

## 10B TELEGRAPH TESTBOARD

### 1. GENERAL

**1.01** This section describes the method of operation of the 10B telegraph testboard which is arranged for testing 100 words per minute data stations.

**1.02** This section is reissued to include a separate test procedure for the 105A data set (Test U) and include operation of TMR OUT key (Tests K and L).

**1.03** Operating features of the 5A automatic data test line and the 6A teletypewriter switchboard arranged for 100 words per minute can also be checked from the testboard.

**1.04** The primary purpose of this section is to describe the use of the cords and other equipment and not to evaluate the signals received for the purpose of determining trouble.

**1.05** The REC A and SEND A cords only are referred to in the operational procedure. If auxiliary teletypewriters are furnished at the testboard position, the associated REC B-SEND B cords and the REC C-SEND C cords may be used in a like manner.

**1.06** The TEL A cord and A key only are referred to in the test procedures. The TEL B cord and B key may be used in a like manner.

**1.07** *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

**1.08** The operational methods and tests covered are:

### Telephone Voice Communications

- A. Outgoing Telephone Call*
- B. Incoming Telephone Call*
- C. Conference Telephone Call*
- D. Tie Trunk Call*

### Data

- E. Answer Data Call*
- F. Sending Distorted Signals to Station:* This test checks the station's ability to print good copy from distorted signals.
- G. Measure Station Signal Distortion:* This test measures distortion of data signals transmitted by station.
- H. Check Ability of Station to Send and Receive a Timed Break:* This test checks the proper operation of the break feature to and from the station.
- I. Loop-Back Test:* This test permits testing station equipment on a full-duplex loop-back basis. Signals transmitted from testboard are looped through station equipment and retransmitted to testboard.
- J. Station Data Set Receiving Sensitivity:* This test determines station equipment receive sensitivity by inserting calibrated attenuation in the send circuit of the testboard.
- K. Transmission Level Measurement:* This test permits measuring level of tones transmitted by station equipment.
- L. Frequency Measurements:* This test permits measuring frequency of tones transmitted by station equipment.
- M. Monitoring:* This outlines the procedure for monitoring on a customer's line, with provisions for making distortion measurements of either station while engaged in data communications.

## SECTION F48.310

**N. Station Disconnect:** Checks ability of the station to initiate a disconnect sequence.

**O. Call to 5A Automatic Data Test Line:** Outlines method of testboard operation when calling automatic data test line.

**P. Testboard Dummy Loop:** Permits operation of position teletypewriter on a local basis.

**Q. Station Restraint Feature:** This test checks for proper operation of the station restrainer circuit.

**R. Send Tone to Station:** This outlines the procedure for sending tone to a station, if the testboard is furnished with a 19C oscillator or a connection to the 1000 cps milliwatt supply. When provided, tone may be used for loop line-up purposes or for station measurement to determine the quality of facilities.

**S. Call to 1 MW Test Line:** This test determines receive loss of testboard data test line.

**T. Call to "Loop Around" Test Line:** Permits testboard to determine signal level delivered by data station to its serving office. For those instances where the testboard has a different originating office than the testboard, as in the case of data stations served over remote exchange facilities.

**U. Complete Test of 105A Data Station:** This test procedure complements the overall tests of the 105A data station. A telephone employee is required at the station.

### 2. APPARATUS

**2.01** A 164C4 telegraph transmission measuring set is required for Tests F, G, H, I, M, O and P.

**2.02** A 13A transmission measuring set, or equivalent, is required for Test K (not required if testboard is provided with a connection to a voice frequency transmission and noise measuring circuit—SD-95900-01). Use of the 13A TMS requires a 2W25A cord.

**2.03** A 72A frequency meter is required for Test L (not required if testboard is equipped with a frequency counter—EPUT meter). Use of the 72A frequency meter requires a 2P22A cord.

**2.04** One 258C plug is required for Test M.

**2.05** One 2P1B cord is required for Tests M and R (not required for Test R if 19C oscillator is not used).

**2.06** One 53A head telephone set is required for all tests.

### 3. PREPARATION

STEP	ACTION	RESULT
<b>Tests F, G, H, I, J, K, L, N, O, Q, S and U</b>		
1	Insert headset plug into TEL SET jack.	
2	Insert SEND A cord into SEND KBD jack of a data test line.	
3	Insert REC A cord into REC jack of same data test line.	
4	Insert TEL A cord into DIAL jack of same data test line.	ORIG lamp lights. Position teletypewriter motor starts. Dial tone heard.
5	Operate A key to DIAL.	
6	Dial desired telephone number.	

STEP	ACTION	RESULT
7	Operate A key to TALK.	Supervisory tones heard during call establishment. When station goes "off hook", ringing ceases and tone (F2M-2225 cps) is heard. Except in Test S where 1000 cps will be heard.

**Tests F, G, H, I, J, K, L, N, O, Q and U**

8	When tone is heard, immediately remove TEL A cord from DIAL jack (to be done within 8 seconds after hearing tone, to prevent unattended stations from disconnecting).	CON lamp lights. Position teletypewriter copies the answer-back signal transmitted by data station.
9	Proceed to send from position teletypewriter keyboard.	Communications take place on half-duplex basis.

**Note 1:** With a call established as above, the teletypewriter cords may be rearranged without causing a disconnect.

**Note 2:** Any step marked with an asterisk (\*) indicates an action which is not required; however, it will provide additional information

**4. METHOD**

STEP	ACTION	RESULT
<b>A. Outgoing Telephone Call</b>		
1	Insert headset plug into TEL SET jack.	
2	Insert TEL A cord into TRK A jack.	Dial tone heard.
3	Operate A key to DIAL.	
4	Dial desired station call number.	
5	Restore A key to TALK.	Supervisory tones heard (ringing, busy, etc). Voice communication established.
6	To hold — Operate A key to HOLD.	
7	To disconnect — Remove cord.	
<b>B. Incoming Telephone Call</b>		
1	When TA lamp lights and buzzer sounds intermittently — Insert TEL A cord into TRK A jack.	Voice communication established.

**SECTION F48.310**

<b>STEP</b>	<b>ACTION</b>	<b>RESULT</b>
-------------	---------------	---------------

**C. Conference Telephone Call**

- |   |   |                              |
|---|---|------------------------------|
| 1 | Connect TEL A and TEL B cords as described in Procedure A or B. | Two calls established.       |
| 2 | If A and B keys are operated — Restore to TALK.                 | Conference call established. |
| 3 | To disconnect — Remove cords.                                   |                              |

**D. Tie Trunk Call**

**Originate a Call**

- |   |                                 |  |
|---|---------------------------------|--|
| 1 | Insert TEL A cord into TT jack. | TT lamp lights.<br>TT lamp extinguished when called station answers. |
|---|---------------------------------|--|

**Station Disconnect**

- |   |                                 |  |
|---|---------------------------------|--|
| 1 | Station disconnects.            | TT lamp lights.<br>CB buzzer sounds.         |
| 2 | Remove TEL A cord at testboard. | TT lamp extinguished.<br>CB buzzer silenced. |

**Incoming Call**

- |   |   |   |
|---|---|---|
| 1 | When TT lamp lights and buzzer sounds — Insert TEL A cord into TT jack. | TT lamp extinguished.<br>Buzzer silenced.<br>Voice communication established. |
| 2 | To disconnect — Remove cord.  |   |

**E. Answer Data Call**

- |   |   |  |
|---|---|--|
| 1 | When ANS lamp flashes and buzzer sounds — Insert SEND A cord into REC jack of data test line. |  |
| 2 | Insert REC A cord into REC jack of same data test line.                                       | Buzzer silenced.<br>ANS lamp lighted steady.<br>Position teletypewriter motor started.<br>CON lamp lights. |
| 3 | When CON lamp lights — Send "RUB-OUT" character from position teletypewriter keyboard.        | "RUB-OUT" character satisfies acknowledge feature of the station.  |
| 4 | To disconnect after data communications — Remove all cords.                                   | Position teletypewriter motor stops.   |

STEP	ACTION	RESULT
5	Depress CLR key momentarily.	BREAK lamp lights. CLR lamp lights. CON lamp extinguished. ANS lamp extinguished. BREAK lamp extinguished. CLR lamp extinguished. Disconnect sequence completed.

#### F. Sending Distorted Signals to Station

10	Adjust S1 and S2 keys of 119D1 telegraph signal distorting set for type distortion desired.	
11	Adjust PD1 and PD5 switches of 119D1 telegraph signal distorting set for per cent distortion desired.	
12	Insert DIST SIGS cord into SEND SIGS jack of data test line.	Test sentence copied by position and station teletypewriters.
*13	Patch INPUT jack of 164C4 TMS into TMS jack of testboard, using 2P33A cord.	
*14	Insert TMS cord into TMS jack of same data test line.	
*15	Operate 164C4 TMS to measure distortion.	Display appears on 164C4 TMS.  <b>Requirement:</b> Within 2.5 per cent of 119D1 telegraph signal distorting set setting.
16	Remove DIS SIGS cord from SEND SIGS jack.	Copy on position teletypewriter ceases.
17	Remove all cords.	Teletypewriter motor stops.
18	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.

#### G. Measure Station Signal Distortion

10	Patch INPUT jack of 164C4 TMS into TMS jack of testboard, using 2P33A cord.	
11	Insert TMS cord into TMS1 jack of data test line.	
12	Request station to transmit a series of U* (U asterisk) from keyboard.	U* series copied by position teletypewriter.

**SECTION F48.310**

<b>STEP</b>	<b>ACTION</b>	<b>RESULT</b>
13	Operate 164C4 TMS, as required, to measure signal distortion.	Display appears on 164C4 TMS.  <i>Requirement:</i> Not to exceed 18 per cent total distortion.
14	Request station to operate the "HERE IS" key several times.	Automatic answer-back sequence copied by position teletypewriter.
15	Operate 164C4 TMS, as required, to measure signal distortion.	Display appears on 164C4 TMS.  <i>Requirement:</i> Not to exceed 18 per cent total distortion.
16a	If station is ASR (automatic send-receive)— Request a test tape be sent.	Test tape message copied by position teletypewriter.
17a	Operate 164C4 TMS, as required, to measure signal distortion.	Display appears on 164C4 TMS.  <i>Requirement:</i> Not to exceed 18 per cent total distortion.
18	Remove all cords.	Teletypewriter motor stops.
19	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.

**H. Check Ability of Station to Send and Receive a Timed Break**

10	Request station to transmit signals and when break alarm is received — Operate break release (BK RLS) key.	Signals copied by position teletypewriter.
11	While station is sending — Operate BREAK key of data test line.	Copy on position teletypewriter ceases, indicating station break alarm has operated. (When station operates BK RLS key, transmission from station may resume).
12	Request station to operate BREAK key when test sentence is received.	
13	Insert UNDIST SIGS cord into SEND SIGS jack of data test line.	Test sentence copied on position and station teletypewriters.  <i>Note:</i> When station operates BREAK key — At testboard — Signal transmission stops. (Copy ceases on position and station teletypewriters.) BREAK lamp lights. Buzzer sounds.

STEP	ACTION	RESULT
14	Remove UNDIST SIGS cord from SEND SIGS jack.	
15	Operate BK RLS key.	BREAK lamp extinguished. Buzzer silenced.
16	Remove all cords.	Position teletypewriter motor stops.
17	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.
<b>I. Loop-Back Test</b>		
10	Request station to operate TEST key.	Loops station demodulator output to the modulator input for retransmittal back to the testboard.
11	Move REC cord from REC jack to REC FDX jack.	
12	Insert UNDIST SIGS cord into SEND SIGS jack of data test line.	Good copy received on position teletypewriter from station.
13a	If auxiliary teletypewriter is available — Insert REC B cord into REC jack of data test line.	Auxiliary teletypewriter copies signals transmitted from testboard.
14	Patch INPUT jack of 164C4 TMS into TMS jack, using 2P33A cord.	
15	Insert TMS cord into TMS 1 jack of data test line.	
16	Operate 164C4 TMS, as required, to measure signal distortion.	Display appears on 164C4 TMS. Measure distortion of signal transmitted.
17	Move TMS cord from TMS 1 jack to TMS 2 jack of data test line.	Measure distortion of signal received from the station data set. Can be compared with measurement of Step 16.
18	Remove UNDIST SIGS cord from SEND SIGS jack.	Copy on position teletypewriter ceases.
19	Remove TMS cord from TMS 2 jack.	
20	Using keyboard, request station to release TEST key and acknowledge by sending a series of upper case G signals.	Position teletypewriter copies message directed to station.
21a	Remove REC B cord from REC jack.	

**SECTION F48.310**

<b>STEP</b>	<b>ACTION</b>	<b>RESULT</b>
22	Move REC A cord from REC FDX jack to REC jack of same data test line.	Upper case G's received. Bell sounds.
23	Operate FLP key at testboard.	
24	Request station to change mode.	BREAK lamp lights momentarily. CLR lamp lights momentarily. ORIG lamp extinguished. CON lamp extinguished momentarily. Teletypewriter motor stops momentarily. ANS lamp lights.
25	Repeat Steps 10 through 22.	
26	Remove all cords.	Position teletypewriter motor stops.
27	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.
<b>J. Station Data Set Receiving Sensitivity</b>		
10	Request station to operate TEST key.	Loops station demodulator output to the modulator input for retransmittal back to testboard.
11	Move REC A cord from REC to REC FDX jack.	Circuit operating full-duplex.
12	Insert UNDIST SIGS cord into SEND SIGS jack of same data test line.	Good copy received on position teletypewriter from station.
13	Set attenuator dial to 0 db.	
14	Operate ATT key.	ATT lamp lights.
15	Rotate attenuator (clockwise) until position teletypewriter copy shows errors.	Attenuator setting indicates operating margin of station data set.
16	Restore attenuator setting to 0 db.	Good copy received on position teletypewriter.
17	Remove UNDIST SIGS from SEND SIGS jack of data test line.	Copy ceases.
18	Request station to release TEST key and acknowledge by sending a series of upper case G's.	
19	Move REC A cord from REC FDX jack to REC jack of data test line.	Upper case G's received. Bell sounds.
20	Operate FLP key.	

STEP	ACTION	RESULT
21	Request station to change mode.	BREAK lamp lights momentarily. CLR lamp lights momentarily. ORIG lamp extinguished. CON lamp extinguished momentarily. Teletypewriter motor stops momentarily. ANS lamp lights. Testboard and station have changed mode.
22	Repeat Steps 10 through 19.	
23	Remove all cords.	Teletypewriter motor stops.
24	Restore all keys.	ATT lamp extinguished.
25	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.
	<p><i>Note:</i> The attenuator may be inserted in the manner just described when the circuit is in half-duplex operation with the following exceptions:</p> <p>(1) The station TEST key is not operated.</p> <p>(2) Station must send a break to notify testboard when errors are being received in copy.</p>	

#### K. Transmission Level Measurement

##### 101-Type Data Sets

10	Have timer card removed from station data set.	
11a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
12b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
13	Read level of tone (F2M-2225 cps) and compare with loop loss shown on station layout card.	
14	Remove cord from LEV IN jack.	
15	Have timer card replaced in station data set.	

SECTION F48.310

STEP	ACTION	RESULT
16	Request station to operate TEST key.	
17a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
18b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
19	Read level of space tone (F2S-2025 cps) and compare with loop loss shown on station layout card.	
20	Remove cord from LEV IN jack.	
21	Request station to release TEST key.	
22	Operate FLP key.	
23	Request station to change mode.	BREAK lamp lights momentarily. CLR lamp lights momentarily. ORIG lamp extinguished. CON lamp extinguished momentarily. Teletypewriter motor stops momentarily. ANS lamp lights.
24	Have timer card removed from station data set.	
25a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
26b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
27	Read level of tone (F1M-1270 cps) and compare with loop loss shown on station layout card.	

STEP	ACTION	RESULT
28	Remove cord from LEV IN jack.	
29	Have timer card replaced in station data set.	
30	Request station to operate TEST key.	
31a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
32b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
33	Read level of tone (F1S-1070 cps) and compare with loop loss shown on station layout card.	
34	Remove cord from LEV IN jack.	
35	Request station to release TEST key.	
36	Remove all cords.	Position teletypewriter motor stops.
37	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.
<b>105A Data Set</b>		
38	Request station to operate TEST key.	
39	Operate TMR OUT key.	TMR OUT lamp lights.
40a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
41b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	

SECTION F48.310

STEP	ACTION	RESULT
42	Read level of space tone (F2S-2025 cps) and compare with loop loss shown on station layout card.	
43	Remove cord from LEV IN jack.	
44	Request station to operate CLR key and then ANS key in quick order. <i>Note:</i> When station is equipped for dial tone detection (Z option) Flip to originate mode can not be accomplished.	
45	Release TMR OUT key.	TMR OUT lamp extinguished.
46	Operate FLP key.	
47	Request station to change mode.	BREAK lamp lights momentarily. CLR lamp lights momentarily. ORIG lamp extinguished. CON lamp extinguished momentarily. Teletypewriter motor stops momentarily. ANS lamp lights.
48	Request station to operate TEST key.	
49	Operate TMR OUT key.	TMR OUT lamp lights.
50a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
51b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
52	Read level of tone (F1S-1070 cps) and compare with loop loss shown on station layout card.	
53	Remove cord from LEV IN jack.	
54	Release TMR OUT key.	TMR OUT lamp extinguished.
55	Request station to operate CLR key.	
56	Remove all cords.	Position teletypewriter motor stops.
57	Operate CLR key momentarily.	All lamps extinguished Disconnect completed.

STEP	ACTION	RESULT
------	--------	--------

L. Frequency Measurements

101-Type Data Sets

- |     |  |                                  |
|-----|--|----------------------------------|
| 10  | Have timer card removed from station data set.   |                                  |
| 11a | If EPUT (events per unit of time) meter is provided —<br>Insert CTR cord into LEV IN jack of data test line.   | CTR BSY lamp lights.             |
| 12b | If EPUT meter is not provided —<br>Connect 72A frequency meter to LEV IN jack of data test line, using 2P22A cord, and operate as required.  |                                  |
| 13  | Read frequency of tone (F2M-2225 cps).   | <b>Requirement:</b> 2225 ± 5 cps |
|     | <p><b>Note:</b> When frequency measurements are made at the testboard it is important to ascertain the type of facilities over which the connection is established. The maximum permissible deviation from the mean frequency is ± 5 cps; however, where carrier is used in the loop makeup, frequency measurements may not be meaningful, since the carrier may introduce frequency shift. The possibility exists where a data set whose modulator exceeds ± 5 cps frequency deviation may be shifted in a compensating direction so as to appear within limits when measured at the testboard and vice versa. Where this type of facility is encountered, the frequency shall be checked at the station.</p> |                                  |
| 14  | Remove cord from LEV IN jack of data test line.  |                                  |
| 15  | Have timer card replaced in station data set.  |                                  |
| 16  | Request station to operate TEST key.   |                                  |
| 17a | If EPUT meter is provided —<br>Insert CTR cord into LEV IN jack of data test line.   | CTR BSY lamp lights.             |
| 18b | If EPUT meter is not provided —<br>Connect 72A frequency meter to LEV IN jack of data test line and operate as required.   |                                  |

SECTION F48.310

STEP	ACTION	RESULT
19	Read frequency.	<b>Requirement:</b> 2025 ± 5 cps (see note in Step 13).
20	Remove cord from LEV IN jack.	
21	Request station to release TEST key.	
22	Operate FLP key.	
23	Request station to change mode.	BREAK lamp lights momentarily. CLR lamp lights momentarily. ORIG lamp extinguished. CON lamp extinguished momentarily. Teletypewriter motor stops momentarily. ANS lamp lights. Testboard and station have changed mode.
24	Have timer card removed from station data set.	
25a	If EPUT meter is provided — Insert CTR cord into LEV IN jack of data test line.	CTR BSY lamp lights.
26b	If EPUT meter is not provided — Connect 72A frequency meter to LEV IN jack of data test line, using 2P22A cord, and operate as required.	
27	Read frequency.	<b>Requirement:</b> 1270 ± 5 cps (see note in Step 13).
28	Remove cord from LEV IN jack.	
29	Have timer card replaced in station data set.	
30	Request station to operate TEST key.	
31a	If EPUT meter is provided — Insert CTR cord into LEV IN jack of data test line.	CTR BSY lamp lights.
32b	If EPUT meter is not provided — Connect 72A frequency meter to LEV IN jack of data test line and operate as required.	
33	Read frequency.	<b>Requirement:</b> 1070 ± 5 cps (see note in Step 13).

STEP	ACTION	RESULT
34	Remove cord from LEV IN jack.	
35	Request station to release TEST key.	
36	Remove all cords.	Teletypewriter motor stops.
37	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.

**105A Data Set**

38	Request station to operate TEST key.	
39	Operate TMR OUT key.	TMR OUT lamp lights.
40a	If EPUT (events per unit of time) meter is provided — Insert CTR cord into LEV IN jack of data test line.	CTR BSY lamp lights.
41b	If EPUT meter is not provided — Connect 72A frequency meter to LEV IN jack of data test line, using 2P22A cord, and operate as required.	
42	Read frequency.	<b>Requirement:</b> 2025 ± 5 cps
	<b>Note:</b> When frequency measurements are made at the testboard it is important to ascertain the type of facilities over which the connection is established. The maximum permissible deviation from the mean frequency is ± 5 cps; however, where carrier is used in the loop makeup, frequency measurements may not be meaningful, since the carrier may introduce frequency shift. The possibility exists where a data set whose modulator exceeds ± 5 cps frequency deviation may be shifted in a compensating direction so as to appear within limits when measured at the testboard and vice versa. Where this type of facility is encountered, the frequency shall be checked at the station.	
43	Remove cord from LEV IN jack.	
44	Request station to operate CLR key and then ANS key in quick order.	
	<b>Note:</b> When station is equipped for dial tone detection (Z option), flip to originate mode can not be accomplished.	

**SECTION F48.310**

<b>STEP</b>	<b>ACTION</b>	<b>RESULT</b>
45	Release TMR OUT key.	TMR OUT lamp extinguished.
46	Operate FLP key.	
47	Request station to change mode.	BREAK lamp lights momentarily. CLR lamp lights momentarily. ORIG lamp extinguished. CON lamp extinguished momentarily. Teletypewriter motor stops momentarily. ANS lamp lights. Testboard and station have changed modes.
48	Request station to operate TEST key.	
49	Operate TMR OUT key.	TMR OUT lamp lights.
50a	If EPUT meter is provided — Insert CTR cord into LEV IN jack of data test line.	CTR BSY lamp lights.
51b	If EPUT meter is not provided — Connect 72A frequency meter to LEV IN jack of data test line and operate as required.	
52	Read frequency.	<i>Requirement:</i> 1070 ± 5 cps (see note in Step 42).
53	Remove cord from LEV IN jack.	
54	Release TMR OUT key.	TMR OUT lamp extinguished.
55	Request station to operate CLR key.	
56	Remove all cords.	Teletypewriter motor stops.
57	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.

**M. Monitoring**

- 1 At MDF —  
Have W2D cord placed between jack of high impedance monitoring circuit and line of data customer.
- 2 Insert headset into TEL SET jack.

STEP	ACTION	RESULT
3a	If monitoring connection is not to be established by dialing the high impedance circuit — Patch MON TRK jack to MON IN jack of monitor circuit, using 2P1B cord.	
4b	If monitoring connection is to be established by dialing the high impedance circuit — Insert TEL A cord into DIAL MON jack.	Dial tone heard.
5b	Operate A key to DIAL.	
6b	Dial number assigned to monitor circuit and proceed to Step 7b.	
7b	Restore A key to TALK.	Call established.
8b	Connect DIAL MON TRK jack to MON IN jack, using 2P1B cord.	
9b	Remove TEL A cord from DIAL MON jack.	
10	Insert REC A cord into MON F1 & F2 jack.	Position teletypewriter will copy all data signals on line.
11	Insert TEL A cord into TEL MON jack.	Audibly monitor circuit.
12c	If data call is in progress — Hold operated MUB key of monitor circuit.	Data copied on position teletypewriter. Data from both stations copied jointly.
13	Insert 258C plug into MON F2 jack.	Copy is now that of originating station.
14d	If auxiliary teletypewriter is available — Remove 258C plug and insert REC cord from auxiliary teletypewriter into MON F2 jack.	Data on auxiliary teletypewriter will be that of called or terminating station.
*15	Patch INPUT jack of 164C4 TMS into TMS jack of testboard, using 2P33A cord.	
*16	Insert TMS cord into TMS F1 & F2 jack.	
*17	Operate 164C4 TMS, as required, to measure signal distortion.	Measure distortion. (If MON F2 jack does not have a plug in it, distortion is that of both data stations; if, however, MON F2 jack has a plug in it, distortion is that of originating station.)
*18	Move TMS cord from TMS F1 & F2 jack to TMS F2 jack.	Measure distortion of the called station.
19	Disconnect by removing all cords from jacks.	
	<b>Note 1:</b> If monitor teletypewriters are left connected to the monitor circuit they will automatically connect and copy all data transmitted on the line being monitored.	

STEP	ACTION	RESULT
------	--------	--------

**Note 2:** The MUB key, held operated, may be used when it is desired to copy signals of a quality too poor to be identified by the timers. Operation of the MUB key prevents the monitor circuit from disconnecting on a one-second space signal as it normally would.

#### N. Station Disconnect

- |    |   |   |
|----|---|---|
| 10 | Request station to initiate a disconnect. | BREAK lamp lights.<br>CLR lamp lights.<br>ORIG lamp extinguished.<br>CON lamp extinguished.<br>Buzzer sounds.<br>BREAK lamp extinguished. |
| 11 | Remove all cords.                         | CLR lamp extinguished.<br>Buzzer silenced.<br>Position teletypewriter motor stops.  |

#### O. Call to 5A Automatic Data Test Line

##### Programmed Trunk

- |     |  |  |
|-----|--|--|
| *10 | Monitor signals from ADTL.<br>Percentage and type of distortion of ADTL signals may be observed by:<br>(a) Patching TMS INPUT jack to TMS jack, using 2P33A cord.<br>(b) Inserting TMS cord into TMS 1 jack of data test line used.<br>(c) Operating 164C4 TMS as required, to make distortion measurements. | Position teletypewriter copies:<br>(1) Two lines of test sentence with zero distortion. Suffixed with UNDIST.<br>(2) Two lines of test sentence with a fixed amount of switched combination distortion. Suffixed with SW-DIST.<br>(3) Two lines of test sentence with a fixed amount of switched combination distortion at a reduced send level. Suffixed with DISPAD.<br>(4) GA SEND (instructions to go-ahead-send). |
| 11  | When GA SEND is received —<br>Send to ADTL preferably, the sequence 78IU78IU, etc.<br><br><b>Note:</b> BK lamp lights.<br>Buzzer is operated.  | Signals copied on position teletypewriter. ADTL reads distortion in amounts of 5 per cent and returns measured distortion. Indications will be:<br>(1) 0 to 5 per cent — 5%<br>(2) 5 to 10 per cent — 10%<br>(3) 10 to 15 per cent — 15%<br>(4) 15 to 20 per cent — 20%<br>(5) Over 20 per cent — 20% +<br>ADTL now sends FLP.   |

STEP	ACTION	RESULT
12	Operate BK RLS key.	
13	Operate FLP key.	
14	Operate CLR key momentarily.	BREAK lamp lights. CLR lamp lights. ORIG lamp extinguished. CON lamp extinguished. ANS lamp lights. CON lamp lights. BREAK lamp extinguished. CLR lamp extinguished.
15	Repeat Steps 10 and 11 for new mode.	After returning percentage of distortion in signals transmitted to ADTL — ADTL sends END, then a space frequency disconnect. CLR lamp lights. Buzzer sounds.
16	Remove all cords.	Position teletypewriter motor stops. CLR lamp extinguished. Buzzer silenced.
<b>Nonprogrammed Trunk</b>		
*17	Monitor signals from ADTL.	Position teletypewriter copies :
18	Percentage and type of distortion of ADTL signals may be observed by :	Continuous transmission of test sentence with zero distortion.
	(a) Patching TMS INPUT jack to TMS jack using 2P33A cord.	
	(b) Inserting TMS cord into TMS 1 jack of data test line used.	
	(c) Operating 164C4 TMS as required, to make distortion measurements.	
19	Operate BREAK key momentarily.	ADTL changes signal transmission, and now transmits continuous test sentence with a fixed amount of switched bias distortion.
20	Operate BREAK key momentarily.	ADTL changes signal transmission, and now transmits continuous test sentence with a fixed amount of switched combination distortion.

SECTION F48.310

STEP	ACTION	RESULT
21	Operate BREAK key momentarily.	ADTL ceases test sentence transmission and sends a space-signal disconnect. CLR lamp lights. Buzzer sounds.
22	Remove all cords.	Position teletypewriter motor stops. CLR lamp extinguished. Buzzer silenced.

P. Testboard Dummy Loop

1	Insert REC A cord into DUMMY REC jack.	Position teletypewriter motor starts.
2	Insert SEND A cord into DUMMY SEND KBD jack.	
3	Type on position keyboard.	Signals copied by position teletypewriter.
*4	Connect INPUT jack of 164C4 TMS and testboard TMS jack, using 2P33A cord.	
*5	Insert TMS cord into DUMMY TMS jack.	
*6	Operate 164C4 TMS, as required, to measure distortion of signals being generated by position keyboard.	164C4 TMS displays keyboard distortion.  <b>Requirement:</b> Peak distortion below 5 per cent. (Signals copied by position teletypewriter.)
7	Insert UNDIST SIGS cord into DUMMY SEND SIGS jack.	Undistorted signals copied by position teletypewriter. 164C4 TMS displays distortion of UNDIST SIGS.  <b>Requirement:</b> Peak distortion below 5 per cent or less.
8	Remove UNDIST SIGS cord from DUMMY SEND SIGS jacks.	Copy ceases on position teletypewriter.
9	Adjust 1S and S2 keys of 119D1 telegraph signal distorting set for type of distortion desired.	
10	Adjust switches PD1 and PD5 of telegraph signal distorting set for per cent distortion desired.	

STEP	ACTION	RESULT
11	Insert DIST SIGS cord into DUMMY SEND SIGS jack.	
12	Operate 164C4 TMS, as required, to measure distortion.	164C4 TMS displays distortion of DIST SIGS.  <i>Requirement:</i> Should be within $\pm 2.5$ per cent of settings of 119D1 telegraph signal distorting set. (Signals copied by position teletypewriter.)
13	Remove all cords.	Position teletypewriter motor stops.
<b>Q. Station Restraint Feature</b>		
10	Request station to transmit signals from keyboard and when REST lamp lights, stop sending.	Signals copied by position teletypewriter.
11	When signals are received — Hold operated SRS key of data test line.	At station — REST lamp lights. Copy on position teletypewriter ceases.
12	Release SRS key at test board.	At station — REST lamp extinguished.
13a	If station under test is equipped for automatic send-receive (ASR), request a test tape be sent.	Test message copied by position teletypewriter.
14a	When tape message is received — Hold operated SRS key of data test line.	At station — REST lamp lights and transmitter distributor is stopped. Copy on position teletypewriter ceases.
15a	Release SRS key at testboard.	At station — REST lamp extinguished and transmitter distributor is started. Copy on position teletypewriter resumes.
16	Remove all cords.	Position teletypewriter motor stops.
17	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.

**R. Send Tone to Station**

*Note:* If the testboard is equipped with a source of tone, either the milliwatt supply or a 19C oscillator, and a request is made for tone to be sent to a station — Instruct station to answer a test call with a TTS 28 test set and a 1011B handset, or their equivalent.

**SECTION F48.310**

<b>STEP</b>	<b>ACTION</b>	<b>RESULT</b>
1	Insert handset plug into TEL SET jack.	
2	Insert TEL A cord into DIAL jack of data test line.	Dial tone heard.
3	Operate A key to DIAL.	
4	Dial desired station's telephone number.	
5	Restore A key to TALK.	Supervisory tones heard during call establishment. When station answers, ringing ceases and voice communication is established.
6a	If 1000 cps milliwatt supply is provided and is to be used — Insert MWS cord into LEV IN jack of data test line.	1000 cps milliwatt supply tone is transmitted to station where frequency and level measurements can be made to determine quality of facilities. ORIG lamp lights.
7b	If 19C oscillator is provided and is to be used — Adjust 19C oscillator for desired frequency.	
8b	Adjust 19C oscillator for desired level.	
9b	Connect OSC jack and LEV IN jack of data test line, using 2P1B cord.	ORIG lamp lights. Tone transmitted to station where frequency and level measurements can be made to determine quality of facilities.
10	Remove all cords.	
11	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.

**S. Call to 1 MW Test Line**

8a	If testboard is equipped with VFM circuit, when tone is heard — Insert VFM cord into LEV IN jack of data test line.	
9b	If testboard is not equipped with VFM circuit, when tone is heard — Connect 13A TMS to LEV IN jack of data test line, using 2P33A cord, and operate as required.	
10	Measure level of incoming 1 MW tone.	Read meter. (Reading indicates receive loss of data test line.)
11	Remove all cords. Operate CLR key momentarily.	Position teletypewriter motor stops. All lamps extinguished. Disconnect completed.

STEP	ACTION	RESULT
<b>T. Call to Loop-Around Test Line</b>		
1	Insert headset plug into TEL SET jack.	
2	Insert SEND A cord into SEND KBD jack of data test line.	
3	Insert REC A cord into REC jack of same data test line.	
4	Insert TEL A cord into DIAL jack of same data test line.	ORIG lamp lights. Position teletypewriter motor starts. Dial tone heard.
5	Operate A key to DIAL.	
6	Dial telephone number of loop-around test line in station's serving office.	
7	Operate A key to TALK.	Supervisory tones heard during establishment of call. When ringing tone ceases, 1000 cps tone heard.
8	Remove TEL A cord from DIAL jack.	
9a	If testboard is equipped with VFM circuit, when 1000 cps tone is heard — Insert VFM cord into LEV IN jack of data test line.	MB lamp lights. TMB lamp lights.
10b	If testboard is not equipped with VFM circuit, when 1000 cps tone is heard — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord and operate as required.	
11	Read level of incoming 1000 cps (1 MW) tone.	Record meter reading.
12	Request station to — (a) Call companion number for loop-around test line. (b) When ringing is tripped, manually send F1M tone for 15 seconds.	
13	Read level of incoming F1M tone.	Record level of tone.
14	Compute level of F1M tone delivered to station's serving office. Step 13 minus Step 11 = Level <b>Example:</b> $-34 - (-20) = -34 + 20 = -14 \text{ db}$	
15	Compare with level shown on station layout card.	
16	Remove all cords.	Teletypewriter motor stops.
17	Momentarily operate CLR key.	All lamps extinguished.

**SECTION F48.310**

STEP	ACTION	RESULT
<b>U. Complete Test of 105A Data Station</b>		
<p><i>Note:</i> The 105A data set cannot recover from a carrier failure condition. If the carrier failure circuit functions, a disconnect will occur. This test will enable a 105A station to be completely tested. A telephone employee is required at the station.</p>		
10	Operate TMR OUT key.	TMR OUT lamp lights.
11	At station — Open Screw Switch A11.	Carrier failure circuit disabled.
12	At station — Open Screw Switch A1.	Timer disabled.
13a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
14b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
15	Read level of tone (F2M-2225 cps) and compare with loop loss shown on station layout card.	
16	Remove cord from LEV IN jack.	
17c	If EPUT (events per unit of time) meter is provided — Insert CTR cord into LEV IN jack of data test line.	CTR BSY lamp lights.
18d	If EPUT meter is not provided — Connect 72A frequency meter to LEV IN jack of data test line, using 2P22A cord, and operate as required.	
19	Read frequency.	<b>Requirement:</b> 2225 ± 5 cps

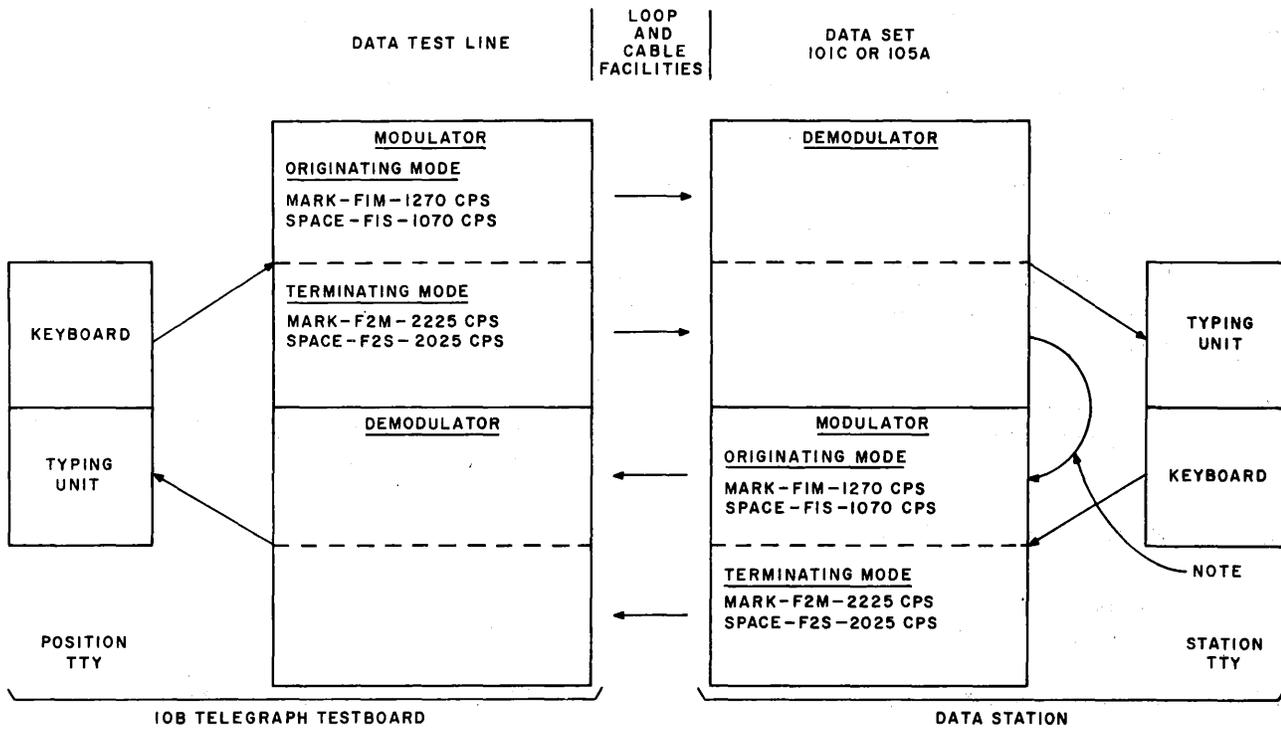
*Note:* When frequency measurements are made at the testboard it is important to ascertain the type of facilities over which the connection is established. The maximum permissible deviation from the mean frequency is ± 5 cps; however, where carrier is used in the loop makeup, frequency measurements may not be meaningful, since the carrier may introduce frequency shift. The possibility exists where a data set whose

STEP	ACTION	RESULT
	modulator exceeds $\pm 5$ cps frequency deviation may be shifted in a compensating direction so as to appear within limits when measured at the testboard and vice versa. Where this type of facility is encountered, the frequency shall be checked at the station.	
20	At station — Open Screw Switch A5.	Station transmits space frequency (F2S-2025 cps).
21	Read frequency.	<i>Requirement:</i> 2025 $\pm$ 5 cps (see note in Step 19).
22	Remove cord from LEV IN jack.	
23a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
24b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
25	Read level of space tone (F2S-2025 cps) and compare with loop loss shown on station layout card.	
26	At station — Close Screw Switch A5.	Station transmits mark frequency (F2M-2225 cps).
27	Remove cord from LEV IN jack.	
28	At station — Close Screw Switch A1.	Timer enabled.
29	Request station to originate a call to 10B after clearing.  <i>Note:</i> Take proper steps to ensure customer is not billed for calls on test (see Section 010-250-001).	
30	Remove all cords.	Position teletypewriter motor stops.
31	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.
32	When ANS lamp flashes and buzzer sounds — Insert SEND A cord into REC jack of data test line.	

**SECTION F48.310**

<b>STEP</b>	<b>ACTION</b>	<b>RESULT</b>
33	Insert REC A cord into REC jack of same data test line.	Buzzer silenced. ANS lamp lighted steady. Position teletypewriter motor started. CON lamp lights.
34	Operate TMR OUT key.	TMR OUT lamp lights.
35	At station — Open Screw Switch A1.	Timer disabled.
36a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.
37b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
38	Read level of tone (F1M-1270 cps) and compare with loop loss shown on station layout card.	
39	Remove cord from LEV IN jack.	CTR BSY lamp lights.
40c	If EPUT meter is provided — Insert CTR cord into LEV IN jack of data test line.	
41d	If EPUT meter is not provided — Connect 72A frequency meter to LEV IN jack of data test line, using 2P22A cord, and operate as required.	
42	Read frequency.	<b>Requirement:</b> 1270 ± 5 cps (see note in Step 19).
43	At station — Open Screw Switch A5.	Station transmits space frequency (F1S-1070 cps).
44	Read frequency.	<b>Requirement:</b> 1070 ± 5 cps (see note in Step 19).
45	Remove cord from LEV IN jack.	
46a	If testboard is equipped with VFM circuit — Insert VFM cord into LEV IN jack of data test line and operate as required.	MB lamp lights. TMB lamp lights.

STEP	ACTION	RESULT
47b	If testboard is not equipped with VFM circuit — Connect 13A TMS to LEV IN jack of data test line, using 2W25A cord, and operate as required.	
48	Read level of tone (F1S-1070 cps) and compare with loop loss shown on station layout card.	
49	At station — Close Screw Switch A5.	Station transmits mark frequency (F1M-1270 cps).
50	Remove cord from LEV IN jack.	
51	At station — Close Screw Switch A1.	Timer enabled.
52	Release TMR OUT key.	TMR OUT lamp extinguished.
53	At station — Close Screw Switch A11.	Carrier failure circuit enabled.
54	Remove all cords.	Position teletypewriter motor stops.
55	Operate CLR key momentarily.	All lamps extinguished. Disconnect completed.



NOTE:  
ON LOOP BACK TEST THE DEMODULATOR OUTPUT IS FED TO THE MOULATOR FOR RETRANSMITTAL BACK TO THE TEST-BOARD.

**Fig. 1 — Block Diagram of Data Call and Frequencies for Both Modes of Operation**

*Legare*

*USE WITH  
591-018-200*

GAE-20 (3-63)

**METHODS & PRACTICES**

**BELL SYSTEM PRACTICES**  
Announcement List



PAC LIST F-55 DATE March, 1965

**PACIFIC TELEPHONE**

Area List Numbers

No. Co.	Bay	L.A.N.	L.A.C.	So. Co.	Nev.
44	49	35	45	45	44

The following B.S.P.  
Changes are announced

<u>Section No.</u>	<u>Issue</u>	<u>Repl. Issue</u>	<u>Title</u>	<u>Distn. Code</u>
<b>ANNOUNCEMENT LIST</b>				
				H1, Y
F48.310	2	1	10B Telegraph Testboard	H1
<b><u>CANCELLATION</u></b>				
Addendum F48.310	1			H1

*Len -  
this is the spec that  
the DATA testbd in Sac  
follows when he is  
making tests with u.  
Ben*