10B DATA LINE CONCENTRATOR

DESCRIPTION

CONTENTS PAGE

1. GENERAL

1.01 This section covers the physical and functional description of the 10B Data Line Concentrator (Fig. 1) which provides the nonblocking switching network and associated electronic controls for the dual access system.

1.02 The main features of the 10B Data Line Concentrator are:

(a) Users of time-shared central data processing systems may share private line (PL) transmission facilities and computer ports. This reduces the number of loops or trunks required between a group of stations and the computer.

(b) Low cost data transmission schemes may be used.

(c) The number of data sets and computer ports required to serve a given number of stations is reduced.

(d) Stations which are equipped for dual access have the choice of accessing either of two separate trunk groups (trunk group A or trunk group B).

(e) Due to the sequential selection of trunks, uniform computer port usage in each trunk group is provided.

(f) Two concentrators may be connected in tandem. This allows an increase of overall system efficiency in certain situations.

(g) If any station requests service to a trunk group in which all the trunks are busy, the concentrator will place the station in a queue and transmit a repetitive signal (camp-on signal) to the stations.

(h) A station that is in queue is automatically connected when a trunk in the trunk group requested becomes idle.

1.03 The 10B Data Line Concentrator is a space division switching system using a ferreed switching matrix for interconnecting station lines and computer port trunks. It is designed to grow modularly from the smallest unit which has a capacity of 32 lines to the largest unit which has a capacity of 128 lines and is available in three trunk group sizes: 8, 16, or 32. The trunks may be divided into any ratio between trunk group A and trunk group B and stations arranged for dual access can be connected to either trunk group.

1.04 A station requests service from the 10B Data Line Concentrator by turning on the terminal equipment. This is done by operating a button on the station terminal equipment. Single access stations are equipped with only one button for call origination and will be connected to only one trunk group. Dual access stations are equipped with two buttons for call origination and will be directed to either trunk group A or trunk group B in accordance with the button operated.

1.05 When the 10B Data Line Concentrator detects a service request, it will connect the station line to an idle trunk in the appropriate trunk group. Completion of the connection provides a metallic dc signal path between the station line and the computer port trunk. The 10B Data Line Concentrator will not be affected by the data signal format, code, or bit rate.

1.06 If the station has requested service to a trunk group and all trunks in the group are busy, the 10B Data Line Concentrator will place the station in a queue and transmit a measured spacing signal (camp-on signal) to the station

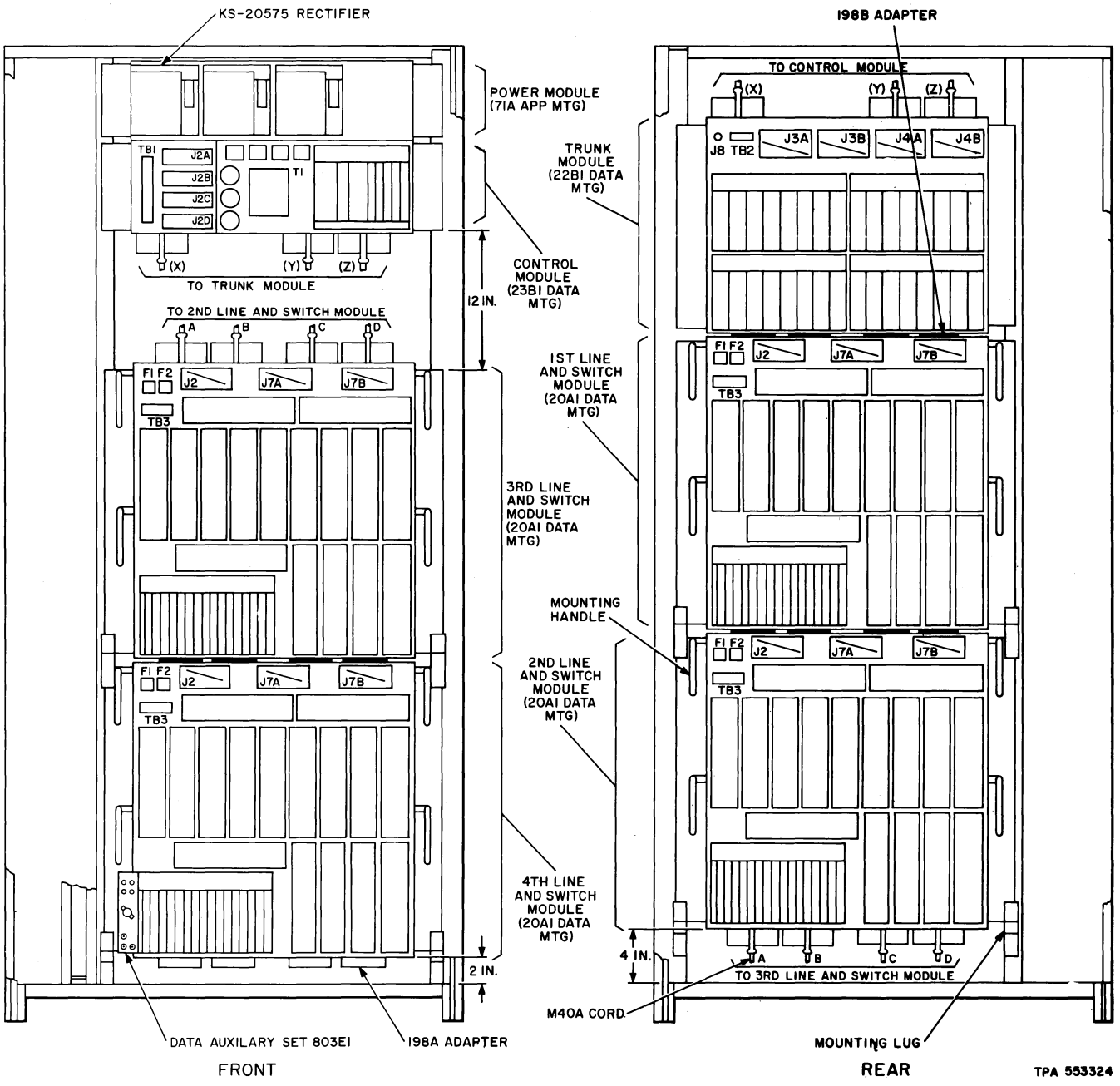


Fig. 1—10B Data Line Concentrator (128 Lines/32 Trunks)

approximately every three seconds. This spacing interval can be selected for a given concentrator to be either 3, 6, or 10-1/2 milliseconds nominally. The camp-on signal indicates to the station attendant that the 10B Data Line Concentrator has acknowledged the request for service. The camp-on signal can be recognized at a teletypewriter (TTY) station by the fact that the terminal equipment receive mechanism selects a delete character approximately every three seconds. At stations equipped with a customer-provided terminal (CPT) and Data Set 109H, the CAMP-ON lamp on the data set will flicker. If the station (TTY or CPT) is equipped with the optional 6041H key, the CAMP-ON lamp on the 6041H key will flash approximately every three seconds.

1.07 The 10B Data Line Concentrator will send the camp-on signal to any and all stations in queue until a trunk becomes available or the station is turned off. As long as a camped-on station remains in the queue, it will be automatically connected when a trunk becomes available.

1.08 The connection of stations requesting service is done on a sequential basis, thereby providing the queue system for stations requesting service in a trunk group having "all trunks busy." This allows the first station that is placed in queue (eg, the first station to request service when all trunks are busy) to be connected to the first trunk that becomes idle. Since all other stations are now served in a sequential order, no camped-on station will be denied service while another station is served twice.

1.09 The 10B Data Line Concentrator will disconnect a station when:

(a) The station terminal equipment is turned off.

(b) The station or computer transmits an EOT character (if terminal equipment is equipped with the EOT disconnect feature).

(c) The computer turns off the data terminal ready (CD) lead to the trunk side data set.

(d) A loss of current is detected on the loop.

1.10 Major operating points of the 10B Data Line Concentrator are continuously monitored for alarm conditions. Each monitored point is provided with an individual alarm indication in the concentrator. In addition, they are collectively connected to a master alarm relay which makes two sets of transfer contacts available for remote alarm indications.

2. PHYSICAL DESCRIPTION

General

2.01 This part covers the physical appearance, dimensions, and weights of the major components that make up the 10B Data Line Concentrator. In the following text, the term "module" will refer to a data mounting equipped with appropriate circuit packs (CPs) or apparatus mounting equipped with appropriate power supplies.

2.02 The 10B Data Line Concentrator consists of the following:

(a) Line and switch module

(b) Trunk module

(c) Control module

(d) Power module

(e) Manual test equipment.

Each of these modules can be arranged to mount in standard 23- or 25-inch central office frames. When installed on customer premises, the modules will mount in a cabinet such as the KS-20093-type.

2.03 The line and switch, trunk, and control modules are all plug and cord interconnected, however, 16-gauge (or heavier) solid wire is required for connection of the power module to the other modules.

2.04 The line and switch module is available in three sizes: 32 lines/8 trunks, 32 lines/16 trunks, and 32 lines/32 trunks. Up to four line and switch modules of the ***same trunk size*** may be interconnected, thereby providing a concentrator capable of serving up to 128 lines.

2.05 The trunk module is available in two sizes: 16 trunks and 32 trunks. The 16 trunk-size trunk module is used with either the 32-lines/8-trunks or 32-lines/16-trunks line and switch module. The 32 trunk-size trunk module is used with the 32-lines/32-trunks line and switch module only.

Line and Switch Module

2.06 The line and switch module consists of either an 18A1 (Fig. 2), 19A1 (Fig. 3), or 20A1 (Fig. 4) Data Mounting equipped with one CP AR366 (line circuit) for every two lines to be served. Line and switch modules that are vertically adjacent to another line and switch module or a trunk module are interconnected by means of 198B adapters (Fig. 5). Those that are not adjacent require the use of M40A cords in addition to the 198B adapters (a 198B adapter must be inserted into each end of the M40A cords). A 198A adapter (Fig. 6) must be plugged into the bottom connector(s) of the last line and switch module for proper termination.

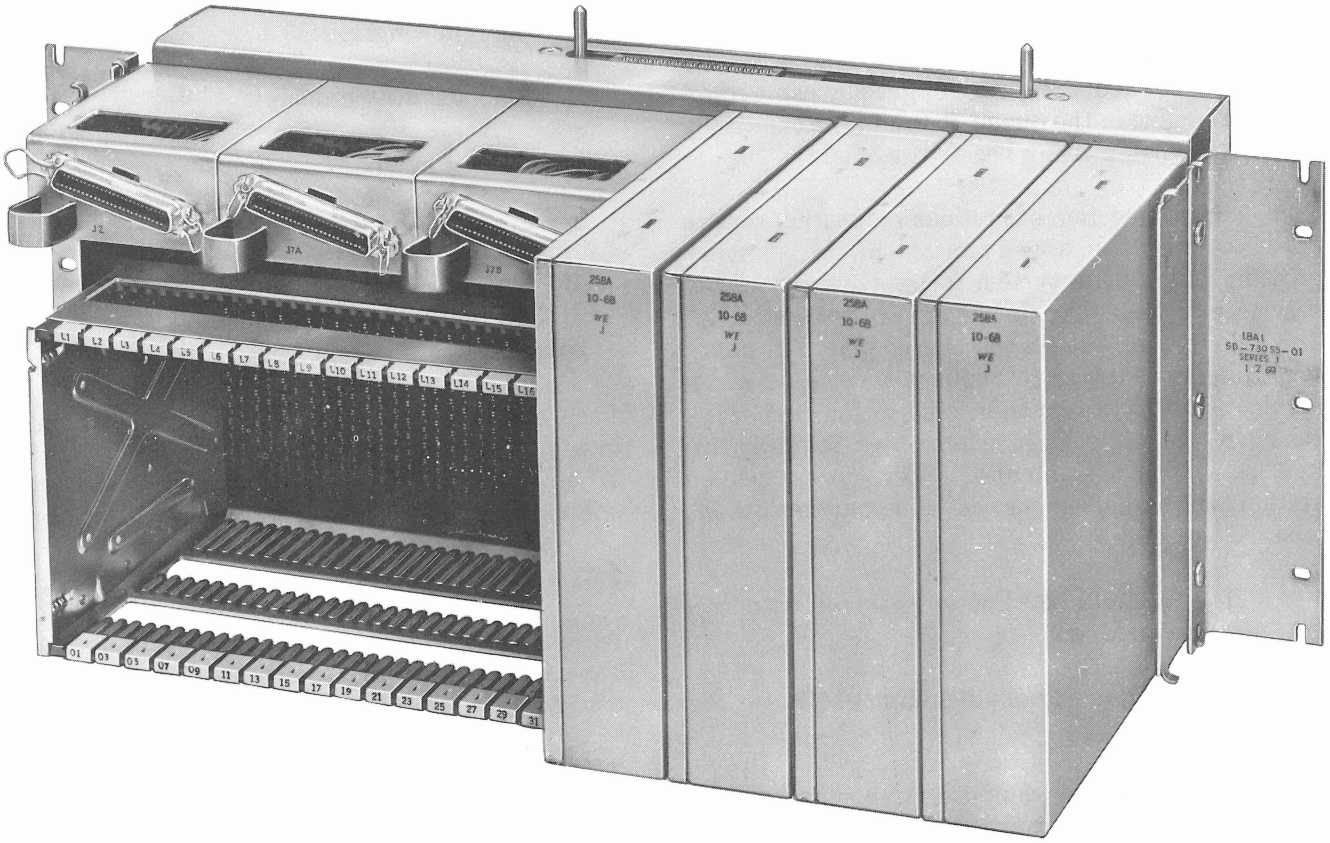


Fig. 2—18A1 Data Mounting

2.07 The 18A1 Data Mounting (Fig. 2) is used in the 8 trunk-size concentrator. It is 9 inches high, 25 (or 23) inches wide, 11-1/4 inches deep, and weighs approximately 42 pounds.

2.08 The 19A1 Data Mounting (Fig. 3) is used in the 16 trunk-size concentrator. It is 15 inches high, 25 (or 23) inches wide, 11-1/4 inches deep, and weighs approximately 73 pounds. The 19A1 Data Mounting is equipped with handles and supplied with mounting lugs for support and alignment while the mounting hardware is installed.

2.09 The 20A1 Data Mounting (Fig. 4) is used in the 32 trunk-size concentrator. It is 22 inches high, 25 (or 23) inches wide, 11-1/4 inches deep, and weighs approximately 128 pounds. The 20A1 Data Mounting is equipped with handles and supplied with mounting lugs for support and alignment while the mounting hardware is installed.

2.10 The AR366 CP is not supplied with any of the data mountings and must therefore be ordered separately. Each AR366 CP provides two complete line circuits. Therefore, only one AR366 CP is required for every two lines to be served. In addition, each line and switch module need only be equipped with enough AR366 CPs to serve the required number of lines (eg, a concentrator serving 28 lines requires only 14 AR366 CPs).

Trunk Module

2.11 The trunk module consists of 21B1 (Fig. 7) or 22B1 (Fig. 8) Data Mounting equipped with one AR488 CP for each trunk assigned to trunk group A and one AR382 CP for each trunk assigned to trunk group B. The trunk module interconnects with the control module and line and switch module by means of 198B adapters.

2.12 The 21B1 Data Mounting (Fig. 7) is used in either the 8 or 16 trunk-size concentrator.

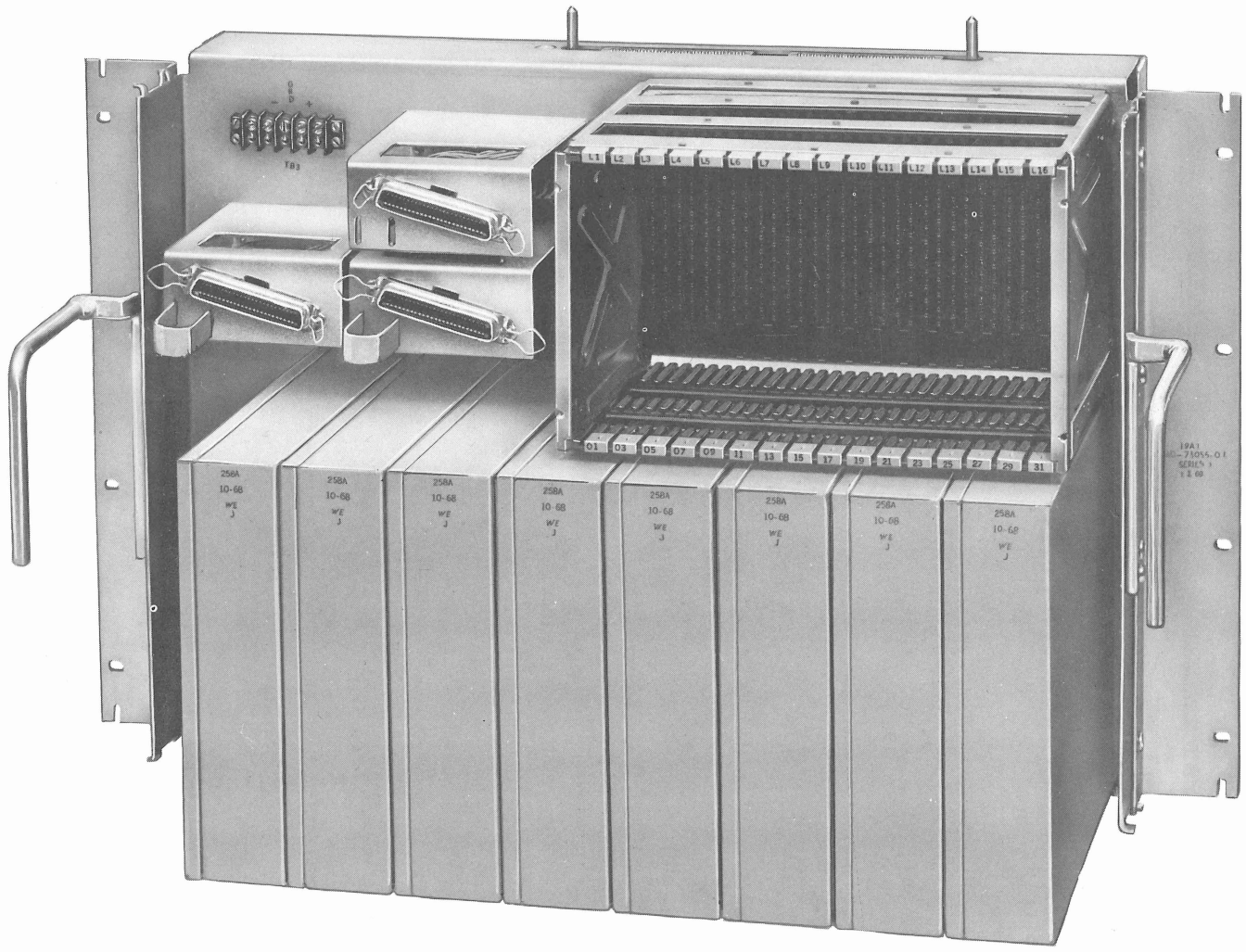


Fig. 3—19A1 Data Mounting

It is 8 inches high, 25 (or 23) inches wide, 10-1/3 inches deep, and weighs approximately 23 pounds. The 21B1 Data Mounting will accept the trunk group A trunk circuit (AR488 CP) in all 16 slots; however, it will accept the trunk group B trunk circuit (AR382 CP) only in slots 9 through 16.

2.13 The 22B1 Data Mounting (Fig. 8) is used in the 32 trunk-size concentrator. It is 14 inches high, 25 (or 23) inches wide, 10-1/3 inches deep, and weighs approximately 40 pounds. The 22B1 Data Mounting will accept AR488 CP in all 32 slots, however, it will accept AR382 CP only in slots 17 through 32.

2.14 The AR488 and AR382 CPs are not supplied with either the 21B1 or 22B1 Data Mounting and must therefore be ordered separately. Each AR488 CP and AR382 CP provides one complete trunk circuit for trunks assigned to trunk groups A and B, respectively. Therefore, it is necessary to order one AR488 CP for each trunk in group A and one AR382 CP for each trunk in group B. In addition, the trunk module need only be equipped with enough trunk circuits of each type to serve the required number of trunks in each group.

Control Module

2.15 The control module consists of a 23B1 Data Mounting (Fig. 9) equipped with the following AR-type CPs.

(a) AR489—Clock circuit

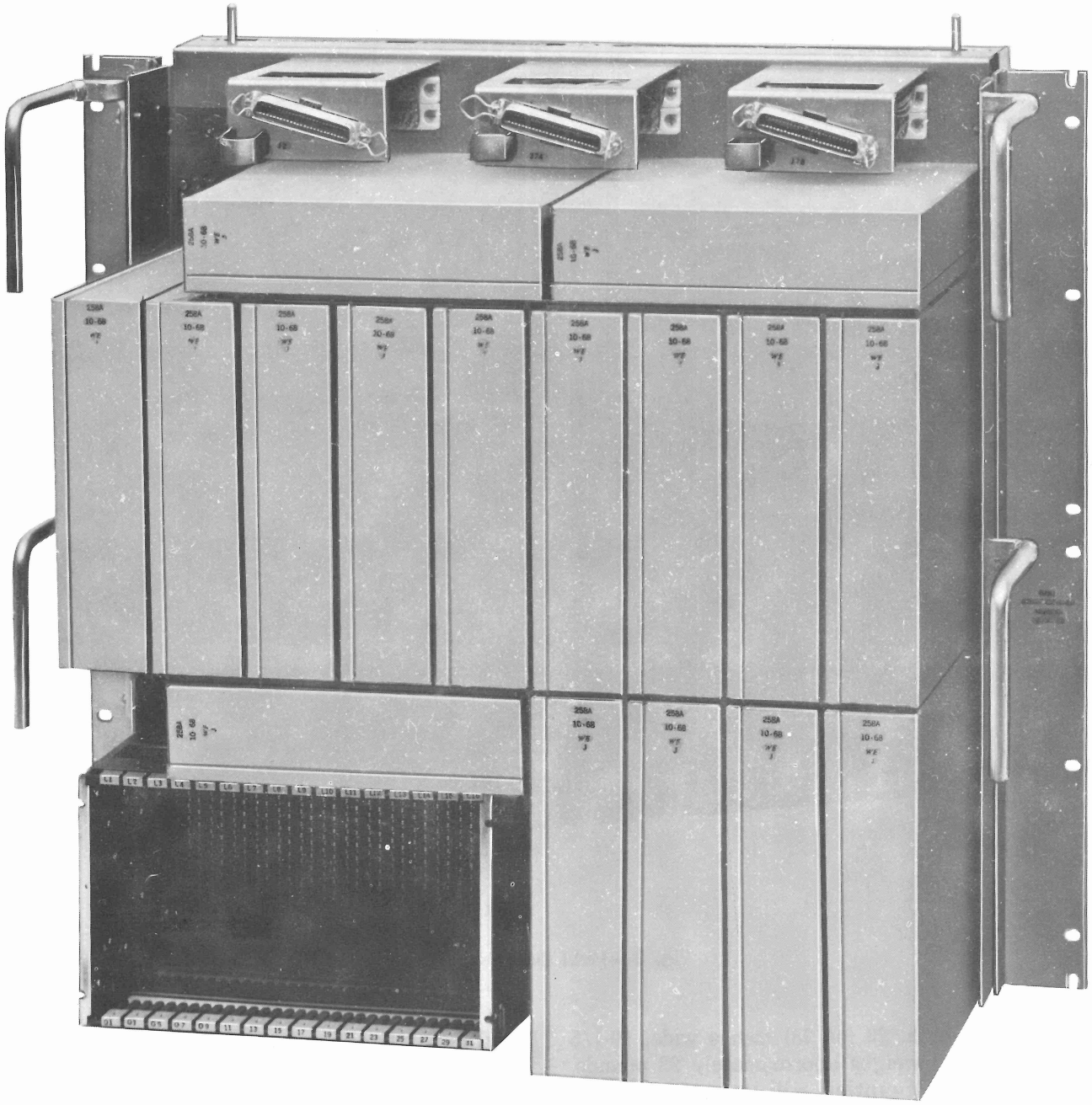


Fig. 4—20A1 Data Mounting

(b) AR377—Dual access control

(c) AR490—Alarms and registers

(d) AR383—Dual access line scanner

(e) AR376—Dual access trunk scanner

(f) FP1—Pulser (supplied with the 23B1 Data Mounting)

(g) AR597—Camp-on signal generator

(h) AR464—Manual test circuit

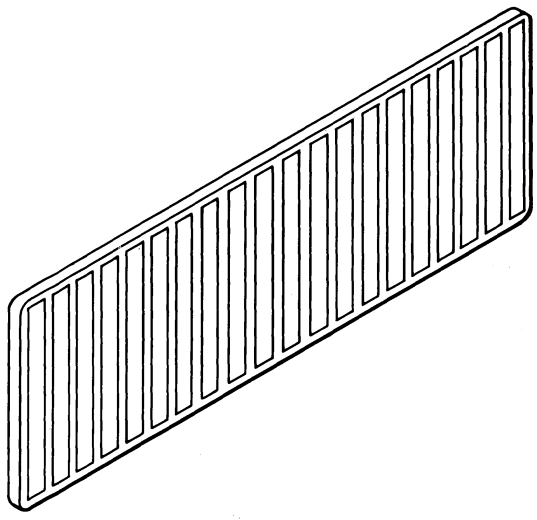


Fig. 5—198B Adapter

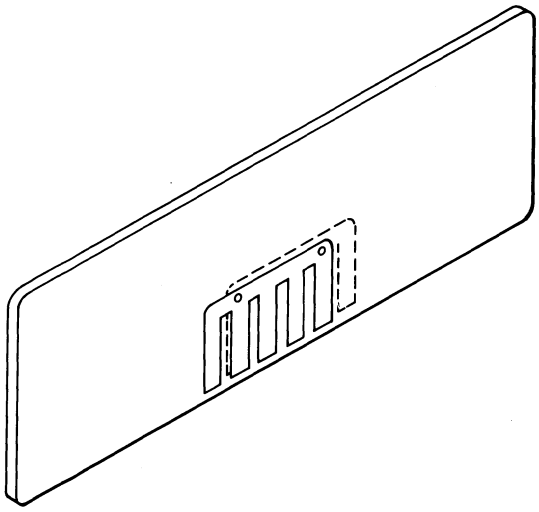


Fig. 6—198A Adapter

(i) AR381—Dc/dc converter.

The Control Module is connected to each line and switch module with M50H cords or A25D connector cables. In addition, it is connected to a vertically adjacent trunk module by means of three 198B adapters. If the control module is not adjacent to a trunk module, three M40A cords equipped with a 198B adapter in each end are required.

2.16 The 23B1 Data Mounting (Fig. 9) is 6 inches high, 25 (or 23) inches wide, 10-1/3 inches deep, and weighs approximately 20 pounds. With the exception of FP1 none of the CPs listed in 2.15 are supplied with the 23B1 Data Mounting and must therefore be ordered separately.

Power Module

2.17 The power module consists of either a 71A apparatus mounting equipped with up to three KS-20575 rectifiers or a 71B apparatus mounting equipped with up to two J87308B converters.

2.18 When 110-volt, 60-Hz ac power is to be used, the 71A apparatus mounting and KS-20575-L1 rectifiers (Fig. 10) are required to furnish +24 and −24 volt dc power to the concentrator. Concentrators of 32 or less lines require only one KS-20575 rectifier. Concentrators of more than 32 lines require three KS-20575-L1 rectifiers.

2.19 The 71A apparatus mounting is 6 inches high, 25 (or 23) inches wide, 6 inches deep, and weighs approximately 9 pounds. Each KS-20575 rectifier weighs 13 pounds.

2.20 If a dc power, such as the −48 volt dc source in a central office, is to be used, the 71B apparatus mounting and J87308B converters (Fig. 11) are required to furnish +24 and −24 volts dc to the concentrator. Concentrators of 32 or less lines require only one converter. Concentrators of more than 32 lines require two converters.

2.21 The 71B apparatus mounting is 6 inches high, 25 (or 23) inches wide, 10.5 inches deep, and weighs approximately 19 pounds. Each J87308B converter weighs approximately 5 pounds.

Manual Test Equipment

2.22 The manual test equipment consists of AR464 CP (which plugs into the control module) and Data Auxiliary Set (DAS) 803E1 (Fig. 12)). The DAS 803E1 is equipped with a clip which allows it to be hooked on the left side of the line and switch or trunk module for storage. Circuit Pack AR464 is equipped with a cord which plugs into the DAS 803E1 and a cord which connects to the test points on the trunk circuit. The DAS 803E1 is equipped with a cord which connects to the test points on the line circuit.

2.23 The DAS 803E1 is 6 inches high, 1-1/2 inches wide, 3-1/4 inches deep, and weighs

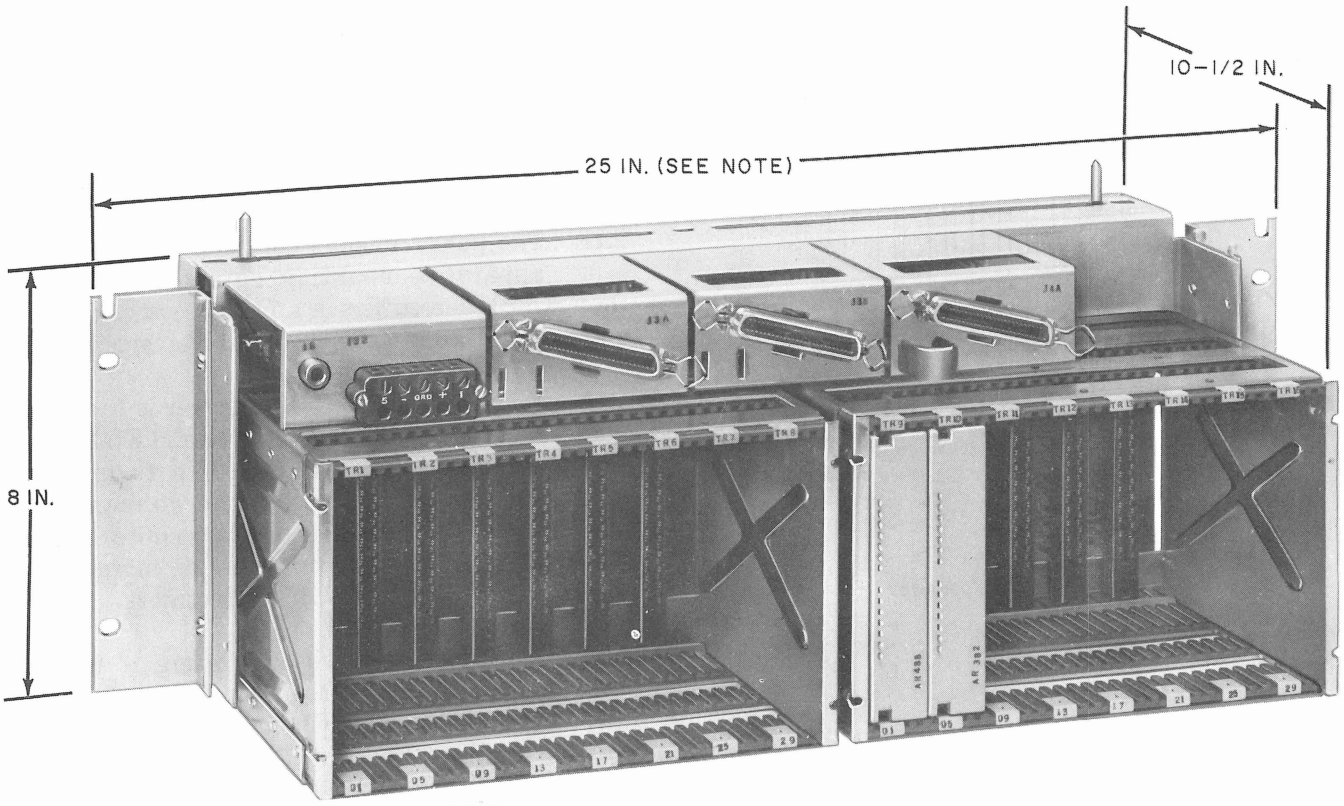


Fig. 7—21B1 Data Mounting

approximately 2 pounds. Where two concentrators are installed in the same location, one DAS 803E1 and one AR464 CP may be shared by both concentrators.

3. FUNCTIONAL DESCRIPTION

General

3.01 The 10B Data Line Concentrator is functionally divided into the following five major parts.

(a) The control module

(b) The line circuits (part of the line and switch module)

(c) The switching matrix (part of the line and switch module)

(d) The trunk circuits

(e) The power module.

A block diagram of the 10B Data Line Concentrator (less power module) is given in Fig. 13.

3.02 The control module contains the circuitry necessary to:

(a) Recognize a service request

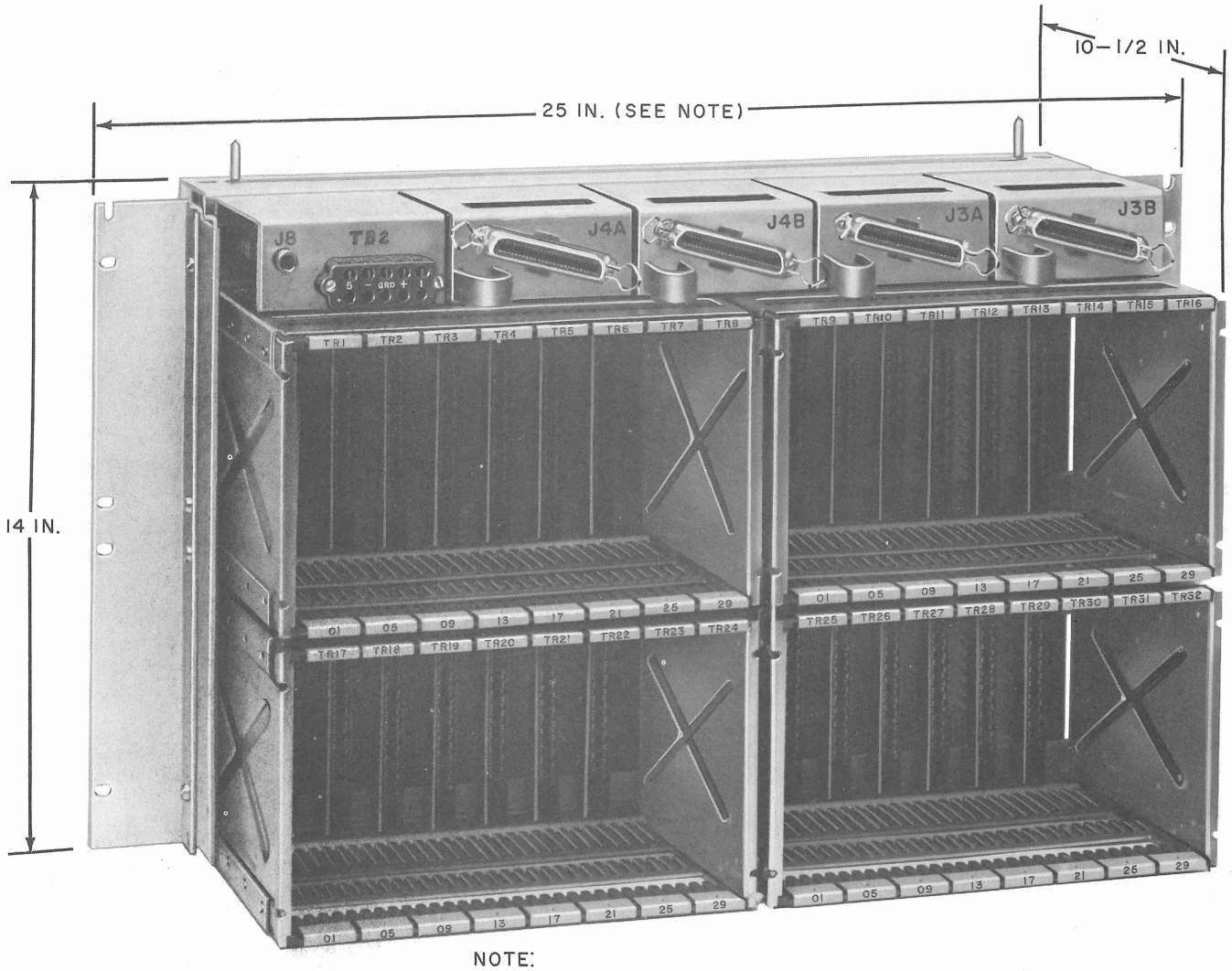
(b) Recognize which line is requesting service

(c) Recognize which trunk group (A or B) is being requested

(d) Recognize an idle trunk in the group requested

(e) Control connection of a line requesting service to an idle trunk in the group requested

(f) Monitor the major operating points of the concentrator for alarm conditions



NOTE:
MOUNTING BRACKETS MAY BE REVERSED FOR 23 IN. MOUNTING

Fig. 8—22B1 Data Mounting

(g) Register the number of calls and overflows to each trunk group

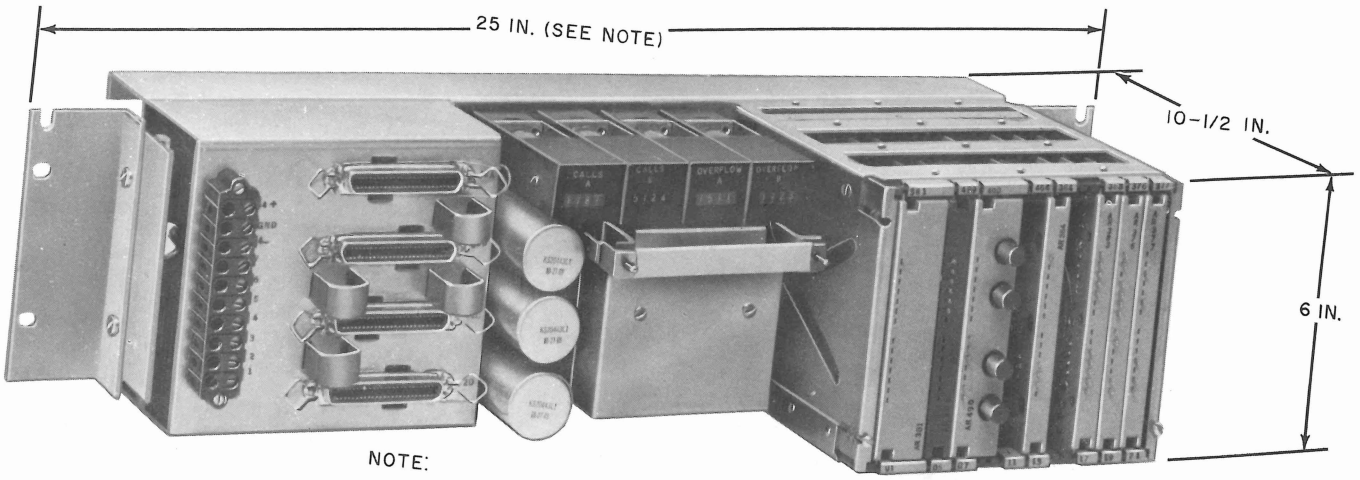
(h) Generate the camp-on signal

(i) Allow a manual test to be performed.

3.03 The line circuits provide the termination for the station loop (when idle) and detects the station service requests. The trunk circuit provides the termination for the trunk loop (when idle), detects the trunk idle indication, and, after a line has been connected to the trunk, monitors the loop for the request for disconnect (either station or computer originated).

3.04 The switching matrix interconnects any line requesting service to an idle trunk in the trunk group requested. This provides a metallic transmission path for the exchange of the bi-polar dc data signals between the line side Data Set 109-type and the trunk side Data Set 109-type, 1A Data Station, or DATA-PHONE® interconnection arrangement.

3.05 A typical sequence of events that occur in the 10B Data Line Concentrator when service



NOTE:
MOUNTING BRACKETS MAY BE REVERSED FOR 23 IN. MOUNTING

Fig. 9—23B1 Data Mounting

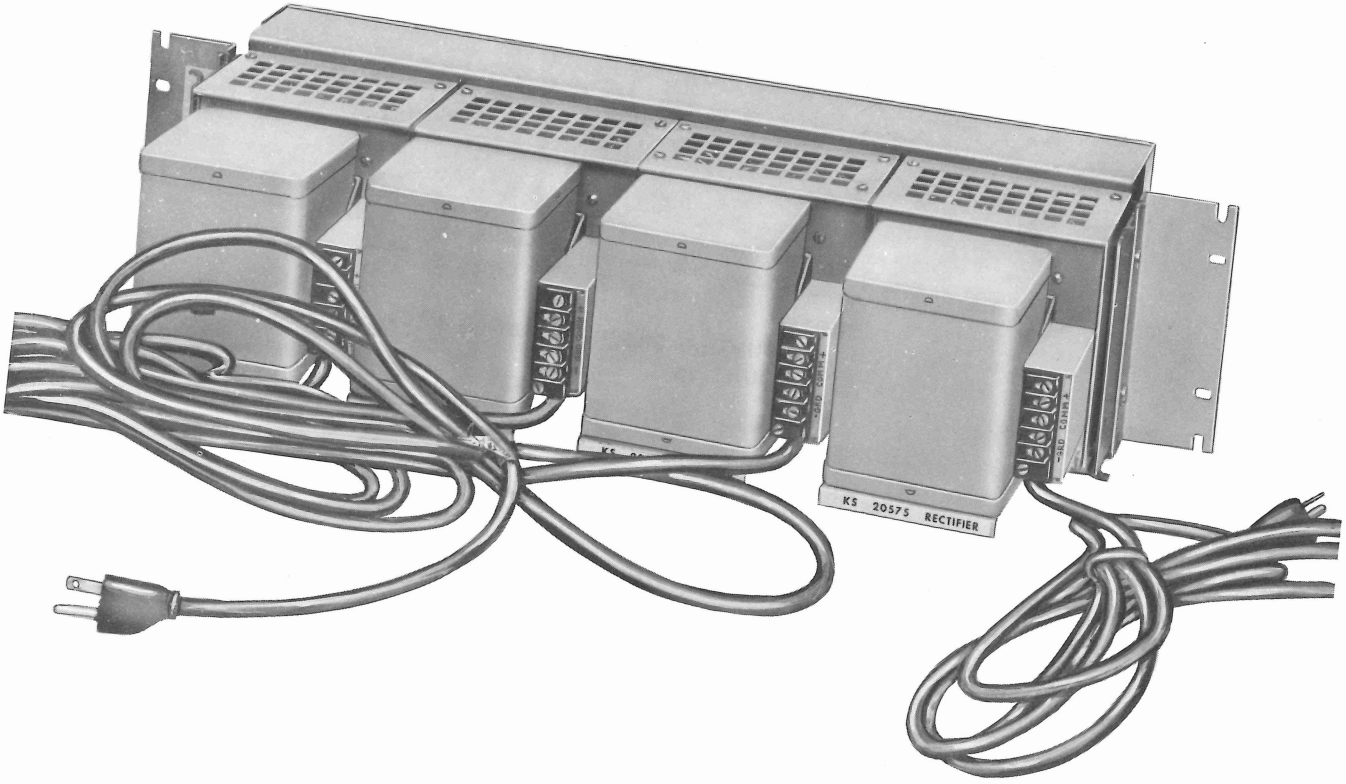


Fig. 10—71A Apparatus Mounting Equipped With Four KS-20575 Rectifiers

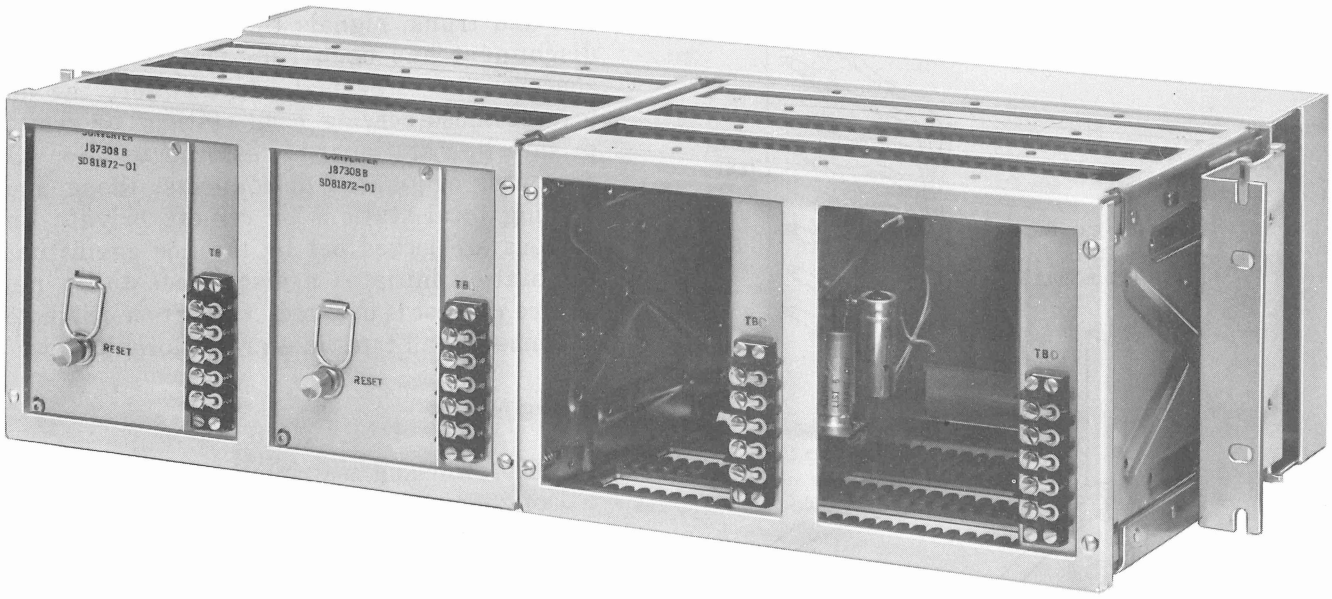


Fig. 11—71B Apparatus Mounting Equipped With Two J87308B Converters

is requested by a station arranged for dual access is as follows:

(1) When the station service request is for trunk group A, 4 volts is applied across the tip and ring of the line circuit. If the service request is for trunk group B, the 4 volts will be of the opposite polarity.

(2) During the idle periods, the dual access trunk scanner which consists of two scanners (one for each trunk group) will be locked on an idle trunk in each trunk group and the dual access line scanner which also consists of two scanners (one for requests to trunk group A and one for requests to trunk group B) will be scanning the line circuits for a service request. When the line scanner reaches the line circuit associated with the station requesting service, it stops on that line and causes a ground to be applied to the matrix winding associated with that line.

(3) The control module determines which trunk group is being requested and closes through the pulsing path to that group.

(4) The control module detects ground on the matrix and, if a trunk in the group requested is idle, at the proper time triggers the pulser. This closes the ferreed switches associated with the line circuit requesting service and the idle trunk in the group requested:

(5) When a trunk is not idle in the group requested, a camp-on signal will be sent to the station to acknowledge the request for service. The camp-on signal consists of a measured spacing signal which is sent approximately every three seconds. In addition, the control module will stop the appropriate line scanner (A or B) on the line circuit of the line requesting service. The stopped line scanner will be periodically disabled to allow the system to scan for service requests to the other trunk group. This provides a simple queuing system that ensures that stations are served sequentially. Therefore, no station requesting service may be served twice until all other stations requesting that trunk group are connected. The camp-on signal is recognized at the station as a delete character.

(6) After the connection is made through the switching matrix, a relay in the trunk circuit closes to complete the connection from line to trunk. This relay protects the ferreed switches from the switching currents, thereby prolonging the life and improving the reliability of the contacts.

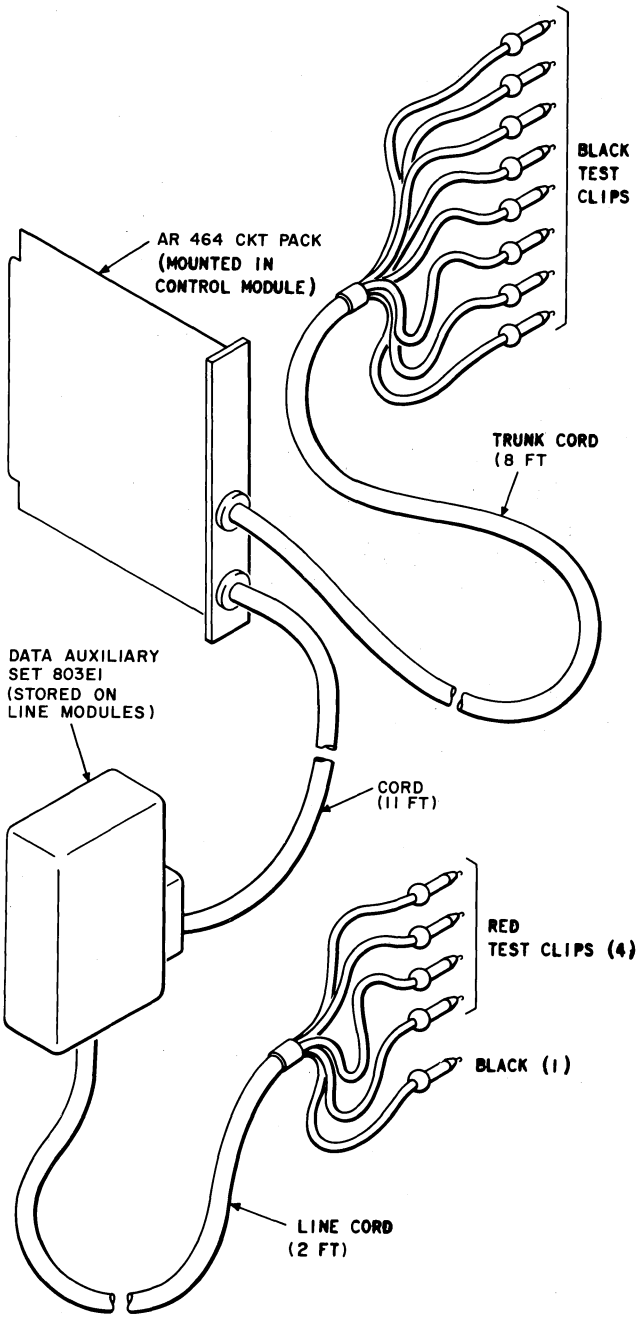


Fig. 12—AR464 CP and DAS 803E1 (Manual Test Equipment)

(7) Once the connection of the line to the trunk is complete, a current sensor in the trunk circuit monitors the loop for a request for disconnect. When either the station or computer originates a disconnect, the loop current drops to zero. The trunk circuit detects the loss of loop current, opens the connection between the line and trunk, signals the line circuit that a disconnect has occurred, and restores the concentrator to normal. In addition, the line (except those serving local stations or remote private line stations) is restored to idle. On computer originated disconnects, those lines serving local stations or remote private line stations are locked out by the line circuit until the station initiates a disconnect and a new service request is initiated. On station originated disconnects , all type lines are restored to idle.

Switching Matrix

3.06 The switching matrix consists of a number of 258A switches (Fig. 14). The 258A switch is an 8 by 8 matrix of ferreed switches. Each ferreed switch provides three contacts (tip, ring, and sleeve). All of the ferreed switches in a vertical column within a 258A switch are connected in multiple, and all the ferreed switches in a horizontal row of a 258A switch are connected in multiple. This way, tip, ring, and sleeve are multipled together in their respective rows and columns.

3.07 The eight rows and eight columns of the 258A switch are provided with a set of three contacts at each of the 64 intersections (crosspoints). The number of lines and trunks to be served will determine which line and switch module is to be used. The 18A1 Data Mounting contains four 258A switches which provide 256 crosspoints for switching 32 lines and 8 trunks. The 19A1 Data Mounting contains eight 258A switches which provide 512 crosspoints for switching 32 lines and 16 trunks. The 20A1 Data Mounting contains sixteen 258A switches which provide 1024 crosspoints for switching 32 lines and 32 trunks.

3.08 In addition to the three contacts, each ferreed switch is composed of a remendur sleeve and two control windings. The remendur sleeve is inserted in a shunt plate of magnetic material and the crosspoint contacts are placed in the sleeve. One of the control windings is connected in series with the corresponding windings of the other switches on the same row. The other control winding is connected in series with the corresponding windings of the other switches in the same column. All of the control winding pulse leads for each row are multipled together at one end and all of the pulse leads for each column are multipled together at one end. The two multiples are then connected together.

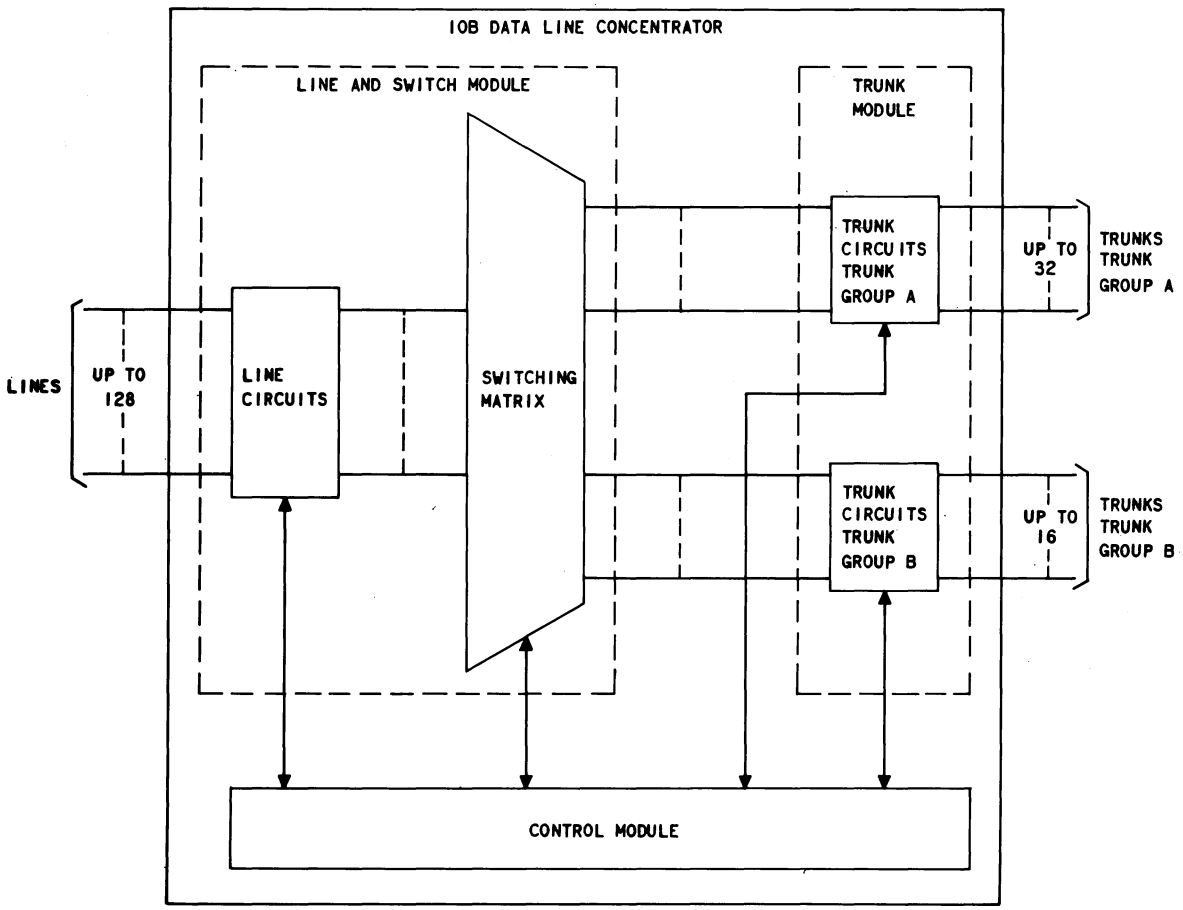


Fig. 13—Block Diagram of 10B Data Line Concentrator (Less Power Module)

3.09 In order to close a particular ferreed switch, it is necessary to pulse both control windings of that switch. A high-current (8 to 10 amperes) of approximately 0.5-millisecond duration is sent through the control windings of the row and column associated with the switch to be closed. The current pulse flows across the row and down the column corresponding to the switch to be operated. The pulse flows through ***both*** control windings of the switch at the crosspoint of the row and column and ***only one*** of the control windings of the other switches on the row and column being pulsed. This closes the switch at the crosspoint and opens any previously closed switches on the row and column. Once a switch is closed by pulsing both of the control windings, the remanent magnetic field in the switch will hold the contacts closed until ***one*** of the control windings is pulsed.

Control Module

3.10 The control module contains the pulser, master clock, dual access line scanner, dual access trunk scanner, dual access control, camp-on

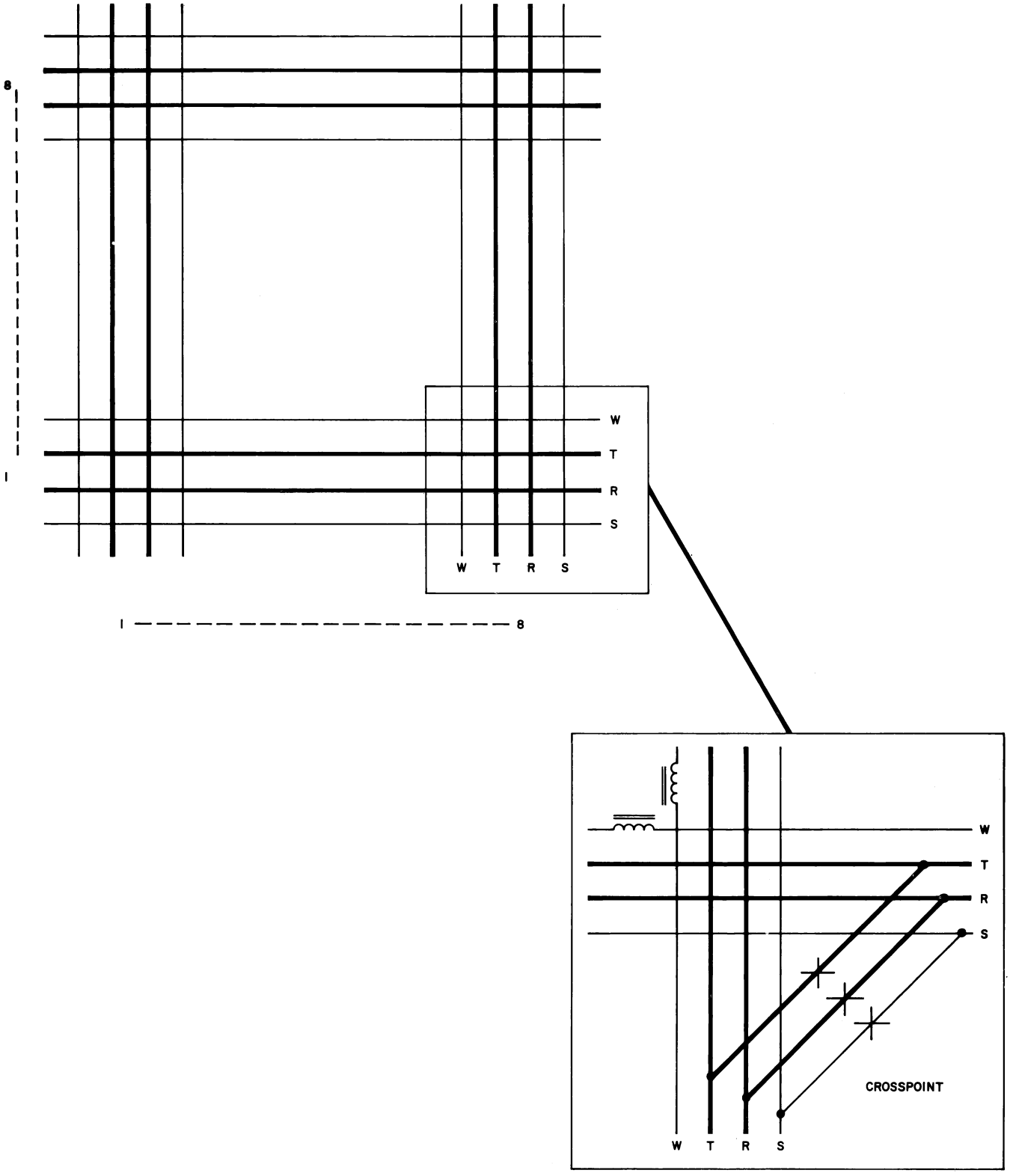


Fig. 14—258A Switch

signal generator, alarms and registers, dc/dc converter, and manual test circuits.

3.11 The pulser produces the control winding pulses used to cause the ferreed switches in the switching matrix to open and close (see 3.09). The master clock generates the timing signals which control the operational sequences for establishing a connection. The dual access control maintains overall control and synchronizes the actions of most of the other circuits.

3.12 The control path of the switching network used in the 10B Data Line Concentrator is shown in Fig. 15. As an example, assume that the trunk M in trunk group A is idle and has been selected by the trunk scanner for connection to a line requesting service in trunk group A. The K1 relay of this selected trunk is operated, thereby partially closing through the pulsing path for the crosspoints. Now assume that the station associated with line 2 has requested service to trunk group A. The line scanner will stop on the line circuit for line 2 and the pulser switch transistor (shown symbolically by the closed contact) in the line circuit turns on, completing the ground return path for the pulser. The pulser is then triggered and the crosspoints associated with line 2 and trunk M of trunk group A are closed. The pulse path is shown by heavy lines in Fig. 15.

3.13 If another station requests service during the time the connection sequence is occuring, the control module prevents the pulser from operating again for about 40 milliseconds. This allows time for the connected trunk circuit to release its K1 relay and for the pulser network to build up enough energy to close another crosspoint.

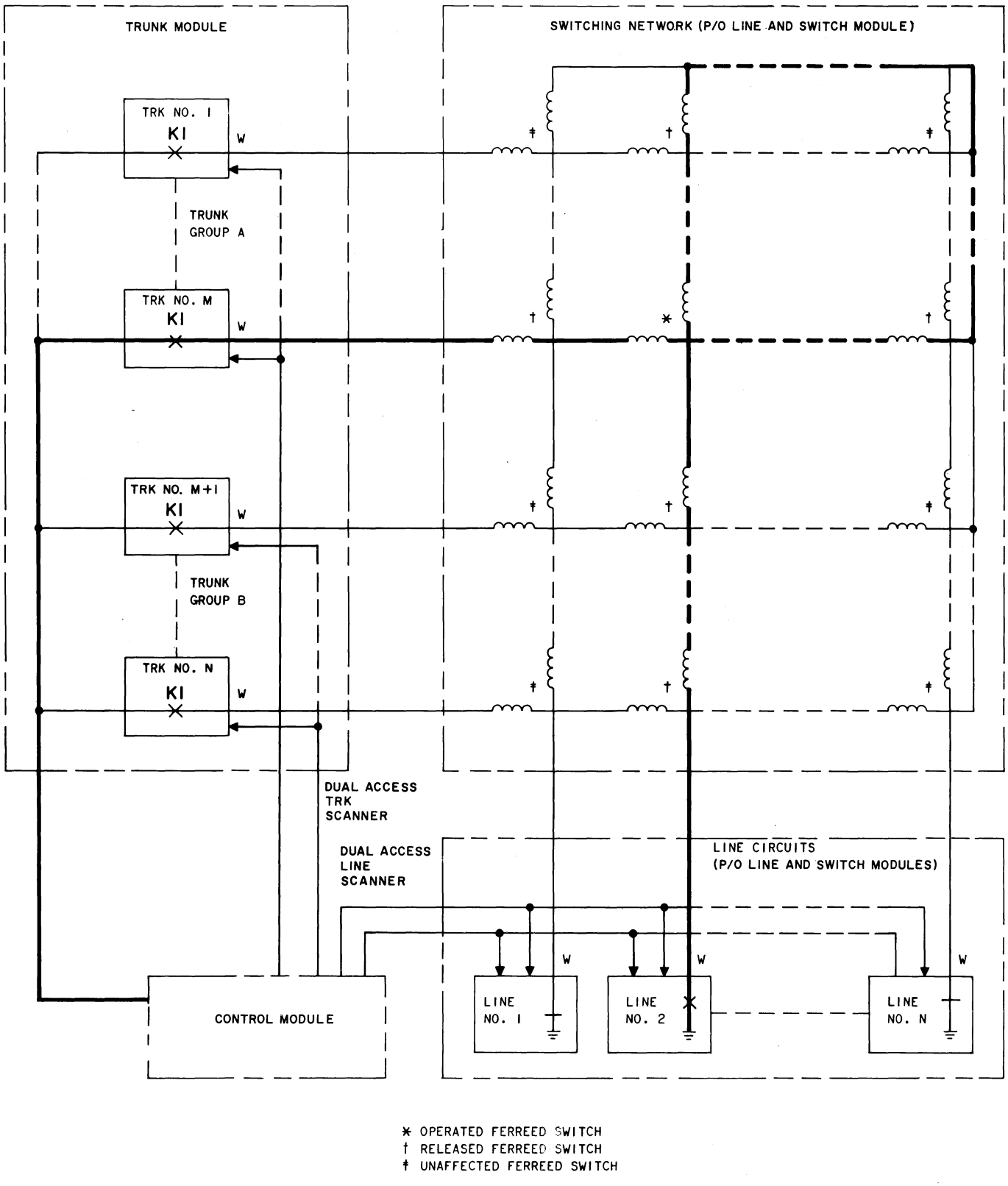
3.14 When all trunks in the group requested are busy, a connection cannot be established. In this case, the K1 relay of all trunk circuits in the group will be released. The trunk scanner will continue to sequentially step through the trunk circuits looking for one to become idle. The line scanner continues to sequentially step through the line circuits searching for a service request. The line scanner stops on the first line with a service request and, if the request is for the trunk group with the all trunks busy condition, waits for a trunk to become idle. Although the line scanner remains locked on this line, it is periodically disabled to allow it to search for service requests to the other trunk group. The camp-on generator sends a camp-on signal to all stations requesting service to the busy trunk group.

3.15 The camp-on generator consists of a 3-second timer and an output signal timer. The 3-second timer is free running and activates the output signal timer approximately every 3 seconds. Everytime the output signal timer is activated it produces a pulse. The output signal timer may be optionally strapped to produce a 3-, 6-, or 10.5-millisecond open on the lines requesting service to a group with all trunks busy. The duration of this open matches the speed of the stations being served (300, 150, or 75 to 110 bauds, respectively).

3.16 The alarm and register circuit (Fig. 16) provides the means for monitoring the major functions of the concentrator, indicates a failure of these functions, registers the number of calls handled by each trunk group, and registers the number of calls to each trunk group that are not handled because of an all trunks busy condition. The following functions are monitored for alarms: the clock, line scanner output, trunk scanner output, pulser, +24 and −24 volt dc supplies to each module, +24 and −24 volt dc fuses on the line and switch module, and the +4.5 volt dc output from the dc/dc converter. Failure of any one of the monitored functions causes the alarm relay on the ***alarms and registers*** circuit (K1) to release. Two sets of transfer contacts are made available on K1 for remoting the alarm indication. In addition, the following individual lamp indications are provided:

- CLK lamp—Indicates a clock failure
- PLSR lamp—Indicates a pulser failure
- LS lamp—Indicates a line scanner failure
- TS lamp—Indicates a trunk scanner failure.

3.17 The free-running clock output is monitored by the clock alarm on the CL2 lead. If the clock stops, the CLK lamp lights and relay K1 on the ***alarms and registers*** circuit is released. The pulser is monitored via relay K1 on the ***control module.*** Certain types of pulser failures cause ***control module*** K1 relay to operate and ground the input to the pulser alarm circuit. This lights the PLSR lamp and releases K1 of the ***alarms and registers*** circuit.



* OPERATED FERREED SWITCH
† RELEASED FERREED SWITCH
‡ UNAFFECTED FERREED SWITCH

Fig. 15—Switching Network Control Paths

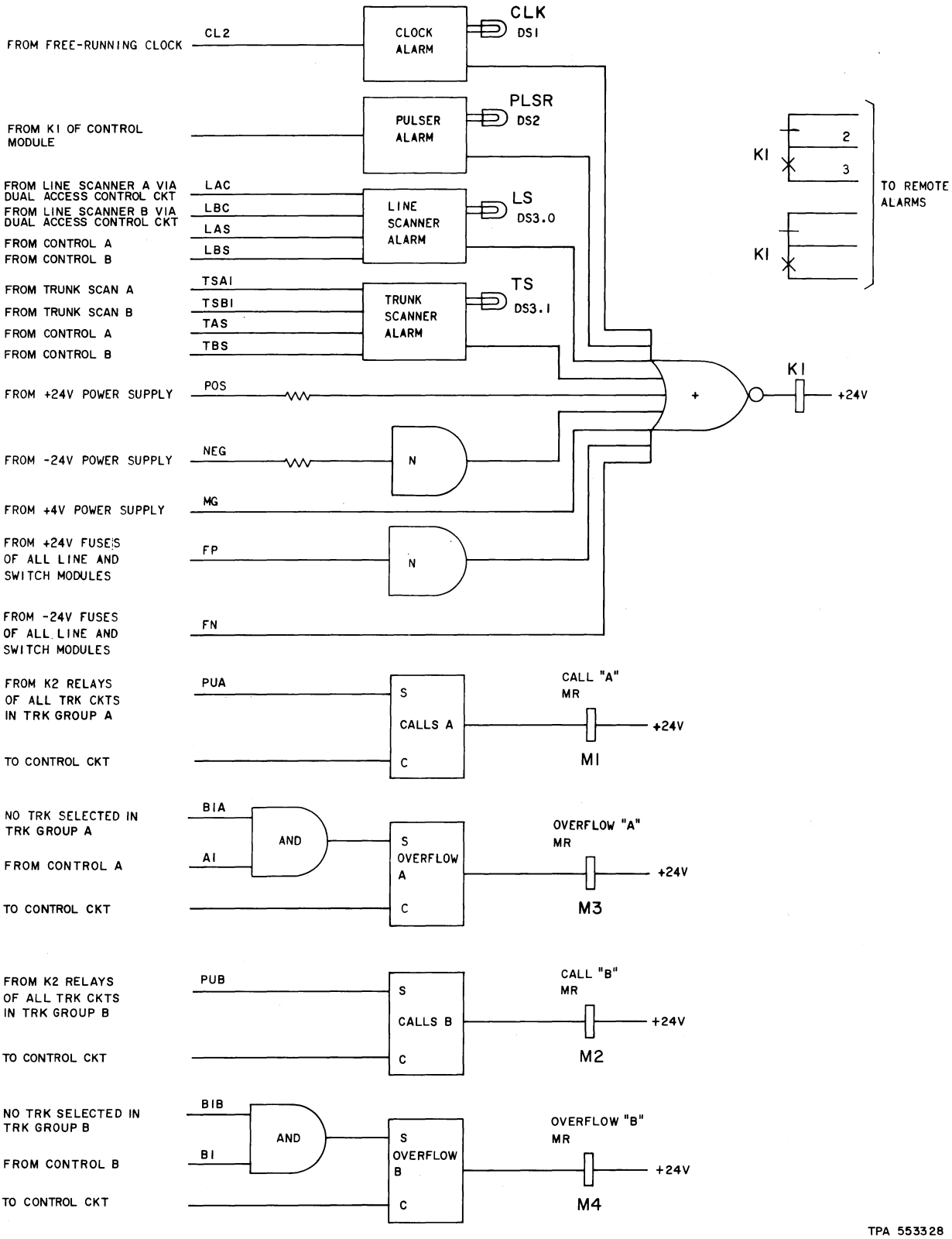


Fig. 16—Block Diagram of Alarms and Registers (AR490)

3.18 The line scanner alarm monitors two leads which are derived from the dual access line scanner (LAC and LBC) and two leads which are derived from the dual access control circuit (LAS and LBS). The LAC and LAS leads monitor the portion of the dual access line scanner that looks for service requests in trunk group A and the LBC and LBS leads monitor the portion of the dual access line scanner that looks for service requests in trunk group B. If a failure occurs in either portion of the dual access line scanner, the LS lamp lights and relay K1 of the ***alarms and registers*** circuit releases. The arrangement for the trunk scanner alarm circuit is the same as that of the line scanner alarm circuit.

3.19 The CALL A and CALL B registers record the number of calls the concentrator processes for trunk group A and trunk group B, respectively. The OVERFLOW A and OVERFLOW B registers record the number of calls completed out of queue placed to trunk group A and trunk group B, respectively.

3.20 The dc to dc converter circuit pack (AR381) operates as a switching mode regulator to convert the +24 volts dc to +4.5 volts dc. The +4.5 volts dc is required to power integrated chip (IC) logic circuits used in the control and scanner circuits.

3.21 The manual test circuit pack (AR464) is used in conjunction with the Data Auxiliary Set 803E1 to select a line, reserve a trunk, simulate a station request for service, and force the concentrator to connect the selected line to the reserved trunk for the purpose of performing tests on the system.

Line Circuits [AR366 (Fig. 17)]

3.22 The line circuit faces the station loop and performs the following functions.

(a) Detects service requests.

(b) Determines which trunk group (A or B) is being requested.

(c) Signals the common control that a request is being made and which trunk group is requested.

(d) Terminates the line loop until a connection is made or the service request is withdrawn.

(e) Sends camp-on signal to the station if all trunks in the group requested are busy.

(f) Transfers loop supervision to the trunk circuit once connection is made.

(g) Terminates the line loop with a lockout condition, when a disconnect is initiated from the trunk side, until the station disconnects.

3.23 The line circuit detects the presence of a request for service by means of two voltage detectors which monitor the line. When service is requested, the station applies a marking voltage across tip and ring of the line circuit. The trunk group being requested is determined by the relative polarity of this voltage.

> ***Note:*** Service requests from stations not equipped with the dual access feature will always be directed to the same trunk group.

3.24 When a service request is detected, the line circuit terminates the line in a low impedance bridge (allowing marking current to flow in the loop) and, when scanned, informs the common control that a service request is present and indicates to the common control circuit which trunk group is being requested. The line scanner causes a transistor in the line circuit to turn on, thereby grounding the line circuits matrix pulse lead.

3.25 If there is an available trunk in the group desired, it will have already been selected for connection by the trunk scanner. The pulser is then triggered and the line is connected to the trunk circuit. The line circuit detects the connection via the sleeve lead and then disables its voltage detectors and relinquishes supervision of the loop to the trunk circuit.

3.26 If there are no available trunks in the group requested when the line scanner interrogates the line circuit, no pulse is generated and the line scanner remains stopped on the line requesting service. The line circuit, under control of the camp-on generator, now sends the camp-on signal to the station. As soon as a trunk in the group requested becomes available, the pulser is triggered and the circuit connection proceeds in the normal manner. If the service request is removed before a trunk becomes available, the line circuit reverts to the idle state.

3.27 A disconnect can be initiated by either the station or the computer. In both cases the request for disconnect is recognized by the trunk circuit and relayed to the line circuit by the sleeve lead in the switching matrix. If the disconnect is station originated, the 4 volts is removed from the line and the line circuit reverts to the idle state. However, if the disconnect is computer originated, the station remains on and continues to apply the 4 volts to the line. In this case, the line circuit connects the line to a low impedance bridge, thereby locking the station out until the station is turned off and a new service request is initiated.

Trunk Circuit (AR488—Trunk Group A)

3.28 The trunk circuit faces the trunk loop and performs the following functions.

(a) Interfaces the concentrator to the trunk terminating data set.

(b) Monitors the trunk loop.

(c) Signals the control module of the trunk loop status.

(d) Establishes the pulsing path for the switching matrix when selected by the trunk scanner.

(e) Connects the line to the trunk after the crosspoints in the switching matrix have closed.

(f) Disconnects the line from the trunk when a request for disconnect is detected.

3.29 There are four modes of operation for the trunk circuit:

(a) Trunk made busy mode

(b) Trunk idle mode

(c) Trunk idle and selected mode

(d) Trunk connected mode.

3.30 In all modes, except the trunk connected mode, a voltage detector is bridged across the tip and ring of the trunk circuit. This voltage detector monitors the voltage applied to the trunk by the trunk terminating data set. When the trunk has been made busy either manually or by the computer, the output of the trunk terminating data set is squelched and zero volts is applied to the trunk loop. The trunk circuit recognizes this condition as the trunk made busy state and signals the control circuit which releases the trunk scanner to proceed to the next trunk circuit.

3.31 When the trunk is idle and available for service, the trunk terminating data set is unsquelched and applies 4 volts to the trunk loop. The trunk circuit recognizes this condition as the trunk idle state. When scanned by the trunk scanner, the trunk circuit operates its K1 relay and signals the control circuit that the trunk is idle.

3.32 When the trunk scanner stops on a trunk circuit with an idle trunk, it remains stopped on that trunk circuit until a connection is established. This is the trunk idle and selected mode. The operated K1 relay in the trunk circuit closes through the pulsing path for the horizontal control windings of the switching matrix ferreed switches.

3.33 When a request for service is detected by the line scanner, the pulser is triggered, thereby closing the crosspoints and connecting the line to the trunk circuit. At this point relay K2 in the trunk circuit operates. This releases relay K1, removes the voltage detector from across the trunk loop; connects the line to the trunk, places two floating current detectors in series with the loop, signals the call register that a connection has been made, and releases the trunk scanner to search for another idle trunk. The two current detectors (one each in tip and ring) are used to protect against longitudinal currents in the loop due to ground potential differences between the computer and the station. The trunk circuit is now in the connected mode.

3.34 A 75-millisecond disconnect timing circuit is provided in the trunk circuit to ensure that the concentrator does not drop the connection, on a request for disconnect, until the supervisory functions of both the line and trunk terminals are completed. Therefore, the trunk connected mode will be maintained until loop current has been removed for a nominal 75 milliseconds.

3.35 When the loop current is removed for 75 milliseconds, the trunk circuit recognizes this as a request for disconnect. The trunk circuit

K2 relay releases at this time. This removes the current detectors from the trunk loop, places the voltage detector across the trunk loop, disconnects the line from the trunk, and signals the line circuit that a disconnect has occurred. After the transfer is made, the trunk circuit will return to the idle mode unless the trunk terminating data set has been squelched removing the 4 volts from the trunk. In this case, the trunk circuit assumes the made busy mode.

Trunk Circuit (AR382—Trunk Group B)

3.36 The trunk circuit for trunk group B operates identically to those for trunk group A (See 3.28 through 3.35) except that the tip and ring terminals are interchanged to allow for loop voltages of the opposite polarity.

4. REFERENCES

4.01 The following circuit description, schematic drawing, and Bell System Practices (BSPs) pertain to the 10B Data Line Concentrator.

SECTION	TITLE
SD- & CD-1D212-01	Data Systems Station—No. 10B Data Line Concentrator
591-810-Series	10-Type Data Line Concentrator System
590-102-110	18A1 Data Mounting—Identification
590-102-111	19A1 Data Mounting—Identification
590-102-112	20A1 Data Mounting—Identification
590-102-113	21-Type Data Mounting—Identification
590-102-114	22-Type Data Mounting—Identification
590-102-119	23-Type Data Mounting—identification
598-075-100	Data Auxiliary Set 803E1—Identification

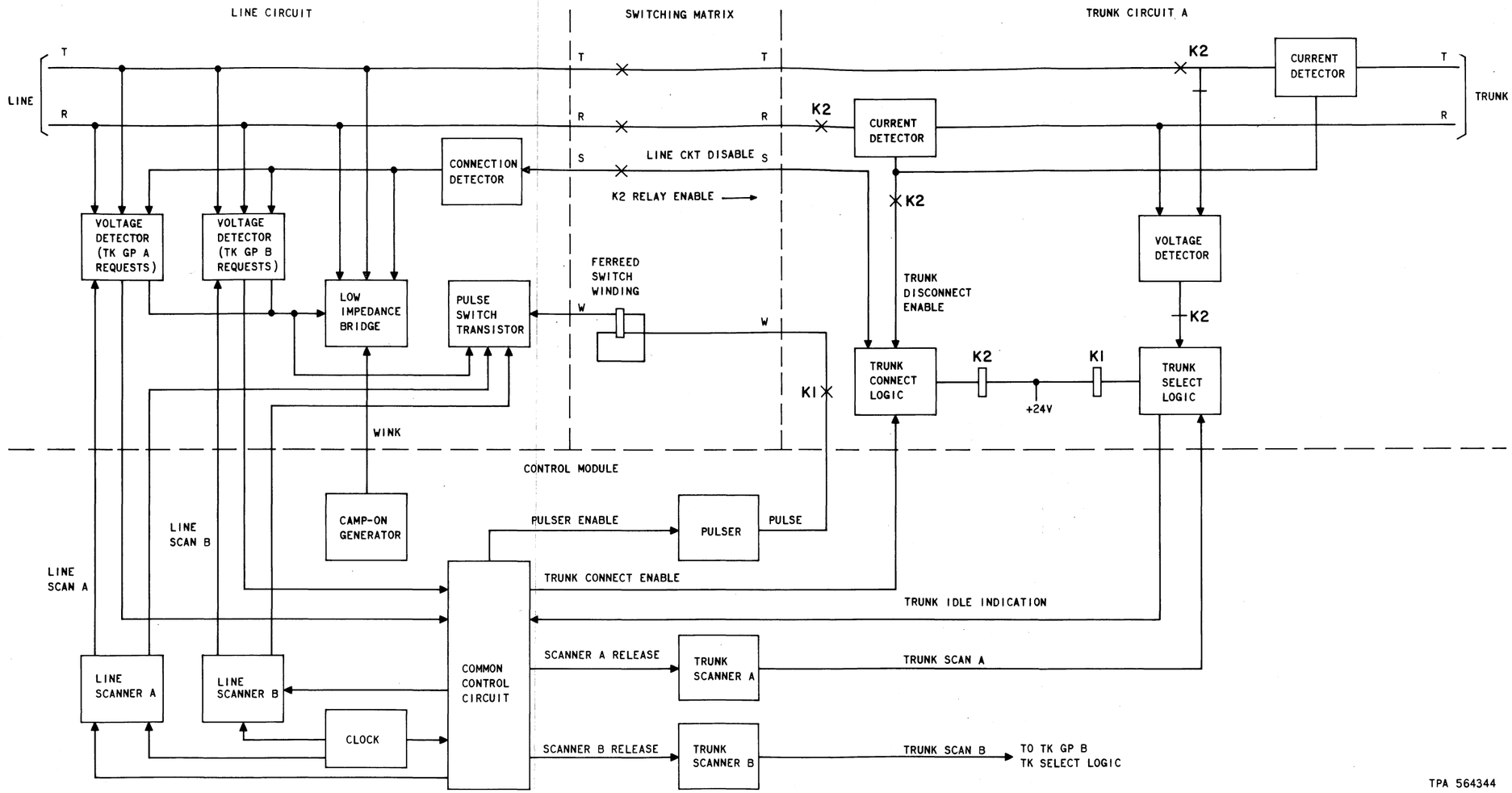


Fig. 17—Line Circuit and Trunk Circuit A Connections