DMS-1* DIGITAL MULTIPLEX SYSTEM

REMOTE CONCENTRATOR TERMINAL

CIRCUIT PACK INSTALLATION

CONTENTS PAGE

1. GENERAL

1.01 This section describes the procedures used when first equipping a Remote Concentrator Terminal (RCT) with circuit packs and when adding optional or line circuit packs.

1.02 *Reason for Reissue:* to add new and revised information.

1.03 Although the circuit packs can be installed in a RCT at any time, the RCT requires signals from the Control Concentrator Terminal (CCT) for operation. Therefore, the procedures in this section should be done after the procedures in 363-2011-205 and 363-2011-210 have been completed, and the digital line is installed and working. In particular, it is important that the line shelf power converters are not turned on before the CCT has been installed and tested.

1.04 *Test Apparatus.* A digital voltmeter with the following characteristics is required to check power converter voltages:

(a) 4-1/2 digit display;

(b) input impedance: $\geqslant 1$ MΩ;

(c) accuracy: 0.1 percent minimum;

(d) equipped with pin-jack test leads, e.g., John Fluke 8100A or 8040A.

1.05 The general order of installation is:

(1) common 5/12-V power converters;

(2) common circuit packs;

(3) ring generator and distribution circuit packs;

(4) line shelf power converters and buffers;

(5) line circuit packs;

(6) order-wire and fault-locate circuit packs.

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1.06 The 48-V supply from the office battery, or from the J7209C power bay, must be connected to the RCT before the steps in this section are started. (See 363-2011-201.)

1.07 If the requirements are not met at any step in this section, refer to 363-2011-500 for fault-locating procedures.

1.08 A circuit pack is installed (Fig. 1) by:

(1) engaging it into the grooves of the upper and lower sliders;

(2) inserting it until the projection of the upper and lower catches can be engaged in the grooves of the shelf support rails;

(3) levering it into the connector using the catches until the projections on the catches can be snapped over the rollpins in the card.

TABLE A
COMMON POWER CONVERTER VOLTAGES

TEST POINT	REQUIREMENT (range in Volts)
+5 V	+4.9 to +5.1
+12 V	+11.85 to +12.15
−12 V	−11.4 to −12.6

Notes:

1. Measured between the test point and the GRD test point.
2. If the requirements are not met, press the RESET button on the converter and remeasure the voltages.

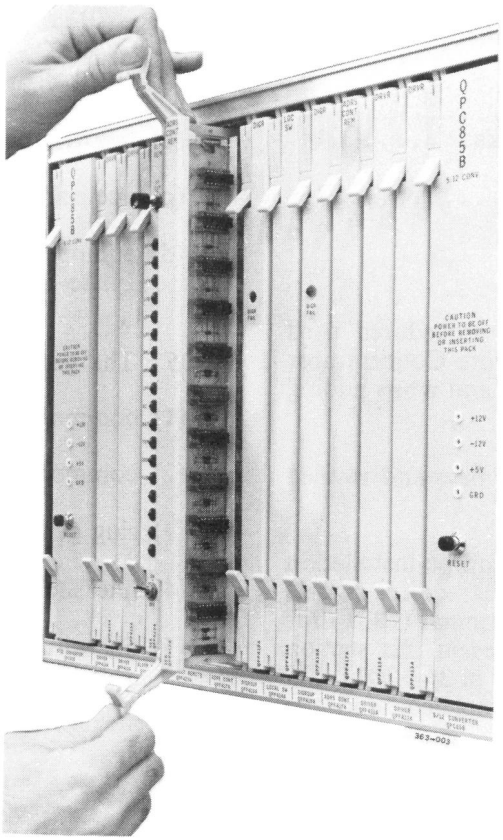


Fig. 1 — Installing Circuit Packs on a RCT Shelf

CHART 1
INSTALLING COMMON POWER CONVERTERS

STEP	PROCEDURE
1	Ensure that all fuses are removed from the fuse panel at the top of the RCT bay.
2	Plug the QPC85 5/12-V converter into digroup A.
3	Place a 5-A fuse (QFF-type) in the F8 fuseholder (Fig. 2).
4	Measure the voltages at the test points on the 5/12-V converter. Replace the circuit pack, if the voltages do not meet the requirements in Table A.
5	If digroup B is installed, plug a QPC85 converter into digroup B.
6	Place a 5-A fuse (QFF-type) in the F9 fuseholder (Fig. 2).
7	Measure the voltages at the test points on the 5/12-V converter. If the voltages do not meet the requirements in Table A, replace the circuit pack.
8	Remove the fuses from the F8 and F9 fuseholders on the fuse panel.

CHART 2
INSTALLING COMMON CIRCUIT PACKS

STEP	PROCEDURE
1	Before plugging circuit packs into the common and power shelves, set the option selector switches and straps on the QPP417, QPP419, QPP420, QPP422, QPP428 or QPP498, QPP496, and QPP436 or QPP437 circuit packs as listed in Table C and as shown in Fig. 6.
2	Plug in all circuit packs on the common shelf, and all circuit packs on the power shelf (Fig. 3 and 4) except the QPP426, QPP430, QPP435, and QPP422. *Note:* When a QPP423 LINE TEST REM is installed, any drainage coils connected to short subscriber lines must be removed to prevent high-voltage transients at the RCT.
3	Install 5-A fuses in the F8 and F9 fuseholders, and a 1-1/3 A fuse in the F10 fuseholder (Fig. 2).
4	Install 5-A fuses in the F4, F5, and F6 fuseholder (Fig. 2).
5	Reset, if necessary, and remeasure the 5/12-V converter voltages (see Chart 1, Step 4). Refer to 363-2011-500 Flowchart 8, if the voltages do not meet the requirements of Table A.

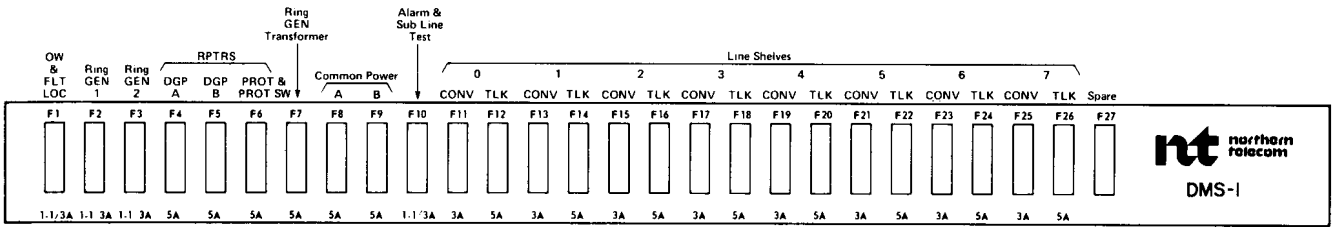


Fig. 2 — Fuse Panel

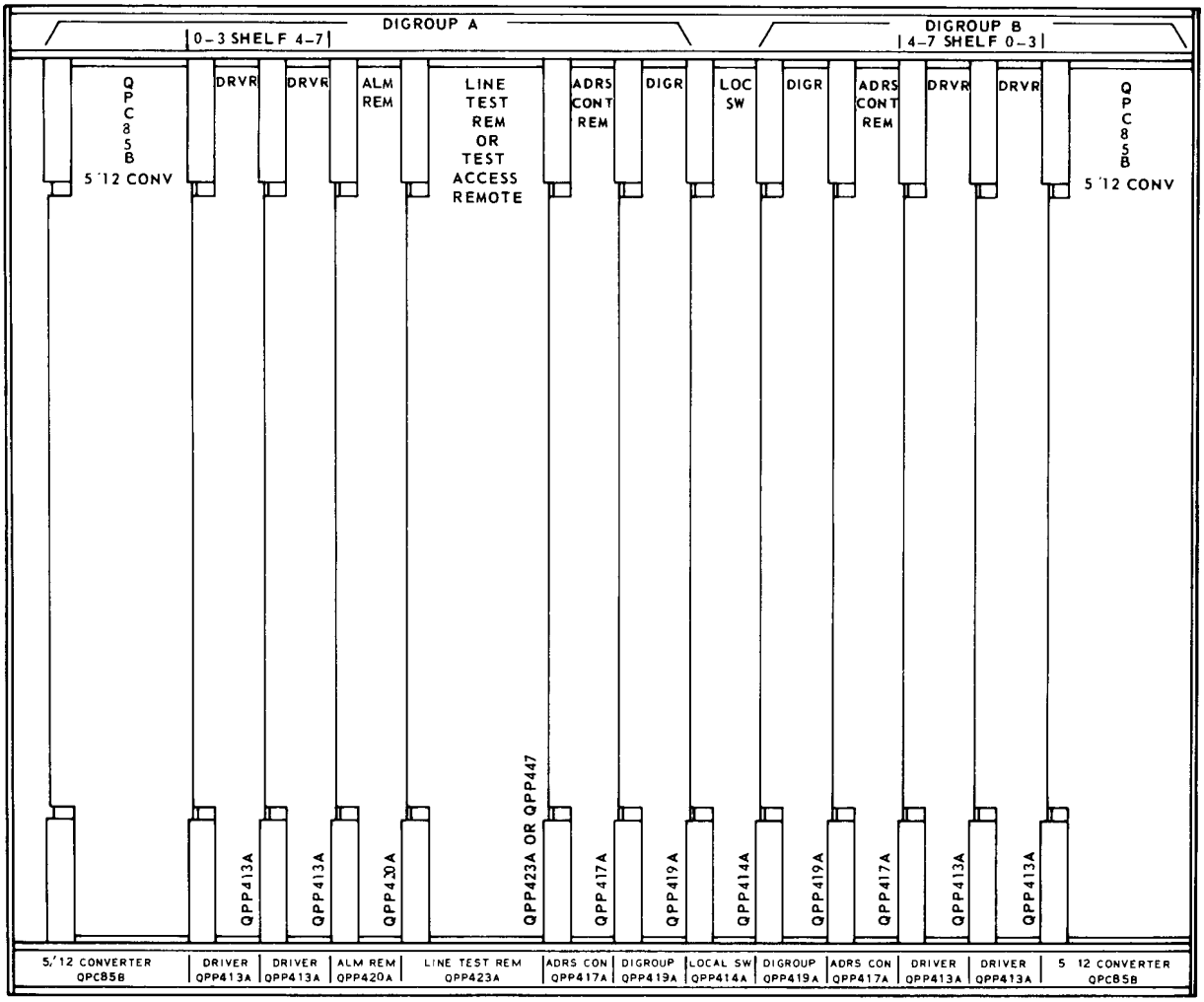
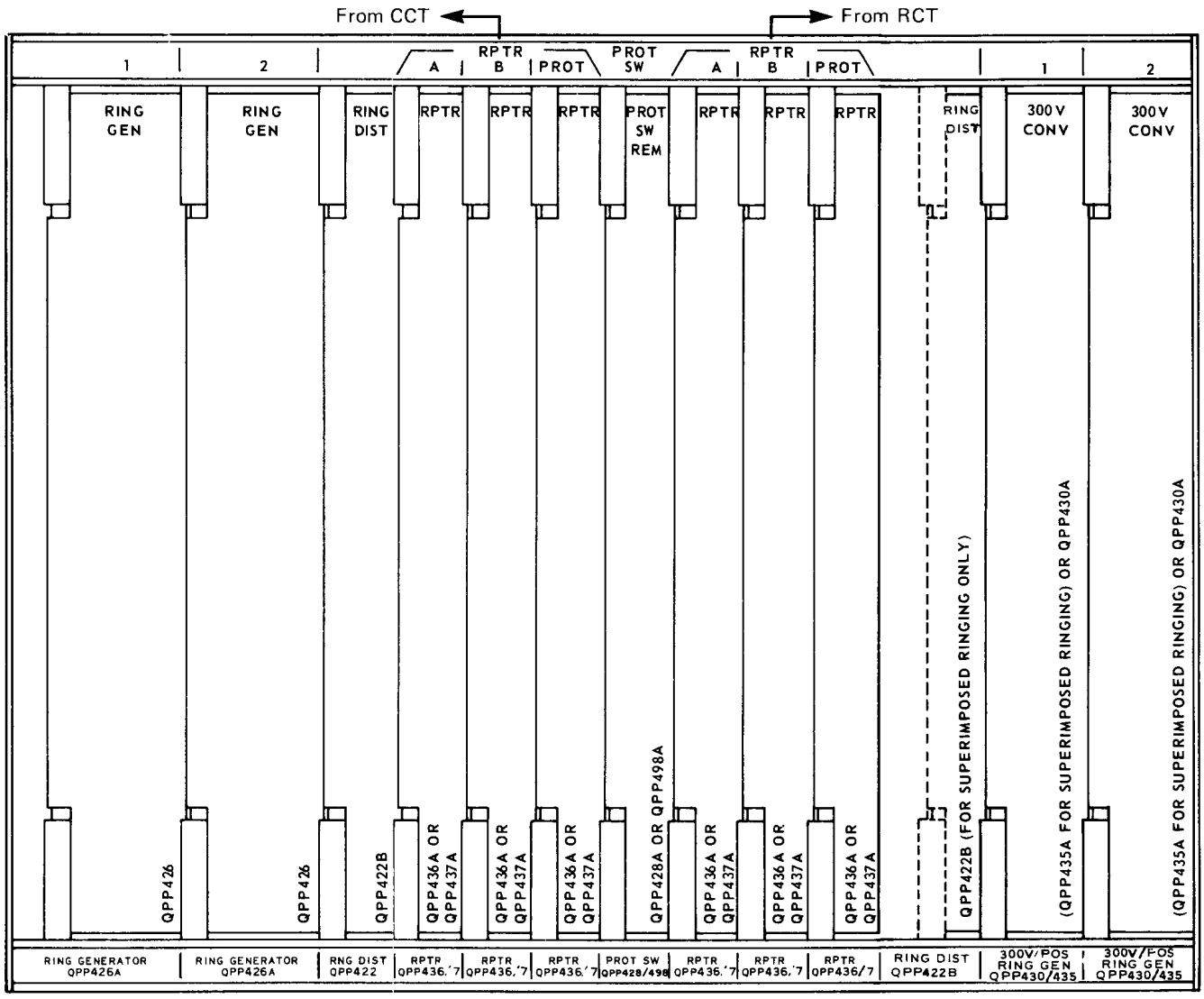


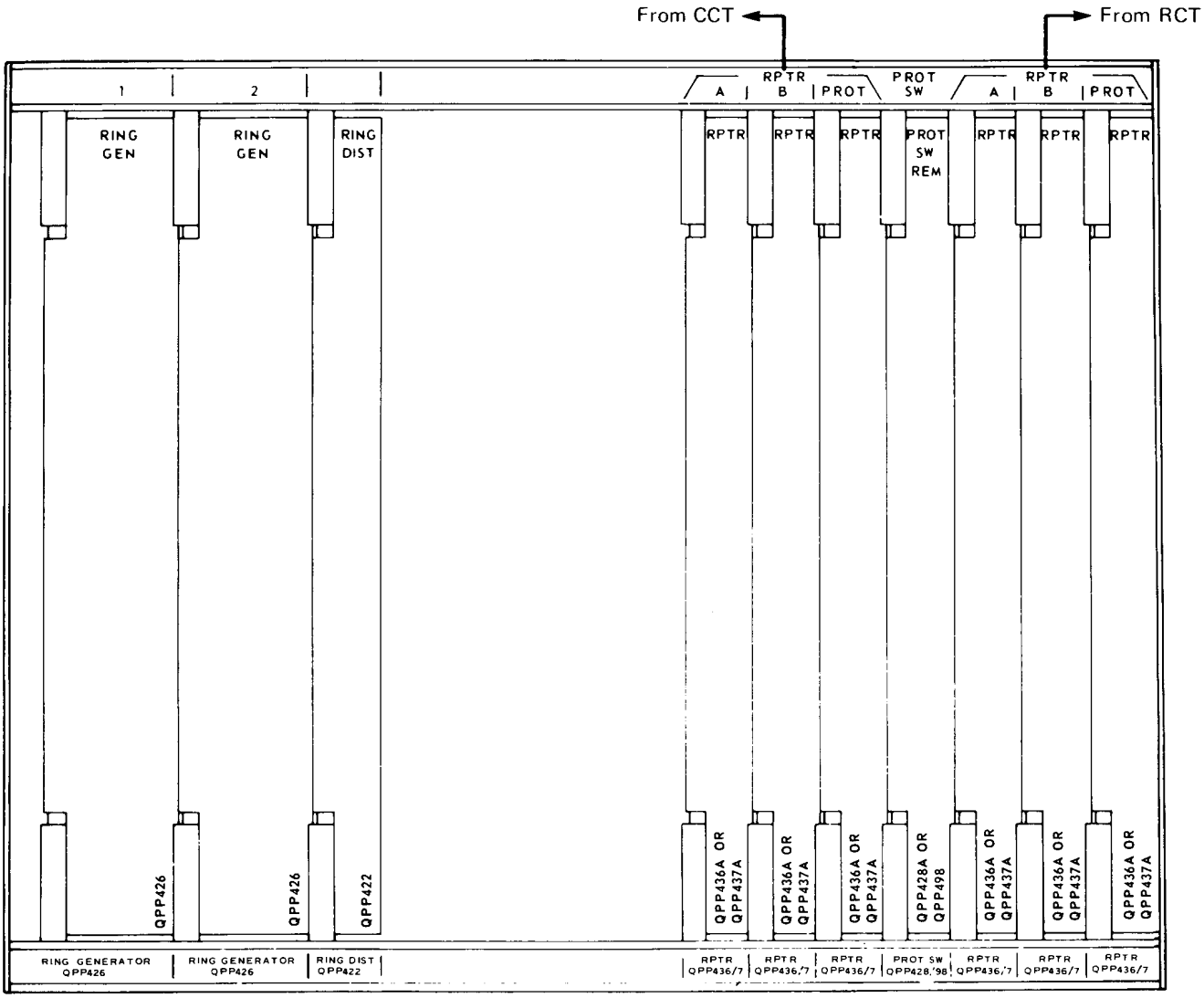
Fig. 3 — Common Shelf



Note: Layout is for a Shelf Fully-Equipped with Both AC/DC and Frequency-Selective Ringing Supplies.

(a) AC/DC Frequency Selective and Superimposed Ringing — FSR Backplane

Fig. 4 — RCT Power Shelf Layout



(b) AC/DC Ringing Only – Power Backplane

Fig. 4 – RCT Power Shelf Layout

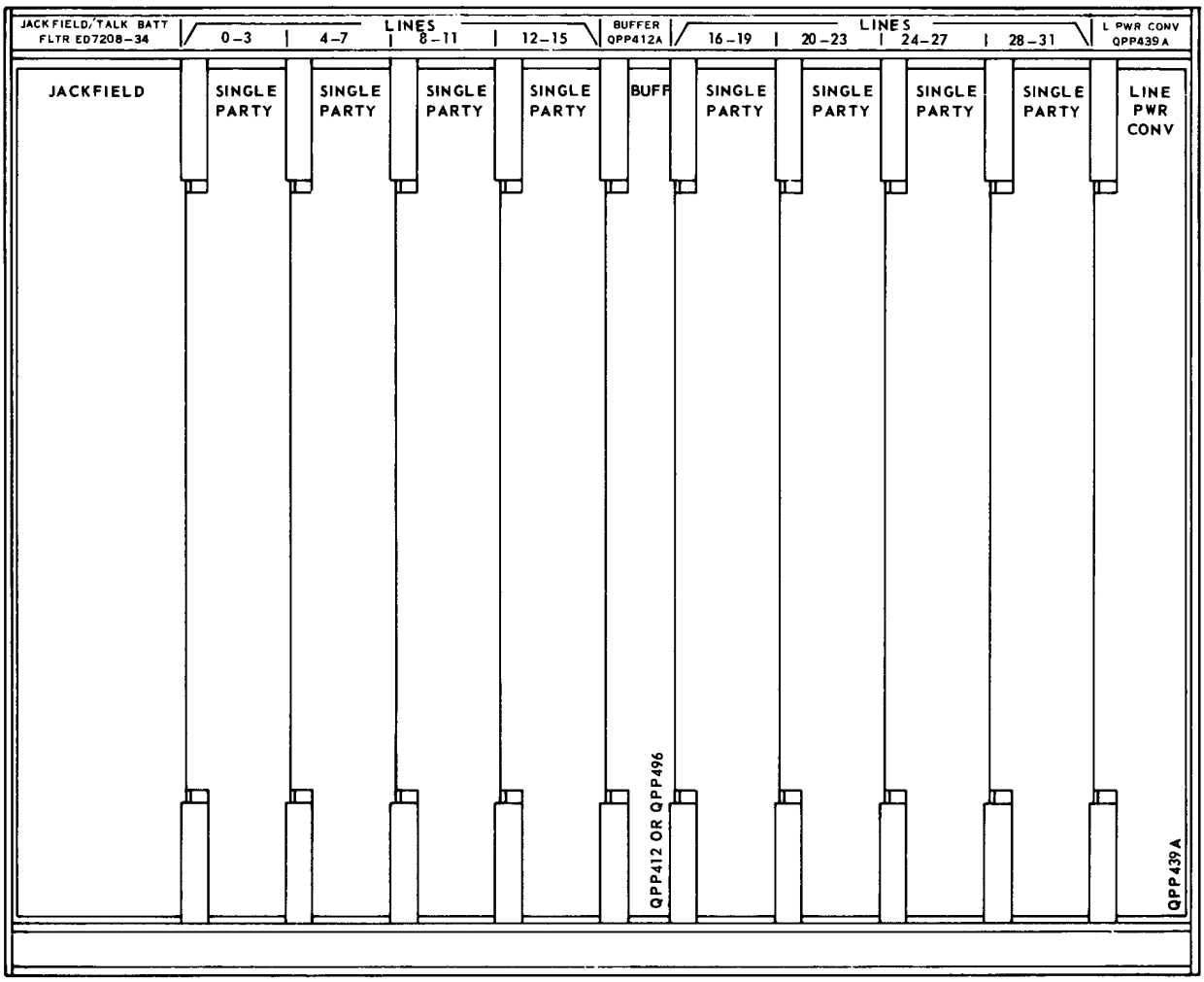
CHART 3
INSTALLING RING GENERATOR AND DISTRIBUTION CIRCUIT PACKS

STEP	PROCEDURE
1	Plug the QPP426, QPP430, or QPP435 as required, and the QPP422 circuit packs into the designated locations on the power shelf (Fig. 4). *Note:* Two QPP422B, two QPP426 and one QPP435 are required for superimposed ringing (Fig. 4[a]).
2	Place 1-1/3 A fuses in the F2 and F3 fuseholders, and a 5-A fuse in the F7 fuseholder (Fig. 2).
3	Place a 1/4-A fuse into each fuseholder on the QPP422 circuit packs.
4	Ensure that the FAIL lamps on the ring generators remain off. If the FAIL lamps light, refer to the trouble-locating procedures in 363-2011-500, Flowchart 7.

CHART 4
INSTALLING LINE POWER CONVERTERS AND BUFFERS

Note: The QPP439 line power converter requires signals from the common circuit packs before it operates. Therefore the steps in Charts 1, 2, and 3 must be completed, before Chart 4 is started.

STEP	PROCEDURE
1	Plug a QPP439 line power converter and a QPP412 or QPP496 buffer into each line shelf to be equipped with line circuit packs (Fig. 5). Ensure that the suitcase-type plug on QPP496 is installed in the REMOTE position (Table C).
2	Refer to Fig. 2. On the fuse panel, identify the two fuseholders associated with the line shelf to be tested. Place QFF-type 3-A and 5-A fuses in the two fuseholders as indicated by the labels under the fuseholders (e.g., for line shelf 0, a 3-A fuse in F11 and a 5-A fuse in F12). *Requirement:* The FAIL lamp on the QPP439, on the line shelf under test shall light. *Note:* The system controller automatically attempts to reset the QPP439, three times at 10-second intervals after the FAIL alarm is detected. Thus, if the FAIL lamp goes out before the RESET button is pressed, Step 3 can be bypassed.
3	Push the RESET button on the QPP439 circuit pack. *Requirement:* The FAIL lamp on the line power converter on the line shelf under test shall go out.
4	Measure the voltages at the test points on the QPP439. If the voltages do not meet the requirements in Table B, replace the circuit pack.
5	Insert a QFF-type, 5-A fuse into the fuseholder of the talk battery filter on the line shelf, if equipped.
6	Repeat Steps 2 through 5 for each of the other line shelves being equipped with line circuit packs.



Notes:
1. Line cards can be any required types but must obey the restrictions of 363-2011-150, Table D, Note 2.
2. Line shelf is shown equipped with QPP412A BUFF. A separate designation strip is supplied when QPP496 BUFF is installed.
3. Jackfields are available with line and equipment drop jacks with grounded sleeves, or line drop monitor jacks with isolated sleeves.

Fig. 5 — Line Shelf

TABLE B
LINE POWER CONVERTER VOLTAGES

TEST POINT POINT	REQUIREMENT (range in Volts)
+5 V	+4.90 to +5.10
+6 V	+5.97 to +6.03
−6 V	−5.97 to −6.03
+10 V	+9.75 to +10.25
−10 V	−9.75 to −10.25

Note: The voltages measured at the +6 V and −6 V test points must be within 0.03 V of each other.

CHART 5
INSTALLING LINE CIRCUIT PACKS

STEP	PROCEDURE

1 Plug the line circuit packs into the line locations on the line shelf being installed (Fig. 5), as specified on the applicable job or office records.

Note 1: At each line position, ensure that the circuit pack being installed is compatible with the circuit pack in the same line shelf position at the CCT, as follows:

TYPE OF SERVICE	CKT PACK INSTALLED AT CCT	CKT PACK REQUIRED AT RCT
Single-Party	QPP406	QPP405
Universal	QPP408	QPP407
Universal Coin	QPP410	QPP409
Priority/Dedicated	QPP411	QPP405
Frequency-Selective	QPP441	QPP440
Post Pay Coin	QPP443	QPP442
Superimposed Ringing	QPP446	QPP445

Note 2: When QPP445 and QPP446 circuit packs are installed, the QPP496 BUFF circuit pack must also be installed.

Note 3: QPP410 and QPP409 circuit packs should be installed only in shroud positions 0 and/or 1 on each line shelf.

2 Recheck the QPP439 voltages, Chart 4.

3 Repeat Steps 1 and 2 for each line shelf as required.

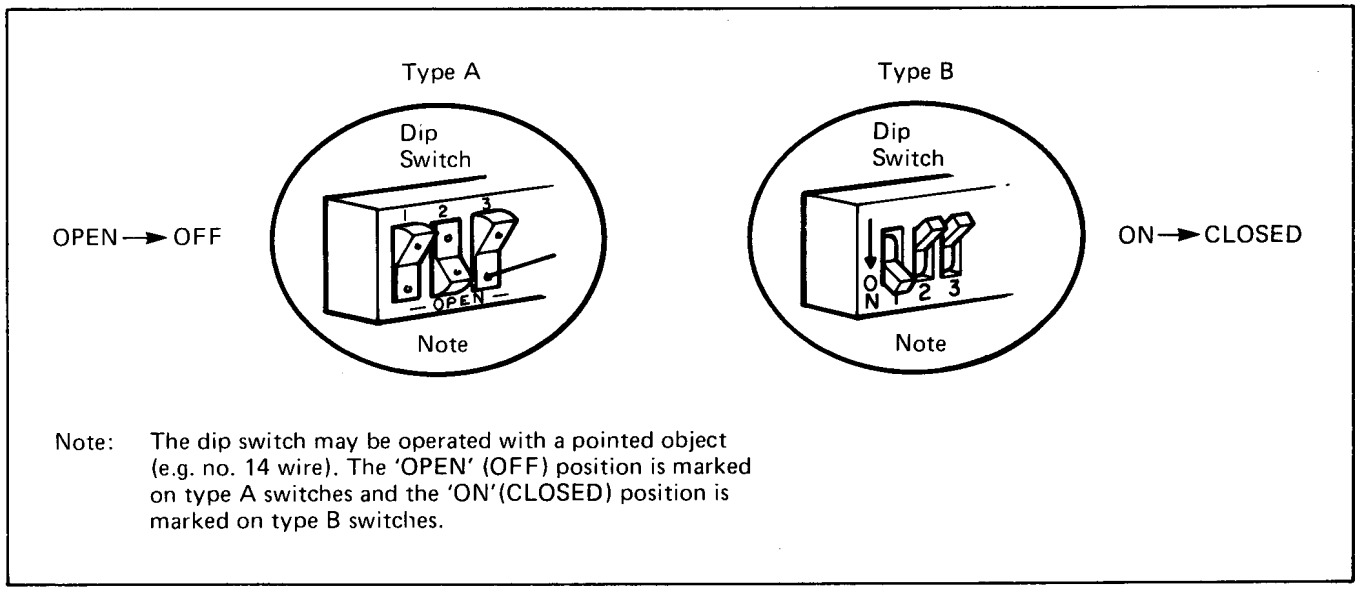


Fig. 6 — Option Selector Switches

CHART 6
ADDING SUBSCRIBER LINES

STEP	PROCEDURE
	ADDING A NEW LINE SHELF
1	Perform the steps of Charts 4 and 5.
2	The options on the QPP417 must be reset to the new line configuration. Refer to Table C.
	Caution: In a single-digroup system, the system must be taken out of service to change the options in the QPP417.
	ADDING LINE CIRCUIT PACKS ONLY
3	If necessary, line circuit packs can be added to an operating line shelf with no disturbance to existing service.
4	Plug in the new line circuit pack(s) on the applicable line shelf (Fig. 5), and measure the QPP439 voltages as in Chart 4.

TABLE C
RCT CIRCUIT PACK OPTION SELECTIONS

CIRCUIT PACK	OPTION SELECTION	PURPOSE
QPP417 ADDRESS CONT REMOTE	Selector S1:	
	Sect. 1 closed	Use if line shelf 0 is installed.
	Sect. 3 closed	Use if line shelf 1 is installed.
	Sect. 5 closed	Use if line shelf 2 is installed.
	Sect. 7 closed	Use if line shelf 3 is installed.
	Sect. 2 closed	Use if line shelf 4 is installed.
	Sect. 4 closed	Use if line shelf 5 is installed.
	Sect. 6 closed	Use if line shelf 6 is installed.
	Sect. 8 closed	Use if line shelf 7 is installed.
		(*Note:* Line shelf numbers are marked on the PCB next to the appropriate switch section.)
QPP419 DIGROUP	Equalizer Selector Switch, S1 (Fig. 3):	Use for cable lengths from QPP419 to office repeater of:
	Sect. 1 only closed	0 – 150 ft (0 – 46 m)
	Sect. 2, 5, 8 only closed	150 – 450 ft (46 – 136 m)
	Sect. 3, 4, 7 only closed	450 – 750 ft (136 – 228 m)
	Sect. 6	Not used.

Table Continued

TABLE C Continued
RCT CIRCUIT PACK OPTION SELECTIONS

CIRCUIT PACK	OPTION SELECTION	PURPOSE
QPP420 ALARM-REMOTE	Selector S1:	
	Sect. 1 open	Use if only dgrp A installed.
	Sect. 1 closed	Use if both dgrp A and B are installed.
	Sect. 2 open	Use if only one QPP426 ring generator is installed.
	Sect. 2 closed	Use if two QPP426 ring generators are installed.
	Settings on the remaining switch sections are not relevant and may be in any position.	
QPP422 RING DISTRIB	Selector Plug P1 in position 1DGP	Use to power the backup QPP426 ring generator from the 5/12-V converter in digroup A if only digroup A is installed, or if no backup ring generator is installed.
	Selector Plug P1 in position 2DGP	Use to power the backup QPP426 ring generator from the 5/12-V converter in digroup B.
QPP437 AND QPP436 REPEATERS	Install the suitcase-type plugs P3, P4, P5, in the 3 dB locations.	Use, if the distance to the first line repeater is 3000 ft (925 m) or more.
	Install the suitcase-type plugs P3, P4, P5 in the 7.5 dB locations.	Use, if the distance to the first line repeater is less than 3000 ft (925 m).
QPP428 AND QPP498 1-FOR-N PROTECTION SWITCH	Selector S1:	
	Sect. 1 open	Use, if the protection line is not equipped.
	Sect. 1 closed	Use, if the protection line is equipped.
	Sect. 2 open	Use, if the protection line is not equipped.
	Sect. 2 closed	Use, if the protection line is equipped.
	Sect. 3 open	Use, if dgrp B is not equipped.
	Sect. 3 closed	Use, if dgrp B is equipped.
	Sect. 4 open	Use, if loopback is allowed.
	Sect. 4 closed	Use, if loopback is not allowed (e.g., at end RCT).
	Sect. 5 open	Use, if bypass is allowed.
	Sect. 5 closed	Use, if bypass is not allowed (e.g., in a single RCT system.)
	Sect. 6 open	Use, if power loopback is allowed.
	Sect. 6 closed	Use, if power loopback is not allowed (e.g., in high ac induction areas where intermittent digital line failures can occur).
	Sect. 7 and 8	Not used.

Table Continued

TABLE C Continued
RCT CIRCUIT PACK OPTION SELECTIONS

CIRCUIT PACK	OPTION SELECTION	PURPOSE
	Install the shorting links P1 through P6 as follows:	
	in the L position	To be used at intermediate RCT in a distributed system to loopback digital line powering.
	in the T position	Used at an end RCT.
QPP496 BUFFER	Install the suitcase-type plug in the REMOTE position (J1)	For correct ANI operation.
ED7208-32G4 REMOTE BYPASS	Selector SW1: Sect. 1, 2, 3: set to binary code corresponding to the number of the line shelf on which the assembly is mounted.	Sets the line shelf number: SHELF NO. / SWITCH SECTION 1 2 3 0 ON ON ON 1 OFF ON ON 2 ON OFF ON 3 OFF OFF ON 4 ON ON OFF 5 OFF ON OFF 6 ON OFF OFF 7 OFF OFF OFF
	Sect 4: OFF ON	– enables circuit packs on the shelf – set ON to disable shelf circuit packs, or if shelf is not equipped.
ED7209-31G2 ED7209-33G2 FAILSAFE REMOTE	Install the shorting links P1 through P6 as follows:	
	in the L position	To be used at intermediate RCT in a distributed system to loopback digital line powering.
	in the T position	Used at an end RCT.

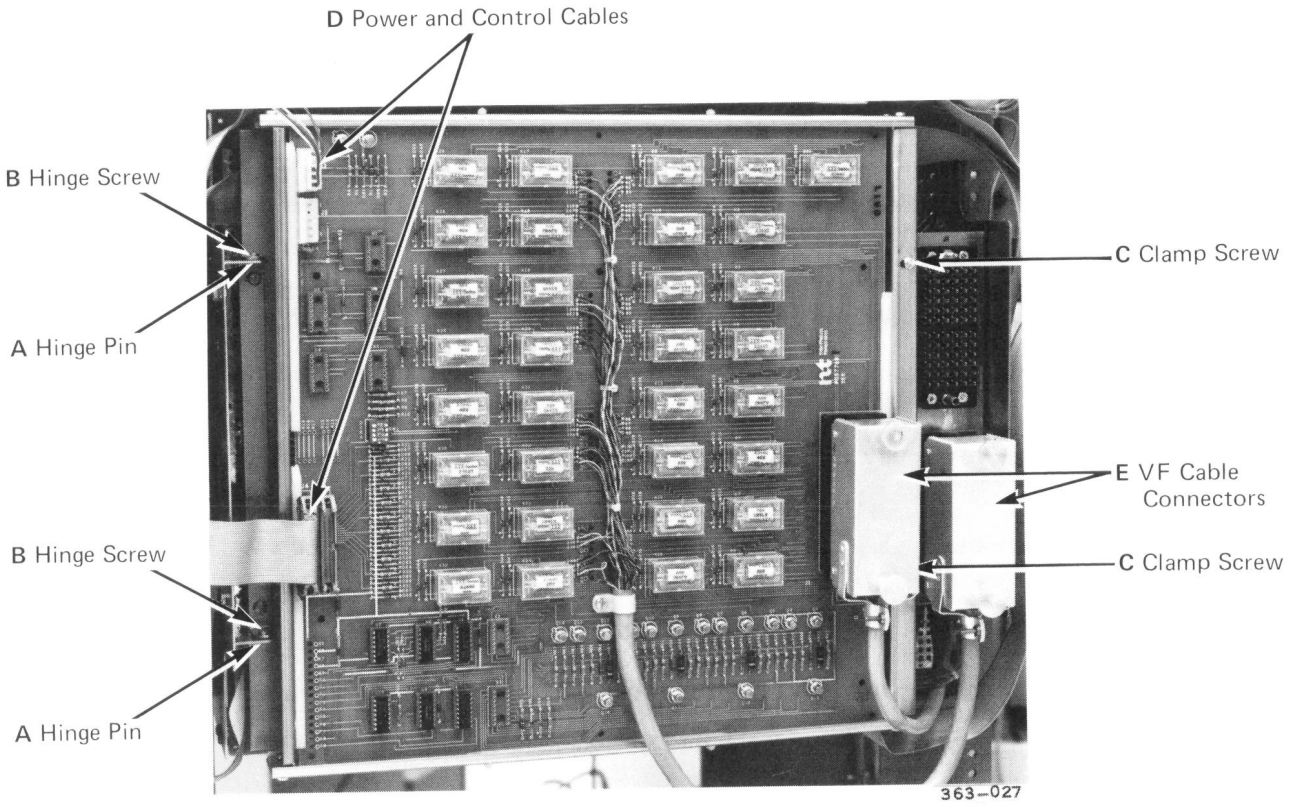


Fig. 7 — Remote Bypass Assembly — Mounting

CHART 7
ADDING OPTIONAL CIRCUIT PACKS

STEP	PROCEDURE
1	When an option is added, the applicable circuit packs may be added to an operating system, but may cause a momentary service interruption while being installed.
2	Plug the circuit pack(s) for the option concerned into the designated location(s) on the shelves, and measure the voltages on the applicable 5/12-V converter as in Chart 1.
3	If QPP447 circuit packs are installed to provide the SLTE option, a remote bypass assembly (ED7208-32, G4) must be installed on the back of each RCT line shelf as follows:
3.1	Set the assembly on the hinge pins on the left of the shelf as viewed from the back (Fig. 7, item A).
3.2	Secure the bypass assembly on the hinge pins with the hinge screws (Fig. 7, item B).
3.3	Swing the assembly shut and tighten the clamp screws to secure the bypass assembly to the connector bracket on the right of the shelf (Fig. 7, item C).
3.4	Connect the power and control cables to the assembly (Fig. 7, item D).
3.5	Set the option selector SW1 on the assembly as listed in Table C.
	Caution: Step 3.6 causes loss of service on the shelf.
3.6	Connect the vf cables (Fig. 7, item E).
4	Refer to Table C, and select the appropriate option settings on the existing circuit packs for the option now being installed.

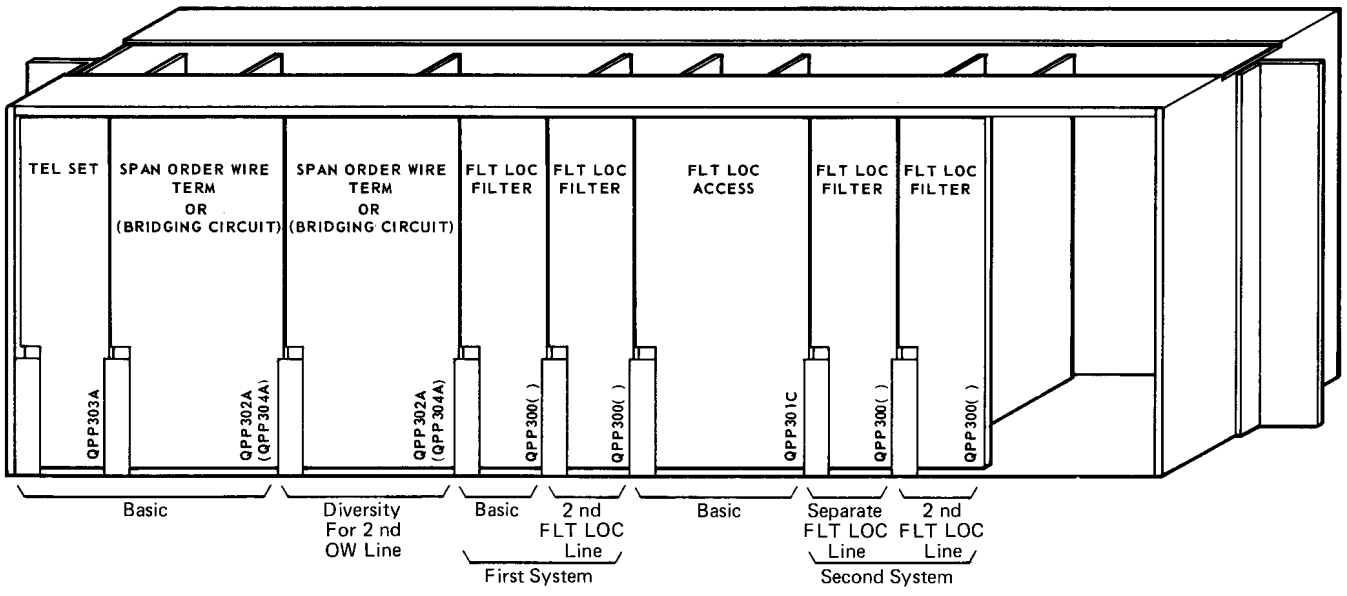


Fig. 8 — Order-Wire and Fault-Locate Shelf

CHART 8
INSTALLING ORDER-WIRE AND FAULT-LOCATE CIRCUIT PACKS

STEP	PROCEDURE
1	Before plugging the circuit packs into the order-wire and fault-locate shelf, the option selector switches on the QPP300 and QPP302 circuit packs must be set as specified for the job and as shown in Table D.
2	Remove the 1-1/3 A fuse from the F1 fuseholder on the fuse panel (Fig. 2).
3	Install the circuit packs on the order-wire and fault-locate shelf in the location shown in Fig. 8.
4	Reinstall the 1-1/3 A fuse in the F1 fuseholder (Fig. 2). If the fuse blows, continue to Step 5. If the fuse does not blow the shelf is ready for testing; refer to 363-2011-212.
5	If F1 blows at Step 4, remove all the circuit packs from the order-wire and fault-locate shelf.
6	Remove the blown fuse from the F1 fuseholder, and reinstall the QPP303 circuit pack at the left-hand side of the shelf.
7	Install a new 1-1/3 A fuse (QFF-type) in the F1 fuseholder. If the fuse blows, replace the circuit pack reinstalled at Step 6 and repeat Steps 6 and 7. If the fuse does not blow, continue to Step 8.
8	Working from the left to the right of the shelf, repeat Steps 6 and 7 for each circuit pack, one at a time, until all the circuit packs are reinstalled.
9	When all circuit packs are in place and F1 is not blown, the shelf is ready for testing, refer to 363-2011-212.

TABLE D
ORDER-WIRE AND FAULT-LOCATE CIRCUIT PACK OPTION SELECTORS

CIRCUIT PACK		OPTION SELECTOR SETTINGS	USE
QPP300 FLT LOC FILTER	SA	Open □ 1 Closed ■ 2 Open □ 3	Use for high-voltage interrogation of the fault-locate filter.
		Closed ■ 1 Open □ 2 Closed ■ 3	Use for low-voltage interrogation of the fault-locate filter.
	SB	Closed ■ 1 Open □ 2 Open □ 3 Closed ■ 4	Use for positive-voltage interrogation of the fault-locate filter.
		Open □ 1 Closed ■ 2 Closed ■ 3 Open □ 4	Use for negative-voltage interrogation of the fault-locate filter.

Table Continued

TABLE D Continued
ORDER-WIRE AND FAULT-LOCATE
CIRCUIT PACK OPTION SELECTORS

CIRCUIT PACK	OPTION SELECTOR SETTINGS		USE
QPP302 SPAN ORDER WIRE TERM	SA	Open □ 1 Open □ 2	Use if the dc resistance of the vf line to the CO switching equipment is less than 350 ohms.
		Closed ■ 1 Closed ■ 2	Use if the dc resistance of the vf line to the CO switching equipment is more than 350 ohms.
QPP304 BRIDGING	SA	Open □ 1 Open □ 2 Note 1 □ 3	*Option Z.* Use to provide ac coupling of two order-wire lines connected to Circuit 1.
		Closed ■ 1 Closed ■ 2 Note 1 □ 3	*Option Y.* Use to provide dc coupling of two order-wire lines connected to Circuit 1.
		Note 2 □ 1 Note 2 □ 2 Closed ■ 3	*Option X.* Use to terminate Circuit 1 if desired; use only with Option Y.
		Note 2 □ 1 Note 2 □ 2 Open □ 3	*Option W.* Use if termination of Circuit 1 is not desired.
	SB	Open □ 1 Open □ 2 Note 3 □ 3	*Option V.* Use to provide ac coupling of two order-wire lines connected to Circuit 2.
		Closed ■ 1 Closed ■ 2 Note 3 □ 3	*Option U.* Use to provide dc coupling of two order-wire lines connected to Circuit 2.
		Note 4 □ 1 Note 4 □ 2 Closed ■ 3	*Option T.* Use to terminate Circuit 1, if desired; use only with Option U.
		Note 4 □ 1 Note 4 □ 2 Open □ 3	*Option S.* Use if termination of Circuit 2 is not required.

Notes:

1. For settings of switch Section 3, see options X and W.
2. For settings of switch Sections 1 and 2, see options Z and Y.
3. For settings of switch Section 3, see options T and S.
4. For settings of switch Sections 1 and 2, see options V and U.

Symbols:

Switch section open = □

Switch section closed = ■