DATA SET 401M-TYPE TRANSMITTER
INSTALLATION AND CONNECTIONS

CONTENTS PAGE

1. GENERAL

1.01 This section provides installation and connection information to be followed when installing data set (DS) 401M-type. Information concerning the associated business machine, data terminal equipment, or related services is ***not*** included.

1.02 This section is reissued to illustrate the level option switch on DS 401M-L1B.

1.03 General data set installation practices, as outlined in the section entitled Data Sets—General Installation and Connection Information (590-010-200), should be followed in addition to the procedures outlined in this section.

1.04 The data set must be installed in the same general location as the business machine and within reach of the customer-supplied interface cord. This cord should not exceed 50 feet in length.

1.05 When test or demonstration calls are made, refer to the section entitled Crediting Charges on Test Calls (010-250-001) for the proper procedure for crediting charges.

1.06 Prior to installing the data set, verify that the local loop has been tested and meets the requirements specified in the section entitled Data Systems—DATA-PHONE® Service Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, and Remote Exchange Lines (314-205-501).

1.07 The procedures for the removal and replacement of the data set covers are outlined in the section entitled Data Set 401M-Type Transmitter—Maintenance (594-028-300).

1.08 The following test equipment, or equivalent, will be required for loop loss and loop resistance measurements.

- KS-14510-L1 volt-ohm-milliammeter (VOM)
- 1013-type handset
- TTS-28 transmission test set.

2. OPTIONS

2.01 Options for data set 401M-type vary depending on the required application. Customer options V, W, and X for data set 401M-L1B are made by means of small 2-pronged plugs which fit into lettered jacks located on the data set. Telephone company (telco) level options are made by means of an 8-segment switch (Fig. 1). Level options for older sets are incorporated by means of screw switches. Installation of options on DS 401M-type is made in accordance with specifications on the service order or circuit layout record card.

THINK ***Options should be installed prior to installation.***

2.02 Location of option switches and option plugs are shown in Fig. 1. Refer to Table A for option information for data set 401M-L1B.

2.03 DS 401M-type is designed to operate on lines supplied by a 48-volt or 72-volt battery with a wide range of loop resistance. Series

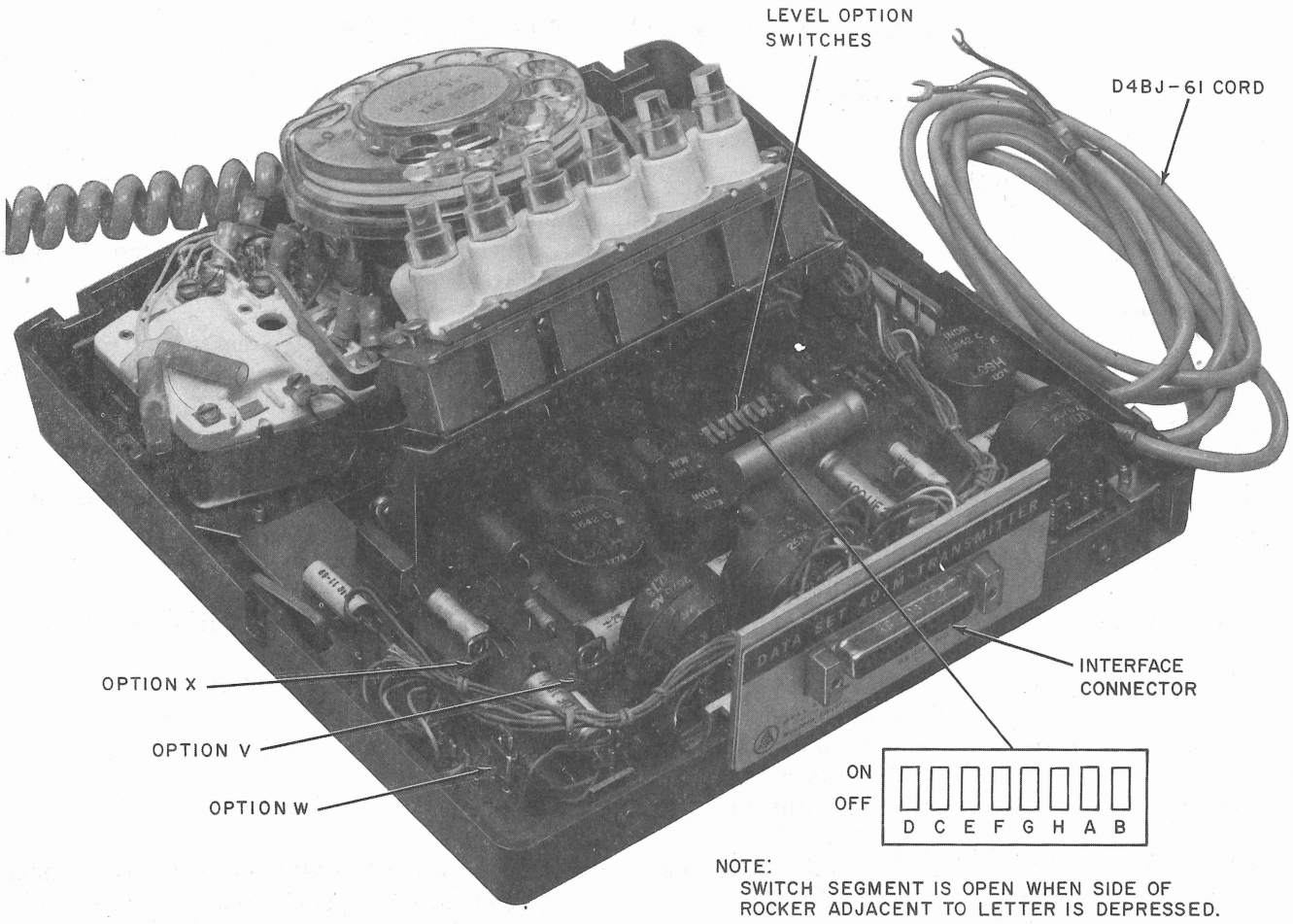

Fig. 1—Data Set 401M-L1B—Option Locations

TABLE A

DATA SET 401M-L1B OPTION STRAPPING

OPTION	DESCRIPTION	PLUG
X	Voice Answer-Back	S2
W	Audible Answer-Back	S1
V	C Group Oscillator	S3

resistors are provided on an optional basis to minimize the effect of loop resistance variation and to adjust output power levels. The adjustments are made as follows:

- Rocker switches are provided on DS 401M-L1B as shown in Fig. 1 to adjust the output power level.
- Screw switches are provided on the line coupler board of data sets 401M-L1/4, -L1/2/3,

-L1/2/4, -L1A/2/3, and -L1A/2/4 (Fig. 2) to adjust the output power level.

3. LEVEL ADJUSTMENT PROCEDURE

3.01 The following procedure is used to set the output level of DS 401M-type. This procedure also enables the telco employee to determine loop loss and loop resistance. The procedure is performed prior to installing the data set.

STEP	PROCEDURE
	Note: Determine the polarity of the T and R leads from the central office before performing the steps to avoid damage to the meter.
1	Connect the 1013-type handset to tip and ring of the incoming telephone line.
2	Call a quiet termination using the handset.
3	Set the VOM to indicate a maximum of 120 mA.
4	After the call to the quiet termination has been answered, connect the KS-14510-L1 VOM, or equivalent, between tip and ring of the incoming telephone line.
	Note: The milliammeter will maintain the loop.

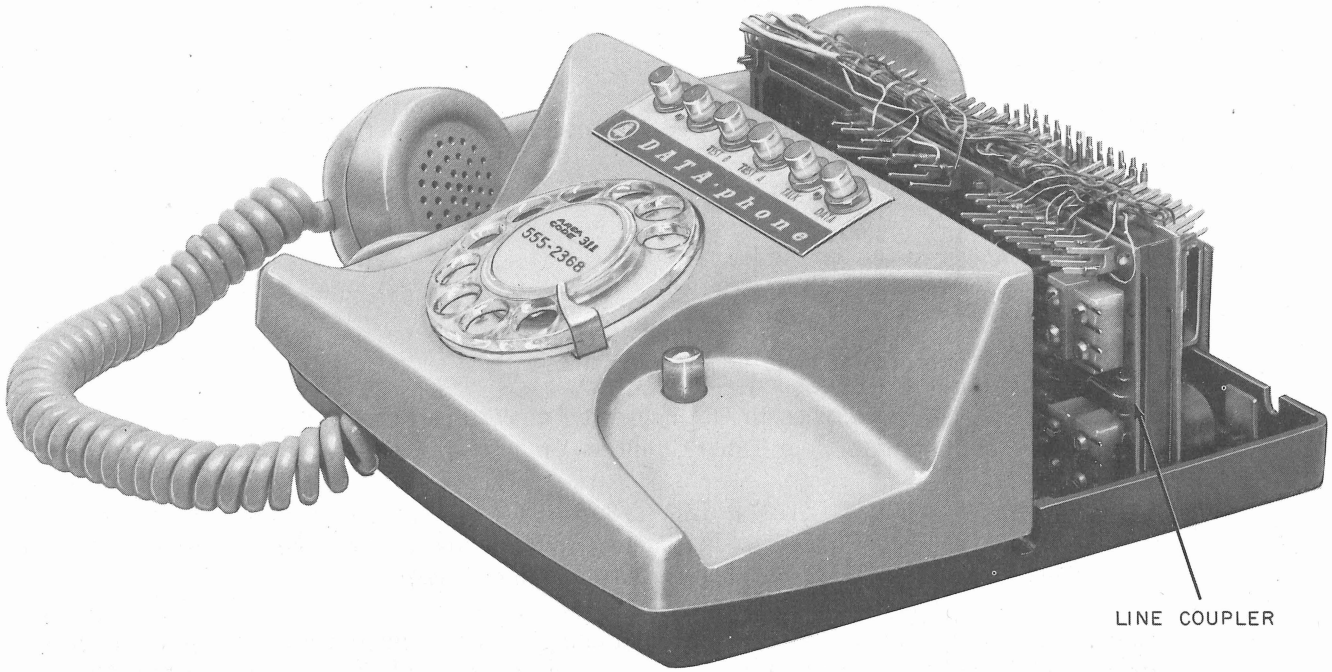

Fig. 2—Data Sets 401M-L1/4, -L1/2/3, and -L1/2/4—Line Coupler Location

STEP	PROCEDURE
5	Remove the handset from the incoming telephone line.
6	Read and record the central office (CO) battery current measurement on the VOM.
7	Connect the handset to tip and ring of the incoming telephone line.
8	Remove the VOM from the incoming telephone line.
9	Set the meter function switch to 300 on the DC VOLTS range for a 72-volt CO or to 60 on the DC VOLTS range for a 48-volt CO.
10	Reconnect the VOM to tip and ring of the incoming telephone line.
11	Remove the handset from the telephone line.
12	Read and record the CO battery voltage.
13	Remove VOM from the telephone line.
14	Divide the reading taken in Step 6 into the reading taken in Step 12. This value is the resistance of the loop. (R = V/I.)
15	Prepare a TTS-28, or equivalent, to measure signal level.
16	Connect the handset to tip and ring of the incoming telephone line.
17	Call a 1-milliwatt, 1-kHz source.
18	When the tone is heard, connect the TTS-28 to the incoming telephone line.
19	Read and record the measured signal level. ***Note:*** This measurement is the loop loss.
20	Remove the TTS-28 from the telephone line.
21	If DS 401M-L1B is to be installed— Set the rocker switches to ON using the above measured values in accordance with Table B (no option V) or Table C (option V). If DS 401M-L1/4, -L1/2/3, -L1/2/4, -L1A/2/3, or -L1A/2/4 is to be installed— Adjust the screw switches on the line coupler board using the measured values in accordance with Table B (L1 and L1A) or Table C (L2). ***Note:*** These adjustments are made by tightening or loosening the letter-designated screws ***on*** the ***line coupler board.*** Tightening a screw makes contact between two terminals on the block. Loosening the screw opens the circuit between the terminals. The option chosen should allow the signal to reach the serving central office at a level of no greater than −12 dBm.

STEP	PROCEDURE
22	End of procedure.

4. INSTALLATION AND CONNECTION PROCEDURE

4.01 DS 401M-type may be installed on any surface (desk, table, etc) that is convenient for customer use and within the limit of the customer-furnished 50-foot interface cord.

4.02 DS 401M-type is supplied with a D4BJ-61 cord (5 feet 6 inches long) for connection to telephone line facilities and key telephone units, if provided. Refer to Fig. 3 for connections required. The A and A1 leads are used to provide A lead control when the data set is used on key telephone systems. If extension telephones are used, an exclusion key must be provided to prevent interference with data transmission.

5. TEST REQUIREMENTS

5.01 Upon completion of the installation, DS 401M-type should be tested as outlined in the section entitled Data Set 401M-Type Transmitter—Test Procedures (594-028-500). These tests must be performed to ensure proper operation of the data set following installation.

TABLE B

TWO-OUT-OF-TEN DATA SETS (L1 AND L1A OR NO OPTION V)

NOMINAL CENTRAL OFFICE BATTERY (VOLTS)	LOOP RESISTANCE (OHMS)	LOOP LOSS IN DB AT 1 KHZ											
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
48	Less than 700	—	—	—	—	—	—	—	—	—	—	—	—
	700 — 1000	BDF	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD
	1000 — 1250	ACE G	ACF	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
	1250 — 2050	ABC DEH	ABC DFG	ABC DEF	ABC DE	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D
72	1300 — 1500	BDF	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD
	1500 — 1870	ACE G	ACF	AC	AC	AC	AC	AC	AC	AC	AC	AC	AC
	1870 — 2930	ABC DEH	ABC DFG	ABC DEF	ABC DE	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D

Note 1: Screw designations shown must be tightened. All other screws must be loosened.

Note 2: If no screws are shown, all screws must be loosened.

Note 3: The rocker switch is ON for letter option; OFF for all others.

TABLE C

THREE-OUT-OF-FOURTEEN DATA SETS (L2 OR OPTION V)

NOMINAL CENTRAL OFFICE BATTERY (VOLTS)	LOOP RESISTANCE (OHMS)	LOOP LOSS IN DB AT 1 KHZ											
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
48	Less than 700	EF	E	—	—	—	—	—	—	—	—	—	—
	700 — 1000	BDF G	BDE F	BDE	BD	BD	BD	BD	BD	BD	BD	BD	BD
	1000 — 1250	ACE H	ACF G	ACG	ACF	AC	AC	AC	AC	AC	AC	AC	AC
	1250 — 2050	ABC DFG H	ABC DEF G	ABC DH	ABC DEG	ABC DF	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D
72	1300 — 1500	BDF G	BDE F	BDE	BD	BD	BD	BD	BD	BD	BD	BD	BD
	1500 — 1870	ACE H	ACF G	ACG	ACF	AC	AC	AC	AC	AC	AC	AC	AC
	1870 — 2930	ABC DFG H	ABC DEF G	ABC DH	ABC DEG	ABC DF	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D	ABC D

Note 1: Screw designations shown must be tightened. All other screws must be loosened.

Note 2: If no screws are shown, all screws must be loosened.

Note 3: The rocker switch is ON for letter option; OFF for all others.

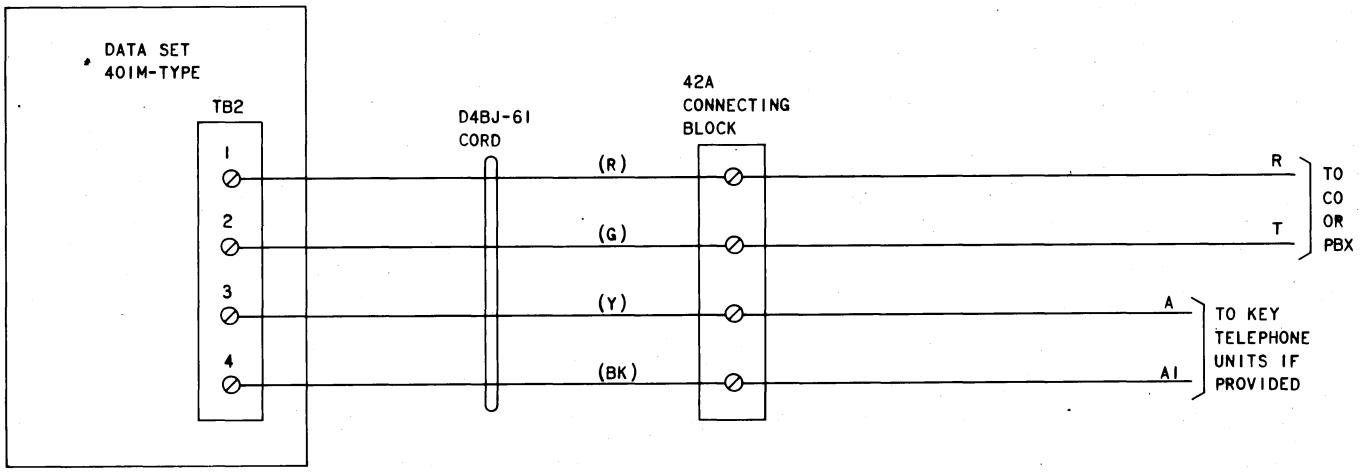

Fig. 3—Data Set 401M-Type—Connection Diagram