

An FM deviation signal is produced by passing the DC offset of the discriminator outputs through an amplifier (U24A). The appropriate input (selected 21.4 MHz discriminator or selected 455 kHz discriminator) is chosen by switch U26A. Trimming adjustments are provided individually for each discriminator (R83 for 15 MHz, R81 for 1 MHz, R79 for 100 kHz, R82 for 20 kHz, R80 for 3 kHz), selected by switches (U26B, U27) controlled by the cardcage bus interface. The output is set so as to be midrange (2.5 Volts) for center-frequency tuning. The amplifier output feeds a connector (J6), and is routed from there to the DVM option cardcage module, if present.

The cardcage interface consists of address decoding (U3, U4) a data latch (U2), and a switch and relay driver (U1). The latch is reset on power-up and is accessed through cardcage bus address 72(hex), as determined by the address decoder. The buffered latch bits control relays K1 - K3 and selection switches for the various discriminators and deviation trimmers. A pair of local voltage regulators (U5, U6) generate the +10.6 Volt power required by the discriminator chips from the cardcage +15 Volt power line. In addition, a switch (U25C) controls power applied to the local oscillator. The oscillator is powered down when a 21.4 MHz discriminator is selected.

Besides the latch bits for AM/FM selection and discriminator selection, there is a narrowband selection bit that must be asserted when one of the 455 MHz discriminators is selected.

7. FIELD SERVICE ADJUSTMENTS

The FM option cardcage module contains a number of adjustments which may be performed in the field. All of these require that the outside case of the receiver be removed for access. In addition, most adjustments require that the cardcage module be placed on extender card, to afford access to the adjustments.

7.1. 21.4 MHz Discriminator Quadrature Coils

The 15 MHz discriminator consists of U17, L7, and surrounding components. The 1 MHz discriminator consists of U16, L6, and surrounding components. Both may be adjusted using the same procedure.

1. Apply a 21.4 MHz signal at -30 dBm to module input J1.
2. Select FM mode and select the desired bandwidth to be adjusted (15 MHz or 1 MHz).
3. Monitor pin 1 of the appropriate discriminator (U17 for 15 MHz, U16 for 1 MHz) and adjust the appropriate coil tuning slug (L7 for 15 MHz, L6 for 1 MHz) for 5.0 Volts at pin 1 of the IC.

7.2. Local Oscillator Adjustment

The local oscillator consists of crystal Y1, transistor Q1, and amplifier U7, plus surrounding components. One of these, C17, allows the frequency of the oscillator to be trimmed.

1. Connect a frequency counter to U7 pin 6 and monitor the frequency there.
2. Adjust C17 for a reading of 20.945 MHz.

7.3. 455 kHz Discriminator Outputs

Each of the three 455 kHz discriminators has a trimpot connected to its output. The purpose of this is to equalize the gains. R45 is for the 100 kHz discriminator, R48 is for the 20 kHz discriminator, and R50 is for the 3 kHz discriminator.

1. Monitor the signal at the signal at the module output (J4).
2. Apply a 21.4 MHz signal modulated at 1 kHz with 75% deviation at -30 dBm at module input J1.

3. Select FM mode and 1 MHz bandwidth. Measure the signal amplitude at the output.
4. Select 100 kHz bandwidth. Adjust R45 for the same amplitude.
5. Select 20 kHz bandwidth. Adjust R48 for the same amplitude.
6. Select 3 kHz bandwidth. Adjust R50 for the same amplitude.

7.4. FM Deviation Null Level

Each of the five discriminators has a separate trimmer to set its FM deviation null level.

1. Connect a signal at 21.4 MHz and -30 dBm to the module input at J1.
2. Monitor the signal at the carrier deviation output (J6).
3. Select FM mode and 15 MHz bandwidth, and adjust R83 for 2.5 Volts at the output.
4. Select 1 MHz bandwidth and adjust R81 for 2.5 Volts at the output.
5. Select 100 kHz bandwidth and adjust R79 for 2.5 Volts at the output.
6. Select 20 kHz bandwidth and adjust R82 for 2.5 Volts at the output.
7. Select 3 kHz bandwidth and adjust R80 for 2.5 Volts at the output.

8. CARD CAGE BUS INTERFACE SUMMARY

The control latch is at address 72(hex):

Bit 0 = AM/FM select:

0 = AM

1 = FM

Bit 1 = narrowband select:

0 = 21.4 MHz discriminators

1 = 455 kHz discriminators

Bit 2 = 15 MHz discriminator select (1 = select)

Bit 3 = 1 MHz discriminator select (1 = select)

Bit 4 = 100 kHz discriminator select (1 = select)

Bit 5 = 20 kHz discriminator select (1 = select)

Bit 6 = 4 kHz discriminator select (1 = select)

Bit 7 = (unused)