

As previously mentioned, the tuning METER is switched to the Detector circuit for the ALIGN and CENTER TUNING positions.

In the ALIGN position the METER is across the 25 μ f, C323 capacitor and measures the DC voltage produced in the Detector circuit. Since the Ratio Detector is not fully limiting from noise alone, the METER can act as a noise voltmeter when the LT-112 is being aligned.

In the CENTER TUNING position the METER is connected in a bridge circuit. The center tap of the secondary of T304 with the two matched diodes, D303 and D304 and the two 5.2 K precision resistors, R8 and R9, form the four legs of the bridge. When the LT-112 is tuned to the center of the broadcast channel, the current through the two diodes is identical, resulting in no current through the METER.

c. Multiplex Circuit Description

For the description which follows you may find it helpful to refer to the Detailed Block Diagram, Section 6.4, page 49 and Figure 23, the Multiplex Schematic on page 54.

Ever since the Federal Communications Commission authorized the broadcasting of stereophonic sound from FM stations, a considerable number of circuits have been developed to demodulate the composite stereophonic into left and right audio signals. The circuit that has proven to be most satisfactory has been a switching circuit where the multiplex demodulator alternately switches the composite signal from the FM detector to the left and right audio outputs. Usually, this involves the use of an amplifier between the FM detector and the demodulator so that sufficient signal will be available for demodulation. This circuit also involves the use of two audio amplifiers where the differential gain between the two audio amplifiers was adjusted to obtain the best separation.

These multiplex circuits, which predate the LT-112, had to be switched from monophonic to stereophonic operation by connecting the two audio amplifiers to either the stereo demodulator diodes, or to a separate network connected directly to the detector of the composite signal amplifier. This required at least the equivalent of a double-pole, double-throw switch.

In order to have such circuits switch automatically from monophonic to stereophonic operation, double-pole, double-throw relays, or at least four diodes were used for this purpose, adding further to the complexity of the circuit.

Investigations and further development over the years produced the LT-112 and showed that the multiplex demodulator diodes themselves could also perform the function of switching from monophonic to stereophonic operation.

Figure 19, page 48, shows such a circuit, which is a portion of the LT-112 multiplex section. Here, the FM detector is of the conventional wideband variety, except that the detector circuit itself is floating and not grounded, so that two terminals are available. Across the output of the detector is a trap circuit tuned to 67 Kc to remove any background music signal usually centered at this frequency. This signal would cause undesirable audible whistles when listening to FM stereo if the station did broadcast such a service. The FM detector circuit is grounded with two groups of resistors, first an 18,000 ohm (R533), and the two 10,000 ohm separation potentiometers. This way a "high" and a "low" output of opposite phase is obtained. The "high" output is also connected to the center tap of the secondary of the 38 Kc oscillator transformer (T502). Here, the oscillator voltage is, in effect, connected in series with the composite signal and applied in opposite phase to two sets of detector diodes. At the moment the upper portion of the detector secondary has a positive voltage, diodes D509 and D510 will conduct to permit the composite signal from the "high" output of the detector to pass through the secondary of the 38 Kc oscillator transformer to the two 10,000 ohm resistors to the left output terminals. Whenever the polarity of the 38 Kc signal is reversed, the opposite pair of diodes, D507 and D508 will conduct and will permit the signal to pass to the right output.

Since the efficiency of switching for stereo demodulation is not 100%, the composite signal is also fed to the left and right outputs, but in opposite phase from the "low" detector output. Here, the two 10,000 ohm separation potentiometers feed the opposite phase signal through two 10,000 ohm resistors to the left and right outputs, respectively. Also, the stereo separation at the left and at the right output can be adjusted separately. These outputs are, of course, connected to de-emphasis circuits and to further audio amplifiers which also have very sharp cutoff 15 Kc filters to prevent any ultrasonic component from being recorded as a whistle when using a tape recorder.

Whenever the FM station does not broadcast stereo, it is desirable to switch the multiplex circuit to monophonic operation as shown in Figure 19. In stereophonic operation, the switch is, in effect, grounded and bias is applied to the 38 Kc oscillator to permit