

**DATA SET 401E-TYPE  
TRANSMITTER  
DESCRIPTION AND OPERATION**

	<b>CONTENTS</b>	<b>PAGE</b>
<b>1. GENERAL</b>	. . . . .	<b>1</b>
<b>2. PHYSICAL DESCRIPTION</b>	. . . . .	<b>1</b>
<b>3. FUNCTIONAL DESCRIPTION</b>	. . . . .	<b>2</b>
<b>4. OPERATION</b>	. . . . .	<b>4</b>
<b>5. REFERENCES</b>	. . . . .	<b>6</b>

**1. GENERAL**

**1.01** This section provides the description and operation information on data set 401E-type (MD). It does not include information concerning the business machine used with the data set.

**1.02** This section is reissued for the following reasons.

- To describe option M of data sets 401E2 and 401E4.
- To delete cover removal and replacement instructions. This information can be found in Section 594-014-200.
- To add a reference section.

**1.03** Data set 401E-type is designed primarily for use in DATA-PHONE® service. It provides one-way transmission of alphanumeric information over the DDD network or 2-wire private lines. The 401E is a 3-out-of-14 multifrequency parallel data transmitter that accepts any of 100 possible characters from the business machine at any rate up to 20 characters per second and transmits these to data set 401J- or 403-type at the receiving station.

**1.04** Data is received at the interface from the transmitting business machine in the form

of contact closures. These closures are converted to voice-frequency tones and transmitted over the telephone line. The data set at the receiving station converts the voice-frequency tones back into contact closures and delivers them across the interface to the receiving business machine.

**1.05** Both rotary dial (data sets 401E1, 401E2, and 401E3) and TOUCH-TONE® (data sets 401E4 and 401E5) versions of the data sets are provided. Data set 401E4 is similar to data set 401E2, and data set 401E5 is similar to data set 401E3.

**2. PHYSICAL DESCRIPTION**

**2.01** Data set 401E-type is an integrated set combining in one housing a telephone set, the data transmitter, an electrical answer-back amplifier, voice answer-back equipment (data sets 401E1, 401E2, and 402E4), and remote testing circuits. Dimensions for data sets 401E2 and 401E3 and data sets 401E4 and 401E5 are shown in Fig. 1 and 2, respectively. Height of the data set with handset in place is 4-1/2 inches.

**2.02** Data set 401E-type is equipped with a 626A key. This key is provided to facilitate testing the data set on customer premises. The 626A key is equipped with two pushbutton keys (TEST A and TEST B). When depressed, either of these keys causes a test signal to be transmitted to the data test center for analysis. Some early production sets were not equipped with this key and have no provision for remote testing.

**2.03** On the early production models of data set 401E1, a D10M-61 cord is available for connection to the telephone line, extension telephone, and speakerphone. The D4BJ-61 cord is furnished with data set 401E1. On data sets 401E2, 401E3, 401E4, and 401E5, the D6AA-61 cord is furnished. When the D4BJ-61 cord or D6AA-61 cord is used, connections are made on the 626A terminal strip.

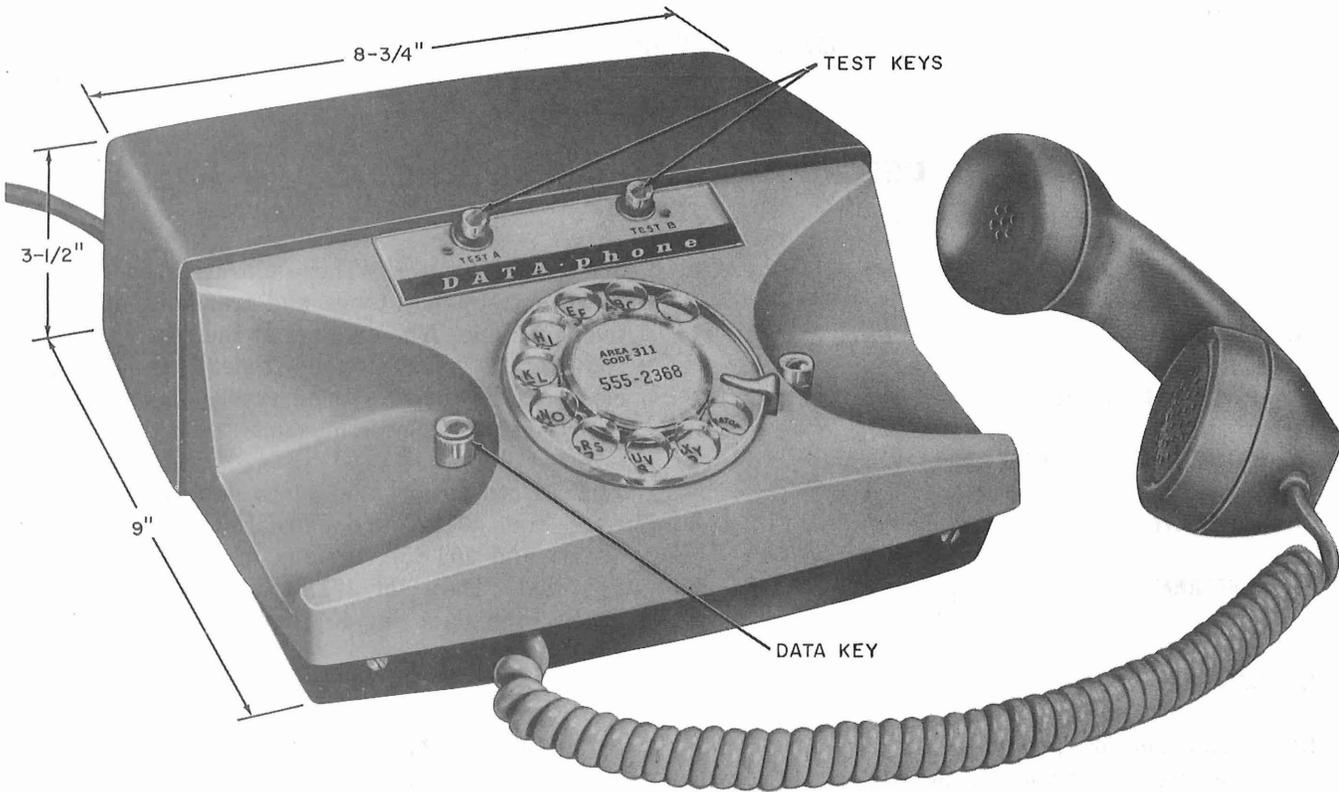


Fig. 1—Data Set 401E2 or 401E3

When the D10M-61 cord is used, connections are made on the terminal block furnished with the cord.

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

**2.05** A G1B ringer provides an audible signal. Access to the ringer volume control is through a hole in the base of the set. If a louder signal is required, the ringer provided in the data set should be disconnected and replaced with an external ringer. Type and number of ringers permissible should be determined by existing BSPs on ringers, subsets, and ringing bridge limitations.

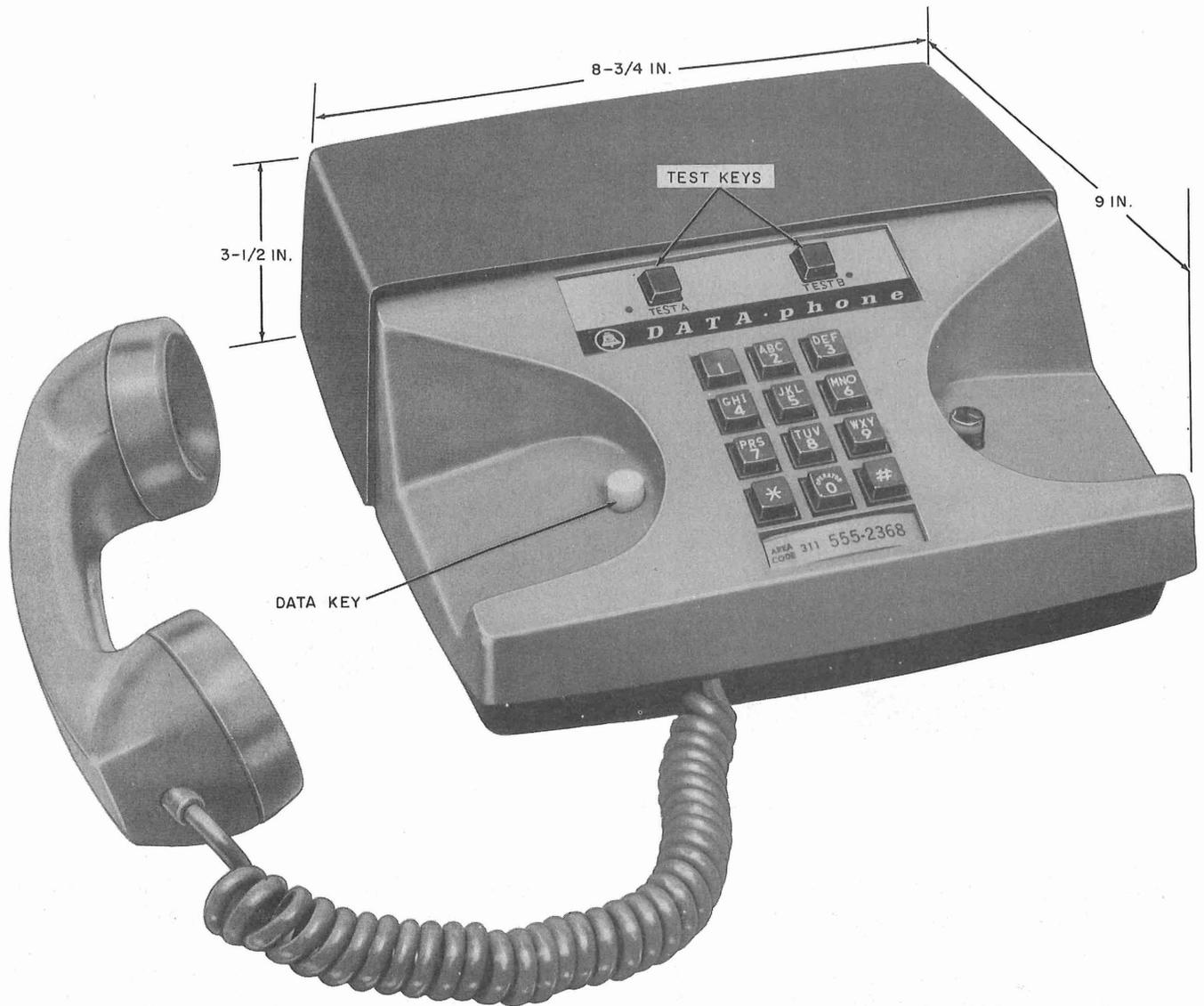
**2.06** Power for the data set is obtained from the telephone line. There are no internal fuses in the data set.

**2.07** The data set is designed to operate within an ambient temperature range of +40 to +120°F with a relative humidity of 20 to 95 percent.

### 3. FUNCTIONAL DESCRIPTION

**3.01** The data transmitter circuit consists of three transistorized oscillators. From each oscillator circuit in the data transmitter, four data leads connect to the business machine. An additional lead which is common to each oscillator connects to the business machine as a common lead. 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 three frequencies, one from each oscillator. With the A and B oscillators capable of generating 5 frequencies each and the C oscillator capable of generating 4 frequencies, a code of 100 combinations is possible.

**3.02** If none of the data leads from an oscillator is connected with the common lead, that



**Fig. 2—Data Set 401E4 or 401E5**

oscillator generates a "rest" frequency provided the customer keying contacts are closed. Rest frequencies are also transmitted for approximately 50 milliseconds after the keying leads are opened. This rest frequency is normally used for echo suppression; rest frequencies may also be used as supplemental data frequencies. The frequencies produced by data set 401E-type are shown in Table A.

**3.03** A two-stage answer-back amplifier monitors both incoming answer-back tones and

transmitted data. The amplifier output is usually fed to a loudspeaker in the business machine.

**3.04** Electronic circuits are powered by the central office supply on the local telephone loop. A polarity guard circuit within the data set maintains the correct voltage polarity.

**3.05** The leads present at the interface connector are numbered and designated as shown in Table B.

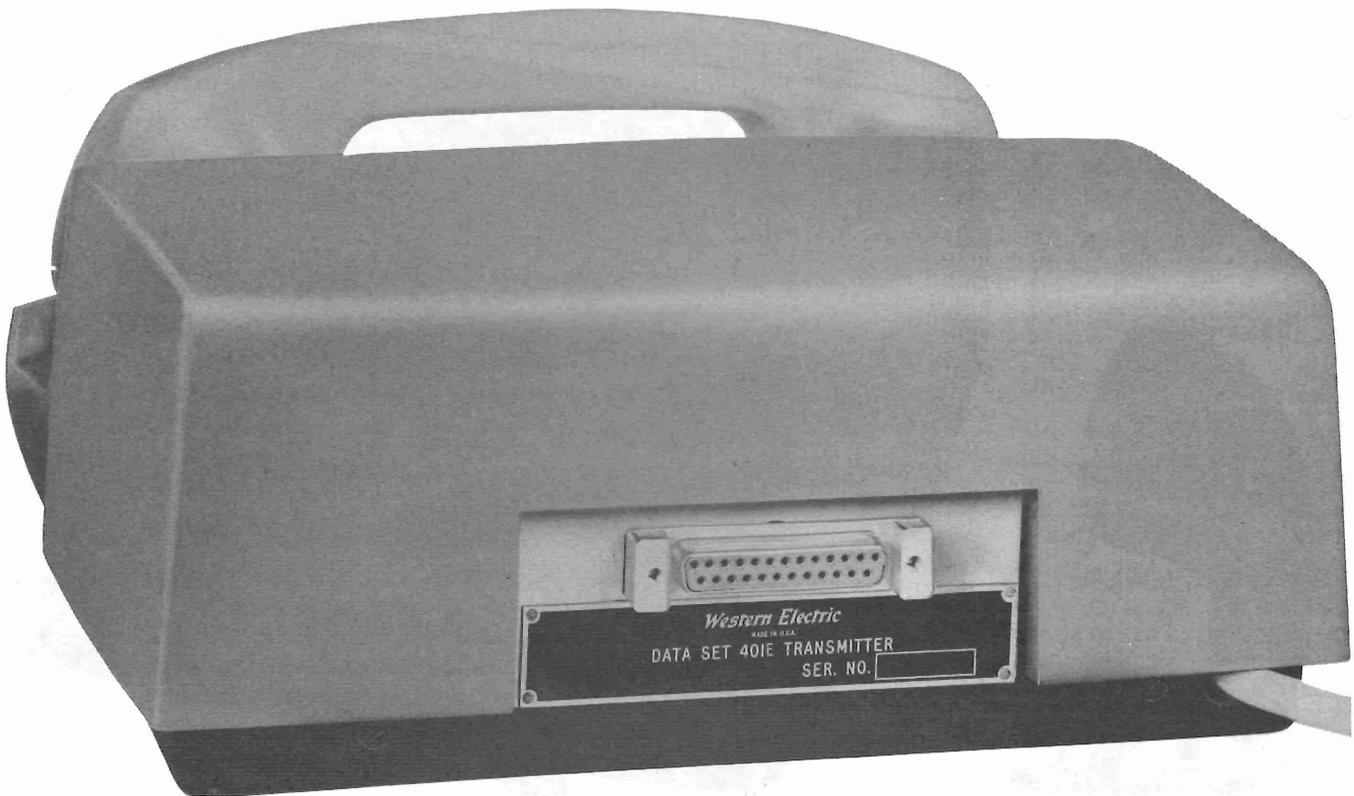


Fig. 3—Data Set 401E-Type—Rear View

**3.06** Data sets 401E3 and 401E5 (Fig. 4) differ from other data sets 401E-type (Fig. 5) as follows:

- Answer-back signals and data signals are coupled directly to the telephone network through a capacitor for monitoring by the telephone handset.
- Contacts of the data key remove the transmitter of the telephone from the circuit and connect the voice answer-back CP3 circuit pack.
- The oscillators are modified to enable the handset to be used for monitoring.

**3.07** Data set 401E2 or 401E4 transmitters can be used as a replacement for data set 401A-type transmitters to work with data set 403-type receivers. This is accomplished by installing option M on data set 401E2 or 401E4. If option M has been installed, the label OPTION M will

have been placed above the customer interface connector at the rear of the data set.

**Note:** Data set 401E-type transmitters can be used as a replacement for data set 401A-type transmitters to work with data set 401J-type receivers with no modification required.◀

#### 4. OPERATION

**4.01** The data key is located on the switchhook assembly in the same position as an exclusion key. Functions of the key are as follows:

##### Key in Normal Position (Down)

- Connects telephone circuit to line.
- Connects extension telephone and speakerphone leads to line.
- Removes data transmitter from line.

**TABLE A**  
**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
C-4*	2350

\*Present at the interface but not used by customer equipment.

**Key in Operated Position (Up)**

- Connects data transmitter to line.
- Disconnects telephone circuit, extension telephone, and speakerphone leads from line.

**Attended Receiving Station**

**4.02** To transmit data, dial the attended receiving station and proceed as follows:

- (1) Establish connection with the receiving station and verbally agree to begin data transmission.
- (2) Pull up data key (leave handset off-hook).
- (3) Slowly count to five and then transmit data.



**Caution customer not to restore the data key or hang up handset during data transmission.**

**TABLE B**  
**INTERFACE LEAD DESIGNATIONS**

PIN NO.	FUNCTION
1	Frame Ground
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	C4
18	Reserved
19	Audible Answer-Back
20	Audible Answer-Back
21	Reserved
22	Reserved
23	Reserved
24	Keying
25	Keying

- (4) Upon completion of data transmission, replace the handset on the switchhook. This will restore the data key and release the line.

**Unattended Receiving Station**

**4.03** To transmit data, dial the unattended receiving station and proceed as follows:

- (1) Call is placed and receiving station automatically answers.
- (2) A 2- or 5-second tone is heard at the transmitting station, indicating that the distant data station has been reached.

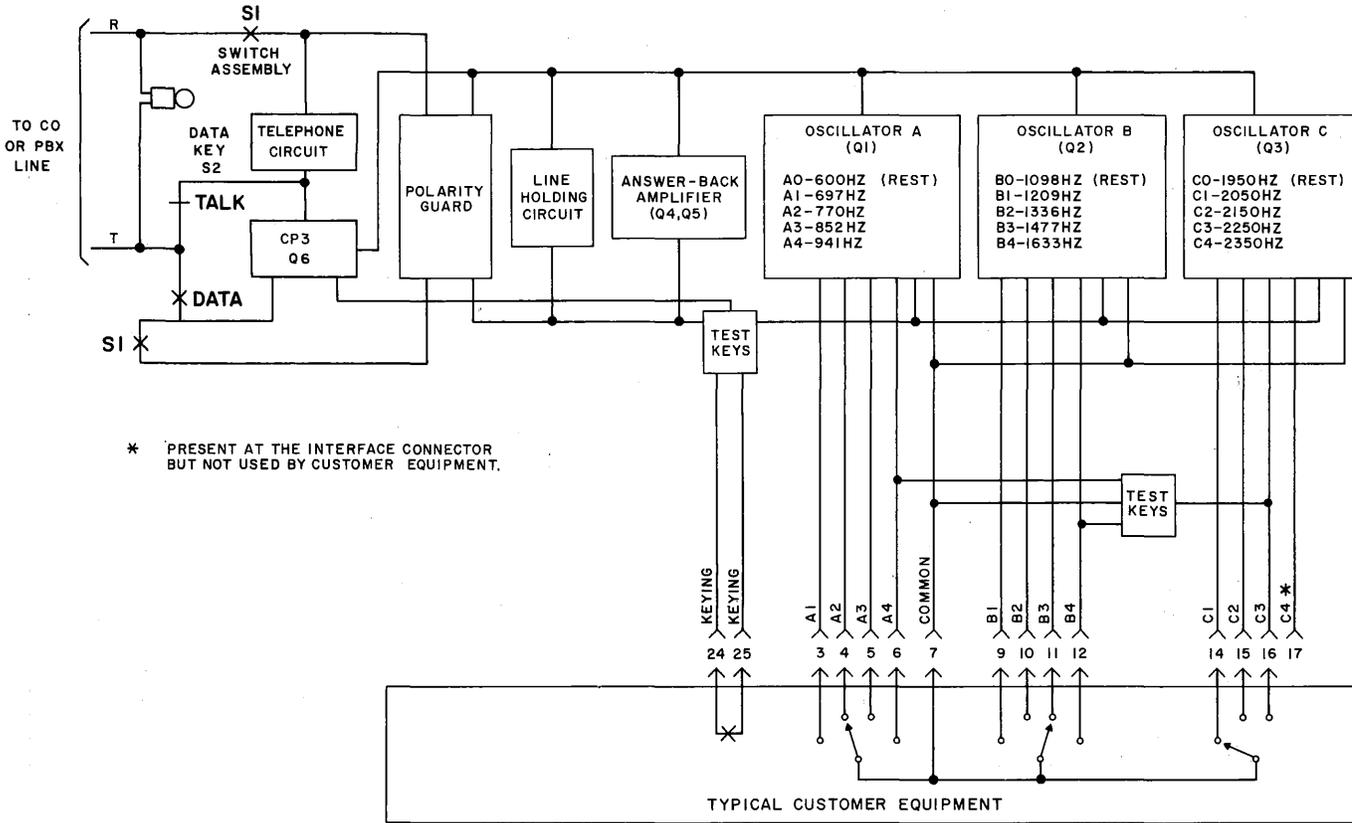


Fig. 4—Data Set 401E3 or 401E5—Block Diagram

- (3) Proceed as in attended operation from 4.02 (2), (3), and (4).

**4.04** An answer-back amplifier receives and amplifies supervisory signals from the receiving station. These signals as well as transmitted signals may be heard through a loudspeaker located in certain customer equipment. The specific manner in which the supervisory tones are used is determined by the business machine operating procedure.

A typical message could be:

- An error has occurred.
- An error has not occurred.

- Resume voice communication.

**4.05** To stop data transmission and resume voice communication, restore the data key to its normal off-hook position. Do not cradle the handset as this will terminate the call.

**5. REFERENCES**

**5.01** The following documents provide additional information on data set 401E-type.

SECTION	TITLE
590-004-101	Data Set 401E-Type—Reference Guide

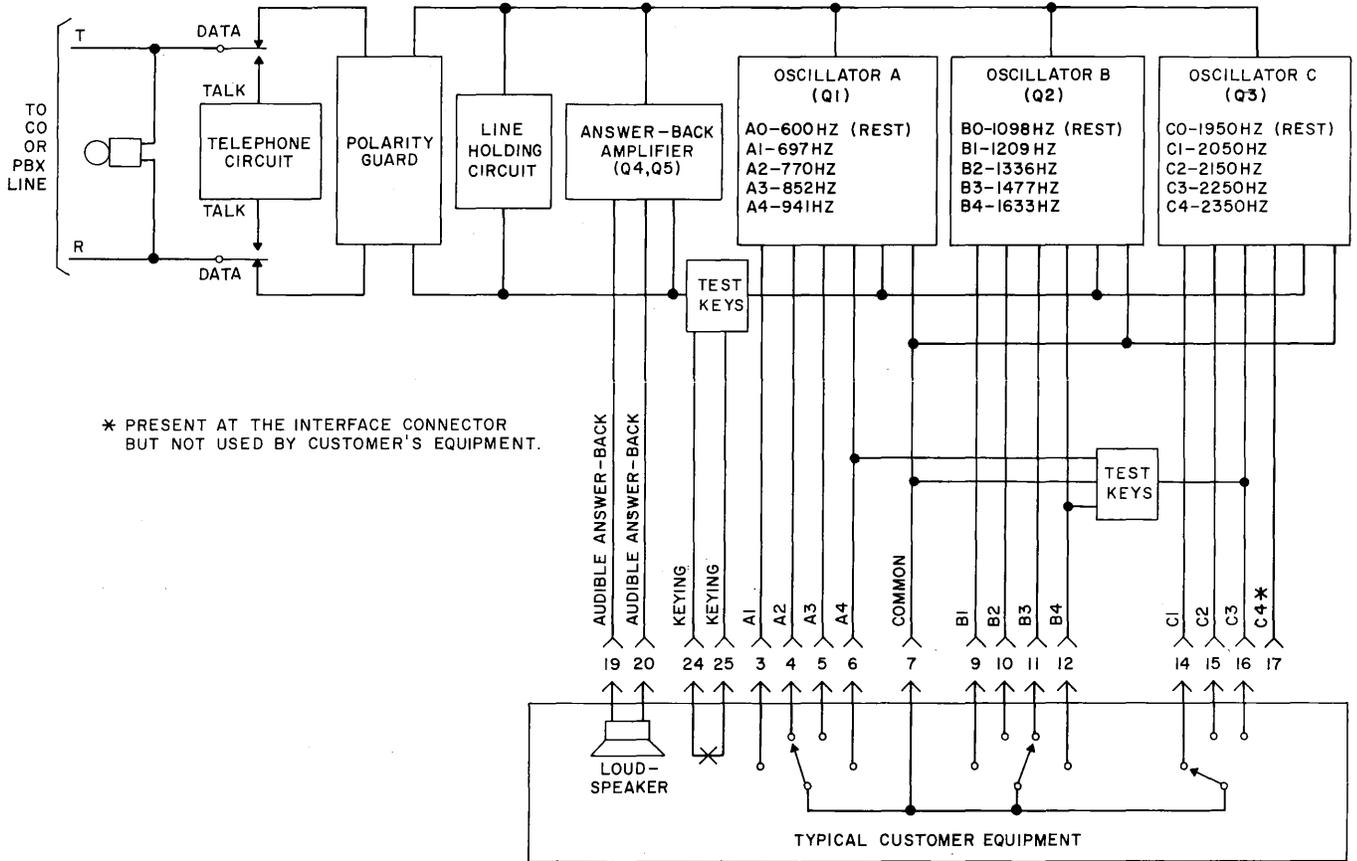


Fig. 5—Data Set 401E1, 401E2, or 401E4—Block Diagram

594-014-200

Data Set 401E-Type Transmitter— Installation and Connections

594-014-150

Data Set 401E-Type Transmitter—Theory of Operation and Supplementary Information

594-014-300

Data Set 401E-Type Transmitter—Maintenance

CD- & SD-1D063-01 Data Systems Station Data Set 401E-Type—Transmitter Circuit

594-014-500

Data Set 401E-Type Transmitter—Test Procedures