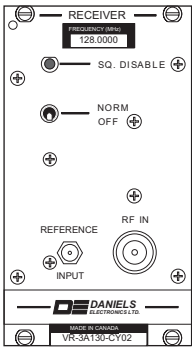
TN210 VR-3A130-C VHF AM Crystal Receiver



The VR-3A130-C receiver is a low standby current, crystal controlled AM receiver capable of operating in 25 / 8.333 KHz channels. The VR-3A130-C receiver operates in the 118 to 138 MHz aviation band. A modular design allows each of the receiver's three internal modules, 21.4 MHz AM IF/Audio Main Board, FE3A Front End, and OCR-3A149 Crystal Control Module, to be individually assembled and tested. This facilitates construction, tuning and maintenance as well as troubleshooting procedures.

Specifications

Frequency Bands	118 - 138 MHz
Sensitivity (for 6 dB S/N)	< -111 dBm
Sensitivity (for 10 dB SINAD)	< -107 dBm
Selectivity (Nose Bandwidth ± 3 KHz)	< 6dB
Selectivity (Skirt Bandwidth ± 22 KHz)	> 75 dB
Spurious Response Rejection	> 75 dB
Intermodulation Response Rejection	> 70 dB
Noise Level	< -40 dB
L.O. Frequency Stability	± 1.5 ppm (-30 °C to +60 °C) (-40 °C to +60 °C optional)
Modulation Type	6K00A3
Distortion (THD) (@ 25 °C)	< 5% @ 85% modulation
Distortion (THD) (-40 °C to +60 °C)	< 10% @ 85% modulation
AGC Attack Time / AGC Decay Time	< 40 ms / < 50 ms
Audio Squelch Sensitivity	> 8 dB SINAD close point / < 20 dB SINAD open point
Squelch Hysteresis	0 to 8 dB
Input Impedance	50 Ω (Type N Connector)
Operating Temperature	-30 °C to +60 °C (-40 °C to +60 °C optional)
Operating Current (Squelched)	< 50 mA

Specifications tested using RTCA DO-186A, TIA/EIA-603 and ETSI Section 8.8 EN300 676

Models Available

VR-3A130-CY0200 Crystal Controlled, AM, 118 - 138 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. A frequency change requires a new Oscillator board in the OC-3 Crystal Controlled Oscillator module. The OC-3 Oscillator board is a fully contained, factory temperature compensated module responsible for providing a stable oscillator frequency in the OC-3. The crystal frequency of the oscillator module determines the operating frequency of the OC-3 and therefore the receiver. The OC-3 Crystal Control Module should be tuned any time the operating frequency is changed in order to optimize performance. If the frequency change is greater than **±5 MHz** from the frequency at which the last complete receiver alignment was performed, the **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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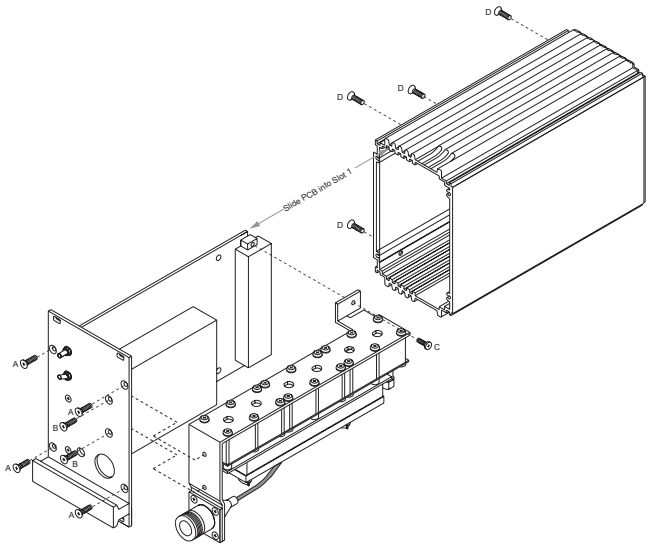
Receiver Alignment Procedures



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.

Crystal Control Module Alignment:
Turn the receiver off and remove the OC-3 Crystal Control Module lid. Inject a 0 dBm on-channel signal at the input of the helical filter. Tune the three helical filter capacitors for the maximum response. The capacitors' tuning slugs should all be at approximately the same depth. Disconnect the injected signal and turn the receiver on. Tune the slugs of L1, L2, L3 and L4 to the middle of the coil. Tune C9 to the top if the operating frequency is near the top of the band (138 MHz for Tx or 159 MHz for Rx), to the bottom if the operating frequency is near the bottom of the band (118 MHz for Tx or 139 MHz for Rx), or proportionately in between for the operating frequency. Peak L1, L2, L3 and L4 for maximum signal level. L1 and L2 will have the greatest effect on the signal. Tune the helical filter for maximum output level. This should be greater than +3 dBm. L52 on the oscillator module may need to be peaked if the proper output level is not achieved. Replace the OC-3 Crystal Control Module lid and, if required, tune the crystal control module onto frequency by adjusting C9 on the oscillator board (accessible through the hole in the lid). Turn the receiver off and reconnect the crystal control module to the IF/audio board.

Front End Alignment:
Alignment for the AM Front End consists of tuning the helical filter capacitors C25 through C29 and the potentiometer R5. There are two methods of tuning the AM Front End. The preferred method of tuning the AM Front End is to use a Spectrum Analyzer with a Tracking Generator. Ensure that the +9.5 Vdc and -6.0 Vdc supplies are connected to the AM Front End. Adjust R5, in order to achieve +8.0 Vdc at TP2. Connect the Tracking Generator output to the AM Front End's RF input. Connect the Spectrum Analyzer input to the AM Front End's IF output. Adjust the helical filter trimmer capacitors C25 through C29 for a flat response centered at the desired RF frequency. The alternate method of tuning the Low Current Front End is to monitor receiver SINAD. Inject the desired RF signal to the RF input connector at a level of -107 dBm and adjust the helical filter trimmer capacitors for best receiver SINAD (>-107 dBm).

Squelch Adjustments:
Receiver squelch action is factory set to establish a squelch hysteresis window of 4 dB, such that the squelch closes at the 8 dB SINAD point and opens 4 dB above**.** eg. If the receiver 8 dB SINAD point is -108 dBm the receiver should be set to unsquelch at -104 dBm and squelch at -108 dBm. Rotate the squelch hysteresis adjust potentiometer (R42) and the squelch threshold potentiometer (R56) fully counter clockwise. Inject a 1 KHz tone at 30% modulation at the 8 dB SINAD level. Slowly adjust the squelch threshold potentiometer (R56) counter clockwise until the receiver squelches. Advance R42 (hysteresis) clockwise until sufficient hysteresis prevents any oscillating COR action at the squelch threshold point. Cycle the RF source off and on while adjusting R56 (threshold) until squelch triggering occurs at the desired signal level. Adjust R42 (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 R42 (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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