FIELD TUNING INSTRUCTIONS
FOR MODEL WP-687-3943
4-CAVITY RECEIVER DIPLEXER

Model WP-687-3943 is a four-cavity diplexer designed to couple two separate receivers operating in the 900-941 MHz band into a common broadband antenna. Each section of the diplexer includes two cavities; one a bandpass, the other a bandpass-reject type. The rejection notch of each bandpass-reject cavity is adjusted to attenuate the transmitter channels in the 929-932 MHz band.

INSTALLATION

The three input connectors are marked "RX1", "RX2" and "Antenna". The lower of the two receiver frequencies should be connected to the connector marked RX1. The higher of the two receiver frequencies should be connected to the connector marked RX2.

EQUIPMENT REQUIRED FOR FIELD ALIGNMENT

The diplexer is factory-tuned to the exact operating frequencies prior to shipment from the factory. No further field tuning or adjustment is normally required. If it becomes necessary to change the operating frequencies of the diplexer, it can be field tuned if a spectrum analyzer with a tracking generator is available.

EXPLANATION OF TUNING ADJUSTMENTS

Each section of the diplexer includes a bandpass and a bandpass-reject filter. The rotatable coupling loops of the bandpass cavitites (No.1 & 4) are factory set to an insertion loss of 0.5 dB. The coupling loop of the bandpass-reject cavities is fixed and cannot be adjusted. Cavities 1 & 2 are always tuned to pass the lower of the two frequencies and cavity 2 rejects the 929-932 MHz band. Cavities 3 & 4 are always tuned to pass the higher frequency and cavity 3 rejects the 929-932 MHz band.

For proper alignment, each section of the diplexer must be tuned to two different frequencies: (1) the frequency to be passed and (2) the frequency to be attenuated or rejected by the filter. The threaded Invar tuning rod is the "pass" frequency adjustment and the variable capacitor is the "reject" frequency adjustment. The reject frequency adjustment (capacitor) must always be the last adjustment made to each cavity. Adjustment of the capacitor moves the notch (reject frequency) closer to, or farther from the pass frequency but does not change the pass frequency alignment. Rotation of the threaded tuning rod changes alignment of the "pass" frequency as desired, but also changes alignment of the notch to some unknown frequency. For this reason, the "pass" frequency adjustment is made first and the "reject" frequency adjustment is made last.

WACOM

Mailing Address: P.O. Box 21145 • Waco, TX 76702

PREPARE THE CAVITIES FOR REALIGNMENT (Pretune)

NOTE: These first 6 steps are preliminary steps and a high degree of accuracy in the frequency or amplitude is not required. Even though high accuracy is not needed, these steps are necessary in order to obtain accuracy in the final steps of tuning the diplexer.

(1) Connect the equipment as shown in Figure 1. Set the analyzer center frequency to the lower of the two receive frequencies and adjust the analyzer sweep setting as to include full response curve (see Figure A).

(2) Loosen the hex nut which locks the threaded tuning rod on the cavities and rotate the threaded tuning rod of cavities 1 & 2 for maximum signal (minimum loss) into the analyzer at the pass frequency.

(3) Remove the slotted dust cap from capacitor A (cavity #2) and tune the capacitor to obtain rejection notches symmetrical about the center frequency as illustrated by Figure A.

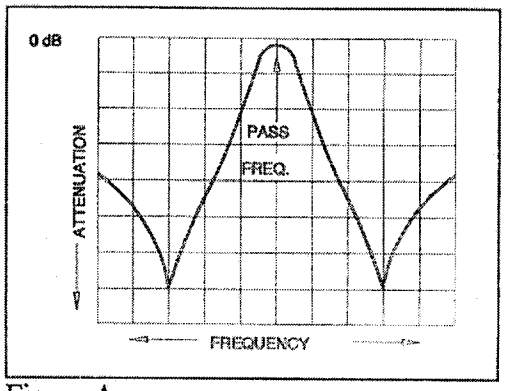

Figure A

(4) Connect the equipment to the diplexer as shown in Figure 2. Set the analyzer center frequency to the higher of the two receive frequencies.

(5) Rotate the threaded rods on cavities 3 & 4 for maximum signal (minimum loss) into the analyzer at the pass frequency.

WACOM
Mailing Address: P.O. Box 21145 • Waco, TX 76702

(6) Remove the slotted dust cap from capacitor B and tune the capacitor to obtain rejection notches symmetrical about the center frequency as illustrated by Figure A.

The diplexer is now in the proper preliminary state to "fine tune" to the distinct receiver frequencies.

NOTE: For all "fine tune" steps use horizontal and vertical scales on the analyzer which will yield highly accurate and reliable frequency and amplitude measurements. We recommend a frequency sweep width of no greater than is required to see the -3 dB points and an amplitude scale no greater that 2 dB per division for insertion loss measurements.

TUNE "PASS" FREQUENCY OF CAVITIES 3 & 4

(7) Check the analyzer center frequency to be sure that the higher of the two receiver frequencies is established.

(8) Rotate the threaded tuning rod of Cavities 3 & 4 for maximum signal(minimum loss) at center frequency into the analyzer. (Tune both cavities several times because of interaction between cavities)

(9) Tighten the hex nuts which lock the tuning rods of Cavities 3 & 4.

TUNE "PASS" FREQUENCY OF CAVITIES 1 & 2

(10) Reconnect the equipment as shown in Figure 1.

(11) Set the analyzer center frequency to the lower of the two receiver frequencies.

(12) Rotate the threaded tuning rod of Cavities 1 & 2 for maximum signal(minimum loss) at center frequency into the analyzer. (Tune both cavities several times because of interaction between cavities)

(13) Tighten the hex nuts which lock the tuning rods of Cavities 1 & 2.

RE-TUNE "PASS" FREQUENCY OF CAVITIES 3 & 4

(14) Repeat Steps 7, 8 & 9. This is a precautionary step to insure that Cavities 3 & 4 are properly tuned. This Step 14 is not necessary if the diplexer is being re-tuned to new frequencies that are close to the old frequencies. Step 14 is mandatory if the new "pass" frequency of Cavities 1 & 2 is close to the old "pass" frequency of Cavities 3 & 4.

(15) Tighten the hex nuts which lock the tuning rods of Cavities 3 & 4.

TUNE "REJECT" FREQUENCY OF CAVITIES 1 & 2

(16) Reconnect the equipment as shown in Figure 1 and terminate the "RX2" port with a 50 ohm load.

(17) Change the vertical scale of the analyzer system to 10 dB per division and set the center frequency of the analyzer to the reject frequency.

(18) Tune capacitors A (on cavity 2) to obtain maximum rejection (notch) at the 929-932 MHz band. Take appropriate steps to increase the sensitivity/dynamic range of your analyzer system to accurately tune the rejection notch.

TUNE "REJECT" FREQUENCY OF CAVITIES 3 & 4

(19) Reconnect the equioment as shown in Figure 2 and terminate the "RX1" port with a 50 ohm load.

(20) Set the center frequency of the analyzer to the reject frequency.

(21) Tune capacitor B (on cavities 3) to obtain maximum rejection (notch) at the 929-932 MHz band. Take appropriate steps to increase the sensitivity/dynamic range of your analyzer system to accurately tune the rejection notch.

The diplexer is now tuned and ready to use.

Mailing Address: P.O. Box 21145 • Waco, TX 76702

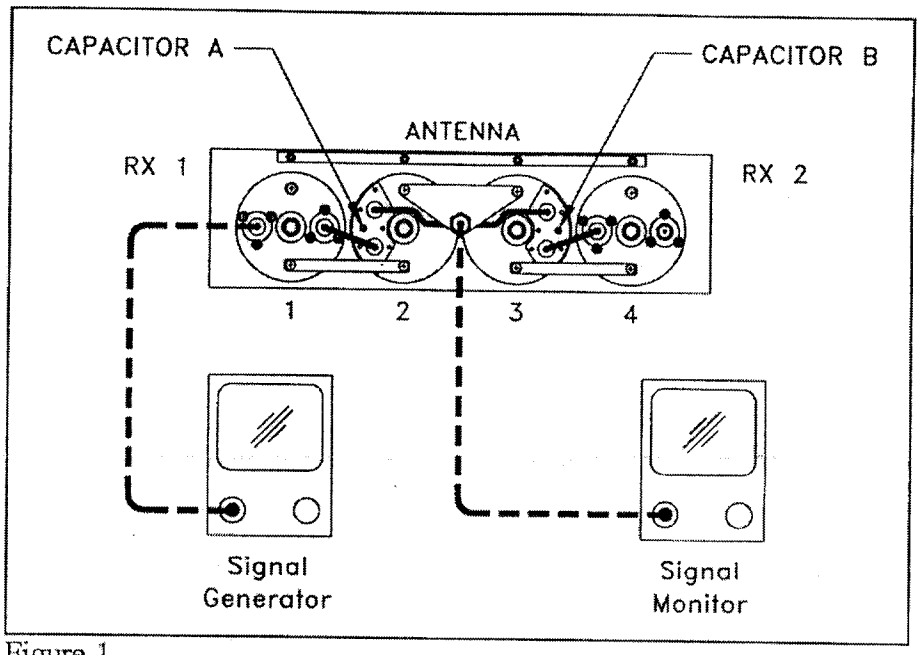

Figure 1

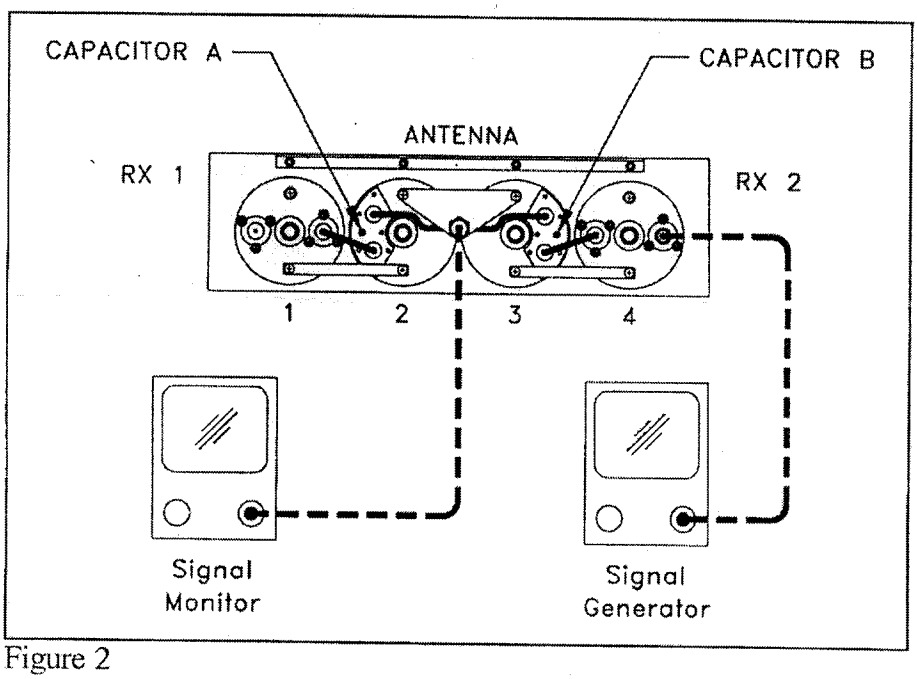

Figure 2