

DATA AUXILIARY SET 816 TYPE

DESCRIPTION AND OPERATION

1. GENERAL

1.01 This section contains a complete description of Data Auxiliary Set 816A1 and Data Auxiliary Set 816B1 and information necessary for their successful operation. It does not include operating information concerning the customer equipment (business machine) associated with the data auxiliary sets.

1.02 Data Auxiliary Set 816A1 is designed to provide a coupling unit between existing facilities using 130-type TTY subscriber set and customer provided equipment requiring a voltage interface that conforms with Electronic Industries Association (EIA) Standard RS-232A. Data Auxiliary Set 816A1 is designed for single unit installations (Fig. 1). It is designed for customers having a single channel of voice frequency (VF) telegraph carrier (43A1 channel terminal).

1.03 Data Auxiliary Set 816B1 is designed for multi-unit locations where more than one channel of VF telegraph carrier terminates (Fig. 2). Data Auxiliary Set 816B1 is designed for up to 10 channels per unit.

1.04 Data Auxiliary Set 816B1 provides a visual carrier fail lamp alarm for each of the 10 channels. In addition, provision has been made for an optional connection for a common alarm carrier failure lamp (AL), in the event that any one of the 10 channels fail.

1.05 Data Auxiliary Set 816A1 and Data Auxiliary Set 816B1 are designed to connect to the full duplex send and receive legs of a 130-type teletypewriter subscriber set on a 4-wire basis (43A1 VF carrier channel is arranged for full duplex, 20 milliampere loop operation).

1.06 Data Auxiliary Set 816A1 and Data Auxiliary Set 816B1 will be referred to in this section as DAS 816A1 and DAS 816B1, respectively.

1.07 The initial application of the DAS 816A1 and DAS 816B1 is for use in low-speed data transmission up to 150 bauds.

2. DESCRIPTION

2.01 DAS 816A1 consists of a data coupling unit (Fig. 3, CP-AR30 printed wiring board), a test (TST) lamp mounted on the front of the DAS (Fig. 1), a NOR-TST (Push-Pull) key (S3) incorporated in the test lamp and a modified 18A power unit in a two-tone gray plastic case. The case is held in place by four retaining screws in the base.

2.02 DAS 816B1 consists of ten 908C connectors (for a maximum of 10 data coupling units), a monitoring selector switch (MON), a monitoring amplifier (CP-BN1) and (MON) jack (548A-49), two J87215A-1, List 1 rectifiers (P1 and P2), and a KS-16671, List 1 plug connector (for connecting the 130-type teletypewriter subscriber sets to the DAS 816B1 on a 23-inch relay rack mounting panel, nine inches high (Fig. 4).

2.03 DAS 816A1 weighs approximately 10 pounds while DAS 816B1 weighs approximately 37 pounds when equipped with 10 data coupling units.

2.04 The cord supplied with DAS 816A1 is:

- (a) Power cord, KS-14532, List 16, three conductors, 10 feet long.

2.05 The cords supplied with DAS 816B1 are:

- (a) Power cords, KS-14532, List 8, three conductors, 10 feet long.

Note: A connecting cable will be required between the 130-type TTY subscriber set and DAS 816B1 such as a Connector Cable A25B. This cable is equipped with a KS-16690 L1 connector on one end and the other end is unequipped. The available lengths are 13, 50, or 100 feet maximum.

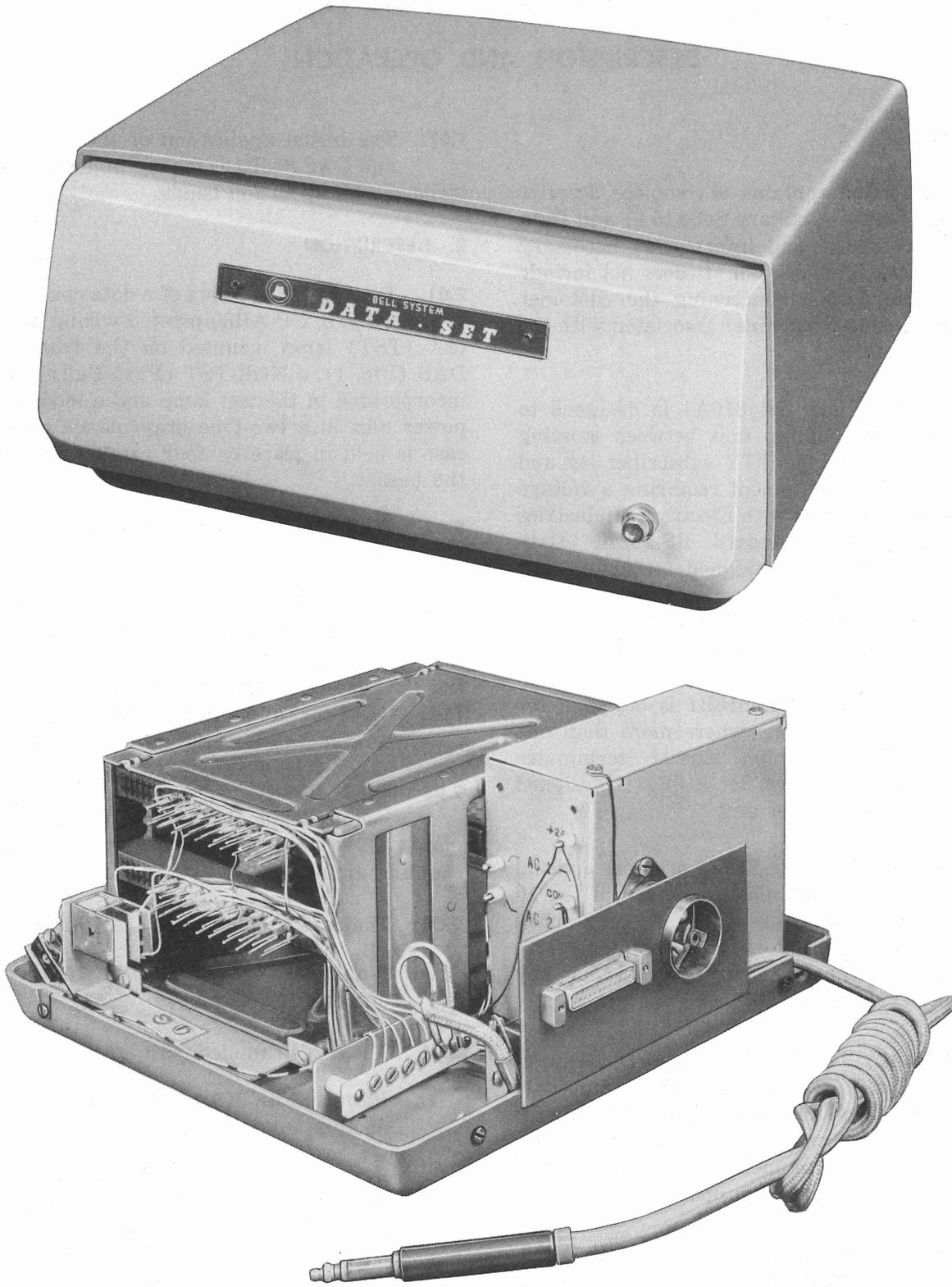


Fig. 1 — Data Auxiliary Set 816A1, Cover Removed

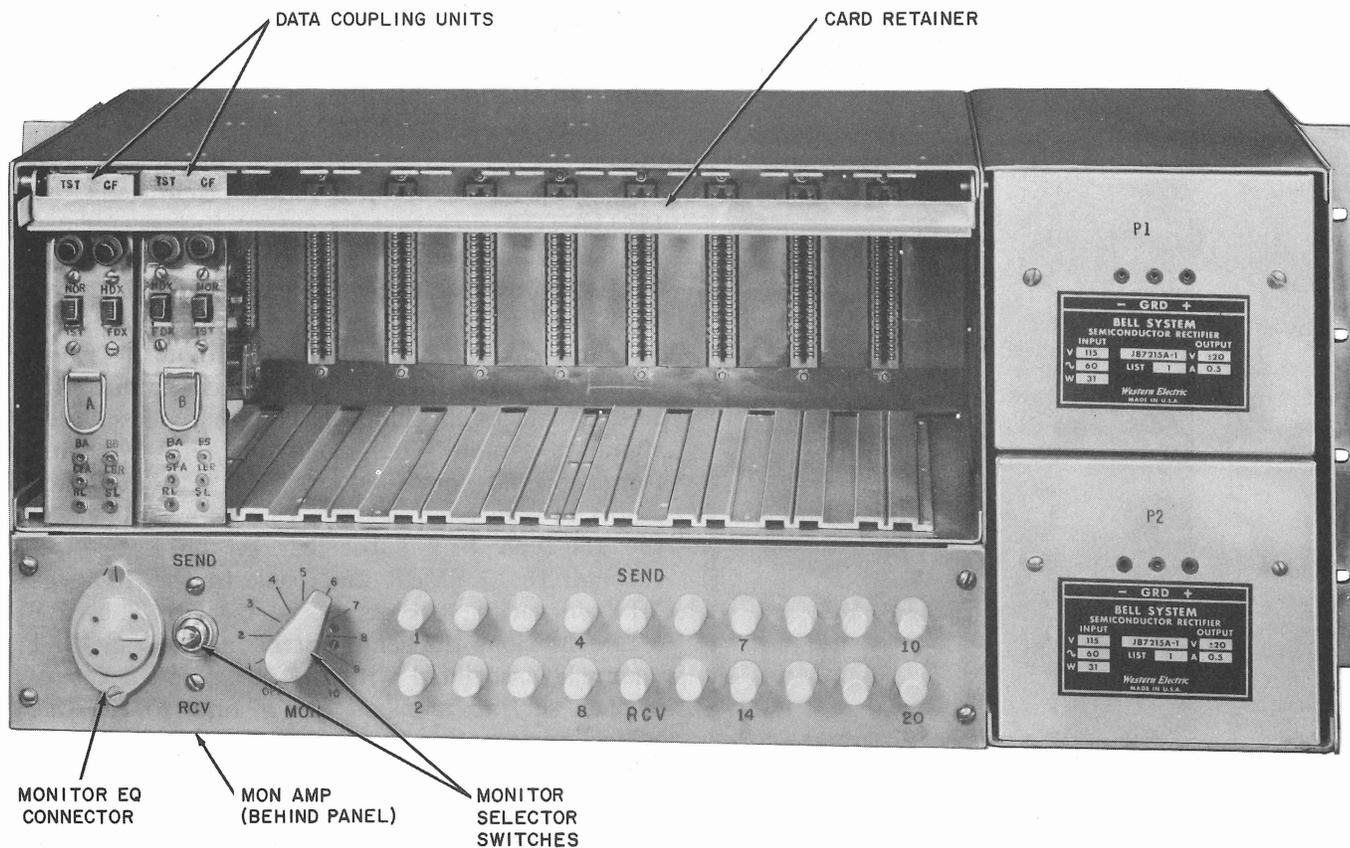


Fig. 2 — Data Auxiliary Set 816B1, Front View

2.06 A 25-pin connector, KS-19087, List 2 is provided at the rear of DAS 816A1 for connecting the business machine equipment. This connection is made with a customer furnished cable (not to exceed 50 feet), equipped with a Cinch or Cannon DB19604-432 type plug.

2.07 Ten 25-pin connectors KS-19087, List 2 are provided at the rear of DAS 816B1 for connecting the business machine equipment. These connections are made with customer furnished cables (not to exceed 50 feet), equipped with a Cinch or Cannon DB19604-432 type plug.

3. OPERATION

3.01 The following description and Fig. 5 will help in understanding the overall operation of a facility that incorporates the use of DAS 816A1 and DAS 816B1.

3.02 In the marking or idle condition of the circuit serving customer A and customer B, the business machine delivers a negative potential on interface lead 2 (BA) to the DAS 816A1. This represents a marking condition. DAS 816A1 presents to the 130-type TTY subscriber set, a closed condition on the send pair. This closed or marking condition causes 20 ma to flow in the send pair. The 43A1 VF TLG CARR associated with the 130-type TTY subscriber set causes the marking frequency to be transmitted to the private line facilities.

3.03 The 130-type TTY subscriber set at customer B location detects this idle or marking condition and causes 20 ma of current to flow in the receive pair to DAS 816B1. DAS 816B1, recognizing this 20 ma current flow, delivers a negative potential to the business machine on interface lead 3 (BB). This negative potential represents a mark signal.

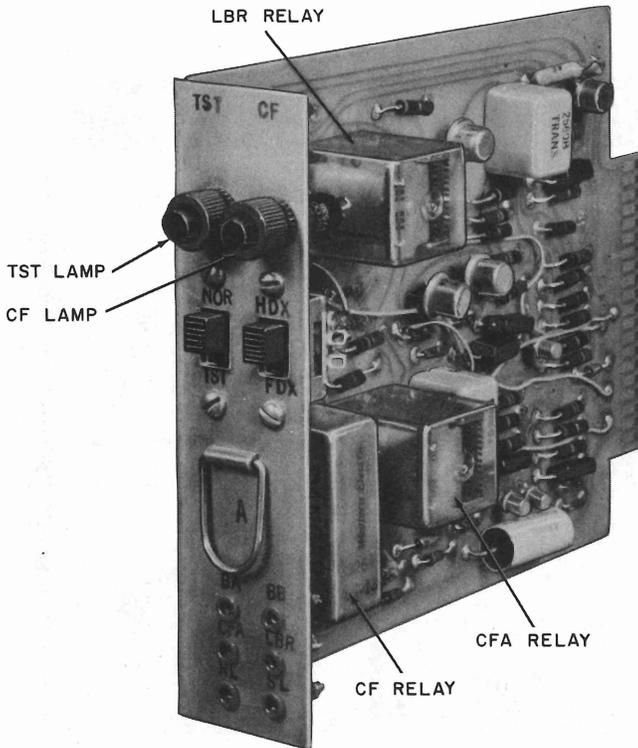


Fig. 3 — Data Coupling Unit

- 3.04** The above description also applies to the direction from customer B to customer A.
- 3.05** When customer A desires to send a space signal, his business machine connects a positive potential to interface lead 2 (BA). This will condition DAS 816A1 to open the send pair to the 130-type TTY subscriber set. The 43A1 VF TLG CARR detects this open send pair and causes the spacing frequency to be transmitted to the private line facilities.
- 3.06** At the receiving location, the 130-type TTY subscriber set with its associated 43A1 VF TLG CARR opens the receive pair to DAS 816B1 when the spacing frequency is received. DAS 816B1 detects the loss of current and causes a positive potential to be applied to interface lead 3 (BB) to the business machine.
- 3.07** The following description (using Fig. 6) will cover a general operating description of DAS 816A1. DAS 816B1 is equipped with the same data coupling unit and will function in the same manner. For details of operation refer to CD- and SD-3D023-01.

Transmitting Data To Line

3.08 In the idle condition or when transmitting the mark signal, the business machine conditions the BA lead by applying a voltage of -5 to -25 volts. This applied voltage conditions the DETECTOR such that its output to transformer T2 is open. The OSC is an astable (free running) multivibrator with a frequency over 200 kilocycles. With the DETECTOR presenting an open circuit to transformer T2, the oscillator signal is transformer coupled to the RECT. This rectifier circuit, as the name implies, rectifies the oscillator signal to establish base bias for KEYER. This forward bias conditions the KEYER to allow 20 ma to flow from positive 130 volts supplied by the 130-type TTY subscriber set on lead SLR, through the KEYER and back to the 130-type TTY subscriber set on the SLT lead. The SLT lead conditions the send control tube of the 43A1 channel (associated with the 130-type TTY subscriber set) to transmit a VF tone to the line which represents a mark signal.

3.09 For a space signal, the business machine conditions lead BA with $+5$ to $+25$ volts. This positive voltage conditions the DETECTOR so that it presents a low impedance to transformer T2. Transformer T2 functions as a saturable reactor and prevents the OSC from being coupled to the RECT. When the core of transformer T2 is saturated this inhibits the transfer of voltage to the RECT, which removes the forward bias to the KEYER. This loss of bias causes the KEYER to open lead SLT thus removing the 20 ma current flow. Loss of the 20 ma current to the send control tube of the 130-type TTY subscriber set causes a different VF tone to be transmitted to the line representing the space signal.

Receiving Data From Line

3.10 In the idle or marking condition, the receiving 130-type TTY subscriber set causes 20 ma to flow from the $+130$ volt supply at the 130-type TTY subscriber set through RLR lead, through the DETECTOR and back on the RLT lead to the output tube (V5) in the 43A1 channel. The DETECTOR is conditioned by this 20 ma current flow such that a low impedance is presented to transformer T1. Transformer T1 functions the same as transformer T2 in the transmitting por-

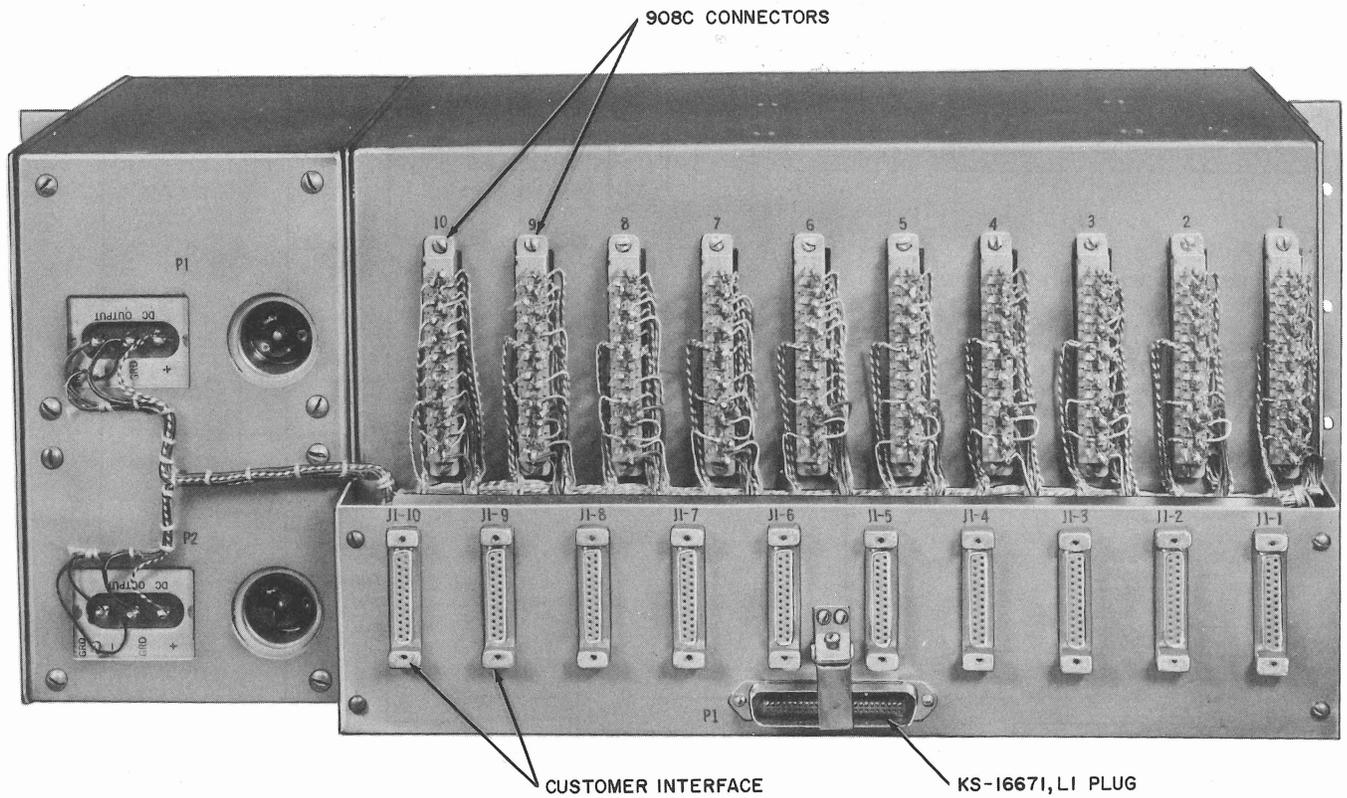


Fig. 4 — Data Auxiliary Set 816B1, Rear View

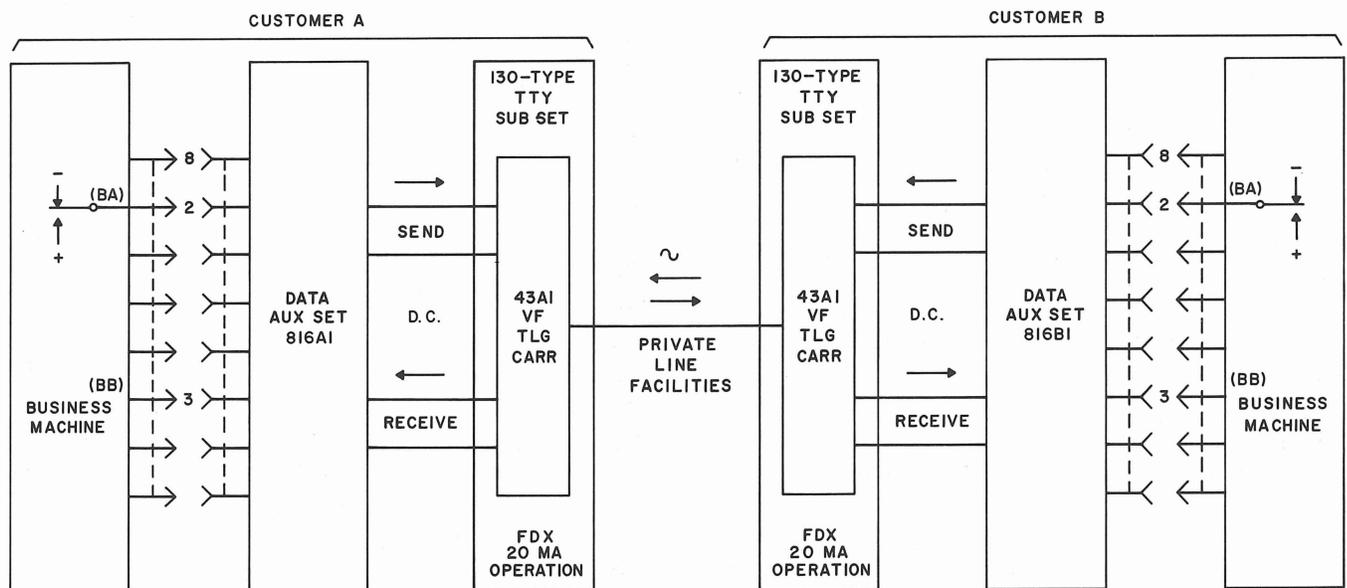


Fig. 5 — System Using DAS 816-Type

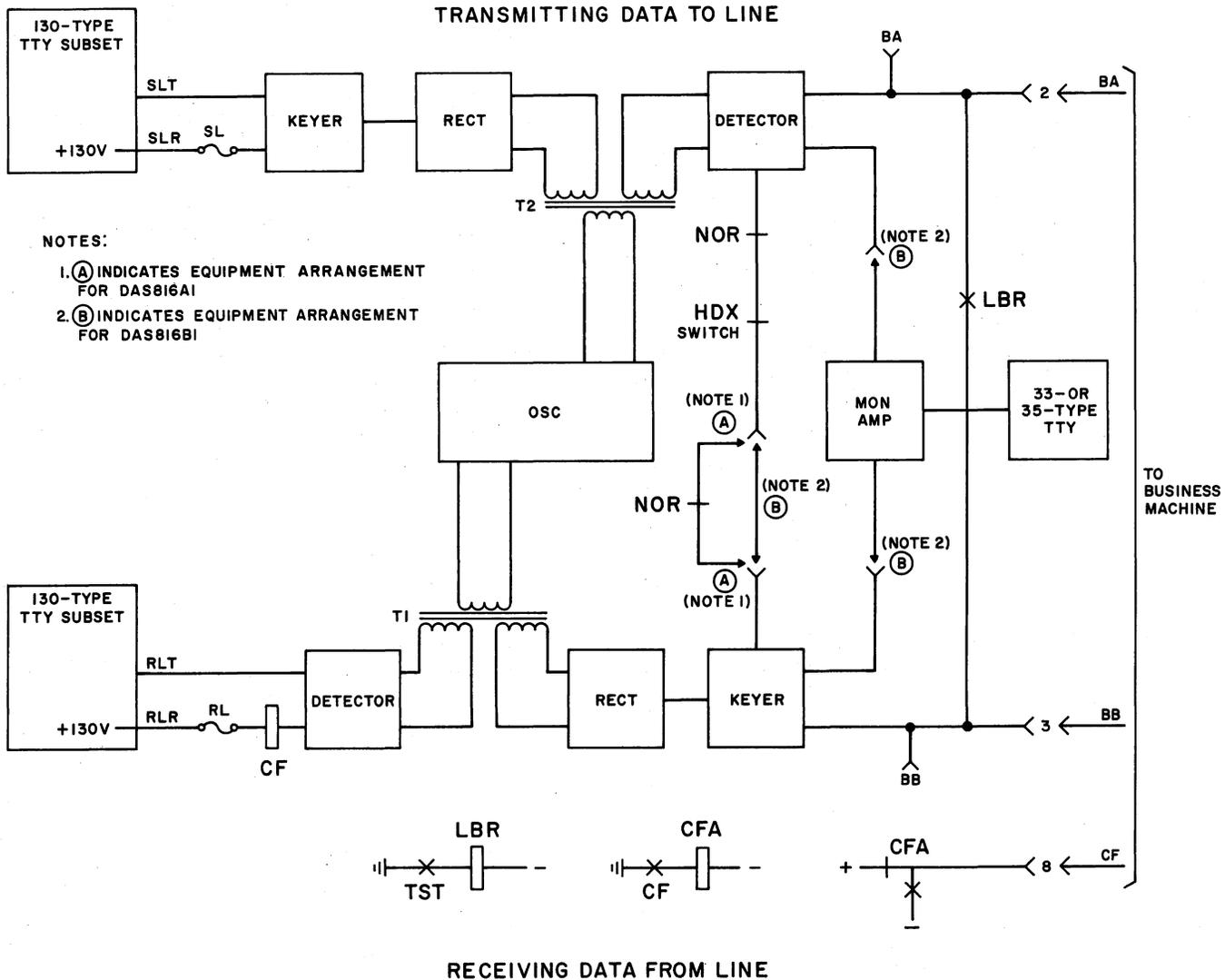


Fig. 6 — Block Diagram DAS 816-Type

tion of the DAS 816A1. With the low impedance provided by the DETECTOR to transformer T1, the output of OSC is prevented, by the saturated core of transformer T1, from being coupled to the RECT. No voltage to RECT conditions the KEYER to present -19 volts on the BB lead to the business machine. This negative voltage is recognized as a mark signal by the business machine.

3.11 When the incoming signal to the 130-type TTY subscriber set changes to a space, the 130-type TTY subscriber set opens the RLT lead which in turn removes the 20 ma current flow to the DETECTOR. The loss of the 20 ma current at the DETECTOR, conditions the DETECTOR to

remove the low impedance to transformer T1. The removal of the low impedance to the transformer T1 winding, allows OSC signal to be transformer-coupled to the RECT. This OSC signal is rectified by RECT and is delivered to the KEYER. The KEYER functions to remove -19 volts from the BB lead, and in turn, apply +17 volts to the BB lead. This positive voltage is recognized as a space signal by the business machine.

Carrier Failure

3.12 Provision has been made in DAS 816A1 and DAS 816B1 to indicate when received carrier is lost by the 130-type TTY subscriber set. A mercury relay (CF) is located in the re-

ceive section of the DAS. This relay is in the path of current flow from the 130-type TTY subscriber set. Due to the design, relay CF remains non-operated under normal 20 ma current flow. When loss of carrier is detected by the 130-type TTY subscriber set, a relay (SU), located in the 130-type TTY subscriber set, releases. The 130-type TTY subscriber set must be modified for proper operation. See section entitled Data Auxiliary Set 816-type, Installation and Connections (598-041-200). Relay SU released, applies ground to terminal 26 of the 130-type TTY subscriber set. This ground causes approximately 65 ma of current to flow from +130 volts through RLR lead, through relay CF back to the 130-type TTY subscriber set on the RLT lead through REC LP potentiometer to ground on relay SU. The increased current causes relay CF to operate. Relay CF operates relay CFA and lights the CF lamp on the data coupling unit. The CF lamp is not visible on DAS 816A1 when the cover is in place. Relay CFA operated removes +20 volts and applies -20 volts to the Data Carrier Detector lead (CF). This change in polarity signals the business machine that the channel is in trouble. DAS 816B1, in addition to the above description, will have its common alarm lamp (AL), when provided, lit by relay CFA operating. The above indication remains until the trouble condition is cleared.

Half-duplex — Full-duplex Control

3.13 Provision has been made with DAS 816A1 and DAS 816B1 for half-duplex (HDX) or full-duplex (FDX) business machine operation.

In the HDX mode, signals transmitted from the business machine are looped back to the receiving circuitry of the business machine by means of the closed contacts of the HDX-FDX switch. This loop-back is routed through two contacts of the connector.

Test Mode

3.14 The NOR-TST switch on CP AR30 is provided for selecting either normal operation of the data coupling unit (NOR) or to facilitate its overall test (TST). The TST mode permits remote testing of the data coupling unit (by the operation of relay LBR) and its associated 130-type TTY subscriber set from a Serving Test Center location, by permitting incoming signals on the receiving leg of the 130-type TTY subscriber set to be coupled to its sending leg through the entire transmission path of the data coupling unit. During such tests, suitable supervisory termination is provided to the business machine. The DAS 816A1 includes an additional TEST switch and lamp external to the card so that it can be operated with the cover in place (Note 1 on Fig. 6). This is a combined key and lamp. The key is a push to operate (TST), push to release (NOR) switch. The lamp is on in the test position. The NOR-TST switch on the data coupling unit MUST be set to NOR for DAS 816A1. In the case of DAS 816B1 a monitoring amplifier and a 33- or 35-type TTY is provided. The additional TST switch and TST lamp are not provided (Note 2 on Fig. 6).