SLC® SERIES 5 CARRIER SYSTEM
EXTENDED TEST CONTROLLER
DESCRIPTION, TURNUP, AND MAINTENANCE

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1. GENERAL

1.01 This practice contains a physical and functional description and the turnup and maintenance procedures for the XTC (eXtended Test Controller).

1.02 This practice is reissued to expand the procedures in the Installation, Functional Test, and Maintenance sections. This issue also includes discussion and interpretation of the 7-segment LED display of test result codes and the new channel units that can be tested using the MC97761A1 XCU (XTC Control Unit).

1.03 Technical assistance for the *SLC* Series 5 carrier system can be obtained by calling the Regional Technical Assistance Center at **1-800-225-RTAC**. This telephone number is staffed 24 hours per day.

1.04 The XTC forms part of the *SLC* Series 5 digital loop carrier system and allows remote testing of customer channels on *SLC* 96 and *SLC* Series 5 carrier systems. The *SLC* Series 5 carrier system uses the same 96-line architecture as the *SLC* 96 carrier system. The Series 5 carrier system has four service offerings designated as FPs (Feature Packages):

- *FPA* includes single-party message telephone service (POTS), 2-wire locally switched special services, multiparty service, FSR (frequency selective ringing), and coin service.
- *FPB* is a Series 5 RT (remote terminal) with features that make it compatible with a *SLC* 96 carrier COT (central office terminal) or a *5ESS®* switch DCLU (digital carrier line unit) with Mode 1 features. FPB supports the same services as FPA.
- *FPC* includes all services of FPA. In addition, FPC supports 2- and 4-wire voice frequency special services and digital data services. Also, FPC can include the DCU (digital connectivity unit) capability.
- *FPD* is an LBRV (low bit rate voice) configuration which supports all of the services of FPC.

The XTC provides test access to all of the Series 5 system feature packages. Testing capabilities depend on the feature package chosen and, for FPC and FPD the CTUs (channel test units) installed.

1.05 The XTC is a replacement for the testing features of the PGTC (pair gain test controller). The XTC performs the same tests as the PGTC plus new and enhanced testing features. The XTC has several testing capabilities:

- MLT-1/XTC/*SLC* 96 carrier — Same capabilities as the PGTC.
- MLT-1/XTC/*SLC* Series 5 carrier (FPA, FPB, FPC, and FPD) — Same capabilities as the PGTC.
- MLT-2/XTC/*SLC* 96 carrier — Same capabilities as the PGTC.
- MLT-2/XTC/*SLC* Series 5 carrier (FPA and FPB) — Same capabilities as the PGTC.

- MLT-2/XTC/*SLC* Series 5 carrier (FPC and FPD) — Same capabilities as the PGTC.

  Note: The feature package is equipped with AUB2/AUB2B and AUB22 channel test units at the COT and RT, respectively.

- MLT-2/XTC/*SLC* Series 5 carrier (FPC and FPD Enhanced testing capabilities (see Table A).

  Note: The feature package is equipped with AUB5 and AUB25 channel test units at the COT and RT, respectively.

- SARTS/XTC/*SLC* Series 5 carrier (FPC and FPD) — New testing capabilities (see Table A).

  Note: The feature package is equipped with AUB5 and AUB25 channel test units at the COT and RT, respectively.

Like the PGTC, the XTC provides the means to connect test trunks from the MC (maintenance center), LTD (local test desks), and local test cabinets to the subscriber line beyond the RT of a *SLC* Series 5 or *SLC* 96 carrier system. The XTC, like the PGTC, also automatically verifies supervision, signaling, end-to-end loss, and noise of the carrier channel (Figure 1) while tests are being made on the subscriber line.

1.06 In addition to those features offered by the PGTC, the XTC allows access to a *SLC* Series 5 carrier system FPC and FPD channel from the SSC (special services center) using the SARTS (Switched Access Remote Test System). The XTC offers enhanced features when FPC or FPD systems are accessed by the MLT-2 (mechanized loop testing system version 2), LTDs, and local test cabinets. Table A summarizes the enhanced testing capabilities of the XTC.

1.07 When an FPC or FPD system is equipped with an AUB5 and AUB25 channel test unit at the COT and RT, respectively, the XTC provides the following features with SARTS:

- Allows test access to locally and nonlocally switched special services channel units (E *SPOTS*® channel unit, DID (direct inward dialing), 4-wire voice frequency, and dataport) without the need for the SMAS (switched maintenance access system) access points. Full splitting access to the metallic pairs is provided at the COT (Figure 2).

- Allows half-splitting access to the drop of an OCU (office channel unit) dataport channel unit when it is used in the COT.

- Allows full-splitting access to a channel at a digital access point (Figure 3). On request, a compatible voice frequency interface or a 64-kb/s bipolar digital interface is available. The digital interface is used for test access to dataport channels. The compatible voice frequency interface is used for E *SPOTS*, DID, and 4-wire channel units — if a transmission only interface is requested, it can be used in a limited manner for POTS, *SPOTS*, FSR, multiparty, and coin channel units.

- Allows a hitless monitor access to a channel for craft to determine if it is busy before beginning to test.

■ Supplies status information at the outset of testing, such as the presence of a major alarm affecting the digroup in which the channel is located, and whether a channel unit is improperly provisioned on the channel to be tested.

System status:

☐ *SLC* Series 5 carrier system major alarms:

- Near end terminal
- Far end terminal
- CFA (carrier line failure)
- Incoming line failure NE
- Incoming line failure FE.

Channel status:

☐ Special (*Red Lined*) circuit

☐ Channel units (COT and RT)

- Not installed
- Unprovisioned
- Wrong type
- POTS or *SPOTS* channel unit
- DCU (digital connectivity unit).

■ Separates diagnostic tests on COT and RT channel units, except dataport channel units, and reports results on each when the tests are completed. Diagnostic tests include testing the signaling and transmission capabilities of E *SPOTS*, DID, and 4-wire voice-frequency special services type channel units listed in Table B.

TABLE A
XTC ENHANCED TESTING CAPABILITIES (NOTE)

CAPABILITIES	CHANNEL UNIT	OS SYSTEM	
		MLT-2	SARTS
CU go/no go diagnostics, on:	POTS	X	
	SPOTS Units	X	
	Coin	X	
	DID*	X	X
	FSR*	X	
	Multiparty*	X	
	E *SPOTS* Units	X	X
	4-Wire	X	X
RT drop access on:	E *SPOTS* Units	X	
	DID	X	
	4-Wire	X	
	Dataport	X	
COT drop access on:	E *SPOTS* Units	X	
	4-Wire	X	
	Dataport	X	
Metallic access at COT towards the RT on:	E *SPOTS* Units	X	
Full splitting metallic access at COT on:	E *SPOTS* Units		X
	DID		X
	4-Wire		X
	Dataport DS0		X
Full splitting bit stream access at COT to:	all channels		X
Half splitting metallic access at COT toward loop for:	Dataport OCU		X
Monitor access		X	X
Status information		X†	X

Note: FPA supports POTS, *SPOTS*, DID, FSR, Multiparty, and Coin channel units. FPB (Series 5 Mode 96) supports POTS, *SPOTS*, DID, FSR, Multiparty, and Coin channel units. FPB (Integrated) Series 5 RT with *5ESS* Switch through DCLU. FPB (Universal) Series 5 RT with *SLC* 96 Carrier System COT. FPC and FPD support POTS, *SPOTS*, DID, FSR, Multiparty, Coin, E *SPOTS*, 4-Wire VF, and Dataport channel units.

* Requires MC97761A1 XCU (XTC Controller Unit).

† MAJOR Alarm only.

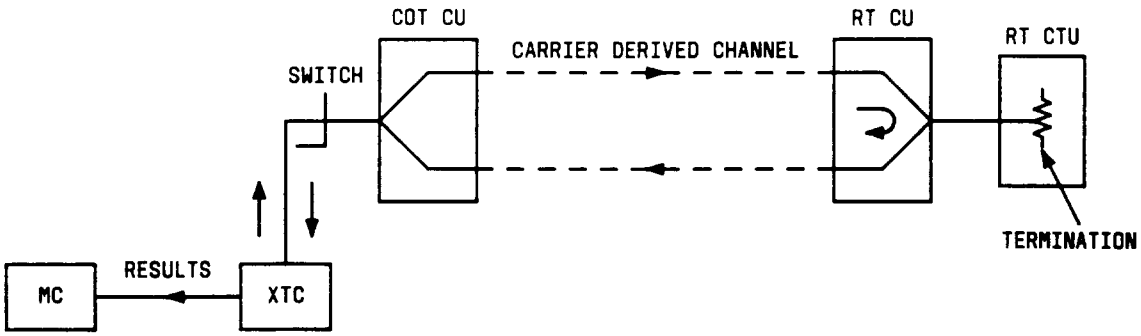


Figure 1 — XTC Test of *SLC* Carrier Channel

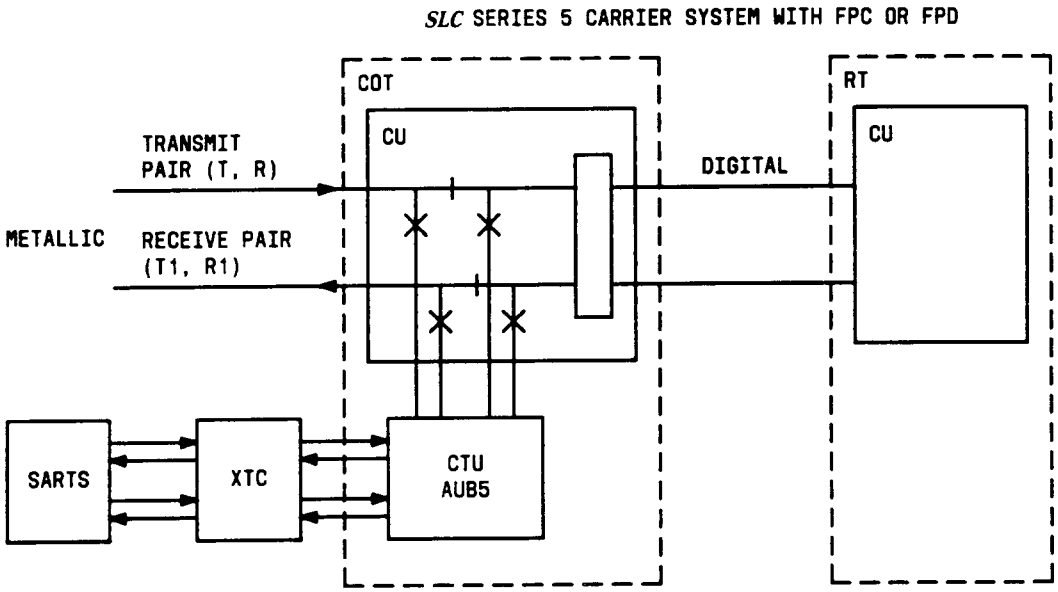


Figure 2 — SARTS Test Access to COT Metallic Connection

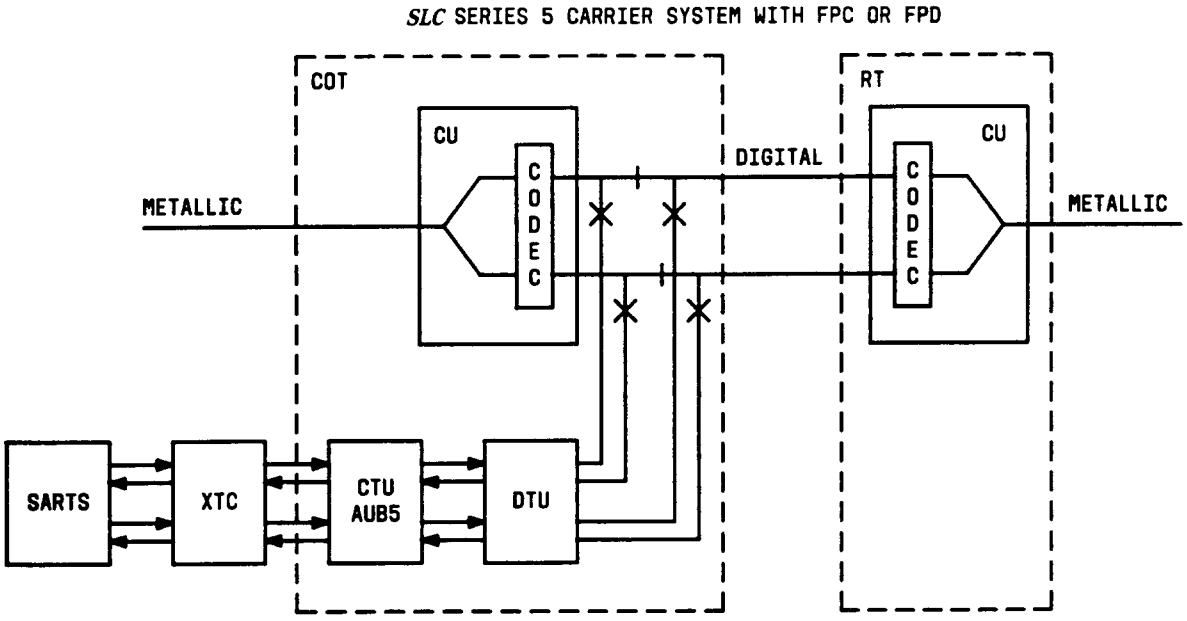


Figure 3 — SARTS Test Access to Digital Bitstream

TABLE B
CHANNEL UNITS TESTABLE BY XTC

CHANNEL UNIT TYPE	CHANNEL UNIT DESIGNATION	*CLEI** CODE
POTS	AUA31, AUA38, AUA58	5SCU110AXX, 5SCU1G0AXX, 5SCU1H0AXX
SPOTS	AUA32, AUA39	5SCU820AXX, 5SCU8M0AXX
POTS/*SPOTS*	AUA51, AUA59	5SCU150AXX, 5SCU1L0AXX
M *SPOTS*	AUA25	5SCURP7AXX
COIN	AUA33, AUA53	5SCU230AXX, 5SCU260AXX
MULTIPARTY†	AUA35, AUA55	5SCU540AXX, 5SCU570AXX
FSR†	AUA37, AUA57	5SCUS04AXX, 5SCUT04AXX
DID† (2-Wire)	AUA36, AUA56	5SCU9F0AXX, 5SCU9E0AXX
E *SPOTS* (2-Wire)	AUA42, AUA43	5SCU690AXX, 5SCU6A0AXX
4W0 (4-Wire)	AUA54 (RT only)	5SCU7B0AXX
4W1 (4-Wire)	AUA41	5SCU7D0AXX
4W2 (4-Wire)	AUA44	5SCU7C0AXX

* COMMON LANGUAGE is a registered trademark and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

† Requires MC97761A1 XCU.

1.08 The XTC *does not* supply SARTS with access to any of the following:

- A system where the COT and RT are equipped with FPA or FPB capability, or FPC or FPD capability where the FPC or FPD bank is equipped with AUB2/AUB2B and AUB22 channel test units at the COT and RT, respectively.
- Metallic pairs of POTS, *SPOTS*, FSR, multiparty, or coin channel units at the COT.
- A compatible voice-frequency signaling interface (e.g., loop start, ground start) to POTS, *SPOTS*, FSR, multiparty, or coin channel units for digital access. This feature is only available for E *SPOTS*, DID, and 4-wire channel units.
- At the present time, drops at the RT location. (This will be available in the future.)

1.09 When used with an MLT system, local test desk, or a local test cabinet, the features provided by the XTC depend on whether it is connected to MLT version 1 (MLT-1) or MLT version 2 (MLT-2) and whether it is accessing a *SLC* 96 carrier system or a *SLC* Series 5 carrier FPA, FPB, FPC, or FPD system. When connected to an MLT-1, the features provided by the XTC are identical to those of the PGTC:

- An MLT-1 connected to an XTC accessing a *SLC* 96 carrier bank assembly.
- An MLT-1 connected to an XTC accessing a *SLC* Series 5 carrier system bank assembly equipped with FPA, FPB, FPC, or FPD regardless of channel test unit types.

1.10 The XTC also provides the same features as the PGTC to MLT-2, LTD (local test desk), and local test cabinets when accessing a *SLC* 96 carrier bank, a *SLC* Series 5 carrier system FPA or FPB, or a *SLC* Series 5 carrier system FPC, and FPD bank equipped with an AUB2 or AUB2B and AUB22 channel test unit at the COT and RT, respectively.

1.11 The XTC provides enhanced features when connected to MLT-2, an LTD, or a local test cabinet when it accesses an FPC, or FPD bank equipped with an AUB5 and AUB25 channel test unit at the COT and RT, respectively:

- Access at the RT to the two drops on 4-wire circuits. MLT-2, a local test desk, or local test cabinet can request access to each loop, one at a time, using the dc test pair (Figure 4).

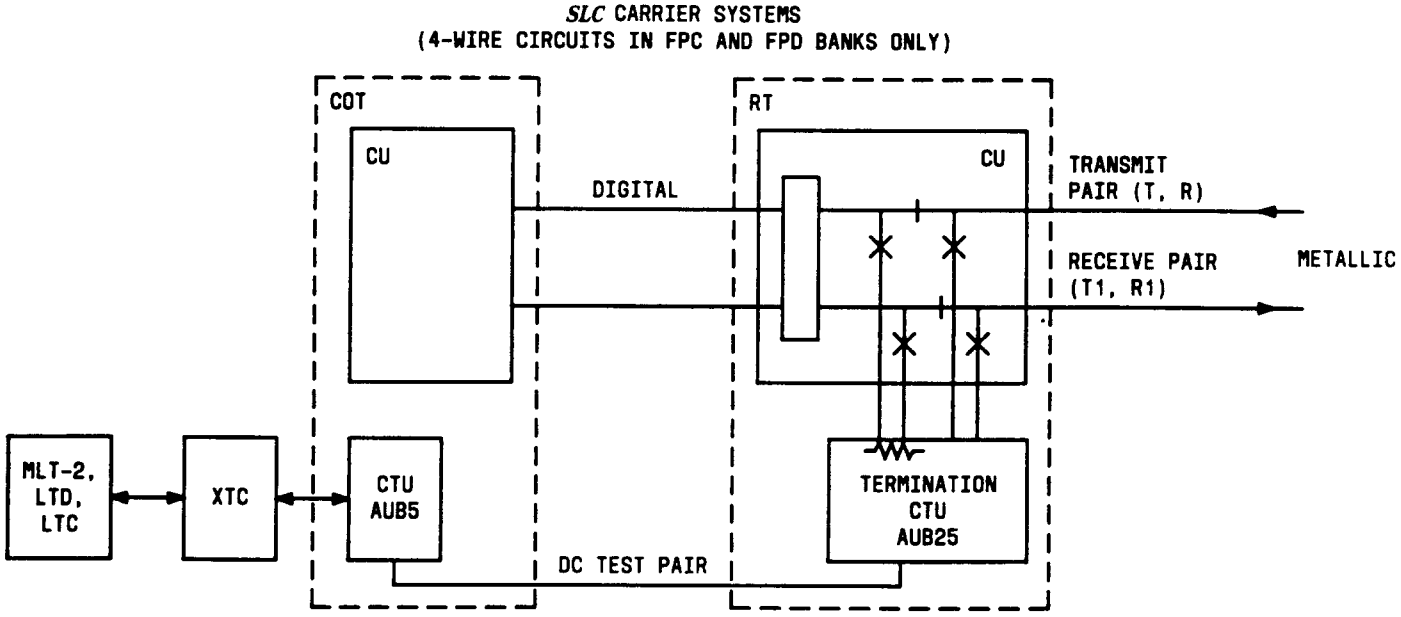


Figure 4 — MLT-2 Test Access to RT Loop

- Separate diagnostic tests on COT and RT channel units, except dataport channel units, installed in an FPC or FPD bank and reports the results on command. Diagnostic tests include testing the signaling and transmission capabilities of all of the channel units listed in Table A.

- For circuits that are nonlocally switched:

  - Access to the drops at the COT. If the drop is a 4-wire circuit an MLT-2, LTD, or local test cabinet can request access to each loop, one at a time (Figure 5).

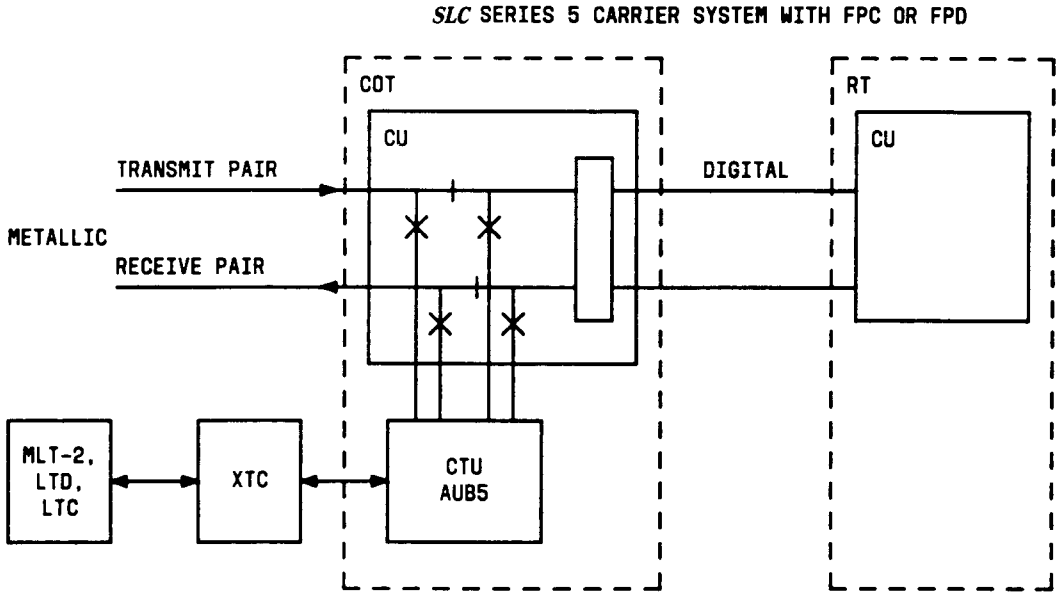


Figure 5 — MLT-2 Test Access to COT Metallic Connection

  - Access to the tip and ring of an E *SPOTS* channel unit looking into the COT channel unit towards the RT.

  - XTC allows a hitless monitor access to an FPC or FPD channel for craft to determine if channel is busy before beginning to test.

1.12 The XTC is compatible with test desks and cabinets that test with the PGTC, as well as MLT-1 and MLT-2. Figure 6 shows the connections between these entities and the XTC, and the required LMOS (loop maintenance operations system)/MLT software generics. Also, Figure 6 shows the length restrictions on cabling among the XTC, the Series 5 system, the MLT LTS (loop testing system), MLT-1 LTF (loop testing frame), an LTD, and a local test cabinet.

1.13 The MLT-1, MLT-2, LTDs, and local test cabinets communicate with the XTC over no-test trunks. The sleeve lead of the test trunk is used to command the XTC — the tip/ring pair is used for test access. For access to circuits served by an FPC or FPD bank (equipped with AUB5 and AUB25 channel test units at the COT and RT, respectively), the XTC connects no-test trunks to the bank via the path labeled test bus 1 in Figure 6. For access to a *SLC* 96 or *SLC* Series 5 carrier FPA bank, the XTC connects no test trunks to the bank via the path labeled test bus 2.

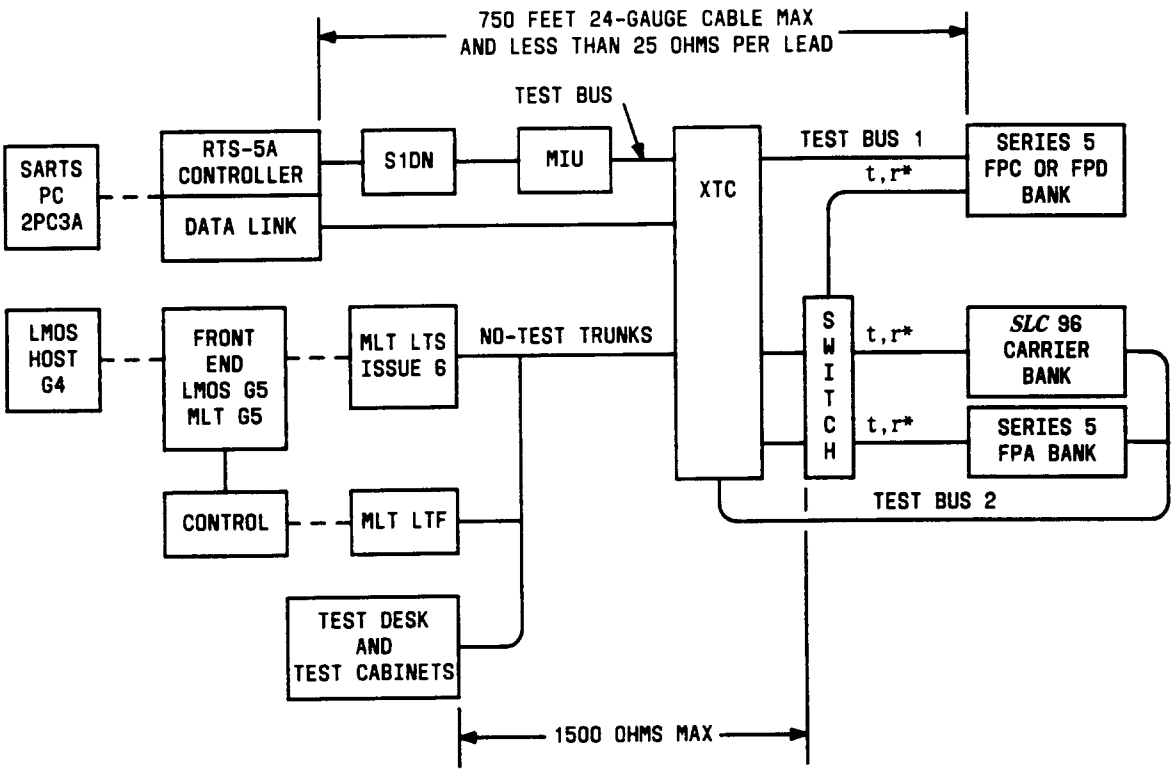
1.14 Table C lists the software and firmware generics needed to support enhanced testing with the XTC.

TABLE C
SOFTWARE AND FIRMWARE GENERICS

EQUIPMENT	SOFTWARE GENERIC (NOTE)	FIRMWARE GENERIC
MLT-2		
LMOS Host	G4	—
LMOS-Front End	G5, Issue 2.1	—
or		
LMOS High Capacity -Front End	G1, Issue 2.0	—
MLT	G5, Issue 1.0	—
LTS	—	Issue 6
SARTS		
Process Controller	2PC3A	—
RTS 5A Firmware (Full Duplex Operation)	—	5RTS3

Note: This issue or later.

1.15 The SARTS uses its RTS-5A and SMAS 5A architecture (Figure 6) to connect to the XTC. The RTS-5A has a data link module that communicates over an asynchronous data link with the XTC. It also includes test ports that are switched via the SMAS 5A network (S1DN, MIU) to connect to the XTC. When SARTS requests access to an FPC or FPD bank over its data link to the XTC, it connects directly to an FPC or FPD bank via the XTC without going through the switch. Figure 6 shows the length restrictions on cabling among the XTC, the Series 5 system, and the SARTS RTS (remote test system). The RTS-5A and SMAS 5A equipment is located in the same wire center with the XTC. The SARTS process controller may be remotely located and may serve more than one RTS.



* t, r REPRESENTS TIP AND RING LEADS.

Figure 6 — XTC Connections to Testing Systems

1.16 The XTC uses the same test bus multiple as used by the PGTC (shown as test bus 2 in Figure 6) to connect to *SLC* 96 and *SLC* Series 5 carrier system FPA or FPC or FPD banks equipped with AUB2/AUB2B or AUB22 channel test units at the COT and RT, respectively. Thus, when doing a cutover from an existing PGTC to a newly installed XTC, the PGTC cable must be unplugged where it connects to the *SLC* 96 carrier or FPA bank at the beginning of the test bus multiple and connected to the XTC (J109) connector.

1.17 The XTC connects to FPC and FPD banks (equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively) with a different cable from that used with *SLC* 96 carrier and Series 5 FPA, FPC or FPD banks (equipped with AUB2/AUB2B and AUB22 channel test units at the COT and RT, respectively) (shown as test bus 1 on Figure 6). This 35-lead interface serves 12 FPC or FPD banks — one 11-foot, 6-inch bay or two 7-foot bays. When fully configured, an XTC serves a total of up to 360 FPC or FPD banks.

1.18 If both test bus 1 and test bus 2 cables (Figure 6) are wired to a Series 5 bay, connection to test bus 1 to derive the enhanced features of the XTC is made when the FPC or FPD bank being tested contains AUB5 (COT) and AUB25 (RT) channel test units. Connection to test bus 2 to derive PGTC features of the XTC is made when AUB2/AUB2B (COT) and AUB22 (RT) channel test units are installed in the FPA, FPC or FPD banks under test. Connections to test bus 1 and 2 are made on the backplane of the XTC.

1.19 The XTC is compatible with the *SLC* carrier systems working on T1 digital lines (metallic) or lightguide cable. If the carrier facility is lightguide cable, access to drops at the remote terminal must be provided separately (dc test pair) since there are no copper pairs in lightguide cable.

1.20 The term MC (maintenance center) is used throughout this section to denote either an MLT, LTD, or test cabinet. The term SSC (special service center) is used interchangeably with SARTS since tests performed from the SSC will be performed using SARTS.

2. DESCRIPTION

A. Physical Features

2.01 An XTC consists of XTC shelves and, if MLT/LTD testing is required, PGTC shelves. The XTC shelves consist of one control shelf (J1C182XA, L1) and two expansion shelves (J1C182XA, L2 and L3). The control shelf is always required for an XTC installation. The expansion shelves are only installed as needed — they provide additional tester units and fan-out units needed to service additional *SLC* Series 5 carrier system banks equipped with FPC or FPD capability. (Refer to Figures 7, 8, and 9).

2.02 The XTC control and each expansion shelf is 12 inches high, 23 inches wide, and 11 inches deep. The shelves are designed for front mounting in a 23-inch wide framework. The recommended mounting arrangement includes all shelves in the same bay (including the PGTC shelves if required). The XTC control shelf should be installed in the middle of the equipment frame. The J1C142A PGTC shelves (Figures 10 and 11) should be front mounted directly below the XTC control shelf. If PGTC expansion shelves are added to the bay, locate them below the XTC control shelf. When XTC expansion shelves are added to the bay, locate them above the XTC control shelf. If the XTC is to be connected to SARTS, then SARTS MIU (metallic interface units), J1P033BE-(), L1, L2 can be front mounted in the same bay at the extreme bottom or in the RTS-5A bay. (Each shelf is 2 inches high.) Each MIU serves two XTC tester units. Therefore, two MIUs are required for an XTC control shelf — two are required for XTC expansion shelf 1, and one is required for XTC expansion shelf 2.

2.03 The recommended bay arrangement for a typical XTC installation along with associated equipment is shown in Figure 12.

2.04 The XTC control shelf (Figure 7) houses a maximum of 28 circuit packs. These circuit packs are listed in Table D. The baffle assembly located at the bottom of the control shelf contains four TEST pin jacks (+20HZ, -20HZ, GND, and -48V), two 0.5A and three 5A fuses (see Table E), and a red incandescent FAIL indicator.

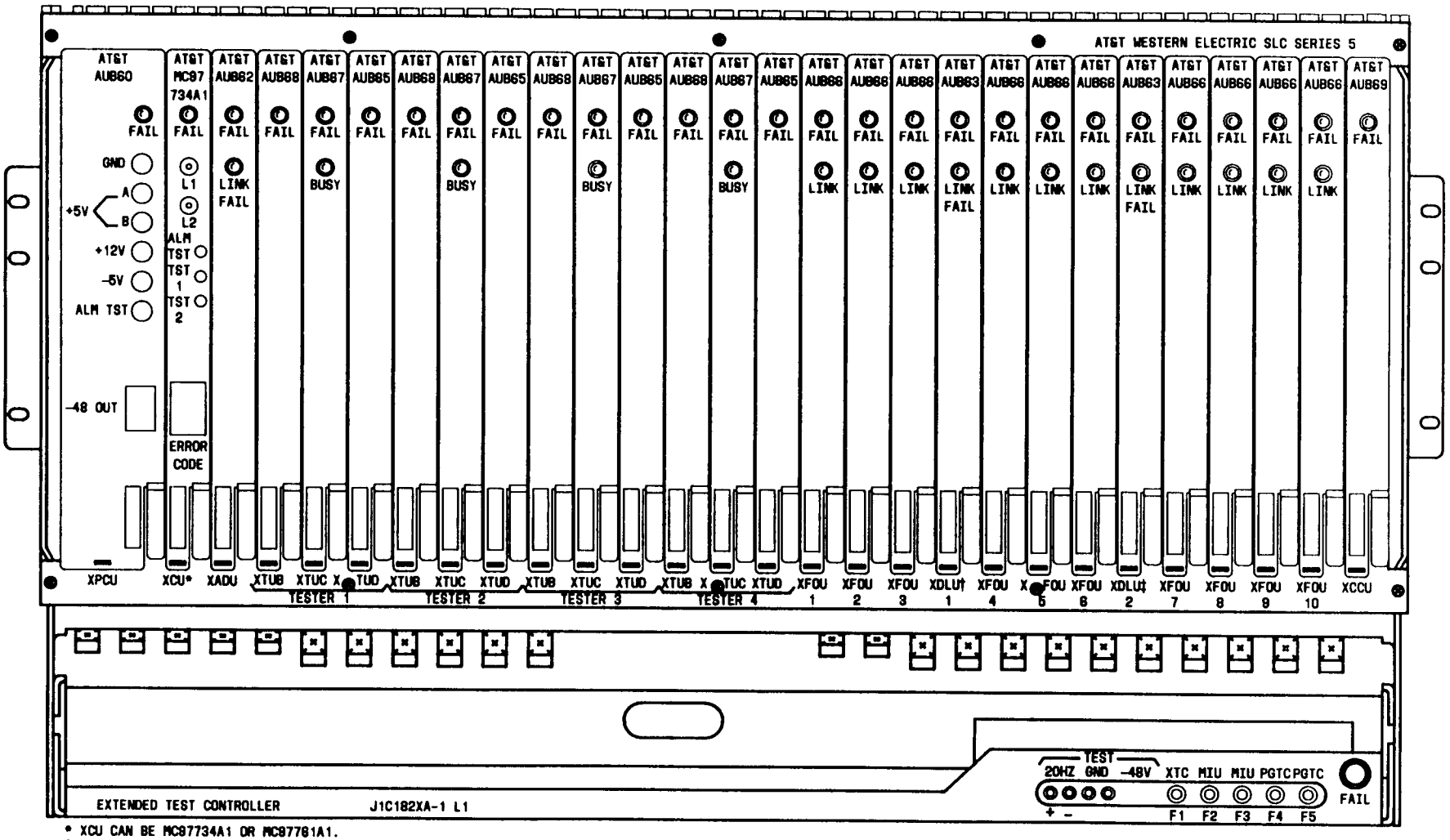
TABLE D
XTC J1C182XA, L1 CONTROL SHELF CIRCUIT PACKS

CODE	DESIGNATION	MAX. NUMBER PER SHELF	*CLEI* CODE
AUB60	Power Converter Unit (XPCU)	1	5SXT100AXX
MC97734A1 or MC97761A1	Control Unit (XCU)	1	5SXTA00BXX 5SXTA20BXX
AUB62	Alarm Display Unit (XADU)	1	5SXT201AXX
AUB63 or AUB63B	Data Link Unit (XDLU)	2*	5SXT300AXX 5SXT320AXX
MC97745A1 2	Tester Unit D (XTUD)	4	5SXT513CXX
AUB66	Fan-Out Unit (XFOU)	10	5SXT600AXX
AUB67	Tester Unit C (XTUC)	4	5SXT700AXX
AUB68 Series 2	Tester Unit B (XTUB)	4	5SXT802AXX
AUB69	Composite Clock Unit (XCCU)	1	5SXT900AXX

* One AUB63 and one AUB63B, *or* two AUB63B XDLUs.

TABLE E
XTC J1C182XA, L1 CONTROL SHELF FUSES

FUSE DESIGNATION	FUSE TYPE	AMPERE RATING	INDICATOR COLOR
XTC F1	80D	5	GREEN
MIU F2	80G	0.5	RED
MIU F3	80G	0.5	RED
PGTC F4	80D	5	GREEN
PGTC F5	80D	5	GREEN



* XCU CAN BE MC97734A1 OR MC97761A1.
† XDLU POSITION 1 CAN BE AN AUB63 OR AUB63B (FOR SARTS APPLICATIONS).
‡ XDLU POSITION 2 FOR COP APPLICATIONS ONLY, AND MUST BE AN AUB63B.

Figure 7 — XTC J1C182XA, L1 Control Shelf

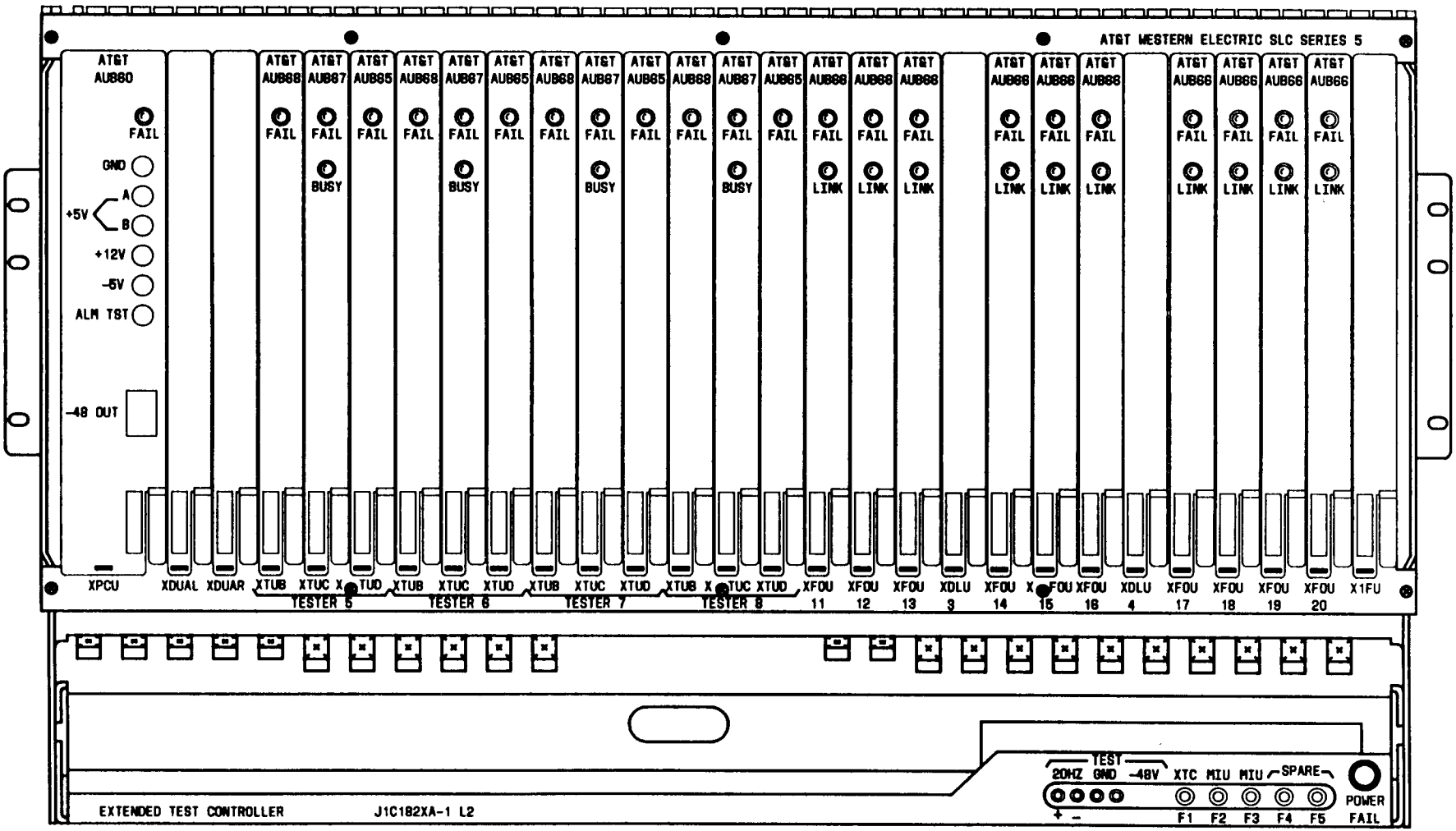


Figure 8 — XTC J1C182XA, L2 Expansion Shelf

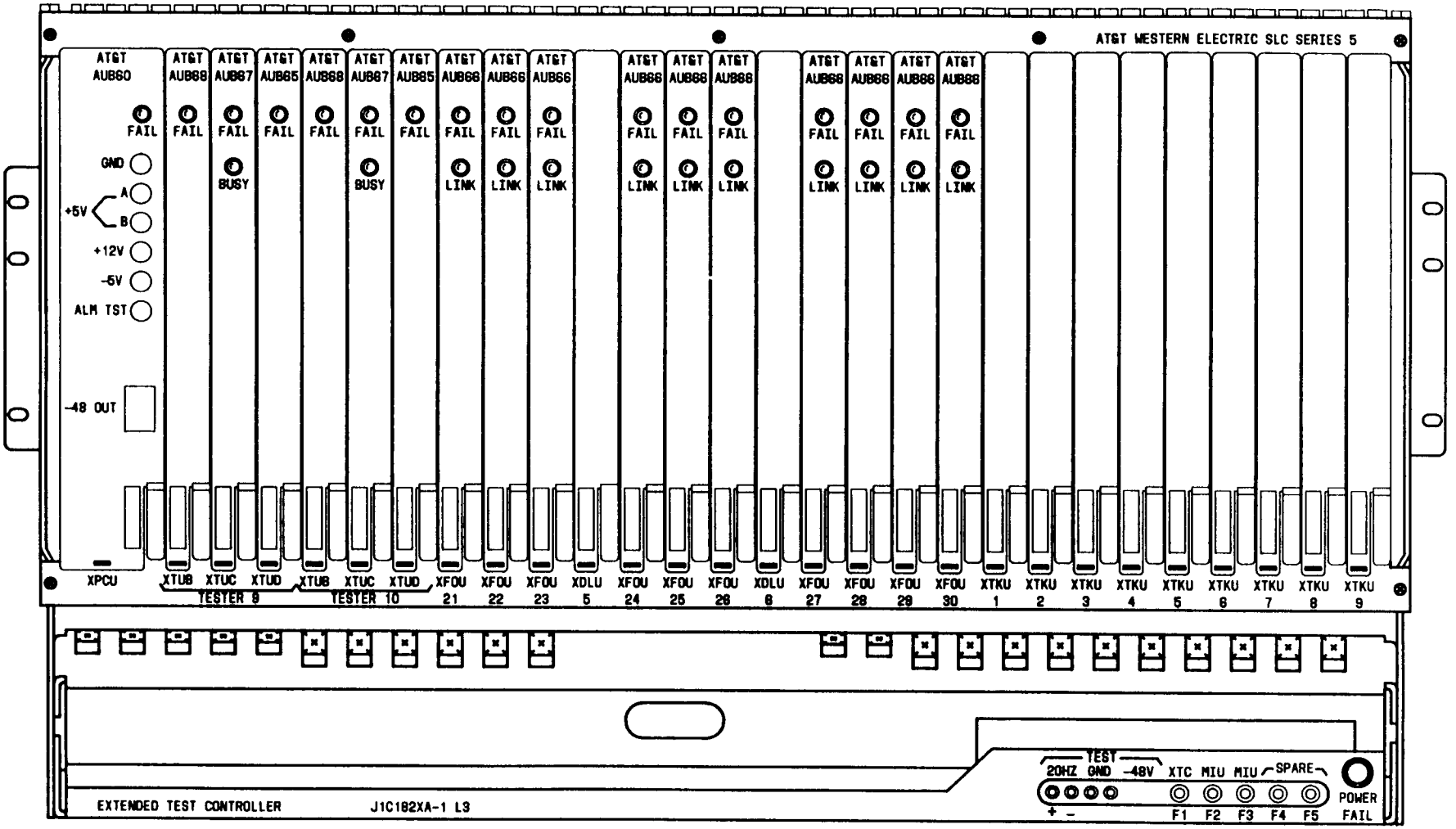


Figure 9 — XTC J1C182XA, L3 Expansion Shelf

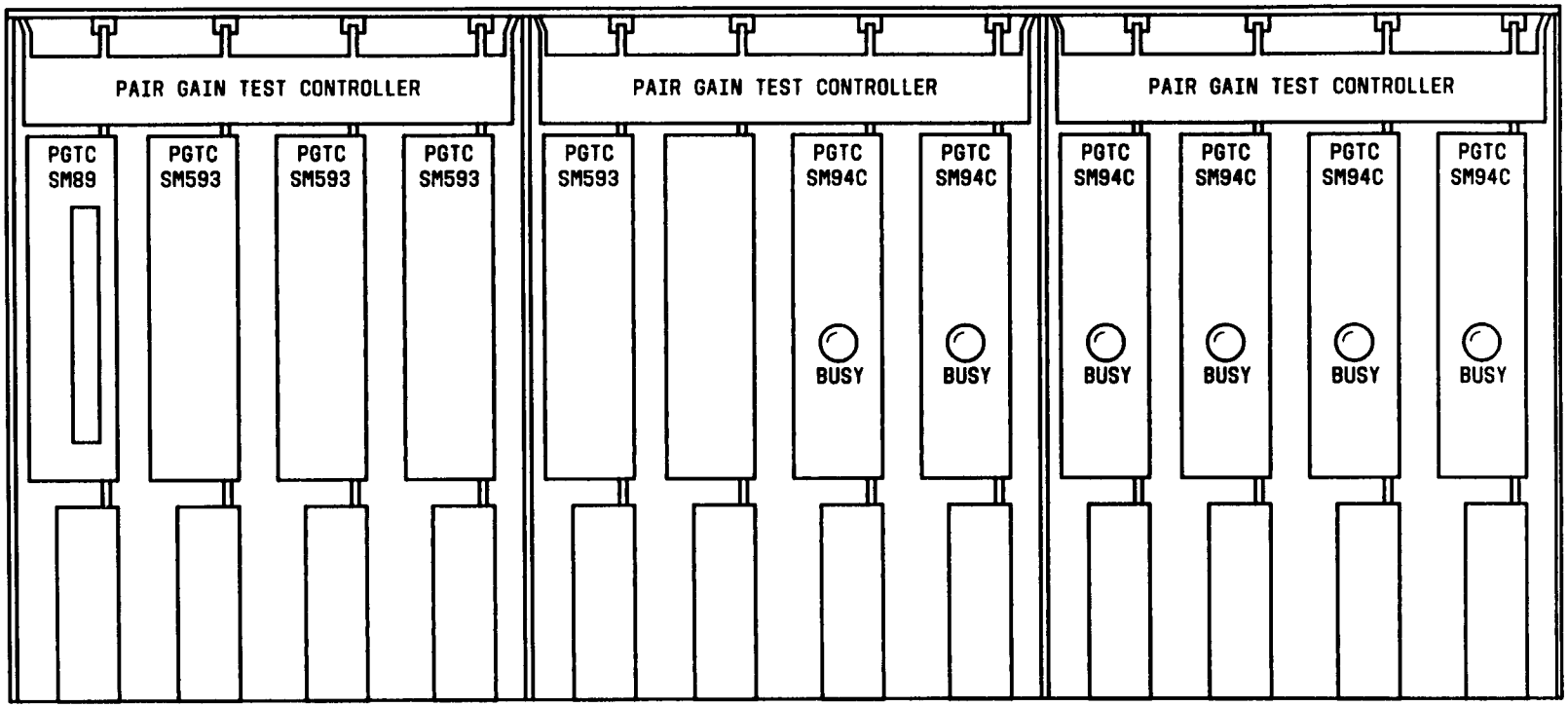


Figure 10 — PGTC J1C142A, L1 Control Shelf (Modified)

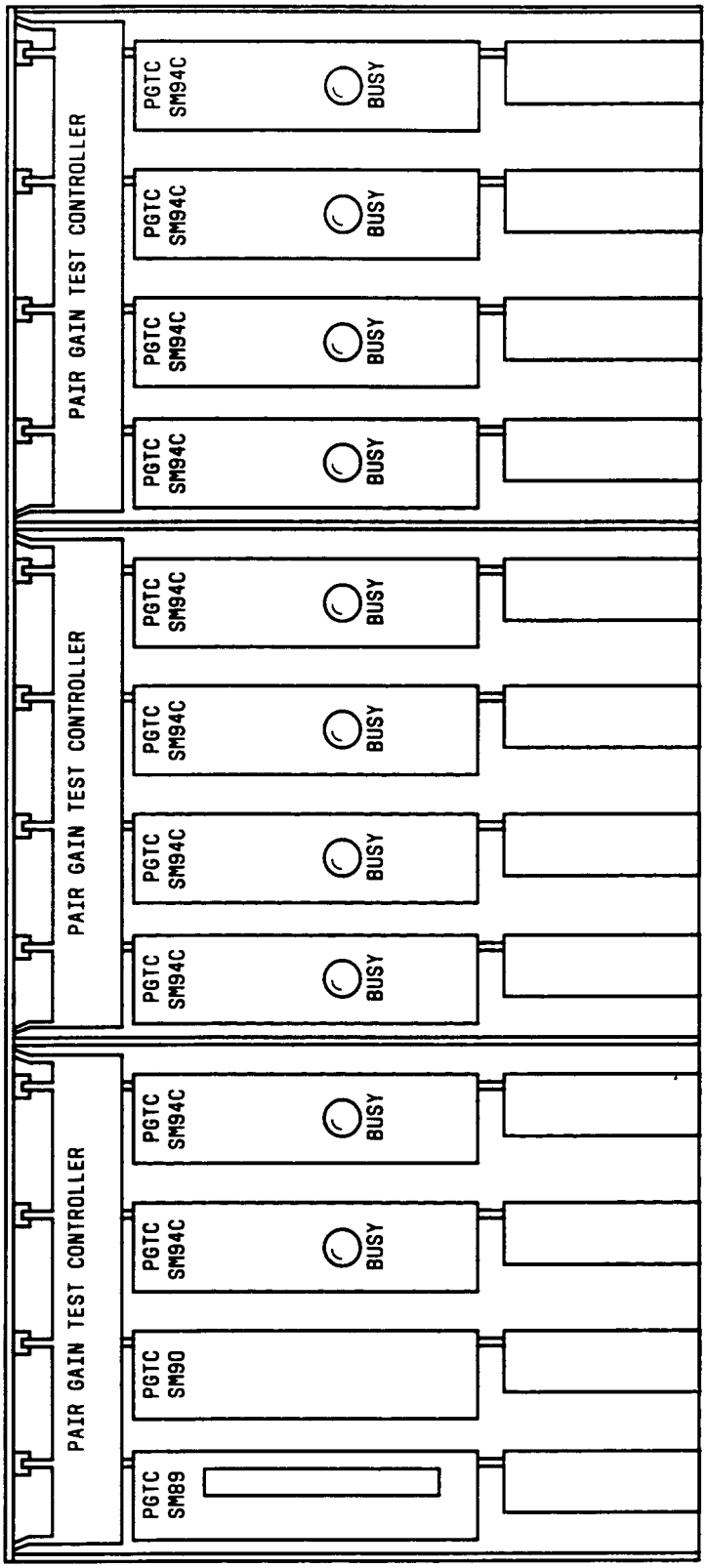
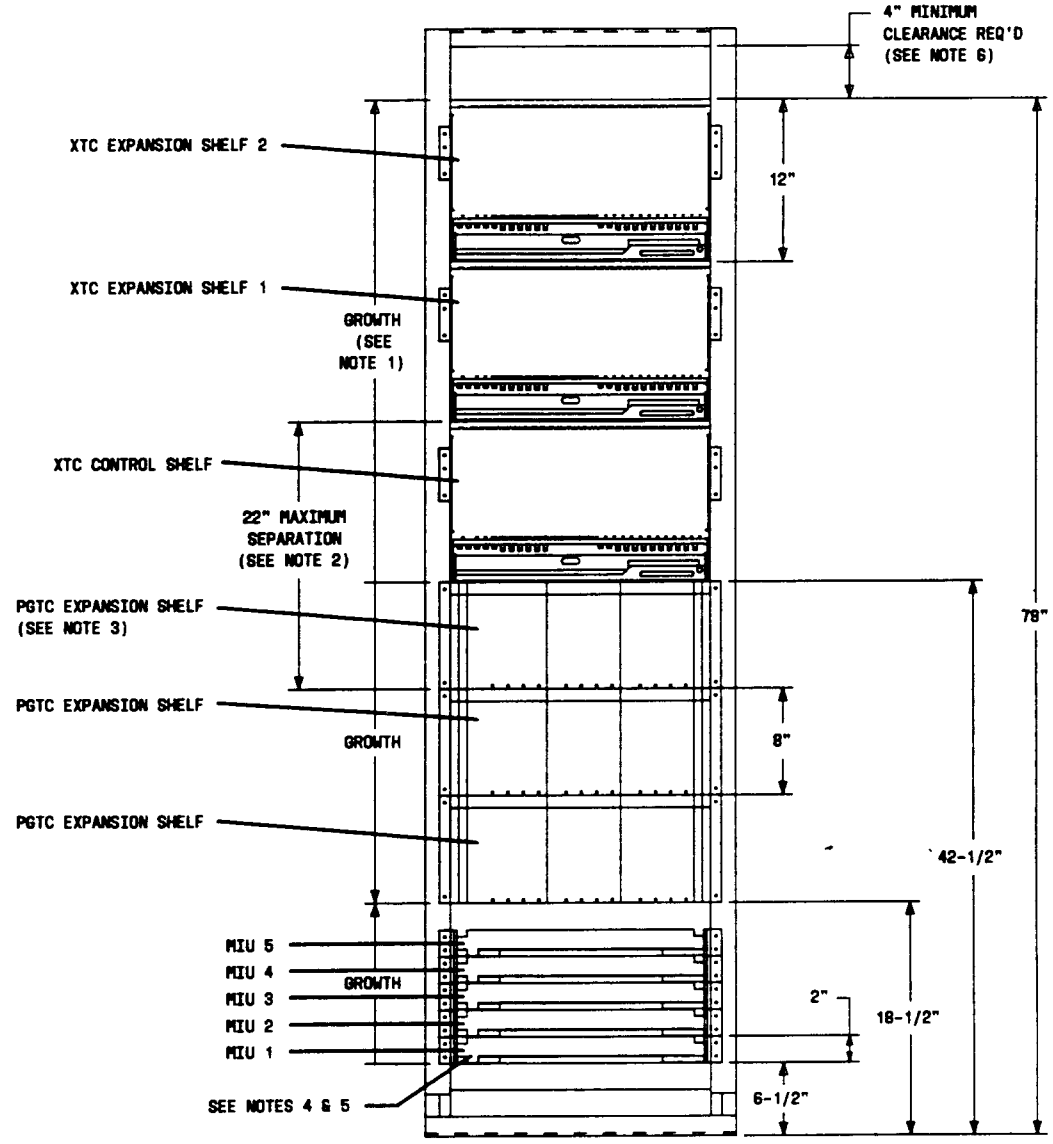


Figure 11 — PGTC J1C142A, L2 Expansion Shelf



NOTES:

1. ALLOW FOR THE ANTICIPATED GROWTH — THE XTC EXPANSION IS UPWARD, THE PGTC EXPANSION IS DOWNWARD, AND THE MIU (METALLIC INTERFACE UNIT) EXPANSION IS UPWARD.
2. THE XTC AND PGTC MUST BE MOUNTED IN THE SAME BAY TO MAINTAIN CABLE LENGTH RESTRICTIONS. THE MAXIMUM ALLOWABLE LENGTH OF CABLE BETWEEN THE XTC CONTROL SHELF AND THE NEAREST PGTC SHELF IS 4-1/2 FEET. THIS CABLE LENGTH RESTRICTION IS CRITICAL FOR THE PROPER OPERATION OF THE XTC/PGTC. IF THE BAY LAYOUT SHOWN HERE CANNOT BE ACCOMMODATED, IT IS RECOMMENDED THAT THE POSITIONING OF THE EQUIPMENT BE ADHERED TO WHENEVER POSSIBLE (E.G., THE XTC CONTROL SHELF MOUNTED ABOVE THE PGTC CONTROL OR THE PGTC EXPANSION SHELF WITH MINIMUM SEPARATION).
3. PGTC EXPANSION SHELF IS PREFERRED, HOWEVER A PGTC CONTROL SHELF CAN BE USED.
4. THE MIU HARDWARE IS TO BE LOCATED AT THE BOTTOM OF THE BAY. THIS WILL PREVENT AIR BLOCKAGE, SINCE THE MIUS ARE SOLID AND WILL BLOCK AIR FLOW.
5. A 2-INCH AIR GAP IS REQUIRED BETWEEN THE MIU AND THE PGTC TO ALLOW PROPER AIR INTAKE FOR THE PGTC. TYPICALLY THERE IS A 1-INCH SPACE BETWEEN EQUIPMENT WITH THE EXCEPTION OF SPACING BETWEEN MIUS — MIU SPACING IS 1/2 INCH.
6. THIS SPACE IS REQUIRED TO AVOID THERMAL PROBLEMS RESULTING FROM HEAT DISSIPATED BY THE XTC TO EQUIPMENT MOUNTED ABOVE.

Figure 12 — Preferred Bay Layout of XTC and Associated Equipment

2.05 The TEST jacks provide access to allow the ringing and -48 volts input voltage to be checked. Fuse F1 provides fusing for the power being supplied to the XPCU circuit pack. Fuses F2 and F3 fuse power supplied to the SARTS MIU (metallic interface units). If required, fuses F4 and F5 fuse power supplied to PGTC shelves. The FAIL indicator will light if a fuse or circuit pack in the XTC control shelf or either of the XTC expansion shelves fails. The FAIL indicator will extinguish when the fault is cleared or when the ACO button on the XADU circuit pack is pressed.

2.06 Two terminal strips labeled TB1 and TB2 are located at the lower rear of the XTC control shelf. Terminal strip TB1 provides connections for central office -48 Vdc input power to the XTC and terminal strip. TB2 provides power connections for the PGTC and the SARTS MIUs through fuses F2 through F5 on the baffle assembly.

2.07 The control shelf may be equipped with circuit packs to provide common control and test functions for up to 60 *SLC* Series 5 carrier dual channel banks equipped with FPC or FPD capability using AUB5 and AUB25 CTUs. It can also support *SLC* 96 and *SLC* Series 5 carrier system banks equipped with FPA, FPC or FPD capabilities using AUB2/AUB2B and AUB22 CTUs.

2.08 All of the circuit packs (except XPCU) contained in the control shelf measure approximately 8.0 inches high, 0.7 inch wide, and 10.0 inches long. The XPCU measures approximately 8.0 inches high, 2.0 inches wide, and 10.0 inches long.

2.09 The J1C182XA, L2 (Figure 8) and J1C182XA, L3 (Figure 9) expansion shelves house a maximum of 25 and 19 circuit packs, respectively. These circuit packs are listed in Table F. The baffle assembly located at the bottom of the expansion shelves contains four TEST pin jacks (+20HZ, -20HZ, GND, and -48V), two 0.5A and three 5A fuses (see Table G), and a red incandescent FAIL indicator.

2.10 When any fuse or the XPCU circuit pack fails, the POWER FAIL indicator will light on the affected expansion shelf and control shelf. These jacks and indicators perform the same function as corresponding jacks and indicators that were previously described for the control shelf.

2.11 Two terminal strips labeled TB1 and TB2 are located at the lower rear of each XTC expansion shelf. Terminal strip TB1 provides connections for central office -48 Vdc input power to the XTC and terminal strip. TB2 provides power connections for the SARTS MIU wiring through fuses F2 and F3 on the baffle assembly.

2.12 Each XTC expansion shelf can be equipped to support up to 60 *SLC* Series 5 carrier system dual channel banks equipped with FPC or FPD capability using AUB5 and AUB25 CTUs. The circuit packs contained in the expansion shelves are listed in Table F.

TABLE F
XTC J1C182XA, L2 AND L3 EXPANSION SHELVES CIRCUIT PACKS

CODE	DESIGNATION	MAX. NUMBER PER SHELF	
		L2	L3
AUB60	Power Converter Unit (XPCU)	1	1
—	Data Link Unit (XDLU)*	2	2
MC97745A1 2	Tester Unit D (XTUD)	4	2
AUB66	Fanout Unit (XFOU)	10	10
AUB67	Tester Unit C (XTUC)	4	2
AUB68 Series 2	Tester Unit B (XTUB)	4	2
—	XTKU*	—	9
—	XDAUL*	1	—
—	XDAUR*	1	—
—	XIFU*	1	—

* For Future Enhancement.

TABLE G
XTC J1C182XA, L2 AND L3 EXPANSION SHELF FUSES

FUSE DESIGNATION	FUSE TYPE	AMPERE RATING	INDICATOR COLOR
XTC F1	80D	5	GREEN
MIU F2	80G	0.5	RED
MIU F3	80G	0.5	RED
SPARE F4	80D	5	GREEN
SPARE F5	80D	5	GREEN

B. Power and Ringing Requirements

2.13 The XTC control shelf requires a −48 Vdc (signal grade) battery supply fused at 20.0 amperes and uninterrupted ringing voltage supplies fused at 0.5 amperes. The ringing voltages supplied to the XTC must correspond to the ringing voltages applied to the *SLC* carrier system (ac-dc positive or negative superimposed as appropriate). Each XTC expansion shelf

requires a −48 Vdc (signal grade) battery supply fused at 8.0 amperes (maximum). The recommended central office fusing for all XTC shelves and associated PGTC and MIU shelves is 30.0 amperes.

C. Cabling Requirements

2.14 The PWB (printed wiring board) backplanes supply all intrashelf wiring. Wire wrap, screw terminals, and connectors are included for terminating installation wiring. During installation, specific cable and wire connections are required:

- A connectorized cable connects the XTC to *SLC* 96 and *SLC* Series 5 carrier systems (equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively) using the same 28-lead test bus multiple as used by the PGTC (shown as test bus 2 in Figure 6). The cutover from an existing PGTC to a newly installed XTC, therefore, requires the unplugging of the PGTC cable where it connects to the *SLC* 96 carrier system or *SLC* Series 5 carrier bank at the beginning of the test bus multiple, and replacing it with the corresponding XTC multiple cable.

  The XTC connects to FPC and FPD banks with a 35-lead cable (shown as test bus 1 in Figure 6). Each connectorized cable service up to 12 systems if the XTC is installed in offices with 11-foot 6-inch or 7-foot bays, or 8 systems, if the XTC is installed in offices equipped with 9-foot bays. A fully equipped XTC will have 30 of these cables connected to support 360 FPC and FPD systems in offices with 11-foot 6-inch bays, or 30 cables to serve 240 FPC systems in offices with 9-foot bays. Cabling of FPC and FPD banks in groups of 12 (or 8) restricts cable and equipment faults to a subset of the FPC and FPD systems in a wire center, and helps maintenance craft to isolate troubles.

  Both test bus 1 and test bus 2 may be cabled directly from the XTC to a Series 5 system frame (which may be up to a maximum of 750 feet away). When AUB5 and AUB25 CTUs are inserted in a Series 5 FPC or FPD system, the enhanced features of the XTC are derived since these CTUs connect to test bus 1 at the backplane. On the other hand, when AUB2B and AUB22 CTUs are installed in a FPA, or FPC or FPD bank, connection to test bus 2 is made at the backplane, and the test capability of the PGTC is derived.

- Wire wrapped NTT (no-test trunk) connections at the PGTC control or expansion shelf for connection to the MC and CO (central office) switch.

- Connectorized cables for connections to the SARTS MIU and the SARTS data link interface unit.

- −48 Vdc power and ground wires connected to screw terminals at the XTC.

- 20-Hz ringing supply cable wire wrapped to the XTC.

- If multiple shelves are used, connectorized intershelf wiring.

- Cabling to PGTC shelves.

- Wire wrapped audible, visual, system identification, and remote alarm cutoff for central office alarm connections.

- Cabling of XTC's CUE (channel unit emulator) telephone number to CO switch.

D. Capabilities and Limitations

2.15 The XTC connects to test ports that serve an MC or an SSC equipped for manual or automated testing. The XTC, like the PGTC, is compatible with all testing features of the LTD (local test desk), test cabinet, and automated testing arrangements. Most LTDs and test cabinets are equipped with all testing keys required for testing through the XTC. Locations that do not have a functional [+STA] key on the LTDs or test cabinets must have the [+STA] key and associated circuitry installed for testing through the XTC.

2.16 The XTC is compatible with direct dc test trunks. When an MC tests subscribers lines being served by a pair gain system, all test trunks except main frame trunks should be connected to the XTC.

2.17 In all cases except one, subscriber channels bridged in the CO *cannot* be tested with the XTC by dialing up the telephone number of the channel unless the bridge is lifted before the test is started. The *exception* to this — when two subscribers are bridged at the CO with the RING party being served by carrier and the TIP party being served by metallic facilities. If minibridge lifters are used, the carrier channel (RING party) can be fully tested by the XTC, including the drop beyond the RT as well as the automatic test of the carrier channel.

E. Circuit Packs

2.18 When the XTC is used with an MC, a PGTC shelf equipped with trunk cards and a power supply is required. To prevent rewiring of existing PGTC installations that have sufficient space for XTC hardware close to the PGTC, the XTC has been designed to work with PGTC SM94C trunk cards. Also, an SM90 fanout extender circuit pack is required for test trunks installed in a PGTC expansion shelf. A description of the PGTC shelves and associated circuit packs is in AT&T Practice 363-202-300.

2.19 Nine different codes of circuit packs are available for use in the XTC control and expansion shelves. The control shelf uses all nine different codes of circuit packs (Table D). However, the expansion shelves use only a portion of the available circuit pack codes (Table F). Upon installation and on a periodic basis, all circuit packs perform a self-diagnostic test. If the test should fail, an office alarm will be activated. The functional description of each circuit pack that can be installed in either the control shelf or expansion shelves is the same regardless of where the circuit pack is located.

2.20 The following parts describe each of the XTC circuit packs and particular PGTC circuit packs used in conjunction with the XTC.

AUB60 Power Converter Unit (XPCU)

2.21 The XPCU uses the −48 V central office signal grade battery supply to generate +5A, +5B, −5, +12, ±48, and ±130 Vdc outputs. These output voltages are used to power other XTC units and provide control signals for CU (channel unit) testing.

2.22 Mounted on the faceplate of the XPCU circuit pack (Figure 13) are:

- Five pin jacks (GND, +5V A, +5V B, +12V, and -5V). These pin jacks provide a means of verifying that the +5V A, +5V B, -5V, and +12V outputs are present.
- One pin jack switch (ALM TEST). When operated by a metallic pin such as a KS-19531 type plug, this switch causes the XPCU FAIL indicator to light and the central office alarm output to be activated.
- One 38A fuse block (-48 OUT). This fuse block contains an 80C (3A, blue bead) fuse that fuses a -48 V filtered battery supply.
- One red LED (light emitting diode) indicator (FAIL). When any one of the following conditions are met, the XTC FAIL indicator will light, along with the FAIL indicator on the XADU circuit pack faceplate:
  - ☐ Under- or over-voltage condition is detected on either or both of the +5A and +5B supplies.
  - ☐ Under-voltage condition exists on either or both of the -5 and +12 supplies.
  - ☐ Any of the +48, ±130, or -48 supplies fails.

2.23 When any of the previous failures causes the FAIL indicator to light, the XPCU will operate contact closures that can be wired to provide six indications:

- Minor alarm closure for the MC
- Minor alarm closure for the SSC
- Closure for system ID for the MC
- Closure for system ID for the SSC
- Closure for CO visual alarm
- Closure for CO audible alarm.

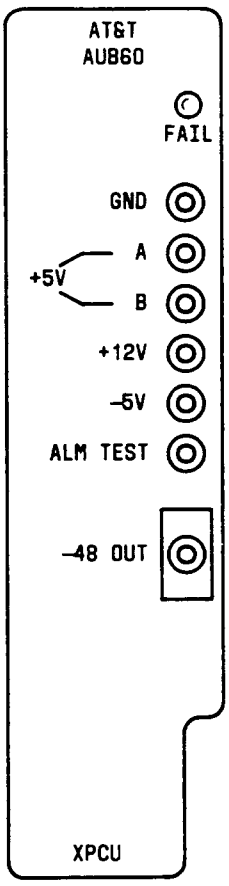


Figure 13 — XTC Power Converter Unit (AUB60)

MC97734A1 Controller Unit (XCU)

2.24 The XCU is microcomputer controlled and supports testing from MLT, LTDs, test cabinets with an [+STA] key, and SARTS. The XCU also controls specific internal operations of the XTC:

- Directs all CU test procedures.
- Responsible for communications between the XTC and the banks of the *SLC* carrier system.
- Determines if resources are available to satisfy a request for test access.
- Handles combinations of up to 10 simultaneous SARTS, MLT, LTD, and test cabinet test sessions.
- Checks other XTC circuit packs for proper operation and activates an alarm if one malfunctions.
- Performs the transmission and signaling tests of the carrier system channels when commanded from an LTD (local test desk), LTC (local test cabinet), MLT (mechanized loop testing) system, or SARTS.

2.25 Mounted on the faceplate of the XCU circuit pack (Figure 14) are:

- Three LED indicators (L1, L2, and FAIL). The red FAIL indicator will light if a failure occurs within the XCU circuit pack. The L1 and L2 indicators are yellow LEDs; the L2 indicator is used during functional tests of XTC tester units and the L1 indicator is unused at this time.
- Three pin jacks (TST1, TST2, and ALM TST). The TST2 jack is used in conjunction with indicator L2 for tester unit testing. The ALM TST and TST1 jacks are unused at this time.
- One 7-segment LED display (ERROR CODE). This numeric LED panel will display up to eight codes to indicate failures on the link between the XTC and *SLC* 96 and *SLC* Series 5 carrier systems equipped with AUB2/AUB2B and AUB22 channel test units at the COT and RT, respectively. Table H lists the codes that can appear on the LED display and the procedures to clear the display.

MC97761A1 Controller Unit (XCU)

2.26 The MC97761A1 XCU (Figure 14) provides all of the functions of the MC97734A1 XCU plus more:

- Provides the channel unit isolation testing capabilities for the multiparty, FSR, and DID channel units.
- Supports the COP (Centralized Operations and Provisioning) feature.
- Displays TRCs (test result codes) on the 7-segment LED of the ERROR CODE display — these TRCs are similar to the TFC (test failure codes) displayed by the SM88C control unit of a PGTC.

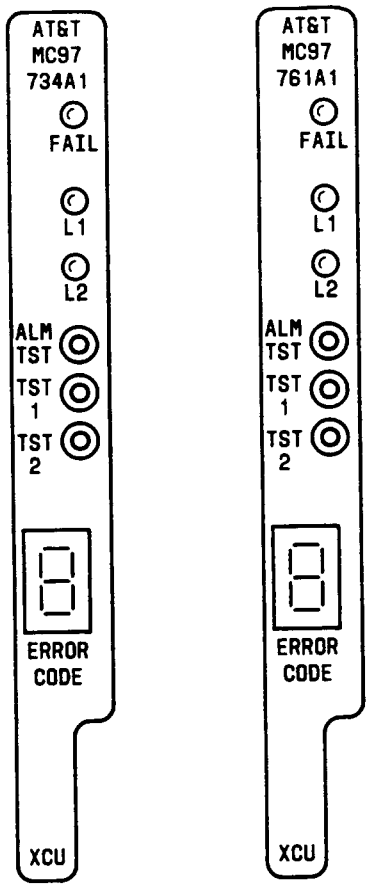


Figure 14 — XTC Control Unit (MC97734A1 or MC97761A1)

The test result codes are used during turnup of the XTC or channel bank, and for trouble fault isolation of carrier system channels. The test result codes are used in two modes of operation:

- PGTC mode. The XTC is being used with *SLC* 96 carrier system or Series 5 systems equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively.
- Enhanced (XTC) mode. The XTC is being used with *SLC* Series 5 carrier FPC and FPD systems equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively.

2.27 The XTC performs the transmission and signaling tests of the carrier system channels when commanded from a LTD (local test desk), LTC (local test cabinet), MLT (mechanized loop testing) system, or SARTS. The 7-segment LED on the XCU displays a test result code that indicates which automatic transmission or signaling test has failed (Tables I and J). The code indicates the type of test (single-party, multiparty, or coin) that has failed, and the sequence number of the test. This test result code display applies only to end-to-end test — it does not apply to channel unit fault isolation tests.

2.28 The test result code is displayed on the 7-segment LED display shown in Figure 15. For the PGTC mode, each segment has a specific function. The horizontal segments indicate the type of test:

- The top horizontal segment indicates test failure of an SP (single-party) channel.
- The middle horizontal segment indicates test failure of an MP (multiparty) channel.
- The bottom horizontal segment indicates test failure of a CN (coin) channel.

The vertical segments indicate the test sequence number. The vertical segments are assigned values, in binary format, to represent the number of the test. Determine the test sequence number by adding the digits associated with the lighted vertical segments.

2.29 For the enhanced (XTC) mode, the vertical segments have the same meaning as in the PGTC mode. But, the horizontal segments are different. In the XTC mode, the horizontal segments indicate the type of test but use the complement of the horizontal segment code used in the PGTC mode:

- The middle and bottom horizontal segments indicate test failure of an SP channel.
- The top and bottom horizontal segments indicate test failure of an MP channel.
- The top and middle horizontal segments indicate test failure of a CN channel.

2.30 The test result code is displayed on the 7-segment LED by operating the 3WD key at the LTD or LTC — the display remains on while the 3WD key is operated. In the case of multiple testing, the first test desk to request test results controls the ERROR CODE display until the TD (test disconnect) key is operated by that test desk.

2.31 Test result codes are only valid for end-to-end tests. If a test result code is displayed after any of the multifrequency 900 commands have been executed, it will be *invalid* and should be *ignored*.

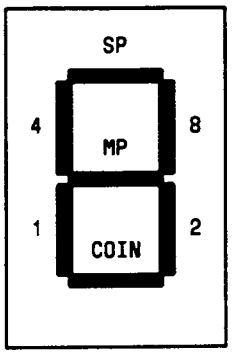


Figure 15 — XCU 7-Segment Test Result Code Display

TABLE H
XTC CONTROL UNIT ERROR DISPLAY CODES

ERROR CODE DISPLAYED	DEFINITION
1	Permanent Seize*
2	Permanent Seize Busy (SEZBY)*
3	Permanent Major Alarm (TMAJ)*
4	Permanent Tone Detect†
6	Permanent Sleeve A (SLV A)‡
7	Permanent Sleeve B (SLV B)‡
8	Permanent Sleeve C (SLV C)‡
9	Permanent Sleeve D (SLV D)‡

* A display of 1, 2, or 3 indicates a stuck seize, seize busy, or TMAJ condition, respectively, in the interface between the XTC and the *SLC* 96 or *SLC* Series 5 carrier system equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively. To clear, remove the CTU circuit packs, one at a time, from those banks until the alarm stops. Replace the CTU that causes the alarm to stop. If the alarm fails to stop after removing all of the CTUs, replace the XADU circuit pack in the XTC. If the alarm persists, check the wire corresponding to the error code for a ground between the XTC and banks.

† To clear, remove the trunk cards, one at a time, from the PGTC shelf until the alarm clears. Replace the trunk card that clears the alarm. If removing all trunk cards fails to clear the alarm, replace the XADU card in the XTC shelf.

‡ A display of 6, 7, 8, or 9 indicates that the SLVA, SLVB, SLVC, or SLVD condition, (sleeve permanently grounded) respectively, exists between the XTC and the *SLC* 96 or *SLC* Series 5 carrier system equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively. To clear, remove the CTU circuit packs, one at a time, from those banks until the alarm stops. If the alarm fails to stop after removing all of the CTUs, replace the XADU circuit pack in the XTC. If the alarm persists, check the associated SLV wire between the XTC and the banks for a ground.

TABLE I
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE (NOTE)	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
SINGLE-PARTY TEST, PART 1 Permanent Ring ground test	SA1		1. Check No Test Trunk wiring between XTC and switch, and wiring between switch and COT channel for ground on Ring conductor. 2. Replace COT and RT channel units.
5ESS® switch and absorptive echo tests	SA2		1. In a *5ESS* switch office, verify XTUB upgrade to AUB68 Issue 2 or 3, and XTUD (MC97745A1) upgrade to MC97745A1 2 per CCN0106NC and CCN0105NC. 2. Replace COT and RT channel units. 3. Replace the RT CTU. 4. Verify that cabling between the XTC and COT channel unit is less than or equal to 2500 feet of 24-gauge wire. 5. Check for excessive loss in No Test Trunk wiring from the XTC to the switch and wiring from the switch to the channel unit. Check for improper placement of a test trunk ringing circuit or other impedance between the XTC and the switch. 6. Check for excessive loss through *5ESS* switch line unit (expect 2 dB loss in each direction).

Note: SA/MA/CA denotes PGTC mode — SB/MB/CB denotes enhanced (XTC) mode.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			7. Check for an undetected stuck test relay on some other RT channel unit in the bank under test. If the CTU is busy while there is no active test session, remove and replace each channel unit in the bank under test until the CTU BUSY indicator goes out. If the CTU is not busy, remove and replace each RT channel unit in the bank containing the channel under test until testing capability returns. 8. Normal failure for Fiber-To-The-Home system with Fiber-To-The-Home non-enhanced testing capability. 9. [*SLC* 96 carrier] Replace TRUs.
SINGLE-PARTY TEST, PART 2 Detect on hook	SA3		1. Check for improperly wired connection from XTC J109 to *SLC* carrier system. 2. Replace COT and RT channel units. 3. Replace COT and RT CTU. 4. [*SLC* 96 carrier] Replace TRUs. 5. [*SLC* 96 carrier] Replace ACUs.
Reflective loss test	SA5		1. Check for negative ringing supply connected at RT and XTC. Verify that ringing supplies are of proper type.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			2. In a *5ESS* switch office, verify XTUB upgrade to AUB68 Issue 2 or 3, and XTUD (MC97745A1) upgrade to MC97745A1 2 per CCN0106NC and CCN0105NC. 3. Replace COT and RT channel units. 4. Replace the RT CTU. 5. Verify that cabling between the XTC and the COT channel unit is less than or equal to 2500 feet of 24-gauge wire. 6. Check for excessive loss in No Test Trunk wiring from the XTC to the switch, and wiring from the switch to the channel unit. Check for improper placement of a test trunk ringing circuit or other impedance between the XTC and the switch. 7. Check for excessive loss through *5ESS* switch line unit (except 2 dB loss in each direction). 8. Check for an undetected stuck test relay on some other RT channel unit in the bank under test. If the CTU is busy while there is no active test session, remove and replace each channel unit in the bank under test until the CTU BUSY indicator goes out. If the CTU is not busy, remove and replace each RT channel unit in the bank containing the channel under test until testing capability returns. 9. Normal failure for Fiber-To-The-Home system with Fiber-To-The-Home nonenhanced testing capability.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			10. [*SLC* 96 carrier] Replace TRUs. 11. [*SLC* 96 carrier] Replace ACUs.
Idle channel noise test	SA6		1. In a *5ESS* switch office, verify *5ESS* switch upgrade per CN81002.1NW. 2. Replace COT and RT channel units. 3. Noisy signal grade battery to XTC. 4. Improper grounding of XTC and/or PGTC shelves. 5. Noisy 337A battery charger at RT (Series 5 only). 6. Noisy ringing generator. 7. Check for a stuck test relay between some other RT channel unit and the RT CTU. If the CTU is busy while there is no active test session, remove and replace each channel unit in the bank under test until the CTU BUSY indicator goes out. If the CTU is not busy, remove and replace each RT channel unit in the bank containing the channel under test until testing capability returns. 8. [*SLC* 96 carrier] Noisy 3A battery charger at RT. 9. [*SLC* 96 carrier] Replace TRUs. 10. [*SLC* 96 carrier] Replace LIUs. 11. [*SLC* 96 carrier] Replace SSUs.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			12. [*SLC* 96 carrier] Replace LSUs. 13. [*SLC* 96 carrier] See TAP-142/DLP-605.
Permanent Tip ground test	SA7		1. Check wiring between XTC and COT channel unit for ground on Tip or low impedance between Tip and ground. 2. Replace COT and RT channel units.
All Pass	MA3*		1. Single-Party OK
2-PARTY TEST Detect on hook	MA1		1. Check for improperly wired connection from XTC J109 to *SLC* carrier system. 2. Replace COT and RT channel units. 3. Replace COT and RT CTU. 4. [*SLC* 96 carrier] Replace TRUs. 5. [*SLC* 96 carrier] Replace ACUs.
Reflective loss test	MA3		1. Check office records to make sure this is a multiparty service. Verify multiparty CUs at COT and RT. 2. Replace COT and RT CUs. 3. Replace RT CTU.

* For single-party service, MA3 display is used to denote single-party all pass.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
ANI test	MA4		1. Replace COT and RT CUs. 2. Replace RT CTU.
All Pass	MA0		1. 2- or 4-party OK
4-PARTY TEST Detect on hook	MA5		1. Check for improperly wired connection from XTC J109 to *SLC* carrier system. 2. Replace COT and RT channel units. 3. Replace COT and RT CTUs. 4. [*SLC* 96 carrier] Replace TRUs. 5. [*SLC* 96 carrier] Replace ACUs.
Absorptive echo test	MA7		1. Check office records to make sure this is a 4-party service. Verify that the XADU switch is in the correct position (4P for 4 party). 2. Check for positive ringing supply connected at the XTC. 3. Check that the PRU is installed at the RT. 4. Replace COT and RT channel units. 5. Replace RT CTU.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
Permanent Tip ground test	MA8		1. Replace COT and RT channel units. 2. Replace RT CTU.
Detect on hook	MA9		1. Check for improperly wired connection from XTC J109 to *SLC* carrier system. 2. Replace COT and RT channel units. 3. Replace COT and RT CTUs. 4. [*SLC* 96 carrier] Replace TRUs. 5. [*SLC* 96 carrier] Replace ACUs.
Absorptive echo test	MA11		1. Replace COT and RT channel units. 2. Replace the RT CTU.
All Pass	MA0		1. 2- or 4-party OK.
COIN TEST Detect on hook	CA1		1. Check for improperly wired connection from XTC J109 to *SLC* carrier system. 2. Replace COT and RT channel units. 3. Replace COT and RT CTUs. 4. [*SLC* 96 carrier] Replace TRUs. 5. [*SLC* 96 carrier] Replace ACUs.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
Absorptive echo test	CA3		1. Replace COT and RT channel units. 2. Replace RT CTU. 3. [*SLC* 96 carrier] Replace SSU at RT. 4. [*SLC* 96 carrier] Replace ACUs.
Positive Coin check	CA4		1. Replace COT and RT channel units. 2. Replace RT CTU.
Reverse battery test	CA7		1. Replace COT and RT channel units. 2. Replace RT CTU.
Detect on hook	CA9		1. Check for improperly wired connection from XTC J109 to *SLC* carrier system. 2. Replace COT and RT channel units. 3. Replace COT and RT CTUs. 4. [*SLC* 96 carrier] Replace TRUs. 5. [*SLC* 96 carrier] Replace ACUs.
Reflective loss test	CA13		1. Replace COT and RT channel units. 2. Replace RT CTU. 3. [*SLC* 96 carrier] Replace SSU at RT. 4. [*SLC* 96 carrier] Replace ACUs.

TABLE I (CONTD)
PGTC MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
ANI test	CA14		1. Replace COT and RT channel units. 2. Replace RT CTU.
All Pass	CA0		1. Coin OK.

TABLE J
ENHANCED (XTC) MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE (NOTES 1,2)	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
SINGLE-PARTY TEST, PART 1 Permanent Ring ground test	SB2		1. Check No Test Trunk wiring between XTC and switch, and wiring between switch and COT channel for ground on Ring conductor. 2. Replace COT and RT channel units.
5ESS switch and absorptive echo tests	SB4		1. In a *5ESS* switch office, verify XTUB upgrade to AUB68 Issue 2 or 3, and XTUD (MC97745A1) upgrade to MC97745A1 2 per CCN0106NC and CCN0105NC. 2. Replace COT and RT channel units 3. Replace the RT CTU. 4. Verify that cabling between the XTC and the COT channel unit is less than or equal to 2500 feet of 24-gauge wire. 5. Check for excessive loss in No Test Trunk wiring from the XTC to the switch, and wiring from the switch to the channel unit. Check for improper placement of a test trunk ringing circuit, or other impedance between the XTC and the switch. 6. Check for excessive loss through *5ESS* switch line unit (expect 2 dB loss in each direction).

Note 1: SA/MA/CA denotes PGTC mode — SB/MB/CB denotes enhanced (XTC) mode.

Note 2: Test result code should be noted at the conclusion of the end-to-end channel test. Run isolation test (MF 920 command) to isolate channel failure to COT or RT end before acting on test result code. TRCs are valid only following end-to-end test. Disregard at any other time.

TABLE J (CONTD)
ENHANCED (XTC) MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			7. Check for an undetected stuck test relay on some other RT channel unit in the bank under test. If the CTU is busy while there is no active test session, remove and replace each channel unit in the bank under test until the CTU BUSY indicator goes out. If the CTU is not busy, remove and replace each RT channel unit in the bank containing the channel under test until testing capability returns. 8. Normal failure for Fiber-To-The-Home systems with Fiber-To-The-Home nonenhanced testing capability.
SINGLE-PARTY TEST, PART 2 Detect on hook	SB5		1. Replace COT and RT channel units. 2. Replace RT CTU.
Reflective loss test	SB6		1. Check for negative ringing supply connected at RT and XTC. Verify that ringing supplies are of proper type. 2. In a *5ESS* switch office, verify XTUB upgrade to AUB68 Issue 2 or 3, and XTUD (MC97745A1) upgrade to MC97745A1 2 per CCN0106NC and CCN0105NC. 3. Replace COT and RT channel units. 4. Replace the RT CTU.

TABLE J (CONTD)
ENHANCED (XTC) MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			5. Verify that cabling between the XTC and the COT channel unit is less than or equal to 2500 feet of 24-gauge wire. 6. Check for excessive loss in No Test Trunk wiring from the XTC to the switch, and wiring from the switch to the channel unit. Check for improper placement of a test trunk ringing circuit or other impedance between the XTC and the switch. 7. Check for excessive loss through *5ESS* switch line unit (expect 2 dB loss in each direction). 8. Check for an undetected stuck test relay on some other RT channel unit in the bank under test. If the CTU is busy while there is no active test session, remove and replace each channel unit in the bank under test until the CTU BUSY indicator goes out. If the CTU is not busy, remove and replace each RT channel unit in the bank containing the channel under test until testing capability returns. 9. Normal failure for Fiber-To-The-Home systems with Fiber-To-The-Home nonenhanced testing capability.
Idle channel noise test	SB8		1. In a *5ESS* switch office, verify *5ESS* switch upgrade CN81002.1NW. 2. Replace COT and RT channel units. 3. Noisy signal grade battery to XTC.

TABLE J (CONTD)
ENHANCED (XTC) MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			4. Improper grounding of XTC and/or PGTC shelves. 5. Noisy 337A battery charger at RT. 6. Noisy ringing generator. 7. Check for an undetected stuck test relay on some other RT channel unit in the bank under test. If the CTU is busy while there is no active test session, remove and replace each channel unit in the bank under test until the CTU BUSY indicator goes out. If the CTU is not busy, remove and replace each RT channel unit in the bank containing the channel under test until testing capability returns.
Permanent Tip ground test	SB9		1. Check wiring between XTC and COT channel unit for ground on Tip, or low impedance between Tip and ground. 2. Replace COT and RT channel units.
All Pass	MB2*		1. Single-Party OK.
2-PARTY TEST Detect on hook	MB1		1. Replace COT and RT channel units. 2. Replace RT CTU.
ANI test	MB2		1. Check office records to make sure this is a multiparty service. Verify multiparty CUs at COT and RT.

* For single party service, MB2 display is used to denote single party all pass.

TABLE J (CONTD)
ENHANCED (XTC) MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
			2. Replace COT and RT CUs. 3. Replace RT CTU.
All Pass	MB0		1. 2- or 4-party OK.
4-PARTY TEST Detect +T, +R ringing and apply non-ANI absorptive termination	MB4		1. Check office records to make sure this is a 4-party service. Verify that the XADU switch is in the correct position (4P for 4 party). 2. Check for positive ringing supply connected at the XTC. 3. Check that the PRU is installed at the RT. 4. Replace COT and RT channel units. 5. Replace RT CTU.
Detect on hook	MB3		1. Replace COT and RT channel units. 2. Replace RT CTU.
All Pass	MB0		1. 2- or 4-party OK.
COIN TEST Detect on hook	CB1		1. Replace COT and RT channel units. 2. Replace RT CTU.

TABLE J (CONTD)
ENHANCED (XTC) MODE TEST RESULT CODE DISPLAYS

DESCRIPTION OF TEST COMMAND	TEST RESULT CODE	7-SEGMENT RESULT CODE DISPLAY	MOST LIKELY CAUSE OF TROUBLE
ANI test	CB2		1. Replace COT and RT channel units. 2. Replace RT CTU.
Detect -130 and apply non-ANI absorptive termination; then detect reverse current and apply non-ANI reflective termination	CB6		1. Replace COT and RT channel units. 2. Replace RT CTU.
Detect on hook	CB3		1. Replace COT and RT channel units. 2. Replace RT CTU.
Reverse battery test	CB7		1. Replace COT and RT channel units. 2. Replace RT CTU.
All Pass	CB0		1. Coin OK.

AUB62 Alarm Display Unit (XADU)

2.32 The XADU contains a microcomputer that is controlled by the XCU. The XADU performs six main functions:

- Activates and silences XTC central office alarms which includes lighting and extinguishing the FAIL indicator on the XTC shelf. Alarms, except those triggered by XPCU failures, can be silenced either locally via the ACO switch on the XADU faceplate or remotely via a remote ACO lead to the XADU alarm cutoff circuitry.
- Checks the XCU for proper operation and lights the FAIL indicator on the XCU and triggers an alarm if the XCU malfunctions.
- Monitors all XTC circuit packs, except the XCU, for the presence of an alarm state and activates an alarm if an alarm state is present.
- Connects to *SLC* 96 and *SLC* Series 5 carrier systems equipped with the AUB2/AUB2B and AUB22 channel test units at the COT and RT, respectively.
- Controls the PGTC trunk cards.
- Emulates a *SLC* carrier channel unit via the CUE (channel unit emulator) circuitry which is assigned a telephone number and wired to the switch. The CUE allows MLT and test desks and cabinets to access nonlocally switched circuits. The CUE does the test setup handshake normally done by *SLC* carrier system COT channel units on locally switched circuits.

2.33 Mounted on the faceplate of the XADU circuit pack (Figure 16) are:

- Three LED indicators (FAIL, LINK FAIL, and ACO):
  - ☐ The red FAIL indicator lights when the XADU has failed.
  - ☐ The yellow LINK FAIL indicator lights when the XADU detects a failure on either its interface to the PGTC cards or to the *SLC* carrier system (28-lead test bus multiple — test bus 2 shown in Figure 6).
  - ☐ The red ACO indicator lights when the ACO button on the XADU is pressed or the remote ACO lead, if provided, is activated during an alarm condition.
- One pushbutton momentary contact switch (ACO). This switch is pressed during an alarm state to turn off the XTC FAIL and/or POWER FAIL indicator on the bottom of each shelf and release all XTC alarms except XPCU failure alarms. The system identification leads are not affected.

2.34 A DIP (dual in-line package) option switch is also located on the component side of the circuit board (Figure 16). This switch is used to provision the XTC for either 2- or 4-party ringing.

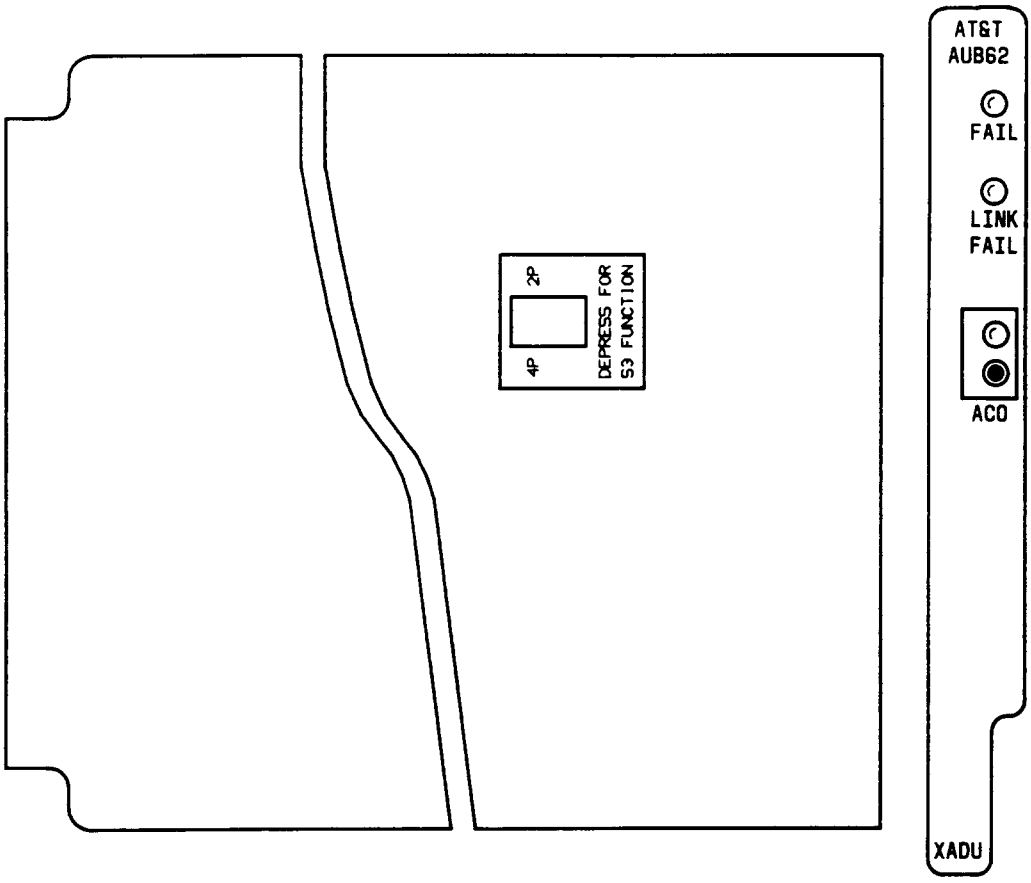


Figure 16 — XTC Alarm Display Unit (AUB62)

AUB63 Data Link Unit (XDLU)

2.35 The AUB63 XDLU provides a communication link between the XTC and SARTS over a voice grade, type 3002 unconditioned, 4-wire, private line facility. This allows communication without modems up to 2000 feet. The link terminates in an EIA RS449 physical interface with an RS-423 electrical interface.

2.36 The communication protocol used is asynchronous, point-to-point, and operates serially at 1200 b/s. It uses ASCII characters with a start bit, seven data bits, even parity, and one stop bit.

2.37 The XDLU contains a microcomputer that passes commands from SARTS to the XCU and responses from the XCU to SARTS.

2.38 The faceplate of the XDLU contains two LED indicators (FAIL and LINK FAIL). The red FAIL LED will light when there is a failure in the XDLU. The yellow LINK FAIL LED will light when there is a failure in the link to SARTS. The AUB63 is used in the XDLU-1 slot to provide this link to SARTS.

AUB63B Data Link Unit (XDLU)

2.39 The AUB63B provides the same features as the AUB63 unit when used in the XDLU-1 slot. In addition, the AUB63B is used to provide the communications link between the XTC and a COP (centralized operations and provisioning) arrangement. To provide this communications link, the AUB63B is used in the XDLU-2 slot. A complete description of this interface can be found in AT&T Practice 363-205-103, *SLC* Series 5 Carrier System — Centralized Operations and Provisioning — Installation, Test, and Maintenance.

MC97745A1 2 Tester Unit D (XTUD)

2.40 The XTUD along with an AUB67 tester unit C (XTUC) and an AUB68 tester unit B (XTUB) comprise the XTC tester unit. The XTUD contains a microcomputer that is controlled by the XCU when performing metallic and digital tests on *SLC* Series 5 carrier system channel units. The XTUD controls operation of the XTUC and XTUB for channel unit testing and for access to SARTS and MLT.

2.41 The faceplate of the XTUD has one red FAIL LED that lights if a failure is detected on either the XTUB, XTUC, or XTUD circuit pack. The FAIL LED on each of these circuit packs lights simultaneously if a fault is detected in either circuit pack because faults cannot be sectionalized among them. The XTUD notifies the XADU via the alarm bus when an alarm occurs.

AUB66 Fanout Unit (XFOU)

2.42 The XFOU contains a microcomputer that is controlled by the XCU — not needed for testing system equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively, or a *SLC* 96 carrier system. The XFOU performs two main functions:

- Connects *SLC* Series 5 carrier systems FPC or FPD, equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively, to the XTUC tester units. A matrix of relay crosspoints in the XFOU permits connections between two groups of three dual banks each and five XTC testers (Figure 17). Two of the five testers have first priority for SARTS testing. The other three testers are available for both MLT and SARTS testing. The assignment of tester units to fanout units is given in Table K. The reverse, the assignment of fanout units to tester units is given in Table L. Each crosspoint connects five balanced pairs between the *SLC* Series 5 carrier system and the XTUC. Of the five balanced pairs, one pair connects 333.3-Hz/64-kHz composite clock and the other four provide full splitting 4-wire access to the *SLC* Series 5 carrier system.

- Communicates between the XCU and the *SLC* Series 5 carrier system equipped for FPC or FPD with AUB5 and AUB25 CTUs at the COT and RT, respectively, through a UART (universal asynchronous receiver transmitter) interface. The transmit and receive paths (each a balanced pair) are connected to the *SLC* Series 5 carrier system DTU (digital test unit).

TABLE K
ASSIGNMENT OF TESTER UNITS TO FANOUT UNITS

TESTER UNIT NUMBER	FANOUT UNIT NUMBER
1	1-3, 7-10, 14-26
2	1-6, 11-13, 17-20, 24-30
3	1-30
4	4-16, 21-23, 27-30
5	1-10
6	1-10
7	11-20
8	11-20
9	21-30
10	21-30

TABLE L
ASSIGNMENT OF FANOUT UNITS TO TESTER UNITS

FANOUT UNIT NUMBER	TESTER UNIT NUMBER
1-3	1, 2, 3, 5, 6
4-6	2, 3, 4, 5, 6
7-10	3, 4, 1, 5, 6
11-13	2, 3, 4, 7, 8
14-16	3, 4, 1, 7, 8
17-20	1, 2, 3, 7, 8
21-23	3, 4, 1, 9, 10
24-26	1, 2, 3, 9, 10
27-30	2, 3, 4, 9, 10

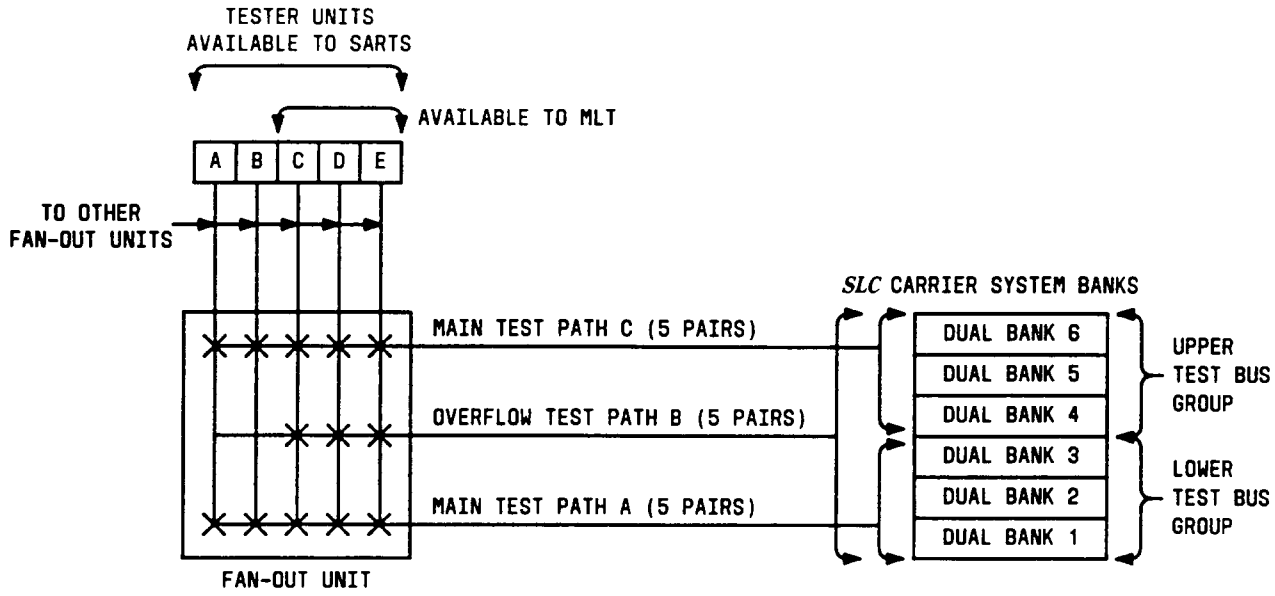


Figure 17 — XTC Fanout Unit (AUB66) Crosspoint Connections

2.43 The faceplate of the XFOU contains two LED indicators (FAIL and LINK). The red FAIL LED will light whenever an internal failure is detected. The yellow LINK LED will light during maintenance testing of the balanced pairs to the *SLC* Series 5 carrier systems served by the XFOU.

Note: If SIDs (system identification numbers) are going to be moved from one XFOU to another XFOU, the XCU should be removed and replaced to clear its memory map. The memory contains a map which correlates SIDs to XFOUs.

AUB67 Tester Unit C (XTUC)

2.44 The XTUC, XTUB, and XTUD make up the XTC tester unit. The microcomputer on the XTUD controls the circuitry on the XTUC. The XTUC performs two main functions:

- Interfaces the test leads between a *SLC* carrier system channel and SARTS or between a *SLC* carrier system channel and the MC, test desk, or cabinets.
- Responds to the MC, test desk, or cabinet with CU test results or status (success or failure) of test access setup.

2.45 The faceplate of the XTUC contains two LED indicators (FAIL and BUSY). The red FAIL LED will light when the XTUC is inserted into the XTC shelf. The FAIL LED will be turned off by the XTUD if the XTC tester unit circuit packs (XTUB, XTUC, and XTUD) pass their internal tests. Also, the FAIL LED will light if a failure is detected in one of the other XTC tester unit circuit packs. The green BUSY LED will light whenever the XTC tester unit is in use.

AUB68 Tester Unit B (XTUB)

2.46 The XTUB, XTUC, and XTUD make up the XTC tester unit. The XTUB performs two main functions:

- Provides a signaling interface (DX or FX) to SARTS via the XTUC when SARTS requests bitstream access,
- Makes transmission and noise measurements on all types of channel units.

2.47 The faceplate of the XTUB contains a red FAIL LED indicator. The FAIL LED will light when the XTUB is inserted into the XTC shelf. The FAIL LED will be turned off by the XTUD if the XTC tester unit circuit packs pass their internal tests. The FAIL LED will also light if a failure is detected in one of the other XTC tester unit circuit packs.

AUB69 Composite Clock Unit (XCCU)

2.48 The XCCU contains a microcomputer that is controlled by the XCU. Upon command from the XCU, the XCCU generates and distributes a composite clock to a tester unit that is undergoing self tests. The composite clock is a 64-kHz bipolar clock (5/8 duty cycle) with bipolar violations at a frequency of 333.3 Hz.

2.49 The faceplate of the XCCU contains a red FAIL LED indicator. The FAIL LED will light when the unit fails the self tests or when it cannot do a task commanded by the XCU. An alarm is also activated when a failure occurs within the XCCU.

SM89 Expansion Shelf Power Unit

2.50 The SM89 power unit, located in position 01 of the PGTC expansion shelf, generates the +5, +12, and −12 Vdc necessary to power all associated circuit packs. The SM89 power unit requires a −48 Vdc signal grade input. Test jacks are provided on the face of the power unit in order for all input and output voltages to be measured.

SM90 Fanout Extender Unit

2.51 The SM90 fanout extender unit, located in position 02 of the PGTC expansion shelf, provides buffering (amplification) and additional fanout capability for the common control signals between the control shelf and the expansion shelf. One SM90 fanout extender unit is required in each expansion shelf.

SM94_ Trunk Unit

2.52 The SM94_ trunk units are installed in the PGTC shelf if testing from an MC, a test desk, or cabinet is required. During testing, each can connect up to two test trunks from the MC to two tester units in the XTC. To satisfy the traffic load for testing, the XTC is not designed for dedicated test access between trunk units and tester units as is done with the PGTC. Therefore, the dedicated access feature of the SM91B trunk unit is not available with the XTC.

2.53 The faceplate of the SM94_ trunk unit contains a BUSY LED indicator that lights when the trunk is in use.

SM593 Circuit Enabler Unit

2.54 The SM593 CEU (circuit enabler unit) is used in a PGTC control shelf to replace a PGTC SM87_ tester unit. It prevents the shorting pins on the PGTC control shelf backplane from making contact.

3. SYSTEM OPERATION

3.01 The XTC may be equipped to provide various arrangements for interconnecting test trunks between various testing vehicles MLT, LTD, local test cabinet, or SARTS, on one hand, and a *SLC* carrier system channel, on the other. The XTC may serve:

- A maximum of 80 NTTs from the MC for automated testing. They pass transparently through the XTC to the switch when a noncarrier channel test is being performed or when the trunk is idle.
- A maximum of 10 TAPs (test access paths) from SARTS to the XTC — one for each tester unit.
- Up to 10 tester units. Tests from the MC use the four tester units in the control shelf. Tests from the SSC (special service center) use all the tester units in the control shelf and both expansion shelves with the tester units in the control shelf having the lowest priority. The six tester units in the two XTC expansion shelves serve the SSC only.
- Up to two groups of three dual *SLC* Series 5 carrier system FPC or FPD banks each equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively, per XFOU (Figure 19).
- *SLC* 96 carrier system banks and *SLC* Series 5 carrier system banks equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively, connected in parallel to the XADU (alarm display unit).

3.02 Even though all test trunks associated with an MC may be connected to the XTC, these test trunks may be used to test subscriber lines not served by a carrier system. The three leads (tip, ring, and sleeve) of the test trunk pass through normally made contacts of a relay in the XTC and are connected through a test trunk circuit to the central office switching system. The circuitry of the XTC in an idle state does not affect the test procedures or test results when testing subscriber lines which are not derived from a carrier system.

3.03 Procedures for accessing and testing a *SLC* carrier system circuit via the XTC vary with the testing system being employed. The procedures used at MLT-1, MLT-2, LTD, and local test cabinet are similar and are described in Section 3.E. The procedures used at a SARTS location are different from procedures used at the other testing system locations and are also described in Section 3.E.

A. XTC Interfacing With MLT/LTD

3.04 The term MLT/LTD is used in this practice to include MLT version 1 (MLT-1), MLT version 2 (MLT-2), local test desks, and test cabinets.

3.05 The MLT/LTD issues commands to the XTC in the form of either dc or MF (multifrequency) tones. The MLT-2 and LTD can issue either type of command when testing either locally or nonlocally switched circuits. The MLT-1 can issue only dc-type commands and can test locally switched circuits only. The MF commands are valid only if used for access on a *SLC* Series 5 carrier system FPC or FPD bank equipped with AUB5 and AUB25 channel test units at the COT and RT, respectively.

B. DC Commands

3.06 To initiate a test on a carrier system channel, the MLT/LTD places a nominal dc voltage of 117 volts between tip and the ground of the NTT (no-test trunk). The ring lead is left open for noncoin circuits and grounded for coin circuits, and the sleeve lead state is ignored.

3.07 When the carrier system channel unit detects the 117 volts, it responds by sending a 333.3 Hz tone toward the XTC. When the XTC trunk card detects the tone, it activates and the test session begins.

3.08 When the 117 V dc is removed from the NTT, the XTC will recognize sleeve lead states as dc commands. There are five sleeve lead states that are defined by the value and polarity of current on the sleeve lead:

- High Positive: 21 to 210 mA
- Low Positive: 6 to 18 mA
- Open: -3 to 3 mA
- Low Negative: -6 to -18 mA
- High Negative: -21 to -210 mA.

3.09 The initial sleeve lead state is treated as a command and thereafter a change in polarity or value of current on the sleeve lead is recognized by the XTC as a new command. Table M contains a list and definition of the dc commands. Notice that the high negative sleeve state is used in forming two commands by using it with and without a resistance bridge across the tip and ring leads of the NTT.

3.10 The XTC responds to the MLT/LTD with one of three responses that either allow or deny further testing:

- Acknowledgment. The command from the MLT/LTD was received, test resources are available, and additional commands can be issued. For this response, the XTC transmits a constant current condition on the tip lead with the ring lead open (seen as a steady voltage deflection at the LTD).
- Failure. The command from the MLT/LTD cannot be executed by the XTC because some test resource is unavailable or the command was invalid. Depending on the circumstances, additional commands may be issued. For this response, the XTC transmits current on the tip lead interrupted by an open at 120 ipm (interruptions-per-minute) with the ring lead grounded (seen at the LTD as a deflection interrupted at a 120-ipm rate).
- Major Alarm. The digroup containing the channel unit at the *SLC* carrier system bank is in a major alarm condition and additional commands cannot be issued. For this response, the XTC transmits current on the tip lead interrupted by an open at 60 ipm with the ring lead grounded (seen at the LTD as a deflection interrupted at a 60-ipm rate). This response is provided for either 15 seconds or until the MLT/LTD issues a sleeve lead command.

3.11 If an MLT-2/LTD wishes to issue MF commands at this time, refer to Section 3.C for a description of the available MF commands.

TABLE M
MLT/LTD DC COMMANDS

SLEEVE	TIP-RING	DEFINITION
—	117V/Tip	Originate Session
High Negative	Open	Disconnect
High Negative	Bridge	Prepare to Receive MF Commands *
Low Negative	Ignore	Provide Last MF Requested Access †
Open	Ignore	Provide CU Results
Low Positive	Ignore	Interpret as Low Negative
High Positive	Ignore	Interpret as Low Negative

* Not used by MLT-1. To avoid disconnection in changing from the high negative sleeve current, tip-ring bridged state, MLT-2/LTD changes to the high negative sleeve current state first before removing the tip-ring bridge.

† Default access is to the bypass test pair for locally switched circuits. The default for nonlocally switched circuits is an open No Test Trunk at the XTC.

C. MF Commands

3.12 The MLT-2 and LTDs can use MF commands, as well as dc commands to test either locally or nonlocally switched circuits. Table N lists the available MF commands. A valid MF command must be either three or eight digits long.

3.13 When the MLT-2/LTD issues the dc command to the XTC to prepare to receive MF commands (high negative sleeve, tip-ring bridge), the XTC recognizes the transition and provides an MF receiver. All MF commands are preceded by the KP tone and followed by the ST tone. Upon receiving the ST tone, the XTC will begin execution of the command received. During execution, the tip and ring leads of the NTT will be left open.

3.14 If the MLT-2/LTD is to send more than one MF command during a test session or the same command more than once, the XTC must be able to distinguish between each command. Therefore, each MF command must be preceded by a transition in the dc command from high negative sleeve, tip-ring bridge to an intermediate command (e.g., low negative sleeve) and then back to high negative sleeve, tip-ring bridge.

3.15 The XTC responses to the MF commands are the same as the responses to the dc commands previously explained. There are cases where the XTC does not check the

legitimacy of a request for access using certain MF commands from the MLT and does not provide the failure response. These cases are listed in Table O.

TABLE N
MLT-2/LTD MF COMMANDS

NUMBER	NAME	DEFINITION
8 Digits *	Bank ID: 4 Digits CU ID: 4 Digits	Establish Connection to Channel and Provide Monitoring Access to Channel
900	Monitor	Provide Monitor Access to Channel
920	Test Channel Units	Test Channel Units on Channel Accessed
990	XTC/Bank Bus Test	Test Connections Between XTC and FPC or FPD Bank equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively.
RT ACCESS		
910	Calibrate	Diode and Resistor Termination Provided for Calibrating RT dc Test Pair
911	Loop 1	Access to 2-Wire Loop or Transmit Pair on 4W Circuits †
912	Loop 2	Access to Receive Pair on 4W Circuits †
COT ACCESS		
930	Calibrate	Provide Open at COT CTU
931	Facility 1	Provide Access to 2-Wire Loop or Transmit Pair on 4W Circuits ‡
932	Facility 2	Provide Access to Receive Pair on 4W Circuits ‡
933	Equipment	Provide Access to Customer Through the CU (2W Circuits Only) §
934	Sealing Current Test 1	Provide Access to Transmit Pair on 4W Circuit With Receive Pair Unsplit
935	Sealing Current Test 2	Provide Access to Receive Pair on 4W Circuit With Transmit Pair Unsplit

* The bank and channel numbers will be zero filled, right justified to form four digits. The range for a valid bank number for the *SLC* Series 5 carrier system is 0001 through 9999. The range for a valid CU number is 0001 through 0096.

† Refer to Figure 4 for the definition of transmit and receive. This shows RT access.

‡ Refer to Figure 2 for the definition of transmit and receive. This shows COT access.

§ The dc test pair is reserved.

TABLE O
XTC TREATMENT OF MF COMMANDS FOR ILLEGITIMATE ACCESS

MF COMMAND		CHANNEL UNIT TYPE	ACTUAL ACCESS PROVIDED
934	Sealing Current 1	E *SPOTS*	Facility 1 Access
935	Sealing Current 2	E *SPOTS*	Open at COT CTU
931	Facility 1(When Circuit Accessed Through Switch)	E *SPOTS*	Open at COT CTU
932	Facility 2	E *SPOTS*	Open at COT CTU
912	Loop 2	2-Wire	Open at RT CTU
933	Equipment	4-Wire (Except DDS OCU)	Access to Transmit Pair Through CU, Receive Pair Split
933	Equipment	DDS OCU	Open at COT CTU
900	Monitor	No Channel Unit(s)	Monitor Provided

D. XTC Interfacing With SARTS

3.16 The XTC provides SARTS with access to circuits served by FPC or FPD *SLC* Series 5 carrier systems equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively. The SARTS issues three basic categories of commands to the XTC for testing:

- Maintenance
- Access (including splitting and release)
- Diagnostic.

Maintenance Commands

3.17 The maintenance commands are used by SARTS for maintenance of the TAPs (test access paths) between SARTS and the XTC. There are five maintenance commands that can be issued:

- TAP turn-down
- TAP turn-up
- TAP tear-down

- Connect loopback at XTC to TAP specified in command
- Release loopback to TAP specified in command.

3.18 A defective TAP can be taken out of service with the TAP turn-down command and returned to service with the TAP turn-up command. The TAP tear-down command is used when SARTS determines that all TAPs occupied for access and maintenance purposes should be released. The loopback TAP commands are used for maintenance testing of TAPs between the RTS-5A and the XTC. Broken TAPs or TAPs with high impedance are removed from service for repair.

Access Commands

3.19 The access commands, including the splitting and release commands, allow for test access to the *SLC* carrier system FPC or FPD circuits and release of the circuit when testing is finished. There are five access commands that can be issued:

- Access bank and channel unit specified at COT and provide status response
- Loopback TAP
- Monitor
- Split at COT to give bitstream or metallic access
- Release.

3.20 Each 8-wire TAP provides full splitting access to a *SLC* carrier special services circuit. Full splitting access may be made on the tip and ring (or transmit and receive pairs for 4-wire channel units) of a channel unit at the COT (referred to as metallic access). The SARTS can also obtain full splitting bitstream access for a selected channel. For voice frequency channel units, the XTC converts the bitstream to analog form at its interface to SARTS. For dataport channels the XTC passes the data transparently to SARTS. The SARTS must also employ the same office timing clock source as that used at the *SLC* carrier system FPC or FPD banks when interfacing with dataport channels.

Diagnostic Command

3.21 The diagnostic command, (G22) diagnose channel units, is used by SARTS to request separate tests on the COT and RT CU (channel units). When CU testing is complete, the XTC responds with the status (good or bad) for the COT and RT CUs.

E. Testing Procedures

3.22 This part contains test procedures of a general nature for testing a *SLC* carrier system circuit through the XTC. These procedures assume that the tests are performed from an MLT/LTD, or similar test system, and SARTS. The test procedures are grouped into tests performed from an MLT/LTD and tests performed from SARTS. The tests performed from an MLT/LTD include testing of locally switched and nonlocally switched circuits and separate COT and RT channel unit tests.

Testing Locally Switched Circuits

3.23 The procedure for testing locally switched *SLC* carrier system circuits with the XTC is the same as with the PGTC:

1. The MLT/LTD seizes an NTT and dials the telephone number of the *SLC* carrier circuit to be tested.

2. After the connection is made and before starting automated tests, testing of the circuit up to the *SLC* carrier system may be done by the MLT/LTD.

3. The MLT/LTD places a nominal voltage of approximately 117 Vdc through 8K (8000) ohms to ground on the tip of the circuit. The ring should be open for noncoin channel units and grounded for coin channel units. For the LTD or test cabinet, this voltage is applied by operating the [REV] and [+STA] keys. The ground on the ring lead is applied by operating the [G] key.

4. The COT channel unit of the *SLC* carrier system responds over the NTT with a 333.3-Hz tone and alerts its BC (bank controller) of the test request.

5. At the RT, the CTU (channel test unit) terminates the RT channel unit in an impedance needed for testing. For a *SLC* Series 5 carrier system FPC or FPD equipped with the AUB5 and AUB25 CTUs at the COT and RT, respectively, the BC tells the XTC the bank and channel unit number for the channel involved. This will be needed, for example, if MLT-2/LTD requests separate channel unit tests.

6. When the XTC is satisfied that its connections to the *SLC* carrier system are properly established and that its internal operations are in order, it provides the acknowledgement response to the MLT/LTD (full scale deflection on the meter at the LTD). If the connections are not satisfactorily established or the bypass pair is busy or the XTC malfunctions, the XTC provides the failure response. (The deflection of the meter is interrupted at a 120-ipm rate.) If the bank informs the XTC of a major alarm, the XTC provides the major alarm response. (The deflection of the meter is interrupted at a 60-ipm rate.) For the acknowlegement response, testing continues. For the failure and major alarm response, the XTC disconnects the MLT/LTD after approximately 15 seconds.

7. Assuming that the acknowledgement response was provided to the MLT/LTD, the MLT/LTD removes the 117 Vdc. The XTC then connects the MLT/LTD to the loop via the bypass test pair and performs diagnostic tests of the channel including the COT

and RT channel units end-to-end tests. The XTC performs the end-to-end test once for all locally-switched channel unit types. Special service channels with a gain of greater than 0 dB or with a loss of more than 2.0 dB will probably fail this test.

8. If the MLT/LTD opens the sleeve lead, the XTC will report the results of its test using combinations of tones plus ±48 V and ground on the tip and ring of the NTT (Table P). The results will be presented for up to 2 minutes. If no new command is received, the XTC will disconnect after sending the failure response for up to 15 seconds. The receipt of any sleeve command during the 15-second period will cause an earlier disconnection.

TABLE P
XTC CHANNEL UNIT END-TO-END TEST RESPONSES TO MC

TONE (NOTE)	TIP	RING	RESULTS
None	Open	Open	XTC Busy, Try Later
None	GND	GND	No Test Results Available *
None	GND	+48 V	Channel Bad
None	−48 V	+48 V	Channel Bad, FPC Bank †
Single Burst	GND	−48 V	POTS, *SPOTS* channel unit good
2 Bursts	−48 V	GND	Multiparty channel good
3 Bursts	+48 V	GND	Coin Channel good

Note: The frequency of the tone ranges from 1000 to 2000 Hz at a 125-Hz sweep rate.

* `No Results Available` will be returned if CU tests were not previously requested or if a system failure occurred during testing or tests were requested on DDS channel units or an error exists in the provisioning data of a provisionable channel unit (E *SPOTS* and 4-wire channel units).

† This response tells the tester that MF commands can be used to do additional testing.

9. The MLT/LTD may either disconnect (by providing a high negative sleeve lead state), or for *SLC* Series 5 carrier system FPC or FPD equipped with the AUB5 and AUB25 CTUs at the COT and RT, respectively, issue MF commands. The procedure for inputting MF commands from an MLT-2/LTD is described in paragraph 3.24, beginning with Step 5, in the part covering the tests of nonlocally switched circuits.

Testing Nonlocally Switched Circuits

3.24 The XTC is used by MLT-2/LTD, but not by MLT-1, to test nonlocally switched circuits served by the *SLC* Series 5 carrier system FPC or FPD equipped with the AUB5 and AUB25 CTUs at the COT and RT, respectively (Figure 18).

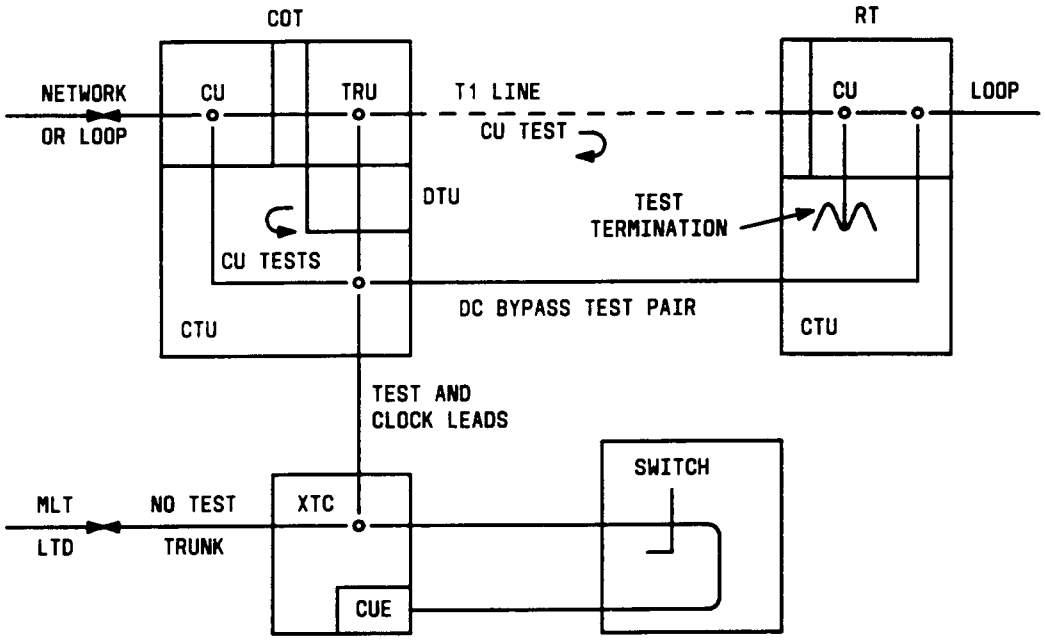


Figure 18 — MLT/LTD Nonlocally Switched Test Access Configuration

Nonlocally switched circuits are not tested end-to-end. A specific procedure is used when testing nonlocally switched circuits:

1. The MLT-2/LTD seizes an NTT and dials the telephone number of the XTC CUE (channel unit emulator). The CUE is a special circuit (on the XADU) that emulates channel unit function handshake for test access by MLT-2/LTD.

2. The MLT-2/LTD places a nominal voltage of 117 Vdc through 8K ohms to ground on the tip of the circuit with the ring lead open.

3. The CUE responds with a 333.3-Hz tone and informs the XCU of the test request.

4. The XCU searches for an available XTC tester unit that has passed its self-diagnostic tests. If no tester unit is available, the XTC responds with the failure response until MLT-2/LTD disconnects. If resources needed for testing are available, the XTC sends the acknowledgement response for up to 15 seconds to allow the MLT-2/LTD to remove the 117 Vdc and input its next command. Since the CUE is no longer needed, the tester unit selected provides a high negative sleeve current to the switch as a disconnect. The MLT-2/LTD now interfaces directly with the XTC. The CUE is now available for use in setting up another test session.

5. To continue testing, the MLT-2/LTD commands the XTC to attach an MF receiver across the tip and ring. The XTC reverses the voltage on the tip and ring leads as an indication that it is prepared to receive MF commands. This causes the S (sender) light at the LTD to light.

6. The MLT-2/LTD sends either a bank and CU address (four digits each) or a disconnect. A bank and CU address is allowed only at this point in a session. If the MLT-2/LTD wants to access another channel, it must terminate the session and originate a new session. To address channels served by 4-wire channel units, the odd channel must be used in the address field. If this is not done, the response to the Test MF command will be failure response.

7. The XTC waits up to 30 seconds for this and all other MF commands. An MF command is complete when the ST tone is sent. After the ST tone is sent, the MLT-2/LTD must remain in the high negative sleeve, tip-ring bridged state. On receipt of the ST tone, the XTC acknowledges by removing ground from the ring then places battery on the tip when the command is completed.

8. If the command is not received within 30 seconds, the XTC returns the failure response for up to 15 seconds before disconnecting. Any dc sleeve command that is received before the 15 seconds expire causes an immediate disconnect.

9. If resources are available to satisfy a valid command and the XTC passes its internal tests, the acknowledgement response is returned to the MLT-2/LTD for up to 15 seconds. If no command is received from the MLT-2/LTD within this time, the XTC disconnects.

10. If resources are not available to satisfy the command or the XTC internal tests have failed or the command is invalid, the failure response is returned to the MLT-2/LTD for up to 15 seconds.

11. For the bank and CU address command, available resources refer to a valid system ID and a fault-free interface between the XTC and the Series 5 carrier system bank. For the acknowledgement response, MLT-2/LTD is given monitoring access to the circuit when the XTC receives the low negative sleeve command. For the failure response, the XTC disconnects after 15 seconds or earlier if any dc command is received. If the *SLC* Series 5 carrier system bank is in a major alarm condition, the major alarm response is returned.

12. After monitoring the circuit, the MLT-2/LTD inputs the next command. For another MF command, the previous steps are repeated. For a dc command, the XTC responds in accordance with the command received. If the MLT-2/LTD receives a failure response at this time, the MLT-2/LTD is given 15 seconds to input a new command before the XTC disconnects. (In Step 11 the XTC disconnected after the failure response without allowing the MLT-2/LTD the option to input a new command within 15 seconds.)

13. The channel unit diagnostic MF command (920) differs from the other commands. The acknowledgement response from the XTC to this command signifies only that the command is valid and that test resources are available — not that the channel unit tests have been run and results are available. The MLT-2/LTD may request results by opening the sleeve lead. An `XTC busy, try later` reply is given if tests are not completed. When tests are completed, the XTC responds with the status (good or bad) of the COT and RT channel units.

Testing COT and RT Channel Units Separately

3.25 An MLT-2/LTD or a SARTS tester may request the XTC to do separate diagnostic testing of the COT and RT CU (channel units) if the circuit being tested is served by a *SLC* Series 5 FPC or FPD carrier system bank equipped AUB5 and AUB25 CTUs at the COT and RT, respectively.

3.26 When a request for separate CU tests is received, the XTC tests each CU in turn and, on completion, provides results to SARTS automatically and MLT-2/LTD on request. The XTC measures the transmission and signaling capability of all channel unit types, (special service and POTS type) except DDS type channel units. The XTC responds with `NO RESULTS AVAILABLE` if a request for diagnostics is received on DDS type channels.

3.27 The response of an XTC to a request for separate CU tests depends on the type of testing system issuing the request. The response to SARTS is in the form of ASCII characters that are interpreted as good or bad COT and RT CU. In response to a request for CU test results from the MLT-2/LTD (open sleeve), the XTC provides the combination of voltages shown in Table Q for up to 2 minutes, on the leads shown.

TABLE Q
XTC TO MLT-2/LTD RESPONSE FOR CU ISOLATION RESULTS (NOTE)

TONE	TIP	RING	MEANING	
			COT CU	RT CU
None	Open	Open	XTC busy, try later	
None	GND	GND	No results available	
None	+48 V	−48 V	Bad	Good
None	+48 V	+48 V	Good	Bad
None	−48 V	+48 V	Bad	Bad
One Burst	GND	−48 V	Good	Good

Note: The voltages are measured from T (tip) to GRD (ground), and R (ring) to GRD on the adapter.

Testing With SARTS

3.28 To obtain an idea of the communication and interface between SARTS and the XTC, refer to the following description of a typical test session:

1. The SARTS begins a test session with the XTC by issuing the access bank and channel unit command over the data link. This command specifies the number of the bank and channel unit to be tested. It also specifies whether metallic or bitstream access to the channel is desired. Several types of test access are available to SARTS:

   - Full-splitting metallic access at the COT
   - Full-splitting bitstream access at the COT — for VF circuits the XTC converts the DS0 to a 4-wire VF equivalent interface (4W-FX0, 4W-FXS, 4W-DX, or 4TO). For DDS, the XTC passes the DS0 directly to SARTS.
   - Half-splitting metallic access at the COT for DATAPORT OCU (toward loop).
   - Monitor access for all circuits
   - Half-splitting metallic access at the RT via a dc bypass pair (toward loop). (This will be available in the future.)

2. If the XTC determines that resources are available to satisfy the test request, it informs SARTS of the TAP it has assigned for the test session. The XTC informs SARTS when certain conditions exist:

   - The circuit is red-lined (special protection).
   - The COT CU is not installed.
   - The RT CU is not installed.
   - The COT contains a DCU (digital connectivity unit).
   - The RT contains a DCU.
   - The circuit contains a POTS, *SPOTS*, or coin channel unit at the COT. (SARTS has limited access to these channel units.)
   - The bank is issuing a major alarm indication:

     - ☐ Near end terminal
     - ☐ Far end terminal
     - ☐ CFA (Carrier Line Failure)
     - ☐ Incoming line failure (NE)
     - ☐ Incoming line failure (FE)

   - The COT CU slot is unprovisioned and contains a provisionable channel unit.
   - The RT CU slot is unprovisioned and contains a provisionable channel unit.
   - The COT CU provisioning data disagrees with that stored in the bank controller's memory.
   - The RT CU provisioning data disagrees with that stored in the bank controller's memory.
   - Access is blocked because test resources are unavailable.
   - The bank and CU number or access point are invalid.

3. Some of the previous conditions block SARTS from continued testing and, for other conditions, the SARTS tester determines whether to continue testing.

4. To continue testing, SARTS issues a TAP loopback command and calibrates the TAP assigned for testing. The SARTS then issues the monitor command to verify that the circuit to be tested is idle.

5. If the circuit is idle, SARTS issues a split command for access to the circuit at the point specified in the access bank command (COT bitstream or COT metallic) and then tests the circuit.

6. Following circuit testing, SARTS tests the CUs by issuing the diagnostic command. When CU testing is complete, the XTC responds with the status (good or bad) of the COT and RT CUs.

7. The SARTS may repeat any of the allowable commands in any order. Upon completion of the test session, SARTS will release the circuit and the TAP.

4. TURNUP AND TEST PROCEDURES

4.01 This section contains the turnup and test procedures for a new XTC and the procedures to add to an existing XTC. This section also covers the turnup and test procedure for a modified PGTC control shelf and PGTC expansion shelves when used in conjunction with an XTC. When a new *SLC* Series 5 carrier system FPC or FPD is installed and connected to a fanout unit, do the *Fanout Unit to SLC Carrier FPC or FPD Bank Test* in Section 5.C. This functional test determines if the cabling between the XTC and the bank is installed properly, and if the channel test unit and the digital test unit for the bank at the COT are functioning properly with the XTC.

4.02 These procedures include the installation and test of all common circuit packs, tester units, fanout units, data link units, and trunk units. The procedures are arranged in sections (see Table R) that cover the sequenced turnup of an XTC. The XTC and PGTC equipment should be installed in the order shown in Table R. If a particular section contains a procedure for a component that is not to be turned up at this time, skip that section and proceed to the next section on the list.

4.03 When equipment is to be added to an existing XTC, it should be done when the XTC is idle, or when low testing traffic is expected from the SSC and MLT. The SSC and MLT should be notified before you add equipment to an existing XTC. This is so they can reschedule their testing, be aware that their tests may be interrupted, or that they may experience higher than normal blocking.

TABLE R
GUIDE TO TURNUP SECTIONS

ITEM(S) TO BE TURNED-UP	SECTION
PGTC Control Shelf (modify)	A
PGTC Expansion Shelf (shelves)	B
XTC Control Shelf	C
XTC Expansion Shelf (shelves)	D
XTC Tester Unit(s)	E
PGTC Trunk Unit(s)	F
XTC Data Link Unit(s)	G
XTC Fanout Unit(s)	H

A. Modify PGTC Control Shelf

4.04 This procedure modifies an existing PGTC control shelf, making it an integral part of an XTC. The modified PGTC control shelf provides the NO TEST TRUNK interface (through the SM94C trunk units) required by MLT/LTD to access and test carrier system channels via the XTC. This procedure assumes that the PGTC control shelf has been rewired and connected to the XTC control shelf using SD-7C127-01 Issue 6M and SD-97760-01 Issue 4B or higher. Also, this procedure assumes that the shelf contains an SM86 power unit and an SM94C trunk unit.

Note: Before turning up the modified PGTC control shelf, visually verify that the cabling between from the XTC control shelf and the modified PGTC control shelf have been installed per SD-7C127-01 Issue 6M and SD-97760-01 Issue 4B or higher, and that the terminal strip assembly J1C142A-1 L3 has been mounted to the PGTC control shelf frame as shown in the J1C142A-1 drawing (also refer to Appendix A). Verify that all lead lengths to and from the terminal strip are as short as possible — leads from the terminal strip to the PGTC control shelf backplane should be point-to-point approximately 3 inches long. These items are critical for the proper operation of the XTC/PGTC.

4.05 The following items are required to perform this procedure:

- KS-22861, L1 DMM (digital multimeter) or equivalent
- 1 80D (5-Amp) fuse
- 1 SM89 power supply circuit pack (optional)
- 4 SM593 blank cards.

STEP	PROCEDURE

1. Remove the **F4** (80D) fuse for the PGTC control shelf power supply from the XTC control shelf fuse panel.

2. Remove all SM87_ tester units and the SM88_ control unit, if installed.

3. Insert the SM593 blank cards into the four vacant **SM87_** slots.

4. Insert the 80D fuse into its original position (**F4**) on the XTC control shelf fuse panel.

   Requirement: The fuse does not blow and no alarms are activated.

   Error Condition: If the fuse does blow, check the wiring per SD-7C127-01 Issue 6M or higher.

STEP	PROCEDURE

Note 1: Since the SM88_ card has been removed as a part of the control shelf modification, the **FAIL** indicator on the SM86B (if so equipped) will be permanently lighted. If the permanently lighted **FAIL** indicator on the SM86B is considered to be undesirable, an SM89_ expansion shelf power unit should be used instead of the SM86B to resolve this problem.

Note 2: If a central office alarm is activated, the alarm cabling from the PGTC shelf was not removed as part of the control shelf modification — the alarm cabling must be removed.

5. Condition DMM to measure volts dc.

6. At the faceplate of the SM86/SM86B or SM89 circuit pack, connect the DMM test leads between the jacks as indicated in Tables S and T.

Requirement: DMM indicates the voltages (per connection) given in Tables S and T.

Error Condition 1: If the reading is not within range, check the fuse (F4) on the XTC control shelf or wiring per SD-7C127-01 Issue 6M or higher.

Error Condition 2: Replace the SM86/SM86B or SM89 circuit pack. Check the wiring per SD-7C127-01 Issue 6M or higher.

Error Condition 3: Replace the SM86/SM86B circuit pack.

TABLE S
DC VOLTAGE MEASUREMENTS FOR SM86/SM86B OR SM89

DMM CONNECTIONS (NOTE)		ACCEPTED RANGE OF VOLTAGE (V dc)	APPLICABLE ERROR CONDITION
BLACK LEAD	RED LEAD		
BG	-48S	-45 *to* -53	1
LG	-12	-10.8 *to* -13.2	2
LG	+12	+10.8 *to* +13.2	2
LG	+5	+4.5 *to* +5.5	2

Note: Connect the color leads to the indicated jacks.

STEP	PROCEDURE

TABLE T
DC VOLTAGE MEASUREMENTS FOR SM86/SM86B ONLY

DMM CONNECTIONS (NOTE)		ACCEPTED RANGE OF VOLTAGE (V dc)	APPLICABLE ERROR CONDITION
BLACK LEAD	RED LEAD		
LG	-48T	-45 *to* -65	3
LG	-130	-130 *to* -195	3
LG	+130	+130 *to* +195	3
LG	+48T	+60 *to* +85	3

Note: Connect the color leads to the indicated jacks.

7. Remove DMM test leads.

B. Turn Up a PGTC Expansion Shelf

4.06 This procedure covers the turnup of a PGTC expansion shelf that has been installed and connected to an XTC control shelf. A PGTC expansion shelf provides the NO TEST TRUNK interface (through the SM94C trunk units) required by MLT/LTD to access and test carrier system channels via the XTC. This procedure assumes that the PGTC expansion shelf has been wired and connected to the XTC control shelf per SD-7C127-01 Issue 6M and SD-97760-01 Issue 4B or higher. This procedure also assumes that the PGTC expansion shelf powering cable has been connected to the fuse panel (F4 or F5) on the XTC control shelf. F4 fuses a PGTC control shelf and the first PGTC expansion shelf, or the first and second PGTC expansion shelves if a PGTC control shelf is not used. F5 fuses the third and fourth PGTC shelves.

Note: Before turning up the PGTC expansion shelf, visually verify that the cabling between the XTC control shelf and the PGTC expansion shelf has been installed as shown in SD-7C127-01 Issue 6M and SD-97760-01 Issue 4B or higher (also refer to Appendix A). This wiring is critical for the proper operation of the XTC/PGTC.

4.07 The following items are required to perform this procedure:

- KS-22861, L1 DMM (digital multimeter) or equivalent
- 1 80D (5-Amp) fuse
- 1 SM89 power supply circuit pack
- 1 SM90 circuit pack.

STEP	PROCEDURE

1. Insert the 80D fuse (if not already installed) into the fuse holder in the XTC control shelf (**F4** or **F5**) assigned to the PGTC expansion shelf being turned up.

   Requirement: The fuse does not blow and no alarms are activated.

   Error Condition: If the fuse does blow, check the wiring per SD-7C127-01 Issue 6M or higher.

2. Insert an SM89 circuit pack into the SM89 slot in the expansion shelf.

   Requirement: The shelf fuse does not blow.

   Error Condition: If the fuse does blow, replace the SM89 circuit pack. Check the wiring per SD-7C127-01 Issue 6M or higher.

STEP	PROCEDURE

3. Condition DMM to measure volts dc.

4. At faceplate of SM89 circuit pack, connect the DMM test leads between the jacks as indicated in Table U.

   Requirement: DMM indicates the voltages (per connection) given in Table U.

   Error Condition 1: If the reading is not within range, check the fuse (F4 or F5) on the XTC control shelf or wiring per SD-7C127-01 Issue 6M or higher.

   Error Condition 2: Replace the SM89 circuit pack. Check the wiring per SD-7C127-01 Issue 6M or higher.

TABLE U
DC VOLTAGE MEASUREMENTS FOR SM89

DMM CONNECTIONS (NOTE)		ACCEPTED RANGE OF VOLTAGE (V dc)	APPLICABLE ERROR CONDITION
BLACK LEAD	RED LEAD		
BG	-48S	-45 *to* -53	1
LG	-12	-10.8 *to* -13.2	2
LG	+12	+10.8 *to* +13.2	2
LG	+5	+4.5 *to* +5.5	2

Note: Connect the color leads to the indicated jacks.

5. Remove DDM test leads.

6. Insert an SM90 circuit pack into the **SM90** slot in the expansion shelf.

   Requirements:

   ☐ **ERROR CODE** display on the XCU circuit pack in the XTC control shelf is clear (valid only if the XTC is working).

   Error Condition: If an ERROR CODE is displayed, use the information in Table H to resolve the problem.

STEP	PROCEDURE

☐ No office alarms are activated.

Error Condition: If alarms are activated, check the wiring per SD-7C127-01 Issue 6M and SD-97760-01 Issue 4B or higher.

C. Turn Up an XTC Control Shelf

4.08 This procedure covers the installation and turnup of the common circuit packs for the XTC control shelf. The XTC tests carrier system channels and provides test access for MLT/LTD and SARTS testing. This procedure assumes that the XTC control shelf has been installed and connected per SD-7C127-01 Issue 6M or higher.

Note: If the interface to MLT/LTD is required, the procedures in Sections 4.A and/or 4.B must be completed and the office alarms must be connected to the XTC.

4.09 The following items are required to perform this procedure:

- KS-22861, L1 DMM (digital multimeter) or equivalent
- 1 KS-19531-type pin plug or equivalent metallic plug insert
- 1 80D (5-Amp) fuse
- 1 AUB60 (XPCU) power converter unit
- 1 AUB62 (XADU) alarm display unit
- 1 AUB69 (XCCU) composite clock unit
- 1 XCU (MC97734A1 or MC97761A1).

STEP	PROCEDURE

1. Verify that power cables, from central office feeders to **TB1** (pin **1** −48V return, pin **2** frame ground, and pin **3** −48V) on rear of XTC, and ringing cables, from central office ringing supply to **TS5** (pin **1** −20 Hz, pin **2** +20 Hz, and pin **3** 20 Hz return) on the XTC backplane, have been properly connected.

2. Condition DMM to measure volts ac.

3. At the XTC control shelf fuse panel, connect the DMM test leads between **TEST +20HZ** (red lead) jack and **TEST GND** (black lead) jack.

   Requirement: The DMM indicates between 80 and 110 Vac.

   Error Condition: If the reading is not within range, check the ringing input (**TS5** pin **2** +20Hz, pin **3** 20Hz return) wiring per SD-7C127-01 Issue 6M or higher.

   Note: If +20 Hz supply is not available in the central office, the DMM will indicate 0 volts.

STEP	PROCEDURE

4. At the XTC control shelf fuse panel, connect the DMM test leads between **TEST -20HZ** (red lead) jack and **TEST GND** (black lead) jack.

   Requirement: The DMM indicates between 80 and 110 Vac.

   Error Condition: If the reading is not within range, check the ringing input (**TS5** pin **1** -20Hz, pin **3** 20Hz return) wiring per SD-7C127-01 Issue 6M or higher.

5. Remove DMM test leads from jacks and condition DMM to measure volts dc.

6. Connect DMM test leads between **TEST -48V** (red lead) jack and **TEST GND** (black lead) jack on the control shelf fuse panel.

   Requirement: The DMM indicates between -45 and -53 Vdc.

   Error Condition: If the reading is not within range, check the fuse (**F1**) on the XTC shelf or wiring per SD-7C127-01 Issue 6M or higher.

7. Connect DMM test leads between **TEST +20HZ** (red lead) jack and **TEST GND** (black lead) jack on the control shelf fuse panel.

   Requirement: The DMM indicates between +45 and +53 Vdc.

   Error Condition: If the reading is not within range, check the ringing input (**TS5** pin **2** +20Hz, pin **3** 20Hz return) wiring per SD-7C127-01 Issue 6M or higher.

   Note: If +20 Hz supply is not available in the central office, the DMM will indicate 0 volts.

8. Connect DMM test leads between **TEST -20HZ** (red lead) jack and **TEST GND** (black lead) jack on the control shelf fuse panel.

   Requirement: The DMM indicates between -45 and -53 Vdc.

   Error Condition: If the reading is not within range, check the ringing input (**TS5** pin **1** -20Hz, pin **3** 20Hz return) wiring per SD-7C127-01 Issue 6M or higher.

STEP	PROCEDURE

9. Remove DMM test leads from jacks. Remove or verify that **XTC-F1** fuse has been removed from XTC control shelf fuse panel.

10. Alert CO (central office) personnel that tests are being made and CO alarms will be activated.

11. Insert the AUB60 circuit pack into the **AUB60** slot in the XTC control shelf.

    Requirements:

    ☐ CO alarm is activated.
    ☐ Visual alarm indicator on aisle lights.
    ☐ **FAIL** indicator on XTC control shelf fuse panel lights.
    ☐ System ID display is activated.

    Error Condition: If the AUB60 fails the requirement, check the wiring per SD-7C127-01 Issue 6M or higher. Try a new AUB60 circuit pack.

12. Insert the 80D (5A) fuse into fuse holder **XTC-F1** in XTC control shelf fuse panel.

    Requirements:

    ☐ The CO alarm go off in about 15 seconds.

    ☐ Neither the **XTC-F1** fuse on XTC control shelf fuse panel nor the **-48V OUT** fuse on faceplate of AUB60 circuit pack is blown.

    Error Condition: If either fuse is blown:

    a. Replace the fuse(s).

    b. Check the wiring per SD-7C127-01 Issue 6M or higher, and for shorted pins on XTC backplane.

    c. Try a new AUB60.

STEP	PROCEDURE

13. At the faceplate of AUB60 circuit pack, connect the DMM test leads between the jacks as indicated in Table V.

Requirement: DMM indicates the voltages (per connection) given in Table V.

Error Condition: If the reading is not within range, check the fuse (**F1**) on the XTC control shelf and the **-48V OUT** fuse on the faceplate of the AUB60 circuit pack. Try a new AUB60 circuit pack.

TABLE V
DC VOLTAGE MEASUREMENTS FOR AUB60

DMM CONNECTIONS (NOTE)		ACCEPTED RANGE OF VOLTAGE (V dc)
BLACK LEAD	RED LEAD	
GND	+5V-A	+4.8 *to* +5.2
GND	+5V-B	+4.8 *to* +5.2
GND	+12	+11.6 *to* +12.4
GND	-5V	-4.8 *to* -5.2

Note: Connect the color leads to the indicated jacks.

14. Remove DMM test leads from the jacks.

15. Insert the KS-19531-type pin plug into the **ALM TEST** jack on the AUB60 circuit pack.

Requirements:

- ☐ **FAIL** indicator on the XTC control shelf fuse panel lights.
- ☐ **FAIL** indicator on the AUB60 circuit pack lights.
- ☐ CO alarm is activated.
- ☐ Visual alarm indicator on the aisle lights.
- ☐ System ID display is activated.

Error Condition: If this test fails, the AUB60 power supply is defective — try another AUB60 power supply.

Note: The alarm wiring is assumed to be correctly connected.

STEP	PROCEDURE

16. Remove the KS-19531-type pin plug from the **ALM TEST** jack.

Requirements:

- ☐ **FAIL** indicator on the XTC control shelf fuse panel goes off.
- ☐ **FAIL** indicator on the AUB60 circuit pack goes off.
- ☐ CO alarm is silenced.
- ☐ Visual alarm indicator on the aisle goes off.
- ☐ System ID display goes off.

Error Condition: If this test fails, the AUB60 power supply is defective — try another AUB60 power supply.

Note: The alarm wiring is assumed to be correctly connected.

17. Insert the XCU circuit pack into the **XCU** slot in the XTC control shelf.

Requirements:

- ☐ **FAIL** indicator on the XCU circuit pack lights, then goes off within 10 seconds.
- ☐ **ERROR CODE** display on the XCU circuit pack lights, then clears within approximately 5 seconds.

Error Condition: If either requirement fails, replace the XCU circuit pack.

18. On the AUB62 circuit pack set option switch **S3** (located on the circuit board — see Figure 16) to **4P** if positive ringing is supplied to XTC **TEST +20HZ** jack — otherwise, set the switch to **2P**.

19. Insert the AUB62 circuit pack into the **XADU** slot in the XTC control shelf.

Requirements:

- ☐ **FAIL** indicator on the XTC control shelf lights, then goes off within 10 seconds.
- ☐ **FAIL** and **LINK FAIL** indicators on the XADU circuit pack light, then goes off within 10 seconds.

STEP	PROCEDURE

Error Condition: If either requirement fails, replace the XADU circuit pack. If the replacement XADU circuit pack also fails, replace the XCU and repeat the procedure from Step 17.

Note: The office alarms will be activated by the XADU if the XCU slot is vacant.

20. Insert the AUB69 circuit pack into the **XCCU** slot in the XTC control shelf.

Requirement: **FAIL** indicator on the XCCU circuit pack lights, then goes off within 10 seconds.

Error Condition: If not, replace the XCCU circuit pack. If the replacement circuit pack also fails, replace the XCU circuit pack and repeat the procedure from Step 17.

D. Turn Up an XTC Expansion Shelf

4.10 This procedure covers the installation and turnup of the common circuit packs for the XTC expansion shelf. An XTC expansion shelf is used to increase the capabilities of an XTC by providing additional tester units and fanout units. This procedure assumes that the XTC expansion shelf has been installed and connected per SD-7C127-01 Issue 6M or higher.

4.11 The following items are required to perform this procedure:

- KS-22861, L1 DMM (digital multimeter) or equivalent
- 1 KS-19531-type pin plug or equivalent metallic plug insert
- 1 80D (5-Amp) fuse
- 1 AUB60 (XPCU) power converter unit.

STEP	PROCEDURE

1. Verify that the power cables, from central office feeders to **TB3** (for expansion shelf 1) or **TB5** (for expansion shelf 2) (pin **1** −48V return, pin **2** frame ground, and **3** −48V) on the rear of the XTC expansion shelf, and the ringing cables from central office ringing supply to **TS9** (for expansion shelf 1) or **TS13** (for expansion shelf 2) (pin **1** −20 Hz, pin **2** +20 Hz, and pin **3** 20 Hz return) on the XTC backplane, have been properly connected.

2. Condition DMM to measure volts ac.

3. At XTC expansion shelf fuse panel, connect DMM test leads between **TEST +20HZ** (red lead) jack and **TEST GND** (black lead) jack.

   Requirement: The DMM indicates between 80 and 110 Vac.

   Error Condition: If the reading is not within range, check the ringing input [(**TS5** for expansion shelf 1) or (**TS13** for expansion shelf 2) (pin **2** +20 Hz, and pin **3** 20 Hz return)] wiring per SD-7C127-01 Issue 6M or higher.

   Note: If +20 Hz supply is not available in the central office, the DMM will indicate 0 volts.

4. At the XTC expansion shelf fuse panel, connect DMM test leads between **TEST −20HZ** (red lead) jack and **TEST GND** (black lead) jack.

   Requirement: The DMM indicates between 80 and 110 Vac.

STEP	PROCEDURE

Error Condition: If the reading is not within range, check the ringing input [(**TS5** for expansion shelf 1) or (**TS13** for expansion shelf 2) (pin **1** +20 Hz, and pin **3** 20 Hz return)] wiring per SD-7C127-01 Issue 6M or higher.

5. Remove DMM test leads from jacks and condition DMM to measure volts dc.

6. Connect DMM test leads between **TEST -48V** (red lead) jack and **TEST GND** (black lead) jack on expansion shelf fuse panel.

   Requirement: DMM indicates between -45 and -53 Vdc.

   Error Condition: If the reading is not within range, check the fuse (**F1**) on the XTC expansion shelf or wiring per SD-7C127-01 Issue 6M or higher.

7. Connect DMM test leads between **TEST +20HZ** (red lead) jack and **TEST GND** (black lead) jack on the expansion shelf fuse panel.

   Requirement: The DMM indicates between +45 and +53 Vdc.

   Error Condition: If the reading is not within range, check the ringing input [(**TS5** for expansion shelf 1) or (**TS13** for expansion shelf 2) (pin **2** +20 Hz, and pin **3** 20 Hz return)] wiring per SD-7C127-01 Issue 6M or higher.

   Note: If +20 Hz supply is not available in the central office, the DMM will indicate 0 volts.

8. Connect DMM test leads between **TEST -20HZ** (red lead) jack and **TEST GND** (black lead) jack on expansion shelf fuse panel.

   Requirement: The DMM indicates between -45 and -53 Vdc.

   Error Condition: If the reading is not within range, check the ringing input [(**TS5** for expansion shelf 1) or (**TS13** for expansion shelf 2) (pin **1** -20 Hz, and pin **3** 20 Hz return)] wiring per SD-7C127-01 Issue 6M or higher.

9. Remove DMM test leads from jacks. Remove or verify that **XTC-F1** fuse has been removed from XTC expansion shelf fuse panel.

STEP	PROCEDURE

10. Alert CO (central office) personnel that tests are being made and CO alarms will be activated.

11. Insert the AUB60 circuit pack into the **AUB60** slot in the XTC expansion shelf.

Requirements:

- ☐ CO alarm is activated.
- ☐ Visual alarm indicator on aisle lights.
- ☐ **FAIL** indicator on the XTC fuse panels for the control shelf and the expansion shelf being turned up light.
- ☐ System ID display is activated.

Error Condition: If the AUB60 fails the requirements, check the wiring per SD-7C127-01 Issue 6M or higher. Try a new AUB60 circuit pack.

12. Insert the 80D (5A) fuse into fuse holder **XTC - F1** in XTC expansion shelf fuse panel.

Requirements:

- ☐ CO alarm silenced in about 15 seconds.
- ☐ Neither **XTC - F1** expansion shelf fuse on XTC fuse panel nor **-48V OUT** fuse on faceplate of AUB60 circuit pack is blown.

Error Condition: If either fuse is blown:

a. Replace the fuse(s).

b. Check the wiring per SD-7C127-01 Issue 6M or higher, and for shorted pins on the XTC backplane.

c. Try a new AUB60.

STEP	PROCEDURE

13. At faceplate of AUB60 circuit pack, connect the DMM test leads between the jacks as indicated in Table W.

Requirement: The DMM indicates the voltages (per connection) given in Table W.

Error Condition: If the reading is not within range, check the fuse (**F1**) on the XTC expansion shelf and the **–48V OUT** fuse on the faceplate of the AUB60. Try a new AUB60 circuit pack.

TABLE W
DC VOLTAGE MEASUREMENTS FOR AUB60

DMM CONNECTIONS (NOTE)		ACCEPTED RANGE OF VOLTAGE (V dc)
BLACK LEAD	RED LEAD	
GND	+5V-A	+4.8 *to* +5.2
GND	+5V-B	+4.8 *to* +5.2
GND	+12	+11.6 *to* +12.4
GND	–5V	–4.8 *to* –5.2

Note: Connect the color leads to the indicated jacks.

14. Remove DMM test leads from the jacks.

15. Insert the KS-19531-type pin plug into the **ALM TEST** jack on the AUB60 circuit pack.

Requirements:

- ☐ **FAIL** indicator on the AUB60 circuit pack lights.
- ☐ **FAIL** indicator on the expansion shelf lights.
- ☐ **FAIL** indicator on the control shelf lights.
- ☐ CO alarm activates.
- ☐ Visual alarm indicator on the aisle lights.
- ☐ System ID display activates.

Error Condition: If this test fails, the AUB60 power supply is defective — try another AUB60 power supply.

STEP	PROCEDURE

Note: The alarm wiring is assumed to be correctly connected.

16. Remove the KS-19531-type pin plug from the **ALM TEST** jack.

Requirements:

- ☐ **FAIL** indicator on the AUB60 circuit pack goes off.
- ☐ **FAIL** indicator on the expansion shelf goes off.
- ☐ **FAIL** indicator on the control shelf goes off.
- ☐ CO alarm is silenced.
- ☐ Visual alarm indicator on the aisle goes off.
- ☐ System ID display goes off.

Error Condition: If this test fails, the AUB60 power supply is defective — try another AUB60 power supply.

Note: The alarm wiring is assumed to be correctly connected.

E. Add a Tester Unit to an XTC Shelf

4.12 An XTC tester unit is comprised of three circuit packs: MC97745A1 2 (XTUD), AUB67 (XTUC), and AUB68 (XTUB). The J1C182XA, L1 XTC control shelf and J1C182XA, L2 XTC expansion shelf each contain up to four tester units and the J1C182XA, L3 XTC expansion shelf contains up to two tester units. A tester unit is used by the XTC to test carrier system channels and to provide MLT and SARTS with test access. This procedure covers the installation of a single tester unit. Since the installation of each tester unit is identical, this procedure can be repeated as necessary to install the required number of tester units.

4.13 The following items are required to perform this procedure:

- MC97745A1 2 circuit pack
- AUB67 (XTUC) circuit pack
- AUB68 Series 2 (XTUB) circuit pack.

STEP	PROCEDURE

1. Insert the AUB67 circuit pack into the **XTUC** slot in the XTC shelf.

   Requirements:

   ☐ **BUSY** indicator lights.
   ☐ **FAIL** indicator lights.

   Error Condition: If either indicator fails to light, replace the AUB67.

2. Insert the AUB68 circuit pack into the **XTUB** slot in the XTC shelf.

   Requirement: **FAIL** indicator lights.

   Error Condition: If not, replace the AUB68.

3. Insert the MC97745A1 2 circuit pack into the **XTUD** slot in the XTC shelf.

   Requirement: **FAIL** indicators on all three circuit packs go off in approximately 30 seconds.

   Error Condition: If not, do the following:

   a. Replace MC97745A1 2 circuit pack. If **FAIL** indicators on all three circuit packs go off within approximately 30 seconds, then go to Step 4. If not, replace MC97745A1 2 with original circuit pack.

STEP	PROCEDURE

b. Replace XTUB (AUB68) circuit pack. Unseat then reseat MC97745A1 2 circuit pack. If **FAIL** indicators on all three circuit packs go off within approximately 30 seconds, then go to Step 4. If not, replace XTUB with original circuit pack.

c. Replace XTUC (AUB67) circuit pack. Unseat then reseat MC97745A1 2 circuit pack. **FAIL** indicators on all three circuit packs should go off within approximately 30 seconds. If not, refer to SD-7C127-01 Issue 6M or higher to check bay wiring.

4. Repeat the procedure from Step 1 until all desired tester units are installed.

F. Add Trunk Units to PGTC Shelf

4.14 A trunk unit is used to provide the interface between MLT/LTD and the switch to access and test carrier system channels via the XTC. This procedure tests:

- The PGTC trunk units,
- The no-test trunk cabling from the XTC to the switch,
- The path through the switch to XTC CUE, and
- The interface between the trunk unit and each tester unit.

4.15 This procedure assumes that the XTC CUE (channel unit emulator) has been assigned a telephone number and is wired to a line circuit. Also, this procedure assumes that the output of the trunk cards (SM94C) are wired to no-test trunks in the switch with multifrequency capabilities.

4.16 The following items are required to perform this procedure:

- KS-22475, L1 TTS (Trunk Test Set) with KS-22475, L2 adapter, or Berry Electronics Model 312A L2 Trunk Test Set with Model 312A L3 Positive Sleeve Current Adapter.
- 47A or 47B test extender card.
- KS-22861,L1 DMM (digital multimeter) or equivalent.
- Two 310 patch cords with Tip (T), Ring (R), and Sleeve (S) conductors.
- Knowledge of the steering digit(s) for testing and the telephone number of the XTC CUE. This information can be obtained from the MLT administrator.
- Knowledge of the type of central office switching equipment providing the XTC CUE telephone number.

STEP	PROCEDURE

1. Set the switches on TTS and adapter:

   On the TTS:

   - **CONTROL** to **ON HOOK** ↓
   - **SLEEVE** to **CLOSED** ↑
   - **CURRENT** to **HIGH** ↑
     (For 2 *ESS*™ switch use **LOW** (↓) position.)

   On the adapter:

   - +**SLEEVE** to **OPEN**
   - +**CURRENT** to **LOW**

2. Insert the KS-22475, L2 adapter into the TTS. (The **BAT**, **GRD**, **T**, **R**, and **S** plugs must mate with their corresponding jacks.)

3. ***Caution: The 47A/47B test extender must be used only in slots designated SM92/SM94 in a PGTC J1C142A shelf (trunk card slots).***

   Insert the 47A/47B test extender card into the **SM92/SM94** trunk card slot to be equipped. Insert the SM94C trunk card to be installed into the **47A/47B** extender slot.

   Requirements:

   - ☐ No fuses blow. If a fuse blows, remove the SM94C trunk card and replace the fuse. Replace the SM94C trunk card with another SM94C card. If the fuse blows again, check the wiring per SD-7C127-01 Issue 6M and SD-97760-01 Issue 4B or higher.
   - ☐ All indicators on the TTS are not lighted
   - ☐ **BUSY** indicator on the SM94C trunk card is not lighted.

STEP	PROCEDURE

4. Using a 310 cord, connect the **-48V** jack on the TTS to the **-48V** jack on the 47A/47B test extender card.

   Requirement: The **POWER** indicator on the TTS lights.

   Error Condition: If the indicator does not light, check the 310 cord, the jack at the extender for -48V power, and the fuse associated with the PGTC shelf input -48V power.

5. Using a 310 cord, connect either **TRUNK** jack output of the TTS to the **ODD TRUNK** jack labeled **TO XTC/PGTC** on the 47A/47B test extender card.

6. At the XTC, unseat the XTUD circuit packs installed in tester unit positions **1** through **4** (XTC control shelf tester units).

   Note: The **FAIL** indicators on the XTUB and XTUC light — ignore these indicators. The **BUSY** indicator on the XTUC lights — ignore this indicator.

7. ***Caution: This procedure has time constraints. Timing is important — timing of some steps is more critical than others but all steps must be completed promptly. If not, the XTC will disconnect and the test must be started over.***

   On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

   Requirements:

   - XBar (crossbar), SXS (step-by-step), DMS-10/100, 3 *ESS* switch, or *5ESS* switch —
     - ☐ **CURRENT** indicator lights.
   - XBar, DMS-10/100, or any *ESS* switch —
     - ☐ **BAT ON RING** indicator lights momentarily, goes off, then
     - ☐ **BAT ON TIP** indicator lights.
   - SXS switch —
     - ☐ **BAT ON TIP** indicator lights.
   - Dial pulse crossbar switch —
     - ☐ A *tone* is heard during the dialing sequence.

STEP	PROCEDURE

Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

8. Press the indicated keys on the TTS keypad in the given sequence:

   a. KP1 (signals system that the keypad is being used).

   b. Enter the steering digit(s), 4 digits of the XTC CUE telephone number.

   c. ST [No. 1 crossbar and 3 *ESS* switches do not require ST (Start) tone].

Requirements:

- All switches —
  - ☐ **BAT ON TIP** indicator goes off.
  - ☐ **BAT ON RING** indicator lights (except 2 *ESS* switch). (For 3 *ESS* switch, the indicator flashes once.)
- 1 *ESS* or 2 *ESS* switch —
  - ☐ **CURRENT** indicator lights after the last digit.

Error Condition: If the response is incorrect, check to make sure that you are using the correct steering digit(s) and the correct digits for the XTC CUE telephone number, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

STEP	PROCEDURE

9. On the TTS, set the **CURRENT** switch to **LOW** (↓).

Requirements:

☐ **BAT ON RING** indicator goes off.
(For *5ESS* switch the indicator remains lighted for up to 6 seconds, then goes off.)

☐ **CURRENT** indicator remains lighted.

Note: If the **BAT ON RING** indicator remains lighted, the line may be busy. On the TTS, set the **SLEEVE** switch to **OPEN** (↓). Monitor the line for conversation. If the line is busy, follow the disconnect procedure in Step 15. Check the telephone number, you are not accessing the correct telephone number for the XTC CUE, then try the test again.

Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

10. On the TTS, set **SLEEVE** switch to **OPEN** (↓).

Requirements:

☐ **BAT ON RING** indicator lights.
☐ **CURRENT** indicator goes off.
☐ A dial *tone* is heard over the TTS speaker.

11. On the TTS, set **SLEEVE** switch to **CLOSED** (↑).

Requirements:

☐ **CURRENT** indicator lights.
☐ **BAT ON RING** indicator goes off.

12. On the TTS, set **CONTROL** switch to **ON HOOK** (↓).

Requirement: The **CURRENT** indicator remains lighted.

STEP	PROCEDURE

13. ***Caution: Complete Step 14 within 8 seconds of completing this Step or the XTC will disconnect.***

    On the adapter, depress the [SLC] pushbutton for 5 seconds.

    Requirement: The **BUSY** indicator on the SM94C card lights.

    Error Condition 1: If there is no response, check the T and R wiring to the XTC CUE for T and R reversal. Try another XADU.

    Error Condition 2: If the **BUSY** indicator lights only momentarily, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). If the trunk card being tested is in a PGTC expansion shelf, try another SM90 circuit pack.

14. On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

    Requirement: A 120 ipm rate is heard on the TTS speaker.

    Error Condition: If a 120 ipm rate is not heard, replace the SM94C trunk card.

15. Set the switches on TTS to disconnect the access:

    - **SLEEVE** to **CLOSED** ↑
    - **CONTROL** to **ON HOOK** ↓
    - **CURRENT** to **HIGH** ↑

    Requirement: All indicators go off.

16. At the XTC, reseat the XTUD circuit pack for one tester unit group (starting with tester unit position 1).

STEP	PROCEDURE

17. Verify that the switches on TTS and adapter are properly set:

    On the TTS:

    - **CONTROL** to **ON HOOK** ↓
    - **SLEEVE** to **CLOSED** ↑
    - **CURRENT** to **HIGH** ↑
      (For 2 *ESS* switch, use **LOW** (↓) position.)

    On the adapter:

    - **+SLEEVE** to **OPEN**
    - **+CURRENT** to **LOW**

18. On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

    Requirements:

    - XBar (crossbar), SXS (step-by-step), DMS-10/100, 3 *ESS* switch, or *5ESS* switch —
      - ☐ **CURRENT** indicator lights.
    - XBar, DMS-10/100, or any *ESS* switch —
      - ☐ **BAT ON RING** indicator lights momentarily, goes off, then
      - ☐ **BAT ON TIP** indicator lights.
    - SXS switch —
      - ☐ **BAT ON TIP** indicator lights.
    - Dial pulse crossbar switch —
      - ☐ A *tone* is heard during the dialing sequence.

STEP	PROCEDURE

19. Press the indicated keys on the TTS keypad in the given sequence:

    a. [KP 1] (signals system that the keypad is being used).

    b. Enter the steering digit(s), 4 digits of the XTC CUE telephone number.

    c. [ST] [No. 1 crossbar and 3 *ESS* switches do not require ST (Start) tone].

    Requirements:

    - All switches —
      - ☐ **BAT ON TIP** indicator goes off.
      - ☐ **BAT ON RING** indicator lights (except 2 *ESS* switch). (For 3 *ESS* switch, the indicator flashes once.)
    - 1 *ESS* or 2 *ESS* switch —
      - ☐ **CURRENT** indicator lights after the last digit.

    Error Condition: If the response is incorrect, check to make sure that you are using the correct steering digit(s) and the correct digits for the XTC CUE telephone number, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

20. On the TTS, set the **CURRENT** switch to **LOW** (↓):

    Requirements:

    - ☐ **BAT ON RING** indicator goes off. (For *5ESS* switch the indicator remains lighted for up to 6 seconds, then goes off.)
    - ☐ **CURRENT** indicator remains lighted.

    Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S

STEP	PROCEDURE

leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

21. On the TTS, set **SLEEVE** switch to **OPEN** (↓).

Requirements:

- ☐ **BAT ON RING** indicator lights.
- ☐ **CURRENT** indicator goes off.
- ☐ A dial *tone* is heard over the TTS speaker.

22. On the TTS, set the **SLEEVE** switch to **CLOSED** (↑).

Requirements:

- ☐ **CURRENT** indicator lights.
- ☐ **BAT ON RING** indicator goes off.

23. On the TTS, set the **CONTROL** switch to **ON HOOK** ↓.

Requirement: The **CURRENT** indicator remains lighted.

24. On the adapter, depress the [SLC] pushbutton until the **CURRENT** indicator on the TTS goes off and then lights again — this will occur in less than 8 seconds.

Requirements:

- ☐ **BUSY** indicator on the SM94C card lights.
- ☐ **BUSY** indicator on the XTC XTUC card lights.

Error Condition 1: If the BUSY indicators do not light, repeat Steps 17 through 24. The problem could be operator error.

Error Condition 2: If there is no response, check the T and R wiring to the XTC CUE for T and R reversal.

Error Condition 3: If the BUSY indicators light only momentarily, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). If the trunk card being tested is in a PGTC expansion shelf, try another SM90 circuit pack.

STEP	PROCEDURE

Error Condition 4: If the trunk card is in an expansion shelf and the BUSY indicator lights, but the BUSY indicator on the XTUC does not light, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). Try another SM90 circuit pack.

Error Condition 5: If the response is incorrect, try another test unit (XTUB, XTUC, and XTUD) or SM94C unit.

25. Set the switches on TTS to disconnect the access:

    - **SLEEVE** to **CLOSED** ↑
    - **CONTROL** to **ON HOOK** ↓
    - **CURRENT** to **HIGH** ↑

    Requirement: All indicators go off.

26. Remove the XTUD circuit pack in the tester unit position just tested. Install the XTUD circuit pack (right to left) for the next equipped XTC tester position. Repeat Steps 17 through 25 for tester positions 2 through 4. After all four tester positions have been tested, proceed with Step 27.

    Note: If all four tester positions are not equipped, a tester group (XTUB, XTUC, and XTUD) may be moved into the vacant position(s) for testing purposes. Install the tester group in the following sequence — XTUC, XTUB, and then XTUD. See Section 4.E, *Add a Tester Unit to an XTC Shelf.*

27. If tests have already been performed on the even circuit on the SM94C trunk card being installed, proceed to Step 28. Otherwise, move the 310 plug from the **ODD TRUNK** jack labeled **TO XTC/PGTC** on the 47A/47B test extender to the **EVEN TRUNK** jack labeled **TO XTC/PGTC**. Repeat Steps 6 through 26 for trunks that are wired to no-test trunks in the switch with multifrequency capabilities.

28. Remove the SM94C trunk card from the 47A/47B test extender. Remove the 47A/47B test extender and install the SM94C trunk card into the vacated slot.

STEP	PROCEDURE
29.	Repeat Steps 1 through 28 for all PGTC SM94C trunk cards to be installed.
30.	After all required SM94C trunk cards are installed, reseat or return all tester cards to their original positions. See Section 4.E, *Add a Tester Unit to an XTC Shelf.*

G. Add a Data Link Unit to an XTC Shelf

4.17 The XDLU (XTC data link unit) provides a communication link between the XTC and SARTS or COP. The XTC control shelf can contain two XDLUs. The XDLU-1 slot is required when the XTC interfaces with SARTS and can be equipped with either an AUB63 or AUB63B. The XDLU-2 slot is used to provide a communications link to COP. It can only be equipped with an AUB63B and requires the MC97761A1 XCU for operation. The XDLU slots in the two expansion shelves are not used at this time.

4.18 The following items are required to perform this procedure:

- AUB63 or AUB63B XDLU for SARTS.
- AUB63B XDLU for COP.

STEP	PROCEDURE

1. ***Note:*** This Step is for the **XDLU-1** — SARTS only.

   Insert the AUB63 or AUB63B circuit pack into the **XDLU-1** slot in the XTC control shelf.

   Requirements:

   ☐ **FAIL** indicator on the XDLU lights, then goes off within 15 seconds.

   ☐ **LINK FAIL** indicator on the XDLU lights, then goes off within 15 seconds.

   Error Condition: If either requirement fails, replace the XDLU circuit pack.

   Note: The **LINK FAIL** indicator on the XDLU will go off, then light again within approximately 25 seconds if the wiring to the RTS-5A DLI (data link interface) module is not connected properly, the RTS-5A DLI is not installed, or the RTS-5A DLI is not functioning properly.

2. ***Note:*** This Step is for the **XDLU-2** — COP only.

   Insert the AUB63B into the **XDLU-2** slot on the XTC control shelf.

   Requirements:

   ☐ **FAIL** indicator on the XDLU lights, then goes off within 15 seconds.

   ☐ **LINK FAIL** indicator on the XDLU lights, then goes off within 15 seconds.

   Error Condition: If either requirement fails, replace the XDLU circuit pack.

H. Add a Fanout Unit to an XTC Shelf

4.19 This procedure covers the installation of a single AUB66 fanout unit. Since the installation of each fanout unit is identical, this procedure can be repeated as necessary to install the required number of fanout units.

Note: If SIDs (system numbers) are going to be moved from one XFOU to another XFOU, the XCU should be removed and replaced to clear its memory map. The memory contains a map which correlates SIDs to XFOUs.

4.20 The following items are required to perform this procedure:

- AUB66 (XFOU).

STEP	PROCEDURE

1. Insert the AUB66 fanout unit into the appropriate **XFOU** slot in the XTC shelf.

   Requirements:

   - ☐ **FAIL** indicator on the XFOU lights, then goes off within 10 seconds.
   - ☐ **LINK** indicator on the XFOU lights, then goes off within 10 seconds.

   Error Condition: If either requirement fails, replace the XFOU circuit pack.

2. Repeat this procedure for all fanout units to be installed.

5. FUNCTIONAL TESTS

5.01 Following the initial installation of an XTC or any add-on installation to an XTC, tests must be performed to insure that the XTC is properly functioning. The functional tests are listed in Table X. All applicable procedures listed in Table X should be performed after the initial installation has been completed. Whenever a tester unit, trunk unit, or *SLC* carrier bank is added to the XTC, Procedures A and B should be performed. When a fanout unit or a *SLC* Series 5 carrier bank, equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively, is added to the XTC, Procedures A, C, and D should be performed. If a data link unit is added to the XTC in the XDLU-1 position, then Procedure F should be performed.

5.02 The functional test of an XTC fanout unit requires the knowledge of the assignment of fanout units to *SLC* Series 5 carrier banks equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively. The assignments should be recorded in Table Y after the initial installation and as fanout units or banks are added.

TABLE X
GUIDE TO FUNCTIONAL TESTS

FUNCTIONAL TEST	PROCEDURE
XTC Self Test of Tester Units	A
Test the XTC (PGTC Mode) for Locally-Switched Services	B
Fanout Unit to *SLC* Carrier FPC or FPD Bank Test	C
Test the XTC and the Enhanced Test Bus to a FPC or FPD System for Locally-Switched Services	D
Test the XTC, the CUE, and the Enhanced Test Bus to a FPC or FPD System for Nonlocally Switched Services	E
SSC Test	F
LTD Test — Locally Switched Channel	G
LTD Test — Nonlocally Switched Channel	H
Test the *SLC* Series 5 Carrier Using the MLT	I
Verify XTC to *SLC* Carrier Interface Cable	J

TABLE Y
ASSIGNMENT OF BANKS TO FANOUT UNITS

FANOUT UNIT #	SYSTEM ID OF BANKS CONNECTED (NOTE)	
	UPPER TEST BUS GROUP IDs (6 BANKS)	LOWER TEST BUS GROUP IDs (6 BANKS)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

Note: Refer to Figure 17 for definition of test bus group to bank assignment.

A. XTC Self Test of Tester Units

5.03 In this procedure, the XCU automatically tests all installed tester units that are inactive.

5.04 A KS-19531 type pin plug or equivalent metallic plug is required to perform this test.

Note: A more comprehensive test of the tester unit is performed if an XCCU circuit pack is installed. If an XCCU circuit pack is installed and its **FAIL** indicator lights, replace the XCCU circuit pack.

STEP	PROCEDURE

1. Insert the KS-19531 type pin plug into the **TST-2** socket on the XCU faceplate.

   Requirements:

   ☐ **L2** indicator on the XCU lights for the duration of the test (approximately 5 seconds), and goes off when testing of all idle tester units is completed.

   ☐ **BUSY** and **FAIL** indicators on the tester unit under test flash. The indicators then go off.

   Error Condition: If either requirement fails, remove the pin plug and replace the failed cards — repeat this step for the new card.

2. Remove the KS-19531 type pin plug.

B. Test the XTC through the Switching Equipment (PGTC Mode) for Locally-Switched Services via the Trunk Test Set

5.05 This procedure tests:

- The XTC
- The no-test trunk cabling from the XTC to the switch
- The path through the switch to a carrier system channel
- The 28 lead interface between the XTC and the carrier systems
- A locally switched *SLC* carrier channel.

Figure 19 shows the PGTC mode test path connections.

5.06 This procedure assumes that certain conditions exist:

- The XTC has been equipped and turnup procedures in Section 4 have been completed.
- The XTC has been installed with a PGTC J1C142A shelf and the output of the SM94C trunk cards are wired to no-test trunks in the switch with multifrequency capabilities.
- A POTS channel is available in the carrier system to be used for testing. The channel should be in a working *SLC* 96 carrier system or a Series 5 System equipped with AUB2/AUB2B COT CTU, and AUB22 RT CTU. This insures that the test will be performed on the 28 lead interface (test bus) between the XTC and the carrier system.
- A POTS telephone number is available for testing and can be temporarily connected to the channel in the system to be used for testing.
- That the carrier system containing the POTS channel is cabled to the 28 lead interface (multiple) and is connected to the XTC.

5.07 The following items are required to perform this procedure:

- KS-22475, L1 TTS (Trunk Test Set) with KS-22475, L2 adapter, or Berry Electronics Model 312A L2 Trunk Test Set with Model 312A L3 Positive Sleeve Current Adapter.
- 47A or 47B test extender card.
- KS-22861,L1 DMM (digital multimeter) or equivalent.
- Two 310 patch cords with Tip (T), Ring (R), and Sleeve (S) conductors.
- Knowledge of the steering digit(s) for testing and the POTS telephone number. This information can be obtained from the MLT administrator.
- Knowledge of the type of switching equipment providing the POTS telephone number used for testing.

STEP	PROCEDURE

1. Remove the XTUD for all equipped testers (except for tester position one) in the XTC control shelf.

2. Set the switches on TTS and adapter:

   On the TTS:

   - **CONTROL** to **ON HOOK** ↓
   - **SLEEVE** to **CLOSED** ↑
   - **CURRENT** to **HIGH** ↑
     (For 2 *ESS* use **LOW** (↓) position.)

   On the adapter:

   - **+SLEEVE** to **OPEN**
   - **+CURRENT** to **LOW**

3. Insert the KS-22475, L2 adapter into the TTS. (The **BAT**, **GRD**, **T**, **R**, and **S** plugs must mate with their corresponding jacks.)

4. ***Caution: The 47A/47B test extender card must only be used in slots designated SM92/SM94 in a PGTC J1C142A shelf (trunk card slots).***

   Remove the SM94C card associated with the trunk to be used for testing. Insert the 47A/47B test extender card into the vacated trunk card slot. Insert the removed trunk card into the extender.

   Requirements:

   - ☐ All indicators on the TTS are not lighted.
   - ☐ **BUSY** indicator on SM94C trunk card is not lighted.

STEP	PROCEDURE

5. Using a 310 cord, connect the **-48V** jack on the TTS to the **-48V** jack on the 47A/47B test extender card.

   Requirement: The **POWER** indicator on the TTS lights.

   Error Condition: If the indicator does not light, check the 310 cord, the jack at the extender for -48V power, and the fuse associated with the PGTC shelf input -48V power.

6. Using a 310 cord, connect either **TRUNK** jack output of the TTS to the **ODD TRUNK** or **EVEN TRUNK** jack labeled **TO XTC/PGTC** on the 47A/47B test extender card associated with the trunk to be used for testing.

7. ***Caution: This procedure has time constraints. Timing is important — timing of some steps is more critical than others but all steps must be completed promptly. If not, the XTC will disconnect and the test must be started over.***

   On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

   Requirements:

   - XBar (crossbar), SXS (step-by-step), DMS-10/100, 3 *ESS* switch, or *5ESS* switch —
     - ☐ **CURRENT** indicator lights.
   - XBar, DMS-10/100, or any *ESS* switch —
     - ☐ **BAT ON RING** indicator lights momentarily, goes off, then
     - ☐ **BAT ON TIP** indicator lights.
   - SXS switch —
     - ☐ **BAT ON TIP** indicator lights.
   - Dial pulse crossbar switch —
     - ☐ A *tone* is heard during the dialing sequence.

   Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

STEP	PROCEDURE

8. Press the indicated keys on the TTS keypad in the given sequence:

   a. [KP1] (signals system that the keypad is being used.)

   b. Enter steering digit(s), 4 digits of a POTS telephone number.

   c. [ST] [No. 1 crossbar and 3 *ESS* switches do not require ST (Start) tone].

   Requirements:

   ■ All switches —

   ☐ **BAT ON TIP** indicator goes off.
   ☐ **BAT ON RING** indicator lights (except 2 *ESS* switch).
   (For 3 *ESS* switch, the indicator flashes once.)

   ■ 1 *ESS* or 2 *ESS* switch —

   ☐ **CURRENT** indicator lights after the last digit.

   Error Condition: If the response is incorrect, check to make sure that you are using the correct steering digit(s) and the correct digits for the POTS telephone number, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

9. On the TTS, set the **CURRENT** switch to **LOW** (↓).

   Requirements:

   ☐ **BAT ON RING** indicator goes off.
   (For *5ESS* switch the indicator remains lighted for up to 6 seconds, then goes off.)
   ☐ **CURRENT** indicator remains lighted.

   Note 1: If the **BAT ON RING** indicator remains lighted, the line may be busy. On the TTS, set the **SLEEVE** switch to **OPEN** (↓). Monitor the line for conversation. If the line is busy follow the disconnect procedure in Step 16. Check to make sure that you are accessing the correct telephone number, then try the test again.

STEP	PROCEDURE

Note 2: If 120 ipm and a flashing **GND ON RING** is returned, then the switch resources may be busy or unavailable. Try again. If continually blocked, call the switch administrator.

Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

10. On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

Requirements:

☐ **BAT ON RING** indicator lights.
☐ **CURRENT** indicator goes off.
☐ A dial *tone* is heard over the TTS speaker.

11. On the TTS, set the **SLEEVE** switch to **CLOSED** (↑).

Requirements:

☐ **CURRENT** indicator lights.
☐ **BAT ON RING** indicator goes off.

12. On the TTS, set the **CONTROL** switch to **ON HOOK** (↓).

Requirement: The **CURRENT** indicator remains lighted.

13. On the adapter, depress the [SLC] pushbutton until the **CURRENT** indicator on the TTS goes off and then lights again — this occurs in less than 8 seconds.

Requirements:

☐ **BUSY** indicator on the SM94C card lights.
☐ **BUSY** indicator on the XTUC card lights.

Error Condition 1: If there is no response, check the T and R wiring to the COT POTS channel unit for T and R reversal.

STEP	PROCEDURE

Error Condition 2: If the BUSY indicator lights only momentarily, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). If the trunk card being tested is in a PGTC expansion shelf, try another SM90 circuit pack.

Error Condition 3: If the trunk card is in an expansion shelf and the BUSY indicator lights, but the BUSY indicator on the XTUC does not light, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). Try another SM90 circuit pack.

Error Condition 4: If the response is incorrect, try another tester unit (XTUB, XTUC, and XTUD), SM94C unit, or COT CTU.

14. On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

Comment: The **TIP** and **RING** are now connected to **BYPASS/DC TEST** pair.

Error Condition 1: If 120 ipm is heard, the system may be busy. Check to see if the *SLC* carrier system is busy (the BUSY indicator on the Series 5 CTU is lighted). Try to run the test again. If the 120 ipm is heard again, check the 28 lead interface between the XTC and the *SLC* carrier bank per the *Verify XTC to SLC Carrier Interface Cable* procedure in Section 5.J.

Error Condition 2: If 60 ipm is heard the system is in *MAJOR* alarm.

15. On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

Requirements:

- ☐ **BAT ON RING** indicator lights, and
- ☐ A single *tone* burst is heard, if the channel test is good.

Error Condition 1: If a single tone burst is not heard, the channel test is bad. Replace the channel units and retest. Check the 28 lead interface between the XTC and the *SLC* carrier bank per the *Verify XTC to SLC Carrier Interface Cable* procedure in Section 5.J (if it has not already been checked).

Error Condition 2: If the ERROR CODE seven segment display on the XCU of the XTC shows a TRC (test result code), follow the procedures (Tables H and I, Section 2) for test result codes to help isolate the problem.

STEP	PROCEDURE

Error Condition 3: A problem related to the *5ESS* switch is noise caused by the *5ESS* switch line units. Check *5ESS* switch related items for the POTS channel being used for testing:

- Check the TN 831 packs (if the line units are Model 2) — they should be Series 9 or less, *or* Series 14 or greater.
- Check the TN 331 packs (if the line units are Model 1) — they should be TN 331B Series 5 or greater.
- Verify that the XTUB AUB68 of the XTC is Series 2 or greater, *and* that the XTUD is MC97745A1 2.

Error Condition 4: If the response remains incorrect, try another tester unit (XTUB, XTUC, and XTUD), SM94C unit, XADU, *or* COT CTU.

16. Set the switches on TTS to disconnect the access:

    - **SLEEVE** to **CLOSED** ↑
    - **CONTROL** to **ON HOOK** ↓
    - **CURRENT** to **HIGH** ↑

    Requirement: All indicators go off.

17. Remove the XTUD circuit pack in the tester unit position just tested. Install the XTUD circuit pack (right to left) for the next equipped XTC tester position. Repeat Steps 7 through 16 for tester positions 2 through 4. After all four tester positions have been tested, proceed with Step 18.

    Note: If all four tester positions are not equipped, a tester group (XTUB, XTUC, and XTUD) may be moved into the vacant position(s) for testing purposes. Install the tester group in the following sequence — XTUC, XTUB, and then XTUD. See Section 4.E, *Add a Tester Unit to an XTC Shelf.*

18. After all tester units have been exercised and all tester unit positions have been tested, reinstall all of the tester units in their original positions. See Section 4.E, *Add a Tester Unit to an XTC Shelf.*

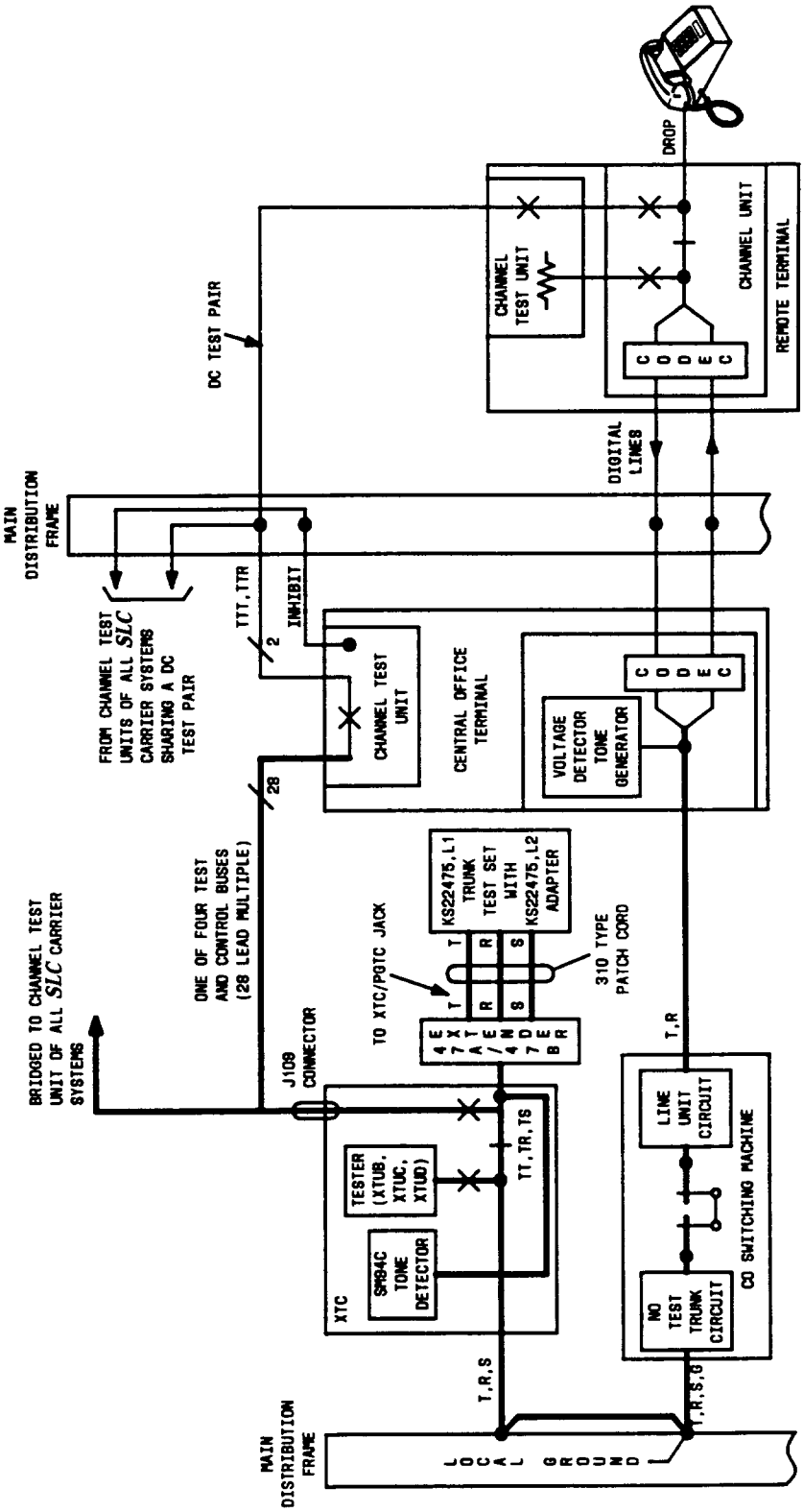


Figure 19—PGTC Mode Test Path Connections

C. Fanout Unit to *SLC* Carrier FPC or FPD Bank Test

5.08 This procedure tests:

- The XTC
- The no-test trunk cabling from the XTC to the switch
- The 35 lead interface between the XTC XFOU and a Series 5 bay equipped with FPC or FPD carrier systems
- The XFOU
- The CUE (channel unit emulator) and associated wiring.

5.09 This procedure assumes that certain conditions exist:

- The XTC has been equipped and the turnup procedures in Section 4 have been completed.
- The XTC has been installed with a PGTC J1C142 shelf and the output of the SM94C trunk cards are wired to no-test trunks in the switch with multifrequency capabilities.
- The XTC has tester units installed in tester positions 1 and 2, or position 3 (see Table L).
- The XFOU to be tested is connected to FPC or FPD systems equipped with AUB5 COT CTUs, AUB25 RT CTUs, and AUA18 DTU-Ls, and AUA19 DTU-Rs in the COTs. The systems must be known to be working.
- The XTC CUE has been assigned and connected to a telephone number and is wired to a line circuit.

5.10 The following items are required to perform this procedure:

- KS-22475, L1 TTS (trunk test set) with KS-22475, L2 adapter, or Berry Electronics Model 312A L2 trunk test set with Model 312A L3 positive sleeve current adapter.
- 47A/47B test extender card.
- KS-22861,L1 DMM (digital multimeter) or equivalent.
- Two 310 patch cords with Tip (T), Ring (R), and Sleeve (S) conductors.
- Knowledge of the steering digit(s) for testing and the XTC CUE telephone number. This information can be obtained from the MLT administrator.
- Knowledge of the SID (system identification) numbers for the systems to be used for testing. This is the four digit number set on the COT ADU (AUB6). An XFOU can be connected to 6 dual channel banks (up to 12 systems) and provides three test buses to the 12 systems as shown in Figure 17. A test should be performed to one bank in the upper and lower bank group to completely test the XFOU interface.

- Knowledge of the type of central office switching equipment providing the XTC CUE telephone number.

STEP	PROCEDURE

1. Set the switches on the TTS and adapter:

   On the TTS:

   - **CONTROL** to **ON HOOK** ↓
   - **SLEEVE** to **CLOSED** ↑
   - **CURRENT** to **HIGH** ↑
     (For 2 *ESS* switch use **LOW** (↓) position.)

   On the adapter:

   - **+SLEEVE** to **OPEN**
   - **+CURRENT** to **LOW**

2. Insert the KS22475, L2 adapter into the TTS. (The **BAT**, **GRD**, **T**, **R**, and **S** plugs must mate with the corresponding jacks.)

3. ***Caution: The 47A/47B test extender card must only be used in slots designated SM92/SM94 in a PGTC J1C142A shelf (trunk card slots).***

   Remove the SM94C card associated with the trunk to be used for testing. Insert the 47A/47B test extender card into the vacated trunk card slot. Insert the removed trunk card into the extender.

   Requirements:

   ☐ All indicators on the TTS are not lighted.
   ☐ **BUSY** indicator on SM94C trunk card is not lighted.

4. Using a 310 cord, connect the **-48V** jack on the TTS to the **-48V** jack on the 47A/47B test extender card.

   Requirement: The **POWER** indicator on the TTS lights.

STEP	PROCEDURE

Error Condition: If the indicator does not light, check the 310 cord, the jack at the extender for −48V power, and the fuse associated with the PGTC shelf input −48V power.

5. Using a 310 cord, connect either **TRUNK** jack output of the TTS to the **ODD TRUNK** or **EVEN TRUNK** jack labeled **TO XTC/PGTC** on the 47A/47B test extender card associated with the trunk to be used for testing.

6. ***Caution: This procedure has time constraints. Timing is important — timing of some steps is more critical than others but all steps must be completed promptly. If not, the XTC will disconnect and the test must be started over.***

   On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

   Requirements:

   - XBar (crossbar), SXS (step-by-step), DMS-10/100, 3 *ESS* switch, or *5ESS* switch —

     ☐ **CURRENT** indicator lights.

   - XBar, DMS-10/100, or any *ESS* switch —

     ☐ **BAT ON RING** indicator lights momentarily, goes off, then
     ☐ **BAT ON TIP** indicator lights.

   - SXS switch —

     ☐ **BAT ON TIP** indicator lights.

     Dial pulse crossbar switch —

     ☐ A *tone* is heard during the dialing sequence.

   Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

STEP	PROCEDURE

7. Press the indicated keys on the TTS keypad in the given sequence:

   a. [KP 1] (signals system that the keypad is being used.)

   b. Enter steering digit(s), 4 digits of the XTC CUE telephone number.

   c. [ST] [No. 1 crossbar and 3 *ESS* switches do not require ST (Start) tone].

   Requirements:

   ■ All switches —

   ☐ **BAT ON TIP** indicator goes off.
   ☐ **BAT ON RING** indicator lights (except 2 *ESS* switch).
   (For 3 *ESS* switch, the indicator flashes once.)

   ■ 1 *ESS* or 2 *ESS* switch —

   ☐ **CURRENT** indicator lights after the last digit.

   Error Condition: If the response is incorrect, check to make sure that you are using the correct steering digit(s) and the correct digits for the XTC CUE telephone number, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

8. On the TTS, set the **CURRENT** switch to **LOW** (↓).

   Requirements:

   ☐ **BAT ON RING** indicator goes off.
   (For *5ESS* switch the indicator remains lighted for up to 6 seconds, then goes off).

   ☐ **CURRENT** indicator remains lighted.

   Note 1: If 120 ipm and a flashing **GND ON RING** is returned, then the switch resources may be busy or unavailable. Try again. If continually blocked, call the switch administrator.

STEP	PROCEDURE

Note 2: If the **BAT ON RING** indicator remains lighted, the line may be busy. On the TTS, set the **SLEEVE** switch to **OPEN** (↓). Monitor the line for conversation. If the line is busy, follow the disconnect procedure in Step 21. Check the telephone number, you are not accessing the correct telephone number for the XTC CUE, then try the test again.

Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

9. On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

Requirements:

- ☐ **BAT ON RING** indicator lights.
- ☐ **CURRENT** indicator goes off.
- ☐ A dial *tone* is heard over the TTS speaker.

10. On the TTS, set the **SLEEVE** switch to **CLOSED** (↑).

Requirements:

- ☐ **CURRENT** indicator lights.
- ☐ **BAT ON RING** indicator goes off.

11. On the TTS, set the **CONTROL** switch to **ON HOOK** (↓).

Requirement: The **CURRENT** indicator remains lighted.

12. On the adapter, depress [SLC] button until the **CURRENT** indicator on the TTS goes off and then lights again — this will occur in less than 8 seconds.

Requirements:

- ☐ **BUSY** indicator on the SM94C card lights.
- ☐ **BUSY** indicator on the XTUC card lights. (If more than one tester is installed, **BUSY** indicators on two XTUCs will light.)

Error Condition 1: If there is no response, check the T and R wiring to the XTC CUE for T and R reversal. Try another XADU.

STEP	PROCEDURE

Error Condition 2: If the BUSY indicator lights only momentarily, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). If the trunk card being tested is in a PGTC expansion shelf, try another SM90 circuit pack.

Error Condition 3: If the trunk card is in an expansion shelf and the BUSY indicator lights but the BUSY indicator on the XTUC does not light, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). Try another SM90 circuit pack.

Error Condition 4: If the response is incorrect, try another tester unit (XTUB, XTUC, and XTUD) or SM94C unit.

13. On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

14. ***Caution: From the time the CURRENT switch is set to HIGH (↑), you have 30 seconds to complete Steps 15 and 16 or the XTC will disconnect.***

    On the TTS, set the **CURRENT** switch to **HIGH** (↑).

    Requirements:

    ☐ **BAT ON RING** indicator lights momentarily, goes off, then
    ☐ **GRD ON RING** indicator lights.

15. Press the indicated keys on the TTS keypad in the given sequence:

    a. [KP1] (signals system that the keypad is being used.)

    b. Enter bank SID (xxxx), four digits for the upper or lower group to be tested.

    c. Enter channel number (0001).

    d. [ST] (Start tone.)

    Requirement: The **BAT ON TIP** indicator lights.

STEP	PROCEDURE

Note: If the indicators on two tester units are lighted, one goes off.

Error Condition 1: If 120 ipm is heard, system may be busy. Check to see if the *SLC* carrier system is *busy*, the BUSY indicator on the Series 5 system CTU is lighted or the CIU has access. Try to run the test again. If 120 ipm is heard again, check the cable between the XTC XFOU and the *SLC* carrier bay being tested.

Error Condition 2: If 60 ipm is heard, the system is in *MAJOR* alarm.

16. On the TTS, set the **CURRENT** switch to **LOW** (↓).

Requirement: **BAT ON RING** indicator lights.

Note: MF commands can now be entered. The 990 command tests the connection from the XFOU to the *SLC* carrier bank.

17. ***Caution: From the time the CURRENT switch is set to HIGH (↑), you have 30 seconds to complete Steps 18 through 20 or the XTC will disconnect.***

On the TTS, set the **CURRENT** switch to **HIGH** (↑).

Requirement: **GRD ON RING** indicator lights.

18. Press the indicated keys on the TTS keypad in the given sequence:

a. [KP1] (signals system that the keypad is being used.)

b. Enter MF command 990 (XTC/Bank bus test).

c. [ST] (Start tone.)

STEP	PROCEDURE

Requirements:

☐ **LINK** indicator on the XFOU lights momentarily, then goes off.

☐ **BAT ON TIP** indicator lights within 25 seconds.

Error Condition: If 120 ipm is heard, the XTC cannot run the test. Possible causes are, the 990 command was not properly keyed, or any of certain units could be defective — XFOU, XCU, a tester unit (XTUB, XTUC, XTUD), COT CTU or COT DTU (DTU-L, DTU-R) or the cable between the XFOU and the *SLC* carrier bay.

19. On the TTS, set the **CURRENT** switch to **LOW** (↓).

20. ***Caution: Complete this Step within 2 minutes or the XTC will disconnect.***

On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

Requirements:

☐ **BAT ON RING** indicator lights, and

☐ A single *tone* burst is heard, if the test buses are good.

Error Condition 1: If a single tone burst is not heard, check the test bus results. On the TTS, set the CONTROL switch to ON-HOOK (↓) and use Table Z to isolate the failure. The combination of voltage readings will indicate the condition of the two test buses, main and overflow, that connect to the XFOU under test.

Note: You have 2 minutes from the time the **SLEEVE** switch is set to **OPEN** (↓) to complete the voltage measurements in Table Z. If the measurements cannot be completed in 2 minutes, set the **SLEEVE** switch to **CLOSED** (↑) and then back to the **OPEN** (↓) position. This will allow another 2 minutes for completing the voltage measurements. Repeat this as often as necessary for additional time.

Error Condition 2: If the response remains incorrect, try another tester unit (XTUB, XTUC, and XTUD), SM94C unit, COT CTU *or* COT DTU (DTU-L and DTU-R).

STEP PROCEDURE

TABLE Z
TEST MEASUREMENTS (NOTE)

TONE	T-GRD	R-GRD	MEANING
None	OPEN	OPEN	Results Not Ready (Test in Progress)
None	GRD	GRD	No Test Performed (Test not Requested or Test Could not be Performed)
None	+48V	−48V	Main Test Bus Bad/ Overflow Test Bus Good
None	+48V	+48V	Main Test Bus Good/ Overflow Test Bus Bad
None	−48V	+48V	Main/Overflow Test Bus Bad
One Burst	GRD	−48V	Main/Overflow Test Bus Good

Note: The voltages are measured from T (tip) to GRD (ground), and R (ring) to GRD on the adapter.

21. Set the switches on the TTS to disconnect the access:

    - **SLEEVE** to **CLOSED** (↑).
    - **CONTROL** to **ON HOOK** (↓).
    - **CURRENT** to **HIGH** (↑).

    Requirement: All indicators go off.

22. Repeat this procedure from Step 6 for a bank in the opposite bank group from the one just tested (if equipped and you have not already done so) that is served by the XFOU.

    Note: For a comprehensive test, repeat this procedure for all systems served by the XFOU.

D. Test the XTC Through the Switching Equipment and the Enhanced Test Bus to a FPC or FPD System for Locally-Switched Services via the Trunk Test Set

5.11 This procedure tests:

- The XTC
- The no-test trunk cabling from the XTC to the switch
- The path through the switch to a carrier system channel
- The 35 lead interface between the XTC XFOU and a Series 5 bay equipped with FPC or FPD carrier systems
- A locally-switched *SLC* carrier channel.

Figure 20 shows the enhanced (XTC) mode test path connections.

5.12 This procedure assumes that certain conditions exist:

- The XTC has been equipped and the turnup procedures in Section 4 have been completed.
- The XTC has been installed with a PGTC J1C142A shelf and the output of the SM94C trunk cards are wired to no-test trunks in the switch with multifrequency capabilities.
- A POTS channel is available in the FPC or FPD system to be used for testing.
- A POTS telephone number is available for testing and can be temporarily connected to the channel in the FPC or FPD system to be used for testing.
- The FPC or FPD system to be used for testing is equipped with an AUB5 COT CTU, an AUB25 RT CTU, and the AUA18 DTU-L and AUA19 DTU-R are installed in the COT. The system must be known to be working and cabled to an XFOU. This insures that the tests will be performed on the 35 lead interface (enhanced test bus) between the XTC XFOU and the Series 5 system.

5.13 The following items are required to perform this procedure:

- KS-22475, L1 TTS (trunk test set) with KS-22475, L2 adapter, or Berry Electronics Model 312A L2 trunk test set with Model 312A L3 positive sleeve current adapter.
- 47A/47B test extender card.
- KS-22861,L1 DMM (digital multimeter) or equivalent.
- Two 310 patch cords with Tip (T), Ring (R) and Sleeve (S) conductors.
- Knowledge of the steering digit(s) for testing and the POTS telephone number. This information can be obtained from the MLT administrator.
- Knowledge of the type of central office switching equipment providing the POTS telephone number used for testing.

STEP	PROCEDURE

1. ***Note:*** If the procedure in Section 5.B has been performed, then go to Step 2. Otherwise, continue with Step 1.

   Remove the XTUD for all equipped testers associated with the XFOU under test (see Table L) in the XTC control shelf.

2. Set the switches on TTS and adapter:

   On the TTS:

   - **CONTROL** to **ON HOOK** ↓
   - **SLEEVE** to **CLOSED** ↑
   - **CURRENT** to **HIGH** ↑
     (For 2 *ESS* switch use **LOW** (↓) position.)

   On the adapter:

   - **+SLEEVE** to **OPEN**
   - **+CURRENT** to **LOW**

3. Insert the KS-22475, L2 adapter into the TTS. (The **BAT**, **GRD**, **T**, **R**, and **S** plugs must mate with their corresponding jacks.)

4. ***Caution: The 47A/47B test extender card must only be used in slots designated SM92/SM94 in a PGTC J1C142A shelf (trunk card slots).***

   Remove the SM94C card associated with the trunk to be tested. Insert the 47A/47B test extender card into the vacated trunk card slot. Insert the removed trunk card into the extender.

   Requirements:

   - ☐ All indicators on the TTS are not lighted.
   - ☐ **BUSY** indicator on SM94C trunk card is not lighted.

STEP	PROCEDURE

5. Using a 310 cord, connect the **-48V** jack on the TTS to the **-48V** jack on the 47A/47B test extender.

   Requirement: The **POWER** indicator on the TTS lights.

   Error Condition: If the indicator does not light, check the 310 cord, the jack at the extender for -48V power, and the fuse associated with the PGTC shelf input -48V power.

6. Using a 310 cord, connect either **TRUNK** jack output of the TTS to the **ODD TRUNK** or **EVEN TRUNK** jack labeled **TO XTC/PGTC** on the 47A/47B test extender card associated with the trunk to be used for testing.

7. ***Caution: This procedure has time constraints. Timing is important — timing of some steps is more critical but all steps must be completed promptly. If not, the XTC will disconnect and the test must be started over.***

   On the TTS, set **CONTROL** switch to **OFF HOOK** (↑).

   Requirements:

   - XBar (crossbar), SXS (step-by-step), DMS-10/100, 3 *ESS* switch, or *5ESS* switch —
     - ☐ **CURRENT** indicator lights.
   - XBar, DMS-10/100, or any *ESS* switch —
     - ☐ **BAT ON RING** indicator lights momentarily, goes off, then
     - ☐ **BAT ON TIP** indicator lights.
   - SXS switch —
     - ☐ **BAT ON TIP** indicator lights.
   - Dial pulse crossbar switch —
     - ☐ A *tone* is heard during the dialing sequence.

   Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

STEP	PROCEDURE

8. Press the indicated keys on the TTS keypad in the given sequence:

   a. [KP1] (signals system that the keypad is being used.)

   b. Enter steering digit(s), 4 digits of the POTS telephone number.

   c. [ST] [No. 1 crossbar and 3 *ESS* switches do not require ST (Start) tone.]

   Requirements:

   ■ All switches —

   ☐ **BAT ON TIP** indicator goes off.
   ☐ **BAT ON RING** indicator lights (except 2 *ESS* switch).
   (For 3 *ESS* switch, the indicator flashes once.)

   ■ 1 *ESS* or 2 *ESS* switch —

   ☐ **CURRENT** indicator lights after the last digit.

   Error Condition: If the response is incorrect, check to make sure that you are using the correct steering digit(s) and the correct digits for the POTS telephone number. Check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

9. On the TTS, set **CURRENT** switch to **LOW** (↓).

   Requirements:

   ☐ **BAT ON RING** indicator goes off.
   (For *5ESS* switch the indicator remains lighted for up to 6 seconds, then goes off).

   ☐ **CURRENT** indicator remains lighted.

   Note 1: If the **BAT ON RING** indicator remains lighted, the line may be busy. On the TTS, set the **SLEEVE** switch to **OPEN** (↓). Monitor the line for conversation. If the line

STEP	PROCEDURE

is busy follow the disconnect procedure in Step 24. Check to make sure that you are accessing the correct telephone number, then try the test again.

Note 2: If 120 ipm and a flashing **GND ON RING** is returned, then the switch resources may be busy or unavailable. Try again. If continually blocked, call the switch administrator.

Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

10. On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

Requirements:

- ☐ **BAT ON RING** indicator lights.
- ☐ **CURRENT** indicator goes off.
- ☐ A dial *tone* is heard over the TTS speaker.

11. On the TTS, set the **SLEEVE** switch to **CLOSED** (↑).

Requirements:

- ☐ **CURRENT** indicator lights.
- ☐ **BAT ON RING** indicator goes off.

12. On the TTS, set the **CONTROL** switch to **ON HOOK** (↓).

Requirement: The **CURRENT** indicator remains lighted.

13. On the adapter, depress the [SLC] pushbutton until the **CURRENT** indicator on the TTS goes off and then lights again — this will occur in less than 8 seconds.

Requirements:

- ☐ **BUSY** indicator on the SM94C card lights.
- ☐ **BUSY** indicator on the XTUC card lights.

STEP	PROCEDURE

Error Condition 1: If there is no response, check the T and R wiring to the COT POTS channel unit for T and R reversal.

Error Condition 2: If the BUSY indicator lights only momentarily, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). If the trunk card being tested is in a PGTC expansion shelf, try another SM90 circuit pack.

Error Condition 3: If the trunk card is in an expansion shelf and the BUSY indicator lights, but the BUSY indicator on the XTUC does not light, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). Try another SM90 circuit pack.

Error Condition 4: If the response is incorrect, try another tester unit (XTUB, XTUC and XTUD), SM94C unit, or COT CTU.

14. On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

Comment: The **TIP** and **RING** are now connected to **BYPASS/DC TEST** pair.

Error Condition 1: If 120 ipm is heard, the system may be busy. Check to see if the *SLC* carrier system is busy, the BUSY indicator on the Series 5 CTU is lighted, or the CIU has access. Try to run the test again. If 120 ipm is heard again, check the 35 lead interface between the XFOU of the XTC and the *SLC* carrier bank per the *Fanout to SLC Carrier FPC or FPD Bank Test* procedure in Section 5.C.

Error Condition 2: If 60 ipm is heard, the system is in *MAJOR* alarm.

15. On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

Requirements:

☐ **BAT ON RING** indicator lights, and
☐ A single *tone* burst is heard, if the channel test is good. (*Go to Step 21.*)

Error Condition 1: If a single tone burst is not heard, the channel test is bad. Check the channel units to make sure that they are good by performing the CU tests starting with Step 16.

Error Condition 2: If the ERROR CODE seven segment display on the XCU of the XTC shows a TRC (test result code), follow the procedures (see Table J, Section 2) for test result codes to help isolate the problem.

STEP	PROCEDURE

16. On the TTS, set the **SLEEVE** switch to **CLOSED** (↑).

17. ***Caution: From the time the CURRENT switch is set to HIGH (↑), you have 30 seconds to complete Steps 18 and 19 or the XTC will disconnect.***

    On the TTS, set the **CURRENT** switch to **HIGH** (↑).

    Requirement: The **GRD ON RING** indicator lights.

18. Press the indicated keys on the TTS keypad in the given sequence:

    a. [KP1] (signals system that the keypad is being used.)

    b. Enter 920 (MF channel unit test command).

    c. [ST] (Start).

    Requirement: The **BAT ON TIP** indicator lights.

19. On the TTS, set the **CURRENT** switch to **LOW** (↓).

20. ***Caution: Complete this Step within 2 minutes or the XTC will disconnect.***

    On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

    Requirements:

    ☐ **BAT ON RING** indicator lights, and
    ☐ A single *tone* burst is heard, if both channel units COT and RT test good.

    Error Condition 1: If a single tone burst is not heard, the channel test is bad. On the TTS, set the CONTROL switch to ON HOOK (↓) and use the Table AA to isolate the failed CU.

    Note: You have 2 minutes from the time the **SLEEVE** switch is set to **OPEN** (↓) to complete the voltage measurements in Table AA. If the measurements cannot be

STEP	PROCEDURE

completed in 2 minutes, set the **SLEEVE** switch to **CLOSED** (↑) and then back to **OPEN** (↓) position. This will allow another 2 minutes for completing the voltage measurements. Repeat as often as needed for additional time.

TABLE AA
TEST MEASUREMENTS (NOTE)

TONE	RING	TIP	MEANING	
			COT CU	RT CU
None	OPEN	OPEN	XTC busy, try later	
None	GRD	GRD	No results available	
None	+48V	-48V	Bad	Good
None	+48V	+48V	Good	Bad
None	-48V	+48V	Bad	Bad
One Burst	GRD	-48V	Good	Good

Note: The voltages are measured from T (tip) to GRD (ground), and R (ring) to GRD on the adapter.

Error Condition 2: A problem related to the *5ESS* switch is noise caused by the *5ESS* switch line units. Check *5ESS* switch related items for the POTS channel being used for testing:

- Check the TN 831 packs (if the line units are Model 2) — they should be Series 9 or less, *or* Series 14 or greater.
- Check the TN 331 packs (if the line units are Model 1) — they should be TN 331B Series 5 or greater.
- Verify that the XTUB AUB68 of the XTC is Series 2 or greater, *and* that the XTUD is MC97745A1 2.

Error Condition 3: If the response remains incorrect, try another tester unit (XTUB, XTUC, and XTUD), SM94C unit, COT CTU or COT DTU (DTU-L and DTU-R).

STEP	PROCEDURE

21. ***Note:*** If the procedure in Section 5.B has been performed, then go to Step 24, otherwise continue.

    Set the switches on TTS to disconnect the access:

    - **SLEEVE** to **CLOSED** (↑)
    - **CONTROL** to **ON HOOK** (↓)
    - **CURRENT** to **HIGH** (↑)

    Requirement: All indicators go off.

22. Remove the XTUD circuit pack from the tester group just tested. Install the XTUD for the next equipped tester group associated with the XFOU under test (see Table L). Repeat Steps 7 through 21 for all tester group positions (only in the XTC control shelf) associated with the XFOU under test, then proceed with Step 23.

    Note: If tester group positions (only in the XTC control shelf) associated with the XFOU under test are not equipped, a tester group (XTUB, XTUC, and XTUD) may be moved into the vacant position(s) for testing purposes. Install the tester group in the sequence — XTUC, XTUB, and then XTUD. See Section 4.E, *Add a Tester to an XTC Shelf.*

23. After the tester units and tester unit positions (only in the XTC control shelf) associated with the XFOU under test have been tested, reinstall all tester unit groups into their original positions. See Section 4.E, *Add a Tester to an XTC Shelf.*

24. Set the switches on TTS to disconnect the access:

    - **SLEEVE** to **CLOSED** (↑)
    - **CONTROL** to **ON HOOK** (↓)
    - **CURRENT** to **HIGH** (↑)

    Requirement: All indicators go off.

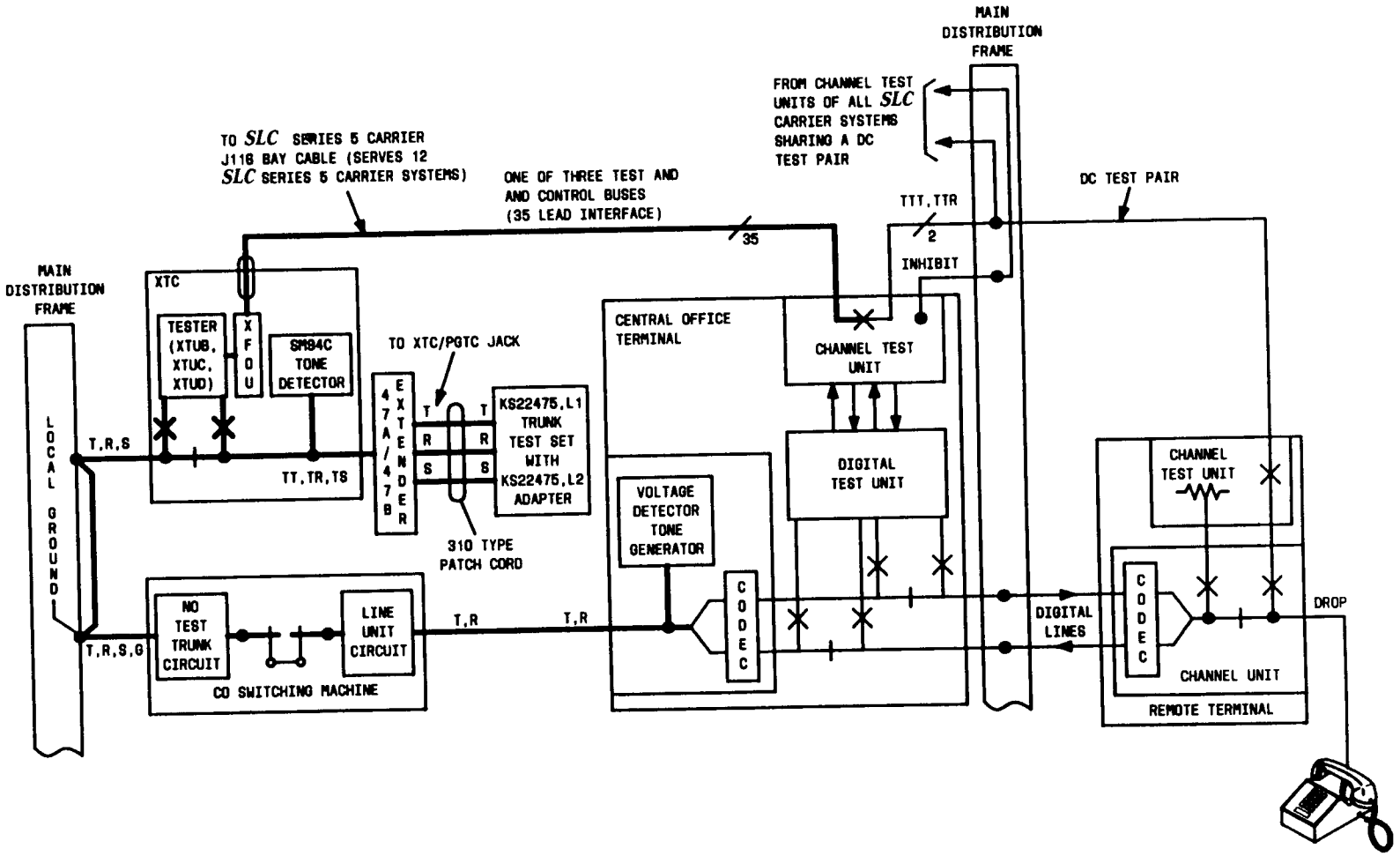


Figure 20 — Enhanced (XTC) Mode Test Path Connections

E. Test the XTC Through the Switching Equipment, the CUE, and the Enhanced Test Bus to a FPC or FPD System for Nonlocally Switched Services via the Trunk Test Set

5.14 This procedure tests:

- The XTC
- The no-test trunk cabling from the XTC to the switch
- The 35 lead interface between the XTC XFOU and a Series 5 bay equipped with FPC or FPD carrier systems
- The CUE (channel unit emulator) and associated wiring
- A nonlocally-switched *SLC* carrier channel.

Figure 21 shows the enhanced (XTC) mode test path connections.

5.15 This procedure assumes that certain conditions exist:

- The XTC has been equipped and the turnup procedures in Section 4 have been completed.
- The XTC has been installed with a PGTC J1C142A shelf and the output of the SM94C trunk cards are wired to no-test trunks in the switch with multifrequency capabilities.
- A channel equipped and provisioned for nonlocally switched service (E *SPOTS* or 4-wire channel units) is available in the FPC or FPD system to be used for testing. Information to provision a channel can be found in Appendix B.
- The FPC or FPD system to be used for testing is equipped with an AUB5 COT CTU, an AUB25 RT CTU, and the AUA18 DTU-L and AUA19 DTU-R are installed in the COT. The system must be known to be working and cabled to an XFOU. This insures that the tests will be performed on the 35 lead interface (enhanced test bus) between the XTC XFOU and the Series 5 system.
- The XTC CUE has been assigned a telephone number and is wired to a line circuit.

5.16 The following items are required to perform this procedure:

- KS-22475, L1 TTS (trunk test set) with KS-22475, L2 adapter, or Berry Electronics Model 312A L2 trunk test set with Model 312A L3 positive sleeve current adapter.
- 47A/47B test extender card.
- KS-22861,L1 DMM (digital multimeter) or equivalent.
- Two 310 patch cords with Tip (T), Ring (R) and Sleeve (S) conductors.
- Knowledge of the steering digit(s) for testing and the XTC CUE telephone number. This information can be obtained from the MLT administrator.

- Knowledge of the SID (system identification) number for the system to be used for testing. This is the four digit number set on the COT ADU (AUB6).
- Knowledge of the type of central office switching equipment providing the XTC CUE telephone number.

STEP	PROCEDURE

1. ***Note:*** If the procedure in Sections 5.B or 5.D has been performed, then go to Step 2. Otherwise, continue with Step 1.

   Remove the XTUD for all equipped testers (except for tester position one) in the XTC control shelf.

2. Set the switches on TTS and adapter:

   On the TTS:

   - **CONTROL** to **ON HOOK** ↓
   - **SLEEVE** to **CLOSED** ↑
   - **CURRENT** to **HIGH** ↑
     (For 2 *ESS* switch use **LOW** (↓) position.)

   On the adapter:

   - **+SLEEVE** to **OPEN**
   - **+CURRENT** to **LOW**

3. Insert the KS-22475, L2 adapter into the TTS. (The **BAT**, **GRD**, **T**, **R**, and **S** plugs must mate with their corresponding jacks.)

STEP	PROCEDURE

4. ***Caution: The 47A/47B test extender card must only be used in slots designated SM92/SM94 in a PGTC J1C142A shelf (trunk card slots).***

   Remove the SM94C card associated with the trunk to be tested. Insert the 47A/47B test extender card into the vacated trunk card slot. Insert the removed trunk card into the extender.

   Requirements:

   ☐ All indicators on the TTS are not lighted.
   ☐ **BUSY** indicator on SM94C trunk card is not lighted.

5. Using a 310 cord, connect the **-48V** jack on the TTS to the **-48V** jack on the 47A/47B test extender.

   Requirement: The **POWER** indicator on the TTS lights.

   Error Condition: If the indicator does not light, check the 310 cord, the jack at the extender for -48V power, and the fuse associated with the PGTC shelf input -48V power.

6. Using a 310 cord, connect either **TRUNK** jack output of the TTS to the **ODD TRUNK** or **EVEN TRUNK** jack labeled **TO XTC/PGTC** on the 47A/47B test extender card associated with the trunk to be used for testing.

7. ***Caution: This procedure has time constraints. Timing is important — timing of some steps is more critical but all steps must be completed promptly. If not, the XTC will disconnect and the test must be started over.***

   On the TTS, set **CONTROL** switch to **OFF HOOK** (↑).

   Requirements:

   ■ XBar (crossbar), SXS (step-by-step), DMS-10/100, 3 *ESS* switch, or *5ESS* switch —

      ☐ **CURRENT** indicator lights.

   ■ XBar, DMS-10/100, or any *ESS* switch —

      ☐ **BAT ON RING** indicator lights momentarily, goes off, then
      ☐ **BAT ON TIP** indicator lights.

STEP	PROCEDURE

■ SXS switch —

☐ **BAT ON TIP** indicator lights.

■ Dial pulse crossbar switch —

☐ A *tone* is heard during the dialing sequence.

Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

8. Press the indicated keys on the TTS keypad in the given sequence:

a. [KP1] (signals system that the keypad is being used.)

b. Enter steering digit(s), 4 digits of the XTC CUE telephone number.

c. [ST] [No. 1 crossbar and 3 *ESS* switches do not require ST (Start) tone].

Requirements:

■ All switches —

☐ **BAT ON TIP** indicator goes off.
☐ **BAT ON RING** indicator lights (except 2 *ESS* switch).
(For 3 *ESS* switch, the indicator flashes once.)

■ 1 *ESS* or 2 *ESS* switch —

☐ **CURRENT** indicator lights after the last digit.

Error Condition: If the response is incorrect, check to make sure that you are using the correct steering digit(s) and the correct digits for the XTC CUE telephone number. Check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

STEP	PROCEDURE

9. On the TTS, set **CURRENT** switch to **LOW** (↓).

Requirements:

☐ **BAT ON RING** indicator goes off.
(For *5ESS* switch the indicator remains lighted for up to 6 seconds, then goes off).

☐ **CURRENT** indicator remains lighted.

Note 1: If the **BAT ON RING** indicator remains lighted, the line may be busy. On the TTS, set the **SLEEVE** switch to **OPEN** (↓). Monitor the line for conversation. If the line is busy follow the disconnect procedure in Step 25. Check the telephone number — you are not accessing the correct telephone number for the XTC CUE, then try the test again.

Note 2: If 120 ipm and a flashing **GND ON RING** is returned, then the switch resources may be be busy or unavailable. Try again. If continually blocked, call the switch administrator.

Error Condition: If there is no response, check the wiring (T, R, and S) between the PGTC backplane for the trunk card under test and the switch no-test trunk (T, R, and S leads may be swapped or disconnected). Check the switch no-test trunk circuit. Check to make sure the switch no-test trunk ground (G) lead is connected to ground.

10. On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

Requirements:

☐ **BAT ON RING** indicator lights.
☐ **CURRENT** indicator goes off.
☐ A dial *tone* is heard over the TTS speaker.

11. On the TTS, set the **SLEEVE** switch to **CLOSED** (↑).

Requirements:

☐ **CURRENT** indicator lights.
☐ **BAT ON RING** indicator goes off.

STEP	PROCEDURE

12. On the TTS, set the **CONTROL** switch to **ON HOOK** (↓).

    Requirement: **CURRENT** indicator remains lighted.

13. On the adapter, depress the [SLC] pushbutton until the **CURRENT** indicator on the TTS goes off and then lights again — this will occur in less than 8 seconds.

    Requirements:

    - ☐ **BUSY** indicator on the SM94C card lights.
    - ☐ **BUSY** indicator on the XTUC card lights. (If more than one tester is installed, **BUSY** indicators on two XTUCs will light.)

    Error Condition 1: If there is no response, check the T and R wiring to the XTC CUE for T and R reversal. Try another XADU.

    Error Condition 2: If the BUSY indicator lights only momentarily, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). If the trunk card being tested is in a PGTC expansion shelf, try another SM90 circuit pack.

    Error Condition 3: If the trunk card is in an expansion shelf and the BUSY indicator lights, but the BUSY indicator on the XTUC does not light, check the intershelf (XTC/PGTC) cabling and the PGTC shelf for noise suppression capacitors (see Appendix A). Try another SM90 circuit pack.

    Error Condition 4: If the response is incorrect, try another tester unit (XTUB, XTUC and XTUD) or SM94C unit.

14. On the TTS, set the **CONTROL** switch to **OFF HOOK** (↑).

15. ***Caution: From the time the CURRENT switch is set to HIGH (↑), you have 30 seconds to complete Steps 16 and 17 or the XTC will disconnect.***

    On the TTS, set the **CURRENT** switch to **HIGH** (↑).

    Requirements:

    - ☐ **BAT ON RING** indicator lights momentarily, goes off, then
    - ☐ **GRD ON RING** indicator lights.

STEP	PROCEDURE

16. Press the indicated keys on the TTS keypad in the given sequence:

    a. [KP 1] (signals system that the keypad is being used.)

    b. Enter bank SID (4 digits).

    c. Enter channel number (4 digits), using leading zeros to create a full 4 digit number.

    d. [ST] (Start tone).

    Requirement: The **BAT ON TIP** indicator lights.

    Note: If the indicators on two tester units are lighted, one goes off.

    Error Condition 1: If 120 ipm is heard, the system may be busy. Check to see if the *SLC* carrier system is busy (the BUSY indicator on the Series 5 CTU is lighted, or the CIU has access). Make sure that the channel units are provisioned. Try to run the test again. If 120 ipm is heard again, check the 35 lead interface between the XFOU of the XTC and the *SLC* carrier bank per the *Fanout to SLC Carrier FPC or FPD Bank Test* procedure in Section 5.C.

    Error Condition 2: If 60 ipm is heard, the system is in *MAJOR* alarm.

17. On the TTS, set the **CURRENT** switch to **LOW** (↓).

    Requirement: **BAT ON RING** indicator lights.

    Note: The MF commands can now be entered. The 920 test channel unit command will not work with POTS-like channel units when access is via the CUE.

18. ***Caution: From the time the CURRENT switch is set to HIGH (↑), you have 30 seconds to complete Steps 19 and 20 or the XTC will disconnect.***

    On the TTS, set the **CURRENT** switch to **HIGH** (↑).

    Requirement: **GRD ON RING** indicator lights.

STEP	PROCEDURE

19. Press the indicated keys on the TTS keypad in the given sequence:

    a. [KP1] (signals system that the keypad is being used.)

    b. Enter 920 (MF command to test channel units).

    c. [ST] (Start tone).

    Requirement: The **BAT ON TIP** indicator lights.

    Error Condition: If 120 ipm is heard, the XTC can not run the test. There are several possible causes:

    - The channel being tested is POTS-like,
    - The 920 command was not properly keyed, or
    - A XCU, tester unit (XTUB, XTUC, XTUD), COT CTU, or COT DTU (DTU-L or DTU-R) could be defective.

20. On the TTS, set the **CURRENT** switch to **LOW** (↓).

21. ***Caution: Complete this Step within 2 minutes or the XTC will disconnect.***

    On the TTS, set the **SLEEVE** switch to **OPEN** (↓).

    Requirements:

    ☐ **BAT ON RING** indicator lights, and
    ☐ A single *tone* burst is heard, if both channel units COT and RT test good.

    Error Condition 1: If a single tone burst is not heard, the channel test is bad. On the TTS, set the CONTROL switch to ON HOOK (↓) and use the Table AB to isolate the failed CU.

    Note: You have 2 minutes from the time the **SLEEVE** switch is set to **OPEN** (↓) to complete the voltage measurements in Table AB. If the measurements can not be completed in 2 minutes, set the **SLEEVE** switch to **CLOSED** (↑) and then back to **OPEN**

STEP	PROCEDURE

(↓) position. This will allow another 2 minutes for completing the voltage measurements. Repeat as often as needed for additional time.

TABLE AB
TEST MEASUREMENTS (NOTE)

TONE	RING	TIP	MEANING	
			COT CU	RT CU
None	OPEN	OPEN	XTC busy, try later	
None	GRD	GRD	No results available	
None	+48V	-48V	Bad	Good
None	+48V	+48V	Good	Bad
None	-48V	+48V	Bad	Bad
One Burst	GRD	-48V	Good	Good

Note: The voltages are measured from T (tip) to GRD (ground), and R (ring) to GRD on the adapter.

Error Condition 2: If the response remains incorrect, try another tester unit (XTUB, XTUC, and XTUD), SM94C unit, COT CTU *or* COT DTU (DTU-L and DTU-R).

22. ***Note:*** If the procedure in Section 5.B or 5.D has been performed, then go to Step 25, otherwise continue.

Set the switches on TTS to disconnect the access:

- **SLEEVE** to **CLOSED** (↑)
- **CONTROL** to **ON HOOK** (↓)
- **CURRENT** to **HIGH** (↑)

Requirement: All indicators go off.

STEP	PROCEDURE

23. Remove the XTUD circuit pack in the tester unit position just tested. Install the XTUD circuit pack (right to left) for the next equipped XTC tester position. Repeat Steps 7 through 22 for tester positions 2 through 4. After all four tester positions have been tested, proceed with Step 25.

    Note: If all four tester positions are not equipped, a tester group (XTUB, XTUC, and XTUD) may be moved into the vacant position(s) for testing purposes. Install the tester group in the following sequence — XTUC, XTUB, and then XTUD. See Section 4.E, *Add a Tester Unit to an XTC Shelf.*

24. After all tester units have been exercised and all tester unit positions have been tested, reinstall all of the tester units in their original positions. See Section 4.E, *Add a Tester Unit to an XTC Shelf.*

25. Set the switches on TTS to disconnect the access:

    - **SLEEVE** to **CLOSED** (↑)
    - **CONTROL** to **ON HOOK** (↓)
    - **CURRENT** to **HIGH** (↑)

    Requirement: All indicators go off.

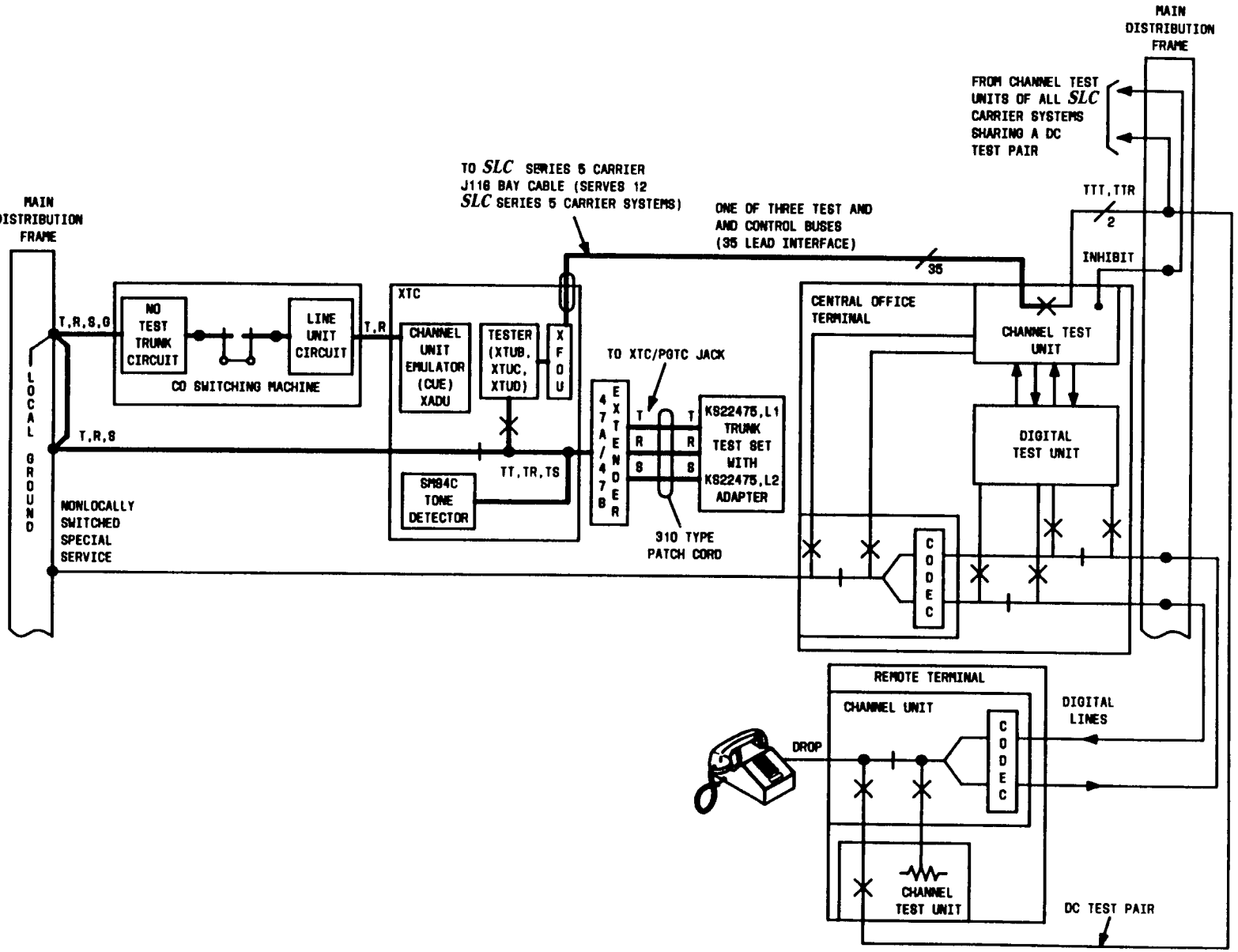


Figure 21 — Enhanced (XTC) Mode Test Path Connections

F. Testing the SARTS/XTC Interface

STEP	PROCEDURE

1. Verify that the following cables have been installed:

   - XTC to RTS-5A DLI (data link interface).
   - XTC to the MIUs (metallic interface units). Is the SARTS level switch on the MIU set correctly? The second digit should be set to represent the S1DN coming from SMAS (the second digit should be set to either 0 or 5).
   - MIU(s) to S1DN (stage one distribution network).

2. Verify that an XDLU has been installed in the **XDLU 1** slot and that it is not in an alarm condition. If the **LINK FAIL** indicator on the XDLU is lighted, there is a communication problem between the XDLU and the RTS-5A DLI. Check the cable between the XDLU and the DLI, the DLI circuit pack, and the XDLU circuit pack.

3. Select a *SLC* Series 5 carrier FPC or FPD system (equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively) and channel for testing. Verify that the system selected is connected to an XFOU and that Procedure 5.C, *Fanout Unit to SLC Carrier FPC or FPD Bank Test,* has been performed. Provision and install channel units via the information contained in Appendix B for either a 2-wire E *SPOTS* channel unit or 4-wire voice-frequency channel.

4. Provide the SARTS tester with the bank system identification number (SID____), channel unit address (Channel___), the SARTS test access information for the circuit and the tutorial in Appendix B.

5. Have the SARTS tester verify that the XTC system code and the *SLC* Series 5 carrier system bank common language location identification have been entered into the SARTS SDD (site dependent data) (038 — *SLC* Series 5 TAP Directory *and* 039 — Alien Access System Directory). SARTS references:

   - SARTS Administrator's Manual (666-611-143)
   - SARTS User's Manual (666-612-101)
   - SARTS 2PC3 General Issue Software Release Document (*SLC* Carrier Feature Tab).
   - SARTS RTS-5A Service Manual (Select Code 700-522).

STEP	PROCEDURE

6. From the SARTS maintenance position, have the SARTS tester attempt all of the commands shown in Table AC.

   Note: After the 704 and 703 commands have been executed, existing SARTS commands can be used to test the circuit. This can be accomplished by sending and receiving tones to/from a craft person (with a transmission measuring set) located at the COT and RT.

   Requirement: All test commands can be successfully executed. If not, check the wiring between the XTC, MIUs and the RTS-5A, and associated equipment. If the **FAIL** indicator on the XDLU, the tester unit (XTUB, XTUC, and XTUD), or the XCU is lighted, replace the affected circuit pack. If the XTC malfunctions without a **FAIL** indicator lighted on any circuit pack, replace the XCU. If SARTS gives a (089) `SMAS ACCESS CONTINUITY CHECK FAILED` message, check the cables between the MIUs and the XTC, and the cables between the MIU and S1DN.

TABLE AC
SARTS TEST COMMANDS

COMMAND	CODE	RESULTS
ACCESS	704	1. Access Bank and Channel Unit Specified at COT and Provide Status Response 2. Loopback TAP 3. Monitor
SPLITTING	703	Split at COT to Give Bitstream or Metallic Access
DIAGNOSTIC	G22	Diagnose Channel Units
RELEASE	G02/2	Release
MAINTENANCE	032/031	1. TAP Turndown 2. TAP Turnup 3. TAP Teardown

G. Testing Locally Switched Circuits Using the Local Test Desk

5.17 This test procedure assumes that certain conditions are true:

- Cabling between the XTC and the *SLC* carrier system banks is properly connected.
- The test pair between the CO DF (distributing frame) and the RT has been verified following standard procedures for voice frequency circuits and any dc leakage noted.
- A test line at the CO, consisting of a temporary telephone number and a subscriber line circuit, is connected to an unassigned channel unit in the *SLC* carrier system.

  Note: These tests are most effective if a coin channel is selected for testing.

- A 500-type telephone set is connected to the drop side (customer side) of the corresponding RT.

STEP	PROCEDURE

Caution: This procedure has time constraints. Timing is important — timing of some steps is more critical but all steps must be completed promptly. If not, the XTC will disconnect and the test must be started over.

1. Select an NTT (no-test trunk) and access the telephone number of the *SLC* carrier circuit to be tested.

2. After the connection has been made, and before starting automated subscriber loop testing, verification of the circuit up to the *SLC* carrier system may be made in the usual manner. (Refer to AT&T Practice 662-505-507.)

3. Apply 117 Vdc to the tip lead with low negative current on the sleeve lead. (At LTD, operate the [REV] and [+STA] keys.) If a coin channel unit is being tested, ground the ring lead. (At LTD, operate the [G] key.)

   Requirements:

   ☐ A steady voltage between 85 and 120 Vdc is present on the tip lead.
   ☐ **BUSY** indicator on the seized tester unit (XTUC) lights.

   Note 1: If the voltage on the tip lead in interrupted at 120-ipm rate — the dc bypass pair is busy, or there is no tester unit, or the XTC has malfunctioned. Correct the problem, if possible, and repeat the procedure from Step 1. If an error code is present on the XCU **ERROR CODE** display, refer to Table H for code interpretation and clearing procedures.

STEP	PROCEDURE

Note 2: If the voltage on the tip lead is interrupted at a 60-ipm rate, the *SLC* carrier system bank has a major alarm condition. Testing cannot continue with the selected test circuit until the cause of the alarm is located and cleared.

Verify dc Bypass Test Pair

4. If a steady voltage is obtained, remove the 117 Vdc from the tip lead while maintaining the low negative current on the sleeve lead. (At LTD release the [+STA] key.) Also remove the ground from the ring lead if a coin channel unit is being tested. (At LTD release the [G] key.)

   Requirement: The tip voltage should be approximately 0 volts.

5. Return all keys to normal.

6. Check the test connection by reading the ballistic deflection. (At LTD, operate and release the [RCCI] key and compare with the ballistic deflection caused by operating and releasing the [REV] key with the [G] key operated.)

   Requirement: The test connection should have approximately 0 volts leakage with a ballistic indication corresponding to one bridged ringer and cable acceptance. If not, check the bypass test pair cabling. Refer to AT&T Practice 662-410-500 for the correspondence between ballistic meter deflection and the number of ringers.

7. Return all keys to normal and disconnect the test trunk.

   Requirement: **BUSY** indicator on the tester unit (XTUC) goes off.

8. At the DF, ground the **INHIBIT** lead coming from the *SLC* carrier system.

STEP	PROCEDURE

Testing Channel Units

9. At the LTD, access the test line again.

10. Apply 117 Vdc to the tip lead with low negative current applied to the sleeve lead. (At LTD, operate the [REV] and [+STA] keys.) The ring lead must also be grounded if a coin channel unit is being tested. (At LTD, operate the [G] key.)

    Requirement: The voltage on the tip lead is interrupted at 120-ipm.

11. Remove the 117 Vdc from the tip lead while maintaining the low negative current on the sleeve lead. (At LTD, release all keys.)

12. Return all keys to normal and disconnect the test trunk.

13. At DF, remove the ground on the **INHIBIT** lead.

Major Alarm Test

14. ***Caution: In this Step, creating a major alarm on a SLC carrier system bank that has been cut over to service will interrupt service to all subscribers in that shelf. If you must use a working bank, do this test during low traffic hours.***

    At the COT of the *SLC* carrier system bank, cause a major alarm by removing the main LIU circuit pack and the LIU circuit pack serving the protection line (if applicable) from the shelf containing the channel unit under test.

15. At the LTD, access the test line again.

    Note: The channel under test must not be served by a *SPOTS* channel unit type for the major alarm test to work.

STEP	PROCEDURE

16. Apply 117 Vdc to the tip lead with low negative current applied to the sleeve lead. (At LTD, operate the [REV] and [+STA] keys.) The ring lead must also be grounded if a coin channel unit is being tested. (At LTD, operate the [G] key.)

    Requirement: The voltage on the tip lead is interrupted at a 60-ipm rate.

17. Remove the 117 Vdc from the tip lead while maintaining the low negative current on the sleeve lead. (At LTD, release all keys.)

18. At the COT, reinsert the main and, if applicable, the protection LIU circuit packs to clear the major alarm condition.

    Testing Channel Units

19. At LTD, access the test line again.

20. Apply 117 Vdc to the tip lead with low negative current on the sleeve lead. (At LTD, operate the [REV] and [+STA] keys.) If a coin channel unit is being tested, ground the ring lead. (At LTD, operate the [G] key.)

    Requirement: A steady voltage between 85 and 120 Vdc is present on the tip lead and the **BUSY** indicator on the seized tester unit (XTUC) lights.

    Note 1: If the voltage on the tip lead is interrupted at a 120-ipm rate — the dc bypass pair is busy, or there is no tester unit, or the XTC has malfunctioned. Correct the problem, if possible, and repeat the procedure from Step 1. If an error code is present on the **XCU ERROR CODE** display, refer to Table H for code interpretation and clearing procedures.

    Note 2: If the voltage on the tip lead is interrupted at a 60-ipm rate, the *SLC* carrier system bank has a major alarm condition. Testing cannot continue with the selected test circuit until the cause of the alarm is located and cleared.

21. If a steady voltage is obtained, remove the 117 Vdc from the tip lead while maintaining the low negative current on the sleeve lead. (At LTD release the [+STA] key.) Also remove the ground from the ring lead if a coin channel unit is being tested. (At LTD release the [G] key.)

    Requirement: The tip voltage should be approximately 0 volts.

STEP	PROCEDURE

22. Apply an open current condition to the sleeve lead and monitor the tone burst(s) from the XTC. (At LTD, operate the [MONITOR] key, the [3WD] key and monitor the tone burst(s) in the headset.)

Requirement: The tone burst(s) heard should correspond to the type of channel unit selected:

CHANNEL TYPE	TONE BURST(S)
Single-Party	One Burst
Multiparty	Double Burst
Coin	Triple Burst

Note 1: If the tone burst(s) is to be regenerated, replace the open condition presently on the sleeve lead with low negative current then reapply the open condition. (At LTD, release the [3WD] key and reoperate it.)

Note 2: If 20 seconds pass while an open condition is on the sleeve and no tone is heard, go on to the next step.

23. Check the tip and ring leads for the voltages shown in Table AD.

Note 1: If, after 30 seconds, none of the voltages are seen and no tone is heard, the tester unit or XCU is defective. Disconnect from the test trunk and repeat the test with another tester unit. If none of the above results is seen for the new tester unit, replace the XCU and repeat the test.

Note 2: The above results will be presented for up to 2 minutes. If no new command is received, the voltage on the tip lead is interrupted at 120-ipm rate for 15 seconds before the XTC disconnects. (At LTD, the VMA meter shows deflections at a 120-ipm rate.)

Separate Testing of Channel Units (Banks Equipped For FPC or FPD Only)

24. ***Note:*** This test checks *SLC* carrier system COT and RT channel units on an individual basis. These procedures can be performed *only* on channel units in *SLC* Series 5 carrier FPC or FPD banks equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively.

Return all keys to normal and place an off-hook impedance across the tip and ring leads followed by high negative current on the sleeve lead and send the KP tone. (At LTD, operate the [KP] key.)

STEP	PROCEDURE

Requirement: Voltage on the tip and ring leads is reversed with −48 Vdc on the tip lead and ground on the ring lead [**S** (sender) indicator at the LTD lights].

25. ***Caution: Complete this step within 30 seconds of the previous step or the XTC will disconnect.***

    Use the MF pad to dial 920 for the test channel units command.

26. While maintaining the tip-ring bridge, send the ST tone. (At LTD, operate the [DSL] and [IN] keys before releasing the [KP] key.)

27. Measure the voltages on the tip lead within 15 seconds. (At LTD, operate the [FEMF] and [REV] keys within 15 seconds.)

    Requirement: A steady voltage of approximately 43 volts will be present on the tip lead indicating that the command was valid and that channel unit tests are in progress. (At LTD, the VMA meter indicates 43 volts but may momentarily indicate 0 volts.)

    Note: If the voltage to be measured is interrupted at a 120-ipm rate, repeat this test from Step 23 after the XTC disconnects. If the 120-ipm interrupted rate is seen on the second attempt, resources needed to satisfy the command are not available or have failed or the command is invalid. Determine the cause of trouble and repeat this test again from Step 19. (At LTD, release the [IN] key followed by the [REV] , [DSL] , and [FEMF] keys before repeating this test.)

28. If a steady voltage is received, apply an open condition on the sleeve lead and monitor for a single tone burst from the XTC. (At LTD, release the [IN] key followed by the [REV] , [DSL] , and [FEMF] keys, then operate the [3W0] and [MONITOR] keys and monitor the tone burst in the head set.) If a tone burst is not heard, check tip and ring leads for the voltages shown in Table AE. (At LTD, release all keys then operate the keys shown in Table AE.)

    Note 1: Diagnostic tests are not performed on DDS channel units. If the XTC receives a request to diagnose a DDS channel unit or any unknown channel unit type, it will return the *no results available* result.

    Note 2: A request for separate testing of channel units on *SLC* 96 carrier banks or *SLC* Series 5 carrier banks equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively, will be denied but the ability to detect MF commands will be determined. If the test circuit being used is in one of these banks, disconnect the test trunk after the request for the separate testing of channel units test is denied.

STEP	PROCEDURE

29. Disconnect the test trunk.

Note: A tester wishing to test a FPC or FPD channel further using other MF commands from Table N must skip to Step 10 in Paragraph 5.18.

30. Remove the test circuit.

TABLE AD
***SLC* CARRIER CHANNEL TEST RESULTS**

CHANNEL TYPE	LEAD	VOLTS	LTD KEYS OPERATED	VMA READING (VOLTS APPROX.)
Single-party	Tip	Ground	REV, 3WO	100
	Ring	-48	FEMF, 3WO	48
Multiparty	Tip	-48	FEMF, REV, 3WO	48
	Ring	Open	3WO	0
Coin	Tip	+48	FEMF, REV, VM REV, 3WO	48
	Ring	Open	3WO	0
Defective Channel Unit	Tip	Ground	REV, 3WO	0
	Ring	+48	FEMF, VM REV, 3WO	48
Defective Channel Unit FPC or FPD* Bank	Tip	-48	FEMF, REV, 3WO	48
	Ring	+48	FEMF, VM REV, 3WO	48

* Equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively.

H. Testing Nonlocally Switched Circuits Using the Local Test Desk

5.18 This test procedure assumes that certain conditions are true:

- The cabling between the XTC and the *SLC* carrier system banks is properly connected.
- The XTC CUE is assigned a telephone number and wired to a subscriber line circuit.
- A test circuit from a *SLC* Series 5 FPC or FPD carrier system bank equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively, is available.

STEP	PROCEDURE

Caution: This procedure has time constraints. Timing is important — timing of some steps is more critical but all steps must be completed promptly. If not, the XTC will disconnect and the test must be started over.

1. Select an NTT and access the XTC CUE telephone number.

   Requirement: The impedance of the XTC channel unit emulator is seen. The measurement is approximately 95,000 ohms on tip or ring to ground and also from tip to ring.

2. Apply 117 Vdc to the tip lead while applying a low negative current on the sleeve lead. (At LTD, operate the [REV] and [+STA] keys.)

   Note: If no tester units are available, the voltage reading will be interrupted at a 120-ipm rate. Disconnect the test trunk and attempt to perform this test again at a later time.

   Requirement: A steady voltage between 85 and 120 Vdc is present on the tip lead. If the tester unit is being used for testing, the **BUSY** indicator on the XTUC circuit pack is lighted.

3. ***Caution: If the 117 Vdc is not removed within 15 seconds, the voltage on the tip lead is interrupted at a 120-ipm rate before the XTC disconnects. This procedure will then have to be repeated from Step 1.***

   Release the 117 Vdc on the tip lead within 15 seconds and measure the voltage on the tip lead. (At LTD, release the [+STA] key and operate the [FEMF] key within 15 seconds of receiving the steady meter deflection; the [REV] key remains operated.)

   Requirement: The voltage on the tip lead is 0 volts.

STEP	PROCEDURE

4. Place an off-hook impedance across the tip and ring leads with high negative current on the sleeve lead then send the KP tone. (At LTD, release the [REV] and [FEMF] keys and operate the [KP] key.)

   Requirement: The voltage on the tip and ring leads is reversed, −48 Vdc on the tip lead and ground on the ring lead [**S** (sender) indicator at the LTD lights].

5. ***Caution: If this Step or any other MF command is not completed within 30 seconds, the XTC will disconnect.***

   Use the MF pad to dial the address of the bank and channel unit number for the test circuit selected.

   Note: The XTC expects four digits for the bank address and four digits for the channel unit address. Use leading zeros for addresses that have less than four digits.

6. Maintain the tip-ring bridge and send the ST tone. (At LTD, operate the [DSL] and [IN] keys before releasing the [KP] key.)

7. Measure the voltage on the tip lead within 15 seconds. (At LTD, operate the [FEMF] and [REV] keys withing 15 seconds.)

   Requirement: A steady voltage of approximately 43 volts is present on the tip lead.

   Note 1: The VMA meter may show 0 volts momentarily.

   Note 2: A steady voltage means that the command is valid.

   Note 3: If resources needed to satisfy the command are not available or have failed, or the command is invalid (not eight digits), the voltage on the tip lead is interrupted at a 120-ipm rate for 15 seconds before the XTC disconnects. Determine the cause of the trouble and repeat this test from Step 1.

   Note 4: If the bank is in a major alarm condition, the voltage on the tip lead is interrupted at a 60-ipm rate.

8. If testing may continue, replace the high negative sleeve with the low negative sleeve state before removing the tip-ring bridge.

STEP	PROCEDURE

9. Monitor the channel to ensure that the line is not being used by the customer. (At LTD, release the [IN] key followed by the [REV] , [DSL] , and [FEMF] keys — then operate the [M] key.)

   Requirement: Monitoring access is provided to the channel.

10. Place an off-hook impedance across the tip and ring leads with high negative current on the sleeve lead then send the KP tone. (At LTD, operate the [KP] key.)

    Requirement: The voltage on the tip and ring leads is reversed, −48 Vdc on the tip lead and ground on the ring lead [**S** (sender) indicator at the LTD lights].

11. ***Caution: If this Step is not completed within 30 seconds, the XTC will disconnect.***

    Use the MF pad to dial a 3-digit MF command number from Table N.

12. ***Caution: Complete Step 13 within 15 seconds of this Step, or the XTC will disconnect.***

    Maintain the tip-ring bridge and send the ST tone. (At LTD, operate the [DSL] and [IN] keys before releasing the [KP] key.)

13. Measure the voltage on the tip lead within 15 seconds. (At LTD, operate the [FEMF] and [REV] keys within 15 seconds.)

    Requirement: A steady voltage of approximately 43 volts is present on the tip lead.

    Note 1: The LTD VMA meter may momentarily indicate 0 volts.

    Note 2: A steady voltage (steady meter deflection) means that the command is valid.

    Note 3: If the voltage on the tip lead is interrupted at 120 ipm, repeat the test from Step 1 after the XTC disconnects. If the interrupted deflection is seen on the second attempt, resources needed to satisfy the command are not available or have failed or the command is invalid. Determine the cause of trouble and attempt the test again at a later time. (At LTD, release the [IN] key followed by the [REV] , [DSL] , and [FEMF] keys.)

STEP	PROCEDURE

14. ***Note 1:*** For the RT calibrate command, test for the diode/resistor combination at the RT end of the dc test pair (Figure 22).

    Note 2: For the COT calibrate command, verify that an open has been provided at the bank. (At LTD, check that the RCCI ballistic reading is approximately the same as that using the [REV] and [G] keys.)

    Note 3: For the facility, drop, and equipment commands, verify that the access requested is available by placing a known condition (e.g., short between tip and ring leads or ground on the tip and ring leads) on the test circuit accessed.

    If testing may continue, replace the high negative sleeve current state with the low negative sleeve current state and remove the off-hook impedance from across the tip and ring leads. (At LTD, release the [IN] key followed by the [REV] , [DSL] , and [FEMF] keys.)

    Requirement: Requested access has been achieved.

15. ***Caution: In this Step, if none of the voltages are present after 30 seconds, either the tester unit or the XCU is defective. Disconnect from the test trunk and repeat the tests with another tester unit. If none of the voltages still are not present, replace the XCU circuit pack and repeat the tests again.***

    For the *test channel units* command, if a steady voltage is received, apply an open condition on the sleeve lead and monitor for a single tone burst from the XTC. (At LTD, release the [IN] key followed by the [REV] , [DSL] , and [FEMF] keys, then operate the [3WD] and [MONITOR] keys and monitor the tone burst in the head set.) If a tone burst is not heard, check tip and ring leads for the voltages shown in Table AE. (At LTD, operate the keys shown in Table AE.)

    Note: Diagnostic tests are not performed on DDS channel unit types. If the XTC receives a request to diagnose this or any unknown channel unit type, the *no results available* will be returned.

16. Disconnect from the test trunk and remove all test circuit connections.

STEP	PROCEDURE

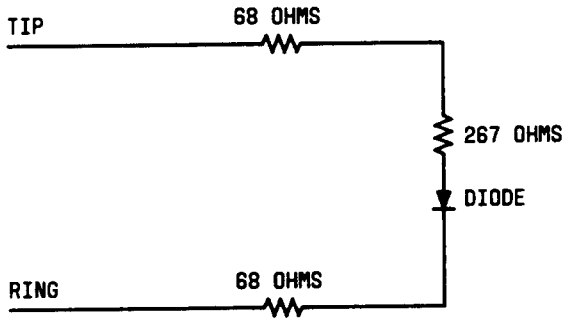


Figure 22 — dc Bypass Pair Calibrate Termination

TABLE AE
SEPARATE COT AND RT CHANNEL UNIT TEST RESULTS

CHANNEL UNIT STATUS	LEAD	VOLTS	LTD KEYS OPERATED	VMA READING (VOLTS APPROX.)
COT Bad, RT Good	Tip	+48	FEMF, VM REV, 3WO, REV	48
	Ring	-48	FEMF, 3WO	48
COT Good, RT Bad	Tip	+48	FEMF, VM REV, 3WO, REV	48
	Ring	+48	FEMF, VM REV, 3WO	48
COT Bad, RT Bad	Tip	-48	FEMF, REV, 3WO	48
	Ring	+48	FEMF, VM REV, 3WO	48
COT Good, RT Good	Tip	Ground	REV, 3WO	0
	Ring	-48	FEMF, 3WO	48
No Results Availvable	Tip	Ground	REV, 3WO	100
	Ring	Ground	3WO	100

I. Testing the *SLC* Series 5 Carrier Using the MLT

5.19 Testing of the *SLC* Series 5 carrier through the MC (using MLT) is documented in specific text manager documents.

STEP	PROCEDURE

1. Have the NTT under test serving the XTC removed from service by the facilities manager. Perform Functional Tests 5.B, 5.D, or 5.E from the LTS frame. Access NTT from the LTS 310 panel — 47A/47B test extender card not needed. If the test fails, run functional tests from the XTC bay using the 47A/47B test extender card.

2. ***Note:*** Steps 2 through 5 must be performed by the facilities manager or database manager.

   Data base requirements are found in two different documents:

   a. Set up the host data bases —

      - See host document PA-2P063-01-XTC_checklist.

   b. Set up the MLT tables —

      - See sad.wc2xtc.

3. Specific documents cover the testing of special services circuits:

   a. For an overview of MLT testing of special services circuits —

      - See usr.dlcmod.

   b. The STV mask —

      - See usr2.STV about changing to STV.
      - See usr2.stvintro for an introduction to STV.
      - See usr2.stventries for the STV mask entries.

STEP	PROCEDURE

c. The SSA request, accessing of nonlocally switched circuits —

- See usr2.SSA.

d. STV/SSA related VER codes —

- See usr.VER_XS, usr.VER_XO, and usr.VER_TS.

4. Enhanced channel testing is covered in separate documents:

a. The CHAN request —

- See usr2.CHAN.

b. New channel diagnostic test codes (VER56, VER57, and VER58) —

- See usr.VER_56, usr.VER_57, and usr.VER_58.

5. A specific document covers analyzing test results:

a. Testing special services circuits —

- See OPA-2P260.

J. Verify XTC to *SLC* Carrier Interface Cable

5.20 This procedure verifies that the XTC to *SLC* carrier interface cable is good.

Note 1: This procedure only needs to be performed if directed by another procedure or if a problem is suspected on the interface (28-lead multiple) between the *SLC* carrier banks and the XTC.

Note 2: A functional *SLC* 96 or Series 5 FPA carrier system equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively, must be available. The system may or may not be in service.

STEP	PROCEDURE
1.	Visually inspect the backplane of the XTC for bent, broken, or crossed terminals.
2.	On the backplane of the XTC, connect the + (plus) lead of the DMM to **TB1** terminal **2** (frame ground).
3.	Using the information in Table AF, connect the – (negative) lead of the DMM to the terminal to be tested (starting with **TS2** terminal **9**). ***Requirement:*** Voltage between –42.5 and –52.5 Vdc. If this step fails to meet the *requirement*, the most common causes are a wrong terminal, an open cable lead, or a bad CTU.
4.	At the COT, ground corresponding terminal to be tested on the CTU — starting with terminal **5** for *SLC* 96 carrier system, terminal **59** for Series 5. ***Requirement:*** Voltage drops to 0 Vdc. If this step fails to meet the *requirement*, the most common causes are the wrong terminal grounded on CTU, cable leads transposed, an open cable lead, or a bad CTU.
5.	Repeat Steps 3 and 4 for all of the leads listed in Table AF.
6.	Condition the DMM to measure resistance (ohms) on the **x10** scale.
7.	On the backplane of the XTC, connect one lead to **TB1** terminal **2** (frame ground).

STEP	PROCEDURE

8. Using the information in Table AG, connect the other lead of the DMM to the terminal to be tested (starting with **TS6** terminal **1**).

   Requirement: The DMM reads *open* circuit. If this step fails to meet the *requirement*, the most common causes are grounded or crossed leads in the cable.

9. At the rear of the COT, ground the corresponding terminal to be tested on the CTU — starting with terminal **37** for *SLC* 96 carrier system, terminal **58** for Series 5).

   Requirement: The DMM reads ground (*short*) circuit. If this step fails to meet the *requirement*, the most common causes are the wrong terminal grounded on CTU, cable leads transposed, or an open cable lead.

10. Repeat Steps 8 and 9 for all of the leads listed in Table AG.

TABLE AF
VOLTAGE MEASUREMENT POINTS

	XTC (TS2) TERMINAL NO.	CTU (*SLC* 96 CARRIER) TERMINAL NO.	CTU (NOTE) (SERIES 5 SYSTEM) TERMINAL NO.
OHA	9	5	59
OHB	20	7	60
OHC	17	10	61
OHD	14	9	62
LOKC	18	21	69
TSTALM	13	18	71
LOKA	10	19	67
PROC C	21	15	65
LOKD	15	20	70
PROC A	11	13	63
LOKB	19	22	68
PROC B	8	14	64
PROC D	16	16	66

Note: Series 5 systems equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively.

STEP PROCEDURE

TABLE AG
CONTINUITY MEASUREMENT POINTS

	XTC TERMINAL NO.	CTU (*SLC* 96 CARRIER) TERMINAL NO.	CTU (NOTE) (SERIES 5 SYSTEM) TERMINAL NO.
	TS6		
TIP A	1	37	58
RING A	2	36	57
TIP B	8	34	56
RING B	7	33	55
TIP C	6	30	54
RING C	5	29	53
TIP D	4	32	52
RING D	3	31	51
	TS2		
SLVA	7	51	74
SEZBY	2	54	73
SLVC	5	4	76
TMAJ	1	27	78
SLVB	6	52	75
SLVD	4	1	77
SIEZE	3	53	72

Note: Series 5 systems equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively.

6. MAINTENANCE

6.01 The XTC has self-diagnostic capabilities designed into it. The XTC monitors its own internal operation and the state of the connecting links between it and *SLC* 96 carrier systems, *SLC* Series 5 carrier systems equipped with FPA capability, or *SLC* Series 5 carrier systems equipped with FPC or FPD capabilities with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively. When a trouble is detected, the XTC causes local visual indicators to be lighted and activates remote visual and audible alarms. The acceptance test in Section 5.C can be used to test the link between the XTC and FPC or FPD banks equipped with AUB5 and AUB25 CTUs at the COT and RT, respectively.

6.02 The visual trouble indicators on the XTC circuit packs and XTC shelf consist of a numeric code display and LED indicators. The XCU circuit pack in the XTC control shelf contains an ERROR CODE numeric code display that provides an indication of trouble on the leads between the XTC and a *SLC* 96 carrier system CTU (channel test unit) or *SLC* Series 5 carrier system equipped with AUB2/AUB2B and AUB22 CTUs at the COT and RT, respectively. Table H lists the codes that appear on the ERROR CODE display and defines the troubles associated with the codes. Digits 1 through 4 will appear on the display if a ground is present on the SEIZE, SEZBY, or TMAJ leads or if a 333.3-Hz tone is present on the TONE DETECT lead for 3 seconds or longer. Digits 6 through 9 will appear on the display if a ground condition is present on the sleeve lead of a tester unit without a ground on the associated LOCK lead for longer than 3 seconds.

6.03 The XTC circuit packs and XTC shelves contain LED indicators that provide the status of the circuit packs and the links between the circuit packs and the *SLC* carrier system. Table AH provides a list of these indicators along with the failures that cause the indicators to light. Also included in the table is a list of the remote alarms (visual and audible) that will be activated by the XTC circuitry when certain failures occur.

6.04 Each XTC circuit pack contains a FAIL indicator that lights when the circuit pack fails. A circuit pack or fuse failure also lights the FAIL indicator located on the XTC control shelf and, if the failed fuse is in an XTC expansion shelf, the POWER FAIL indicator on the associated XTC expansion shelf will also light. Each time an XTC circuit pack is installed into an XTC shelf, it automatically performs an internal self test that takes approximately 10 seconds to perform. During the time the self test is being performed, the FAIL indicator on the circuit pack will light. If the circuit pack is operating properly, the FAIL indicator will extinguish when the self test is completed.

6.05 The FAIL indicator on the XTC tester unit circuit packs will also light when the XTC is performing its internal test of these units during normal operation. The BUSY indicator on the AUB67 tester unit circuit pack will flash for the duration of this internal test. If the tester unit passes this test, all indicators will be extinguished. If the tester unit fails, the red FAIL indicator remains lighted and an alarm is activated.

6.06 When the XTC detects a fault condition, after a delay of 25 seconds it operates contact closures — these can be wired to activate remote visual and audible alarms. The time delay allows the XTC to perform its internal self tests.

6.07 The XADU has an ACO (alarm cutoff) switch — to release all contact closures except the system ID contacts. The ACO indicator on the XADU will light while the XTC is in the ACO state. While the XTC is in the ACO state, the reception of a new alarm condition will not

override the ACO state. The ACO state is cleared when no alarm condition is present on the alarm lead. A remote ACO feature is available for the XTC. This feature allows the ACO state to be entered via an external ground or loop closure condition that provides the same results as the ACO switch.

6.08 The functional test procedures in Section 5 should be used to fault isolate other troubles.

TABLE AH
XTC ALARM INDICATIONS

TROUBLE	INDICATOR LIGHTED	REMOTE ALARM ACTIVATED
Under Voltage: +5A, +5B, -5, +12 Over Voltage: +5A, +5B No Voltage: +48, +130, -130, -48	XPCU FAIL FAIL on XTC Control Shelf	CO Audible and Visual
Power Failure at PGTC Shelves	FAIL on XTC Control Shelf*	CO Audible and Visual
Link Fail: XTC to *SLC* 96 carrier, or *SLC* Series 5 carrier FPA†	XADU LINK FAIL	CO Audible and Visual
Link Fail: XTC to SARTS	XDLU LINK FAIL	CO Audible and Visual
Fuse Failure at XTC Shelves	FAIL on XTC Control Shelf POWER FAIL on XTC Expansion Shelf	CO Audible and Visual
Circuit Pack Failure	FAIL on Failed CP FAIL on XTC Control Shelf	CO Audible and Visual

* If XTC powers PGTC shelf.

† Or *SLC* Series 5 carrier FPC or FPD equipped with AUB2/AUB2B and AUB22 channel test units at the COT and RT, respectively.

7. REFERENCES

7.01 The following list of AT&T Practices contains additional information concerning the XTC and associated equipment.

PRACTICE	TITLE
363-005-246	AUB60 XTC Power Converter Unit - Data Sheet - *SLC* Series 5 Carrier System
363-005-247	MC97734A1 XTC Controller Unit - Data Sheet - *SLC* Series 5 Carrier System
363-005-248	AUB62 XTC Alarm Display Unit - Data Sheet - *SLC* Series 5 Carrier System
363-005-249	AUB63 XTC Data Link Unit - Data Sheet - *SLC* Series 5 Carrier System
363-005-250	MC97745A1 2 XTC Tester Unit D - Data Sheet - *SLC* Series 5 Carrier System
363-005-251	AUB66 XTC Fanout Unit - Data Sheet - *SLC* Series 5 Carrier System
363-005-252	AUB67 XTC Tester Unit C - Data Sheet - *SLC* Series 5 Carrier System
363-005-253	AUB68 XTC Tester Unit B - Data Sheet - *SLC* Series 5 Carrier System
363-005-254	AUB69 XTC Composite Clock Unit - Data Sheet - *SLC* Series 5 Carrier System
363-005-255	AUB63B XTC Data Link Unit - Data Sheet - *SLC* Series 5 Carrier System
363-005-256	MC97761A1 XTC Controller Unit - Data Sheet - *SLC* Series 5 Carrier System
363-202-300	*SLC* 24 and 96 Carrier Systems - Pair Gain Test Controller - Description and Installation - Pair Gain Systems
363-205-100	*SLC* Series 5 Carrier System - General Description - Loop Transmission Systems
660-168-274	Mechanized Loop Testing-1/Mechanized Loop Testing-2 - Maintenance - Preparation and Test Procedures for Test Trunk Circuits Using KS-22475, L1 Trunk Test Set With KS-22475, L2 Adapter - Automated Repair Service Bureau
662-YYY-ZZZ	Cable, Local Test Desks, and Local Test Cabinets - *SLC* Series 5 Carrier System
666-610-274	SARTS (Switched Access Remote Test System) 1A - General Description
666-611-143	SARTS Administrator's Manual
666-612-101	SARTS User's Manual
666-YYY-ZZZ	SARTS 2PC3 General Issue Software Release Document (*SLC* Feature tab)

8. ABBREVIATIONS AND ACRONYMS

This section defines commonly used *SLC* Series 5 carrier system abbreviations and acronyms.

ABBREVIATIONS AND ACRONYMS	DEFINITION
ACO	Alarm Cut-Off
ACXT	Apparatus Case Crosstalk
ADPCM	Adaptive Pulse Code Modulation
ADU	Alarm Display Unit
ADU/ASU	Alarm Display Unit/Alarm Suppressor Unit
AIU	Alarm Interface Unit
ALBO	Automatic Line Build-Out
ALIT	Automatic Line Insulation Test
ANI	Automatic Number Identification
ASU	Alarm Suppressor Unit
AWC	Average Worst Case
B8ZS	Bipolar with Eight Zero Substitution
BC	Bank Controller
BCU	Bank Control Unit
BET	Building Entrance Terminal
BFU	Bank Fuse Unit
BP	Binding Posts
CARL	Computerized Administration Route Layout
CBC	Coupled Bonding Conductor
CCITT	International Telephone & Telegraph Consultative Committee
CCS	One Hundred Call Seconds/Hour
CDO	Community Dial Office
CDS	Circuit Design System
CENTREX	Central Office Exchange Service
CEV	Controlled Environment Vault
CFU	Channel Fuse Unit
CIMAP	Circuit Installation and Maintenance Package
CIR	Customer Information Release
CIU	Craft Interface Unit
CN	Coin
CO	Central Office
CODEC	Coder/Decoder
COP	Centralized Operations and Provisioning
COT	Central Office Terminal
CPC	Circuit Provisioning Center
CPE	Customer Premises Equipment
CRC	Cyclic Redundancy Code
CRT	Cathode Ray Terminal
CSA	Carrier Serving Area
CSC	Community Service Cabinet
CTU	Channel Test Unit
CU	Channel Unit
CUE	Channel Unit Emulator

ABBREVIATIONS AND ACRONYMS	DEFINITION
CZ	Carrier Zone
DACS	Digital Access Cross-Connect System
DA	Discontinued Availability
DCB	Dual Channel Bank
DCLU	Digital Carrier Line Unit
DCU	Digital Connectivity Unit
DCU-L	Digital Connectivity Unit-Left
DCU-R	Digital Connectivity Unit-Right
DDS	Digital Data System
DEPIC	Dual Expanded Polyethylene Insulated Conductor
DF	Distributing Frame
DFI	Digital Facility Interface
DID	Direct Inward Dialing
DILEP	Digital Line Engineering Program
DILEP II	Digital Line Engineering Program II
DIP	Dual In-Line Package
DLC	Digital Loop Carrier
DLI	Data Link Interface
DLR	Digital Layout Record
DLS	Digital Line Schematic
DP	Dial Pulse
DPT	Dial Pulse Terminating
DS1	Digital Signal, 1-rate (1.544 Mb/s)
DSDC	Distributed Services Design Center
DSL	Digital Subscriber Line
DS0	Digital Signal Zero
DSS	Designed Special Services
DSX	Digital System Cross-Connect
DTS	Digital Terminal System
DTU	Digital Test Unit
ECCR	Exchange Customer Cable Record
EEE	Electronic Equipment Enclosure
ESD	Electrostatic Discharge
ESF	Extended Superframe Format
EWC	Extreme Worst Case
EWO	Engineering Work Order
EXR	Extended Range
FAC	Facility Assignment and Control Center
FACS	Facility Assignment and Control System
FCU	Fan Control Unit
FDI	Feeder Distribution Interface
FE	Far End
FEME	Foreign Electromotive Force
FEMF	Foreign Potential
FEXT	Far End Crosstalk
FL	Fault-Locating
FL/OW	Fault Locate/Order Wire

ABBREVIATIONS AND ACRONYMS	DEFINITION
FP	Feature Package
FPA	Feature Package A
FPB	Feature Package B
FPC	Feature Package C
FPD	Feature Package D
FSR	Frequency Selective Ringing
FX	Foreign Exchange
F_s	D4 Digital Channel Bank Framing Format
ICOT	Intercity and Outstate Trunk
IDF	Intermediate Distributing Frame Kilobits per second
ISDN	Integrated Services Digital Network
ISLU	Integrated Services Line Unit
LAC	Loop Assignment Center
LBO	Line Build-Out
LBRV	Low Bit Rate Voice
LCRIS	Loop Cable Record Inventory System
LDU	Load Distribution Unit
LED	Light Emitting Diode
LFC	Line Feed Converter
LFU	Line Fuse Unit
LIU	Line Interface Unit
LM12	Loop Multiplexer 12 (DS1 to DS2)
LMOS	Loop Maintenance Operations System
LSU	Line Switch Unit
LTC	Local Test Cabinet
LTD	Local Test Desk
LT	Line Terminal
LTF	Loop Testing Frame
LTS	Loop Testing System
LTU	Line Terminating Unit
MA	Maintenance Administrator
MAT	Metropolitan Area Trunk
MC	Maintenance Center
MDF	Main Distributing Frame
MF	Multifrequency
MFD	Main Distributing Frame
MISC	Miscellaneous
MIU	Maintenance Interface Unit
MJ	Major
MLT	Mechanized Loop Testing
MN	Minor
MP	Multiparty
MPP	Miscellaneous Pair Panel
NAIU	Network Access Interface Unit
NCTE	Network Channel Terminating Equipment
NE	Near End
NEXT	Near-End Crosstalk

ABBREVIATIONS AND ACRONYMS	DEFINITION
NTEC	Network Terminal Equipment Center
NTT	No-Test Trunk
OCU	Office Channel Unit
OHT	On-Hook Transmission
OPE	Outside Plant Engineer
OPS	Off Premise Station
ORB	Office Repeater Bay
OSI	Open Switching Interval
OSPE	Outside Plant Engineer
OSP	Outside Plant
OTU	Office Timing Unit
OU	Optical Unit
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
PC	Preferred Count
PCU	Power Converter Unit
PG	Pair Gain
PGS	Pair Gain System
PGTC	Pair Gain Test Controller
PIC	Polyethylene-Insulated Conductor
PICS	Plug-in Inventory Control Center
PLR	Pulse Link Repeater
PMN	Power Minor
PMO	Present Mode of Operation
POTS	Plain Old Telephone Service
PRU	Positive Ringing Unit
PWB	Printed Wiring Board
RBOC	Regional Bell Operating Company
RCVG	Receiving
REN	Ringer Equivalency Number
RMU	Remote Maintenance Unit
RMU	Remote Measuring Unit
RPFT	Remote Power Feed Terminal
RSB	Repair Service Bureau
RSMISC1	Remote Terminal Miscellaneous Alarm 1
RSMISC2	Remote Terminal Miscellaneous Alarm 2
RSM	Remote Switching Module
RSU	Ring Switch Unit
RT	Remote Terminal
RTS	Remote Test System
RZ	Resistance Zone
S1DN	State One Distributing Network
S1DP	Stage One Distributing Panel
SAI	Serving Area Interface
SARTS	Switched Access Remote Test System
SCCS	Switching Control Center System
SCC	Switching Control Center

ABBREVIATIONS AND ACRONYMS	DEFINITION
SDDF	Subscriber Digital Distribution Frame
SDFI	Subscriber Digital Facility Interface
S-DFI	Subscriber-Digital Facility Interface
SD	Schematic Drawing
SFIU	Switching Facility Interface Unit
SID	System Identification Numbers
SLIM	Subscriber Loop Interface Module
SMAS	Switch Maintenance Access System
SP	Single Party
SSC	Special Services Center
SSP	Special Service Protection
STA	Span Terminating Assembly
STIU	Switching Transmission Inteface Unit
STM	Span Terminating Module
SXS	Step-By-Step
SXSS	Small Cross-Section Shelf
TASC	Telecommunications Alarm Surveillance and Control System
TAP	Test Access Path
TBCU	Test Bus Control Unit
TCU	Transcoder Unit
TD	Toll Diversion
TFC	Test Failure Code
TFIU	Transmission Facility Interface Unit
TO	Transmit Only
TOC	Task Oriented Costing
TOP	Task Oriented Practice
TPI	Tip Party Identification
TRC	Test Result Code
TRMTG	Transmitting
TRU	Transmit/Receive Unit
TTS	Trunk Test Set
UART	Universal Asynchronous Receiver Transmitter
VF	Voice-Frequency
VLSI	Very Large Scale Integration
WATS	Wide Area Telephone Service
WORD	Work Order Record Detail
XADU	XTC Alarm Display Unit
XCCU	XTC Composite Clock Unit
XCU	XTC Control Unit
XDLU	XTC Data Link Unit
XFOU	XTC Fanout Unit
XTUB	XTC Tester Unit B
XTUC	XTC Tester Unit C
XTUD	XTC Tester Unit D
XPCU	XTC Power Converter Unit

ABBREVIATIONS AND ACRONYMS	DEFINITION
XTC	eXtended Test Controller
ZCS	Zero Code Suppression

9. ISSUING ORGANIZATION

9.01 Published by
The AT&T Documentation Management Organization.

APPENDIX A — XTC/PGTC CONTROL OR XTC/PGTC EXPANSION SHELF CABLE INSTALLATION GUIDE

A. Introduction

This appendix contains information (see Figures 23 through 28 and Tables AI through AL) for a quick reference showing how the critical cabling should be run between the XTC control shelf and PGTC control and expansion shelves. All cabling and wiring must be kept as short as possible. The location and connections for the noise suppression capacitors (Figure 29) are also included. Also, this appendix includes references to applicable T-drawings and Figures.

TABLE AI
XTC CONTROL/PGTC CONTROL SHELVES
12 LEAD SHIELDED CABLE CONNECTIONS

LEAD DESIGNATION	CABLES 1, 2 AND 3 LEAD COLORS	CABLE 1		CABLE 2		CABLE 3	
		FROM XTC TS4	TO PGTC TS1	FROM PGTC TS1	TO 1ST PGTC EXP. SHELF	FROM 1ST PGTC EXP. SHELF	TO 2ND PGTC EXP. SHELF
Shield Ground	(BK)	1	1*	1	1	198	1
SEL A	(BR2W)	5	2	2	8	154	8
SEL B	(BR1W)	4	3	3	15	177	15
SEL C	(S1W)	3	5	5	16	152	16
SEL D	(BL1R)	2	6	6	10	175	10
SEZBY	(S2W)	10	8	8	9	150	9
TDET	(G1W)	12	9	9	14	179	14
ABUSY	(O1W)	9	10	10	13	178	13
BBUSY	(BL1W)	8	11	11	11	156	11
CBUSY	(BL2W)	7	12	12	12	153	12
DBUSY	(O2W)	6	13	13	6	176	6
120 IPM	(BL2R)	11	15	15	17	151	17

* Shield ground connects to terminal 1 on right side of TS1 terminal strip.

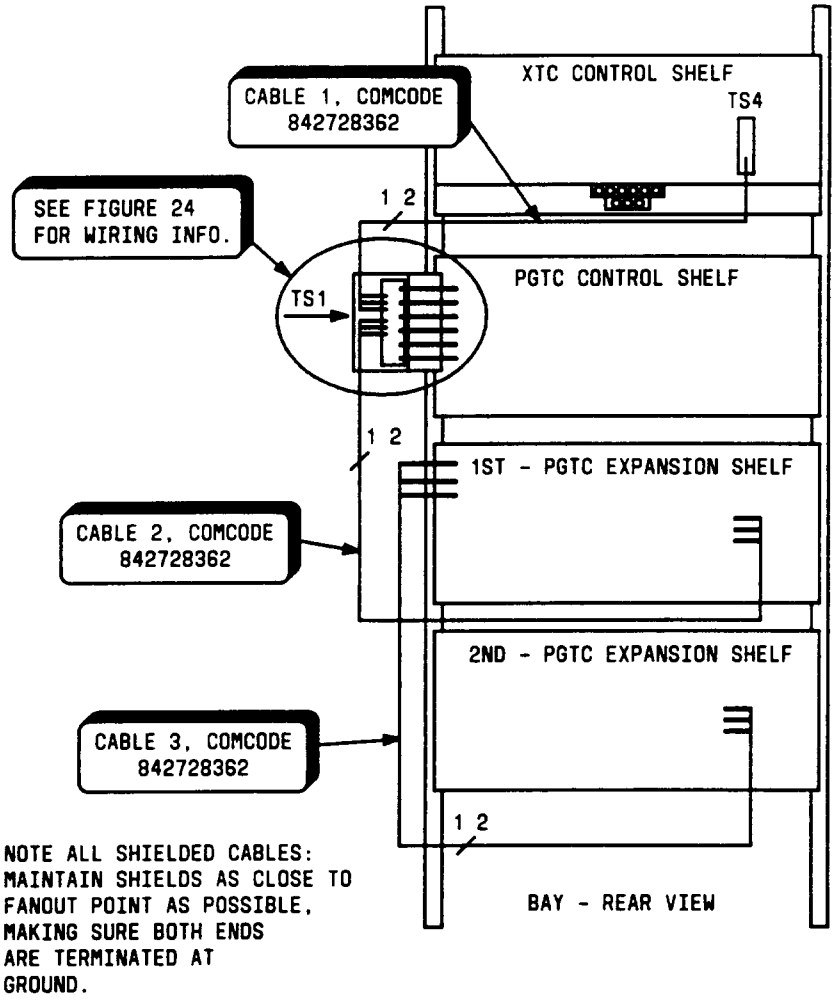


Figure 23 — XTC Control/PGTC Control Shelves - 12 Lead Shielded Cable Connections

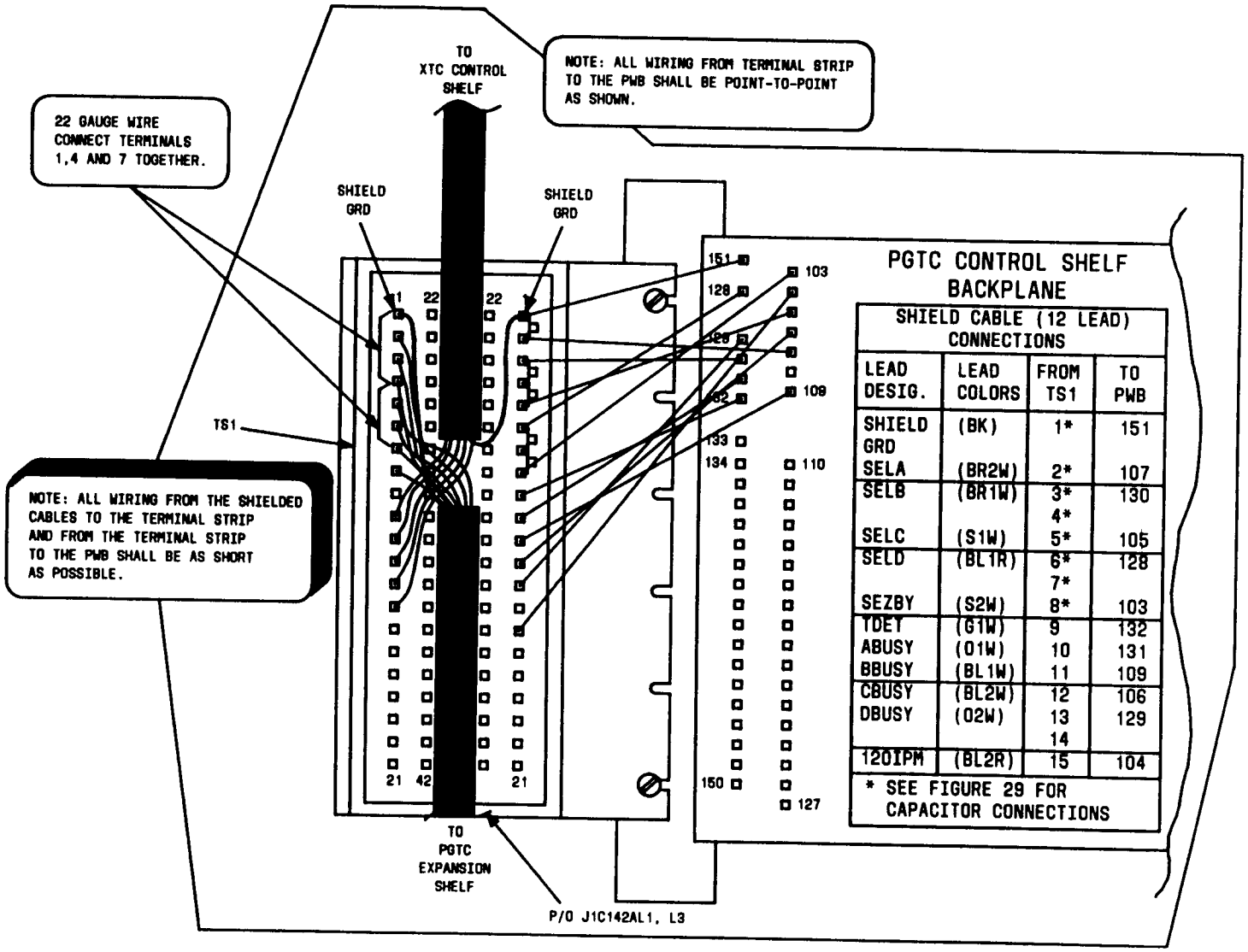


Figure 24 — XTC Control/PGTC Control Shelves - Wiring Between the TS1 Terminal Strip and the Backplane Connections

TABLE AJ
XTC CONTROL/PGTC CONTROL SHELVES
24 LEAD CABLE CONNECTIONS

LEAD DESIGNATION	P/O CABLE 4			P/O CABLE 5			P/O CABLE 6		
	FROM XTC CONT. (J22)	COLOR	TO PGTC CONT. TS1	FROM PGTC CONT. TS1	COLOR	TO 1ST PGTC EXP. SHELF	FROM 1ST PGTC EXP. SHELF	COLOR	TO 2ND PGTC EXP. SHELF
TA	1	(BL-W)	16	16	(G)	21	160	(G)	21
RA	26	(W-BL)	17	17	(G-W)	37	187	(G-W)	37
TTA	2	(O-W)	18	18	(BR)	25	164	(BR)	25
TRA	27	(W-O)	19	19	(BR-W)	26	165	(BR-W)	26
SA	3	(G-W)	20	20	(BL)	34	184	(BL)	34
TSA	28	(W-G)	21	21	(BL)	40	190	(BL)	40
TB	4	(BR-W)	22	22	(O)	33	183	(O)	33
RB	29	(W-BR)	23	23	(O-W)	36	186	(O-W)	36
TTB	5	(S-W)	24	24	(BL)	30	180	(BL)	30
TRB	30	(W-S)	25	25	(BL-W)	38	188	(BL-W)	38
SB	6	(BL-R)	26	26	(W)	23	162	(W)	23
TSB	31	(R-BL)	27	27	(O)	28	167	(O)	28
TC	7	(O-R)	28	28	(BR)	20	159	(BR)	20
RC	32	(R-O)	29	29	(BR-W)	19	158	(BR-W)	19
TTC	8	(G-R)	30	30	(G)	31	181	(G)	31
TRC	33	(R-G)	31	31	(G-W)	39	189	(G-W)	39
SC	9	(BR-R)	32	32	(BR)	22	161	(BR)	22
TSC	34	(R-BR)	33	33	(G)	41	191	(G)	41
TD	10	(S-R)	34	34	(S)	32	182	(S)	32
RD	35	(R-S)	35	35	(S-W)	24	163	(S-W)	24
TTD	11	(BL-BK)	36	36	(O)	18	157	(O)	18
TRD	36	(BK-BL)	37	37	(O-W)	27	166	(O-W)	27
SD	12	(O-BK)	38	38	(S)	35	185	(S)	35
TSD	37	(BK-O)	39	39	(BR)	29	168	(BR)	29

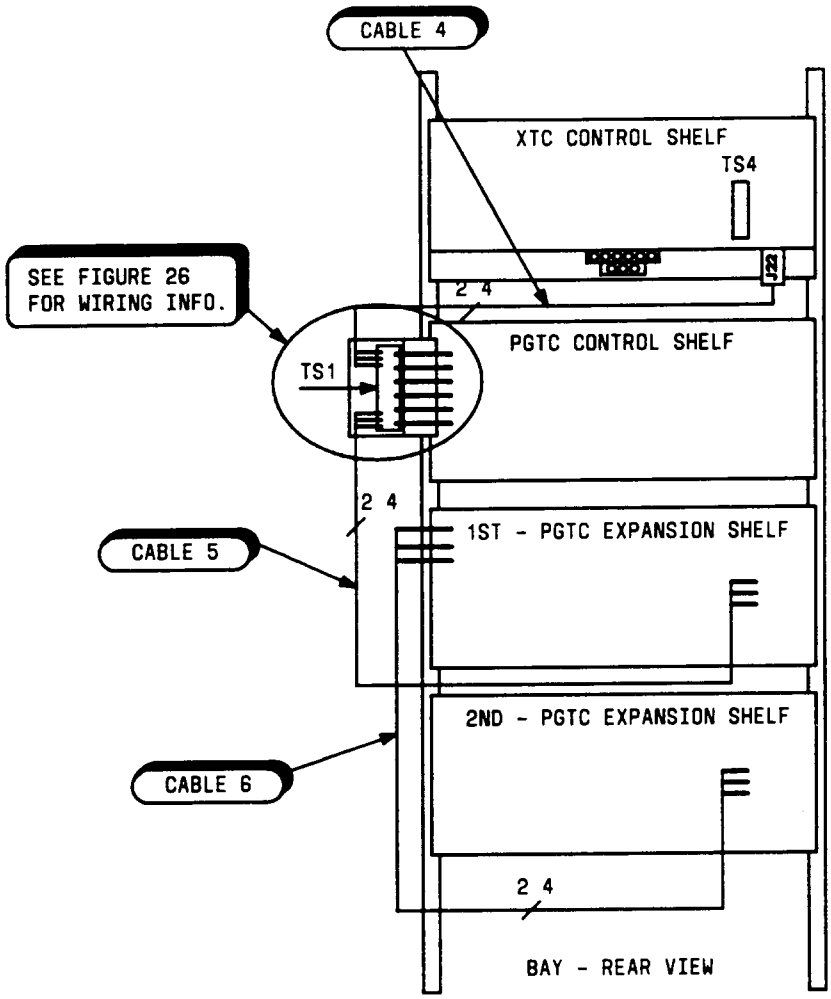
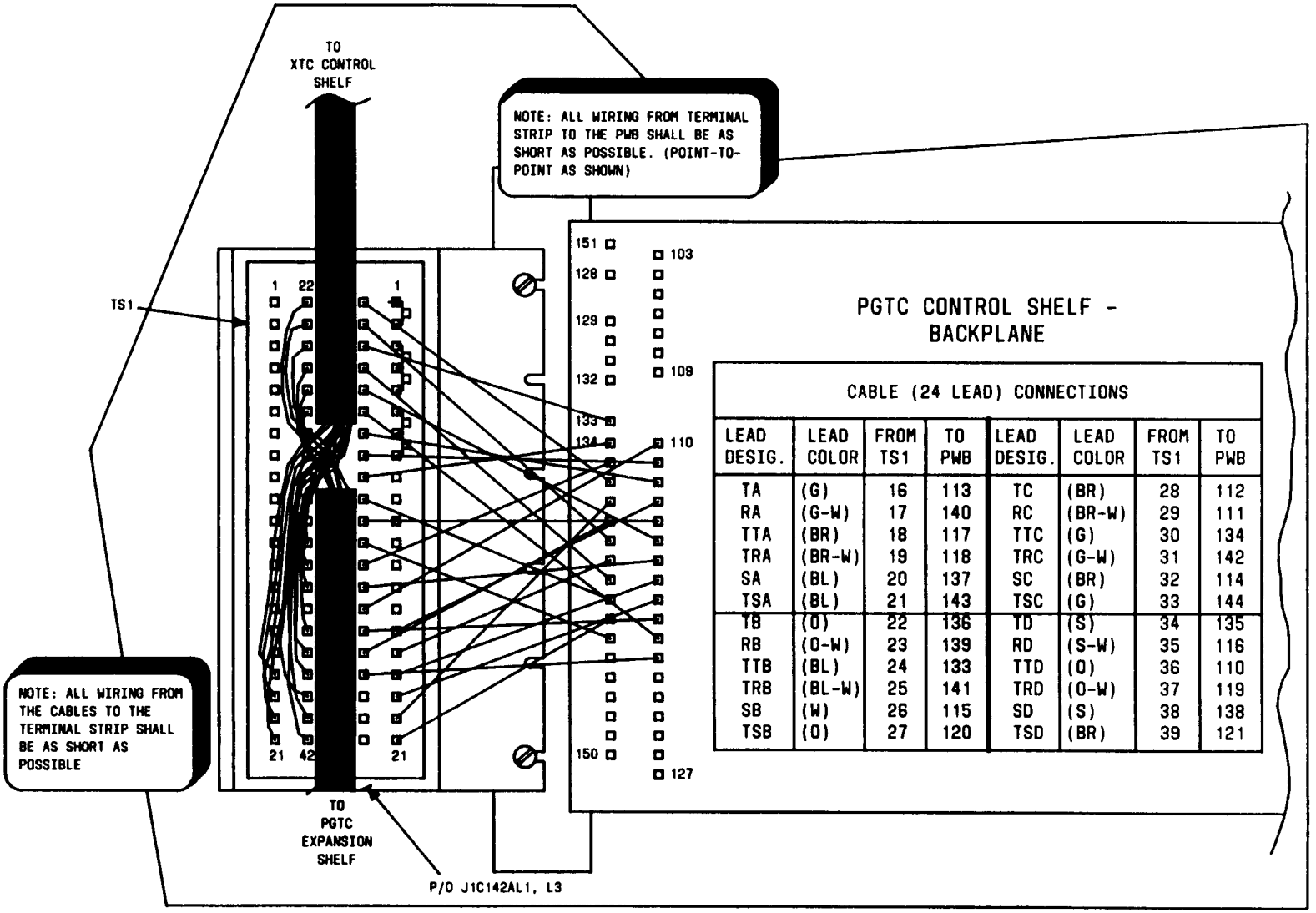


Figure 25 — XTC Control/PGTC Control Shelves - 24 Lead Cable Connections



CABLE (24 LEAD) CONNECTIONS

LEAD DESIG.	LEAD COLOR	FROM TS1	TO PWB	LEAD DESIG.	LEAD COLOR	FROM TS1	TO PWB
TA	(G)	16	113	TC	(BR)	28	112
RA	(G-W)	17	140	RC	(BR-W)	29	111
TTA	(BR)	18	117	TTC	(G)	30	134
TRA	(BR-W)	19	118	TRC	(G-W)	31	142
SA	(BL)	20	137	SC	(BR)	32	114
TSA	(BL)	21	143	TSC	(G)	33	144
TB	(O)	22	136	TD	(S)	34	135
RB	(O-W)	23	139	RD	(S-W)	35	116
TTB	(BL)	24	133	TTD	(O)	36	110
TRB	(BL-W)	25	141	TRD	(O-W)	37	119
SB	(W)	26	115	SD	(S)	38	138
TSB	(O)	27	120	TSD	(BR)	39	121

Figure 26 — XTC Control/PGTC Control Shelves - Wiring Between the TS1 Terminal Strip and the Backplane Connections

TABLE AK
XTC CONTROL/PGTC EXPANSION SHELVES
12 LEAD SHIELDED CABLE CONNECTIONS

LEAD DESIGNATION	CABLES 1, 2 AND 3 LEAD COLORS	CABLE 1		CABLE 2		CABLE 3	
		FROM XTC TS4	TO 1ST PGTC EXP. SHELF	FROM 1ST PGTC EXP. SHELF	TO 2ND PGTC EXP. SHELF	FROM 2ND PGTC EXP. SHELF	TO 3RD PGTC EXP. SHELF
Shield Ground	(BK)	1	1	198*	1	198*	1
SEL A	(BR2W)	5	8	154*	8	154*	8
SEL B	(BR1W)	4	15	177*	15	177*	15
SEL C	(S1W)	3	16	152*	16	152*	16
SEL D	(BL1R)	2	10	175*	10	175*	10
SEZBY	(S2W)	10	9	150*	9	150*	9
TDET	(G1W)	12	14	179	14	179	14
ABUSY	(O1W)	9	13	178	13	178	13
BBUSY	(BL1W)	8	11	156	11	156	11
CBUSY	(BL2W)	7	12	153	12	153	12
DBUSY	(O2W)	6	6	176	6	176	6
120 IPM	(BL2R)	11	17	151	17	151	17

* See Figure 29 for capacitor connections.

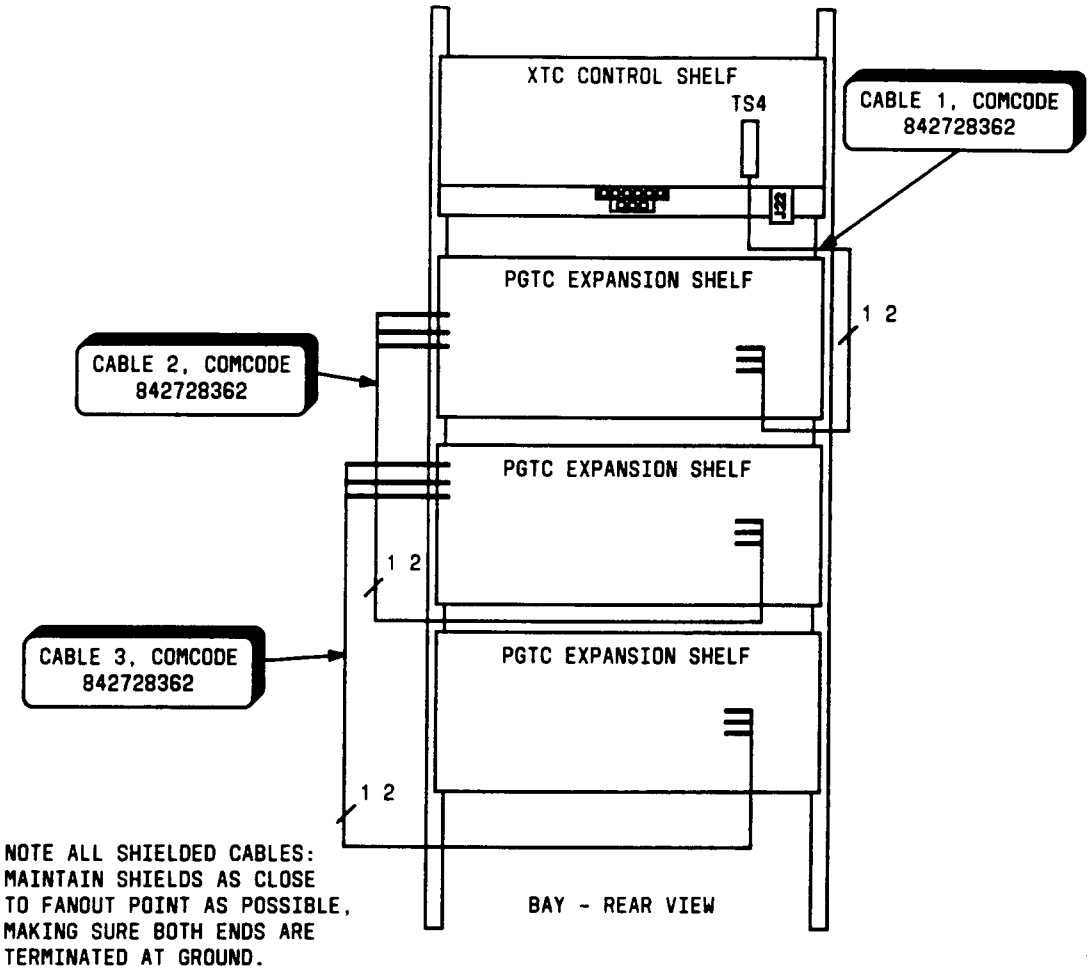


Figure 27 — XTC Control/PGTC Expansion Shelves - 12 Lead Shielded Cable Connections

TABLE AL
XTC CONTROL/PGTC CONTROL SHELVES
24 LEAD CABLE CONNECTIONS

LEAD DESIGNATION	P/O CABLE 4			P/O CABLE 5			P/O CABLE 6		
	FROM XTC CONT. (J22)	COLOR	TO 1ST PGTC EXP. SHELF	FROM 1ST PGTC EXP. SHELF	COLOR	TO 2ND PGTC EXP. SHELF	FROM 2ND PGTC EXP. SHELF	COLOR	TO 3RD PGTC EXP. SHELF
TA	1	(BL-W)	21	160	(G)	21	160	(G)	21
RA	26	(W-BL)	37	187	(G-W)	37	187	(G-W)	37
TTA	2	(O-W)	25	164	(BR)	25	164	(BR)	25
TRA	27	(W-O)	26	165	(BR-W)	26	165	(BR-W)	26
SA	3	(G-W)	34	184	(BL)	34	184	(BL)	34
TSA	28	(W-G)	40	190	(BL)	40	190	(BL)	40
TB	4	(BR-W)	33	183	(O)	33	183	(O)	33
RB	29	(W-BR)	36	186	(O-W)	36	186	(O-W)	36
TTB	5	(S-W)	30	180	(BL)	30	180	(BL)	30
TRB	30	(W-S)	38	188	(BL-W)	38	188	(BL-W)	38
SB	6	(BL-R)	23	162	(W)	23	162	(W)	23
TSB	31	(R-BL)	28	167	(O)	28	167	(O)	28
TC	7	(O-R)	20	159	(BR)	20	159	(BR)	20
RC	32	(R-O)	19	158	(BR-W)	19	158	(BR-W)	19
TTC	8	(G-R)	31	181	(G)	31	181	(G)	31
TRC	33	(R-G)	39	189	(G-W)	39	189	(G-W)	39
SC	9	(BR-R)	22	161	(BR)	22	161	(BR)	22
TSC	34	(R-BR)	41	191	(G)	41	191	(G)	41
TD	10	(S-R)	32	182	(S)	32	182	(S)	32
RD	35	(R-S)	24	163	(S-W)	24	163	(S-W)	24
TTD	11	(BL-BK)	18	157	(O)	18	157	(O)	18
TRD	36	(BK-BL)	27	166	(O-W)	27	166	(O-W)	27
SD	12	(O-BK)	35	185	(S)	35	185	(S)	35
TSD	37	(BK-O)	29	168	(BR)	29	168	(BR)	29

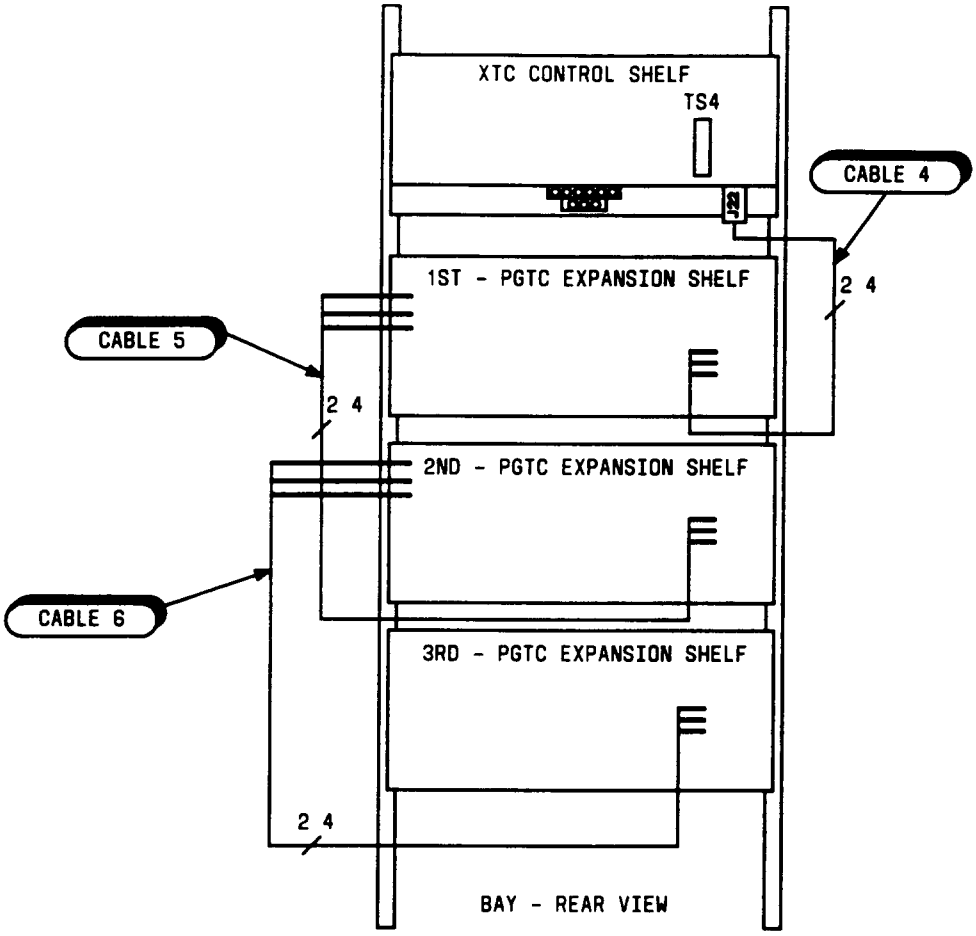


Figure 28 — XTC Control/PGTC Expansion Shelves - 24 Lead Cable Connections

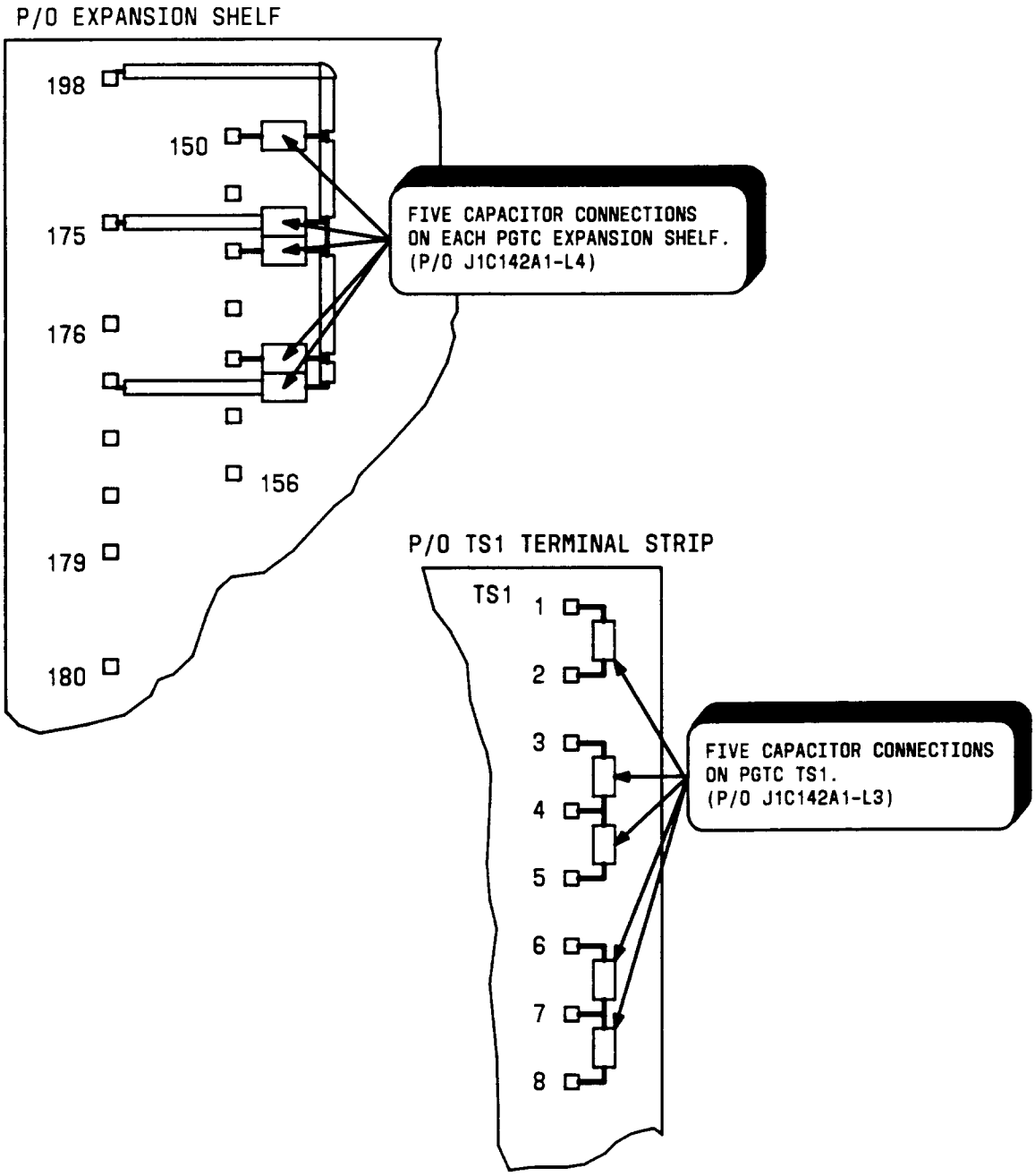


Figure 29 — Capacitor Connections - Mounted on Terminal Strip (TS1) or PGTC Expansion Shelf

APPENDIX B — SARTS *SLC* SERIES 5 CARRIER FEATURE

A. Introduction

This tutorial (see Figures 30 and 31, and Tables AO through AT) is a simplified picture of all the related components needed to do *SLC* Series 5 carrier testing and the capabilities this feature can provide. Owing to the complexity of the subject matter involved, the *How to test ... using the* SLC *Series 5 carrier system* question is beyond the scope of this tutorial.

B. System Components

To understand how this package works, a brief explanation of all major components involved is needed. First is the SARTS PC (process controller). The *SLC* Series 5 carrier access is a billable feature currently available in SARTS. The only preparation needed at the PC when upgrading the software with the *SLC* carrier feature, is the updating of the Series 5 system related SDD in the 038 table for local access and the 039 table for foreign access. Detailed explanation of these SDD tables and the commands used to access the *SLC* Series 5 carrier through SARTS will be discussed later in this tutorial.

The second component is the RTS-5. Two of the modules needed by *SLC* Series 5 carrier accesses are the DLI (data link interface) enhancement module and the MIU (Metallic Interface Unit). The control link goes through the DLI, and the TAP (test access path) is through the MIU. The function of the control link is to establish communication between the RTS-5 and *SLC* Series 5 carrier, through the XTC to split and release the circuit under test. It also provides a path for the G22 diagnostic command and to retrieve status information from the COT and the RT. The main function of the test access path is to bring the leads of the circuit under test from the *SLC* Series 5 carrier access point into the RTS-5. It also provides a mechanism for the *SLC* Series 5 carrier system to recover gracefully if the RTS-5 fails. The MIU in this path acts as a psuedo-MC (maintenance connector) for all *SLC* Series 5 carrier accesses. So, an SMAS loop test to a *SLC* Series 5 carrier access point would go all the way to the channel banks instead of the normal MC loop.

The third component is the *SLC* Series 5 carrier system. There are three major parts within the *SLC* Series 5 carrier system. The first is the COT (central office terminal) which, as its name implies, is located inside the CO (central office). The second part is the RT (remote terminal). The RT is usually located in an outside plant enclosure near the customer premises it serves. The COT and RT are connected by T1 facilities. The third component in the *SLC* Series 5 carrier system is the XTC. The XTC is usually installed next to or close to the COT in the central office. The function of the XTC is to allow either SARTS or MLT to test through the associated *SLC* carrier banks.

C. Testing Through *SLC* Series 5 Carrier Systems

With all the components and SDD in place, and the provisioning data in *SLC* Series 5 carrier entered properly, testing through the system is as simple as executing a 704 command. The user provides the *SLC* Series 5 carrier *CLLI* code and system ID, the bank and channel number to be tested as either analog or digital point, plus the orientation and configuration codes as in a 701 access. The XTC assigns the TAP for testing and completes the access. The normal 703 command would be prompted by the system as usual. After the 703, it is just another test

access for the user. There is no functional restriction on other SARTS tester commands beyond the 703 command. There are changes made in existing commands plus one new command (G22). The following sections detail the modified as well as the new commands.

D. New and Modified SARTS Tester Commands

[704] Access Command

The [704] command was originally implemented in SARTS to accommodate *DACS* (Digital Access and Cross-Connect System) access.

```
704/          /       /              /    /     /    /
704/LOCN      /SYS    /ACCESS #      /ORTN/CNFGN/TP #/SEG
```

The LOCN field refers to the *SLC* carrier CLLI code with which the circuit under test is associated. The SYS field has the format Wxx where W identifies the *SLC* Series 5 carrier as the network element and xx (alphanumeric) identifies the XTC and *SLC* Series 5 carrier group. The ACCESS # field requires a 7-character code to identify the particular circuit under test and has the format **mmmmnno** where:

- **mmmm** is the *SLC* Series 5 carrier channel bank number (0001-9999)
- **nn** is the channel number in the bank (01-96)
- **o** is the test access location on the circuit. The test access location is a single alpha character:
  - ☐ C - metallic access at COT test access locations other than C are digital access points at the COT with specific testing interface for the RTS-5A.
  - ☐ D - DS0 testing
  - ☐ E - 4-wire VF with Ring direction E
  - ☐ F - 4-wire VF with Ring direction F
  - ☐ T - 4-wire VF with Transmission only
  - ☐ X - 4-wire VF with Duplex signaling.

The CNFGN field accepts a limited set of configuration codes for *SLC* Series 5 carrier testing. The valid codes for *SLC* Series 5 carrier testing are 2WA, 4AB, 4BA, MAB, QAB, QBA, DAB, and DBA. When used, configuration codes QAB and MAB are mapped into 4AB — QBA and MBA are mapped into 4BA.

[G22] Channel Unit Diagnostic Command

The [G22] channel unit diagnostic command is provided to initiate diagnostic tests of the COT and RT *SLC* Series 5 carrier channel units by the XTC.

```
        G22/
CHAN DIG G22/NO PARAMETER CHOICES/
```

The [G22] command performs specific diagnostic tests:

- C-notched noise
- Idle circuit noise
- Reflected signal with matched termination (2W)
- Reflected signal with reflected termination (2W)
- Returned signal with 4-wire loop-back (4W)
- Signaling

A pass or fail indication is returned to the user. The [G22] command interrupts the circuit, so the tester should monitor the circuit before using the command.

[031] TAP Maintenance Release Command

First stage prompter:

```
            031/
TAP RELEASED 031/DACS:SLC/
```

Second stage prompter:

```
            031/2/     /            /
TAP RELEASED 031/ /LINK#/SLC SESSION#/
```

The *SLC* Series 5 carrier link number can be obtained from the [038] table. The best way to obtain the *SLC* Series 5 carrier session number is from any *SLC* Series 5 carrier related console error message. Another way is through a line monitor.

[032] TAP Status Control Command

First stage prompter:

```
            032/
TAP CONTROL 032/DACS:SLC/
```

Second stage prompter:

```
            032/2/     /    /
TAP CONTROL 032/ /LINK#/TAP#/OUT:IN/
```

Link and TAP numbers can be obtained from the [038] table. The *OUT* and *IN* choices in field 4 means *make metallic TAP busy* and *make metallic TAP available*, respectively.

[061] SDD Librarian Command

If the SUBSET parameter (option 09) has been selected in the first stage of the [061] prompter, the second stage prompter display will expand field 3 (PAGE) from the previous two to the current four characters.

Second stage prompter:

```
        061/  09  /    /     /                /                /
CPY PAGE 061/SUBSET/MASK/PAGE /SRC SET ID     /DEST SET ID     /
```

[037] Find Access System Directory Command

The [037] command:

```
                 037/            /         /
FIND ACC SYS DIR 037/038:039:BOTH/LOCN     /SYS     /
```

[038] Series 5 System TAP Directory

The [038] command:

```
                  038/   2    /
LOCAL ACC SYS DIR 038/DACS:SLC/PAGE
```

The [038] command has a response:

```
038/2 / xxx    SLC TAP DIRECTORY AND SMAS NUMBER ASSIGNMENTS

SLC LOCN                  SLC SYSTEM              SLC DATA LINK #
RTS CLLI                  RTS SYSTEM #

     SLC    2WA,4AB      MAB          DAB          QAB
     TAP    2WB,4BA      MBA          DBA          QBA
  ------------------------------------------------------
      A
      B
      C
      D
      E
      F
      G
      H
      I
      J
```

There are a total of 150 [038] pages and each page can accommodate 10 entries. The SLC LOCN and SLC SYSTEM fields in the [038] Directory correspond to the LOCN and SYS fields of the [704] command. The SYS DATA LINK field is the 3-digit enhancement replication number for the DLI card. This can be determined by Table AM.

TABLE AM
DATA LINK INTERFACE UNIT MAPPING

CIRCUIT PACK LOCATION	ENHANCEMENT NUMBER	REPLICATION NUMBER
J5	08	4
J8	08	5
J11	08	6
J14	08	7
J17	09	4
J20	09	5
J23	09	6
J26	09	7

The *SLC* carrier TAPs are hardwired SMAS connections used to determine the connection links between the MIC (metallic interface circuit) and the metallic TAP assigned by the *SLC* carrier system. The RTS CLLI and RTS SYSTEM fields identify the RTS to which the *SLC* carrier TAPs and control link are connected.

The 5-digit SMAS numbers for the MCs (maintenance connectors) have specific assignments:

- First digit - super-quadrant (5, 6, 7, or 8)
- Second digit - S1DP level within the quadrant (0 through 9)
- Third digit - one of two test paths (0 or 5)
- Fourth and fifth digits - the quadrant and whether monitoring is voice or data (Table AN).

TABLE AN
SMAS QUADRANT ASSIGNMENT

QUADRANT	VOICE	DATA
A	01	08
B	25	32
C	49	56
D	73	80

[039] Alien Access System Directory

The [039] masks are used for alien DACS and *SLC* Series 5 carrier circuits. Each [039] page can accommodate 100 entries and there are a total of 50 [039] pages.

```
                    039/
ALIEN ACC SYS DIR   039/PAGE
```

The ALIEN PC CLLI field can accommodate the regular 11 character maximum *CLLI* code. The LOCN and SYS fields are equivalent to the ones in the [038] mask. The [039] command has a response:

```
039/xx                    ALIEN ACCESS SYSTEM DIRECTORY

ALIEN PC CLLI   0
LOCN      SYS      LOCN      SYS      LOCN      SYS      LOCN      SYS      LOCN      SYS
```

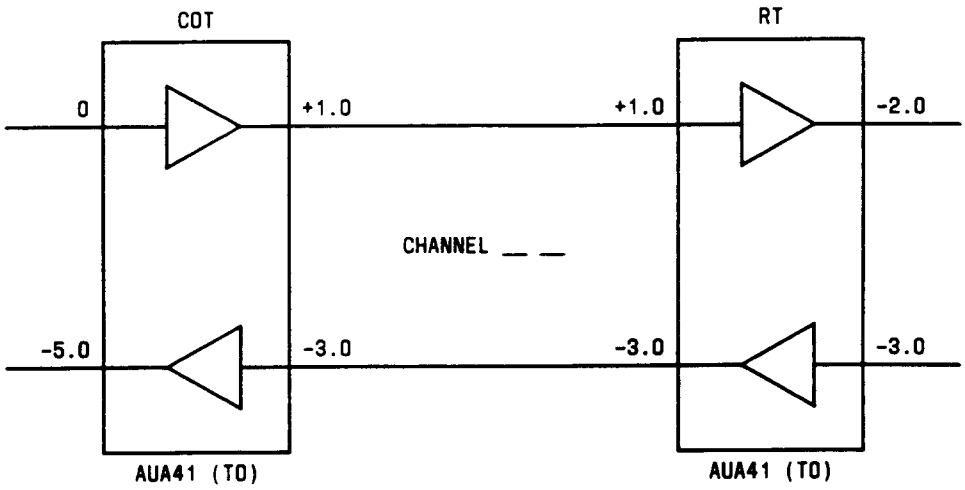


Figure 30 — 4-Wire Transmission Only Circuit

TABLE AO COT 4-WIRE TRANSMISSION ONLY CIRCUIT PROVISIONING DATA	
LOCATION: COT **SYSTEM ID: _____** **CHANNEL: __** **CHANNEL UNIT: AUA41**	
CIU PROMPT	**VALUE**
SYSTEM ID	_____
CHANNEL	__
CU LOCATION	CO-END
CLEI	5SCU7D
FUNCTION CODE	TO4
TRMT ATTENUATOR	8
RCV ATTENUATOR	2
-7dB TRMT	BK
-7dB RCV	BK
REDLINE-SSP?	NO

TABLE AP RT 4-WIRE TRANSMISSION ONLY CIRCUIT PROVISIONING DATA	
LOCATION: RT **SYSTEM ID: _____** **CHANNEL: __** **CHANNEL UNIT: AUA41**	
CIU PROMPT	**VALUE**
SYSTEM ID	_____
CHANNEL	__
CU LOCATION	RT-END
CLEI	5SCU7D
FUNCTION CODE	TO4
TRMT ATTENUATOR	9
RCV ATTENUATOR	3
-7dB TRMT	BK
-7dB RCV	BK
REDLINE-SSP?	NO

TABLE AQ
SARTS TEST ACCESS INFORMATION
4-WIRE TRANSMISSION ONLY CIRCUIT

COMMAND	ACCESS POINT	C	D
701 and 704	Access System Location	*clli* code	*clli* code
	Access System Identification	Wxx	Wxx
	Access Number	mmmmnno	mmmmnno
	Orientation Code	EF	EF
	Configuration Code	4BA	4BA
	Test Point Identity	1	2
	Circuit Segment		
703	Signaling Format	NON	NON
	Signaling Operation [Z-A]	OT	OT
	Signaling Operation [A-Z]	OT	OT
	Ring Direction	N	N
	Test Impedance	22	22
	Transmission Level Point [Z-A]	-5	-3
	Transmission Level Point [A-Z]	0	+1

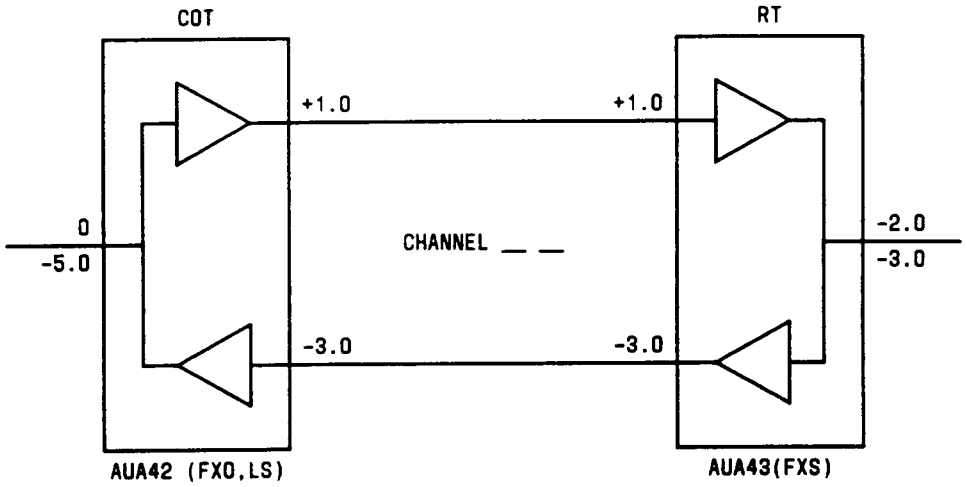


Figure 31 — 2-Wire Loop Start Circuit

TABLE AR
COT 2-WIRE LOOP START CIRCUIT PROVISIONING DATA

LOCATION: COT
SYSTEM ID: _____
CHANNEL: ___
CHANNEL UNIT: AUA42

CIU PROMPT	VALUE
SYSTEM ID	_____
CHANNEL	___
CU LOCATION	CO-END
CLEI	5SCU69
FUNCTION CODE	FXO
IMPEDANCE	600
BALANCE	3
TRANSMIT GAIN	1
RECEIVE GAIN	-2
SLOPE	0
TOLL DIVERSION?	NO
SIGNALING TYPE	LS
ON-HOOK TRANSMISSION?	NO
REDLINE-SSP?	YES

TABLE AS
RT 2-WIRE LOOP START CIRCUIT PROVISIONING DATA

LOCATION: RT
SYSTEM ID: _____
CHANNEL: ___
CHANNEL UNIT: AUA41

CIU PROMPT	VALUE
SYSTEM ID	_____
CHANNEL	___
CU LOCATION	RT-END
CLEI	5SCU6A
FUNCTION CODE	FXS
IMPEDANCE	600
BALANCE	3
TRANSMIT GAIN	0
RECEIVE GAIN	-3
SLOPE	0
ON-HOOK TRANMISSION?	NO
REDLINE-SSP?	YES

TABLE AT
SARTS TEST ACCESS INFORMATION
2-WIRE LOOP START CIRCUIT

COMMAND	ACCESS POINT	C	D
701 and 704	Access System Location	*clli* code	*clli* code
	Access System Identification	Wxx	Wxx
	Access Number	mmmmnno	mmmmnno
	Orientation Code	EF	EF
	Configuration Code	2WA	4BA
	Test Point Identity	1	2
	Circuit Segment		
703	Signaling Format	L2W	L4E
	Signaling Operation [Z-A]	LN	LN
	Signaling Operation [A-Z]	LN	LN
	Ring Direction	F	F
	Test Impedance	22	22
	Transmission Level Point [Z-A]	-5	-3
	Transmission Level Point [A-Z]	0	+1