# OPERATION AND MAINTENANCE
# TERMINAL STATION
# HOT STANDBY
# DR 6/11-135EC
# SYSTEM OPERATIONS

This section describes the manual switching operations and the order-wire features of a terminal station in the Hot Standby DR 6/11-135 Digital Radio System. This description includes:

- How to perform both transmitting and receiving manual protection switching operations at each terminal station of the bidirectional switching section

- What indications will light for each operation

- What each operation does

- How to use the order-wire feature.

*This practice is reissued to include the AMR103B TERM STAT unit and the RF Switch Network. The practice is used in binders 421-105-090, 421-105-100, 421-105-003AC, and 421-105-004AC.*

## MANUAL SWITCHING OPERATIONS

Manual switching operations are used to:

- Reinforce an automatic switch during repair maintenance

- Transfer the regular channel payload to the protection channel during routine maintenance

- Lock out the protection channel during repair or routine maintenance to inhibit automatic switching.

Protection switching operations in a hot standby system are done per station on a hop-by-hop basis. Each terminal bay provides separate transmitting and receiving transmission circuits for the regular and the protection channel. The terminal bay (Fig. 1) is equipped with a control/service channel shelf (Fig. 2) that provides control functions for each transmission path. The shelf also provides a service channel that enables the control circuits at the two terminal stations and any intermediate regenerator stations to communicate with each other.

To determine the correct operation, the technician must know the direction of transmission of the channel to be switched and whether a receive or transmit switch is required. As shown in Fig. 1, the protection and regular channel receivers (transmitters) are associated with the receive (transmit) direction. To switch the regular channel receiver (transmitter) to protection, a technician would perform a receive (transmit) switch. The operation required depends on which circuits need maintenance. See Transmitting Manual Operations and Receiving Manual Operations that follow.

Manual switching operations are made locally and only affect switching at that station. A centralized alarm center can perform switching operations at any station in the switching section by telemetry.

The manual switching operations are listed in Table A. The first column identifies the switch by its functional name (e.g., RCV switch). This name will be referenced from other parts of this document. The second column identifies the direction of transmission that the manual operation will affect. To perform a manual operation, simultaneously press the appropriate pushbuttons on the units identified in the TO OPERATE column. The unit indications that will light locally are listed in the LOCAL INDICATIONS column. To release a manual operation, simultaneously press the appropriate pushbuttons on the units identified in the TO RESET column.

Figure 2 shows the location of the alarm cutoff control, the control/service channel shelf, and the bay location of the protection and regular channels. Also shown are the control units, pushbuttons, and indications referenced in Table A.

## TRANSMITTING MANUAL OPERATIONS

Figure 3 shows the transmitting transmission signal flow for the normal path and the TRMT-switched path at a hot standby terminal station. The figure identifies the terminal station transmitting units that are bypassed by the TRMT switch units and that can be replaced when the transmit switch is operated.

### TRMT Switch

*Caution: Operating this switch (if not already switched automatically) and resetting it will cause momentary out-of-frame conditions on the downstream transmission line.*

The transmit switch transfers service normally carried by the regular channel transmission circuits to the protection channel transmission circuits at the transmitting terminal station. All regular digital and radio transmitter circuits up to the input of the transmitter switch are protected. If the terminal station control or the transmitter switch has failed or if the performance of the protection channel is worse than that of the regular channel, the manual switch will not operate.

### TRMT Lockout

*Caution: Service will be interrupted if a failure occurs on the transmitting regular channel while the transmitting protection channel is locked out.*

The transmit lockout is used to prevent automatic switching of the regular channel to protection while the protection channel is being repaired. All protection digital transmitter and radio transmitter circuits up to the input of the transmitter switch are protected. If the protection channel is in use because of a transmit switch, this lockout will not operate.

## RECEIVING MANUAL OPERATIONS

Figure 4 shows the receiving transmission signal flow for the normal path, RCV-switched path, and RTX-switched path at a hot standby terminal station. The figure identifies the terminal bay receiving units that are bypassed by the switches and that can be replaced when the indicated switch is operated.

**RCV Switch**

The receive switch transfers service normally carried by the regular channel line transmission circuits to the protection channel line transmission circuits at the receiving terminal station. The line transmission circuits that are protected include the regular radio receiver circuits and the regular digital receiver circuits up to the input of the receive switch unit. Operation of this switch will not introduce hits or errors to the transmission channel service. If the receive switch, line alignment, or protection channel has failed, the manual switch will not operate.

**RTX Switch**

*Caution:   Operating this switch (if not already switched automatically) and resetting it will cause momentary out-of-frame conditions on the downstream transmission line.*

The radio terminating cross-connect switch transfers service normally carried by the regular channel terminating and line transmission circuits to the protection channel terminating and line transmission circuits. All regular channel active circuits are bypassed by this switch. If any protection circuits are in use or have failed, the switch will not operate.

**RCV Lockout**

*Caution:   Service will be interrupted if a failure occurs on the receiving regular channel while the receiving protection channel is locked out.*

The receive lockout is used to prevent automatic switching (RCV or RTX) of regular channel to protection while the protection channel is being repaired. All active protection digital receiver and the radio receiver circuits are protected. If the protection channel is in use because of a receive switch, this control will not operate.

| TABLE A |
|---|
| HOT STANDBY MANUAL PROTECTION SWITCHING OPERATIONS |

| MANUAL OPERATION | | TO OPERATE (NOTE) | | LOCAL INDICATIONS | | TO RESET (NOTE) | |
|---|---|---|---|---|---|---|---|
| FUNCTION | DIRECTION OF TRANSMISSION | UNIT | PUSHBUTTON | UNIT | INDICATOR | UNIT | PUSHBUTTON |
| RCV SWITCH | RECEIVING | MSTR ALARM, TERM STAT | RCV SW and RECEIVE OPR | TERM STAT, SC MULDEM, *RCV SW | RECEIVE RCV SW, MAN SW; SRV CHAN SWITCHES –RCV; RCV SW | MSTR ALARM, TERM STAT | RST and RECEIVE OPR |
| RTX SWITCH | RECEIVING | MSTR ALARM, TERM STAT | RTX SW and RECEIVE OPR | TERM STAT, SC MULDEM, †VMR & CODER | RECEIVE RTX SW, MAN SW; SRV CHAN SWITCHES –RCV; SPAN (RTX) SWITCH | MSTR ALARM, TERM STAT | RST and RECEIVE OPR |
| RCV LOCKOUT | RECEIVING | MSTR ALARM, TERM STAT | LOCK OUT and RECEIVE OPR | TERM STAT | RECEIVE LOCKOUT | MSTR ALARM, TERM STAT | RST and RECEIVE OPR |
| TRMT SWITCH | TRANSMITTING | MSTR ALARM, TERM STAT | TRMT SW and TRANSMIT OPR | TERM STAT, SC MULDEM, ‡SWITCH CONTROL NETWORK/ RF SWITCH NETWORK | TRANSMIT TRMT SW, MAN SW; SRV CHAN SWITCHES –TRMT; STANDBY/ STBY | MSTR ALARM, TERM STAT | RST and TRANSMIT OPR |
| TRMT LOCKOUT | TRANSMITTING | MSTR ALARM, TERM STAT | LOCK OUT and TRANSMIT OPR | TERM STAT | TRANSMIT LOCKOUT | MSTR ALARM, TERM STAT | RST and TRANSMIT OPR |

*Note:* The "and" indicates that both pushbuttons must be pressed simultaneously.

* The RCV SW unit is located in the Regular Digital Terminal shelf.
† The VMR & CODER unit(s) located in *both* the Regular and the Protection Digital Terminal shelves will indicate SPAN (RTX) SWITCH.
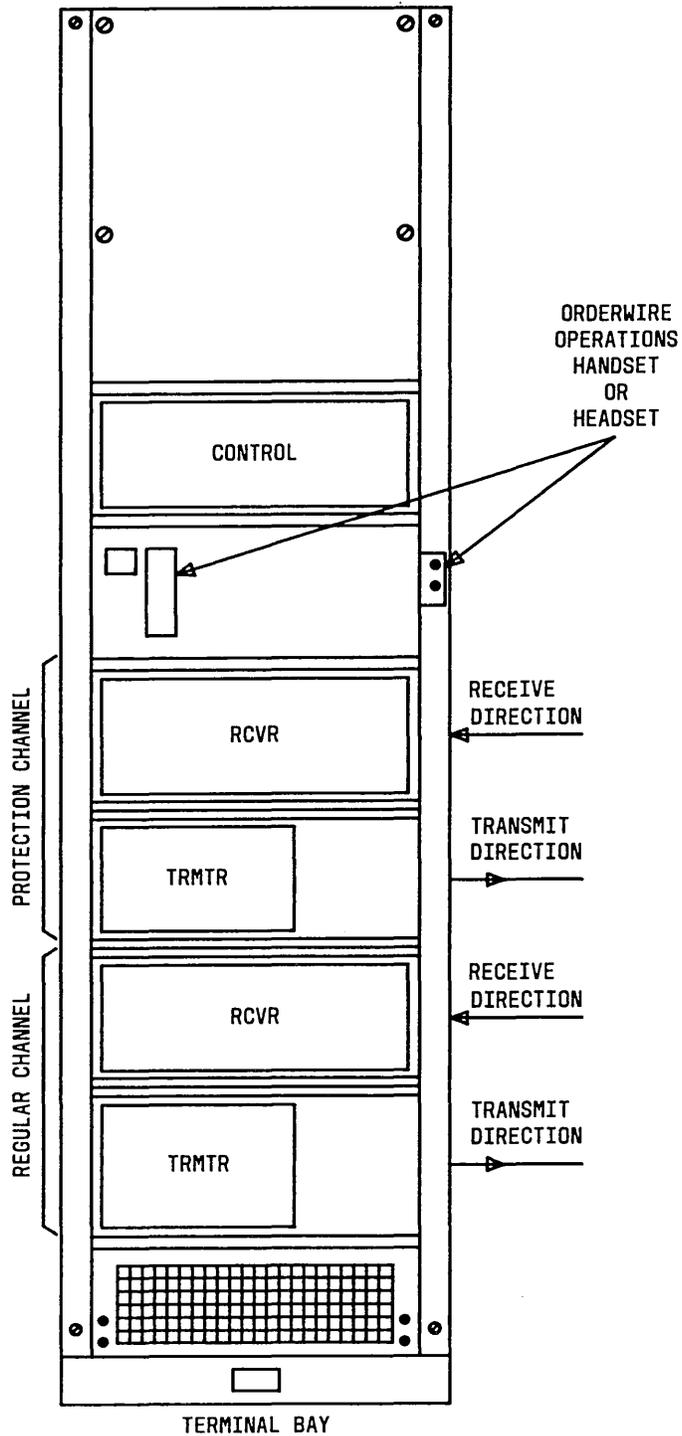‡ Located in the associated Radio Transmitter (top of frame).

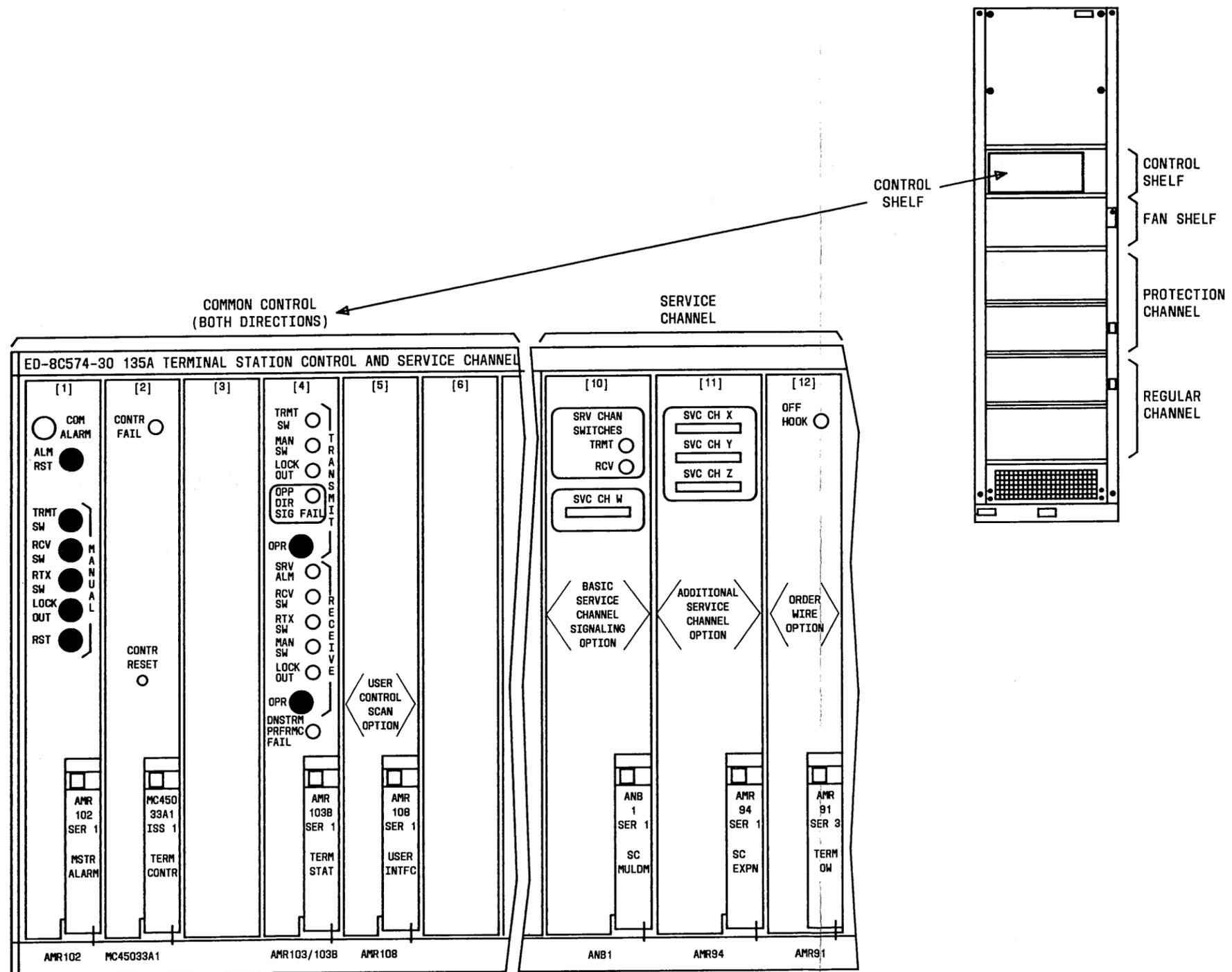Fig. 1—Typical Transmit and Receive Transmission (Bidirectional)

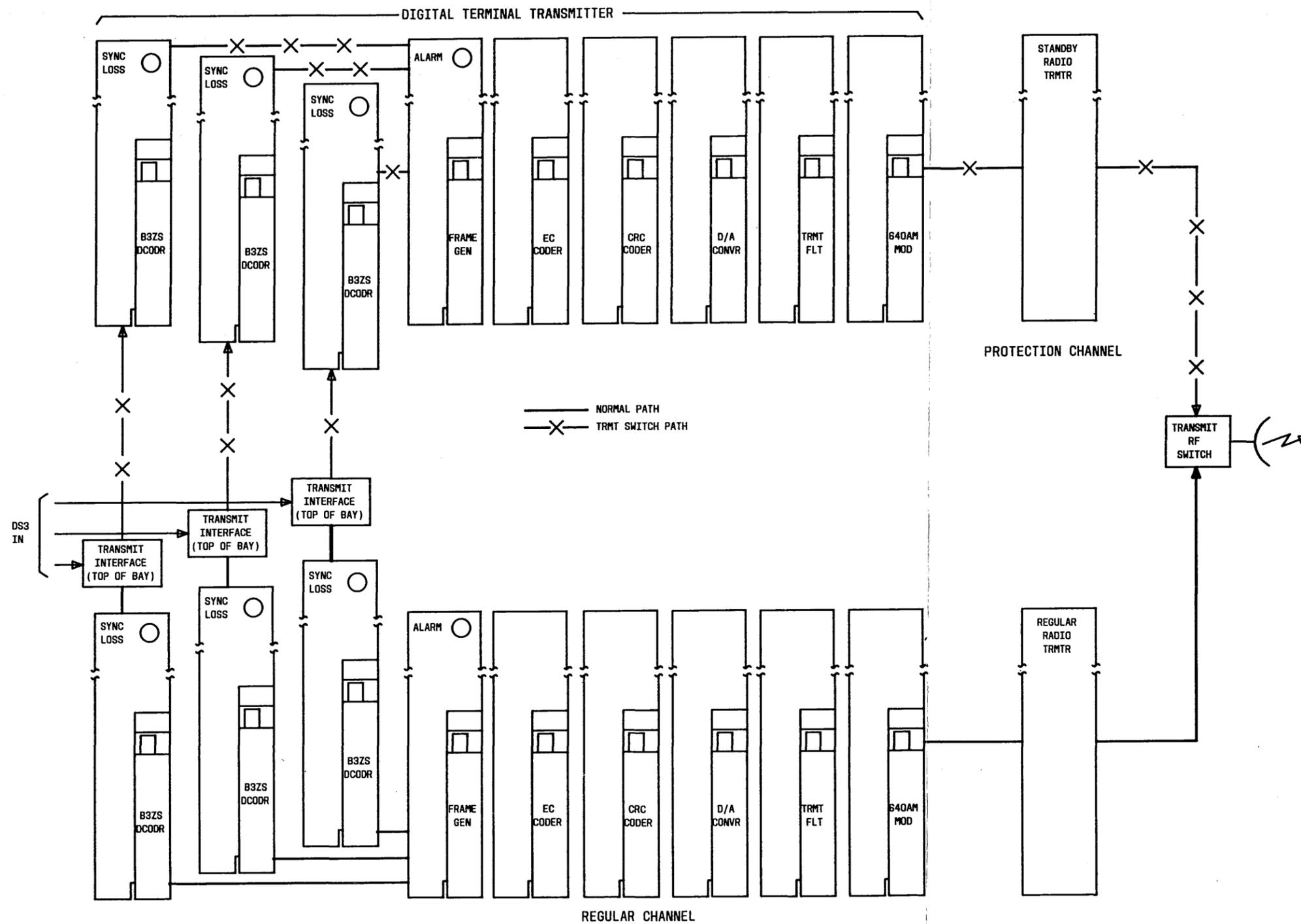Fig. 2—Terminal Station Control Units

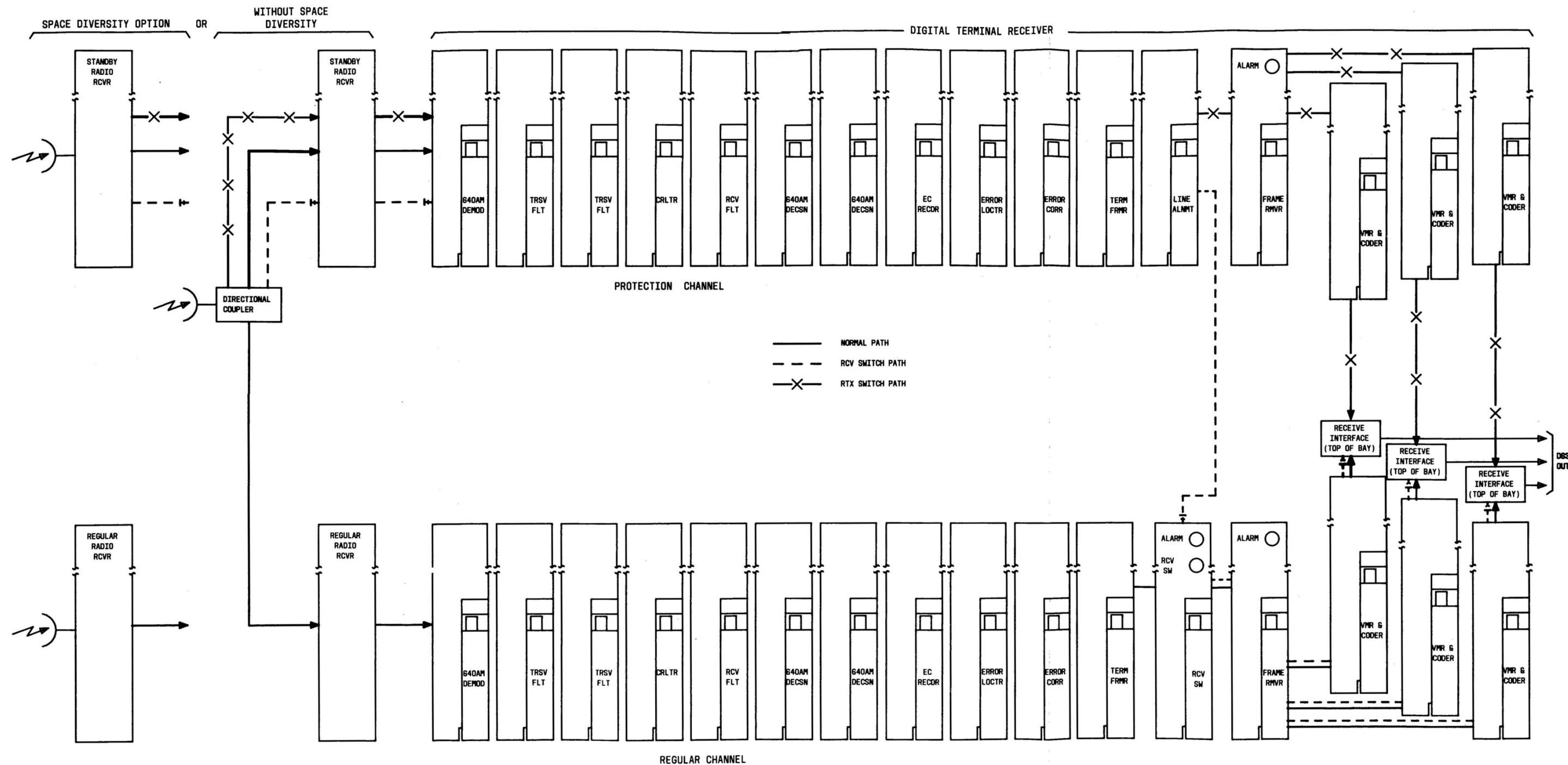Fig. 3—Transmitting Terminal Signal Path Block Diagram

Fig. 4—Receiving Terminal Signal Path Block Diagram

## ORDER-WIRE OPERATIONS

The OW (order-wire) operations require that a 2- or 3-digit station code be enabled in the OW signaling equipment at each station. The code is determined by wire straps on terminal strip TS1 on the right side of the control shelf. If DDD (direct distance dialing) service is required, one terminal station on the OW circuit must be directly wired to the subscriber line. All stations on the OW circuit access the DDD interface through the one selected terminal station.

Station-to-station signaling on the OW circuit is accomplished by using a touch-tone telephone set mounted on the fan shelf or a headset equipped with a pushbutton key pad. An additional touch-tone telephone may be wired directly to the frame terminal strip and used on the OW circuit. The normal hang-up will terminate the call.

The procedure below is used to originate and terminate the following calls:

• Local-station to single-station

• Local-station to all-stations

• DDD.

| STEP | PROCEDURE |
|------|-----------|
| 1 | Pick up the telephone handset on the fan shelf. If a telephone headset is used, connect it to the OW jack on the right side of the frame. |

> *Requirement:* The OFF-HOOK indicator on the OW unit will light and an audible dial tone will be heard.
> *Note 1:* The dial tone will last for approximately 20 seconds or until any telephone handset digit is dialed.
> *Note 2:* Absence of a dial tone indicates that another station on the OW circuit is also off-hook. In this case you will hear a short triple beep.

For local-station to single-station calls, go to Step 2.

For local-station to all-stations calls, go to Step 3.

For DDD calls, go to Step 4.

**Local-Station to Single-Station Calls**

| 2 | On telephone handset, depress buttons for the 2- or 3-digit code of the desired station on the OW circuit. |

> *Requirement:* Dial tone will stop and the station signaling tone will sound at the station being called. The signaling tone will sound for approximately 3 minutes or until the station answers. When the called station answers (goes off-hook), a triple beep will be heard.
> *Note:* This triple beep is generated by any station going off-hook as well as by an incoming call on a DDD line.

If no answer is received and you want to terminate the call, hang up. If a telephone headset is used, pull the plug from the OW jack.

| STEP | PROCEDURE |
|---|---|

**Local-Station to All-Stations Calls**

3    On telephone handset, depress the # pushbutton three times.

*Requirement:*  Dial tone will stop and the station signaling tone will sound at all stations. The signaling tone will sound for approximately 3 minutes. If any station answers, the signaling tone will stop.

If all stations do not answer and all are required to answer, repeat this step until all stations answer.

If no answer is received and you want to terminate the call, hang up. If a telephone headset is used, pull the plug from the OW jack.

**DDD Calls**

4    On the telephone handset, depress the "9" pushbutton.

*Requirement:*  The OW dial tone will stop and the central office dial tone will sound. St 1 If central office dial tone is not received, repeat this step.

If central office dial tone is received, go to Step 5.

5    On the telephone handset, depress the pushbuttons for the desired telephone number. Use DDD access and area codes, if required.

6    To terminate the DDD call, just hang up.

*Note:*  If you wish to make another DDD call at the end of this call or continue a conversation on the party line OW circuit without hanging up, depress the * pushbutton on the telephone handset. This will cause you to be disconnected from the DDD network but leave you connected to the OW circuit. To make another DDD call repeat from Step 4.

## ISSUING ORGANIZATION

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