DATA SET 403A - TYPE
RECEIVER
IDENTIFICATION AND OPERATION

1. GENERAL

The interim production will be coded X 403A—type.

1.01 This section provides a physical description of the overall data set, its integral components, and lists the services provided by the data set. It also describes what conditions should be provided at the installation for optimum utilization of the data set. This section also gives the cover removal and replacement procedures and explains how to operate the data set.

1.02 This section is reissued to change the rating from AT&TCo Special to AT&TCo Standard. Included is information on external and internal answer-back operation and also minor changes to the test.

1.03 Data Set 403A-type (Fig. 1) can be one or two receivers within one housing. The data set may be provided with or without 5A1 Data Unit which provides a ring attendant function. The coding of the data set is dependent upon the integral components making up the set. Table A lists the possible codings for Data Set 403A-Type.

TABLE A

CODING FOR DATA SET 403A TYPE

DATA SET CODE	INTEGRAL COMPONENTS OF DATA SET
403A1	2 Receivers with 5A1 Data Unit.
403A2	1 Receiver without 5A1 Data Unit.
403A3	2 Receivers without 5A1 Data Unit.

1.04 The interim production is coded X403A-type. There are also model shop data sets in the field similar to the interim production sets which are coded Data Set X403A(M10)-type and are covered in TI-252. the data set is designed for use in DATA-PHONE* service.

*Service Mark of American Telephone and Telegraph Company.

1.05 This section does not include information concerning the business machine used with the data set. Information concerning auxiliary equipment is covered in sections concerning the particular auxiliary equipment.

1.06 The Data Set 403A uses a 2-out-of-8 code and will receive voice-frequency signals from Data Set 401A-Type, A TOUCH-TONE® telephone, or any transmitter using the 2-out-of-8 code.

1.07 Received data is translated from multifrequency tones into contact closures for delivery to various classes of business machines with a speed up to 10 characters per second.

1.08 In single data set installations ▶where either the Data Set 403A2, or Data Set 403A3 is used,◀ a Data Auxiliary Set 804C will be connected to the data set to provide control functions (Talk, Data and Test). In multiple installations using Data 403A1, the control functions ▶(Talk, Data and Test)◀ will be provided by multiple button console telephone sets (630- or 631-type).

1.09 Data Set 403A-type is capable of being operated in either the attended or unattended mode.

1.10 Data Set 403A-Type provides tone answer-back capability.

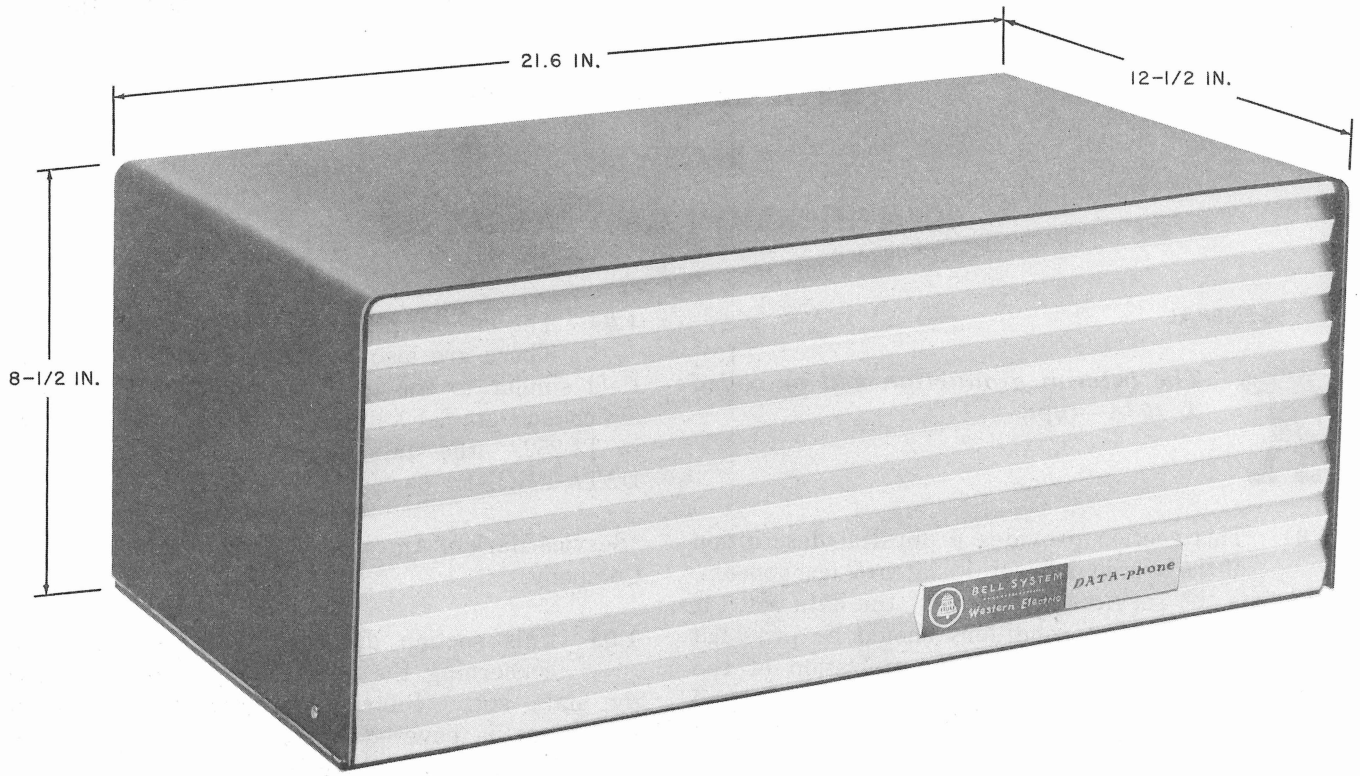


Fig. 1—Data Set 403A-Type, Front View

1.11 The data set accepts customer ▶recorded or machine generated◀ voice signals, limits their power level, and passes them on the the telephone line.

1.12 Circuitry to provide loop-back testing is incorporated in Data Set 403A-type.

1.13 The customer must furnish one cable per receiver, fitted with a Cinch or Cannon type DB-19604-432 connector, or equivalent fitted with a Cinch DB-51226-1 hood assembly.

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

1.15 When test or demonstration calls are made refer to section entitled Crediting Changes On Test Calls (010-250-001).

2. IDENTIFICATION

2.01 ***System Description:*** Data Set 403A-Type will operate in a multiple, or single set configuration. Data Auxiliary Set 804C-type provides control of signal inputs and testing in the single set installations. Fig. 2 illustrates a typical single set installation ▶using Data Set 403A3. The data auxiliary set supplies the control function for both receivers in the Data Set 403A3 or the single receiver in Data Set 403A2. In larger installations◀ 630- or 631-type telephone sets, or multiples of these telephone sets are used for signal control and testing. Fig. 3 illustrates a typical multiple data set installation utilizing ▶four Data Sets 403A1 and a 630-type telephone set. The line signals to the data set are from a TOUCH-TONE dial or telephone, Data Set 401E or other transmitter, which uses the 2-out-of-8 code. The data set changes the line signals to contact closures which are delivered◀ to the business machine. The business machine then responds by passing contact closures, or recorded voice signals back through the answer-back portion of the data set to the originating source.

2.02 Physical Description

(a) ***External Description:*** Data Set 403A-type is a single unit which contains one or two data receivers. The data set is enclosed in a

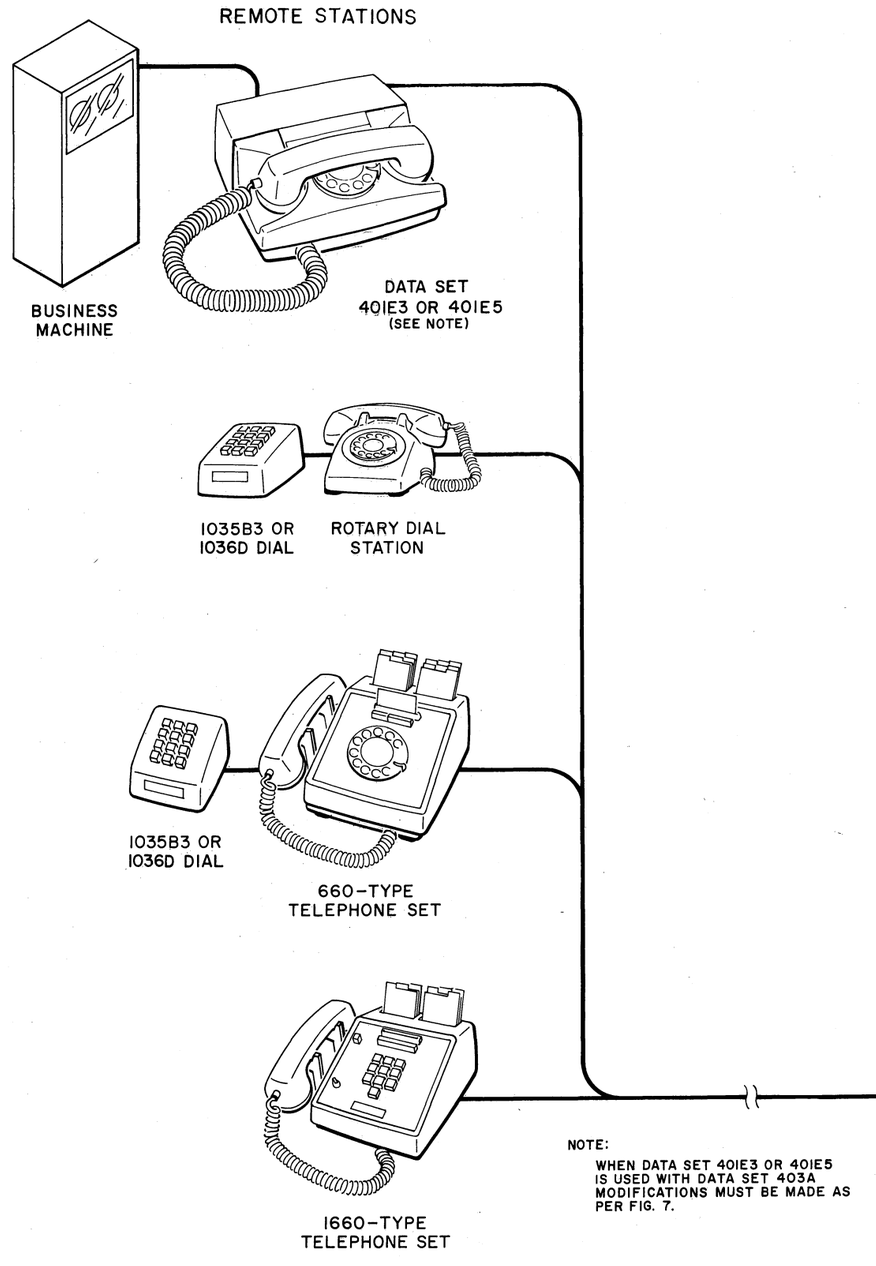
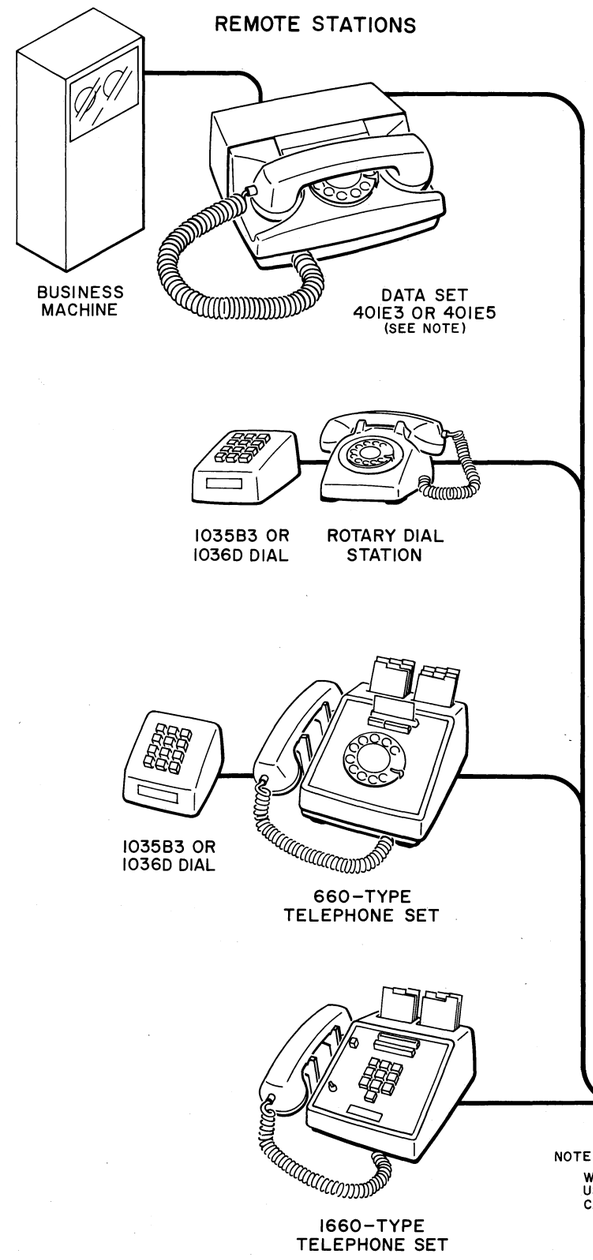


Fig. 2—Typical Individual Data Set 403A3, Installation With Remote Station Input Source



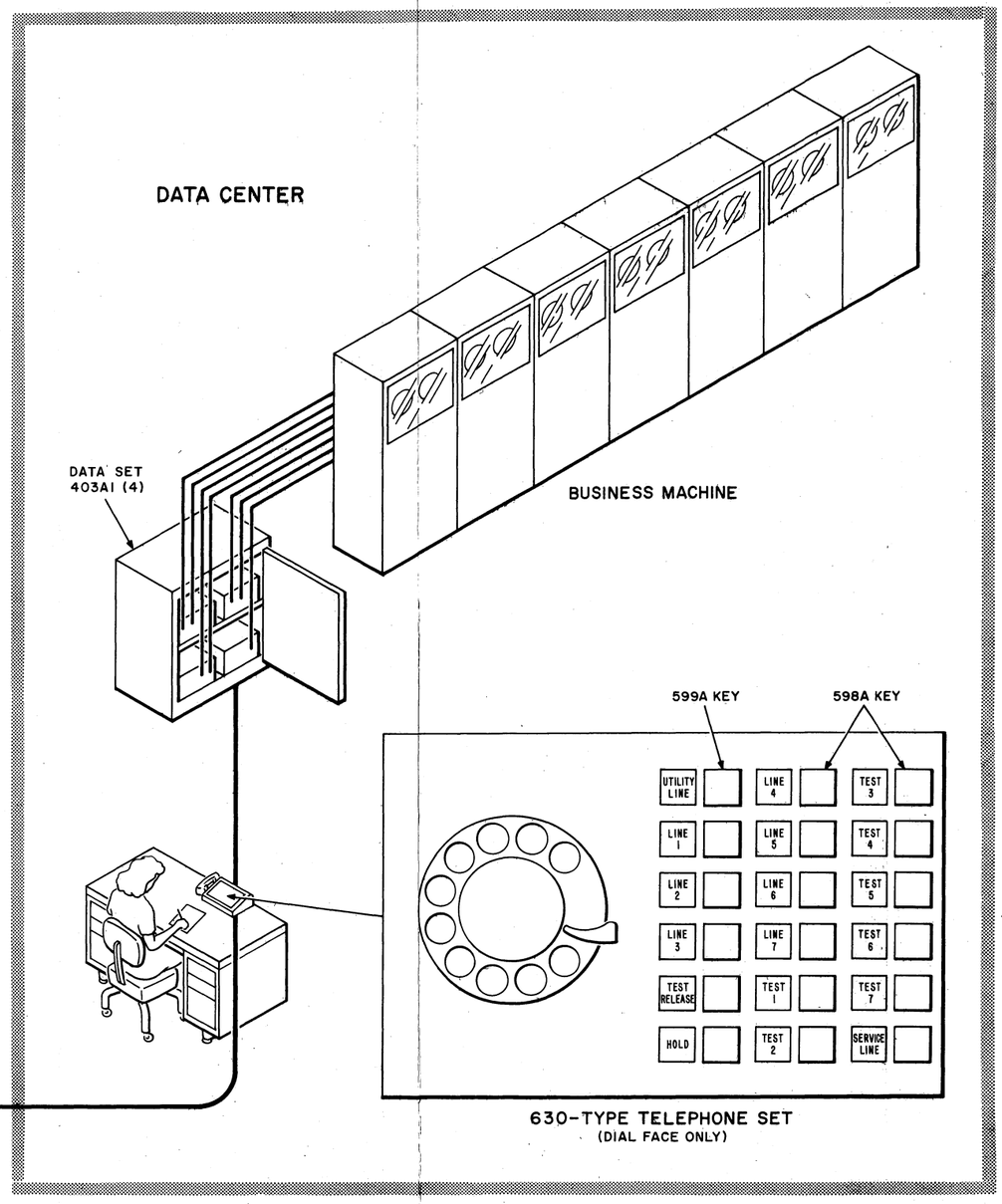


Fig. 3—Multiple Data Set 403A1 Installation With Remote Station Input Sources

gray metal case with aluminum front, and its measurements are as shown in Fig. 1. At the rear of the data set are four jacks for connecting the data set (Fig. 4). The TEL LINE jack provides the connection for a 50-conductor-A25D-connector cable which is not provided with the data set or Data Auxiliary Set 804C. The jacks designated J2 CKT1 and J2 CKT2 are the customer interface jacks. The cables which attach to these jacks are customer provided, and interconnect the business machine and the data set. These cables should be fitted with a Cinch or Cannon type DB-19604-432 connector, or equivalent fitted with a Cinch DB-51266-1 hood assembly. The circular jack is the power jack. Power cord, KS-14533 List 16, is a 3-conductor cord, 10 feet long, with a U-type grounding plug, and is provided with the data set.

(b) ***Cover Removal and Replacement:***

(1) Remove three screws at the lower rear of data set and one screw along each side (Fig. 4).

(2) Lift the data set cover from the base and faceplate.

(c) ***To Replace Cover of Data Set:***

(1) Position data set cover over base and secure with five screws, three at the rear, and one along each side (Fig. 4).

(d) ***Internal Description:***

(1) Internally Data Set 403A-type contains 10 circuit pack boards for each receiver, a power supply, four test relays, two or four mercury relays, and a plug-in 5A1 Data Unit (Fig. 5), if required. There is also a terminal board (TB1) at the rear of the data set and a smaller terminal board at the bottom of the 5A1 Data Unit for option strapping. The circuit pack boards contain the following circuitry:

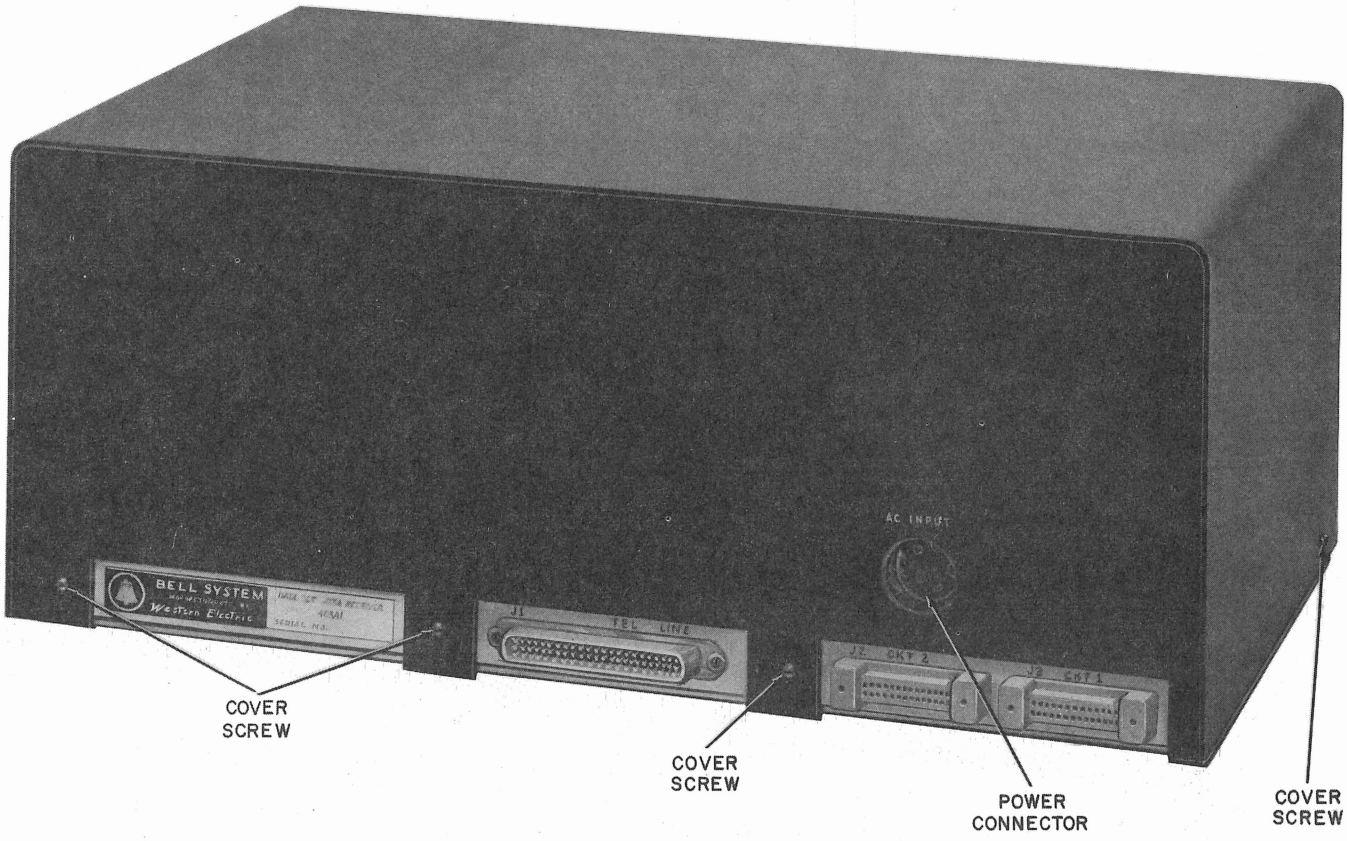


Fig. 4—Data Set 403A-Type Rear View

(a) CP AR48 contains the line control circuit which acts as interface between the telephone line and data set, and provides the following functions:

- Automatic call answering and disconnect. Response to disconnect initiated by the customer.
- 2025 Hz answer-back tone to calling station.
- Timing functions which are necessary to make the data set compatible with single frequency (SF) signaling on existing telephone plant.
- ◗Impedance matching between the data set and DDD or private lines (600 or 900 ohms).
- Protection of data set from electrical disturbances on data line.

(b) CP AR49 contains the AGC amplifier.

(c) CP AR50 contains a band elimination filter.

(d) CP AR51 contains group amplifiers and limiters.

(e) CP AR52 contains detector circuits for 697 and 770 Hz.

(f) CP AR53 contains detector circuits for 852 and 941 Hz.

(g) CP AR54 contains detector circuits for 1209 and 1336 Hz.

(h) CP AR55 contains detector circuits for 1477 and 1633 Hz.

(j) CP AR56 contains the signal timer, output timer, threshold circuitry, and data carrier detector.

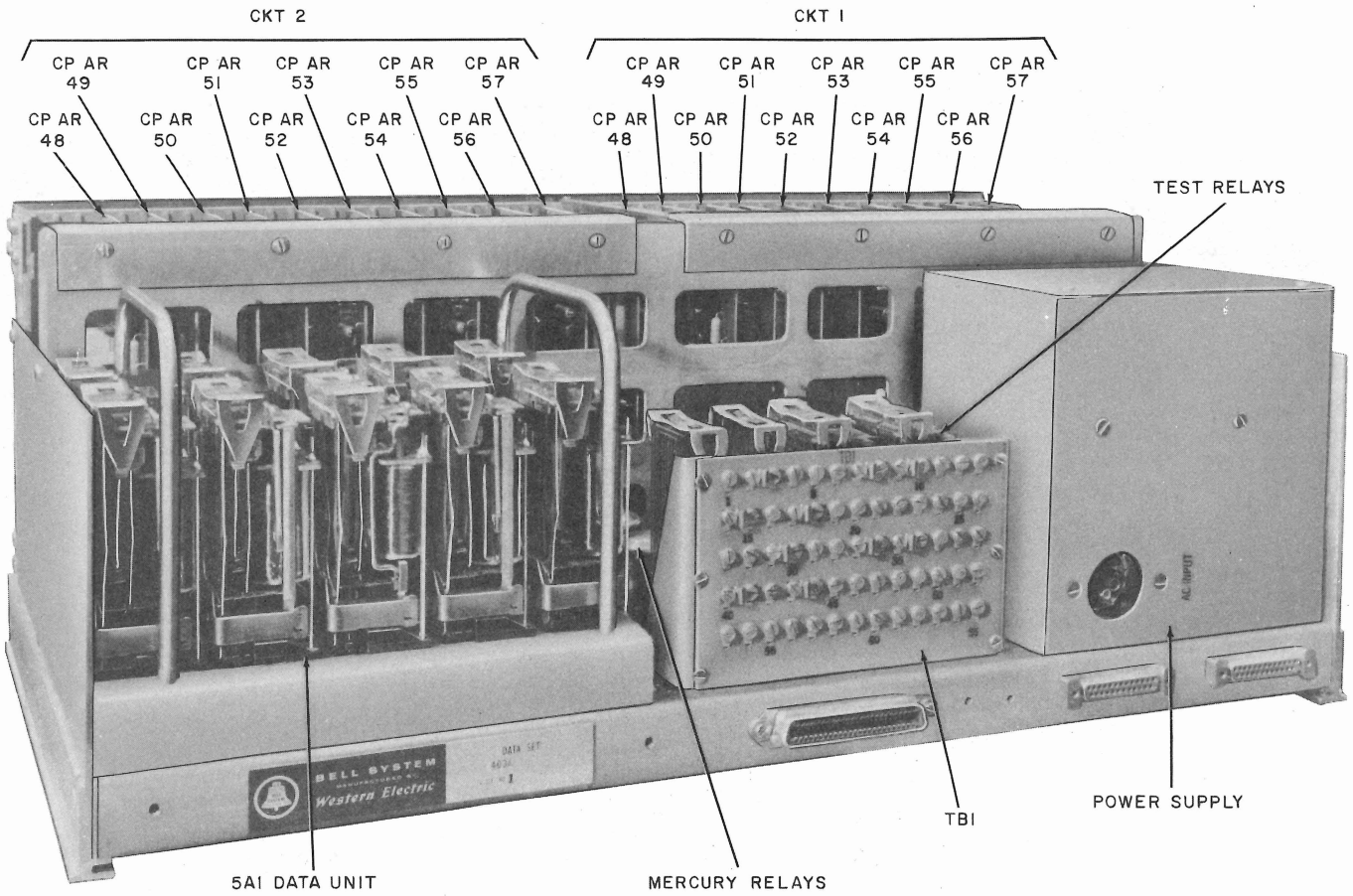


Fig. 5—Data Set 403A-Type, Rear View With Cover Removed Showing Internal Components

(k) CP AR57 contains the answer-back transmitter, voice answer-back channel and remote testing circuitry. ▶Answer-back transmitter and voice answer-back channel constitutes the internal answer-back feature in Data Set 403A type. External and internal answer-back option connections are given in section entitled Data Set 403A-Type Receiver Installation and Connections (594-023-200).◀

(2) The power supply converts 117-volts 60-Hz into two regulated 18-volt dc outputs. The outputs supply ground, —18 volts, and —36 volts to all parts of the data set.

(3) ***Test Relays:*** These relays with associated circuits provide a remote testing feature.

(4) ***Mercury Relays:*** These relays are provided in pairs, one for each receiver, a single pair consists of a DR relay and an AB relay.

(5) The 5A1 Data Unit is a key telephone control unit which consists of ten relays, five for each receiver. It is used with key telephone equipment in multiple line installations. It provides the necessary switching and controls to intercept incoming data calls, and places the data set in the test mode. The 5A1 Data Unit is available in the data set on a plug-in basis. Fig. 6 shows a functional block diagram of Data Set 403A-type.

2.03 ***Interface Lead Designations of Data Set 403A-Type:*** The leads present at the interface connector are numbered and designated as shown in Table B.

TABLE B INTERFACE LEAD DESIGNATIONS

PIN NO.	DESIGNATION	FUNCTION
1	FRAME GRD	Chassis ground of data set.
2	RESERVED	
3	A1	A1 data output terminal, gives contact closure to pin 7.
4	A2	A2 data output terminal, gives contact closure to pin 7.
5	A3	A3 data output terminal, gives contact closure to pin 7.
6	A4	A4 data output terminal, gives contact closure to pin 7.
7	A COMMON	A channel common data output terminal.
8	RESERVED	
9	B1	B1 data output terminal, gives contact closure to pin 13.
10	B2	B2 data output terminal, gives contact closure to pin 13.
11	B3	B3 data output terminal, gives contact closure to pin 13.
12	B4	B4 data output terminal, gives contact closure to pin 13.

TABLE B (Cont)

PIN NO.	DESIGNATION	FUNCTION
13	B COMMON	B channel common. Data outut terminal.
14	RING INDICATOR	Gives ground output when ringing is detected.
15	ATTENDANT	***Single Set Installation:*** External grounding turns on TALK lamp of Data Auxiliary Set 804C when in the data mode. ***Multiple Set Installation:*** External grounding flashes line lamp on 630- or 631-type telephone set when in the data mode.
16	DATA CARRIER DETECTOR	Gives ground output during data output and beyond if input signal is still present.
17	VOICE ANSWER-BACK 1	Balanced 600Ω input to voice answer-back channel.
18	VOICE ANSWER-BACK 2	Balanced 600Ω input to voice answer-back channel.
19	ANSWER-BACK CONTROL A	External ground turns on 1017 Hz answer-back tone.
20	ANSWER-BACK CONTROL B	External grounding turns on 2025 Hz answer-back tone.
	Note: External grounding of both 19 and 20 simultaneously turns on 17854 Hz answer-banck tone.	
21	DATA RECEIVE	Externally grounded data receiver is in data receive condition. Ungrounded data receiver is in the answer-back condition.
22	DATA TERMINAL READY	Externally grounded when the business machine is ready to send or receive data.
23	DATA SET READY	Gives ground output when data receiver is in the data mode.
24	SIGNAL GROUND	Data set power supply ground.
25	OUT OF SERVICE	Externally grounded when data receiver is to be placed out of service.

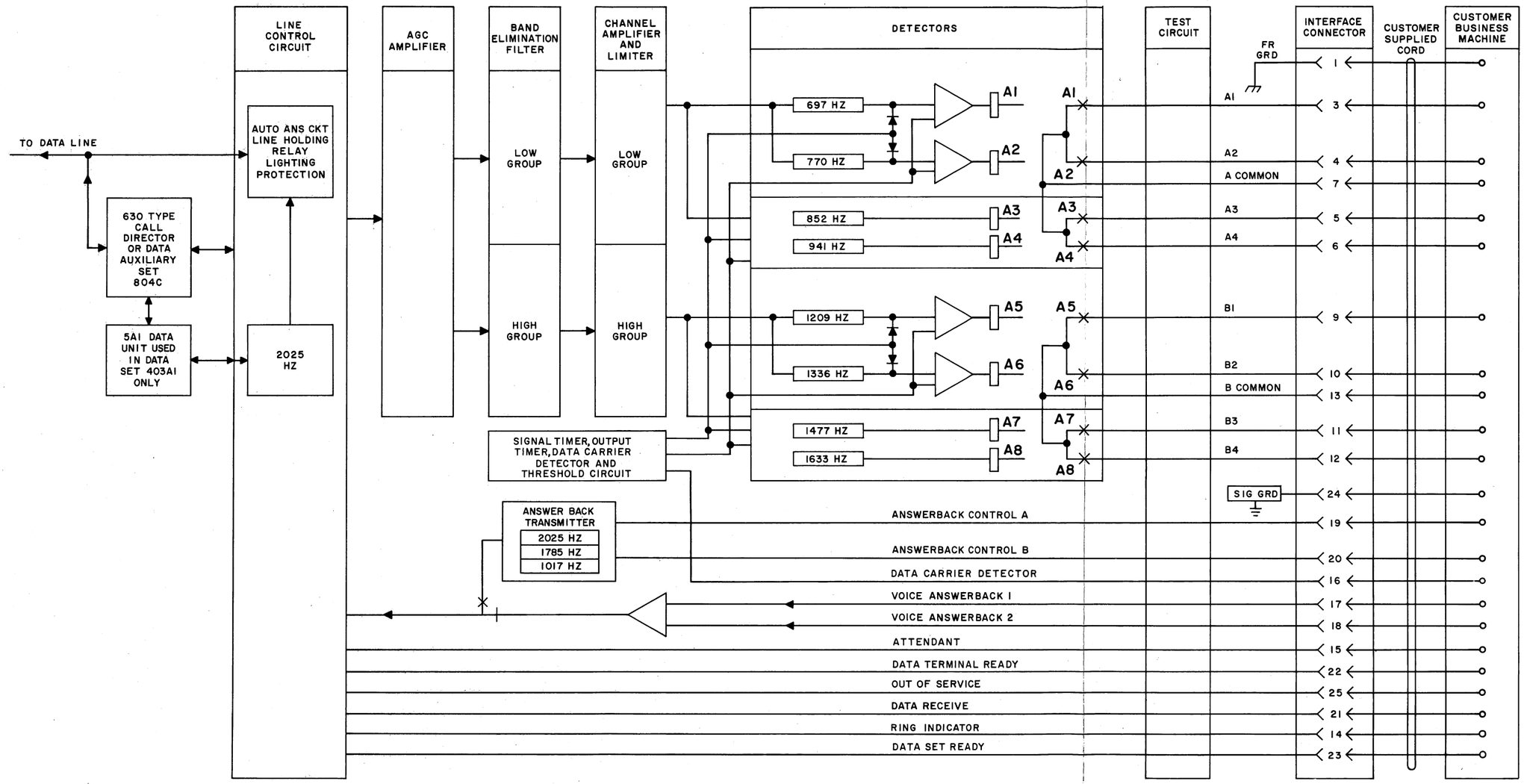


Fig. 6—Data Set 403A-Type, Functional Block Diagram

3. OPERATION

3.01 The Data Set 403A-type may be used in a multiple, or single data set installation. When used in a single data set installation, Data Auxiliary Set 804C provides control key for human interface functions.

3.02 Data Set operation for individual data set installations being used in an unattended mode is described in Table C using Fig. 7.

TABLE C

UNATTENDED OPERATION OF DATA SET 403A-TYPE IN A SINGLE DATA SET INSTALLATION

STEP	OPERATION
1	Connection is established (A to B).
2	Ringing appears on line (B).
3	Ringing is automatically tripped, a dc holding path is connected across line (B). There is no indication that data transmission is taking place.
4	After 1.1 seconds a 2025-Hz tone is transmitted for approximately 1.25 seconds (B to A).
5	Business machine (B) is signaled that data set (B) is ready to receive data.
6	Data is transmitted (A to B). ***Note 1:*** If operator (A) were to have need to converse with operator (B), when Data Auxiliary Set 804C is being used, prior arrangements must be made by the parties for signaling. If required, transmittal of a special might cause the business machine to flash the TALK lamp on the data auxiliary set. After signaling, all that is necessary to go into the talk mode is for the operator to depress the TALK button. To return to data mode, depress the DATA button.
7	The connection may be released in one of the following ways: (a) At any time during a data call, the call can be terminated by opening the Data Terminal Ready lead from the business machine. (b) If there is conversation between customer A and B, all that is needed to terminate the call is for both parties to hang up. ***Note 2:*** If power is lost between the data set and data auxiliary set the data auxiliary set will still operate as a telephone. When the handset is removed from the cradle, line (1) is available. In order to utilize line (2), the operator must lift the left switch hook key.

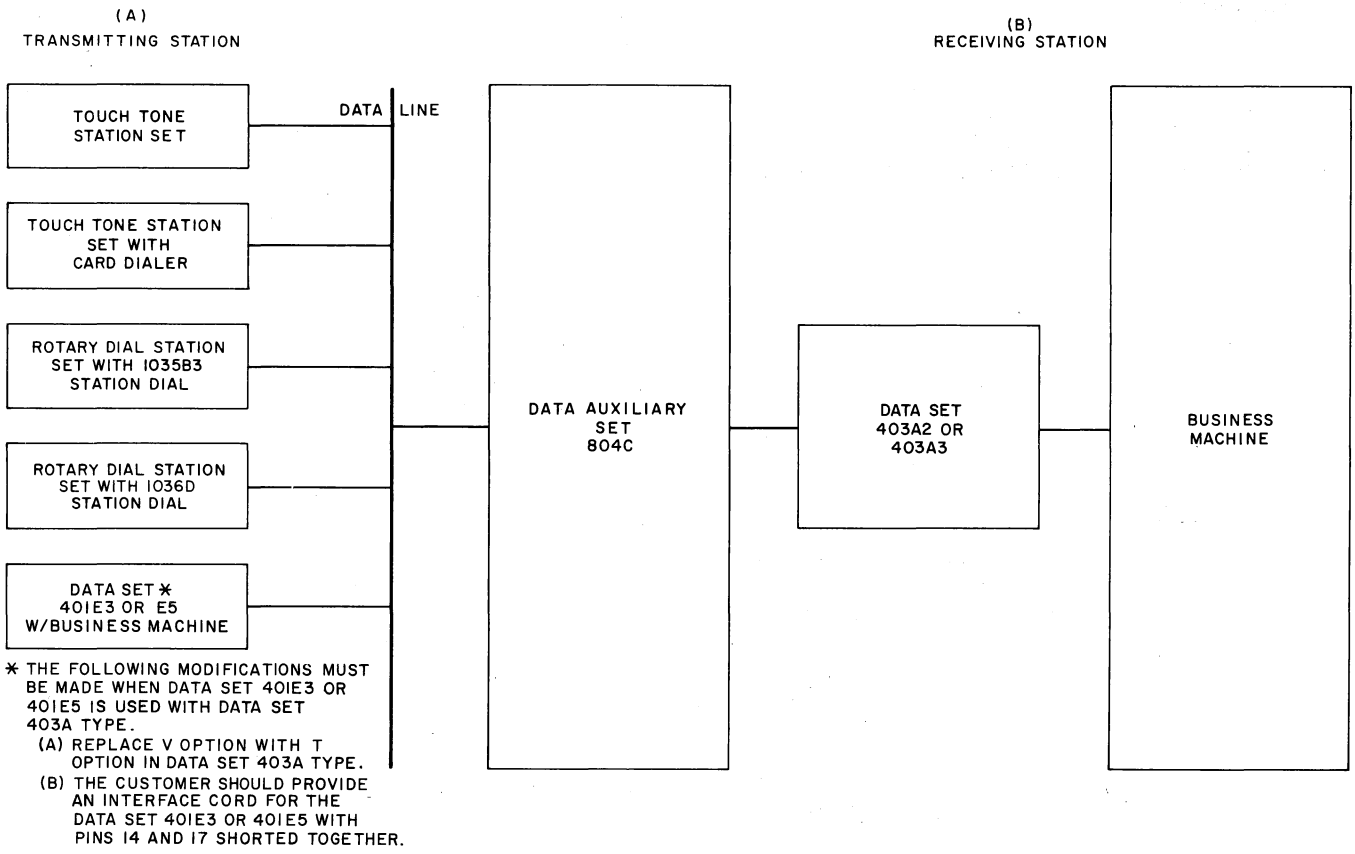


Fig. 7—Unattended or Attended Operation of Data Set 403A2 or 403A3, Single Data Set Installtion Typical

3.03 Data Set operation for individual data set installations being used in the attended mode is described in Table D using Fig. 7.

3.04 The Data Set ▶403A1◀ may be used in any one of a number of multiple data set configurations. Data Set ▶401A1◀ does not have control keys for various functions. Control keys are provided by a 630- or 631-type telephone set or multiples of these telephone sets, dependent on the type and size of the installation required. The 630- or 631-type telephone set provides both line intercept and test control functions. Both functions may be provided by one telephone set, or these functions may be divided by providing two 630- or 631-type telephone sets (one for line intercept and one for test control). Fig. 8 illustrates a 630-type telephone set which provides the line intercept and test control functions for four data sets with 7 of their 8 contained receivers in operation. ▶Each receiver is assigned one LINE key and one TEST key.◀

- The line keys designated LINE 1, 2, 3, 4, 5, 6, and 7 are provided for the line intercept feature.

- The SERVICE LINE provides a loop to the central office for testing the data sets (one at a time). when not in use for testing it may be used for making normal outgoing calls.

- When a data set is to be tested it is removed from its respective data line and connected to the SERVICE LINE and placed in the test mode by depressing the respective TEST key.

- The TEST lamp 1, 2, 3,4, 5, 6, or 7 indicates which of the data sets is connected to the SERVICE LINE and indicates whether or not that line is in the test mode.

- The TEST RELEASE removes the data set from the SERVICE LINE, returns it to its original data line and releases the data set from the test mode.

- The UTILITY line provides an additional facility for making outgoing calls.

- The HOLD button places a data line, the SERVICE LINE, or the UTILITY line in the HOLD condition provided voice communication has been established.

3.05 In multiple data set installations the customer's business machine may or may not control line intercept. When the business machine requires contol of line intercept the 5A1 Data Unit must be in the Y option. Line intercept access can then be gained only by grounding the ATTENDANT lead at the customer interface. If control of line intercept is not required by the customer, the 5A1 Data Unit may be placed in the Z option. If the Data Unit has the Z option the attendant can interfere with data transmission. Ordinarily the only time the attendant would operate the equipment is during testing, or if the remote transmitting station were to need information in addition to what the business machine would provide. In this case, the business maching acting upon a special code or on its own initiative, grounds the ATTENDANT lead. The monitoring attendant recognizes this condition by observing a flashing LINE button. a buzzer may be added for audible observation. The monitoring attendant answers by removing the handset and depressing the appropriate LINE button. The monitoring attendant may also select any of the data sets and place it on the SERVICE LINE for testing.

3.06 Data set operation for a typical multiple data set installation is described in Table E using Fig. 9.

TABLE D

ATTENDED OPERATION OF DATA SET 403A-TYPE SINGLE DATA SET IN A SINGLE DATA SET INSTALLATION

STEP	OPERATION
1	Connection is established (A to B).
2	Ringing is heard at B.
3	Monitor at (B) removes handset and depresses the proper TALK key.
4	Conversation determines that data is to be transmitted.
5	Monitor at (B) depresses the appropriate DATA key and hangs up.
6	A 2025 Hz tone is transmitted for 1.25 seconds.
7	To terminate call, refer to Table C step 6 and 7.

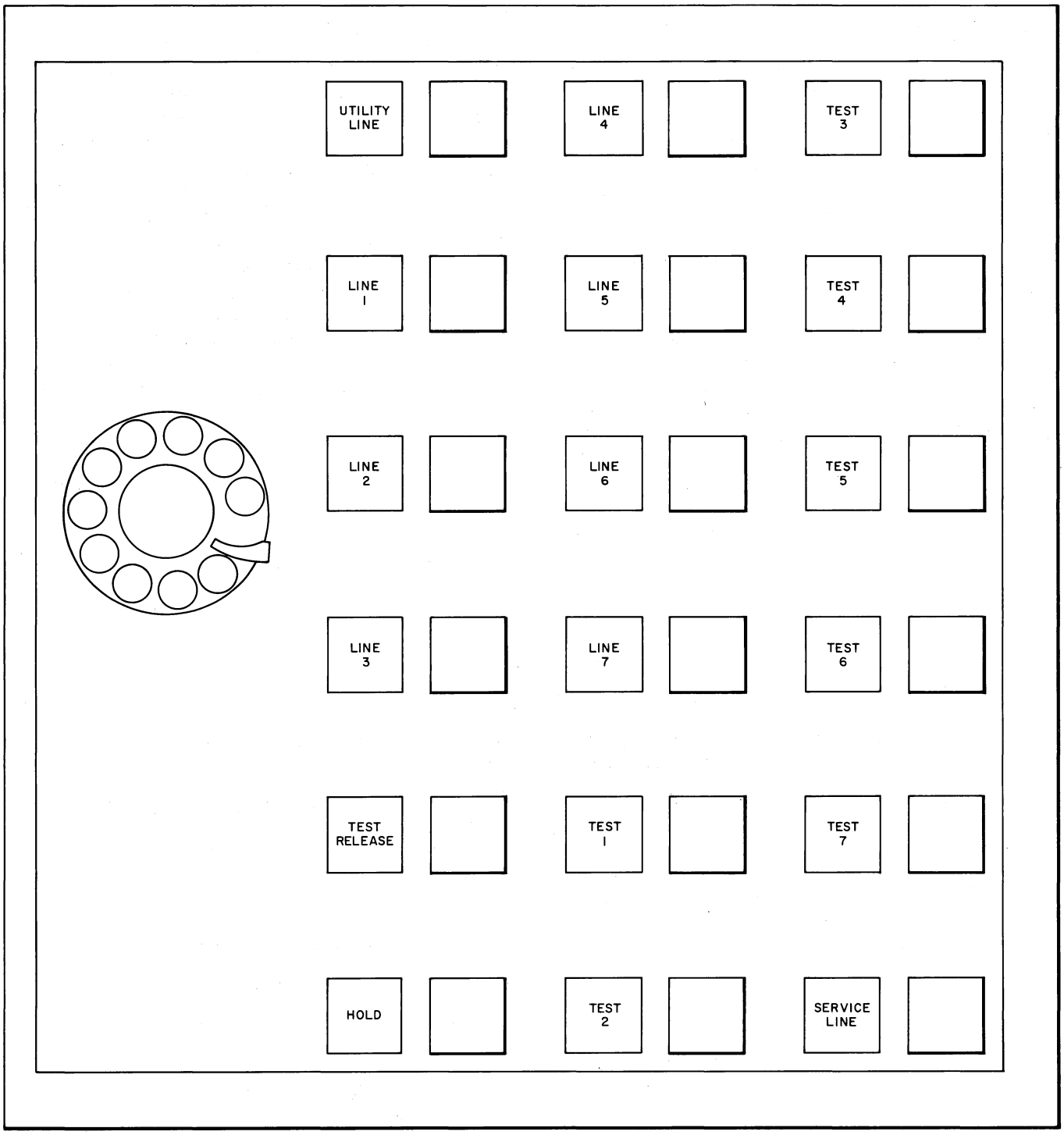


Fig. 8—630-Type Telephone Set Showing Test Buttons and Their Designations

TABLE E

TYPICAL OPERATION OF DATA SET 403A TYPE

STEP	OPERATION
1	Connection is established (A to B).
2	Ringing appears on line (B).
3	Ringing is automatically tripped, a holding bridge is connected across line (B). There is no indication that data transmission is taking place.
4	After 1.1 seconds a 2025-Hz tone is transmitted for approximately 1.25 seconds (B to A).
5	Business machine (B) is signaled that data set (B) is ready to receive data.
6	Data is transmitted (A to B). *Note:* If operator A were to have need to converse with operator B, the business machine acting on a special code or its own initiative establishes the connection which appears as a flashing LINE lamp on the 630- and 631-type telephone set of operator B. Operator B observes this, lifts the handset, depresses the flashing LINE lamp, which then becomes a steady light, and speaks to operator A.
7	The connection may be released in one of the following ways: (a) At any time during a data call, the call can be terminated by opening the Data Terminal Ready lead from the business machine. (b) If there is conversation between customer A and B, all that is needed to terminate the call is for both parties to hang up.

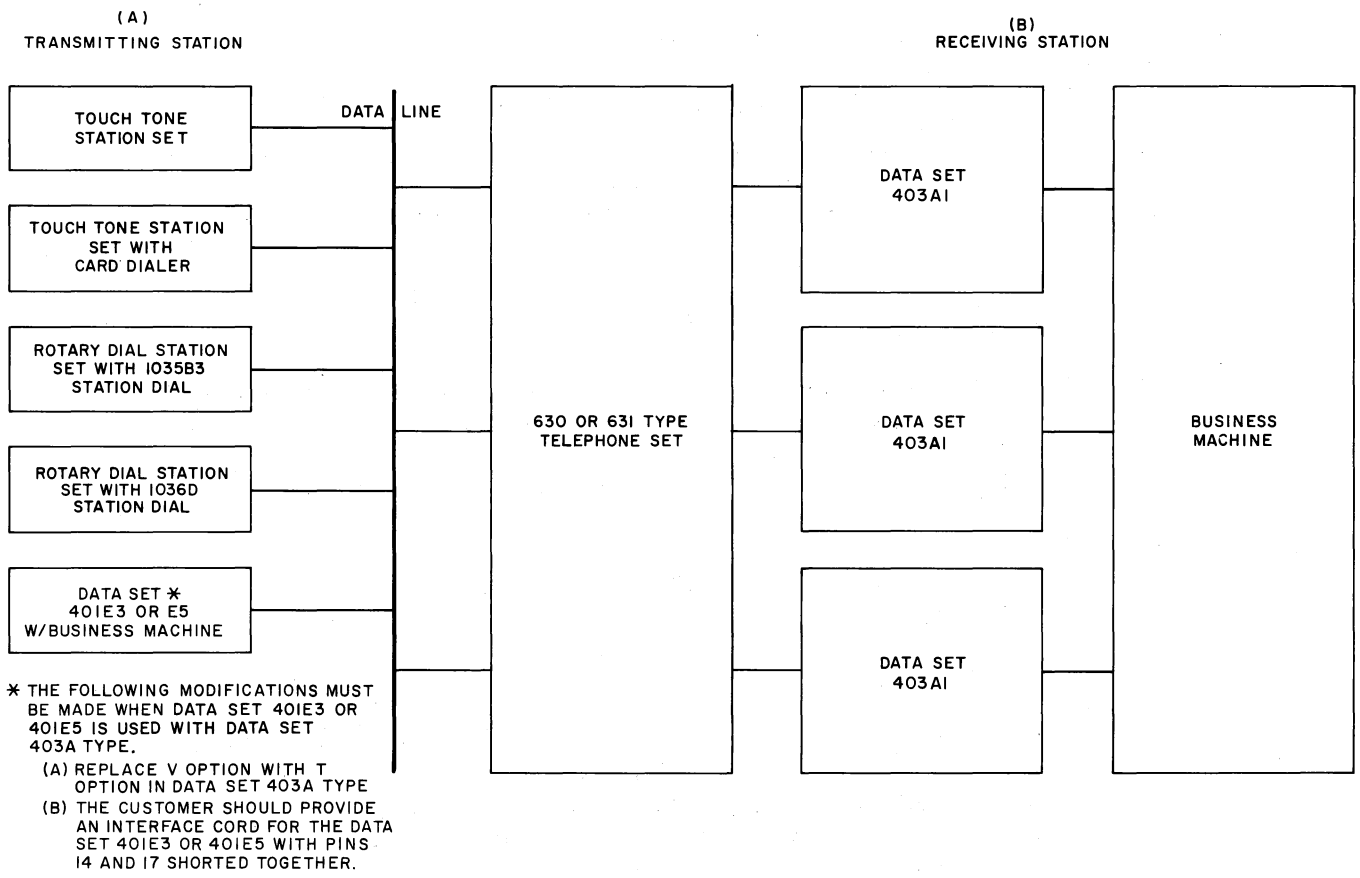


Fig. 9—Typical Operation of Data Set 403A1, Multiple Installation