

## FORMS FOR RECORDING CIRCUIT OR TRUNK ORDER TEST RESULTS

### 1. GENERAL

1.01 This section describes the use of Form E-2545A designed for recording circuit or trunk order tests on all types of message telephone trunks. The form is designed to be used as an office record and a supervisory tool. Where required by other instructions, a copy of the form may be used as a report of circuit order test results.

1.02 This section was revised to provide extensive revisions of the text, arrows indicating changes are omitted.

1.03 Form E-2545A has been designed to be used in conjunction with the following sections:

(a) Section 660-450-300 provides general information on the circuit or trunk order tests required to be made on *all* types of message trunks before they are placed in service in the Direct Distance Dialing (DDD), Extended Area Service (EAS), and Local Dialing Telephone Networks.

(b) Section 660-450-301 covers the circuit or trunk order tests required to be made on all types of message trunks before they are placed in service. Section 660-450-301, Table XIV provides a summary of the preliminary tests required to be made on equipment components and facilities assigned to the trunks. Section 660-450-301, Table XV, provides a summary of the overall line-up tests required to be made between the trunk terminals.

(c) Section 682-000-100 describes the standard coding procedures used in preparing circuit layout records. It includes information on the circuit layout record, the circuit layout record card, the outline, the coding plan used and examples of typical coded layout records.

(d) Section 005-200-100 describes the general principles by which message trunks are identified under the common language format.

(e) Section 005-220-100 describes the standard codes used for message trunk line facilities. It describes the codes for voice grade and carrier facilities such as wire pairs, open-wire lines, and carrier channels or the transmission equivalent of each type.

(f) Section 005-230-100 describes the location identification code for identifying locations in the United States, Canada and foreign countries.

### 2. USE OF FORM

2.01 Form E-2545A is used for recording circuit order test results on all types of message trunks. The form is always completed by the designated control office for each trunk or circuit order. The noncontrol office prepares the appropriate form for its own office, completing only those items which are required at that office. Fig. 1 is an example of a completed E-2545A Form.

2.02 A form is prepared for every message network trunk. If an order covers more than one trunk, a form is still required for each trunk. The form then becomes the office record of actual transmission design data.

2.03 Local operating procedures may require the Control Office to report results for both the control and noncontrol end, or specify that the noncontrol office report balance results for that office.

2.04 Forms are prepared *whenever trunks are placed in service* or when orders are issued for rearrangements or changes which require that circuit order tests be completed as discussed in Section 660-450-301.

2.05 All circuit order tests should be complete and meet requirements before the trunk is turned up for service.

**2.06** The term circuit order or trunk order tests is used in this section to indicate transmission and operational tests required to be made on all types of message trunks as follows:

- (a) When circuit or trunk orders authorize a new trunk group or add trunks to an existing group.
- (b) When circuit or trunk orders authorize rearrangements or equipment and/or facilities assigned to existing trunk groups.

**2.07** If all tests are not required on a trunk, the test data on the tests not performed should be carried forward on the new E-2545A. For example, a rearrangement of the four wire facility of an intertoll trunk, would not require balance tests to be made again. The balance results from the existing E-2545A for that circuit should be transcribed to the new E-2545A and the same test date carried forward. This procedure will result in only one E-2545A (in the office record) per trunk.

### 3. PREPARATION OF FORM

#### A. General

**3.01** The form has been designed to accommodate Common language designations and spaces have been provided for this format.

**3.02** The form was designed so that it will be possible to summarize and analyze results taken from the completed test data. For this reason, all requirements and measurements should be entered where required and should be entered in the space provided and should be completely *legible*.

All entries of loss and gain measurements should be shown to the nearest tenth of a dB. All the entries of noise measurements should be shown to the nearest dB. All entries of Return Loss and Singing points should be shown to the nearest dB. If other designations are used, they should be fitted into the spaces provided. The items in the heading are completed using data from the circuit or trunk order, XRL form or circuit layout record card. If several trunks are covered on one order, a form is made out for each trunk. If several identical trunks are to be installed in the same trunk group, the headings should be identical on each form, except for the trunk number and item number.

**3.03** The information necessary to complete the heading should be taken from the circuit order or trunk order, adding or rearranging the trunk to be tested.

- (a) The entries to be made under facility makeup should be made as follows: Compandored Carrier and non-compandored carrier, enter the carrier type as N1, N2, N3, L1, L3, L4, T1, K1, K2, OA, OB, ONA, ONB, etc.
- (b) All heading entries should be entered starting at the left-hand space of the spaces provided for each particular entry.
- (c) When the heading is completed, check each item on the front and back of the form to see if action is required. For example, loss and noise measurements are required on all trunks, but balance measurements are required only on toll connecting and certain intertoll trunks. If tests or verification are required for any item, check the "Yes" box. If not required, check the "No" box. Guidance for determination whether tests are required is found in Section 660-450-301.

**3.04** When action is required on any item and it is completed, the results should be recorded. The item should be initialed in the left-hand column, in the space designated "compl". If action is required but is not completed for any reason, the item should be initialed, and suitable notes should be added to permit later follow-up and correction if necessary.

**3.05** The Tests on Item 13 of the form should generally be completed first. These are Equipment and Facility Preparation tests for all offices, and "A" pad operational test for 4-wire offices. The remaining items involve overall trunk tests and balance tests. Each type of data is recorded in the same part on each form. The items are discussed further below.

#### B. Overall 1000 Loss and Frequency Response Measurements (Control Office)

**3.06** Measurements at 1000 Hz are required on all trunks. Tests are made at other frequencies as specified in Table XV, Section 660-450-301.

**3.07** Record data in Item 1 as follows:

**UTF** — Enter the Upper Test Frequency (UTF) as specified in Section 660-450-301, Table XV.

**EML** — Enter the expected measured loss (EML) as specified in the layout record card, XRL, or equivalent.

**Note:** If the EML *does not include* TP2, be sure the test facility *does not include* a 2 dB test pad. If a trunk is lined up using a test pad in the measuring arrangement when the layout record does not call for it, the trunk will have 2 dB too little loss when used by the customer. Conversely, if the layout cards call for the test pad and it is not provided, the trunk will have 2 dB too much loss.

**Requirements** — Enter the values specified in Section 660-450-301 Table XV.

**AML (Office A)** — Record the actual measured loss (AML) at 1000 Hz plus the other listed frequencies. The Permissible deviation of the AML from the EML is specified on Table XIII of Section 660-450-301.

**Dev. (Office A)** — Compare the AML at 1000 Hz with the EML and record the difference. If the AML is smaller, the deviation is minus (-). Compare the AML at other frequencies with the 1000 Hz AML. Record the differences. If the AML at other frequencies is smaller than the 1000 Hz AML, the deviation is minus (-). Permissible deviation of the frequency response measurements from the AML is specified on Table XV of Section 660-450-301.

**AML and Dev. (Office Z)** — Record the AMLs and deviations measured at the non-control office in the same manner as above. Two-way loss measurements are required on all trunks regardless of facility.

### C. Message Circuit Noise Measurements (Control Office)

**3.08 Item 2** provides for recording results of message circuit noise measurement. Requirements and actual measurements should be shown in dBrnc. Make entries as follows:

**Requirement (Office A)** — Enter the value shown on the layout record card, or

XRL. If not shown, enter the circuit order limit as specified in Section 660-403-500.

**Measurement (Office A)** — Enter the actual noise measurement made at the control office.

**Requirement (Office Z)** — Enter the value shown on layout record card, or XRL. If not furnished, enter the circuit order limit as specified in Section 660-403-500.

**Measurement (Office Z)** — Enter the actual noise measurement made at the non-control office. Noise measurements are required at both the control and non-control ends of the trunk.

### D. Impulse Noise Measurements (Control Office)

**3.09 Item 3** provides spaces for recording impulse noise measurements as required in Section 660-403-300.

### E. PAR Measurements (Control Office)

**3.10 Item 4** is reserved for future use in recording measurements with the PAR meter.

### F. Talking and Listening Tests (Control Office)

**3.11 Item 5** provides for noting, talking and listening observations after all transmission tests have been completed. The purpose of this test is to identify any hum, clicks, cross-talk, distortion, clipping, etc.

### G. Balance Tests (Control or Noncontrol Office)

**3.12 Item 6** — Terminal Balance Tests. Terminal balance tests are completed after other overall transmission requirements have been met. For balance tests, a trunk may have more than one mode of access. The balance requirement will depend on the mode of origination or termination as defined in the balance instructions. The attached Appendix 1, is provided to help clarify what tests are to be performed, etc. To help clarify what tests are to be performed, the requirements, where to enter the results on the form, and practice reference. **Appendix 1** is a summary sheet which lists the type of offices in which balance tests are required and the types of trunks to be tested. The tables

of this Appendix lists the tests, requirements, where to enter the results on the form and the section outlining the test procedure. This information is contained in the following tables:

**Table I** — Terminal Balance Tests — Class 4 and higher ranking offices not including 4-type switching offices.

**Table III** — Terminal Balance Tests — No. 4-type switching offices.

This *appendix* should serve to ensure all paths are tested and the results entered in the proper place on the form. The switching maintenance center can verify from cross-connection records what accesses are used. In an ESS office, the program flow shows the normal states of a trunk. When these are determined, select the requirements from Appendix 1 and enter them in the "requirements" spaces. Record the "median" and "minimum" requirements for echo return loss (ERL) and singing point (SP). When the balance tests are completed for any mode of access and adjustments and corrections have been made to obtain the best results, record the final values. This is always the final measurement loss less the correction for the test setup.

**3.13 Item 7** — Through Balance Tests.

Through balance tests are completed after other overall transmission requirements have been met. For balance tests, a trunk may have more than one mode of access, but the "median" and "minimum" requirements are the same for each mode and are preprinted. To help clarify what tests are to be performed, the requirements, where to enter the results on the form, and practice reference. The tables of this *appendix* list the tests, requirements, where to enter the results on the form and the section outlining the test procedure. This information is contained in the following table:

**Table II** — Through Balance Testing — 2-wire Class 3 and Higher ranking offices.

This *appendix* should serve to ensure all paths are tested and the results entered in the proper place on the form. Record the final measurements of ERL and SP for each mode of access after final adjustments and corrections have been made to obtain the best results. The recorded data is always the final measurement less the correction for the test setup.

**H. Trunk Places in Service (Control Office)**

**3.14 Item 8** provides for showing that the control office verified that the trunk has been placed in service at both ends. Space is also provided to show that the trunk can be tested via an automatic test frame circuit (if provided) for both operation and transmission.

**COMPLETION REPORT**

**Item 9** — If the form is not used as a completion notice and another form of completion report is required, enter the date, and the supervisor responsible should sign or initial the form indicating that the report has been made.

**I. Operational and Transmission Tests — Trunk With Two or More Modes of Operation**

**3.15 Item 10** — Two or more modes of operation may be provided. One mode is tested in Item 1. Other modes should be tested and the AML recorded in the appropriate space. This must be done to ensure that performance meets the requirements for all modes. Since some modes may have coils and/or pads not included in other modes, the EMLs for the various modes may be different.

**3.16** Since the terminology for the modes of access vary with the type of switching system, they are further defined in the attached Appendix 2.

**J. Overall Signaling Tests**

**3.17 Item 11A** — Overall signaling tests to a test line is provided to record the results of signaling tests. Item 11 is provided to indicate when circuits equipped with MF signaling are tested to a signaling test line.

**3.18 Item 11B** — Overall Pulsing Tests is provided the results of measurements of overall pulsing tests. The requirements and test procedures for making these tests is contained in the 100 layer of the 333 division.

(a) The signaling test point at Office A and Z are to be entered in: Send Point A, Z and Receive Point A, Z on Form E-2545A.

(b) The test point designation is taken from the appropriate Pulsing Requirements Diagram for the type of signaling configuration used by the trunk being tested.

(c) The required percent break send and receive values are also taken from the Pulsing Requirements Diagram and entered in Form E-2545A.

(d) The measured receiving percent break values are entered in Form E-2545A for offices A and Z.

(e) Check the *measured* percent break receive value to see if they meet the required receive percent break.

#### K. Overall Echo Suppressor and Disabler Test

**3.19** *Item 12* — This item is provided to show that an overall test of the echo suppressor and disabler has been made if the trunk is so equipped.

#### L. Equipment and Facility Preparation Tests

**3.20** *Item 13* — provides for verifying that other tests essential to placing a trunk in service were made and were satisfactory. When an item requires verification, the item should be initialed and dated when the verification is obtained.

**3.21** Completion Tests on cable pair or open wire. When any part of a trunk is made up of cable or open wire, it should be verified that the facility meets requirements and is ready for use.

**3.22** Repeater tests and repeater gains. If repeaters are required in any part of the circuit, it should be verified that they are connected and properly adjusted.

**3.23** Singing point tests. If repeaters require hybrids, it should be verified that any required singing point tests have been made and meet the requirement shown on the Circuit Layout Card.

**3.24** Echo suppressor and disabler tests. If an echo suppressor and disabler is required, it should be verified that they are connected and adjusted.

**3.25** SF signal tests. When SF units are required, it should be verified that they are connected and adjusted.

**3.26** Carrier system tests. If the order requires the use of carrier facilities, it should be verified that the required carrier line and channel requirements have been satisfactorily met, and that the overall channel gain between VF patching bays has been properly adjusted.

**3.27** Office wiring and equipment losses. Spaces are provided to record the specified repeater gains or pad values if provided to meet office loss requirements. Record the specified values and the actual values used to meet the requirements.

#### M. Test of "A" Pad Operation and Control

**3.28** *Item 14* — 17C testboard. This test is required in No. 5 crossbar offices on all trunks equipped with "A" pads. Record the send and receive AMLs for the specified key conditions and verify that the deviation limits are met.

#### N. Test of "A" Pad Control Signals

**3.29** *Item 15* — 4A switching maintenance center. This test is required on all high loss toll connecting and intertoll trunks to verify that "A" pad control signals are correct. Verify the lamp indications on the test frame. On trunks equipped with "A" pads, record the send and receive AMLs for the specified key conditions. Check that the deviation limits are met.

#### 4. AVAILABILITY OF FORMS

**4.01** Form E-2545A may be obtained from Western Electric Company in pads of 50, two pads per package. Order in multiples of 100. The ordering information is as follows:

(Quantity) Form E-2545A

#### 5. NOTES

**5.01** Any notes pertaining to the result not meeting requirements, not being completed or other data relative to the circuit being tested, should be written on a separate sheet of paper and attached to the form for future reference.

B.S.P. 660-450-010  
PRINTED IN U.S.A.

E-2545A  
(5-69)

CIRCUIT ORDER OR TRUNK ORDER TESTS - ALL TYPES OF MESSAGE TRUNKS													
TRUNK NO.		TRUNK TYPE			OFFICE A			OFFICE Z					
CIRCUIT ORDER OR TRUNK ORDER NO.		ITEM NO.		DUE DATE		TYPE AND DIRECTION OF PULSING		TRUNK MILEAGE					
CONTROL OFFICE		HOME OFFICE			COMP CXR		FACILITY MAKE-UP NON-COMP CXR		NON-GAIN VF				
									"E" REPT				
TYPE OF TEST AND REQUIREMENTS													
B.S.P. 660-450-301, TABLE XV													
OVERALL 1000-HERTZ LOSS AND FREQUENCY RESPONSE MEASUREMENTS													
1	TEST REQ. YES NO	FREQUENCY			FREQUENCY RESPONSE REQ. REFERRED TO 1KHZ AML		MEAS. AT OFC. A		MEAS. AT OFC. Z				
		1000 HZ					EM' AML DEV.		AML DEV.				
		400 HZ _____ TO _____ OF 1KHZ AML											
		2300 HZ _____ TO _____ OF 1KHZ AML											
	COMPL.	UTF _____ HZ _____ TO _____ OF 1KHZ AML											
B.S.P. 660-450-301, TABLE XV													
MESSAGE CIRCUIT NOISE MEASUREMENTS													
2	COMPL.	OFFICE A			OFFICE Z								
		REQ. _____ DBRNC		MEAS. _____ DBRNC		REQ. _____ DBRNC		MEAS. _____ DBRNC					
B.S.P. 660-450-301, TABLE XV													
IMPULSE NOISE MEASUREMENTS													
3	COMPL.	REQ. _____			MEAS. AT OFFICE A _____			MEAS. AT OFFICE Z _____					
B.S.P. 660-450-301, TABLE XV													
PAR MEASUREMENTS													
4	COMPL.	REQ. _____			MEAS. AT OFFICE A _____			MEAS. AT OFFICE Z _____					
B.S.P. 660-450-301, TABLE XV													
TALKING AND LISTENING TESTS													
5	COMPL.	OFFICE A _____			OFFICE Z _____								
BSP 660-450-301 TABLE XIV													
6	COMPL.	TERMINAL BALANCE TESTS - CLASS 4 IT AND TC TRUNKS				REQUIREMENT				BSP 660-450-301 TABLE XIV			
		ACCESS				ERL		SP		MEAS. AT OFC. A		MEAS. AT OFC. Z	
						MED MIN		MED MIN		ERL SP		ERL SP	
		INCOMING				_____		_____		_____		_____	
		INCOMING LOCAL TERM.				_____		_____		_____		_____	
		TC TRUNKS-TEST OF 4W TERM				_____		_____		_____		_____	
		OUTGOING				_____		_____		_____		_____	
		SWITCHBOARD				_____		_____		_____		_____	
BSP 660-450-301 TABLE XIV													
THROUGH BALANCE TESTS - IT TRUNKS - CLASS 3 AND HIGHER OFFICES													
7	COMPL.	ACCESS				ERL		SP		MEAS. AT OFC. A		MEAS. AT OFC. Z	
						MED MIN		MED MIN		ERL SP		ERL SP	
		INCOMING				_____		_____		_____		_____	
		OUTGOING				_____		_____		_____		_____	
		SWITCHBOARD				_____		_____		_____		_____	
B.S.P. 660-450-301, TABLE XV													
TRUNK PLACED IN SERVICE													
8	COMPL.	TIME _____			DATE _____			INIT.: A _____ Z _____		AUTO. TEST FRAME TEST _____			
B.S.P. 660-450-301, TABLE XV													
9		COMPLETION REPORT:			DATE _____			SUPV. _____					

SECTION 660-450-010

<b>10</b>	YES NO	OPER. AND TRANS. TEST - TRUNK WITH TWO OR MORE MODES OF OPER.	B.S.P. 660-450-1300, 301, 501, 502																																										
	COMPL.	<table style="width:100%; border:none;"> <tr> <td style="width:33%;">ORIG. MODE - 2W</td> <td style="width:33%;">TERM. MODE - 2W</td> <td style="width:33%;">TERM. MODE - 4W</td> </tr> <tr> <td>AML _____ MACH. ACCESS</td> <td>AML _____ IT</td> <td>AML _____ IT TRAIN</td> </tr> <tr> <td>AML _____ EMER. SWBD. ACCESS</td> <td>AML _____ TAN.</td> <td>AML _____ TAN TRAIN</td> </tr> <tr> <td>AML _____ TAN ACCESS</td> <td>AML _____ SUBS</td> <td>ORIG. MODE - 4W</td> </tr> <tr> <td>AML _____ SUBS. ACCESS</td> <td>AML _____ SWBD</td> <td>AML _____ MACH.</td> </tr> <tr> <td>AML _____ SWBD. ACCESS</td> <td>AML _____ SWBD</td> <td>AML _____ EMER. SWBD.</td> </tr> </table>	ORIG. MODE - 2W	TERM. MODE - 2W	TERM. MODE - 4W	AML _____ MACH. ACCESS	AML _____ IT	AML _____ IT TRAIN	AML _____ EMER. SWBD. ACCESS	AML _____ TAN.	AML _____ TAN TRAIN	AML _____ TAN ACCESS	AML _____ SUBS	ORIG. MODE - 4W	AML _____ SUBS. ACCESS	AML _____ SWBD	AML _____ MACH.	AML _____ SWBD. ACCESS	AML _____ SWBD	AML _____ EMER. SWBD.																									
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<b>11</b>		OVERALL SIGNALING TESTS																																											
	COMPL.	<table style="width:100%; border:none;"> <tr> <td style="width:33%;">OVERALL SIGNALLING TESTS TO TEST LINE</td> <td style="width:33%;"></td> <td style="width:33%; text-align:right;">B.S.P. 660-450-301 TABLE XV</td> </tr> <tr> <td>TEST AT OFFICE A (INIT)</td> <td>TEST AT OFFICE Z (INIT)</td> <td></td> </tr> <tr> <td colspan="3" style="text-align:center;">OVERALL PULSING TESTS</td> </tr> <tr> <td colspan="3" style="text-align:center;">OFFICE A TO OFFICE Z</td> </tr> <tr> <td style="width:15%;"></td> <td style="width:15%;">SEND BK</td> <td style="width:15%;">REC BK AT POINT</td> <td style="width:15%;">SEND BK</td> <td style="width:15%;">REC BK AT POINT</td> </tr> <tr> <td></td> <td>AT POINT</td> <td>REQUIREMENT</td> <td>MEAS</td> <td>REQUIREMENT</td> </tr> <tr> <td>TEST 1 12 PPS</td> <td style="text-align:center;">[ ] [ ]</td> <td>MAX [ ] [ ]</td> <td style="text-align:center;">[ ] [ ]</td> <td>MAX [ ] [ ] [ ] [ ]</td> </tr> <tr> <td>TEST 2 12 PPS</td> <td style="text-align:center;">[ ] [ ]</td> <td>MIN [ ] [ ]</td> <td style="text-align:center;">[ ] [ ]</td> <td>MIN [ ] [ ] [ ] [ ]</td> </tr> <tr> <td>TEST 3 8 PPS</td> <td style="text-align:center;">[ ] [ ]</td> <td>MAX [ ] [ ]</td> <td style="text-align:center;">[ ] [ ]</td> <td>MAX [ ] [ ] [ ] [ ]</td> </tr> <tr> <td>TEST 4 8 PPS</td> <td style="text-align:center;">[ ] [ ]</td> <td>MIN [ ] [ ]</td> <td style="text-align:center;">[ ] [ ]</td> <td>MIN [ ] [ ] [ ] [ ]</td> </tr> </table>	OVERALL SIGNALLING TESTS TO TEST LINE		B.S.P. 660-450-301 TABLE XV	TEST AT OFFICE A (INIT)	TEST AT OFFICE Z (INIT)		OVERALL PULSING TESTS			OFFICE A TO OFFICE Z				SEND BK	REC BK AT POINT	SEND BK	REC BK AT POINT		AT POINT	REQUIREMENT	MEAS	REQUIREMENT	TEST 1 12 PPS	[ ] [ ]	MAX [ ] [ ]	[ ] [ ]	MAX [ ] [ ] [ ] [ ]	TEST 2 12 PPS	[ ] [ ]	MIN [ ] [ ]	[ ] [ ]	MIN [ ] [ ] [ ] [ ]	TEST 3 8 PPS	[ ] [ ]	MAX [ ] [ ]	[ ] [ ]	MAX [ ] [ ] [ ] [ ]	TEST 4 8 PPS	[ ] [ ]	MIN [ ] [ ]	[ ] [ ]	MIN [ ] [ ] [ ] [ ]	
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<b>12</b>		OVERALL ECHO SUPPRESSOR AND DISABLER TESTS:	B.S.P. 660-450-301, TABLE XV																																										
		INIT _____ DATE _____																																											
<b>13</b>		EQUIPMENT AND FACILITY PREPARATION TESTS																																											
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SAMPLE FORM E-2545A



SECTION 660-450-010

10	YES NO	OPER. AND TRANS. TEST - TRUNK WITH TWO OR MORE MODES OF OPER.	B.S.P. 660-450-(300, 301, 500, 501)																																			
	<input checked="" type="checkbox"/> <input type="checkbox"/>	<table style="width:100%; border:none;"> <tr> <td style="width:33%;">ORIG. MODE - 2W</td> <td style="width:33%;">TERM. MODE - 2W</td> <td style="width:33%;">TERM. MODE - 4W</td> </tr> <tr> <td>AML _____ MACH. ACCESS</td> <td>AML <u>4.5</u> IT</td> <td>AML <u>4.5</u> IT TRAIN</td> </tr> <tr> <td>AML _____ EMER. SWBD. ACCESS</td> <td>AML _____ TAN.</td> <td>AML _____ TC TRAIN</td> </tr> <tr> <td>AML _____ TAN ACCESS</td> <td>AML <u>5.0</u> SUBS.</td> <td>ORIG. MODE - 4W</td> </tr> <tr> <td>AML _____ SUBS. ACCESS</td> <td>AML _____ SWBD.</td> <td>AML <u>4.5</u> MACH.</td> </tr> <tr> <td>AML <u>4.5</u> SWBD. ACCESS</td> <td>AML _____ EMER. SWBD.</td> <td></td> </tr> </table>	ORIG. MODE - 2W	TERM. MODE - 2W	TERM. MODE - 4W	AML _____ MACH. ACCESS	AML <u>4.5</u> IT	AML <u>4.5</u> IT TRAIN	AML _____ EMER. SWBD. ACCESS	AML _____ TAN.	AML _____ TC TRAIN	AML _____ TAN ACCESS	AML <u>5.0</u> SUBS.	ORIG. MODE - 4W	AML _____ SUBS. ACCESS	AML _____ SWBD.	AML <u>4.5</u> MACH.	AML <u>4.5</u> SWBD. ACCESS	AML _____ EMER. SWBD.																			
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EXAMPLE OF COMPLETED FORM E-2545A

TABLE I

Test No.	Terminal Balance Tests - Class 4 and higher ranking switching OFC's - Not including 4 type. (See Table III)	Test Conditions for Echo Return Losses and Singing Points	Terminal Balance Test Requirement				(E-2545A) Circuit Order Test Results Entry Designation	BSP Plant Series Reference - How to Make Test		
			ERL		SP					
			Med.	Min.	Med.	Min.				
	Toll connecting trunks on 2-wire facility - tested to a balance test termination in distance class 5 offices. Test No's 1 to 3							SXS 660-470-503 Par.	No. 5 - X-Bar 660-470-502 Par.	X-Bar Tandem 660-470-501 Par.
1	Machine Path Operator Office Trunk Machine Toll Switch Trunk		18	13	10	6	Outgoing	Par. 7.12	Par. 7.09	Par. 7.09
2	Switchboard Path of Operator Office Trunk Toll Switch Trunk Recording Completing Trunks		18	13	10	6	Switchboard Incoming	Par. 7.19 7.25	Par. 7.09 7.11	Par. 7.09 7.11
3	CAMA Trunk ANI Trunk		18	13	10	6	Incoming	Par. 7.22	Par. 7.11	Par. 7.11
	Toll connecting trunks on 4-wire facility - tested to a balance test termination in distance class 5 offices. See Note 3. Test No's 4 to 6.									
4	Machine Path Operator Office Trunk Machine Toll Switch Trunk		22	16	15	11	Outgoing	Par. 7.12	Par. 7.09	Par. 7.09
5	Switchboard Path of Operator Office Trunk Toll Switch Trunk Recording Completing Trunk		22	16	15	11	Switchboard Incoming	Par. 7.19 7.25	Par. 7.09	Par. 7.09 7.11
6	CAMA Trunk ANI Trunk		22	16	15	11	Incoming	Par. 7.22	Par. 7.11	Par. 7.11

TABLE I

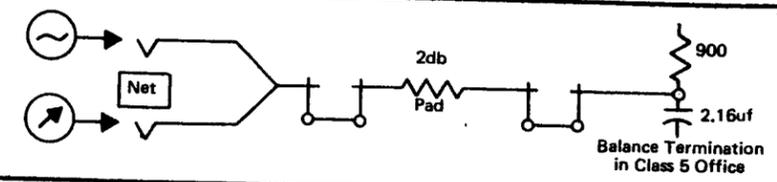
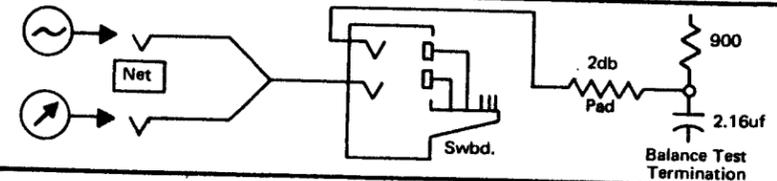
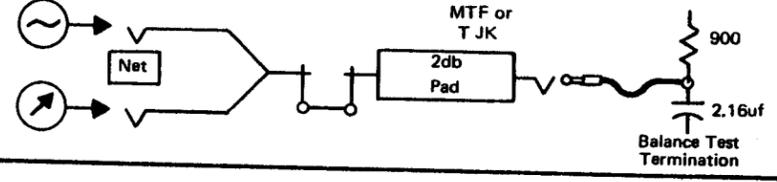
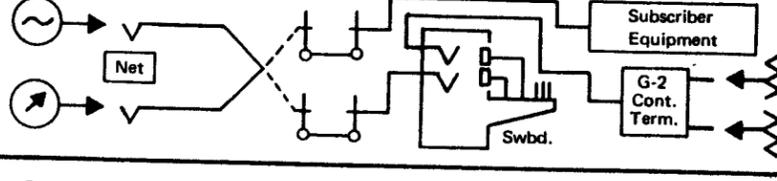
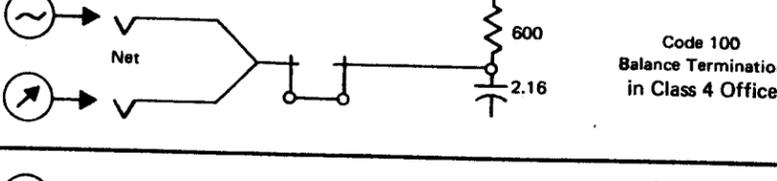
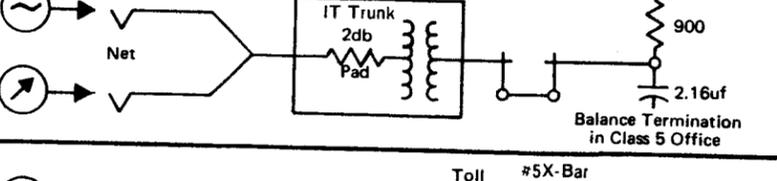
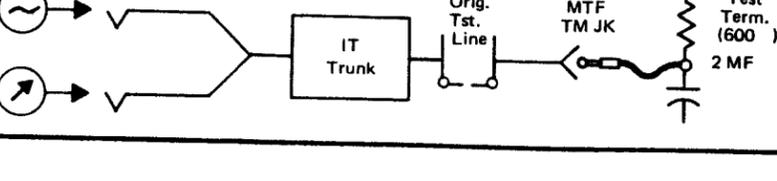
Test No.	Test & Circuit Classification	Test Conditions for Echo Return Losses and Singing Points	Terminal Balance Test Requirement				(E-2545A) Circuit Order Test Results Entry Designation	BSP Plant Series Reference - How to Make Test		
			ERL		SP					
			Med.	Min.	Med.	Min.				
	Toll connecting trunk having fixed 2db pads - tested to a balance test termination in class 5 offices in the same building as the higher class office. Test No.'s 7 to 9							SXS 660-470-503	No. 5 X-Bar 660-470-502	X-Bar Tandem 660-470-501
7	Machine Toll Switch Trunk		22	18	14	10	Only required as part of circuit order work for No. 5 X-Bar, see Test No. 12	Par. 7.12	-	Par. 7.09
8	Toll Switch Trunk Recording Completing Trunk		22	18	14	10	Switchboard	Par. 7.25	Par. 7.09 7.11	Par. 7.09 7.11
9	CAMA Trunk ANI Trunk LAMA Trunk		22	10	14	10	Incoming	Par. 7.22	Par. 7.11	Par. 7.11
10	Toll connecting trunks (2-or 4-wire) terminated in subscriber equipment (includes mobile radio service, coastal harbor service, etc., trunks).		15	9	10	6	Incoming Local Term or Switchboard	Par. 7.28	Par. 7.13	Par. 7.13
11	In class 4 offices only, 4-wire terminating sets used on intertoll trunks—tested to a code 100 balance test termination. See Note 2.		27	21	No Req	No Req	Incoming	Par. 7.06	Par. 7.16 7.16	Par. 7.16 7.16
12	Class 4 No. 5 X-Bar offices test of 4-wire terminating sets to a local office balance termination.		22	18	14	10	Incoming Local Term	-	Par. 7.09	-
12A	Class 4 intertoll trunks test of the outgoing through path (CAMA and LAMA serving offices only).		22	18	No Req	No Req	Outgoing	Par. 7.23	Par. 7.16 7.18 Test connect No. 3 & 4. See Note 6.	Par. 7.16 7.17 Use method outlined for 1-way out trunk

TABLE I

Test No.	Terminal Balance Tests – Class 4 and higher ranking switching OFC's – Not including 4 type. (See Table III)		Terminal Balance Test Requirement				(E-2545A) Circuit Order Test Results Entry Designation	BSP Plant Series Reference – How to Make Test		
	Trunk & Circuit Classifications	Test Conditions for Echo Return Losses for Singing Points	ERL		SP					
			Med.	Min.	Med.	Min.				
							SXS 660-470-503  Par.	No. 5 X-Bar 660-470-502  Par.	X-Bar Tandem 660-470-501  Par.	
13	Operator telephone set circuits (switchboards and toll testboards).		11	7	8	4	See Note 4	Par. 7.31	Par. 7.21	Par. 7.18
14	Toll information trunks (terminated in operator telephone sets).		15	11	12	8	See Note 4	Par. 7.31	Par. 7.21	Par. 7.18
15	4-wire terminating sets in the toll switching offices used on toll connecting trunks—tested to an intertoll trunk 4-wire terminating set. See Notes 2 & 3.		22	16	No Req	No Req	To Trunks – Test of 4-wire Term. Set	Par. 7.15 Step 5	Par. 7.12 Step 5	Par. 7.12 Step 6
16	Operator service trunks (E.G. TX), 2-wire toll tandem trunks, and operator junctions—tested to a switchboard balance test termination.		22	16	14	8	See Note 4	Par. 7.31	Par. 7.07 7.08	Par. 7.18

NOTES: 1. The test requirements given in this table are the balances of the companies network against the lines connected to the 2-wire side of the 4-wire terminating set used in the measurement. This means that the transmit and receive losses (transhybrid losses) of the 4-wire terminating set must be subtracted from the actual measured values.

2. The 4-wire terminating sets are tested in order to insure that the compromise networks and the network building-out capacitors are clear of trouble.

TABLE II

TEST NO	THROUGH BALANCE TESTING - 2 WIRE CLASS 3 AND HIGHER CLASS OFFICES		BALANCE TEST REQUIREMENT				(E-2545A) CIRCUIT ORDER TEST RESULTS ENTRY DESIGNATION	BSP PLANT SERIES REFERENCE - HOW TO MAKE TEST		
	TEST & CIRCUIT CLASSIFICATIONS	TEST CONDITIONS FOR ECHO RETURN LOSSES AND SINGING POINTS	ERL		SP					
			MED	MIN	MED	MIN				
	INTERTOLL TRUNKS - TEST NO'S 1-3 SPECIFY TEST REQ., ETC. FOR PRIMARY INTERTOLL TRUNKS. TEST NO'S 4-6 SPECIFY TEST REQ., ETC. FOR SECONDARY INTERTOLL TRUNKS.							SXS 660-475-501 PAR.	NO. 5 X-BAR 660-475-502 PAR.	CROSSBAR TANDEM 660-475-503 PAR.
1	INTERTOLL TRUNKS - TEST TO CODE 100		27	21	20	14	INCOMING	4.01	6.03	6.01
2	INTERTOLL TRUNKS - TEST OF THE OUTGOING BRANCH OF MACHINE INTERTOLL TRUNKS		27	21	20	14	OUTGOING	4.01	6.04	6.09
3	INTERTOLL TRUNKS - TEST OF THE OPERATOR ACCESS TO THE MACHINE INTERTOLL TRUNK OR RINGDOWN INTERTOLL TRUNK.		27	21	20	14	OUTGOING	4.01	6.05	6.07 6.08
4	OPERATOR SERVICE TRUNKS - 121, TH, WH ETC.		27	21	20	14	INCOMING	4.01	6.06	6.12 NOTE 2
5	OPERATOR JUNCTORS -		27	21	20	14	OUTGOING	-	6.06	-
6	4-WIRE TANDEM TRUNKS		27	21	20	14	OUTGOING	-	-	6.12

NOTES: 1. THE TEST REQUIREMENTS GIVEN IN THIS TABLE ARE THE BALANCES OF THE COMPROMISE NETWORK AGAINST THE LINES CONNECTED TO THE 2-WIRE SIDE OF THE 4-WIRE TERMINATING SET USED IN THE MEASUREMENT. THIS MEANS THAT THE TRANSMIT AND RECEIVE LOSSES (TRANSHYBRID LOSSES) OF THE 4-WIRE TERMINATING SET MUST BE SUBTRACTED FROM THE ACTUAL MEASURED VALUES.

2. THE OPERATOR SERVICE TRUNKS IN A X-BAR TANDEM OFFICE, OTHER THAN 121 TRUNKS ARE TESTED AS PART OF TERMINAL BALANCE.

TABLE III - SEE NOTE 1

TEST NO	TEST & CIRCUIT CLASSIFICATIONS	TEST CONDITIONS FOR ECHO RETURN LOSSES AND SINGING POINTS	TYPE OF "A" PAD USED IN OFFICE	TERMINAL BALANCE (SEE NOTE 2) TEST REQUIREMENT				E-2545A CIRCUIT ORDER TEST RESULTS ENTRY DESIGNATION	BSP PLANT SERIES REFERENCE - HOW TO MAKE TEST 660-470-504
				ERL		SP			
				MED	MIN	MED	MIN		
1	LOW LOSS MACHINE TOLL SWITCH TRUNKS OR MACHINE PATH OF OPERATOR OFFICE TRUNKS TEST NO'S 1 THROUGH 6 NOTE (4).		SPLIT	26	22	18	14	OUTGOING	6.10
2			SPLIT OR SINGLE	22	18	14	10	OUTGOING	6.10
3			SPLIT	22	17	14	10	OUTGOING	6.10
4			SPLIT OR SINGLE	18	13	10	6	OUTGOING	6.10
5				18	13	10	6	OUTGOING	6.10
6			SPLIT OR SINGLE	26	20	19	13	OUTGOING	6.10
7	HIGH LOSS TRUNKS MACHINE TOLL SWITCH TRUNKS OR MACHINE PATH OF OPERATOR OFFICE TRUNKS NOTE (4).		SPLIT OR SINGLE	22 + 2A	18 + 2A	14 + 2A	10 + 2A	OUTGOING	6.10
8			SPLIT OR SINGLE	18 + 2A	12 + 2A	10 + 2A	6 + 2A	OUTGOING	6.10
9			SPLIT OR SINGLE	18 + 2A	12 + 2A	10 + 2A	6 + 2A	OUTGOING	6.10
10			SPLIT	18 + 2A	12 + 2A	10 + 2A	6 + 2A	OUTGOING	6.10
11			SPLIT OR SINGLE	22 + 2A	16 + 2A	15 + 2A	11 + 2A	OUTGOING	6.10
12			SPLIT OR SINGLE	26 + 2A	16 + 2A	19 + 2A	13 + 2A	OUTGOING	6.10

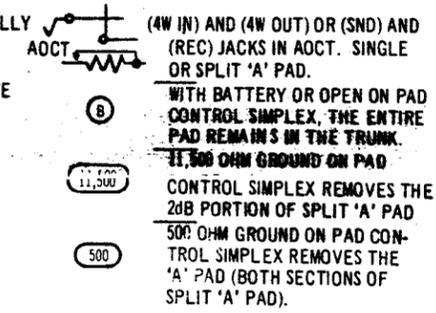
TABLE III SEE NOTE 1

TEST NO	TEST & CIRCUIT CLASSIFICATIONS	TEST CONDITIONS FOR ECHO RETURN LOSSES AND SINGING POINTS	TYPE OF 'A' PAD USED IN OFFICE	TERMINAL BALANCE SEE NOTE 2 TEST REQUIREMENT				E-2545A CIRCUIT ORDER TEST RESULTS ENTRY DESIGNATION	BSP PLANT SERIES REFERENCE - HOW TO MAKE TEST 660-470-504
				ERL		SP			
				MED	MIN	MED	MIN		
13	LOW LOSS TRUNKS CAMA, LAMA, OR ANI TRUNKS TESTS 1 THROUGH 6 NOTE (4).		SPLIT	26	22	18	14	INCOMING	6.13
14			SPLIT OR SINGLE	22	18	14	10	INCOMING	6.13
15			SPLIT	22	17	14	10	INCOMING	6.13
16			SPLIT OR SINGLE	18	13	10	6	INCOMING	6.13
17			SPLIT OR SINGLE	18	13	10	6	INCOMING	6.13
18			SPLIT OR SINGLE	26	20	19	13	INCOMING	6.13
19			SPLIT OR SINGLE	22 +	18 +	14 +	10 +	INCOMING	6.13
20			SPLIT OR SINGLE	18 +	12 +	10 +	6 +	INCOMING	6.13
21	HIGH LOSS TRUNKS CAMA, LAMA OR ANI TRUNKS TESTS 19 THROUGH 24 NOTE (4).		SPLIT OR SINGLE	18 +	12 +	10 +	6 +	INCOMING	6.13
22		SPLIT OR SINGLE	18 +	12 +	10 +	6 +	INCOMING	6.13	
		SPLIT OR SINGLE	22 +	16 +	15 +	11 +	INCOMING	6.13	
24		SPLIT OR SINGLE	26 +	16 +	19 +	13 +	INCOMING	6.13	

TEST NO	TRUNK & CIRCUIT CLASSIFICATIONS	TEST CONDITIONS FOR ECHO RETURN LOSSES AND SINGING POINTS	TERMINAL BALANCE SEE NOTE 2 TEST REQUIREMENT				(E-2545A) CIRCUIT ORDER TEST RESULTS ENTRY DESIGNATION	BSP PLANT SERIES REFERENCE - HOW TO MAKE TEST 660-470-504	
			ERL		SP			PAR.	FIG.
			MED	MIN	MED	MIN			
25	TX TRUNKS TO THE OUT SWITCHBOARD AND INCOMING TANDEM TRUNKS (NOT EQUIPPED WITH 'A' PADS) FROM THE OUT SWITCHBOARD. (500-OHM GROUND ON PAD CONTROL SIMPLEX).		27 +	23 +	20 +	16 +	SWITCHBOARD	6.06	11
			2A	2A	2A	2A		6.07	12
26	INCOMING TANDEM TRUNKS (EQUIPPED WITH 'A' PADS) FROM THE OUT SWITCHBOARD. (BATTERY ON PAD CONTROL SIMPLEX)		27	23	26	16	SWITCHBOARD	6.06	12
27	INFORMATION, RATE AND ROUTE, ETC. TRUNKS TO DESKS, (500-OHM GROUND ON PAD CONTROL SIMPLEX).		15 +	11 +	12 +	8 +	SWITCHBOARD	6.08	14
28	TOLL CONNECTING TRUNKS WITH FIXED 2dB PADS - TESTED TO CLASS 5 OFFICES IN THE SAME OR ADJACENT BLDG. NOTE 3. REC. COMP. AND TOLL SWITCHING		22 +	18 +	14 +	10 +	SWITCHBOARD	6.08	11
			2A	2A	2A	2A			
29	2-WIRE TOLL CONNECTING TRUNKS TO DISTANT CLASS OFFICES (INCLUDES CARRIER TRUNKS WITH 2-WIRE EXTENSIONS) NOTE 3. REC. COMP. AND TOLL SWITCHING SWBD. PATH OF OPERATOR OFFICE TRUNKS		18 +	14 +	10 +	6 +	SWITCHBOARD	6.08	11
			2A	2A	2A	2A			
3	4-WIRE TOLL CONNECTING TRUNKS TO DISTANT CLASS 5 OFFICES NOTE 3. REC. COMP. AND TOLL SWITCHING SWBD. PATH OF OPERATOR OFFICE TRUNKS.		22 +	18 +	15 +	10 +	SWITCHBOARD INCOMING (NOTE 5)	6.08	11
			2A	2A	2A	2A			
32	ANY TOLL CONNECTING TRUNK (INCLUDING MOBILE RADIO AND COASTAL HARBOR SERVICE TRUNKS) TERMINATED IN OFF-HOOK SUBSCRIBER SET. NOTE 3.		15 +	11 +	10 +	6 +	SWITCHBOARD	6.14	12
			2A	2A	2A	2A			
31	4-WIRE TERMINATING SETS USED ON TOLL CONNECTING TRUNKS AND HAVING THE 2-WIRE SIDE TOWARD THE SWITCHBOARD.		22	18	-	-	TEST OF TOLL CONNECTING TRUNK 4W TERM.	6.08	FIG 11
								STEP 7	NOTE 2

NOTES:

- THE TEST REQUIREMENTS SHOWN ASSUME ALL MEASUREMENTS ARE MADE IN ACCORDANCE WITH THE PROCEDURES OF THIS SECTION EXCEPT THAT ERL MEASUREMENTS ARE MADE USING A 201B NOISE GENERATOR (WITH A 455B WEIGHTING NETWORK), AND A 3-TYPE NOISE MEASURING SET (WITH C-MESSAGE WEIGHTING NETWORK).
- THE VALUE OF 'A' SHOWN IN THE REQUIREMENTS IS THE VALUE OF THE OFFICE 'A' PAD ('A-2' + '2' IN SPLIT PAD OFFICES.). IF THE AOCT. AND THE INCOMING TEST TRUNK (SD-68547-01 OR EQUIVALENT) HAVE BEEN MODIFIED TO PROVIDE TP2, ALL REQUIREMENTS SHOULD BE INCREASE BY AN ADDITIONAL 4dB.
- THE REQUIREMENTS SHOWN FOR TOLL CONNECTING TRUNKS ON THE OUT SWBD., ASSUME THE USE OF TX AND INCOMING TDM TRUNKS (NOT EQUIPPED WITH 'A' PADS) TO REACH THE AOCT. IF INCOMING TDM TRKS WITH 'A' PADS ARE USED DELETE THE REFERENCE TO '2A' IN THE TEST REQUIREMENTS.
- SKETCHES ARE SIMPLIFIED AND AND GENERALLY DEPICT OUTGOING TRUNKS, WITH INCOMING TRUNKS, THE TERMINATION MAY BE ON THE TOLL SIDE OF THE LOCAL SWITCHING MACHINE THE SAME REQUIREMENTS APPLY TO BOTH INCOMING AND OUTGOING TRUNKS.

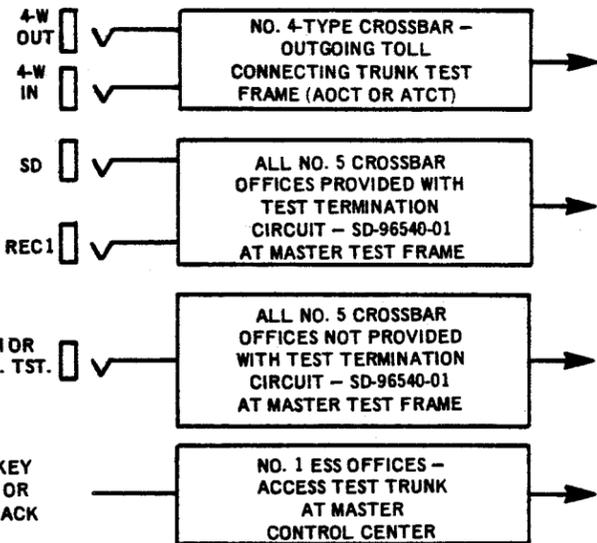


				Intertoll Trunks (See Figs. 2, 3, 4, 5)										2-Way Operator Office Trunk (See Figs. 7, 8)				EAS or End Office Toll Trunk (See Fig. 1)									
				Mode To Be Tested																							
				5	6	7	8	9	10	11	12	13	14	15	16												
				Incoming	To Code 101, 102, 104	Incoming Local Term	To 4 Digit Testline	Outgoing	Switchboard	Swbd. Outgoing Via Tandem Trunk or Opt. Junction	Outgoing Subscriber Access	Outgoing	Intertoll and Tandem Access	Outgoing	Testboard Access	Outgoing Switchboard and Test Board Access	Outgoing Machine Path	Incoming	Swbd. Access	Outgoing	Incoming						
				Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office	Orig. Office	Term Office		
				Type of Office		Tests To Be Made On:		Trunk Options And Features				Class Of Office															
No. 5 Crossbar	All Trunks		4 And Higher	A	C	A	D	B	C	E	C	F	D	E	C	A	D	B	D	F	D	E	C	A	B	A	B
	Trunks With These Options And Features	Switchboard, Multiple No Switchboard Mult. CAMA Serving Office Intertoll Thru Switching Machine Access Outgoing	4 or 3 4 or 3 4 or 3 3 4 And Higher																								
SXS	All Trunks		3 & 4	A	C	A	D	B	C			F	D	E	C	A	D	B	D	F	D	E	C	A	B	A	B
	Trunks With These Options And Features	Switchboard Multiple CAMA Service Office Intertoll Thru Switching Machine Access Outgoing	3 & 4 3 & 4 3 - 4 And Higher																								
Crossbar Tandem	All Trunks		4 And Higher	A	C			B	C											F	D	E	C	A	B	A	B
	Trunks With These Options And Features	Switchboard Mult. No Swbd Mult. CAMA Serving Office Intertoll Thru Switching Machine Access Outgoing	3 & 4 3 & 4 3 & 4 3 4 And Higher																								
4A or 4M	All Trunks		4 And Higher	A	B																						
	Trunks With These Options And Features	Swbd Mult. No Swbd Mult. Machine Access Intertoll Thru Switching	4 And Higher 4 And Higher 4 And Higher 3 And Higher																								

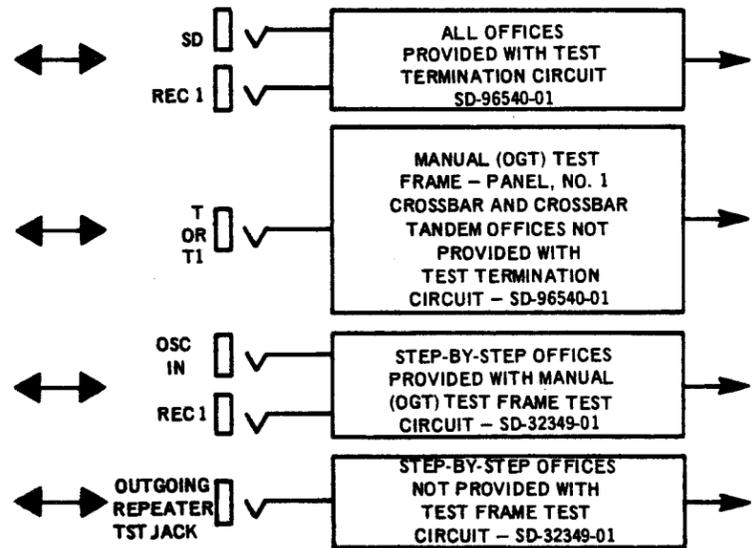
- Notes: 1. This Appendix and associated Table A is provided to be used as an aid in determining the appropriate tests and test points. When making transmission measurements on message trunks with more than one mode of operation. (2-Way Trunks.)
2. To use the Table, select the type of trunk from the horizontal headings at the top of the page, select the type of office from the left hand vertical column. (1) Vertical Column (2) Separates the trunks into two test categories. Tests that are to be made on all trunks and that are to be made on trunks with the options and features listed in column 3.
3. Some modes are only used in specific classes of offices, as shown, in column 4.
4. After selecting the type of office, trunk options and features and type of trunk, the required tests and test (letter codes on Chart A appear on associated figures as test points) points can be determined by the horizontal and vertical coordinates on the Chart.

TO AND FROM  
TRANSMISSION  
MEASURING  
EQUIPMENT

(A)



TEST TRUNK ACCESS PATHS USED FOR MANUAL MEASUREMENTS ON OUTGOING TRUNKS - NO. 4-TYPE CROSSBAR, NO. 5 CROSSBAR, AND NO. 1 ESS OFFICES.

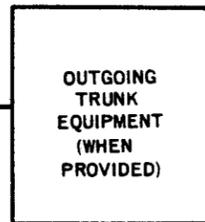
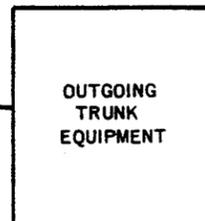


TEST JACK ACCESS PATHS USED FOR MANUAL MEASUREMENTS ON OUTGOING TRUNKS - ALL OFFICES EXCEPT NO. 4-TYPE CROSSBAR, NO CROSSBAR, AND NO. 1 ESS.

ORIGINATING END

OUTGOING SWITCH  
APPEARANCE

OUTGOING SWITCH  
APPEARANCE

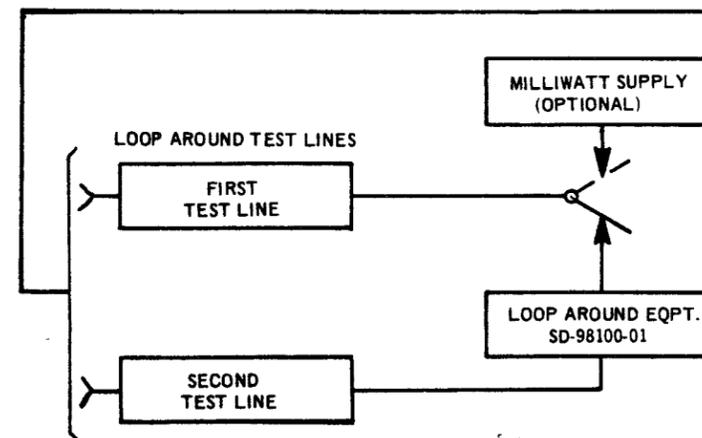


TERMINATING END

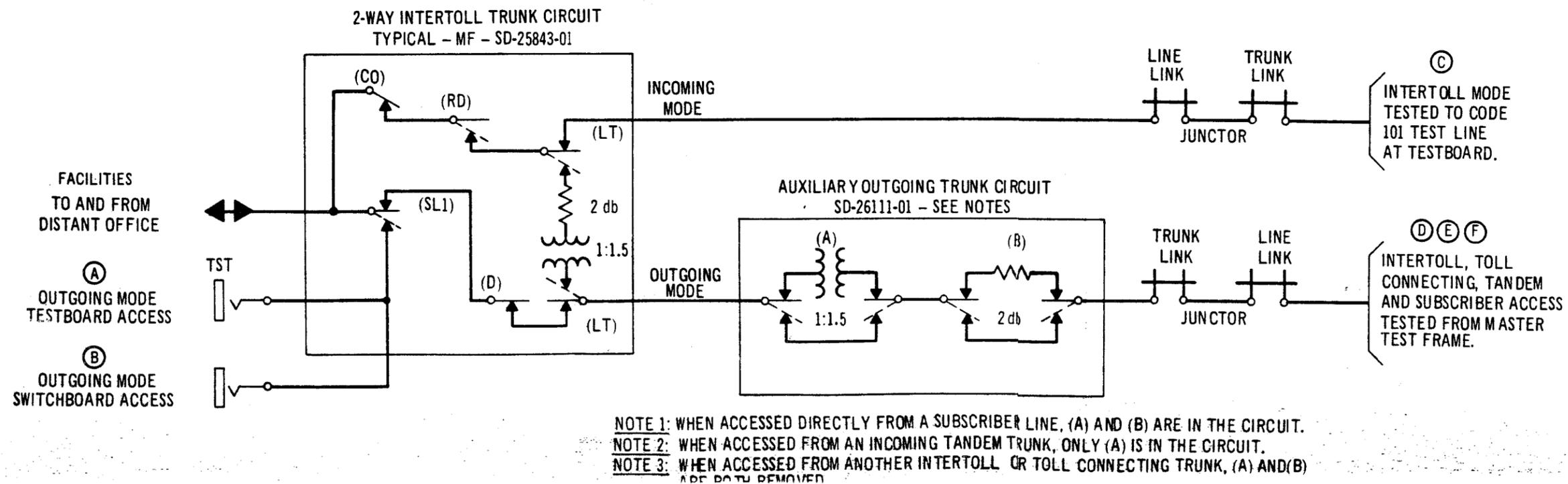
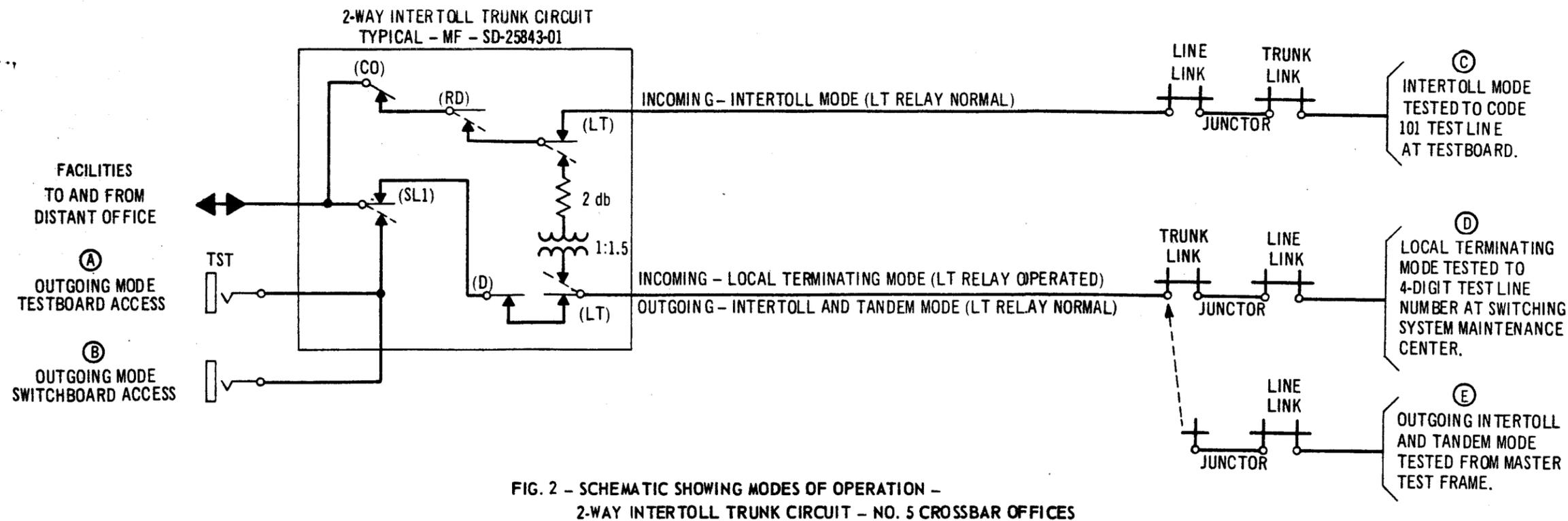
OUTGOING SWITCH  
APPEARANCE



LOCAL TERMINATING MODE  
TESTED TO 4 DIGIT TEST  
LINE NUMBER AT SWITCHING  
SYSTEM MAINTENANCE  
CENTER.



TEST LINE CIRCUITS AND TERMINATING ARRANGEMENTS USED FOR MAKING TRANSMISSION MEASUREMENTS ON INCOMING TRUNKS.



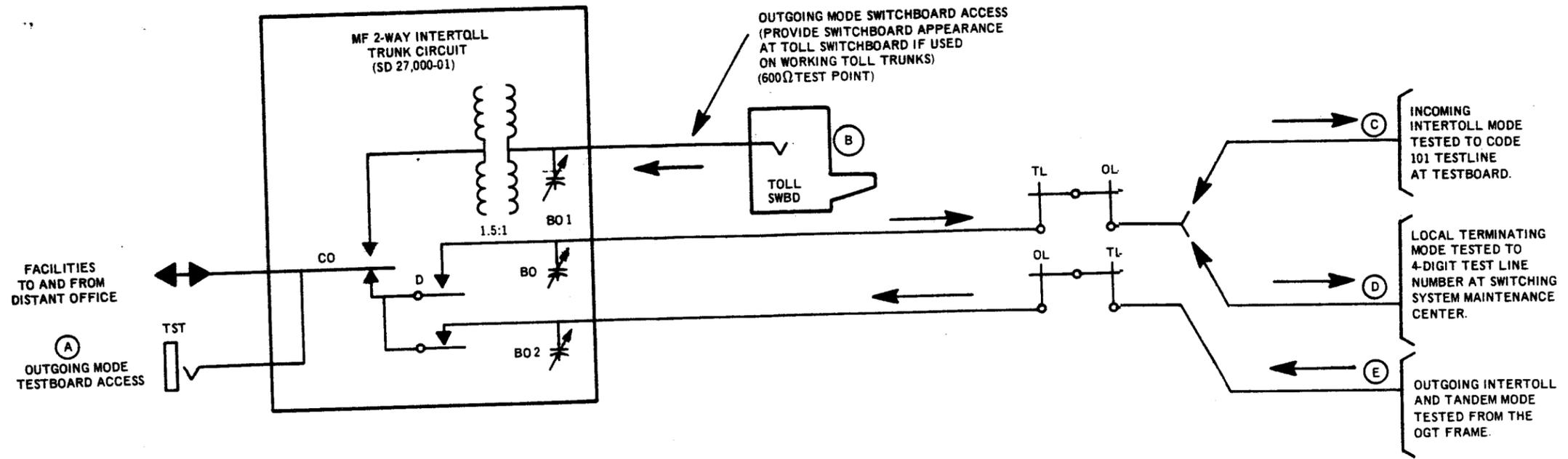
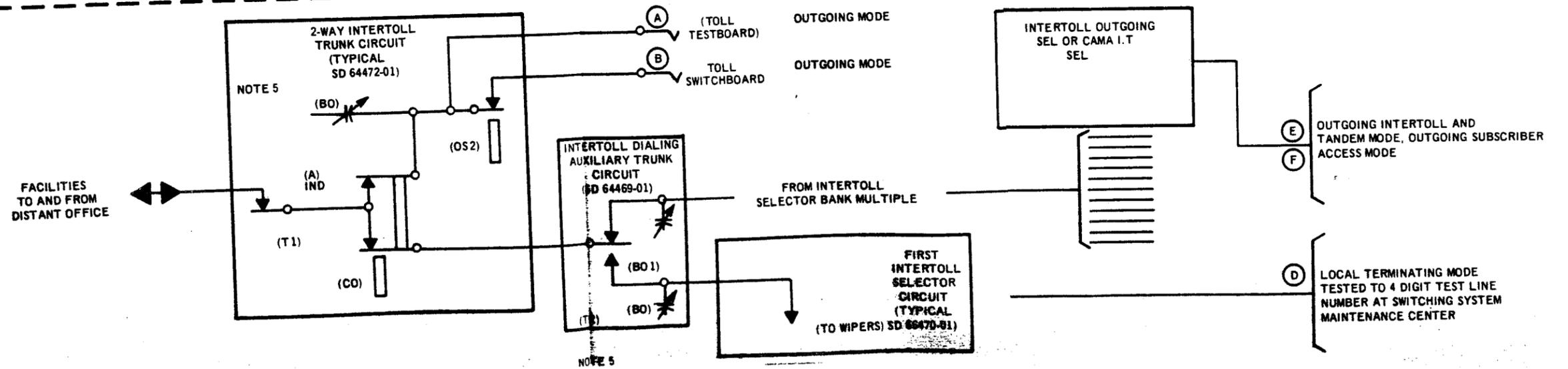


FIG. 4 - SCHEMATIC SHOWING MODES OF OPERATION - 2-WAY INTERTOLL TRUNK CROSSBAR TANDEM OFFICES.



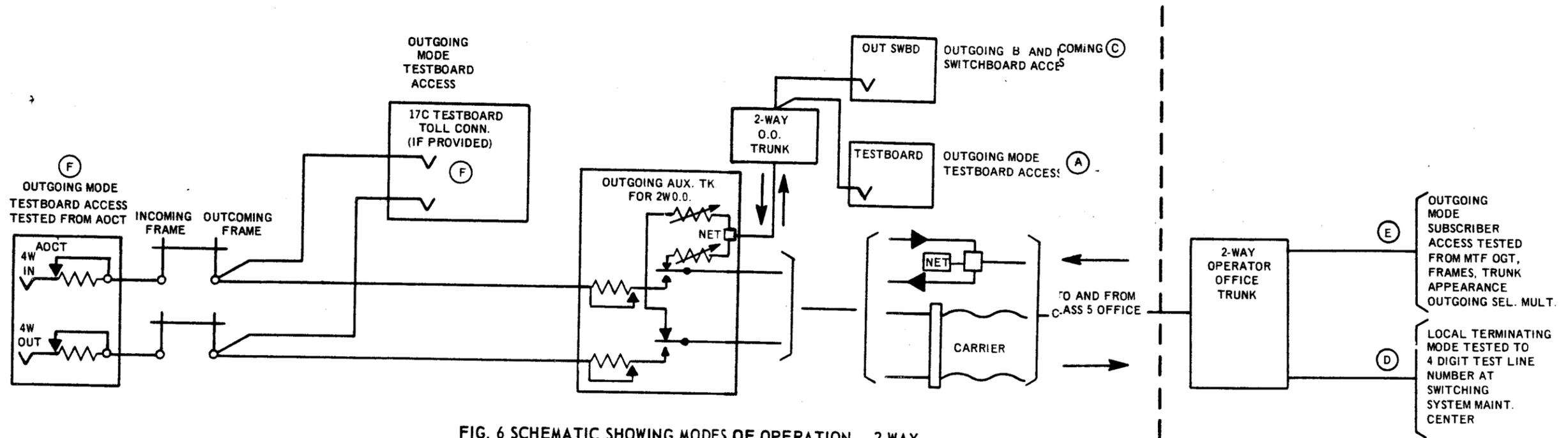
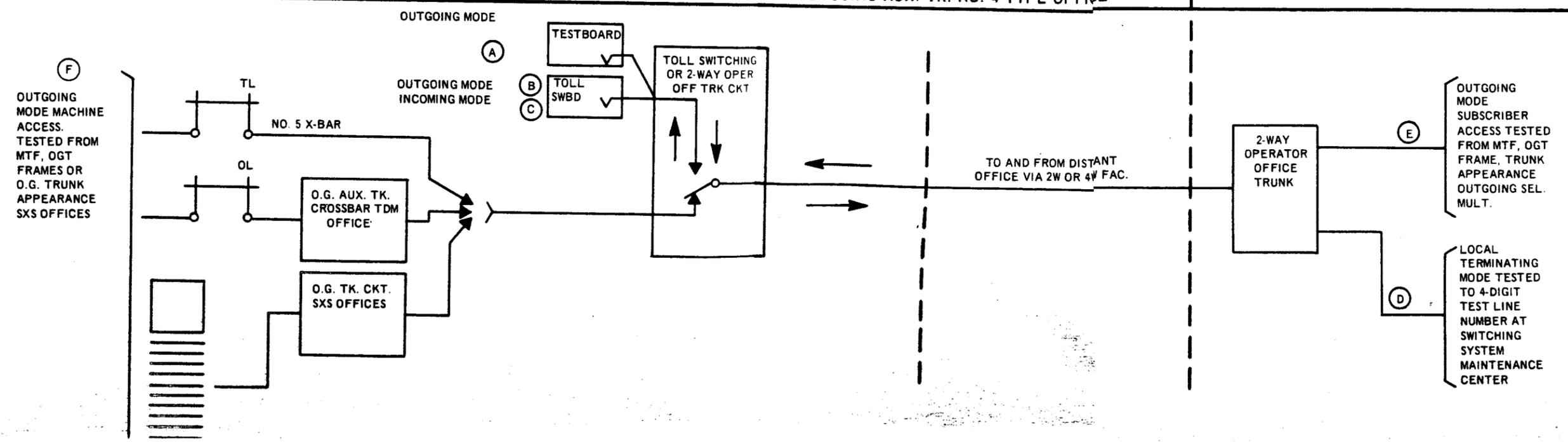


FIG. 6 SCHEMATIC SHOWING MODES OF OPERATION - 2-WAY OPERATOR OFFICE TRUNK AND OUTGOING AUX. TK. NO. 4 TYPE OFFICE



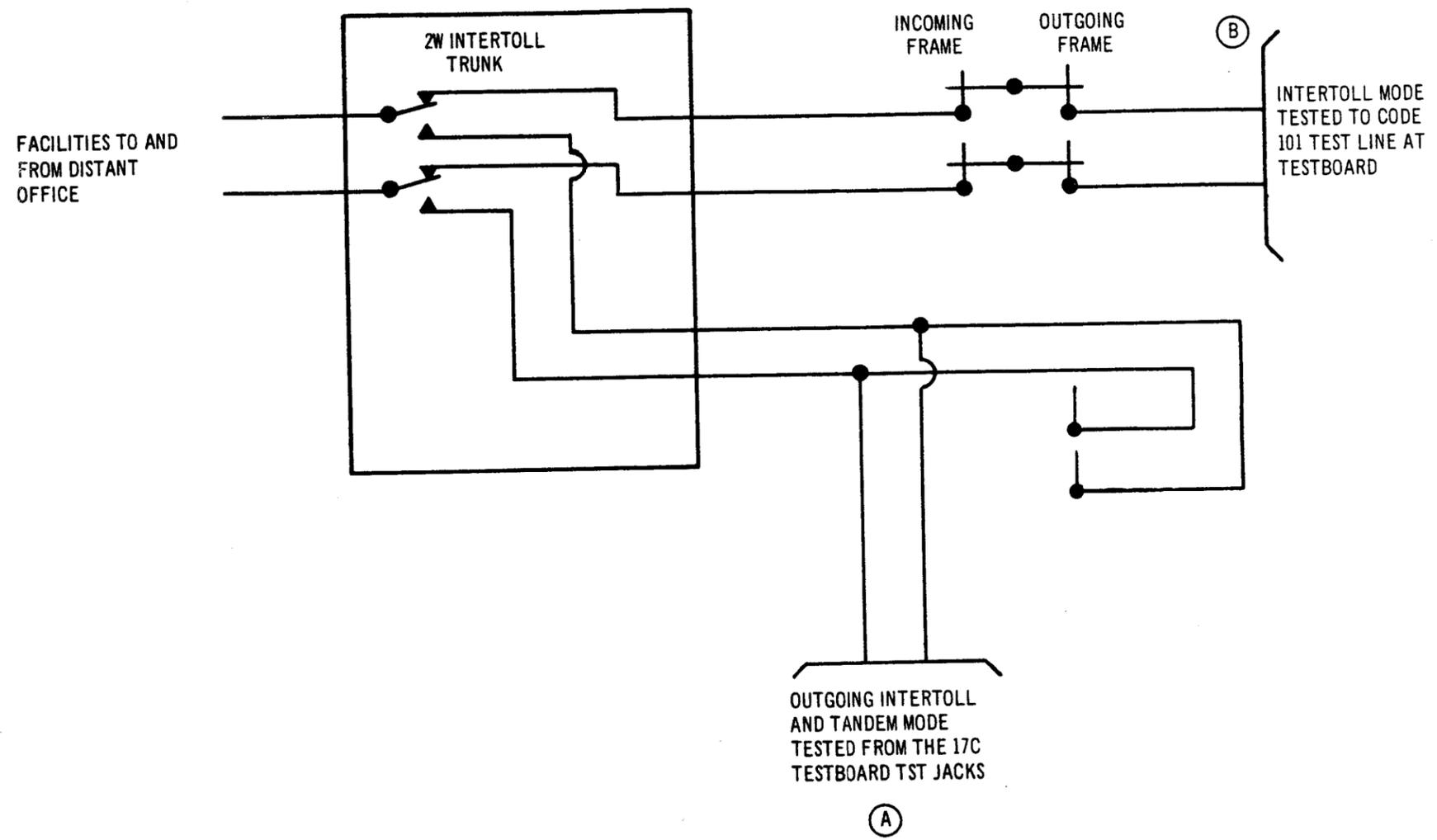


FIG. 8 SCHEMATIC SHOWING MODES OF OPERATION -  
2-WAY INTERTOLL TRUNK - NO. 4A CROSSBAR OFFICES.