DATA SET 401M-TYPE TRANSMITTER

DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL

1.01 This section contains a description of data set (DS) 401M-type and information pertinent to its operation. Information concerning the business machine associated with the data set is not included.

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

1.03 DS 401M-L1B [rated Manufacture Discontinued (MD)] replaces data sets 401M-L1/4, -L1/2/3, and -L1/2/4 which have also been rated MD. Data set 401M-L1B provides optionally the same functions as the other data sets. Data sets 401M-L1A/2/3 and -L1A/2/4 with TOUCH-TONE® dial are also rated MD. They may be replaced with DS 401-L1B, which has a rotary dial. No TOUCH-TONE replacement is available. Information on the MD data sets has been retained in this section because these data sets are still in service.

1.04 The DS 401M-type transmitter (Fig. 1) is designed for use in DATA-PHONE® service. It is used for low-speed, parallel (2-out-of-10 or 3-out-of-14 frequencies) transmission of alphanumeric data over the switched network at speeds of up to 20 characters per second. It also provides for either of two types of answer-back: voice answer-back through the telephone handset receiver, or audible answer-back through a customer-provided loudspeaker.

1.05 DS 401M-type is intended to replace DS 401A- and 401E-types which are rated MD. Table A explains the features described by list number and option designation associated with data set 401M-type.

1.06 Alphanumeric data is received from a transmitting business machine, such as a card reader, in the form of contact closures. These closures are converted to voice-frequency tones and sent over the telephone line. The data set at the receiving station converts the voice-frequency tones back into contact closures and delivers them to the receiving business machine.

2. PHYSICAL DESCRIPTION

2.01 DS 401M-type is an integrated set mounted in a two-tone gray plastic housing consisting of the following:

- Telephone set
- 11-Type apparatus unit
- 589-Type key
- One circuit pack for data set 401M-L1B (Fig. 2 and 3)
- Three or four modular circuit packs as required for data sets 401M-L1/4, -L1/2/3, and -L1/2/4 (Fig. 4).

2.02 DS 401M-L1B (Fig. 3) is provided with eight level option switches and three removable 2-prong option plugs. The option plugs fit into numbered jacks on the data set. Level options for the sets listed below are incorporated by means of screw switches. DS 401M-L1B provides ***rotary dial*** service only, and replaces the following data sets:

- 401A1 Rotary

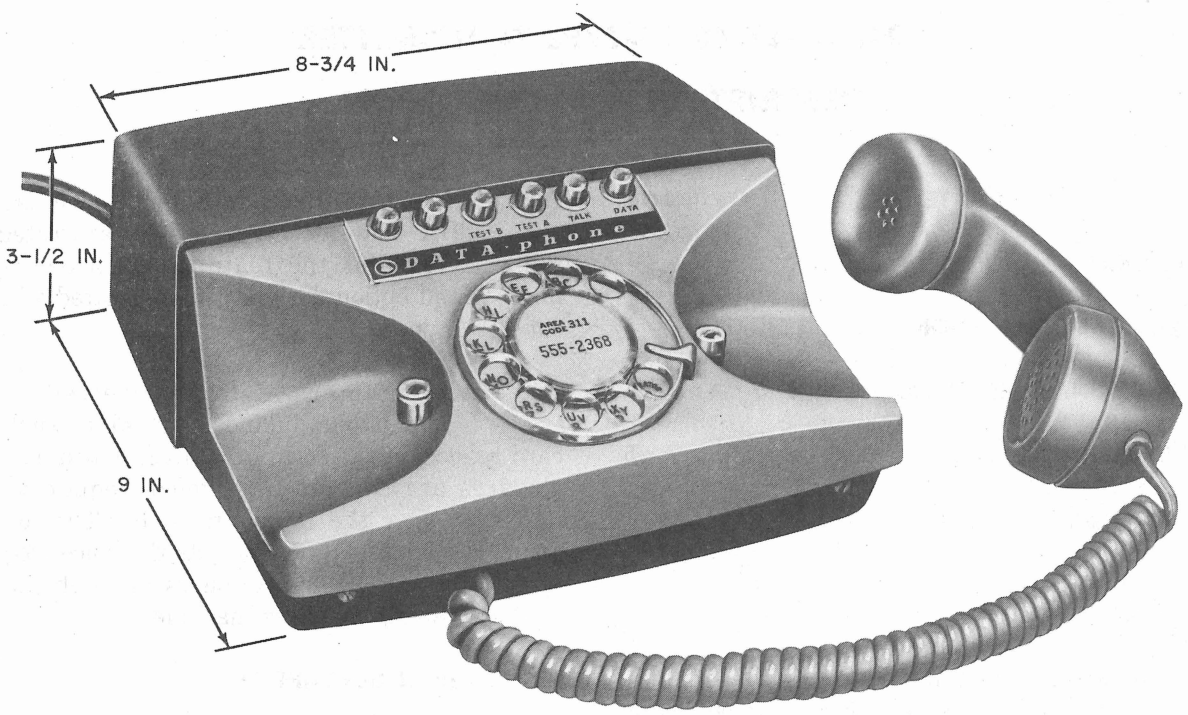

Fig. 1—Data Set 401M-Type

TABLE A

LIST NUMBERS AND FEATURES ASSOCIATED WITH DATA SET 401M-TYPE

FEATURE	401M-L1B OPTION DESIGNATION	401M-L1 SERIES	401M-L1A SERIES
2-out-of-10 transmitter with rotary dial	No V	L1	NA*
2-out-of-10 transmitter with TOUCH-TONE dial	Not Available	NA	L1A
C group oscillator. Increases transmitter capability to 3-out-of-14.	V	L1/2	NA
Voice answer-back (handset)	X	L1/3	NA
Audible answer-back (loudspeaker)	W	L1/4	NA

* Not available.

- 401E2 Rotary
- 401E3 Rotary
- 401E4 TOUCH-TONE
- 401E5 TOUCH-TONE
- 401M-L1/3 Rotary
- 401M-L1A/3 TOUCH-TONE
- 401M-L1/4 Rotary
- 401M-L1A/4 TOUCH-TONE

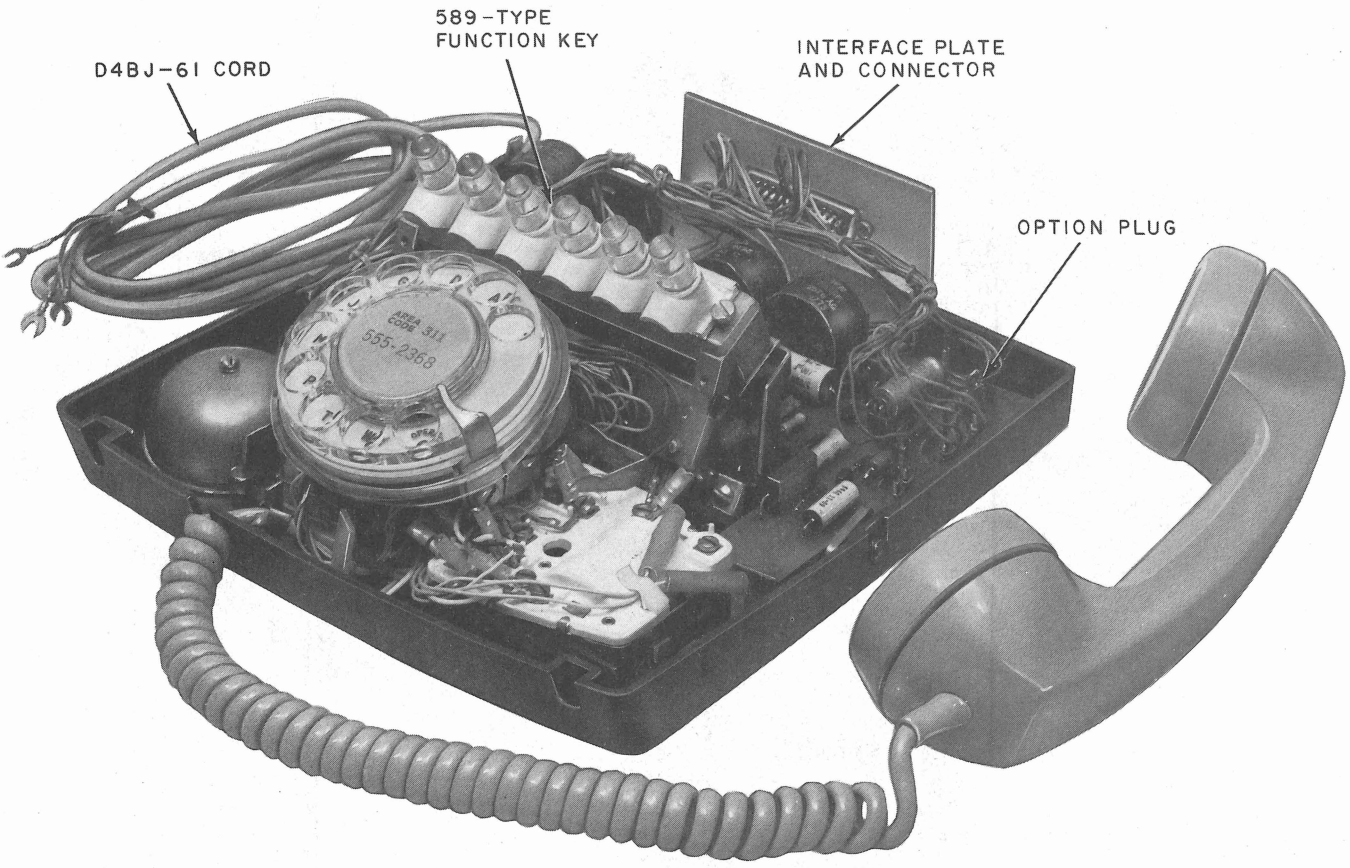

Fig. 2—Data Set 401M-L1B With Cover Removed

- 401M-L1/2/3 Rotary
- 401M-L1A/2/3 TOUCH-TONE
- 401M-L1/2/4 Rotary
- 401M-L1A/2/4 TOUCH-TONE

2.03 DS 401M-type weighs approximately 6 pounds and is designed to operate within an ambient temperature range of 40 to 120°F with a relative humidity of 20 to 95 percent.

2.04 Power for the data set is obtained entirely from the telephone line. There are no internal fuses in the data set.

2.05 A D4BJ-61 mounting cord (5 feet 6 inches long) is provided for connection to the telephone line facilities and key telephone units, if provided.

2.06 Interface connections are made through a KS-19087-L2 or -L6 connector located at the rear of the data set (Fig. 3). The corresponding plug (Cannon or Cinch DB-19604-432) and connecting cord must be provided by the customer.

2.07 DS 401M-type is equipped with a 589-type key which is provided to facilitate testing the data set on customer premises. The 589-type key is equipped with four functional pushbuttons which are designated and used as follows:

- DATA—Nonlocking releasing key; depressing this key places the set in data mode.
- TALK—Locking; depressing this button places the set in talk mode, thereby providing for normal voice communications.
- TEST A—Nonlocking; depressing this button will transmit the following frequencies: 941

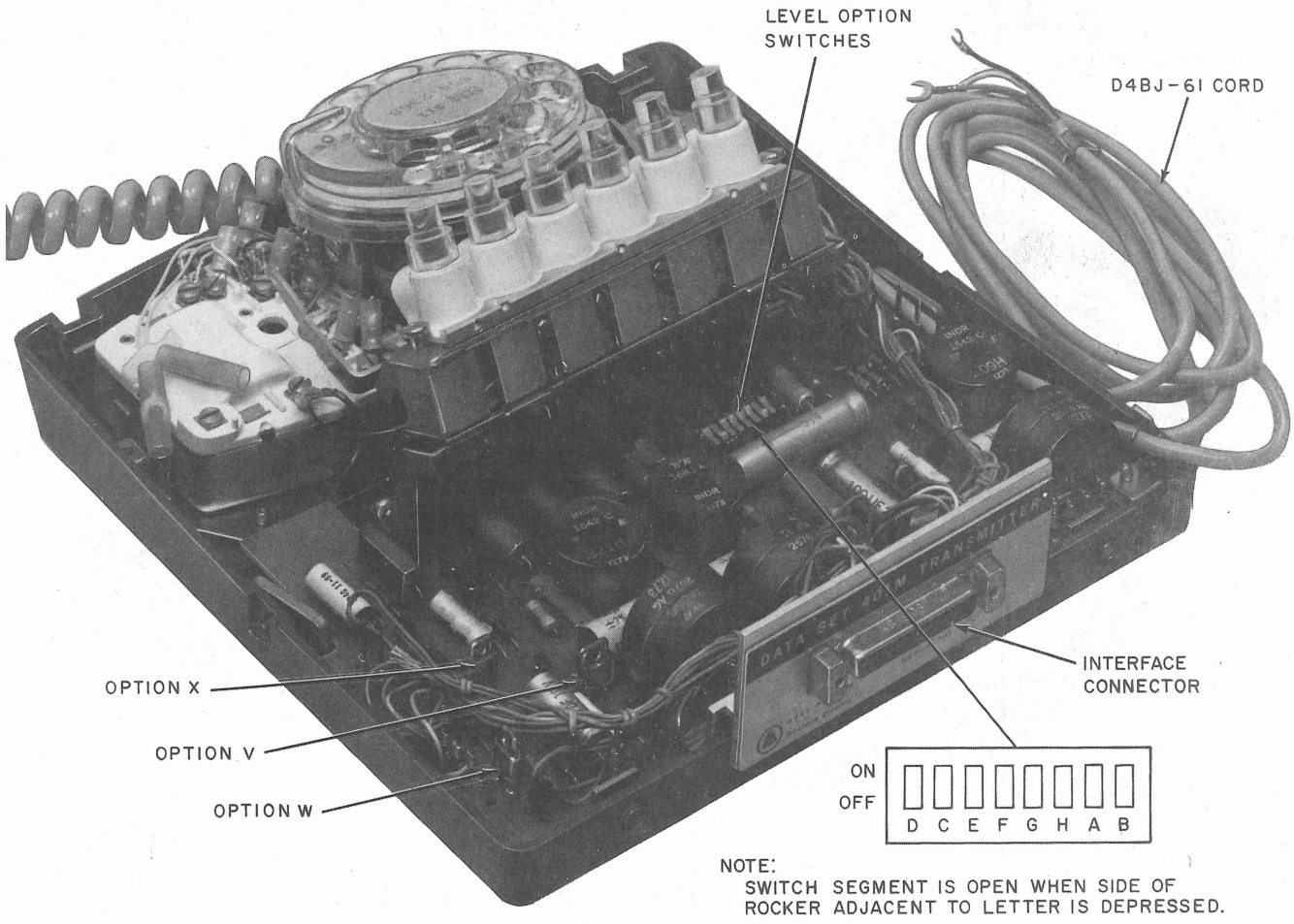

Fig. 3—Data Set 401M-L1B—Option Locations

Hz, 1633 Hz, and if oscillator C is provided, 1950 Hz.

- TEST B—Nonlocking; depressing this button will cause the set to transmit the following frequencies: 600 Hz, 1098 Hz, and if oscillator C is provided, 2250 Hz.

3. FUNCTIONAL DESCRIPTION

3.01 Refer to Fig. 5 for a block diagram of DS 401M-type. The data transmitter consists of either two or three transistorized oscillators. Data from the business machine consists of contact closures between the common lead and one data lead from each oscillator. Thus, the transmitted signal for each character consists of a composite of either two or three frequencies. The A and B oscillators are capable of generating five frequencies each, and the C oscillator is capable of generating four frequencies. As a result, 25 character combinations are possible when the A and B oscillators are used, and 100 character combinations are possible when the A, B, and C oscillators are used.

3.02 If none of the data leads from an oscillator are connected with the common lead, the oscillator generates a rest frequency, provided the customer keying contacts are closed. Also, rest frequencies are transmitted for approximately 50 ms after the keying leads are opened. These rest frequencies are used to condition the automatic gain control circuits in the receiver so the receiver will be less likely to respond to echoes. The rest frequencies may also be used as supplemental data frequencies.

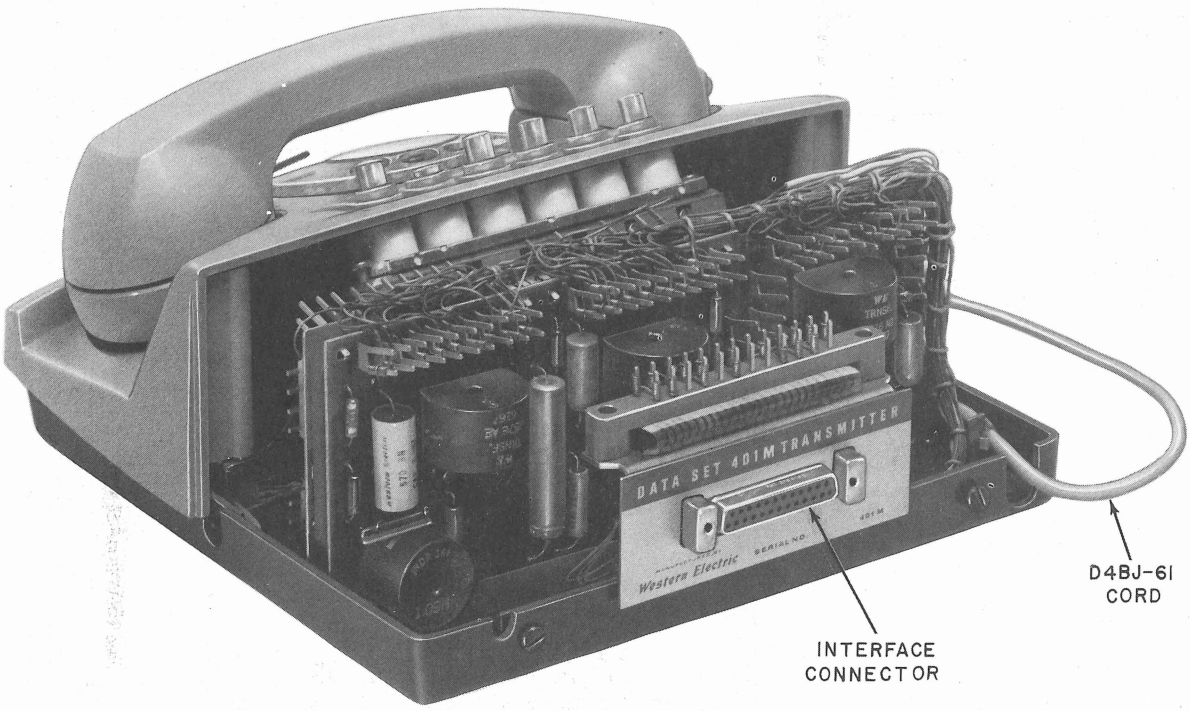

Fig. 4—Data Set 401M-L1/4 -L1/2/3, -L1/2/4, -L1A/2/3, or -L1A/2/4—Rear Cover Removed

3.03 Table B shows the frequenices produced by DS 401M-type.

3.04 Leads present at the interface connector are numbered and designated as shown in Table C.

3.05 When the audible answer-back feature is provided, a 2-stage amplifier monitors both the incoming answer-back tones and transmitted data. The amplifier output usually feeds a loudspeaker in the business machine.

3.06 When the voice answer-back feature is provided, line signals and outgoing data may be monitored by the handset receiver of the data set. A handset receiver muting circuit is provided to reduce the level of locally generated data signals.

3.07 Electronic circuits are powered from the central office battery over the local telephone loop. A polarity guard circuit within the data set maintains the correct voltage polarity, in the event that tip and ring connections are reversed.

3.08 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 resistors are provided on an optional basis to minimize the effect of loop resistance variation and provide for output power level adjustments. Refer to the section entitled Data Set 401M-Type Transmitter—Installation and Connections (594-028-200) for the proper option installation procedures.

4. OPERATION

4.01 To transmit data, proceed in the following manner.

(a) Lift handset, depress TALK button, and establish voice communications with the receiving station.

(b) After verbally agreeing to begin data transmission, depress DATA button.

Note: Handset must remain off-hook during data transmission.

(c) Transmit data.

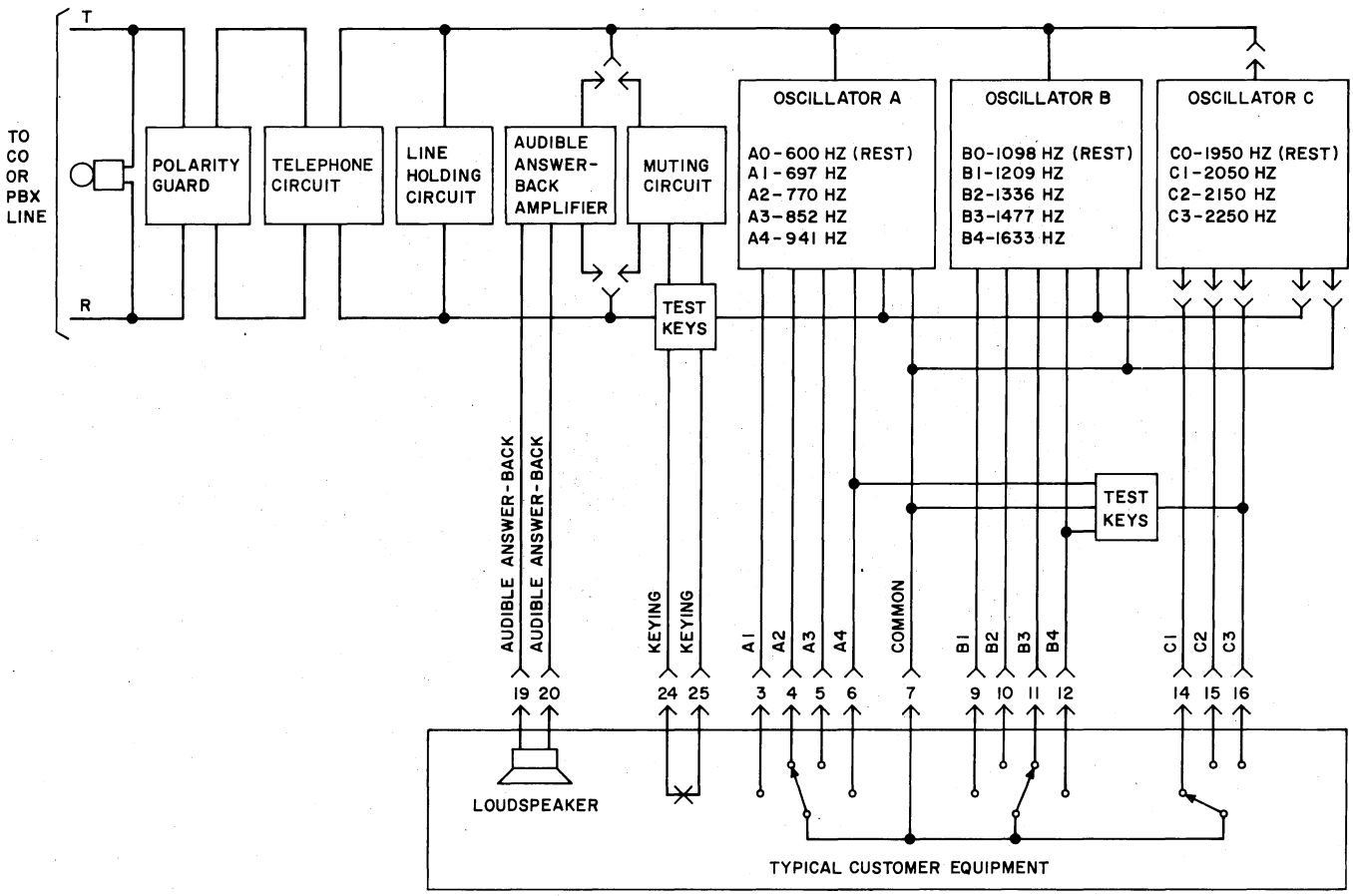

Fig. 5—Data Set 401M-Type—Functional Block Diagram

TABLE B

DATA FREQUENCIES

DESIGNATION	FREQUENCY (Hz)
A-0 (Rest)	600
A-1	697
A-2	770
A-3	852
A-4	941
B-0 (Rest)	1098
B-1	1209
B-2	1336
B-3	1477
B-4	1633
C-0 (Rest)	1950
C-1	2050
C-2	2150
C-3	2250

TABLE C

INTERFACE LEAD DESIGNATIONS

PIN NO.	FUNCTION
1	Reserved
2	Reserved
3	A1
4	A2
5	A3
6	A4
7	Common
8	Reserved
9	B1
10	B2
11	B3
12	B4
13	Reserved
14	C1
15	C2
16	C3
17	Reserved
18	Reserved
19	Audible Answer-Back
20	Audible Answer-Back
21	Reserved
22	Reserved
23	Reserved
24	Keying
25	Keying

(d) Upon completion of data transmission, depress TALK button and replace handset on the switchhook to terminate the call.

4.02 Nonlocking buttons designated TEST A and TEST B are provided to test the data set on customer premises with the assistance of the data test center. The buttons are functional after the data set has been placed in data mode. Refer to the section entitled Data Set 401M-Type Transmitter—Test Procedures (594-028-500) for proper operating procedures for these buttons.

5. REFERENCES

5.01 The following documents pertain to data set 401M-type.

NUMBER	TITLE
CD & SD-1D194-01	Data Systems Station—Data Set 401M-Type Transmitter

SECTION	TITLE
590-004-108	Data Set 401M-Type Transmitter—Reference Guide
594-028-180	Data Set 401M-Type Transmitter—Summarizing Specification—Data Systems Station
594-028-200	Data Set 401M-Type Transmitter—Installation and Connections
594-028-300	Data Set 401M-Type Transmitter—Maintenance
594-028-500	Data Set 401M-Type Transmitter—Test Procedures