NORTHERN TELECOM

PRACTICE 297-1001-522
ISSUED: 93 02 08
RELEASE: 05.04 STANDARD

DIGITAL SWITCHING SYSTEM

DMS-100* FAMILY

AUTOMATIC BOARD-TO-BOARD TESTING REFERENCE MANUAL

* DMS-100 is a trademark of Northern Telecom

CONTENTS

FIGURES

TABLES

1. INTRODUCTION

GENERAL

1.01 This Practice describes the equipment and procedures necessary to:

* perform Automatic Board-to-Board Testing (ABBT)

* cut over service to new Digital Multiplex Switches (DMS) installed as replacements for various types of switches.

1.02 Before service is transferred (cutover) to a new DMS, subscriber lines are either connected to the distribution frames of both the old and new switches or, in the case of subscriber lines served by SLC-96[1] or DMS-1 Urban carrier systems, the subscriber lines are connected only to the Remote Terminal of the SLC-96 carrier system or the Remote Terminal of the DMS-1 Urban carrier system, respectively.

With the SLC-96 carrier system, a DMS Peripheral Module called Subscriber Module SLC-96 (SMS) links to the DS-1 line between the the RCS and Central Office Terminal (COT) of the old switch. With the DMS-1 Urban system, the DMS-100 switch links to the Control Terminal (CT) of the DMS-1 Urban system through a data link. The Subscriber Module Urban (SMU), the peripheral module that replaces the DMS-1 Urban CT when the RCU is integrated to a DMS switch, is not used.

Notes:

1. The SLC-96 Remote Terminal is called a Remote Concentrator SLC-96 (RCS) in DMS terminology.

2. The DMS-1 Urban Remote Terminal is called a Remote Carrier Urban (RCU) in DMS terminology.

1.03 Switching functions are performed only by the old switch because software that identifies lines to the DMS is in the cutoff state.

1.04 To achieve cutover to the DMS without risking loss of subscriber service due to misconnected lines, the one-to-one correspondence of lines connected to both switches is verified before cutover. This verification, known as a Board-to-Board Test, compares subscribers original Directory Numbers (DN) with the physical locations of corresponding line equipment assigned to those same subscribers in the new DMS.

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[1] SLC is a registered trademark of AT&T Technologies, Inc.

PRACTICE APPLICATION

1.05 The information contained in this Practice is applicable to offices having Batch Change Supplement (BCS) release 25 software and later.

The application of all Northern Telecom Practices (NTP) editions with respect to a given BCS release is given in 297-1001-001.

SOFTWARE IDENTIFICATION

1.06 Software applicable to a specific DMS-100 Family office is identified by a BCS release number and by Northern Telecom (NT) Product Engineering Codes (PEC). The significance of the BCS number and the PEC is described in 297-1001-450 (section III-2) and in the Office Feature Record D-190.

1.07 A display of the BCS number and PEC for the NT feature packages available in a specific office can be obtained by entering the command string:

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DSU;INFORM LIST;LEAVE
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at a Maintenance and Administration Position (MAP).

1.08 Information in this Practice applies only to offices having the following NT feature packages:

NTX057AB Cutover Assistance II (non-resident)

NTX057AC Cutover Assistance I (non-resident)

NTX057AD ABBT Beyond Metallic Range for RLM

NTX057BA Cutover Assistance Automatic Board-to-Board Testing Speed-up

NTX057CA Cutover Assistance I (non-resident)

NTX398AA Subscriber Carrier Module - 100S: Interface to SLC-96 Remote Terminal

NTX387AA Subscriber Carrier Module - 100U: Interface to DMS-1 Urban Remote Terminal

REASON FOR REISSUE

1.09 This Practice has been re-issued to include:

* changes to cutover procedures

* add warning message about individual DMS line testing prior to cutover

COMMAND FORMAT CONVENTIONS

1.10 In this Practice, a uniform system of notation is used to illustrate system commands and responses. It shows the order in which command elements appear, the punctuation, and the options. Where the conventions are not used, an explanation is given in the text.

CAPITAL letters or special characters	show constants, commands, or keywords that the system accepts when entered as written.
lowercase letters	show a user- or system-supplied parameter. Definitions are given for each parameter.
Brackets [ ] or 	enclose optional parameters. A vertical list enclosed in brackets means that one or more of the parameters may be selected.
Underlined parameter	is a default. If no choice is entered, the system acts as though the underlined parameter had been entered.
Underscore connecting words	means the words are to be treated as one item, for example, pm_type or #_one_two.
***	indicates repeated steps or items.

In addition, the following conventions are used.

n (lowercase n)	is a number from 0 to 9.
a (lowercase a)	is a letter from A to Z.
h (lowercase h)	is a hexadecimal integer from 0 to F.

REFERENCES

1.11 References listed as prerequisites are essential for an understanding of this Practice. Those listed as informative contain detailed information concerning other items mentioned in this Practice, but are not essential. References are inserted at the appropriate places in the text.

Note: The documents listed may exist in more than one version. See 297-1001-001 to determine the release code of the version compatible with a specific release of software.

Prerequisite References

DOCUMENT NUMBER	TITLE
297-1001-103	Peripheral Modules
297-1001-110	Maintenance and Administration Position (MAP)
297-1001-120	Equipment Identification
297-1001-516	Trunks Maintenance Reference Manual

Informative References

DOCUMENT NUMBER	TITLE
297-1001-001	Master Index of Practices
297-1001-310	Table Editor Reference Manual
297-1001-451	Common Customer Data Schema
297-1001-500	Index to Switch Maintenance Performance Documents
297-1001-501	Trunk Maintenance Alarm Analysis, Test and Card Replacement
297-1001-509	Command Reference Manual
297-2101-451	Local Customer Data Schema
363-2051-105	DMS1-U Dynamic Control Interface Description, Installation, and Maintenance (also refer to appendix 1 for this NTP)
GFXINDEX	General Feature Description Index of Documents
GS1X67	Terminal and Data Link Contollers
GS2X17	Line Circuit Card Type A
GS2X18	Line Circuit Card Type-B
GS2X46	Metallic Test Access (MTA) Unit
GS2X58	Maintenance Trunk Module, Office Alarm Unit and Remote Service Module
GS2X83	2-Wire, Outgoing, DP or MF, Reverse Battery Trunk Circuit Card
GS6X17	Standard Line Circuit Type A with Cutover

2. STEPS IN ABBT AND CUTOVER

2.01 Paragraphs in this part of the Practice describe the general sequence of steps in the ABBT and cutover process. In each paragraph, references are provided to the following items:

* procedures for performing the step described

* a detailed description of each step.

2.02 Three methods for ABBT exist. The first is used on subscriber lines served by a SLC-96 carrier system Remote Terminal (RCS). The second method is used on subscriber lines served by a DMS-1 Urban system Remote Terminal (RCU). The third method (referred to as the original ABBT method in this document) is used on all other lines.

2.03 The ABBT for RCS and RCU subscriber lines and the original ABBT method are similar and use many of the same resources. A major difference between ABBT for RCS subscriber lines arises because a metallic test pair from the new DMS switch to the RCS is an optional feature. A metallic test pair, used in new offices for the original ABBT method, may not always be available for performing ABBT on RCS subscriber lines.

2.04 Even if a metallic test pair were available for testing RCS subscriber lines, using it would require the new DMS switch to communicate with the RCS over this metallic test pair. The RCS would then be open to receiving commands from two switches (old and new), and this could disrupt service.

2.05 ABBT on RCU subscriber lines uses the Metallic Test Access (MTA) in a unique way. During ABBT on a subscriber line, the MTA is connected to the line through an MTA card in the CT or Line Test Access (LTA) cards in the CT and RCU. The DMS-100 switch accesses information on the physical location of the line to which the MTA connects by collecting the information over a data link. The DMS switch compares the collected information with its own physical location records for the DN/LEN under test and so verifies the line.

2.06 To execute ABBT by any method a NT5X73 Test Unit and special test equipment are connected to both the old and the new switches. Once installed, ABBT equipment is verified to ensure it is operating correctly.

* See Setting up ABBT Equipment on page 100 for setup procedures.

* Refer to Verifying the Set-Up on page 147 for test equipment verification procedures.

THE ORIGINAL ABBT METHOD

2.07 For the original ABBT method, precautions must be taken to ensure that Tip (T) and Ring (R) leads to Line Circuits (LC) involved in an Automatic Board-to-Board Test remain disconnected while ABBT is being performed. This disconnection is achieved using non-resident LMCUT software to open contacts of Cutoff (CO) relays on LC. Ground straps are then installed to ensure that these CO relay contacts remain open.

* See Operating Principle of Cutoff Relays on page 15 for a description of of CO relays.

* Refer to LMCUT Software on page 16 for a description of the LMCUT non-resident software.

* See Pre-Cutover Procedures on page 94 for procedures used for operating CO relays with LMCUT software.

2.08 Once ABBT equipment is installed and verified, and the disconnection of Tip (T) and Ring (R) leads on LC is ensured, non-resident ABBT software is loaded into the DMS and ABBT tests are run.

2.09 When ABBT has been completed using the original method and all connection problems have been corrected, ground straps installed to ensure disconnection of Tip and Ring leads are removed. The DMS software is then activated. Tip and Ring leads to the old office are cut and commands are input to close contacts of CO relays on LC of the new DMS under software control.

ABBT WITH RCS SUBSCRIBER LINES

2.10 For the ABBT method with RCS subscriber lines, the SMS is set up to scan for signaling and messaging bits on the DS-1 link between the RCS and COT.

2.11 The COT has a Line Interface Unit (LIU), which is the functional equivalent of a Central Office Repeater. However, no acceptable way exists for bridging onto the PCM signal at the COT with a Bridging Repeater.

Note: Using a Bridging Repeater during ABBT is recommended; this ensures that in all cases ABBT will be executed correctly. A non-powering LIU (WN3) is used. In some cases, ABBT can be performed without using Bridging Repeaters, but exact specifications need to be determined. Therefore, prior to executing the ABBT, the COT must be reconfigured using external Central Office Repeaters and a Digital Signal Crossconnect (DSX). By doing so, the DSX provides a monitoring jack where the transmitted PCM signal from the COT to the RCS can be patched to the input of a Bridging Repeater, regenerated, and applied to the appropriate port of the SMS (the SMS ports also appear at the DSX). A mini-

mum of five bridging repeaters are needed for a mode I RCS and three bridging repeaters for a mode II RCS.

2.12 The RCS must be manually busy to the new DMS switch but in-service to the old switch. If the new DMS switch detects an in-service RCS, it marks that RCS as not requiring ABBT, particularly since the ABBT could interfere with call processing.

2.13 Though a Metallic Test Access (MTA) is not used from the new DMS, an entry for the RCS to be tested should be datafilled in the Metallic Test Access Line Module Assignment (MTALME) Table. When more than one RCS module shares a MTA vertical (up to ten RCS modules can share a vertical, provided the modules have the same site and frame designations), one RCS is designated the MTAOWNER. This MTAOWNER is the first RCS datafilled in the RCSINV Table. The MTAOWNER is also datafilled in the MTALME table. This is the only entry in the MTALME Table needed for a group of RCS modules sharing the same MTA vertical. For more information on the RCSINV Table, refer to 297-2101-451, section 144; for more information on the MTALME Table, refer to 297-2101-451, section 105.

2.14 The MTALME Table must be datafilled to reflect the configuration of RCS modules and metallic bypass pairs as they exist in the old switch. After the ABBT is executed, if a MTA is not required for new switch operation, the entry in the MTALME Table can be deleted.

2.15 An entry in the MTALME Table is used within ABBT software for RCS lines to reduce the time required to indicate that a particular RCS is undergoing ABBT. If the MTA is marked busy for an RCS, an ABBT cannot run on other RCS modules sharing the same MTA until the ABBT finished on the first RCS.

Note: Due to changes to the MTA structure for BCS24 and higher, the MTALME table has been replaced with MTAVERT. MTALME is datafilled only for pre-BCS24 offices. For BCS24 and higher, use table MTAVERT. For more information, refer to 297-2101-451.

2.16 For BCS24 and higher, though the MTA functionality as it applies to the ABBT remains the same as before, the table names and the structure of MTA has changed. The essential difference is that the column and row structure of the pre-BCS24 MTA has been replaced with a matrix of verticals and horizontals.

2.17 In the pre-BCS24 MTA, depending on the type of minibar driver used, a column consists of 4, 8, or 20 verticals and a row consists of 8 horizontals. A column and a row form an MTA minibar (MTAM) in which the verticals and the horizontals make the crosspoints. In this arrangement, different types of MTAM drivers (of different sizes) cannot be used in the same column. But for BCS24 and higher, the matrix structure of the MTA does away with the column and row restrictions, thus allowing the

use of different types of MTAM drivers anywhere in the matrix. The changes to the MTA structure are as follows:

* the column and row structure has been replaced with the vertical and horizontal structure

* the tables MTALME and MTATRK have been replaced with MTAVERT and MTAHORIZ respectively

For more information on the tables, refer to 297-1001-451

ABBT WITH RCU SUBSCRIBER LINES

2.18 For the ABBT with RCU subscriber lines, the DMS switch is set up to communicate with the CT of the DMS-1 Urban carrier system over a data link called a Dynamic Control Interface (DCI). The DMS switch exchanges messages with the CT over the data link using an Auto Dial Terminal Controller (ADTC, NT1X67BD) and also accesses commands the DMS-1 Urban carrier system processes. The ADTC supports up to four data links and communicates with the DMS switch through an Input/Output Controller and Central Message Controller. Central Control of the DMS switch exchanges messages with the ADTC over an IOC parallel bus.

2.19 The CT must have a DCI card (NT3A41AB) and SPR14 firmware in the CP card-daughter board. The RCU must also have SPR14 firmware.

2.20 During the ABBT, a metallic test path is connected to the DN or LEN being tested. Metallic access uses either an LTA card (NT3A59 in the CT and NT3A60 in the RCU) or MTA card (NT3A44 in the CT), with the Test Trunk accessing the DMS-1 Urban carrier system through these cards.

2.21 An MTA vertical must be datafilled in Table MTAVERT for a subscriber line off an RCU to be tested with ABBT software. The MTA vertical is seized when a line is tested. This ensures that only one line is tested at a time on an RCU or on a group of RCU modules that share a vertical.

2.22 As with the original ABBT method, once ABBT equipment is installed and verified, non-resident ABBT software is loaded into the DMS, and the ABBT is run.

* See Description of Board-to-Board Test Methods on page 37 for descriptions of Board-to-Board tests for all methods.

* Refer to Test Capabilities on page 44 for ABBT capabilities and to Test Limitations on page 46 for ABBT design limits.

* Procedures for loading, running, and unloading ABBT software are given in Performing ABBT on page 153.

2.23 After ABBT has passed successfully for RCS lines, different cutover procedures exist, depending on how the operating company has configured the equipment for the ABBT. Figure 38 on page 167 shows the equipment configuration for cutover of RCS lines when a Bridging Repeater is used.

2.24 After successful ABBT, the Bridging Repeater is removed. Patch cords connecting the COT and Office Repeater are removed at the DSX, which automatically activates on/off contacts for jumper cables extending from the Office Repeater to the SMS.

2.25 After ABBT has passed successfully for RCU lines, the lines are ready for cutover to the DMS switch or to the SMU. Refer to Figure 40 on page 169 and Figure 41 on page 170 to see an example of equipment configuration used for cutover of RCU lines.

* Refer to Part 5 on page 92 for a description of cutover for the original ABBT method. Refer to Cutover for the ABBT Method With RCS Lines on page 93 for a description of cutover for the ABBT method with RCS lines. Refer to Cutover for the ABBT Method With RCU Lines on page 93 for a description of cutover for the ABBT method with RCU lines.

* Refer to Cutover Procedure for Original ABBT on page 162 for instructions on cutting over service to the new DMS after ABBT is completed for the original test method. Refer to Cutover Procedure for ABBT With RCS Lines on page 162 for instructions on cutting over service to the new DMS after ABBT is completed for the ABBT method used when transferring service from subscriber lines supported by an RCS to a DMS switch. Refer to Cutover Procedure for ABBT With RCU Lines on page 162 for instructions on transferring service to a DMS switch from subscriber lines supported by and RCU.

3. PRE-CUTOVER DESCRIPTION

3.01 This Part of the Practice applies only to the original ABBT method. It describes the operating principles of the CO relays, the LMCUT software, and the Man-Machine Interface (MMI) for the LMCUT software.

OPERATING PRINCIPLE OF CUTOFF RELAYS

3.02 Before transfer of service to the new office, subscriber lines appear at both the old and new offices. However, Tip and Ring leads to each LC in the new DMS office are disconnected. This disconnection is achieved by keeping the CO relay on each LC in the operated condition.

3.03 Individual CO relays can be operated or released by means of non-resident LMCUT software initialized and controlled at a MAP of the DMS. See 297-1001-110 for a description of the MAP.

3.04 Once operated, CO relays may be kept in the operated condition by connecting a common cutover circuit in each Line Drawer (LD) to ground. This ground connection may be made by operating the HOLD relay in each LD with LMCUT software commands or by bridging HOLD relay contacts with a strap (jumper).

3.05 When the common cutover circuit is connected to ground by installation of a strap or by operating the HOLD relay, sufficient current flows through the CO relay coil to energize the relay but not enough to operate it. When the CO relay is tripped by an LMCUT command, the energizing current provided through the ground connection is sufficient to prevent release of the relay. Release of the CO relay can then only be achieved by input of a countermanding LMCUT command and removal of the ground strap (if installed).

3.06 If the CO relays are to remain operated for an extended period, or if more than 32 relays are to be kept in the operated condition at one time any Line Drawer, a strap must be installed on the Line Drawer for greater reliability. The installation of a strap ensures that all CO relays in a LD remain in the operated state until one of the following occurs:

* the strap is removed

* power to the LD is cut off

* the LC is removed then re-inserted.

Should one of these situations occur before ABBT is complete, contacts of the CO relays affected must be reoperated immediately with LMCUT software commands to disconnect T and R leads from subscriber lines.

WARNING

The process of removing and re-inserting line cards in order to test individual line features prior to cutover is unreliable and could be potentially disruptive. To test individual lines, the cutoff relays on all lines in the associated drawer, except the required line, should be activated using the LMCUT command OPRTCO, and then the ground strap on the drawer common cutover circuit removed.

3.07 The type of strap used and the installation method for the strap depends on the type of LD. Installation of straps on various types of LD is described in Pre-Cutover Procedures on page 94.

3.08 In DMS offices equipped with NT2X05AA power converters where more than 350 CO relays are to be operated at one time, NT4X99AA Diode Fixtures should be installed to prevent the release of CO relays in the event of power converter failure. Installation of diode fixtures is described in Pre-Cutover Procedures on page 94. Installation of diode fixtures is not required in offices equipped with NT2X05AB converters.

LMCUT SOFTWARE

3.09 The LMCUT software is a non-resident program on magnetic tape which must be loaded into the DMS before it can be used. Once LMCUT is loaded, access is provided to a repertoire of commands which control the operation of the HOLD and CO relays. LMCUT software commands also provide a means of testing the voltages present at the T and R leads of the LC. Responses to LMCUT commands are in the Command Interpreter Prompter (CI) format described in 297-1001-509. For all commands, lines which are unequipped or unused (in system data tables) are skipped by the LMCUT program. Commands available in the LMCUT program are described below.

CUTOFF	frame unit [drawer]

operates then releases CO relays in the specified frame, unit and drawer (See Note 1).

Where:

frame functional reference number of the frame containing the lines to be cut off (See Note 2).

Range: 0 through 99

unit unit number (See Note 2).

Range: 0 through 9

drawer drawer number (in LM) or line subgroup (in LCM) (See note 2).

Range: 0 through 19

Notes:

1. If a strap has been installed in the LD or if the HOLD relay has been operated with an OPRTHOLD command, CO relays operated with the CUTOFF command remain in the operated condition until one of the following occurs:

   * power is removed from the LD

   * the LD is withdrawn from the shelf into which it fits

   * the strap bridging the HOLD relay is removed (if installed), the HOLD relay is released by input of an appropriate RLSHOLD command, and an appropriate RLSCO command is input.

2. See 297-1001-120 for a description of DMS-100 Family Equipment Labeling, Numbering and Referencing Scheme.

Responses:

OPERATION IS SUCCESSFUL IN SPECIFIED DRAWER

Explanation: Cutoff relays on specified LC were successfully operated and released.

WARNING: CUTOFF INEFFECTIVE. HOLD RELAY MUST BE OPERATED.

Explanation: The HOLD relay for the LD is not in the operated condition. The CO relays in the specified LD have therefore not latched into the operated state. Tip and Ring leads of the LC are still connected directly to subscriber lines.

User Action: Operate the HOLD relay in the LD with the OPRTHOLD command. Install a jumper as described in the Pre-Cutover Procedures on page 94 if the HOLD relay is to be held in the operated state for an extended period. Input the CUTOFF command again.

CUTOVER	frame unit [drawer]

releases the HOLD and CO relays in the specified frame, unit, and drawer

Where:

frame functional reference number of the frame to be cutover.

Range: 0 through 99

unit functional reference number of the bay (on LM) or module (on LCM) to be cutover.

Range: 0 through 9

drawer drawer number (in LM) or line subgroup (in LCM) (See note 2) to be cutover.

Range: 0 through 19

Notes:

1. See 297-1001-120 for an explanation of the DMS-100 Family Equipment Labeling, Numbering and Referencing Scheme.

2. Each LD in a LCM contains two subgroups of Line Circuits: an even-numbered primary subgroup and an odd-numbered secondary subgroup. There is, however, only one HOLD relay per LD. This HOLD relay is associated only with the primary subgroup which is always even-numbered. Therefore, in LCM, an even-numbered subgroup must be specified for the 'drawer' parameter.

LMCUT	

starts the LMCUT program once LMCUT non-resident software is loaded as described in Pre-Cutover Procedures on page 94.

NOBTST	frame unit [drawer] [circuit....]

verifies that CO relays on specified LC are operated. Tests for potential difference at the T and R leads of specified LC.

Where:

frame functional reference number of the frame containing the lines affected (See note).

Range: 0 through 99

unit unit number (See note).

Range: 0 through 9

drawer drawer number (in LM) or line subgroup number (in LCM) (See note).

Range: 0 through 19

circuit LC functional reference number (See note). More than one LC may be specified.

Range: 0 through 31

Note: See 297-1001-120 for details of the DMS Family Equipment Labeling, Numbering and Referencing Scheme.

Responses:

MODULE			DRWRNO	LINENO	STATUS	RINGVOLTS	TIPVOLTS
site	frame	unit	drwrno	lineno	status	V	V
	*		*	*	*	*	*
	*		*	*	*	*	*
	*		*	*	*	*	*

Where:

site location of frame containing the LC being tested.

Values: HOST, RLM or RSM

frame functional reference number of the frame containing the LC being tested.

Range: 0 through 99

unit bay functional reference number (in LM) or Module number (in LCM).

Range: 0 through 9

drawrno functional reference number of the LD (in LM) or line subgroup (in LCM) which contains the LC being tested.

Range: 0 through 19

lineno functional reference number of the LC being tested.

Range: 0 through 31

status status of the LC being tested.

Values: OK, FAIL or NEQ (not equipped)

V Voltage present at Tip or Ring leads. Voltage is displayed to the nearest 2 volts

QUIT	

ends the LMCUT program.

RLSCO	frame unit [drawer] [circuit...]

releases the CO relay in each LC specified. If the HOLD relay in the LD containing the specified LC is operated by means of a command or if a ground strap is installed, CO relays in the specified LC will not release.

Where:

frame functional reference number of frame containing CO to be released (See note).

Range: 0 through 99

unit functional reference number of the bay (in LM) or module (in LCM) containing the CO relay(s) to be released.

Range: 0 through 9

drawer functional reference number of the drawer (in LM) or line subgroup (in LCM) containing the CO relay(s) to be released.

Range: 0 through 19

circuit... functional reference number of the circuit whose LC relay is to be released. More than one circuit may be specified.

Range: 0 through 31

Note: See 297-1001-120 for a description of the DMS-100 Family Equipment Labeling, Numbering and Referencing Scheme.

Responses:

CANNOT RLSCO: HOLD RELAY OPERATED ON DRAWER

Explanation: The HOLD relay in the LD containing the specified LC has been operated by means of an OPRTHOLD command. The CO relay on the specified LC cannot therefore release.

User Action: Check that no ground strap is installed on the LD containing the specified LC. Input an appropriate RLSHOLD command to release the HOLD relay, then input the RLSCO command again.

OPRTHOLD	frame unit [drawer]

operates the hold relay for a specified drawer. If 'drawer' is not specified all HOLD relays in the specified, unit are operated.

Where:

frame LM, LCM, or RLM frame number (See note 1).

Range: 0 through 99

unit functional reference number of the bay (in LM) or module (in LCM) containing the HOLD relay to be operated.

Range: 0 through 9

drawer functional reference number of the drawer containing the HOLD relay to be operated (See note 1 and note 2).

Range: 0 to 19

Notes:

1. See 297-1001-120 for an explanation of the DMS-100 Family Labeling, Referencing, and Numbering Scheme.

2. Each LD in a LCM contains two line subgroups. There is, however, only one HOLD relay per LD. The HOLD relay is associated with the primary subgroup which is always even-numbered in LCM. The drawer specified for LCM must always therefore be even-numbered.

Responses:

WARNING: THIS COMMAND MAY CAUSE SOME LINES IN SPECIFIED DRAWER(S) TO BE CUTOFF.
Please confirm ("Yes or No")

Explanation: Once operated by an OPRTHOLD command, CO relays in the specified LD are energized but not operated. If a CUTOFF or OPRTCO command affecting LC in the specified LD is input, the CO relays will remain in the operated state even if a RLSCO command is input. The user is asked to confirm or abort the command.

User Action: The user inputs YES to execute the command or NO to abort it.

OPERATION SUCCESSFUL IN SPECIFIED DRAWER(S)

Explanation: The HOLD relays in specified frame, unit (and drawer) are operated.

FAILED TO OPERATE HOLD RELAY IN DRAWER (n)

Explanation: n is the number of a drawer in which a HOLD relay did not operate.

User Action: Verify that the drawer is fully inserted into the shelf in which it fits and that power for the LD is switched on. Input the command again. If the same response appears, contact your Maintenance Support Group.

OPRTCO	frame unit drawer[circuit...]

operates the CO relay in each specified LC (See note 1 and 2)

CAUTION

Do not use the OPERTCO command to operate more than CO relays on more than 32 Line Cards in one unit of a Line Concentrating Module at one time. Otherwise, power circuits may become overloaded.

Where:

frame functional reference number of the frame. (See note 3).

Range: 0 through to 99

unit functional reference number of the bay (in LM) or module (in LCM) containing the CO relay(s) to be operated.

Range: 0 through 9

drawer functional reference number of the LD (in LM) or line subgroup (in LCM) containing the CO relays to be operated.

Range: 0 through 19

circuit functional reference number of the LC whose relay is to be operated (See note 4).

Range: 0 through 31

Notes:

1. The OPRTCO command should only be used for brief periods and only when it is necessary to cut off selected lines within a LD where neither ground strap is installed nor HOLD relay is operated

2. To minimize current draw, no more than 32 CO relays must be operated in one unit of an LCM at a time with the OPERTCO command. It is recommended that the HOLD relay for the LD be operated instead by means of an OPRTHOLD command or by installation of a ground strap.

3. Refer to 297-1001-120 for a description of DMS-100 Family Equipment, Labeling, Numbering and Referencing.

4. More than one LC may be specified.

QHOLD	

lists LD in which HOLD relays are operated.

Responses:

SITE	MODULE		DRAWER	HELD
<site>	<frame>	<unit>	<drawer>	<yes or no>
	*	*	*	*
	*	*	*	*
	*	*	*	*

Where:

<site> location of LD.

Values: HOST, RLM or RSM

<frame> frame functional reference (See note 1).

Range: 0 through 99

<unit> functional reference number of the bay (in LM) or module (in LCM) containing the HOLD relay.

Range: 0 through 9

<drawer> functional reference number of the drawer containing the HOLD relay in the LD is operated.

Range: 0 through 19 (See note 2).

<yesorno> indicates whether or not the HOLD relay in the LD is operated

Values: YES or NO

Notes:

1. See 297-1001-120 for a description of DMS-100 Family Equipment Labeling, Numbering and Referencing.

2. Each LD in a LCM contains two line subgroups. There is, however, only one HOLD relay in a LD. This HOLD relay is always associated with the primary subgroup which is even-numbered. Therefore, drawer numbers displayed in response to the QHOLD command are always even numbered.

RLSHOLD	frame unit [drawer]

releases the HOLD relay in the specified drawer. If drawer is not specified, all HOLD relays of LD in the specified unit are released (See note 1).

Where:

frame functional reference number of the frame containing the HOLD relay to be released (See note 2).

Range: 0 through 99

unit functional reference number of the bay (in LM) or the module (in LCM) containing the HOLD relay to be operated.

Range: 0 through 9

drawer drawer number (in LM) or line subgroup number (in LCM) (See note 3).

Range: 0 through 19

Notes:

1. If ground straps are installed, the the HOLD relay in the specified LD will release but CO relays of all LC will remain operated.

2. See 297-1001-120 for an explanation of the DMS-100 Family Equipment Labeling, Numbering and Referencing Scheme.

3. Each LD in a LCM contains two line subgroups. There is, however, only one HOLD relay per LD. This HOLD relay is associated with the primary subgroup which is always even-numbered

in LCM. Therefore, the drawer specified for LCM must always be an even number.

Responses:

OPERATION SUCCESSFUL IN SPECIFIED DRAWER(S)
WARNING: STRAPS ASSUMED TO BE OFF

Explanation: HOLD relays in the specified LD are released. The LMCUT software is unable to verify that ground straps have been removed. If ground straps are not removed, CO relays will not release on LC in the specified drawer.

FAILED TO RELEASE HOLD RELAY IN DRAWER n

Explanation: n is the number of a LD in which the HOLD relay did not release.

User Action: Input the command again. If the same response appears, contact your Maintenance Support Group.

4. DESCRIPTION OF AUTOMATIC BOARD-TO BOARD TESTING

4.01 This Part of the Practice describes the following items:

* the general arrangement and types of equipment used for ABBT
* the sequence of events involved in board-to board testing of one subscriber line
* ABBT capabilities
* design limits of ABBT
* ABBT non-resident software. This includes descriptions of commands, parameters, and system responses associated with ABBT.

GENERAL ARRANGEMENT OF TEST EQUIPMENT

4.02 The original ABBT uses the general arrangement of test equipment shown in Figure 1 on page 33. The ABBT method for RCS subscriber lines uses the test equipment shown in Figure 2 on page 34. The ABBT method for RCU subscriber lines uses the test equipment shown in Figure 3 on page 35. ABBT equipment is described in the following lists. The first list describes equipment used with the original ABBT method. The second list describes equipment used with the ABBT method for RCS subscriber lines. The third list describes equipment used with the ABBT method for RCU subscriber lines.

ABBT Equipment for the Original Test Method

LM, LCM OR RLM of DMS-100	Line Module, Line Concentrating Module or Remote Line Module of DMS-100 switch. See 297-1001-103 for a description of LM, LCM and RLM.
LINE CIRCUIT(LC)	Line Circuit card associated with a subscriber line to be tested. ABBT may be performed with three types of LC: NT2X17, NT2X18 and NT6X17. See GS2X17, GS2X18 or GS6X17 respectively for a description of the LC.
OG TRUNK CIRCUIT	one of two Outgoing (OG) Dial Pulse (DP) or Multifrequency (MF) trunk circuits on a NT2X83AA card. See GS2X83 for a description of the OG trunk card.

SCAN POINTS	five scan points on a NT0X10 card of the DMS.
SD POINTS	ten Signal Distribution (SD) points on a NT2X57 card, located in a Maintenance Trunk Module (MTM) of the DMS. See GS2X57 for a descriptions of the SD card and GS2X58 for a description of the MTM.
MTA UNIT	NT2X46 Metallic Test Access Unit (MTA) of the DMS. See GS2X46 for a description of the Metallic Test Access Unit.
OLD DF	Distribution Frame (DF) of the old office.
NEW DF	DF of the DMS.
NT5X73AB Test Unit	Board-to-Board test unit.
VARIABLE BATTERY	Variable voltage dc power supply.
IDF	Intermediate Distribution Frame (IDF).
INCOMING TEST ACCESS TO OLD OFFICE	device capable of connecting signals from the DMS to the old office via a test trunk.
CABLES A, B, C and D	Set of five interconnection cables TUDF01 through TUDF05 supplied with the NT5X73AB ABBT Test Unit.
OLD OFFICE	The office being replaced by then new DMS.

ABBT Equipment for the RCS Test Method

SMS	Subscriber Module SLC-96 of the DMS switch. Refer to 297-1001-103 and to GFXINDEX for a description of the SMS. The GFXINDEX contains a list of General Feature Descriptions based on feature package numbers. The feature package for SMS is NTX398AA.
OG TRUNK CIRCUIT	One of two Outgoing (OG) Dial Pulse (DP) or Multifrequency

	(MF) trunk circuits on a NT2X83AA card. See GS2X83 for a description of the OG trunk card.
SCAN POINTS	Five scan points on a NT0X10 card of the DMS.
SD POINTS	Thirteen Signal Distribution (SD) points on a NT2X57 card, located in a Maintenance Trunk Module (MTM) of the DMS. See GS2X57 for a description of the SD card and GS2X58 for a description of the MTM.
MTA UNIT	NT2X46 Metallic Test Access Unit (MTA) of the DMS. See GS2X46 for a description of the Metallic Test Access Unit.
OLD DF	Distribution Frame (DF) of the old office.
NEW DF	DF of the DMS.
NT5X73AB Test Unit	Modified NT5X73AB Board-to-Board test unit. This test unit is modified according to a specific Engineering Sketch and may be designated NT5X73AC at a later date.
VARIABLE BATTERY	Variable voltage dc power supply.
IDF	Intermediate Distribution Frame (IDF).
INCOMING TEST ACCESS TO OLD OFFICE	Device capable of connecting signals from the DMS to the old office via a test trunk.
CABLES A, B, C and D	Set of five interconnection cables TUDF01 through TUDF05 supplied with the modified NT5X73AB ABBT Test Unit. Cable A is not used.
OLD OFFICE	The office being replaced by the new DMS.
Bridging Repeater	Repeater that regenerates the PCM signal, traveling from the COT to the RCS on the DS-1

line, and applies it to the appropriate SMS port.

ABBT Equipment for the RCU Test Method

DCI Card — Dynamic Control Interface card (NT3A41AB) located on the DMS-1 Urban CT that communicates over a data link with the DMS switch. The CT and RCU must have the SPR14 version of firmware.

ADTC — Auto Dial Terminal Controller (NT1X67BD). The DMS switch uses the ADTC to communicate over the data link with the CT. The data link uses an RS232-C full duplex standard interface.

The ADTC communicates with the DMS switch through an Input/Output Controller and Central Message Controller. The CC in the DMS switch and the ADTC exchange messages over an IOC parallel bus.

OG TRUNK CIRCUIT — One of two Outgoing (OG) Dial Pulse (DP) or Multifrequency (MF) trunk circuits on a NT2X83AA card. See GS2X83 for a description of the OG trunk card.

SCAN POINTS — Six scan points on a NT0X10 card of the DMS.

SD POINTS — Thirteen Signal Distribution (SD) points on a NT2X57 card, located in a Maintenance Trunk Module (MTM) of the DMS. See GS2X57 for a description of the SD card and GS2X58 for a description of the MTM.

MTA UNIT — NT2X46 Metallic Test Access Unit (MTA) of the DMS. See GS2X46 for a description of the Metallic Test Access Unit.

OLD DF — Distribution Frame (DF) of the old office.

NEW DF	DF of the DMS.
NT5X73AB Test Unit	Modified NT5X73AB Board-to-Board test unit. This test unit is modified according to engineering sketch 10233-RTP issue 4. This sketch provides the ABBT unit with the capability to put a +116 V dc signal on the tip of the Test Trunk, and to put either ground or open on the ring. The signal initiates setup of the metallic test path to the subscriber line. The switch also provides the ABBT unit with the capability to recognize when the Pair Gain Test Controller, a testing device that executes automatic transmission and signaling tests on line card circuits, has grounded the tip of the Test Trunk.
MTA Card	Metallic Test Access card. Common equipment card in the CT used for metallic test access to a subscriber.
LTA card	Line Test Access card. Common equipment card in the CT and in the RCU that is used for metallic test access to a subscriber. The LTA card can be used with a Pair Gain Test Controller for end-to-end testing of line circuits.
VARIABLE BATTERY	Variable voltage dc power supply.
IDF	Intermediate Distribution Frame (IDF).
INCOMING TEST ACCESS TO OLD OFFICE	Device capable of connecting signals from the DMS to the old office via a test trunk.
CABLES A, B, C and D	Set of five interconnection cables TUDF01 through TUDF05 supplied with the modified NT5X73AB ABBT Test Unit. Cable A is not used.

OLD OFFICE	The office being replaced by the new DMS.

4.03 The central item of ABBT equipment is the NT5X73AB ABBT Test Unit (modified for ABBT with RCS and RCU subscriber lines). The ABBT Test Unit is a portable test set supplied with a set of five cables: TUDF01 through TUDF05. Each cable is fitted with cable connectors at the Test Unit end and wire-wrap connections at the DF end. Keys and lamps on the front panel of the NT5X73AB ABBT Test Unit are used to monitor the functions of the Unit. The functions of these keys and lamps are given in Table A on page 36. Their location on the front panel of the unit is shown in Figure 4 on page 38.

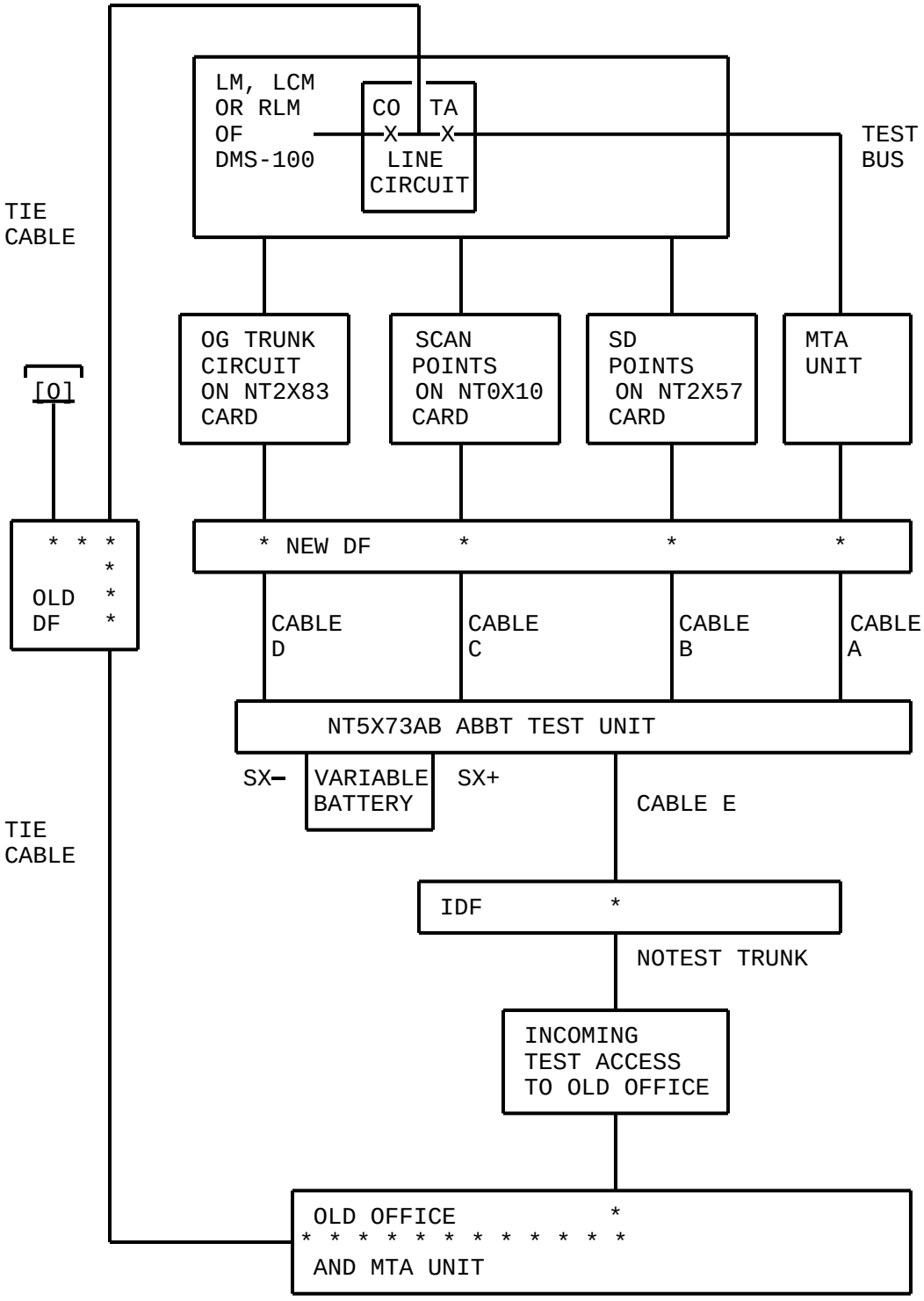


Fig. 1 - General Test Equipment Arrangement for ABBT

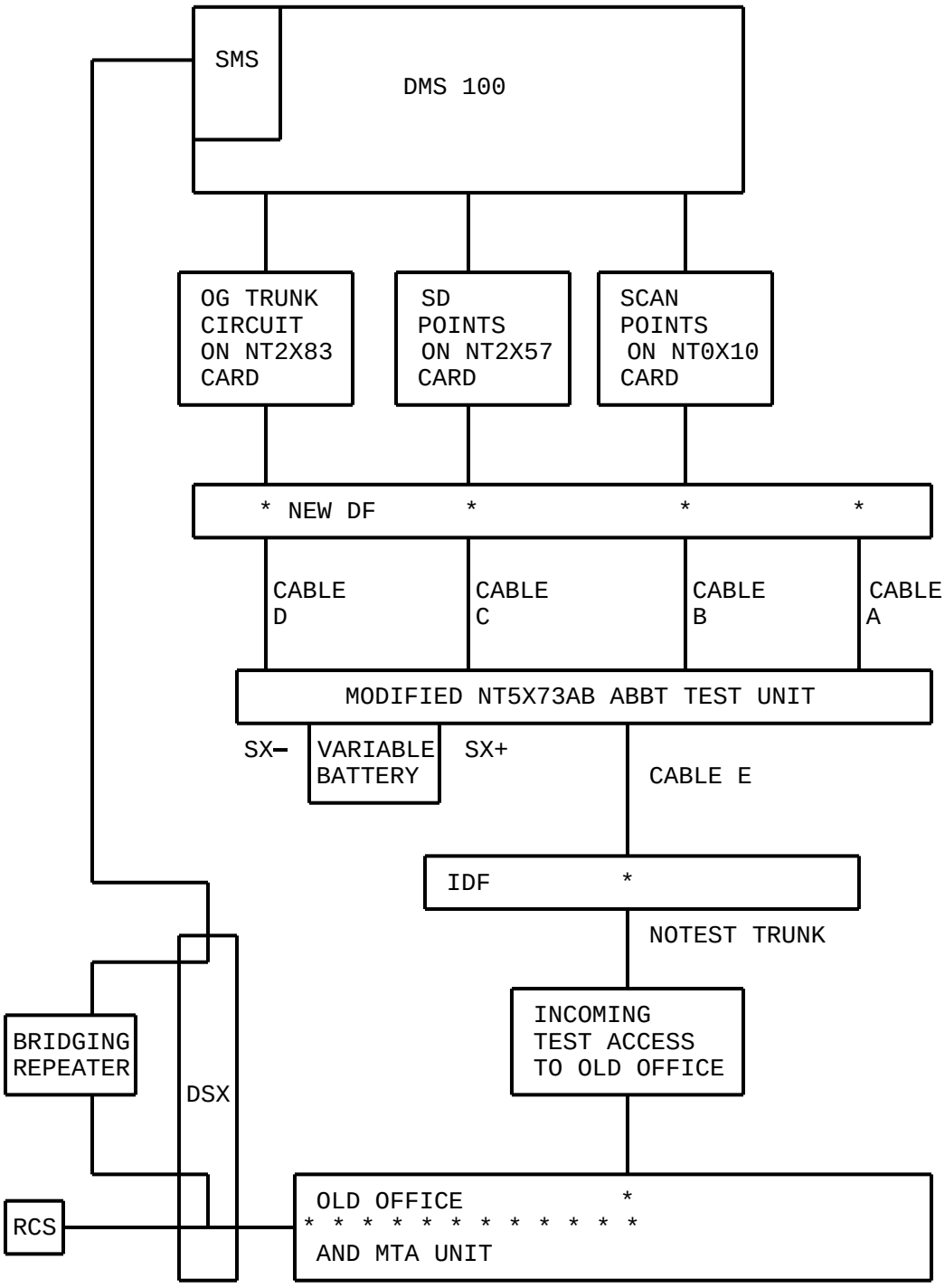


Fig. 2 - Test Equipment Arrangement for ABBT (RCS)

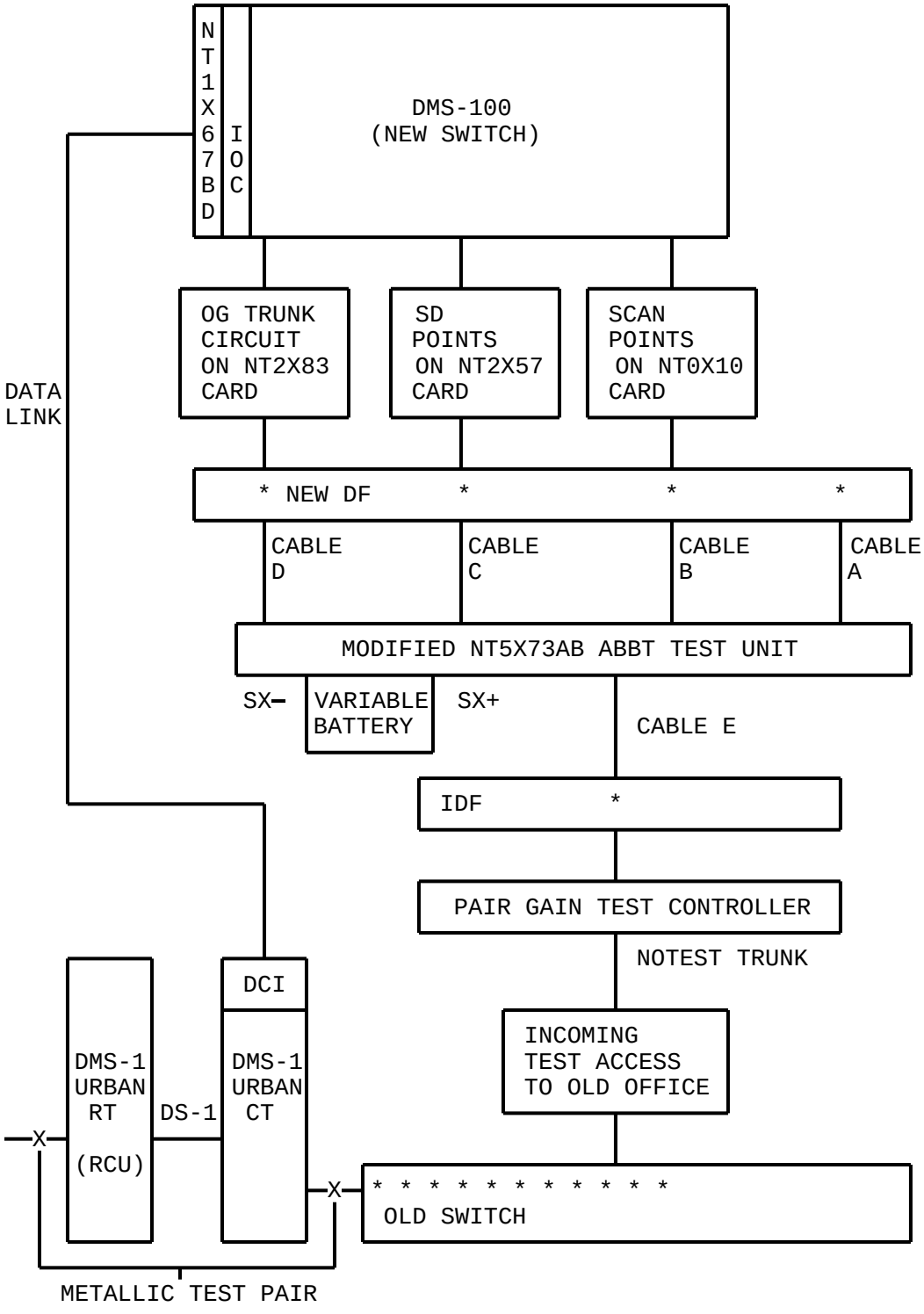


Fig. 3 - Test Equipment Arrangement for ABBT With LTA (RCU)

TABLE A
FUNCTION OF KEYS AND LAMPS ON THE NT5X73AB ABBT TEST UNIT

KEY OR LAMP DESIGNATION	TYPE	FUNCTION WHEN KEY IS OPERATED
PWR (Key)	Locking	Connects -48 V battery and ground leads to the ABBT NT5X73 Test Unit and lights the POWER lamp.
OT, OR, NT, NR		For normal circuit operation, lamps OT, OR, NT and NR light and extinguish in step with the operation of the associated relays in the NT5X73AB Test Unit. Failure of a lamp to light indicates a component failure or a wiring error. The faulty condition must be corrected before further tests are carried out.
REV (Key)	Locking	Reverses the T and R connections from the old office. If the REV key is not operated where required, a series of trouble-idle faults or a major fault such as the halt of the test due to failure to connect may occur.
STOP	Locking	Interrupts the test sequence and lights the STOP lamp. Testing can be resumed by releasing the STOP key and entering the appropriate command from a DMS-100 MAP.
SXS (Key)	Locking	Transfers lines from a SXS switch to a DMS-100 switch. Lights the SXS lamp. Modifies the OG Trunk sleeve conditioning circuitry for signaling toward a SXS switch.

Table Continued

TABLE A (Continued)
FUNCTION OF KEYS AND LAMPS ON THE NT5X73AB ABBT TEST UNIT

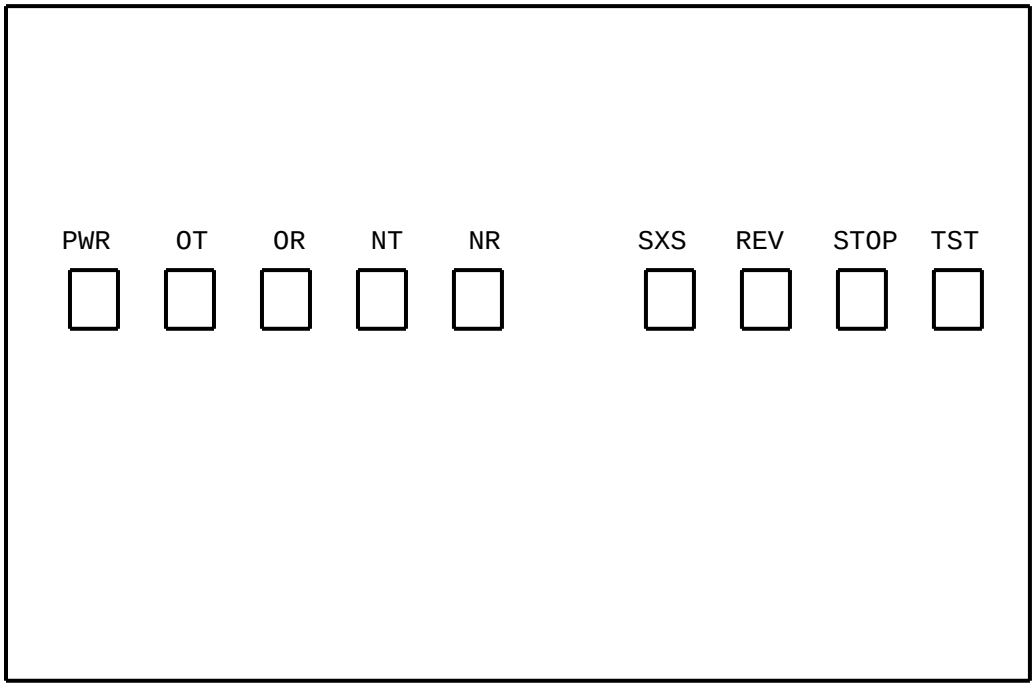
KEY OR LAMP DESIGNATION	TYPE	FUNCTION WHEN KEY IS OPERATED
TST (Key)		Verifies: * diodes D1, D2, D3, and D4. * The operation of relays NR, NT, OR, and OT. * the wiring associated with the diodes and relays. CAUTION: The TST key must not be operated while testing is in progress. Operating the TST key in this case stops the test and lights the STOP lamp.This may place the DMS-100 scan points in an undefined state causing the test sequence to be disrupted. If this action occurs, the test must be reinitiated from a DMS-100 Map.

4.04 In offices equipped with NT feature package NTX057BA, Board-to-Board Speedup, up to eight (0 through 7) ABBT Test Units may be set up for running a maximum of eight simultaneous board-to-board tests. The general arrangement of test equipment for performing multiple board-to-board tests is shown in Figure 5 on page 39. Connections are similar to those used for performing ABBT with one ABBT Test Unit. However, a different pair of MTA crosspoints must be used for each ABBT unit and sufficient hardware must be provided (SCAN cards, SD cards, test access circuits, cables) to support the number of ABBT Test Units being setup.

DESCRIPTION OF BOARD-TO-BOARD TEST METHODS

4.05 Board-to-Board testing is performed using an ABBT program on tape which must be loaded into the DMS from a Magnetic Tape Drive (MTD) located in an Input Output Frame of the DMS. Once loaded, the program is initiated and controlled at a MAP connected to the DMS (See 297-1001-110).

4.06 This practice contains three descriptions of ABBT: one for the original test method, one for RCS subscriber lines, and one for RCU subscriber lines.



KEYS: PWR, SXS, REV, STOP, TST

LAMPS: OT, OR, NT, NR

Fig. 4 - NT5X73AB Test Unit, Location of Controls and Indicators

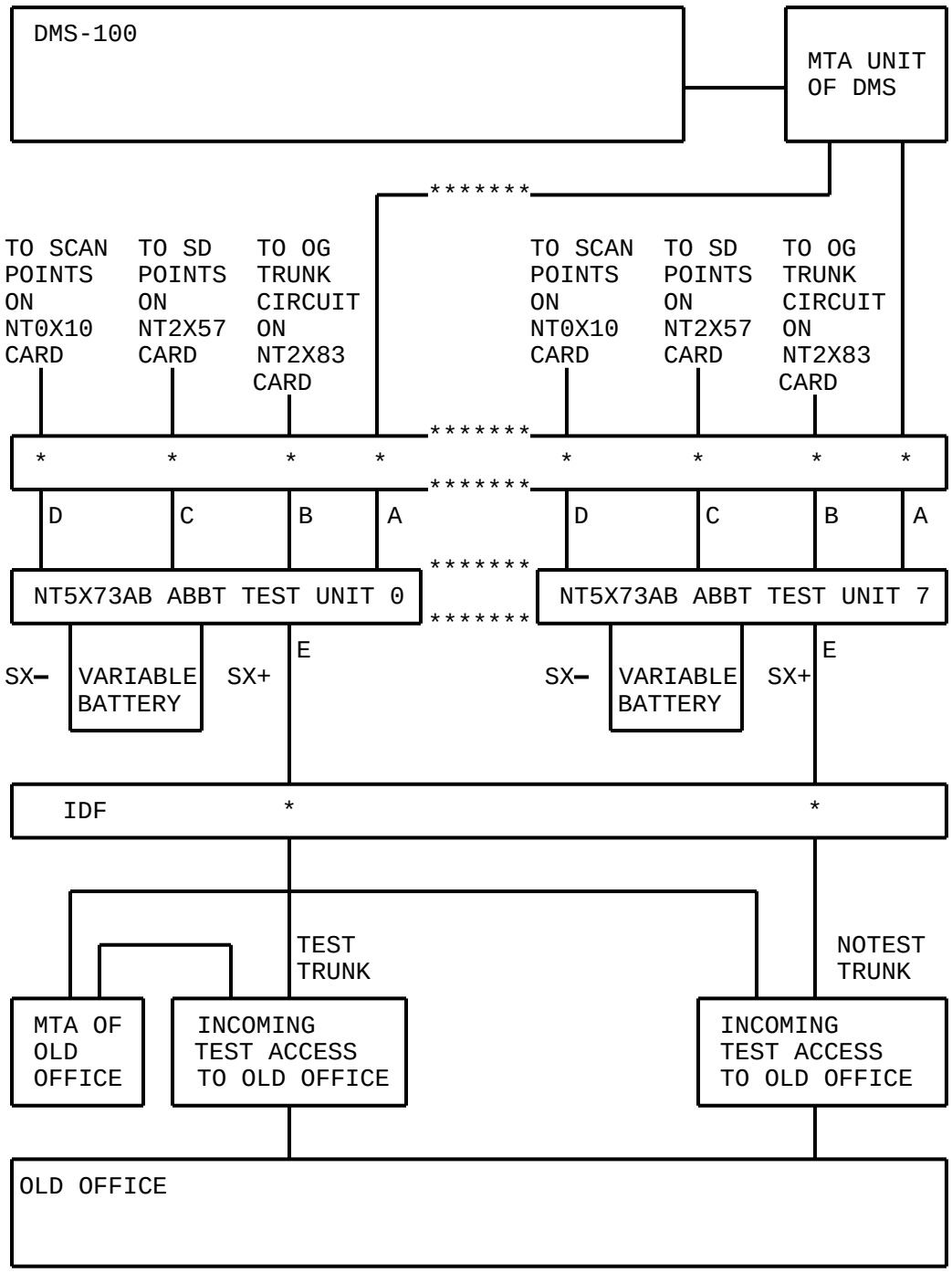


Fig. 5 - General Test Equipment Arrangement for Performing ABBT with more than one NT5X73AB Test Unit

Description of the Original Test Method

4.07 Refer to Figure 1 on page 33 during the following description. When the START command is input at a MAP the following sequence occurs for the original ABBT method:

1. The ABBT program sorts DN into Line Equipment Number (LEN) order if testing in LEN order has been requested during entry of test parameters.

2. The ABBT program selects the first DN to be tested.

3. The DMS selects the LINE CIRCUIT associated with the first DN, closes the contacts of the TA relay on the LINE CIRCUIT and operates the crosspoint of the MTA UNIT assigned to the ABBT TEST UNIT. This connects the new line to be tested to the ABBT TEST UNIT.

4. The DMS then seizes the NO TEST TRUNK to the old office.

5. The DMS pauses for the time necessary for the old office to prepare itself for receiving digits. (This pause may have a value of 0 seconds for some types of old office.) The DN is then pulsed out from the OG TRUNK CIRCUIT to the OLD OFFICE via the NEW DF, CABLE D the ABBT TEST UNIT, CABLE E, the NO TEST TRUNK and apparatus used as the INCOMING TEST PROCESS TO THE OLD OFFICE.

6. On receiving the DN, the OLD OFFICE performs a switching operation through its own MTA Unit and completes the test circuit back to the LINE CIRCUIT in the DMS through TIE CABLES and the OLD DF.

7. The ABBT program performs tests on the loop just established by activating relays in the NT5X37AB ABBT TEST UNIT through SD POINTS on the DMS. Test results are read through SCAN POINTS connected to the NT5X73 ABBT TEST UNIT. Test performed are capable of detecting the items listed in Test Capabilities on page 44.

8. Test results are sent to the output device specified when ABBT was initiated.

9. The ABBT program supplies the DMS with the next DN to be tested and the sequence of events just described is repeated until the last DN has been tested.

Description of ABBT With RCS Subscriber Lines

4.08 The following list describes the ABBT method used for subscriber lines on a RCS. Refer to Figure 2 on page 34 during the description.

1. The ABBT program sorts DN into Line Equipment Number (LEN) order if testing in LEN order has been requested during entry of test parameters.

2. The ABBT program selects the first DN to be tested.

3. The DMS operates a relay in the ABBT Test Unit and seizes the NO TEST TRUNK to the old office.

4. The DMS pauses for the time necessary for the old office to prepare itself for receiving digits. (This pause may have a value of 0 seconds for some types of old office.) The DN is then pulsed out from the OG TRUNK CIRCUIT to the OLD OFFICE via the NEW DF, CABLE D, the ABBT TEST UNIT, CABLE E, the NO TEST TRUNK, and apparatus used as the INCOMING TEST PROCESS TO THE OLD OFFICE.

5. On receiving the DN, the OLD OFFICE performs a switching operation through its own MTA Unit and completes the test circuit path back to the DMS.

6. When the ABBT software runs the first DN or LEN, the CC of the DMS switch sends the SMS an ABBT request message. A software task in the SMS receives the message and determines the number of the RCS that connects to the subscriber line to be tested. The SMS also determines the line circuit number associated with the subscriber line.

7. For line cards (channel units) that are part of shelves operating in modes I or III, the DS-1 channel assignment for the line circuit is predetermined: a direct relationship exists between DS-1 channel and RCS line circuit number.

   The SMS determines the DS-1 channel and p-side port assignment for a particular line circuit number by looking up the information in existing tables. DS-1 lines connect to particular p-side ports, so knowing the p-side port allows the DS-1 link connecting to that port to be determined.

8. With information on RCS number, DS-1 link, and DS-1 channel, the SMS can monitor signals from the COT to the RCS on a specific DS-1 channel associated with a subscriber line.

9. When the DMS switch outpulses the DN or LEN to the old office, it also causes the ABBT Test Unit to initiate the setup for testing the line circuit associated with the DN or LEN that was outpulsed.

   This test setup is initiated when the ABBT Test Unit sends a +116 V dc current that is applied to the tip conductor of the COT with the ring conductor open; if a coin line is being tested, the ring conductor is grounded.

   This dc signal causes the COT to send a Channel Test signaling pattern on the DS-1 link and DS-1 channel assigned to the

line circuit. This test pattern is a request to the RCS to set up for channel unit tests.

10. Verification that the DN or LEN corresponds to the correct RCS and line circuit occurs if the SMS detects the Channel Test signaling pattern on the DS-1 channel that it is scanning within a specified time (12 seconds). If the SMS detects the pattern, it reports the ABBT as successful to the CC. If the SMS does not detect the Channel Test signaling pattern within 12 seconds, then it notifies the CC that the test and, hence, verification was unsuccessful.

    RCS subscriber lines that pass or fail the ABBT are reported to the switch operator through an output result file. Failure reasons are included.

11. The ABBT program supplies the DMS with the next DN to be tested and the sequence of events just described is repeated until the last DN has been tested.

12. For mode II operation, no direct relationship exists between DS-1 channel and RCS line circuit number. The SMS must determine which DS-1 channel to scan by finding which DS-1 channel the old switch assigns for the Channel Unit test.

13. To associate a DS-1 channel with a RCS line circuit number, the COT sends a trunk assign message to the RCS. The COT must send this message before a Channel Unit test is run. This message is contained in the C-field of the Derived Data Link (DDL) and contains the shelfgroup line number and DS-1 channel assignment.

    The SMS determines the RCS number, line circuit number, and DS-1 link of the DN to be tested from the CC through the ABBT request. From this information, the SMS determines the DDL corresponding to the RCS circuit number and determines the shelfgroup line number from the line circuit number.

    Knowing the DDL and shelfgroup line number, the SMS scans the C-field of the DDL for the trunk assign message. The SMS collects the DS-1 channel assignment from the trunk assign message. When the DS-1 channel assignment is known, the necessary information exists for the SMS to scan for the Channel Test signaling pattern. From this point on, the same sequence of operations is followed as for modes I and III.

Description of ABBT With RCU Subscriber Lines

4.09 The following list describes the ABBT method used for subscriber lines on a RCU. Refer to Figure 3 on page 35 during the description.

1. The ABBT program sorts DN into Line Equipment Number (LEN) order if testing in LEN order has been requested during entry of test parameters.

2. The ABBT program selects the first DN to be tested.

3. The DMS operates a relay in the ABBT Test Unit and seizes the NO TEST TRUNK to the old office.

4. The DMS pauses for the time necessary for the old office to prepare itself for receiving digits. (This pause may have a value of 0 seconds for some types of old office.) The DN is then pulsed out from the OG TRUNK CIRCUIT to the OLD OFFICE via the NEW DF, CABLE D, the ABBT TEST UNIT, CABLE E, the NO TEST TRUNK, and apparatus used as the INCOMING TEST PROCESS TO THE OLD OFFICE.

5. On receiving the DN, the OLD OFFICE performs a switching operation through its own MTA Unit and completes the test circuit path back to the DMS.

   The DMS switch requests the ABBT unit to place a +116 V signal on the tip of the Test Trunk. This signal initiates metallic test access setup.

   If an LTA card is to be used for test access to the line and the line to be accessed is a coin line, the ring lead must be grounded. The ring lead must be open when an MTA card is used. Lines other than coin lines also have an open ring. Coin cards have an option switch that must be set properly to indicate the type of metallic test access provided, MTA or LTA.

   If test access is through an MTA card, open must be set on the ring lead of a coin card for at least five seconds. For other types of lines, open must be set on the ring for three seconds.

   The MTA card provides two different options for test pair access and takedown signals that are applied on the tip and ring of the Test Trunk. The option switch (S1) on the MTA card must be set for positive voltage detector enabled, negative voltage detector disabled.

6. After the metallic test access is set up, the +116 V dc signal is removed.

7. The ADTC and ABBT software emulate an asynchronous data terminal that logs onto the DCI processor when the data link between the DMS switch and the CT is defined (the ADTC is defined in Table TERMDEV, refer to 297-1001-451, Section 008).

8. The DMS switch sends the DCI command "H" over the data link to the DCI processor. This command queries the DMS-1 Urban CT for the line connected to the metallic test pair.

9. The DCI processor in the CT returns a message over the data link to the DMS switch that specifies the physical location of the line connected to the metallic test pair.

10. The DMS switch compares the physical location information in the message with its own records on physical location for the DN/LEN under test. If the records match, the ABBT for the line passes. If the records disagree, the ABBT fails.

TEST CAPABILITIES

4.10 ABBT may be performed on the types of old office listed in Table B.

TABLE B
TYPES OF OLD OFFICE ASSOCIATED WITH ABBT

COMPANY	TYPE
AEI (Woolwich)	Step-by-Step (SXS)
Automatic Telephone and Electric (A TEL + ELECT CO)	Step-by-Step (SXS) Type 2000 SXS Type 4000 SXS
Automatic Electric Company (AE)	SXS C1-EAX No.1 EAX
Bell Laboratories (Bell Labs)	No.1 Crossbar (XEAR) No.355A No.3 ESS
Federal Telephone and Electric (FED TEL+ELECT)	SXS
Hitachi	SXS-1E
International Telephone and Telegraph (ITT)	A1 Pentaconda 10C Metaconda 7E Belgium
Nippon Electric Company (NEC)	ND20 23BA

Table Continued

TABLE B (Continued)
TYPES OF OLD OFFICE ASSOCIATED WITH ABBT

COMPANY	TYPE
North Electric Company (NE)	NX1D
Northern Electric/Northern Telecom	DMS-10 DMS-100 (adding lines to an existing DMS-100) No.1 ESS No.5 XBAR SA-1 SF-1 SP-1 NE-1 350A 355A
Stromberg Carlson (SC)	X-Y
United States Instruments (USI)	Motorswitch
Western Electric (WE)	SXS

4.11 The original ABBT method has the following capabilities:

* Test where old offices are to be replaced by RLM (see Figure 34 on page 143) that are controlled by a distant or host new DMS office via a Digital Carrier Module (DCM) and DS1 carrier links. The ABBT equipment is located at the host site if loop resistance does not exceed 1250 ohms.

* Test old offices beyond metallic range (If the loop resistance exceeds 1250 ohms, the office is said to be beyond metallic range) in DMS offices equipped with NT feature package NT0X05AD (See Figure 35 on page 144). In these offices, the ABBT equipment is located at the RLM site and the NT2X83 OG Trunk Circuit at the host site is connected to the RLM by a dedicated channel-bank facility.

* Test for proper assignment of line equipment in the DMS.

* Test for continuity of new lines.

* Test for absence of jumper reversals at the DF.

* Test for T and R affiliations of party lines (except for SXS and NX1D offices).

* Test for loop start and ground start assignments in the DMS line data tables (SXS offices only).

* Test in LEN order (except for the situations given under Test Limitations) This reduces test time for the original ABBT method in the following ways:

  - eliminates the requirement to disconnect and reconnect the MTA unit of the DMS for each line being tested

  - minimizes contention for test access to line equipment in the old office.

* Test multiple lines simultaneously (possible only in offices having NT feature package NTX057BA), up to 300 lines may be given a basic test in one hour (10,000 lines during an eight-hour shift). See note.

  Note: This figure is calculated on the basis of eight ABBT Test Units and the association of a unique set of DN in the old office with each Test Unit.

4.12 The ABBT method used for transferring service for subscriber lines connected to an RCS or RCU tests:

* for proper assignment of line equipment in the DMS

* up to eight lines simultaneously on eight different RCS or RCU modules, provided each RCS or RCU holds a unique MTA

TEST LIMITATIONS

4.13 The following design limits apply to the original ABBT method:

* ABBT does not recognize intercept in the old office and tests the line associated with the DN as though intercept were not in effect.

* Depending on the location of a short circuit or a ground fault on a test loop, ABBT may be unable to distinguish between the short circuit and the ground fault.

* Testing in LEN order cannot be performed in offices where DN in the old office are different from those in the new office or where the old office uses optimized outpulsing. For these situations, testing in DN order must be performed.

4.14 The following design limits apply to the ABBT method used with RCS and RCU subscriber lines:

* The design limits previously described for the original ABBT method also apply to the ABBT method used with RCS and RCU subscriber lines. The ABBT method used with RCS and RCU sub-

scriber lines does not perform any fault detection other than checking for correct assignment of line equipment in the DMS.

* Only one ABBT can be executed at one time for a given RCS or RCU module or group of RCS or RCU modules that share the same MTA vertical.

* ABBT cannot be executed on single-circuit cards occupying any of the four rightmost slots on a shelf of an RCS in mode II.

* The RCS and COT must be free of alarms (except a minor alarm due to the absence of a protection link) when the ABBT is executed. If alarms are present, they could cause the ABBT on RCS subscriber lines to yield incorrect results.

* The RCU and CT must be free of major alarms when an LTA card is used for metallic test access. Major alarms cause invalid ABBT results.

  Major alarms can be present when an MTA card is used for metallic test access, but these alarms must have no relationship to resources used by MTA card metallic test access. It is recommended that no major alarms be present during ABBT.

* ABBT takes about 45 seconds per RCU line.

Note: Checking for tip and ring affiliations of party lines is not required for RCS or RCU lines, since neither the RCS nor RCU have any lines altered. Checking for absence of jumper reversals at the DF is not required, since the subscribers connect to the RCS or RCU, not the DF.

ABBT SOFTWARE

4.15 The ABBT software is a non-resident program recorded on magnetic tape.

4.16 Once loaded into the DMS and initiated at a MAP, the ABBT software provides access to a repertoire of commands which are used to set up and run ABBT. Descriptions of each of these commands are presented on subsequent pages.

4.17 Before ABBT can be run, information about the old office, the number of ABBT Test Units, output files, devices and DN to be tested must be supplied to the ABBT software. To do this, users must input the DEFINE command once with each of its associated parameters. When all aspects of the test are defined, the user inputs a START command to run ABBT.

4.18 Test results are accumulated in a file and are sent to an output device when testing is complete. Both the file in which results are accumulated and the output device to which test results are sent are specified when the DEFINE command is input. A sample of test results output is given in Figure 6 on page 82.

An explanation of the test codes output for ABBT is given in Table I on page 83.

ABBT MMI

4.19 The following commands are available in ABBT software:

BBTDL	DEFINE rcusite rcuframe rcuunit tcname bbtuser bbtpw lta? DELETE rcusite rcuframe rcuunit QUERY

defines, deletes, or queries data for data links used for the ABBT.

Where:

DEFINE specifies that data for establishing a data link for the ABBT is to be entered.

rcusite specifies physical location of the RCU that supports the line being tested.

Range: Valid site name defined in Table SITE

rcuframe specifies frame number of RCU that supports the line being tested.

Range: 0 to 99

rcuunit specifies the unit number of RCU that supports the line being tested.

Range: 0 to 9

tcname specifies the name of the Auto Dial Terminal Controller used to interface to the DCI. Table TERMDEV holds the physical location of the Auto Dial Terminal Controller.

Range: Alphanumeric

bbtuser specifies the DCI userid for the DCI processor

Range: Four alphanumeric characters

bbtpw specifies the DCI password

Range: Four alphanumeric characters

lta? specifies whether test access is through an LTA or MTA card

Range: Yes or No

DELETE specifies that a data link is to be removed. The parameters rcusite, rcuframe, and rcuunit must be entered.

QUERY specifies that data for established data links is to be displayed.

Responses:

```
RCUNUM   TCNAME  BBTUSER  BBTPW  TEST ACCESS

RCU1 4 0 BBTDL1  0005     0000     LTA
RCU1 4 1 BBTDL2  0003     0000     MTA
```

Explanation: Two data links are present, one on RCU1 4 0 and the other on RCU1 4 1. The ADTCs, datafilled in Table TERMDEV, are named BBTDL1 and BBTDL2. The user-ids for these two links are 0005 and 0003, respectively. The password for both links is 0000. BBTTDL1 is associated with metallic test access through an LTA card. BBTDL2 is associated with metallic test access through an MTA card.

NO BBT DATA LINKS DEFINED

Explanation: No data links are defined in the system.

User Action: Define a data link in Table TERMDEV.

THIS COMMAND IS VALID ONLY ON RCU

Explanation: The BBTDL command is valid only for RCUs.

User Action: Issue the BBTDL command again with information that applies to an RCU.

BBT DATA LINK NOT DEFINED FOR THIS RCU

Explanation: The RCU specified in the BBTDL command does not have a data link specified.

User Action: Define a data link for the RCU in Table TERMDEV.

LOGOUT FROM DCI SUCCESSFUL

Explanation: Logging off the DCI was successful.

FAILED TO LOGOUT FROM DCI

Explanation: Logout is always successful: the data link is deleted and marked as undefined and not logged in. The previous message appears when an abnormal condition occurs that indicates logout was abnormal. For example, noise on the link during logout could cause the message to appear.

A serious problem could prevent logging back on after redefining the link.

User Action: If unable to log back on, check the data link.

INVALID TERMINAL CONTROLLER

Explanation: The ADTC is not of the console type or is not defined.

User Action: Ensure the data link is defined correctly in Table TERMDEV.

MAXIMUM NUMBER OF BBT DATA LINES ALREADY DEFINED

Explanation: Eight data links, the maximum number, have already been defined.

A BBT DATA LINK IS ALREADY ASSIGNED TO THIS RCU

Explanation: A data link was defined previously for the RCU.

User Action: Choose another definition for the data link.

FAILED TO CREATE BBTDL PROCESS

FAILED TO SEND MESSAGE TO BBTDL PROCESS

NO REPLY FROM BBT DATA LINK PROCESS

INVALID SITENAME FOR RCU

Explanation: The previous four messages indicate an abnormal condition for the data link process.

User Action: Check log reports to determine the source of the error.

FAILED TO LOGIN TO DCI AT RCU <site> (frame> <unit>

Explanation: This message indicates that login was unsuccessful. The data link remains undefined and not logged in. One of the following messages accompanies the previous message.

UNEXPECTED REPLY FROM BBT DATA LINK PROCESS

Explanation: An abnormal condition exists with the data link process.

User Action: Check log reports.

NO RESPONSE FROM TERMINAL CONTROLLER <controller name>

Explanation: The ADTC is not responding.

User Action: Test the ADTC and, if it is faulty, replace it.

INVALID RESPONSE FROM DCI. TRY AGAIN.

Explanation: The DCI responses in the protocol were corrupted.

User Action: Noise could cause corrupted responses, so try to login again. If the problem persists, ensure the data link is properly connected and intact. Check the CT and RCU for alarms.

INVALID STATUS FROM TERMINAL CONTROLLER <controller name>

Explanation: The DCI returned a corrupted status byte.

User Action: If the problem persists, check the status of the DMS-1 Urban and ensure that no alarms are present.

TERMINAL CONTROLLER <controller name> IS NOT IN SERVICE

Explanation: The ADTC is not in service.

User Action: Post the ADTC at the IOD level of the MAP and return it to service.

TERMINAL CONTROLLER <controller name> is not a 1X67BD

Explanation: The ADTC is not of the correct type.

User Action: Check the ADTC entry in Table TERMDEV. Define the data link for a ADTC of the correct type.

INVALID DCI USERID OR PASSWORD

Explanation: An incorrect userid or password was entered.

User Action: Enter the password again.

TERMINAL CONTROLLER <controller name> IS ALREADY BOUND TO SOMEONE ELSE

Explanation: The ADTC is already being used.

Example 1

The following example shows a command string that defines a new data link in the system. The link is associated with RCU1 4 0 and is named BBTDL1. The userid associated with the link is 0005 and, the password for logging onto the DCI processor is 0000. "Yes" indicates that metallic test access is through an LTA card.

```
BBTDL DEFINE RCU1 4 0  BBTDL1  ’0005’ ’0000’ yes
```

CLEAR	

removes ABBT software from the DMS. This command must be input only immediately before unloading ABBT software. If more testing is to be done, ABBT software must be unloaded then reloaded. Attempts to run more tests without unloading and reloading ABBT software will fail.

CONTINUE	bbt_set_nbr ALL

continues an Automatic Board-to-Board Test associated with a specified ABBT Test Unit from the point at which the test was halted by input of a STOP command.

Where:

bbt_set_nbr number of the ABBT Test Unit for which the Board-to Board test is to be continued. (See note)

Range: 0 through 8

ALL continues all board-to-board tests associated with all ABBT Test Units

Note: If CONTINUE is input without parameters, the user is prompted for the required ABBT Test Unit number.

Responses:

CONTINUE AS IT IS?

Explanation: This response appears when testing by LEN or DN. The ABBT software wishes to know if any changes have been made to the test setup since the last test. Such changes may result from the following:

* input of a DEFINE command

* a system restart

* input of a LIT command

User Action: Input NO if changes have been made. Otherwise; Input YES.

System Action: If YES is input, the ABBT software resumes testing immediately. If NO is input, the ABBT software sets up the ranges of DN again, then resumes testing. Setup of the ranges of DN may take up to ten minutes. YES should therefore be specified when possible.

DEFINE	OFFPARS [parmlist1] ABBTSET [parmlist2] DNINPUT [parmlist3] OUTPFILE [parmlist4] OUTPTYPE [parm] TESTTYPE [parmlist5]

used for setting up or modifying parameters for an Automatic Board-to-Board Test (See note 1 and note 2).

Where:

OFFPARS displays a series of prompts for information about the old office (See note 2 and note 3). Refer to Table C on page 58 for the data to be input for each prompt.

ABBTSET displays a series of prompts for information about one ABBT Test Unit (See note 3). Refer to Table D on page 61 for the data to be input for each prompt.

DNINPUT displays a series of prompts that define ranges of DN to be tested (See Note 3). Refer to Table E on page 67 for the data to be input for each prompt.

OUTPFILE displays a series of prompts that define both the name of the file in which test results are accumulated and the device to which accumulated test results are sent (See note 3). Refer to Table F on page 70 for the data to be input for each prompt.

OUTPTYPE defines the type of test results output. If PARM is not supplied, the user is prompted for the required information (See note 3).

TESTTYPE displays a series of prompts that define the types of tests to be performed for each DN. Refer to Table H on page 72 for the data to be input for each prompt (See note 3).

Note: The parameter TESTTYPE is not used for the ABBT method with RCS subscriber lines.

parmlist1 optional list of parameters that specify information about the old office (See note 3 and note 4). The optional parameter list consists of the items listed below. Refer to the appropriate prompt in Table C on page 58 for the information to be input for each parameter.

<NBR OF SETS>

<PREDIAL DELAY>

<DISC RELAY>

<DISC TIME>

<SXS?>

<OPT OUTPULSING?>

This parameter must be input only if YES was specified for parameter 'SXS?'.

<PULSE TYPE>

<DIGIT NBR>

<STARTS>

<IDGTIME>

parmlist2 optional list of parameters for specifying information about one NT5X73AB Test Unit (See note 3 and note 4). The optional list of parameters con-

sists of the items listed below. Refer to the appropriate prompt Table D on page 61 for the information to be input for each parameter.

<SET_NUMBER>

<AT HOST?>

<RELAY DELAY> This parameter is input if NO was specified for parameter ATHOST.

<SCAN DELAY> This parameter is input if NO was specified for parameter ATHOST.

<SD_MEM>

<PM>

<NBR>

<CKT>

<SC MEM>

<PM>

<NBR>

<CKT>

<OUT_MEM>

<PM>

<NBR>

<CKT>

<COL> This parameter is prompted for in pre-BCS24 applications.

<ROW> This parameter is prompted for in pre-BCS24 applications.

<HORIZ> This parameter is promted for in pre-BCS24 applications.

<NBR OF COLS> This parameter is prompted for in pre-BCS24 applications.

<VERT> This parameter is prompted for in BCS24 and higher.

<HORIZ> This parameter is prompted for in BCS24 and higher.

<HORIZGRP> This parameter is prompted for in BCS24 and higher.

<NBR VERTS> This parameter is prompted for in BCS24 and higher.

Note: For BCS24 and higher, parameters COL, ROW, HORIZ, and NBR OF COLS have been replaced by VERT, HORIZ, HORIZGRP, and NBR VERTS respectively.

For more information, refer to 297-2101-451.

parmlist3 optional list of parameters used for specifying the ranges of DN to be tested (See note 3 and note 4). The parameter list consists of the items listed below. Refer to the appropriate prompt in Table E on page 67 for the information to be input for each parameter.

<DN_WITH_SET?>

<INPUT TYPE> Range: FILE or MANUAL

When MANUAL is specified, INPUT TYPE must be followed by parameters:

BBTSETNUM
NEW START_DN
NEW END_DN
OLD START_DN
TESTING ORDER.

When FILE is specified, INPUT TYPE must be followed by parameters:

OLD DN DIFFERENT?
INP FILE NAME
TESTING ORDER.

parmlist4 optional list of parameters used for specifying both the name of a file in which test results are accumulated and the output device to which accumulated test results are sent when testing is complete (See note 3 and note 4). The list consists of the items listed below. Refer appropriate prompt in Table F on page 70 for the information to be input for each parameter.

<OUTPUT DEVICE NAME>

<OUTPUT FILE NAME>

parm optional parameter used for specifying the types of test results to be output. Refer to prompt

OUTPUT TYPES: in Table G on page 71 for the information to be input.

parmlist5 optional list of parameters used for specifying the type of ABBT test to be conducted (see note 3 and note 4). This parameter consists of the items listed below. Refer to the appropriate prompt in Table H on page 72 for the information to be input for each parameter.

<SET NUMBER>

<TYPE OF TEST>

Notes:

1. Before input of the START command, the DEFINE command must be input once with each of parameters OFFPARS, DNINPUT, OUTPFILE OUTPTYPE AND TESTYPE. Since the ABBTSET parameter defines information for only one NT5X73 ABBT Test Unit at a time, DEFINE ABBTSET must be input once for each NT5X73AB Test Unit used.

2. DEFINE OFFPARS must be input before DEFINE ABBTSET.

3. When a user inputs the DEFINE command with one of parameters OFFPARS, ABBTSET, DNINPUT, OUTPFILE or TESTYPE, the ABBT software displays a series of prompts for the correct information.

   Each prompt in the series consists of the word 'Enter:' followed by one or more parameters. For example:

   Enter: <new start_dn> <new end_dn> <old start_dn>

4. Instead of being prompted for the required information, experienced users may choose to input all of the parameters required on one line immediately after one of parameters OFFPARS, ABBTSET, DNINPUT, OUTPFILE, OUTPTYPE OR TESTTYPE. These required parameters are listed under optional parameters PARMLIST1, PARMLIST2, PARMLIST3, PARMLIST4, PARM and PARMLIST5.

   Should a mistake be made during input, the ABBT software prompts for the correct information. The ABBT software begins prompting for data at a point in the sequence following the last correctly entered parameter. Prompting continues until all necessary parameters are input.

TABLE C
PROMPTS FOR DEFINE OFFPARS

PROMPT	RANGE AND DESCRIPTION
<NBR OF SETS>	Range: 1 through 8 number of simultaneous Automatic Board-to-Board Tests the user wishes to run. The number of sets specified cannot exceed the number of NT5X73AB Test Units and associated hardware available (OG Trunk Circuits, SD Points, SCAN points, test trunks and so on). If the office does not have feature package NTX057BA, only one NT5X73AB Test Unit may be specified.
<PREDIAL DELAY>	Range: 0 through 300 time in hundreds of milliseconds between sending of an off-hook by the DMS on the notest trunk to the old office and outpulsing of digits on that trunk. For example, an input of 2 gives a delay of 200 milliseconds. For old offices which indicate successful seizure of the notest trunk by means of Tip and Ring lead reversals, a predial delay of 0 must be specified. If a PREDIAL DELAY of 0 is specified, the DMS outpulses digits after receiving a specified number of Tip and Ring reversals from the old office. These reversals indicate successful seizure of the notest trunk by the old office. This number of reversals is specified by the STARTS parameter. If a PREDIAL DELAY of anything other than 0 is specified, outpulsing begins only after the specified delay. All reversals of Tip and Ring leads put on notest trunk by the old office are ignored.

Table Continued

TABLE C (Continued)
PROMPTS FOR DEFINE OFFPARS

PROMPT	RANGE AND DESCRIPTION
<DISC RELAY>	Range: A or K relay in the NT5X73AB ABBT Test Unit which, when operated, disconnects the ABBT Test Unit from the old office. For all old office types except C1EAX and NX1D, relay A must be specified.
<DISC TIME>	Range: 1 through 300 time in 100-millisecond increments required for the old office to properly release once a disconnect signal has been received from the DMS. For example, an input of 2 gives a disconnect time of 200 milliseconds. Typical disconnect time for most offices is between 300 and 500 milliseconds.
<SXS?>	Range: YES or NO indicates whether or not the old office is of the step-by-step type.
<OPT. OUTPULSING?>	Range: YES or NO displayed only for SXS offices, requests if the old office uses optimized outpulsing.
<PULSE TYPE>	Range: DP or MF type of pulsing, Dial Pulse (DP) or Multifrequency (MF), used by the notest trunk to the old office.
<DIGIT NBR>	Range: 4, 5, 6 or 7 number of digits that must be outpulsed by the DMS to connect to a line in the old office.

Table Continued

TABLE C (Continued)
PROMPTS FOR DEFINE OFFPARS

PROMPT	RANGE AND DESCRIPTION
<STARTS>	Range: IM, XD, WK or DD Where: IM = no Tip or Ring reversals XD = one reversal of the Tip and Ring leads WK = two reversals of the Tip and Ring leads DD = two reversals of the Tip and Ring leads. See WK above. type of start signal provided by the old office to indicate seizure of the notest trunk.
<IDGTIME>	Range: 2 through 100 maximum allowable time in 10-millisecond increments between individual digits outpulsed on the notest trunk to the old office. For example, an input of 3 indicates a time between digits of 30 milliseconds.

TABLE D
PROMPTS FOR DEFINE ABBTSET

PROMPT	RANGE AND DESCRIPTION
<SET NUMBER>	Range: 0 to 7 number of the NT5X73AB Test Unit for which information is being defined.
<AT HOST?>	Range: YES or NO If the ABBT Test Unit is located at the Host site, input YES. If not, input NO.
<RELAY DELAY>	Range: 0 to 100 time in 100-millisecond increments for a signal output from an SD point of the Host DMS to travel to the ABBT Test Unit located at a remote site and operate a relay in the ABBT Test Unit. For example, input of a 2 specifies a delay of 200 milliseconds. This prompt appears only if the ABBT Test Unit is located at a remote site (AT HOST = NO).
<SCAN DELAY>	Range: 0 through 10 time in 100-millisecond increments for a signal generated by an ABBT Test Unit located at a remote site to travel to a SCAN point of the Host DMS and be read. For example, an input of 2 specifies a delay of 200 milliseconds. This prompt appears only if the ABBT Test Unit is located at a remote site (AT HOST = NO).

Table Continued

TABLE D (Continued)
PROMPTS FOR DEFINE ABBTSET

PROMPT	RANGE AND DESCRIPTION
<SD MEM>	Range: 0 through 51 unused group number associated with the primary SD circuit of a NT2X57 card connected to this ABBT Test Unit. An unused SD group number may be determined by examining the SDGRP system data table of the DMS. See 297-2101-451, Section 128, for a description of the SDGRP table and 297-1001-310 for a description of the Table Editor which may be used to examine contents of DMS system data tables. If a number for a group already in use is input, the user is prompted for the correct information.
<PM>	Range: TM0, TM2, TM4, TM8, MTM or RSM When displayed immediately after data for prompt 'SD MEM:' is input, the type of PM containing the primary SD circuit connected to this ABBT Test Unit is being requested.
<NBR>	Range: 0 through 2047 When displayed as the second prompt after 'SD MEM:', the number of the PM containing the SD circuit connected to this ABBT Unit is being requested.

Table Continued

TABLE D (Continued)
PROMPTS FOR DEFINE ABBTSET

PROMPT	RANGE AND DESCRIPTION
<CKT>	Range: even-numbered values 0 through 28 When displayed as the third prompt after 'ENTER SD MEM:', the number of the primary circuit on the NT2X57 card connected to this ABBT Test Unit is being requested. Each SD card contains two SD circuits: an even-numbered primary circuit and an odd-numbered secondary circuit. Each circuit contains seven SD points for a total of 14 SD points per card. Since ten SD points must be connected to each ABBT Test Unit, two SD circuits must be used. Both circuits must be on the same NT2X57 card. To ensure that this is the case, an even-numbered (primary) circuit must be specified for this prompt. The SD circuit specified must be dedicated uniquely to ABBT.
<SC MEM>	Range: 0 to 511 unused group number associated with the SCAN circuit on a NT0X10 card connected to this ABBT Test Unit. An unused SCAN group number may be determined by examining the SCGRP system data table of the DMS. See 297-2101-451, Section 127, for a description of the SCGRP table and 297-1001-310 for a description of the Table Editor which may be used to examine contents of DMS system data tables. If a number for a group already in use is input, the user is prompted for the correct information. SCAN circuits for ABBT must also be dedicated uniquely to ABBT.
<PM>	Range: TM0, TM2, TM4, TM8, MTM or RSM When displayed immediately after input of data for prompt 'SC MEM:', the type of PM containing the SCAN circuit connected to this ABBT Test Unit is being requested.

Table Continued

TABLE D (Continued)
PROMPTS FOR DEFINE ABBTSET

PROMPT	RANGE AND DESCRIPTION
<NBR>	Range: 0 through 2047 When displayed as the second prompt after 'SC MEM:', the number of the PM containing the SCAN circuit connected to this ABBT Test Unit is being requested.
<CKT>	Range: 0 through 29 When displayed as the third prompt after 'SC MEM', the number of the SCAN circuit on the NT0X10 card connected to this ABBT Test Unit is being requested. The SCAN circuit specified must be dedicated uniquely to ABBT.
<OUT MEM>	Range: 1 to 10000 unused external trunk number associated with the OG Trunk Circuit card connected to this ABBT Test Unit. This is the trunk used for outpulsing digits to the old office. An unused external trunk number can be determined by examining the TRKMEM system Data Table of the DMS. See 297-1001-451, Section 20, for a description of the TRKMEM table and 297-1001-310 for a description of the Table Editor which may be used to examine contents of DMS system data tables. If a trunk number already in use is input, the user is prompted for the correct information.
<PM>	Range: TM0, TM2, TM4, TM8, MTM or RSM When displayed immediately after input of data for prompt OUT MEM: is input, the type of PM having the OG Trunk Circuit connected to this ABBT Test Unit is being requested.
<NBR>	Range: 0 through 2047 When displayed as the second prompt after 'OUT MEM:', the number of the TM containing the OG Trunk Circuit connected to this ABBT Test Unit is being requested.

Table Continued

TABLE D (Continued)
PROMPTS FOR DEFINE ABBTSET

PROMPT	RANGE AND DESCRIPTION
<CKT>	Range: 0 through 29 When displayed as the third prompt after 'OUT MEM', the number of the OG Trunk Circuit on the NT2X57 SD card connected to this ABBT Test Unit is being requested.
<COL>	Range: 0 through 31 first column of the DMS Metallic Access (MTA) Unit containing a Metallic Access Driver (MTA-DRIVER) which controls the horizontal associated with this ABBT Test Unit. See GS2X46 for a description of the MTA Unit. The horizontal of the MTA Unit used for this ABBT Test Unit may appear across several columns of the MTA Unit. 'COL' specifies the first column at which the horizontal appears. NBR OF COLS' indicates the number of columns starting from 'COL' over which the horizontal appears. The MTA of the new DMS is not connected during ABBT with RCS subscriber lines, even if the MTA is present. An arbitrary value within the correct range of input for column must be entered, however.
<ROW>	Range: 0 through 7 row of the MTA Unit containing a number of MTA-DRIVERS which are on the horizontal associated with this ABBT Test Unit. The MTA of the new DMS is not connected during ABBT with RCS subscriber lines, even if the MTA is present. An arbitrary value within the correct range of input for row must be entered, however.
<HORIZ>	Range: 1 through 15 number of the horizontal in the MTA Unit connected to this ABBT Test Unit. The MTA of the new DMS is not connected during ABBT with RCS subscriber lines, even if the MTA is present. An arbitrary value within the correct range of input for horizontal must be entered, however.

Table Continued

TABLE D (Continued)
PROMPTS FOR DEFINE ABBTSET

PROMPT	RANGE AND DESCRIPTION
<NBR OF COLS>	Range: 1 through 32 number of columns in the MTA Unit that contain MTADRIVER which are on the horizontal associated with this ABBT Test Unit. Specify a number of columns sufficient to provide the ABBT horizontal with access to all new lines being tested.
<VERT>	Range: 0 to 639 defines the start vertical on the MTA matrix.
<HORIZ>	Range: 1 to 127 is a horizontal in the MTA matrix on which the test equipment is connected.
<HORIZGRP>	Range: 0 to 159 allows the assignment of different test equipment (horizontal agents) on the same MTA horizontal but associated with different MTAMs.
<NBR VERTS>	Range: 1 to 640 is the number of MTA verticals associated with the LCDs under test.

Note: For BCS24 and higher, parameters COL, ROW, HORIZ, and NBR OF COLS have been replaced by VERT, HORIZ, HORIZGRP, and NBR VERTS respectively. For pre-BCS24 offices, COL, ROW, HORIZ, NBR OF COLS are applicable.

For more information, refer to 297-2101-451.

TABLE E
PROMPTS FOR DEFINE DNINPUT

PROMPT	RANGE AND DESCRIPTION
<DN_WITH_SET?>	Range: YES or NO specifies whether or not ranges of DN are accessible only by one particular ABBT Test Unit. DNs are considered to be accessible by one particular ABBT Test Unit if, for example, the test access device to the old office provides access to a range of DNs which cannot be accessed through an access device connected to another ABBT Test Unit. If the same range of DNs can be accessed through more than one test access device, the ABBT software assigns 30 of the DNs to each ABBT Test Unit and runs board-to-board tests. When testing is complete, the ABBT software assigns the next 30 DNs to each ABBT Test Unit then runs the tests again; and so on until all DNs are tested.
<INPUT TYPE>	Range: FILE or MANUAL specifies whether or not the list of DNs to be tested is contained in a file or is to be input manually. If manual input is requested, only one range of DNs may be specified. When MANUAL is specified, the DMS displays the prompts BBT_SET_NBR, NEW START_DN, NEW END_DN, OLD START_DN and TESTING ORDER. When FILE is specified, the DMS displays the prompts OLD DN DIFFERENT, INP FILE NAME and TESTING ORDER.
<BBT_SET_NBR>	Range: 0 through 7 the number of the ABBT Test Unit used to test a range of DNs which are specified manually. This parameter is required only if the range of DN is being specified manually and is accessible by only one ABBT Test Unit.

Table Continued

TABLE E (Continued)
PROMPTS FOR DEFINE DNINPUT

PROMPT	RANGE AND DESCRIPTION
<NEW START_DN>	Range: seven digits from 0000000 to 9999999 starting DN of a range of DNs to be tested in the new office.
<NEW END_DN>	Range: seven digits from 0000000 to 9999999 end DN of a range of DNs to be tested in the new office.
<OLD START_DN>	Range: seven digits from 0000000 to 9999999 starting DN of a range of DNs to be tested in the old office. The DN is incremented by one each time a DN in the new office is tested. This continues until the range specified by NEW START_DN and NEW END_DN is reached.
<INP FILE NAME>	Range: eight alphanumeric characters name of file containing a range or ranges of DNs to be tested. An input file used for specifying DNs for ABBT must contain entries in the following format: BBT_SET_NBR NEW_START_DN OLD_START_DN NEW_END_DN (optional) For example: 3 6210000 7210000 6220000 0 6211234 6211241 ABBT Test Unit 3 tests DNs 621-0000 to 622-0000 in the new office starting at DN 721-0000 in the old office. Simultaneously, ABBT Test Unit 0 tests DN 621-1234 in the new office against DN 621-1241 in the old office.

Table Continued

TABLE E (Continued)
PROMPTS FOR DEFINE DNINPUT

PROMPT	RANGE AND DESCRIPTION
<OLD DN DIFFERENT?>	Range: YES or NO asks if the DNs being tested in the old office are the same as those in the new office.
<TESTING ORDER>	Range: BYLEN OR BYDN Where: BYLEN specifies testing in LEN order BYDN specifies testing in DN order If DNs in the old office are different from those in the new office, or if the old office is a SXS office that uses optimized outpulsing, BYDN must be input for the TESTING ORDER parameter.

TABLE F
PROMPTS FOR DEFINE OUTPFILE

PROMPT	RANGE AND DESCRIPTION
<OUTPUT DEVICE NAME>	Range: 8 alphanumeric characters name of an output device to which accumulated ABBT results are to be sent. For example, PRT1.
<OUTPUT FILE NAME>	Range: 8 alphanumeric characters name of a file in which ABBT results are to be accumulated before being sent to the specified output device.

TABLE G
PROMPTS FOR DEFINE OUTPTYPE

PROMPT	RANGE AND DESCRIPTION	
<TYPE OF OUTPUT>	Range: ALL, FAIL, FAILUNASSIGNED, RELAY, SCAN, TEST or UNASSIGNED	
	Where:	
	ALL	outputs test results of all types.
	FAIL	outputs only results indicating a test failure.
	FAILUNASSIGNED	outputs results indicating test failure or unassigned lines.
	RELAY	outputs unassigned lines and simplex scans. Stops tests before operation of each relay in the ABBT Test Unit. Input the CONTINUE command to resume testing
	SCAN	same as RELAY except that testing stops before each reading of a SCAN point.
	TEST	same as RELAY except that testing stops before testing of each line.
	unassigned	performs no tests but indicates all unassigned lines.

TABLE H
PROMPTS FOR DEFINE TESTTYPE

PROMPT	RANGE OR DESCRIPTION
<SET NUMBER>	Range: 0 through 7 number of the ABBT Test Unit performing the types of tests to be specified.
<TYPE OF TEST>	Range: ALL, BASIC, CLASS or START Where: ALL performs a BASIC test and if the DN passes the BASIC test, performs a CLASS test. If the DN passes both tests, a START test is performed. BASIC tests for continuity, absence of Tip and Ring lead reversals, CLASS performs a BASIC test plus a class of service test if the DN passes the BASIC test. START performs a BASIC test plus a START test if the DN passes the BASIC test

Responses:

For prompts that appear when the DEFINE command is input without an optional parameter, see one of the following Tables:

For DEFINE OFFPARS, see Table C on page 58.
For DEFINE ABBTSET, see Table D on page 61.
For DEFINE DNINPUT, see Table E on page 67.
For DEFINE OUTPFILE, see Table F on page 70.
For DEFINE TESTTYPE, see Table H.

Other responses are as follows:

could not add tuple_name to table table_name

Explanation: Input of a DEFINE command changes the contents of some system data tables. The ABBT software was unable to do this due to a system fault or because

commands DEFINE OFFPARS and DEFINE ABBTSET were input in the wrong order.

User Action: DEFINE OFFPARS must be input before DEFINE ABBTSET. If this was not the case, input DEFINE OFFPARS first then DEFINE ABBTSET. Otherwise, contact your Maintenance Support Group.

Tuple BBTOUT out_mem is already in TRKMEM
Do you want me to update the existing tuple?

Explanation: out_mem is the number of the external trunk input in response to prompt 'OUT MEM'. This response indicates that the number is already assigned in system data table TRKMEM for some other purpose.

User Action: Verify with qualified personnel if overwriting of the data is allowed, then input Y to overwrite the existing tuple or N to leave the existing tuple in place and abort the prompting sequence.

Tuple SC_MEM is already in SCGRP
Do you want me to overwrite the existing tuple?

Explanation: SC_MEM is the number of the group input in response to the prompt ENTER SC MEM:. This response indicates that the group number is already assigned in system data table SCGRP.

User Action: Verify with qualified personnel if overwriting of the data is allowed, then input Y to overwrite the existing tuple or N to leave the existing tuple in place and abort the prompting sequence.

Tuple SD_MEM is already in SDGRP
Do you want me to update the existing tuple?

Explanation: SD_MEM is the number of the group input in response to the prompt ENTER SD MEM:. This response indicates that the group number is already assigned in system data table SDGRP.

User Action: Verify with qualified personnel if overwriting of the data is allowed, then input Y to overwrite the existing tuple or N to leave the existing tuple in place and abort the prompting sequence.

Examples:

1. Define office parameters using the prompt mode of input for an old office having the following characteristics:

   * The old office is a NTL office of the No. 5 XBAR type.

* Three NT5X73 ABBT Test Units are installed at the host DMS site.

* The notest trunks from the DMS to the old office use XD start signals (one tip and ring lead reversal) and there is a delay of 0 milliseconds before outpulsing of digits on the notest trunk.

* Signals on the notest trunk are of the DP type and seven-digit numbers are pulsed out to the old office. Spacing between digits is 20 milliseconds.

* Disconnect time for the notest trunk is 200 milliseconds.

To begin the prompting sequence, the user inputs DEFINE OFFPARS. The following sequence then occurs:

ABBT SOFTWARE PROMPT:

Enter: <NBR OF SETS><PREDIAL DELAY><DISC RELAY><DISC TIME><SXS?>

USER:

3 0 A 0 NO

Enter: <PULSE TYPE><DIGIT NBR><STARTS><IDGTIME>

USER:

DP 7 XD 2

2. Define office parameters without use of prompts using parameters for example 1.

```
DEFINE OFFPARS 3 0 A 0 NO DP 7 XD 2
```

3. Define parameters for ABBT Test Unit 0 using the prompt mode of input. ABBT Test Unit 0 has the following characteristics:

* The ABBT Test Unit is located at the host DMS site.

* The primary SD circuit connected to ABBT Unit 0 is to be assigned to unused group 3 in system data table SDGRP.

* The SD primary circuit is located in MTM 3 22.

* The SCAN circuit connected to ABBT Unit 0 is to be assigned to unused group 5 in system data table SCGRP.

* The SCAN circuit is located in MTM 2 28.

* The outgoing trunk circuit connected to ABBT Test Unit 0 is to be assigned as unused trunk member 0 in the system data table TRKMEM.

* The trunk circuit is located in TM8 0 20.

* The column and row of the MTA Unit containing the first MTADRIVER on the horizontal used by ABBT Test Unit 0 are 0 and 0 respectively.

* The number of columns over which the horizontal appears starting at column 0 is 1 column.

* The horizontal of the MTA Unit used by ABBT Test Unit 0 is horizontal 11.

To begin the prompting sequence, the user inputs DEFINE ABBTSET. The following sequence then occurs:

ABBT SOFTWARE PROMPT:

Enter: <SET_NUMBER><AT HOST?>

USER:

O Y

ABBT SOFTWARE PROMPT:

<SD MEM><PM><NBR><CKT><SC MEM><PM><NBR><CKT>

<OUT MEM><PM><NBR><CKT><COL><ROW><HORIZ><NBR OF COLS>

USER:

3 MTM 3 22 5 MTM 2 8 0 TM8 0 20 0 0 11 1

4. Define characteristics of ABBT Test Unit 0 in without prompts using the parameters for example 3. The user inputs the following:

DEFINE ABBTSET 0 YES 3 MTM 3 22 5 MTM 2 8 0 TM8 0 20 0 0 11 1

5. Define the output types of test results to be output if all tests are to be output. The user inputs DEFINE OUTPUT TYPE ALL for the no-prompt mode.

If the user neglects to input ALL, the system displays the prompt

Enter: <TYPE OF OUTPUT>

6. Using the prompt mode of input, specify system file BBT1 as being the file in which the results of ABBT are to be accumu-

lated and printer PRT1 as the device to which accumulated test results are sent.

To begin the prompting sequence, the user inputs DEFINE OUTPTYPE. The following prompts are presented:

ABBT SOFTWARE PROMPTS

Enter: <OUTPUT DEVICE NAME><OUTPUT FILE NAME>

USER:

PRT1 BBT1

7. Without using prompts, specify system file BBT1 as the file in which ABBT results are accumulated and printer PRT1 as the output device to which the accumulated test results are sent.

   DEFINE OUTPTYPE PRT1 BBT1

8. Define manually the range of DN to be tested. The range of DN to be tested in the new office is from 621-0000 to 621-0099 and the range of DN is not associated with one particular ABBT Test Unit. Testing is to be conducted in order of DN.

   To begin the prompting sequence, the user inputs DEFINE DNINPUT. The following sequence occurs:

   ABBT SOFTWARE PROMPTS:

   Enter: <DN_WITH_SET?><INPUT TYPE>

   USER:

   NO MANUAL

   ABBT SOFTWARE PROMPTS:

   Enter: <NEW START_DN><NEW END_DN><OLD START_DN>
   <TESTING ORDER>

   USER:

   6210000 6210099 7770000 BYDN

ERRFILE	OPEN dev_name fl_name CLOSE

records all failed directory numbers during an ABBT test. It can be used as a DNINPUT file in the DEFINE command to retest failures from an earlier ABBT test.

Where:

OPEN — opens the error file on a specified device.

dev_name — is the name of the specified device on which the error file is opened.

fl_name — is the name of the error file to be opened for recording the failed directory numbers during an ABBT test.

CLOSE — closes the error file.

Note: Choose the FILE option in response to prompt "INPUT TYPE" for DNINPUT in the DEFINE command.

Responses:

YOU HAVE DEFINED AN ERROR FILE ALREADY. DO YOU WANT TO LOSE IT AND CREATE A NEW ONE ?

Explanation: An error file is already defined.

System Action: Generates the message

User Action: Enter Y if you want to create a new file, otherwise enter N.

BAD DEVICE NAME WAS PREVIOUSLY SPECIFIED. PLEASE TRY TO ERRFILE A NEW ERROR FILE.

Explanation: Incorrect device name was specified while creating an error file.

System Action: None

User Action: Specify a valid device name and re-enter the command.

COULD NOT CREATE THE ERROR FILE.

Explanation: System failed to create the error file.

System Action: Generates the message.

User Action: Check that the specified device name is valid. Check that the error file is already defined.

THERE IS AT LEAST 1 BBT SET IN TESTING. YOU CANNOT
CLOSE THE ERROR FILE UNLESS ALL BOARDS ARE STOPPED FIRST.

Explanation: The error file can be closed only after all testing is finished.

System Action: Outputs the message.

User Action: Make sure that all testing is finished before closing the error file.

SHOW	GENERAL ABBTSET bbt_set_nbr

displays information defined for ABBT (See note).

Where:

GENERAL displays general information such as information concerning the old office, the ranges of DN tested and the number of tests currently running.

ABBTSET displays information associated with one particular ABBT Test Unit.

bbt_set_nbr number of the ABBT Test Unit for which the associated information is to be displayed.

Range: 0 through 8

Note: If a DEFINE DNINPUT command has just been input in order to redefine the ranges of DN tested, the SHOW command will not display the updated information until the ABBT software rearranges the DN. This rearrangement occurs only after the START command is input.

Examples:

1. Show information for ABBT Test Unit 1. The user inputs the command SHOW ABBTSET 1. Information similar to the following is displayed:

```
ABBT 1:

Test Type : ALL - all tests if basic test passed.

EQUIPMENT ASSOCIATED:

   SDCARD:   SCSDGRPNO 5, on MTM 3 22,
   SDCARD:   SCSDGRPNO 5, on MTM 2 8,
   BBTOUT 0: TM8 0 20,

   MTA HORIZONTAL: Column 0 Row 0 Horizontal 8,
      Nbr of columns : 1.
TESTING INFO:
   Testing order is by DN,
   DN range presently associated with set:
        NEW OFFICE START DN: 722 4222
        NEW OFFICE END DN  : 722 4222
        OLD OFFICE START DN: 621 1234
       LAST DN DONE: 722 4222
     STATUS: NOT currently active.
```

Note: The display of MTA Horizontal and number of columns shown in this example is only valid for pre-BCS24 offices. For BCS24 and higher, Column, Row, Horizontal, and Nbr of columns is replaced by Vertical, Horizontal, Horizontal Group, and Nbr of verticals respectively.

2. Show general information. The user inputs the command SHOW GENERAL. Information similar to the following is displayed.

```
GENERAL DATA:

OFFPARS:
   You have 2 bbt sets,
   PRE_DIAL DELAY : 0 secs,
   Disconnect relay : A
   Disconnect time: 50 tenms,
   The old office IS NOT SXS,
   Old office PULSING type: DP,
   Number of digits to outpulse to the old office: 5
   Interdigital time: 10
   Start signal of 'BBTOUT' : XD

DNINPUT:
   The DN range is linked to set 0
   and we currently are testing

      START        : 722 4222
      TO           : 722 4222
      WITH OLD NBT : 621 1234

0 boards/processes are currently actively running.
```

START	[bbt_set_nbr ALL]

runs the Automatic Board-to Board Test associated with a specified ABBT Test Unit (See note 1 and note 4).

Where:

bbt_set_nbr number of the ABBT Test Unit for which the associated board-to-board test is to be run.

Range: 0 through 8

ALL starts all tests associated with all ABBT Test Units.

Notes:

1. Refer to Figure 6 on page 82 for a sample of ABBT results and to Table I on page 83 for an explanation of ABBT test result codes.

2. The START command is not executed unless the following has been done:

   * DEFINE ABBTSET has been input for each ABBT Test Unit connected.

   * The DEFINE command has been input once with each of parameters OFFPARS, DNINPUT, OUTPFILE, OUTPTYPE and TESTTYPE.

3. If underway, the test must first be ended by input of the STOP command before the test can be restarted.

4. The OG trunk to the old office must be in one of the following states in order to begin ABBT:

   * SB = System Busy

   * IDL = Idle

   * INI = Initialize

   To ensure that the trunk is in one of these states, access the TTP level of the MAP, then post, busy and return the trunk to service. This procedure is described in Performing ABBT on page 153.

5. If the START command is entered without parameters, the user is prompted for the required information.

Responses:

Software is setting up the dn ranges.
It might take up to 10 mins, and will tell you
when the test starts.

Explanation: This response appears only if testing in LEN order is specified. Up to 10 minutes may be required for ABBT software to set up the the DN in LEN order before testing begins. Before the test begins, a list of unassigned lines is displayed. The system indicates that the test has started by displaying the response:

Process/Board n is started.

Process/Board n is started.

Explanation: n is the number of the ABBT test unit specified when the START command was input. Ranges of DN have been set up and the specified board-to-board test process is being executed. Test results are accumulated in the file specified when DEFINE OUTPFILE was input. When the test is complete, test results accumulated will be sent to the output device specified.

NOTE: Headers in this figure are provided for explanatory purposes only.

SET NO	OLD DN	NEW DN	NEW OFFICE FRAME	NEW OFFICE UNIT	LEN LD	LEN LC	RESULT CODE	EXPLANATION
0	7353020	7259020	1	1	10	2	0	'OK'
0	7253029	7259029	2	1	10	2	0	'OK'
0	7253040	7259040	0	0	10	3	1	'UNASSIGNED'
0	7253061	7259061	0	1	10	3	0	'OK'
0	7253062	7259062	2	0	10	5	2	'TEST ACCESS FAIL'
0	7253074	7259074	2	1	10	5	0	'OK'
0	7253110	7259110	0	1	10	6	5	'OUTPULSING FAIL'
0	7253191	7259191	1	0	10	5	0	'OK'
0	7353201	7259201	1	0	10	3	6	'SEIZE FAIL'
0	7253276	7259276	1	1	10	3	7	'TRUNK OVERFLOW'
0	7253291	7259291	2	0	10	3	11	'IDLE FAULT'
0	7253300	7259300	2	1	10	3	0	'OK'
0	7253310	7259310	0	0	10	4	12	'BUSY FAULT'
0	7253321	7259321	0	1	10	4	0	'OK'
0	7253335	7259335	0	1	10	7	13	'T/R REVERSAL'
0	7353341	7259341	1	0	10	4	14	'LINE CLASS FAULT'
0	7253350	7259350	1	1	10	4	15	'PARTY FAULT'
0	7253355	7259355	2	0	10	4	0	'OK'
0	7253356	7259356	2	1	10	4	16	'ABNORMAL SCAN'
0	7253376	7259376	0	0	10	5	0	'OK'
0	7253396	7259396	0	1	10	5	17	'BUSY START'
0	7253404	7259404	1	0	10	6	0	'OK'
0	7253408	7259408	1	1	10	5	20	'START FAULT'
0	7253420	7259420	0	0	10	1	0	'OK'
0	7253424	7259424	0	1	10	1	38	'FILE READ FAULT'
0	7253425	7259425	1	0	10	1	0	'OK'
0	7253441	7259441	1	1	10	1	51	'T OPEN, R OPEN REV'
0	7253462	7259462	2	0	10	1	0	'OK'
0	7253484	7259484	2	1	10	1	52	'R OPEN, T OPEN REV'
0	7253487	7259487	0	0	10	2	0	'OK'
0	7253497	7259497	0	1	10	2	53	'T/R OPEN'
0	7253610	7259610	1	0	10	2	0	'OK'
0	7253620	7259620	1	0	10	10	54	'T OR R GROUND'
0	7253653	7259653	1	1	10	7	0	'OK'
0	7253718	7259718	2	9	10	7	55	'T/R SHORT'
0	7253730	7259730	2	1	10	7	0	'OK'
0	7252739	7259739	0	0	10	8	0	'OK'
0	7253797	7259797	1	0	10	8	0	'OK'

*** TEST COMPLETED FOR ABBSET 0 ***
*** TEST COMPLETED FOR ALL ABBSETS ***

Fig. 6 - Sample Printout of ABBT Results

TABLE I
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
0	OK: Passed all requested tests.
1	UNASSIGNED: There is no line equipment corresponding to specified DN. Normal calls would get some kind of intercept treatment. In these cases no attempt is made to query the old office.
2	TEST ACCESS FAIL: This result code may be followed by indication of a bad horizontal, a bad vertical, a hardware failure, a software error, a busy horizontal or a busy vertical. Refer to Table S on page 158 for probable causes and corrective action.
5	OUTPULSING FAIL: Most likely cause is a stop-dial signal from the old office during outpulsing for example, a busy test connector in SXS.
6	SEIZE FAIL: This indicates a problem in the seizure protocol and/or connection between the outpulsing trunk (via board- to-board test circuits) and the test trunk or equivalent in the old office. Reverse the setting of the REV button on the ABBT test set and check the wiring from the OG trunk card to the old office.
7	TRUNK OVERFLOW: Indicates that a connection could not be made to the old office (NOTEST Trunk could not access line in old office).
8	OFLO AT DMS MTA: A connection could not be made through the MTA of the DMS to access the new line because the crosspoints of the MTA associated with that line were busy.
11	IDLE FAULT: The ABBT test set has detected a condition which is known to be faulty, but which does not normally occur and therefore has not been refined to one of results 51 to 55. If this result persists for any given line, it should be reported so that it can properly classified.

Table Continued

TABLE I (Continued)
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
12	BUSY FAULT: Same as 11, except that the line was busy at the time.
13	T/R REVERSAL: Aside from reversals, this can indicate mismatched party types in the case of a SXS old office. For example party is ring party according to new office data but wired as tip party in old office.
14	LINE CLASS FAULT: Data indicates a Private Branch Exchange (PBX) line but the ABBT results disagree.
15	PARTY FAULT: The new and old office disagree on whether or not line is tip or ring party (See note). Note: Result code 15 is not used for old offices of the SXS, type. For SXS offices, see instead item 13.
16	ABNORMAL SCAN: The ABBT test set has detected a condition which is supposed to be impossible. This can happen if, for example, line was ringing at time of test, and simplex voltage is incorrect for busy lines. If the condition persists, stop the run and test the ABBT Test Unit using the TEST button (lamps OT, OR, NT, NR, and STOP should light).
17	BUSY START: These results only occur if the optional loop versus ground start test has been requested. It indicates that the line passed the BASIC test, but that the START or PARTY test could not be performed because the line was busy.
20	START FAULT: The line passed the BASIC test, but failed the optional loop versus ground start test. For example, the line is loop-start according to new office data but equipped as ground-start in the old office. An origination on a ground-start line during this test produces a test-failed result.

Table Continued

TABLE I (Continued)
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
21	A/B BITS FAILURE: The SMS failed to detect the A/B-bit pattern for the Channel Test Signaling pattern on the channel it was scanning. This fault is possible for a RCS in any mode of operation and indicates that the line equipment in the old switch and the new switch, associated with the DN being tested, do not terminate to the same subscriber loop; that the DN being tested is not assigned in the old switch; or that test access to the line on the old switch is busy. The switch operator should check the DN of the subscriber line as used in the old office, the test access availability to the subscriber line, and the line equipment designations for both the old and new switches.
22	DDL FAILURE: The SMS failed to detect the Trunk Assign message on the DDL for the line being tested. This fault applies to an RCS operating in Mode II and indicates that: * the line equipment in the old switch and the new switch, associated with the DN being tested, do not terminate to the same subscriber loop * the DN being tested is not assigned in the old switch * test access to the line on the old switch is busy The switch operator should check the DN of the subscriber line as used in the old office, the test access availability to the subscriber line, and the line equipment designations for both the old and new switches.
23	ABBT IN PROGRESS FOR RCS: The SMS has notified ABBT software that an ABBT Test is already in progress for the RCS. This occurs if the MTALME Table or, in the case of BCS24 and higher, the MTAVERT Table is improperly datafilled. Before an ABBT is requested on a RCS, the RCS is checked to see whether it has an ongoing ABBT. The switch operator should check the datafill in the MTALME or MTAVERT Table, as the case may be, to ensure all MTA are correctly datafilled for RCS modules.

Table Continued

TABLE I (Continued)
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
24	UNEQUIPPED PORT ON RCS: The port associated with the channel on which the SMS is to scan is unequipped. This fault arises when the CC and SMS data for the ports to the RCS are inconsistent. An SMS audit will clear this fault (SMS audits will be implemented in BCS 20).
25	SPECIAL MODE II CASE OF RCS: A line terminating on a single-circuit plug-in (channel unit) in one of the four rightmost slots of a RCS operating in Mode II cannot be tested using ABBT software.
26	INVALID SHELF MODE: The RCS shelf on which the line to be tested is located is in an invalid mode. Inconsistencies between the CC and SMS data on shelf modes causes this fault. The datafill in the RCSINV Table should be corrected.
27	OFLO AT DMS MTA FOR RCS: The crosspoints of the minibar in the MTALME Table or, in the case of BCS24 and higher, the MTAVERT Table associated with the RCS to be tested are busy, indicating that another test at the RCS is in progress. In the multiple ABBT environment, an attempt was made to execute more than one ABBT simultaneously on a RCS. The ABBT software will test the line later. This fault could arise if the vertical of the minibar switch was not released after an ABBT Test or if the ABBT was terminated abnormally (the vertical was connected and remained connected after the abnormal termination). If not in the multiple ABBT environment, a reload restart will clear the fault.
28	RCS NOT MANBUSY: The line to be tested belongs to a RCS that is not manually busy to the new, DMS-100 switch. The RCS should be posted at the MAP and manually busied.
29	INVALID NUMBER OF CIRCUITS: The channel unit to which the line to be tested connects had an invalid number of circuits. This indicates a data inconsistency between the CC and SMS about the number of circuits in the channel unit. The LNINV Table should be corrected.

Table Continued

TABLE I (Continued)
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
30	TIMEOUT ON SMS TEST REPLY: The SMS did not return the ABBT Test results to the CC within a specified time period. A problem exists at the SMS; possibly it has gone system busy during the test. Check the status of the SMS and its links at the MAP.
31	SWER: A SWER log is ouput indicating a fault occurred while testing the line. These SWER logs are described in the next three entries. In each case, the error type is MISC (Miscellaneous). For two cases, the Result Code is blank.
None	INVALID NODE NUMBER: The node of the line being tested is invalid.
31	RCS NODE STATUS NOT OBTAINED: The status of the RCS node could not be determined.
None	VERTICAL RELEASE FAILURE: The vertical associated with the minibar switch and RCS failed to release. The ABBT Test continues, but when another test on a line that connects to this RCS is attempted the message OFLO AT DMS MTA FOR RCS will be output in the test result file.
32	SWER: A SWER log is output indicating a fault occurred while testing the line. These SWER logs are described in the next seven entries. In each case, the error type is MISC (Miscellaneous), except when a fault exists in the messaging from the CC to the SMS, in which case the error type is BADRC (Bad Record).
32	BAD VERTICAL: The vertical of the minibar switch (used by DMS software to determine if an ABBT test is ongoing on the RCS to which a second line, for which an ABBT is requested, connects) is invalid.
32	NO MESSAGE: A problem exists in messaging from the CC to SMS.

Table Continued

TABLE I (Continued)
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
32	SMS NODE NUMBER NOT OBTAINED: The SMS node number could not be determined.
32	GET SOLICITOR NUMBER FAILED: A problem exists in messaging from the CC to the SMS.
32	ABBT MESSAGE PROBLEM: A problem exists in messaging from the CC to the SMS.
32	INVALID RETURN CODE FROM SMS/ABBT: The test result that the SMS returned to the CC was an unknown value.
33	LINE NOT IDLE: The line to be tested is busy. The +116 volt dc potential sent to the RCS during the ABBT Test severely degrades the talking path of a busy line, so only idle lines are tested. The ABBT Test for this line will be delayed and run later.
36	TERM CONTROLLER BIND FAIL: The ADTC is being used for another operation.
37	DMS-1U/LTA TEST ACCESS FAIL: The PGTC failed to apply ground to the tip of the NoTest Trunk, to indicate that the metallic test access was set up.
38	FILE READ FAULT: Can only occur when the DN to be tested are read from an input file, and an error occurs while reading the file. The probability of this is very low. The ABBT test is aborted.

Table Continued

TABLE I (Continued)
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
39	ABBT NOT PERFORMED ON RCU LINE: No ABBT executed because of inadequate resources or other problems. Refer to SWER logs for specific problem.
40	BBT FAILED ON RCU LINE: The ABBT failed on the line being tested. The line equipment and DN are incorrectly associated.
41	BBTDL NOT INSV: The ADTC is out of service. The ADTC must be returned to service and the ABBT attempted again.
42	INVALID REPLY FROM BBTDL: The ADTC sent an invalid reply.
43	BBTDL INVALID STATUS: The message received from the ADTC contained an invalid status.
44	TC NOT 1X67BD: The ADTC used to connect the data link is not NT1X67BD.
46	BBTDL INVALID DATA: The DCI card in the CT sent invalid data or the data got corrupted en route to the ADTC.
47	DCI INVALID USER OR PASSWD: A logon failure occurred because an invalid password or user identifier was supplied.
48	OFLO AT DMS MTA FOR RCU: Another line on the same RCU is being tested.
49	NO RESPONSE FROM BBTDL: ADTC or DCI card failed to reply to a request.
50	BBT NOT LOGGED ON DCI: The ABBT process is no longer logged onto the DCI. The test must be restarted.

Table Continued

TABLE I (Continued)
RESULT CODES AND EXPLANATIONS

RESULT CODE	EXPLANATION
51	T OPEN, R OPEN REV: Tip or ring open.
52	R OPEN, T OPEN REV: Tip or ring open.
53	T/R OPEN: Aside from open T and R leads, this can indicate a faulty or missing line card in the new office or one of many possible faults in testing continuity.
54	T OR R GROUND: Some ground conditions on busy lines will be detected as reversals or not at all. The one known case where this result indicates a short is on an idle tip party line in SXS.
55	T/R SHORT: One known case where this result does not indicate a short is a tip ground on a busy tip party line in a SXS office.

Note: Since the COT is not slave timed from the SMS during ABBT for RCS subscriber lines (the SMS and COT clocks are not in synchrony), slips will occur on the DS-1 links. When a DS-1 frame slips, DDL framing is lost. The SMS re-synchronizes DDL framing and sends an unsolicited message to the DMS switch. The extent of the timing mismatch will determine how frequently slips occur. When slips occur, a software (SWER) log is printed. These occurrences do not affect SLC-96 or DMS-100 operation. If a line fails the ABBT because of a frame slip, it will be retested.

STOP	bbt_set_nbr ALL

stops the Automatic Board-to-Board Test associated with a specified ABBT Test Unit (See Note 1).

Where:

bbt_set_nbr number of the ABBT Test Unit for which the associated board-to-board test is to be stopped.

Range: 0 through 8

ALL stops all tests associated with all ABBT Test Units.

Notes:

1. If the STOP command is input without parameters, the user is prompted for the required information.

5. DESCRIPTION OF CUTOVER

5.01 Three methods exist for cutting over subscriber lines from an old office to a new office. One method exists for the original ABBT method; a second method exists for the ABBT method used with subscriber lines connecting to an RCS; and a third method exists for the ABBT method used with subscriber lines connecting to an RCU.

5.02 Cutover to the new DMS should be executed only if:

* All wiring errors from the DMS to the MDF have been corrected.

* ABBT has been successfully performed on all lines to be cut over and the result codes for all lines tested are 0.

* All software needed to perform the switching function is loaded into the DMS and is operational.

* All DMS hardware is installed, is tested and is functioning correctly.

CUTOVER FOR THE ORIGINAL ABBT METHOD

5.03 At cutover time, lines to be cutover are first disconnected from the old office. Immediately thereafter, CO relays in the DMS office associated with lines being cutover are released under software control using the LMCUT program.

5.04 CO relays in the DMS may be released on an LC, LD, bay (LM), module (LCM) or frame basis using the LMCUT program. This permits the operating company to cut over at one time the number of lines best suited to the old office and that will produce the least interruption of subscriber service. To reduce interruption of subscriber service to a minimum, it is recommended that cutover be performed during low-traffic hours.

5.05 Before cutover, diode fixtures installed during the pre-cutover procedures must be removed. Ground straps installed to prevent accidental release of CO relays during rewiring and board-to-board testing must also be removed. The software command holding the CO relays of an LD in the operated state may be absent due to accidental erasure of files or a power failure. In this case, the CO relays will release when the strap is removed and subscriber service will therefore be interrupted. To avoid this possibility, all HOLD and CO relays that were operated during the pre-cutover procedures should be re-operated using the LMCUT program in offices where ground straps have been installed.

CUTOVER FOR THE ABBT METHOD WITH RCS LINES

5.06 Although Bridging Repeaters are recommended for ABBT to ensure that testing will work under all conditions, sometimes they are unnecessary. Details describing when Bridging Repeaters are unnecessary are to be determined.

5.07 If a Bridging Repeater is used for ABBT, it is removed prior to cutting the RCS lines over. This is accomplished by removing the patch cord that connects the COT monitor jack at the DSX frame to the Bridging repeater receive jack. The patch cord connecting the transmit jack of the Bridging Repeater to the receive jack of the SMS is also removed. Finally, the patch cords between the COT jacks and the Office Repeater jacks are removed, automatically completing a connection from the Office Repeater to the SMS through jumper cables. Figure 38 on page 167 shows the configuration used for cutover.

5.08 An example of a configuration used when the COT LIU powers the line for ABBT is shown in Figure 39 on page 168. In this case, the connection to the COT LIU is removed and the Office Repeater is plugged in simultaneously.

CUTOVER FOR THE ABBT METHOD WITH RCU LINES

5.09 Transferring service is best done during off-peak nightime hours to minimize disruptions to customers. Figure 40 on page 169 shows the equipment configuration in the DMS-1 Urban carrier system prior to cutover. Only two links, three and four, are shown, but up to eight links could be present. Figure 41 on page 170 shows the equipment configuration when links from the SMU are attached to links from the RCU and cutover is completed. Refer to Table V on page 166 for the steps to follow in cutting over RCU lines.

6. PROCEDURES

PRE-CUTOVER PROCEDURES

6.01 Before performing the original ABBT, read the pre-cutover summary in Table J, and execute the procedures given in Table K on page 95.

TABLE J
PRE-CUTOVER PROCEDURE SUMMARY

STEP	ACTION
1	Put ground straps on drawers to be placed in CUTOFF state. WARNING Cutoff relays on most line cards have been made more sensitive, and will operate with the current provided by the ground strap.
2	Enter the CUTOFF command for drawers that are to be placed into CUTOFF state. This action operates the HLD relay on the BIC card, and then momentarily operates the cutoff relay on each line line card in the drawer. The cutoff relay will be held up by the ground strap and the HLD relay.
3	Enter the CUTOVER command for all drawers in CUTOFF state. This action releases all HLD and cutoff relays, and ensures that no excess current is being used by the HLD and cutoff relays. The CO relays are held operated only by the ground strap.
4	Enter the NOBTST command for drawers in CUTOFF state to verify the status of the cutoff relay. Fix any failures.
5	Enter the QHOLD command for drawers in CUTOFF state to verify the status of the HLD relay.

TABLE K
PRE-CUTOVER PROCEDURE
(putting lines into CUTOFF state)

STEP	ACTION
1	Obtain the following equipment: * LMCUT non-resident software on magnetic tape * ground straps of one of the following types: – One NT2X1914 ground strap for each NT2X19AA line drawer to be tested – One NT2X1973 ground strap for each NT2X19AC line drawer to be tested – One AO2855 ground strap for each NT6X05AA line drawer to be tested
2	If the LM, LCM or RLM frame containing lines to be cut over is equipped with NT2X05AA power converters, obtain the following items: * One NT4X99A diode fixture for each frame in which more than 350 CO relays are to be kept in the operated state for an extended period. * A Digital Voltmeter (DVM) * A 3 inch by 4 inch card or equivalent and marker pens for marking a warning tag. * contact insulator such as toothpick
3	Install one ground strap on each line drawer to be put into CUTOFF state, as follows: WARNING CO relays on most line cards have been made more sensitive, and will operate with the current provided by the Ground strap. * On NT2X19AA line drawers, install the strap between pins 59 and 71 of the control cable connector for the

Table Continued

TABLE K (Continued)
PRE-CUTOVER PROCEDURE

STEP	ACTION

LD. This is the upper of the two connectors at the rear of the LD to be tested.

* On LD of types other than NT2X19AA, install the AO2855 or NT2X1973 strap across the two cutoff pins designated 'CO' at the rear of the LD to be tested.

5 If the frame containing the lines to be tested is equipped with NT2X05AA power converters, continue at Step 6. Otherwise, skip to Step 7.

6 When more than 350 CO relays on an LM/RLM frame are to be held in the operated state for an extended period, NT4X99AA diode fixtures must be installed to prevent accidental release of the CO relays in the event of +24 V power converter failure.

Exercise extreme care when installing the diode fixtures to ensure that power pins 37 through 44 are not short-circuited to ground pin 46 on the LM/RLM terminal strip. See Figure 7 on page 101.

Should it become necessary to replace a NT2X05 power converter, remove the diode fixtures before commencing converter replacement.

CAUTION

Failure to exercise these cautions may result in the shut-down of power to the frames, damage to the terminal strips and subsequent loss of subscriber service.

Refer to Figure 7 on page 101 to install the diode fixtures as described in the following steps:

a Using the DVM, ensure that pins 1 through 4 are not shorted to pins 5 through 7 on the the diode fixture connectors.

b Set the DVM to OHMS, connect the DVM leads across one of the diodes in the fixture and measure the diode

Table Continued

TABLE K (Continued)
PRE-CUTOVER PROCEDURE

STEP	ACTION
	resistance. Reverse the DVM leads and measure again. In one direction the resistance should be 25-100 ohms and 200-500 ohms in the opposite direction.
	c Test the remaining diodes in the fixture as outlined in Step b.
	d Verify that the LM, LCM or RLM frame is in working condition and is not in the "takeover" mode of operation.
	e Insert a contact insulator such as a toothpick into pins 5 and 6 of each diode fixture connector and cut off flush with the surface of the connector. This will assist in preventing a short-circuit of power to ground when plugging in the connector.
	f Connect the diode fixture connectors to the terminal strips of the LM, LCM or RLM frames as shown in Figure 7 on page 101. The connector spans pins 37 through 44 of the terminal strip. Both connectors on the diode fixture are identical, therefore connectors on the diode fixture may be connected to either bay.
	g Create and install a warning tag for each LM/RML frame in which the diode fixture has been installed. The tag should give the following warning: CAUTION: REMOVE DIODE FIXTURE BEFORE REPLACING 2X05 POWER CONVERTER".
7	Install the LMCUT software tape on an idle Magnetic Tape Drive (MTD).
8	Input: MOUNT n n number of the magnetic tape drive on which LMCUT software tape is installed.
9	Input: LIST Tn TO LMCUTSUB$FC n number of the MTD specified in Step 18.
10	Input: COPY LMCUTSUB$FC SFDEV

Table Continued

TABLE K (Continued)
PRE-CUTOVER PROCEDURE

STEP	ACTION
11	Input: LISTSF ALL
12	Input: READ LMCUTSUB$FC
13	Input: DEMOUNT Tn n number of the MTD specified in Step 18.
14	Input: LMCUT to start the LMCUT program.
15	The following steps operate the cutoff relays on line cards and ensure that these relays will remain operated while ABBT is being performed. CAUTION Cutoff relays must not be released until ABBT is complete and all connection errors are corrected. For each line drawer containing lines to be cut over: a Input: CUTOFF site frame unit drawer to operate the HLD relay on the BIC card, and to operate then release one-by-one, every line card cut-off relay in the drawer. Because a ground strap was installed in Step 3, and the HLD relay is operated, the cutoff relays will remain in the operated state. b Input: CUTOVER site frame unit drawer to ensure that no software command is operating the HLD relay. Note: Entering the CUTOVER command ensures that software is not being used to keep the HLD and cutoff relays operated. The cutoff relays remain operated only because of the GRD strap. c Input: NOBTST site frame unit drawer

Table Continued

TABLE K (Continued)
PRE-CUTOVER PROCEDURE

STEP	ACTION
	to verify the status of the cutoff relay on each line card. ->Information under the Status header is: OK relay is operated and line is cut off FAIL relay is not operated NEQ not equipped
d	If any line cards have a status of FAIL, continue at Step c. Otherwise, skip to Step h.
e	Replace line cards having a status of FAIL.
f	Access the LTP level of the MAP and use the DIAG command to run extended diagnostic tests on each line card replaced.
g	For each line card replaced, repeat Steps a through f again.
h	Leave the CO relays in the operated state for at least 6 hours.
i	If necessary, input: LMCUT to reaccess LMCUT software.
j	For each line drawer, input: NOBTST site frame unit drawer to verify the status of the cutoff relay on each line card once again. ->Information under the Status header is: OK relay is operated and line is cut off FAIL relay is not operated NEQ not equipped
k	Replace any failed line cards as described in Steps d through g.
16	Input: QHOLD to verify the status of all HLD relays.

Table Continued

TABLE K (Continued)
PRE-CUTOVER PROCEDURE

STEP	ACTION
17	Input: QUIT to leave the LMCUT program.
18	The pre-cutover procedures are now complete.

SETTING UP ABBT EQUIPMENT

6.02 Proceed as described in Table L on page 102. Repeat the steps in Table L on page 102 once for each ABBT Test Unit being used.

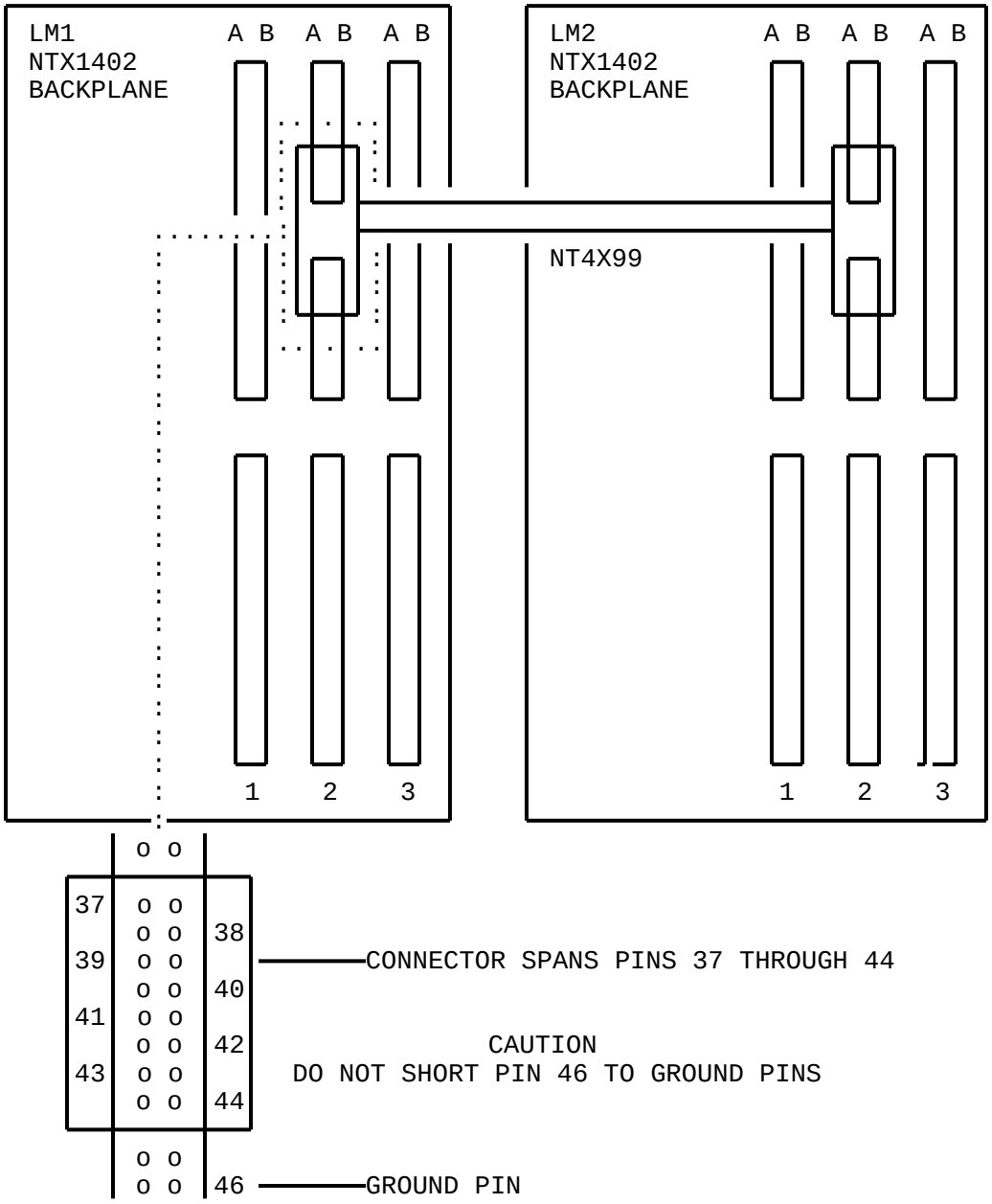


Fig. 7 - Diode Fixture Installation

TABLE L
SETTING UP ABBT EQUIPMENT

STEP	ACTION
1	Obtain the test equipment given in Table M on page 104 for the old office being replaced. See REFERENCES for a listing of the General Specifications (GS) describing the units listed in Table M on page 104.
2.	Refer to the figure listed below for the old office being replaced and connect the test equipment together as shown ensuring that Cables A through D are connected to the ABBT Test Unit as indicated in Table N on page 116. Connections for Cable E are indicated on the referenced figures.

*	AEI (Woolwich) SXS	Figure 8 on page 117
*	A TEL + ELECT CO 2000 SXS	Figure 9 on page 118
*	A TEL + ELECT CO 4000 SXS	Figure 10 on page 119
*	AE SXS	Figure 11 on page 120
*	AE C1-EAX	Figure 12 on page 121
*	AE No.1 EAX	Figure 13 on page 122
*	Bell Laboratories No.1 XBAR	Figure 14 on page 123
*	Bell Laboratories No. 355A SXS	Figure 15 on page 124
*	Bell Laboratories No. 3 ESS	Figure 16 on page 125
*	FED TEL + RADIO SXS	Figure 17 on page 126
*	Hitachi SXS-1E	Figure 18 on page 127
*	ITT A1 Pentaconda	Figure 19 on page 128
*	ITT 10C Metaconda	Figure 20 on page 129
*	ITT 7E (Belgium)	Figure 21 on page 130
*	NEC ND20	Figure 22 on page 131
*	NEC 23BA	Figure 23 on page 132
*	NE NX1D	Figure 24 on page 133
*	NTL DMS-10	Figure 25 on page 134
*	NTL DMS-100	Figure 26 on page 135
*	NTL No.1 ESS	Figure 27 on page 136
*	NTL No.5 XBAR	Figure 27 on page 136
*	NTL SA-1	Figure 28 on page 137
*	NTL SF-1	Figure 29 on page 138
*	NTL SP-1	Figure 27 on page 136
*	NTL NE-1	Figure 30 on page 139
*	NTL 350A	Figure 30 on page 139
*	NTL 355A	Figure 30 on page 139
*	SC X-Y	Figure 31 on page 140
*	USI Motorswitch	Figure 32 on page 141
*	WE SXS	Figure 33 on page 142
*	RLM within metallic range	Figure 34 on page 143
*	RLM beyond metallic range	Figure 35 on page 144
*	SLC-96 Carrier System	Figure 36 on page 145
*	DMS-1 Urban Carrier System	Figure 37 on page 146

Table Continued

TABLE L (Continued)
SETTING UP ABBT EQUIPMENT

STEP	ACTION
3.	Set the ABBT Test Unit Controls described in Table A on page 36for the old office type and line conditions where ABBT is to be performed.
4.	Set the switches on the NT2X57AB SD card as follows: SWITCH NUMBER — POSITION S1.00 through S1.06 — DOWN S1.10 through S1.16 — DOWN S2.00 (1) through S2.06 (1) — OFF S2.10 (1) through S2.16 (1) — OFF S2.00 (4) through S2.06 (4) — ON S2.10 (4) through S2.16 (4) — ON
5.	Set the switches on the NT0X01AA SCAN card as follows: SWITCH NUMBER — POSITION S1.0A through S1.6A — OFF S1.0B through S1.6B — OFF
6.	Connect the variable battery to the SX+ and SX- terminals of the ABBT Test Unit.

TABLE M
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
Note: When applicable, one piece of equipment is required unless otherwise specified in the NOTES column of this table.			
Common Requirement	NT5X73AB	ABBT Test Unit	1. A modified NT5X73AB Test Unit is used for ABBT run on subscriber lines connecting to a RCS.
Common Requirement	NT2X46AA	MTA Unit See GS2X46 for details.	1. Provides access to new line appearances. 2. One horizontal with access to all lines in the new office must be dedicated to ABBT.
Common Requirement	NS6573 (variable battery)	15.0V to 22.5V power pack with taps at 1.5V intervals.	1. Used in conjunction with No. 773 Eveready power pack.
Common Requirement	No.773 Eveready (variable battery)	5.0V to 7.5V power pack with taps at 1.5V intervals.	1. Used in conjunction with the NS6573 power pack. 2. Used to operate the SD and the SCAN relays in the ABBT Test Unit. 3. The choice of an incorrect voltage will give incorrect results on busy lines with short loops. Reducing the voltage will correct the problem.

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
Common Requirement	NT0X10AA	Miscellaneous Scan Card See GS0X10 for details.	1. One circuit is needed to drive the five SCAN points (detectors) of each ABBT Test Unit. 2. Should be dedicated to ABBT. 3. For offices within the metallic range, the Scan Card is inserted in an unused Maintenance Trunk Module (MTM) or the Office Alarm Unit (OAU). 4. For offices beyond the metallic range, the Scan Card is inserted in the Remote Service Module (RSM) at the remote site.
Common Requirement	NT2X57AB	Signal Distribution Card, Type I. See GS2X57 for details.	1. The two circuits on the card are required to drive the 10 signal distribution points of the ABBT Test Unit. 2. The modified ABBT Test Unit used for RCS subscriber lines uses 13 SD points.

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
Common Requirement	NT2X83AA	2-wire Outgoing DP Reverse Battery Trunk Card. See GS2X83 for details.	1. Provides out-pulsing to the old office. The ABBT program provides only single pulses to step the test connector for SXS offices. 2. One circuit is required for each ABBT Test Unit.
Common Requirement	NT0X26AU	Cable set consisting of five cables: A(TUDF01) B(TUDF02) C(TUDF03) D(TUDF04) E(TUDF05)	1. Cable A is not necessary for ABBT with RCS lines being cutover to a new office with an SMS.
All DMS offices having NT2X19AA Line Drawers	NT2X1914	Line Drawer Cutover Cord (Ground Strap)	1. One is required for each NT2X19AA Line Drawer (LD) involved in ABBT and cutover. 2.Installed in LD where CO relays on the LC are to be held in the operated state for extended periods. Ensures that the T and R leads of LC remain disconnected from the host office during ABBT.

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
All DMS offices having NT6X05 Line Drawers	AO2855	LD Cutoff Strap	1. One is required on each NT6X05AA LD involved in ABBT and cutover. 2. Installed in NT6X05AA LD where CO relays on LC are to be held in the operated state for extended periods. Ensures that the T and R leads of LC remain disconnected from the host office during ABBT.
All DMS offices having NT2X19AC Line Drawers	NT2X1973	LD Cutoff Strap	1. One is required on each NT2X19AC LD involved in ABBT and cutover. 2. Installed in NT2X19AC LD where CO relays on LC are to be held in the operated state extended periods. Ensures that the T and R leads of LC remain disconnected from the host office during ABBT.

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
All DMS offices having NT2X05AA Power Converters	NT4X99A	Line Cutover Cord (Diode Fixture)	1. One is required for each LM, LCM, or RLM involved in ABBT and cutover equipped with NT2X05AA power converters. 2. Installed in LM, LCM or RLM frames equipped with NT2X05AA power converters where more than 350 cutoff relays will be in the operated state at one time.
AEI Woolwich SXS	NT2X79AA	Test Distributor Circuit	1. Allows access to old line appearances. 2. Must be dedicated to ABBT. 3. Must function on a no-test, no-ring, and no-hunt basis.
AEI (Woolwich)	XT11727	Test Selector	1. See notes 1 and 3 for NT5X79AA
A TEL + ELECT CO Type 4000 SXS	S236260	Test Selector	1. See notes for AEI (Woolwich) SXS 2. For busy override short capacitors C2 and C3 on the test selector
	NT5X79AA	Applique Circuit	2. See notes for AEI (Woolwich) SXS

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
A TEL + ELECT CO Type 2000 SXS	S204241 OR S218150	Test Selector	1. See notes for AEI (Woolwich) SXS 2. For busy override short capacitors QB and QC on the test selector
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
AE SXS 4-digit	H580092-A	Test Distributor	1. See notes for AEI (Woolwich) SXS
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
AE SXS 5-digit	H580219-A	Test Distributor	1. See notes for AEI (Woolwich) SXS
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
AE CI-EAX	PH87100-A	Remote Subscriber Test Access Trunk Circuit	1. See notes for AEI (Woolwich) SXS
AE No. 1 EAX	EL-10202	Incoming Test Trunk circuit	1. See notes for AEI (Woolwich) SXS
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
Bell Labs No. XBAR	SD-25432-01	Incoming Test	1. See notes for AEI (Woolwich) SXS
Bell Labs No. 355A SXS	SD31743	Test Distributor	1. See notes for AEI (Woolwich) SXS
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
Bell Labs No. 3 ESS	CPS-FB519	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
FED TEL + RADIO SXS	C-10307	Test Distributor	1. See notes for AEI (Woolwich) SXS
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
Hitachi SXS-1E	732581	Incoming Test Distributor	1. See notes for AEI (Woolwich) SXS
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
ITT A1 Pentaconda	LSC-072 -145	Wire Chief Test and Identification Circuit	1. See notes for AEI (Woolwich) SXS
ITT 10C Metaconda	SCT-324-1021	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
ITT 7E (Belgium)	AS-6-1551	Wire Chief Group Selector	1. See notes for AEI (Woolwich) SXS 2. For busy override: -short capacitors (1/2 microfarad) across leads "a" and "b" -insulate contacts L61 and L62 of relay L6R.
	OR		
	S-6-1642	Wire Chief Group Selector	1. See notes for AEI (Woolwich (SXS) 2. For busy override: -short capacitors (1/2 microfarad) across leads "a" and "b" -insulate contacts L61 and L62 of relay L6R

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
NEC ND20	S4435A-LCRAP	Test Trunk Interface Circuit	1. See notes for AEI (Woolwich) SXS 2. For busy over-ride, prevent operation of relay SA or bridge contacts SA0 and SA1.
NEC 23BA	LTB-XC 72721-001	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS
NE NX1D	C-A-1452-C	Local Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS 2. For busy override prevent operation of relay LBY by insulating the contact of relay C1
NTL DMS-10	NT2T16	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS
NTL DMS-100	NT2X90AB	Incoming Test Trunk circuit	1. See notes for AEI (Woolwich) SXS
NTL NE-1, 350A, 355A	SD31401	Test Distributor Control Circuit	1. See notes for AEI (Woolwich) SXS
	OR		
	SD31349	Test Distributor Control Circuit	1. See notes for AEI (Woolwich) SXS

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
	OR		
	SD32007	Test Distributor	1. See notes for AEI (Woolwich) SXS
	WITH A		
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS 2. NT5X79AA is used only with the SD32007 test distributor
NTL No.1 ESS	SD1A186	Incoming Test	1. See notes for AEI (Woolwich) SXS
NTL No. 5 XBAR	SD26136	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS
	OR		
	SD25078	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS 2. SD26136 supercedes SD25078
NTL SA-1	SD 4168-01	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS
NTL SF-1	KSD4770-01	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS
NTL SP-1	SD 1Y53-01	Incoming Test Trunk Circuit	1. See notes for AEI (Woolwich) SXS

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
SC X-Y	S419027	Test Selector	1. See notes for AEI (Woolwich) SXS 2. For busy override prevent operation of TS relay on the test selector.
	OR		
	S30160	Test Selector	1. See notes for AEI (Woolwich) SXS 2. For busy override prevent operation of TS relay on the test selector
USI Motorswitch	C-704884	Test Distributor	1. See notes for AEI (Woolwich) SXS
	CS4530	Test Connector	1. Used with C-704884
	NT5X79AA	Applique Circuit	1. See notes for AEI (Woolwich) SXS
WE SXS	SD31401	Test Distributor Control Circuit	1. See notes 1 and 3 for NT5X79AA
RLM beyond metallic range Dial Pulse (DP) signaling	DP0QPP354	Transmitter	1. Part of dedicated channel bank facility 2. Used for DP applications
	DPTQPP356	Receiver	1. Part of dedicated channel bank facility 2. Used for DP applications

Table Continued

TABLE M (Continued)
EQUIPMENT REQUIRED FOR ABBT

OFFICE TYPE	CODE OR TYPE NO	DESCRIPTION	NOTES
RLM beyond metallic range, Multifre-quency (MF) signaling	QVF16	Multiplexer	1. Part of dedicated channel bank facility 2. Used for MF applications
	QVF17	Decoder	1. Part of dedicated channel bank facility 2. Used for MF applications
	2W E+M	Transceiver	1. Part of dedicated channel bank facility 2. Two are required
Offices associated with SLC-96 carrier systems	QRY20A	Bridging Repeater	1. Bridging repeaters are recommended to interface the SMS to the COT
Offices associated with DMS-1 Urban carrier systems	NT3A41AB	Dynamic Control Interface Card	1. The DCI card is required for message transfer between the CT and DMS switch
	NT1X67BD	Auto Dial Terminal Controller	1. The ADTC communicates with the DMS switch and connects to the CT through a data link

TABLE N
COMMON BOARD-TO-BOARD CONNECTIONS (CABLES A THROUGH D)

CONNECTIONS AT THE NT5X73AB TEST UNIT END OF THE CABLE				CONNECTIONS AT THE DMS-100 END OF THE CABLE		
CABLE IDENTIFICATION	CONNECTOR IDENTIFICATION	PIN NO.	LEAD IDENTIFICATION	PIN NUMBER OR LOCATION ON THE DMS		
A TUDF01	A	1 2	T1 R1	MTA Unit, NT2X46AA (Any unassigned horizontal level may be used)		
B TUDF02	B			SCAN CONN	NT0X10AA CARD CONN	SCAN POINT
		1	OT	3	19A	1.06
		2	OR	61	17A	1.05
		3	NT	49	10A	1.04
		4	NR	37	8A	1.03
		5	STOP	25	6A	1.02
		6	SIG	13	4A	1.01
C TUDF03	C			SD CONN	NT2X57AB CARD CONN	SD POINT
		1	A	3	19A	1.06
		2	B	61	17A	1.05
		3	C	49	10A	1.04
		4	D	37	8A	1.03
		5	E	25	6A	1.02
		6	F	13	4A	1.01
		7	G	1	1A	1.00
		8	H	17	33A	1.16
		9	J	5	31A	1.15
		10	K	63	29A	1.14
		11	L	51	27A	1.13
		12	O	39	25A	1.12
	(TUD05)	8	CR	27	23A	1.11
D TUDFO4	D	1 2	RT TT	(OG TRUNK CARD) (NT2X83AA)		

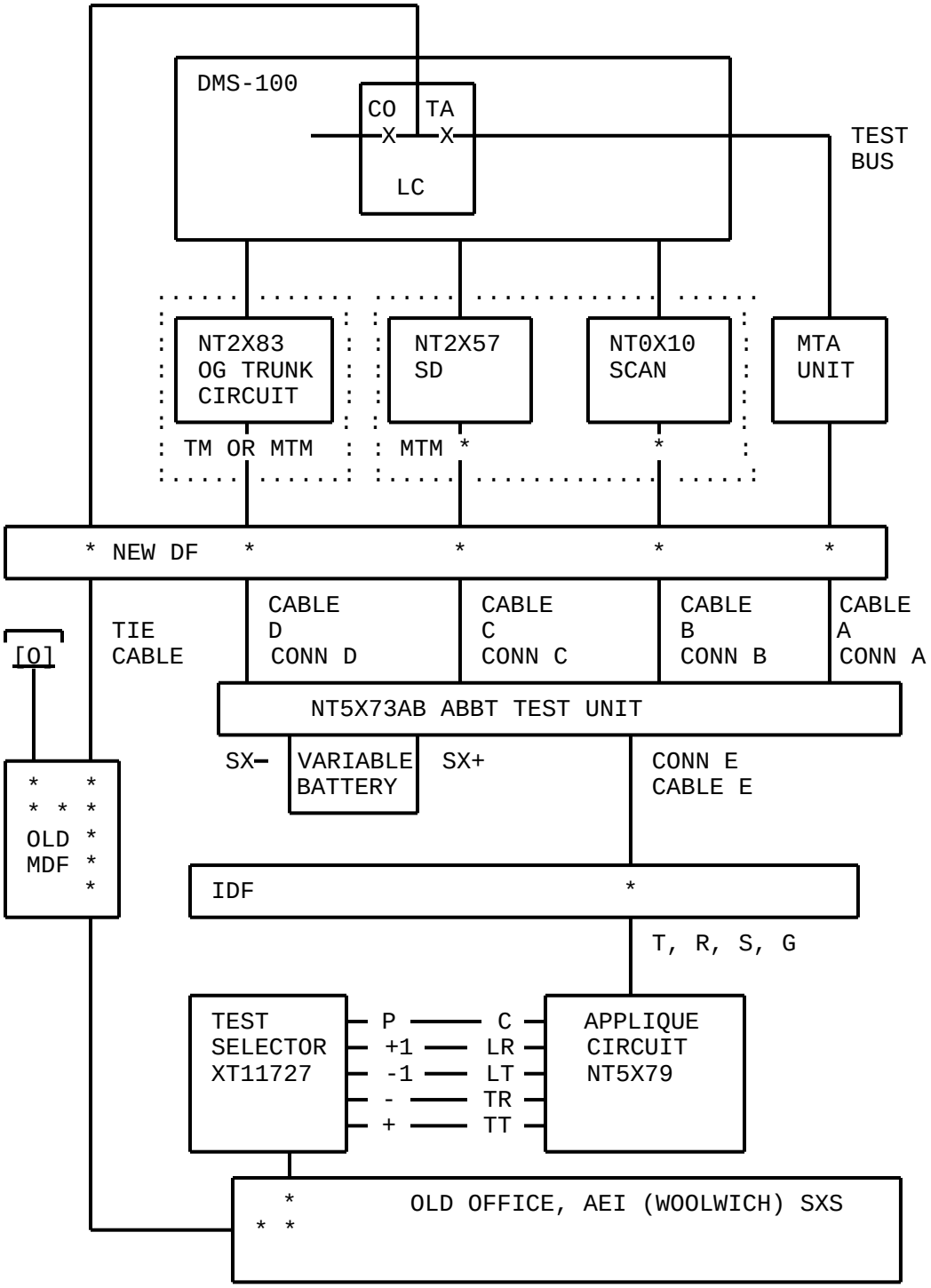


Fig. 8 - ABBT Connections for AEI (Woolwich) SXS Switches

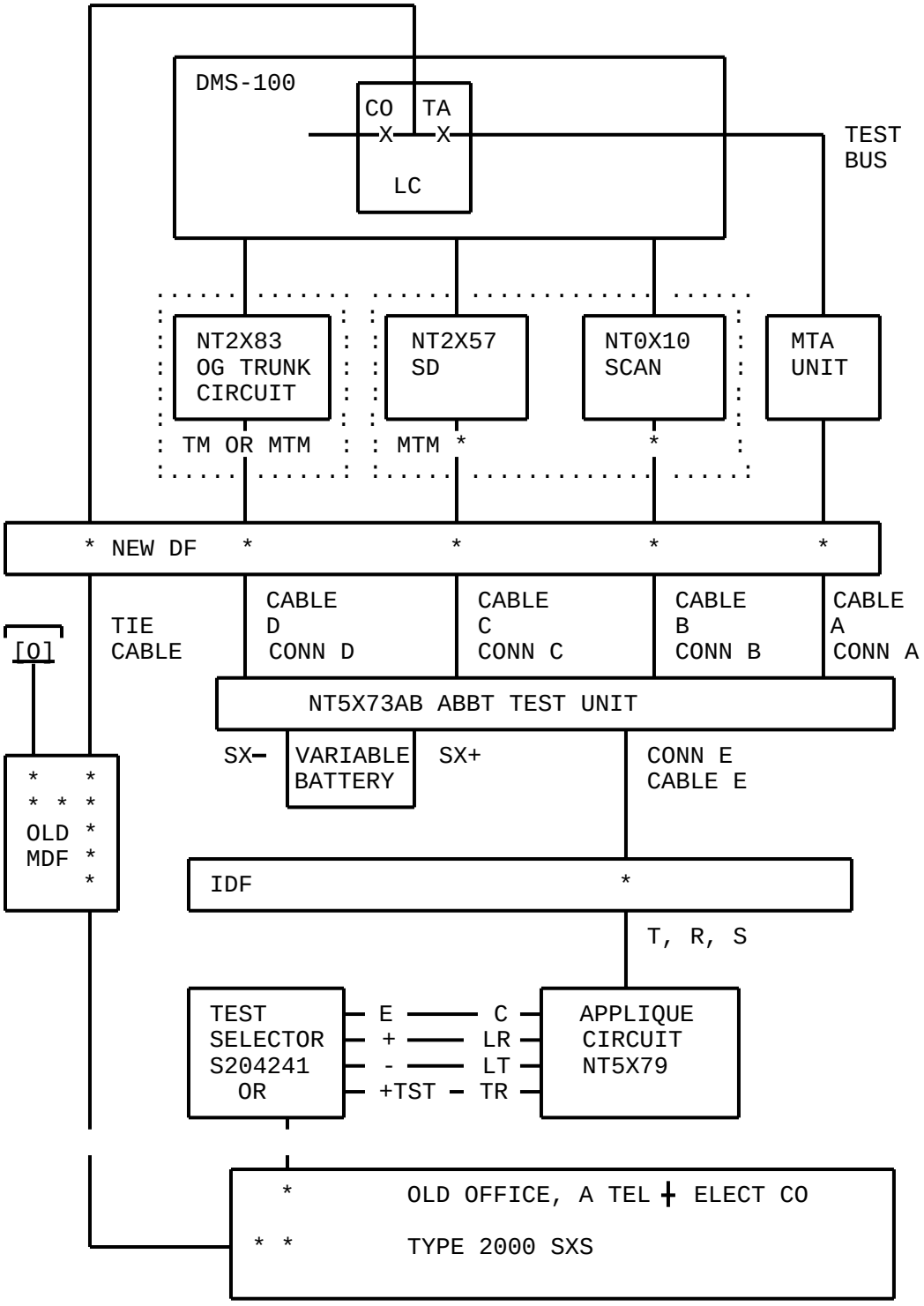


Fig. 9 - ABBT Connections for A TEL + ELECT CO TYPE 2000 SXS

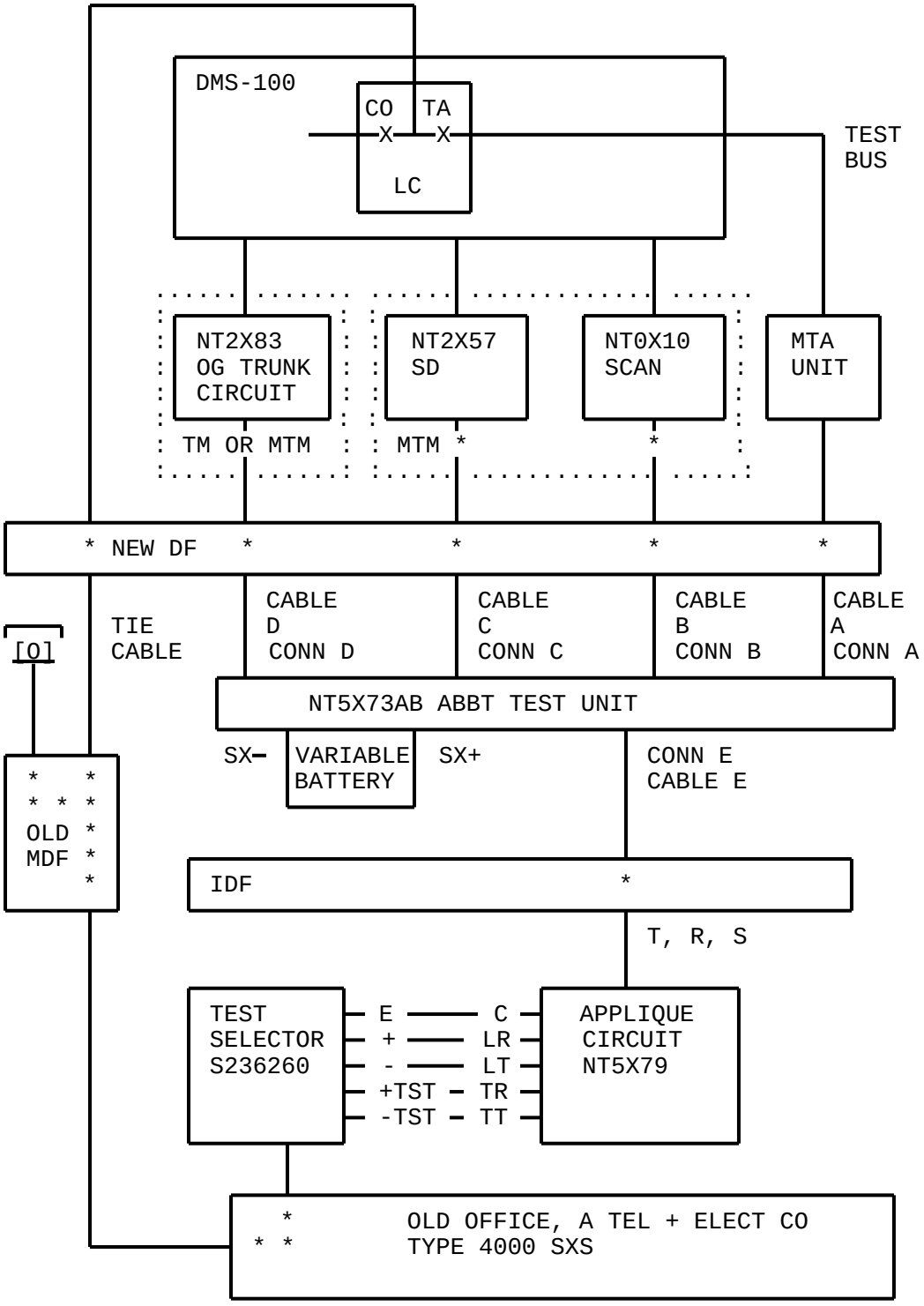


Fig. 10 - ABBT Connections for A TEL + ELECT CO Type 4000 SXS

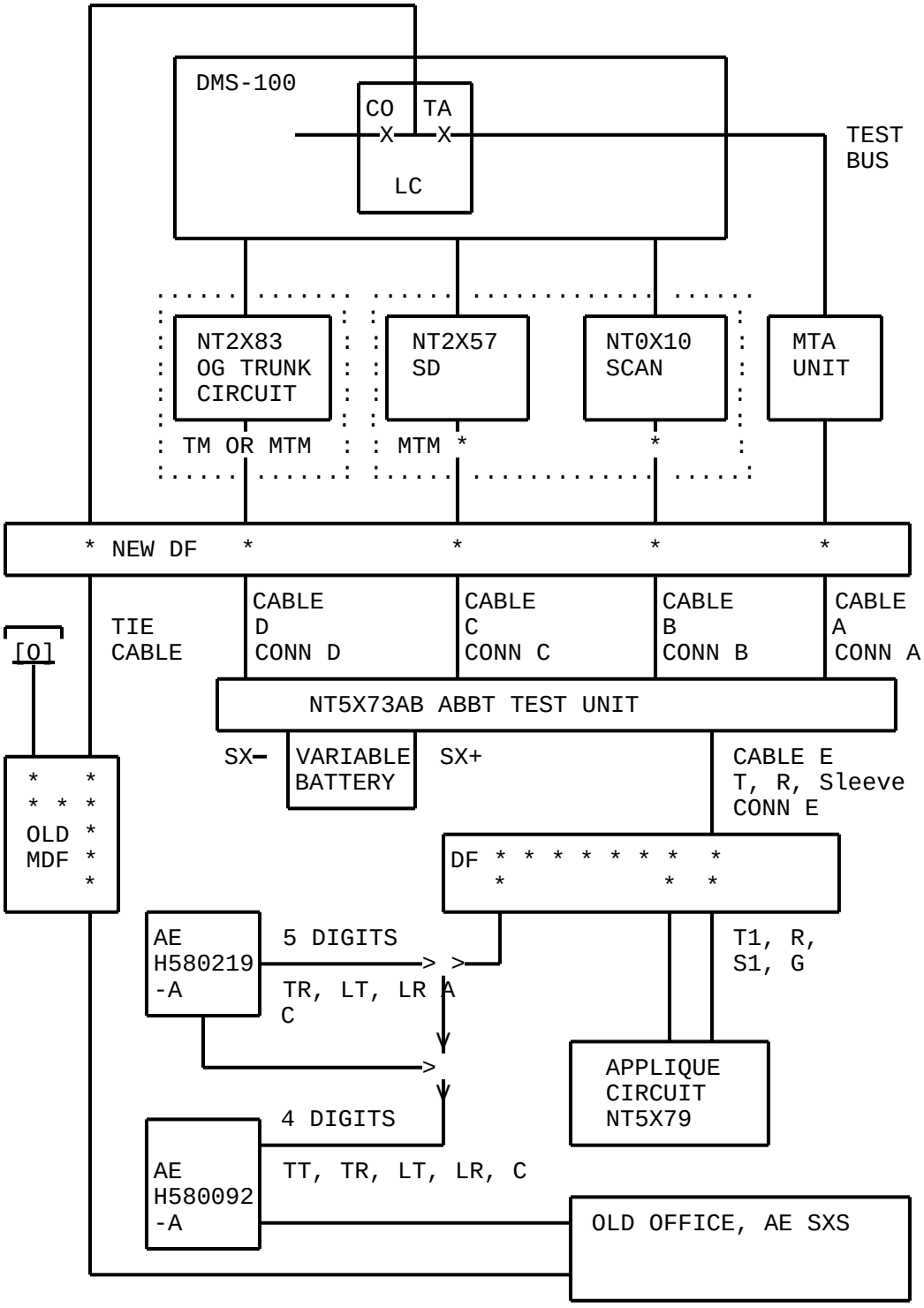


Fig. 11 - ABBT Connections For AE SXS Switches

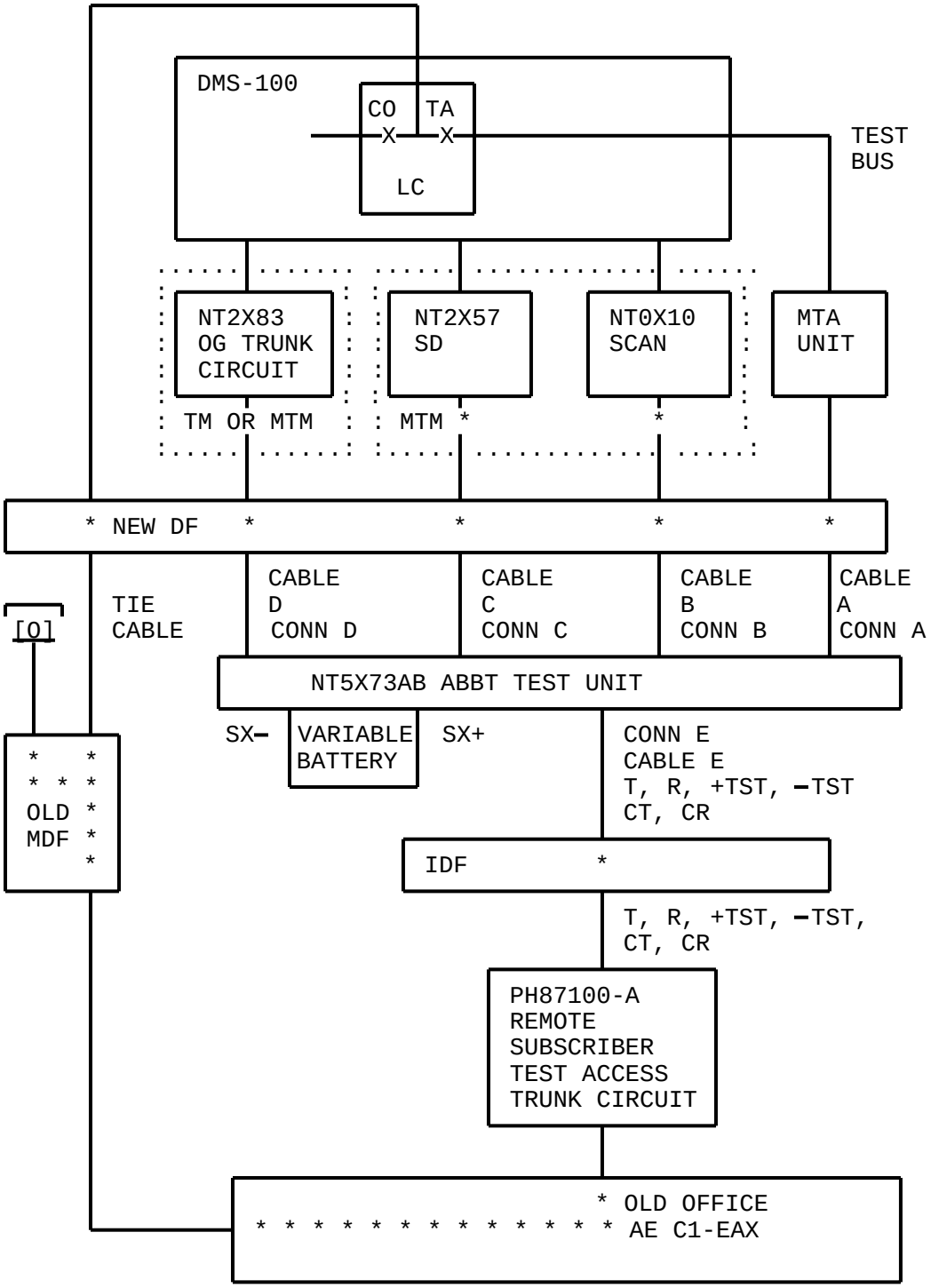


Fig. 12 - ABBT Connections for AE C1-EAX Switches

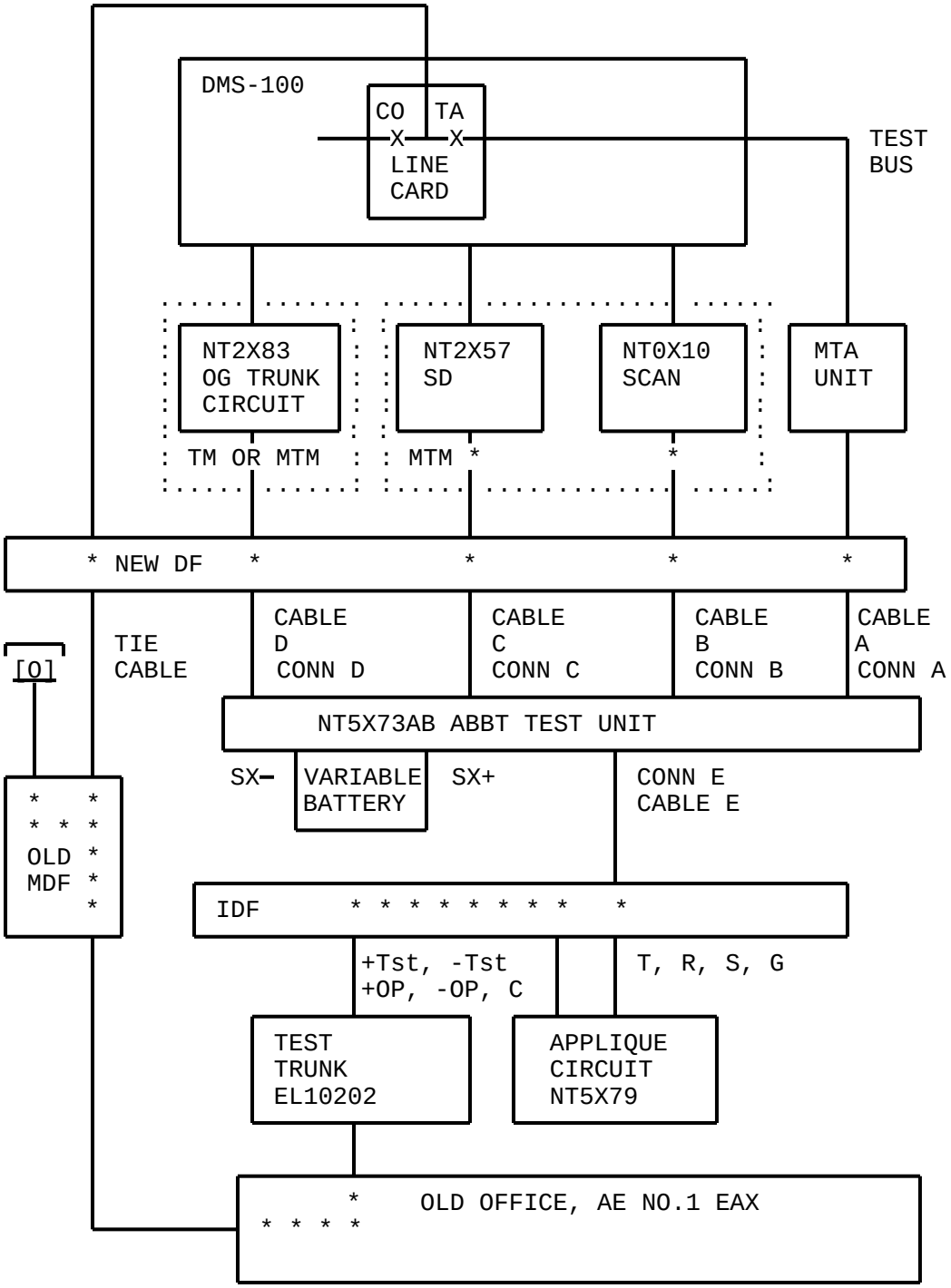


Fig. 13 - ABBT Connections for AE No.1 EAX Switches

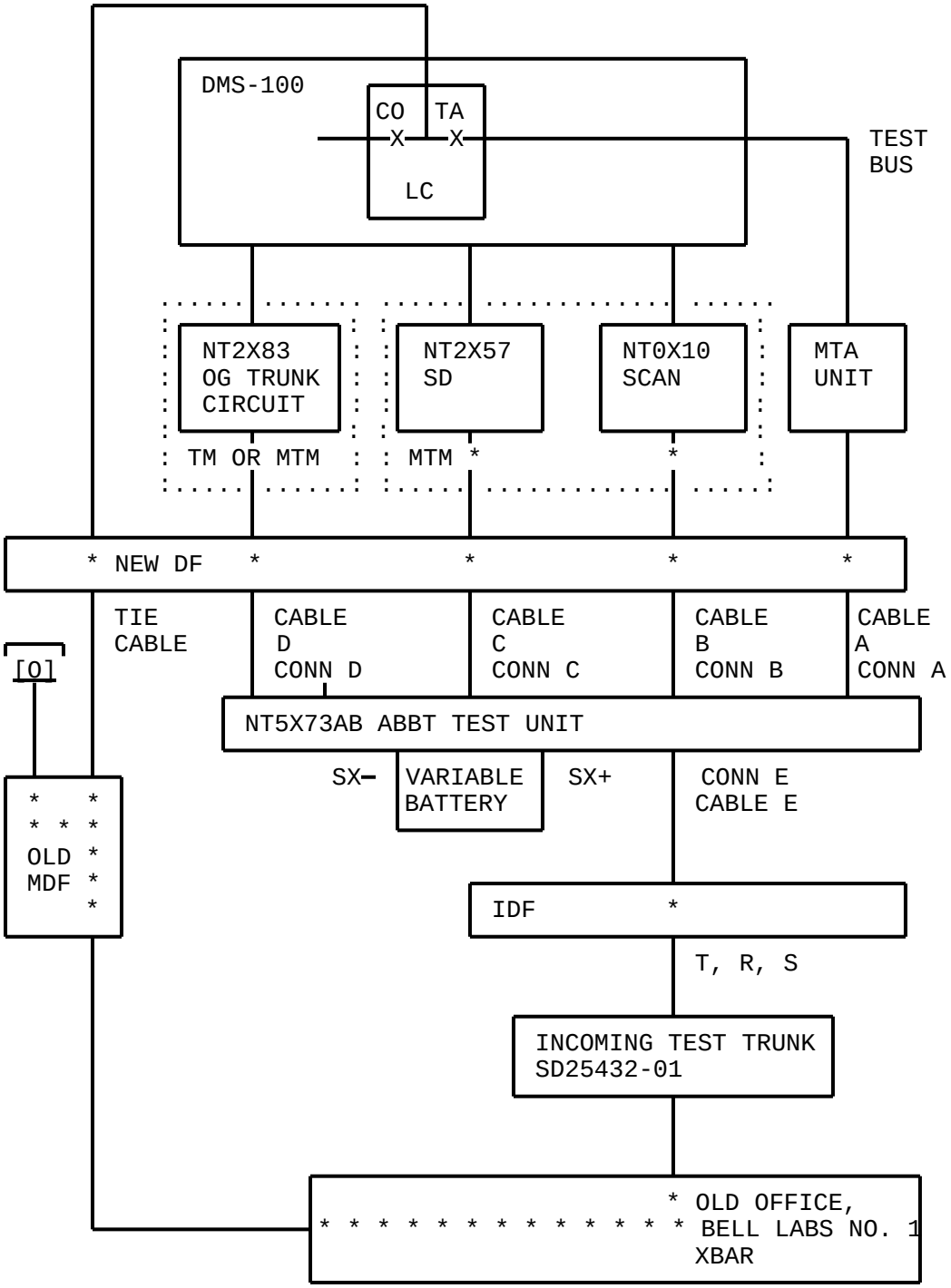


Fig. 14 - ABBT Connections for Bell Laboratories No.1 XBAR

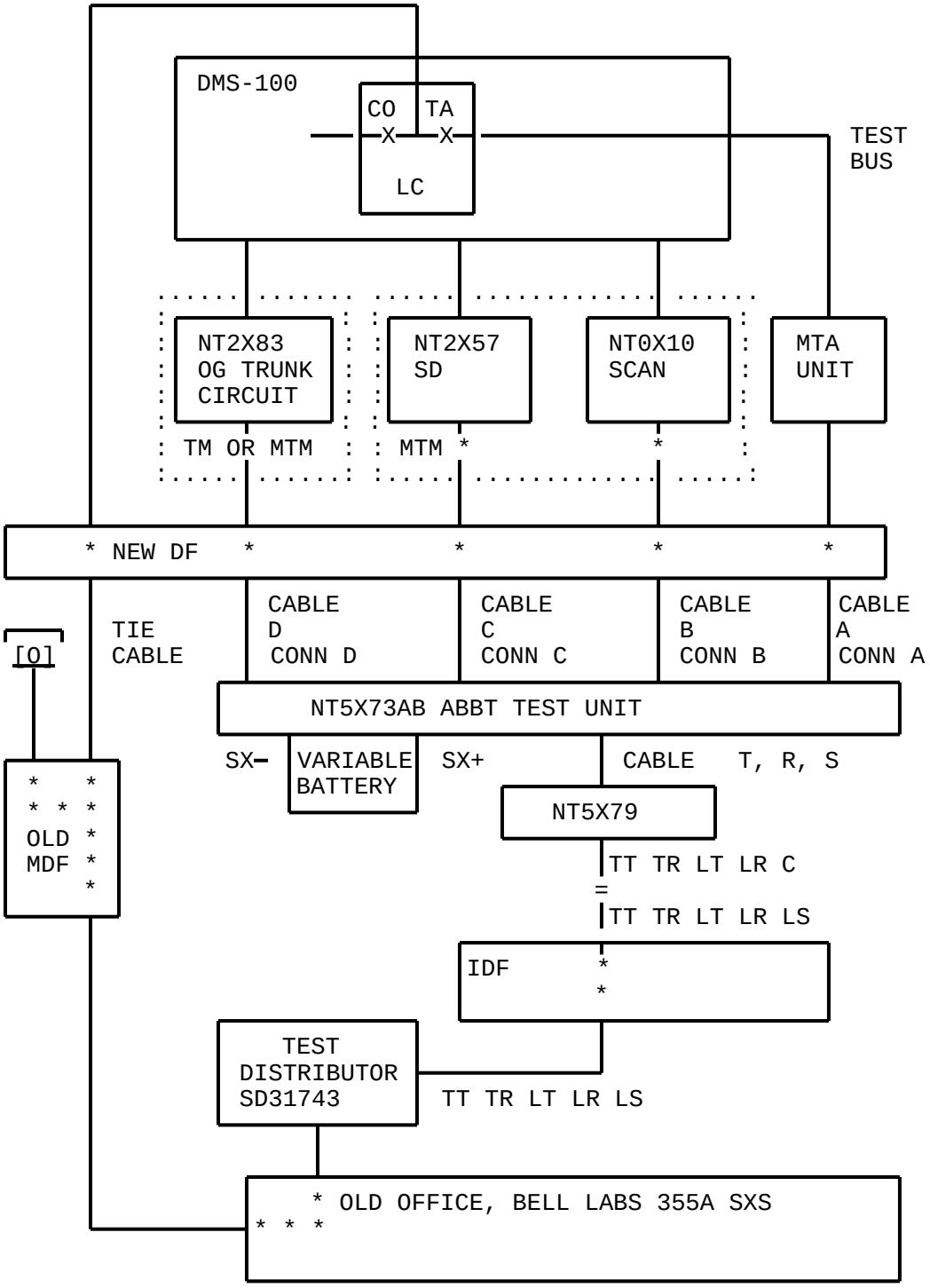


Fig. 15 - ABBT Connections for Bell Laboratories No. 355A SXS

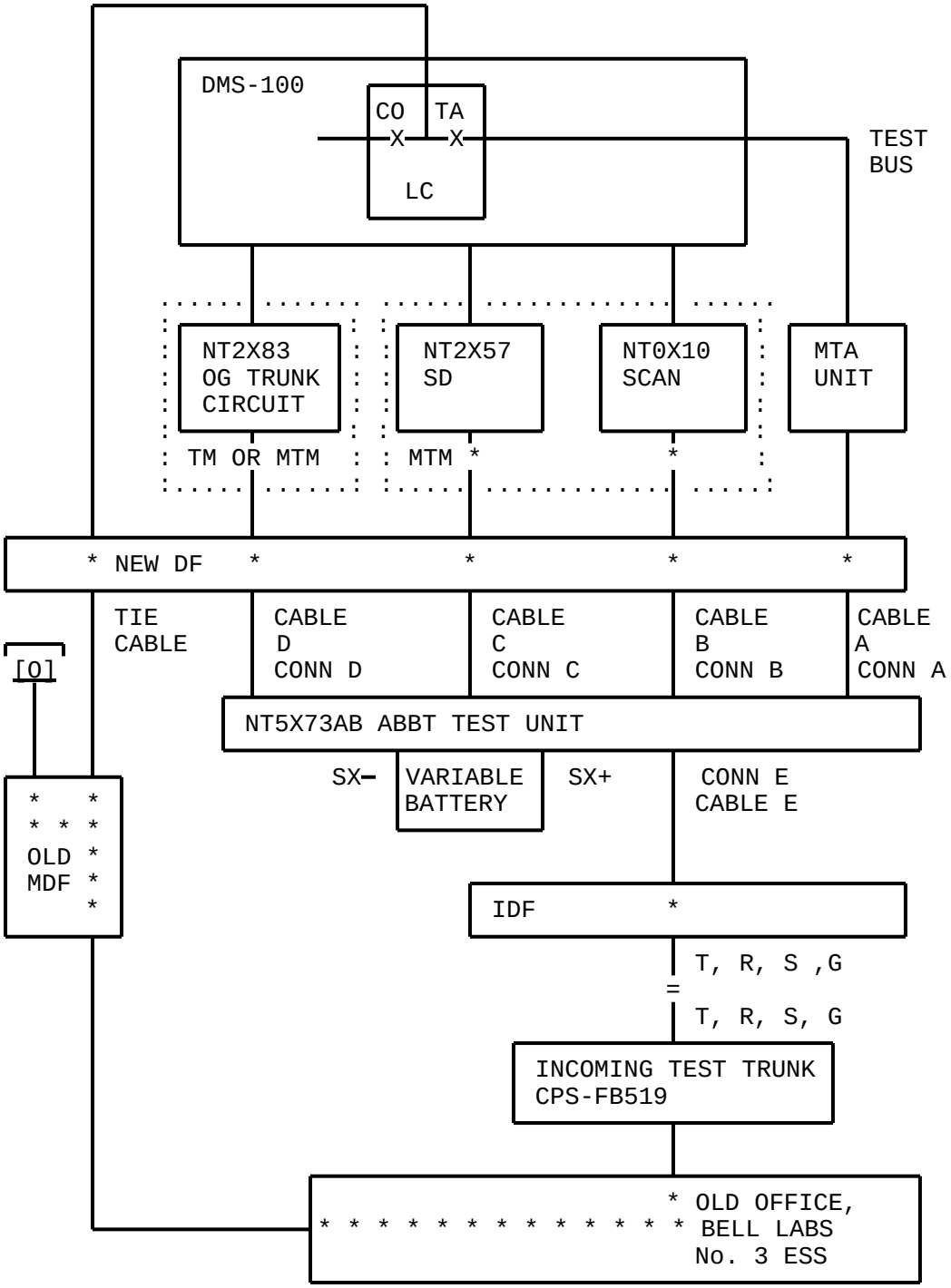


Fig. 16 - ABBT Connections for Bell Laboratories No. 3 ESS

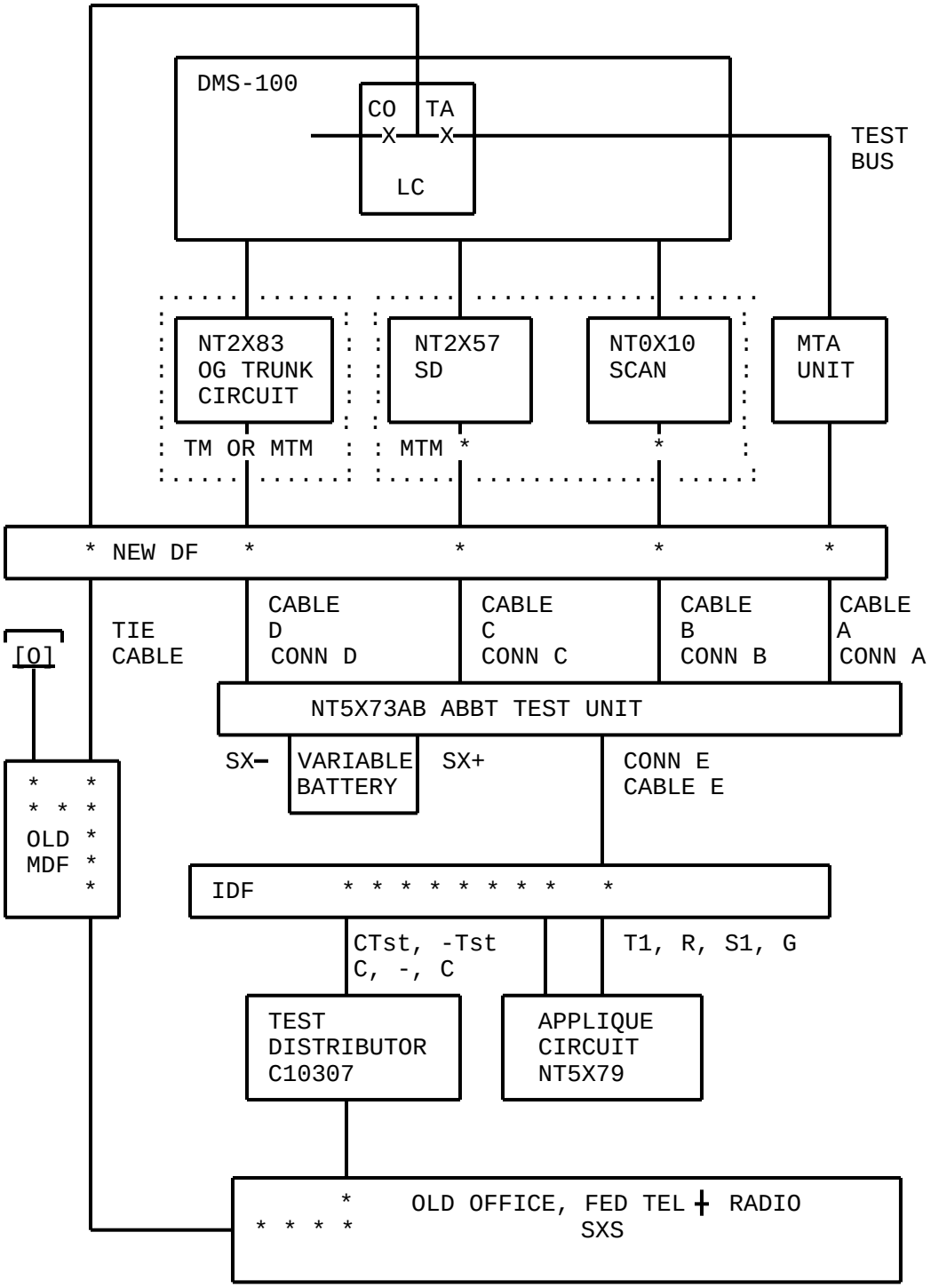


Fig. 17 - ABBT Connections for FED TEL + RADIO SXS Switches

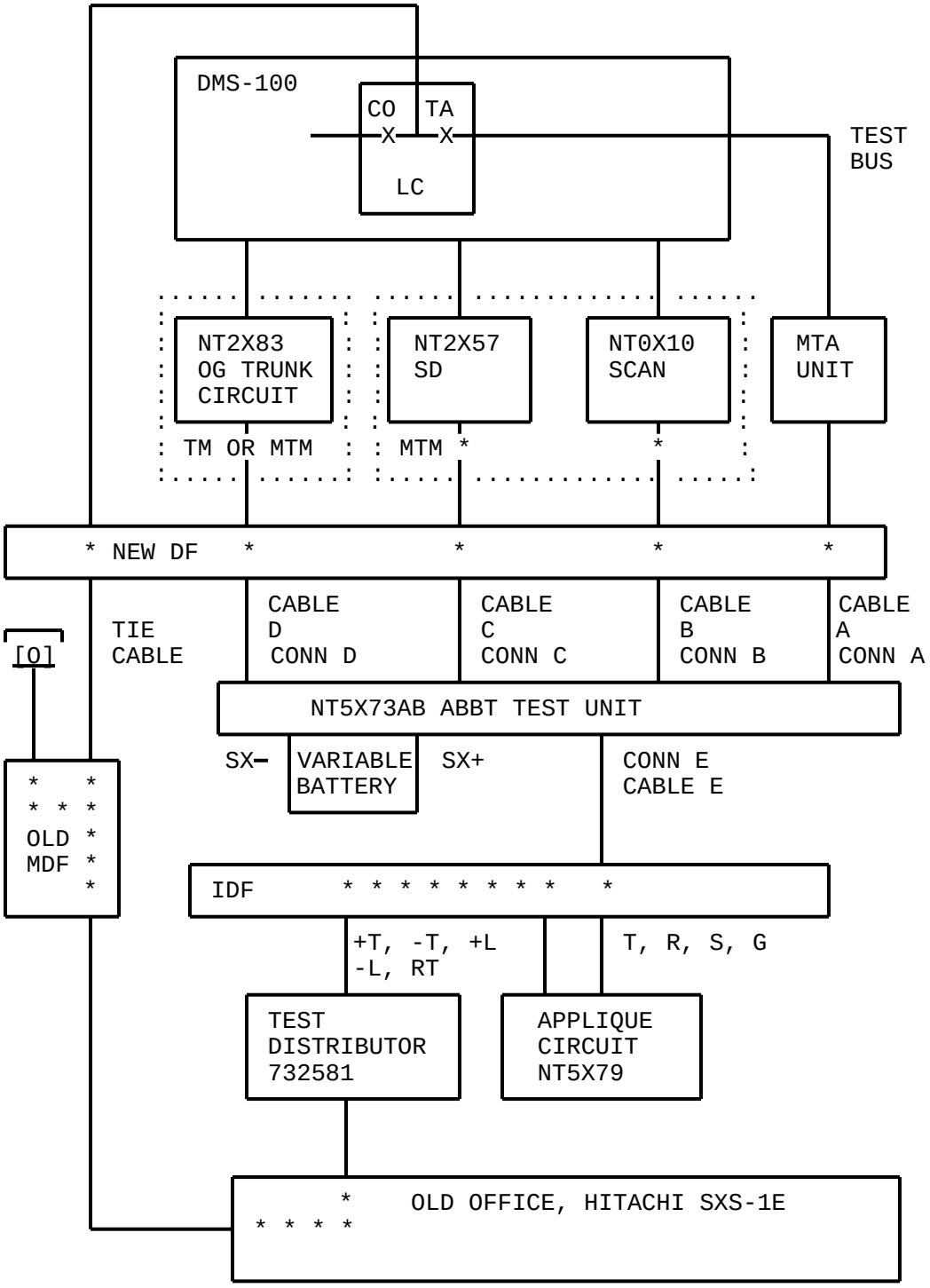


Fig. 18 - ABBT Connections for Hitachi SXS-1E Switches

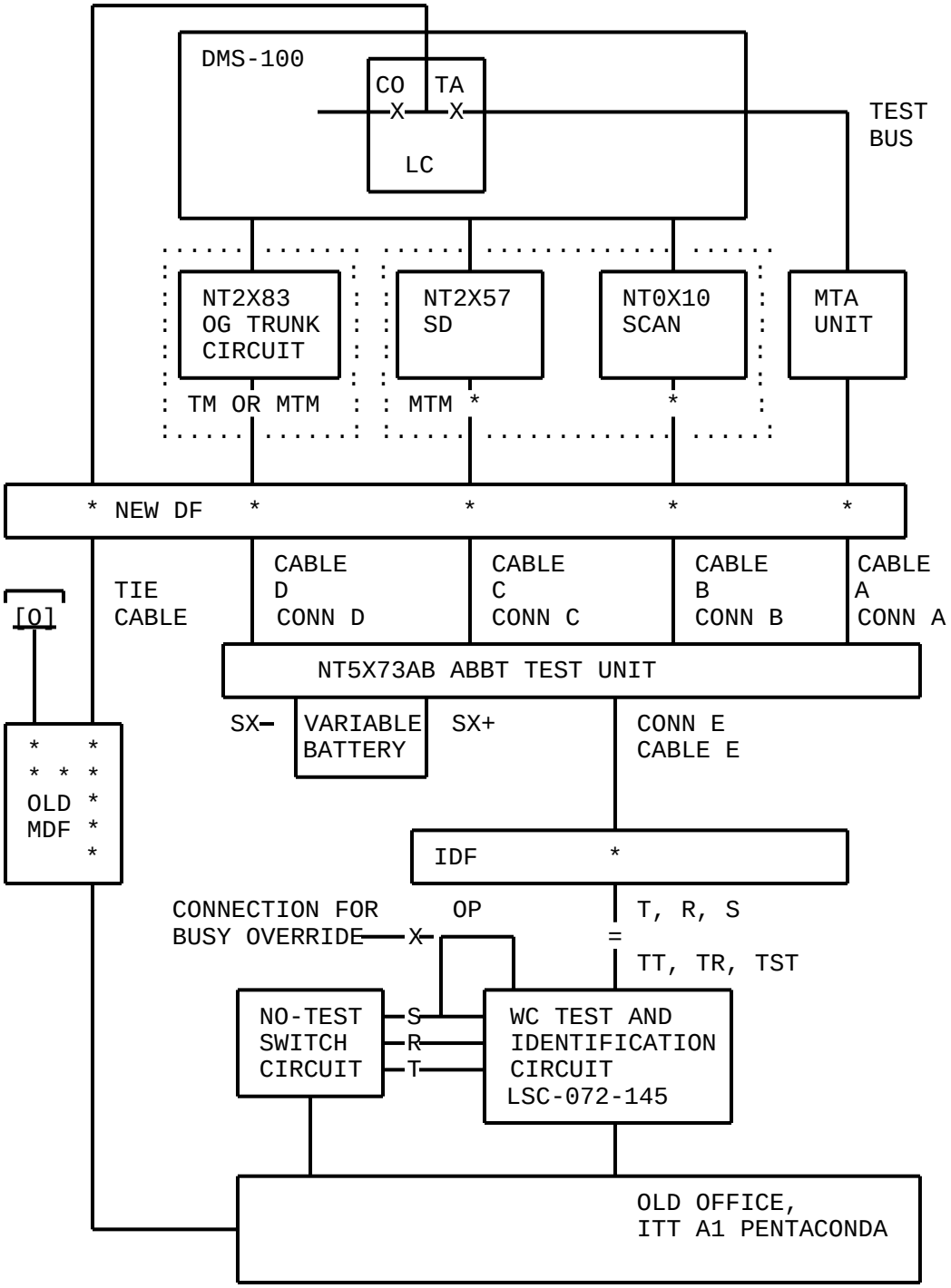


Fig. 19 - ABBT Connections for ITT A1 Pentaconda Switches

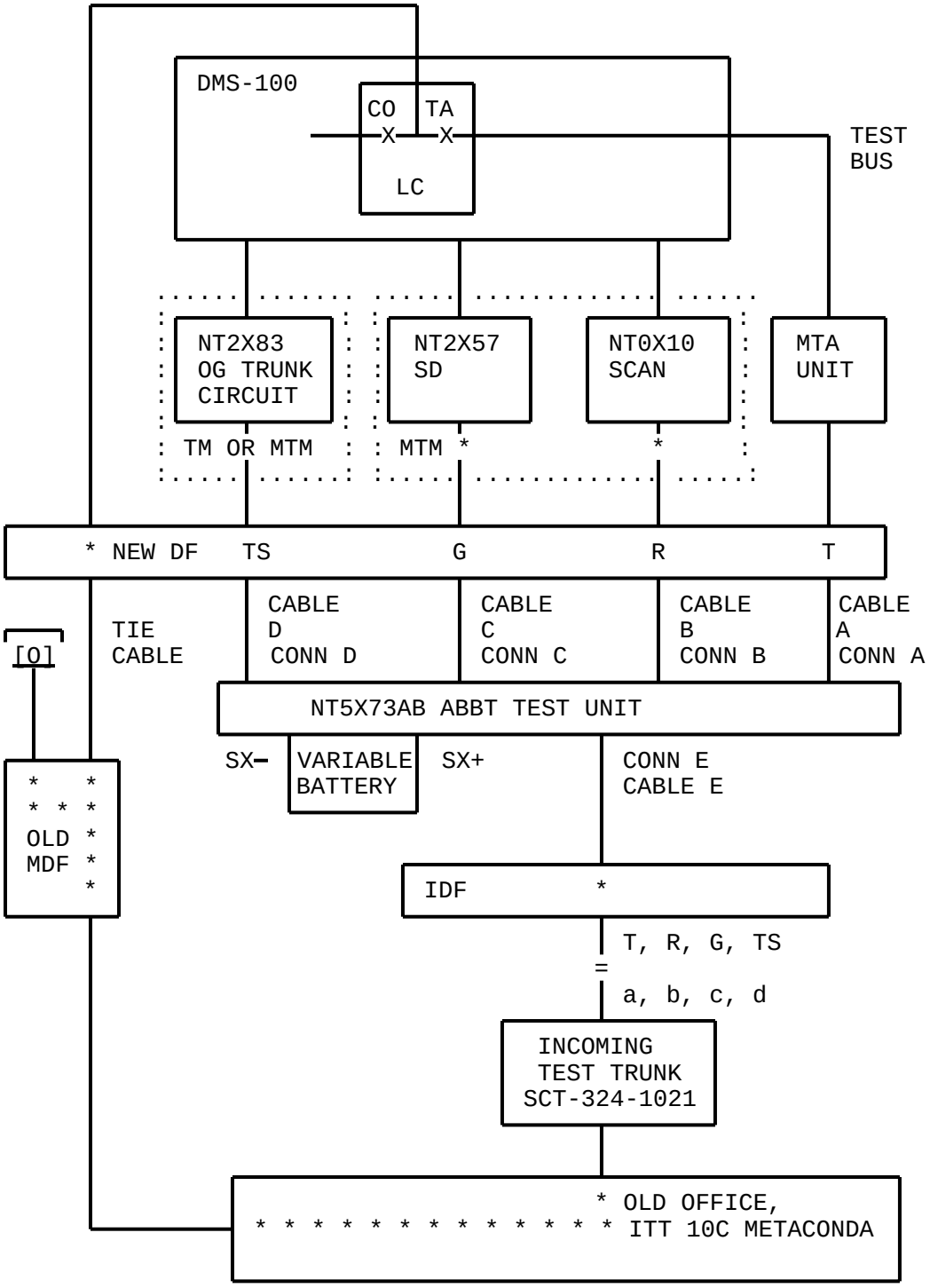


Fig. 20 - ABBT Connections for ITT 10C Metaconda Switches

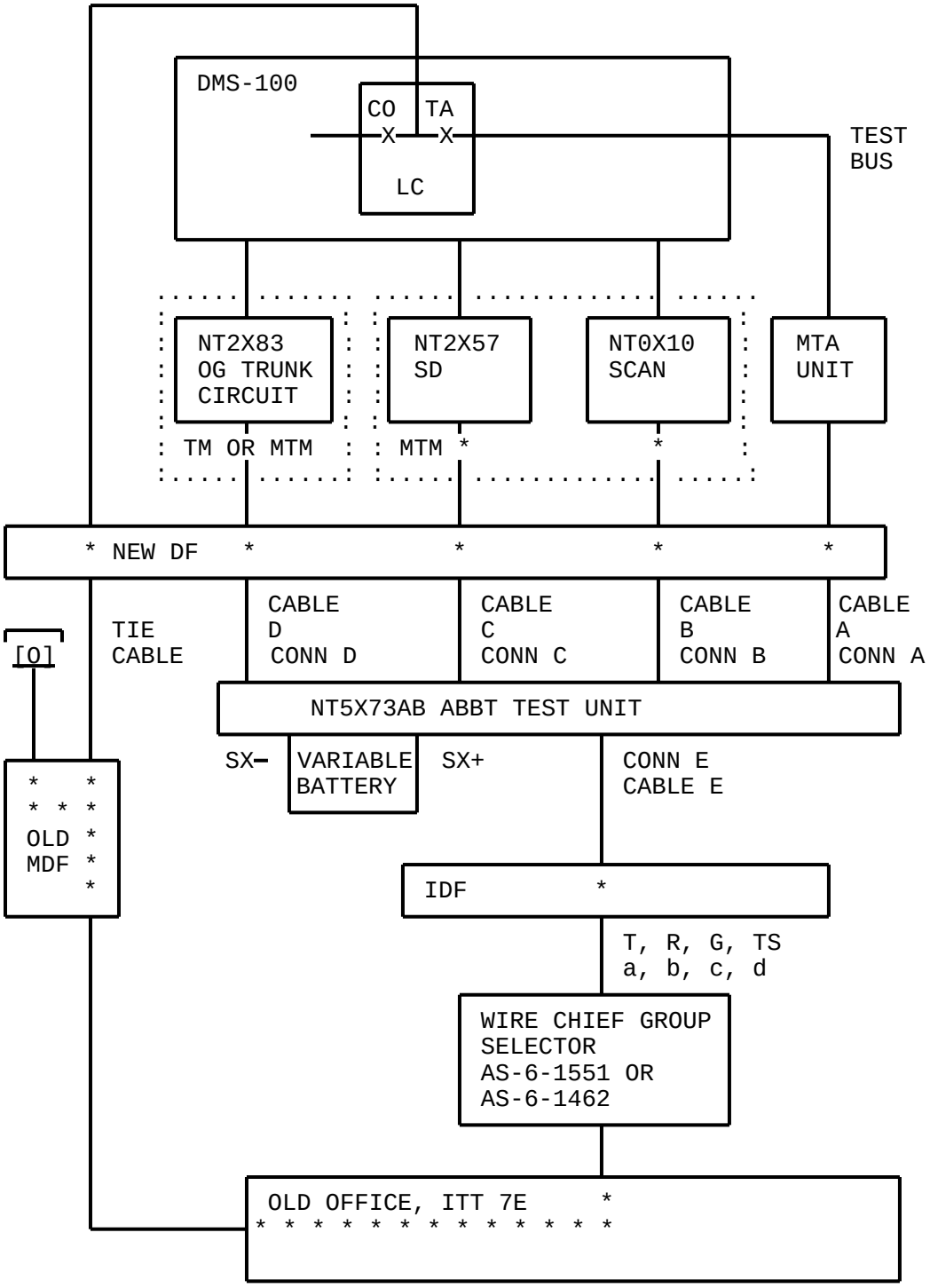


Fig. 21 - ABBT Connections for ITT 7E (Belgium) Switches

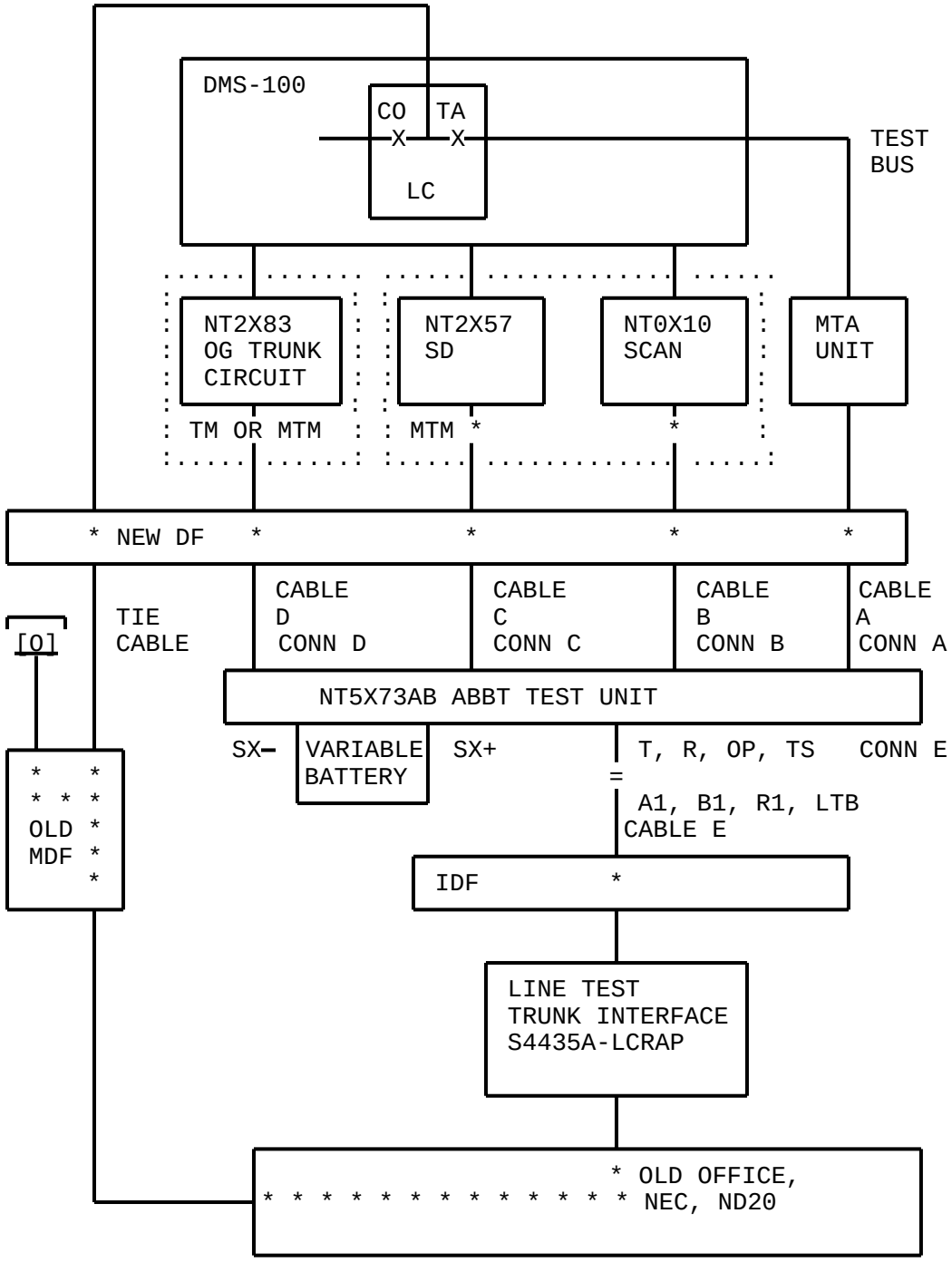


Fig. 22 - ABBT Connections for NEC ND20 Switches

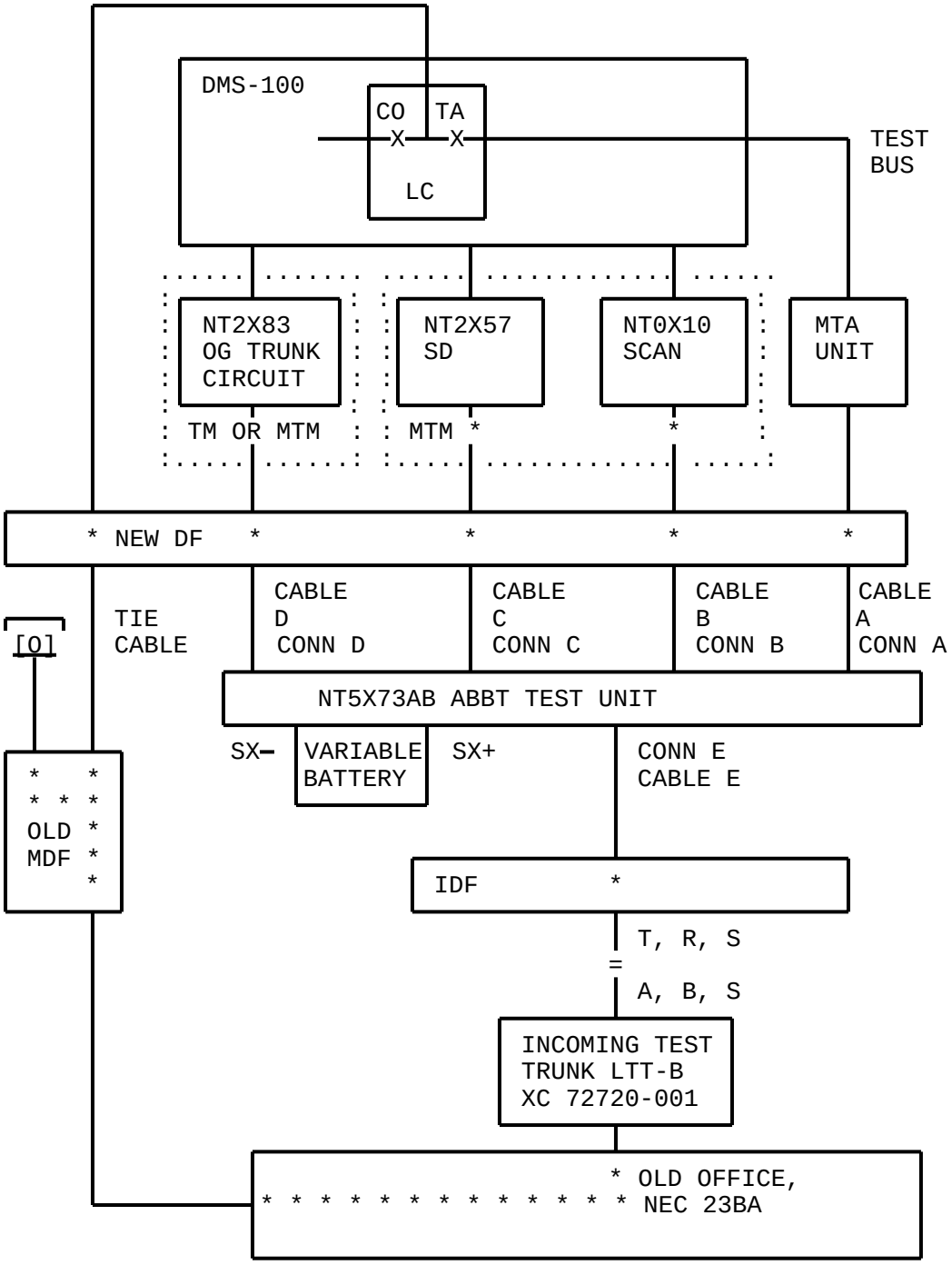


Fig. 23 - ABBT Connections for NEC 23BA Switches

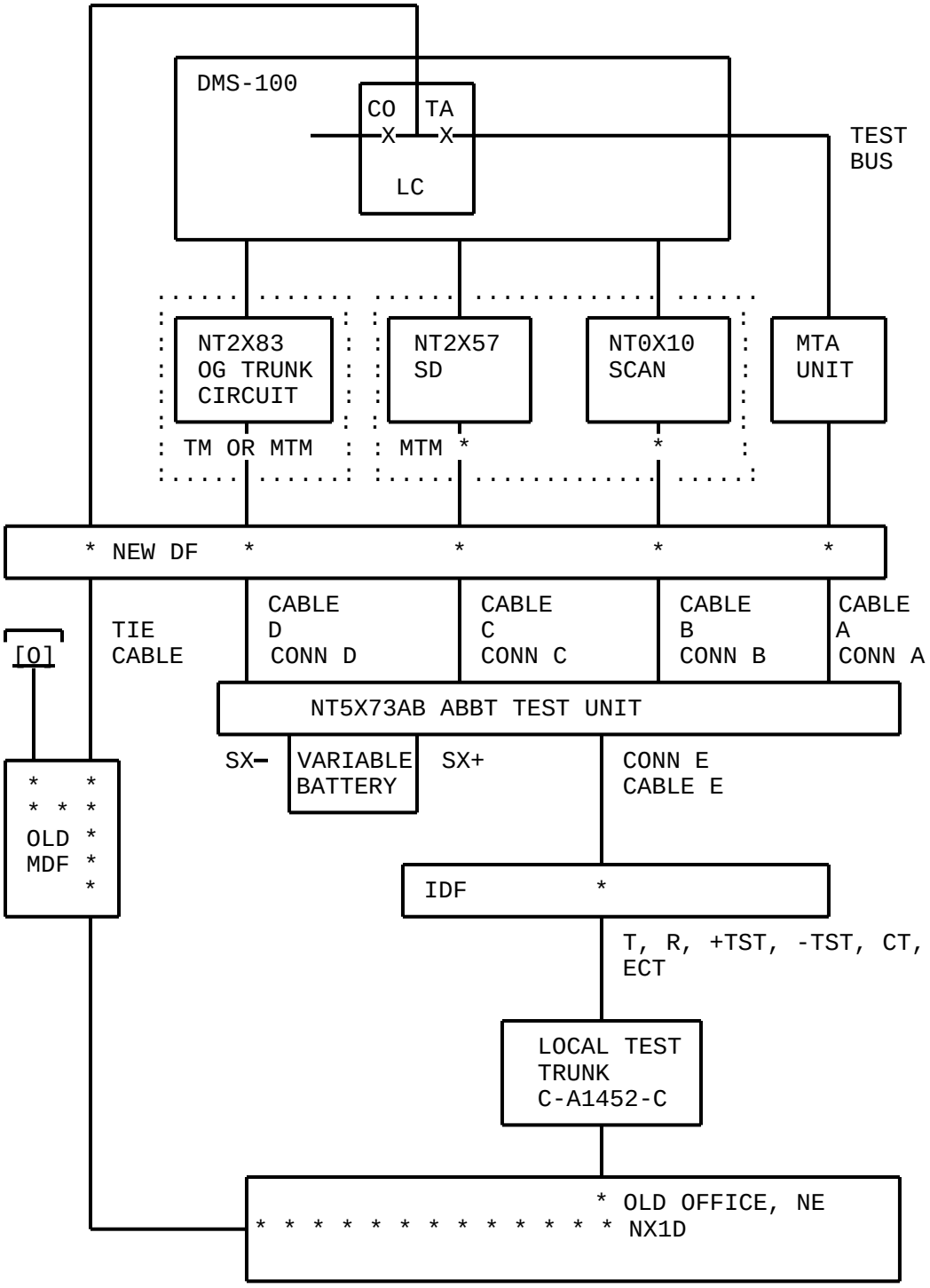


Fig. 24 - ABBT Connections for NE NX1D Switches

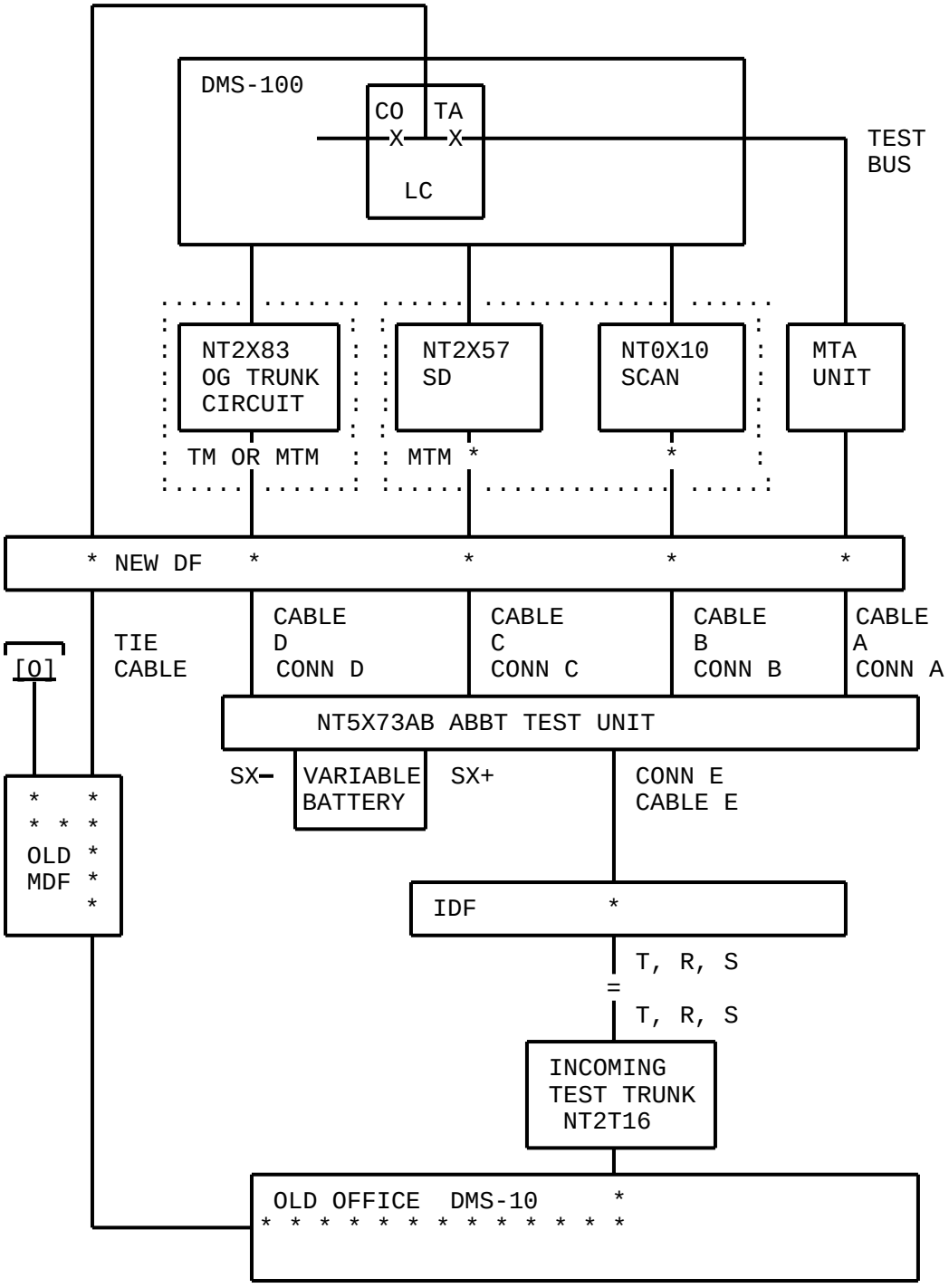


Fig. 25 - ABBT Connections for NTL DMS-10 Switches

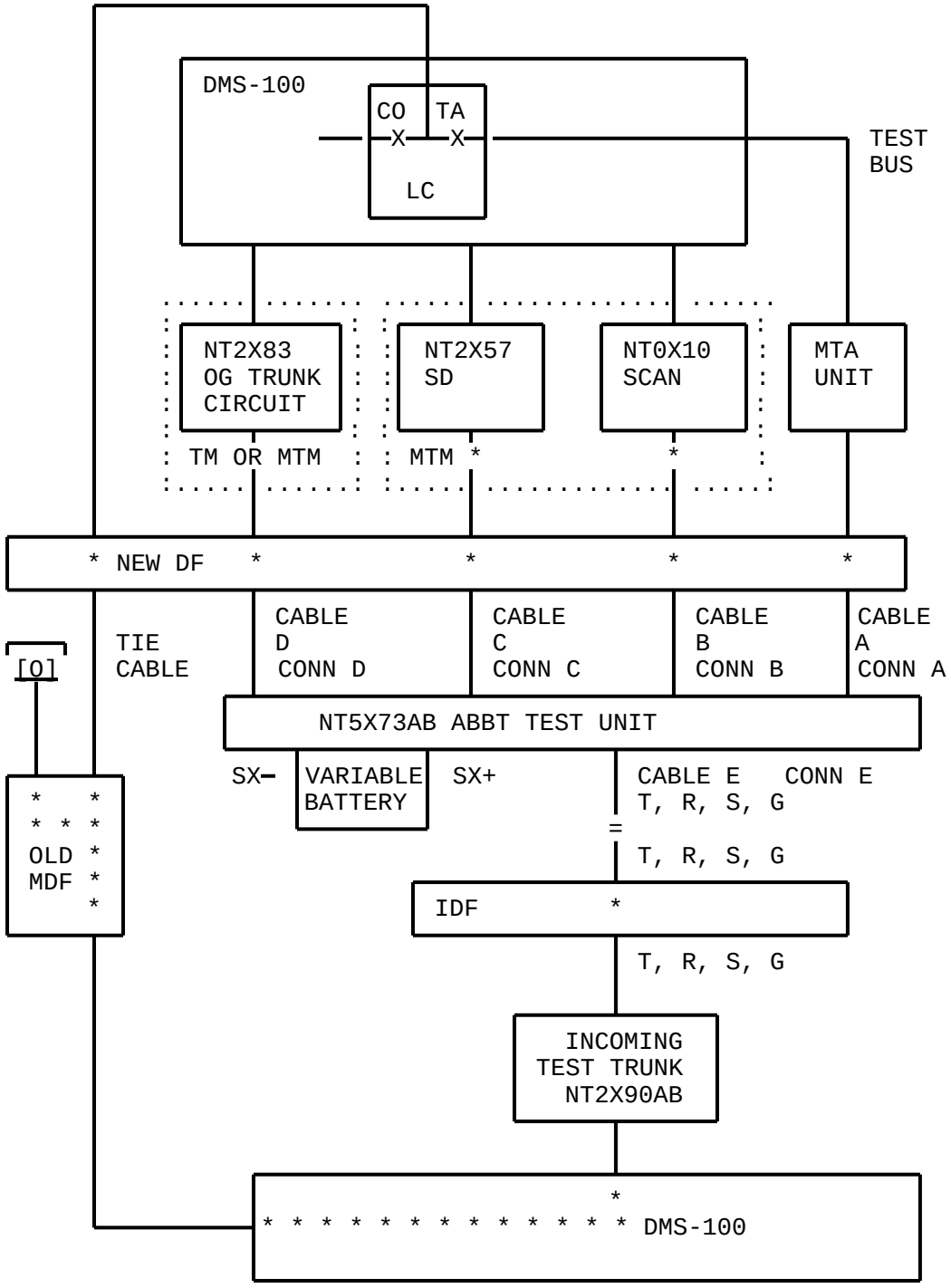


Fig. 26 - ABBT Connections for NTL DMS-100 Switches

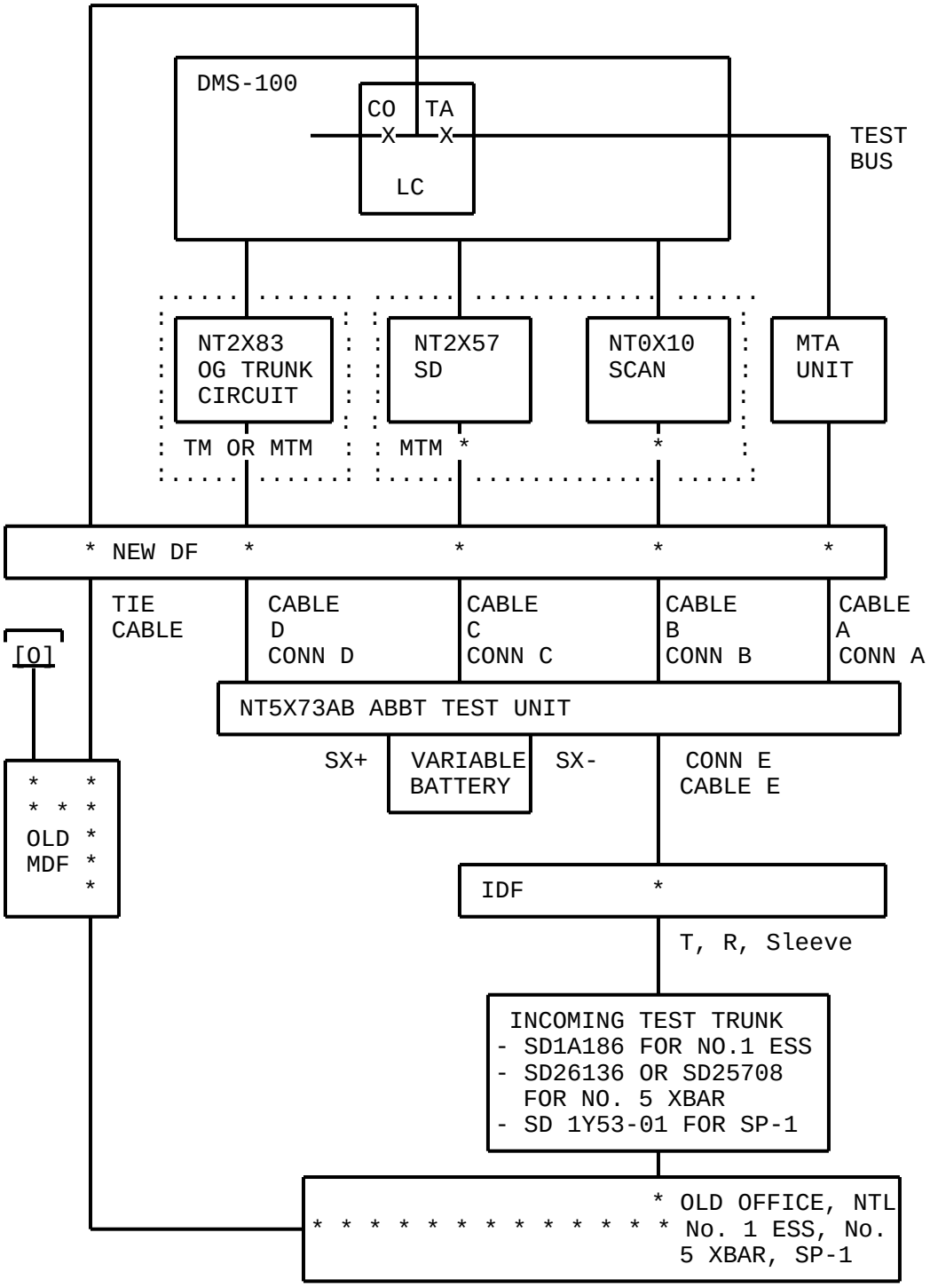


Fig. 27 - ABBT Connections for NTL No. 1 ESS, No. 5 XBAR, SP-1

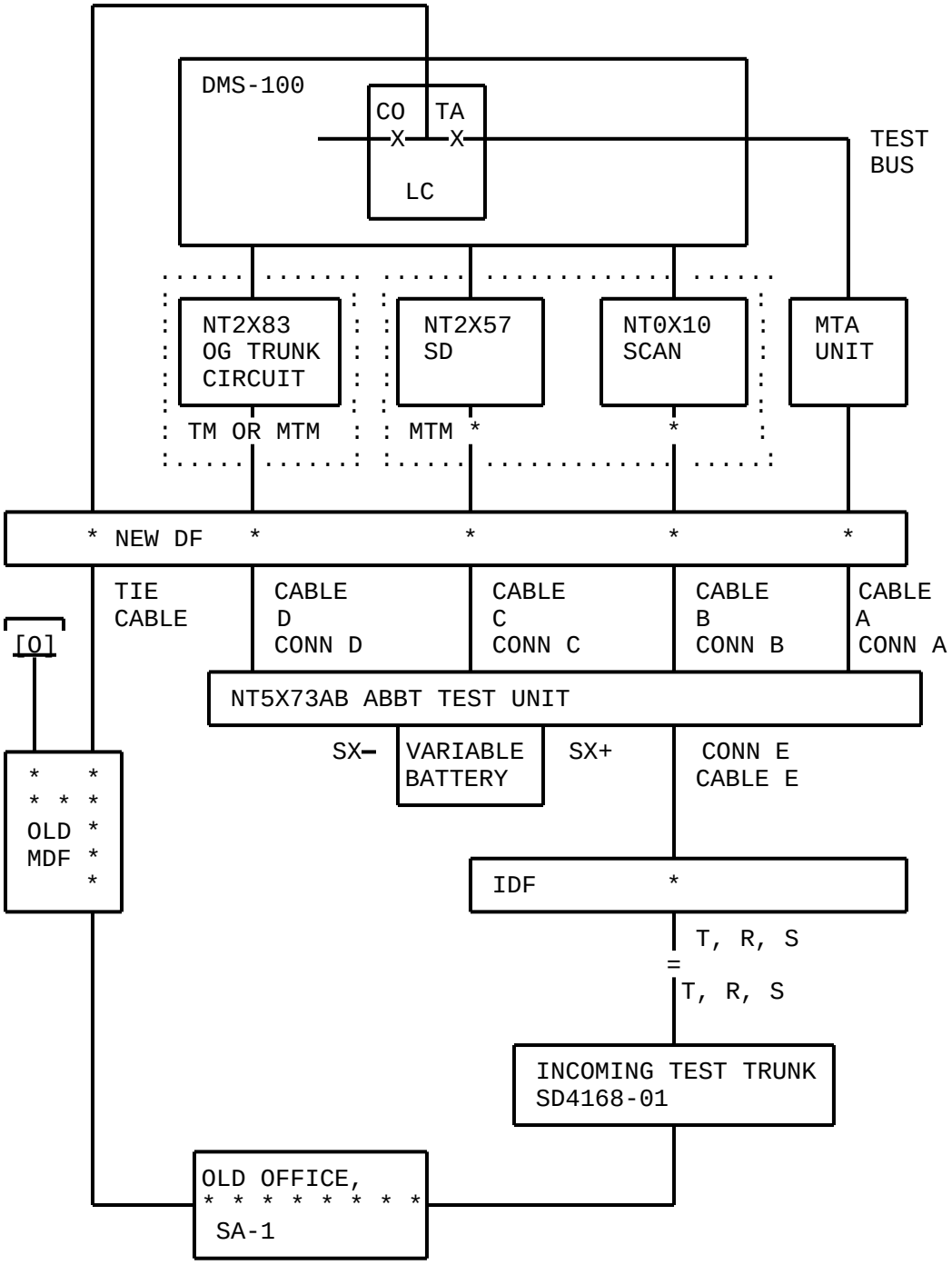


Fig. 28 - ABBT Connections for NTL SA-1 Switches

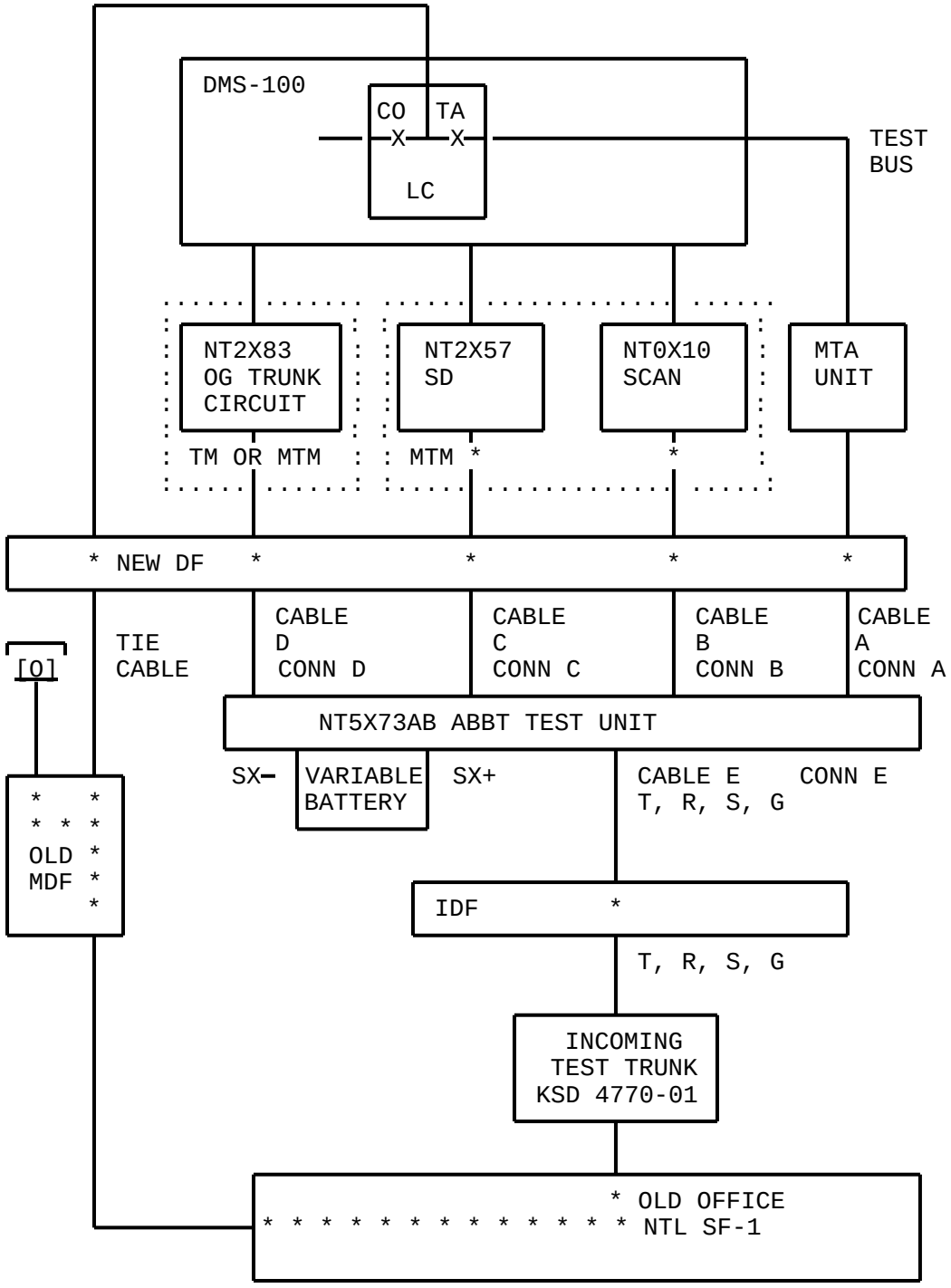


Fig. 29 - ABBT Connections for NTL SF-1 Switches

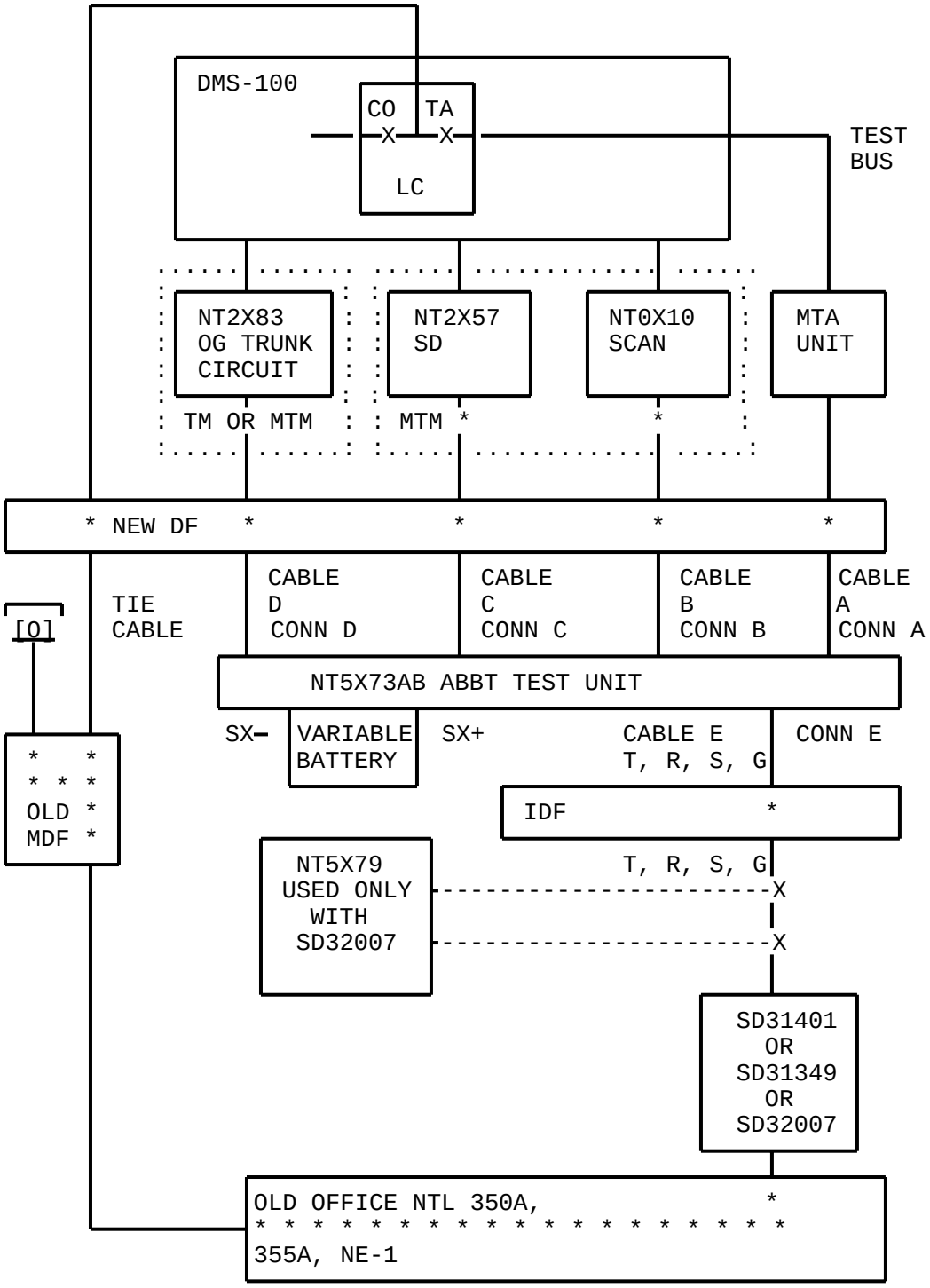


Fig. 30 - ABBT Connections for NTL 350A, 355A, NE-1

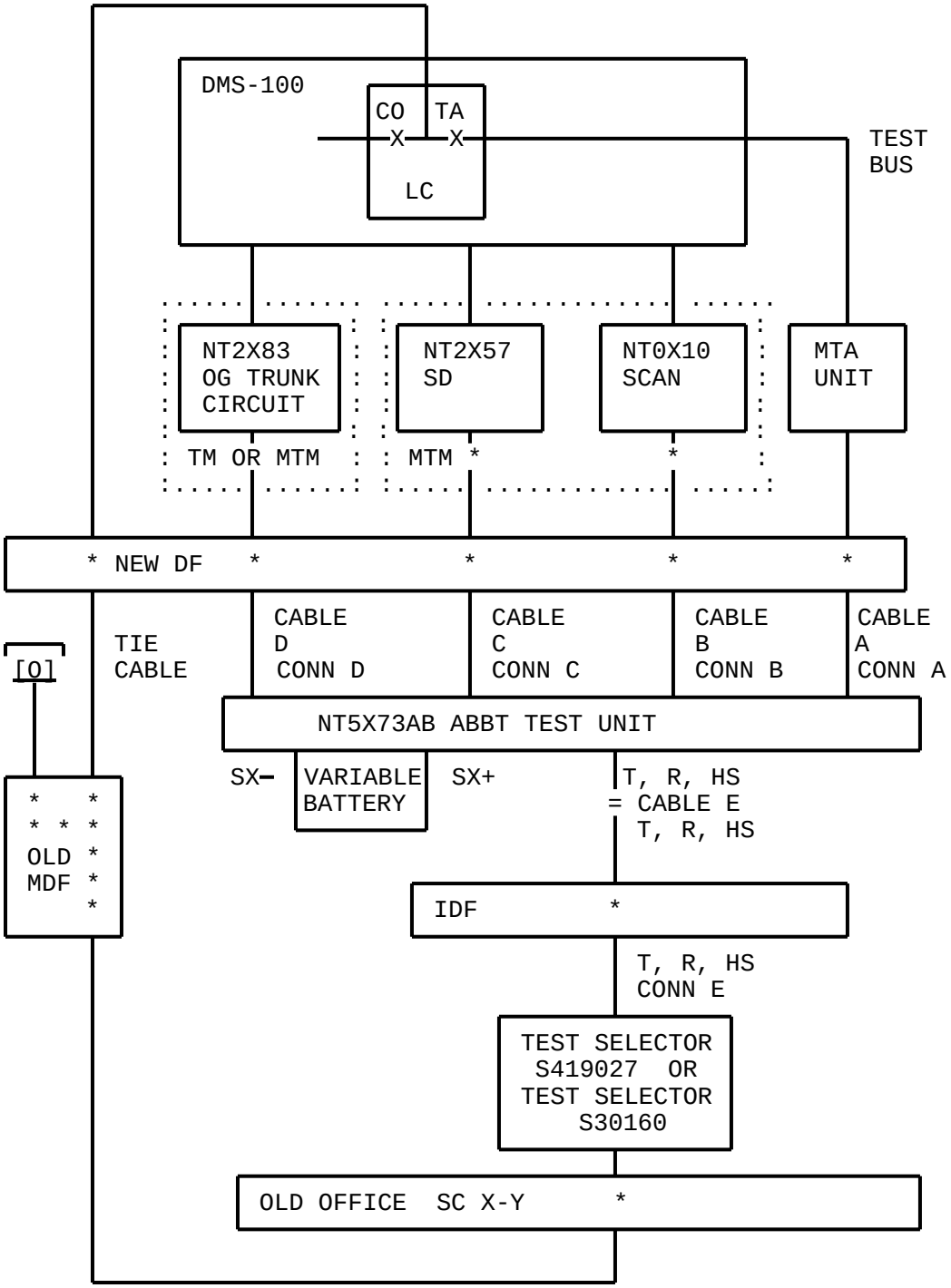


Fig. 31 - ABBT Connections for SC X-Y Switches

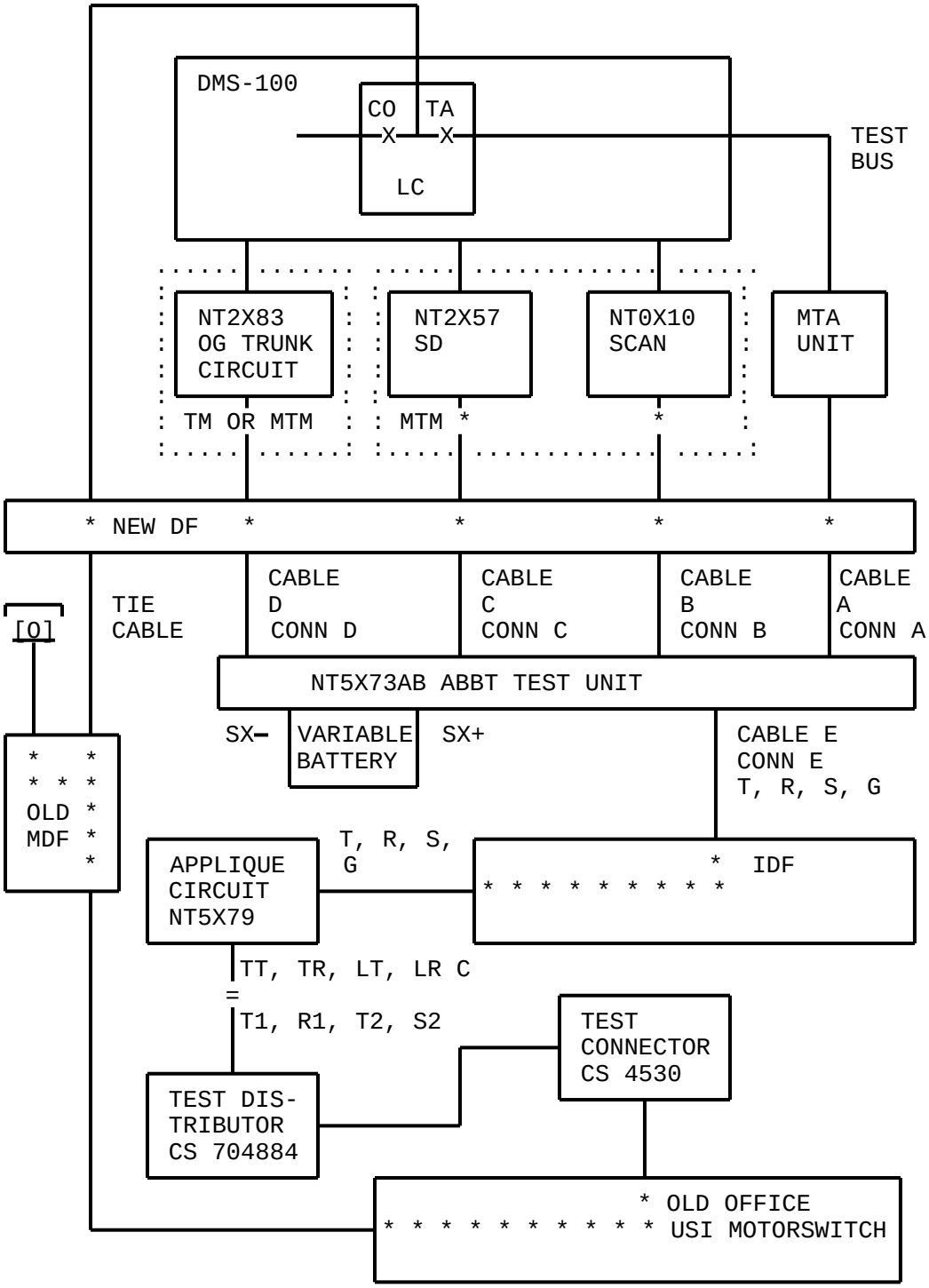


Fig. 32 - ABBT Connections for USI Motorswitch Switches

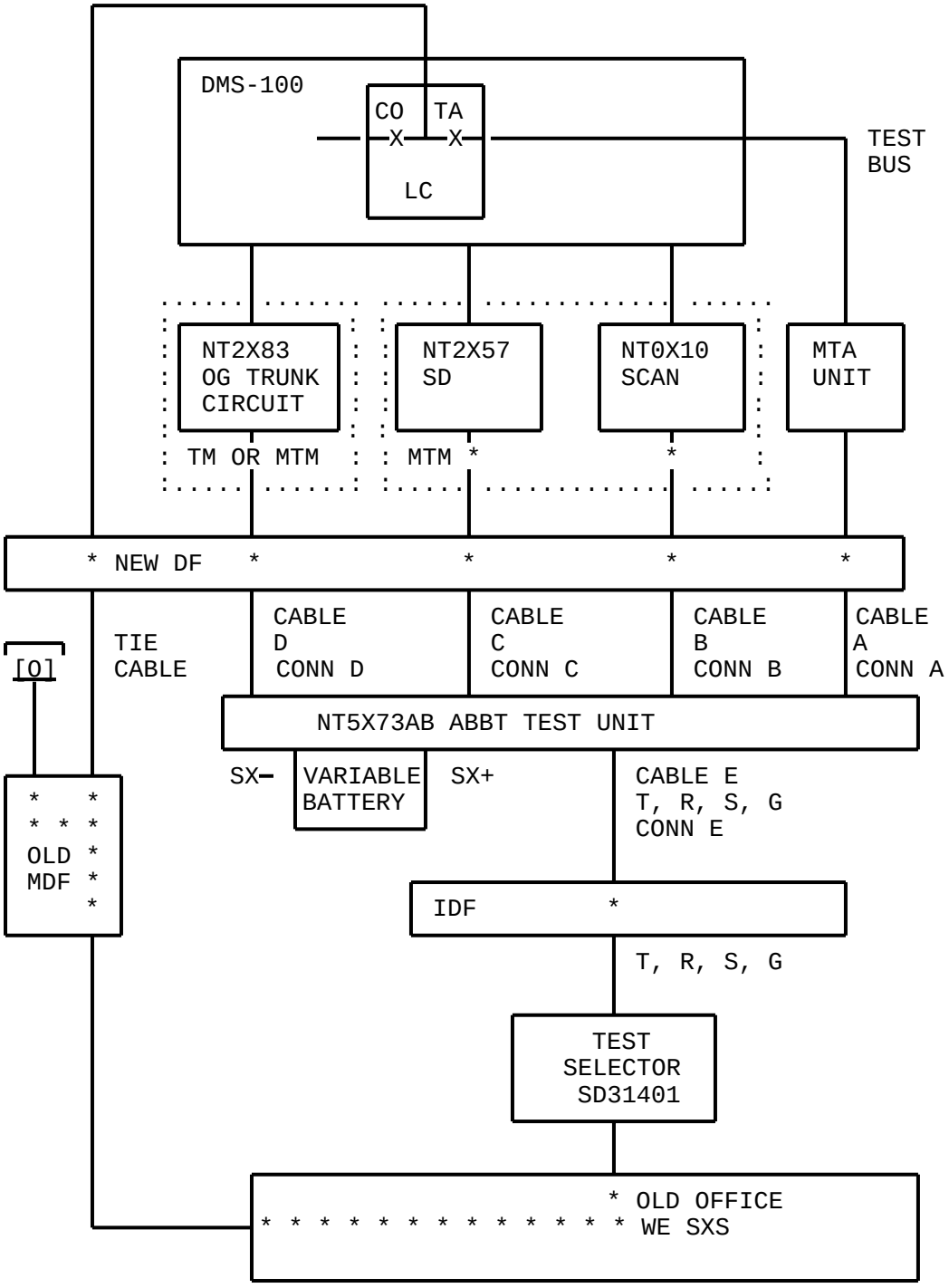


Fig. 33 - ABBT Connections for WE SXS Switches

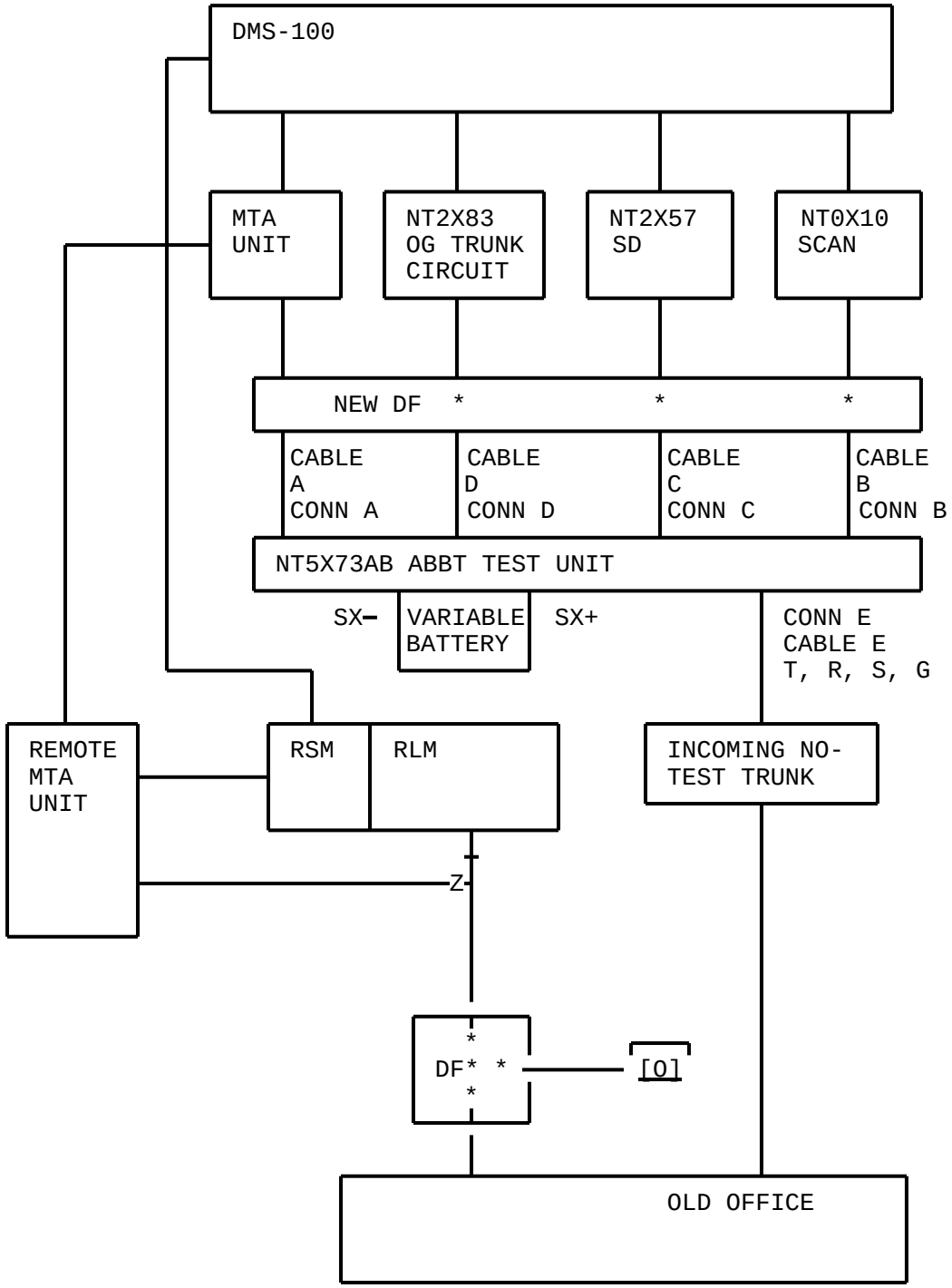


Fig. 34 - ABBT Connections for RLM Within Metallic Range

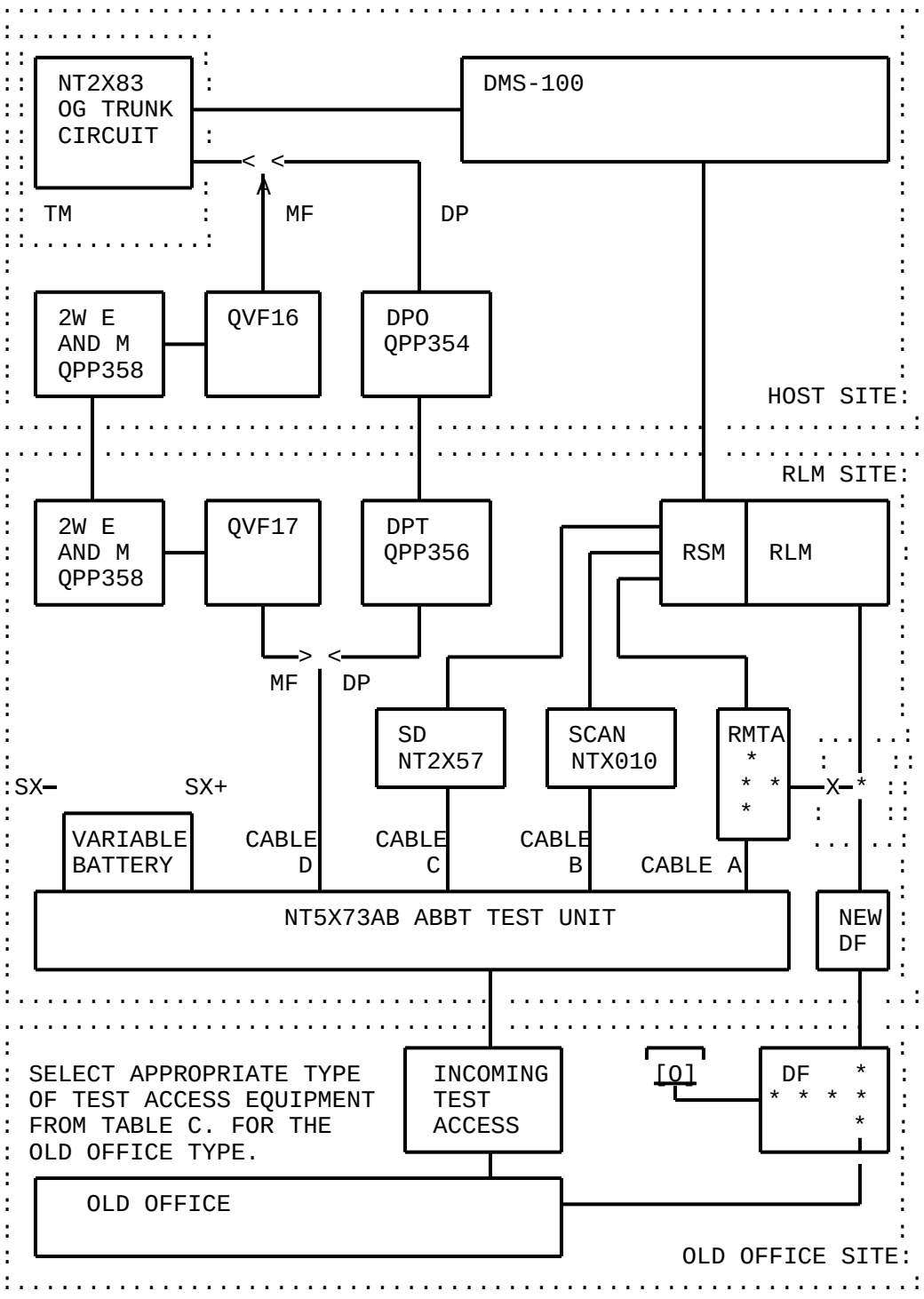


Fig. 35 - ABBT Connections for RLM Beyond Metallic Range

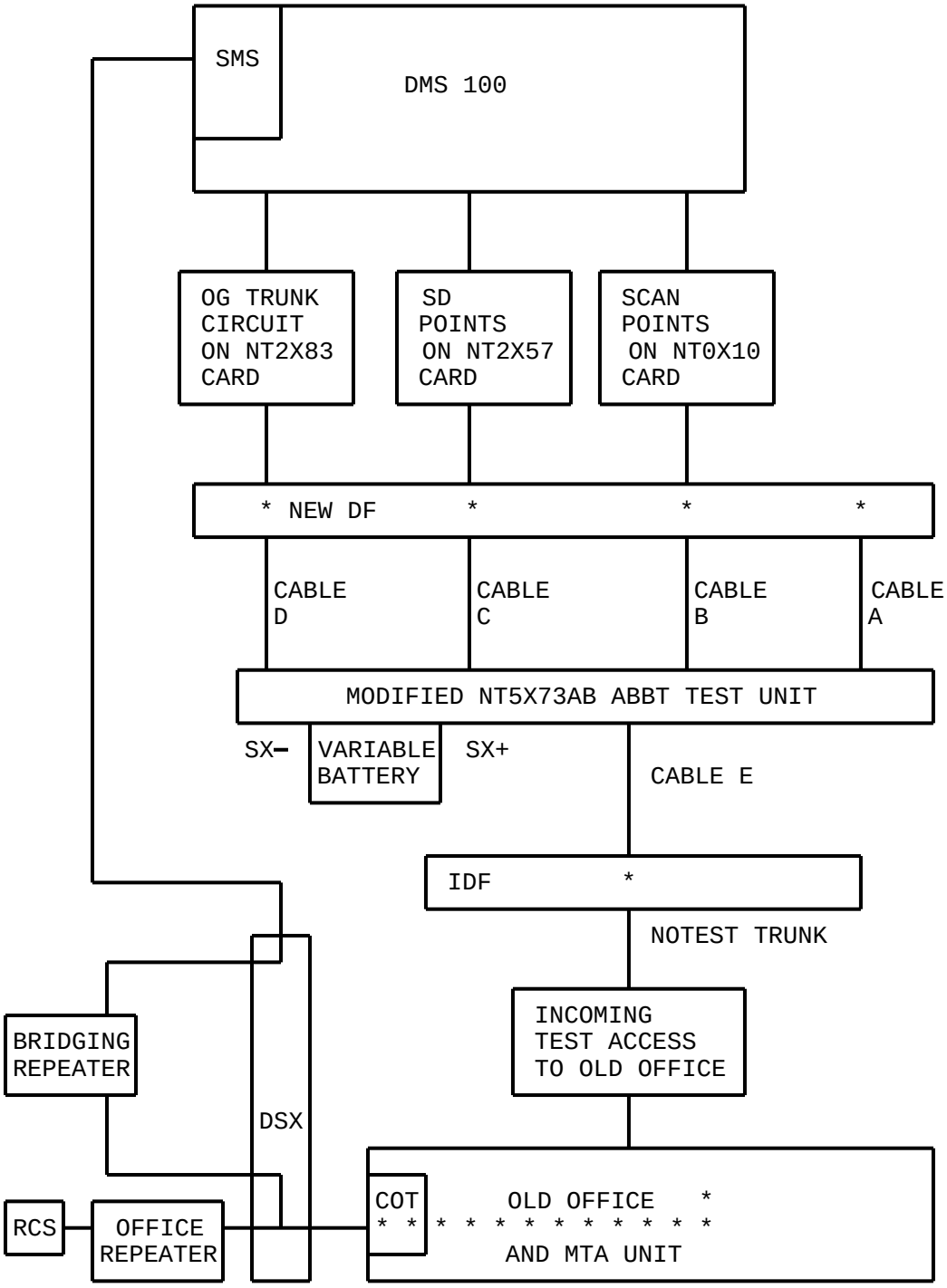


Fig. 36 - ABBT Connections for SLC-96 Subscriber Lines

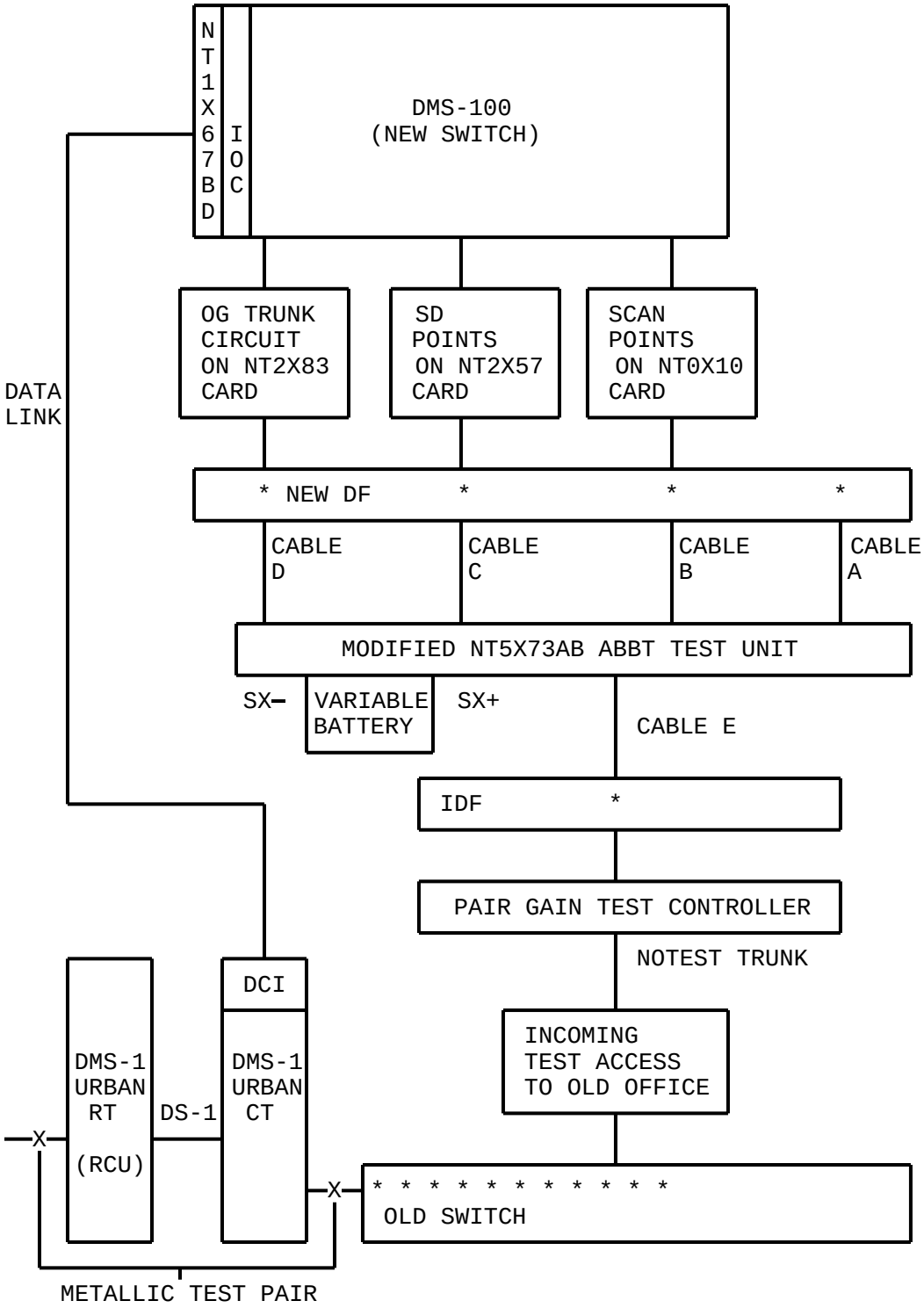


Fig. 37 - ABBT Configuration for RCU Lines With LTA

VERIFYING THE SET-UP

6.03 To ensure correct operation of the ABBT equipment during testing, the following tests are necessary:

* verification of internal operation of the ABBT Test Unit

* verification of NT2X83 OG Trunk Circuits

* verification of SCAN and SD point connections

These tests are described in subsequent paragraphs. Each test must be repeated for each trunk circuit, SD card and SCAN card used for ABBT.

Verifying the ABBT Test Unit

6.04 Press and release the Test (TST) key on each ABBT Test Unit and verify that the NT, OR, OT and STOP lamps light while the TST key is pressed. Failure of any of these lamps to light the while TST key is pressed indicates a fault in the ABBT Test Unit.

Verifying the OG Trunk Circuits

6.05 The operation of the OG Trunk Circuit may be verified using a MAP connected to the DMS. Machine responses to commands used for testing the OG Trunk Card are in the Command Interpreter (CI) format described in 297-1001-509. To verify the OG Trunk Card, proceed as indicated in Table O on page 148.

TABLE O
VERIFYING THE OG TRUNK CIRCUITS

STEP	ACTION
1	ASSIGN the OG Trunk Circuit as a spare 2X83AA 2-wire DP 900 ohm Trunk Circuit in the TRKMEM table using the Table Editor described in 297-1001-310.
2	POST the Trunk Circuit at the Trunk Test Position (TTP) level of the MAP as per 297-1001-516.
3	TEST the Trunk Circuit as described in 297-1001-516. The results displayed on the video display of the MAP should be: CARD OK FACILITY FAULT Note: The FACILITY FAULT is displayed because the J relay on the OG Trunk Circuit is not operated and the trunk is therefore not terminated.
4	Return the status of the Trunk Circuit to what it was before assignment in Step 1.
5	Delete the assignment of the Trunk Circuit in the TRKMEM table.

Verifying Connection of the SCAN and SD Points

6.06 Connection of the SCAN and SD points may be verified using the SCSDTST software. The SCSDTST software is a non-resident program on magnetic tape which must be loaded into the DMS. Once loaded, access is provided to a repertoire of commands which operate SD points on NT2X57 SD cards and provide a reading of the SCAN points on the NT0X10 scan card. Commands available for the SCSDTST software are listed and described in subsequent paragraphs.

6.07 SD and SCAN points must be checked for all ABBT Test Units connected. To use the SCSDTST software for checking connections to the SD and SCAN points, proceed as described in Table P on page 151.

HELP	

lists all commands available in the SCSDTST program.

LEAVE	

ends the SCSDTST program.

READ	pmtype pmnum sccktno [point]

reads the state of the specified SCAN point. If POINT is not specified, the states of all points in the specified sccktno are read.

Where:

pmtype Type of peripheral module in which the SCAN card is assigned.

Range: TM0, TM2, TM4, TM8, MTM, or RSM

pmnum Functional reference number of the peripheral module containing the SCAN card.

Range: 0 to 99

sccktno Circuit number of the SCAN card.

Range: 0 through 31

point Number of the SCAN point to be read on the specified SCAN circuit.

Range: 0 to 6

RESET	pmtype pmnum sdcktno [point]

releases the specified SD point. If POINT is not specified, all points in the specified circuit are released

Where:

pmtype Type of peripheral in which the SD card is assigned.

Range: TM0, TM2, TM4, TM8, MTM or RSM

pmnum Functional reference number of the peripheral module containing the SD card.

Range: 0 to 99

sdcktno Circuit number on the SD card

Range: 0 to 31

point Number of the SD point to be RESET

Range: 0 to 6

SCSD	

starts the SCSDTST program once the non-resident software is loaded and listed

SET	pmtype pmnum sdcktno [point]

Sets the specified SD point. If POINT is not specified, all seven points in the specified SD circuit are set.

See the information for the RESET command for an explanation of the parameters.

TABLE P
VERIFYING CONNECTIONS OF THE SCAN AND SD POINTS

STEP	ACTION
1	Install the NON-resident utility tape on an idle Magnetic Tape Drive (MTD).
2	Input: MOUNT n Where: n number of the magnetic tape drive on which the SCSDT software is installed.
3	Input: LIST Tn Where: n number of the magnetic tape drive on which the SCSDT software is mounted.
4	Input: LOAD SCSDTST
5	Input: SCSD to start the SCSDTST program.
6	Temporarily ground the OT load (connector D, pin 1) of cable TUDF02 if the old office does not provide a ground.
7	Set in turn each of the SD points listed below using the SCSDTST program commands and verify that the appropriate relay in the ABBT Test Unit operates. SD POINT SET — RELAY OPERATED CKT0 Point 6 — A CKT0 Point 5 — B CKT0 Point 4 — C CKT0 Point 3 — D CKT0 Point 2 — E CKT0 Point 1 — F CKT1 Point 6 — H CKT1 Point 5 — J CKT1 Point 4 — K CKT1 Point 3 — L CKT1 Point 2 — O CKT1 Point 1 — CR

Table Continued

TABLE P (Continued)
VERIFYING CONNECTIONS OF THE SCAN AND SD POINTS

STEP	ACTION
8	Temporarily disconnect cable E from the rear of the ABBT Test Unit.
9	Two persons will be required for the following step; one at the ABBT Test Unit and one at the terminal from with the SCSDTST program is being controlled.
10	Depress and hold the TST key on the ABBT Test Unit.
11	While the TST key is depressed, verify the SCAN points. Scan points 2, 3, 4, 5 and 6 should be operated. If not, check that the variable battery is connected with the correct polarity and that output voltage is being produced.
12	Release the TST key.
13	Using the SCDTST program, set the groups of SD points as listed in Table Q on page 153, verify that the appropriate lamps light on the ABBT Test Unit and that the corresponding SCAN points read as indicated.
14	Reconnect Cable E.
15	When testing is complete, exit from the SCSDTST program by inputting: LEAVE
16	Remove ground installed in Step 6.
17	Input: DEMOUNT Tn to unload tape. Where: n number of magnetic tape drive unit on which SCSDTST software tape is mounted.

TABLE Q
TEST DATA FOR THE SCSDTST PROGRAM

SD POINTS SET	RELAYS OPERATED	LAMPS LIT	SCAN POINTS SET
First Group			
CKT1 Point 4	K	OT	6
CKT0 Point 5	B	OR	5
		NT	4
		NR	3
Second Group			
CKT0 Point 5	B	OT	6
CKT0 Point 2	E	NR	3
Third Group			
CKT0 Point 1	F	OT	6
CKT0 Point 6	A		
CKT0 Point 2	E		
Fourth Group			
CKT0 Point 6	A	NT	6
CKT0 Point 5	B	NR	3
CKT0 Point 2	E		
Fifth Group			
STOP button depressed	None	STOP	2
Sixth Group			
No Relay	None	None	None

PERFORMING ABBT

Hints for Performing ABBT

6.08 The following hints may facilitate the use of ABBT software:

* The 'HX' command must never be input during ABBT. Use the STOP command as described in ABBT Software on page 47 to halt the program.

* Each ABBT Test Unit uses 10 SD points. Each of the two circuits on an SD card contains seven (0 through 6) points. Therefore, two circuits are required. Both must be located in the same SD card. To ensure that this is the case, specify only an even number when defining the primary SD circuit for a particular ABBT Test Unit.

* All SD, SCAN or OG trunk cards must be dedicated uniquely to ABBT. No SD or SCAN points can be used for other alarms.

* After any DEFINE ABBTSET command is executed or after execution of any DEFINE command that affects the OG trunk to the old office do the following:

  - Access the TTP level of the MAP (see 297-1001-501)

  - Observe the status of the OG trunk to the old office. This trunk has a Common Language Location Identifier (CLLI) of 'BBTOUT'. The status should be 'INB'.

  - Return the trunk to service as described in 297-1001-501.

* Do not assign any card in a system data table. The ABBT software performs this operation when the DEFINE commands are input.

* Execute ABBT on 30 known correctly connected lines to pinpoint any equipment set-up errors before performing ABBT on a series of subscriber lines.

* The first line of a file containing a series of DN to be tested must never be a blank line.

Loading, Running and Unloading ABBT Software

6.09 To load, run and unload ABBT software proceed as described in Table R on page 155.

TABLE R
LOADING, RUNNING AND UNLOADING THE ABBT SOFTWARE

STEP	ACTION
1	Install the ABBT non-resident software on an idle MTD as described in 297-1001-500.
2	Input: MOUNT n to mount the tape. Where: n number of the MTD on which the ABBT software is installed.
3	Input: LIST Tn TO BBTZSUBF$FC Where: n number of the MTD input in Step 2.
4	Input: COPY BBTZSUB$FC SFDEV
5	Input: READ BBTZSUB$FC
6	If more than one ABBT Test Unit is to be used, continue at Step 7. Otherwise, skip to Step 10.
7	Input: LIST Tn TO BBTOPTSU$FC To load the optional software module for running several ABBT concurrently. This module is only available in office equipped with NT feature package NTX057BA. In the above command n is the MTD number input in Step 2.
8	Input: COPY BBTOPTSU$FC SFDEV
9	Input: READ BBTOPTSU$FC
10	Input: DEMOUNT Tn Where: n functional reference number of the MTD input in Step 2.
11	Input: ABBT To start the ABBT program.

Table Continued

TABLE R (Continued)
LOADING, RUNNING AND UNLOADING THE ABBT SOFTWARE

STEP	ACTION
12	Use the DEFINE command to set-up all parameters and all Test Units. See ABBT Software on page 47. Before any tests can be run the following must be input: * the DEFINE command once for each of parameters OFFPARS, DNINPUT, OUTPFILE, OUTPTYPE and TESTTYPES. * the DEFINE ABBTSET command once for each ABBT Test Unit used. * the DEFINE OFFPARS command must be input before the DEFINE ABBTSET command.
13	Perform ABBT on a single known correctly connected line. Refer to Table S on page 158 for a list of the most common test equipment set-up faults, their most likely causes and corrective action to be taken.
14	Steps 15 through 20 are used to obtain an approximate setting for the variable battery voltage.
15	Using the DEFINE TESTTYPE, change the test sequence to SCAN.
16	Run ABBT on the same known correct line. When the ABBT program stops at the first SCAN stage, relays B and D of the ABBT Test Unit should be operated and all four lamps, OT, OR, NT, and NR should be lit.
17	Decrease the variable battery voltage to the minimum value that still permits all four lamps to remain lit. Measure this voltage with a DVM and record the value as Vmin.
18	Busy the test line by setting the line to the off-hook condition. Lamps OR and NR on the ABBT Test Unit should extinguish.
19	Set the variable battery voltage to the maximum value that still keeps the OR and NR lamps extinguished. Measure this voltage with the DVM and record the value as Vmax.
20	Set the voltage of the variable battery midway between Vmin and Vmax.

Table Continued

TABLE R (Continued)
LOADING, RUNNING AND UNLOADING THE ABBT SOFTWARE

STEP	ACTION
21	Perform ABBT on all lines to be cutover using the ABBT software commands described in ABBT Software on page 47. For an explanation of the test result codes output by the ABBT software, see Table I on page 83.
22	When ABBT is complete and all wiring errors are corrected, continue.
23	Input: CLEAR To remove ABBT program and permit unloading of the ABBT software.
24	If several ABBT Test Units have been used, input the following: * PRINT BBTOPTSU$FC to display the optional software modules used for multiple ABBT. * UNLOAD modulename Where: modulename name of the optional software modules used for performing ABBT with several ABBT Test Units This command must be input once for each of the modules displayed by input of the PRINT BBTSU$FC command. The last module loaded must be unloaded first. * ERASE BBTOPTSU$FC To erase the file name for the optional modules from the DMS.
25	Repeat Step 24 for file BBTZSUB$FC to remove all other ABBT software from the DMS.

TABLE S
COMMON FAULTS, PROBABLE CAUSES AND CORRECTIVE ACTION

TYPE OF FAULT	PROBABLE CAUSES AND CORRECTIVE ACTION
Test Access Failure, Bad Horizontal, Bad Vertical or Software Error	Incorrect information specified for the MTA Unit. Input SHOW ABBTSET (n) and verify the following: * that enough columns were specified to access all the verticals used by this ABBT Test Unit. * the number of the row and horizontal assigned to the ABBT Test Unit. Using the Table Editor (see 297-1001-310) check the MTATRK table or, in the case of BCS24 and higher, MTAHORIZ table to ensure that all entries have a selector of type 'B' and are associated with the correct ABBT Test Unit number. If the ABBT Test Unit number is incorrect, input DEFINE ABBTSET (n) and re-define all parameters for this Test Unit.
Test Access Failure, Hardware Error	Verify that the MTADRIVER in the MTA unit is operating.

Table Continued

TABLE S (Continued)
COMMON FAULTS, PROBABLE CAUSES AND CORRECTIVE ACTION

TYPE OF FAULT	PROBABLE CAUSES AND CORRECTIVE ACTION
Outpulsing Failure or Seize Failure	Connections to the OG Trunk are incorrect or information specified for the trunk is incorrect. Input SHOW GENERAL and SHOW ABBTSET (n) then examine the displayed information to ensure the following: * the type of start signal for the notest trunk is correct * the disconnect time is correct. Incorrect disconnect time is often indicated by a fault code 7 : TRUNK OVERFLOW Check the following: * Access the TTP level of the MAP (see 297-1001-501) and ensure that the trunk is in the Returned to Service (RTS) state. * Verify that the REV key on the ABBT Test Unit is correctly set. Incorrect setting of the REV key is often indicated by a fault code 6 : SEIZE FAIL:15
Test Access Failure, Horizontal Busy	Using the Table Editor (see 297-1001-310), verify table MTATRK or, in the case of BCS24 and higher, table MTAHORIZ to ensure that no other trunk is associated with the horizontal for the ABBT Test Unit.

Table Continued

TABLE S (Continued)
COMMON FAULTS, PROBABLE CAUSES AND CORRECTIVE ACTION

TYPE OF FAULT	PROBABLE CAUSES AND CORRECTIVE ACTION
Trunk Overflow	Trunk overflow faults may occur because the MTA Unit of the old office is busy, or the old DN is of the incorrect type (For example: the old DN is subject to intercept treatment). Verify that the old DN is of the correct type, then try the test again. If the overflow persists, relays in the ABBT Test Unit may be operating too quickly. Using the DEFINE OUTPTYPE command, change the test sequence to RELAY and run ABBT again. If the difficulty disappears, specify a longer DISCTIME with the DEFINE OFFPARS command. Return the type of test sequence to its previous value and run ABBT on the line once more. Repeat this process until the difficulty is corrected.
Overflow at the MTA of the DMS	The vertical in the MTA of the DMS accessed is busy. This cannot occur if the testing order is conducted in LEN order. If the problem persists, conduct testing in order of LEN.

Table Continued

TABLE S (Continued)
COMMON FAULTS, PROBABLE CAUSES AND CORRECTIVE ACTION

TYPE OF FAULT	PROBABLE CAUSES AND CORRECTIVE ACTION
T and R Open	The possible causes and associated corrective actions are as follows: * The cabling between the old and new offices is faulty. Check connections to the old office. * The old office may have released the connection from the NOTEST trunk to the line under test. Using the DEFINE OUTPTYPE command, change the test sequence to RELAY and run ABBT again checking to make sure that no disconnect signal appears on the Sleeve lead of the NOTEST trunk. If a disconnection occurs, Sleeve lead current on the NOTEST trunk may be low, a fault may exist in the ABBT circuit or a relay in the MTA may be stuck. * The connection in the MTA Unit between the line to the new office and the horizontal for this ABBT Test Unit may be faulty. Check the appropriate cross-points in the MTA Unit.
Tip and Ring reversal	Tip and Ring leads of the old and new lines are reversed. Check the cross-connections between the horizontal of the MTA Unit for this ABBT Test Unit and the vertical for the new line. Try the test on a line associated with a different column of the MTA Unit, or try moving the horizontal to different set of cross-points. If the old office is of the SXS type, the problem could be a mismatch between line class codes of the lines as assigned in the old and new offices.

Table Continued

TABLE S (Continued)
COMMON FAULTS, PROBABLE CAUSES AND CORRECTIVE ACTION

TYPE OF FAULT	PROBABLE CAUSES AND CORRECTIVE ACTION
Busy Start	This occurs when ALL is specified for DEFINE TESTTYPES and the line in the old office is busy. If however, this occurs while the line is NOT busy check the following: * That the new line is in the cutoff condition. * That Tip and Ring voltage in the old office is set to the correct value.
Abnormal Scan, Party Fault, Start Fault	If this problem occurs frequently, suspect an incorrect voltage setting of the variable battery. Choose a sample number of lines that are known to be properly connected and run ABBT repeatedly on those lines adjusting the voltage of the variable battery each time until consistent results are obtained.

CUTOVER PROCEDURE FOR ORIGINAL ABBT

6.10 To perform cutover read Part 5 on page 92 then proceed as indicated in Table T on page 163.

CUTOVER PROCEDURE FOR ABBT WITH RCS LINES

6.11 To cut over RCS lines, read Cutover for the ABBT Method With RCS Lines on page 93, then proceed as indicated in Table U on page 165.

CUTOVER PROCEDURE FOR ABBT WITH RCU LINES

6.12 To cut over RCU lines, read Cutover for the ABBT Method With RCU Lines on page 93, then proceed as indicated in Table V on page 166.

TABLE T
CUTOVER PROCEDURE

STEP	ACTION
1	Remove any NT4X99AA diode fixtures installed during the precutover procedure and return to one of the following addresses: * In Canada: Installation Tool Room (NTL) Dept 3970 8200 Dixie Road Bramalea, Ontario * In the United States: Installation Tool Room (NTL) Dept. 1501 12507 Mount Hermon Church Road Morrisville N.C. 27650
2	If not already loaded, load the LMCUT software as described in Steps 7 through 14 in Table K on page 95.
3	Issue the CUTOFF command for all drawers that are to be cutover. This operation will operate the HLD relay and all cutoff relays momentarily. This step ensures that the HLD relay ground keeps all cutoff relays operated when the ground strap is removed.
4	Remove the ground straps from all line drawers to be cutover.
5	Physically disconnect lines being cutover from the old office.

WARNING

If using cable shears to cut cable, EXTREME care must be taken to ensure that the cut wire ends do not short together or contact foreign battery or ground. The DMS peripheral may be driven into OVERLOAD if this precaution is not observed.

Table Continued

TABLE T (Continued)
CUTOVER PROCEDURE

STEP	ACTION
	Note: The DMS peripherals will not be affected until step 6 is performed, so inspect the cable wire ends before proceeding.
6	Enter the CUTOVER command for all drawers to be cutover. This action releases all HLD and cutoff relays.
7	Enter the QHOLD command to verify that all HLD relays have been released.
8	Check for dial tone on cutover lines. If there is any doubt about the status of the relays, use the RLSHOLD and RLSCO commands ensure the relays are released. Use the NOBTST command if necessary to verify the state of cutoff relays.
9	This completes all steps required for ABBT and cutover.

6.13 Refer to Figure 38 on page 167 for cutover from an office where Bridging Repeaters were used during ABBT. Refer to Figure 39 on page 168 for an example of cutover from an office where Bridging Repeaters were not used during ABBT. Table U on page 165 describes two cutover procedures: one where Bridging Repeaters were originally configured for ABBT and non-powering LIU circuit packs are used, and one where Bridging Repeaters were not configured for ABBT and powering LIU circuit packs are used.

TABLE U
CUTOVER PROCEDURE FOR RCS LINES TO DMS

STEP	ACTION
1	Cutover Where Bridging Repeaters Originally Used
a	Jumper cables should be installed between the Office Repeater and SMS prior to cutover. They remain disconnected while the Office Repeater jacks are connected to the COT jacks by patch cords.
b	Remove the Bridging Repeaters used during the ABBT. Disconnect the patch cord at the DSX Frame connecting the monitor jack of the COT to the receive jack of the Bridging Repeater and disconnect the patch cord from the transmit jack of the Bridging Repeater to the receive jack of the SMS.
c	Remove the patch cords between the COT jacks and the Office Repeater jacks. This automatically activates contacts connecting jumper cables between the Office Repeater and SMS.
2	Cutover Where Bridging Repeaters Not Used
1	Simultaneously, remove the LIU circuit pack and plug in the Office Repeater.

TABLE V
CUTOVER PROCEDURE FOR RCU LINES TO DMS

STEP	ACTION
1	Install one CO repeater in the Office Repeater Bay (ORB) for each DS-1 link to be transferred from the DMS-1 Urban carrier system to the SMU-RCU subsystem. Ensure the switch settings on the repeaters are set correctly for the required distances. Do not power the repeaters yet.
2	Wire the c-side (office side) of the repeaters to the same DSX bay as the SMU. Run a connection on the p-side (line side) from the repeater to the Main Distribution Frame (MDF). Verify continuity of cabling on both c-side to DSX bay and p-side to MDF.
3	Remove the repeater for digroup 1 of the CT. Traffic on this digroup is reassigned automatically.
4	At the MDF, run a jumper wire half-tapping the appropriate link from the ORB (where the CO repeaters were installed) to the cable side of the link serving digroup 1 of the CT.
5	Reinsert the CT repeater (the link alarm should clear).
6	Repeat this procedure for all links.
7	Remove subscribers from VF pairs 97-112 (these slots on the RCU hold MP cards).
8	Ensure the DMS-1 Urban carrier system is operating correctly (passes P6044 test, P6011/P6022 switchovers, no alarms exists, and line tests, jack access, and bypass all work properly)
9	Datafill tables LTCPSINV and RCUINV correctly.
10	Ensure the SMU is working properly.
11	Remove the line cards for subscriber lines 97-112 at the RCU. Place MP cards in slots 13 and 14 (Shelf 4) of the RCU.
12	Power the repeaters in the ORB.
13	Remove RCU CP cards and insert RCU CP cards that hold RCU firmware.

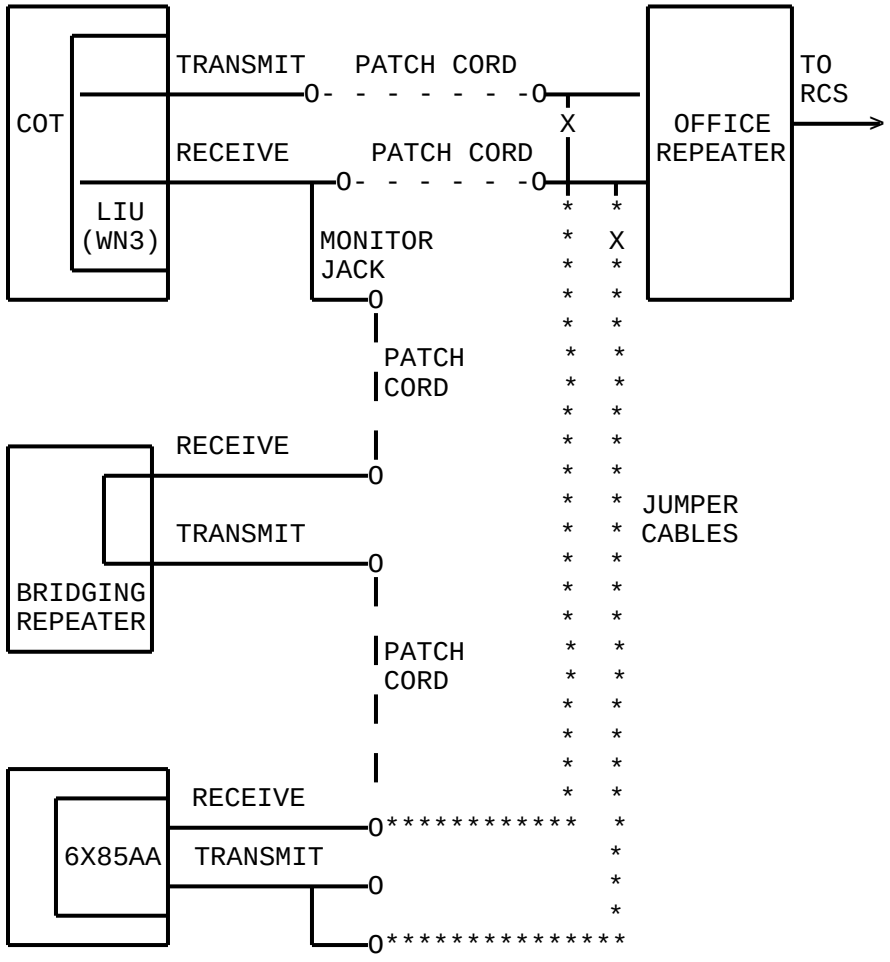


Fig. 38 - Post-ABBT Cutover Configuration

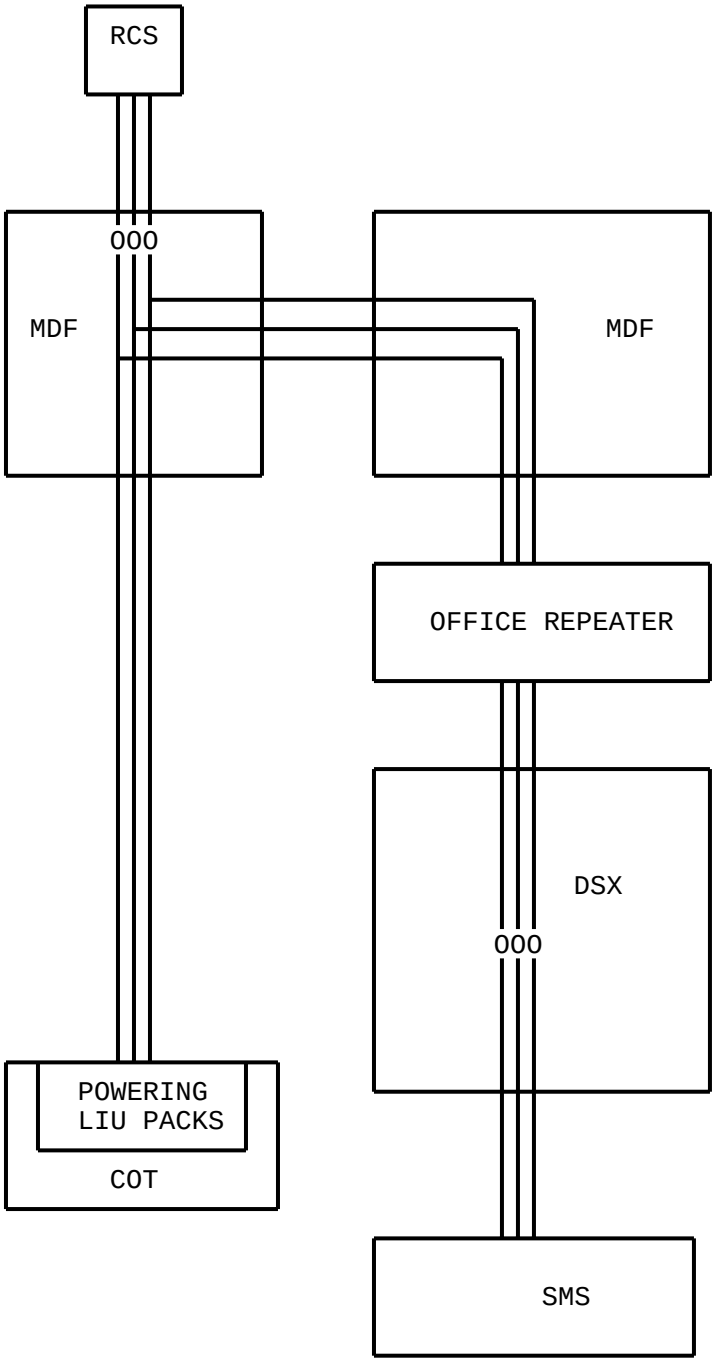


Fig. 39 - Post-ABBT Cutover Configuration With Powering LIU Packs

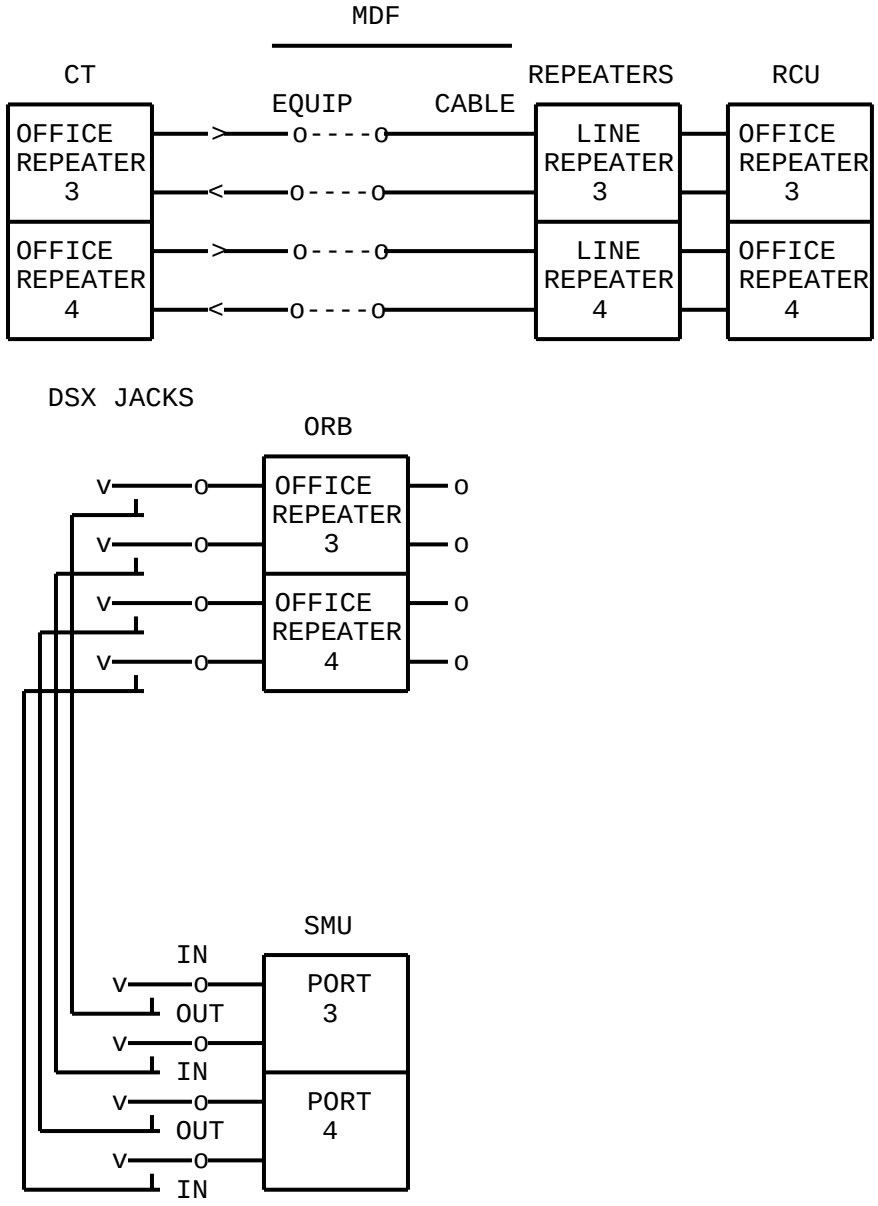


Fig. 40 - ABBT Pre-Cutover Configuration for RCU Lines

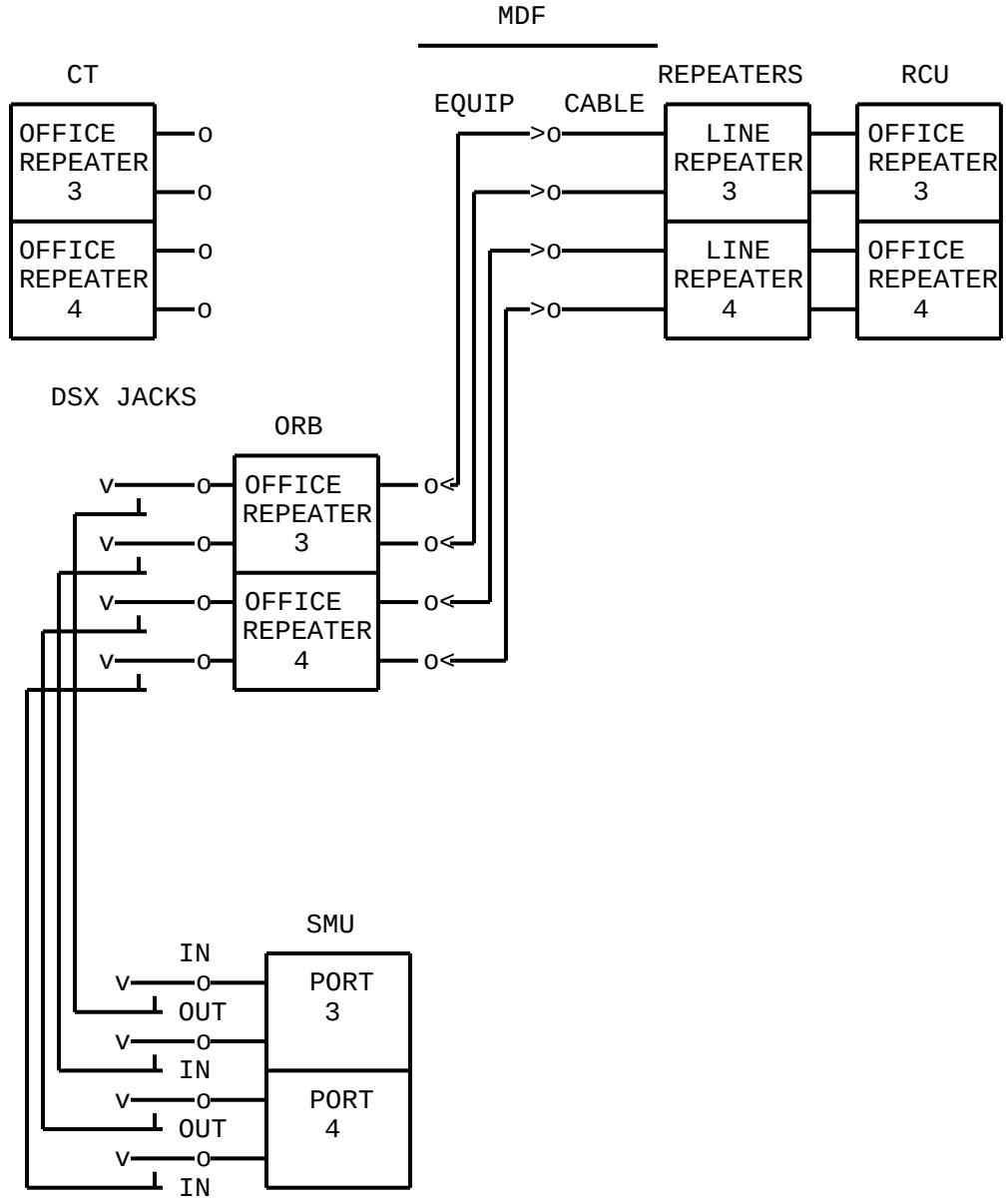


Fig. 41 - ABBT Post-Cutover Configuration for RCU Lines

7. ABBREVIATIONS

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A TEL + ELECT CO	Automatic Telephone and Electric Company
ABBT	Automatic Board-to-Board Testing
AE	Automatic Electric
BCS	Bulk Change Supplement
BELL LABS	Bell Laboratories
CLLI	Common Language Location Identifier
CI	Command Interpreter
CO	Cutoff (Relay)
CR	Carriage Return
DCM	Digital Carrier Module
DDL	Derived Data Link
DF	Distribution Frame
DMS	Digital Multiplex Switch
DP	Dial Pulse
DN	Directory Number
DVM	Digital Voltmeter
FED TEL + ELECT	Federal Telephone and Electric Company
G	Ground
GS	General Specification
ITT	International Telephone and Telegraph
IDF	Intermediate Distribution Frame
LC	Line Circuit
LD	Line Drawer
LEN	Line Equipment Number
LM	Line Module
LCM	Line Concentrating Module
MAP	Maintenance and Administration Position
MF	Multifrequency
MTA	Metallic Test Access (Unit)
MTD	Magnetic Tape Drive
MTM	Maintenance Trunk Module
NE	North Electric
NEC	Nippon Electric Company
NTL	Northern Telecom Limited
NTP	Northern Telecom Practices
NR	No Ring
NT	No Tip
OAU	Office Alarm Unit
OG	Outgoing (Trunk)
OR	Open Ring
OT	Open Tip
PBX	Private Branch Exchange
PEC	Product Engineering Code
POP	Performance Oriented Practices
R	Ring
RCS	Remote Concentrator SLC-96
RCU	Remote Carrier Urban
RLM	Remote Line Module
RSM	Remote Service Module
RTS	Return to Service
S	Sleeve
SC	Stromberg Carlson

SCAN	Scan (Point)
SD	Signal Distribution (Point)
SMS	Subscriber Module SLC-96
SMU	Subscriber Module Urban
SXS	Step-by-Step
T	Tip
TA	Test Access
TM	Trunk Module
TST	Test
TTP	Trunk Test Position
USI	United States Instruments
WE	Western Electric
XBAR	Crossbar