TYPE OF EXHIBIT:	TUNE UP PROCEDURE
FCC PART:	2.10333 (c9)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	DTX-442
TYPE OF UNIT:	UHF-FM Two Way Radio Transceiver Module
FCC ID:	AIERIT17-442
DATE:	Dec 18, 2003

DTX-442 ALIGNMENT PROCEDURE

An authorized RF service technician must perform test and alignment of the DTX-442. Do not attempt service of the DTX-442 if not completely familiar with frequency synthesized radio operation.

RECOMMENDED TEST EQUIPMENT

1) 0 to +15 VDC, 1A current-limited power supply
2) RF Communications Test with:
   - FM Deviation Meter
   - RF Wattmeter
   - Frequency Counter
   - SINAD Measuring Device
3) Oscilloscope
4) VTVM or DMM
5) RITRON PC Programming Kit

RADIO PREPARATION

1) Remove the DTX-442 from case.
2) Connect the FM communications test set to the antenna connector.
3) Connect RITRON programming cable to radio and PC.
4) Apply 13.8 VDC to the red wire with the black to ground.
5) Run RITRON software and read the radio.
6) Program two channels for band edge tune up, one on the low side of the operating band and one on the high side and another in the middle. (Hint: use a bit of an offset from even frequencies to avoid receiver interference. A good choice is 450.1, 460.1 and 470.1. All of these will be wideband mode.
7) Type in these RX and TX frequencies in three channels.
8) Program the radio with these parameters.

REFERENCE FREQUENCY AND TX POWER

The DTX-442 is preset at the factory for 5 watts in high power and 2 watts in low power at 13.8 VDC. If you need to change or readjust do the following:

1) Make sure that the unit is at room temperature and power supply at 13.8 VDC.
2) Set the RF communications test set to the transmit mode.
3) Select low edge channel on channel select inputs CS2, CS1 and CS0.

4) Make sure the Hi/low power pin 5 is ungrounded. This selects high power.
5) Ground PTT pin 14 of J301 to transmit.
6) Transmitter frequency error should be less than +/-200 Hz (assuming your equipment is calibrated)
7) Adjust the trimmer cap on the rectangular reference frequency oscillator Y301 if not within specs.
8) Adjust the power pot R222 to give 4.8 watts (+/- 0.2)
9) Confirm the upper edge frequency produces the same results.
10) If upper edge power is too low spike L208 to reduce inductance and increase high side power. To access L208 remove the copper tape over the access hole on the transmitter shield. The 2 turn inductor will appear beneath this opening. If the high side power is too high squeeze the 2 turn windings closer together to increase the inductance.
11) Check low edge power again. Readjust L201 to balance band edge powers. Replace copper tape over hole.

TRANSMITTER VOICE & DATA DEVIATION

If the transmitter voice deviation needs adjustment perform the following.

1) Set the RF communications test set to the transmit mode.
2) Set audio filtering from <20 Hz to 15 kHz.
3) Set to FM demodulation with +/- peak deviation.
4) Connect oscilloscope to the demodulated output.
5) Select the mid band channel on channel select inputs CS2, CS1 and CS0 which has no tone on it.
6) Connect sinusoidal 1 kHz audio source to pin 4 microphone input and set to 100 mV peak-peak .
7) Ground PTT (pin 14) to transmit.
8) Adjust deviation pot R388 for peak deviation of 4300 +/- 100 Hz.
9) Stop transmitting, remove mic input and inject a 50 Hz +/- 20 Hz square wave into AUX_IN (pin 7) with the signal amplitude of your data source generator. Adjust R375 to get 3.0 +/- .1 kHz (1.5 +/- .05 for narrowband) deviation.
10) Adjust the balance pot R304 to give a flat sloop on the demodulated output oscilloscope waveform.
11) Readjust R375 to maintain 3.0 kHz deviation.
12) Stop transmitting by releasing the /PTT line on pin 14.

*NOTE: Sub audible tone deviation is automatically set to be within 600 to 900 Hz after this adjustment on wide band tone channels. Maximum voice and tone deviation on wide band channels will then be 4800 to 5300 Hz. Narrow band tone deviation will be 350 to 500 Hz with overall deviation of 2400 to 2650 Hz.

RECEIVER FRONT END TUNNING

If the DTX-442 receiver appears to be less sensitive on one of the band edges the front end tuning coils may need readjustment. Connect a SINAD meter to the SPEAKER output (pin 12). Unsquelch the audio amp by grounding pin 11. Set the generator to the upper band edge frequency programmed at –120 dBm with +/- 1.5 kHz deviation. Adjust coil cores L101 and L102 in until SINAD starts to drop. Back off slightly to maintain best SINAD. Now, set generator to the lowest frequency programmed at –120 dBm. Similar SINAD readings as the high band edge frequency should be obtained. If not, adjust coils slightly. Recheck high end and balance performance.

RECEIVER SQUELCH

The DTX-442 is capable of two squelch operating modes. Also, both can operate simultaneously. See the theory above. The units can be configured as the user requires. When a low level signal appears the noise squelch opens when the carrier level with 1.5 kHz deviation is –120dBm or greater. When the signal appearing is –106dBm or greater the RSSI squelch opens the audio with an even faster attack time. The above levels are factory set levels. Ambient noise will affect the level at which the RSSI should

be set. The squelch level ideally should be set on the desired frequency, in the actual location the radio will be used and connected to the desired antenna. The level should be set high enough to reject most false signals.

If a very fast receiver decay time (or squelching after signal disappears) is needed the noise squelch should be defeated by turning the R144 pot fully counterclockwise.

To adjust squelch levels for simultaneous use do the following:

Set RSSI squelch level first:

1) Temporarily defeat noise squelch pot by turning R 144 to counterclockwise minimum setting.
2) Adjust RSSI pot R123 fully counterclockwise to squelch audio. Be sure AUX_MON line is high to allow squelching.
3) Set generator to –106dBm on channel desired with 1.5 kHz deviation and 1 kHz tone. Add any CTCSS or DCS as needed.
4) Turn R123 clockwise until audio opens. Go no further if you want only RSSI squelch functionality.

Now set noise squelch:

1) Select a channel.
2) Adjust squelch pot R144 fully counter clockwise.
3) Adjust the communications test set generator on frequency with an output level of –120dBm. The deviation should be +/- 1.5 with a 1 kHz audio signal.
4) Slowly adjust squelch pot R144 clockwise until squelch opens.
5) Reduce generator level until radio squelches.
6) Increase generator level until audio opens. Confirm squelch hysteresis is between 0.5 and 5 dB.