AUTOMATIC BOARD-TO-BOARD TESTING PROCEDURES
2-WIRE NO. 1 ELECTRONIC SWITCHING SYSTEM

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NOTICE

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1. GENERAL

1.01 This section provides procedures for using the automatic board-to-board test (XBBT) auxiliary program (part of MOD 5 auxiliary program package APT04) for the 2-wire No. 1 Electronic Switching System (ESS). The function of the XBBT program is to automatically test the large number of interoffice line connections which exist just before an office cutover or an area transfer. The program operates as a library program in program store (PS) module 05 of PS 0 (or mod 15 of PS 1) and requires that the special library module be loaded as described in PA-1A500.

1.02 This section is reissued for the following reasons:

(a) To update to Issue 6 of pident XBBT504

(b) To include operation with the miniaturized universal trunk (MUT) frame

(c) To add Fig. 7

(d) To remove Mod 5 loading and removal instructions and refer to PA-1A500

(e) To reorganize headings and make minor changes.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

This section does not affect the equipment test list (ETL).

1.03 The following information is pertinent to the use of this section.

(a) The term board-to-board testing is the same as office-to-office testing, multiple-to-multiple testing, meet-to-meet testing, or join-to-join testing.

(b) Refer to Section 231-152-501 for test and adjustment procedures any time the outgoing test trunk circuits are moved to a different location.

(c) The descriptions (Parts 2 and 3) are given for background and may not be necessary for experienced users.

1.04 The XBBT program is used in conducting tests on lines that are being transferred from:

(a) An old office being removed from service to a precut or a functioning No. 1 ESS office

(b) A working office to a precut or a functioning No. 1 ESS office on an area transfer basis.

The purpose of XBBT is to insure that the connection of these lines to the new office is correct with respect to the existing connections in the older office (Fig. 1).

1.05 Abbreviations used in this section are explained in Part 11.

2. CIRCUIT AND TEST DESCRIPTION

A. Circuit Description

2.01 The circuit used for automatic board-to-board testing (SD-1A320-01) is a plug-in unit that has one 2-wire (tip and ring) trunk network appearance, six signal distributor controlled relays, three universal trunk scanner points, and one 3-wire (tip, ring, and sleeve) outgoing trunk. If the old office is a No. 1 ESS office, the outgoing trunk from the board-to-board circuit is a 4-wire (tip, ring, sleeve, and ground) outgoing trunk. This outgoing trunk connects to an incoming trunk circuit in an old office involved in the line transfer. The incoming trunk to the old office is normally connected to incoming local test equipment, test selector, test connector, or similar equipment arranged with the no-test feature. By means of this connection to the old office, the new No. 1 ESS office has access to the old office line appearances of the lines involved in the transfer.

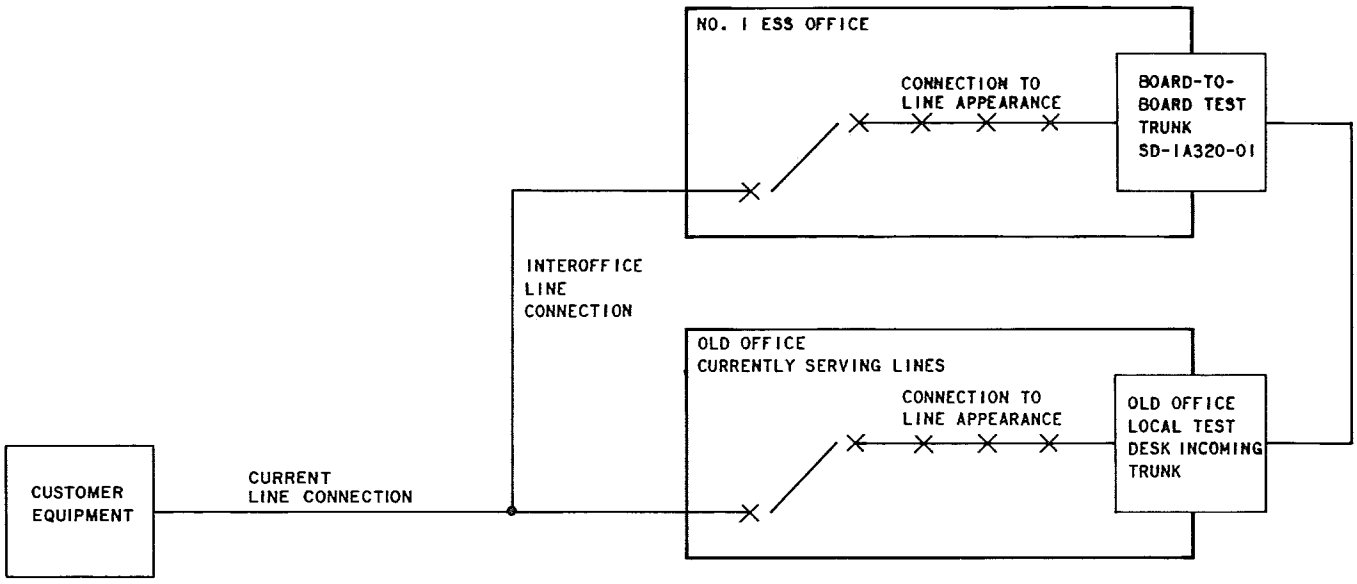

Fig. 1—Board-To-Board Test Connection

B. Test Description

2.02 To conduct a test on a given line, the following steps are taken under program control:

(1) A transmitter of proper type (dial pulse or multifrequency) is connected through the No. 1 ESS trunk switching network to the trunk network appearance of the board-to-board test circuit.

(2) The board-to-board test circuit, in conjunction with the transmitter, generates a seizure signal which causes the old office local test connecting equipment to set itself for digit reception.

(3) The TN of the line, as listed in the translations of the new office, is outpulsed, suitably modified to the format expected by the old office local test equipment.

(4) When the digits have been received at the old office, the local test equipment attempts to set up a path to the line to be tested.

(5) After outpulsing from the new No. 1 ESS office is completed, the path between the transmitter and the board-to-board test circuit is abandoned and a new path is set up between the trunk network appearance of the board-to-board test circuit and the new office line appearance of the line through the ESS trunk and line switching networks.

(6) After an appropriate delay, depending on the type of office, a check is made to see if the other office successfully sets up its path.

(a) ***Not a Successful Path:*** If the other office (not step-by-step) was unsuccessful, a tone indicating overflow is sent from the old office local test equipment. If the tone is present, a disconnect signal is generated by the board-to-board test circuit which causes the old office local test desk to become idle. The path in the ESS network between the board-to-board test circuit and the line is abandoned and no test is made. If the old office is a step-by-step office, no tone is sent to the new office; therefore, no tone is expected. The indication that the step-by-step office was unsuccessful in setting up its path is a reverse battery. This is interpreted by the generic outpulsing programs as an outpulsing failure; the line is abandoned, and no test is made.

(b) ***Successful Path:*** If a tone or reverse battery is not present after an appropriate delay, it is assumed that the old office was

successful in setting up its path. Checks are then made to see if the line is busy or idle in the old office by looking for the presence of battery and ground through the old office and new office connections to the line. If the line is idle, battery and ground are then applied at the trunk network side of the board-to-board test circuit. If battery and/or ground is not detected at the trunk side of the board-to-board circuit in the correct polarity, the line is assumed to be incorrectly connected. If the line is busy, the talking connection battery and ground conditions are used to test the continuity and polarity status. If it is not properly detected at the trunk side of the board-to-board circuit, the line is assumed to be incorrectly connected. A simplexed floating battery is then applied to busy lines through the interconnection to verify that this is the proper busy line.

2.03 Besides testing for continuity of the tip/ring interconnection, it is also possible to test for:

(a) Reversed tip/ring interconnections.

(b) Party affiliations on 2-party lines and tip or ring affiliations only on 4- and 8-party lines where the old office is a panel or step-by-step.

(c) Party affiliations on 2-party lines, tip or ring affiliations only on 4- and 8-party lines, and hunting conditions on multiline hunt or series completion lines where the old office is a No. 1 or No. 5 crossbar.

(d) As an option, the wiring of the old office line circuit can be compared with the wiring of the new office line ferrod to check that they are the same with respect to ground start-loop start operation.

C. Board-to-Board Test Trunk Translations

2.04 One board-to-board test trunk is connected to one old office local test desk incoming trunk. With this arrangement, one board-to-board test trunk has access to as many line appearances in the old office as the old office local test equipment to which it is connected. Usually, local test desk trunks accept four or five digits and have access to one or several groups of 10,000 lines each. In order to access these lines in the old office or offices through the old office local test equipment, route index (RI) and trunk translations for the board-to-board test trunks should be established. All the No. 1 ESS board-to-board test trunks connected to local test equipment with access to the same group of lines in one old office will be members of one trunk group. Each line involved in the transfer will be a member of one of the above mentioned groups; therefore, a trunk group will point to a group of board-to-board test trunks with access to the old office line appearance of the line. For each NXX code involved in the transfer, an RI is assigned that:

(a) Points to a trunk group of board-to-board test trunks having access to the old office line appearances of the lines with the given NXX code

(b) Specifies with its prefix and delete information how the telephone number (TN) [ie, directory number (DN)] of a line is to be modified and then outpulsed into an old office local test desk trunk

(c) Specifies the type of outpulsing to be used, either dial pulse or multifrequency.

2.05 The following five independent examples demonstrate how RI and trunk translations are used to allow XBBT access to the old office line appearances of the lines involved in the transfer.

(a) Three NXX codes are being transferred into the ESS. The local test equipment being used are 4-digit trunks. Three trunk groups containing board-to-board test trunks, each having access to just one of the NXX codes, are used. The digits to be outpulsed are the 4-digit TNs. Three RIs are used, each pointing to a separate trunk group. Each of the RI expansion table entries contains data to delete three digits and prefix none.

(b) Three NXX codes are being transferred into the ESS. The local test equipment being used are 5-digit trunks. One trunk group containing board-to-board test trunks with access to all three NXX codes is used. The digits to be outpulsed are the third digit of the NXX code followed by the 4-digit DN. One RI is used. The RI expansion table entry contains data to delete two digits and prefix none.

(c) Four NXX codes are being transferred into the ESS. The local test equipment being used are 5-digit trunks. One trunk group containing board-to-board test trunks with access to all four NXX codes is used. The digits to be outpulsed are a directing digit and a 4-digit DN. The directing digit for each NXX code is fixed but is not the third digit of the NXX code. Four RIs are used. The RI expansion table entries contain data to delete three digits and prefix one digit. The digit to be prefixed for each RI is the directing digit used for the given NXX code.

(d) One NXX code is being transferred into the ESS. The local test equipment being used are 4-digit trunks. One trunk group containing board-to-board test trunks is used. The office code has the peculiar property that the 4000 number group is accessed from the local test desk by dialing nine instead of four (that is, for DN NXX-4wyz, 9wyz is dialed from a local test desk). Two RIs are used. One RI expansion table entry contains data to delete three digits and prefix none. The other RI expansion table entry contains data to delete four digits and prefix digit nine.

(e) Three NXX codes are being transferred into the ESS. The local test equipment being used are 5-digit trunks. One trunk group containing board-to-board test trunks with access to all three NXX codes is used. The TNs of the lines are changing so that if the old TN is abc-xxxx, the TN is efg-xxxx and the directing digit used to access the lines in the old office is the third digit of the old office code. Three RIs are used. The RI expansion table entries contain data to delete three digits and prefix one digit. The digit to be prefixed for each RI is the third digit of the old office code (abc) corresponding to the new office code (efg).

2.06 Example (e) shows how line transfers involving some types of changing TNs can be handled. As long as the last four (or possibly even three) digits of the TNs remain unchanged, RIs can be assigned to direct XBBT to outpulse the correct digit sequences for these TNs to the old office local test equipment. However, if there is no reasonable correspondence between the old and new TNs, not much use can be made of XBBT. It is possible to input, via a TTY input message, each line individually describing both the old and new TNs, but this procedure is little better than existing manual board-to-board test schemes.

3. PROGRAM DESCRIPTION

A. Introduction

3.01 The primary purpose of XBBT is to automatically conduct a test on the interconnections between the old office and the new office of all lines involved in a line transfer. From the point of view of the No. 1 ESS, a test should be run on all TNs that are listed as inactive with respect to the current state of the area cutover program for growth (PR-1A098). A reasonable manner in which to specify such a request is that the board-to-board test on all TNs which are inactive be conducted in the range abcd through ijkl, inclusive, of the office code NXX (abcd and ijkl are arbitrary values as is NXX which must be an intraoffice code.) This is the method used by the auxiliary program XBBT. Thus, for a request as stated above, each line starting with TN NXX-abcd and ending with TN NXX-ijkl will be obtained sequentially from No. 1 ESS translations and examined. If found to be assigned and inactive, the board-to-board test will be conducted on it. The range of lines NXX-abcd through NXX-ijkl is called a group of lines. The numeral 0 in the TN is treated as the least numeral (zero) and not as a 10. XBBT has the capability of simultaneously and independently controlling the testing of up to four different groups of lines, not necessarily all in the same old office. The different groups may also be served by various types of switching equipment.

3.02 When the program is active, it uses a table in call store (CS) that is normally used by the generic program for card writing and card verification. XBBT uses this table for storing information describing lines to be tested. Should card writing or card verifications become active while XBBT is active, XBBT will abort. There are two ways that lines are entered into the exceptional line table in CS.

(a) When the program is active, a TTY message can be used to enter a line into the table.

(b) If a condition occurs so that a line cannot be tested at that time, the program enters the line into the table.

3.03 During operation the program stops its sequential testing every six minutes eighteen seconds ±6 seconds to interrogate the exceptional line table. At this time, an attempt will be made to test all the lines listed in the table. If a line cannot be tested, it will again be entered in the table. If the 6-minute 18-second timing is overridden by a TTY input message, the program will stop its sequential testing and interrogate the table. After all lines in the table have been tested or reentered in the table, the program resumes its sequential testing. When testing is resumed, the table will again be interrogated six minutes eighteen seconds later unless overridden by another TTY message. A line will be entered into the table a maximum of two times. After a line has been retrieved from the table a second time and is still unable to be tested, it will not be reentered, but one of the following program procedures occur.

(1) If the old office is other than SXS, a TTY output message with a code of UNT or NGL will be printed (paragraph 7.02).

(2) If the old office is SXS, and the line is busy, the busy line test [paragraph 2.02 (6) (b)] will be performed. If it is untestable for some other reason, an output message with a code of UNT or NGL will be printed (paragraph 7.02).

B. Program Modes

3.04 Program XBBT, when actual testing is being done, has two modes in which to operate:

(a) ***Normal Mode:*** In normal mode, the program tests a group or groups of lines sequentially and periodically interrogates the exceptional line table containing lines to be tested. As testing proceeds, lines with trouble are reported by the program. TTY outputs in this mode consist of trouble reports on lines found in trouble, progress report messages for each group of lines upon demand or after a table interrogation, and a list of any lines left in the exceptional line table after it has been interrogated. If requested, the results of every line tested can be printed; ***however, this should be done only when testing a small group of lines due to the large amount of data produced by the program.***

(b) ***Interrogate Mode:*** In the all interrogate mode, the program never attempts to test lines from the groups; rather, it constantly interrogates the table searching for lines to test. Thus, lines entered into the table via the TTY are tested quickly. The all interrogate mode can be used when a large number of lines are to be entered for retest. This mode makes it easier to analyze the test results of lines in question. The program can be started in either the normal or all interrogate mode and once in operation can be switched between the two modes arbitrarily. When the program is in the all interrogate mode, the test results of all lines are always printed.

C. Ground Start-Loop Start Verification

3.05 As an option, an extra test can be conducted on all lines except party lines. This optional test checks the wiring of the old office line circuit of a line against the new office line ferrod of the same line verifying that the two are wired the same with respect to ground start or loop start operation. This test will be conducted on idle lines if the line passes the normal board-to-board test.

3.06 If a line is idle and it has passed the normal board-to-board test, the optional test is conducted as a part of the sequence for disconnecting the old office local test equipment from the old office line appearance. If a line is found to be busy, the normal busy test is conducted. If the line passes the normal busy test, it is then entered in the exceptional line table with an indication that only the optional ground start-loop start test remains. When the line is obtained from the table on the next table interrogation, the usual connection is set up in the old and new offices. At this point, the busy/idle status of the line is determined. If the line is still busy, the line is placed back in the table so that the test will be tried again later (paragraph 3.03). If the line is now idle, the ground start-loop start verification test can now be conducted. When the program is in the all interrogate mode, the ground start-loop start verification test is not conducted on busy lines that have passed the normal busy board-to-board test. This is because the program would continue setting up connections to test the same line until it became idle. Instead of continuing to make attempts to test the busy line, a TTY output message is printed (NGL) stating that the line was found to be busy, passed the normal board-to-board test, and the ground start-loop start verification test was not

conducted. The line can be reentered into the table manually at a later time if desired.

3.07 When the ground start-loop start test is required, it will slow down the board-to-board testing because of time allowances that must be made for busy lines. Because of this, the ground start-loop start test should be requested only on one or two runs of XBBT. The runs selected should be ones where most of the line interconnections are correct because the optional test is conducted only on correctly interconnected lines.

3.08 The ground start-loop start test can give erroneous results if an origination attempt occurs on a ground start line while the test is being conducted. This origination causes the line to appear as a loop start line.

D. Obtaining a List of Unassigned Directory Numbers

3.09 The automated board-to-board test program conducts a test on any TN that is listed as assigned but inactive with respect to the current state of the area cutover program. This procedure will not find lines that are assigned in the old office and have been listed as unassigned in the new office. Program XBBT can be used to obtain a list of TNs that are listed as unassigned in the new office. To obtain a list of unassigned TNs, a separate run of XBBT should be made. No hardware is used and no tests are conducted during this separate run. Also, only one group of TNs can be specified. This requirement causes the list to be sequential, making it easy to compare against the old office records.

3.10 When XBBT is used to obtain a list of unassigned TNs, every TN (active or inactive) in the range of the single input group is looked at in turn. Every TN found unassigned is printed and all other assigned TNs are skipped over. Thus, the output consists of a list of all unassigned TNs in the given input group interspersed with periodic progress report messages. If a listing of the unassigned lines from more than one office code is desired, a separate list-gathering run of the program is required. A listing may also be gathered for unassigned TNs that point to a specific RI as well as for an office code.

E. Obtaining a List of Multiparty Directory Numbers

3.11 This feature is used in the same manner as the feature for obtaining a list of unassigned TNs. All the restrictions in the various steps pertaining to gathering a list of unassigned TNs also apply to gathering a list of multiparty TNs. The output format is different from that obtained when the program is used to gather a list of unassigned TNs. A line report message for every multiparty TN will be printed with an identifying code MPi. The i denotes which party this TN is (1 through 8). All assigned parties on a given line will be displayed consecutively by party in one group of line report messages. Each group will be followed by the message:

LIB MESSAGE END MP

indicating the end of a multiparty group. The list generated by XBBT will be easy to compare with old office records for correct party affiliations because various TNs on multiparty (does not apply to 2-party) lines will be grouped together by multiparty line equipment numbers.

F. Aborting XBBT

3.12 A normal requirement of all auxiliary programs is that they cease functioning on demand or when a maintenance interrupt occurs. It is not always possible for XBBT to immediately stop functioning because of the large amount of interaction time spent with the generic program. If XBBT receives an abort command due to a TTY input message, maintenance interrupt, etc, which it cannot immediately honor, the output message

LIB MESSAGE AIP

will be printed. This message indicates that the abort order has been received and will be executed as soon as possible. The actual abort should normally occur within 20 seconds after the abort order is received by the program. Due to the amount of time spent with the generic program in control, the initial abort order is most likely received when at least some of the tests being currently conducted are under the control of the generic outpulsing programs. These programs do not relinquish control until they are finished. Any attempt to immediately abort when outpulsing has control would cause network paths to be lost and hardware circuits such as transmitters to be left

in nonidle states. The abort scheme used by XBBT leaves all paths, circuits, etc, idled so that no audit printouts will occur.

3.13 Normally, any maintenance interrupt level F through A will cause the abort of any functioning auxiliary program. The auxiliary program XBBT has been provided with the ability to operate in the presence of maintenance interrupt levels F through C if requested to do so by TTY input messages. This feature will allow lines to be tested during periods when interrupts might occur and the office is unattended. However, this feature should be used with ***caution,*** especially in an office that is already providing telephone service. An auxiliary program that is causing repeated interrupts could cause damage to a functioning office by causing emergency action (EA) phasing.

3.14 If the abort was originated by program XBBT, the following TTY output message will occur:

LIB23 RELØ ABT ADDR XBBT nnnnn.

The reason for the abort may be found in the ABØRT_CATALØGUE section of PIDENT XBBT (PR-1A509).

4. PROGRAM RESTRICTIONS

4.01 Test arrangements are based on using dial pulse or multifrequency incoming local test equipment. Revertive incoming local test equipment cannot be used with XBBT. The board-to-board program under program control connects to lines in the old office. This effectively simulates the test actions manually done by maintenance personnel at the test desk using no-test trunks.

4.02 In addition to normal auxiliary program requirements, the following restrictions apply:

(a) Installation of the No. 1 ESS office to which the lines are being transferred should have progressed to the point where the lines to be tested have been bridged from the old office to the new office.

(b) The generic program must be functioning normally (automatically satisfied in a growth situation).

(c) The area cutover program for growth (PIDENT SACT—PR-1A098) must be active (ie, cutover translations must be in effect). The positions of the CUT 1 and CUT 2 keys have no effect on XBBT. However, it is suggested that the states of these keys ***not*** be changed while XBBT is running.

(d) The TNs to be tested must be inactive with respect to the current state of the cutover program. Note that the current state of the cutover program can be either precut or postcut; it is the inactive TNs that can be tested. This is a requirement only when the program is being used to run actual board-to-board tests. If only a list-gathering run of unassigned or multiparty TNs is desired, active TNs may be included in the range.

> ***Note:*** Since the customer temporarily has two lines assigned (ie, one to the old office and one to the new office), the terms "active" and "inactive" are used to distinguish between them. The line that is active (available for customer use) before the cut will be inactive after the cut.

(e) All no test access to lines (being transferred in the old office) should be routined according to the appropriate Bell System Practice before automatic board-to-board procedures are started.

(f) No card writing or card verification should be in progress during the time that program XBBT is actually running.

(g) The XBBT program requires the installation of at least one No. 1 ESS board-to-board test circuit (SD-1A320-01, J1A082A-1, Fig. 2). Up to four test circuits can be driven simultaneously and independently by XBBT. Up to four circuits are allowed because XBBT is organized in the manner of a call processing program and uses call registers for storage of information and for control. The maximum of four is limited by the call store space which can be used as call registers for XBBT.

(h) No other MOD 5 auxiliary programs may be active while XBBT is active.

(i) The auxiliary programs per J1A064AA-1 are generic oriented and compatibility is issue sensitive. Current compatibility information is

shown in Table A of the PG drawing of each generic and of each auxiliary program.

5. PRELIMINARY PROCEDURES

A. Board-to-Board Test Circuit Installation

5.01 To install the board-to-board test circuit, proceed as follows (Fig. 2).

(1) Connect the board-to-board test circuit to the trunk frame for which translations are to be established. From one to four test circuits may be used simulaneously [paragraph 4.02 (g)]. The connection is made with a jumper cord that is an option with the test circuit. The trunk frame may be either a universal trunk frame (UTF)or a miniaturized universal trunk (MUT) frame, depending on the selection of jumper cord options as given in SD-1A320-01 and CD-1A320-01.

(a) To connect the test circuit to a UTF, use an 840040703 jumper cord (option W and Y) (Fig. 2).

(b) To connect the test circuit to a MUT frame, use an 841994353 jumper cord (option W and X) assembly.

(c) To connect the test circuit to either a UTF or MUT frame, select options W, X, and Y as given in SD-1A320-01.

Note: Early test circuits did not have all of the jumper cord options referred to above.

(2) Using patch cords, establish connections from the test circuit to the +24 volt and ground jacks on the control panel at the frame.

(3) Set the SXS-NON SXS switch to the proper setting. (If SXS, see paragraph 7.02 TBS.)

(4) Set the NOR-REV switch to NOR when the expected start pulsing signal from the terminating office is ground on tip and -48 volts on ring. Set the NOR-REV switch to REV when the expected start pulsing signal is -48 volts on tip and ground on ring.

(5) Make a connection at the main distributing frame of the tip, ring, and sleeve leads from the board-to-board test trunks to the appropriate incoming test trunks.

B. Adding Translations for the Board-to-Board Test Circuit

5.02 A flowchart of the major steps to add translations for board-to-board test trunks is shown in Fig. 3. Reference should be made to the section indicated in the flowchart for a more detailed procedure. The layout of the trunk class data is needed to assign the trunk class expansion table entries for board-to-board test trunks. Figure 4 is an example of trunk class data, but is not intended for actual use. For actual data, refer to Translation Guide TG-1A, Div. 4, Sec. 2e. The program checks the validity of these translations upon initial entry and will abort if not valid. The number nnnnn in the abort message (paragraph 3.14) will specify the reason.

Note 1: The test trunks for the test circuits should be arranged in trunk groups so that test trunks in a given trunk group have access to as many old office line appearances of lines to be tested as possible. Route indices pointing to these trunk groups should be assigned (allowing additional flexibility, if needed) via route index prefix and delete information. No alternate routing is expected. Ultimately, it is one of these route indices which identify to the program the correspondence of the 3-digit office code of a group of lines to be tested and the trunk group containing test trunks that can be used in testing the lines.

Note 2: This note applies only for SXS offices. If test selectors are used in the old office test train so that normal access from local test desks is five digits, the test selectors to which board-to-board test circuits are connected should be plugged (perhaps with toothpicks) to permanently select a test distributor. The route indices which point to board-to-board test trunks connecting to SXS offices should specify to delete three digits and preface none, showing that the test selectors are being bypassed and only four digits are being pulsed into the permanently selected test distributor in the old SXS office. Notice that a test distributor is associated one-to-one with a board-to-board test circuit.

Fig. 2—J1A082A Test Set for Board-to-Board Testing

C. MOD 5 Configuration Procedures

5.03 PS module 05 or 15 must be loaded with the proper auxiliary program package. Therefore, before running XBBT, perform the preliminary procedures in PA-1A500 for inserting an auxiliary test module, configuring auxiliary test programs into service, and using the LIB-EDIT- message.

D. TTY Assignment

5.04 Input messages can be typed in from any TTY; however, the output messages will be printed on the primary maintenance TTY channel unless otherwise designated. It is recommended that another TTY channel be used since the XBBT program will be printing almost constantly, which prevents the receipt of any other messages unless the XBBT program is aborted. To designate the

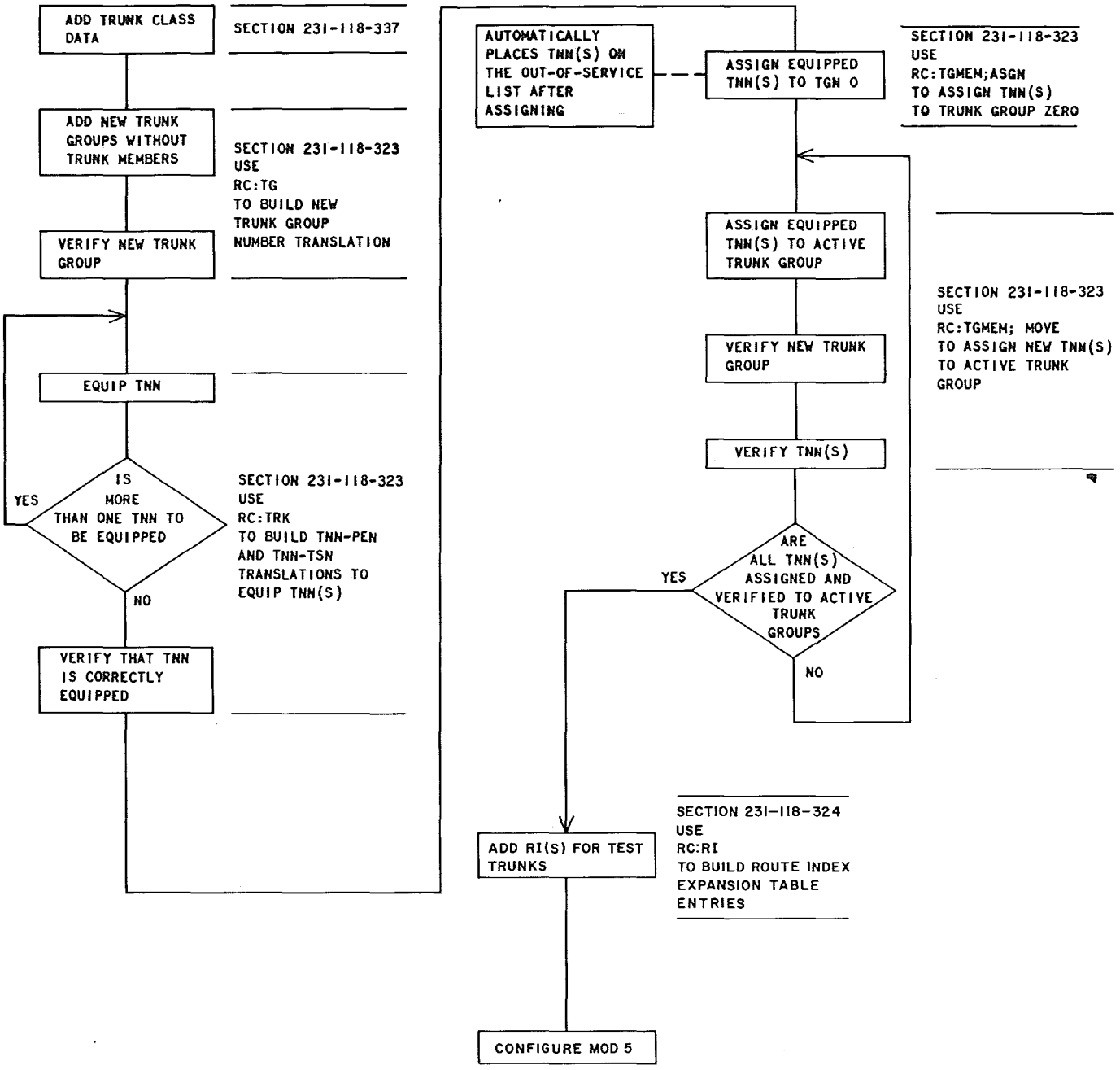

Fig. 3—Flowchart for the Addition of Translations

DIV. 4, SEC. 2e
May, 1977
ESS 1204 (10) TG-1A

TRUNK CLASS CODE RECORD

TRANSLATION GUIDE
TG-1A

SD-1A320-01

TEL CO 3 4 5
BASE 6 7 8 9
CONT GR 10 11
FORM CODE 2 H 14 15

TITLE: Outgoing Test Trunk Circuit for Board-to-Board Testing.

SEE NOTE: 9

DATE

TCC 17 18 19

ESS UNIT

KEY PUNCH CARD 1/23

TRUNK ORDER CODE 02000 25 29

TRANSLATION WORD 1

BIT POSITION	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
INPUT	0	0	0	0		0	0	0	0			0	0			0	0	0	0	1	0	0	0
KP COLUMN	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53

1 = MULTI-PORT, 0 = NO
1 = CONFERENCE RESTRICTED, 0 = NO
1 = INTERTOLL AND OGT ODD
0 = START DIAL SIGNAL
1 = MAKE BUSY - DISTANT OFFICE, 0 = NO
START DIAL: 11 = WINK, 10 = DELAY, 01 = NOT VALID, 00 = NO
1 = FLASH EXPECTED, 0 = NO
1 = BATTERY ON TIP, 0 = BATTERY ON RING
SEE NOTES FOR THIS BIT
COMPENSATING RESISTANCE
CONTINUITY CHECK TONE LEVEL
SEE NOTES FOR THESE BITS
1 = TSP/S OR RP TO XBAR, 0 = NO
OUTPULSING: 001 = MF OR TSP/S, 010 = DP, 011 = RP, 100 = PCL, 101 = TT, 110 = CCIS, 000 = NO
1 = IDLE CIRCUIT TERMINATION, 0 = NO
SUPERVISION: 000 = REV BAT, 0010 = HIGH-LOW, 0011 = E & M OR F, 0100 = HIGH-LOW REV BAT, 0101 = REV HIGH-LOW, 1000 = SLEEVE LEAD, 1001 = POLAR DOUBLE DUPLEX, 1010 = CCIS, 1011 = GROUND START
1 = WORD 3 IS APPLICABLE, 0 = NO OR CP CONTROLLED
01 = INCOMING OR SIN, 10 = TWO WAY OR MAKE BUSY, 11 = MISCELLANEOUS, 00 = OUTGOING

KEY PUNCH CARD 1/23

TRUNK ORDER CODE 02000 25 29

TRANSLATION WORD 2

BIT POSITION	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	–	–	–	–
INPUT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KP COLUMN	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

1 = CHARGE ON FREE NUMBER, 0 = NO
HIGH FIVE NORMALIZED OFFICE CODE OR MF INPULSING FROM PANEL OFFICE
NORMALIZED OFFICE CODE OR INCOMING TRUNK OFFICE CODE SELECTOR TABLE NUMBER
DISCONNECT TIMING
QUANTITY OF DIGITS RECEIVED: 0100 = 4, 0101 = 5, 0111 = 7, 0000 = 2, 3 OR NO
START DIAL SIGNAL: 01 = DELAY DIAL, 10 = WINK, 11 = DIAL TONE, 00 = NO
ROUTING: 01 = LOCAL, 00 = NO
INPULSING: 001 = MF, 010 = DP, 011 = RP, 101 = TT/DP, 110 = CCIS, 000 = NO
SEE DIVISION 4, SECTION 2E KEY PUNCH CARD 1 FOR OPTIONAL DATA

KEY PUNCH CARD 2/23

TRUNK ORDER CODE 02000 25 29

TRANSLATION WORD 3

BIT POSITION	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
INPUT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KP COLUMN	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53

TONE: 01 = STEADY, 10 = INTERRUPTED, 11 = ANN OR RCH, 00 = NO
NOT USED
1 = MODIFIED FOR TDM TIE LINE, 0 = NO
NOT USED
1 = HL4W INTRAPROCESSOR TRK, 0 = NO
1 = CUSTOM CALLING FEATURE DEMONSTRATION, 0 = NO
1 = ANN CUT-THRU TO OPR, 0 = NO
1 = NO TEST, 0 = NO
1 = CONTROLLED RING, 0 = NO
1 = TOLL SWITCH, 0 = NO
1 = RECORDING COMPLETING, 0 = NO
NOT USED
1 = INBAND SIGNALING, 0 = NO
1 = WINK FOR INBAND SIGNALING, 0 = NO
1 = OPERATOR TRUNK, 0 = NO

TRANSLATION WORD 4

BIT POSITION	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	–	–	–	–
INPUT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
KP COLUMN	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

1 = FAST ANSWER, 0 = NO
NUMBER OF PORTS FOR MULTI-PORT TRUNKS
1 = PRIVATE NETWORK, 0 = NO
1 = OUTGOING TO ESB, 0 = NO
1 = CITY OF ORIGIN, 0 = NO
1 = EMERGENCY RINGBACK FLASH, 0 = NO
1 = OGT TO AUTOMATIC INCPT, 0 = NO
1 = FLASH REPEATING, 0 = NO
1 = FLASH TIMING, 0 = NO
SEE NOTES FOR THIS BIT
1 = SEE NOTES FOR THESE BITS, 10 = MESSAGE TRUNK, 01 = SEE NOTES FOR THESE BITS, 00 = NO
1 = SEE NOTES FOR THIS BIT, 0 = SEE NOTES FOR THIS BIT
CIRCUIT PROGRAM INDEX
SEE DIVISION 4, SECTION 2E KEY PUNCH CARD 2 FOR OPTIONAL DATA

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Fig. 4—Trunk Class Data

use of a TTY channel other than the primary maintenance channel, type the following input message:

LIB-TCHAN-aa.

aa = TTY that is conveniently located and does not have much activity.

Note: aa is the same code (decimal) describing the selected TTY as is described in the TTY-MLTCHAN input message (refer to IM-1A001).

6. PROCEDURES FOR RUNNING PROGRAM XBBT

Caution: The procedures in this part assume that the restrictions in Part 4 are being observed and that the preliminary procedures in Part 5 have been performed.

A. Procedures for Requesting XBBT

6.01 The following procedure is used to request program XBBT.

Note: If it is desired to run with some board-to-board test trunks busy:

- Start with all test trunks idle
- Initiate program in the all-interrogate mode so no tests are run
- Busy out the desired board-to-board test circuits
- Commence testing either in the all-interrogate mode or switch to the normal mode.

(1) To start program XBBT, type the following:

LIB-START-230abnn.

a = 0 for normal testing

= 1 if XBBT is being run only to collect a list of unassigned DNs is to be obtained (Note 1)

= 2 if XBBT is being run only to collect a list of multiparty DNs is to be obtained (Note 1)

b = 0 if XBBT is to be aborted by interrupts F through A (paragraph 3.13)

= 1 if XBBT is to run without being aborted by interrupts F through C (paragraph 3.13)

nn = 04 if 1 group of lines is tested (Note 2)

= 08 if 2 groups of lines are tested

= 12 if 3 groups of lines are tested

= 16 if 4 groups of lines are tested.

System response should be an ØK TACK.

Note 1: If a = 1 or 2, proceed to Step (6) after Step (1).

Note 2: If a = 1 or 2, nn must be 04 (ie, one group of lines). For these two cases, the DNs can be active with respect to the current state of the cutover program.

(2) If only individually entered lines are to be tested (ie, all-interrogate mode is to be used), type:

LIB-SET-118.

System response should be an ØK TACK.

(3) If it is desired to have the test results of every line printed in the normal mode, type:

LIB-SET-115.

System response should be an ØK TACK.

Note: This message is not normally recommended (paragraph 3.04).

(4) If it is desired to have all DNs found unassigned printed in the normal mode, type:

LIB-SET-113.

System response should be an ØK TACK.

Note: LIB-SET-113 is not required if LIB-SET-115 is used because LIB-SET-115 includes LIB-SET-113. If a large number of unassigned lines are encountered, this feature

will cause the same undesirable effect that the use of LIB-SET-115 causes. A better method is to make a separate run to obtain a list of unassigned lines (paragraph 3.09).

(5) If it is desired to have the ground start-loop start verification test performed on all lines, type:

LIB-SET-112.

System response should be an ØK TACK.

This feature should be used sparingly because it will slow the speed of testing (paragraph 3.07).

(6) From one to four groups of lines can be tested. For each group of lines to be tested, type:

LIB-DEC-srrrr/
ttnnn/
vxxxx/
wuuuu.

Note 1: All variables are decimal.

Note 2: An OK response should follow each slash or period.

One 4-word LIB-DEC message must be entered for each group of lines being tested and parameter ***nn*** in the LIB-START message must be equal to four times the number of 4-word LIB-DEC messages. Also, a group of lines should be specified for each test circuit. This allows faster testing because each circuit will be testing lines independently. If only one group of lines is specified for an RI pointing to a trunk group containing more than one board-to-board circuit, the test circuits will be used alternately and no speed will be gained by having more than one circuit.

s = numerical code for the type of old office.

= 1 for step by step.

= 2 for panel.

= 3 for No. 1 crossbar with access to extra line numbers not included in the regular subscriber number series.

= 4 for No. 5 crossbar or for No 1 Crossbar without extra line numbers not included in the regular subscriber number series.

= 5 for No. 1 ESS when all lines have DNs.

= 6 for No. 1 ESS where the lines in a multiline hunt group do not necessarily have DNs and are to be identified by means of their 11-digit multiline hunt number format.

rrrr = Route index number used for testing this group when a = 0 in the LIB-START message [paragraph 6.01 (1)].

= 0 if a list of unassigned DNs by office code is needed when a=1 in the LIB-START message.

= Route index number to which unassigned DNs are routed if a list of unassigned DNs by RI is needed when a=1 in the LIB-START message.

= 0 when a=2 in the LIB-START message.

tt = 02 through 63 (delay in increments of 200 ms to allow the other office time to set up its test connection to a line after the cut-through signal is generated). For SXS offices, use tt = 04 to give 800ms delay.

nnn = The 3-digit office code of the group to be tested.

Note: If a = 0 in the LIB-START message [paragraph 6.01 (1)], this office code must be inactive with respect to the current state of the cutover program. However, if a = 1 or 2 in the LIB-START message, this office code may be either inactive or active.

v = 0, for none of the below.

= 1, to allow an extra 800 ms time in the disconnect state (for a total of 1600 ms).

= 2, to restore trunk through the trunk guard timing list.

= 3, for both 1 and 2 above.

xxxx = the 3-digit start DN of the group of numbers to be tested (0000 is first number. The XBBT program will perform the necessary conversion if the actual office first number is not 0000).

w = 0 through 9 (delay in increments of 100 ms after outpulsing is completed before transferring from the seizure signal state to the cut-through signal state). For SXS offices, use tt = 02 to give 200ms delay.

uuuu = The 4-digit stop DN of the group of numbers to be tested. "0" is to be treated as zero, not ten; therefore, 9999 is last number.

In order to understand the use of the ***tt, v,*** and ***w*** parameters in non step-by-step offices, it is necessary to understand the manner in which the old office test connection to a line is initiated. First, a transmitter is seized and a path in the ESS network is set up between the transmitter and a board-to-board test trunk. The outpulsing programs put the test trunk in a bypass state consisting of a tip/ring path through the circuit and high current on the sleeve lead to the old office local test equipment and put the transmitter in a seizure state consisting of a closure across the tip and ring. Thus, the signal sent to the old office local test equipment is a closure on the tip/ring loop and high current on the sleeve lead (a valid seizure signal from a local test desk). This state is maintained during outpulsing. When outpulsing is complete, the test trunk is put in a hold state, ***w,*** which maintains the high sleeve lead current and the tip/ring closure directly from the test trunk. The transmitter is then idled and the path between it and the test trunk is abandoned. The hold state, ***w,*** is maintained for a variable period of time, after which the test trunk is put in a state consisting of low current on the sleeve and an open on the tip/ring loop (a cut-through signal to the old office local test equipment causing that equipment to cut through to the line in the old office).

After the cut-through signal is generated, a period of time, ***tt,*** must be taken to allow the old office time to set up its path to the old office line appearance. After the test is completed (including step-by-step), the test trunk is put in a state consisting of high current on the sleeve lead and an open across the tip/ring loop (a disconnect signal to the old office local test equipment). This disconnect state, ***v,*** is maintained for either 800 or 1600 ms after which time the test trunk is idled and made available to be reseized for a new test either immediately or 750 ms later (ie, will be idled either using or not using the trunk guard timing interval).

When selecting values of ***tt, v,*** and ***w,*** use different values until a good combination of the three is found. Obviously, the shorter the intervals specified by these parameters, the less time is required for one line test. On the other hand, enough time must be taken to allow the old office equipment to properly respond to the signals generated by a board-to-board test trunk. As an aid in finding the right combination of these parameters, the following procedure may be used. Type in LIB-SET-115 so that all line test results will be immediately seen. If parameter ***tt*** is too small, the probable result will be none or few line test result TTY output messages. If parameter ***w*** is too small, the probable result is the same as above. If a bad value of parameter ***v*** is chosen, the probable result is either NT04 T-T SUPF error message printouts specifying a board-to-board test trunk or TN08 error message printouts specifying a board-to-board test trunk.

System response should be an ØK TACK after each line.

If all is well, the program should be entered and started, buffer bus lamp 23 should light, and the following TTY message should print:

mm/dd/yyyy xxx aa:bb:cc

mm/dd/yyyy = month-day-year

xxx = Usual 3-letter abbreviation for day of the week (Tue = Tuesday)

aa:bb:cc = time of day in hours, minutes, and seconds.

6.02 After the last LIB-DEC message, the following conditions may exist.

(a) If all is not well, an abort message will be received. See paragraph 3.14.

(b) If all is well and LIB-SET-118 was not typed, the program will commence testing the input group(s) of lines.

(c) If all is well and LIB-SET-118 was typed, the program will cycle and look for additional LIB-DEC input data messages (paragraph 6.06).

B. Miscellaneous Input Messages

Table Interrogation, Report, and Mode Switch Request Messages

6.03 The input messages in this paragraph can be used at any time while XBBT is running to request exceptional line table interrogation, to request progress reports, or to switch modes.

(a) To request a table interrogation followed by a progress report on the program test, type:

LIB-SET-119.

This message resets the 6-minute 18-second timer for table interrogations.

System response should be an ØK TACK.

(b) To request only a progress report without resetting the 6-minute 18-second timer for table interrogations, type:

LIB-SET-120.

System response should be an ØK TACK.

(c) To switch from the all interrogate mode to the normal mode, type:

LIB-SET-018.

System response should be an ØK TACK.

(d) To switch from the normal mode to the all interrogate mode, type:

LIB-SET-120/
118/
119.

System response should be an ØK TACK after each line.

LIB-SET Messages

6.04 The features associated with the LIB-SET-115, LIB-SET-113, and LIB-SET-112 messages [paragraph 6.01 (3), (4), (5)] can be invoked any time while the program is running.

6.05 Any feature that has been turned on by a LIB-SET-1nn. message can be turned off at any time by a LIB-SET-0nn message. System response is OK.

Individual Line Test (LIB-DEC) Messages

6.06 Once the program is running, either testing groups of lines or cycling (ie, looking for individual lines to test because LIB-SET-118 was typed), the following LIB-DEC messages can be used to enter individual lines to be tested. A LIB-DEC message also can be used to enter a route index that points to a group of board-to-board test trunks desired to undergo the dc to dc converter test. The LIB-DEC messages are rejected when XBBT is being used only for a list gathering run. These messages cannot be used until the XBBT is initially entered since each entry is made into the exceptional line table. Each entry will remain in the table for a maximum of two table interrogations (paragraph 3.03).

(a) To enter a line for test with the same 7-digit DN in both offices, type:

LIB-DEC-2qnnn/
0xxxx.

(b) To enter a line for test with a different 7-digit DN in each office, type:

LIB-DEC-4qnnn/
0xxxx/
00mmm/
0uuuu.

(c) To enter a multiline hunt line for test with only a multiline hunt line number in the new office and a 7-digit DN in the old office, type:

LIB-DEC-5qnnn/
0xxxx/
0tttt/
00mmm/
0uuuu.

(d) To enter a multiline hunt line for test specified only by different 11-digit multiline hunt line format numbers in both offices, type:

LIB-DEC-6qnnn/
0xxxx/
0tttt/
00mmm/
0uuuu/
0ssss.

(e) To enter a multiline hunt line for test specified only by the same 11-digit multiline hunt line format in both offices, type:

LIB-DEC-3qnnn/
0xxxx/
0tttt.

(f) To enter a route index that points to a group of board-to-board test trunks desired to undergo the dc to dc converter test (paragraph 8.01), type:

LIB-DEC-1aaaa.

The following variable explanation applies to all input messages in paragraph 6.06.

q = 0, the test results on this line will be printed only if the test fails on this line

= 1, the test results on this line will be printed if the test passes or fails on this line

nnn = new office office code

xxxx = new office DN numeric

tttt = new office multiline hunt line terminal number

mmm = old office office code

uuuu = old office DN numeric

ssss = old office multiline hunt line terminal number

aaaa = route index of board-to-board test trunk(s).

Note 1: The leading digit in the LIB-DEC message indicates the number of words (typed lines) in the message.

Note 2: If mmm = 000 in the LIB-DEC-4 and LIB-DEC-5 messages and the other office is a No. 1 crossbar, this indicates that the old office line appearance occurs on the extra number series frame. For any NXX code, an extra number series associated with it allows that code to have an extra 1000 numbers assigned to it. Such lines are usually used as part of the multiline hunt groups.

System response for the input messages in this paragraph (6.06) should be an ØK TACK after each line and the following output message:

LIB MESSAGE ppp

ppp = ACP, ***accepted,*** if the message has been accepted and thus stored in the exceptional line table

= IWC, ***incorrect word count,*** if an incorrect word count specified by the leading digit was entered

= NIN, ***not assigned,*** if the entered line is not listed as an assigned line in the new office

= NPR, ***not precut,*** if the line is not listed as precut in the new office

= NMH, ***not multiline hunt,*** if the line is not listed as a multiline hunt line in translations

= NBT, ***not being tested,*** if the line is not in a group being tested

= FUL, ***full,*** if the exceptional line table is full and, therefore, the line cannot be entered into the table

= NFL, ***nearly full,*** if the line has been accepted and stored in the exceptional line table but the table is almost full.

Correcting a LIB-DEC Message Typing Error

6.07 If a typing error is made in a LIB-DEC message, type:

LIB-SET-116.

System response is OK.

Retype the LIB-DEC message.

C. Procedures for Terminating XBBT

Automatic Halt

6.08 When the program is testing groups of lines and all groups have been tested, the program automatically halts, issues a final progress report, and prints a LIB23 UN23 END message.

Manual Halt

6.09 It may be necessary to halt XBBT before it terminates normally. When the program is operating in all interrogate mode (ie, LIB-SET-118 is typed), it does not stop automatically; consequently, it requires a TTY input message to stop.

To halt XBBT and receive a progress report, type

LIB-SET-117.

The program should halt, issue a final progress report, and print a LIB23 UN23 END message.

Manual Abort

6.10 To abort XBBT (and not receive a final progress report), type:

LIB-SET-122.

System response should be OK TACK. The XBBT program will be stopped as soon as possible. No final progress report is issued. The output message LIB MESSAGE AIP (abort in progress) may be received before the relocatable abort message is received.

The XBBT program can also be aborted by the user typing:

LIB-START-0000000.

The effect is the same as for the previous message except that the response is AB TACK.

7. OUTPUT MESSAGES

7.01 Once XBBT is running, output messages consist primarily of line report messages and progress report messages. Other messages that may occur are overflow messages, circuit failure reports, and abort in progress messages.

A. Line Report Messages

7.02 The line report message consists of the number identifying the line, line equipment number in the new No. 1 ESS office, and a 3-letter code identifying the result of a test. Output messages indicating that the line passed all tests are received only on demand. A line report message may be received indicating all tests passed although not requested. This can occur if the line was reentered into the table and successfully tested on the second table interrogation (paragraph 3.03). Line report output messages are as follows:

(a) For a 7-digit DN with the same DN in both offices, the line report is

LIB23 LRP ppp ii i i i i ii 0nxx abcd.

(b) For a 7-digit DN with two different DNs, the line report is

LIB23 LRP ppp ii i i i i ii 0nxx abcd
0myy efgh.

(c) For an 11-digit MLH line in the new office and a 7-digit DN in the old office, the line report is

LIB23 LRP ppp ii i i i i ii 0nxx abcd uvwz 0myy efgh.

(d) For an 11-digit MLH line with two different 11-digit MLH numbers (old office = No. 1 ESS), the line report is:

LIB23 LRP ppp ii i i i i ii 0nxx abcd uvwz 0myy efgh qrst.

(e) For an 11-digit MLH line with the same MLH number in both offices (old office = No. 1 ESS), the line report is:

LIB23 LRP ppp ii i i i i ii 0nxx abcd uvwz.

The following variable explanation applies to all output messages in paragraph 7.02.

iiiii = Line equipment number (network/ frame/ bay/ concentrator/switch/ level).

nxx = new office, office code number.

abcd = new office DN numeric.

uvwz = new office multiline hunt line terminal number.

myy = old office, office code number.

efgh = old office DN numeric.

qrst = old office multiline hunt line terminal number.

ppp = a 3-letter code describing the test result.

= TBL, interoffice connection on this line was found incorrect (this line was idle when test was conducted).

= TBS, interoffice connection on this line was found incorrect (this line was busy when test was conducted) (Note 1).

= TCB, test connector busy (paragraph 8.03).

= RVS, interoffice connection on this line was found to have a tip/ring reversal.

= WPA, the party affiliations for this line as listed in the new office do not match those listed in the old office (only for party lines in the old office which is No. 1 or No. 5 crossbar).

= WVR, the party affiliations for this line as listed in the new office do not match those listed in the old office or the interoffice connection on this line was found to have a tip/ring reversal (only for party lines in the old office which is panel or step by step).

= NMH, this line, listed as multiline hunt or series completion in the new office, is not so listed in the old office (only for a No. 1 or No. 5 crossbar old office).

= ASW, all seems well on this line (received only in the all interrogate mode or from a line input message via LIB-DEC with q not equal to zero, or if LIB-SET-115 is used) (paragraph 7.02).

= NIN, this is not an intraoffice line (the DN is unassigned in the new office) (Note 2).

= NPR, this line is not a precutover line.

= UNY, this line is as yet untested.

= UNT, this line is untested and is ***no longer*** stored in the table because a test has been attempted twice, as explained in paragraph 3.03, and apparently cannot be tested.

= AGL, this line was found to be busy and passed the normal busy

board-to-board test and is now stored in the exceptional line table awaiting the opportunity to have the ground start-loop start verification test performed on it.

= NGL, the line was found to be busy and passed the normal busy board-to-board test but no ground start-loop start verification test was conducted. The line is not stored in the exceptional line table and, therefore, is not awaiting the opportunity to have the ground start-loop start verification test conducted on it.

= MPi, multiparty DNs, i indicates the number of this party on the line (1 through 8) (paragraph 3.11).

Note 1: With an SXS old office, if a high rate of TBS errors check out to be correctly connected (usually toll lines), a temporary modification of the J1A082A (SD-1A320-01) test set can be made to improve the validity of the TBS output messages by increasing the voltage of the dc to dc converter. The modification is performed as follows.

(1) Remove the test circuit chassis assembly from the case by loosening the four corner fasteners on the front panel and lifting out by the handles.

(2) Remove the wire from terminal 2 of the ED-2H052-30 dc to dc converter (A, Fig. 5) to make terminal 6 of the relay A.

(3) Insert a KS-6571 (24v. 4.8ma.) battery, or equivalent (20-25v., 4-5ma.), between the front panel and chassis, and tape in place as shown in Fig. 6.

(4) Attach one end of a clip lead to terminal 2 of the dc to dc converter and the other end to the negative (—) terminal of the added battery (Fig. 5).

(5) Attach one end of another clip lead to make terminal 6 of relay A and the other end to the positive (+) terminal of the added battery (Fig. 5). The test voltage is now increased to +48v.

(6) Following completion of the tests on that office, the modification must be removed since it decreases sensitivity and if used in a normal office will overlook many TBS errors.

(7) Reconnect terminal 2 of the dc to dc converter to make terminal 6 of relay A (Fig. 5) by wire wrapping a length of yellow or orange wire (26 ga. or larger). This color can be more readily located for a future modification.

Note 2: When XBBT is being used to obtain a list of unassigned DNs, the only line report messages are those with the code NIN. To minimize TTY output, only the first unassigned DN will be printed using a full report message. All remaining unassigned DNs will be displayed using the abbreviated form

LIB23 DN nxx abcd

The following variables describe the results of the ground start-loop start verification test where a mismatch has occurred:

ppp = GL1, old office line circuit wired for ***loop start,*** new office line ferrod wired for ***loop start,*** new office translations marked for ***ground start***

= GL2, old office line circuit wired for ***loop start,*** new office line ferrod wired for ***ground start,*** new office translations marked for ***loop start***

= GL3, old office line circuit wired for ***loop start,*** new office line ferrod wired for ***ground start,*** new office translations marked for ***ground start***

= GL4, old office line circuit wired for ***ground start,*** new office line ferrod wired for ***loop start,*** new office translations marked for ***loop start***

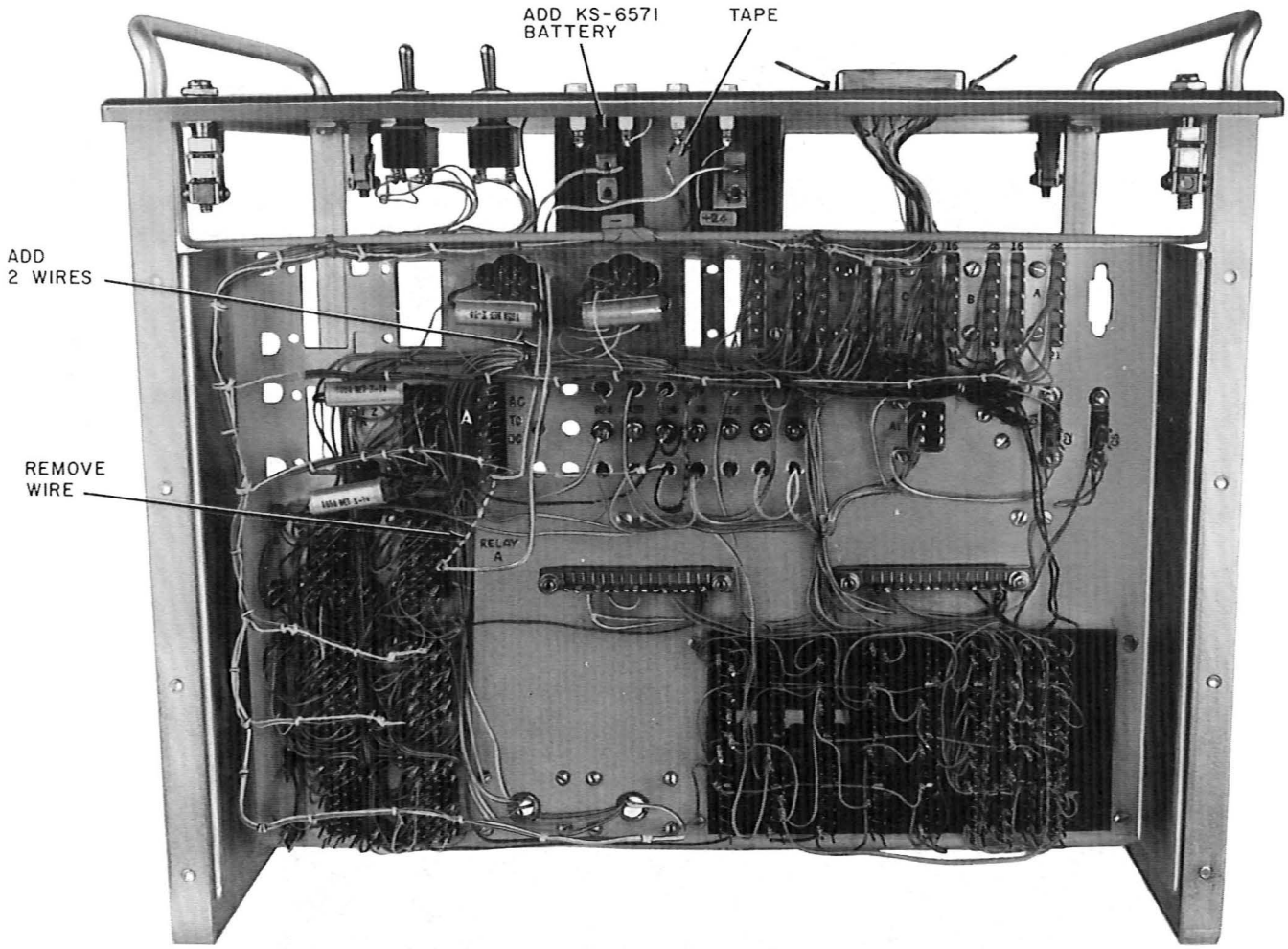

Fig. 5—Wiring Modification of J1A082A Test Set

= GL5, old office line circuit wired for ***ground start,*** new office line ferrod wired for ***loop start,*** new office translations marked for ***ground start***

= GL6, old office line circuit wired for ***ground start,*** new office line ferrod wired for ***ground start,*** new office translations marked for ***loop start.***

The following codes will be printed if any inconsistency has been detected by the ground start-loop start test.

ppp = GLØ, the old office line circuit of the line appears to be improperly wired.

= GLN, the new office line ferrod of this line appears to be improperly wired.

= GLB, both the old office line circuit and the new office line ferrod of this line appear to be improperly wired.

B. Progress Report Messages

7.03 A progress report is printed every six minutes 18 ±6 seconds or upon demand. The progress report consists of a progress report message for each group of lines being tested followed by a list of line report messages with the code UNY for as yet untested lines or AGL for busy lines awaiting the ground start-loop start test. These line report messages describe lines currently in the exceptional

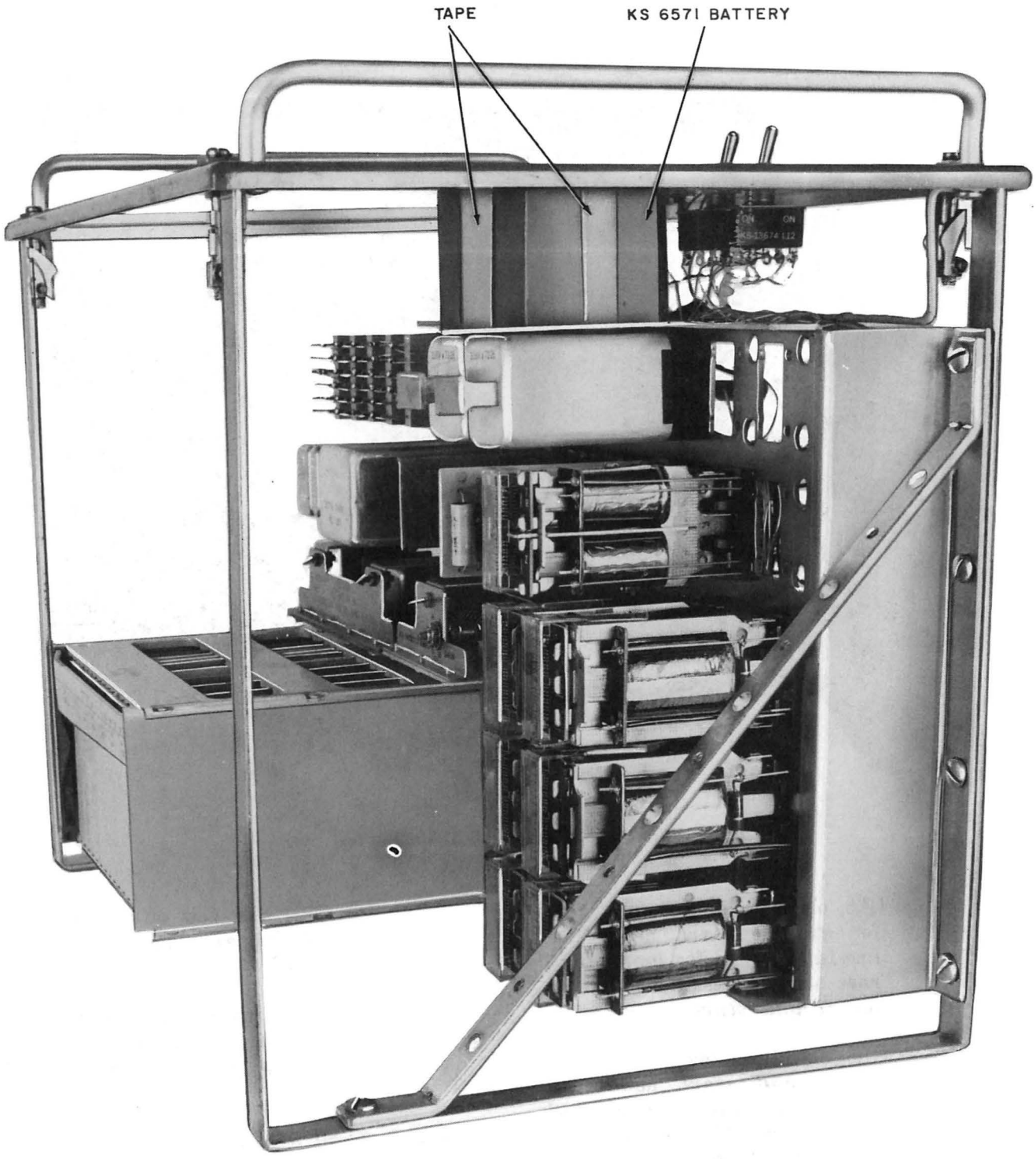

Fig. 6—Battery Addition for Modification of J1A082A Test Set

line table that have not been tested at the time of the report. These lines remain in the table for automatic subsequent table interrogation (paragraph 3.03).

7.04 The format of the progress report output message is as follows:

LIB23 PRG nxx S xxxx P uuuu E yyyy
TC aaaaa TF bbbbb

nxx = office code of the group

S = Start at

xxxx = start DN numeric

P = Presently at

uuuu = DN numeric of line currently being tested

E = End at

yyyy = DN numeric of last line in the group

TC = Tests completed

aaaaa = count of tests completed on this group from start of test

TF = Troubles found

bbbbb = count of troubles found on this group from start of test.

An example of a progress report is given in Fig. 7.

7.05 Lines entered into the table (paragraph 3.03) remain in the table for two table interrogations and the progress report occurs immediately after a table interrogation. It is possible that immediately preceding any progress report, there will occur a line report message with codes UNT (untested) or NGL (no ground start-loop start test performed). Lines output in that manner are lost to the program and will have to be tested either manually by reentering them individually as described in paragraph 6.06, or by waiting for a subsequent run of the XBBT program.

C. Overflow Messages

7.06 When the XBBT program is testing groups of lines in sequence and finds a line which is currently in an untestable state, information describing the line is put into a call store table. (The same table is used for information for lines input individually by LIB-DEC messages.) The table is finite in length and may overflow. The overflow (OVF) output messages are as follows:

LIB MESSAGE OVF

followed shortly after by

LIB23 LRP xxx - - -

xxx = UNT for untested.

= NGL for no ground loop verify test conducted. The line was found busy, passed the normal busy test, but no ground start-loop start test was conducted. These lines are lost to the program and must be retested as explained in paragraph 7.05.

--- = The dashes represent the remainder of the appropriate line report message in paragraph 7.02.

D. Circuit Failure (CKT FLR) Report

7.07 If trouble is encountered with a board-to-board test circuit, the following output message prints:

LIB 23 CKT FLR aa a a a a

aa a a a a = TNN of failing circuit

Use of this message is explained in E below.

E. Abort in Progress (AIP) Message

7.08 The abort-in-progress message is explained in paragraphs 3.12 and 6.10.

8. SOLVING EQUIPMENT PROBLEMS

8.01 One component of the board-to-board circuit is a subcircuit known as a dc to dc converter. This component is a solid state device used in the busy line test. If this circuit has gone bad, an

This figure gives an example of a progress report. Assume that two registers are active. One is testing office code 682 from 0000 through 9999. The other is testing office code 852 from 3000 through 6999.

The first register currently is at 2183 with the following exceptional lines:

682-2133

682-2099 (new office DN)

623-3299 (old office DN)

682-2172-0002 (11-digit MLH line)

The second register currently is at 5216 with the following exceptional lines:

852-5203-0013 (new office 11-digit MLH line)

791-0021 (old office 7-digit MLH line) (awaiting ground start loop start verification test)

852-4800-0032 (new office 11-digit MLH line)

791-2902-0040 (old office 11-digit MLH line)

The progress report will appear as follows:

```
NN LIB23 PRG 682 S 0000 P 2183 E 9999 TC aaaaa TF bbbbb
NN LIB23 PRG 852 S 3000 P 5216 E 6999 TC aaaaa TF bbbbb
NN LIB23 LRP UNY 11 1 1 1 1 11 0682 2133
NN LIB23 LRP UNY 11 1 1 1 1 11 0682 2099 0623 3299
NN LIB23 LRP UNY 11 1 1 1 1 11 0682 2172 0002
NN LIB23 LRP AGL 11 1 1 1 1 11 0852 5203 0013 0791 0021
NN LIB23 LRP UNY 11 1 1 1 1 11 0852 4800 0032 0791 2902 0040
```

Where:

11 1 1 1 1 11 = LEN

aaaaa = Peg count of tests completed

bbbbb = Peg count of troubles found.

Fig. 7—Progress Report Example

inordinate amount of troubles will be found by the busy test (a high number of line report messages with the code TBS). If such a trouble is suspected, this component can be tested by the program using the following procedure. Determine an RI associated with a group of lines being tested which appears to be experiencing this problem. While the board-to-board test program is running, type:

LIB-DEC-1xxxx.

xxxx = RI in decimal

System response should be an ØK TACK followed by:

LIB MESSAGE ACP

(ACP = Accepted) if the message is accepted or

LIB MESSAGE NBT

(NBT = Not being tested) if the specified RI is not one of a group being tested.

Allow approximately two minutes to pass while the program is running, testing lines from the group with the suspected RI. If the program is in the all interrogate mode, make sure several lines of the office codes associated with the input RI are tested. If the program continues to run, evidently there is no problem. Other RIs can be tried if there are other ones currently being used. However, if the following message appears

LIB23 CKT FLR aa a a a a

where aa a a a a = the trunk network number of a board-to-board test circuit and the program aborts with a relocatable abort address pointing to pident XBBT so that the message for that address in the abort catalogue (paragraph 3.14) is "program aborted due to circuit problems," the dc to dc converter should be thoroughly checked. The test results obtained using that circuit are subject to question so the program will have to be restarted at some appropriate spot.

8.02 The automated board-to-board test program exercises the old office local test equipment to a great extent. It is possible that this equipment will hang up and cease to respond to the signals generated by the board-to-board test circuit connected to it. Symptoms of such a problem would be repeated transfer of supervision failures (NT04 T-T SUPF printouts) from the attempt to connect the board-to-board test trunk to a transmitter or transmitter time-outs (TN08 printouts). Since these printouts will generally not appear on the TTY being used for board-to-board testing, the XBBT will print out a

LIB23 CKT FLR aa a a a a

message when an associated NT04 or TN08 is printed out. The rare occurrence of an occasional LIB23 CKT FLR message due to an NT04 T-T SUPF or a TN08 is not indicative of any serious equipment problem; it is the sudden occurrence of a large number of these that signals the problem. If too many of these occur in an interval of time (16 in 6 minutes in the normal mode, 16 in any interval of time in the all interrogate mode), the program will abort with a relocatable abort message, the relocatable abort address of which draws attention to this problem. In such a case, the trunk network number displayed by the LIB23 CKT FLR message should point to the problem. The local test equipment will have to be manually restored; then, the program can be restarted.

8.03 If the old office is step by step, a failure report message will occur if the XBBT program attempts to test a line contained in the 100 circuits accessed by a test connector which is busy. Although this is an "all paths busy" condition, a line failure report message will be printed with a code of TCB (paragraph 7.02) followed by a LIB23 CKT FLR message. Testing of this line group will be delayed for 18 to 24 seconds and retested if it is being tested in sequence. If the line is from the table, it will be reentered into the table or an untested output message will be printed as described in paragraph 3.03. Generally, outpulsing failures from an old SXS office are due to a busy test connector since there is only one test connector per 100 lines. The XBBT program waits approximately 21 seconds and then attempts a retest (as explained above) of the line. It will attempt a maximum of 16 retests in a 6-minute 18-second period and then abort as explained in paragraph 8.02. A check will also be made by the XBBT to determine if the last two digits of the DN could not be outpulsed, thus indicating a possible test connector busy condition. Although a busy test connector will be the primary reason for this abort, there can be an actual circuit problem or someone may be "hogging" the test connector. (For example, a local test person or busy-verify operator may be holding the hundreds test connector busy for an extended period of time. These conditions will be indicated by several (usually 16) pairs of these output messages

LIB23 LRP TCB- - -
LIB23 CKT FLR- - -

followed by a program abort as described in paragraph 6.02.

8.04 If XBBT is forced to abort, every attempt is made to idle all circuits and their associated old office equipment. If the program is not able to abort immediately, the output message

LIB MESSAGE AIP

will be printed (AIP = Abort in progress). When the abort is complete, the standard relocatable abort message will be printed. This interval of time will generally be only a few seconds and should never be greater than 20 seconds. If an abort should take place that is excessively long, the board-to-board test circuits should be manually inspected to make sure that they are idle. Whether or not the board-to-board circuits are idle does not mean that the old office local test desk equipment is idle. It is possible to release the old office equipment from the board-to-board test circuit by operating relays A and C of the circuit, holding them operated for a few seconds, releasing relay C leaving relay A operated a few seconds, and then releasing relay A.

8.05 If the program store containing the auxiliary program for automated board-to-board testing is switched out of service while the program is running, system audit programs will eventually idle all paths and circuits left nonidle. Unfortunately, this does not guarantee that the old office equipment is idle; therefore, the procedures described in paragraph 8.04 must be taken.

8.06 If program stores are switched while XBBT is running or in the process of aborting, unusual symptoms may occur.

9. END PROCEDURES

9.01 Configure the MOD 5 containing XBBT out of service, remove the PS module, and replace it with the original PS module 05, using procedures outlined in PA-1A500.

9.02 Refer to the sections indicated in Fig. 3 for the proper procedures to remove RIs, trunk class data, and trunk translations.

10. REFERENCES

PR-1A509—XBBT Program listing

Section 231-152-501—Outgoing Test Trunk Circuit for Board-to-Board Testing SD-1A320-01, Test and Adjustments

Section 820-505-151—Outgoing Test Trunk Set for Board-to-Board Testing, No. 1 Electronic Switching System Arranged with 2-Wire Features, Equipment Design Requirements

SD-1A320-01 and CD-1A320-01—Outgoing Test Trunk Circuit for Board-to-Board Testing

11. ABBREVIATIONS

AIP	Abort in progress
CKT FLR	Circuit failure
CMT	Combined miscellaneous trunk frame
CS	Call Store
DN	Directory number
ESS	Electronic switching system
ETL	Equipment test list
MLH	Multiline hunt
MUT	Miniaturized universal trunk frame
PS	Program store
RI	Route index
SXS	Step by step
TN	Telephone number (directory number)
TTY	Teletypewriter
UTF	Universal trunk frame
XBBT	Board-to-board auxiliary test program