

DATA SET 205C2
TRANSMITTER-RECEIVER
TEST PROCEDURES

1. GENERAL

1.01 This section is reissued to expand the coverage. Due to extensive changes, change arrows have been omitted.

1.02 This section contains test procedures for the Data Set 205C2. The following tests are to be made at the time of installation (with the exception of the Maintenance Tests) and may be used for clearing routine trouble conditions. The tests are described in the following order:

• Remote Test

(a) Remote Test is normally accomplished by a 904E-type Data Test Center (arranged for Data Set 205C2 tests). The customer may place the data set in Remote Test through the RMT interface lead.

(b) The Remote Test may be used at the time of a maintenance visit to check the accuracy of the oscillator when directed by the Data Test Center.

(c) The Remote Test can determine the condition of the data set and can determine when a maintenance visit is necessary if a trouble report has been received.

• Installation Test

(a) Ground Noise Test

(b) Power Test

(c) Data Set Preparation, Conditioning, Tests (with dc meter and handset), and Back-to-Back Test

(d) End-to-End Test

• Maintenance Test

1.03 The following test equipment is required to perform the Installation Test listed above:

1—6A Impulse Counter

1—901B-2 Data Test Set

1—902B Data Test Set

2—903B Data Test Set

1—KS-14510 volt-ohm-milliammeter

1—1011-type handset

1—KS-19087 L2 Connector

6—Test Probes—Double End—WEC0 735A (to mate with test points on data set printed wiring boards)

1—Resistor, 600-ohm, ± 1 percent, 0.25 watt

1.04 The Data Set 205C-type replaces Data Set 205A-type which is rated manufacture discontinued. The 205C can directly replace the 205A providing interface pin 11 is connected either to a negative voltage or ground.

2. CAUTIONS

2.01 The following cautions must be observed when working with the data set:

• Always disconnect the ac power cord before removing or installing printed wiring boards.

• It is very easy to accidentally short the +18 vdc or -18 vdc power supply voltages (appearing on the rear of the data set) to adjacent terminals. This must be avoided because application of either +18 vdc or -18 vdc to *virtually any* other wire on the back of the data set will result in transistor or diode

SECTION 592-017-502

destruction. DO NOT WORK ON THE TERMINAL SIDE OF THE EQUIPMENT—USE TEST POINTS AND THE INTERFACE CONNECTOR ONLY.

- In the event that it is necessary to repair or replace wires on the rear of the data set, extreme care is required to avoid pulling on the terminal pins. Pulling on the terminal pins will deform the contacts and destroy the terminal. Use wire wrapping and unwrapping tools only.
- Before attempting any tests, check that all printed circuit boards are pushed all the way in and are securely seated in their respective connectors.
- Before applying operating voltages to the data set, or troubleshooting (with power off), visually check the alignment of every terminal on the wiring side, and straighten if necessary, to be sure that adjacent terminals are not touching.

3. TESTING

REMOTE TEST

3.01 Upon request of the operator of a 904E-type Data Test Center (arranged for Data Set 205C tests) the data set under test is placed in the remote test mode by operating the remote test relay. This can be accomplished through the interface circuit, or place a strap between TP12 and TP4 on board 021 to operate the K2 relay. Check that the LINE-TEST key is in the LINE position and that the set is strapped with options for normal operation.

3.02 In the remote test mode, the Data Test Center may check the following:

- (a) The RS-CS operation and time intervals.
- (b) Data performance at 2400 and 1200 bps.
- (c) Effectiveness of the transmitter and receiver synchronization recovery circuits.
- (d) The function of the CON lead.

(e) Local oscillator accuracy. The oscillator must be calibrated at least once every three years by the Data Test Center if the six-second holdover requirement is to be met.

3.03 The oscillator potentiometer is located at the top and to the front of the 65A oscillator printed wiring board 051.

Note: Do not attempt to adjust the potentiometer on the 65A oscillator unless *expressly* requested to do so by the Data Test Center. If requested to make an adjustment, use the procedure given in 3.04. The potentiometer adjustment screw may be reached and adjusted without removal of the board.

3.04 One revolution of the oscillator potentiometer screw varies the oscillator frequency by approximately 5.5 parts per million (ppm). The data set under test must have had power on for at least 15 minutes prior to the determination of frequency by the Data Test Center.

- (a) To *increase* the oscillator frequency, turn screw *clockwise*.
- (b) To *lower* the oscillator frequency, turn screw *counterclockwise*.

3.05 The Data Test Center determines when the 65A oscillator is in calibration.

3.06 *If the remote test of the data set is successful, NO further testing need be done.*

3.07 If further testing is required, or a Data Test Center is unavailable, test the Data Set 205C2 as described in the remainder of this section.

3.08 Restore the Data Set 205C2 to normal operation.

INSTALLATION TESTS

3.09 The following tests are to be made either at the time of installation or under conditions given in 3.06 and 3.07 above. The tests can also be used to determine the condition of the data set during a maintenance visit.

A. Ground Noise Test

3.10 Measure the noise between data set ground and business machine ground using a 6A Impulse Counter as follows:

- (a) Arrange the interface test adapter (part of the 901B-2 Data Test Set) as shown in Fig. 1. This connects the test adapter between data set and customer business machine ground through the interface connector.
- (b) Connect the 6A Impulse Counter between TST 1 and EQ 1 on the test adapter. Follow the step procedure listed on Fig. 1.

3.11 If any counts are noted in a 15-minute period, grounding arrangements must be improved.

3.12 General description, calibration, and operating procedures for the 6A Impulse Counter are contained in J94006A (6A) Impulse Counter; Description, Operation and Maintenance (Section 103-620-100).

B. Power Test

3.13 Measure the ac line voltage applied to the power supply with a KS-14510 test meter. The ac line voltage should measure between 105 and 129 volts.

C. Data Set Preparation, Conditioning and Tests (With DC Meter and Handset)

3.14 The following preparation procedures include instructions for both preparing the Data Set 205C2 for succeeding tests, and conditioning selected control leads to provide the desired operation. The test procedures are written for use with 900-type Data Test Sets listed in 1.03. To provide data set conditioning with equipment different from the 900-type Data Test Sets, the required condition of both control and data signal inputs for each test step is given. Regardless of test equipment used, the data set under test may be conditioned as required with the following instructions. Control settings of the 900-type Data Test Sets are described as follows:

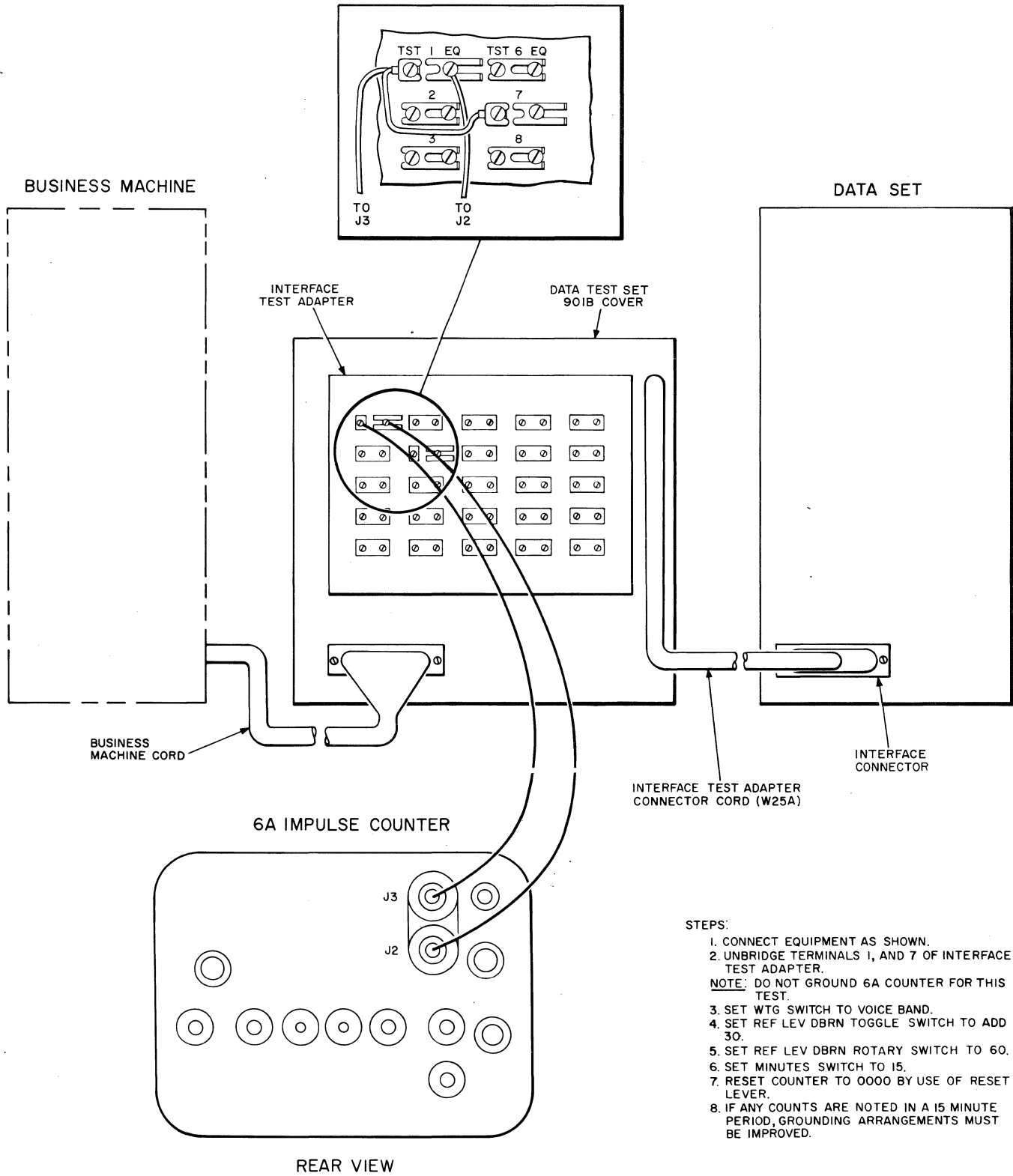
Data Set Preparation and Arrangement of External Test Equipment

3.15 Prepare the Data Set 205C2 as follows:

- (a) In the following order, disconnect the ac power cord, the CUSTOMER A and CUSTOMER B cords, and the 4A1 Data Unit cord from their respective connectors on the data set.
- (b) Check that terminals E1 to E2 on the data set are strapped.
- (c) Carefully remove and check TR-SW (181/019) circuit pack. Strap terminal 3 to 4 (if not so strapped). The strap grounds the SCTE interface signal lead. Remove any strap between terminals 1 and 2, if the board is not already conditioned in this manner. Carefully reinsert the circuit pack in the proper position.
- (d) Operate the 4A1 Data Unit LINE-TEST key to TEST position.

3.16 Connect and prepare the 901B-2 Data Test Set as follows:

- (a) Position both A TEST and B TEST switches to OFF.
- (b) Connect the 901B-2 test set cord to the interface adapter (part of the 901B-2 test set cover). Connect the interface adapter to the data set CUSTOMER B connector using the W25A cord provided. Set the SELECTOR switch to position 3. (CUSTOMER A connector will not be used for the following tests.)
- (c) Make the following arrangements on the interface adapter:
 - Open shorting clips 11, 12, 14, 18, 23, 24, and 25.
 - Strap 20 to EQ 23, TST 14 to EQ 25, and TST 18 to EQ 12.
- (d) Connect the ac power cord to the data set.



- STEPS:
1. CONNECT EQUIPMENT AS SHOWN.
 2. UNBRIDGE TERMINALS 1, AND 7 OF INTERFACE TEST ADAPTER.
- NOTE: DO NOT GROUND 6A COUNTER FOR THIS TEST.
3. SET WTG SWITCH TO VOICE BAND.
 4. SET REF LEV DBRN TOGGLE SWITCH TO ADD 30.
 5. SET REF LEV DBRN ROTARY SWITCH TO 60.
 6. SET MINUTES SWITCH TO 15.
 7. RESET COUNTER TO 0000 BY USE OF RESET LEVER.
 8. IF ANY COUNTS ARE NOTED IN A 15 MINUTE PERIOD, GROUNDING ARRANGEMENTS MUST BE IMPROVED.

Fig. 1—Interface Test Adapter Connections For Measuring Noise Count

Preliminary Tests

3.17 Before attempting a data transmission test, such as Back-to-Back or End-to-End, measure the operating and interface voltages with the following procedures.

3.18 Measure the -18vdc and +18vdc power supply voltages using the following test sequence:

- (a) Condition the KS-14510 test meter to measure 60 vdc full scale. Connect the negative probe to terminal A (on the 901B-2 test set) and the positive probe to terminal C. Set the ATT-UNATT switch to UNATT.
- (b) Position B TEST switch to 1.
- (c) The test meter should indicate 18 (± 2.2) vdc.
- (d) Disconnect test meter probes.
- (e) Position B TEST switch to 2.
- (f) Connect the positive test meter probe to terminal A and the negative probe to terminal C. The test meter should indicate 18 (± 2.2) vdc.
- (g) On the interface adapter, strap 9 to EQ 18, 9 to 19, and 10 to EQ 11.

3.19 Measure the interface voltages. If voltage indications are measured at terminals on a 901B-2 test set, take care to observe polarity. DC measurements are made between terminals A and C. Terminal C is always at ground potential. AC measurements are made between terminals B and C.

3.20 Measure the DSR (Data Set Ready) interface voltage. Set the 901B-2 A TEST switch to position 1 and B TEST switch to OFF. Position the 4A1 LINE-TEST key in TEST position. Proceed as follows:

- (a) With the equipment prepared as above, the DSR voltage measured between 901B-2 test set terminals A and C (ground) should be -6.5 (± 1.3) vdc. Remove the test meter probes.

- (b) Operate the 4A1 LINE-TEST key to LINE position.

- (c) The DSR voltage measured between terminals A and C should be +7.0 (± 1.3) vdc.

3.21 If the DSR voltage requirements are not met, remove the ac power cord. Carefully remove the printed wiring board 185 (A-835185) from location 059. Replace the board with an identical board known to be good. Reconnect the ac power cord and repeat procedures given in 3.20. If the requirements are not met, remove the ac power cord. Carefully remove the 185 board from location 059 and replace the original printed wiring board in location 059. Carefully remove printed wiring board 175 (A-835175) from location 054 and replace with an identical board known to be good. Reconnect the ac power cord and repeat procedures given in 3.20. If the requirements are not met, carefully remove the 175 board from location 054 and replace the original board. Substitute the 175 board known to be good in location 057. Replace the ac power cord and repeat procedures given in 3.20. If the requirements are not met, remove the ac power cord, replace the original 175 board in location 057, and replace the data set.

3.22 Operate the LINE-TEST key to TEST position.

Measure for the dc and ac interface voltage requirements listed in Table A. If the measurements exceed the listed tolerance, refer to the appropriate section (Table D) in Maintenance Test Procedures. It is recommended that all dc voltage measurements be obtained first, then repeat the procedures to obtain ac voltage indications. If any requirement is not met, refer to Maintenance Procedures.

Note: Remove test meter leads and observe polarity before each measurement.

3.23 After the requirements of Table A have been measured, remove the test meter leads and operate the ATT-UNATT switch on the 901B-2 to ATT position. The data set now operates at half-speed.

3.24 Repeat all measurements specified in Table A. Results should be the same for all steps except when B TEST switch is on position 5 and A TEST switch is on position 20, or 18. Measurements for this step should be +6.1 (± 0.7) vdc and 0 vac for A TEST switch in position 20; and +7.0 (± 1.3) vdc and 0 vac for A TEST in position 18.

TABLE A
INTERFACE REQUIREMENTS

LEAD TESTED	A TEST POSITION	B TEST POSITION	RS LEAD CONDITION	SD LEAD CODE*	TEST METER INDICATION	
SCT	23	8	OFF	01	0.0 (± 0.7) vdc	6.8 (± 1.6) vac
DTI	22	8	OFF	01	0.0 $\begin{pmatrix} +1.5 \\ -0.7 \end{pmatrix}$ vdc	7.5 (± 2.1) vac
CS	21	8	OFF	01	-6.5 (± 1.3) vdc	0 vac
RD	20	8	OFF	01	-6.1 (± 0.7) vdc	0 vac
SCR	19	8	OFF	01	0.0 (± 0.7) vdc	6.8 (± 1.6) vac
	18	8			-6.5 (± 1.3) vdc	0 vac
COO	17	8	OFF	01	-6.5 (± 1.3) vdc	0 vac
CS	21	5	ON	01	+7.0 (± 1.3) vdc	0 vac
RD	20	5	ON	01	0.0 (± 0.7) vdc	6.8 (± 1.6) vac
	18	5			-6.5 (± 1.3) vdc	0 vac
COO	17	5	ON	01	+7.0 (± 1.3) vdc	0 vac
RD	20	4	ON	00	+6.1 (± 0.7) vdc	0 vac
	18	4			+7.0 (± 1.3) vdc	0 vac
RD	20	3	ON	11	-6.1 (± 0.7) vdc	0 vac
	18	3			-6.5 (± 1.3) vdc	0 vac

* With 900-type test equipment, the 01 code which appears on the DTI lead is connected to the SD lead for the test indicated.

3.25 Condition the data set for Remote Test.

Relay K2 should operate and the relay contacts should open the interface signal leads. Measure between 901B-2 terminals A and C (ground) for dc voltages, and between terminals B and C for ac voltages. Make both dc and ac measurements for each specified position of the A TEST switch. Position B TEST switch to 6.

A TEST SWITCH	DC VOLTAGE	AC VOLTAGE
23	0	0
21	0	0
20	0	0
19	0	0
17	0	0

3.26 If the requirements of 3.25 are not met, disconnect the ac power cord, carefully remove printed wiring board 184 (A-835184) from location 021. Replace the 184 board with an identical board known to be good. Reconnect the ac power cord and test for requirements of 3.25. If the requirements are not met, disconnect the ac power cord, carefully remove the 184 board, replace the original board in location 021 and replace the data set.

3.27 Frequency check with handset.

- (a) Connect a 1011-type handset across terminals B and C on the 901B-2 test set.

Caution: Keep handset away from ear.

- (b) Operate the ATT-UNATT switch on the 901B-2 test set to UNATT position.
 - (c) Turn the A TEST switch to 23 and the B TEST switch to 5. SCT is then connected to terminal B. A 2400-Hz tone will be heard (full-speed transmit clock).
 - (d) Operate the ATT-UNATT switch to ATT position.
 - (e) A 1200-Hz tone (half-speed transmit clock) will be heard from the handset.
 - (f) Position ATT-UNATT switch to UNATT. A 2400-Hz tone will be heard (full-speed transmit clock).
 - (g) Momentarily place a strap from EQ 14 to TST 7. A 4800-Hz tone will be heard (double-speed transmit clock). Remove the strap after testing.
 - (h) Position A TEST switch to 19 and repeat (a) through (g) (receive clock) and obtain the same requirements.
 - (i) Position the ATT-UNATT switch to UNATT.
 - (j) On the interface adapter, remove the strap between terminals 10 and EQ 11. Momentarily place a strap between terminals 9 and EQ 11. A 1200-Hz tone will be heard (half-speed receiver clock).
 - (k) Remove the strap between terminals 9 and EQ 11, and replace a strap between terminals 10 and EQ 11 on the interface adapter.
- 3.28** If the proper frequencies are not heard, replace the printed wiring boards listed under groups A, H, and I in Table D of Maintenance Procedures. Use the following procedure for each printed wiring board:
- (a) Remove the ac power cord
 - (b) Carefully remove the printed wiring board
 - (c) Carefully insert an identical printed wiring board known to be good into the proper location
 - (d) Reconnect the ac power cord and retest for correct frequency.
- 3.29** If the above test procedure does not repair the malfunction, replace all the original printed wiring boards to the data set and replace the data set.
- 3.30** Measure Transmit Output Level.
- (a) Disconnect ac power cord from the data set.
 - (b) Turn A TEST and B TEST switches to OFF.
 - (c) Carefully remove the TR-SW board (019) and remove the strap between terminals 3 and 4. Carefully replace the board in the original location.
 - (d) Operate LINE-TEST key to LINE position.
 - (e) Connect a strap between terminals EQ 24 and 17 on the interface adapter.
 - (f) Connect the ac power cord to the data set.
 - (g) Condition the KS-14510 test meter to measure on the 3-volt ac scale. Measure between the TRANSMIT CLOCK terminal and the RECEIVE CLOCK terminal on the 901B-2 test set. The test meter shall indicate less than 1.0 volts ac.
- Note:** Use the special 0-3vac scale (red) provided on the test meter.
- (h) If the requirement for (g) is not met, replace the printed wiring boards listed under group L in Table D of Maintenance Procedures. Use the procedures given in 3.26 and 3.27.
 - (i) Disconnect ac power cord from the data set.
 - (j) Remove the strap from between terminals EQ 24 and 17 on the interface adapter.
 - (k) Replace the strap between terminals 3 and 4 on TR-SW (019) board.
 - (l) On the interface adapter, remove the strap between terminals 9 and EQ 18, and place a strap between terminals 10 and EQ 18.
 - (m) Place a 600-ohm resistor between terminals 7 and 8 on the KS-19087 L2 connector and connect it to the TEL LINE connector on the 4A1 Data Unit.

SECTION 592-017-502

- (n) Check that the LINE-TEST key is in LINE position.
- (o) Position both A TEST and B TEST switches to OFF.
- (p) Turn B TEST switch to 5. (RS is ON and SD is 01 code.)
- (q) Connect the ac power cord to the data set.
- (r) Line readings should be as shown in the following Table B for the desired output level as stated on the service order. (Readings may be made with a KS-14510 volt-ohm-milliammeter set to the 3 vac scale connected across the 600-ohm resistor. If an RMS voltmeter is used to make these measurements, the tolerances shown in the second column should be used.)

TABLE B

VOLTS	TRANSMIT OUTPUT LEVEL	STRAPPING ON 044 BOARD
0.70 ±0.15	0 (±1.5 db)	1-4
0.50 ±0.15	-3 (±1.5 db)	1-3
0.35 ±0.15	-6 (±1.5 db)	1-2
0.25 ±0.15	-9 (±1.5 db)	None

- (s) If the above requirements are not met, remove the ac power cord, carefully remove printed wiring board 182 (A-835182) in location 044. Insert a 182 board known to be good in location 044. Reconnect the ac power cord and retest for requirements of (r). If requirements are not met, remove the ac power cord, replace the original 182 board in location 044, and replace the data set.
- (t) Position B TEST switch to 8. A 0 reading should be obtained for all transmit output levels.
- (u) If the requirements of (t) are not met, remove the ac power cord, carefully remove the 184 (A-835184) printed wiring board from location 021. Replace the 184 board with an identical board known to be good. Reconnect the ac power cord and retest. If the requirements are not met, remove the ac power cord, replace the original 184 board in location 021, and replace the data set.

- (v) Remove the KS-19087 L2 connector from the TEL LINE connector.
- (w) Operate LINE-TEST key to TEST position.
- (x) Disconnect ac power cord from the data set.
- (y) Proceed with the Back-to-Back Test.

3.31 Perform a Back-to-Back Test using the following preparations:

- (a) Check that the 4A1 Data Unit LINE-TEST key is in TEST position.
- (b) Arrange the 901B-2, 902B and two 903B test sets to provide random data with RS to ON at 2400 bps speed. Connect the equipment as follows:

- 901B-2 test set

SELECTOR switch to 3.

A TEST switch to 9.

B TEST switch to OFF.

ATT-UNATT switch to UNATT.

- 902B test set

BIT RATE to EXT SYNC.

SELECTOR switch to DIST MEAS.

TRIGGER to - (minus).

- 903B test set (both No. 1 and No. 2 test sets)

BIT RATE to EXT CLOCK.

RANDOM-DOT to RANDOM.

TRIGGER to + (plus).

POWER to OFF.

Note: For the following connections, mate red to red, and black to black.

- (c) Connect the SIGNAL OUT terminals of the No. 1 903B test set to the TRANSMIT DATA terminals on the 901B-2 test set.

- (d) Connect the EXT CLOCK terminals of the No. 1 903B test set to the TRANSMIT CLOCK terminals on the 901B-2 test set.
- (e) Connect the DATA IN terminals of the 902B test set to the RECEIVE DATA terminals on the 901B-2 test set.
- (f) Connect the EXT SYNC terminals on the 902B test set to the RECEIVE CLOCK terminals on the 901B-2 test set.
- (g) Connect the No. 2 903B test set to the 902B test set with the provided connector cord.
- (h) Connect both 903B test set power cords to the ac voltage supply and turn each POWER SWITCH to ON.
- (i) Connect the data set ac power cord and perform the back-to-back test using the following sequence of operations:
 - (j) Momentarily press the START switch on both No. 1 and No. 2 903B test sets.
 - (k) Momentarily press the WORD SYNC & RESET switch on the 902B test set.
 - (l) The TOTAL ERROR lamps on the 902B test set will indicate errors as they occur. To obtain total errors, add the values indicated by all lighted lamps. The bottom lamp will light when the error capacity of the counter has been exceeded and the indicated count is erroneous.
 - (m) To be sure that the 902B test set is counting errors, momentarily press the START switch of the No. 2 903B test set. The 902B test set will light the bottom lamp indicating maximum errors.
 - (n) Momentarily press the WORD SYNC & RESET switch on the 902B test set. Allow the test to continue for 5 minutes. No errors should be recorded. If an error count is indicated, replace the data set. If the test is satisfactory, disconnect both test equipment and data set ac power cord. Restore required options in the data set, and remove the strap between Terminals E1 and E2 before connecting CUSTOMER A plug (if required to do so by the service order). Call the Data Test Center for a final check before releasing the data set for customer service.

D. End-to-End Test

3.32 This test is similar to the Back-to-Back Test except transmission between data set stations is tested in both directions simultaneously. Identical test equipment must be used at both stations. At the local station, a 903B test set provides signals through a 901B-2 test set and cover to drive the data set. The signals are transmitted to the distant station data set, through a 901B-2 test set and cover, to a connected 902B test set. Both local and distant stations have a second 903B test set generating a comparison signal and connected into the 902B test set. The 902B test set can synchronize the two signals and count the number of errors in the received data. The following test set arrangement allows simultaneous checking of data set transmission and reception.

3.33 Arrange the 901B-2, 902B and two 903B test sets at both local and distant stations as follows:

- 901B-2 test set

SELECTOR switch to 3

A TEST switch to 9

B TEST switch to OFF

ATT-UNATT switch to UNATT

- 902B test set

BIT RATE to EXT SYNC

SELECTOR switch to DIST MEAS

TRIGGER to - (minus)

- 903B test set (both sets at both stations)

BIT RATE to EXT CLOCK

RANDOM-DOT to RANDOM

TRIGGER to + (plus)

POWER to OFF

Note: For the following connections, mate red to red and black to black.

SECTION 592-017-502

- (a) Connect the SIGNAL OUT terminals of the No. 1 903B test set to the TRANSMIT DATA terminals on the 901B-2 test set.
- (b) Connect the EXT CLOCK terminals of the No. 1 903B test set to the TRANSMIT CLOCK terminals on the 901B-2 test set.
- (c) Connect the DATA IN terminals of the 902B test set to the RECEIVE DATA terminals on the 901B-2 test set.
- (d) Connect the EXT SYNC terminals on the 902B test set to the RECEIVE CLOCK terminals on the 901B-2 test set.
- (e) Connect the No. 2 903B test set to the 902B test set with the provided connector cord.
- (f) Connect the 901B-2 test set to the interface adapter (on the 901B-2 test set cover).
- (g) Prepare the interface adapter as follows:
 - (1) Open shorting clips 11, 14, 23, 24, and 25.
 - (2) Strap 9 to 19, 10 to EQ 11, 10 to 18, 20 to EQ 23, and TST 14 to EQ 25.
- (h) Carefully remove the TR-SW (181/019) circuit pack. Strap terminals 3 and 4, and remove any strap between terminals 1 and 2 (if the board is not already strapped in this manner).
- (i) If necessary, operate and lock the LINE-TEST switch on the 4A1 Data Unit in LINE position and mate the cord plug with the 4-WIRE connector. Check that the telephone line is properly terminated at the 4A1 Data Unit TEL LINE connectors.
- (j) Connect the interface adapter cord to the CUSTOMER B jack on the data set. Disconnect CUSTOMER A plug, if used.

Note: Place strap between E1 and E2 when CUSTOMER A plug has been disconnected, and remove strap when CUSTOMER A plug is reconnected, if required to do so by the service order.

- (k) At each station, connect both 903B test set power cords to the ac voltage and turn both POWER SWITCH controls to ON.

- (l) Connect the data set ac power cord.

3.34 Perform the End-to-End Test using the following sequence of operations. If possible, both local and distant stations should perform steps (a), (b), and (c) simultaneously.

- (a) Momentarily press the START switch on the No. 1 903B test set.
- (b) Momentarily press the START switch on the No. 2 903B test set.
- (c) Momentarily press the WORD SYNC & RESET switch on the 902B test set.
- (d) The TOTAL ERROR lamps on the 902B test set will indicate errors as they occur. To obtain total errors, add the values indicated by all lighted lamps. The bottom lamp will light when the error capacity of the counter has been exceeded and the indicated count is erroneous.
- (e) To be sure the 902B test set is counting errors, momentarily press the START switch on the No. 2 903B test set. The 902B test set will light the bottom lamp indicating maximum errors.
- (f) Momentarily press the WORD SYNC & RESET switch on the 902B test set. Allow the test to continue for 5 minutes, note the indicated error count and press the WORD SYNC & RESET switch again. Operate this test for 3 consecutive 5-minute intervals. The error rate can be considered average if a total of 20 errors are recorded for the three test periods. If the error count approaches 100 for the three test periods, the transmission parameters of the line should be checked in accordance with Section 314-410-500. If the line checks satisfactory, refer to Plant Staff through lines of organization. If these tests are satisfactory, disconnect both data set ac power cord and test set ac power cords.

(g) Remove test equipment connections and replace original options in the data set before restoring to normal operation. Remove the strap between terminals E1 and E2 before connecting CUSTOMER A plug (if required to do so by the service order). Call the Data Test Center for a final check before releasing the data set for customer service.

4. MAINTENANCE TEST PROCEDURES

4.01 The Installation Tests should be used on maintenance visits to clear routine trouble conditions. If the trouble is not cleared, either replace the data set or proceed with the tests in this section. The following tests are designed to indicate which printed circuit board (or boards) should be replaced as a logical choice to repair a trouble condition.

4.02 Table C lists the dc voltages that appear on the printed wiring boards. If the reading given is not obtained, the board shall be replaced.

4.03 Signal grounds are available at the following locations:

- (a) TP12 on 008
- (b) TP1 on 012
- (c) TP1 on 014
- (d) TP5 on 017
- (e) TP4 on 021
- (f) TP3 on 044
- (g) TP4 on 059

TABLE C

DC VOLTAGE READINGS ON DATA SET

DC VOLTAGE	TEST POINT ON CIRCUIT PACK	CIRCUIT PACKS IN EQUIPMENT LOCATIONS
+ 6.2 (± 0.6)	TP8	001, 002, 003, 005, 006, 007, 008, 009 037, 038, 039, 040, 041, 042, 043, 049 050, 053, 054, 055, 056, 057, 058
	TP14	010, 017
	TP6	012, 014
	TP2	021
	TP3	060
+ 6.8 (± 1.0)	TP7	019
	TP8	059
+ 8.2 (± 0.9)	TP1	044
+12.0 (± 1.5)	TP11	017
	TP6	019
- 6.2 (± 0.6)	TP6	060
- 6.8 (± 1.0)	TP12	059
- 8.2 (± 1.1)	TP3	012, 014
-12.0 (± 1.5)	TP10	016

SECTION 592-017-502

Note: The following paragraphs outline the instructions required to safely and accurately use the information contained in Table D. Read all instructions up to Table D and follow the sequence of procedure for every circuit board replacement or group of replacements specified by the table.

Caution: *Always be careful when removing, inserting, or handling the printed wiring boards. NEVER remove or insert a printed wiring board unless the ac power has been disconnected from the data set.*

4.04 Table D provides correlation between the 901B-2 test set A TEST and B TEST switch positions (used in Table A) and the printed wiring boards that provide the function under test. The letters in the blocks of Table D are keyed to the groups of circuit boards following Table D. For example: Failure to meet voltage requirements of Table C; A TEST-21; B TEST-8 (see Groups B, C, D) would require that the following test procedure be followed:

- (a) Remove the ac power connector from the data set. Carefully insert a different 185 board known to be good in location 059.
- (b) Replace the ac power connector and retest for proper indications as required in Table A. If the voltage requirements are met, put the 059 board originally removed from the data set where it can be later identified, tagged, and returned for repair.
- (c) If the voltage requirements are not met, remove the ac power connector from the data set; remove the 185 board from location 059 and place it where it cannot be mixed with circuit boards in question. Replace the original 185 board in location 059.

(d) Repeat the procedure of (a), (b), and (c) with a 175 (A-835175) board using Group C and locations 054, 057, and 058, respectively. If the failure continues to exist, repeat the procedure of (a), (b), and (c), with a 176 (A-835176) board in locations 055 and 056. If the failure has not been eliminated using the 176 board, go on to Group D and repeat the procedure of (a), (b), and (c) with a 175 board in locations 038, 043, and 039; and a 176 board in location 040. If the failure has not been eliminated, replace the data set.

4.05 Table D references a selected group of printed wiring boards under test for each position combination of both A TEST and B TEST switches. The procedure in 4.04 should be used for replacing boards in any selected group. Always replace the designated boards one at a time, repeating the voltage measurement each time, until the trouble board is found and replaced. When a replacement circuit board apparently corrects for a requirement failure, retest by starting at the beginning of Table A and each succeeding step. Measure for each requirement to be sure a new or different failure has not developed.

4.06 Information Note: The 901B-2 test set performs the functions listed below:

- (a) SELECTOR switch in position 3 prepares the A TEST and B TEST switches to control the data set.
- (b) A TEST switch connects various interface leads to test terminals on the 901B-2 test set. See Table E following.
- (c) B TEST switch is used in conjunction with A TEST switch and in a similar manner. See Table F following.

- (d) The ATT-UNATT switch is used as a control input for speed selection.

4.07 At the conclusion of MAINTENANCE TEST, perform the following steps:

- (1) Disconnect ac power from the 903B test sets and the ac power cord from the data set.
- (2) Remove all test equipment connections.
- (3) Remove the strap between terminals E1 and E2 if required to do so by service order.
- (4) Verify that original options are replaced in the data set.

- (5) Operate and lock the LINE-TEST key in LINE position.

- (6) Connect the 4A1 Data Unit cord to the 4-WIRE connector.

- (7) Connect the customer equipment to the data set.

- (8) Connect ac power cord.

- (9) Call the data test center for a final check before releasing the data set to customer service.

TABLE D
TEST SECTIONS FOR TABLE A FAILURES

B TEST POSITION	A TEST POSITION						
	23 (SCT)	22 (DTI)	21 (CS)	20 (RD)	19 (SCR)	17 (COO)	18 (PR)
8	A	A B	B C D	E F G	H I	F J	K
5 (UNATT)			B C D	E F G		F J	K
5 (ATT)				E F G			K
4				E F G			K
3				E F G			K
6			See 3.25 and 3.26				

CIRCUIT PACK TYPE

A	L O C A T I O N	186	175	185	176	65A
		AR 94	AR 92	AR 92	AR 86	
		060	058	059	040	051
			043		041	
		054		042		
		039		053		
		057				

CIRCUIT PACK TYPE

B	L O C A T I O N	185	
		AR 72	
		059	

TABLE D (Cont)

CIRCUIT PACK TYPE

C

L O C A T I O N	175	176	183	
	AR 85	AR 86	AR 87	
	057 054 058 009	055 056	010	

CIRCUIT PACK TYPE

D

L O C A T I O N	175	176	
	AR 85	AR 86	
	038 043 039	040	

CIRCUIT PACK TYPE

E

L O C A T I O N	186	175	177	180	
	AT 94	AR 85	AR 91	AR 96	
	060	007 009	008	012 014	

CIRCUIT PACK TYPE

F

L O C A T I O N	179	178	181	
	AR 89	AR 88	AR 95	
	016	117	019*	

* Check to see that option strapping is identical to that on the original board.

TABLE D (Cont)

CIRCUIT PACK TYPE

G

L O C A T I O N	182	175	176	186	
	AR 90	AR 85	AR 86	AR 94	
	044*	038 039 058 057	037 040 041	060	

* Check to see that option strapping is identical to that on the original board.

CIRCUIT PACK TYPE

H

L O C A T I O N	186	175	185	
	AR 94	AR 85	AR 92	
	060	057 058 009 039	059	

CIRCUIT PACK TYPE

I

L O C A T I O N	175	176	
	AR 85	AR 86	
	006 001 007	003 053 005 002	

TABLE D (Cont)

CIRCUIT PACK TYPE

J

L O C A T I O N	185	177	175	
	AR 92	AR 91	AR 85	
	059	008	007 009	

CIRCUIT PACK TYPE

K

L O C A T I O N	185	175	176	
	AR 92	AR 85	AR 86	
	059	050	049	

CIRCUIT PACK TYPE

L

L O C A T I O N	185	175	177	176	
	AR 92	AR 85	AR 91	AR 86	
	059	009 006 039	008	002	

TABLE E

A TEST SWITCH

A TEST POSITION	CONNECTS				A TEST POSITION	CONNECTS			
	INTERFACE LEAD			901B A TERM TO		INTERFACE LEAD			901B A TERM TO
	RS TO	SD TO	RMT TO			RS TO	SD TO	RMT TO	
1				DSR	13	+13I			
2				RD	14	+18I			SCR
3				SCT	15	+18I			
4				CS	16	+18I			
5				COO	17				COO
6	+18I	-18I	GRD	RD	18				
7	+18I	+18I	GRD	RD	19				SCR
8	+18I	DTI	GRD	RD	20				RD
9	+18I		GRD	SCR	21				CS
10	+18I			CS	22				DTI
11	+18I			COO	23				SCT
12	+18I				OFF				

Note: Blank spaces indicate no connections.

TABLE F

B TEST SWITCH

B TEST POSITION	CONNECTS				B TEST POSITION	CONNECTS			
	INTERFACE LEAD			901B A TERM. TO		INTERFACE LEAD			901B A TERM. TO
	RS TO	SD TO	RMT TO			RS TO	SD TO	RMT TO	
1				-18I	7	GRD	DTI	+18I	
2				+18I	8	GRD	DTI	GRD	
3	+18I	-18I	GRD		9	GRD	DTI	GRD	
4	+18I	+18I	GRD		10	+18I	+18I	GRD	
5	+18I	DTI	GRD		11	GRD	+18I	+18I	
6	GRD	DTI	+18I		OFF				

Note: Blank spaces indicate no connection.