

DIRECTOR SYSTEM TYPE 101  
REGISTER-SENDER (H-850215-B) TESTS  
USING TYPE 36 DIRECTOR ROUTINE TEST SET

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5. FUNCTIONAL TESTS .....	4	1.01 This section provides procedures to test register-sender circuit H-850215-B. This register-sender is a System Standard circuit used in the Type 101 Director System. For information on the Type 101 Director System, refer to the related sections in the 240-205 series of General System Practices.
Dial Pulse Calls .....	6	1.02 The procedures provided in this section may be used to detect malfunctions in the system before they result in customer complaints. Tests to localize a fault detected during routine testing are also included. For information on testing the register-sender using the director test frame, refer to the related section in the 240-205 series of General System Practices.
Touch Calling Calls .....	8	1.03 This section is reissued to provide procedures for testing the H-850215-B register-senders which have been rated System Standard. The procedures provided are based on the use of System Standard test equipment. The title and rating of this section also have been changed.
6. INPUT PULSING TESTS .....	8	1.04 Extensive changes have been made to this section; therefore, marginal arrowed brackets indicating changed areas have been omitted. This section supersedes Section 240-205-500, Issue 1, rated GT&E Provisional. Remove and destroy all copies of Section 240-205-500, Issue 1.
Pulse Repeating Relay Test .....	8	1.05 Test procedures presented in this section are based on register-sender circuits equipped to accept dial pulse and Touch Calling multifrequency (TCMF) tone pulsing, and to output in both the dial pulse and multifrequency (MF) modes. If the register-sender circuits being tested do not have all of these features, disregard the test(s) not applicable.
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2. TEST EQUIPMENT

2.01 Before performing any test, check the test equipment to be used. It should be in good working order. The test equipment required is listed in Paragraph 2.02. All meters should be checked for full scale deflection, and adjusted and calibrated if required. This will insure accurate meter readings under prevailing voltage conditions. For information on adjusting or calibrating the test equipment listed in Paragraph 2.02, refer to the related sections in the 108 series of General System Practices.

2.02 The following test equipment, and associated cords, are recommended for tests provided in this section:

- (a) AECO Type 30A Card Tester
  - (1) 2-Conductor Battery Supply Cord, D-543333-A
- (b) AECO Type 36 Director Routine Test Set
  - (1) 2-Conductor Battery Supply Cord, D-543333-A
  - (2) Director Access Test Cord, D-543554-A
  - (3) 3-Conductor External Pulsing and Class-of-Service Cord, D-543559-B
  - (4) Module Display "Y" Connecting Cord, D-543555-A
  - (5) Remote Control Set, D-320296-A
- (c) AECO Type 32A MF Pulsing Test Set
  - (1) 2-Conductor Battery Supply Cord, D-543333-A
  - (2) Input-Output Cord, D-543126-F
- (d) AECO Type 28 Semi-Automatic Routines
  - (1) 2-Conductor Battery Supply Cord, D-543333-A

(2) Test Cord B, H-885119

(e) AECO Type 800 Hand Test Telephone

(1) Cord D-542725-C

(f) Weston Type 931 Multimeter and Manufacturer Supplied Test Leads

NOTE: Use battery supply cord D-543175-C in place of D-543333-A if the director bay does not have a battery jack.

3. PREPARATION FOR TESTING

Developing a Test Program

3.01 A test program should be developed to facilitate testing in an organized and thorough manner. A program of this type will also expedite testing and provide a valuable record of the readout indications that should be exhibited when predetermined digits are dialed (or keyed) into the register-sender. A test program form similar to the sample shown in Table 1 can easily be prepared. Table 1 is based on the sample switching diagram shown in Figure 1. The information presented in Table 1 is intended only as a guide to indicate the type of information required to prepare an adequate test program form for the individual office being tested.

3.02 The test program should verify the repeat, absorb, early release, hold send, etc., functions of the director system. Operating requirements vary from office to office. A familiarity with the tests provided in this section, and a knowledge of the office programming, will aid in determining which tests are required.

Test Set Connections

3.03 Before making any test set connections, be sure that all test set keys are in their normal position. Also, manually busy out the register-sender to be tested by operating the BUSY key at the register-sender. The Type 36 test set can override the manual busy.

3.04 The main piece of test equipment used is the Type 36 test set. Using the D-543333-A battery supply cord, connect one end to the test set BAT jack and the other end to central office battery. If the director bay does not have a battery jack, use a D-543175-C battery supply cord. In this

Table 1. Sample Test Program Form.

Type of Call	Incoming Digits	Translation	Test Set Indication
Local (Dial Pulse Output)	485-1534	024(AB) 014(RP) 024(AB) 02 017(AS) 04(D3)	Lamp ABS flashes. Next dialed digit lamp flashes. Lamp ABS flashes. Lamp No. 2 lights. No lamp indication. Lamps No. 1, 5, 3, and 4 light sequentially. Lamp RLS flashes when the register-sender releases.
Local (MF Outpulsing)	488-1534	024(AB) 014(RP) 027(HS) 147(MF) 01(DO) 017(AS)	Lamp ABS flashes. Next dialed digit lamp flashes. No lamp indication. No lamp indication. The following lamps on the Type 32A test set light: KP Lamp No. 0 and 4 in position 1 No. 1 and 7 in position 2 No. 1 and 7 in position 3 No. 0 and 1 in position 4 No. 1 and 4 in position 5 No. 1 and 2 in position 6 No. 0 and 4 in position 7 ST Lamp Lamp RLS flashes when the register-sender releases.
SATT (DDD)	1 + 7 or 10 Customer Dialed Digits	01 017(AS) 01(DO)	Lamp No. 1 lights. No lamp indication. Lamps corresponding to the 7 or 10 customer dialed digits light. Lamp RLS flashes when the register-sender releases.
SATT (EDDD)	0 + 7 or 10 Customer Dialed Digits	01 02 017(AS) 02(D1)	Lamp No. 1 lights. Lamp No. 2 lights. No lamp indication. Lamps corresponding to the 7 or 10 customer dialed digits light. Lamp RLS flashes when the register-sender releases.
Special Service	113	01 017(AS) 12(D2)	Lamp No. 1 lights. No lamp indication. Lamp RLS flashes when the register-sender releases.

Table 1. Sample Test Program Form (Continued).

Type of Call	Incoming Digits	Translation	Test Set Indication
Dispatch	110	01 27 012(RL)	Lamp No. 1 lights. Lamp No. 9 lights. Lamp RLS flashes when the register-sender releases.
Intercept	41	024(AB) 47 012(RL)	Lamp ABS flashes. Lamp No. 0 lights. Lamp RLS flashes when the register-sender releases.
Reverting Call	611	014(RP)  012(RL)	Lamp for digit being repeated flashes. Lamp RLS flashes when the register-sender releases, and call is routed to the reverting call switchtrain.

case, connect the plug end to the BAT jack on the test set; then, connect the red clip lead to positive ground and the black clip lead to the load side of fused negative battery, in that order. See Figure 2.

NOTE: When connecting the test set to office battery, always connect the supply end last. When removing this connection, always disconnect the supply end first.

3.05 Using the D-543554-A director access test cord, connect the Type 36 test set to the register-sender to be tested. Connect one end of the test cord to the test set DIRECTOR ACCESS receptacle. Connect the opposite end of the test cord to the register-sender test receptacle. If the register-sender being tested is not close to the Type 36 test set, the D-320296-A Remote Control Set may be used to seize, release, and dial into the register-sender. If the remote control set is used, connect its twin plug to the test set REMOTE CONTROL R/B jacks. After connecting the test set to the register-sender, observe the test set BUSY lamp; it should be lit steadily.

#### 4. SEIZURE

4.01 Observe the test set SUPY lamp. When it is dark, operate the test set RLS/SEIZE key to the SEIZE position momentarily. The test set BUSY lamp should remain lit and the test set SUPY and INTER lamps should light steadily,

indicating successful seizure. If the test set SUPY lamp does not light, the register-sender is not seized. In this case, remove the register-sender equipment cover, and visually inspect the status of relays A, B, BA, DR, RS, TC, and DS. Relays A, B, BA, DR, RS and TC should be operated. If the register-sender is strapped to repeat the first digit to the selector (DSA-DSB terminals strapped), relay DS also should be operated.

4.02 If the proper relay operation is observed, check leads G and H for ground, using the Weston Type 931 Multimeter. Ground on leads G and H should be present.

4.03 Take any necessary corrective action, release the register-sender by operating the test set RLS/SEIZE key to the RLS position momentarily, and repeat the seizure test. If the test is successful and no further testing is required, restore all test set keys to normal, remove all test cord connections, replace the register-sender equipment cover, and place the register-sender back in service by restoring the register-sender BUSY key. If additional testing is required, leave all test set connections intact, leave the register-sender BUSY key in the operated position, and replace the register-sender equipment cover.

#### 5. FUNCTIONAL TESTS

5.01 The functional tests consist of presenting test calls directly into the register-sender in

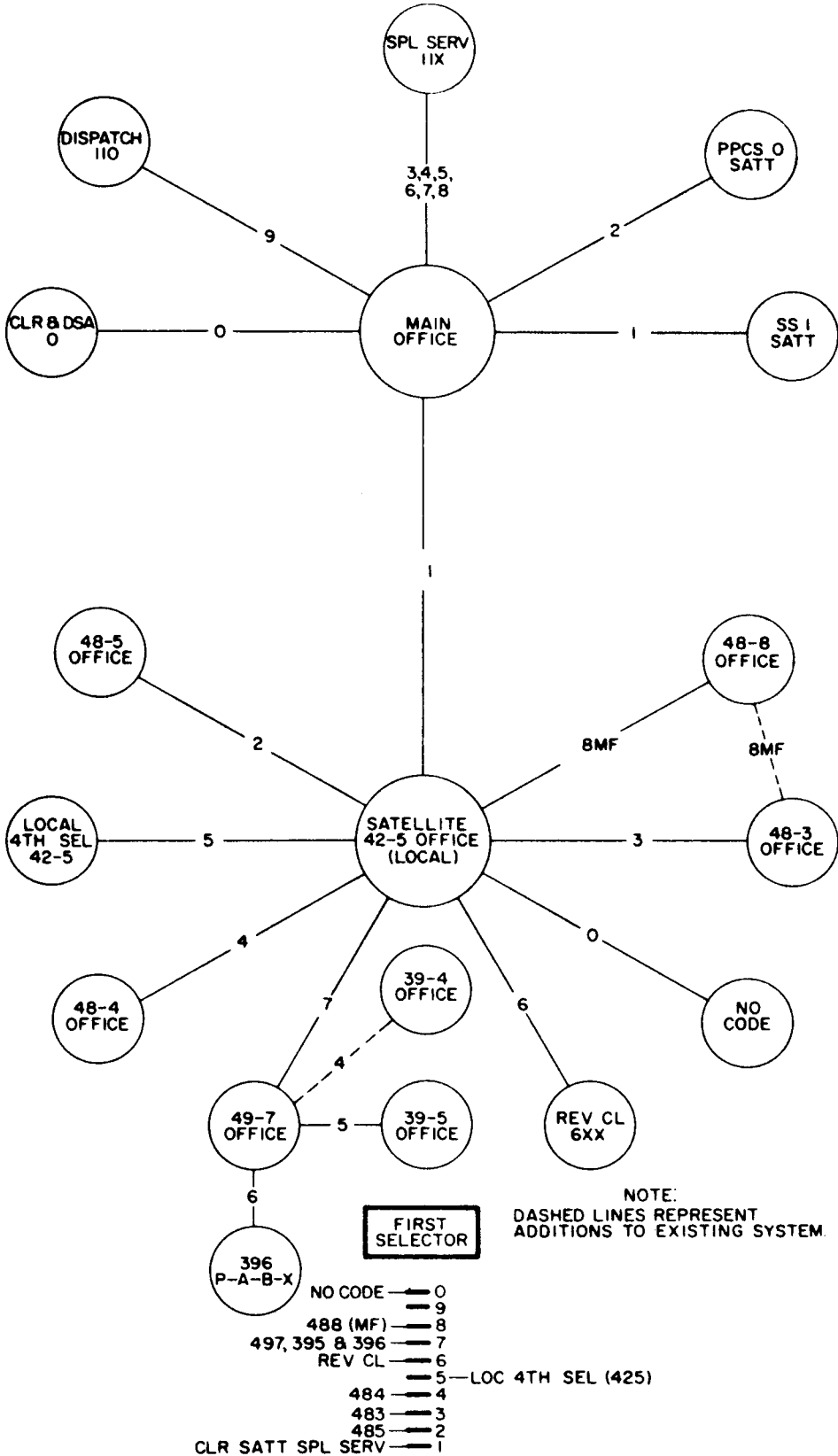


Figure 1. Typical Switching Diagram.

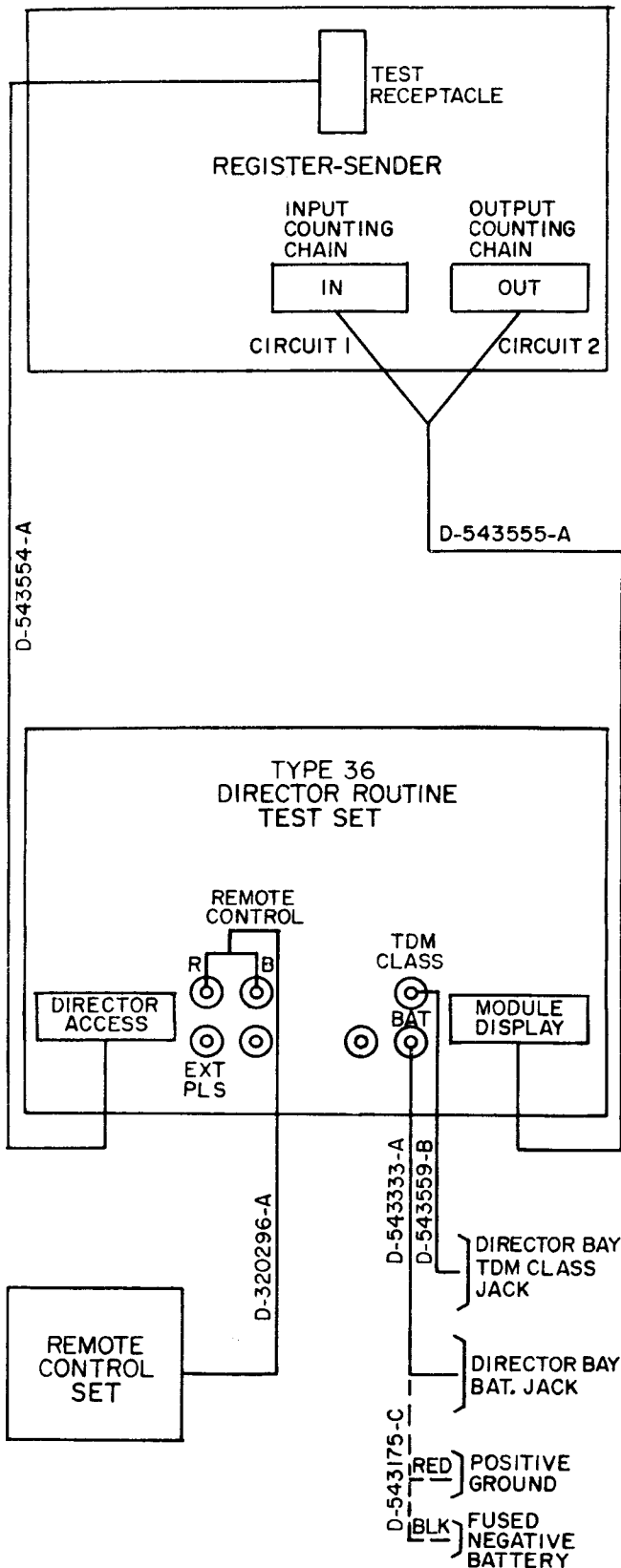


Figure 2. Type 36 Director Routine Test Set Connections.

the form of incoming traffic, following the program established by the ETNL drawing. This drawing is furnished with the particular director system application used in the office. The progress of these calls is then monitored by the test equipment.

5.02 Office codes (or test codes) presented to the director system should be presented under both loop and leak conditions for either 1400 or 1700 ohms, whichever is applicable to the office being tested. When testing in an office providing Touch Calling service, test calls should be presented to the register-sender under both normal (-3dBm) and decreased (-17dBm) tone level conditions.

5.03 If MF sending is employed outgoing from the office, the MF digits outpulsed may be monitored with the Type 32A test set. The Type 32A test set provides lamp supervision for the KP and ST signals from the register-sender, and displays the MF information outpulsed by the register-sender in a two-out-of-five code. See Tables 2 and 3.

5.04 Fault conditions as indicated by lamp supervision and/or audible alarms should be investigated and corrected before proceeding with the tests. Once a fault has been corrected, the test should be repeated to insure that the fault condition has been eliminated.

5.05 This Part provides the procedures for the functional tests to detect fault conditions. Subsequent Parts provide test procedures as an aid to localizing a detected fault.

Dial Pulse Calls

5.06 The Type 36 test set may be used to simulate dial pulse service. With the Type 36 test set connected as described in Part 3, condition the test set for this test in the following manner:

- (1) Rotate the PULSE MODE selector switch to position 5. The test set is now conditioned to provide loop pulses to the register-sender and to accept loop outpulsing from the register-sender for digital display. See Table 4.
- (2) Operate the 1400 LEAK/LOOP key to the LEAK position to provide leak

Table 2. Two-Out-of-Five Code Conversion.

DIALED DIGIT	LAMP DISPLAY
1	0-1
2	0-2
3	1-2
4	0-4
5	1-4
6	2-4
7	0-7
8	1-7
9	2-7
0	4-7

Table 4. PULSE MODE Selector Switch Positions.

POS.	DIRECTOR INPUT		DIRECTOR OUTPUT	
	1	PULSE CHECK		
	PULSE	SEIZE	PULSE	SEIZE
2	TCMF	LP	MF	LP
3	TCMF	LP	LP	LP
4	LP	LP	MF	LP
5	LP	LP	LP	LP
6	MF	LP	MF	LP
7	SX	SX	SX	SX
8	MF	SX	MF	SX
9	SX	SX	MF	SX
10	LP	LP	SX	SX
11	SX	SX	LP	LP
12				

NOTE: Position 1 provides access to the pulse measuring network of the test set.

Table 3. MF Outpulsing Frequencies.

DIGIT OUTPULSED	RELAYS OPERATED	FREQUENCIES APPLIED TO T AND R LEADS
KP	KP	1100,1700
1	M0, M1	700,900
2	M0, M2	700,1100
3	M1, M2	900,1100
4	M0, M4	700,1300
5	M1, M4	900,1300
6	M2, M4	1100,1300
7	M0, M7	700,1500
8	M1, M7	900,1500
9	M2, M7	1100,1500
0	M4, M7	1300,1500
ST	ST	1500,1700

pulses. (If a 1700-ohm test is to be simulated, use the 1700 LEAK/LOOP key.)

- (3) If EC lead class marking is used, operate the CLASS-OF-SERVICE B/A/C key as required. Position B provides a 2000-ohm resistance ground mark; position A provides an absence-of-ground mark; and position C provides a direct ground mark.
- (4) If testing of other than 1400-ohm lines (e.g., 1700-ohm lines or lines with restricted service) is required, operate the TDM CLASS/% BRK key to the TDM CLASS position to provide the appropriate TDM class mark. (These class marks are assigned according to the requirements of the local exchange.) Also, connect the test set TDM CLASS jack to the TDM CLASS jack in the director bay, using class-of-service cord D-543559-B. See Figure 2.

5.07 Seize the register-sender by operating the RLS/SEIZE key to the SEIZE position. The SUPY, BSY, and INTER lamps should light. Select a group of codes from the test program, each of which requires different routing. The codes selected should check the repeat, absorb, and release functions, as well as each route provided. The test set OUTPUT DISPLAY lamp corresponding to the digit outputted by the register-sender should light momentarily.

5.08 Dial or key the first digit of the selected code into the register-sender. If the first digit is absorbed, the ABSORB lamp should flash momentarily. Dial the remaining digits necessary to obtain the programmed translation from the translator. Observe the digits outputted as indicated by the test set OUTPUT DISPLAY lamps. During each interdigital pause, the INTER lamp should light. Continue dialing the required digits. The additional dialed digits should be displayed by the OUTPUT DISPLAY lamps. When the register-sender releases, the RLS lamp should flash, the SUPY and BSY lamps should extinguish.

5.09 Repeat the procedure described in Paragraphs 5.07 and 5.08 to check the remaining codes selected.

### Touch Calling Calls

5.10 Touch Calling service may be simulated by using the 1-0 keys of the TCMF keyset on the test set. Operate the test set keys as described in Paragraph 5.06 except for the following:

- (1) Rotate the PULSE MODE selector switch to position 3. In this position, the test set is conditioned to present TCMF tone pairs representative of the digit keyed to the register-sender, and to accept loop outpulses from the register-sender for digital display. See Table 4.

5.11 Test the register-sender in the manner described for dial pulse calls, except key in digits from the TCMF keyset. Maintain the TCMF LEVEL lever key in its normal (-3 DBM) position for normal tone level tests; operate the lever key to the -17 DBM position for decreased tone level tests. The -17DBM position is primarily used to check the lower limits on the zero loop of the TCMF receiver associated with the register-sender.

5.12 In the case of TCMF calls, the register-sender will hold sending until all required digits have been keyed if the register-sender is to outpulse in the MF mode. Otherwise, operation is as described in Paragraph 5.08. The test program developed from the ETNL drawing should indicate this requirement.

## 6. INPUT PULSING TESTS

### Pulse Repeating Relay Test

6.01 Input pulsing tests check the pulse repeating characteristics of the A relay in the register-sender. Tests provided in this part test the A relay under both loop and leak conditions. The AECO Type 28 Semi-Automatic Routiner is used to provide an external source of pulses. For information on the Type 28 routiner, refer to the related section in the 108-503 series of General System Practices.

6.02 Prepare for input pulsing tests as follows:

- (a) Using the D-543559-B external pulsing cord, connect one end to the MF OUT/EXT PLS jack on the Type 36 test set. Connect the other end to the



SW BLK jack on the Type 28 routiner. See Figure 3.

- (b) Connect the red control plug on the H-885119 Test Cord B to the CONTR RED jack on the routiner as shown in Figure 3.

NOTE: The black control plug and the test plug assembly of the H-885119 Test Cord B are not used for tests presented in this section.

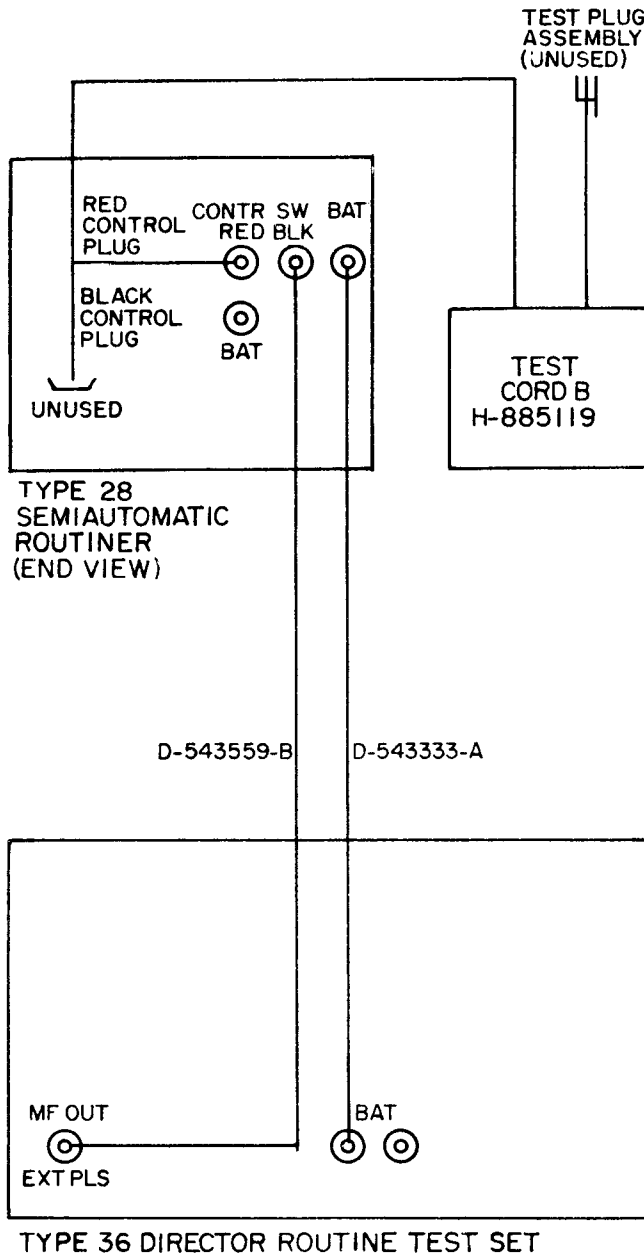


Figure 3. Type 28 Semi-Automatic Routiner Test Connections.

- (c) Ground pin 3 on the test plug assembly on Test Cord B.
- (d) Interconnect the BAT jack on the Type 28 routiner and the unused BAT jack on the Type 36 test set, using battery supply cord D-543333-A.

6.03 The Type 36 test set should be connected to central office battery and the register-sender as described in Part 3, if not already so connected. Position the PULSE MODE switch on the Type 36 test set to position 5, and perform the pulse repeating test as follows:

- (1) Momentarily operate the RLS/SEIZE key on the Type 36 test set to the SEIZE position.
- (2) Dial a test code to condition the register-sender for the pulse repeating relay test.
- (3) Operate the PULSING TEST key on the Type 28 routiner.
- (4) Operate the CONT IMPULSE toggle switch on the routiner, and place the routiner's PULSING CONDITION LP/LK/STD switch in the STD position. This position provides a standard ratio of 61.5% break with no loop or leak conditions.
- (5) Operate the 1400 (or 1700) LEAK/LOOP key on the Type 36 test set to the LOOP position, and operate the MF DISPLAY HLD/PLS REPEAT key to the PLS REPEAT position.
- (6) Operate the EXT PLS key on the Type 36 test set.
- (7) Momentarily depress the LP (loop) pushbutton on test cord B and observe the pulse speed in pulses per second. The meter reading should be  $12 \pm \frac{1}{2}$  pps.
- (8) Operate the TDM CLASS/% BRK key on the Type 36 test set to the % BRK position.
- (9) Momentarily depress the LP (loop) pushbutton on test cord B and ob-

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serve the % break reading. If the required limits for percent break are not obtained, the A relay in the register-sender may require adjustment to obtain the specified value. Refer to the relay adjustment sheet (AH) for the specified adjustment limits.

- (10) Release the register-sender, condition the Type 36 test set for leak conditions (1400 or 1700 LEAK/LOOP key in LEAK position), and repeat the pulse repeating relay test.

6.04 After input pulsing tests have been completed, release the register-sender. If the required loop and leak limits are not met, the A relay in the register-sender requires readjustment. Refer to AH-850215-B for the specified limits, adjust relay A to meet these limits, and repeat the input pulsing test under loop and leak conditions. When no further input pulsing tests are necessary, release the register-sender, disconnect the Type 28 router, and restore all keys to normal on the Type 36 test set, except the DISABLE TIME OUT key. Leave all Type 36 test set connections intact.

## 7. OUTPUT PULSING TESTS

7.01 Output pulsing tests check the operation of the output correed counting chain and the pulse generating circuit. Outpulsing may be in either the dial pulse or multifrequency (MF) mode. Therefore, separate tests are provided for each outpulsing mode.

7.02 In an office employing MF outpulsing, the Type 32A MF Pulsing Test Set is required, in addition to the Type 36 Director Routine Test Set. For information on the Type 32A test set, refer to the related section in the 108-251 series of General System Practices.

### Dial Pulse Mode

7.03 Condition the Type 36 test set for the input and output pulsing conditions to be employed by operating the PULSE MODE switch to the appropriate position. Refer to Table 4. The DISABLE TIME OUT key should remain in the operated position. If EC lead class-of-service marking is employed, the test set CLASS OF SERVICE B/A/C key should be in the appropriate position. If TDM class marking is required, operate

the TDM CLASS/% BRK key to the TDM CLASS position and connect the TDM class jack to the TDM class jack in the director bay. See Figure 2.

7.04 Select a group of office codes which will result in all digits 1 through 0 being outpulsed so that the pulse generator and output counting chain operation may be checked for all digits 1 through 0. Seize the register-sender and dial in the first selected office code. Observe the DIGIT OUTPUT CORREED COUNTING CHAIN DISPLAY and OUTPUT DISPLAY lamps on the Type 36 test set.

7.05 Repeat dialing the selected office codes. If wrong digits are outpulsed or if the call is routed improperly, try to establish a definite pattern by repeatedly dialing in the office code in trouble. Note whether the OUTPUT DISPLAY lamps display the proper digits. If these checks do not isolate the fault, check the pulse generating circuitry as described in Paragraphs 7.06 through 7.08.

7.06 If the output counting chain is functioning properly, but the output display indicates wrong digits are being outpulsed, check the operation of the pulse generator by measuring the speed and percent break of the pulsing contacts in the outpulsing loop.

7.07 To perform the speed and percent break tests, adjust the Type 36 Test Set meter for full scale deflection, then proceed as follows:

- (1) Operate the register-sender TIMER DISABLE and PULSE TEST keys. Restore the test set DISABLE TIME OUT key to normal.
- (2) Operate the PLS CHECK/SET FULL SCALE key of the Type 36 test set to the PLS CHECK position.
- (3) Seize the register-sender and observe the test set meter reading in pulses per second. The reading should be  $10 \pm 0.5$  pps.
- (4) Operate the test set TDM CLASS/ % BRK key to the %BRK position.
- (5) Observe the percent break reading. The reading should be  $61 \pm 1$  percent break.

- (6) Restore the PLS CHECK/SET FULL SCALE and TDM CLASS/% BRK keys to their normal position.

7.08 If the readings indicated in Paragraph 7.07 are not obtained, readjust potentiometer R1 (SPEED) for pulse speed, then potentiometer R2 (RATIO) for percent break. Potentiometers R1 and R2 are slightly interactive; repeat the speed and percent break test after they have been readjusted.

#### Multifrequency (MF) Mode

7.09 The Type 36 Director Routine Test Set and the Type 32A MF Pulsing Test Set are used when checking outpulsing in the MF mode. Connect the Type 32A test set as follows:

- (1) Connect one end of battery supply cord D-543333-A to the BAT jack on the Type 32A test set; connect the opposite end to the unused BAT jack on the Type 36 test set.
- (2) Using the D-543126-F input-output cord, interconnect the Types 32A and 36 test sets. Connect the INPUT/OUTPUT twin jack on the Type 32A test set to the MF OUT/MF IN twin jack on the Type 36 test set.

7.10 At the Type 36 test set, operate the PULSE MODE switch to position 4. See Table 4. Operate the CLASS OF SERVICE B/A/C or TDM CLASS key to the appropriate position, if required for class-of-service marking. Also, operate the MF DISPLAY HLD/PLS REPEAT key to the MF DISPLAY HLD position. Seize the register-sender from the Type 36 test set.

7.11 Select an office code requiring outpulsing in the MF mode. Using the Type 36 test set dial, dial the selected office code and observe the routing digit outpulsed on the Type 36 test set. Observe the KP, MF digits outpulsed, and ST lamps on the Type 32A test set.

7.12 The first MF digit should not be outpulsed until a route digit has loop pulsed the test set, and KP tone has been closed to the outpulsing loop and removed. Observe the KP lamp on Type 32A test set to determine if the KP signal was closed to the outpulsing loop. If the key pulse

signal is not closed to the outpulsing loop, remove the register-sender equipment cover and check the operation of relay KP.

7.13 If the circuit is functioning properly, two-out-of-five T correeds and two-out-of-five corresponding M relays should operate and restore for each digit (displayed on Type 32A test set). The M ( ) relays close the two leads from the MF tone supply for the tones equivalent to the digit to be outpulsed. If wrong digits are being outpulsed, check these relays. Also check for proper advancing of the sequence out SQO switch. If the fault is not located after these checks, the trouble may be in the MF tone supply.

7.14 If the translator is suspected, refer to the related section in the 240-202 series of General System Practices for test procedures.

## 8. TRANSLATION TESTS

8.01 Based on office requirements, a number of routing instructions may be returned to the register-sender. These include absorb, repeat next dialed digit, routing complete-advance sequence to read out the stored digits, etc. Procedures presented in this Part provide for testing these register-sender functions.

8.02 The test set DISABLE TIME OUT key should be operated during the translation test cycle. Also, the register-sender equipment cover should be removed in order to observe relay operation. The Type 36 test set is the only equipment required for these tests.

8.03 The office codes requiring different translations should be selected from the ETNL drawing supplied with the equipment, or from the test program developed for the office. Testing should be performed on an "as required" basis, selecting the tests which are applicable.

#### Repeat Next Dialed Digit

8.04 Seize the register-sender from the Type 36 test set and dial in sufficient digits from an office code which will cause a repeat (code 0-1-4) translation to be returned to the register-sender. Observe relay DS. It should be operated. If the DS relay is not operated, check correed T0, T1, and T4 circuitry. When timed ground over lead TG, and timed battery via levels D, E, and G of the

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sequence-out switch (SQO) are returned, correeds T0, T1, and T4 should operate. Dial in another digit and observe the OUTPUT DISPLAY lamps to verify the next digit is correctly repeated.

#### Absorb Cycle

8.05 The absorb function is monitored by the test set ABSORB lamp. Release and reseize the register-sender from the Type 36 test set. Select and dial an office code which will cause an absorb (code 0-2-4) translation to be returned. Observe whether the ABSORB lamp flashes. If it does, the absorb function was performed.

8.06 If the ABSORB lamp does not flash, release and reseize the register-sender. Again dial in the selected office code.

8.07 Correeds T0, T2, and T4 should operate on return of timed ground on lead TG, and timed battery via levels D, F, and G of the sequence-out (SQO) switch. Observe relay AB. It should operate and open the outpulsing loop.

#### Advance Sequence to M Space

8.08 Release and reseize the register-sender. Select and dial an office code which will cause an advance sequence (code 0-1-7) translation to be returned. Correeds T0, T1, and T7 should operate from timed ground on lead TG and timed battery via levels D, E, and H of switch SQO.

8.09 Check relays AS and MP (prepares circuit for parity check). They should operate when correeds T0, T1, and T7 are operated. As soon as relay PS operates, correeds T0, T1, and T7 should restore. Observe switch SQO. It should step self-interruptedly to the twelfth bank contact. Relay PS should restore as soon as switch SQO reaches the twelfth bank contact; also relay AT should operate at this point. The circuit is now prepared to receive deletion control information.

#### Delete Digits

8.10 Deletion control is determined by translator programming. Rotary switch SQO, positioned on contact 12, connects the T ( ) correeds to the M leads of the route commons. The number of steps the SQO rotary switch takes is dependent on the returned digit control marking (timed

battery) via the M leads. When MF outpulsing is used, deletion control is immediately after the MF directive.

8.11 Release and reseize the register-sender. Select an office code and note the number of digits to be deleted, as specified on either the ETNL drawing or the test program. Dial in the selected office code, and observe the OUTPUT DISPLAY lamps on the test set. Note whether the required number of digits are outpulsed; if not, check the circuitry of the T correeds by releasing the register-sender and repeating the test. Check whether the correct two-out-of-five T ( ) correeds operate. Also, check for proper stepping of rotary switch SQO.

#### Hold Sending

8.12 The requirement for the register-sender to store all dialed (or keyed) digits before beginning to outpulse may be programmed as a hold send translation (code 0-2-7). It is usually used if MF outpulsing is required.

8.13 Select an office code requiring the hold send translation. Using the test set keyset or dial, whichever is appropriate, dial (or key) in the selected code. Correeds T0, T2 and T7 should operate from timed ground on lead TG and timed battery via levels D, F, and H of sequence-out switch SQO. Observe relays DS, AB, and SQ. Relays DS and AB should operate after the T ( ) correeds operate, and remain operated until sequence-in switch SQI steps to the eighth (or eleventh) bank contact.

8.14 When switch SQI steps as described in the preceding paragraph, observe relays AB and DS. They should restore. Also, relay DS in restoring should remove the short circuit from the outpulsing loop, and should connect the timed ground (TG) lead to the T ( ) readout correeds.

#### Send in MF Mode

8.15 In the office being tested, MF outpulsing may be required for some trunk groups. When MF outpulsing is necessary, a translation is returned to change from the dial pulse mode to the MF mode.

8.16 Select an office code requiring MF outpulsing to the distant office. Dial the selected

office code, using the Type 36 test set dial. A hold send (code 0-2-7) translation should be returned, followed by a routing digit which should be outpulsed in the dial pulse mode. At this point, a change from the dial pulse mode to the MF mode of outpulsing instruction (code 1-4-7) should be received.

8.17 Correeds T1, T4, and T7 should operate from timed ground over lead TG and timed battery via levels E, G, and H of sequence-out switch SQO. Observe the M1, M4, and M7 relays, which should operate, and in turn operate relay MFA.

#### Release Register-Sender

8.18 The Type 36 test set RLS lamp monitors the release function of the register-sender. If the translator in the office is wired to "early release" (release interdigitally), an 0-1-2 translation should be returned to instruct the register-sender when to release. Select an office code which requires an early release translation. Dial in the selected office code, and observe the RLS lamp; it should flash once as the register-sender releases in response to the returned early release translation.

8.19 If the register-sender fails to release, releases prematurely, or releases too late, repeat the release test and check the circuitry of correeds T0, T1, and T2. They should operate from timed ground over lead TG and timed battery via levels D, E, and F of sequence-out switch SQO. Check relay RL operation. Check lead CF to the access circuit; it should be open.

8.20 If the preceding checks fail to isolate the fault, check the operation of rotary switches SQI and SQO. They should return to normal in sequence by stepping self-interruptedly.

#### Parity Check

8.21 Normally, the PC (parity check) relay is unoperated. Observe the PC relay. If it is operated (parity fault), determine which T( ) correeds are operated. Either only one T( ) correed will be operated (undermarking), or more than two T( ) correeds will be operated (overmarking). Check the position of the SQO rotary switch and make a note of its position. Then proceed as follows:

- (1) Restore the register-sender TIMER

DISABLE key, and wait approximately four seconds for time out.

- (2) Using the hand test telephone, plug into register-sender test jack springs 1-2 and listen for busy tone. Busy tone should be heard.
- (3) Remove the hand test telephone connection; then operate the RLS/SEIZE key of the Type 36 test set to the RLS position momentarily.
- (4) Observe the register-sender SUPY lamp; it should be flashing.
- (5) Operate the register-sender READ key and read the digit codes from digit storage as displayed on the 0-1-2-4-7 lamps on the register-sender. Read one digit at a time by sequencing the register-sender STEP key.
- (6) Check digit storage cards (by substitution) in accordance with the digit(s) displayed improperly during readout. Replace cards(s) with cards known to be good and repeat test.

## 9. CLASS-OF-SERVICE DETECTION TESTS

9.01 Class-of-service detection may be provided by either of two methods, based on individual office arrangements. The only test equipment required for testing is the Type 36 test set. See Part 3 for information on test set connections.

#### EC Lead Class Marking

9.02 If EC lead class marking is employed, the CLASS OF SERVICE B/A/C key on the test set is used to provide the necessary class marking. Operate the B/A/C key to the appropriate position, based on class marking to be simulated. Operate the PULSE MODE switch to the proper position, in accordance with Table 4.

9.03 Seize the register-sender, and dial in the selected office code. Note whether the proper translations are returned, and if the call terminates in the test set properly. If the test is unsuccessful, remove the register-sender equipment cover, release and re seize the register-sender, and repeat the test. Observe the operation of relays SA

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and SB. Relays SA and SB should operate in accordance with the following:

- (a) Key position A, absence-of-ground on EC lead, neither relay should operate,
- (b) Key position B, 2,000-ohm ground on EC lead, relay SA should operate,
- (c) Key position C, direct ground on EC lead, relays SA and SB should operate.

When the test is completed, restore test set keys to their normal position.

C Lead TDM Class Marking

9.04 In offices arranged for "C" lead TDM class marking, a standard feature is returning positive pulses from the register-sender to the C lead of the individual calling line equipment. If this method is employed, connect the TDM CLASS jack on the test set to the TDM CLASS jack in the director bay, using connecting cord D-543559-B. See Figure 2. Position the PULSE MODE switch as required. See Table 4. Seize the register-sender and dial the selected office code. Note whether the proper translations are returned and if the call terminates in the test set properly.

10. TIME-OUT TESTS

10.01 The register-sender is arranged to time out and release under certain conditions. The conditions and their recommended time-out intervals are:

- (a) Local permanent line, 20 seconds; accelerated time-out, 10 seconds.
- (b) Local no code, 10 seconds under light traffic (approximately 7 seconds under heavy traffic).
- (c) Delay in dialing, 10 seconds under light traffic (approximately 7 seconds under heavy traffic).
- (d) Delayed CLR, 4 seconds.
- (e) Stop-dial permanent, 10 seconds under light traffic (approximately 7 seconds under heavy traffic).

10.02 Simulate each of the above conditions as described in Paragraphs 10.04-10.08, and check the time-out interval. The timing intervals are adjustable. Local conditions may require resetting the timing intervals.

10.03 If the register-sender is releasing prematurely, or if excessive time-out intervals are noted under any of the conditions listed in Paragraph 10.01, check the adjustment of the associated potentiometer(s), and readjust as required. Refer to H-850215-B for information on these adjustments.

Local Permanent Line

10.04 Local permanent line time-out may be checked by performing the following:

- (1) Momentarily operate the RLS/SEIZE key of the Type 36 test set to the SEIZE position to seize the register-sender.
- (2) Do not dial any digits into the register-sender. If routing to intercept, etc., is provided for permanents, observe the OUTPUT DISPLAY lamps for the proper display of the routing digits. If the register-sender is to release on permanent lines, observe the RLS lamp. Under normal traffic conditions, the register-sender should time out in approximately 20 seconds; under heavy traffic conditions, approximately 10 seconds as evidenced by the flashing of the test set RLS lamp.

Local No Code

10.05 Check the local no code time-out of the register-sender by performing the following:

- (1) Momentarily operate the RLS/SEIZE key of the Type 36 test set to the SEIZE position to seize the register-sender.
- (2) Dial a non-translatable code into the register-sender. Observe the OUTPUT DISPLAY lamps on the test set for the proper routing of the call.

Delay In Dialing

10.06 The time-out interval recommended for delayed dialing calls is the same as for a local no code call (10 seconds). To test the time-out interval of a delayed dialing call, seize the register-sender by operating the RLS/SEIZE key on the Type 36 test set to the SEIZE position. Dial the first digit of a code (except 1 or 0) which should return a translation. Do not dial any other digits. Check the time-out interval (approximately 10 seconds), and observe whether the call is properly routed.

Delayed CLR Routing

10.07 To check the time-out interval for delayed CLR routing of calls, seize the register-sender by momentarily operating the RLS/SEIZE key on the Type 36 test set to the SEIZE position. Dial the digit "0" into the seized register-sender. After approximately 5 seconds, the call should be routed to the CLR operator. Check the time interval, and observe the display lamps on the test set for the proper routing translation of the call.

Stop-Dial Permanent

10.08 To check the stop-dial permanent time-out interval, follow the procedure in Paragraph 11.02, steps (1) through (5). Do not restore the STOP DIAL key. Time the stop-dial permanent time-out interval. Time-out should occur after 10 seconds. If stop-dial permanent routing is used, restore the STOP DIAL key after time-out.

11. MISCELLANEOUS TESTS

Local Stop-Dial Condition

11.01 A stop-dial condition should result in the operation of the register-sender SD relay due to battery reversal over the +0 and -0 leads. Relay SD in operating should disconnect the TG lead from the T ( ) correeds, stopping the pulsing relays. Subsequently, when normal polarity is restored, relay SD should restore and restart the pulsing relays.

NOTE: If the stop-dial condition remains for approximately 10 seconds, it is considered a stop-dial permanent condition and the register-sender will time out.

11.02 The stop-dial function may be tested by simulating a stop-dial condition. Proceed as follows:

- (1) Connect the Type 36 test set to the register-sender.
- (2) Condition the test set for pulsing by operating the PULSE MODE switch to the appropriate position. See Table 4.
- (3) Operate the test set CLASS OF SERVICE key to the appropriate position if class marking is required. Restore the DISABLE TIME OUT key to normal. If the register-sender TIMER DISABLE key is operated, restore it to normal.
- (4) Seize the register-sender and dial a test number.
- (5) Observe the test set OUTPUT DISPLAY lamps; when outpulsing begins, operate the STOP DIAL LOCAL/TOLL key to the LOCAL position and observe if outpulsing stops.
- (6) After a few seconds (less than 10 ), restore the STOP DIAL key to its normal position. Note whether outpulsing resumes.

11.03 If faulty operation is encountered, check the PS, PSA, and SD relays for proper operation, and visually inspect the SD relay contacts.

Local ATB Condition

11.04 The Type 36 test set may be used to simulate a local ATB (all trunks busy) condition. Condition the Type 36 test set as follows:

- (1) The test set should be prepared for testing as described in Part 3. The test set DISABLE TIME OUT key should be operated.
- (2) Position the PULSE MODE switch on the test set to position 5.
- (3) Operate the ATB LOCAL/TOLL key to the LOCAL position.
- (4) Seize the register-sender by momentarily operating the RLS/SEIZE key to the SEIZE position.

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- (5) Dial a code for which there is an alternate route and observe the routing digit outpulsed by the register-sender. This digit is displayed by the test set OUTPUT DISPLAY lamps. The test set should simulate the selector's eleventh rotary position as an ATB condition, in which case the register-sender would release the established switchtrain.
- (6) Observe the ABSORB lamp on the test set. It should flash as the switchtrain is released.

- (7) Observe the test set OUTPUT DISPLAY lamps. After releasing the established switchtrain, the register-sender should outpulse alternate route information in accordance with the office program.

11.05 When the local ATB test is completed, release the register-sender, restore all operated test set keys to normal, place the register-sender back in service by restoring its BUSY key, and disconnect the test set. When disconnecting the test set, remove the supply end first.