The SD-225 series UHF/VHF transceiver cover the frequency bands, U1(400-440 MHz) U2(440-480 MHz) and V2(148-174 MHz). They should not require any special alignment, unless repairs are performed on the transceiver portion. Should repairs be necessary, use the “Alignment Points Diagram", in conjunction with the following procedures.

An extender board is required in order to separate the digital and RF PCB’s to allow access to the alignment points.

RECEIVER

RX VCO
The RX VCO is pre-tuned at factory and no further adjustment should be required.

To identify a defective of RX VCO, check the VCO control voltage as follows.

1. Set the unit to the highest receive frequency, 440MHz(U1), 470MHz(U2) or 174MHz(V2) and check the VCO control voltage is under 10.0 volts. If it’s over 10.0 volts, adjust C308 of RX VCO to obtain 10.0 volts as measured at TP1.
2. Set the unit to the lowest receive frequency, 400MHz(U1), 440MHz(U2) or 148MHz(V2) and check that the VCO voltage is above 1.5 volts. If it’s less than 1.5 volts, adjust C308 to obtain 1.5 volts as measured at TP1.

Note: Use TP1 to measure the voltage.

Audio Output Level Adjustment
1. Select a receiver channel that is programmed for standard band (25kHz) operation.
2. Prepare the standard test signal as follows.
   Set the RF signal generator to the receiver frequency.
   Set the AF modulation signal to 1 kHz at ±3kHz deviation.
   Set the RF output level of the RF signal generator to –47dBm.
3. Apply a standard test signal to the receiver antenna terminals.
4. Adjust RV401 for the specific audio output level (1 Vrms into 8 ohms is default).

Level Shifter for Modem Option Board
1. Select a receiver channel which is programmed for standard band (25kHz) operation.
2. Apply a standard test signal for to the antenna terminal of the receiver.
3. Adjust RV403 until the center voltage of the demodulated signal (1KHz sine wave) at TP401 (IC416 pin 8) is 2.5 Vdc.
4. Select a receiver channel which is programmed for narrow band (12.5kHz) operation.
5. Apply a standard narrow band test signal (decrease deviation of AF modulation signal to ±1.5KHz) to the antenna terminal of the receiver.
6. Check the center voltage of the demodulated signal at TP401 (IC416 pin 8) is 2.5 Vdc. If necessary, adjust RV403 until the center voltage is near 2.5 Volts for each bandwidth (25KHz / 12.5KHz).

TRANSMITTER

Connect the unit to a service monitor with the power meter set to the 10 W scale (or autorange)

TCXO
Set the radio to a mid-range frequency 420MHz(U1), 460MHz(U2) or 160MHz(V2) MHz, adjust TCXO1 for a reading of ±200Hz of the programmed frequency.

TX VCO
The TX VCO is pre-tuned at factory and no further adjustment should be required.

To identify a defective of TX VCO, check the VCO control voltage as follows.

1. Set the unit to the highest transmit frequency, 440MHz(U1), 470MHz(U2) or 174MHz(V2) and check the VCO control voltage is under 10.0 volts. If it's over 10.0 volts, adjust C208 of TX VCO to obtain 10.0 volts as measured at TP1.
2. Set the unit to the lowest transmit frequency, 400MHz(U1), 440MHz(U2) or 148MHz(V2) and check that the VCO voltage is above 1.5 volts. If it's less than 1.5 volts, adjust C208 to obtain 1.5 volts as measured at TP1.

Note: Use TP1 to measure the voltage.

CTCSS, DCS & TX Deviation and Balance Adjustment
1. Set the unit to a mid range frequency and a CTCSS of 67Hz. Key the radio and adjust RV402 for desired CTCSS tone deviation.
2. Switch to a channel with the same frequency and CTCSS of 250.3Hz. Key the radio and adjust RV1 to the same CTCSS tone deviation same as step 1.
3. Switch between the 67Hz channel and the 250.3Hz channel and adjust RV1 until the deviation is the same on both channels. It may be necessary to readjust RV402 to achieve the desired deviation.
4. Set the unit to a mid range frequency and apply a 100 mVrms of 400 Hz audio to the TX data input (pin 1 on the DB9 connector).
5. Increase the signal level to 20 dB from standard level (1Vrms).
6. Monitor the demodulated signal from service monitor. Adjust RV1 to make the monitored signal a balanced square wave.
7. Reduce input signal to the standard level (100mVrms) and adjust RV2 for the standard deviation.

APC
1. Set the unit to a mid range frequency high power channel and adjust RV4 for 5W.
2. Set the unit to a mid range frequency low power channel and adjust RV3 for 1W.

SQUELCH ADJUSTMENT

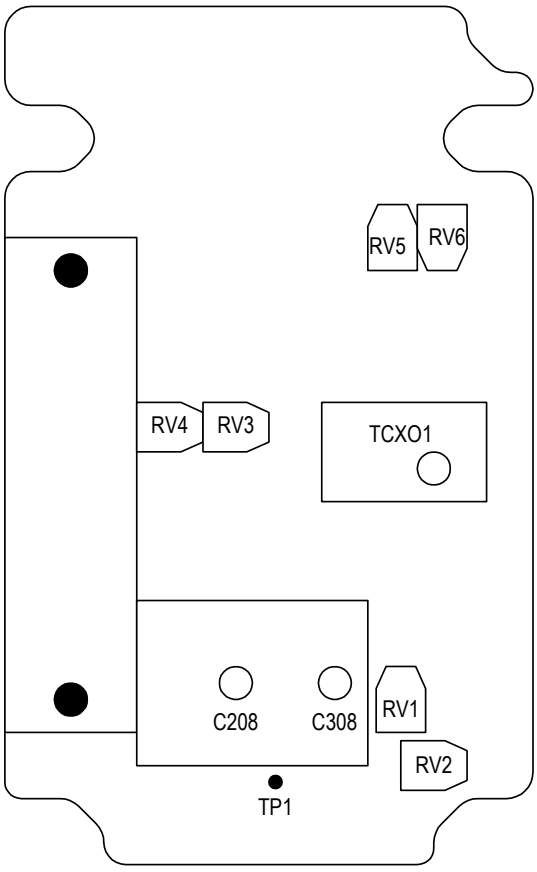
RSSI squelch adjustment using ACC-2025 & ACC-917
The factory default squelch level for all the SD-225 series is approximately:

1. Squelch open (un-mute) at -114 to -113dBm (0.45 - 0.5μV of RX signal strength)
2. Squelch close (mute) at -117 to -116dBm (0.3 - 0.35μV of RX signal strength)

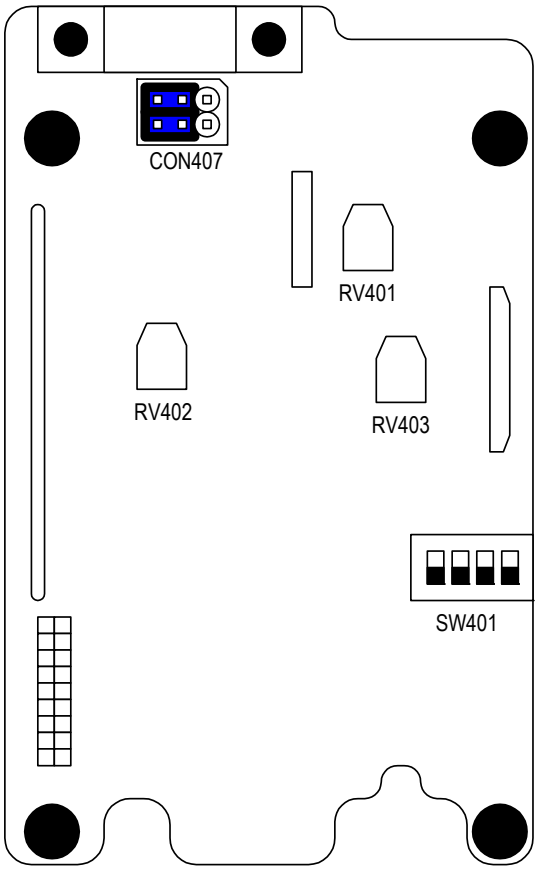
Changing the default squelch settings requires use of the programming cable, software and a RF signal generator. A radio communications test set is recommended.
1. Set the channel switch, SW401 for channel 1. Connect the ACC-2025 to the PC USB port and the SD-225.
2. Run the ACC-917 software and select squelch mode. The SD-225 will initially be set to channel 1. To select a different channel, use the "Change Channel" and "SET" buttons.
3. Select "Custom Define" from the squelch window of the ACC-917.
4. Adjust the RF signal generator for the desired signal strength to OPEN squelch
   (e.g. default setting is -113dBm, that is equivalent to 0.5μV)
5. Press "SET(OPEN)" button, the LED indicator will flash 3 times.
6. Adjust the RF signal generator for the desired signal strength to CLOSE squelch
   (e.g. default setting is -116dBm, that is equivalent to 0.35μV)
7. Press "SET(CLOSE)" button, the LED indicator will flash 2 times.
8. Press "SAVE" button, the LED indicator will flash once.
9. Press the "CLOSE" button. Test for the desired level by increasing or decreasing the RF signal to the levels set for squelch (LED will be OFF when squelch is closed and ON when squelch is open).

NOTE: The difference of RF signal strength between the un-mute and mute levels should be greater than 2 dB and at least equal to 0.15μV (-123.5dBm) for the squelch setting to work properly. If the levels are too close, RSSI through the A/D conversion can not differentiate between the mute and un-mute level properly. As a result, the CD (Carrier Detect) will act intermittent.

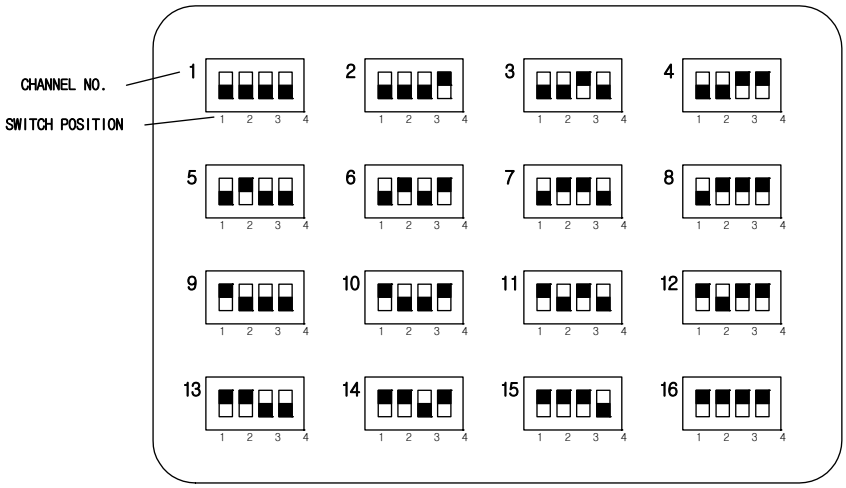
ALIGNMENT POINTS DIAGRAM



RF BOARD
ALIGNMENT POINTS



DIGITAL BOARD
ALIGNMENT POINTS



SW401
CHANNEL SELECT SWITCH