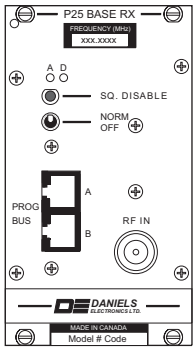
TN266 UR-4D400 UHF P25 Digital Base Receiver



The UR-4D400 P25 digital base receiver is a high performance, low current FM receiver capable of P25 digital or analog operation in 12.5 KHz (narrowband) or 25 KHz (wideband) channels. The UR-4D400 base 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 internal modules to be individually assembled and tested. This facilitates construction, tuning and maintenance as well as troubleshooting procedures. The receiver can be programmed with up to 2 banks of 16 channels each.

Daniels P25 digital base receivers are primarily used in base station applications and will receive clear or secure (encrypted) P25 and analog voice radio communications (secure mode operation is optional). P25 receiver options such as Frequency, CTCSS, NAC and analog / digital operation are software programmed with Daniels Radio Service Software package.

Specifications

Frequency Bands	406 - 430 MHz / 450 - 470 MHz
Channel Spacing	12.5 KHz and 25 KHz
Receiver Switching Range	± 2 MHz
Reference Sensitivity (12 dB SINAD)	< -118 dBm (.280 µV)
Faded Reference Sensitivity (5% BER)	< -118 dBm (.280 µV)
Adjacent Channel Rejection (Selectivity)	> 63 dB (narrowband) / > 80 dB (wideband) (TIA/EIA-603)
Adjacent Channel Rejection (Selectivity)	> 50 dB (narrowband) (TIA/EIA-603-C)
Spurious Response Rejection	> 70 dB
Intermodulation Rejection	> 70 dB
Hum & Noise Ratio	> 34 dB
L.O. Frequency Stability	± 1.0 ppm (-30 °C to +60 °C)
Modulation Type (Analog)	11K0F3E (FM) or 16K0F3E (FM)
Modulation Type (Digital)	8K10F1E (FM)
Audio Distortion (Analog)	< 3.0% @ 25 °C
Audio Distortion (Digital)	< 5.0% @ 25 °C
Squelch Threshold	-121 to-115 dBm
Audio Output (600 Ω Balanced)	+3.0 dBm De-emphasis Max.
Input Impedance	50 Ω (Type N Connector)
Operating Temperature	-30 °C to +60 °C
Operating Current (Squelched)	< 82 mA (no encryption) / < 112 mA (encryption)
Operating Current (Unsquelched)	< 150 mA (no encryption) / <180 mA (encryption)

Models Available

UR-4D420-B0-000	12.5 / 25 KHz Bandwidth, 406 - 430 MHz, no encryption capability
UR-4D460-B0-000	12.5 / 25 KHz Bandwidth, 450 - 470 MHz, no encryption capability
UR-4D420-B1-000	12.5 / 25 KHz Bandwidth, 406 - 430 MHz, DES-OFB encryption capable
UR-4D460-B1-000	12.5 / 25 KHz Bandwidth, 450 - 470 MHz, DES-OFB encryption capable

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 **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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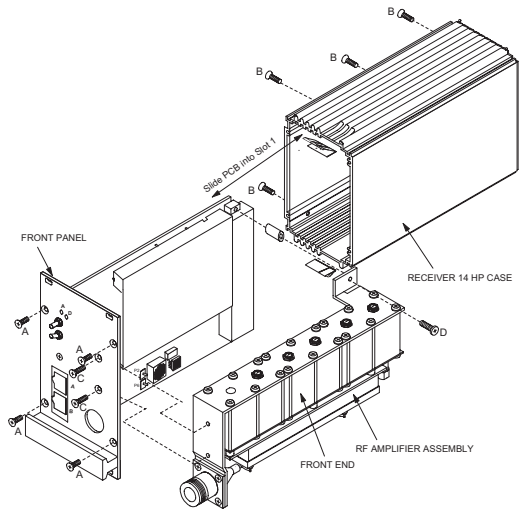
Receiver Alignment Procedures



Remove the four front panel screws (A) and four side panel screws (B) to slide the receiver outer cover off and expose the Main Board, Controller and DSP Boards, RF Board and Front End Assemblies. Remove the two front panel screws (C) and internal screw (D) to remove the Front End Assembly.

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 Receiver's RF input. Connect the Spectrum Analyzer input to the Front End's IF output (SMB cable normally connected to P6 on the Main Board). 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 -118 dBm and adjust the helical filter trimmer capacitors for best receiver SINAD (>-118 dBm).

RSS Service Mode:
The RSS has the ability to put a receiver into Service Mode, where the Reference Oscillator may be aligned and a BER test can be performed. To put the receiver into Service Mode, it must be connected to a PC running the Radio Service Software (RSS) through the Radio Programming Interface Module (RPIM). Connect the RPIM to the receiver and apply power. From the RSS Receiver Configuration window, click on the Service button. Note that you must not remove power to the radio or swap radios during servicing. When any required Service functions have been completed, the radio can be taken out of Service Mode by clicking on the Exit button in the Service window.

Reference Oscillator Alignment**:**
To adjust the Reference Oscillator frequency connect the RF input of the RF board to a frequency counter or communications test set by removing the SMB cable from P2 on the Main Board and connecting the cable to the test set. Note the frequency stated in the Reference Frequency text box, and adjust the test set to monitor this frequency. For this test, the RF board will GENERATE a 0 dBm RF signal from its RF INPUT. Click on the Enable button in the RSS, and the communications test set should show the presence of a carrier near the nominal frequency. Note the frequency error and click on the Softpot Value spinbutton until the measured frequency is as close as possible to the nominal frequency. Click on the Program button to save the new Reference Oscillator Softpot value to the radio, or on the Cancel button to return to the original setting.

BER Test:
To test the Bit Error Rate, the Receivers RF input should be connected to a communications test set capable of P25 digital operation. Set the signal generator to the desired test frequency with an RF level of -70 dBm, modulated with the P25 STD 1011 Hz (Bit Error Rate) test pattern. Change the frequency displayed in the Frequency text box in the RSS to match the signal generator frequency. Ensure the Test Type box is set to Continuous. Check that the Number of Frames box is set to three frames, (which gives an update rate of about a second), and the Audio box is set to Unmuted. Click on the Start button. The Number of Bit Errors box and Bit Error Rate box will be updated each second. Reduce the RF level of the signal generator while monitoring the Bit Error Rate displayed in the Bit Error Rate box. Note that the reading will not be exactly 5%, but will vary slightly from second to second, similar to the SINAD reading on an analog receiver.

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

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