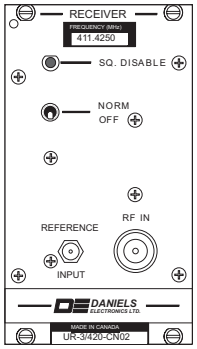
TN260 UR-3/400-C UHF Crystal Receiver



The UR-3/400-C receiver is a low standby current, crystal controlled FM receiver capable of operating in 12.5 KHz (narrowband) or 25 KHz (wideband) channels. The UR-3/400-C receiver operates in one of two frequency bands: 406 to 430 MHz or 450 to 470 MHz. A modular design allows each of the receiver's three internal modules, 21.4 MHz FM IF/Audio Main Board, FE3 Front End, and OCR-3/400 Crystal Control Module, to be individually assembled and tested. This facilitates construction, tuning and maintenance as well as troubleshooting procedures.

Specifications

Frequency Bands	406 - 430 MHz / 450 - 470 MHz
Reference Sensitivity (12 dB SINAD)	< -116 dBm (.350 µV)
Adjacent Channel Rejection (Selectivity)	> 75 dB (narrowband) / > 80 dB (wideband)
Spurious Response Rejection	> 85 dB
Intermodulation Rejection	> 70 dB
Hum & Noise Ratio (20 KHz Low Pass Filter)	> 55 dB (narrowband) / > 60 dB (wideband)
L.O. Frequency Stability	± 1.5 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 (< 6.0% @ -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)	< 55 mA

Models Available

UR-3/420-CW0200	Crystal Controlled, 25 KHz Bandwidth, 406 - 430 MHz
UR-3/420-CN0200	Crystal Controlled, 12.5 KHz Bandwidth, 406 - 430 MHz
UR-3/460-CW0200	Crystal Controlled, 25 KHz Bandwidth, 450 - 470 MHz
UR-3/460-CN0200	Crystal Controlled, 12.5 KHz Bandwidth, 450 - 470 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 and Front End should be tuned any time the operating frequency is changed in order to optimize performance. 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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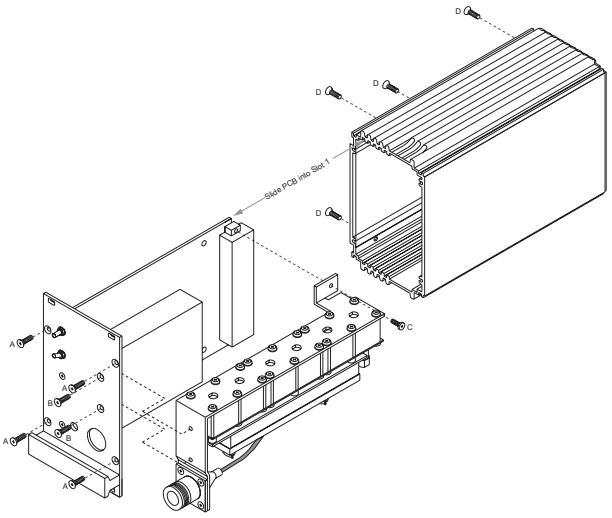
Receiver Alignment Procedures



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 and L3 to the middle of the coil. Also set C25, C27 and C33 to the middle of their tuning range. Tune C9 to the top if the operating frequency is near the top of the band (470 or 512 MHz), to the bottom if the operating frequency is near the bottom of the band (406 or 470 MHz), or proportionately in between for the operating frequency. Peak L1, L2, L3, C25, C27 and C33 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 Low Current Front End consists of tuning the five section preselector filter only. There are two methods of tuning the Low Current Front End. The preferred method of tuning the Low Current 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 at a level of -20 dBm to the Front End's RF input. Connect the Spectrum Analyzer input to the Front End's IF output. Adjust the helical filter trimmer capacitors 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 -116 dBm and adjust the helical filter trimmer capacitors for best receiver SINAD (>-116 dBm).

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 -116 dBm the receiver should be set to unsquelch at -113 dBm and squelch at -119 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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