of the shelf. Adding labels under the hood would prevent the hood from being closed or would pinch a fiber cable, causing a loss of traffic. Stagger the labels of each FP along the channel so that they are not bunched into a bulge that prevents the channel cover from being closed.

- 2 From the faceplate, route the cable down through the cable guides and into the cable management channel. Route a DS3 or E3 coax cable to the right side of the frame and a fiber cable to the left side of the frame. Avoid crossing coax and fiber cables.
- 3 From the cable management channel, route the cable over the bend relief organizers at either end of the cable management channel. The part numbers of the relief organizers are P0902861 for the left end (facing the front of the frame) and P0902862 for the right end.
- 4 Route the cable up or down the side of the frame towards the next leg of the cable path. Route the cable to the closest cable management bracket.

When the optional extended cable management brackets are present on one or both sides of the frame, route the cable to the closest cable management bracket, then to the rear (lowest) arm, innermost finger. All cables from the same FP will eventually be fastened to the same finger. For details on the strategies of cable management, you must do "Bundling FP cables" (page 209).

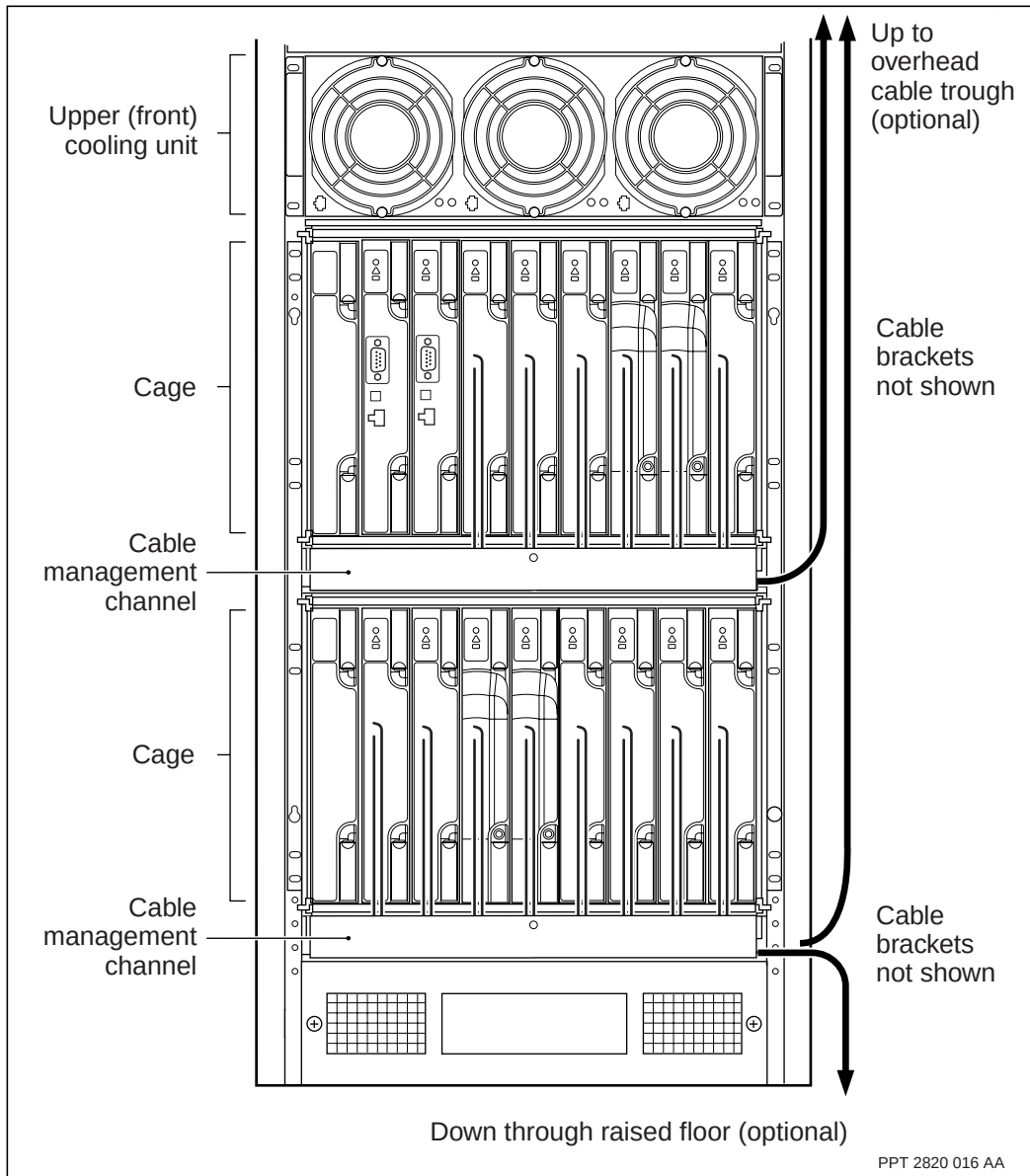
- 5 Route the cable to the next higher or lower brackets, same fingers, in whichever direction the cables are being routed for an overhead or under-floor cable path.
- 6 Route the cable and dress it loosely up to the next connection.
- 7 Repeat step 1 to step 6 for each other cable of the FP, moving from the bottom right of the faceplate upwards, then down to the bottom left, as required by the position and number of ports on the FP. The pattern is intended to facilitate efficient and organized clustering of cables inside the cable management channel.

For electrical FPs, also include the control port cable.

- 8 Loosely fasten the cables of the same FP with tie-wraps along the path. Do not tie-wrap any portion of the cables under the hood of a fiber optic FP. Avoid crimping fiber cables by overtightening the tie-wraps.
- 9 Tuck the cable cluster into the cable management channel.
- 10 Repeat step 1 to step 9 for each other FP of the same type and in the same group in the cage, moving from the ends towards the middle so that the cable clusters maximize the use of space inside the cable management channel.

Procedure job aid

Figure 233
FP cable paths, front view, lower shelf



Routing power cables from overhead to the BIP

Route power input cables in sequence from overhead to the BIP in a NEBS 2000 frame to establish a significant portion of the power cable path.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- When using conduit for the power cables, you need kit NTHR78, which contains a conduit junction box with two 16-mm (5/8-in.) hex-head screws.
- You need the following specialty tools a cutter for up to No. 1/0 AWG (53.5 mm²) cable.
- When the source of power is from tapping off a main cable, the minimum gauge of the cable to the BIP must be very flexible 1/0 AWG (53.5 mm²) unless a power-and-ground cable assembly is used.



CAUTION

Risk of damage to power connections by weight

Use tie-wraps every 10 cm (4 in.) to fasten the cables to the 7-mm (0.25-in.) thick strain-relief bracket (part number P0891284 or P0911981) at the rear of the BIP. Use tie-wraps every 15 cm (6 in.) to fasten the cables to the cable ladder from an overhead cable trough or down the side of the NEBS 2000 frame or equivalent. Fastening the power cables provides strain relief from the weight of the cables on the power input lugs at the rear of the BIP.

Procedure steps

- 1 If you are using conduit, fasten the conduit junction box to the top rear of the NEBS 2000 frame using the 2 provided screws and threaded screw holes. Tighten the screws to snug plus a 1/2 turn.
- 2 Stop the conduit just past the lip of the holes in the conduit junction box, leaving enough room for 4 or 8 cables to bend smoothly onto the strain-relief bar at the rear of the BIP.
- 3 If you are not using conduit, position a cable ladder at the right of the frame while facing the rear of the BIP. The position and capacity of the

ladder must meet your local electrical codes, especially for supporting the weight of 4 or 8 power input cables.

- 4 From the ladder or the conduit box, route and align the appropriate positive (+) and negative (-) cables with the labelled studs as indicated by the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290). Permanently label each cable. Place the label so it will be easily read and traced to termination after all cables are fastened in a cluster along the strain relief bar.

**CAUTION****Risk of equipment damage by reversed polarity**

Use the plus (+) and minus (-) symbols on the rear of the breaker interface panel (BIP) to ensure that the polarity of each A and B battery (-48/-60 V dc) and battery return for the input power feeds is correct. When powering up the BIP, reversed polarity will damage circuits inside it.

- 5 Dress the power cable above the BIP so that it remains aligned.
- 6 Cut the cable at about 38 cm (15 in.) below the strain relief bar, wrap the end with electrical tape, and leave it hanging.
- 7 Repeat the previous two steps for the other 3 or 7 power cables. Install them 1 at a time, end to end, from right to left across the rear of the BIP. (The bottom switch is powered from the studs on the left half of the rear of the BIP.)

Procedure job aid

Refer to the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290).

Routing power cables from under the floor to the BIP

Route power input cables in sequence from under the floor to the BIP in a NEBS 2000 frame to establish a significant portion of the power cable path.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need the following specialty tools:
 - a deburring tool for metal
 - a stable work surface for clamping and bending metal from a knockout disk
- Four No. 1/0 AWG (53.5 mm²) power cables fit through each knockout hole in a bottom frame plate. Since each Passport 15000 or 20000 needs four cables (two feeds), a second switch in the same NEBS 2000 frame means two holes are needed. Use only the number of knockouts as required to pass cable or conduit through the bottom frame plate. Compliance to fire regulations mandates that no openings occur in the bottom of the frame.



CAUTION

Risk of damage to power connections by weight

Use tie-wraps every 10 cm (4 in.) to fasten the cables to the 7-mm (0.25-in.) thick strain-relief bracket (part number P0891284 or P0911981) at the rear of the BIP. Use tie-wraps every 15 cm (6 in.) to fasten the cables to the cable ladder from an overhead cable trough or down the side of the NEBS 2000 frame or equivalent. Fastening the power cables provides strain relief from the weight of the cables on the power input lugs at the rear of the BIP.

Procedure steps

- 1 Remove the rear plate at the bottom of the rear half of the NEBS 2000 frame by unfastening the 4 screws.

**CAUTION****Risk of equipment damage by fire**

A bent bottom plate leaves an opening into the frame area which reduces the fire proofing effect of the Passport 15000 or 20000 in a NEBS 2000 frame.

- 2 At a workbench, remove a 5-cm (2-in.) knockout disk from the plate by
 - clamping the plate to the edge of a bench so that it does not move and so that the disk is over open air
 - pressing on an unfastened edge of the disk until you can pivot it in the opening
 - wobbling the disk back and forth until it detaches
 - filing the burrs off the top and bottom edges of the opening
- 3 If you are using conduit, test fit the plate so that the conduit just passes the lip of the knocked out hole. If the location of the hole is inconvenient for routing the cables, swap the positions of the plates.
- 4 Facing the rear of the frame, route a power cable through the opening of the bottom plate. Pass the cable through a hole in the plate. Leave the plate unfastened for easier cable manipulation.
- 5 Facing the rear of the frame, route the cable through the right rear side opening as shown in the figure "Power cabling to the BIP from the floor" (page 675).
- 6 Route the cable up along the frame to the BIP. Plan nesting your cables because the other 3 or 7 cables will run parallel to it.
- 7 Fasten the cable securely on the zig-zag bars of the frame with tie-wraps having a minimum width of 0.5-cm (3/8-in.). The tie-wraps must not overlap the outermost side of the frame uprights when supporting power cables, as shown in the figure "Power cabling to the BIP from the floor" (page 675). This would interfere with the optional frame-to-frame brackets for joining 2 frames.

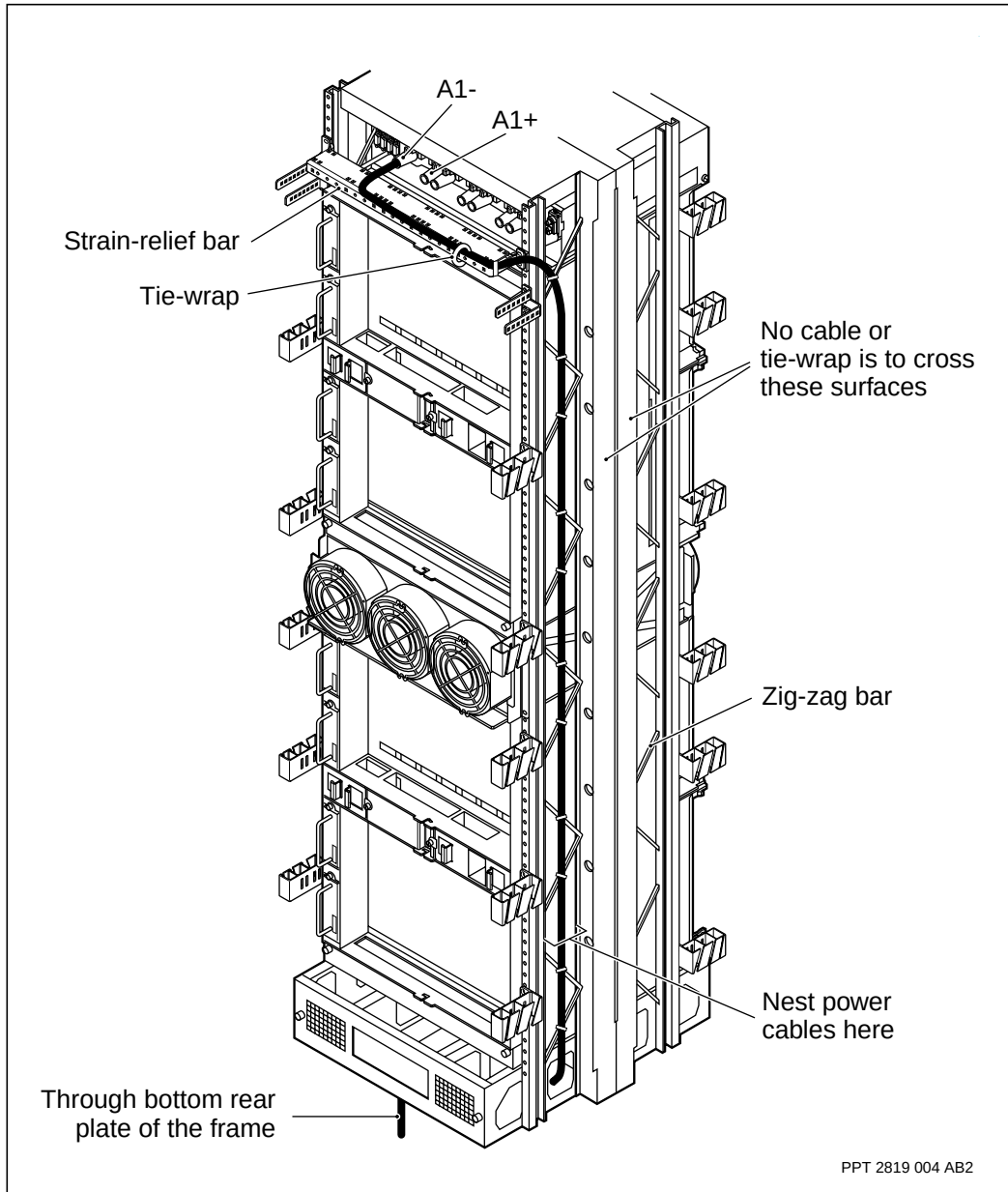
- 8 Route the remainder of the cable up to the BIP and along the strain relief bar at the rear of the BIP. Cut the cable so that it can easily reach the rear stud on the BIP from a right-angled turn off the strain relief bar.

If the BIP is to be equipped with a power-and-ground assembly (A0834143 or A0834149), each cable must be routed above the BIP, permanently suspended from above, and routed down past the appropriate terminal block. Cut each cable at the strain relief bar.
- 9 Wrap the end of the cable in electrical tape and leave it hanging.
- 10 Permanently label the cable as indicated in the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290), for example, B1+. Position the label so it can be easily read and traced to termination after all cables are installed.
- 11 Repeat step 4 to step 10 for the remaining power cables. Install them 1 at a time, end to end, from right to left across the rear of the BIP. (The bottom Passport 15000 or 20000 is powered from the studs on the left half of the rear of the BIP.)
- 12 Fasten the bottom plate back onto the frame.

Procedure job aid

Refer to the figure “Overhead power input cables for the lower shelf connected to the BIP” (page 290).

Figure 234
Power cabling to the BIP from the floor



Seating cards from the transportation position

Seat CP and FP cards from the transportation position of an initial installation to enable them to be powered up and loaded with software. Blank processor cards are also seated, but they are filler cards that do not operate.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- For the initial installations of the processor and blank processor cards, for example, in a Passport 20000 switch, the cards are transported partially installed in their appropriate shelf slots and latched to a transportation ridge at the top of the shelf assembly and latched to individual slot pockets at the bottom of the shelf assembly. The FP cards are held firmly in position, but unseated. This protects the backplane connectors and pins from damage by vibrations during transportation.
- Fully seat each processor and blank processor card as follows, starting at the card on the right and proceeding to the right for each cage.

Procedure steps

- 1 On the faceplate of each card, open each latch fully by pinching the inner edge of the latch and lifting away from the faceplate.
- 2 While holding each latch open horizontally, gently slide the card inwards until it stops and the faceplate is flush with the shelf edges above and below it. There are keyways and guide pins to ensure that each card aligns with the connections at the backplane (inside, at the rear of the cage).
- 3 Bypass any blank cards that are already fully seated. Otherwise, seat them like any other card. A blank card has BLANK labeled on the faceplate. Slots 0E and 1E are reserved for later development and must contain blank cards in the meantime.
- 4 Latch each card closed so that the latch is flush with the faceplate. If not, unlatch and re-seat the card. If a card still does not seat properly, latch the FP in the unseated position and report the slot number, node identifier, and node location to your local Nortel Networks technical support representative.
- 5 For any empty slot, do the procedure “Installing a blank processor card” (page 338).

Procedure job aid

Figure 235
Upper transportation pockets for card latches

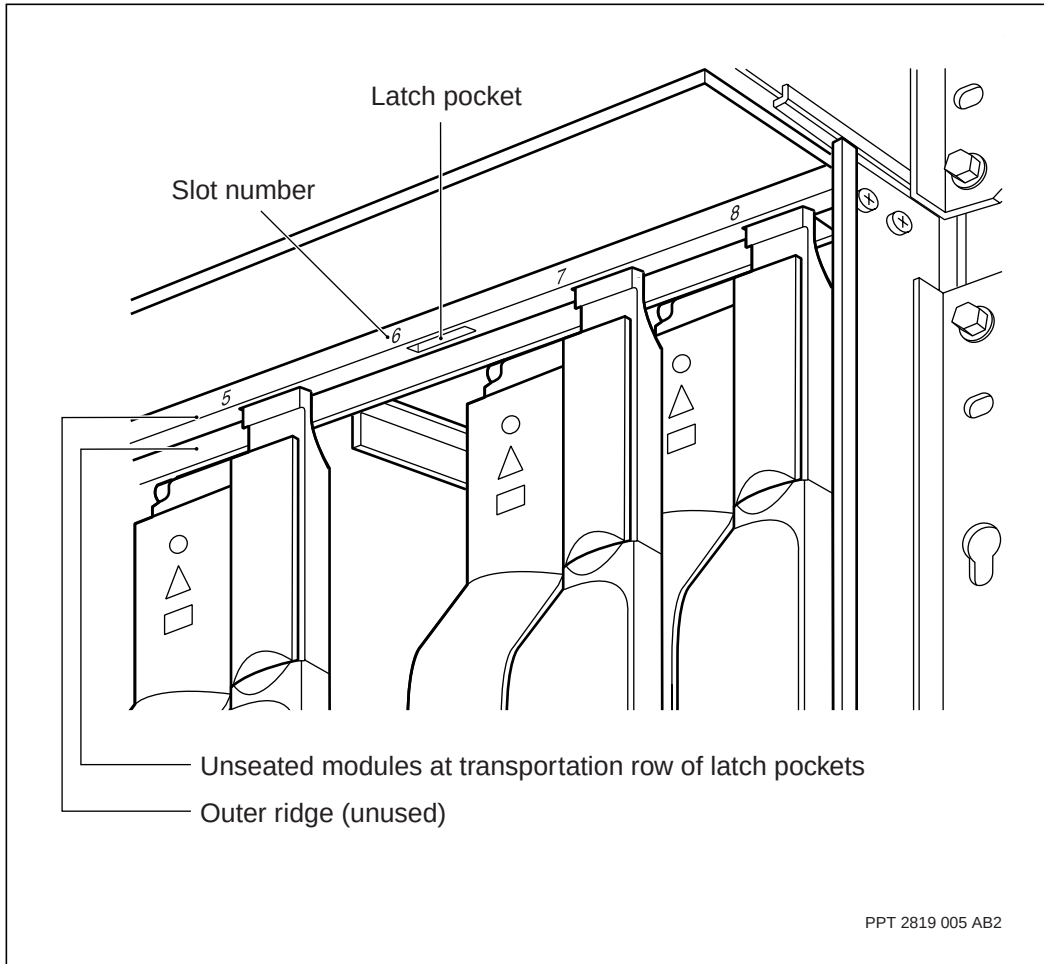
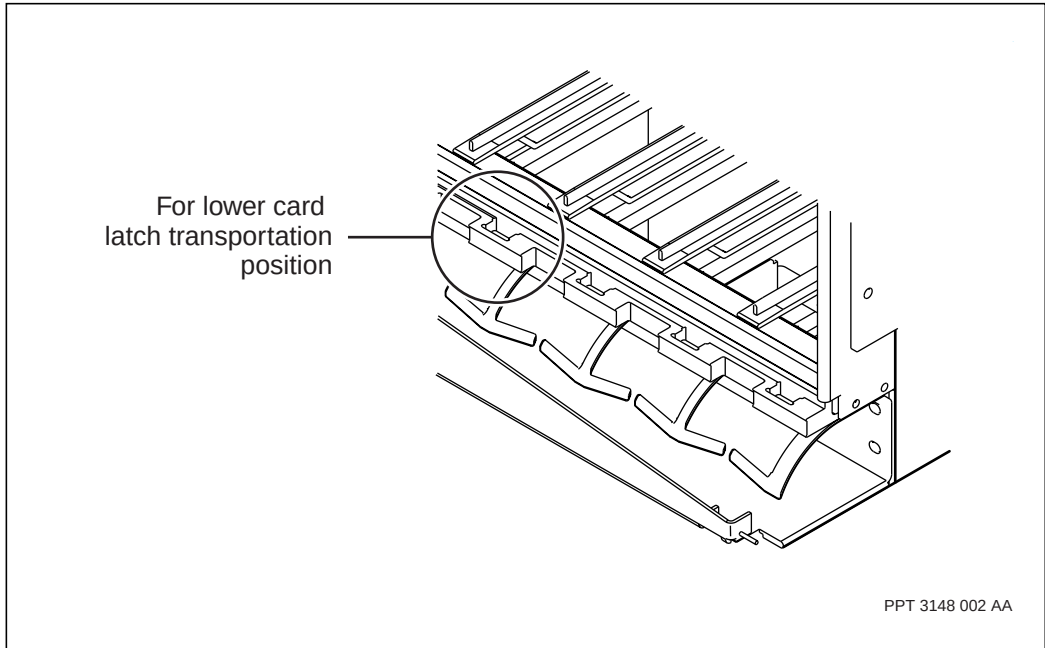


Figure 236
Lower transportation pockets for card latches



Seating fabrics from the transportation position

Seat a fabric card from the transportation position at the rear of a Passport 20000 to initially install it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- When fabrics are shipped in the transportation position, they do not have protection covers installed on the fabric connectors. Do not remove the fabric to look. The position protects the connectors from accidental contacts.



CAUTION

Risk of service degradation or damage by heat

The tape covering the gap at the top of an upper fabric card cage in the upper frame position prevents foreign objects from entering the cavity behind the fabric during transportation. The tape must be completely removed as part of the fabric installation.

Procedure steps

- 1 Peel off all of the strip of tape that covers the air vent at the top outside of the top fabric card cage of an upper shelf assembly. See the location of the vent in the figure “Location of protective tape over fabric airflow opening” (page 681).
- 2 While holding the fabric in position, unfasten the 2 slotted captive screws of the retaining strap. See the figure “Straps retaining Passport 20000 fabrics in the transportation position” (page 682).

Be careful not to let the fabric slip out of the transportation notches at the corners. The fabric can rest against the notches such that the upper alignment bushings tilt away from shelf assembly, however, tapping the fabric can cause it to fall off the shelf.
- 3 While using the right fabric handle to hold the fabric against the transportation notches, unfasten the Phillips captive screw on the lever of the fabric. The lever may pop out slightly.
- 4 Once the 4 bushings enter the alignment grooves, place a hand in each fabric handle and gently push the fabric into the shelf such that

- the fabric lever remains fully open as shown in the figure “A fabric of a Passport 15000, front view” (page 346)
- each rolling alignment bushing at the outside corners evenly enters the 4 alignment grooves shown in the inset of the figure “Locations of notches for fabric hinge bushings on Passport 20000 shelf assembly” (page 354)
- the 4 guide pin keyway blocks at the rear corners of the fabric in the figure “A fabric of a Passport 20000, rear view” (page 352) align with the 4 guide pins on the backplane

- 5 Hold the fabric in place with one hand and close the fabric lever. Moving the lever starts seating the fabric and requires a firm, steady motion to the left against variable resistance. When the lever is almost closed, the tension on it will lessen noticeably. Any squeaking is normal.

If inserting the fabric is stopped by a blockage, typically you can feel it but not see it. When you feel blockage, stop the insertion and re-align the fabric hinge pins. If the blockage persists, contact your Nortel Networks technical support representative.

- 6 When the alignment bushings reach the end of the groove, the fabric lever is almost fully closed. Fully seat the fabric and depress the reset button by closing the fabric lever flush with the cover of the fabric.

Seating the NTPN02 requires slightly more force than an NTHR16 of a Passport 20000. If the NTPN02 hinge bushings squeak during seating, this is normal.

When pressed in, the fabric reset button enables the fabric to be loaded with firmware when the switch is powered. Whenever the fabric reset button is not fully depressed, the fabric cannot be put into service.

- 7 Tighten the captive screw on the lever to snug plus a 1/5 turn when
- all 4 alignment bushings are at the end of the alignment grooves
 - the 4 corners of the fabric cover are evenly aligned with the surrounding edges of the shelf assembly
 - the fabric lever is closed flush

Avoid stripping the screw.

Procedure job aids

Figure 237

Location of protective tape over fabric airflow opening

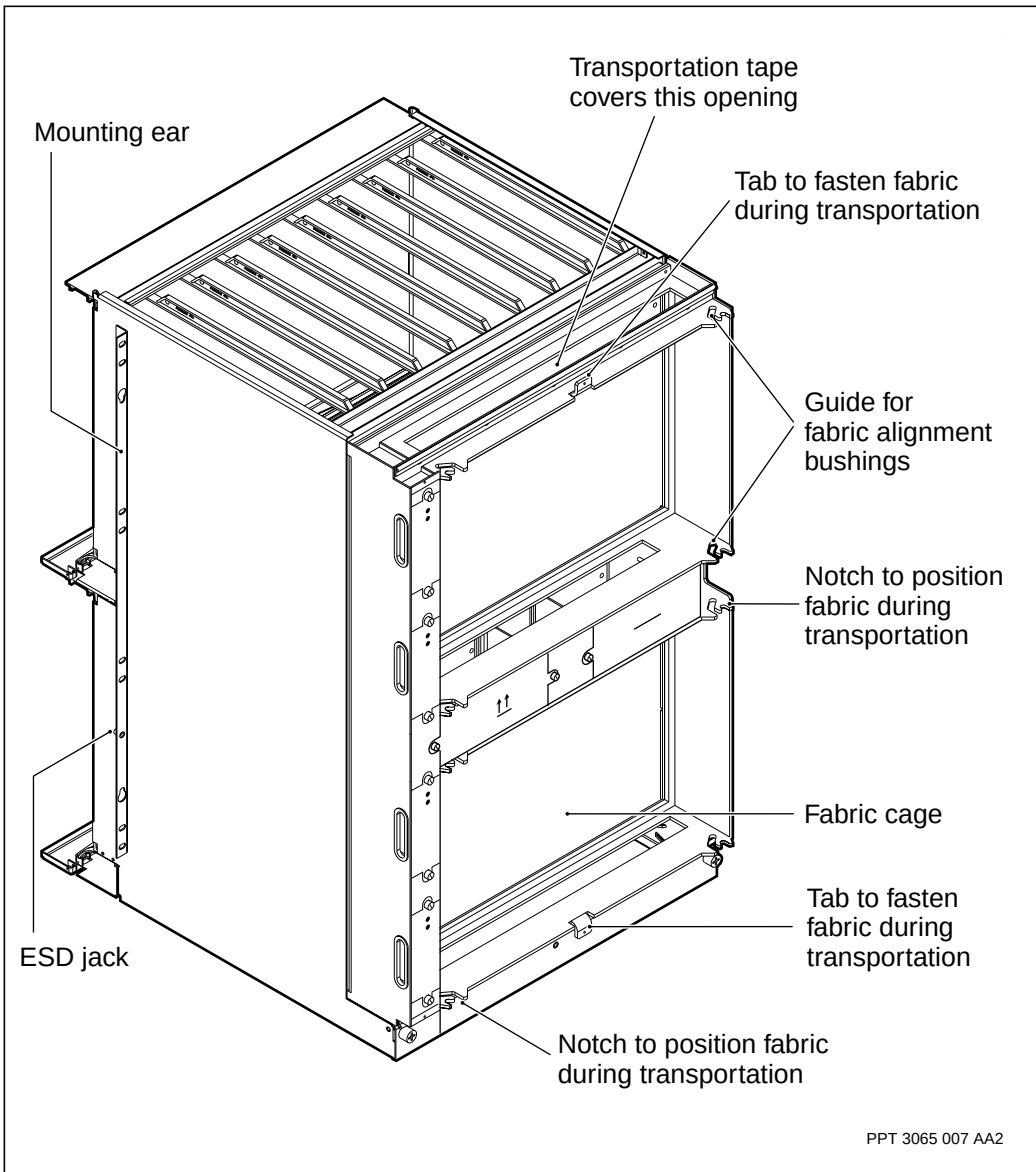
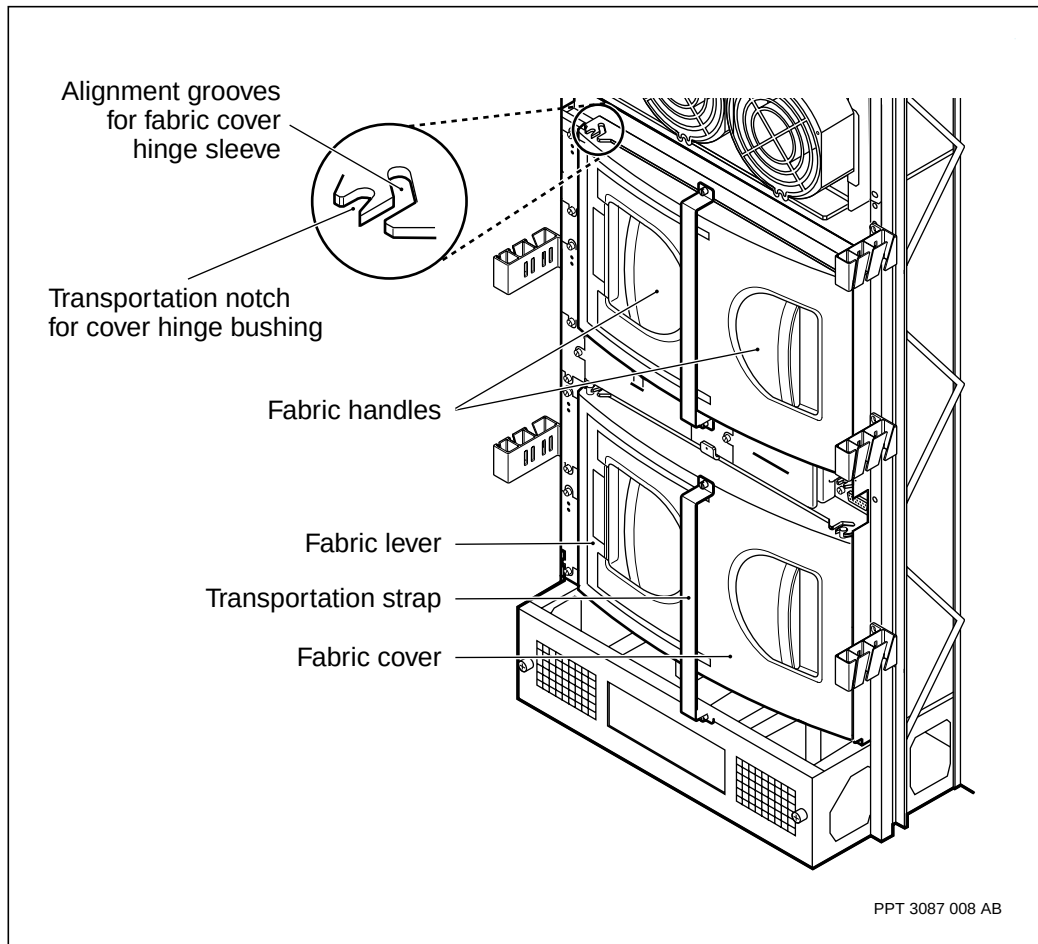


Figure 238
Straps retaining Passport 20000 fabrics in the transportation position



Setting modem dip switches

Set modem dip switches to enable the configuration of the modem software.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- This procedure uses a US Robotics 56K modem as an example. Follow the instructions provided by the manufacturer of your modem to access and set the dip switches. Set the switches as indicated in the table “Modem settings of the hardware dip switches” (page 683). This table applies to a US Robotics.

Procedure steps

- 1 Set the modem dip switches as specified in the table “Modem settings of the hardware dip switches” (page 683). The table applies to a US Robotics 56K modem as an example of the settings you must apply.

Procedure job aid

Table 28
Modem settings of the hardware dip switches

Switch number	Description of the setting	Required setting
1	modem ignores DTR (override)	on (down)
2	verbal (word) results	off (up)
3	disable word codes	off (up)
4	suppresses echo	on (down)
5	modem answers on first ring, or higher if specified in non-volatile memory (NVRAM)	off (up)
6	modem sends CD signal when it connects with another modem, drops CD on disconnect	off (up)
(Sheet 1 of 2)		

Table 28 (continued)
Modem settings of the hardware dip switches

Switch number	Description of the setting	Required setting
7	loads Y or Y1 configuration from user-defined NVRAM	off (up)
8	disables command recognition (dumb mode)	off (up)
(Sheet 2 of 2)		

Switching on the BIP circuit breakers

Switch on BIP circuit breakers to begin the powering up of a Passport 15000 or 20000 system.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Switching on the BIP breakers automatically distributes power from the BIP to the power interface modules (PIMs), which feed all plug-ins of the shelf assembly.
- For a Passport 20000, the two LEDs on each PIM indicate solid green when powered up. There is a LED for each A and B power feed from the BIP.



WARNING

Risk of injury by fan blades

While working on any equipment near the cooling unit fans, be continuously aware that the rpm of a live fan can suck loose clothing, hair, or jewelry into the fan blades or amputate a finger. Do not touch a live fan with anything.



WARNUNG

Verletzungsgefahr durch Lüfterblätter

Beim Arbeiten in der Nähe der Lüfter des Kühlaggregats besteht die Gefahr, daß ein rotierender Lüfter lose Kleidung, Haare oder Schmuck in die Lüfterblätter saugt oder einen Finger abtrennt. Berühren Sie einen Lüfter niemals, weder direkt noch indirekt.

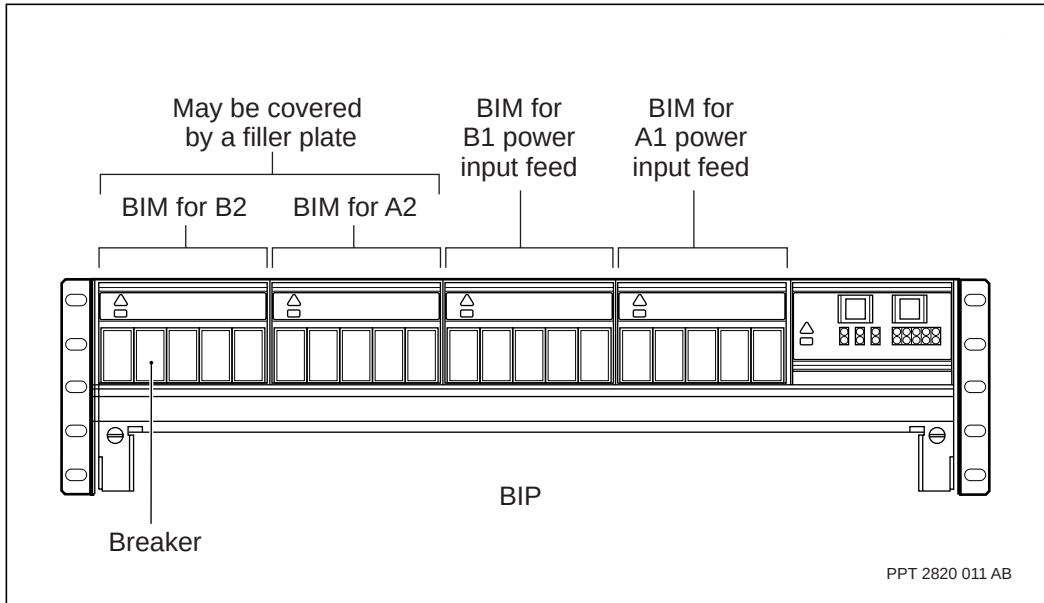
Procedure steps

- 1 Unseat the spare CP and all of the FPs in the shelf. Ensure that their rear connectors are not touching the backplane. The CP in slot 0 must remain seated.
- 2 Facing the power source that feeds the BIP, switch on power to the BIP unless the BIP is already sharing power through a C-tap from larger cables.

- 3 Facing the front of the BIP, ensure all breakers are off (the O is pushed in). See the figure "Circuit breakers on the front of the BIP" (page 687).
- 4 Turn on the cooling unit by switching on the third breaker (the middle one) on the 2 BIMs at the right. Switch on a breaker by pushing the bar symbol (|) in.
- 5 Continuing from the right side of the 2 BIMs on the right, switch on the breakers one at a time until all breakers are on. For a Passport 15000 or 20000 with BIMs installed in a frame that is waiting for the second (upper) node, leave the breakers of BIMs in slots 1 and 2 off.
- 6 On the alarm module, test the operation of the LEDs in the BIP by pressing the button labelled Test LED that is identified in the figure "Location of alarm module status LEDs" (page 695). (The BIM breakers can be on or off.) The six LEDs below the button pass the test when they stay on for approximately 10 seconds.
- 7 After all breakers of each BIM are switched on, observe the LEDs cycling from solid red to solid green. Ensure that the LED status of the alarm module and the BIMs are green. See the figure "Location of BIM status LEDs" (page 694). If not, power down all breakers and trouble-shoot the problem.
- 8 When the BIP is powered from an MFA150 system of ac rectifiers, check the AMP readings on the front of each rectifier. The acceptable range of current is approximately 7 to 50 amps depending on the number and type of seated processor cards in the Passport 15000 or 20000.

Procedure job aid

Figure 239
Circuit breakers on the front of the BIP



Testing sparing panel connectivity

Test sparing panel connectivity after a hardware replacement to ensure proper functioning.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- After replacing a hardware part that is directly connected to a fanout or sparing panel in a Passport 15000 or 20000 setup, test the transmit and receive connectivity between the FPs and the panel. Replacing a part includes any one or more of:
 - a DS3 or E3 FP
 - the cable or cable assembly connecting the FP port to the sparing panel port or fanout panel connection
 - a connector at either end of the cable connecting an FP port to a sparing panel port or fanout panel connection
 - the sparing panel, fanout panel, or a part of either one
- The one-for-six sparing panel (NTQS31) has the hardware capability for monitoring the transmit signal on any port on a specific FP. Ports of the same number cannot be monitored on different FPs at the same time. The monitoring signal of the panel is 25 dB lower than the transmit signal so that the transmission is insignificantly affected.
- Testing must be done by your own customer premises test equipment.

Procedure steps

- 1 Ensure traffic is running through the FPs that are connected to the sparing panel.
- 2 On the sparing panel, press the FP selection button until the numeral of the appropriate FP appears in the LED display beside it. The button is the upper one of the pair.
- 3 Press the port selection button until the hexadecimal number of the port appears in the LED display beside the button. The button is the lower one of the pair.
 - a. When replacing an FP, select the first port of all connected ports on the FP.

- b.** When replacing a cable or part of a cable, select only the port associated with the cable.
 - c.** When replacing (or re-locating) the sparing panel, select the first port of the first FP that is connected to the sparing panel.
- 4** Connect the test equipment according to the equipment manufacturer's instructions.
- 5** Run the test equipment to verify connectivity according to the equipment manufacturer's instructions.
- 6** Record the test result for the FP-to-sparing panel port path.
- 7** Repeat this procedure until you cycle through all of the ports that are connected to the part that was replaced.
- 8** For each port that failed the transmit connectivity test, test the FP, and check the cable connectors, cable, and cable connections. Re-test each as you check. If any port still fails the test, contact your equipment administrator to decide what to replace.

Testing the power output from a system of ac rectifiers

Test the power output from a system of ac rectifiers to the BIP to prevent inadvertent damage to equipment by verifying the polarity, connectivity, and appropriate levels of power before the BIP is powered up.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Test the power output connections from a system of ac rectifiers by following the instructions provided by that product. When the system of ac rectifiers is an MFA150 power system, ensure that you have done “Checking power output from a system of ac rectifiers” (page 222) and then follow the testing instructions provided in the Astec document 167-9021-133 *Advanced Power Systems MFA150 Modular Front Access Power System Detailed Installation Guidelines and Procedures Manual*.

Testing the power to the BIP

Test the input power to the BIP from each feed to confirm appropriate levels of power to run the Passport 15000 or 20000 and to prevent inadvertent damage to the cards before powering up the BIP.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- You need an accurate multi-meter with about 25-cm (10-in.) probes (leads) as the specialty tool. A digital read-out is recommended as easier to read.
- When a polyvalent or the ETSI power-and-ground assembly has been installed, do the testing procedure at the terminal block clamping screws that retain the power input cables. This test confirms connectivity and the correct polarity of the power input cables to the terminal blocks. Then repeat the testing procedure at the BIP studs.

Procedure steps

- 1 Facing the front of the BIP, ensure all of the breakers are off (O is pushed in).
- 2 Enable the power source to the BIP by:
 - connecting the power input feeds of the BIP to their source of power
 - testing their connectivity, polarity, and labels of connection information
 - switching on the power
- 3 Using an ohmmeter at the rear of the BIP, verify there is no potential on the A1 feed by placing the positive lead on the A1+ stud and the negative lead on each of the other positive studs. A correct hookup shows 0.0 for each pair.
- 4 Using an ohm meter at the rear of the BIP, indicate the match up of the battery lead with its return by placing the positive lead on the A1+ stud and the negative lead on the A1- stud. A normal reading is approximately 6.5 ohms because of the capacitors inside the BIP. Repeat for each A and B pair of plus and minus signs (+ and -). Record any connections.

If the ohmmeter points to the infinity symbol (open circuit) or displays “0.L” (overload), in a pair of leads regardless if they are reversed, a

discontinuity exists in that pair. Measure also the resistance between the equipment side of the B-fuse and its associated battery return cable, while maintaining a short circuit across the A-leads. In this case, a reading of 0 (zero) ohms indicates the battery leads are reversed. To correct, reverse the battery -48/-60 V A and -48/-60 V B leads at the power source or at the BIP as well as the associated battery return A and B leads. Also, verify that the cable labels are still correct.

- 5 After correcting a reversal or a mismatch, repeat the two previous steps until all battery and battery return pairs are confirmed.
- 6 Unseat all the BIMs in the BIP by gripping the lower front lip and pulling firmly and evenly straight out of the BIP. Stop when the front of the BIMs are approximately 10 cm (4 in.) past the front of the BIP.
- 7 Apply the site's battery power to only the A1 feed going to the BIP.
- 8 Verify that the voltage between the A1- and the A1+ pair is negative and ranges within -40 and -60 V dc by applying the voltmeter's COM, LO, or black lead to the BIP's A1+ lug and the V, HI, or red lead to the BIP's A1- lead. A system with batteries can read up to 65 V dc.

While probing the terminals with the multi-meter, the voltage at the unpowered A or B feed is slightly less than the voltage at the powered feed. For example, if the powered reading is -52 V dc, the unpowered reading can be -51.6 V dc. This is normal.



WARNING

Risk of injury by electrocution

When switching off breakers at the power source of a breaker interface module (BIM), wait 15 seconds for the capacitors in the BIM to discharge. Each BIM controls up to 100 A.



WARNUNG

Lebensgefahr

Warten Sie nach dem Auslösen der Trennschalter an der Stromversorgung (BIM) 15 Sekunden, bis sich die Kondensatoren in der Schaltereinheit entladen haben. Ein BIM steuert bis zu 100 A.

- 9 Switch off the site's battery power to the A1 feed going to the BIP and switch on the power to the B1 feed.

- 10** Verify that the voltage between the B1- and the B1+ is negative and ranges within -40 and -60 V dc.
- 11** Slide the insulating boot to the BIP end of the cable, align it with the shape of the lug (toe upwards), rest the boot flush against the rear of the BIP, and add the boot retainer as shown in the figure "Insulating boots and clamps at the rear of the BIP" (page 291). Using a small Pozidriv screwdriver bit, tighten the boot retainer screw at the rear of the BIP to snug plus a 1/5 turn (1.7 Nm or 16 in.-lbs of torque).
- 12** Repeat step 3 to step 11 for the A2 and B2 feeds.
- 13** Check the labels of the power cables at the BIP to match the labels at the power sources, all to indicate the shelf being powered. Ensure the identifications are in the site records.
- 14** Seat all the BIMs in the BIP.
- 15** Switch the BIP breakers on one at a time from right to left. A breaker is on when the | is pushed in. Although other equipment turns on, they will be tested by a different procedure later.
- 16** Ensure the LEDs on the BIM at the front of the BIP are showing green. If showing red, switch the BIM breakers off and re-inspect the cabling for appropriate polarity. If green, proceed. See the figures "Location of alarm module status LEDs" (page 695) and "Location of BIM status LEDs" (page 694).
- 17** Switch off all BIP breakers.

If the power to the BIP is on except for a BIM that was switched off for replacing an input power cable, restore power to the cable and switch on the breakers the | is pressed in) of the BIM that aligns with that cable. The software alarms associated with replacing a cable are cleared.

Procedure job aid

Figure 240
Location of BIM status LEDs

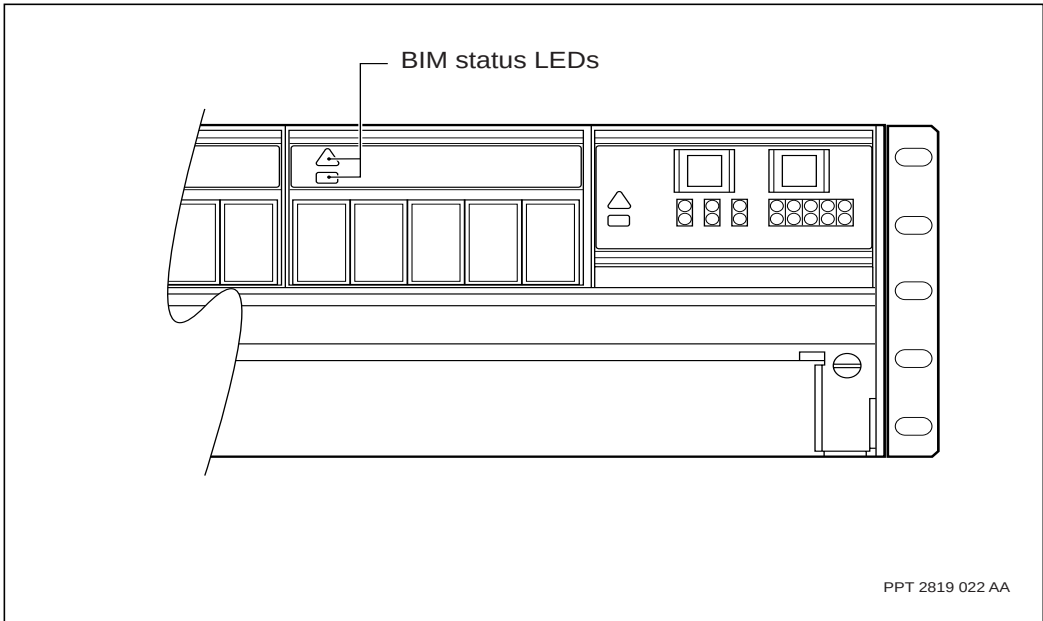
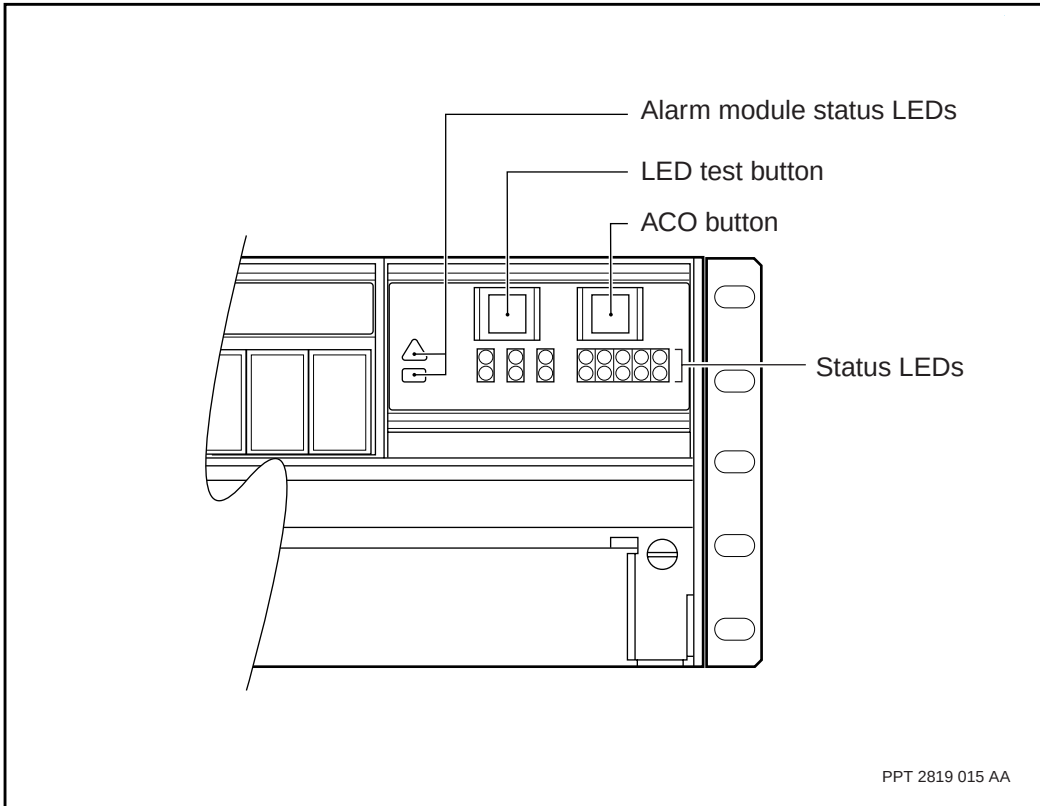


Figure 241
Location of alarm module status LEDs



Unpacking a processor card or module

Unpack a processor card, fabric card, or module just prior to installing it into the shelf assembly.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).



CAUTION

Risk of equipment damage by ESD

Unpack a card or module only minutes before it is to be inserted in its slot in a Passport. The packaging protects the circuitry from electrostatic discharge (ESD).



CAUTION

Risk of equipment damage by ESD

Whenever unpacking or handling unpacked circuit cards or modules, always wear an antistatic wrist strap that is plugged into an appropriate electrostatic discharge (ESD) receptacle. Hold a card by its faceplate, and a module or a fabric card by its handle or handles. Never touch other parts (for example, electrical connections, pins, soldered surfaces, or chips).

Procedure steps

- 1 Carefully move the containers to where the Passport is located.
- 2 Open the container. When cutting the tape or straps that seal the container, make very shallow cuts.
- 3 Gently remove any loose padding surrounding the contents, if present. Avoid contacting any rows of pins with the packing material.
- 4 If the part is inside a pouch, remove it and the pouch. Remove the part from the pouch or container by holding only its top and bottom edges. Be ready for it to be heavier than it looks.
- 5 Install the part as instructed.
- 6 Store the container and packing material for re-use.

Unpacking a shelf assembly

Unpack a shelf assembly just prior to installing it.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- A shelf assembly is identified by one of the following PECs:
 - For a Passport 15000, an NTHW99CA with DS1timing
 - For a Passport 15000, an NTHW99DA with E1 balanced timing
 - For a Passport 15000, an NTHW99EA with E1 unbalanced timing
 - For a Passport 20000, an NTPN77BA with DS1timing
 - For a Passport 20000, an NTPN77CA with E1 balanced or unbalanced timing

Procedure steps

- 1 Carefully move the shipping container to where the NEBS 2000 frame is anchored.
- 2 Plug in an anti-static wrist strap or equivalent device into a properly grounded receptacle and wear the strap whenever handling a hardware part.
- 3 Open the container of the shelf assembly. When cutting the tape or straps that seal the container, make very shallow cuts. Do the box ends before the sides so that you can raise the middle slightly to cut it.
- 4 Gently remove any loose padding surrounding the contents, if present. Avoid contacting the rows of exposed pins or connectors with the packing material. Do not touch any pins or connectors.
- 5 Remove the shelf from all packaging so that you can see all sides. Do not hold the shelf assembly by the ribs or rails inside the cavity. These will break.
- 6 Verify the straightness of the backplane pins according to “Checking the backplane pins” (page 216).
- 7 If the unit seems undamaged, put the original packing material and container aside for returning the removed shelf assembly.

Unpacking the Shasta 5000

Unpack a Shasta 5000 just before installing it in the shelf.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).

Procedure steps

- 1 Position the shipping crate in front of the NEBS 2000 frame. Ensure that the 4 metal clasps are at the bottom of each corner.
- 2 Release each clasp by lifting the key and then turning it counter clockwise.
- 3 Grasp the top of the crate and lift straight up.
- 4 Store the upper half of the crate where it will not interfere with the installation of the Shasta 5000.
- 5 Cut the metal strap that holds the Shasta 5000 to the base of the crate.
- 6 Locate the 2 screws in the bottom corners at the front of the Shasta 5000.
- 7 Unfasten the 2 screws that secure the Shasta 5000 to the crate bottom.
- 8 Store the screws where they will not interfere with the installation of the Shasta 5000.

Vacuuming equipment

Vacuum equipment after initial installation of equipment and periodically thereafter to reduce the accumulation of dust.

Prerequisites

- You must be familiar with “Safety considerations and best practices” (page 41).
- Vacuuming reduces the frequency that air filters need to be changed.
- Use a vacuum cleaner with an induction-wound motor, which reduces the potential for damage of cards or modules by electromagnetic interference (EMI). Also use a plastic shaft and attachments to prevent electrical shock and scratching the anti-corrosive coatings on the equipment.

Procedure steps

- 1 At the front of the frame or other mounting apparatus, for each Passport 15000 or 20000 ensure that the cable management channel cover is closed.
- 2 At the rear of the frame or other mounting apparatus, for each Passport 15000 ensure the fabric casings or levers are closed.
- 3 Select the long-bristle dusting attachment for the vacuum.
- 4 While standing on a ladder, vacuum the top of the mounting apparatus. Use slow brushing motions to prevent masses of dust from falling into the top of the frame or from being blown around by the airflow exhaust.
- 5 Vacuum the rear, the sides (if accessible), then the front of the mounting apparatus, leaving all panels closed.
- 6 Vacuum in and around the exposed portions of the mounting apparatus, shelves, and cabling. Be careful not to bump any part of the equipment. Do not force the nozzle into places it will not fit without friction. Remove the dust brush to improve access if necessary.
- 7 Vacuum the floor around the frame, especially in front of the kick plates.

Passport 15000, 20000 Hardware Installation, Maintenance, and Upgrade

Release 5.2

Copyright © 2003 Nortel Networks.
All Rights Reserved.

NORTEL, NORTEL NETWORKS, the globemark design, the
NORTEL NETWORKS corporate logo, DPN, and PASSPORT are
trademarks of Nortel Networks.

ADC is a registered trademark of ADC Telecommunications, Inc.

AMP, MATE-N-LOK, and Z-PACK are registered trademarks of Tyco
Electronics of Canada, Ltd.

Astec, Helios, MFA150, and Advanced Power Systems are
trademarks of Astec Advanced Power Systems.

EdgeLink is a trademark of Telco Systems.

Pozidriv is a registered trademark of Phillips Screw Company.

VT100 is a trademark of Digital Equipment Corporation.

Publication: 241-1501-240

Document status: Standard

Document version: 5.2S1

Document date: November 2003

Printed in Canada

