KANTRONICS

TALON UDC SERIES

RADIO MODEM SERVICE MANUAL

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1 REVISIONS

Revision	Date	Description
-	2003-09-11	Preliminary

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3 GENERAL INFORMATION

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3.3 Miscellaneous

The Kantronics TALON UDC (universal data controller) series of radio modems is manufactured in the U.S.A.

All brands and product names are trademarks of their respective companies.

3.4 Disclaimer Notice

We have attempted to make this manual technically and typographically correct as of the date of the current issue. Production changes to the TALON UDC series may add changes to the manual at a later date.

Send comments or suggest corrections to Kantronics Co., Inc., 1202 E. 23rd Street, Suite A, Lawrence, KS 66046, or e-mail sales@kantronics.com.

Information in this document is subject to change without notice.

Published in the United States of America.

4 MAINTENANCE INFORMATION

Refer to the last section for parts lists, schematic diagrams, and parts layout diagrams.

4.1 Repair Cautions

CAUTION

Equipment contains electrostatic sensitive components that could be damaged through handling. Take proper ESD precautions.

4.1.1 Surface Mount Repair

Surface mount products require special techniques and equipment. Improper servicing can permanently damage the printed circuit board and/or components; any such RESULTING DAMAGE IS NOT COVERED by the Kantronics warranty.

4.1.2 Precautions For Handling CMOS Devices

CMOS parts require special handling, because their circuits are very susceptible to damage from electrostatic or high voltage charges. This damage can be latent, with failures not appearing until weeks or months afterward. Because of this susceptibility to damage, be aware that the proper handling of CMOS devices is even more critical in low humidity environments. Observe the following special precautions:

4.1.2.1 Storage/Transport

Place CMOS devices to be stored or transported in conductive material with all exposed leads shorted together. Do not insert CMOS devices into conventional plastic “snow” or into plastic trays as are used for other semiconductors. The proper conductive containers for CMOS devices are typically gray or pink in color.

4.1.2.2 Grounding.

All CMOS devices must be placed on a grounded bench surface. Also, the technician (working on the equipment/CMOS circuit) must be grounded, usually by wearing a conductive wrist strap in series with a 100 kΩ resistor to ground.

4.1.2.3 Clothing

Do not wear nylon clothing while handling CMOS circuits.

4.1.2.4 Power Off

Remove power before connecting, removing or soldering a printed circuit board containing CMOS devices.

4.1.2.5 Power/Voltage Transients

Do not insert or remove CMOS devices with power applied. Check all power supplies used for testing, to ensure no voltage transients are present.

4.1.2.6 Soldering

Use a soldering iron having a grounded tip for soldering CMOS circuitry.

4.1.2.7 Lead-Straightening Tools

When straightening CMOS leads, provide ground straps on the straightening tool.

4.2 Unit Disassembly

4.2.1 To remove Cover

Remove four screws on bottom, two top screws each from Front and Rear Panel, and two screws on top near the left end side.

4.2.2 To remove Rear Panel with Finned Heat Sink

Remove two top screws, one bottom screw, two #2 nuts and lock washers, two #4 nuts and lock washers next to #2 hardware, and two screws that hold panel to chassis.

If Cover is removed already, remove one bottom screw, two #2 nuts and lock washers, two #4 nuts and lock washers next to #2 hardware, and two screws that hold panel to chassis.

4.2.3 To remove Finned Heat Sink from Rear Panel

(With Rear Panel and Finned Heat Sink as a unit.) Remove two #4 nuts and lock washers.

4.2.4 To remove Front Panel only

Remove two top screws, one bottom screw, two screws that hold panel to chassis, and the two jack screws for the Serial I/O connector.

If Cover is removed already, remove one bottom screw, two screws that hold panel to chassis, and the two jack screws for the Serial I/O connector.

If necessary, to completely remove the Front Panel out of the way, the ANT connector and the GPS connector may be removed from the panel.

Note: Handle the ANT connector and cable with caution. Do not allow the cable to move around excessively or the center conductor and/or cable braid will break at the radio transceiver connection points.

4.2.5 If your unit has an I/O, A3, CCA

This will be the CCA on top. If your unit does not have an I/O CCA the Controller, A2, CCA will be on top. In either case the top CCA is held on by three #4 screws and lock washers.

4.2.6 To remove the Controller, A2, CCA

Either remove three #4 screws with lock washers or, if your unit has an I/O, A3, CCA and that is removed, remove three standoffs. After removing the three screws or standoffs, remove the #4 hardware holding the heat sink tab of voltage regulator A2VR1. Remove the two #2 self-tapping screws that hold the Controller CCA to the radio transceiver heat sink at left rear of unit. Turn unit upside down with left hand, grab Controller CCA with right hand, and pull Controller CCA off of radio transceiver by rocking slightly front to back so mating connector will come apart. Watch for the four #2 flat washers that will fall off and ferrite beads on the leads of connector A2P1.

4.2.7 To remove the radio transceiver, A1, CCA with heat sink plate

Remove two standoffs from near the front.

4.2.8 To remove the radio XCVR from the heat sink plate

Remove two #2 screws and lock washers.

4.3 Unit Assembly

Assembly is the reverse of disassembly.

Be sure to use silicone heat sink compound
- Between radio transceiver heat sink and heat sink plate
- Between heat sink plate and inside of rear panel
- Between outside of rear panel and finned heat sink
- Between voltage regulator, A2VR1, heat sink tab and chassis
- Between chassis top lip and inside of top cover

This all for best heat flow.

To assemble the Controller, A2, CCA to the radio transceiver assembly, A1:
- Place the #2 self-tapping screws in their holes
- Place masking tape over their heads to hold them in place
- Turn the Controller CCA upside down
- Place 4 #2 flat washers, two each, over the #2 screws
- Install 6 ferrite beads, 3 each over A2P1-1 and A2P1-7

- If the Front Panel is not attached to the ANT connector, twist the connector clockwise and loop the coaxial cable so it will lie over the top of the backside of the connector, with the connector facing towards the front.
- Hold the Controller CCA (upside down) in your right hand
- With the left hand turn the chassis upside down
- Mate the Controller CCA to the radio transceiver
- The pins of A2P1 must match to A1J101, the two sets of #2 hardware must line up with the holes in the radio XCVR heat sink, and the holes near the front of the Controller board must align to the standoffs holding the radio XCVR to the chassis
- Turn unit right side up
- Push down on Controller CCA to make sure it is in place
- Remove masking tape from #2 screws and with a flat blade screwdriver screw the #2 self-tapping screws into place
- Install 3 #4 lock washers and 3 #4 screws to hold down Controller CCA
- Install #4 screw through heat sink tab of A2VR1 and chassis
- Hold in place with #4 lock washer and #4 nut

5 ALIGNMENT

WARNING

Only qualified and trained service personnel must perform alignment.

5.1 Required Test Equipment

The following test equipment is required to align the TALON Series radio modems. All test equipment should be properly calibrated with traceability to NIST or your country's authority.

- ♦ Service monitor or
  - RF signal generator at operating frequency of equipment with output level adjustment and FM.
  - FM demodulator, that can drive a deviation meter
  - Deviation meter
  - RF frequency counter: Must operate at the RF frequency of the equipment, with a resolution of 10 Hz or better, and accuracy of ± 1 PPM (± 150 Hz at VHF, ± 450 Hz at UHF) or better.
  - RF power meter: Capable of accurately indicating the equipment RF power output.
  - RF power attenuator or dummy load with coupled output. Must be 50 Ω impedance at the operating frequency, rated for the output power of the

equipment, and have an output which can drive the FM demodulator and frequency counter at the correct level.

- ♦ Audio oscillator: Must have sine wave and square wave output and adjustable output frequency and amplitude.
- ♦ Voltmeter for dc: ≥ 10 MΩ input impedance. Any good DMM will have this.
- ♦ Oscilloscope: ≥ 20 MHz bandwidth and X10 probe.
- ♦ Power Supply: Capable of approximately 12 V dc at 3 A.

Note that alignment instructions are written for a service monitor.

5.2 Alignment Procedure

It is not necessary to perform all alignment steps detailed below. However, some adjustments have interaction with others (e.g.: balance affects deviation and output power has a slight affect on TX frequency trim). It is recommended to spot check all adjustments.

Refer to the last section of this manual for parts lists, schematic diagrams, and parts layouts.

After removing the cover:

- Jumper A2J8 with A2P3
- Be sure A2P2 is in place across A2J7
- Connect a PC to the TALON Series unit Serial I/O port via an RS232 cable assembly
- Open a communications program, such as HyperTerminal™ found in Windows™. Set communications for COM port you set up (usually COM1), 38400 baud, no parity, 8 data bits, and 1 stop bit
- Attach the ANT connector to a communications service monitor
- Apply dc power to the unit
- Observe the correct display on the PC's VDT

Note:

- Press the "Esc" key to get out of any command
- Press the "B" key (PERM Radio parameters), when not in any other command, at any time to make adjustment parameters permanent

5.2.1 TRANSMIT AND RECEIVE FREQUENCY

Set transmit and receive frequencies with the "T" key to frequency of operation.

Note: If the receive frequency is the same as the transmit frequency, just enter the transmit frequency. Receive frequency will be set automatically. Otherwise, press the "R" key and set the receive frequency.

5.2.2 RX FREQUENCY TRIM

Press the “1” key for the RX FREQUENCY TRIM and set the 1st LO on frequency using a frequency counter connected to the ANT port. (The 1st LO frequency is indicated on the VDT screen next to the RX FREQUENCY). The offset voltage at A2P1-7 will be ≅ 2.50 V dc. This setting, if incorrect, will degrade receive sensitivity and distortion.

When in RX FREQUENCY TRIM, certain stages in the transmit chain are enabled, which cause local oscillator leakage at the ANT connector to be stronger than normal. Even so, the level may be less than 0 dBm. The frequency counter must be connected directly to the ANT connector and be able to operate at this level.

CAUTION: DO NOT PLACE THE UNIT IN A TRANSMIT MODE DURING THIS PROCEDURE: SERIOUS DAMAGE TO THE COUNTER WILL RESULT.

5.2.3 CARRIER DETECT

- Set service monitor generator frequency to receive frequency of radio modem
- No modulation
- Set service monitor power output to signal level required for carrier-detect to go true.

Press the “2” key for CARRIER DETECT ON TRIM adjustment. Adjust until there is a constant ON (on the VDT) indicated. This may be monitored at A2AR2-1 with a dc-coupled oscilloscope. There should be a 5 V dc level with no negative going glitches.

- Set the service monitor power output to signal level required for carrier-detect to go false.

Press the “3” key for CARRIER DETECT OFF TRIM adjustment. Adjust until there is a constant off. The ON indicator (on the VDT) being off indicates this. Continue monitoring at A2AR2-1 with dc-coupled oscilloscope. There should be a 0-V dc level with no positive going glitches.

5.2.4 RECEIVER DC OFFSET ADJUST

Set service monitor power output for a level above the carrier-detect on level with 1200 Hz tone at 2.3 kHz deviation modulation on.

Measure V_{BIAS} at MX919B IC terminal 21 (A2U3-21).

Press the “4” key for the RECEIVER DC OFFSET ADJUST.

Adjust this to get measured V_{BIAS} value at MX919B IC terminal 23 (A2U3-23).

5.2.5 RECEIVER GAIN ADJUST

Set modulation at a 1200 Hz tone for 2.3 kHz deviation.

Press the “5” key for the RECEIVER GAIN ADJUST.

Adjust this to get a 1 V pp signal at MX919B IC terminal 23 (A2U3-23).

Go back and check the RECEIVER DC OFFSET ADJUST, because the RECEIVER GAIN ADJUST interacts with it due to a dc offset in the radio transceiver.

5.2.6 TRANSMITTER RF POWER OUTPUT ADJUST

Set service monitor to measure transmitter power.

Press the “6” key for TRANSMITTER POWER ADJUST. Then press the “+” or “-” key once to activate.

Adjust the RF power output level by pressing the “+” or “-” key, up to 6 W, in accordance with your license.

Note: The transmitter is not rated for 100 % duty cycle (continuous operation) at the higher power levels. Work quickly to set the power.

For operational use with an RF power amplifier, adjust the output power of the TALON UDC unit for the minimum power required to drive the power amplifier to the licensed power output. Final power output is set with the Talon UDC connected to the RF power amplifier following the manufacturer’s instructions.

5.2.7 TRANSMITTER BALANCE

For proper modulation and bandwidth occupancy, check and set this adjustment at the transmit frequency.

- Turn UUT off
- Remove A2P2 from A2J7
- Connect a square wave generator at a frequency of 500 Hz, 50 % duty factor, approximately 0.2 V pp, and 2.5 V dc offset to A2J7-2 (adjacent to A2P1-7) and GND (A2D1-A)
- Turn UUT on

Press the “7” key for TRANSMITTER BALANCE.

Monitor the demodulated signal:
- Press a key to transmit
- Adjust the amplitude of the 500-Hz square wave to obtain 2.3 kHz deviation on the service monitor. (The deviation will change with balance). Amplitude will be about 0.4 V pp.

- Adjust the balance SMD potentiometer, A1R180. This is adjusted with a small, non-conductive, flat blade screwdriver through a clearance hole (MTH1) in the Controller, A2, CCA. Adjust such that the oscilloscope display shows a square wave with no rounded corners or overshoot. (This is similar to compensating an oscilloscope probe.)
- Quit transmitting
- Turn UUT off
- Remove the square wave generator
- Replace jumper A2P2 on header A2J7

5.2.8 TRANSMITTER DEVIATION

Set service monitor to measure transmitter deviation.

Press the “8” key for TRANSMITTER DEVIATION.

Press “T” for 1200-Hz tone and adjust for 2.3 kHz deviation.

5.2.9 TX FREQUENCY TRIM

Press the “9” key for TX FREQUENCY TRIM and set the transmitter on frequency using a frequency counter connected to the ANT port. The offset voltage at A2P1-7 will be ≅ to 2.50 V dc.

Note: Observe proper power level for frequency counter so you do not cause serious damage.

ADJUSTMENT COMPLETE

Remove jumper from J8 so unit will be in operating mode. P3 may be stored by attaching it to one terminal only of J8.

6 ADDITIONAL INFORMATION FOR A1 ASSEMBLIES

The A1 assembly is made from the A1A1 circuit card assembly Ritron radio transceiver.

6.1 Internal Adjustments

Note: All internal adjustments for optimum performance have been performed at Ritron's factory. These adjustments should not be changed unless one is fairly certain alignment is necessary, or repairs have been made to appropriate sections of the CCA. In order to effect adjustments you will need to prepare a cable assembly to go between the Controller CCA and the radio transceiver CCA, so the Controller CCA can be swung out of the way in order to gain access to the radio transceiver and still be connected to it.

6.1.1 Front-end Inductors

Front-end inductors

- L101 – L106 on the Ritron DTX-454-OBN6-DD UHF radio
- L102 – L104 and L107 – L109 on the Ritron DTX-154-OBN6-DD VHF radio

are factory-preset for optimum sensitivity across the band of frequencies for each model. These inductors should never need adjustment unless a component in the front end is replaced, and even then, adjustment should not be necessary. If adjustment is desirable, adjust the slugs for maximum sensitivity at mid-frequency, then check the band edge frequencies. If the sensitivity is worse by 1 dB or more, each slug should be adjusted slightly to test for improvement. Only those slugs, which improve the sensitivity, should be changed and only by an amount necessary to bring the sensitivity within 1 dB of the mid-frequency. After any change is made, recheck sensitivity across the band. You may have to repeat adjustments several times to achieve satisfactory performance.

6.1.2 VCTCXO Frequency Adjust

The frequency of the VCTCXO (Y101) is controlled by dc voltage on its tuning pin and by adjustment of the trimmer capacitor accessible through a hole in the top of the VCTCXO itself. Tuning sensitivity through the electronic control pin is much greater than that of the trimmer capacitor. The trimmer capacitor is normally never adjusted, even at the factory. If, however, the TX and RX Frequency Trim values are approaching the limits of the electronic adjustment, adjustment of the trimmer capacitor may help bring trim values toward the center.

6.2 Active Component Voltage Chart for DTX-454 RF CCA

Note: All voltages measured with reference to negative supply input (case ground).

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
Q101	RX RF Preamp			
	E	0	0	
	B	0	0.7	
	C	0	2.5	
Q102	RX 1st IF Amp			
	E	0	0	
	B	0	0.7	
	C	0	3.5	
Q103-A	Noise Squelch Voltage Reference			
	E (1)	0	0.5 to 1.5	RX voltage varies w/signal level
	B (2)	0	1.1	
	C (6)	0	5.0	
Q103-B	Noise Squelch Amp			
	E (4)	0	0.5 to 1.5	RX voltage varies w/signal level
	B (5)	0	0 to 1.5	RX voltage varies w/signal level
	C (3)	0	0 to 1.5	RX voltage varies w/signal level
Q104	TX Driver Amp			
	E	0	0	
	B	0.7	0	
	C	2.5 to 3.5	0	
Q105	TX Pre-driver Amp			
	E	0	0	
	B	0.7	0	
	C	2.5 to 3.5	0	
Q106	VCO Amp			
	E	0	0	
	B	0.7	0.7	
	C	2.2 to 3.0	2.2 to 3.0	
Q107	VCO Buffer Amp			
	E	0	0	
	B	0.7	0.7	
	C	2.2 to 3.0	2.2 to 3.0	

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
Q108	VCO			
	E	1.5	1.5	
	B	2.2	2.2	
	C	4.4	4.4	
Q109	VCO RX/TX SW XSTR			
	E	0	0	
	B	4.1	0	
	C	0.2	4.3	
Q110	VCO RX/TX SW XSTR			
	E	4.3	4.3	
	B	0	5	
	C	4.1	0	
Q111	VCO Active PS Filter			
	E	4.3	4.3	
	B	4.9	4.9	
	C	4.9	4.9	
Q112	Reference OSC Tripler			
	E	0.4	0.4	
	B	0.7	0.7	
	C	4.7	4.7	
Q113	TX SW XSTR			
	E	7.3	7.3	
	B	6.4	7.3	
	C	7.1	0	
Q114	TX SW XSTR			
	E	0	0	
	B	5	0	
	C	0.2	7.3	
Q115	TX Enable SW XSTR			
	E	5	5	
	B	0	5	
	C	4.8	0.2	
Q116	PLL Lock Detect Drive XSTR			
	E	5	5	
	B	5	5	0 V when unlocked
	C	0	0	4.9 V when unlocked

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
Q117	PLL Charge Pump VR			
	E	6.1	6.1	
	B	6.7	6.7	
	C	7.3	7.3	
IC101	RX 1st Freq Converter			
	1	0	1.6	
	2	0	5	
	3	0	5	
	4	0	5	
	5	0	5	
	6	0	5	
	7	0	5	
	8	0	0.8	
IC102	RX 2nd Freq Converter, IF, Detector			
	1	0	4.4	
	2	0	3.8	
	3	0	3.7	
	4	0	4.6	
	5	0	3.6	
	6	0	3.6	
	7	0	3.6	
	8	0	4.6	
	9	0	2.1	
	10	0	0.6	
	11	0	3.5	
	12	—	—	No connect
	13	0	0 to 3	RX voltage varies w/signal level
	14	0	0	
	15	0	0	
	16	0	1.8	
IC103	RX Detector Buffer Amp			
	1	0	2.4	
	2	0	2.3	
	3	0	2.3	
	4	0	0	
	5	0	2.5	
	6	0	2.5	
	7	0	2.7	
	8	7.3	7.3	

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
IC104	RF PA Module			
	1	2.5 to 3.5	0	
	2	0 to 4	0	TX voltage varies w/RF power
	3	≅7.4	≅7.4	
	4	—	—	Don’t measure!
IC105	RX/TX Logic			
	1	5	0	
	2	0	5	
	3	0	5	
	4	5	0	
	5	5	0	
	6	0	5	
	7	0	0	
	8	5	0	
	9	0	5	
	10	0	5	
	11	5	0	
	12	5	0	
	13	0	5	
	14	5	5	
IC106	5 V Regulator			
	1	7.3	7.3	
	2	0	0	
	3	5	5	
	4	—	—	No connect
	5	7.3	7.3	
IC107	RX 5 V Regulator			
	1	7.3	7.3	
	2	0	0	
	3	0	5	
	4	—	—	No connect
	5	7.3	7.3	

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
IC108	PLL Synthesizer IC			
	1	0	0	
	2	4.9	4.9	
	3	6.1	6.1	
	4	1 to 5	1 to 5	Tuning V, depends on freq
	5	0	0	
	6	1.6	1.6	
	7	1.6	1.6	
	8	0	0	
	9	2.4	2.4	
	10	—	—	No connect
	11	5	5	Lock detect, 0 when unlocked
	12	5	5	
	13	0	0	
	14	0	0	Data, pulses high while being loaded
	15	0	0	Data, pulses high while being loaded
	16	0	0	Data, pulses high while being loaded
	17	0	0	
	18	—	—	No connect
	19	—	—	No connect
	20	0	0	
	21	—	—	No connect
	22	5	5	
	23	5	5	
	24	—	—	No connect

6.3 Active Component Voltage Chart for DTX-154 RF CCA

Note: All voltages measured with reference to negative supply input (case ground).

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
Q101	RX RF Preamp			
	E	0	0	
	B	0	0.7	
	C	0	2.5	
Q102	RX 1st IF Amp			
	E	0	0	
	B	0	0.7	
	C	0	3.5	

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
Q103-A	Noise Squelch Voltage Reference			
	E (1)	0	0.5 to 1.5	RX voltage varies w/signal level
	B (2)	0	1.1	
	C (6)	0	5.0	
Q103-B	Noise Squelch Amp			
	E (4)	0	0.5 to 1.5	RX voltage varies w/signal level
	B (5)	0	0 to 1.5	RX voltage varies w/signal level
	C (3)	0	0 to 1.5	RX voltage varies w/signal level
Q104	TX Driver Amp			
	E	0	0	
	B	0.7	0	
	C	2.5 to 3.5	0	
Q105	TX Pre-driver Amp			
	E	0	0	
	B	0.7	0	
	C	2.5 to 3.5	0	
Q106	VCO Amp			
	E	0	0	
	B	0.7	0.7	
	C	2.2 to 3.0	2.2 to 3.0	
Q107	VCO			
	E	1.5	1.5	
	B	2.2	2.2	
	C	4.4	4.4	
Q108	VCO RX/TX SW XSTR			
	E	0	0	
	B	4.1	0	
	C	0.2	4.3	
Q109	VCO RX/TX SW XSTR			
	E	4.3	4.3	
	B	0	5	
	C	4.1	0	
Q110	VCO Active PS Filter			
	E	4.3	4.3	
	B	4.9	4.9	
	C	4.9	4.9	

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
Q111	Reference OSC Tripler			
	E	0.4	0.4	
	B	0.7	0.7	
	C	4.7	4.7	
Q112	TX SW XSTR			
	E	0	0	
	B	5	0	
	C	0.2	7.3	
Q113	TX SW XSTR			
	E	7.3	7.3	
	B	6.4	7.3	
	C	7.1	0	
Q114	TX Enable SW XSTR			
	E	5	5	
	B	0	5	
	C	4.8	0.2	
Q115	PLL RF Buffer XSTR			
	E	0.4	0.4	
	B	1.1	1.1	
	C	3.0	3.0	
Q116	PLL Charge Pump VR			
	E	6.1	6.1	
	B	6.7	6.7	
	C	7.3	7.3	
Q117	PLL Lock Detect Driver XSTR			
	E	5	5	
	B	5	5	0 V when unlocked
	C	0	0	4.9 V when unlocked

ITEM	TERMINAL	VOLTAGE TX	RX	COMMENTS
IC101	RX 1st Freq Converter			
	1	0	1.6	
	2	0	5	
	3	0	5	
	4	0	5	
	5	0	5	
	6	0	5	
	7	0	5	
	8	0	0.8	
IC102	RX 2nd Freq Converter, IF, Detector			
	1	0	4.4	
	2	0	3.8	
	3	0	3.7	
	4	0	4.6	
	5	0	3.6	
	6	0	3.6	
	7	0	3.6	
	8	0	4.6	
	9	0	2.1	
	10	0	0.6	
	11	0	3.5	
	12	—	—	No connect
	13	0	0 to 3	RX voltage varies w/signal level
	14	0	0	
	15	0	0	
	16	0	1.8	
IC103	RX Detector Buffer Amp			
	1	0	2.4	
	2	0	2.3	
	3	0	2.3	
	4	0	0	
	5	0	2.5	
	6	0	2.5	
	7	0	2.7	
	8	7.3	7.3	
IC104	RF PA Module			
	1	2.5 to 3.5	0	
	2	0 to 4	0	TX voltage varies w/RF power
	3	≅7.4	≅7.4	
	4	—	—	Don’t measure!

		VOLTAGE		
ITEM	**TERMINAL**	**TX**	**RX**	**COMMENTS**
IC106	RX/TX Logic			
	1	5	0	
	2	0	5	
	3	0	5	
	4	5	0	
	5	5	0	
	6	0	5	
	7	0	0	
	8	5	0	
	9	0	5	
	10	0	5	
	11	5	0	
	12	5	0	
	13	0	5	
	14	5	5	
IC107	5 V Regulator			
	1	7.3	7.3	
	2	0	0	
	3	5	5	
	4	—	—	No connect
	5	7.3	7.3	
IC108	RX 5 V Regulator			
	1	7.3	7.3	
	2	0	0	
	3	0	5	
	4	—	—	No connect
	5	7.3	7.3	

ITEM	TERMINAL	VOLTAGE TX	VOLTAGE RX	COMMENTS
IC109	PLL Synthesizer IC			
	1	0	0	
	2	4.9	4.9	
	3	6.1	6.1	
	4	1 to 5	1 to 5	Tuning V, depends on freq
	5	0	0	
	6	1.6	1.6	
	7	1.6	1.6	
	8	0	0	
	9	2.4	2.4	
	10	—	—	No connect
	11	5	5	Lock detect, 0 when unlocked
	12	5	5	
	13	0	0	
	14	0	0	Data, pulses high while being loaded
	15	0	0	Data, pulses high while being loaded
	16	0	0	Data, pulses high while being loaded
	17	0	0	
	18	—	—	No connect
	19	—	—	No connect
	20	0	0	
	21	—	—	No connect
	22	5	5	
	23	5	5	
	24	—	—	No connect

7 BLOCK DIAGRAM, PRODUCT STRUCTURE, PARTS LISTS, SCHEMATIC DIAGRAMS, AND PARTS LAYOUTS

Arrangement of information is:

- Block Diagram
- Product Structure Diagrams
- Assemblies and subassemblies, in reference designator prefix order.

UNIT	Final assembly
A1A1	Radio XCVR CCA
A2	Controller CCA
A2A1	GPS RCVR CCA

Each assembly/subassembly has:

- A parts list (PL), whose drawing number is the Kantronics' part number for that item
- A schematic diagram
- A parts layout (if it exists)