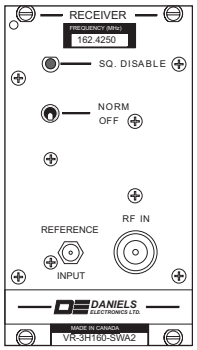
TN242 VR-3H150-S VHF Enhanced Receiver



The VR-3H150-S receiver is a high performance synthesized FM receiver capable of operating in 12.5 KHz (narrowband) or 25 KHz (wideband) channels. The VR-3H150-S receiver operates in one of two frequency bands: 132 to 150 MHz or 150 to 174 MHz. A modular design allows each of the receiver's three internal modules, 21.4 MHz FM IF/Audio Main Board, FE3H Enhanced Front End, and OS-3H150 Synthesizer, to be individually assembled and tested. This facilitates construction, tuning and maintenance as well as troubleshooting procedures. The synthesizer module can be programmed to have up to 16 channels exclusive to one frequency band.

Specifications

Frequency Bands	132 - 150 MHz / 150 - 174 MHz
Channel Spacing	12.5 KHz or 25 KHz
Receiver Switching Range	± 2 MHz
Reference Sensitivity (12 dB SINAD)	< -118 dBm (.280 µV)
Adjacent Channel Rejection (Selectivity)	> 85 dB (narrowband) / > 90 dB (wideband)
Spurious Response Rejection	> 95 dB
Intermodulation Rejection	> 85 dB
Hum & Noise Ratio (20 KHz Low Pass Filter)	> 50 dB (narrowband) / > 55 dB (wideband)
L.O. Frequency Stability	± 1.0 ppm (-30 °C to +60 °C) (-40 °C to +60 °C optional)
Modulation Type	11K0F3E (FM) or 16K0F3E (FM)
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
Input Impedance	50 Ω (Type N Connector)
Operating Temperature	-30 °C to +60 °C (-40 °C to +60 °C optional)
Operating Current (Squelched)	< 380 mA

Models Available

VR-3H140-SWA200	Enhanced Synthesized, 25 KHz Bandwidth, 132 - 150 MHz
VR-3H140-SNA200	Enhanced Synthesized, 12.5 KHz Bandwidth, 132 - 150 MHz
VR-3H160-SWA200	Enhanced Synthesized, 25 KHz Bandwidth, 150 - 174 MHz
VR-3H160-SNA200	Enhanced Synthesized, 12.5 KHz Bandwidth, 150 - 174 MHz

Receiver Operating Frequency

The receiver is initially aligned at the factory for the frequency stamped on the 'Factory Set Operating Frequency' 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 **±2 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.

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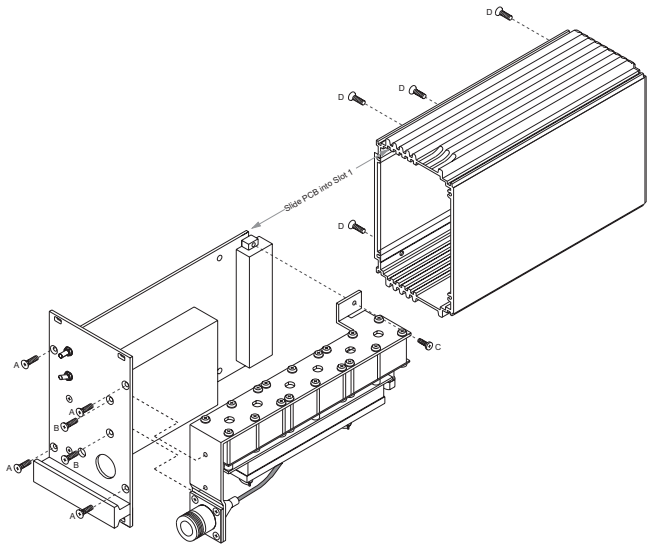
Receiver Alignment Procedures



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 pole band pass filter only. There are two methods of tuning the Enhanced Front End. The preferred method of tuning the Enhanced Front End is to use a Spectrum Analyzer with a Tracking Generator. Ensure that the +9.5 Vdc supply is connected to the Front End (red wire). Connect the Tracking Generator output to the Front End's RF input. The Tracking Generator should have an output level of -10 dBm and the Spectrum Analyzer should have a frequency span of at least 10 MHz. Connect the Spectrum Analyzer input to the Front End's IF output. Adjust C39 through C43 for a uniformly flat response centered at the desired RF frequency. The alternate method of tuning the Enhanced Front End is to monitor receiver SINAD. Inject the desired RF signal to the RF input connector at a level of -118 dBm and adjust C39 through C43 for best receiver SINAD (>-118 dBm).

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", use a small standard blade screwdriver, and turn the VCO frequency "tune" trimmer capacitor C24 fully clockwise until it stops. Using a high impedance (10 MΩ) DC Voltmeter, measure the PLL control voltage at TP4 located on the synthesizer module main circuit board. Access to TP4 is available through the synthesizer top cover. If the maximum TP4 voltage is approximately **+8.0 Vdc** the "center voltage" is +**4.5 Vdc**. If the maximum TP4 voltage is approximately **+5.0 Vdc** the "center voltage" is **+2.3 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. At room temperature, adjust C24 until the "center voltage" is obtained. 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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