Radius®
by MOTOROLA

25 kHz to 12.5 kHz Channel Spacing Conversion Kits for GM300, M10, M120, and M130 Series Mobile Radios

HLN9575 and HLN9576

PLEASE NOTE:

This instruction sheet is provided as a guide for technically competent service personnel who are familiar with electronic communications circuitry and test equipment. If you are not confident in your ability to understand and complete the instructions, or you lack the proper test equipment:

STOP– Do not continue.

Description

The HLN9575 Conversion Kit for the VHF models and the HLN9576 Conversion Kit for the UHF models are used to convert the GM300, M10, M120, and M130 series of Radius mobile radios from 25 kHz to 12.5 kHz channel spacing.

NOTE

These conversion kits can also be used on limited versions of the Radius M100, M200, and MaxTrac mobile radios. The VHF RF boards must be HLD4321C (or later) and HLD4322C (or later). The UHF RF boards must be HLE9310B (or later).

Refer to the specific radio service manual to find the circuit details and PC board overlays for each model.

Equipment Needed

- 45 Watt soldering iron
- Communications Service Analyzer (such as the Motorola R2000 Series)
- Radio Service Software (RSS) for the radio being modified, with the required computer and interface setup (refer to the RSS manual)
- Required service aids (i.e. cables and adapters) listed in the Service manual or RSS manual

Conversion Kit HLN9575 for VHF Models (136-162 MHz and 146-174 MHz)

Table 1 lists the reference (from the schematic diagram and parts list in the service manual), the part number (value) to remove from the 25 kHz board, and the part number (value) to replace it with to convert the board to 12.5 kHz.

Table 1. HLN9575 for VHF Models

Reference	Part Number (Value) on 25 kHz Board REMOVE	Part Number (Value) for 12.5 kHz Board REPLACE WITH
FL51	91-80097D06 (455 kHz 6D)	91-80097D04 (455 kHz 6F)
FL52	91-80098D06 (455 kHz 4D)	91-80098D04 (455 kHz 4F)
R61	06-11077B19 (68kΩ)	06-11077B07 (22kΩ)
R62	06-11077B09 (27kΩ)	06-11077A26 (10Ω)
R163	06-11077A50 (100Ω)	06-11077B11 (33kΩ)
R165	06-11077B03 (15kΩ)	06-11077A98 (10kΩ)
R223	06-11077A66 (470Ω)	06-11077A92 (5.6kΩ)
R225	06-11077B01 (12kΩ)	06-11077A92 (5.6kΩ)
Y51 (a & b)	91-80022M02 (45.1 MHz, 25 kHz)	91-80022M03 (45.1 MHz, 12.5 kHz)

Conversion Kit HLN9576 for UHF Models (403-433 MHz, 438-470 MHz, 465-495 MHz, and 490-520 MHz)

Table 2 lists the reference (from the schematic diagram and parts list in the service manual), the part number (value) to remove from the 25 kHz board, and the part number (value) to replace it with to convert the board to 12.5 kHz.

Table 2. HLN9576 for UHF Models

Reference	Part Number (Value) on 25 kHz Board REMOVE	Part Number (Value) for 12.5 kHz Board REPLACE WITH
FL51	91-80097D06 (455 kHz 6D)	91-80097D04 (455 kHz 6F)
FL52	91-80098D06 (455 kHz 4D)	91-80098D04 (455 kHz 4F)
R61	06-11077B19 (68kΩ)	06-11077B07 (22kΩ)
R62	06-11077B09 (27kΩ)	06-11077A26 (10Ω)
R163	06-11077B17 (56kΩ)	06-11077B23 (100kΩ)
R165	06-11077B03 (15kΩ)	06-11077A98 (10kΩ)
R301	06-11077A82 (2.2kΩ)	06-11077B03 (15kΩ)
Y51 (a & b)	91-80022M02 (45.1 MHz, 25 kHz)	91-80022M03 (45.1 MHz, 12.5 kHz)

Converting Your 25 kHz Radio to a 12.5 kHz Radio

Replacing the Board Components

1. If you have a VHF model radio:
   Carefully remove and replace receiver components FL51, FL52, R61, R62, and Y51 (a & b) listed in Table 1.
   OR
   If you have a UHF model radio:
   Carefully remove and replace receiver components FL51, FL52, R61, R62, and Y51 (a & b) listed in Table 2.

Receiver Alignment

Use a Communications System Analyzer, operating in the "Generate" mode.

Receiver 45.1 MHz IF Alignment

1. Apply an on-channel signal modulated with a 400 Hz tone at 120% (3 kHz) of maximum rated system deviation (2.5 kHz).
2. Connect an ac Voltmeter between chassis ground and the "I-F" test point on the RF board (near ceramic filter FL52). The ac Voltmeter must be capable of operating at 455 kHz.
3. Starting at approximately -70 dBm, increase the RF signal level as necessary until an indication of 10 to 30 mV rms is measured on the ac Voltmeter.
4. Adjust coils L55, L56, L57, and L59, in that order, for a maximum indication on the ac Voltmeter. Reduce the RF signal level as necessary to keep the meter indication within the range of 10 to 50 mV rms. After adjusting the coils once, readjust L55, L56, L57, and L59, in that order, for a maximum indication on the ac Voltmeter.
5. Disconnect the ac Voltmeter from the "I-F" test point.

Squelch Sensitivity Adjustment

6. Connect the SINAD input of the Communications Service Analyzer to the chassis (for ground) and to the (+) speaker.
7. Apply an on-channel signal modulated with a 1 kHz tone at 60% (1.5 kHz) of maximum rated system deviation (2.5 kHz).
8. Turn the "SQ" (Squelch) control potentiometer on the RF board fully counterclockwise. The "SQ" control is located between the 14-pin connector and U51 on the "components" side of the PC board.
9. Adjust the RF signal level until 10 dB SINAD is obtained.
10. Turn the "SQ" control clockwise until the flashing "tx" LED just goes out.
11. Reduce the RF signal level to minimum. Slowly raise the RF level until the "tx" LED indicator just begins to flash. Remeasure the SINAD. If a minimum reading of 9 dB SINAD is not obtained, repeat steps 7, 8, 9, and 11 above.

Transmitter Alignment

Replacement of the transmitter circuitry chip resistors shown in Table 1 (R163, R165, R223 and R225), for VHF models, or Table 2 (R163, R165 and R301), for UHF models, may not be necessary. Use the following procedure to determine if further modifications are required. For the transmitter measurements, use the Communications System Analyzer operating in the "Monitor" mode.

1. Using the RSS, program Channel 1 and Channel 2 for the same frequency at or near the midfrequency of the range (e.g., use 454 MHz for a 438-470 MHz M120).

1A. Program Channel 1 with "Tx Squelch Code" = "CSQ."

1B. Program Channel 2 with "Tx Squelch Code" = "XZ" (TPL 67.0).

2. Connect the Communications Service Analyzer to the radio antenna connector. Set the frequency to the same frequency used for Channels 1 and 2.
3. Connect the 1 kHz tone oscillator output of the Communications System Analyzer to the microphone jack of the radio.

VCO Modulation Adjustment

4. Place the radio on Channel 1.
5. Press the PTT. Adjust the oscillator level (while the radio is keyed) to 800 mV rms.
6. Measure and record the deviation of the 1 kHz tone. Adjust R302, the "VCO MOD" potentiometer, for exactly one half (50%) of the recorded deviation. (R302 is located near the VCO/Synthesizer shielded compartment at the pin-1 end of connector J6.)
7. If the minimum setting of R302 produces the 50% reading, skip to Step 8. If it does not produce the 50% reading, follow Steps 7A–7C:

7A. On VHF radios, replace chip resistors R223 (470Ω) with 5.6kΩ and R225 (12kΩ) with 5.6kΩ.

7B. On UHF radios, replace chip resistor R301 (2.2kΩ) with 15kΩ.

7C. Remeasure the 1 kHz tone deviation on the CSQ channel. Readjust R302, "VCO MOD," for exactly one half (50%) of the deviation measured in Step 6.

8. Release the PTT.

Reference Oscillator Deviation

9. Place the radio on Channel 2.

10. Turn OFF the 1 kHz tone. Press the PTT. Measure and record the PL deviation. Adjust R164, the "REF MOD" potentiometer, for exactly one half (50%) of the recorded deviation. (R164 is located near L51 at the pin 14 end of connector J6.)

11. If the minimum setting of R164 produces the 50% reading, skip to Step 12. If the minimum setting of R164 does not produce the 50% reading, follow Steps 11A–11C:

11A. On VHF radios, replace chip resistors R163 (100Ω) with 33kΩ and R165 (15kΩ) with 10kΩ.

11B. On UHF radios, replace chip resistors R163 (56kΩ) with 100kΩ and R165 (15kΩ) with 10kΩ.

11C. Remeasure the PL deviation on the second channel. Readjust R164, "REF MOD," for exactly one half (50%) of the deviation recorded in Step 10.

12. Release the PTT.