

DATA SET 402B

RECEIVER

TEST PROCEDURES

1. GENERAL

1.01 The data set should be tested for proper operation after installation. This section is reissued to:

- Describe tests using 901B data test set.
- Change test procedures when using 901A data test set (use only when 901B is not available).

1.02 Due to extensive changes marginal arrows have been omitted.

2. INSTALLATION TESTS

2.01 Before proceeding with any tests of the data set, it is assumed that:

- Data loop has been tested and meets requirements as specified in Section 314-205-500. A check with the local test center will verify whether the loop has been tested and whether it meets requirements.
- Telephone portion of installation meets standard dc, talk, signaling, and supervision requirements.

2.02 If a 24-type loop checking system is available, a transmission check of facilities should be made using the 24A loop checker just prior to connecting the data set.

Outlet Ground Source Test (If Required)

2.03 Conduct noise tests between grounds with 6A impulse counter as follows:

- (1) Connect business machine ground to J1.
- (2) Connect data set ground to J4.



Do not ground the 6A for this test.

(3) Set switch S1 to voice-band.

(4) Set switches S2 and S3 to total 90 DBRN.

(5) Set timer for 15 minutes.

(6) Reset counter to 0.

2.04 If any counts are noted in a 15-minute period, it is an indication that the grounding arrangement is unsatisfactory. Check grounding requirements described in Section 594-017-200. If trouble persists, consult your supervisor.

Note: General description, calibration, and operating procedure for the 6A impulse counter are contained in Section E40.467.

2.05 Test equipment required:

- 901B Data Test Set
- KS-14510 Volt-Ohm-Milliammeter
- 1011-Type Hand Set
- 8-Inch Test Lead equipped with alligator clips.

2.06 The following data set tests are described in this section:

- Power Supply
- Answer-Back
- Data Channels
- Interlock
- Installations having both a data set 402A and 402B bridged on the same line.

Note: Tests performed with a 901A data test set do not test all the features of

the data set. Therefore the 901A should be used only when a 901B is not available.

2.07 Power Supply Test

- (1) Connect data set power cord to a 105- to 120-volt ac outlet.
- (2) Remove rear panel of data set.
- (3) Using KS-14510 meter, measure ± 2 volts between terminal 16 (ground) and terminal 15 (+18 volts) of J1 (Fig. 1).
- (4) Measure -18 ± 2 volts between terminal 16 (ground) and terminal 8 (-18 volts) of J1.

2.08 Answer-Back Transmitter Test

- (1) Set the 901B data test set controls as follows:
 - SELECTOR switch to 9
 - A TEST to OFF
 - B TEST to OFF
 - Toggle switch to ATT
- (2) Connect 901B test set cord to interface connector of data set in place of business machine cord.
- (3) Connect 1011 hand set to tip and ring of telephone line at connecting block, key in MON position.
- (4) Using the telephone set associated with the data set, call the nearest data test center.

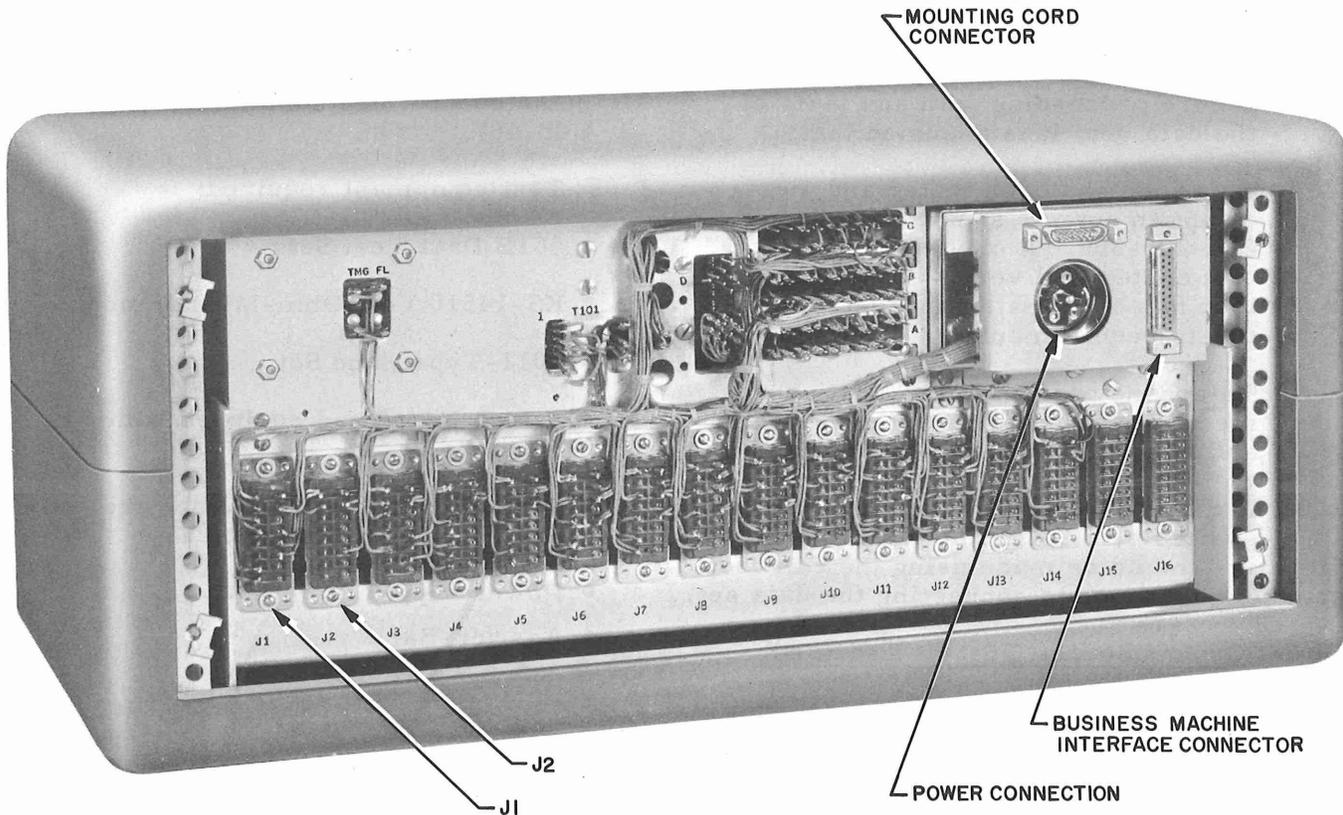


Fig. 1 - Data Set 402B, Rear View, Cover Removed

- (5) Request answer-back transmitter tests from data test center.
- (6) Raise telephone set data key to up position.
- (7) A 1152-cycle tone (rest) should be heard by the test center and in the 1011 hand set. Disconnect 1011 hand set to permit test center to measure frequency and level.
- (8) After a prearranged time interval, move A TEST switch to position 14. A 1785-cycle tone (A and B channels) should be heard and measured by the test center.
- (9) Using the same time interval as determined for (8), move A TEST switch to position 13. A 1017-cycle tone (A channel) should be heard and measured by the test center.
- (10) Using the same time interval as determined for (8), move A TEST switch to position 12. A 2025-cycle tone (B channel) should be heard and measured by the test center.
- (11) Reconnect 1011 hand set to telephone line, key in TALK position. Verify with test center that the four frequencies were correct.
- (12) If above test is satisfactory, data set is ready for data channels test.

2.09 Data Channels Test

(a) The purpose of these tests is to verify capability of data set 402B to detect spacing and marking signals on each of the eight data channels. With the 901B data test set connected to the interface of the data set and an ohmmeter connected to its terminals, readings of 100,000 ohms indicate MARK and 300,000 ohms indicate SPACE. There is a network present in the 901B data test set for the purpose of stretching short contact closures in order to give a readable ohmmeter indication. An example of this is the measurement of the 5-msec timing channel contact closure on the data set 402B. This results in a reading of 300,000 ohms and 100,000 ohms for an open closure, respectively. If this

network were not present, these readings would be infinite and 0 resistance, respectively. Table A shows marking and spacing frequencies for each of the eight data channels and marking and spacing frequencies of the timing channel. The data test center will alternately transmit the spacing and marking frequencies for each channel. Detection of these frequencies will be observed by alternate readings of 300,000 and 100,000 ohms, respectively, on the meter. It should be noted that in the absence of test center frequencies, speech or noise on the line may simulate timing tone transitions and may cause meter readings to change from 300,000 ohms to 100,000 ohms or vice versa. It should also be noted that the test center must transmit timing tone transitions each time a marking or spacing tone is sent on a data channel.

- (1) Move A TEST switch to position 2 and B TEST switch to position 3.
- (2) Connect KS-14510 meter, using X10,000 scale, to terminals B and C of 901B data test set. Meter should read 100,000 ohms, or 300,000 ohms depending on whether the data relay is in MARK or SPACE condition.
- (3) Inform data test center that data station is ready to proceed with data channels test.
- (4) Move 1011 hand set switch to MON.
- (5) Listen on 1011 hand set for timing transitions (1410 to 1480 cps) followed by 750-cycle tone.
- (6) Disconnect 1011 hand set from data line.
- (7) Meter should read 100,000 ohms. Test center will then change to SPACE frequency of channel 1 (780 cps). When timing tone transitions are received, followed by 780-cycle tone, meter should change from 100,000 to 300,000 ohms.
- (8) Reconnect 1011 hand set to data line, key on TALK.
- (9) Request test center to test data channels 2 through 8 and timing

channel, moving A TEST switch as shown in Table A. (Frequencies received in Steps 5 and 7 will vary according to channel being tested.)

Note: When testing the timing channel, test center will alternately send SPACE and MARK signals. Meter should fluctuate in an area between 300,000 and 100,000 ohms. The amplitude of the pulses will be determined by the speed of these transitions.

(10) If test requirements have been met, test center may be released.

(11) Disconnect 1011 hand set.

TABLE A
CHANNEL TEST

Channel	A TEST Switch On 901	Channel Frequency		Test Frequency	
		cps		cps	
		MARK	SPACE	MARK	SPACE
1	2	730	800	750	780
2	3	900	970	920	950
3	4	1070	1140	1090	1120
4	5	1240	1310	1260	1290
5	7	1580	1650	1600	1630
6	8	1750	1820	1770	1800
7	9	1920	1990	1940	1970
8	10	2090	2160	2110	2140
TIMING	6	1410	1480	1410	1480

2.10 Interlock Test

(1) Move A TEST switch to 12, B TEST switch to OFF.

- Meter should read 100,000 ohms.

(2) Replace handset on data set.

- Meter should read 300,000 ohms.

(3) Disconnect all test equipment.

2.11 Data Channels Test Using 901A Data Test Set (Use Only When 901B Is Not Available)

(1) Set the 901A data test set controls as follows:

- SELECTOR switch to 402B.
- A TEST to position 2.
- B TEST to OFF.
- Toggle switch to ATT.

(2) Connect 901A test set cord to interface connector of data set in place of business machine cord.

(3) Connect KS-14510 meter, using X10,000 scale, to terminals B and C of 901A data test set. Meter should read 100,000 or 300,000 ohms depending on whether the data relay is in the MARK or SPACE condition.

(4) Connect 1011 hand set to tip and ring of telephone line at connecting block, key in MON position.

(5) Using the telephone set associated with the data set, call the nearest data test center.

(6) Request test from data test center on MARK and SPACE test frequency of each channel, along with a timing signal.

(7) Raise telephone set data key to up position.

(8) Listen on 1011 hand set (key in MON position) for timing tone transitions (1410 to 1480 cps) followed by 750-cycle tone.

(9) Disconnect 1011 hand set from data line.

(10) Meter should read 100,000 ohms. Test center will then change to SPACE test frequency of channel 1 (780 cps). When timing tone transitions are received, followed by 780-cycle tone, meter should change from 100,000 to 300,000 ohms.

- (11) Reconnect 1011 hand set to data line, key on TALK.
- (12) Request test center to test data channels 2 through 8 and timing channel. Repeat Steps 8 through 11. Move A TEST switch as shown in Table A. (Frequencies received in Steps 8 and 10 will vary according to channel being tested.)

Note: When testing the timing channel, test center will alternately send SPACE and MARK signals. Meter should fluctuate in an area between 300,000 and 100,000 ohms. The amplitude of the pulses will be determined by the speed of these transitions.

2.12 Answer-Back Transmitter Test (Use Only When 901B Is Not Available)

- (1) Move A TEST switch to position 12.
- (2) Using alligator clip, test lead. Connect terminal 5 of J1 to terminal 7 of J2 at rear of data set (Fig. 1).
- (3) Move key on 1011 hand set to MON position. A 2025-cycle tone (B channel) should be heard by test center and in 1011 hand set.
- (4) Disconnect 1011 hand set to permit test center to measure frequency and level.
- (5) After a prearranged time interval, move A TEST switch to position 13. A 1017-cycle tone (A channel) should be heard and measured by the test center.
- (6) After the same interval move A TEST switch to position 14. A 1785-cycle tone (A and B channels) should be heard and measured by the test center.

- (7) Remove test lead from terminal 5 of J1 and 7 of J2.
- (8) Move 1011 hand set key to TALK.
- (9) Verify with test center that the three answer-back frequencies were correct.
- (10) Disconnect all test equipment.

2.13 Installations which have both a 402A and 402B bridged on the same line are tested as follows:

- 402A: Tested as outlined in Section 594-016-500.
- 402B: Place a strap between terminals 3 and 9 on set 402B 44A connecting block No. 1 of data set 402B (BR-W and S-W cord leads). Test as outlined in 2.05 through 2.10 (2.07, 2.11, and 2.12 when 901A data test set is used). The strap is needed to operate the D relay in the receiver which connects the telephone line to the data set 402B. All other operations remain the same except that a 1011 hand set is used in place of the 503B telephone set, and the data key is on the data set 402A.

2.14 If the data set meets test requirements, it may be considered to be operating properly.

2.15 Sets that fail to meet requirements should be replaced.

2.16 Sets that fail to meet installation requirements should be covered by engineering complaint in accordance with established procedures.