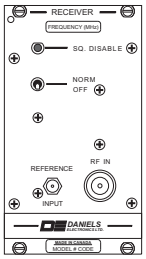
TN220 VR-3H040 VHF Lowband Receiver



The VR-3H040 receiver is a high performance synthesized FM receiver capable of operating in 20 KHz channels. The VR-3H040 receiver operates in one of two frequency bands: 29 to 38 MHz or 38 to 50 MHz. A modular design allows each of the receiver's three internal modules, 21.4 MHz FM IF/Audio Mainboard, FE3H Enhanced Front End, and OS-3H040 Synthesizer, to be individually assembled and tested. This facilitates construction, tuning and maintenance as well as troubleshooting procedures. The internal synthesizer module may be programmed with up to 16 channels for remote frequency control applications.

Specifications

Frequency Bands	29 - 38 MHz / 38 - 50 MHz
Channel Spacing	20 KHz
Frequency Switching Range	± 0.5 MHz (29 - 38 MHz) / ± 1 MHz (38 - 50 MHz)
Reference Sensitivity (12 dB SINAD)	≤ -118 dBm (.280 µV)
Adjacent Channel Rejection (Selectivity)	≥ 90 dB
Spurious Response Rejection	≥ 95 dB
Intermodulation Rejection	≥ 85 dB
Hum & Noise Ratio (20 KHz Low Pass Filter)	≥ 55 dB
L.O. Frequency Stability	± 5.0 ppm (-30°C to +60°C) (-40°C to +60°C optional)
Audio Distortion	≤ 2.0% @ 25°C (≤ 3.0% @ -40°C to +60°C)
Receiver Attack Time	≤ 10 ms
Receiver Closing Time	≤ 10 ms
Squelch Threshold / Hysteresis	-123 to -105 dBm, adjustable from 2 dB to 20 dB
Audio Output (600 Ω Balanced or Unbalanced)	+3.0 dBm De-emphasis/Flat
Operating Temperature	-30°C to +60°C (-40°C to +60°C optional)
Operating Current (Squelched)	≤ 385 mA

Models Available

VR-3H035-SWA200	Enhanced Synthesized, 20 KHz Bandwidth, 29 - 38 MHz
VR-3H045-SWA200	Enhanced Synthesized, 20 KHz Bandwidth, 38 - 50 MHz

Receiver Operating Frequency

The receiver is initially aligned at the factory for the frequency shown on the label on the front panel. For a small frequency change, no re-alignment of the receiver may be required. If the frequency change is greater than **±0.5 MHz** or **±1 MHz** from the frequency at which the last complete receiver alignment was performed, the **synthesizer** and **front end** will need to be realigned. To align and / or adjust the receiver, the outer cover needs to be removed; the receiver needs to be plugged into the subrack via a cable and / or extender card; and power must be applied to the system.

43 Erie Street
Victoria, B.C.
Canada V8V 1P8

Toll Free Canada & U.S.A.
Phone: 1-800-664-4066
Fax: 1-877-750-0004

International
Phone: 250-382-8268
Fax: 250-382-6139

Internet
Email: sales@danelec.com
Web: www.danelec.com

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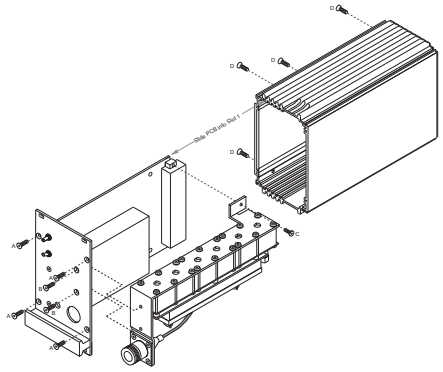

Remove the four front panel screws (A) and four side panel screws (D) to slide the receiver outer cover off and expose the IF / Audio Main Board Local Oscillator and Front End Assemblies. Remove the two front panel screws (B) and internal screw (C) to remove the Front End for easier access to the Local Oscillator.

Front End Alignment:

Alignment for the Enhanced Front End consists of tuning the five section bandpass filter only. The preferred method of tuning the Enhanced Front End is to use a Spectrum Analyzer with a Tracking Generator. With the Local Oscillator absent, the frequency response of the Preselector Filter can be seen at the IF port. Supply +9.5 Vdc to the Enhanced Front End and connect the Tracking Generator output with -10 dBm or less to the RF input. Connect the IF output to the Spectrum Analyzer input. Centre the spectrum analyzer at the desired RF frequency. Adjust L1 through L5 for a uniformly flat response at a level typically -30 dBc, centred at the desired RF frequency.

Synthesizer Alignment:

The enhanced synthesizer is manufactured with two different synthesizer chips. Depending on the version of the chip, the loop control voltage (TP4) will be set at a “center voltage”. To determine the “center voltage”, the synthesizer lid needs to be removed. If a single jumper wire is installed next to C29, the “center voltage” is +2.3 Vdc. If the jumper wire is NOT present, the “center voltage” is +4.5 Vdc. As of the year 2001, all new products have a +2.3 Vdc “center voltage” FM enhanced synthesizer. Labels have been applied to MOST enhanced synthesizers that have a “center voltage” of +2.3 Vdc. Using a high impedance (10 MΩ) DC Voltmeter, measure the PLL control voltage at TP4 located on the synthesizer module at room temperature. Using a small standard blade screwdriver, carefully adjust the VCO fine frequency “tune” trimmer capacitor C24 until the “center voltage” is obtained. If the “center voltage” at TP4 is unattainable through adjustment to C24, then the coarse frequency jumpers, JU2 - JU4, require modification in order to pull the VCO tune range within the adjustment range of fine tuning capacitor C24. The top synthesizer cover must be removed in order to gain access to the coarse frequency jumpers. The coarse frequency jumpers may be considered to be selectable binary weighted capacitor elements with JU2 being the most significant ‘bit’ and JU4 being the least significant ‘bit’. If the voltage is higher than the “center voltage”, decrease the tuning jumper setting by 1 ‘bit’ position and re-adjust C24. If the tuning voltage is lower than the “center voltage”, increase the the tuning jumper setting by 1 ‘bit’ position and re-adjust C24. Access to TP4 and C24 is available through the synthesizer top cover.

Squelch Adjustments:

Receiver squelch action is factory set to establish a squelch hysteresis window of 6 dB centred about the point of receiver 12 dB SINAD sensitivity. Eg. if the receiver sensitivity point is -118 dBm the receiver should be set to unsquelch at -115 dBm and squelch at -121 dBm. Adjustment to the squelch circuitry should be the last receiver alignment step performed. Rotate the squelch hysteresis adjust potentiometer (R115) fully counter clockwise. Rotate the squelch threshold potentiometer (R88) fully clockwise. Inject a standard signal at the desired unsquelch level. Slowly adjust the squelch threshold potentiometer (R88) counter clockwise until the receiver unsquelches. Advance R115 (hysteresis) clockwise until sufficient hysteresis prevents any oscillating COR action at the squelch threshold point. Cycle the RF source off and on while adjusting R88 (threshold) until squelch triggering occurs at the desired signal level. Adjust R115 (hysteresis) clockwise to increase the squelch hysteresis window. Slowly lower the RF source signal level and monitor the point at which the receiver squelches. Increase or decrease R115 (hysteresis) to achieve the desired hysteresis window.

Note: For complete alignment procedures, refer to the instruction manual. These notes are for reference only.

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