

RAMP Development Kit

User's Guide Version 4.0

global solutions: local support wireless.support@lairdtech.com www.lairdtech.com/wireless Version 4.0

REVISION HISTORY

Version 4.0

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OVERVIEW

This document contains information about the hardware included as part of a Laird OEM Transceiver System Developer Kit (SDK).

The SDK is designed to allow flexibility at the hardware interface level so that the SDK can be interfaced to the OEM product, to a PC for performance testing, or to any other device that supports +5/3.3V TTL, RS232, RS485, or USB interface signals.

The SDK is a complete, integrated package that contains all the hardware, software, and documentation needed to integrate an OEM transceiver quickly and simply.

The SDK includes the following:

- SDK interface boards (2)
- AC power adapters (2)
- DB9 to DB9 cables (2)
- USB cables (2)
- Omni-directional dipole antennas with a 5" pigtail and MMCX connector (2)
 Other antennas are available for testing
- Card with software utilities and documentation download information

HARDWARE

SDK Board

The SDK board is provided so the developer can use a standard PC interface to operate the transceivers and to aid in system integration. As shown in Figure 2 below, there are many features that enhance the functionality and usability of this board. It uses +5V TTL, RS232, RS485, and USB data formats for interfacing with the transceiver. The configuration and operation of the SDK board is continuously shown by the LEDs located on the edge of the board. See Table 1 (Status LEDs) and Table 3 (Switch and jumper settings) for definitions of the LEDs and switches.



Figure 1: SDK board assembly drawing

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Table 1: Status LEDs

LED	Definition
+VCC	Lights when power is applied to the serial adapter board.
Low Power	Monitors the 5 volt supply and lights when the supply dips below 4.8 volts.
Reset	Lights when the Reset line to the processor is <i>High</i> , resetting the transceiver.
TxD	Lights when the TXD line is <i>Low</i> , flashes rapidly when data is transmitted from the transceiver to the host.
RxD	Lights when the RXD line is <i>Low</i> , flashes rapidly when data sent by the host is received by the transceiver.
Forced 9600 Recovery	Lights when the 9600 Baud line is <i>Low</i> , shows that the FORCED CONFIGURATION jumper is set to force the transceiver to 9600 Baud. The transceiver must be reset before it is forced to 9600.
Status 1	If used with a client transceiver, lights if the client transceiver is in range of a server transceiver with the same system ID and channel number. If used with a server transceiver, always lights when the server is powered in normal mode and is ready to accept data.
Status 2	Reflects the state of the Command/Data pin (AC4490, AC4486, AC4424, AC4790, AC4868), the TE pin (AC3124, AC1524) and the Pktmode pin (AC5124). This is controlled by the PC RTS pin when the Program Mode/Normal Mode switch is set to <i>Program Mode</i> . Lights when this pin goes <i>Low</i> .

Table 2: LEDs – AC4490 only section (includes AC4486, AC4790, and AC4868)

LED	Definition
Potentiometer/AD In	This varies the voltage (0 – 3.3 V) presented to the AD In pin (pin 18).
Gen Out 0 LED	Lights when the GO0 pin (pin 1) is <i>Low</i> .
Gen Out 1 LED	Lights when the GO1 pin (pin 9) is <i>Low</i> .
Gen In 0 Pushbutton	When depressed, forces the GIO pin (pin 4) Low.
Gen In 1 Pushbutton	When depressed, forces the GI1 pin (pin 14) Low.
DA_Out	Probe point that provides a location for measuring the DA_Out pin (pin 19).
GND	Probe point that provides a GND reference location.

Table 3: Switch and jumper settings

Switch	Definition
Program Mode/ Normal Mode (S6)	When this switch is moved to the Program Mode position, the RTS pin from the DB9/USB connector is connected to the Command/Data pin (AC4490, AC4486, AC4424, AC4790, AC4868), the TE pin (AC3124, AC1524), and the Pktmode pin (AC5124) of the transceiver. RTS of the transceiver is also connected to GND. This allows the SDK software to control these pins with RTS always enabled.
RESET (S1)	When this pushbutton is pressed, the transceiver hardware performs a soft reset.

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Switch	Definition
WR ENABLE (S2)	When this pushbutton is pressed, it takes the Write Enable pin (AC4424, AC5124, AC3124, AC1524) or G11 pin (AC4490, AC4486, AC4790, AC4868) <i>Low.</i> This button must be pressed and held during the write process for AC5124, AC3124, AC1524, and AC4424 product families.
RS485 or TTL Radio	If using a transceiver module fitted with a RS-485 interface chip, RS485 Radio should be selected. This converts the transceiver's RS-485 interface to serial, which is then converted to the interface selected by the COMM SELECT jumper.
	If not using a transceiver module fitted with a RS-485 interface chip, TTL Radio should be selected.
	When this jumper is moved to the <i>RS232 Enable</i> position, RS-232 communication is enabled through the DB9 connector (J2).
	When this jumper is moved to the <i>RS485 Enable</i> position, RS-485 communication is enabled through the RS-485 header pins.
COMM SELECT (J12)	When this jumper is moved to the <i>Loopback Mode</i> position, the transceiver TxD pin is tied to the transceiver RxD pin. This is only valid for AC5124, AC4424, AC4486, AC4490, AC4790, AC4868 products. RST mode must be disabled on the transceiver when Loopback Mode is enabled. This mode is not compatible with RS485 Radio selection.
	When this jumper is moved to the $+5V$ Radio position, the transceiver is powered with 5 volts.
radio voltage (j9)	When this jumper is moved to the +3.3V Radio position, the transceiver is powered with 3.3 volts. The AC4x90-1000, AC4868, and AC4x90-1x1 must have this jumper set to 3.3 volts.
	Special care should be taken when setting this jumper. An improper setting can cause catastrophic damage to the transceiver.
	When this jumper is moved to the <i>Normal Operation</i> position, the transceiver communicates at the baud rate configured in the EEPROM.
CONFIGURATION (J11)	When the jumper is moved to the <i>Forced 9600 Recovery</i> position, the transceiver interface baud rate is forced to 9600 baud upon reset. This is for EEPROM recovery only and should not be used in normal operation.
	When this jumper is moved to the <i>Power Conn</i> position, power is supplied to the SDK board through the power connector (J4).
POWER SOURCE (J7)	When this jumper is moved to the <i>Batteries</i> position, power is supplied to the SDK board through the two AA battery sockets on the bottom of the SDK board.
	Special care should be taken when selecting batteries to power the SDK. High quality alkaline batteries should be used. Do not mix battery types or batteries that have been used unequally as performance could suffer. Four alkaline batteries produce a voltage of six volts. A minimum of 5.5 volts is required to power the SDK board. Power should be constantly monitored when using

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Switch	Definition
	battery power.
	If <i>USB Power</i> is selected, the transceiver and development board receives power from the USB port. USB power should only be used for AC4486 , AC4490, AC4790, and AC4868 product families. Most USB ports can only supply 500 mA of power max, therefore it is recommended that USB power only be used with transceivers that draw less than 300 mA peak. Though PCs should have over-current protection for their USB ports, drawing too much current through the USB port has the potential to cause damage to the PC and should be avoided.

Table 4: DB9 (J2) signal definitions

J2 Pin #	J1 Pin #	Signal Name	Description	Direction
1	36	DCD	Data Carrier Detect	Ι
2	14	RXD	Receive Data	Ι
3	16	TXD	Transmit Data	0
4	34	DTR	Data Terminal Ready	0
5	1, 20, 21, 40	GND	Ground	
6	32	DSR	Data Set Ready	I
7	27	RTS	Request to Send	0
8	23	CTS	Clear to Send	I
9	19	RI	Ring Indicator	I

Note: I/O direction is relative to the PC.

Table 5: SDK board to transceiver pin definitions

J2 Pin #	Туре	AC5124 Pin #	AC5124 Signal Name	AC1524/ AC3124/ AC4424/ AC4490/ AC4486/ AC4868 Pin #	AC1524/ AC3124 Signal Name	AC4424 Signal Name	AC4490/ AC4486 Signal Name	AC4790 Signal Name	AC4868 Signal Name
1	GND	1	GND	5	GND	GND	GND	GND	GND
2	I	2	PKTMODE	17	TE	Command/ Data	Command/ Data	Command/ Data	Command/ Data
3	VCC	3	VCC	10	VCC	VCC	VCC	VCC	VCC
4	NC	4	NC	_	NC	NC	NC	NC	NC
5	VCC	5	VCC	_	NC	NC	NC	NC	NC
6	NC	6	NC	_	NC	NC	NC	NC	NC
7	NC	7	NC	-	NC	NC	NC	NC	NC
8	NC	8	NC	19	NC	NC	DA_Out	NC	DA_Out
9	NC	9	NC	-	NC	NC	NC	NC	NC
10	NC	10	NC	-	NC	NC	NC	NC	NC

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J2 Pin #	Туре	AC5124 Pin #	AC5124 Signal Name	AC1524/ AC3124/ AC4424/ AC4490/ AC4486/ AC4868 Pin #	AC1524/ AC3124 Signal Name	AC4424 Signal Name	AC4490/ AC4486 Signal Name	AC4790 Signal Name	AC4868 Signal Name
11	0	11	RSSI	13	RSSI	RSSI	RSSI	RSSI	NC
12	NC	12	NC	-	NC	NC	NC	NC	NC
13	NC	13	NC	-	NC	NC	NC	NC	NC
14	0	14	TXD	2	TXD	TXD	TXD	TXD	TXD
15	0	15	In Range	20	In Range	In Range	In Range	Session Status	In Range
16	Ι	16	RXD	3	RXD	RXD	RXD	RXD	RXD
17	Ι	17	RI_In	-	NC	NC	NC	NC	NC
18	NC	18	NC	-	NC	NC	NC	NC	NC
19	0	19	RI_Out	9	NC	NC	GO1	GO1	GO1
20	GND	20	GND	18	RE	NC	AD_In	AD_ln	AD_In
21	GND	21	GND	-	NC	NC	NC	NC	NC
22	Ι	22	DCD_ln	-	NC	NC	NC	NC	NC
23	0	23	CTS	7	CTS	CTS	CTS	CTS	CTS
24	NC	24	NC		NC	NC	NC	NC	NC
25	NC	25	NC		NC	NC	NC	NC	NC
26	Ι	26	BDSEL	12	Test Mode/ Packet Frame	9600 Baud/ Packet Frame	9600 Baud	9600 Baud	9600 Baud
27	Ι	27	RTS	8	NC	RTS	RTS	RTS	RTS
28	NC	28	NC		NC	NC	NC	NC	NC
29	NC	29	NC		NC	NC	NC	NC	NC
30	NC	30	NC		NC	NC	NC	NC	NC
31	NC	31	NC		NC	NC	NC	NC	NC
32	0	32	DSR	6	Hop Frame	Hop Frame	Hop Frame	NC	Hop Frame
33	NC	33	NC		NC	NC	NC	NC	NC
34	Ι	34	DTR	4	NC	NC	GI0	GI0	GIO
35	NC	35	NC		NC	NC	NC	NC	NC
36	0	36	DCD_Out	1	NC	NC	GO0	GO0	GO0
37	Ι	37	Write Enable	14	Write Enable	Write Enable	GI1	GI1	GI1
38	I	38	µP_Reset	15	µP_Reset	µP_Reset	µP_Reset	µP_Reset	µP_Reset
39	VCC	39	VCC	11	VCC	VCC	VCC	VCC	VCC
40	GND	40	GND	16	GND	GND	GND	GND	GND

I = Input to the transceiver

O = Output from the transceiver

NC = No Connection (though there is an internal connection in some instances; this pin should be left disconnected)

Note: The 40-pin header (J1) on the SDK board maps directly (pin-for-pin) to the 40-pin connector (J3).

Interfacing the SDK Board to Other RS-232 Hardware

The development kit serial board is defined as DCE (Data Communications Equipment). DCE is wired to interface directly with DTE (Data Terminal Equipment). Typically, DTE is defined as a PC and DCE is defined as a peripheral. To interface DCE to other DCEs, or DTE to other DTEs, a null modem is required. The null modem swaps pins to convert a DCE to a DTE and vice-versa. Normally, a null modem consists of a female and a male DB9 connector. A typical null modem configuration is shown in Table 6.

DCE Pin #	DCE Signal Name	DCE Direction	DTE Pin #	DTE Signal Name	DTE Direcion	Null Modem Female DB9	Null Modem Male DB9
1	DCD	0	1	DCD	I	1	4 or NC
2	TXD	0	2	RXD	l	2	3
3	RXD	l	3	TXD	0	3	2
4	DTR	I	4	DTR	0	4	6 and 1 or NC
5	GND		5	GND		5	5
6	DSR	0	6	DSR	I	6	4 or NC
7	RTS	I	7	RTS	0	7	8
8	CTS	0	8	CTS	I	8	7
9	RI	0	9	RI	I	9	NC

Table 6: DTE, DCE, and Null modem signal definitions

Interfacing the SDK Board to RS-485 Equipment

The SDK serial board has been designed to interface to RS-485 equipment. If such operation is desired, the COMM Select jumper should be set to **RS485 Enable**. The RS-485 circuitry used by the SDK board has been specially designed to negate the requirement for a DE/RE signal. Thus, the receiver is always enabled unless the transceiver has something to send to the OEM host. The OEM must ensure that the OEM host does not send data at the same time as the transceiver; otherwise a RS-485 contention occurs because the RS-485 hardware is half duplex.

RS-485 Pin Name	Description
A TRUE	The non-inverted form of the serial data. This pin is at rest High.
B INVERT	The inverted form of the serial data (an exact inversion of A TRUE). This pin is at rest Low.
GND	GND
+5V	This is regulated 5V output from the serial board for general purpose use. A maximum of 100 mA should be drawn through this node.

Table 7: RS-485 header pins

Power Requirements

The serial board employs a National LM2940 linear regulator to regulate the incoming voltage to 5VDC. Due to heat dissipation limitations and current requirements, a maximum of 10VDC should be present at connector J4. A minimum of 5.5V should also be present at the connector.

SOFTWARE

USB Software Installation

To install the USB software, follow these steps:

- 1. Disconnect the SDK hardware from the USB port of the PC (if it is currently connected).
- 2. Close any open USB driver installation menus.
- 3. Locate the RAMP product page on the Laird website: <u>www.lairdtech.com/ramp</u> > Product Information
- 4. Scroll down to the RAMP RF Development Kits section.
- 5. Click the USB Drivers link to download the USB drivers .zip file.

SDK Software Installation

To install the SDK software, follow these steps:

1. Locate the RAMP product page on the Laird website:

www.lairdtech.com/ramp > Product Information

- 2. Scroll down to the RAMP RF Development Kits section.
- 3. Click the Configuration Utility link to download the DVK software .zip file.
- 4. Install the development kit software. The first time the software is run, the following message displays:

AeroComm	Development Kit Utility	×
Welcome	to your AeroComm Wireless Developr Please select a product.	nent Kit Utility.
	ОК	

5. Click OK.

The software attempts to open COM1 of the PC. If there is a conflict or the port does not exist, the software shows the port as unavailable. This may occur for one of the following reasons:

- There is other software running that has control over the COM1 port. Locate this software and shut it down while running the Laird OEM software.
- The PC does not have a COM1 port or the port has been disabled.

PC Settings

The first time the Configuration Utility is run, the PC Settings tab automatically displays (Figure 2)

Select the appropriate product in the Product drop-down menu to automatically set the default baud rate for the applicable product family.

If the COM port is listed as unavailable, select a different COM port from the Port drop-down menu.

The software can use two serial ports if the Enabled checkbox is selected.

Port1/Port2 Settings

The software can control up to two COM ports including virtual COM ports which physically map to USB or Ethernet ports. Select the applicable port (COM1 through COM 16) from the Port drop-down menu.

Configure	Range Test	Terminal/Chat	Command	PC Setting
Port1 Settings		Optio	ns	
USB / CON	1 Por: Find	Open Port 🔽	Save Settings on Ekit	
C TCP/ IP Por	t Ports	Close Port	Read/Write with AT Con	nmands
Fort Status:	Upen		S	
Port	Communications Port (LI		Jot	
Baud Rate:	57600	✓ Pro	duct: AC4490	<u> </u>
Data Bits:	8		AC4790	R
Dubu	None	-	AC4424	
Fanty:	la.		AC4486-5 AC4868-250	
Stop Bits:	Ťi.		AC5124	
C USB / COM C TCP//P Por Port Status: Port Baud Rate: Data Bits: Parity: Stop Bits:	Por: Closed Communications Port (CC 57600 8 None 1	Dpen Port Close Port		
		Ę	About	Help

Figure 2: PC Settings tab

Options

Save Settings on Exit

When enabled, all changes made to the Settings page are automatically loaded the next time the software is run. Otherwise, changes are discarded.

Read/Write with AT Commands

When enabled, the software uses AT commands for its read/write EEPROM functions instead of the standard configuration commands. This is only available for the AC5124 (when enabled in EEPROM), AC4424, AC4486, AC4490, AC4790, and AC4868. It is ignored for all other product modes.

Status Bar

Located at the bottom of the software, the status bar gives the state of Port 1, RTS Port 1, CTS Port 1, Port 2, RTS Port 2, and CTS Port 2 lines. When the text appears black, the current state displays. When the text appears grey, the current state is not displayed. The text shown in the bottom status bar gives a simplified status of the current, pending software process. The software has no pending process when *Communications Idle* is displayed.

About

Click **About** to determine the software revision number and Laird contact information.

Help

Click Help to access the Help files.

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Configure

The Configure tab provides a GUI representation of the 256 byte EEPROM contents within the radio.

The same data is shown in a full hexadecimal dump of the EEPROM in the EEPROM Editor view. Figure 3 displays the configure tab as it appears until a radio is successfully read.

Note: All Configure text boxes have a Hex button located to the right of the box. When selected, you are able to choose between the Hexadecimal and Decimal numbering format. When the program is restarted, all text boxes revert back to Hexadecimal.

Configure	Range Test	Terminal/Chat	Command	PC Settings	
Radio Interface		Rad	io RF		
Interface	Timeout:	Hex	Mode		
RF Pac	ket Sze:	Hex	<u>R</u> F Mode		
!	CTS On:	Hex	RF Channet	Hex	
	CTS Off:	Hex	Sync to Channet	Hex	
Transmit	t Retres:	Hex	Sub Hop Adjust	Hex	
Broadcast A	Attempts:	Hex	Freguency Offset	Hex	
Stop B	lit Deay:	Hex	Max Power	Hex	
Range	Refresh:	Hex	System ID:	Hex	
Radio Other E Dest MAC Address:	Baud:	Calc Baud	io Features Nuto Config T BTS Enable Sync Channel T Full Duple <u>x</u> Ptcl Status Barity Nuto Channel Modem 185 DE/RE Dne Eeaco	ed F Broadcast F Unicast Onl Auto Dest F DES n F Becv API	
Dest DES MAC Address: Eirmware Version:	Addr: 1 : Key: D.O.B.: ROM View	Hex F 4	trol Status ently uuto Channel Modem 185 DE/RE One Eeaco	│ Auto Des │ DES n │ <u>R</u> ecv AP	

Figure 3: Configure tab

Read Radio

To update the Configure and EEPROM Editor View pages with the EEPROM contents of a radio currently connected to the proper port on the PC, click **Read Radio**. Figure 4 displays a Configure page after a transceiver has successfully been read.

Write Radio

After making changes to the controls on the Configure page, click **Write Radio** to save the changes to the radio EEPROM.

Port 1/Port 2

Whichever is selected (Port 1 or Port 2) determines which port the Read Radio and Write Radio use to communicate.

Configure	Range Test	Terminal/Chat	Command	PC Settings
Radio Interface		Radio R	F	
Interface 1	Timeout: 4	Hex	Mod <u>e</u>	Client
RF Pac	set Size: 46	Hex	<u>B</u> F Mode:	Acknowledge 🖉
	TS On: D2	Hex	RF Channet	0 Hex
	CTS Off. AC	Hex	Sync to Channet	1 Hex
Transmit	Retres: 10	Hex	Sub Hop Adjust	A0 Hex
Brgadcast A	ttempts; 4	Hex	Freguency Offset	1 Hex
Stop B	it Deay: 3	Hex	Max Po <u>w</u> er.	F Hex
Range I	Refresh: 48	Hex	System ID:	1 Hex
Radio Uther B Dest MAC Address: 00 50 Eirmware Version: V	aud: 57600 Add: FF	Calc Baud Calc Baud F Hex 5D 6DHex 2005 Calc Baud F Auto Ptcl 485 I 485 I 2005	config	abled Broadcast Deg Unicast Only Auto Dest DES acon Recv API
GUI View EEPF Editor	Compare EE	Load File Save to F	ïle Print W	rite Radio Read Radio

Figure 4: Configure tab after a radio has been successfully read

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Calc Baud

The Baud drop-down menu includes all standard PC baud rates. To select a non-standard baud rate, click Calc Baud.

To calculate the settings for a specific baud, type that rate into the Desired Baud Rate text box and click Calculate. If the baud rate is not supported by the radio, an error message displays. Otherwise, the baud rate information displays and the Update button is enabled.

Click Update to allow the displayed Actual Baud Rate to be displayed in the Baud window on the Configure page of the software.

Click **Cancel** to ignore the changes.

De die Oliker		1
Baud 57600	0 👻 Calc Baud	
Dest Addr. FF FF	FF FF FF FF Hex	
DES Key: OD 10) 2D 3D 4D 5D 6D Hex	
🛢 Calculate Baud Rate	9	
Desired Baud Rate	19200	Calculat
Actual Devel Deter	19200	Update
Actual Baud Hate:	0	Cancel
Baud High (Address 43H):	Г. А.	-
Baud Low (Address 42H):	11.4	

The Actual Baud Rate does not always match the Desired Baud Rate. However, the program Note: verifies that the Desired Baud Rate is within 3% of the Actual Baud Rate (as required by the radio).

GUI View/EEPROM View

When the EEPROM Editor View button is selected, the Configure window changes from the GUI view to the EEPROM Editor view (a hexadecimal dump of the full 256 byte EEPROM resident on the radio). (Figure 5)

Configure Range Test Terminal/Chat Command PC Setting: 0 1 2 3 4 5 6 7 8 9 A B C D K F At 55 C 7 8 9 A B C D K F At 55 C 7 8 9 A B C D K F At 55 C 7 8 9 A B C D K F At 55 C 7 8 9 A B C D K F At 55 C 3 3 0 5 0 S 0 S 0 S 0 S 0 Command PT F F F F F At 7 3 0 S 0 S S S S S S S S S S	490 Con	figu	irat	ion	/Te	st U	tilii	у												
0 1 2 3 4 5 6 7 8 9 A B C D E F 0000 1 2 3 4 5 6 7 8 9 A B C D E F 0010 70 70 72 65 6 7 65 7 4 0 4 0 4 0 20 4 0 4 2 2 2 0 4 2 6 5 0020 2 E 34 2 C 31 0D 41 90 FF F 0030 00 D 6 0 0 00 FF A0 0A P4 05 E 3 03 18 48 02 FF 900 90 0 0040 00 2 FC 00 0 2 14 01 09 0F F7 0 FE 10 04 09 4 0 7 70 90 1 0050 02 00 C 6 0 0 00 FF A0 0A P4 05 E 3 03 18 48 02 FF 900 90 90 70 90 90 90 90 90 90 1 0050 02 00 C 6 0 0 0 0 FF F	Configure		Υ		Rar	nge 1	est		Υ	T	ermi	nal/(Chat		ľ	- 3	Comr	mand	PC Set	tings
OQAO O1 O2 O5 O4 O5 O6 O7 O8 O9 OA OB OC OF OF O8 O9 OA OB OC OF FF F	0000 0010 0020 0030 0040 0050 0050 0060 0070 0080 0090	0 70 28 00 02 00 FF 00 34	1 45 79 34 D6 02 03 20 FF 50 34	2 52 72 2D 9F 9C 0C 9F 67 35	3 4F 69 31 00 00 00 60 FF 15 30	4 43 67 0D 02 07 A0 FF 28 FF	5 4F 68 41 FF 14 00 00 FF 01 FF	6 4D 74 90 A0 01 43 56 01 FF FF	7 4D 20 FF 0A 0E 07 90 FF FF FF	8 20 32 FF F4 90 04 08 FF FF FF	9 49 30 FF 05 FF 04 2F FF FF FF	A 4E 30 FF E3 70 01 6C FF FF FF	B 43 55 FF 03 FE 46 F3 E3 FF FF	C 2E 0D FF 18 10 D2 00 46 FF FF	D 0D 56 FF 48 04 AC 00 FF FF	E 43 20 FF 02 09 23 FF FF FF FF	F 6F 36 FF 40 08 FF FF FF	ARDOCOMM : pyright 2: .4-13AD33; yydyyyyy0; yygDyyCy3; y y`yVDy, yyyyyyyyy; y y'yVDy, yyyyyyyyy; y yyyyyyyyy; y gy(yyyy; 449000000	INC.ÿCo 005ÿV 6 9999999 9899499 9899999 9997999 9989999 9999999 9999999	
Bute Description: Copyright [28]	00A0 00B0 00C0 00D0 00E0 00F0	01 70 FF 0D 08 F9	02 80 FF 1D 18 F9	03 AC FF 2D 2C FE	04 C0 FF 3D 05 FD	05 E0 FF 4D FF FE	FF FO FF SD FF FE	07 FF FF 6D FF FF	08 FF FF 00 FF 00	FF FF FF FF FF	FF FF FF FF FF	OB FF FF FF FF Ol	FF FF FF FF FF O2	OE FF FF FF FF O2	FF FF FF FF FF 02	50 FF FF FF FF 03	FF FF FF FF O3	4390999999 9999999999 9999999999 999-9999999	22222222222222222222222222222222222222	
				But	te De	escrij	otion	- [C	opyri	ight	[28]									
	rt 1 Por	12			C	Comp	are	E	[]	.oad	File		Save	to F	ile		Print	Write Ra	adio Read	d Ra
rt 1 Port 2 Compare EE Load File Save to File Print Write Radio Read Ra	1: Open ications idl		RT	S Po	rt1:	ligh		CTS	6 Po	rt1: L	.ow	Ţ	Po		Close	be		RTS Pot2: High	n J CTS P	ort2:

Figure 5: EEPROM Editor view

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Compare EE | Load File | Save to File | Print 😽 Write Radio | Read Radio

 Compare EE – The Compare EE button allows you to compare two or more saved EEPROM files. This can be useful when analysing the performance of two or more transceivers. (Figure 6)

Address:	Description:	Summary:	
41	Type	(I)=UI,(I)=UZ	
74	Destination ID [1]	(1) = 28, (1) = 48	
75	Destination ID [0]	(1) = 01, (1) = 42	
84	IEEE MAC Address [1]	(1) = 28, (1) = 48	
85	IEEE MAC Address [0]	(1)=01,(1)=42	
<			

Figure 6: EEPROM comparison

- Load File The Load File button allows you to load a previously-created file to restore an EEPROM to a former state.
- Save to File The Save to File button allows you to save an EEPROM to a file. The saved EEPROM can be restored at a later time.
- **Print** Click to print the EEPROM dump window or the GUI view.

Terminal/Chat

The **Terminal/Chat** tab (Figure 7) allows you to send small data packets between two COM ports. As data is received, it is added to the appropriate Port window.

- Send Click Send to send the data in the text box out to the selected port(s). The current Window user's username is also sent with the data.
- ASCII Display or Hexadecimal Display Select the applicable radio button to display the newlyreceived data in ASCII format or Hexadecimal format.
- Clear Click Clear to erase all text that is displayed in the text windows.
- Font Click Font to change the font used in both text boxes.

Configure	Range Test] Terminal/Chat	Command	PC Settings
Port 1:	0		Line: 1	of 1
21				181
Dud D			12.00	11
P UR Z.	0		Ling. J	UL I
<				2
Send				Port 1 Por
ASCII Display				
C Hexadecimal Disp	lay	Clear	Font Print	Save to F
	· · · ·			

Figure 7: Terminal/Chat tab

- **Print** Click **Print** to print the text in either of the two Port text boxes.
- Save to File Click Save to File to save the text in either of the two text boxes to file.

Range Test

The Range Test tab allows you to send data packets between two radios and it reports the number of successes and errors. (Figure 8)

- **Test Selection** There are six test options; each uses one of the following hardware setups:
 - Setup #1: One radio is plugged into a serial or USB port on a PC. The second radio is plugged into a separate power supply and has the Comm Select jumper set to *Loopback*.
 - Setup #2: One radio is plugged into a serial or USB port on a PC. The second radio is plugged into a different serial or USB port on the same computer.
 - Setup #3: One radio is plugged into a serial or USB port on a PC. The second radio is connected to a serial or USB port on another PC.



Figure 8: Range Test tab

If using two PCs for the test, the software on both sides should have the second COM port disabled on the Settings tab.

	Port 1 Action	Port 2 Action	Hardware Setup
Port 1 → Port 2	Tx	Rx	2
Port 2 → Port 1	Rx	Tx	2
Port 1 ←→ Port 2	Tx/Rx	Tx/Rx	2
Port 1 Send Only	Tx	Not Applicable	3
Port 1 Receive Only	Rx	Not Applicable	3
Port 1 Loopback	Tx/Rx	Not Applicable	1

- **Transmit Packet Selection** This section allows you to select the data packet used to perform the range test. You may either create data of a specified byte length or load your own text or configuration file.
- **Test Type –** Select one of the following to determine the type and length of the test:

Test Type	Description
Continuous	Test runs until stopped
Timed	Test runs for a specified time
Number of Runs	Test runs for a specified number of runs
Single Step	Test runs for a single step
Break on Error	Test runs until an error occurs

- Receive Packet Display This section allows you to select how the received packets are displayed. Received packets can be displayed in ASCII or Hexadecimal format, marked with a time stamp, and/or displayed only when an error occurs.
- Timing –This section allows you to modify the Transmit and Receive timing of the test.
 - **Tx Delay** Allows you to modify (in ms) the delay between transmissions.
 - Rx Timeout Allows you to specify the total amount of time that you want a packet to be displayed.

- Test Results Displays the following test results:
 - Runs Displays the number of runs that occurred during the test whether or not errors occur.
 - Errors Indicates the number of errors that occurred during the test.
 - Percentage Good Displays the percentage of successful test results.

 $\frac{\text{Runs-Errors}}{\text{Runs}}*100 = \text{Percentage Good}$

- Approximate Throughput Uses a rough calculation to display the amount of data transferred in bits per second (bps).
- **Port 1/Port 2** The Port 1 and Port 2 text boxes display the Transmit and Receive activities for the applicable port. Use the View Tx Packets/View Rx Packets radio buttons to choose which to display.
- Save to File Click to save the contents of the Received Data text box.
- Clear Click to return all statistics and errors back to zero. This button can be used while a test is running.
- Stop Click to halt the current test. This function does not clear the statistics and errors.
- Run (F10) Click Run or F10 to begin a test.

Command

The Command tab is used to send configuration (CC – product family dependent) and AT commands (product family dependent) to the radio on the selected port (Figure 9).

- **Command Name** The length of the command name is not restricted and is not a software requirement.
- **Commands** Displays the commands that are sent to the radio.
- Radio buttons The software sends one command at a time. Select the desired command by clicking the applicable radio button.
- Optional Comments The length of the comment is not restricted and is not required by the software. The command description/comment is displayed when that command's radio button is selected.

	Range Test	Terminal/Chat	Command	PC Setting
Command N	lames: D	ommands:		
Status R Read CH Write CH AT Enter Exit AT C Last Bea Last Pac C	equest annel to 10h Cmd Mode Cmd Mode con RSSI ket RSSI	CC 00 00 CC C0 40 01 CC C1 40 01 10 41 54 28 28 28 0D CC 41 54 4F 0D CC 22 CC 26		
Optional Com <u>R</u> eceived Da	ments: ta Port1:			×
	ta Port2:			
Beceived Da				~
Beceived Da	AT Enter/Exit Comm	and Mode F Perfc	rm Reset After Completi	n

Figure 9: Command tab

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 Received Data Port1/Port2 – Data received over the serial port while on the Command tab (whether or not in response to a command) is displayed in the Received Data window in hexadecimal format (Figure 10).

	0	l	2	з	4	5	6	7	8	9	A	в	С	D	E	F	1
0000	CC	40	01	00													
																	2
S. 61		3/12															
eceiv	edDa	ata P	ort2:	8													
																	1

Figure 10: Received Data Ports text boxes

- AT Enter/Exit Command Mode When selected, the radio enters Enter/Exit AT Command mode to complete the selected command by creating a virtual version of the Command/Data Line.
 - Enter AT Command mode Asserts this virtual line Low (to enter Command mode)
 - Exit AT Command mode Asserts this virtual line High (to enter Data mode)
- Perform Reset After Completion When enabled, the radio is reset after the selected command is complete.

Note: This feature is supported by all product families except the AC1524 and AC3124 families.

- Port 1/Port 2 Buttons Determines the port for which received data is displayed.
- Clear Clears the Received Data screens.
- Load Click to load a different command file onto the Command tab.
- Save Click to save current changes to the Command tab.
- Send Comm Click to send the selected command by way of the selected port.

TROUBLESHOOTING

Issue	Solution
No lights on the SDK board.	 Check the power connection. The VCC LED should be lit when power is applied to the serial board. Ensure that there is nothing shorting the VCC to GND and that the radio is properly seated into the interconnect board. Ensure that all jumpers are installed correctly.
Radio EEPROM cannot be read by the .exe file.	 Verify that power is applied and that the serial/USB cable is connected to the serial board and the PC. Try resetting the radio with the Reset button. Verify that the correct serial/USB port is selected in the software (Port 1 or Port 2). Verify baud rate and port address on the PC Settings tab. Ensure that the Program Mode/Normal Mode switch is set to Normal Mode and Read/Write with AT Commands is selected on the PC Settings tab. Check to make sure the FORCED CONFIGURATION jumper is in the correct position. Verify the COMM SELECT jumper setting.
Writing to the EEPROM fails.	 Press and hold the Write Enable button before writing to the EEPROM if using the AC1524, AC3124, AC4424, and AC5124 product families. Reset the radio (using the Reset push-button) before retrying.
EEPROM can be read/viewed with the OEM software, but data cannot be sent between the two transceivers using the .exe file.	 Ensure that the Status 1 LED is not turned on. If so, find out what is driving RTS Low (and turning on the Status 1 LED); either slide the Program Mode/Normal Mode switch to Normal or cause RTS to go High. If the Status 1 LED is not lit, reset both radios. Make sure both transceivers have the same Channel Number and System ID (if applicable). Check all cables and connections. Ensure that one radio is a server and one is a client (excluding AC4790). Check radio addressing. Ensure that the radios are separated by at least ten feet. Make sure the In Range LED is lit on both transceivers.
Packets can be sent between both radios using the .exe file, but cannot be sent from software or hardware not supplied by Laird.	 Use the Hardware section of this guide to determine if a null-modem adapter is required for interfacing to the hardware. Ensure that the baud rate of the radios matches that of the OEM Host hardware. Ensure that the Status 1 LED is not turned on. If so, find out

to go High .
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e

Central Standard Time.



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