



CreataLink TM XT

Data Transceiver

Series: Product Family 91B

Installation and Operation

Issue Date: October 15, 1998

68XXXXXXXX-O



MOTOROLA

CreataLink 2 XT

Data Transceiver

Series: Product Family 91B

Installation and Operation

Issue Date: October 15, 1998

68XXXXXXXX-O



MOTOROLA

Foreword

General Information

The information in this manual has been reviewed for accuracy. However, no responsibility is assumed for inaccuracies. Motorola Inc. reserves the right to make changes to any products discussed herein. The information in this document is subject to change without notice. Motorola Inc. assumes no liability for hardware or software damage or loss of data because of errors or omissions in this manual. Motorola Inc. does not assume any liability arising from the application or use of any products or circuits described herein. Neither does Motorola Inc. convey any license under its patents or right of others.

Refer questions concerning the contents of this manual to the following location:

Motorola, Inc.
Paging Products Group
3301 Quantum Boulevard,
Boynton Beach, FL 33426

or telephone: **1-800-MOT-FASD**

Refer questions regarding warranty repair to Motorola Paging Products Group:

telephone: **(888) 668-3273**

Refer all other product inquiries to the One-Call-Support Center:

telephone: **(800) 520-7243**

Computer Software Copyrights

The Motorola products described in this manual might include copyrighted Motorola computer software stored in semiconductor memories and other media. Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted computer programs, including the exclusive right to copy or reproduce in any form the copyrighted computer software.

Accordingly, any copyrighted Motorola computer software contained in the Motorola products described in this manual cannot be copied or reproduced in any manner without the express written permission of Motorola.

Furthermore, the purchase of Motorola products does not grant, either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Motorola, except for the normal, nonexclusive, royalty-free license to use that arises by operation of law in the sale of a product.

Trademarks

CLP, CreataLink, FLEX, Motorola, the Motorola logo, and ReFLEX are trademarks or registered trademarks of Motorola, Inc.

MAXIM is a registered trademark of MAXIM Integrated Products, Inc. Other trademarks are noted as such throughout this document.

Trademarks contained herein are the acknowledged property of their respective owners.

Important Safety Information

The installation, maintenance, and / or operation of this equipment may present potentially unsafe conditions, including, but not limited to, electrical shock, improper voltage to components, and improper operation that can cause personal injury, death or damage to property.

Read Instructions: Read all the safety instructions before operating the equipment. Retain these safety instructions for future reference. Specialized procedures and instructions are required and must be followed. Also, all applicable safety procedures, such as Occupational, Safety, and Health Administration (OSHA) requirements, National Electric Code Requirements, local code requirements, safe working practices, and good judgement must be used by personnel.

Heed Admonitions: Adhere to all warnings on the equipment and in the operating instructions. Follow all operating and use instructions. Two safety admonitions are used in this instruction manual to indicate:

- Personal injury or equipment damage.



This safety admonition applies to an operating or maintenance procedure, practice or condition which, if not strictly observed, could result in personal injury or damage to the equipment or database.

- Harmful injury that may result in death.



This safety admonition applies to an operating or maintenance procedure, practice or condition which, if not strictly observed, could result in serious personal injury or death.

Mounting: Mount the equipment only as recommended by the manufacturer. Situate the equipment away from heat sources such as radiators, heat registers, stoves, or other equipment (including amplifiers) that produces heat.

Power Sources and Grounding: Connect the equipment to the type of power source described in the installation instructions or as marked on the equipment. Take precautions to avoid defeating the grounding or polarization provisions of the equipment. Disconnect the power to the equipment by a circuit breaker when left unused for long periods of time.

Cleaning: Clean the outside of the equipment by using only a damp cloth. Do not immerse the equipment in any type of liquid, including water. Do not use liquid cleaners or aerosol cleaners. Dirt or other foreign matter should not be allowed to accumulate in the interior of the enclosure.

Damage Requiring Service: Do not attempt to perform service functions that are not described in the operating instructions. All other servicing should be referred to qualified service personnel.

Motorola is not responsible for static damage to equipment not sold under the Motorola logo.

© Motorola, Inc. 1997, 1998. All rights reserved. Printed in the U.S.A.

Introduction

1

This chapter introduces the reader to this document and any other relevant documents. This chapter covers the following topics:

Audience, 1-2

About This Manual, 1-3

Audience

This document provides technical assistance for proper installation and configuration of the CreataLink™2 XT data transceiver (referred to as CreataLink data transceiver).

About This Manual

This document summarizes the product features and defines the installation procedures for the CreataLink data transceiver.

The following chapters are contained within this document:

- Chapter 1: Introduction—This chapter provides a brief introduction to this document.
- Chapter 2: Product Overview—This chapter provides a general description of the CreataLink data transceiver product.
- Chapter 3: Product Specifications—This chapter describes the product and accessories specifications.
- Chapter 4: Installation—This chapter describes the installation procedures for the CreataLink data transceiver.
- Chapter 5: Parts Information—This chapter provides information for ordering accessories.

Product Overview

2

This chapter describes the major parts of the CreataLink data transceiver and the interface components.

General Description, 2-2

Interface Components, 2-3

General Description

The CreaLink™2 XT is a two-way data transceiver supporting the ReFLEX 25 and ReFLEX 50 protocols. Using a RS232 level serial port, the CreaLink2 XT can initiate message transmissions into a ReFLEX NBPCS network as well as decode, store and forward messages received from the ReFLEX network to an interconnected host device. CreaLink2 XT performs all necessary ReFLEX protocol processing to maintain connection to the ReFLEX network, accurately receives and acknowledges messages, and delivers messages in a manner which complies with protocol requirements. The serial port data interface supports the Communications Link Protocol (CLP').

Additionally, CreaLink2 XT supports an 8 bit bi-directional parallel I/O port with the capability of mapping over-the-air messages directly to the port to effect changes in state on output pins and to report changes in state to any input pins. Eight total parallel I/O signals are present, each configurable as in input or output individually.

CreaLink2 XT also will support the ability for 3rd parties to write custom resident applications to meet their needs; thereby, eliminating the necessity of an external interface board in many solutions.

The CreaLink2 XT software architecture is based upon the FLEXKernel real time operating system with the addition of ReFLEX stack software, a message manager, and the CLP default application which provides a 3rd party embedded messaging API. Ownership of the serial port can be passed to a 3rd party application in place of the CLP application via a Motorola provided application framework. The selection of an ARM core based microprocessor provides 32 bit addressing, 16 bit wide data, state of the art software development, and debugging support tools and environment using an industry standard JTAG port.

The serial port data interface supports the Communication Linking Protocol (CLP'). The CLP protocol serial interface provides commands to direct the actions of the CreaLink data transceiver to obtain status information about the network, transmit messages, and download received messages.

The CreaLink2 XT hardware is a single PCB marrying RF, digital, and analog circuitry on a single PCB. The product will contain no housing and will be sold as an OEM product. The

CreaLink data transceiver is available in an external antenna configuration, which provides an industry-standard SMA connection for cabling to a remote antenna.

The CreaLink data transceiver model and configuration are shown (see Table 2-1).

Table 2-1: Model Numbers

Model Number	Configuration
J12GWS0552AE	ReFLEX 50 Creatalink2 XT
J11GWS0552AE	ReFLEX 25 Creatalink2 XT

Interface Components

The Creatalink data transceiver has the following connector interfaces (see Figure 3-1):

- 22 pin polarized-shrouded-header connector used for power, ground, serial communications, parallel I/O, 2 10-bit A/D channels, and a back up/transmit power sourcePower/asynchronous
- 8 pin polarized-shrouded-header, JTAG connector for Software development and download
- SMA connector. This connector is for connecting the external antenna.

Product Specifications

3

This chapter describes the power requirements and specifications for the CreataLink data transceiver and its accessories and presents typical user configurations.

Specifications, 3-2

Power Requirements, 3-3

Connectors Description, 3-4

External Antenna Connector, 3-4

Power / Asynchronous TTL Serial Port, 3-4

Accessories, 3-6

External Antenna Kit, 3-6

Power / Serial Interface Cable Assembly, 3-6

Typical Configurations, 3-8

Specifications

The Creatalink data transceiver general specifications are listed in Table 3-1.

Table 3-1: General Specifications

Item	Specification
Coding format	ReFLEX 50
Operating temperature	-40°C to +85°C
Interface	22 pin vertical shrouded header for combined power supply and TTL serial interface; 8 pin vertical shrouded header for JTAG interface; SMA connector for antenna connection
Power supply requirements	5-9 Vdc, 2A maximum, 100 mV p-p up to 5 MHz ripple
Physical dimensions	Length: 3.75 in (95.25 mm)
	Width: 1.75 in (44.45 mm)
	Height: .7 in (17.78 mm)
	Weight: 1.5 oz (42.5 grams)
Antenna	External SMA connector
Transmitter specifications:	
Frequency	901–902 MHz
RF power output (at antenna port)	2 W
Transmit data bit rate	9600 bps
Modulation	4-level FSK
Frequency stability	1 ppm on transmit
Receiver specifications:	
Frequency	940–941 MHz
Sensitivity	-120 dBm
Receive data bit rate	6400 bps
Modulation	4-level FSK
Channel spacing	50 kHz

Power Requirements

The FLEX protocol for two-way paging provides low power modes of operation for power conservation. In receive mode, all logic and receive circuits are powered, waiting to receive a message. In standby mode, all circuits are in a low power state for power conservation. In transmit mode, all logic circuits and the power amplifier are active and consume larger amounts of current for short durations. The power consumption in each mode is shown below (see Table 3-2).

Table 3-2: Power Consumption

Operating Mode	Current Drain ¹
Standby	500 μ A
Receive	40-50 mA
Transmit	1.4 A

1. Current drain values are approximate.

Connectors Description

The Creatalink data transceiver has three connectors present.

External Antenna Connector

The external antenna connector is a gold-plated SMA female connector. The connector provides a 50-ohm contact to the Creatalink data transceiver board. Any antenna with a standard male SMA connector can be connected to the Creatalink data transceiver.

Power/Asynchronous TTL Serial Port

The 22 pin connector provides electrical power, serial communications input, and I/O capability for the Creatalink data transceiver (see Table 3-3, Table 3-4, and Table 3-5).

Table 3-3: 22 Pin Part Number and Specifications

Part Number	Electrical Specifications
Molex P/N 87332-2220	Max rated @ 2 A

Table 3-4: 22 Vertical Header Connector Pin Signals

Pin Number	Signal Name	Description
1	Supply	Provides Power to Device
2	GND	Ground
3	TXDO	3.3V Serial Data from Creatalink 2XT
4	RS232_TXDO	+/- 5V Serial Data from Creatalink 2XT
5	BATT	Backup Battery
6	BATT_GND	Ground
7	RXDI	TTL Serial Data Received by Creatalink 2XT

Table 3-4: 22 Vertical Header Connector Pin Signals

Pin Number	Signal Name	Description
8	RS232_RXDI	RS232 Serial Data Received by Creatalink 2XT
9	RESET_ENABLE	Enables external reset capability
10	EXT_RESET	External reset pin
11	RX_ACTIVE	3.3V when Creatalink 2XT is receiving a page
12	TX_ACTIVE	0V when Creatalink 2XT is transmitting a page
13	A/D_EXT1	Externally supplied analog input
14	A/D_EXT2	Externally supplied analog input
15	HVIO_0	Open collector output/High voltage input
16	HVIO_1	Open collector output/High voltage input
17	HVIO_2	Open collector output/High voltage input
18	HVIO_3	Open collector output/High voltage input
19	HVIO_4	Open collector output/High voltage input
20	HVIO_5	Open collector output/High voltage input
21	HVIO_6	Driven output/High voltage input
22	HVIO_7	Driven output/High voltage input

JTAG Communication Port

TABLE 3-5: 8 Vertical Header Connector Pin Signals

Pin Number	Signal Name	Description
1	B++	Ice power source
2	TMP1	Mode select
3	ARM_TDI	JTAG Data in
4	ARM_TRST	JTAG reset
5	ARM_TCK	JTAG clock
6	GND3	Ground
7	ARM_TDO	JTAG Data out
8	ARM_TMS	JTAG I/O

TABLE 3-6: 8 Pin and 22 Pin Mating Connector Part Numbers

Part Number	Electrical Specifications
Molex P/N 51110-0860 (Polarized 8 pin receptable)	Max rated @ 2 A with 26 AWG wire
Molex P/N 51110-2251 (Polarized 22 pin receptable)	

Accessories

The following accessory options are available for the CreataLink data transceiver:

- External antenna kit
- Power / serial interface cable kit (for development only)
- Sahara interface pcb kit

External Antenna Kit

The optional external antenna kit includes a low profile antenna and coaxial cable with connector (see Table 3-7).

TABLE 3-7: External Antenna Specifications

Property	Description
Type	Low profile with radome
Transmit frequency	896-902 MHz (data only)
Receive frequency	929-941 MHz (data only)
Impedance	50 ohms nominal
VSWR	1.5:1 maximum
Polarization	Linear, vertical
Gain	0 dBi
Maximum power	5 watts continuous
Coaxial cable	6-foot long RG58/U, with SMA male connector

Power/Serial Interface Cable Assembly

The power / serial interface cable interfaces the 22 pin power and serial I/O signals from the CreataLink data transceiver to end user’s developed product for easy connection.

Typical Configurations

The CreaLink data transceiver has one cable and antenna configurations (see Figure 3-1):

- Interface cable and external antenna

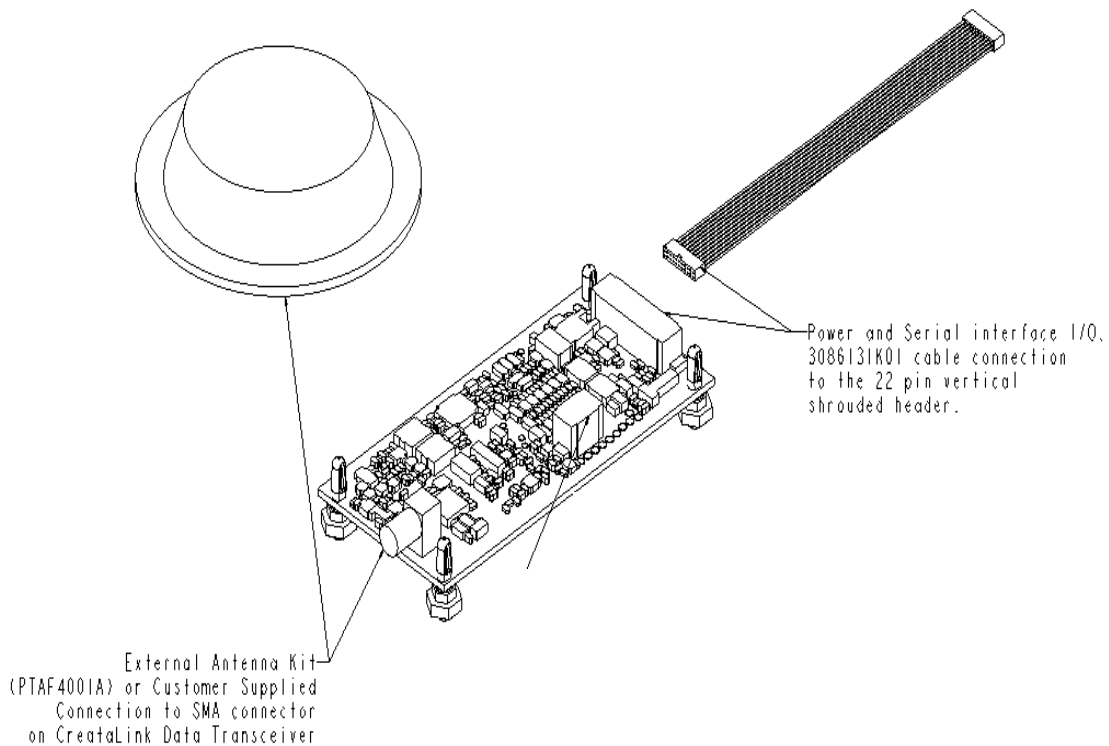


Figure 3-1: Configuration Options

Installation

4

This chapter describes the procedures required to install the Creatalink data transceiver.

Installation Overview, 4-2

Required Tools and Equipment, 4-3

Installation Procedures, 4-4

External Antenna Assembly, 4-5

Creatalink Data Transceiver Installation, 4-5

Power and Serial Port Cable Connection, 4-6

Verifying the Installation, 4-8

Troubleshooting, 4-9

Installation Overview

The CreataLink data transceiver is a small, easy-to-operate product that requires a minimum of space. Installation requires common tools and equipment. A template is provided to use in spacing and aligning the mounting holes (see Appendix A).

The procedures provided are for basic external antenna installation.

It is important to follow the installation procedure exactly as specified and to follow the guidelines listed below, so as to not cause the CreataLink to function improperly and / or cause the CreataLink to become non-compliant with FCC regulations. Listed below are guidelines to follow:

- The mounting location should be in a relatively clean EMI location, away from noisy digital supplies and controllers. This includes mounting inside an enclosure.
- The CreataLink should not be mounted within close proximity of metallic objects, or in a location which would subject the device to constant vibration.
- The voltage supply must be well regulated, free from excessive ripple and voltage spikes. The ripple specification is 100mV up to 5 MHz, anything above with is considered excessive. The voltage supply should not drop below 4.5 V when 1.5 amps are drawn from the supply.
- The external antenna must be mounted in a location where people will never come within 12 inches of the antenna, so as to comply with FCC RF hazard regulations.

Required Tools and Equipment

The tools and equipment required for the installation are listed in Table 4-1.

Table 4-1: Tool and Equipment List

Item	Type	Purpose/Use
Drill and Bit	Drill with .138-inch (#28) drill bit	To drill holes in mounting surface for data transceiver
	1/2-inch drill bit	To drill holes for external antenna (PTAF1001A)
Mounting Standoffs	4 Richco Standoffs p/n SCBSM-3-01 and nuts p/n HN6-32-01 (or some other standoff to mount in .128 inch pcb holes).	To connect data transceiver to mounting surface. End user can design a different mounting scheme for integrating pcb assembly into the end product.
Template	Provided	To mark mounting surface for data transceiver location

Installation Procedures

Follow the installation procedures in the order listed. Take into consideration CreactaLink data transceiver antenna orientation, and electrical noise factors. Check for any door opening and closing interference before mounting the CreactaLink data transceiver, if applicable.

External Antenna Assembly

For proper antenna installation, the mounting surface should be at the highest elevation, flat, clean, and at least 8 inches in diameter. For optimum antenna performance, the mounting surface should be metal with no metal objects within close proximity of the antenna.

1. Select a high, flat mounting surface at least 8 inches in diameter with a maximum thickness of 0.4 inches.

Note: The mounting surface hole should be close enough to the CreactaLink data transceiver location to ensure sufficient cable length.

2. Drill a 1/2-inch hole in the center of the mounting surface.

Note: Do not cut coaxial cable. Changing the length may deteriorate antenna performance.

3. Insert coaxial cable through the mounting surface hole until the external antenna lies flush on the mounting surface.
4. Install the lockwasher and mounting nut and tighten to a snug fit using a 3/4-inch wrench. Do not overtighten.

CreactaLink Data Transceiver Installation

1. Use the dimensions given in Figure 3-1 (37.01 mm and 87.99 mm) to mark the mounting location.
2. Drill four .138-inch (#28 drill bit) mounting holes.
3. Position the CreactaLink data transceiver and install the Richco Standoffs (or other equivalent standoffs to be inserted into the .128 inch pcb holes). Do not overtighten the hex nuts.

Note: Step 4 applies only to the external antenna.



Do not overtighten the SMA mating connector. The connector should be fully seated. Overtightening may cause permanent damage to the data transceiver.

4. Connect the coaxial antenna cable to the CreataLink data transceiver SMA connector. Tighten the cable connector finger tight only. Do not use any tools (open end wrench, adjustable wrench, pliers, etc.) to tighten the cable connector. See Caution Statement Above.

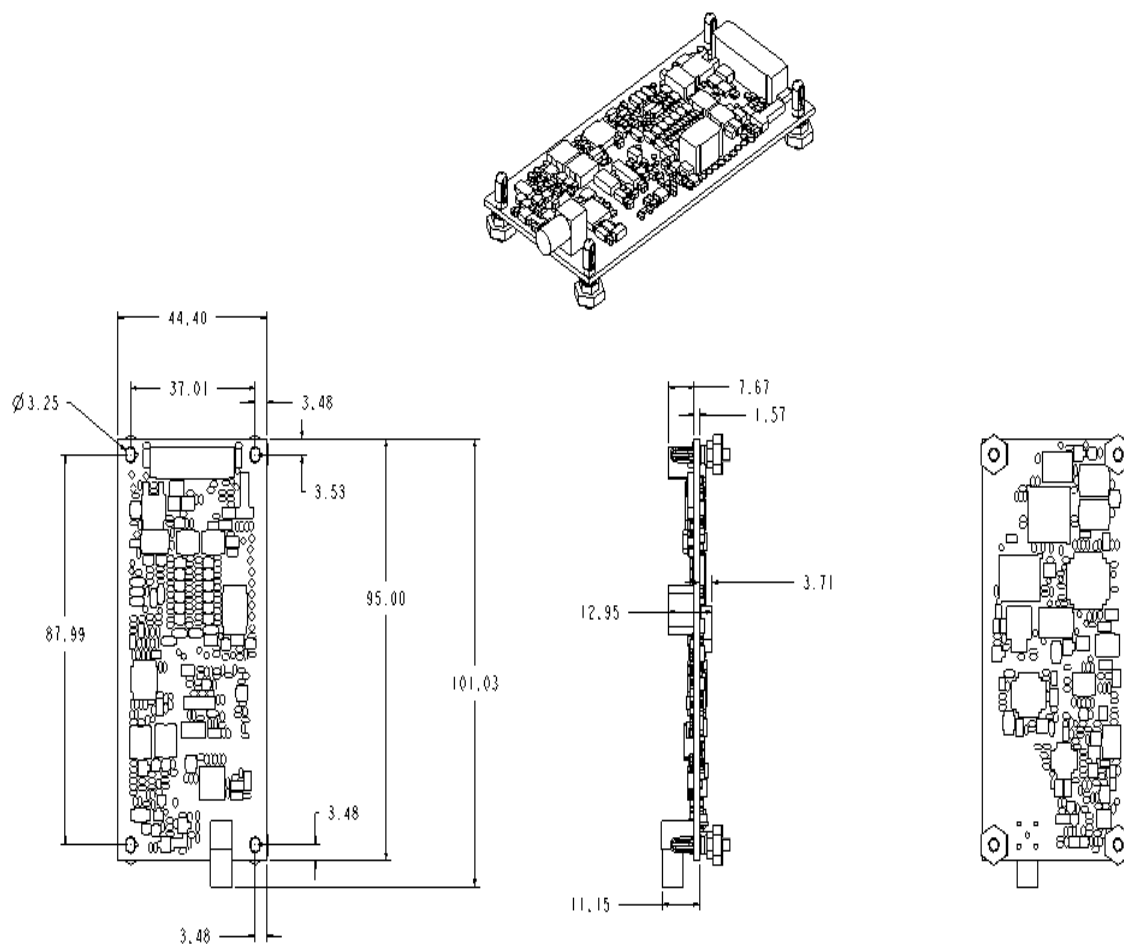
Power, Serial, and JTAG Port Cable Connection

This section describes the procedures for connecting cables and the power supply for both the Motorola RS-232 power cable and a customer-supplied cable assembly.

Note: Use a common ground between the CreataLink data transceiver power ground and the host machine.

Motorola Cable Connection

1. Connect one end of the 22 pin to 22 pin cable (p/n 3086131K01) to the 22 pin shrouded header on the CreataLink datatransceiver and the other end of the cable to the 5-9V power supply along with the data line interface to the end user's product (see Table 3-4 for the CreataLink data transceiver pinout on the 22 pin shrouded header).

**Figure 3-1**

Verifying the Installation

There are several ways to verify that the CreataLink data transceiver can receive and initiate pages. Use the host system built-in test mode if available. If a built-in test mode is not available, use a palmtop or laptop computer with a test application to prompt the CreataLink data transceiver to initiate and read pages. Use the following methods to verify correct installation and check the operation of the CreataLink data transceiver:

- The host system initiates a page directed to another two-way communicator to verify network operation.
- The CreataLink data transceiver initiates multiple pages to itself to verify the capability to send and receive pages.
- Initiate pages from the internet, E-mail, or another two-way communicator to the CreataLink data transceiver.

Troubleshooting

Before performing detailed troubleshooting, check for faults in the external power source, including fuses, circuit breakers, and interlocking safety switches, to eliminate these as the potential sources of problems (see Table 4-2).

Table 4-2: Troubleshooting

Problem	Fault Isolation
No power up	1. Check all interface cables for secure connections. Repair or replace as required.
	2. Check 22 pin connector pin 1 for 5 Vdc and pin 2 for ground.
No serial I/O	1. Check continuity of 22 pin connector at data transceiver connection.
	2. Check 22 pin connector pin 7 for 3.3 Vdc.
No communications	1. Check registration status using proper CLP protocol command. ¹
	2. If not registered, check out-of-range status using proper CLP protocol command. ¹
	3. For internal antenna, check antenna orientation (see Figure 4-1).
	4. For external antenna, check connection at antenna and connection at the CreaLink data transceiver SMA connector.

1. Refer to the Communication Linking Protocol Serial Interface Description, part number 6880498G30, for command description.

Parts Information

5

This chapter contains parts and ordering information for the basic and optional configurations.

Ordering and Parts Information, 5-2

Ordering and Parts Information

Refer to the description and option number to obtain accessories information (see Table 5-1). Order items by calling One-Call-Support at (800) 520-7243.

Table 5-1: Accessories and Options

Description	Accessory Kit Number
External antenna	PTAF1001A
22 Pin Ribbon Cable	
Communication Linking Protocol Serial Interface Description	
CreataLink™ 2 XT Data Transceiver Integrator's Guide	