Instructions for Changing or Adding Crystals for Mentor Radio Model MB Base Station

CHANGING CRYSTALS

Changing crystals is the easiest procedure, because the frequency switch is known to be wired correctly and the tuning voltage trimmer potentiometer is known to be installed. If the radio has only one channel, the frequency switch is omitted.

The bottom plate must be removed for access to the "oscillator board" on which the crystals are mounted. Remove the nine no. 4-32 screws, four of which pass through the plastic feet. It may not be necessary to remove the top cover. However, the cover may be removed by taking out the six no. 8-32 screws on the sides.

A pair of crystals is required for each channel. The receive crystal operates at a higher frequency than the transmit crystal. Most crystals are marked with the channel frequency, with either "T" (for "transmit") or "R" (for "receive") substituted for the decimal point. Refer to Figure 1 for crystal placement. If there is more than one channel, then channel 1 is selected by the most counter-clockwise position of the channel selector switch. For single channel radios, Mentor Radio mounts the crystals in the channel 1 position. The crystals need not be installed in any particular order, such as ascending or descending frequencies.

For MB's manufactured prior to June 1988, the crystals were soldered to the oscillator board. These must be removed as follows: remove the two no. 4-32 screws which hold down the oscillator board. Also remove either screw holding a hinge standoff. Turn the board over for access to the rear of the crystals. Use a suction type desoldering machine or Solder wick or the equivalent to remove a crystal. Avoid holding the soldering iron against the crystal leads for an extended period, as the heat can travel through the leads and desolder connections inside the crystal.

For MB's manufactured after June 1988, it is not necessary to access the rear of the board. The crystals are in sockets and are removed by holding them firmly between your fingers and pulling, wiggling them from side to side if necessary.

Handle the old and new crystals gently; the quartz disk inside can be shattered if a crystal is dropped. Carefully install the new crystals in their correct positions and replace the board hold-down screws.

It is usually necessary to readjust the tuning voltage using the associated trimmer potentiometer (figure 1), but this step may be skipped if the new and old channel frequencies are less than 0.3 MHz apart. If the change in frequency is large (such as more than 5 MHz) it may be necessary to readjust some of the trimmer capacitors and variable inductors in the tuned circuits to maintain peak receiver sensitivity and transmitter output.

After crystal changes, it is advisable to check receiver sensitivity and band pass and the transmitter frequency and carrier power output. On MB's made after June 1988 a trimmer capacitor (C148) near the crystals permits small adjustments to the transmitter frequency. FCC regulations require that the transmitter frequency be within .002% of the nominal channel frequency, which is approximately 2.4 KHz for the aviation band. The frequency label should be changed so operators know which channel is active.

ADDING CRYSTALS

Many of the comments in the previous sections on changing crystals also apply when adding channels, so please read those sections first.

Unless otherwise specified when a model MB is ordered, single-channel radios are shipped without a frequency selector switch. If it is later desired to add a channel, a selector switch must be added and wired. All necessary wires are available in the wiring harness; these are contained in a flat- or ribbon-type cable that will be found folded back and covered with tubing. The tubing may be cut away and the wiring completed as shown in Figure 2.

A two-pole switch having up to six positions is required. For switches of the type used by Mentor Radio, the number of detent positions can be increased by breaking off tabs to allow additional rotation. To mount the switch in a single-channel radio, peel back the frequency label to expose the switch mounting hole on the front panel.

Each channel requires a pair of crystals, four crystal sockets, two PIN diodes and a trimmer potentiometer used to establish the "tuning voltage" that electronically tunes all RF amplifier tuned circuits. Depending on the age of the radio, adding a channel may require installing these parts, available from Mentor Radio. Each PIN diode act as an electronic switch; when a current is passed through the diode it switches the associated crystal into the oscillator circuit. Only one receive crystal and one transmit crystal is switched into the circuit at one time. Refer to schematic 4101163 for more details.

After the new crystals are installed, the trimmer potentiometer must be adjusted. Apply a signal to the receiver on the new channel and adjust the associated trimmer pot for maximum receiver sensitivity (or simply adjust for maximum speaker noise if no signal is available). It should not be necessary to adjust the pots for channels that were not affected by the changes.

If the new channel differs from existing channels by more than several MHz, it may be necessary to readjust the transmitter to avoid low carrier power at the high end of the band. When there is a wide range of transmitter frequencies, some compromise in power output at the band ends is usually necessary. It should be possible to find adjustments that result in at least 8 watts transmitter carrier power for all frequencies.

In case of problems, contact Mentor Radio for further assistance.

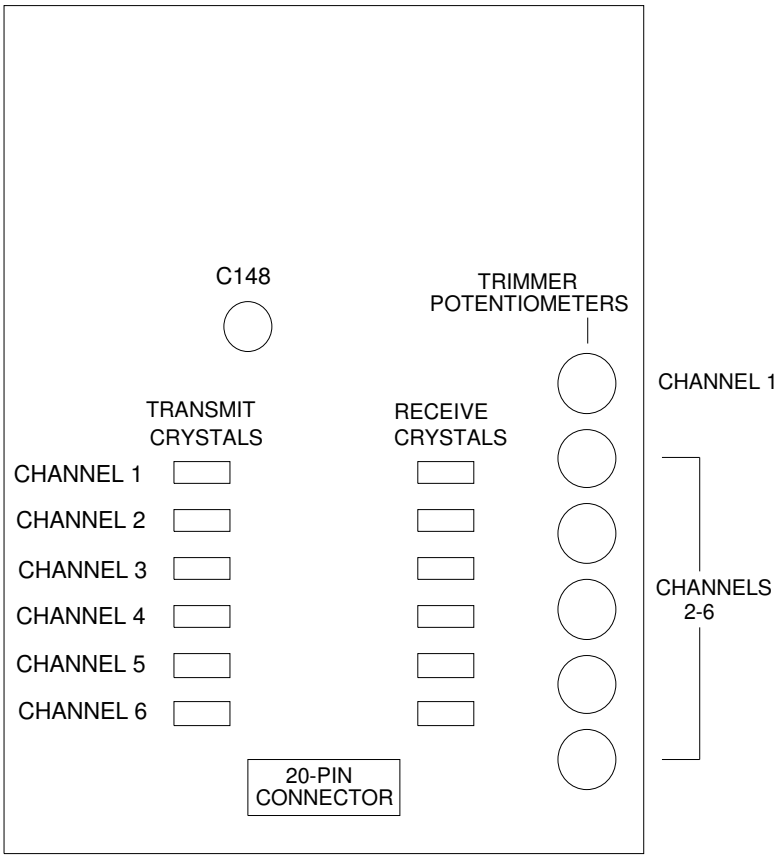
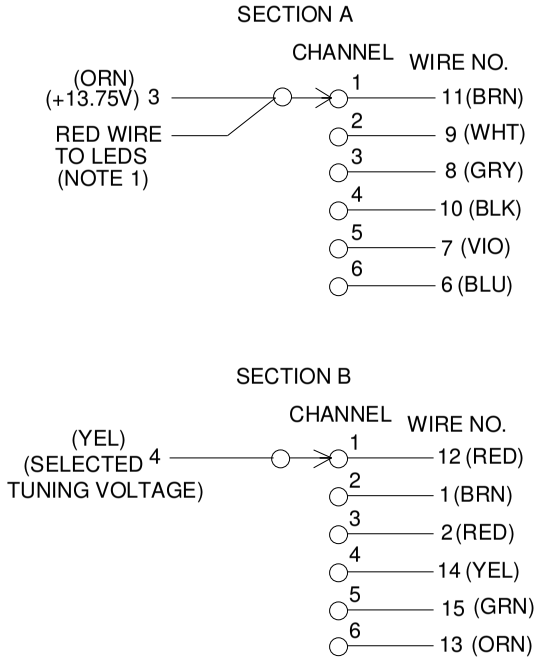
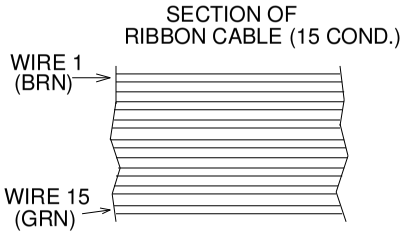


Figure 1
MB Oscillator Board
Crystal & Trim Pot Locations



6-POS, 2-POLE
FREQ. SELECTOR SWITCH



WIRE NO.	COLOR
1	BRN
2	RED
3	ORN
4	YEL
5	GRN
6	BLU
7	VIO
8	GRY
9	WHT
10	BLK
11	BRN
12	RED
13	ORN
14	YEL
15	GRN

NOTES: 1. FOR SINGLE CHANNEL RADIOS, WIRES 11 & 3 ARE TIED AND CONNECTED TO COMMON (+13.75V) TERMINALS OF THE THREE PANEL LEDS.
2. SOME WIRE COLORS ARE DUPLICATED; BE SURE TO CONNECT AS SHOWN ABOVE.

MENTOR RADIO CO.
1101257-4 (04-01)

FIGURE 2
MB FREQUENCY SWITCH CONNECTIONS