INTEGRA-TR INTEGRATED WIRELESS MODEM
VHF 132-174 MHZ
UHF 380-512 MHZ
900 MAS 928-960 MHZ
SUTRON PART NUMBER 6661-1249-1

APPLICATION NOTE

PREPARED BY:
INTEGRATED SYSTEMS DIVISION
2009

SUTRON 22400 Davis Drive Sterling, VA 20164 www.sutron.com
(703)406-2800 (703)406-2801 fax sales@sutron.com

TABLE OF CONTENTS

1. Introduction

The Dataradio Integra-TR integrated wireless modem provides advanced features without complicated system setup. Designed specifically for data transmission, this programmable, transparent modem transmits data real-time without delays at speeds up to 19.2 kbps. With enhanced diagnostics it is the perfect choice even in the harshest environments.

Features:

- Supports Data Activated Transmit (DOX) or RTS/CTS flow control
- **On-line Radio Network Diagnostics** to monitor and maintain your communications link
- Diagnostic output supports **OPC Enabled Diagnostics** feature
- User selectable data rates:
  - 6.25 kHz: 4800 bps
  - 12.5 kHz: 4800 or 9600 bps
  - 25 kHz: 4800, 9600, or 19200 bps
- Separate Application and Setup/diagnostics ports
- Prevents transmission of any extraneous data bits
- Approved for Non-Incendiary (Class 1, Division 2) by Factory Mutual
- Low power consumption mode:
  - Variable Output Power
- Front panel LEDs
- One piece integrated design
- DIN-rail mount options available
- Two-year limited factory warranty

2. Programming the Radio

Download the programming software from the following link.

http://www.dataradio.com/4_2.html

Proceed with the following steps to program the radio.

a. Connect the power connector on the back of the radio. Also, connect the 5W load resistor and rubber duck antenna to the RF port of the radio.

b. Connect the red & black wire of the power connector to the +12 Volt & GND of power supply, respectively.

c. Connect the 9-pin serial cable from computer's COM port to the Setup Port of the Radio.

d. Start the IntegraTR Program on your PC. The following screen will appear.

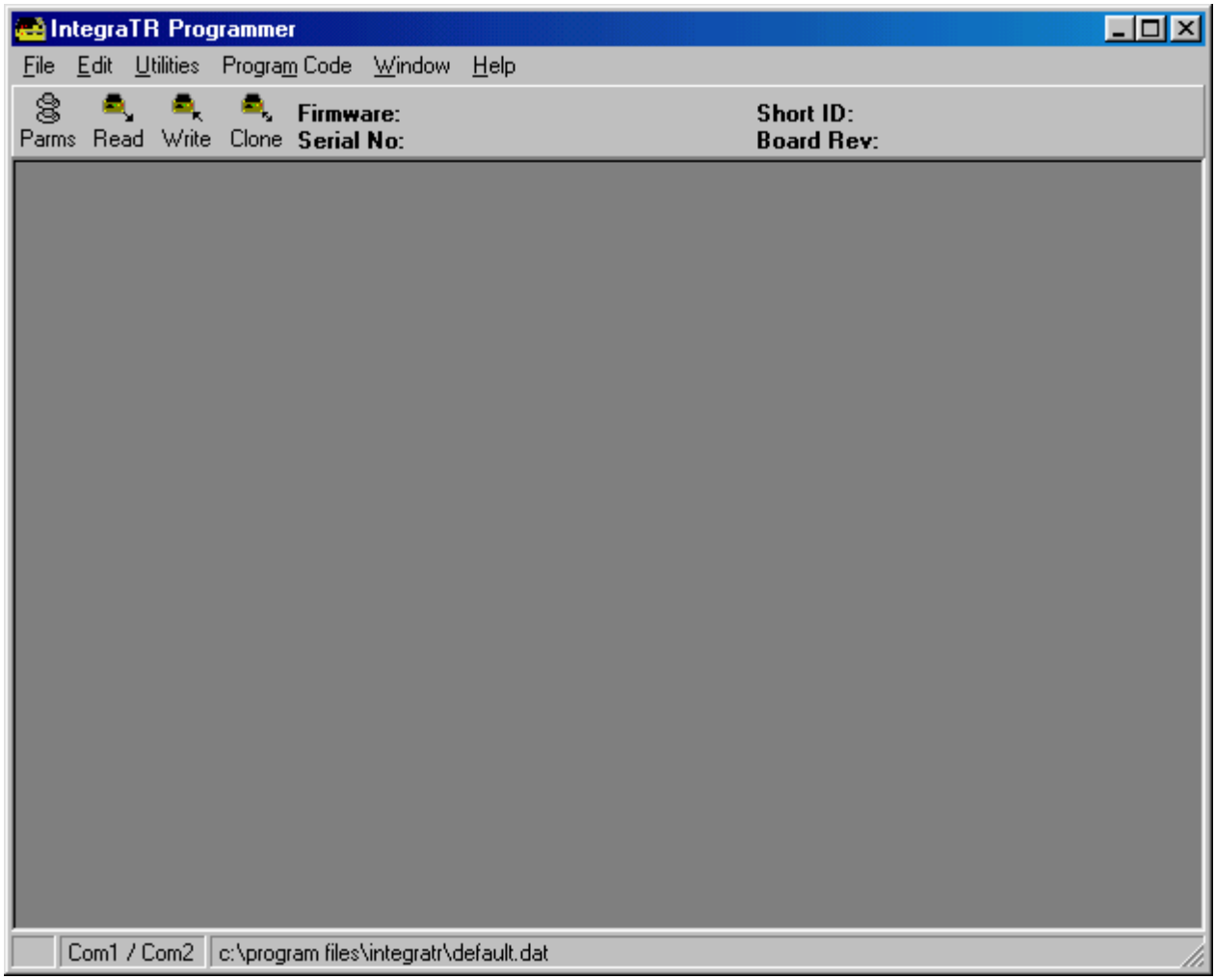


Figure 1. IntegraTR Programmer main window

e. Click on the Read toolbar button on the screen. This step will update the program with the latest settings in the radio.

f. From the main menu, select Utilities|Port Settings (Figure 2. Port Settings window).

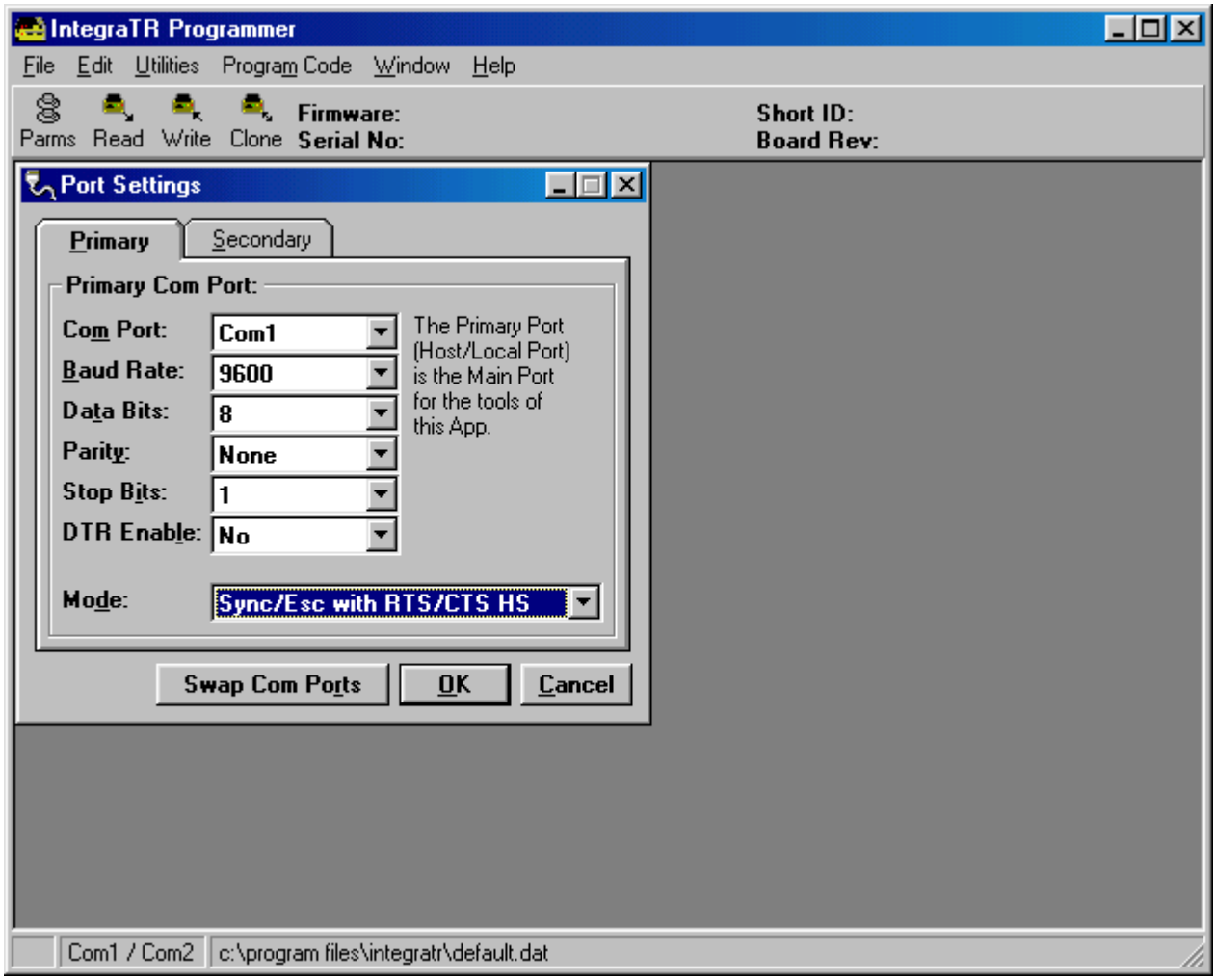


Figure 2. Port Settings window

g. Make sure your settings match the settings above in Figure 2; if not, make any necessary changes. Click OK when finished. **Never change the Baud Rate in the Port Settings window**. This baud rate is just for your PC to talk to the radio.

h. Click on the Parms toolbar button in the main window. Figure 3. Modem parameters setup window will appear. Make sure the Modem tab is selected. Select the Network Speed. For 8210/9210s select 9600 Half Chan if you have one frequency for TX and RX. If you have separate TX and RX frequencies, select [XXXX]. For details on these settings, please see the INTEGRA technical manual section 2.4.4.1.

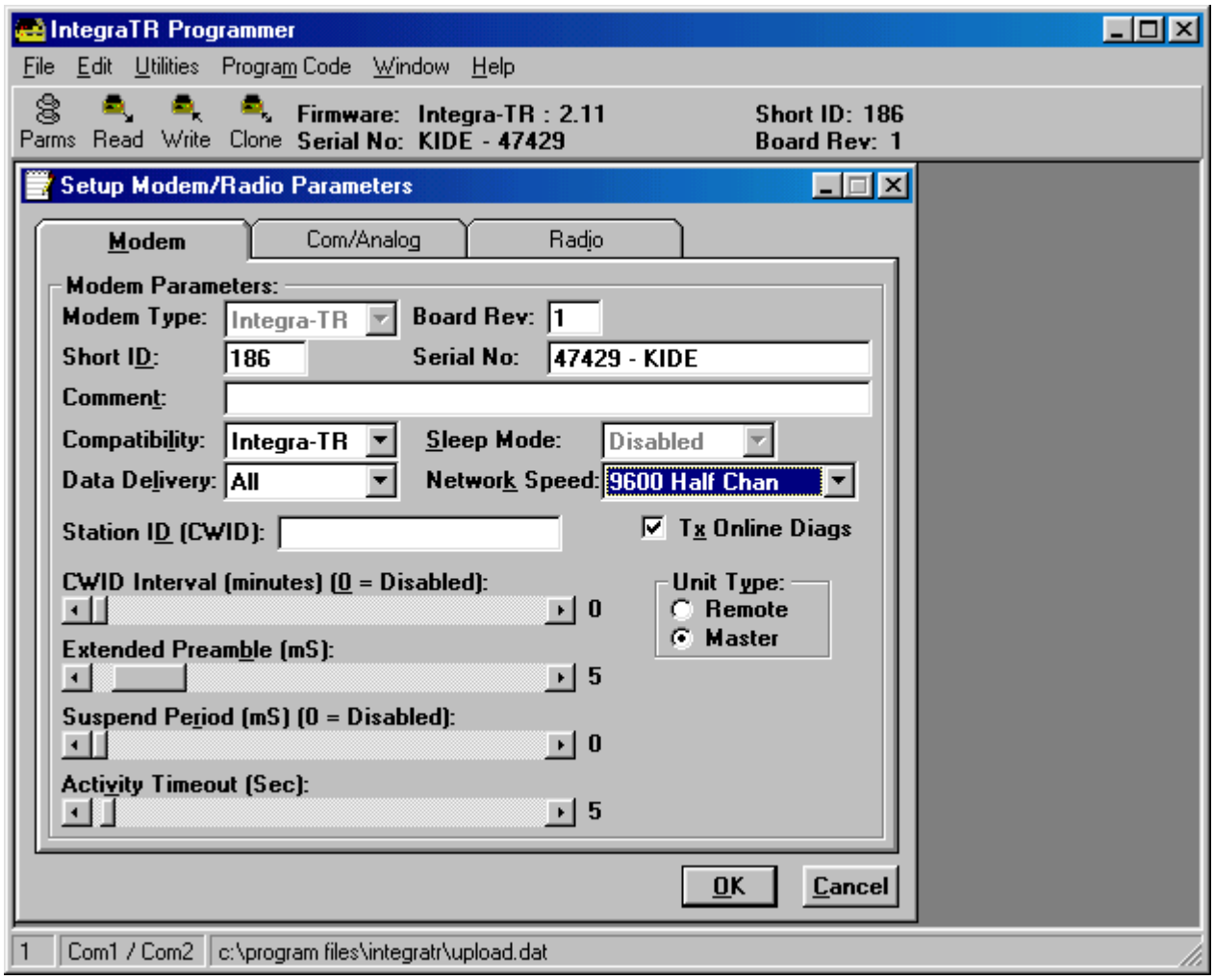


Figure 3. Modem parameters setup window

i. Next, click on the Com/Analog tab in the Modem/Radio Parameters window (Figure 4). Select the desired radio communications baud rate. For details on these settings, please see the INTEGRA technical manual section 2.4.4.3.

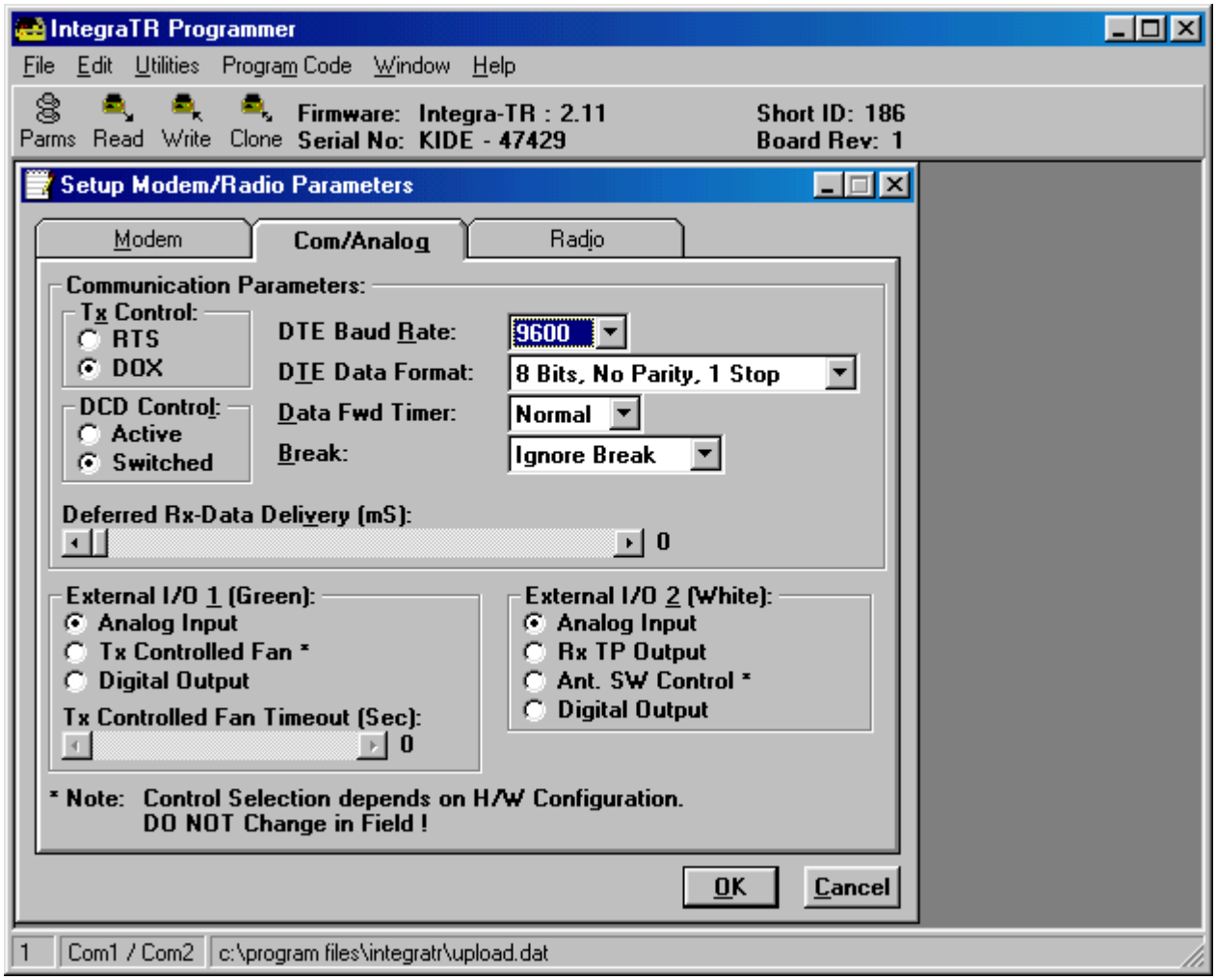


Figure 4. Com/analog parameters setup window

j. Lastly, click on the Radio Tab to program the frequency (Figure 4). Enter the RX/TX frequencies and the power. A power value of 255 is equivalent to 5 W power. Click OK to save all parameter settings. For details on these settings, please see the INTEGRA technical manual section 2.4.4.4

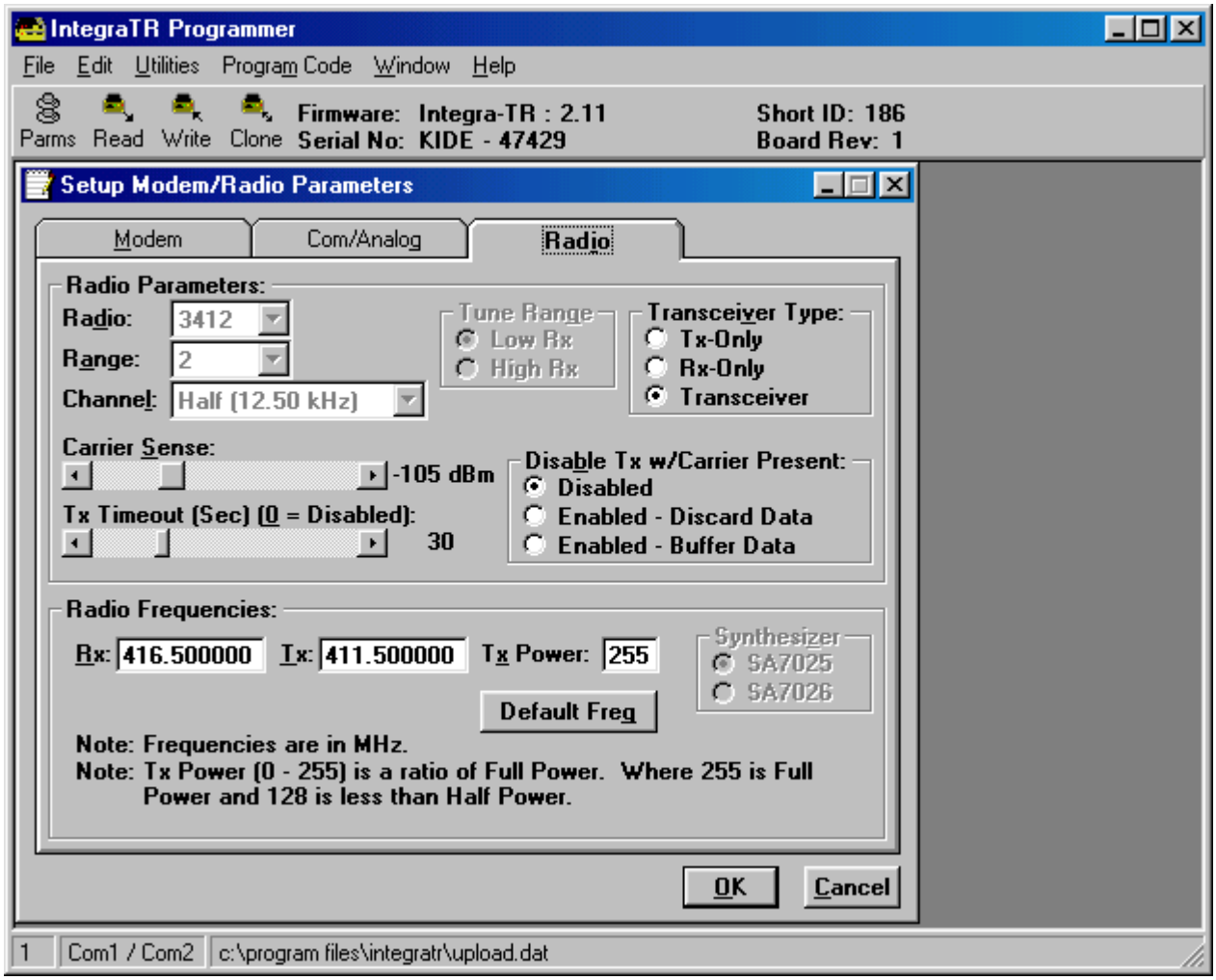


Figure 5. Radio parameters setup window

k. Click Write toolbar button in the main window to write all the settings to the radio. Figure 6 will appear at the beginning of the writing process. Click OK to proceed

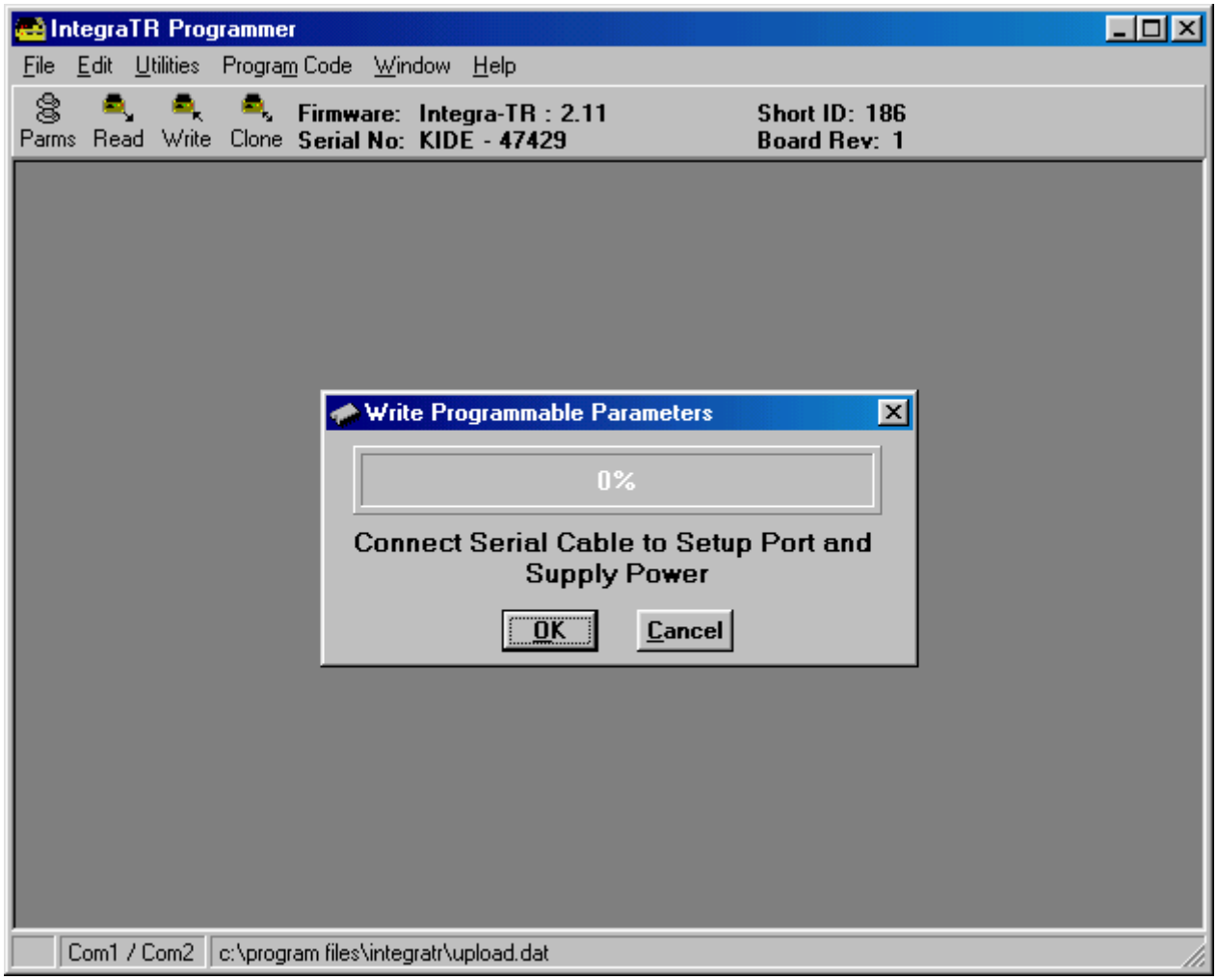


Figure 6. Write in progress window

l. After the programming is done the window will go blank and Figure 7 will appear. Disconnect the programming cable from you radio. The radio is now programmed.

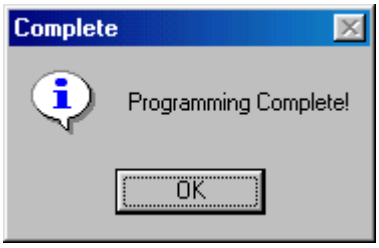


Figure 7. Program complete window

3. Serial Port Connections

3.1 Integra with 9210

a. 9210 COM2 – Radio cable: Sutron Part # 6411-1484.

b. Radio – PC cable: Sutron Part # 6411-1484.

c. Antenna Jumper cable (Antenna – Polyphaser): Sutron Part # 6411-1522-12 (SMA Male to N-Male).

d. Polyphaser: Sutron Part # 1311-1056 or 1311-1057.

e. Antenna:- Choose from catalog.

f. Antenna cable: Sutron Part # 6411-1162-1.

3.2 Integra with 8210

a. 8210 TERM – Radio cable: Sutron Part # 6411-1551-1.

Function	Integra	8210
DCD	1	4
RX	2	3
TX	3	2
GND	5	5
RTS	7	6

b. Radio – PC cable: Sutron Part # 6411-1484.

c. Antenna Jumper cable (Antenna – Polyphaser): Sutron Part # 6411-1522-12 (SMA Male to N-Male).

d. Polyphaser: Sutron Part # 1311-1056 or 1311-1057.

e. Antenna: Choose from catalog

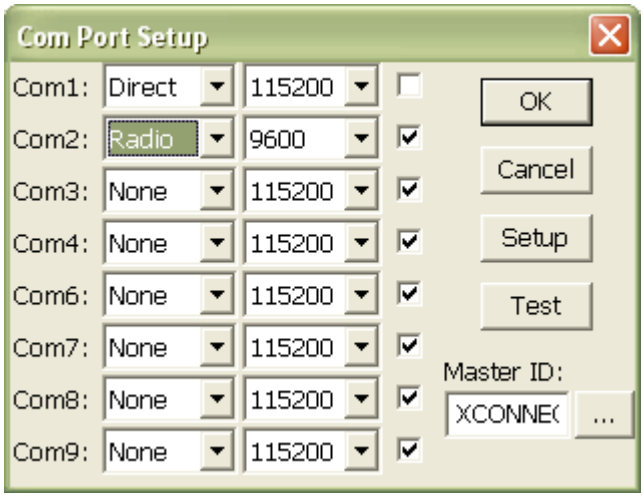
f. Antenna Cable: Sutron Part # 6411-1162-1.

4. Radio Settings & Testing

4.1 Xlite

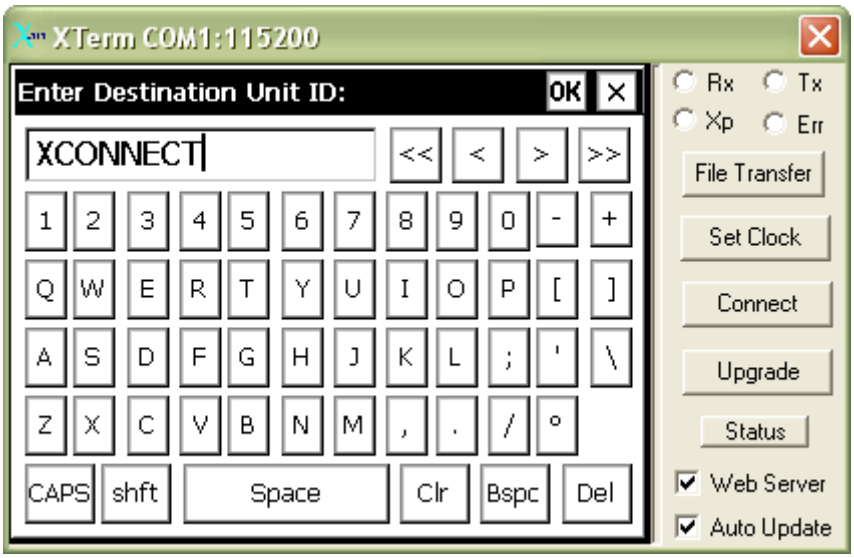
Please read Sutron Xpert/Xlite Manual on how to connect to Xpert/Xlite with the Xterm program. After Connecting to the 9210 with the Xterm go to the following window under the Setup Tab . Click on the Coms and Press the Edit button located in the bottom middle of the following window.

Following window will appear. Select the Com2 or 3 as Radio and the baud rate as 9600. Click on the OK button and then save the setup file. After saving the setup come back to the following same window and click on the Test button.

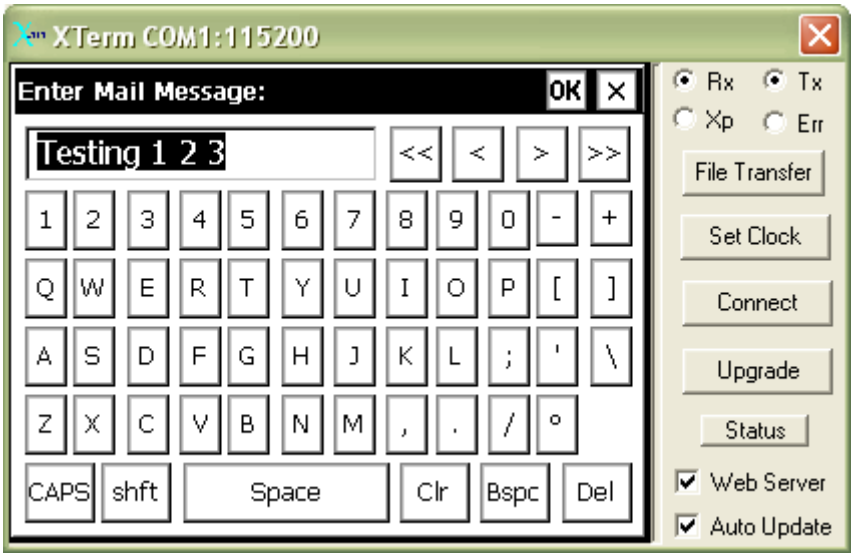


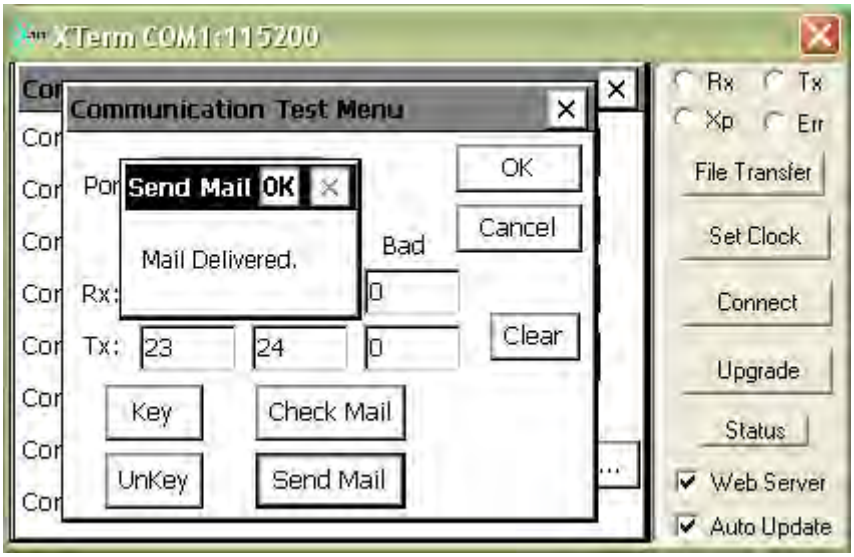
The following window will appear. In this window select Radio2 under Port and press the Send Mail button. Pressing Send Mail will cause the system to prompt for a destination and a message. The destination should be a master station (Xconnect Master ID which is XCONNECT by default) id.

After typing the destination unit id click OK.



Type the message in following window. You can leave it on the default Testing 1 2 3 message also. Whatever message you type in the following window it will appear in the Xconnect SSP Decoder window running at the base station PC. Click OK and you will get the status whether the mail have been delivered or failed.

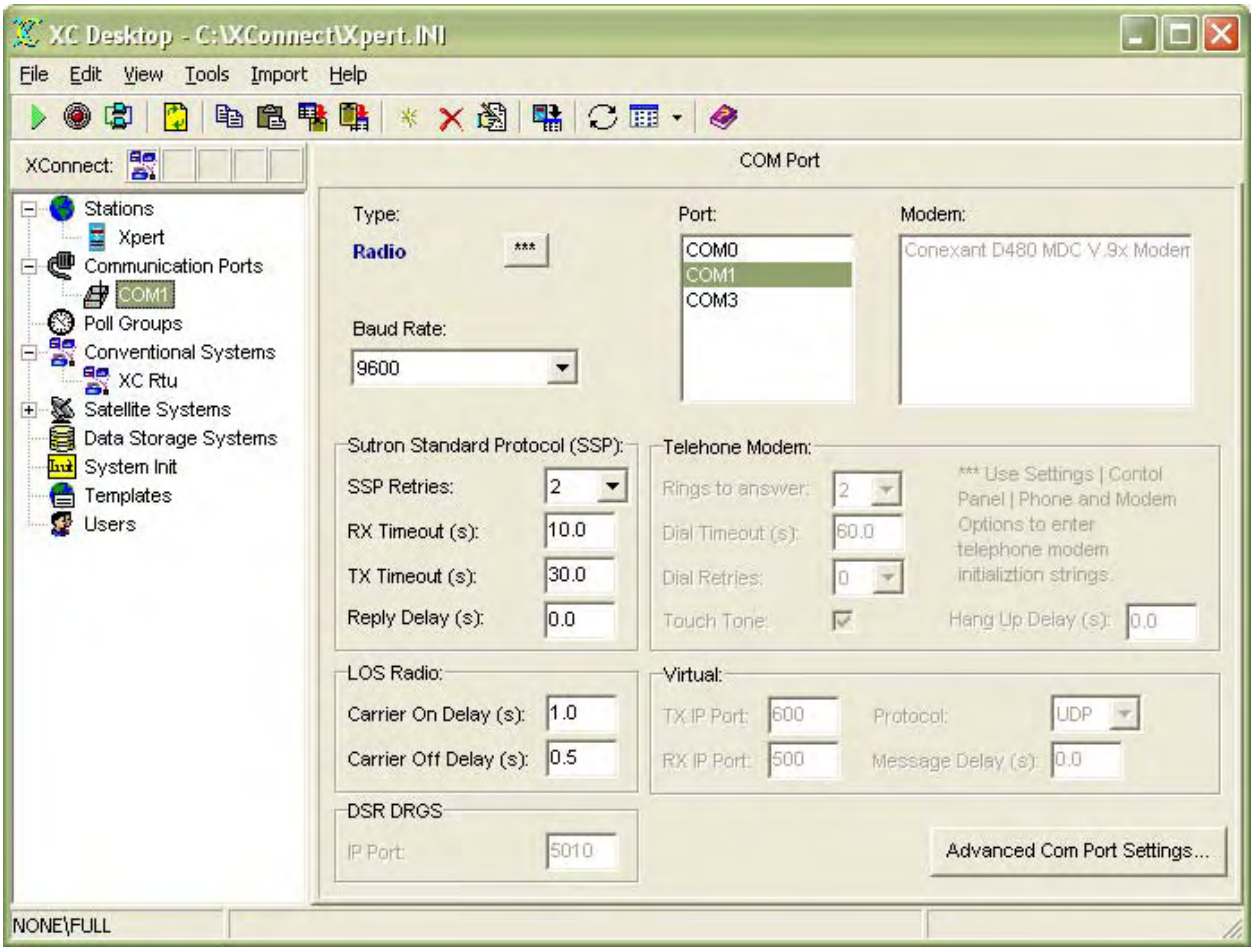




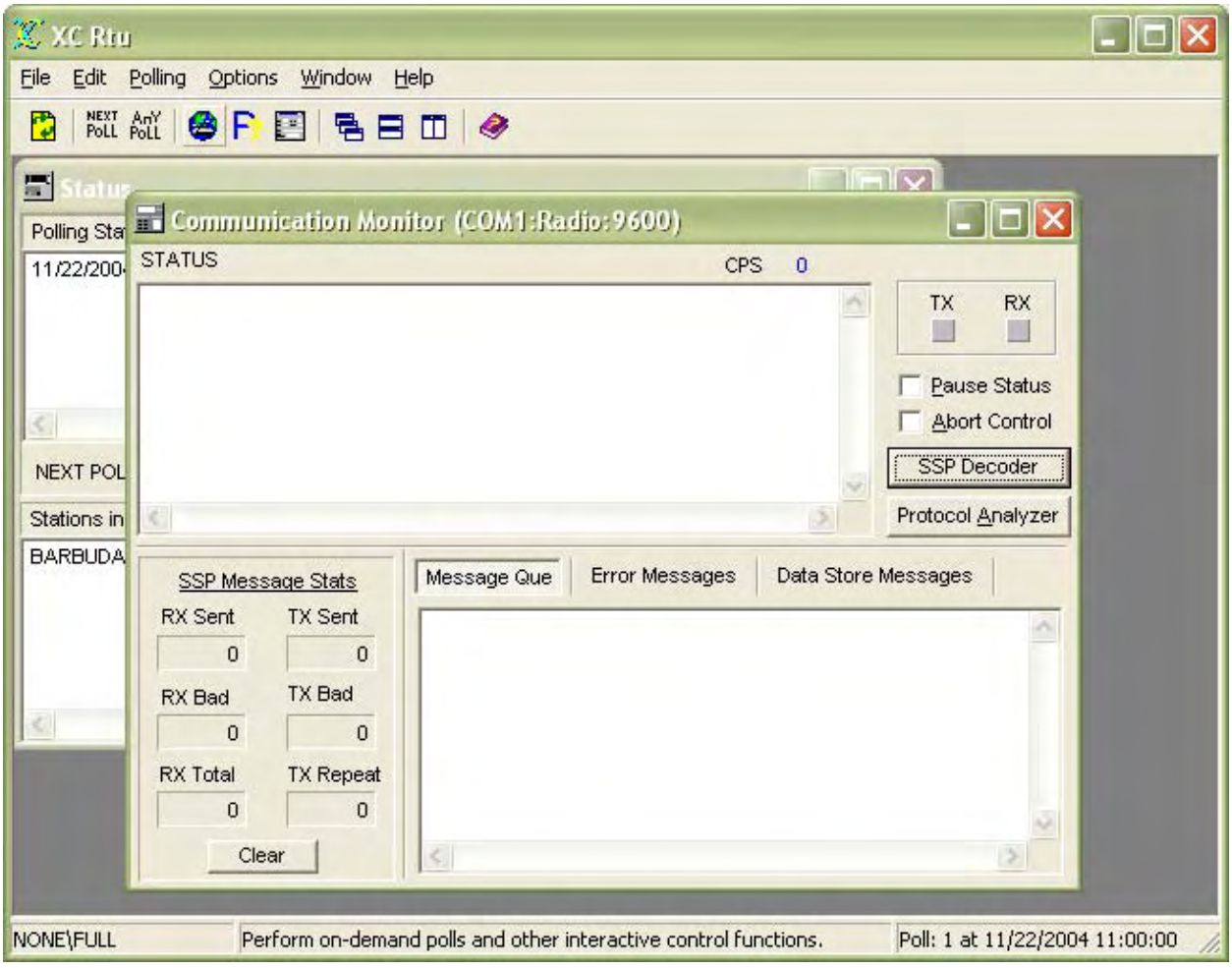
Also if you press the Key button in the above window it would turn the carrier on the TX LED (RED) will come on. At the same time the Receiving radio RX LED (Yellow) should also come on. Make sure you press Unkey button after Keying the Radio.

4.2 XConnect

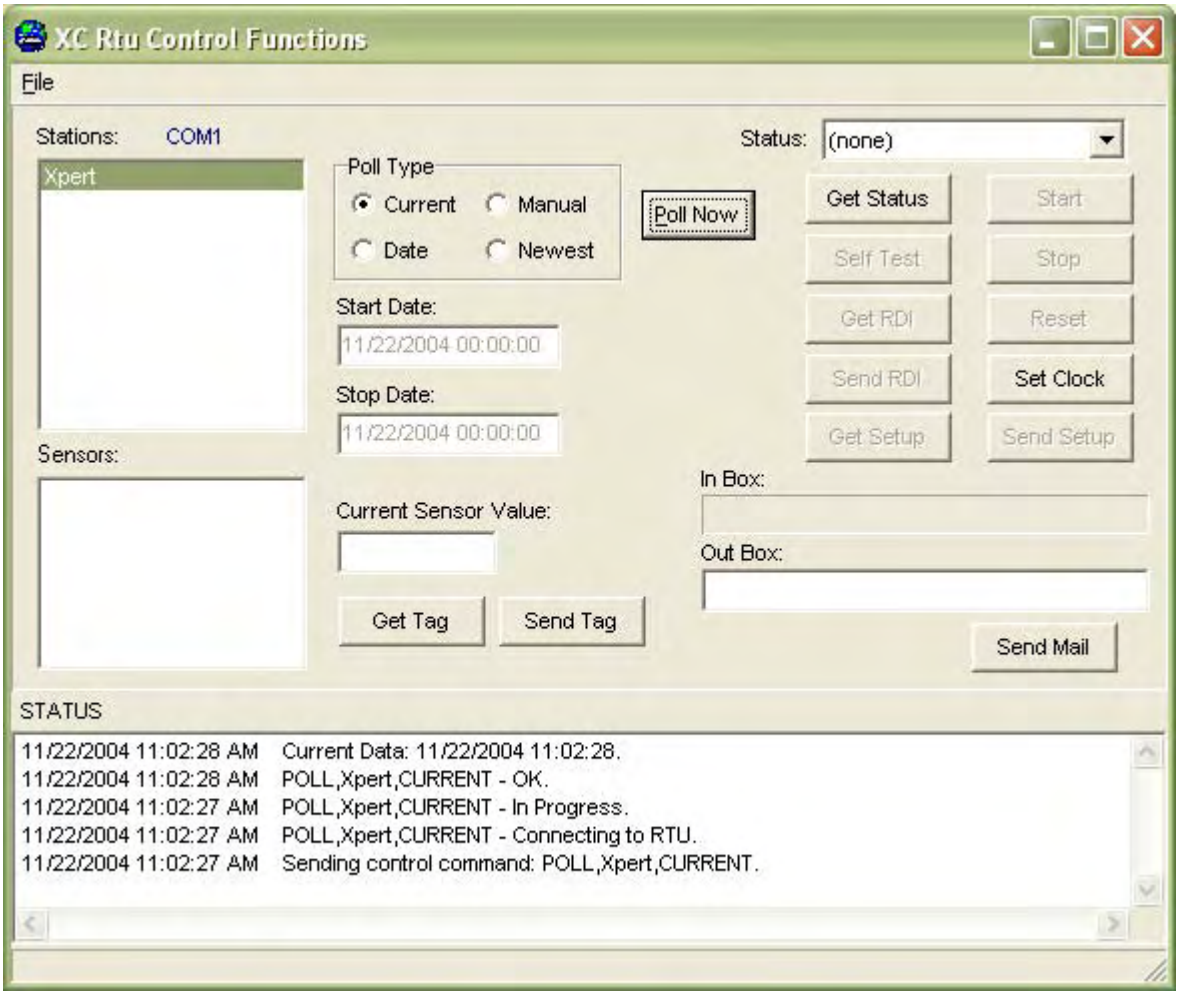
Configure a Station in the Xconnect based on the unit id and other information in the Remote Xpert/Xlite . Set the Com port of Xconnect to the Type Radio, baud rate 9600 as follows



Start the Xconnect Program and click on the XC RTU window and also click on the SSP Decoder.



Click on the Green button (Under the Polling & Options) and following window will appear. Select the Station and click on the Poll Type as Current. Click on the Poll Now button and you should get an almost instant response back from the Remote Xpert/Xlite as shown in the above window.



5. Interface Definition

5.1 Integra-TR Data Interface

Communication and Setup connectors: DE-9F

Pin	Description
1	DCD Data Carrier Detect
2	RXD RX Data
3	TXD TX Data
4	DTR
5	Ground
6	DSR
7	RTS Request to Send
8	CTS Clear to Send
9	Not used; reserved

Power/Analog connector: Snap and lock 4-pin

Pin	Description
1	+13.3 VDC (red)
2	Ground (black)
3	Analog In 1 (green)
4	Analog In 2 / RX-TP (white)

5.2 9210 Com port Info

COM1 – DCE Female

DCE	Signal Name	Direction
1	CD	OUT
2	RD	OUT
3	TX	IN
4	DTR	IN
5	GND	
6	DSR	OUT
7	RTS	IN
8	CTS	OUT
9	RI	OUT

COM2 - 4 (6-9 if installed) – DTE Male

DTE	Signal Name	Direction
1	CD	IN
2	RD	IN
3	TX	OUT
4	DTR	OUT
5	GND	
6	DSR	IN
7	RTS	OUT
8	CTS	IN
9	Set by jumpers to RI, +5V or +12V	

6. Integra TR Technical Specifications

Modem			
Channel Bandwidth	6.25 KHz*	12.5 KHz	25 KHz
Data Rate (user selectable)	2400, 4800 bps	4800, 9600 bps	4800, 9600, 19200 bps
Modulation	DRCMSK		
RTS/CTS Delay	4 msec		
Bit Error Rate 1 x 10^{-6}	@ .35 µV (2400 bps)	@ 1.4 µV	@ 1.0 µV (9600 bps); @ 2.3 µV (19.2 kbps)
Com Port			
Interface	EIA RS-232C		
Data Rate	1200 - 19200 bps		
Protocol	Transparent; 7 or 8 data bits; 1 or 2 stop bits; even, odd, or no parity		
Set Up / Diagnostic Port			
Data Format	Proprietary binary for setup; ASCII for diagnostics		
Data Rate	9600 bps		
General			
Band	**UHF**	**VHF**	**900 MAS**
Frequency Range	380-512 MHz	132-174 MHz	928-960 MHz
FCC Type Acceptance	E0TMCUB5R	E0TMCUA5R	E0TMCUC5R
FCC Emission Designators	9K30F1D, 15K3F1D	9K30F1D, 15K3F1D	9K30F1D, 15K3F1D
IC Type Acceptance	773195561A	773195562A	773195611A
IC Emission Designators	9K30F1D, 15K3F1D	9K30F1D, 15K3F1D	9K30F1D, 15K3F1D
European Approval	CE Mark (403-470 MHz)	CE Mark	-

ETSI	300.113 (403-470 Mhz)	300.113	-
Current Drain (Tx @ 13.3 VDC)	< 2.0 A	< 1.8 A	< 2.5 A
Current Drain (Rx @ 13.3 VDC)	< 220 mA (with a terminal connected to the COM port)		
Current Drain (Power Save Mode)	15 mA nominal		
Frequency Tolerance	0.5 ppm (6.25 KHz); 1.5 ppm	1.0 ppm (6.25 KHz); 2.5 ppm	1.5 ppm
Operating Voltage	10-16 VDC		
Operating Temperature	-30°C to +60°C		
Dimensions	4.5"W x 2.2"H x 4.75"D (11.4cm W x 5.6cm H x 12.1cm D)		
Shipping Weight	1.60 lbs (0.73 kg)		
Operating Mode	Simplex or Half-duplex		
Bandwidth without tuning	450-470: 20 MHz All other bands: 16 MHz	132-150: 18 MHz 150-174: 24 MHz	928-960: 32 MHz
Receive Operation	Continuous (no tuning required)		
Transmitter			
Tx Attack Time	< 7 msec		
RF Output Power	1-5 watts, PC programmable		
Duty Cycle	50% @ 5 watts, 30 seconds max. transmit; extended transmit with cooling fan option		
Transmit Operation	Continuous (no tuning required)		