

**OPERATION AND MAINTENANCE  
MAINTENANCE SUPPORT  
HOT STANDBY  
DR 6/11-135A AND 135EC  
DESCRIPTION  
RADIO**

**DR 6-30-135 DIGITAL RADIO**

A DR 6/11-135 Digital Radio frame can contain up to four vertical radio T/R (transmitter/receiver) pairs. However, most hot standby applications will only require two T/R pairs per radio frame. The waveguide can be arranged to grow from left to right or right to left in a radio frame. This section uses block diagrams to describe the DR 6-30-135 and the DR 11-40-135 radios in terms of the radio transmitter, radio receiver, common alarm circuit, and dc power distribution.

*This practice is reissued to add the 4411( ) ALC Network and the 4415( ) RF Switch Network. The practice is used in binders 421-104-001 and 421-104-060.*

The following symbols are used in the block diagrams.

- = NOMINAL POWER IN DBM
- = WAVEGUIDE
- C1 ○ = UT-141A COAXIAL CABLE UNIFORM TUBE
- C2 ○ = KS-19224, L2 COAXIAL CABLE
- C3 ○ = 731B COAXIAL CABLE

**DR 6-30-135 DIGITAL RADIO**

**TRANSMITTING**

A 64-QAM (quadrature amplitude modulation) signal at 70 MHz from the digital terminal transmitter or regenerator is fed to both the regular and the standby radio transmitter. The 70-MHz signal is mixed with a locally generated frequency (via the microwave generator) in the 6-GHz band. The signal is then amplified to a specified high power level, fed into the transmit switch, and transmitted (either regular or standby—based on the transmit switch position) to the next station.

Figure 1 shows a block diagram of a 6-GHz radio transmitter with TWT (traveling wave tube) option. Figure 2 shows the 6-GHz radio transmitter with the solid-state amplifier option.

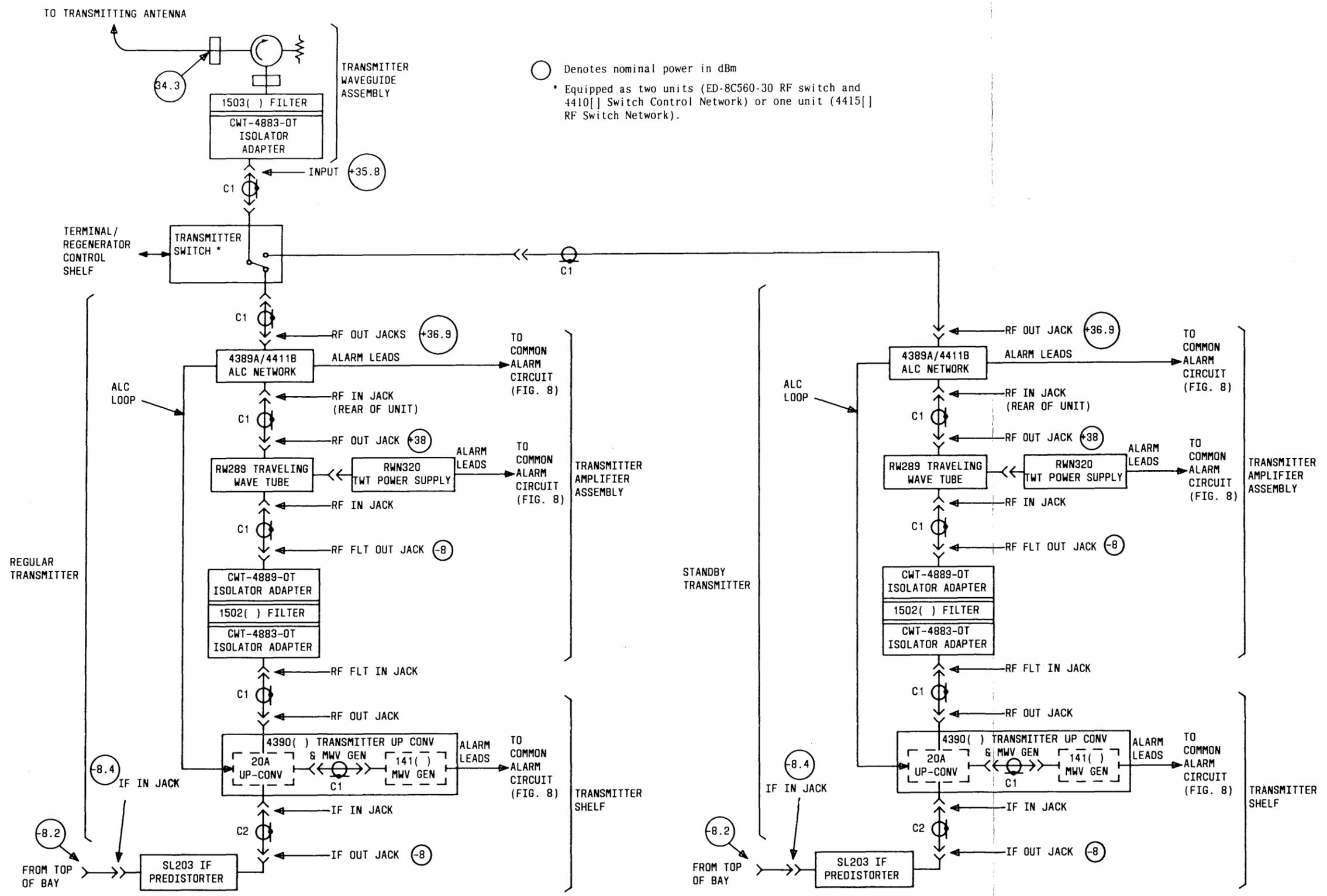


Fig. 1—6-GHz Hot Standby Radio Transmitter with TWT Option

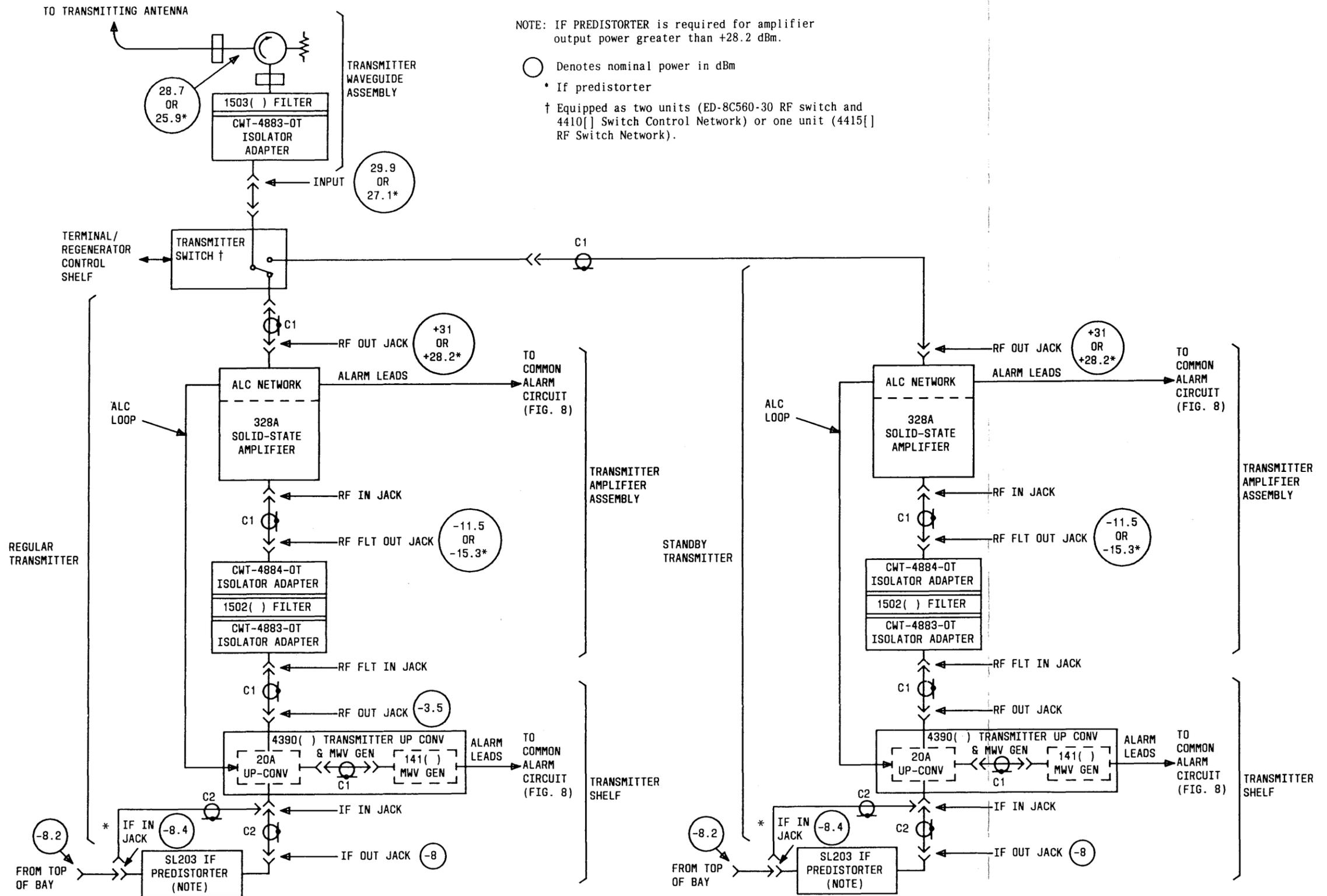


Fig. 2—6-GHz Hot Standby Radio Transmitter with Solid-State Option

**RECEIVING**

In the standard hot standby receiver arrangement, the two radio receivers are dual-fed with unequal signal levels via a 10 dB microwave directional coupler. The standby receiver input signal level is 10 dB below the regular receiver input signal level. Switching is done at baseband in the digital terminal or regenerator receiver, based on the best quality signal present. Therefore, in normal circumstances, the regular radio receiver will be selected to carry transmission service.

In the hot standby/space diversity arrangement, the regular antenna and waveguide equipment are connected to the regular radio receiver and the diversity antenna and waveguide equipment are connected to the standby radio receiver. Again, switching is done at baseband in the digital terminal or regenerator receiver, and under normal nonfading conditions, the regular radio receiver (or longest waveguide path) will be selected to carry transmission service.

The received 6-GHz signals are translated to two 70-MHz IF signals. The signals are then corrected to produce a 70-MHz output signal with constant power and minimum linear distortion for dual output to the digital terminal or regenerator.

Figure 3 shows a block diagram of a 6-GHz radio receiver.

Figure 4 shows a block diagram of a 6-GHz radio receiver with space diversity option.

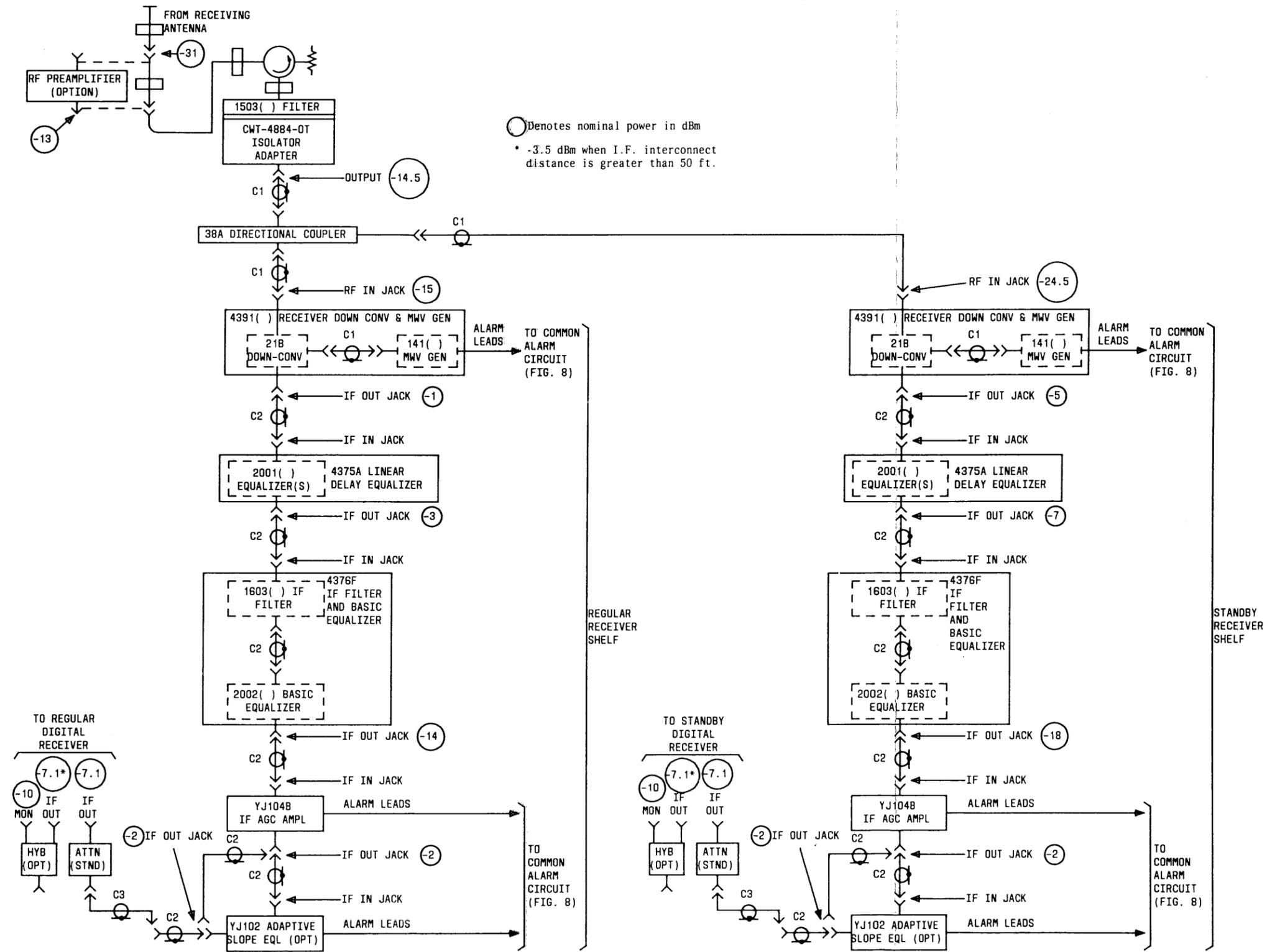


Fig. 3—6-GHz Hot Standby Radio Receiver

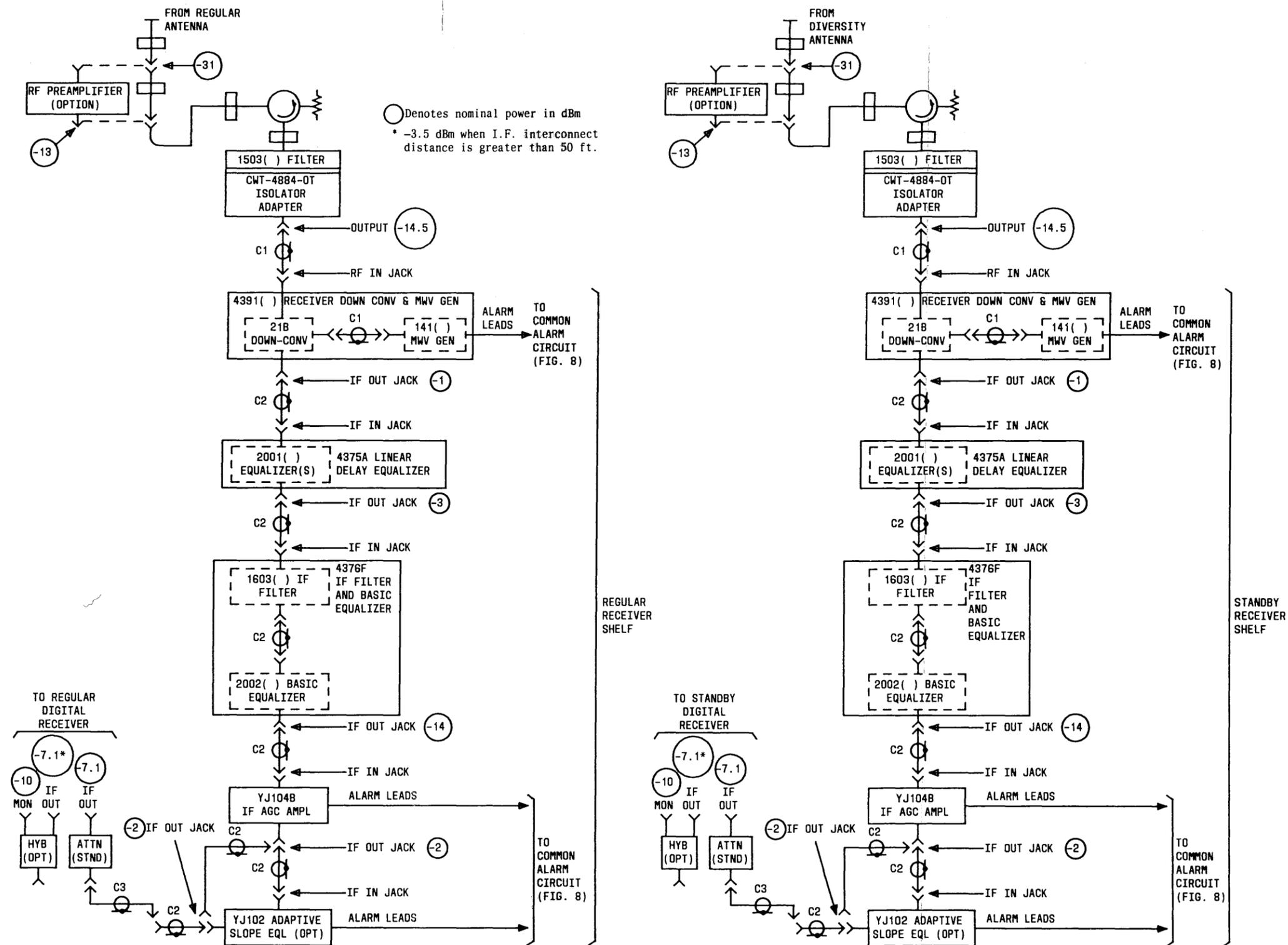


Fig. 4—6-GHz Hot Standby Radio Receiver with Space Diversity Option

## DR 11-40-135 DIGITAL RADIO

**TRANSMITTING**

A 64-QAM signal at 70 MHz from the digital terminal transmitter or regenerator is fed to both the regular and the standby radio transmitter. The 70-MHz signal is mixed with a locally generated frequency (via the microwave generator) in the 11-GHz band. The signal is then amplified to a specified high power level, fed into the transmit switch, and transmitted (either regular or standby base on the transmit switch position) to the next station.

Figure 5 shows a block diagram of an 11-GHz radio transmitter.

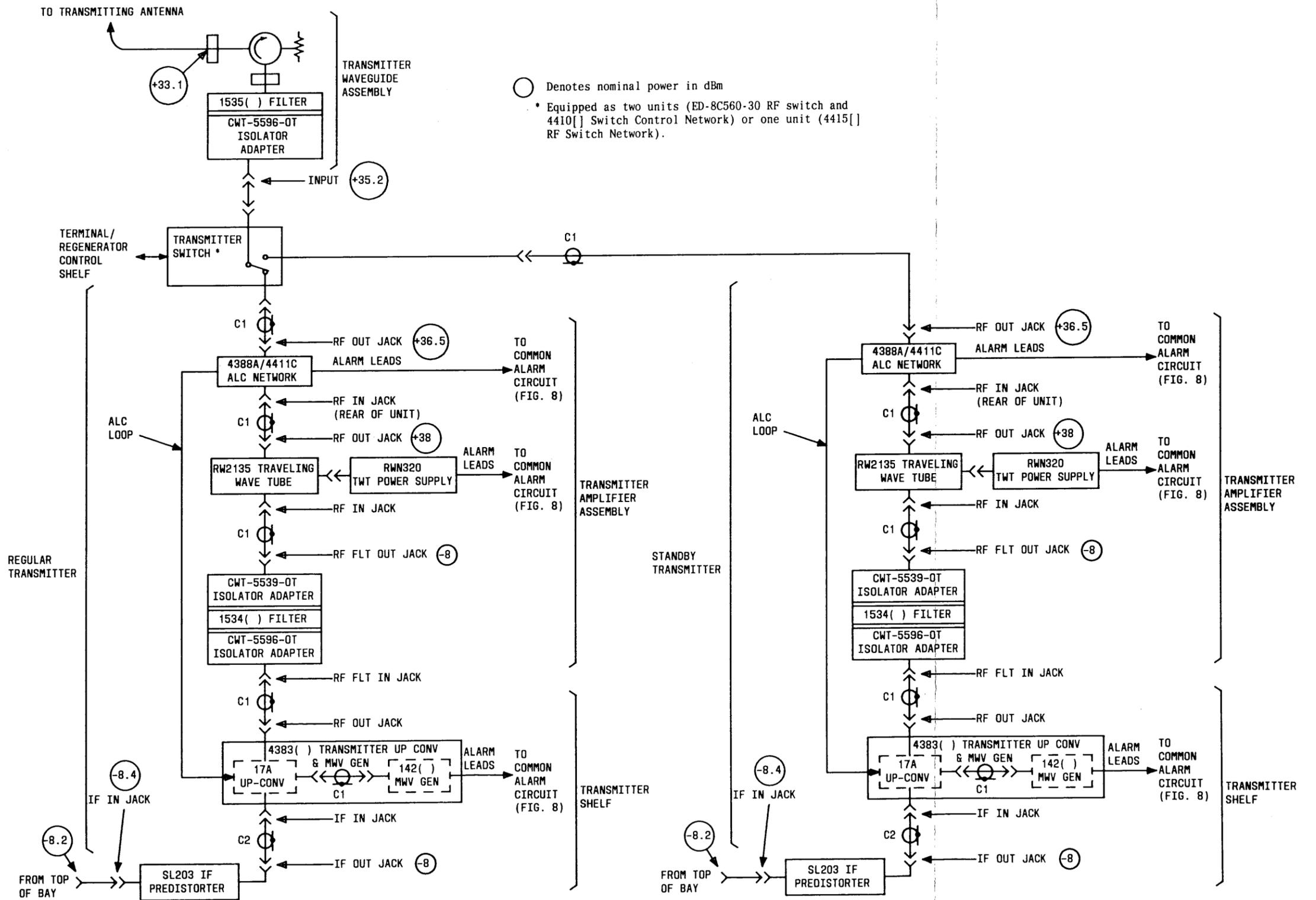


Fig. 5—11-GHz Hot Standby Radio Transmitter

**RECEIVING**

In the standard hot standby receiver arrangement, the two radio receivers are dual-fed with unequal signal levels via a 10 dB microwave directional coupler. The standby receiver input signal level is 10 dB below the regular receiver input signal level. Switching is done at baseband in the digital terminal or regenerator receiver based on the best quality signal present. Therefore, in normal circumstances, the regular radio receiver will be selected to carry transmission service.

In the hot standby/space diversity arrangement, the regular antenna and waveguide equipment are connected to the regular radio receiver and the diversity antenna and waveguide equipment are connected to the standby radio receiver. Again, switching is done at baseband in the digital terminal or regenerator receiver, and under normal nonfading conditions, the regular radio receiver will be selected to carry transmission service.

The received 11-GHz signals are translated to two 70-MHz IF signals. The signals are then corrected to produce a 70-MHz output signal with constant power and minimum linear distortion for dual output to the digital terminal or regenerator.

Figure 6 shows a block diagram of 11-GHz radio receiver.

Figure 7 shows a block diagram of a 11-GHz radio receiver with space diversity option.

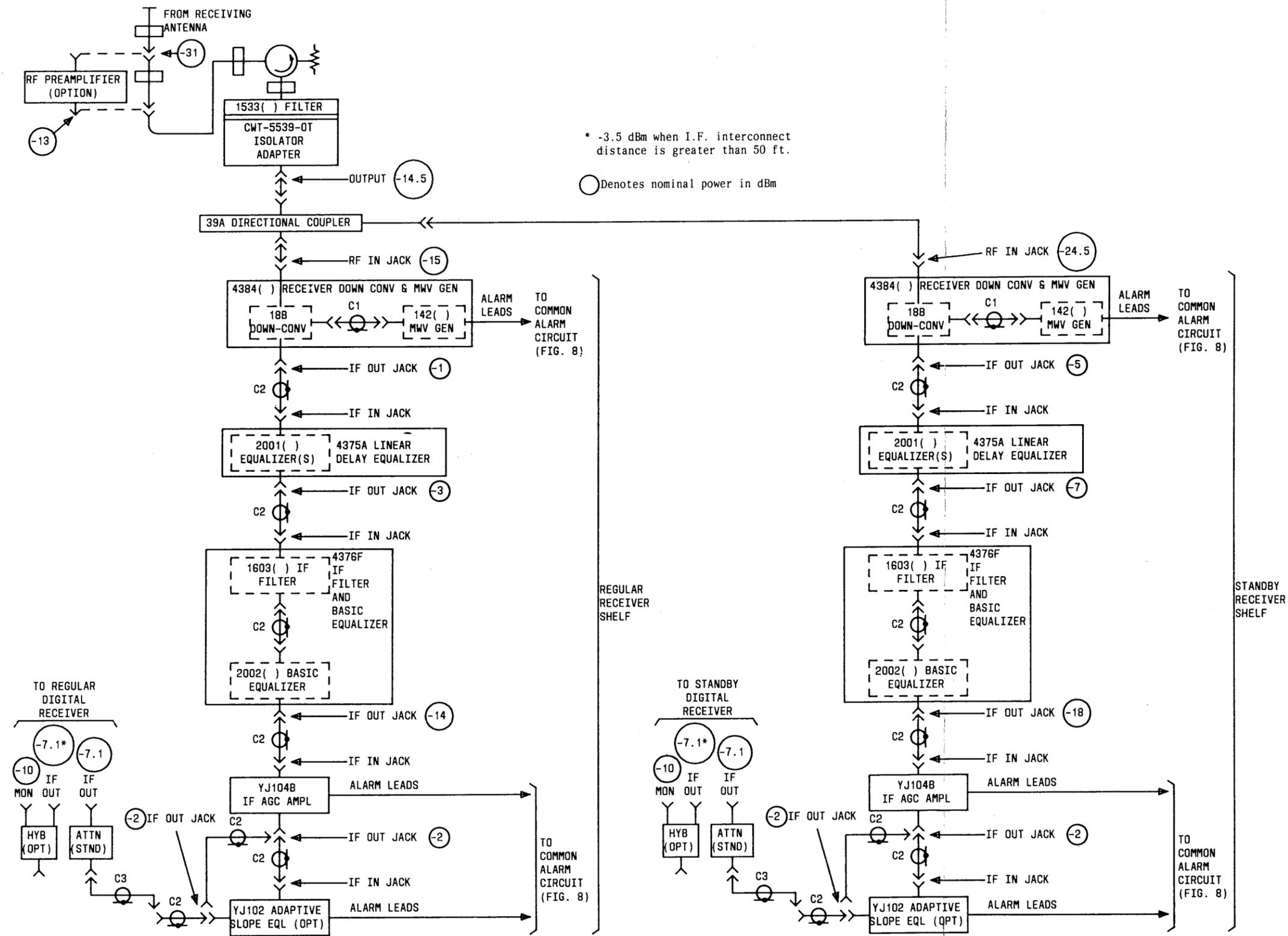


Fig. 6—11-GHz Hot Standby Radio Receiver

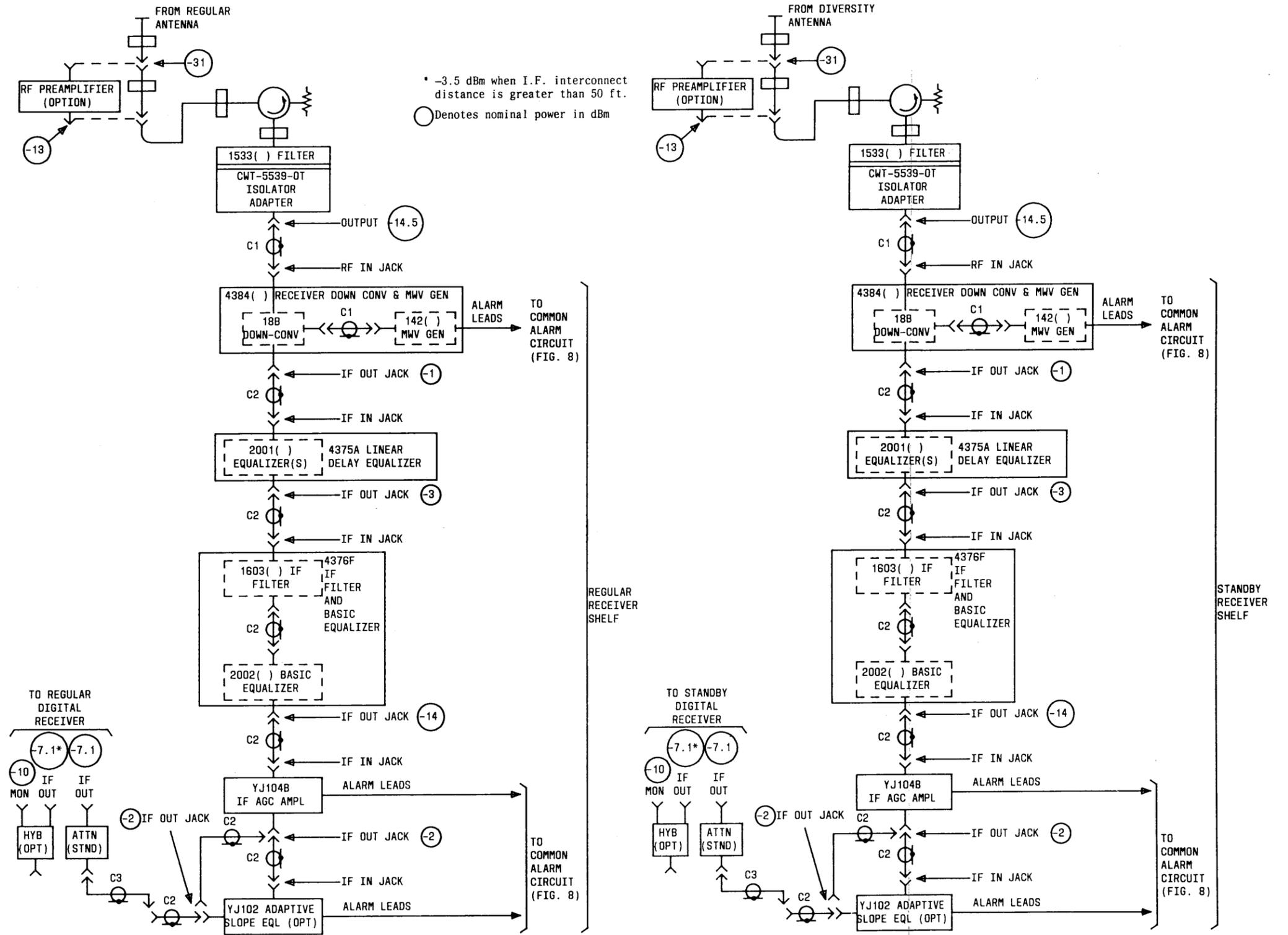
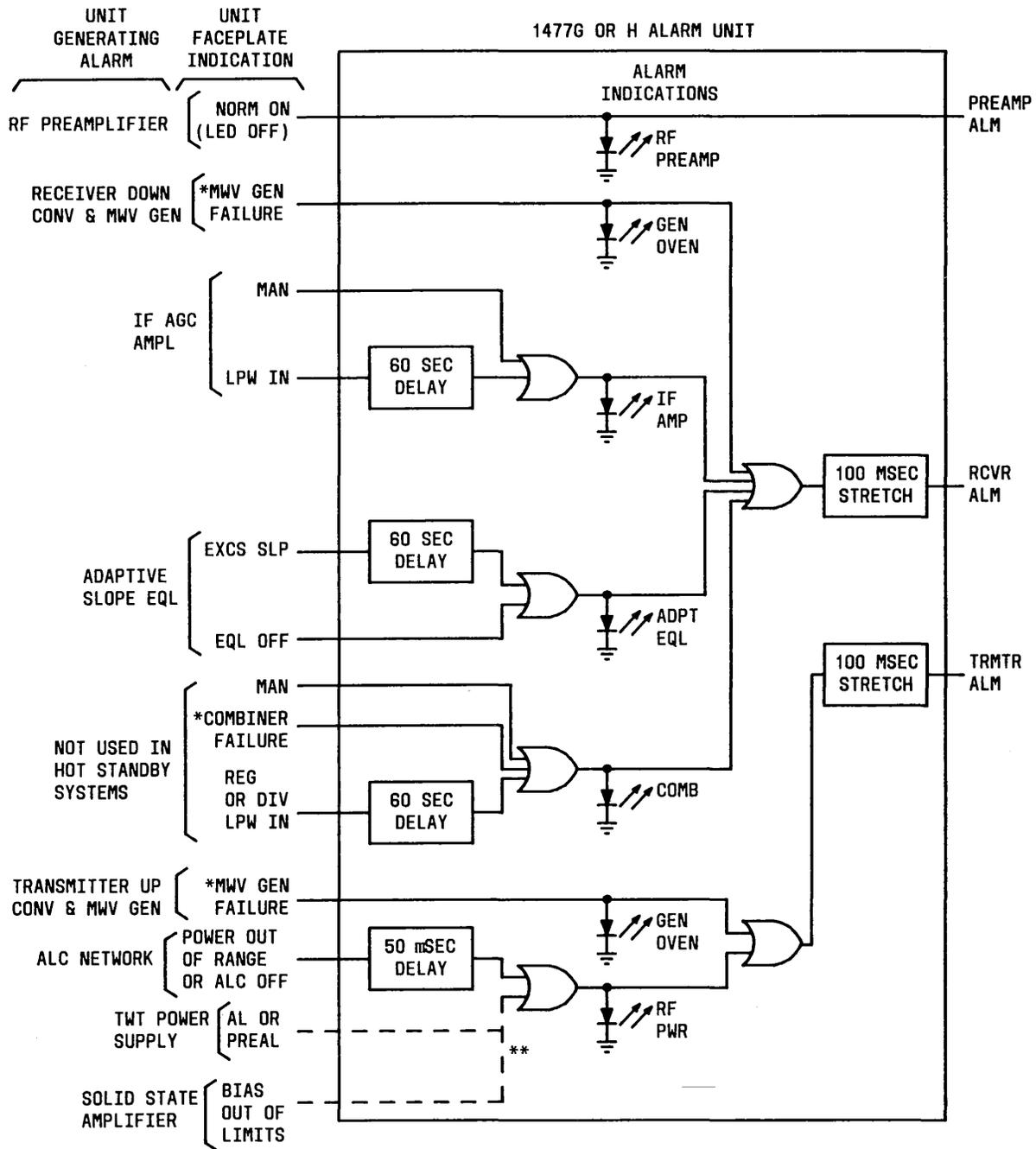


Fig. 7—11-GHz Hot Standby Radio Receiver with Space Diversity Option

**COMMON ALARM CIRCUIT**

The alarm circuit is common to a vertical T/R pair. The alarm unit collects and displays the status of various circuits associated with the radio transmitter and radio receiver. The status outputs are then sent to the associated digital terminal or regenerator CHAN CONTR unit.

Figure 8 shows the radio alarm reporting signal path.



\* NO FACEPLATE INDICATION

\*\* EITHER A TWT OR SOLID STATE AMPLIFIER CAN BE USED

Fig. 8—Radio Alarm Reporting Signal Path

**POWER DISTRIBUTION**

The radio transmitter and radio receiver are equipped with power conditioning units to provide the appropriate dc voltages to their respective units. Some units are powered directly by the  $-24\text{ V}$  or  $-48\text{ V}$  office power source.

Figures 9 and 10 show the radio transmitter power distribution. Figure 11 shows the radio receiver power distribution.

**ISSUING ORGANIZATION**

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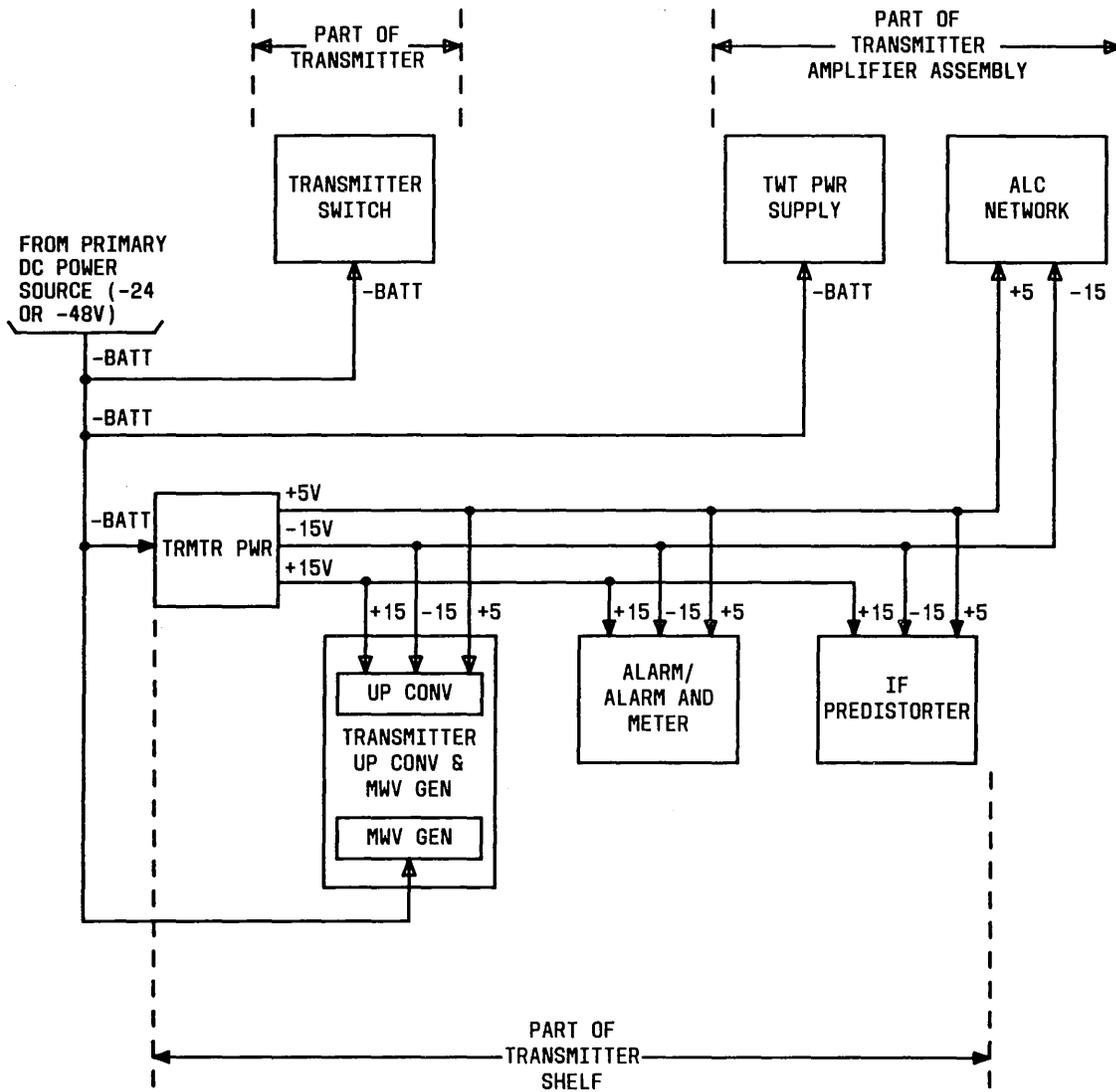
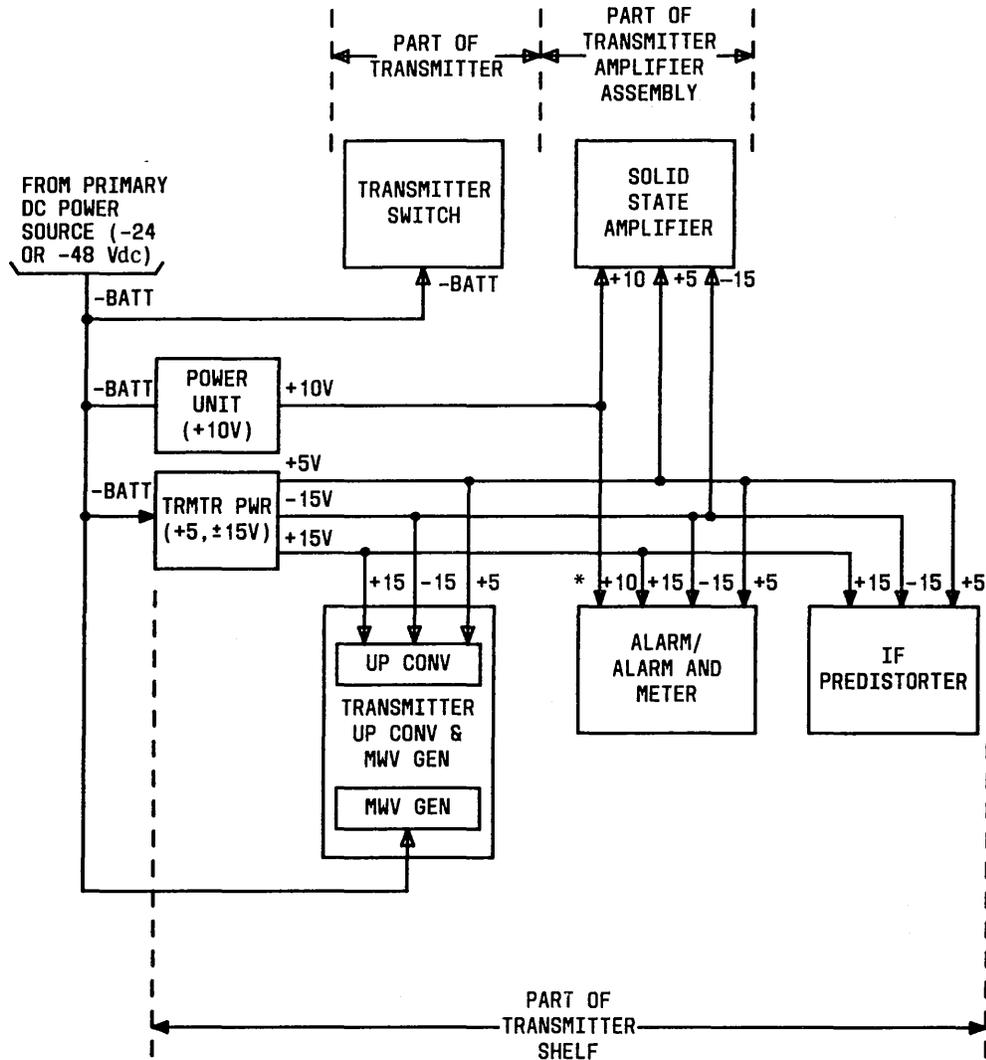
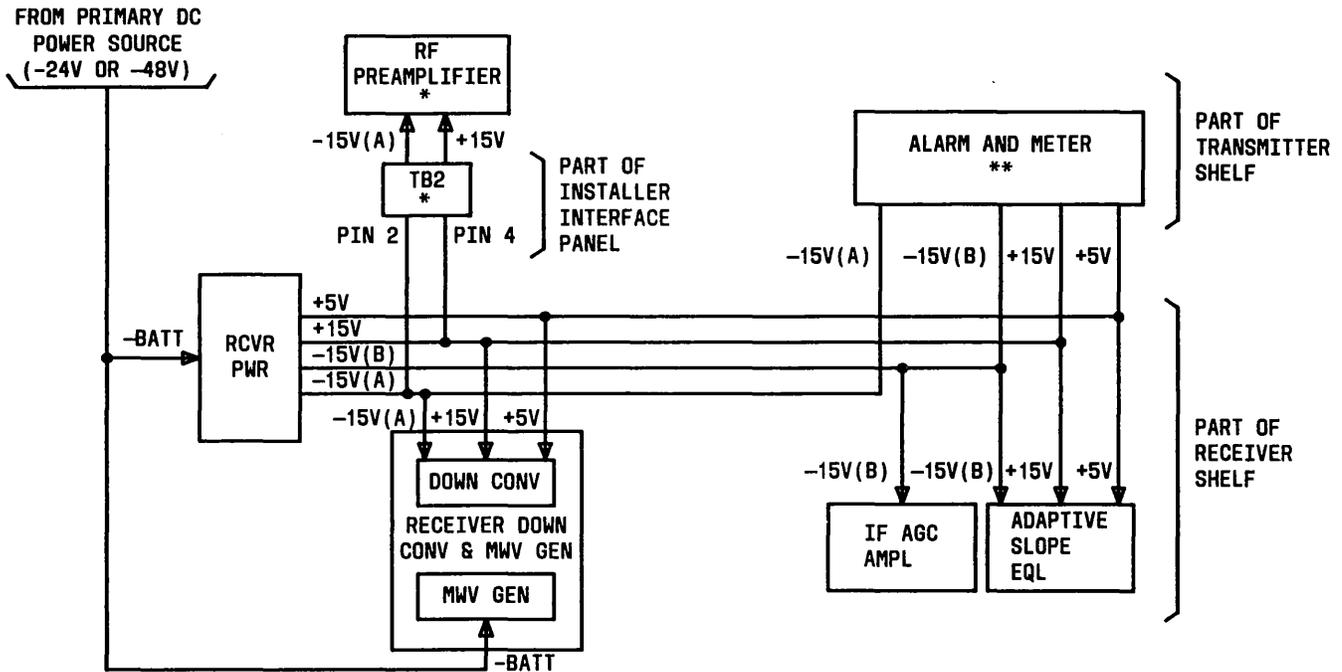


Fig. 9—Radio Transmitter Power Distribution (TWT Amplifier)



\* +10V LEAD USED FOR MONITORING PURPOSES ONLY

Fig. 10—Radio Transmitter Power Distribution (Solid-State Amplifier)



- \* The RF preamplifier (if equipped) is powered by the first and/or second receiver (if space diversity) equipped in a radio frame
- \*\* ALARM AND METER unit powered from transmitter shelf. Receiver voltage leads provided for monitoring purposes only.

Fig. 11—Radio Receiver DC Power Distribution