OPERATION AND MAINTENANCE
MAINTENANCE SUPPORT
1XN FREQUENCY DIVERSITY
DR 6/11-135A
DESCRIPTION
TERMINAL

CONTENTS PAGE

The 135A line terminal bays are located at each end of a switching section. The line terminal bay is available as an initial bay or a growth bay. The initial bay contains one protection channel, one regular channel, and the necessary control and switching logic for up to seven regular channels in the DR 6 system or up to ten regular channels in the DR 11 system. The growth bay contains up to three additional regular channels. A fully equipped DR 6 system requires one initial bay and two growth bays at each end of the switching section. A DR 11 system requires one initial bay and three growth bays.

This practice is reissued to provide information on the Blue Signal Generator. The practice is used in binder 421-101-001.

If only an initial bay is equipped at each end of a switching section, the system is defined as a 1X1 arrangement (one protection channel to protect one regular channel). If an initial bay and one or more growth bays are at each end of a switching section, the system is defined as a 1XN arrangement (one protection channel to protect two or more regular channels).

As shown in the "Equipment Identification" tab, the initial line terminal bay contains (from top to bottom) an installer interface panel, a growth shelf, a control and service channel shelf, a fan shelf, a protection digital terminal shelf, a regular digital terminal shelf, and an equalizer panel (optional). A growth bay contains an installer interface panel, up to three regular digital terminal shelves, a fan shelf, and an equalizer panel (optional).

The installer interface panel provides the DS3 input/output interface. The growth shelf contains the transmit and receive span switch units for each equipped regular channel. It also contains the transmit selector units and the receive distribution units for all growth regular channels. The growth shelf is required only if the system is a 1XN arrangement or is equipped with a protection

channel access option. The control shelf contains the system control and service channel units. The protection channel shelf and each regular channel shelf contain a digital terminal transmitter that inputs and transmits digital data in one direction of transmission and a digital terminal receiver that receives and outputs digital data from the opposite direction of transmission. The equalizer panel provides passive equalizer circuits that compensate for long (greater than 50 feet) IF interconnecting cables to and from the radio bays.

This section describes the line terminal bay functions in terms of transmitting, receiving, and associated controls. The temperature control (fans) and per shelf dc power distribution are also described.

TRANSMISSION

TRANSMITTING END

The transmitting portion of the line terminal bay accepts 44.736-Mb/s (DS3) digital inputs and delivers a 70-MHz output to the radio transmitter. Block diagrams are used to show the signal path and the interconnections between shelves and units.

Figure 1 shows the transmit signal flow of a 1X1 line terminal bay that is not equipped with the protection channel access option. Figure 2 shows the 1X1 arrangement that is equipped with the protection channel access option. Figure 3 shows a 1XN arrangement. Figures 1, 2, and 3 also show the different functions of the transmitting line terminal bays. The detailed block diagrams of these functions and the shelves they are located in are referenced in the figures. The detailed block diagrams are:

- Figure 4—Transmit Interface Unit
- Figure 5—Regular Channel Digital Terminal Transmitter
- Figure 6—Protection Channel Digital Terminal Transmitter
- Figure 7—Transmit Growth Span Director Units
- Figure 8—Transmit Growth Line Selector Units.

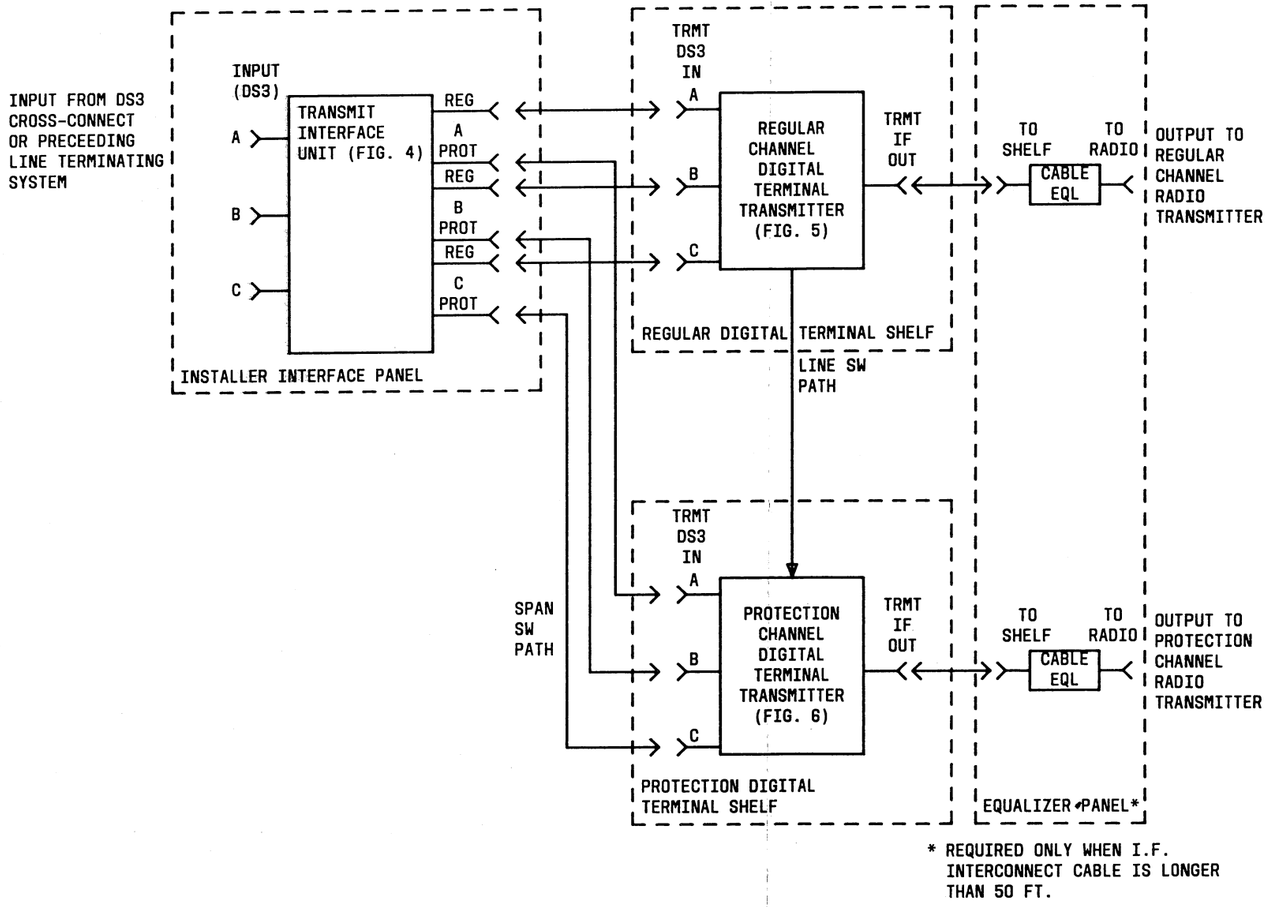
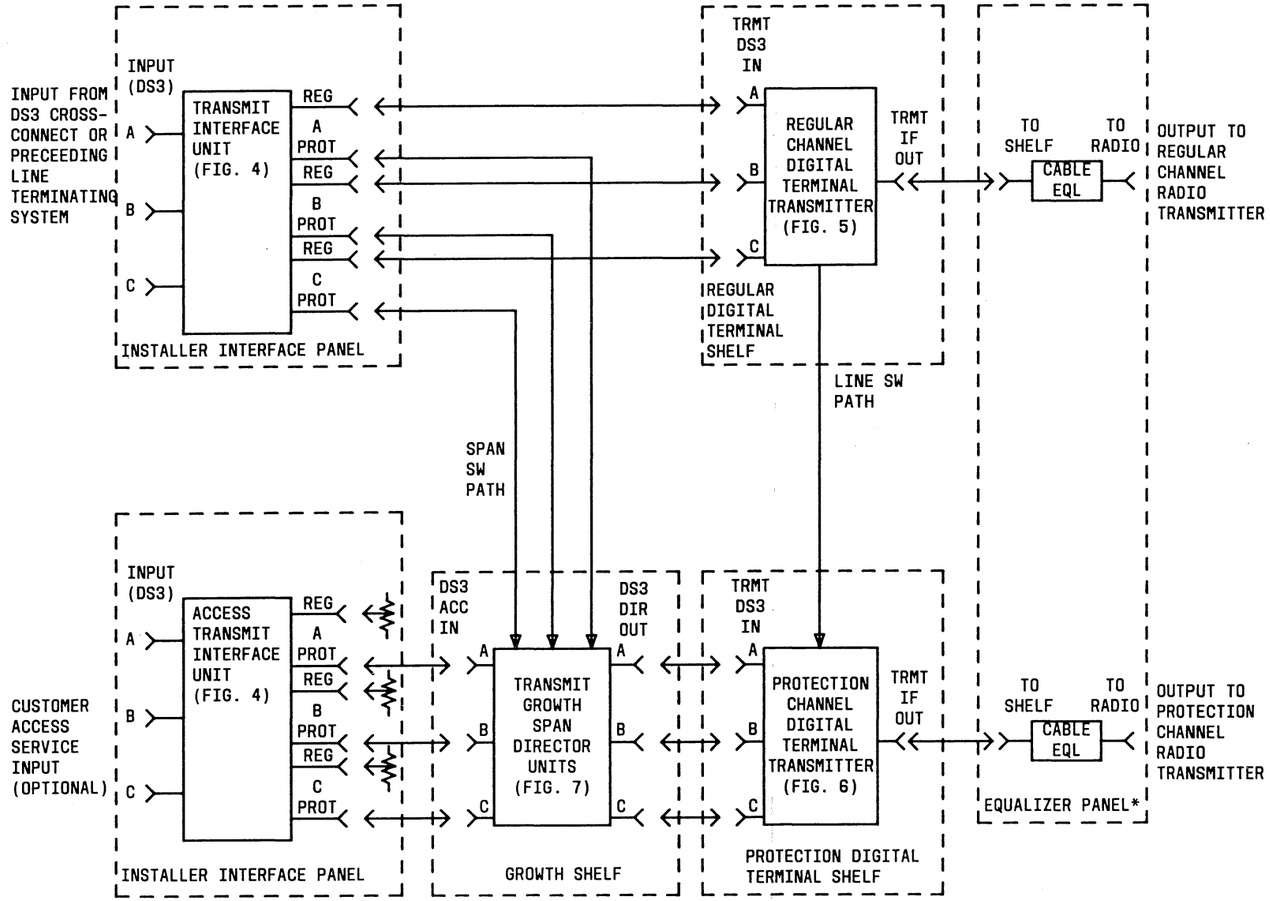


Fig. 1—1X1 Line Terminal Bay, Transmitting Without Access Option



* REQUIRED ONLY WHEN I.F. INTERCONNECT CABLE IS LONGER THAN 50 FT.

Fig. 2—1X1 Line Terminal Bay, Transmitting With Access Option

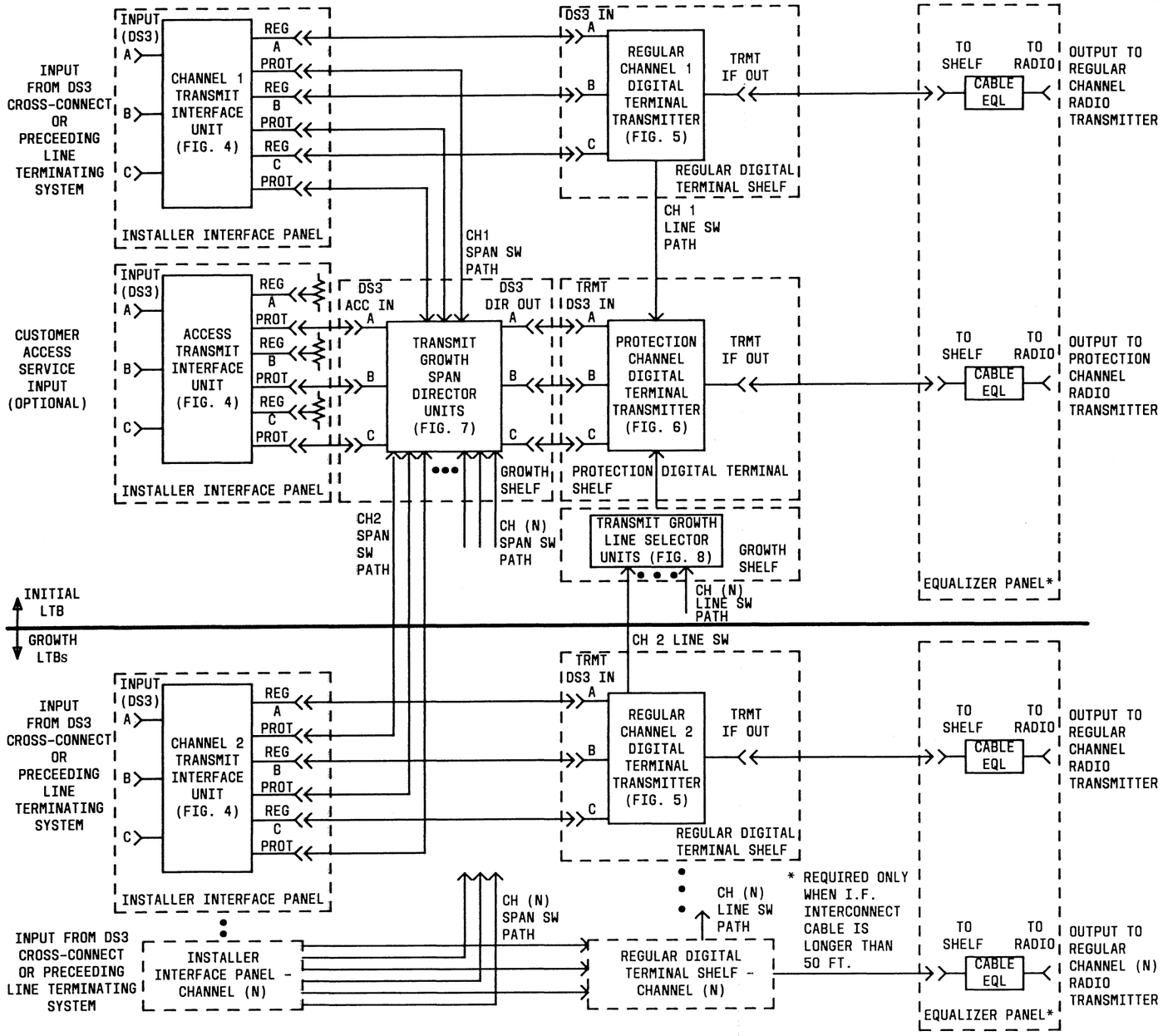


Fig. 3—1XN Line Terminal Bay, Transmitting

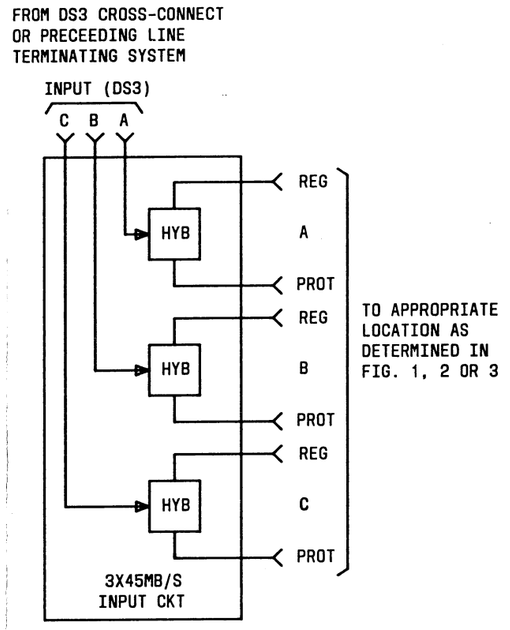
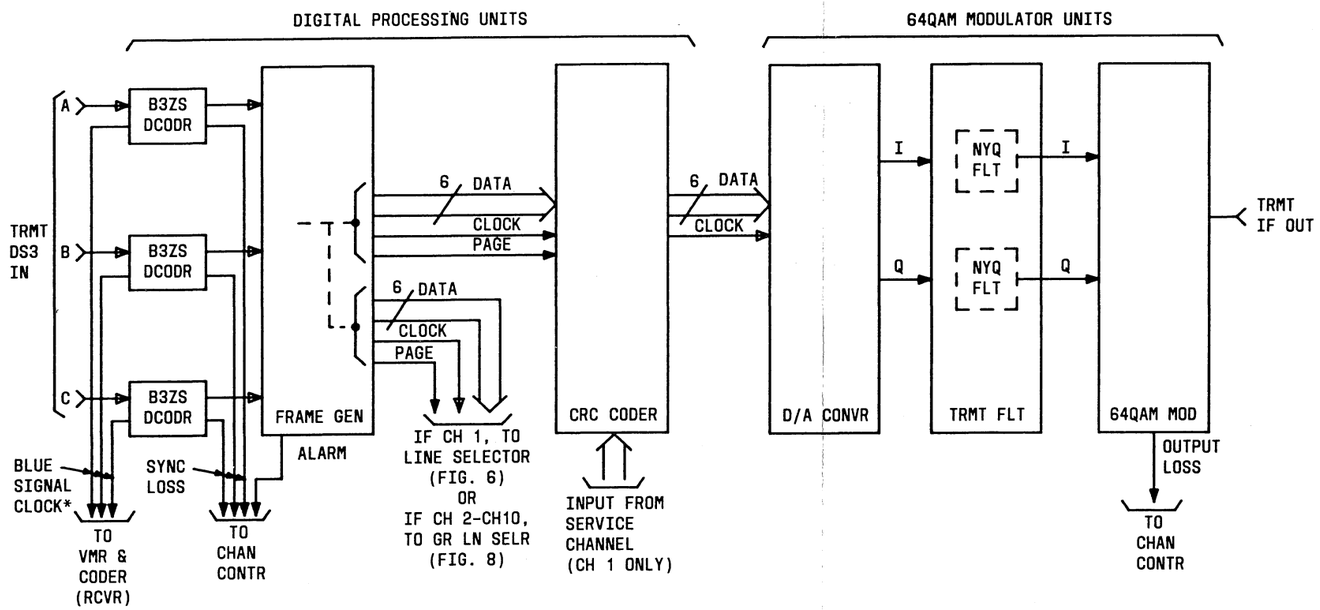


Fig. 4—Transmit Interface Unit



* NOT USED IF BLUE GEN IS EQUIPPED

Fig. 5—135A Regular Channel Digital Terminal Transmitter

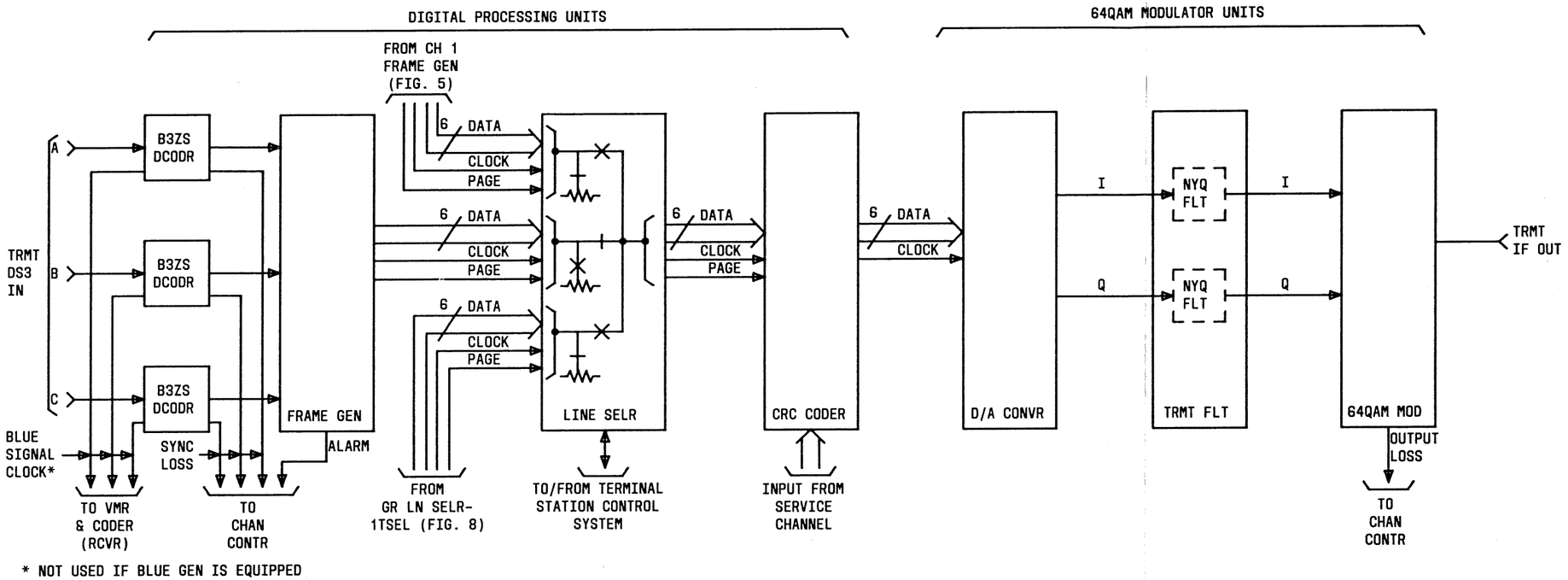


Fig. 6—135A Protection Channel Digital Terminal Transmitter

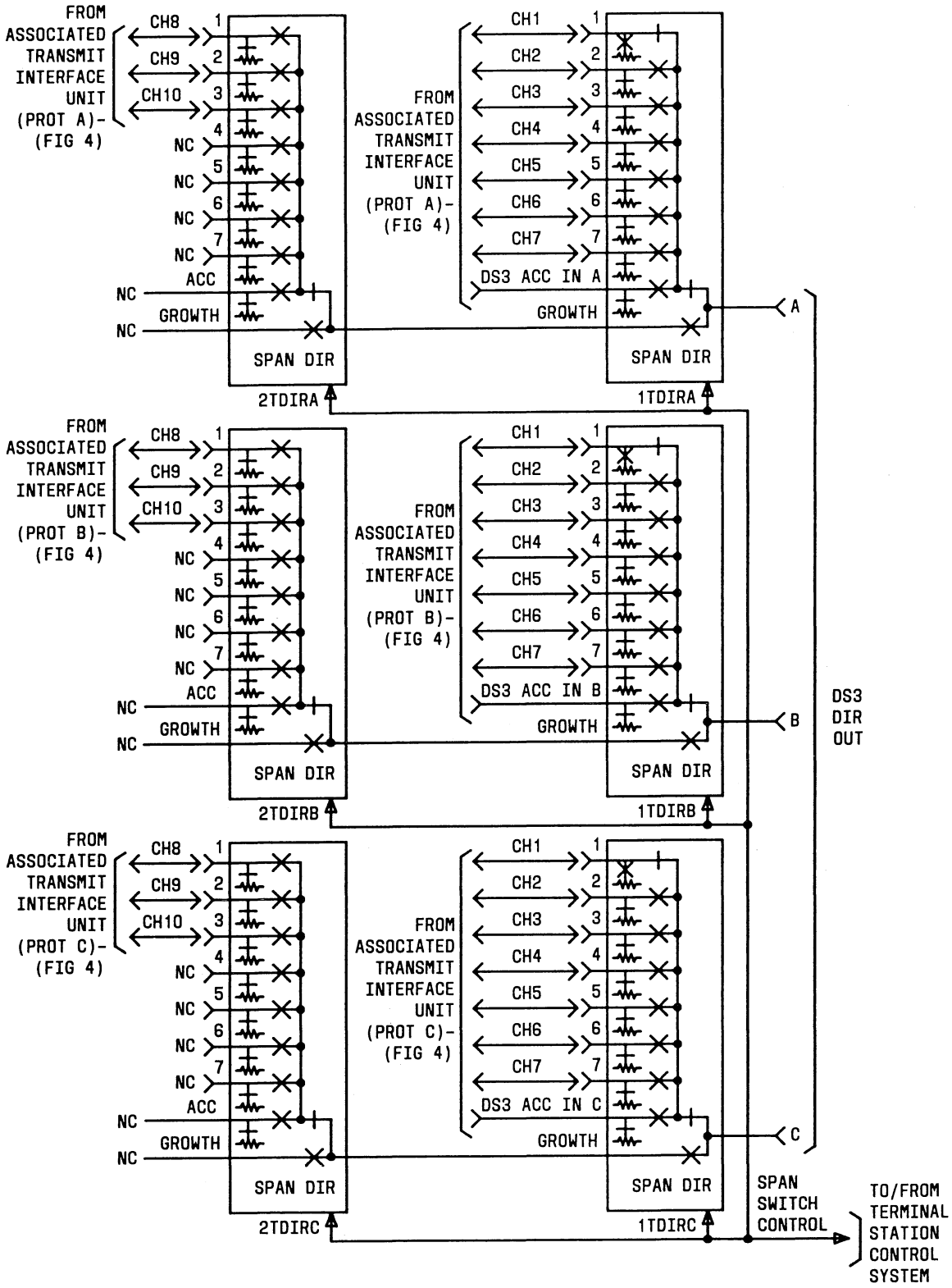


Fig. 7—Transmit Growth Span Director Units

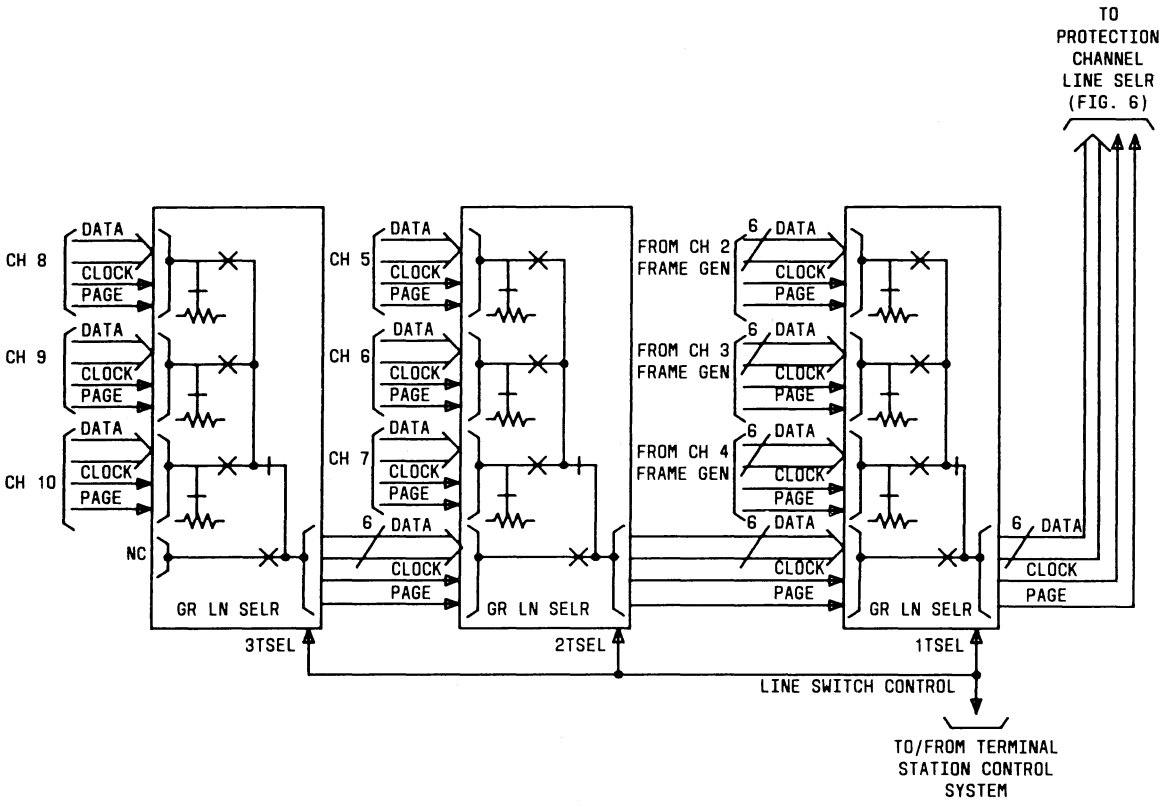


Fig. 8—Transmit Growth Line Selector Units

RECEIVING END

The receiving portion of the line terminal bay accepts 70-MHz input from the radio receiver and delivers 44.736-Mb/s (DS3) digital outputs. Block diagrams are used to show the signal path and the interconnections between shelves and units.

Figure 9 shows the receive signal flow of a 1X1 line terminal bay that is not equipped with the protection channel access option. Figure 10 shows the 1X1 arrangement that is equipped with the protection channel access option. Figure 11 shows a 1XN arrangement. Figures 9, 10, and 11 also show the different functions of the receiving line terminal bays. The detailed block diagrams of these functions and the shelves they are located in are referenced in the figures. The detailed block diagrams are:

- Figure 12—Regular Channel Digital Terminal Receiver
- Figure 13—Protection Channel Digital Terminal Receiver
- Figure 14—Receive Growth Line Distribution Units
- Figure 15—Receive Growth Span Director Units
- Figure 16—Receive Interface Unit.

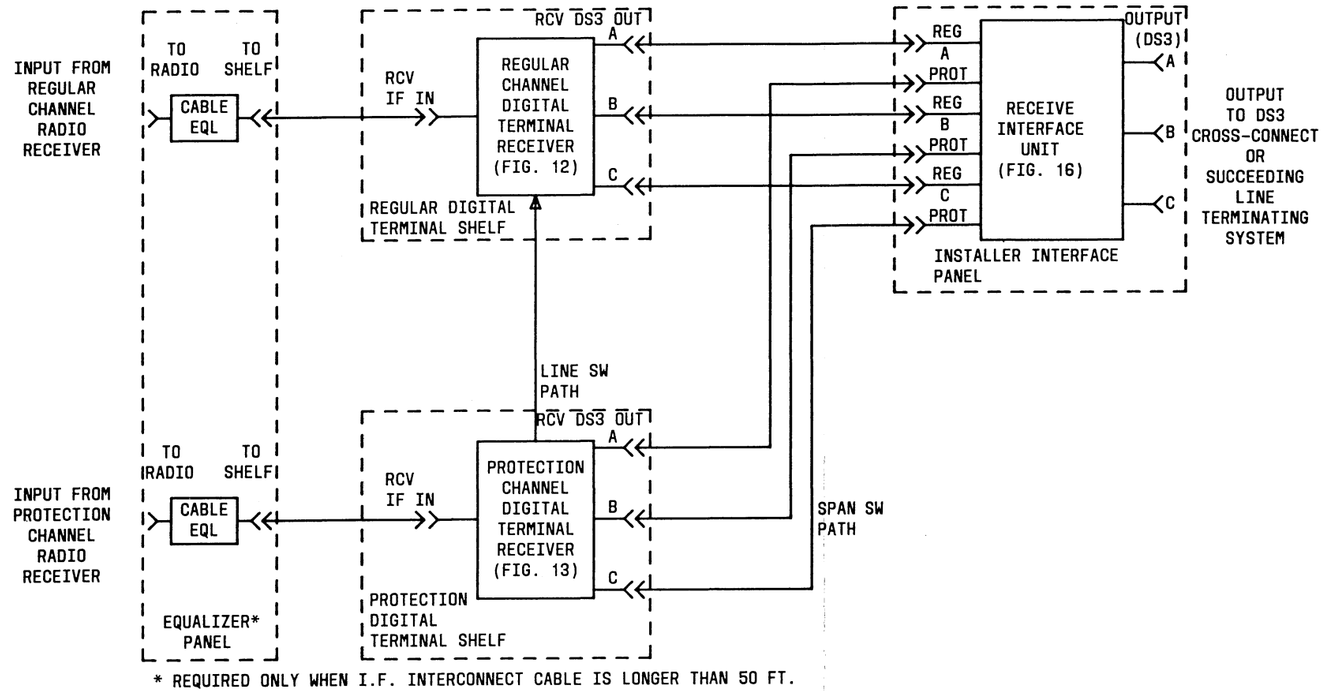


Fig. 9—1X1 Line Terminal Bay, Receiving Without Access Option

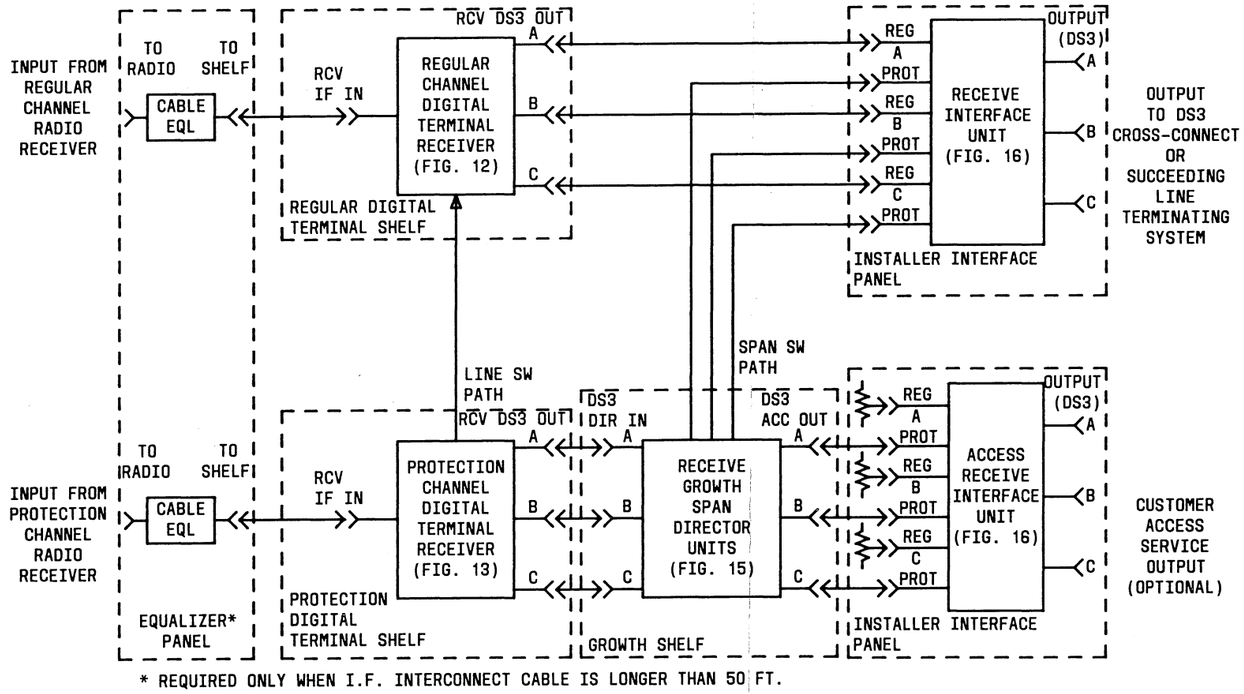


Fig. 10—1X1 Line Terminal Bay, Receiving With Access Option

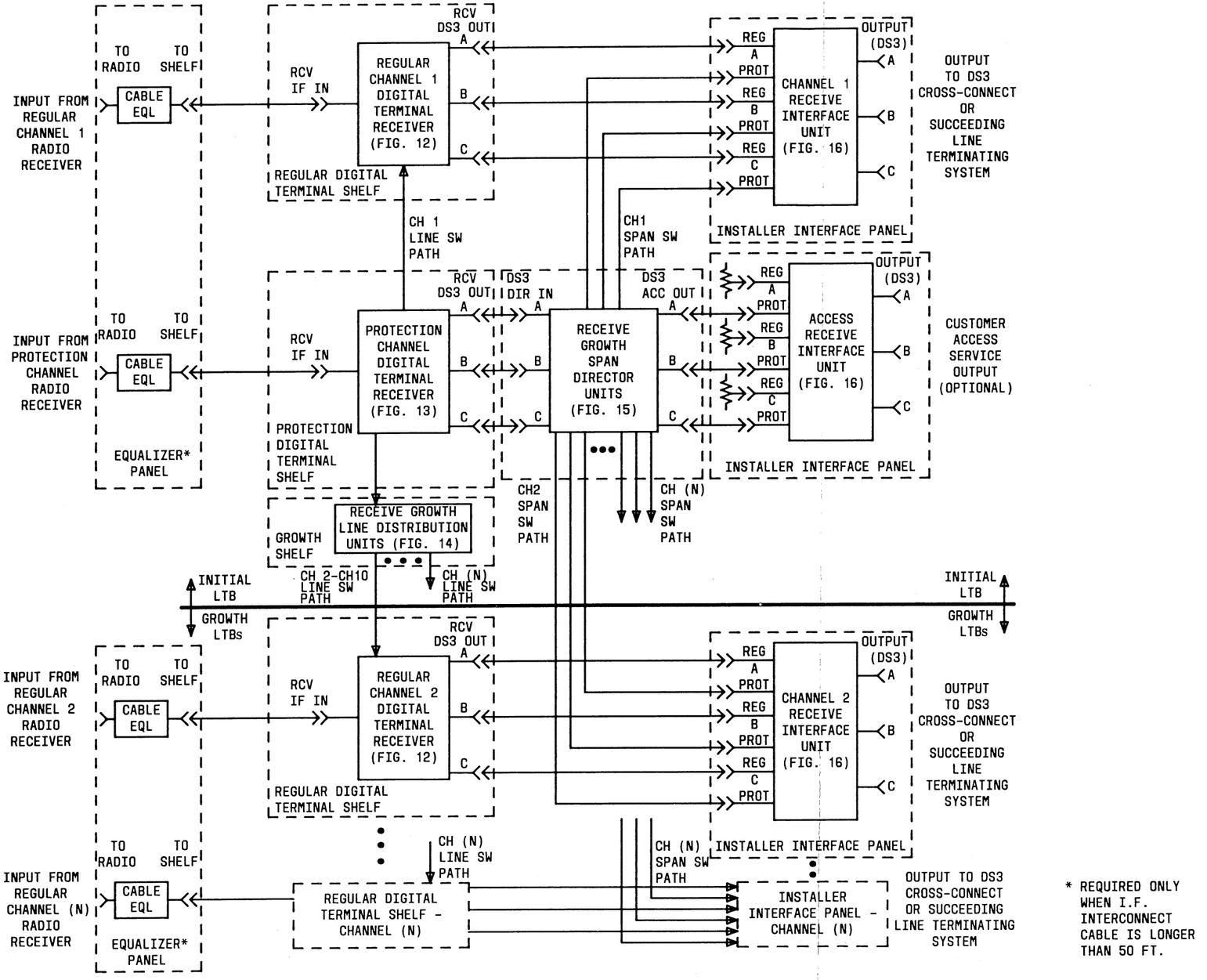


Fig. 11—1XN Line Terminal Bay(s), Receiving

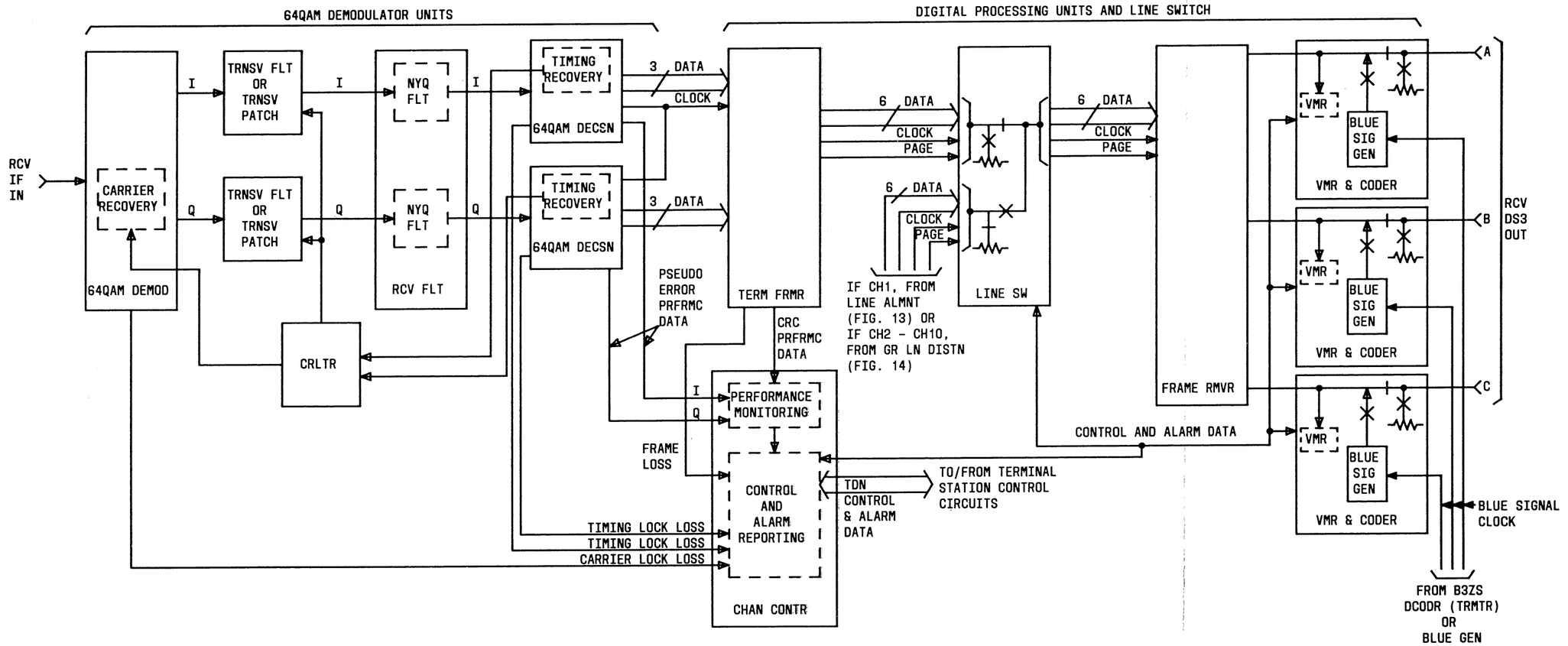


Fig. 12—135A Regular Channel Digital Terminal Receiver

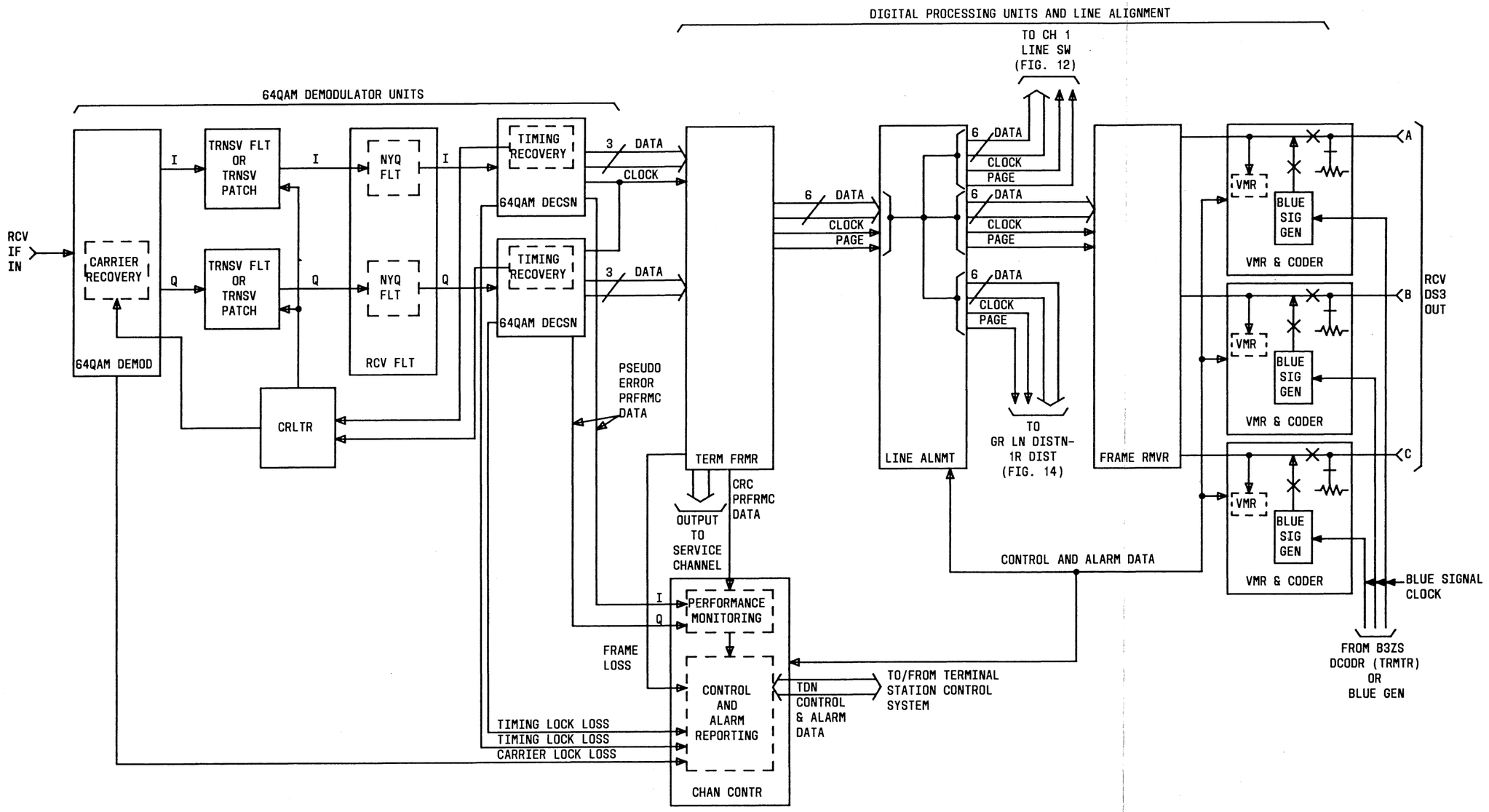


Fig. 13—135A Protection Channel Digital Terminal Receiver

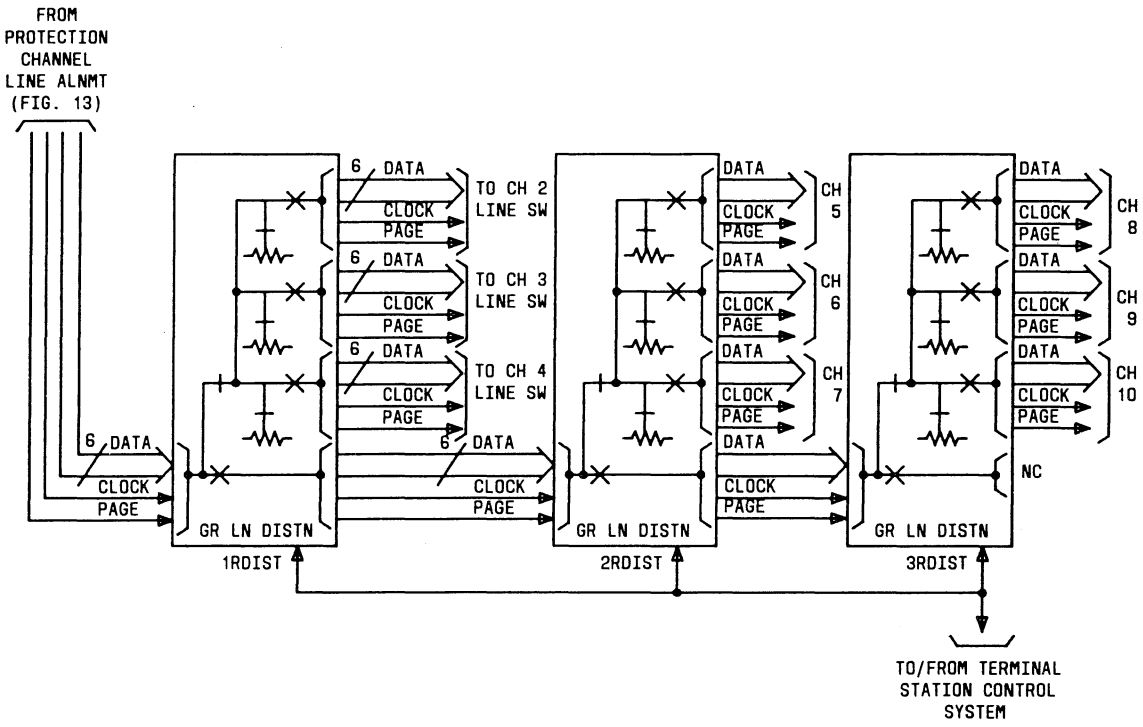


Fig. 14—Receive Growth Line Distribution Units

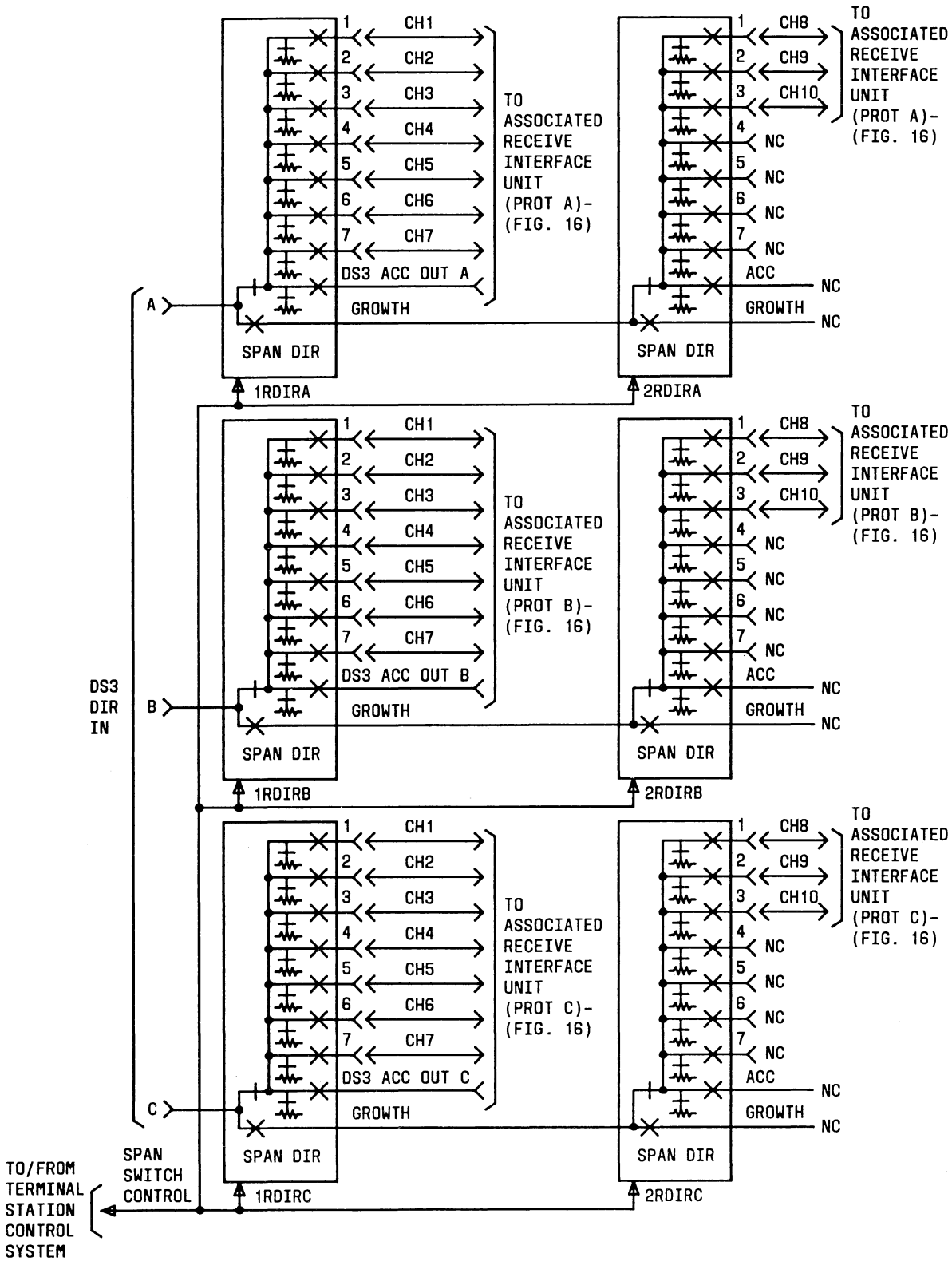


Fig. 15—Receive Growth Span Director Units

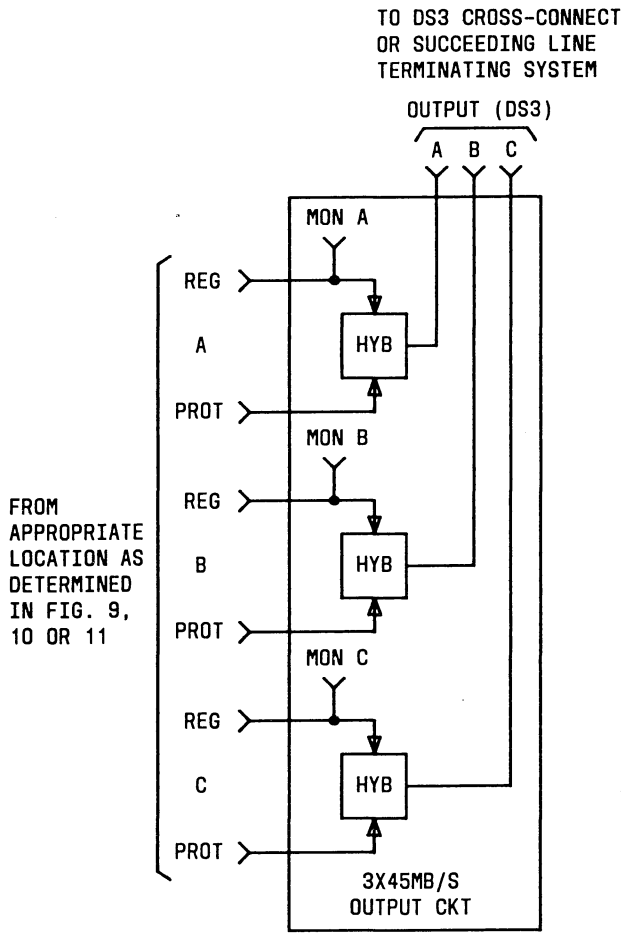


Fig. 16—Receive Interface Unit

TERMINAL STATION CONTROL AND SERVICE CHANNEL

This part contains information about the control functions of the line terminal bay. Figure 17 shows the Terminal Station Control System that is made up of up to 11 CHAN CONTR units and the terminal station control units. Figure 18 shows a functional block diagram of the terminal station control units. References are provided for detailed block diagrams of the terminal station control functions. The block diagrams are:

- Figure 19—Central Processing Units
- Figure 20—System Interface Units
- Figure 21—Channel Status and Control Units
- Figure 22—TBOS AS&C Telemetry
- Figure 23—TABS AS&C Telemetry
- Figure 24—TABS AS&C Telemetry With FMAS Remote Performance Monitoring and Fault Locating
- Figure 25—Discrete AS&C Telemetry.

TBOS and TABS telemetry are remote alarm, status, and control telemetry interconnections to an E2A-type remote. Using TBOS telemetry, regenerators may be connected locally by a dedicated serial port on the E2A-type remote or to a terminal station by a dedicated 16-kb subchannel (W, X, and/or Y) in the service channel.

With TABS telemetry, regenerators pass telemetry data to and from the terminal station using the subservice channel S3 and a single serial port on the E2A-type remote at the terminal station.

FMAS telemetry does performance data monitoring using 1-minute observation intervals of defined digital signal parameters. Alarm, status, and control telemetry is passed to and from the terminal station using the subservice channel S3. Fault locating data is sent to the terminal station using the subservice channel S4.

Discrete telemetry is a remote alarm, status, and control telemetry interconnection to a telemetry remote using parallel, discrete leads. This system uses a reduced set of scan points and controls as opposed to a serial telemetry system.

Figure 26 shows a functional block diagram of the terminal station service channel, and Figure 27 shows the service channel switching arrangement.

Figure 28 shows the terminal station alarm reporting signal path.

Automatic switching is also a function of the terminal control system. The transmission performance is monitored and all automatic switch requests are initiated, on a directional basis, at the receiving-end terminal. That is, the receiving-end terminal determines if an automatic

switch must be made and then communicates with the transmitting-end terminal to accomplish the appropriate switching action. The various automatic switch request processing and control functions are shown in block diagrams as follows:

- Figure 29—Automatic Line Switch, Receiving-End
- Figure 30—Automatic Line Switch, Transmitting-End
- Figure 31—Automatic Span Switch, Receiving-End
- Figure 32—Automatic Span Switch, Transmitting-End
- Figure 33—Blue Signal Substitution, Receiving-End Only.

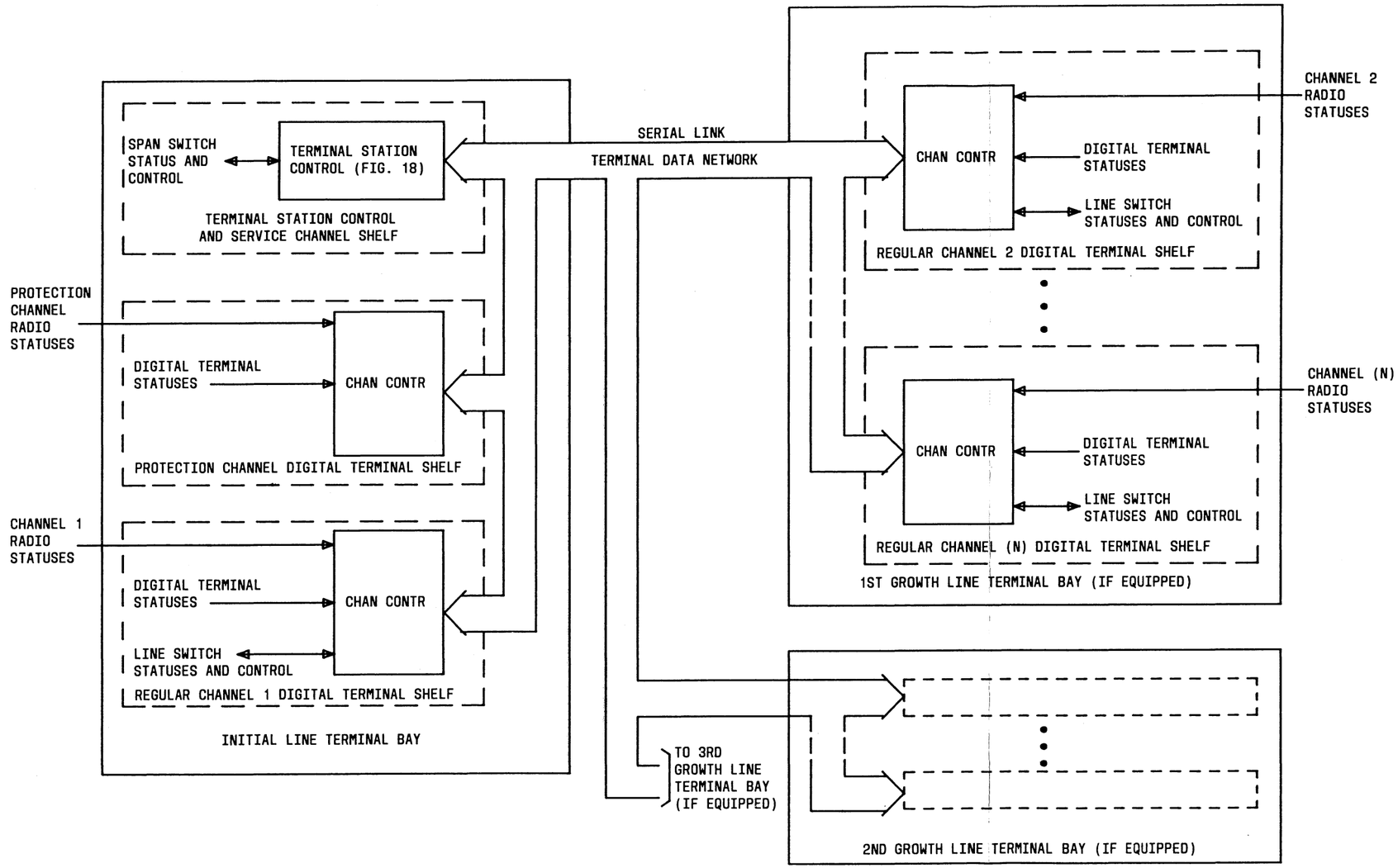


Fig. 17—Terminal Station Control System

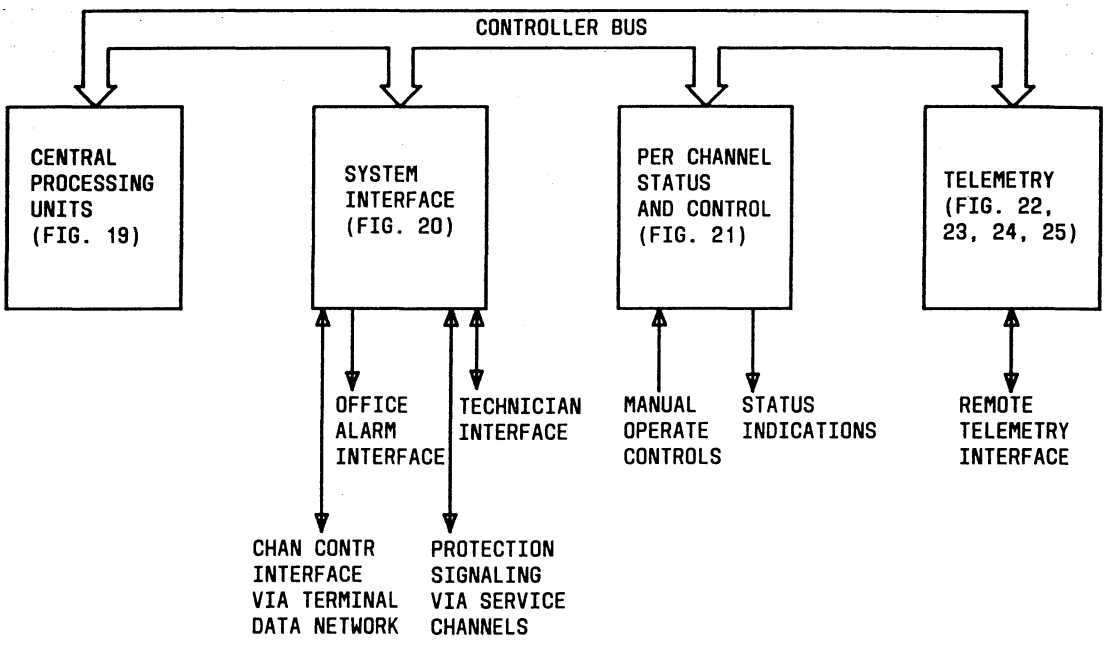


Fig. 18—Terminal Station Control Functional Block Diagram

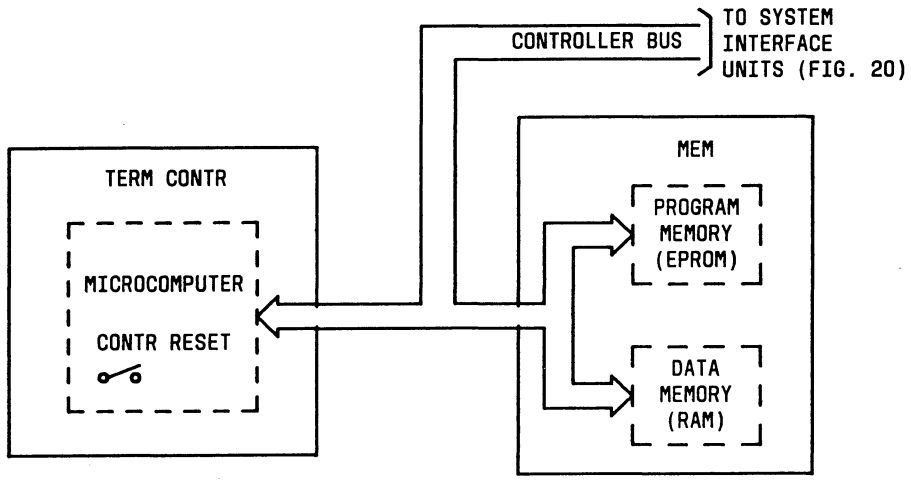


Fig. 19—Central Processing Units

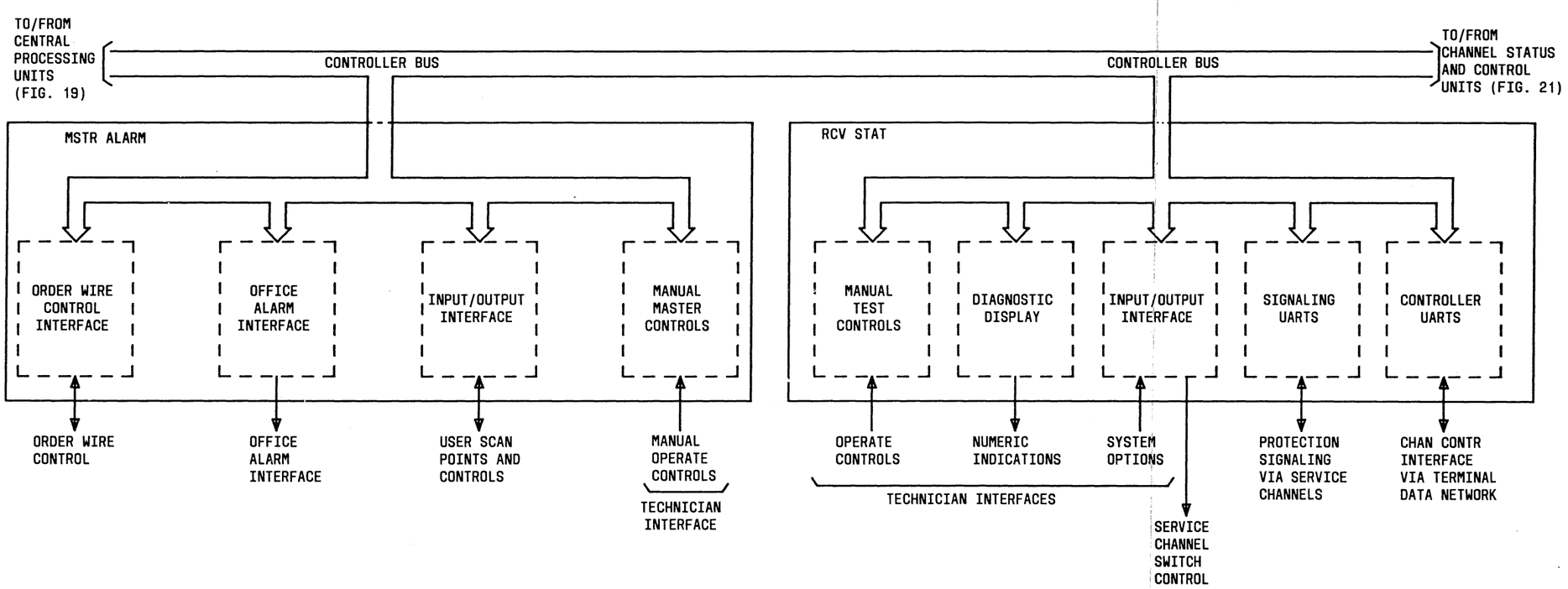


Fig. 20—System Interface Units

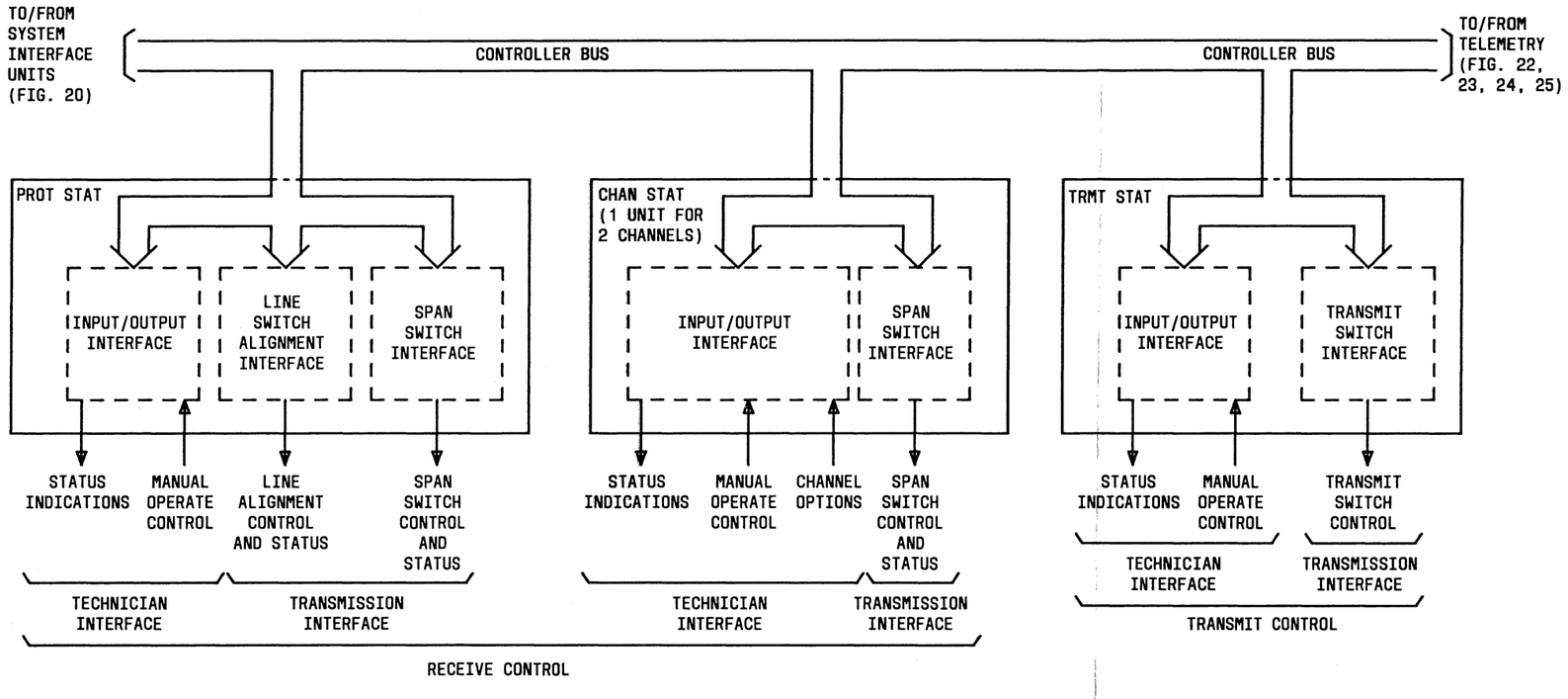


Fig. 21—Channel Status and Control Units

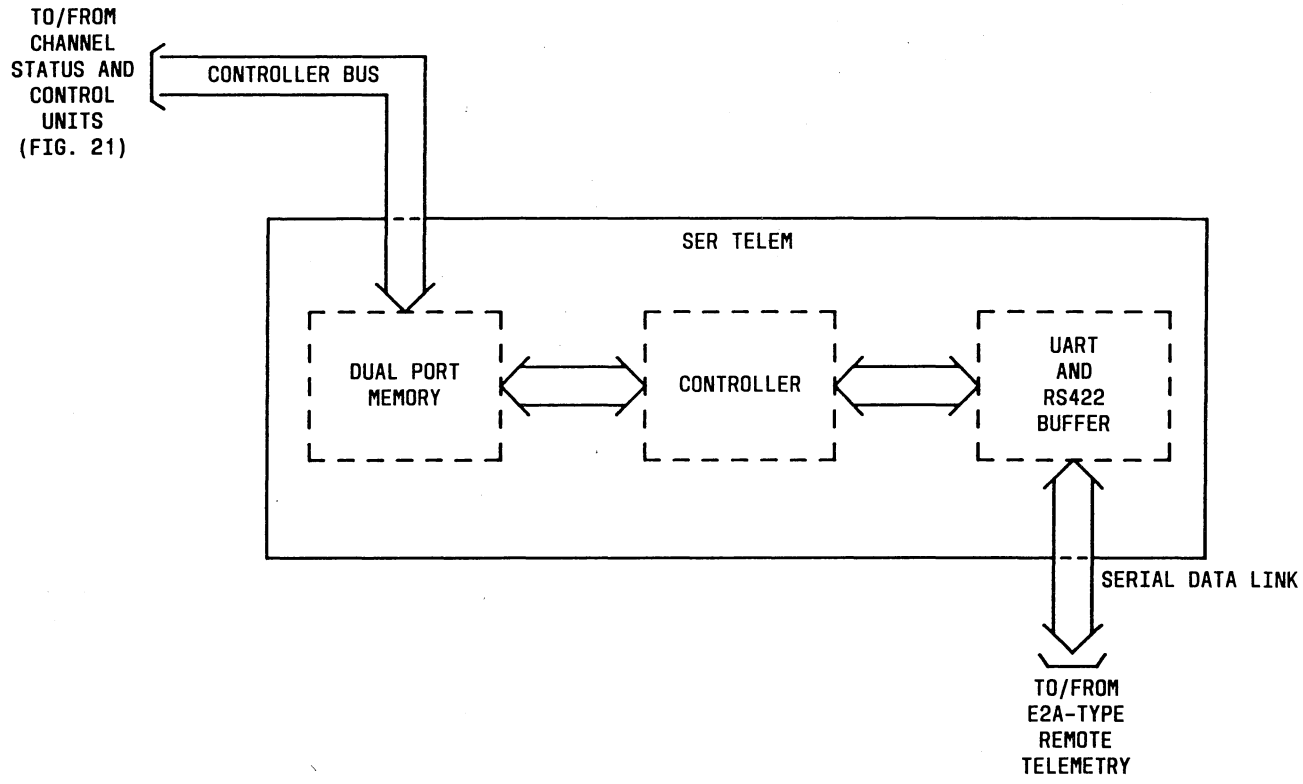


Fig. 22—TBOS AS&C Telemetry

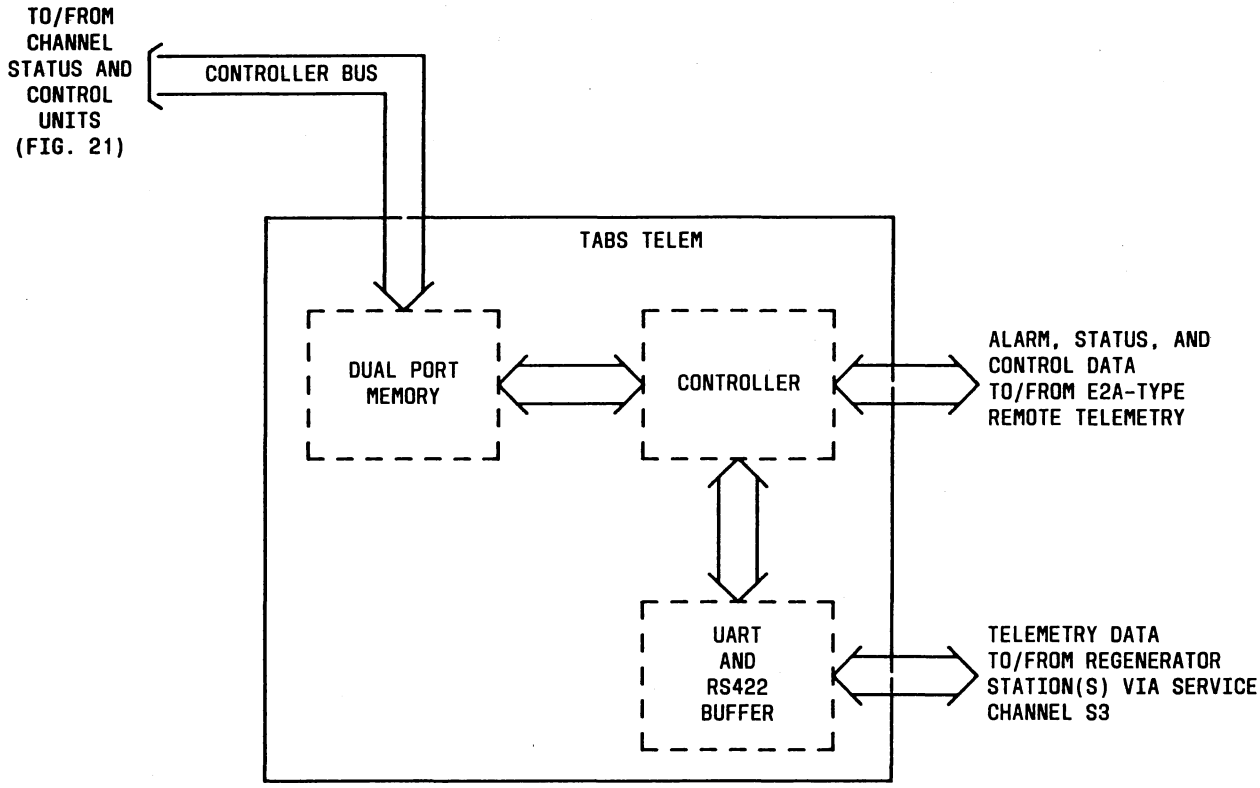


Fig. 23—TABS AS&C Telemetry

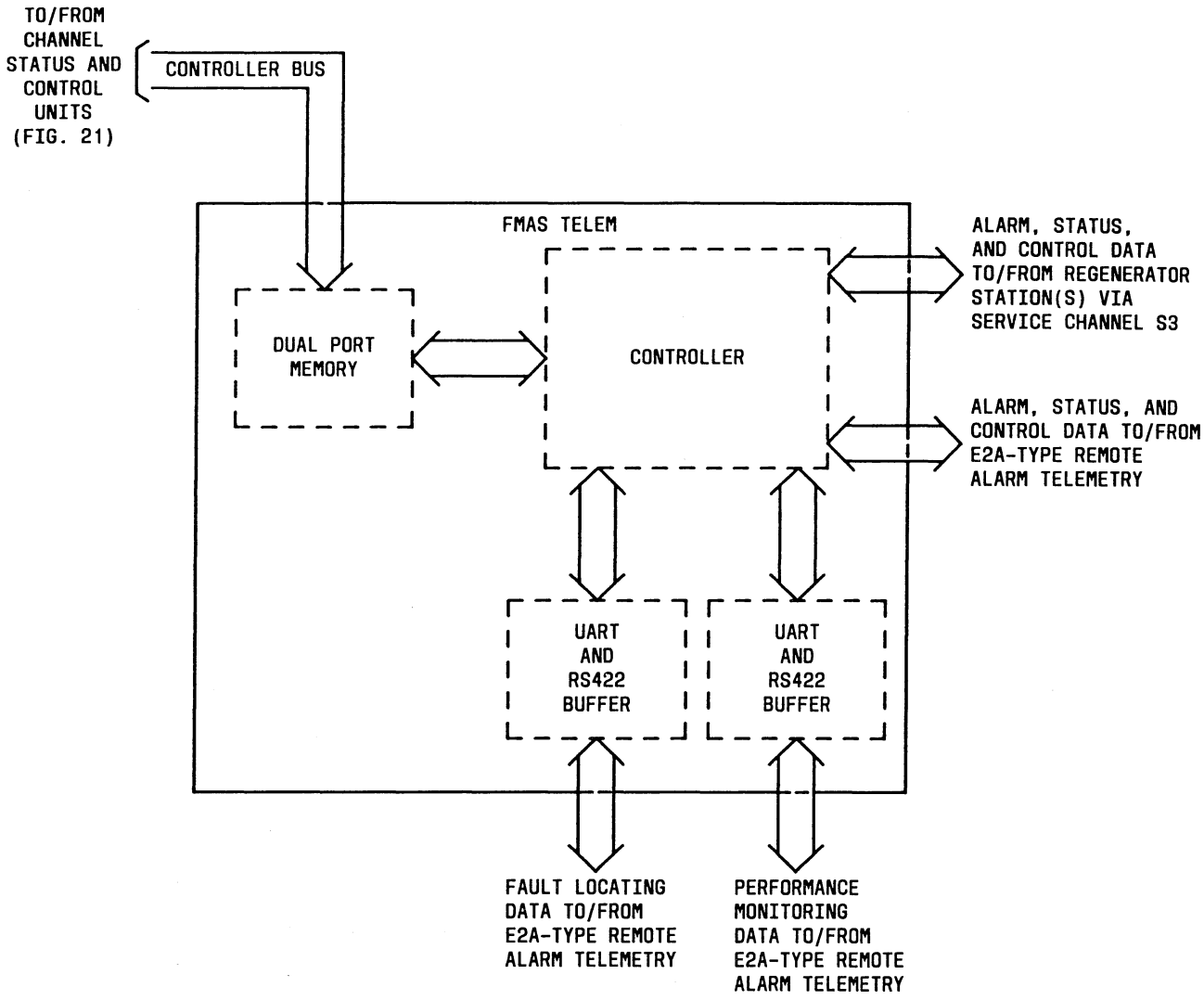


Fig. 24—TABS AS&C Telemetry with FMAS Remote Performance Monitoring and Fault Locating

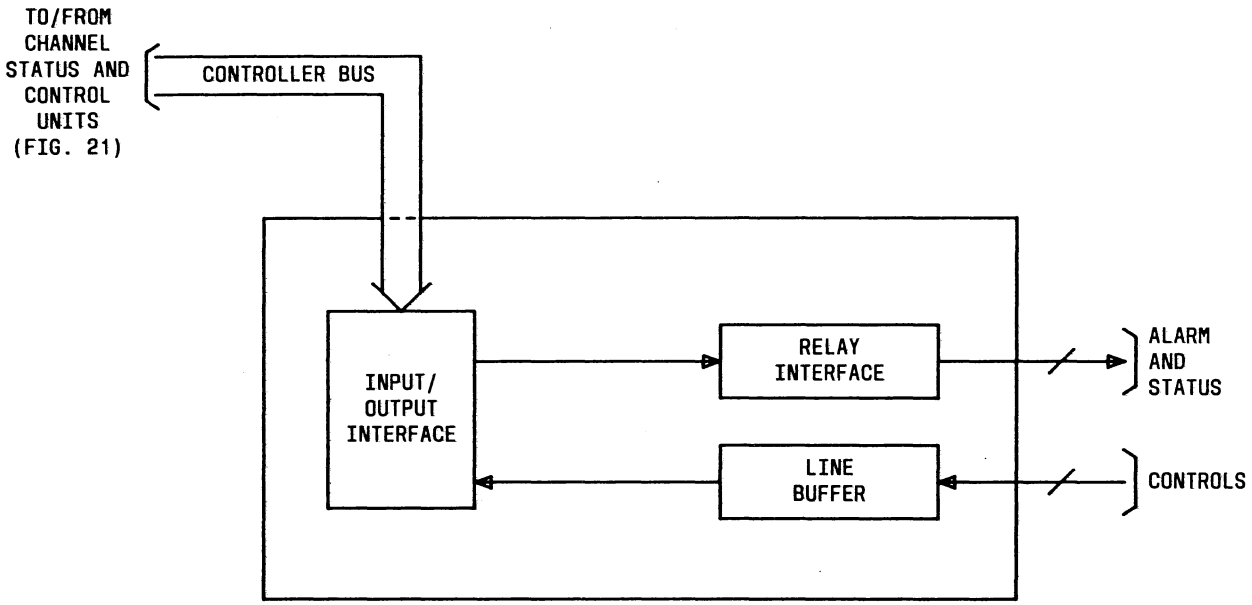


Fig. 25—Discrete AS&C Telemetry

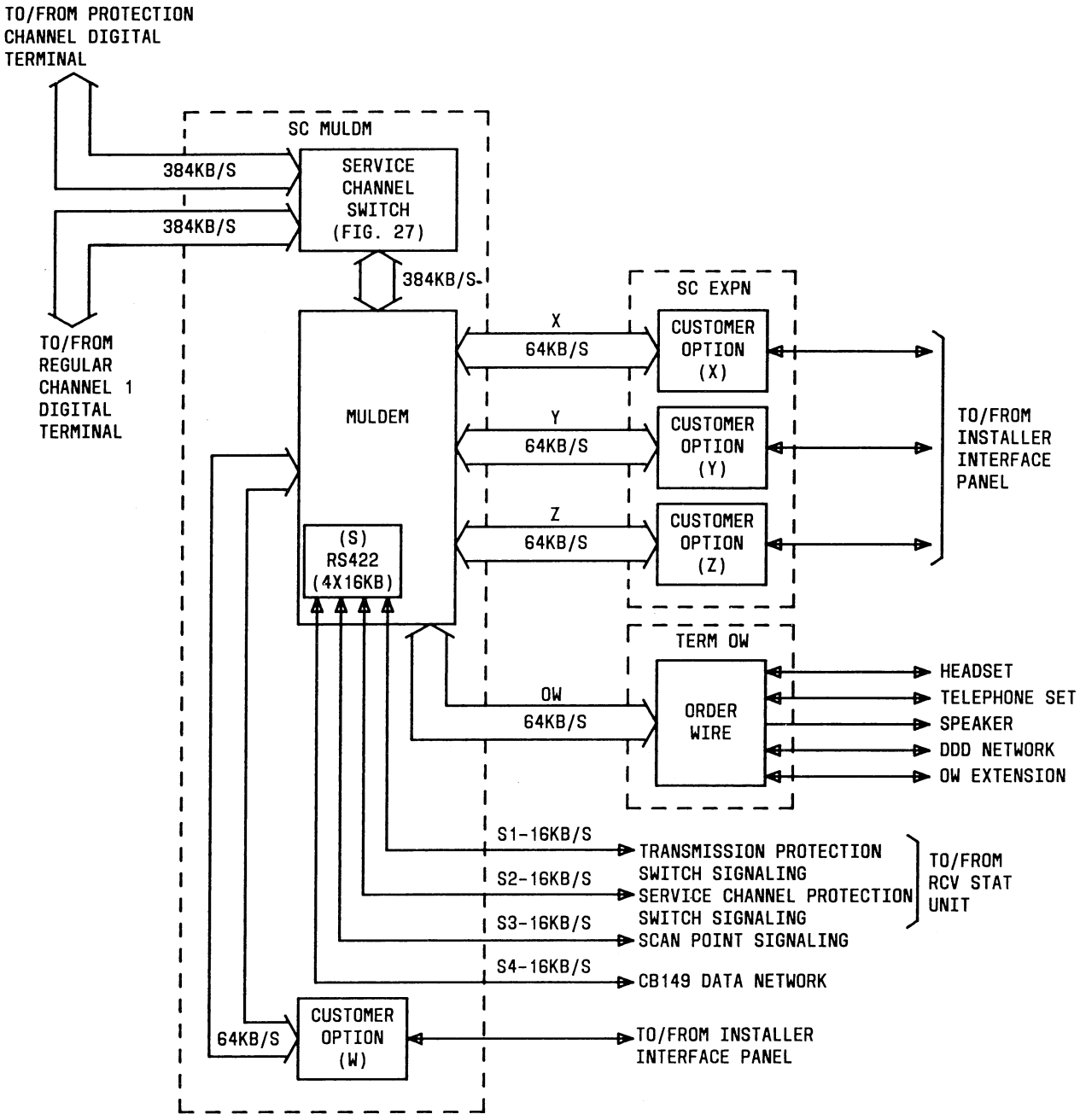


Fig. 26—Terminal Station Service Channel Functional Block Diagram

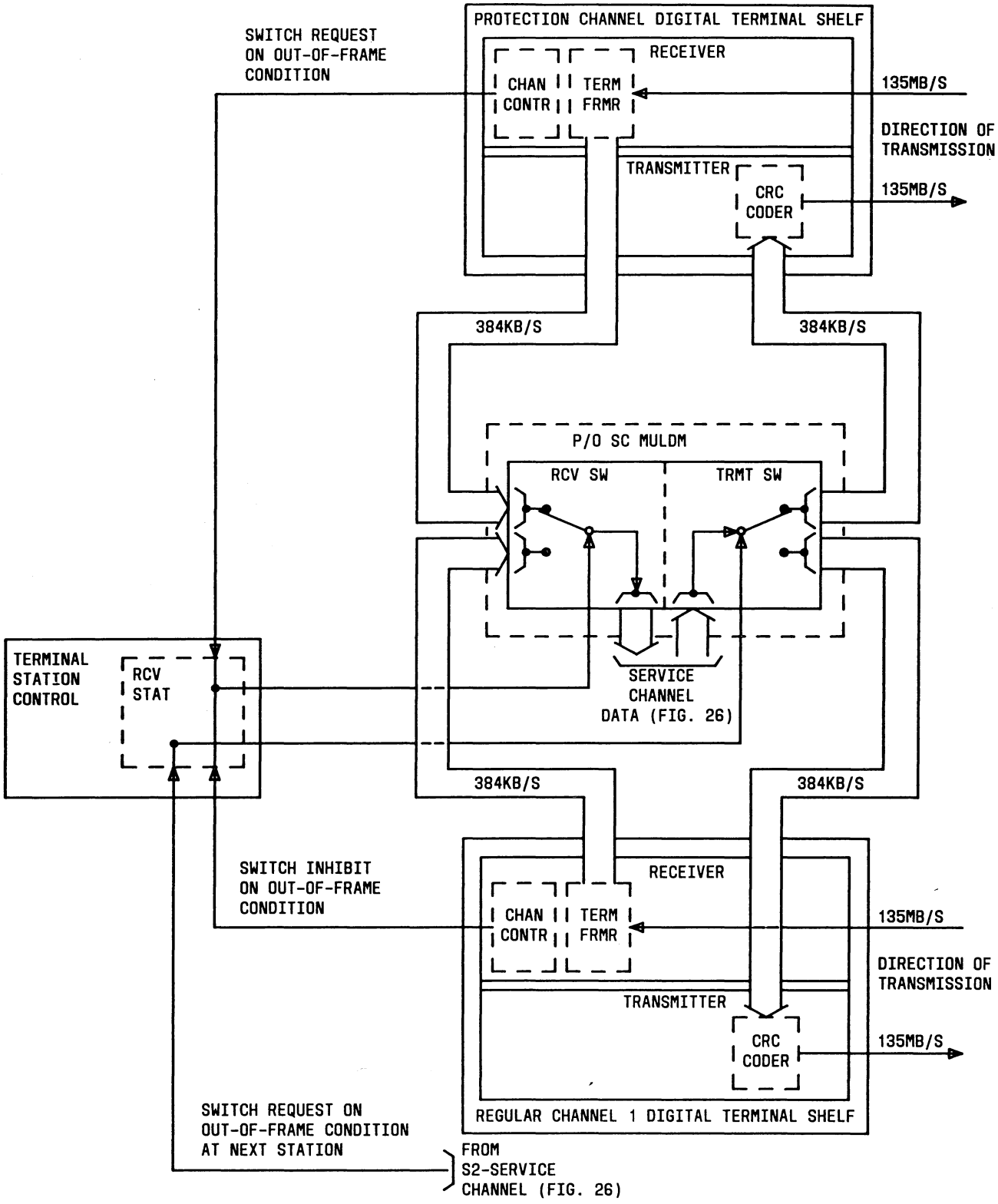


Fig. 27—Terminal Station Service Channel Switching

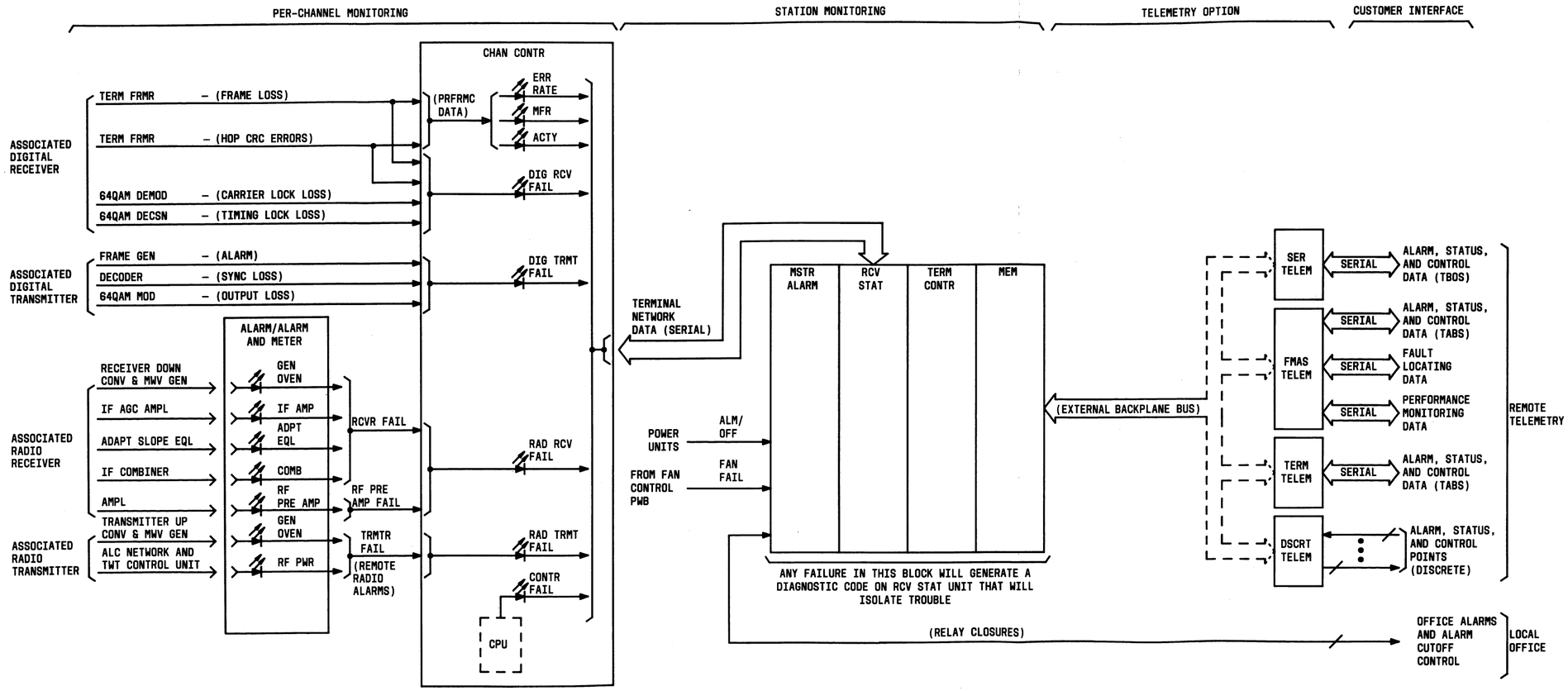
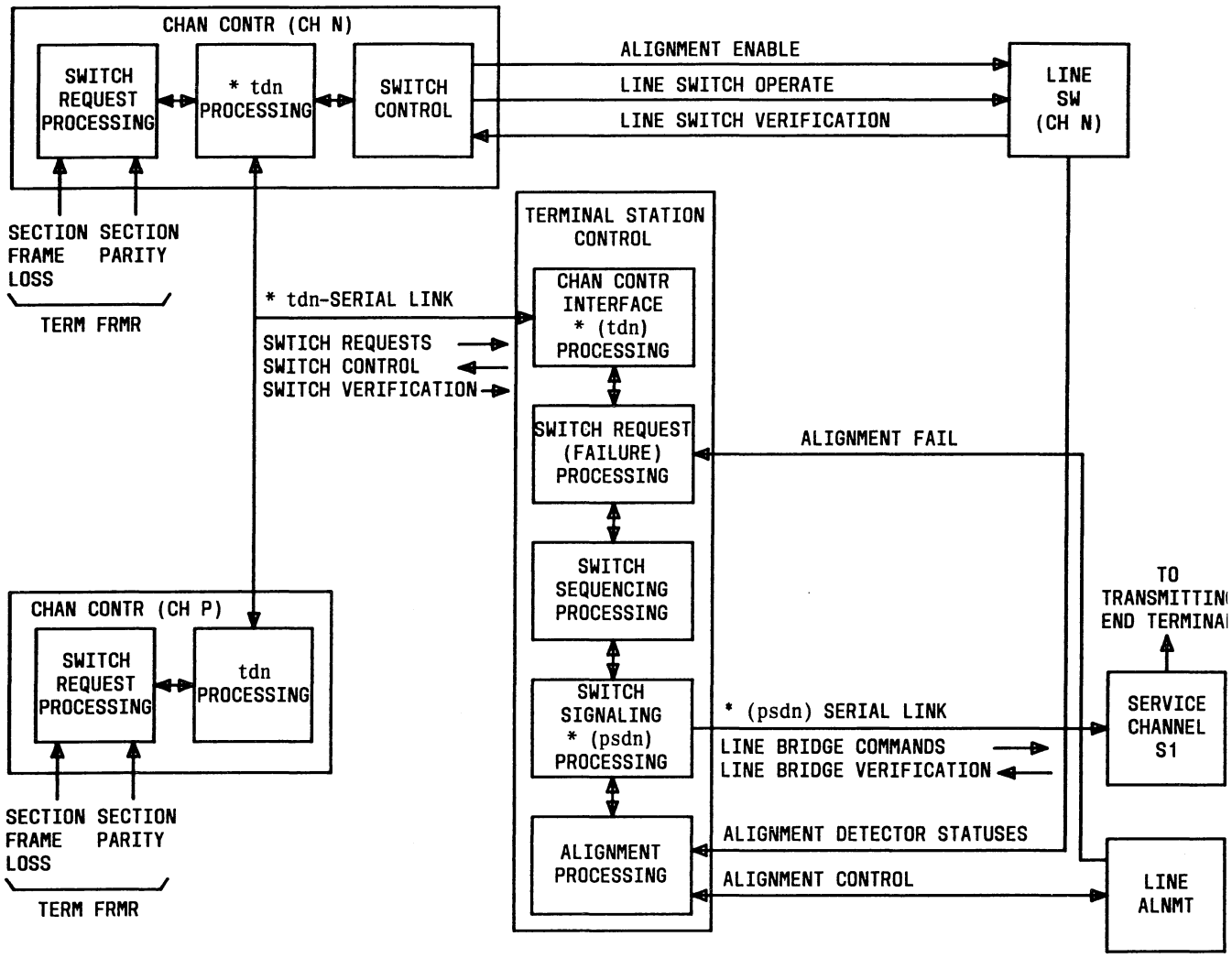
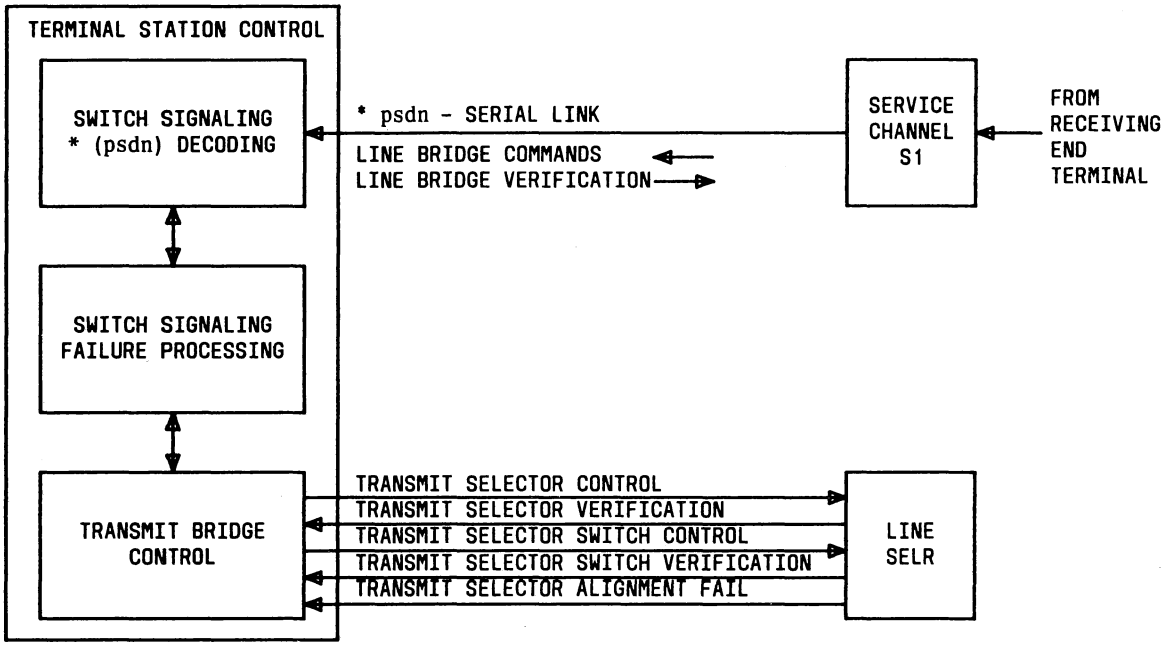


Fig. 28—Terminal Station Alarm Reporting Signal Path



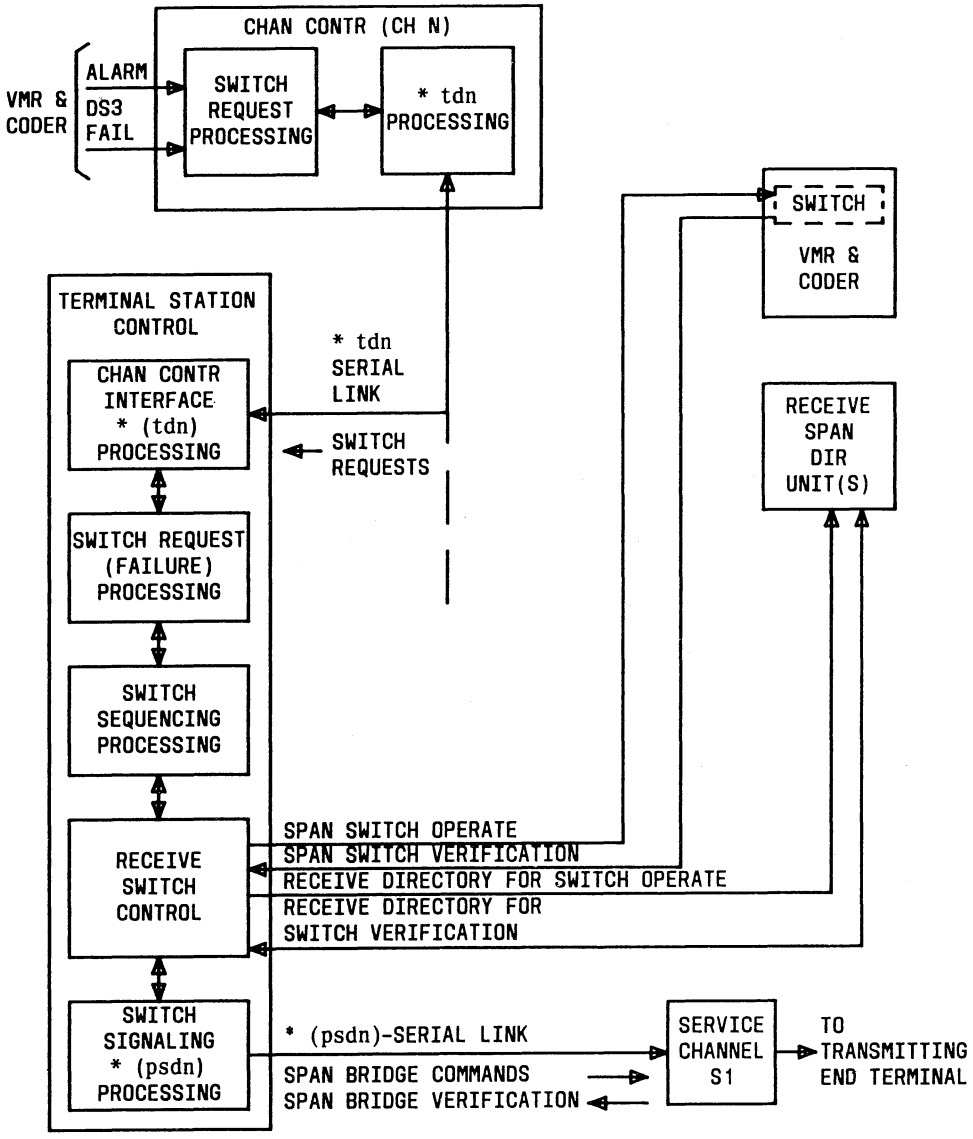
* psdn = PROTECTION SIGNALING DATA NETWORK
tdn = TERMINAL DATA NETWORK

Fig. 29—Automatic Line Switch, Receiving End



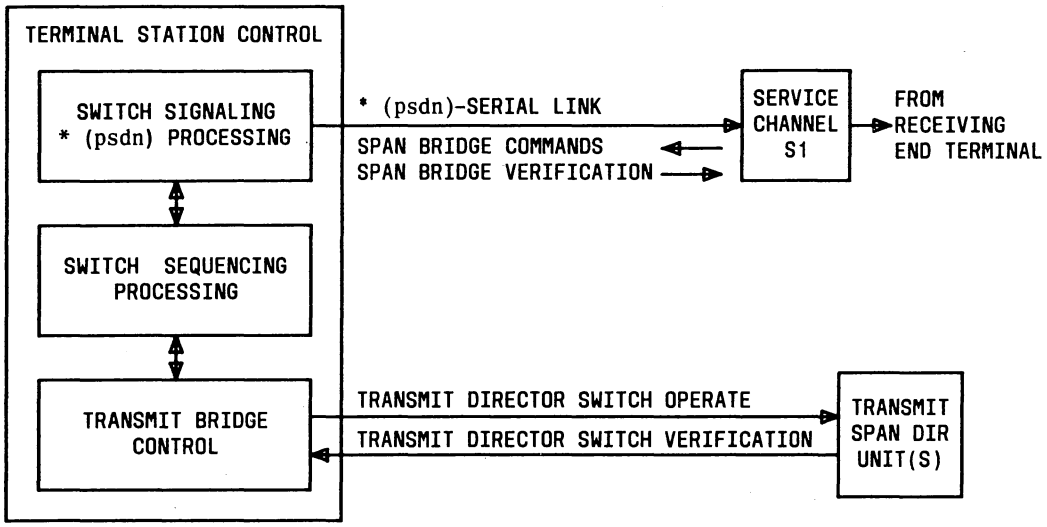
* psdn = PROTECTION SWITCHING DATA NETWORK

Fig. 30—Automatic Line Switch, Transmitting End



* psdn = PROTECTION SWITCHING DATA NETWORK
tdn = TERMINAL DATA NETWORK

Fig. 31—Automatic Span Switch, Receiving End



* psdn = PROTECTION SWITCHING DATA NETWORK

Fig. 32—Automatic Span Switch, Transmitting End

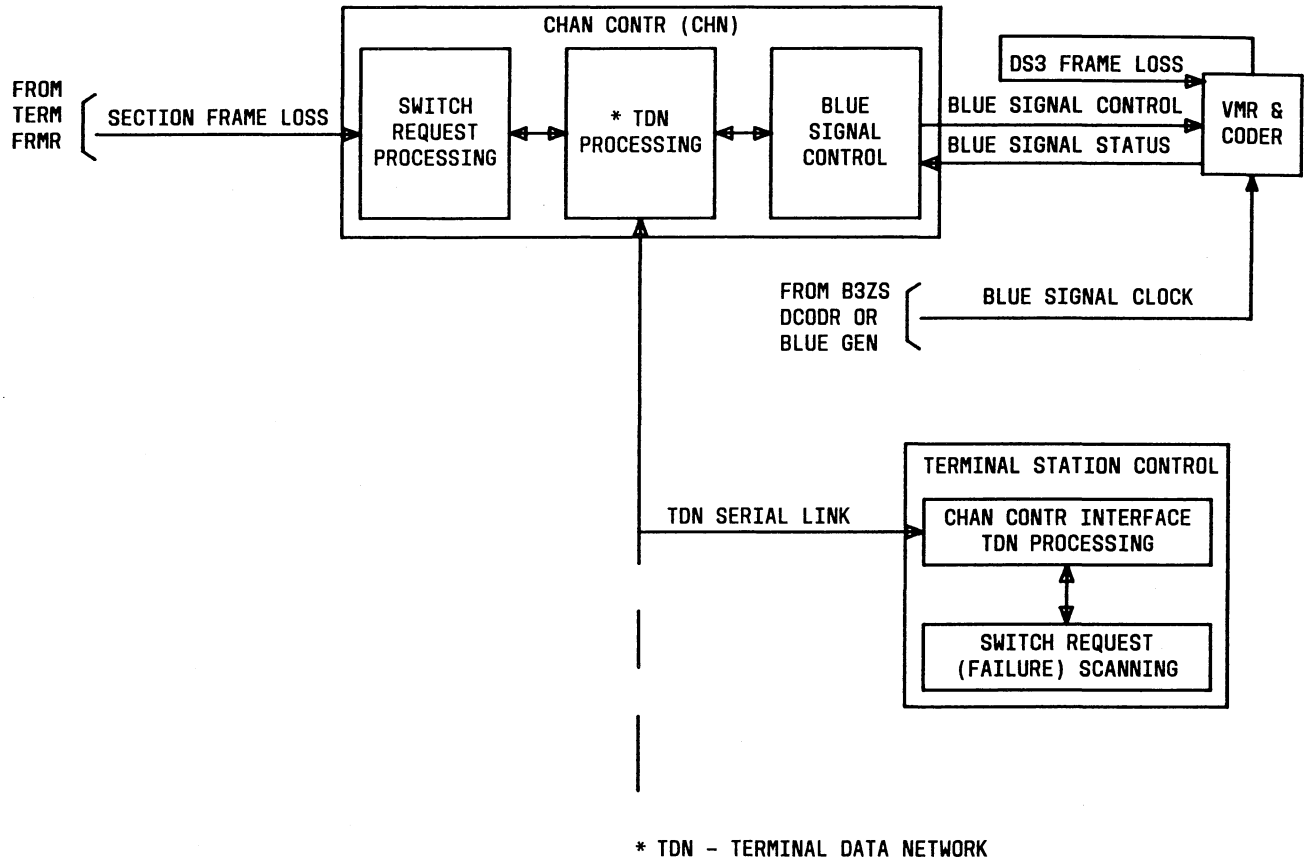


Fig. 33—Blue Signal Substitution, Receiving End Only

TEMPERATURE CONTROL

A fan shelf is used to remove the heat dissipated by the line terminal equipment. Figure 34 shows a functional block diagram for the fan shelf.

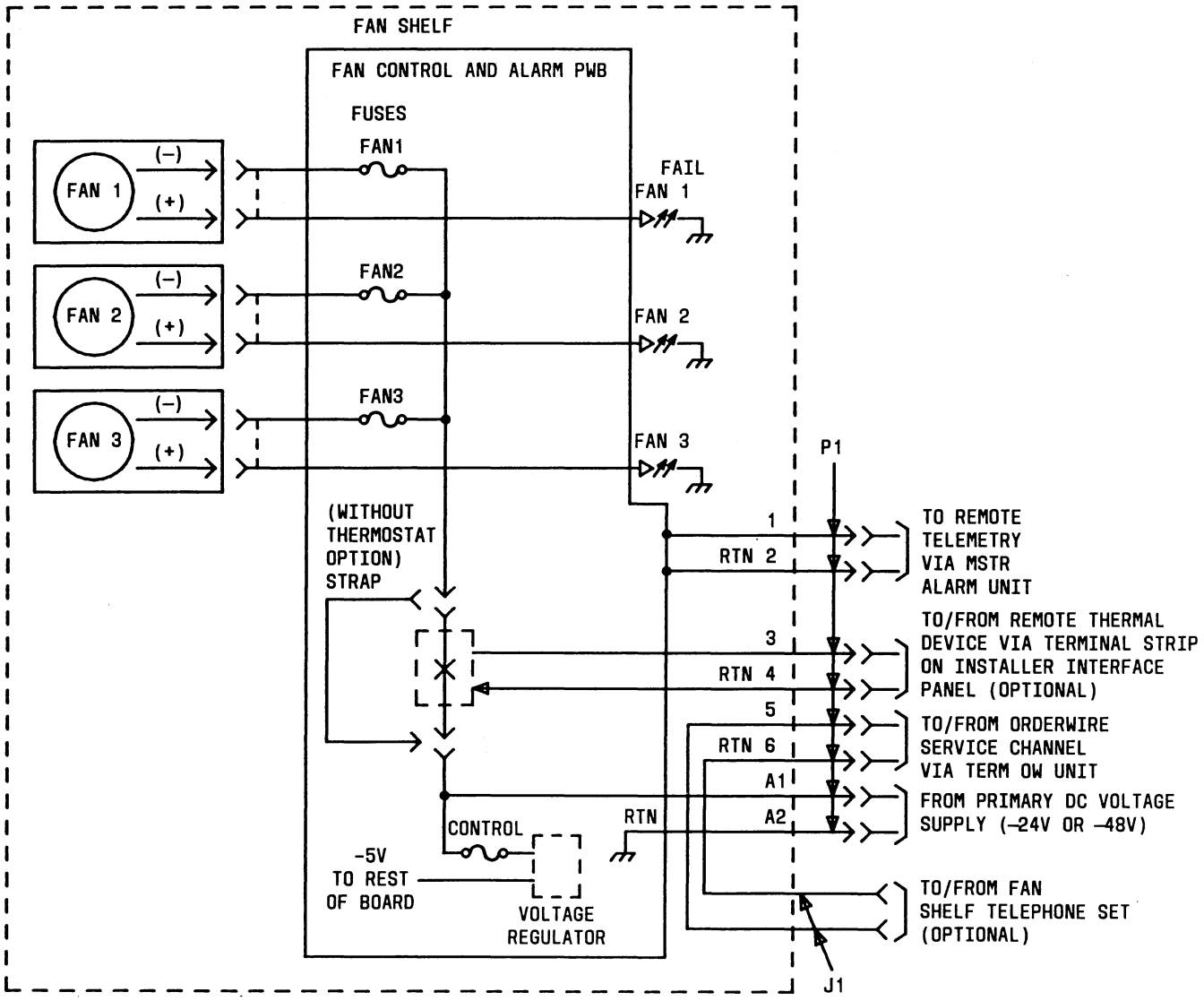


Fig. 34—Terminal Fan Shelf Functional Block Diagram

POWER DISTRIBUTION

Each shelf in a line terminal bay is equipped with the necessary power conditioning units to provide the appropriate dc voltages to the circuit packs. Block diagrams of these units are provided as follows:

- Figure 35—Growth Shelf Power Distribution
- Figure 36—Terminal Station Control and Service Channel Shelf Power Distribution
- Figure 37—135A Protection Digital Terminal Shelf Power Distribution
- Figure 38—135A Regular Digital Terminal Shelf Power Distribution.

ISSUING ORGANIZATION

Published by the AT&T Documentation Management Organization.

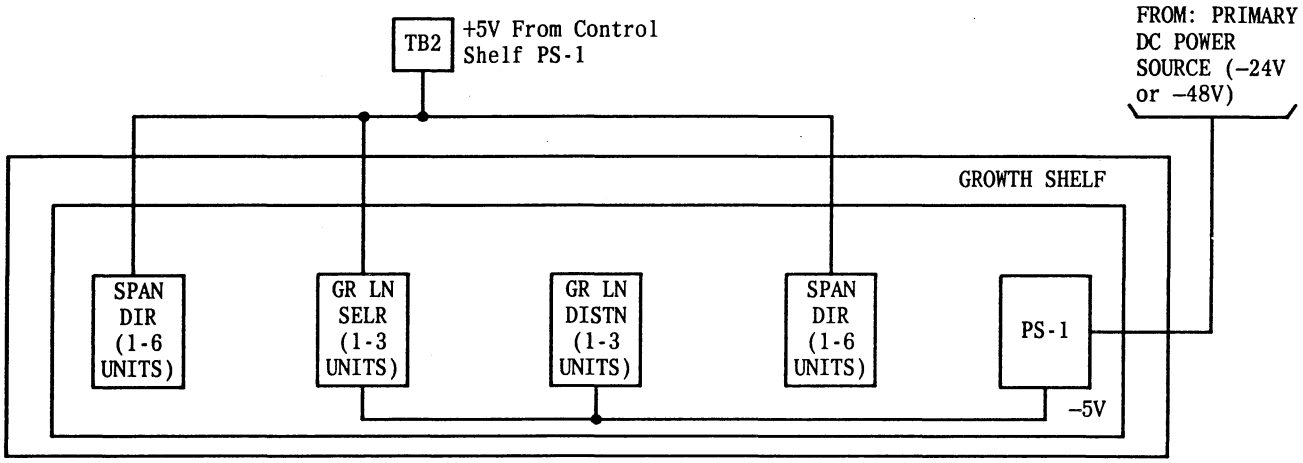


Fig. 35—Growth Shelf Power Distribution

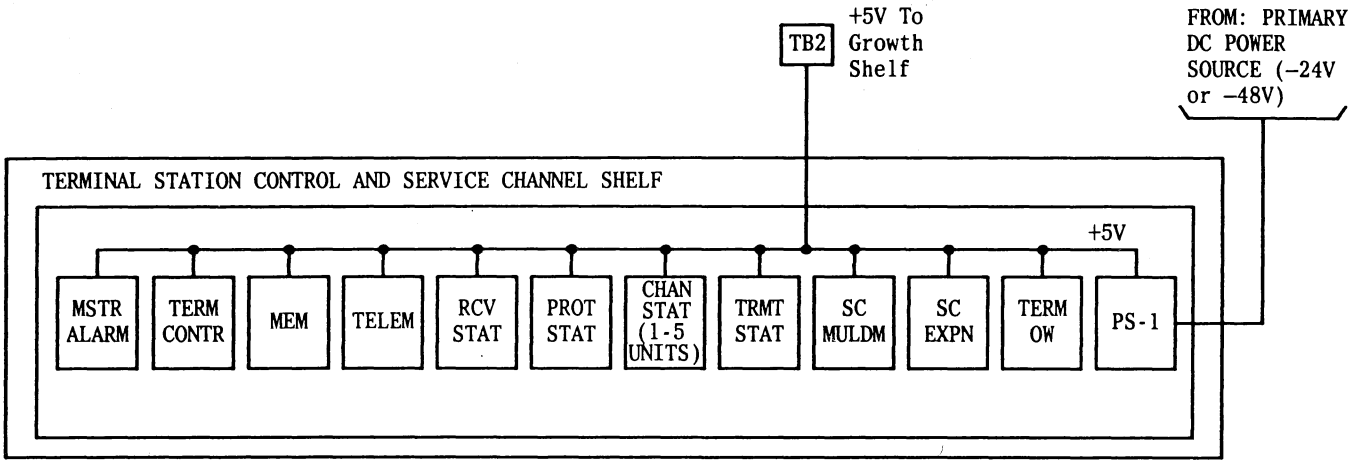


Fig. 36—Terminal Station Control and Service Channel Shelf Power Distribution

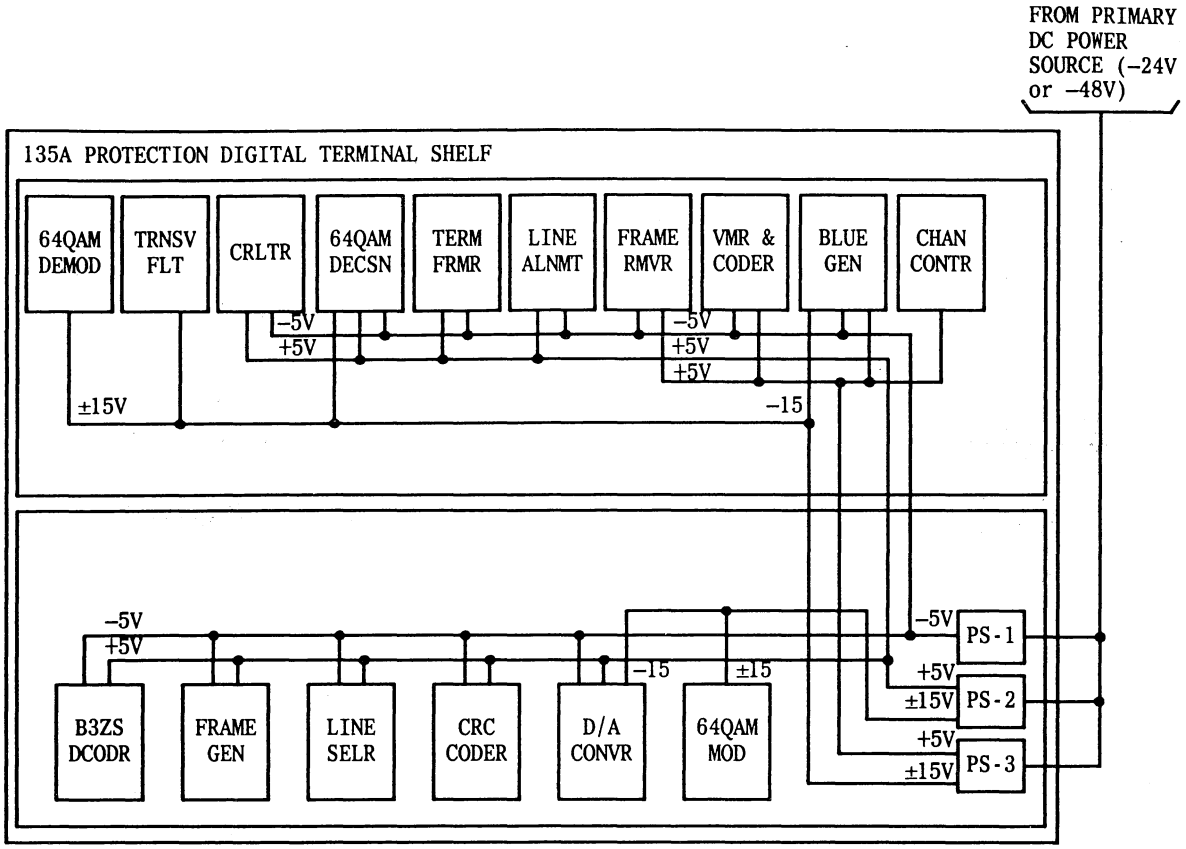


Fig. 37—135A Protection Digital Terminal Shelf Power Distribution

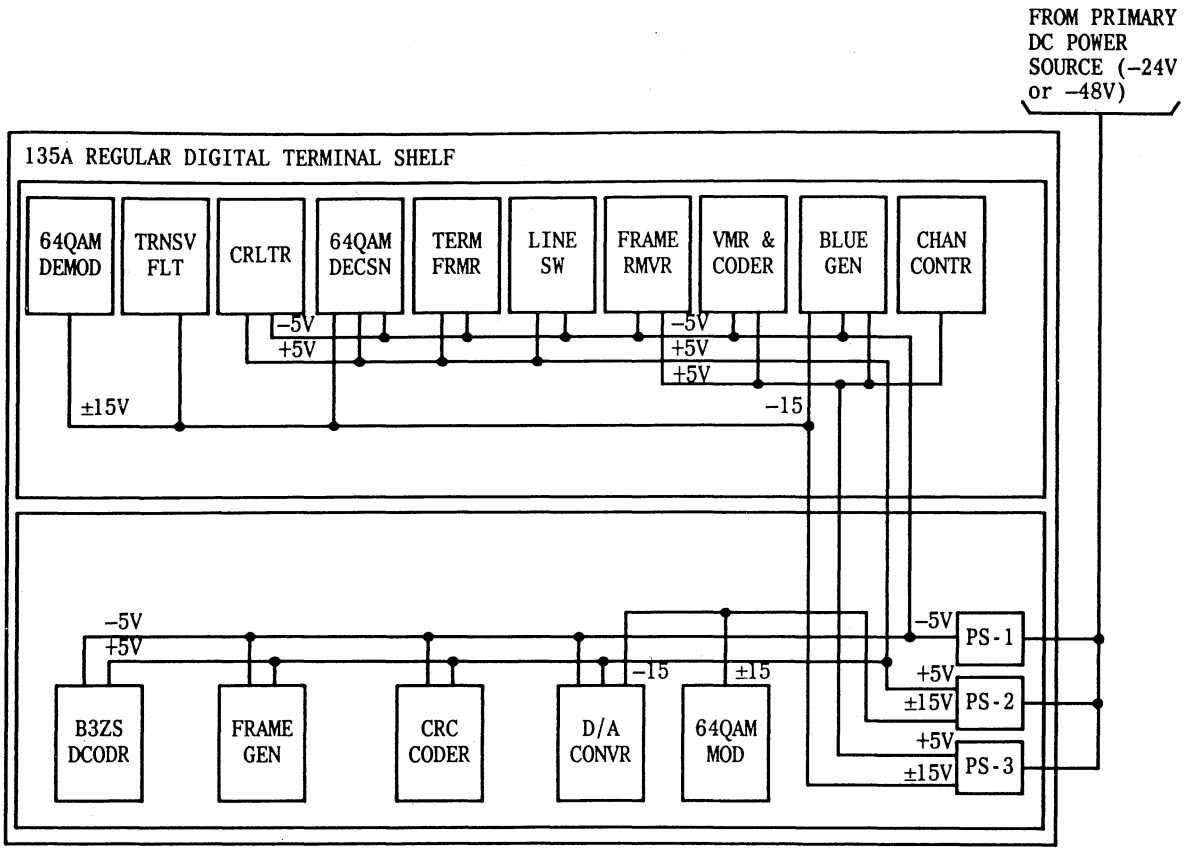


Fig. 38—135A Regular Digital Terminal Self Power Distribution