

**DATA AUXILIARY SET 824A-TYPE**  
**50-KILOBIT DATA RECOGNIZER**  
**(FOR CPE USE)**  
**DESCRIPTION**

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a wideband data station using Data Set (DS) 303-type. Due to extensive revision, change arrows have been omitted.

**1.03** Data Auxiliary Set 824A-type provides for data recognition and switching. Installer options are available to convert DAS 824A for use in any one of five different station arrangements. These DAS 824A configurations are designated as options.

**1.04** This section provides a detailed description of DAS 824A when used exclusively with customer-provided equipment (CPE). This arrangement is referred to as option X. Options Z, Y, W, and V that are used with associated Bell System-provided equipment are described briefly. Options Z, Y, W, and V are described in detail in Sections 593-800-101, -201, and -501 where the DAS 824A interconnection with other Bell System equipment is described.

**2. PHYSICAL DESCRIPTION**

**2.01** Data Auxiliary Set 824A-type is designed to physically mount and operate independently or with associated units.

**2.02** The equipment can be located either at the central office or on the customer's premises.

**2.03** Data Auxiliary Set 824A2 comes equipped with a 26A power unit. DAS 824A1 is not equipped with a power unit and must obtain its power from an external source. Refer to Fig. 1, 2, 3, and 4.

**2.04** When DAS 824A-type is to be used as an independent unit, DAS 824A2 must be used. When two data recognizers are installed together (adjacent), one must be DAS 824A2 and the other can be a DAS 824A1. In this case, DAS 824A2 supplies power for DAS 824A1 also.

**1. GENERAL**

**1.01** This section contains the physical and functional description of Data Auxiliary Set (DAS) 824A-type and information pertinent to its application.

**1.02** The section is reissued to add information pertaining to the use of DAS 824A-type with

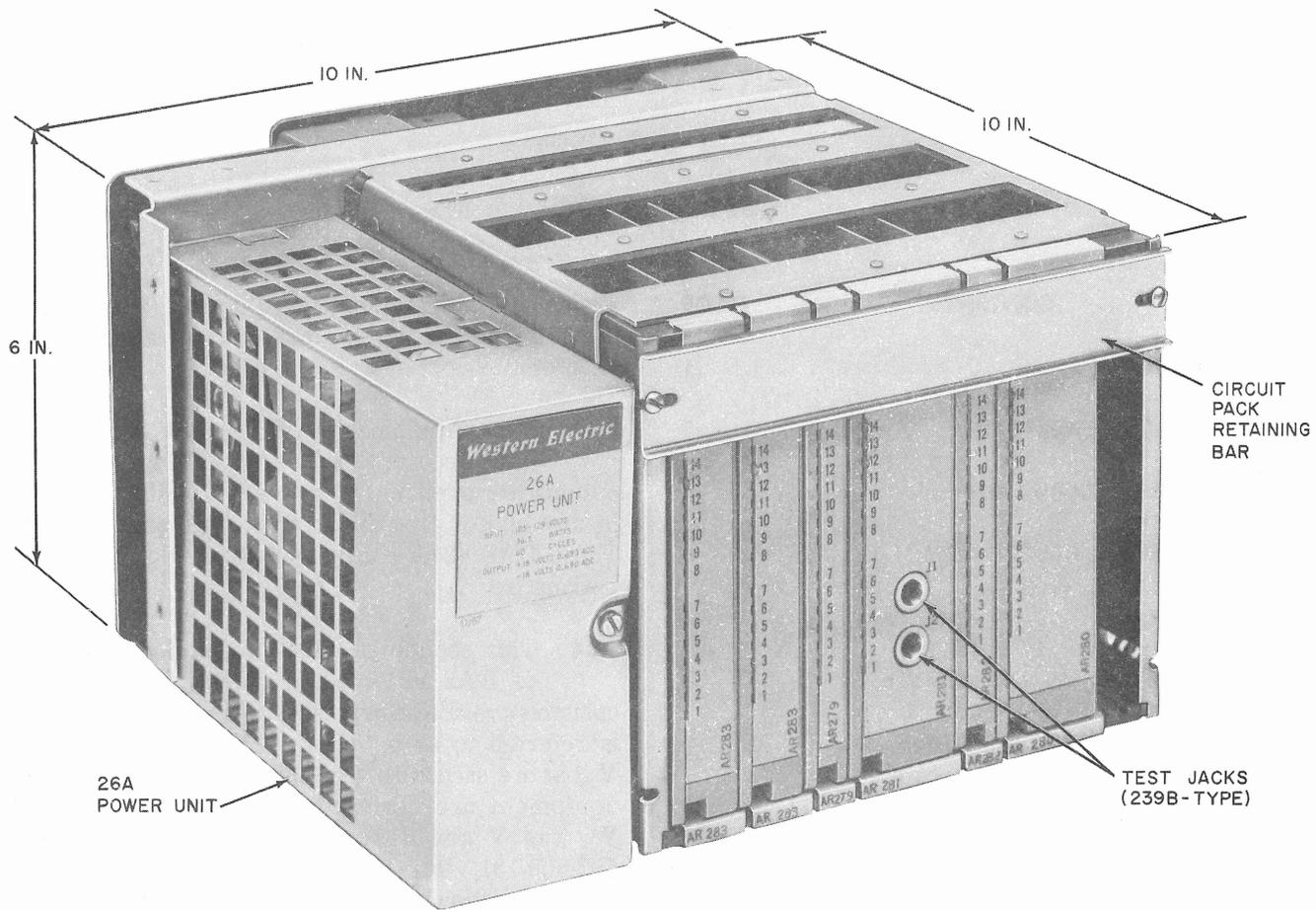


Fig. 1—Data Auxiliary Set 824A2, Front View

**2.05** When DAS 824A-type is used as part of a 303-type wideband data station, DAS 824A1 can be used and mounted adjacent to the associated DAS 806. In this case, the DAS 824A1 power is usually obtained from DAS 806. Refer to Section 593-800-201.

**2.06** Data Auxiliary Set 824A-type measures approximately 6 inches high, 10 inches wide, and 10 inches deep.

**2.07** Data Auxiliary Set 824A1 weighs approximately 10.5 pounds. DAS 824A2 weighs approximately 15.5 pounds.

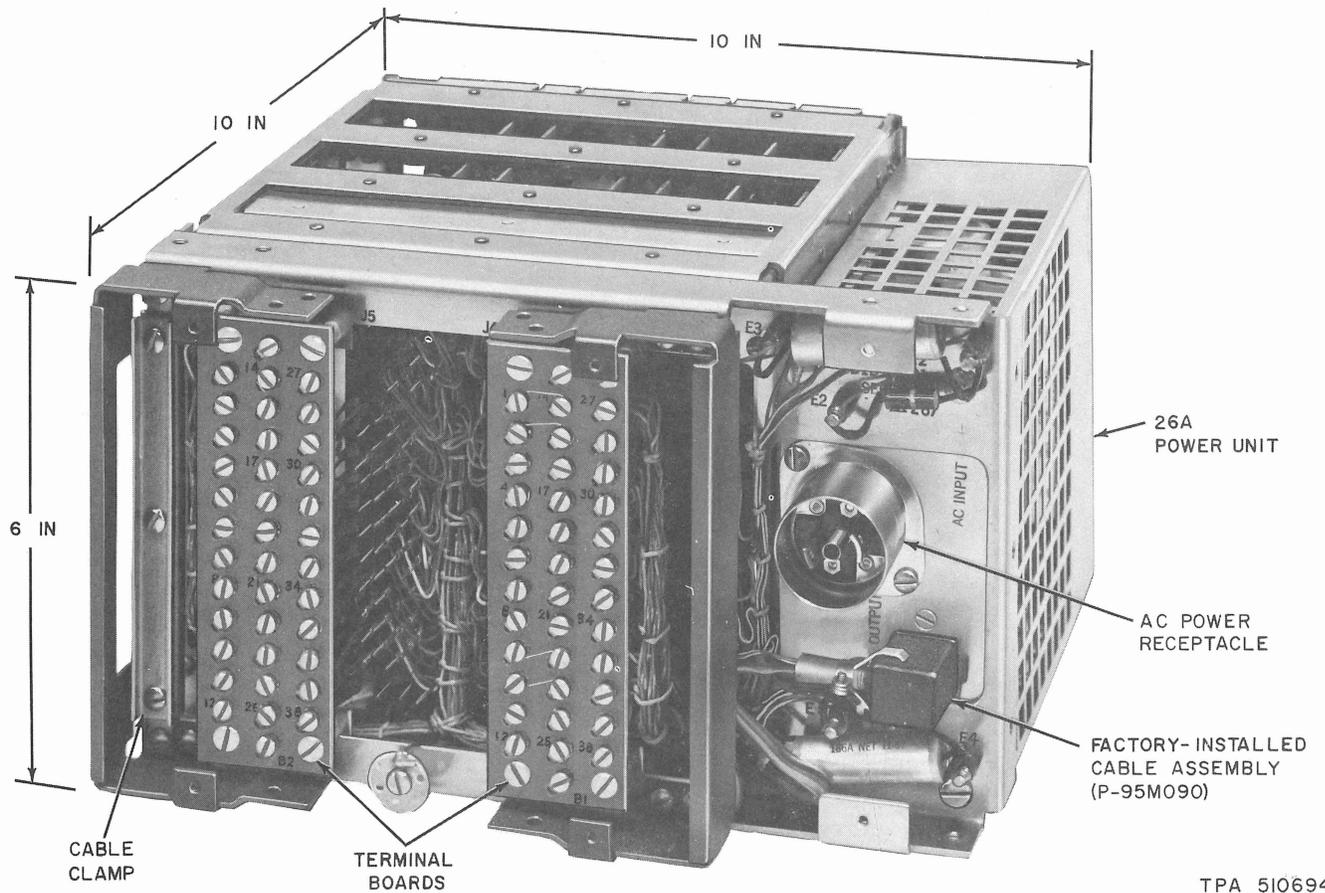
**2.08** Data Auxiliary Set 824A-type mounts individually, with appropriate 87-type mounting brackets on 19-inch, 23-inch, or 25-inch Bell System

relay racks or in KS-20018 or KS-20093 type cabinets. Refer to Section 598-060-200.

**2.09** Data Auxiliary Set 824A-type can be mounted in combination with another DAS 824A-type or a DAS 806-type, with appropriate 87-type mounting brackets, on 23-inch or 25-inch Bell System relay racks or in KS-20018 or KS-20093 type cabinets. Refer to Section 593-800-201.

**2.10** A factory-installed cable assembly is provided on DAS 824A1 for obtaining dc power from the adjacent DAS 824A2 or DAS 806-type.

**2.11** A KS-14532-L2 cable assembly is supplied with the DAS 824A2 for obtaining 117-vac power from the customer-provided power receptacle.



TPA 510694

**Fig. 2—Data Auxiliary Set 824A2, Rear View (Covers Removed)**

**2.12** Interface connections to DAS 824A-type are made by running connecting cables under cable clamps at right side of set (looking at rear) and onto the two terminal boards located under the rear cover. Refer to Section 598-060-200.

**2.13** Two jacks (239B-type) are provided on the front of DAS 824A-type (CP AR281) to facilitate testing.

### 3. GENERAL DESCRIPTION

**3.01** Data Auxiliary Set (DAS 824A) circuitry bridges and monitors the customer's transmit and receive lines. The purposes of DAS 824A are:

- To determine when 50-kbps (kilobit per second) data is being transmitted from the near-end customer-provided equipment (CPE) and/or facilities and when 50-kbps data is

being received from the far-end CPE and/or facilities.

- To switch 4-wire balanced customer or plant lines (carrying voice, voice-frequency signaling tones, or 50-kbps baseband serial binary signals) to either a 4-wire voice-frequency channel or to a 4-wire 50-kbps data transmission channel.
- To independently switch customer 4-wire balanced wideband and voiceband lines to Bell System wideband and voiceband facilities on an 8-wire to 8-wire basis as a function of the signals on the customer's line.
- To provide a simulated data signal under certain conditions.
- To bypass a CPE translator when voice-frequency signals are being transmitted.

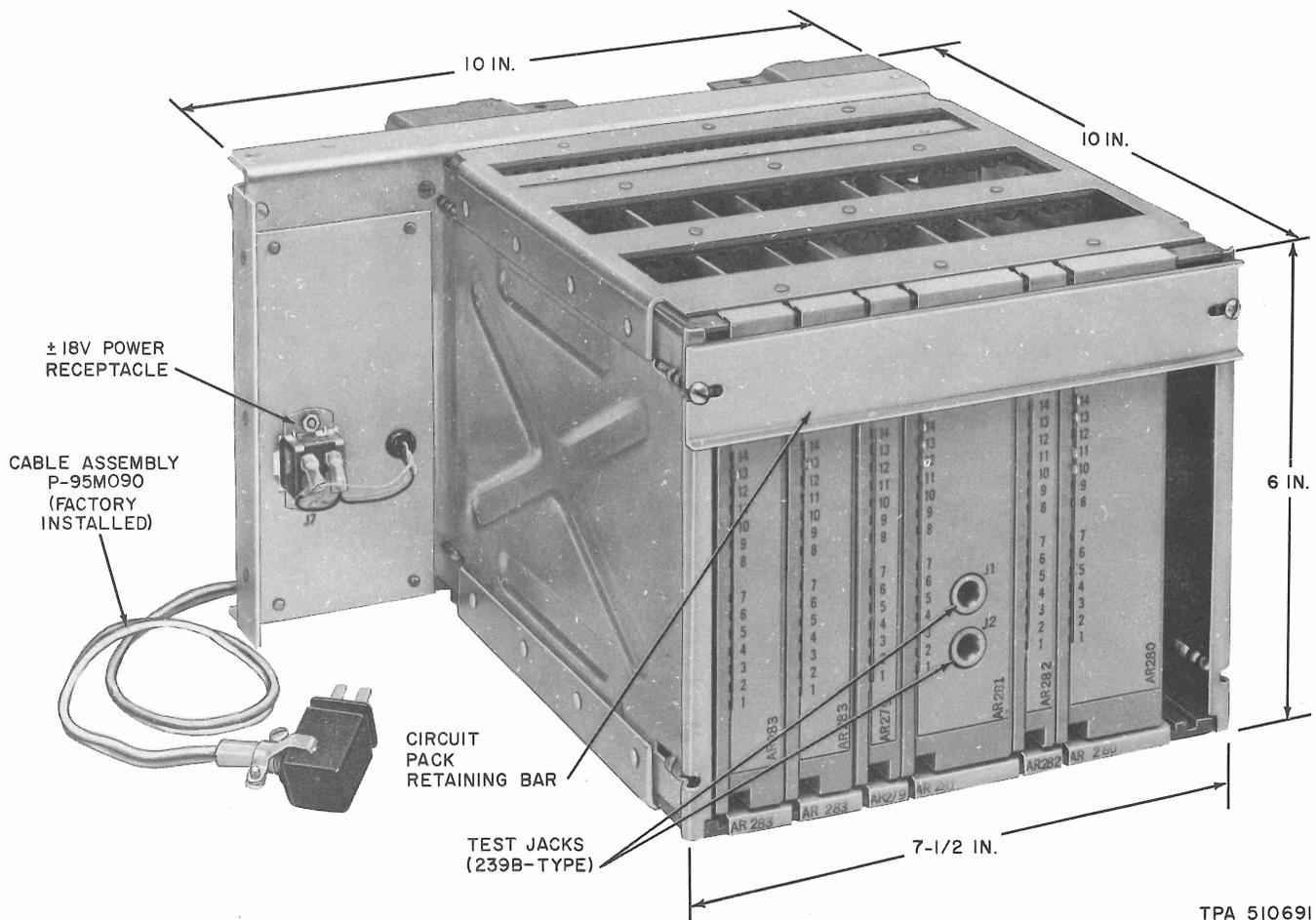


Fig. 3—Data Auxiliary Set 824A1, Front View

- To provide the customer with a set of contact closures when 50-kbps digital signals are being transmitted or received and the station is used for 8-wire to 8-wire switching.

**3.02** There are several configurations available using DAS 824A. The particular configuration is selected at time of installation by means of option strapping. This permits operation in a variety of applications.

**3.03** There are five different options available to convert DAS 824A for use in any of the five different configurations of customer connections and transmission facilities. However, only four of these configurations are used over the Bell System facilities. Each option is assigned a letter designation for reference purposes. The X option is used to introduce a CPE translator in a 4-wire line when

50-kbps data is present. A complete description of the X option is contained in Part 4. The following is a brief description of the Z, Y, W, and V options, all of which are used in arrangements with DS 303-type wideband data stations.

- (1) ***Four-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line (Option Z):*** Provides a means for full-duplex switching of a customer's 4-wire voice-frequency or wideband line to either a 4-wire wideband Bell System line or a 4-wire voice-frequency Bell System line. Refer to Fig. 5. When no data is present, the switching is such that the connection is to the voice-frequency line. The connection is switched to the wideband line when data is present.
- (2) ***Four-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line With 50-kbps***

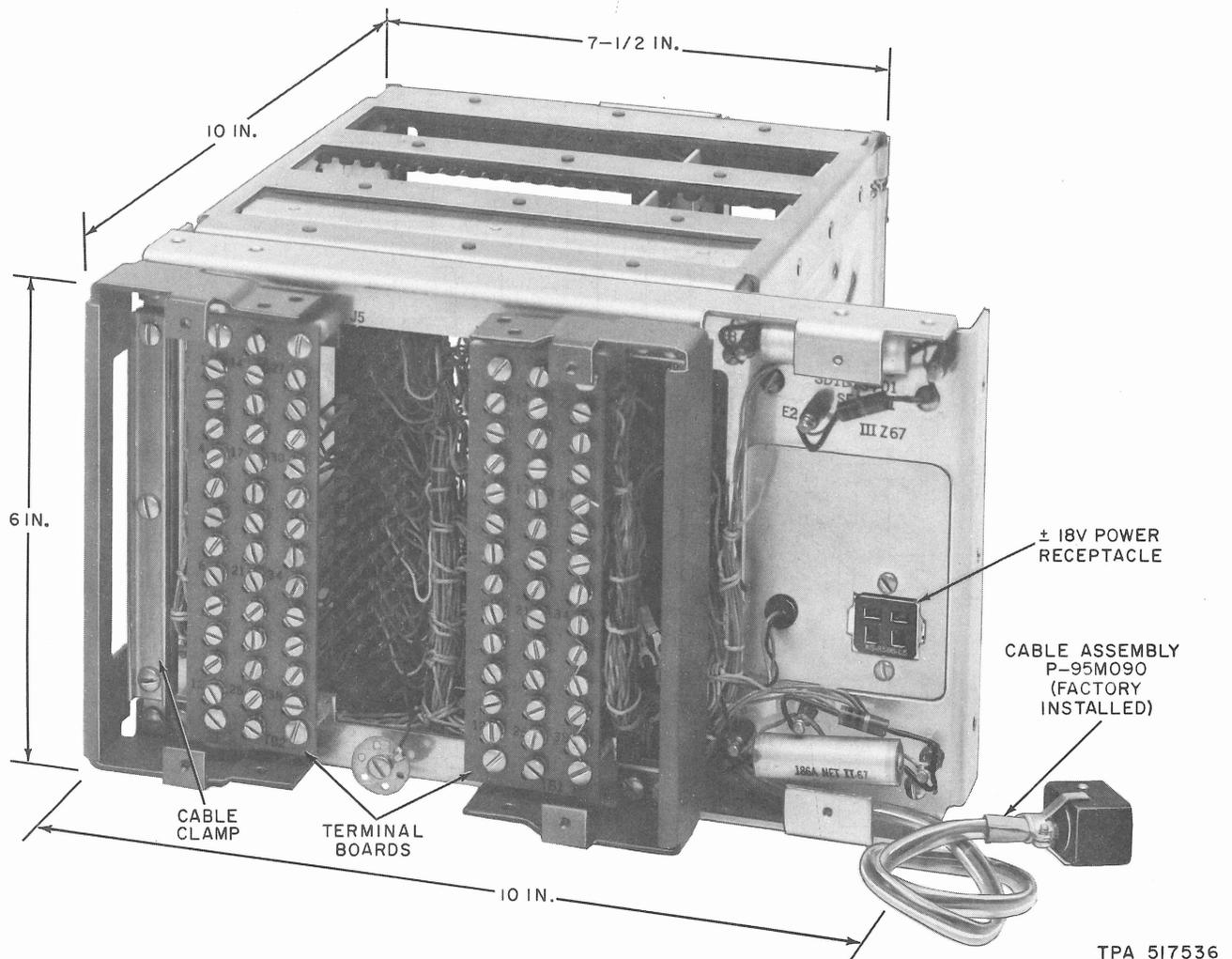


Fig. 4—Data Auxiliary Set 824A1, Rear View (Covers Removed)

**Oscillator (Option Y):** Provides the 4-wire to 8-wire switching function of the Z option and, in addition, simulates a digital response necessary to keep certain customer equipment from timing out ("fooler"). Refer to Fig. 6. Provides a means for sending a 50-kilobit dotting signal (25-kilohertz rectangular wave) which is returned to the originating station to simulate data in order to hold the customer's equipment on line until a data signal is returned from the far end.

(3) **Four-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line With Translator (Option W):** Provides the 4-wire to 8-wire

switching and "fooler" function of option Y and, in addition, provides facilities for connecting CPE translating equipment in the wideband branch. Refer to Fig. 7.

(4) **Eight-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line (Option V):** Provides the 8-wire to 8-wire interface and independent switching of the customer's voice and wideband data pairs. Also, provides contact closures to the customer when data is detected in either direction of transmission. Refer to Fig. 8.

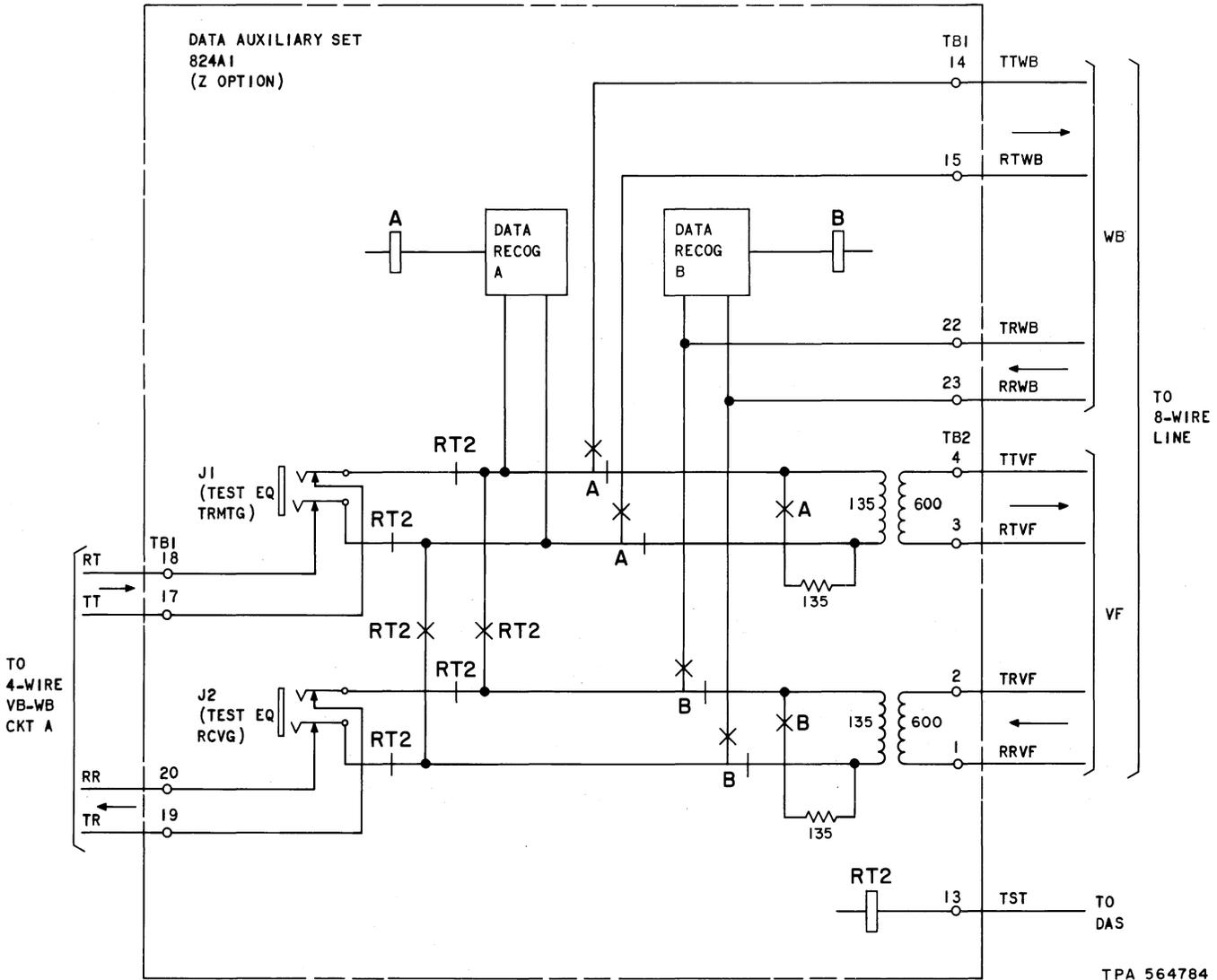


Fig. 5—Four-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line (Option Z)

4. FUNCTIONAL DESCRIPTION

A. General

4.01 Data Auxiliary Set (DAS) 824A-type is designed to perform certain switching as a function of 50-kbps data being present. Fig. 9 is a functional schematic of DAS 824A-type arranged in the X option configuration.

4.02 Data Auxiliary Set 824A-type provides switching arrangements from a 4-wire customer line to an 8-wire Bell System line and from an 8-wire customer line to an 8-wire Bell System line for use with a 303-type wideband data station. The above switching is provided by options V, W, Y, and Z.

Information pertaining to the use of these options and the associated Bell System station equipment is provided by Sections 593-800-101, -201, and -501.

4.03 Data Auxiliary Set 824A-type also provides a 4-wire to 4-wire switching arrangement for use with CPE equipment (option X). Option X uses no Bell System equipment other than DAS 824. This option is described in detail in the following paragraphs.

B. Option X Voiceband Mode

4.04 Option X provides a 4-wire to 4-wire switching arrangement. One side is designated as VF-WB CIRCUIT (A) and the other side as VF-WB

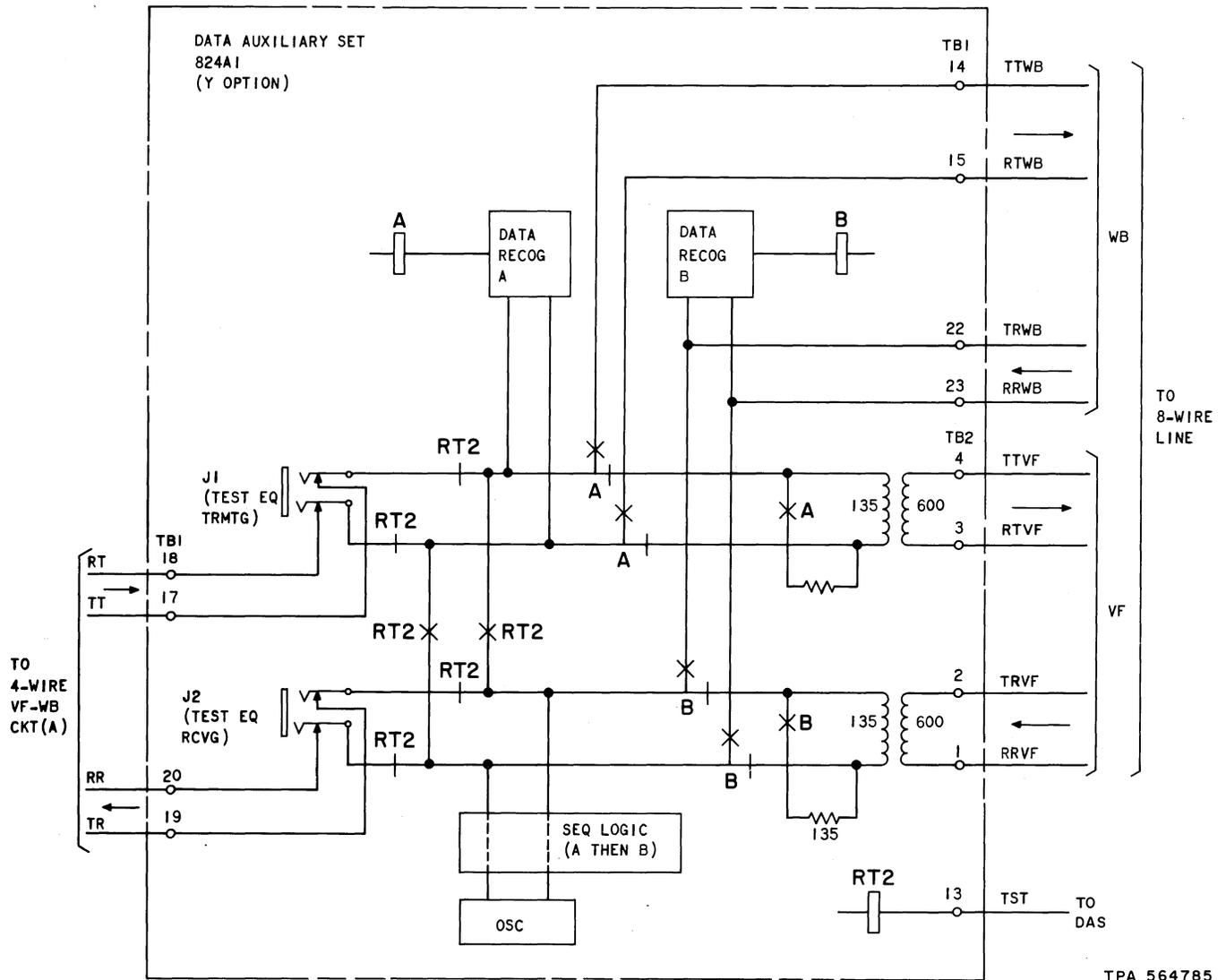


Fig. 6—Four-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line With 50-KBPS Oscillator (Option Y)

CIRCUIT (B) (refer to Fig. 9). The internal circuitry (option X only) is a straight 2-way, 4-wire voice-frequency channel from side A to side B when no data is present at either input. In the normal voiceband mode, the voiceband signal from the customer is present on transmit side (A) of DAS 824A-type. The signals pass through the normally closed contacts of the DA and DB relays, inserted between the transmit and receive side of the channel, and then pass on to receive side (B). These contacts bypass the customer's translator in the voiceband mode.

**4.05** When voiceband signals are present on the transmit channel of the (B) side, the reverse procedure to that previously described is required.

**4.06** Provision is made in the voiceband path to insert a single-frequency (SF) signaling unit when required. The S option is used when the SF unit is provided. The R option must be used when no SF unit is provided.

### C. Option X Wideband Mode

**4.07** The 4-wire VF-WB CIRCUIT (A) and (B) alternately carry either voiceband and/or wideband signals. When the presence of data is detected for either direction of transmission, the CPE translator is introduced to the circuit in that direction of transmission.

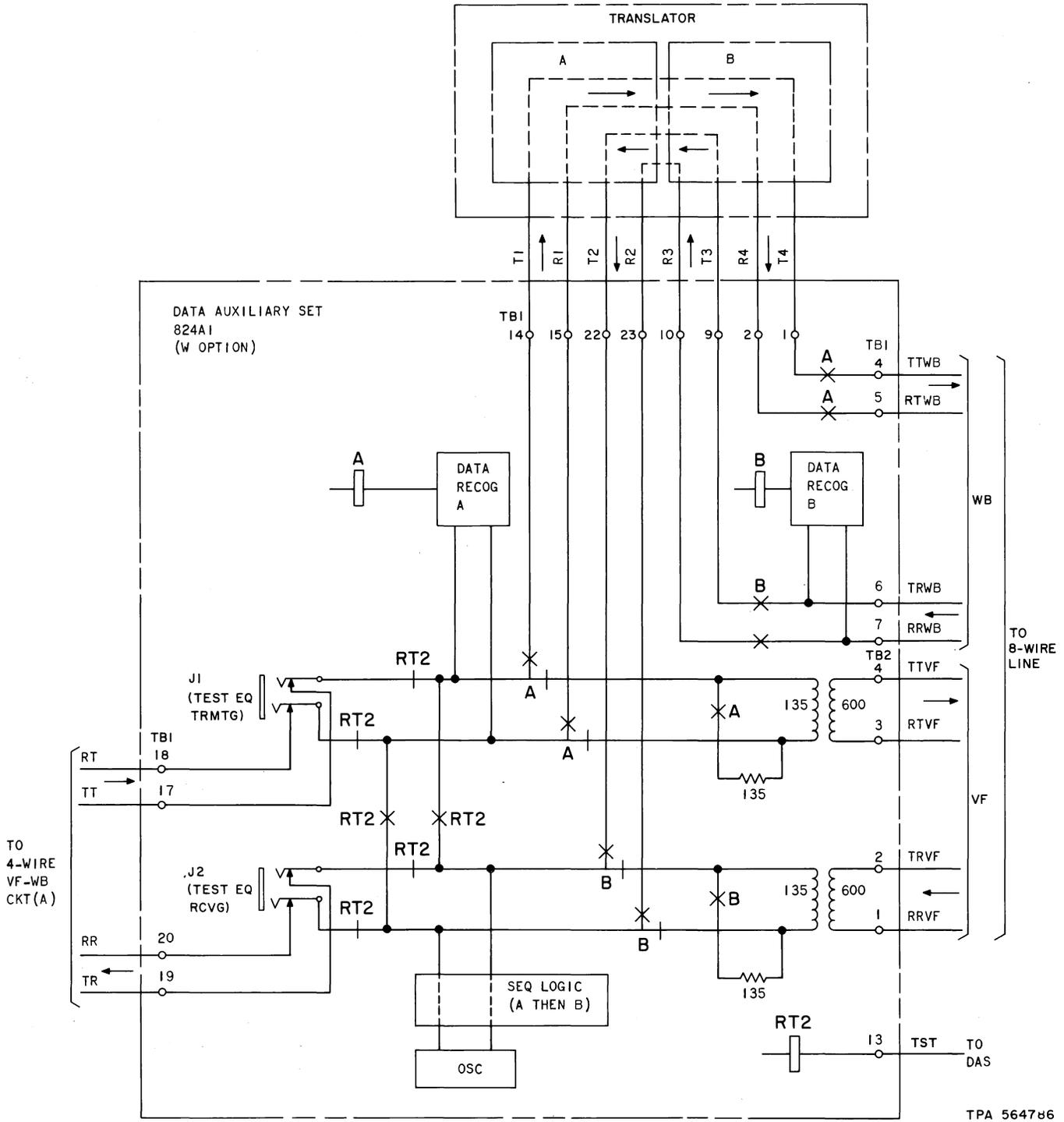


Fig. 7—Four-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line With Translator (Option W)

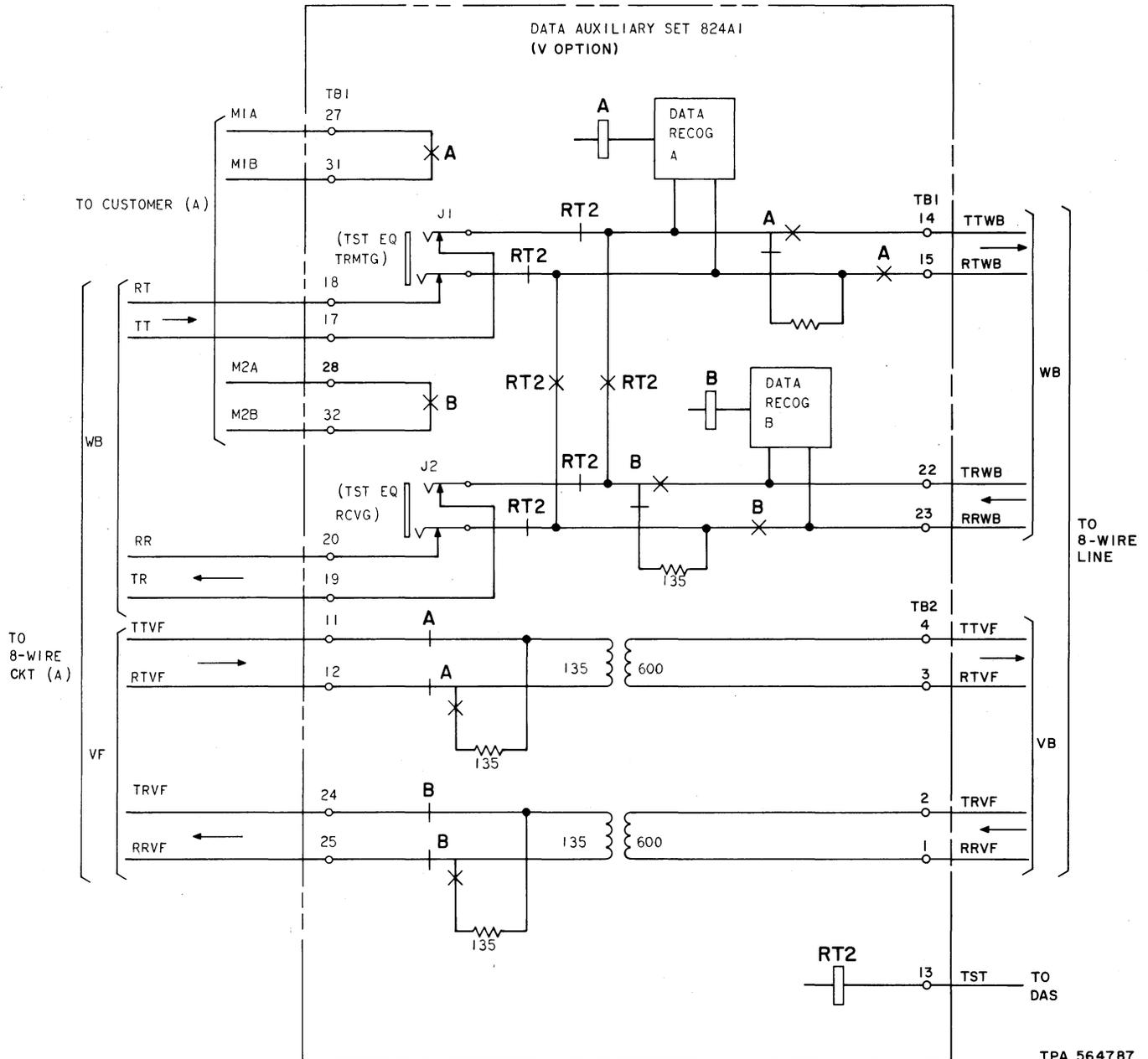


Fig. 8—Eight-Wire Voice Frequency—Wideband Circuit to Eight-Wire Line (Option V)

4.08 Two data recognizers are provided in DAS 824A-type. The recognizer monitoring the A-to-B direction is identified as data recognizer A; the recognizer monitoring the B-to-A direction is identified as data recognizer B.

4.09 For descriptive purposes, the circuit condition considered will be the data mode with data present on VF-WB CIRCUIT (A) (transmit). The

reverse procedure applies when VF-WB CIRCUIT (B) becomes the originating data station.

4.10 When 50-kilobit data is detected on the transmit channel by *data recognizer A*, this condition is used to operate relay DA which controls the transmission path in the A-to-B direction. The information from data recognizer A is also used, in conjunction with the information from data

recognizer B, to control application of the "fooler" 50-kilobit dotting signal.

**4.11** The line relay DA, operated under control of the sequence logic circuit, transfers the data signals to the CPE TRANSLATOR CIRCUIT (A) for processing. The signal is then returned to the data auxiliary set via TRANSLATOR CIRCUIT (B) to again pass through the DA relay to the input of VF-WB CIRCUIT B.

**4.12** A second function of the data recognizer circuit is to provide information to the sequence logic circuit for controlling the time and direction of application of the "fooler" signal.

**4.13** In the example, the "fooler" oscillator provides a simulated data (dotting) signal on the receive channel of the originating station [VF-WB CIRCUIT (A)] at the time data is initiated on the transmit channel. The simulated data signal holds the customer's equipment on line until data returns from the far end. The "fooler" is removed when actual data is received. In this configuration, the oscillator can be switched in either direction to supply a holding signal to the receive data leg of the side which initiates data.

**4.14** The sequence logic is *set* in two conditions; either the A-before-B condition when data is initiated on the transmit side of VF-WB CIRCUIT (A) or a B-before-A condition when data is initiated on the transmit side of VF-WB CIRCUIT (B). Once actual data is returned from the far end to the originating end, the "fooler" is disconnected and sequencing cannot be repeated until data transmission has ceased in both directions.

**D. Remote Test**

**4.15** Data Auxiliary Set 824A-type contains provision for looping the DAS at the customer's A side under remote control. This feature is applicable only when the DAS 824A-type is used as part of a 303-type wideband data station in any one of the V, W, Y, or Z options. In such applications, the remote test feature is controlled from an associated DAS 806B-type and extends the remote testing of the associated 303-type station to include the line-switching features of the DAS 824A-type. This feature is not applicable when DAS 824A is arranged for the X option. For a description of the DAS 824A remote test feature, refer to Section 593-800-101.

**5. COMPONENT DESCRIPTION**

**5.01** The following circuit packs are not illustrated separately. A simplified block diagram of each circuit pack is included as part of Fig. 9. Each circuit pack shown is used in all five of the optional configurations.

**A. Data Recognizer (CP AR283)**

**5.02** The detection circuitry of the data recognizer presents a high-impedance bridge across 135-ohm balanced or unbalanced transmission pairs.

**5.03** The incoming signals from the line pass through a balanced differential amplifier. The low-frequency (VF) gain of the amplifier is eliminated by inductive filters, and the resulting differentiated pulses are reshaped and integrated.

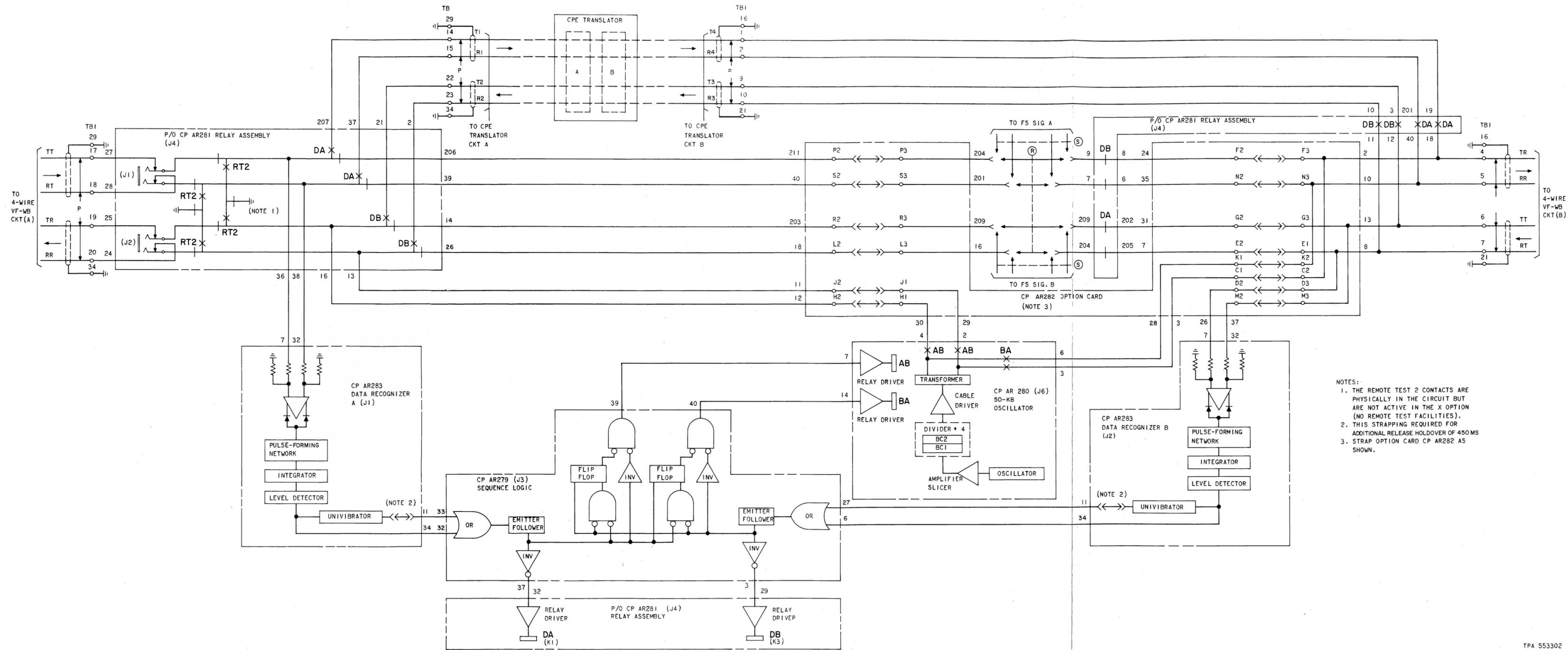
**5.04** When the integrated signal exceeds a fixed level, the level detector is triggered and remains on for 55 milliseconds after the last data was received by the integrator. This signal provides control for switching relay DA on the relay assembly.

**5.05** With the use of an option provided on the data recognizer card, an additional 450 milliseconds in the release time is obtained. This option connects in a univibrator which generates a pulse of 450-millisecond duration when the level detector reverts to its normal state. This extends the enable time of the drive pulse to the sequence logic card and delays the release of relay DA.

**B. Sequential Logic (CP AR279)**

**5.06** The sequential logic card performs two functions: (1) control for the line-switching relays and (2) control of the "fooler."

**5.07** The output of each data recognizer may be applied to either one or two inputs of the appropriate side of the sequential logic card. The path followed by the signal depends upon whether the extended enable option of the data recognizer card is used. The sequential logic card is driven directly from the level detector unless the extended enable option is used. When the extended enable option is used, the sequential logic card is driven from both the level detector and from the univibrator with each path being applied as an input to an *or* gate.



- NOTES:
1. THE REMOTE TEST 2 CONTACTS ARE PHYSICALLY IN THE CIRCUIT BUT ARE NOT ACTIVE IN THE X OPTION (NO REMOTE TEST FACILITIES).
  2. THIS STRAPPING REQUIRED FOR ADDITIONAL RELEASE HOLDOVER OF 450MS
  3. STRAP OPTION CARD CP AR282 AS SHOWN.

Fig. 9—Data Auxiliary Set 824A-Type X Option Functional Schematic

**5.08** The sequential logic circuit is divided into two halves, each having identical circuitry for each direction of transmission. The sequence logic circuits examine both signal channels for data. It checks for signals on either one channel or the other, neither channel, or both channels and the sequence in which they appear.

**5.09** The description which follows is for the A-before-B sequence in the application of data.

**5.10** The output signal from the data recognizer is applied to an **or** gate which feeds an emitter follower. The emitter follower provides isolation and its output divides to feed the inputs to a driver, inverter, two **and** gates, and a bi-stable multivibrator.

**5.11** With no signal applied to either channel, there is no emitter follower output. The DA line-switching relay (K1) is turned off and the DA relay remains normal. The flip-flop is set such that the output of the last **and** gate is at ground, thus the driver for the AB relay in the oscillator circuit is disabled.

**5.12** When a signal is applied to data recognizer A, the output of the emitter follower turns on a transistor driver which places ground through a driver to the DA line-switching relay. This switches the line connections associated with data recognizer A. Part of the emitter follower signal is fed to an inverter circuit and part to an **and** circuit in the branch which controls the AB relay. Since only the A input is energized, the flip-flop does not change state, but the output of the inverter does. Now the like inputs to the last **and** gate result in an output from that gate which causes the AB relay to operate and place the "fooler" on-line in the A-before-B sequence.

**5.13** When data on the return path is detected by data recognizer B, the presence of data at both inputs to the sequential logic card causes the first **and** gate associated with the AB relay to deliver an output to the flip-flop. The flip-flop then changes state, changing the input to the second **and** gate. Since this **and** gate now has unlike inputs, the output goes to ground. Relay AB releases and the "fooler" is disconnected.

**5.14** If data is lost from the B input, ie A not B state is reinstated, the AB relay will not

operate again because the sequence is incorrect. The flip-flop remains in the state set by the A and B input condition, and the output from the second **and** gate remains at ground. This keeps the AB relay in the released condition.

**5.15** Both channel A and channel B inputs must return to zero before the sequence can be repeated.

**5.16** The B-before-A sequence is controlled by the second logic circuit which operates in a similar fashion. This controls the operation of relay BA.

### C. Relay Assembly (CP AR281)

**5.17** The relay assembly provides the line-switching functions for DAS 824A-type. With no data signal applied to the data recognizer, the relay driver is held in an **off** condition and line relay DA nonoperated. When data is detected, ground is applied to the lead from the sequential logic circuit to the relay driver, thereby operating the DA relay.

**5.18** The three relays and associated transistor drivers on the relay assembly circuit pack each operate similarly. The DA and DB relays perform line-switching functions, and the RT (remote test) loops the line for remote testing of the 303-type wideband data station switching features.

**5.19** Two impedance-matching transformers are provided to match the 135-ohm customer line to the 600-ohm 4-wire voice-frequency telephone lines. This requirement applies to the use of DAS 824A-type with a wideband data station. No line-matching transformers are used with X option.

**5.20** Test line jacks provide access to the 4-wire VF-WB CIRCUIT (A) side of the data auxiliary set for testing with the 912-type Data Test Set (DTS). When the test plug is inserted, the station on the A side is automatically disconnected.

### D. 50-KBPS Oscillator-Fooler (CP AR280)

**5.21** The circuit pack consists of a crystal oscillator, amplifier-slicer, divider network, cable driver, output transformer, and two relays with the associated relay drivers.

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**5.22** The crystal oscillator produces a 100-kilohertz sine wave. The output of the oscillator is applied to an amplifier-slicer. The amplifier-slicer drives a 2-stage binary counter to divide the frequency by four. The result is a 25-kilohertz (50-kbps) rectangular output. This 50-kbps signal is applied to a cable driver. Transformer T1 is in the emitter circuit of the cable driver to provide impedance matching with a balanced 135-ohm cable.

**5.23** Relay drivers control the operation of the AB and BA relays. A positive signal from the sequential logic circuit causes the relay driver to turn on and operate the associated relay. Closed contacts of the operated relay apply the output of the oscillator circuit to the option board where it is routed to the proper line connection.

### **E. Option Card (CP AR282)**

**5.24** Option changes, both factory and installer, are readily made with slide bars on screw

terminals. Printed circuit type wiring is used to connect the screw terminal and CP jack connections.

## **6. REFERENCES**

**6.01** The following references will provide additional information:

SD-1D134-01

CD-1D134-01

SD-1D060-01-J439

Section 593-800-101

Section 593-800-201

Section 593-800-501.