



DYACON®
RUGGED DATA SYSTEMS



REFERENCE MANUAL

CT630 SERIES

**57-6009 Rev C
Sep 2010**

DYACON®, inc

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CT630 SERIES REFERENCE MANUAL

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Declaration of Conformity

Manufacturer

Dyacon, Inc.
220 West 300 South
Newton, UT 84327
USA

Declares that the product

The CT630 Series™ module, (also known as CT6xx) a rugged vehicle-mounted computer/data terminal intended for connection by I/O ports to a modem or other RS-232 equipment, J1708, and digital inputs and outputs conforms to the following Standards and Specifications.

FCC Conformity

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instructions, may cause harmful interference to radio communications. There is no guarantee, however, that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Warning

Any unauthorized changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

CT630 Series Modules and Their Respective FCC ID Numbers

Enfora, FCC ID MIVGSM0308

Contains FCC ID: MIVGSM0308

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Grant Notes:

Modular transmitter. POWER OUTPUT IS CONDUCTED. The module as used in the CT630 is intended for mobile the installation and must meet the following conditions:

Maximum RF output power and antenna gain to meet Maximum Permissible Exposure Requirements:

GSM850 mode: Power at antenna port is +32 dBm. The maximum antenna gain is 4.5 dBi (2.35 dBd).

GSM1900 mode: Power at antenna port is 31.3 dBm. The maximum antenna gain is 2 dBi in order to meet the requirements of maximum 2 watts EIRP for mobile transmitters.

If RF power and/or antenna gain is desired, a separate FCC certification is required.

Antennas used with this device must be installed to provide a separation distance of at least 20 cm from all persons.

Warranty Information

Limited Hardware Warranty

Dyacon, Inc. warrants that all CT630 Series modules shall be free from defects in materials and workmanship for a period of one (1) year from the date of shipment when properly installed, and operated in accordance with instruction manuals accompanying said hardware and used for the purpose for which said hardware was designed. In the event a defect in materials or workmanship is discovered and reported to Dyacon within said one-year period, Dyacon will at its option repair the defect or replace the defective product. This warranty does not apply where the product has been operated outside the environmental specifications of the product. Dyacon's obligation hereunder will be limited to such repair or replacement. Customer shall have the responsibility to ship the defective equipment to Dyacon at its (customer's) expense, with all cost of shipment prepaid. Dyacon will ship the repaired or replaced item at its (Dyacon's) expense by the same type of carrier as used by the customer in shipment to Dyacon.

Disclaimer of Warranties

The warranties set forth above are in lieu of all other warranties of Dyacon, whether written, oral, or implied. Dyacon makes no warranties regarding its products (hardware or software), including without limitation warranties as to merchantability, fitness for a particular purpose, any warranty arising from course of performance, course of dealing or usage of trade whether any of the foregoing warranties are either expressed or implied. Dyacon specifically makes no warranties as to the suitability of its products for any particular application. Dyacon shall in no event be liable for performance, or use of any product covered by this agreement whether such claim is based upon warranty contract (express or implied), strict liability, negligence, or otherwise. Any responsibility and/or liability of Dyacon shall, in connection with a warranted product, be limited in maximum amount to the original purchase price of that product.

Removal of Serial Number

Removal of the original serial number label from the device voids any warranty on said device. Dyacon will not repair or update a CT630 Series module and return it to an individual if the CT630 Series module is without said serial number label.

Opening the Case

The CT630 Series has no internal user-serviceable parts. If the terminal is opened or in any other way tampered with, all warranties are null and void.

Updates or Modifications

Dyacon shall be under no obligation to update or modify its products except as herein noted to correct defects or errors. Further, customer agrees that all representation and warranties contained herein shall be immediately null and void in the event of any modification, alteration, or change in or to any product effected by or on behalf of customer except for a change made by Dyacon or other direct supervision thereof.

CT630 SERIES INTRODUCTION

Scope

There are three manuals for the CT630:

- (1) 57-6009 CT630 Series Reference Manual
- (2) 57-6008 CT630 Series Software Development Manual
- (3) 57-6010 CT630 Series Quick Start Guide

The content of this document is intended for system integrators, installers, and those who are interested in the hardware aspects of the CT630. Mechanical and electrical descriptions are contained in this document. The system integrator is responsible to provide specific operating instructions and manuals for end users.

CT630 Series General Description

The CT630 Series is a rugged, tracking and communication device intended for the vehicle market. It is an open architecture device, programmable with industry standard tools. It incorporates a powerful ARM based processor, multiple communication ports, and digital inputs and outputs. In addition, it can include GPS, GSM/GPRS, and Bluetooth. It also boasts both SAE J1708 and SAE J1939 interfaces. It includes a built-in UPS to sustain operation during short interruptions in power. With its power supply sensing input, enough time is available for the application to store critical data and put the unit in a low power mode to prevent the loss of data and prevent the corruption of the application.

Note: Reference to the CT630 Series, CT630, CT6xx are found in this manual and should be considered equivalent.

Development Disk

A CD containing the files discussed in this document is available from Dyacon. It can either be purchased directly from Dyacon, or portions of it can be downloaded from Dyacon's web site. Refer to the CT630 Series Software Development Manual and the CT630 Series Quick Start Guide for additional information.

Technical Support

Contact Information

Dyacon, Inc.

220 West 300 South

Newton, UT 84327

Phone: (435) 753-1002

Fax: (435) 753-1262

Email: support@dyacon.com

Internet: www.dyacon.com

Normal business hours are from 8:00 a.m. to 5:00 p.m. (Mountain Time Zone)

Phone / Email Support

If you need technical support via the phone or email, please have the following information ready:

Instrument name, model number, and serial number.

Your name.

Name of company/university/agency.

Phone number, email address.

Billing and Shipping address.

A clear description of the question or problem.

Repairs

If your equipment is in need of repair, call or email for a Return Materials Authorization (RMA) number. Place the RMA number on the outside of the shipping container next to the shipping label or make it a part of the shipping label. Make sure to include a detailed description of the problem and any other additional services that should be performed on the returned unit.

For equipment that is not under warranty, extended warranty, or a maintenance agreement, a purchase order is required before repairs can begin.

PRODUCT OVERVIEW

Model Configuration Table

Feature	Model**					
	CT630-1	CT630-2	CT630-3	CT630-4	CT630-5	
COM1, RS232/RS485	X	X	X	X		
COM2, RS-232	X	X	X	X	X	
COM-D, Console	X	X	X	X	X	
2 Digital Inputs	X	X	X	X		
2 Digital Outputs	X	X	X	X		
J1708	X	X	X	X		
J1939	X	X	X	X		
UPS	X	X	X	X		
Options Available						
GPS	X	X	X			
Cell Phone, GPRS	X	X				
Bluetooth	X					

** Production variations are created as required. Custom versions are available and may not be represented in the configurations shown.

Special Features

Wake from Suspend

The CT630 can be placed in a low power mode using the sleep() or suspend() functions. The unit can be reset to full run mode by any of the following methods.

Real-time clock alarm (Sleep only.)

Data activity on cell phone cell phone RI or CTS. (First characters may be lost.)

Level change on Com 1 CTS

DC Good and the UPS

The CT630 is equipped with an internal un-interruptible power supply (UPS). This circuit will sustain the CT630 for over one minute in full run mode **with all peripherals turned off**.

The CT630 monitors incoming power drops below 7 V. The dc_good() function may be configured to capture the bad power interrupt and shutdown the system in a controlled fashion. The following are suggested actions.

- Disable cell phone
- Turn off digital outputs
- Disable Bluetooth transceiver
- Disable GPS receiver
- Save critical data to flash memory

Software Selectable Com 2 (RS-232/485)

The Com 2 port can be selected as an RS-232 port or a full duplex RS-485. The default mode is RS232.

Electrical Architecture

Processor and Memory

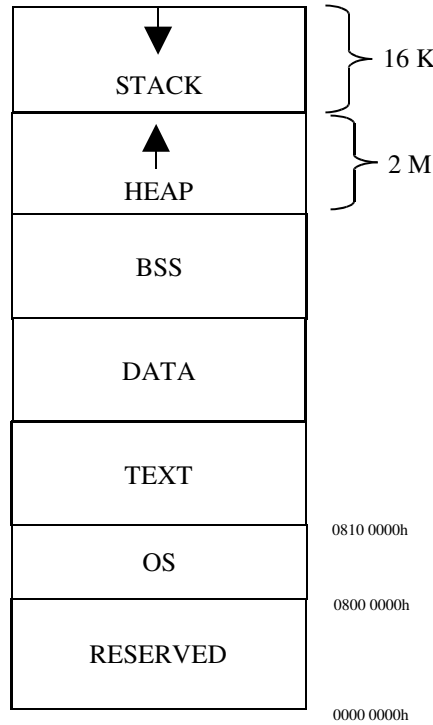
The CT630 uses a Freescale Dragonball iMXL processor.

16 MB of SDRAM is available for run-time memory.

16 MB flash is used for the OS (protected sectors) and the Tiny File System (TFS) is a transaction-based flash file system. More details are available in the software manual.

Memory Map

Following is a simplified block diagram of the memory map.



File System

A close look at the commands provided for the CT630 file system reveals that there are no commands that change the file header, that is, commands to change file type, rename the file, etc.

The file system organizes the files within the flash in a contiguous one-way linked list. The initial portion of the file is a file header, which contains information about the file, pointer to the next file, and 32-bit CRCs of the header and data portion of the file. Maintaining unique CRC checks for the header and data allows the file system to more accurately detect corruption. File size is limited only by the amount of flash allocated to the file system. There is no restriction with regard to sector boundaries.

As files are created, they are appended to the end of the linked list of files. If a file is deleted from the list, it is simply marked as deleted. At some point, after several files have been deleted, it becomes necessary to clean up the file system flash space by running a defragmentation. This requires that a sector be dedicated to the defragmentation process and it also uses a small block of flash at the end of the file system flash space for maintaining a non-volatile state that can be retrieved in the event of an interrupted defragmentation (power hit or reset).

Note that the spare sector resides outside the file system's flash space.

Flash File System

Flash memory is composed of 512 KB sectors. Individual bytes within these sectors can be written, but whole sectors must be erased at one time. This process is handled by the flash file system and is opaque to the application. While the write process is relatively fast, the erase process is slow.

To minimize the impact of erasing sectors during program execution, sectors are tagged for deletion and new or modified data is written to a fresh sector. These tagged sectors, or garbage, accumulate until, combined with active data, the drive is full. Accrual of these unnecessary files

can also cause some delay when processing the linked file list, such as during boot or when retrieving files from flash memory.

Automatic garbage collection is initiated when the drive is full. However, this has the potential of stalling the current operation while drive defragmentation is in progress. As a preventative step, it is suggested that the application defragment the flash drive periodically.

Mechanical Architecture

Board Structure

The CT630 is composed of a single main circuit board, to which radio modules are attached for the cell phone, GPS, and Bluetooth. This modular approach allows the CT630 to be customized at production time while maintaining the robust mechanical performance of a single mechanical board structure.

The CT6xx has been field tested and proven to be highly resistant to vehicle vibration and temperature conditions.

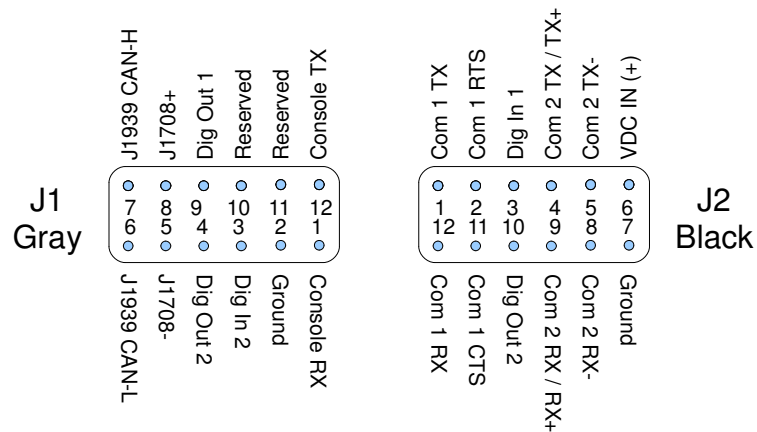
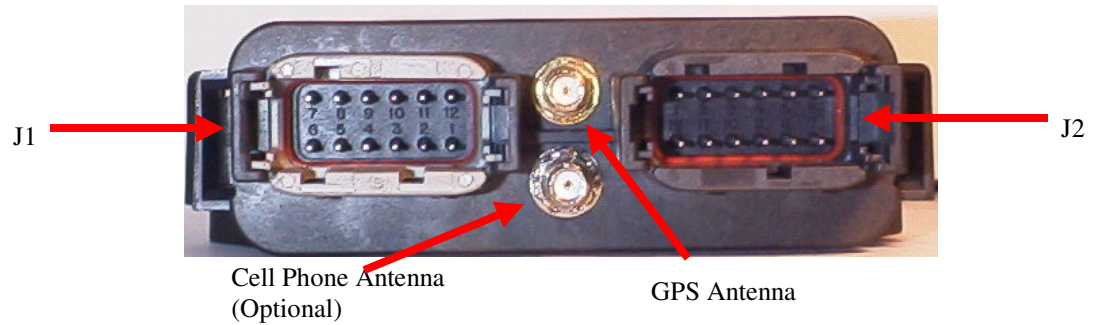
Enclosure

The CT630 is housed in a Deutsch EEC-325X4 enclosure with two 12-pin receptacles. The enclosure features a through-hole mounting flange on each side. The housing and connectors are sealed to meet the demands of the industrial and transportation markets. A radial flange seal provides environmental sealing to the enclosure. The flanged receptacles mate with the Deutsch DT06 and DTM06 Series standard plugs. These plugs can utilize solid, stamped or formed contacts.



Connectors

The CT630 Series utilizes two 12-pin Deutsch connectors for connecting power, serial communications, and input and output devices. The gray connector is J1 and the black connector is J2. Note the pin positions of each of the connectors. Pin assignments vary depending upon the product model number.



J1 (Gray) Connector Table

J1 Pin	CT630-2 Signal	Comments
1	Console RX	Console port, Receive Data
2	GND	Ground
3	Dig In 2	Digital Input 2
4	Dig Out 2	Digital Output 2
5	J1708 -	J1708 - (B)
6	CAN -	J1939 - , CAN Bus Low
7	CAN +	J1939 + , CAN Bus High
8	J1708 +	J1708 + (A)
9	Dig Out 1	Digital Output 1
10	N/C	Reserved for future development
11	N/C	Reserved for future development
12	Console TX	Console port, Transmit Data

J2 (Black) Connector Table

J2 Pin	RS-232 Mode	RS-485 Mode	Comments
1	Com 1 TX	Com 1 TX	COM1 Transmit Data
2	Com 1 RTS	Com 1 RTS	COM1 Request to Send
3	Dig In 1	Dig In 1	Digital Input 1
4	Com 2 TX	Com 2, B TX +	COM2 Transmit Data or RS-485 B TX +
5	N/C	Com 2, A TX -	No Connection or RS-485 A TX -
6	DCV +	DCV +	DC Input Power (7.5 to 36 volts DC)
7	GND	GND	Power Ground
8	N/C	Com 2, A RX -	No Connection or RS-485 A RX -
9	Com 2 RX	Com 2, B RX +	COM2 Receive Data or RS-485 B RX +
10	GND	GND	Ground
11	Com 1 CTS	Com 1 CTS	COM1 Clear To Send
12	Com 1 RX	Com 1 RX	COM1 Receive Data

J2 (Black Connector) - Power/COM Ports

Power Input

Power input to the CT630 is found on the J2 (Black) connector. The DC voltage input can range between 7.5 and 36 volts DC. Following are the connector pin assignments for power input:

J2 Pin	Signal	Description
6	PWR +	Power Input + (7.5 - 36 VDC)
7	GND	Power Ground

COM1 RS-232

COM1 is an RS-232 serial port with limited hardware handshaking lines. COM1 includes the following RS-232 signals:

J2 Pin	Signal	Description
1	Com 1 TX	COM 1 Transmit Data
2	Com 1 RTS	COM 1 Request To Send
10	GND	Ground
11	Com 1 CTS	COM 1 Clear To Send
12	Com 1 RX	COM 1 Receive Data

COM2 RS-232/RS-485

COM2 is a software-configurable RS-232 or RS-485 serial port with no hardware handshaking lines. RS-485 is a bus architecture that can be used to network multiple devices or sensors.

The default mode is RS-232. Refer to the software manual on configuring the port using the `com2_typecfg()` function.

Following are the connector pin assignments:

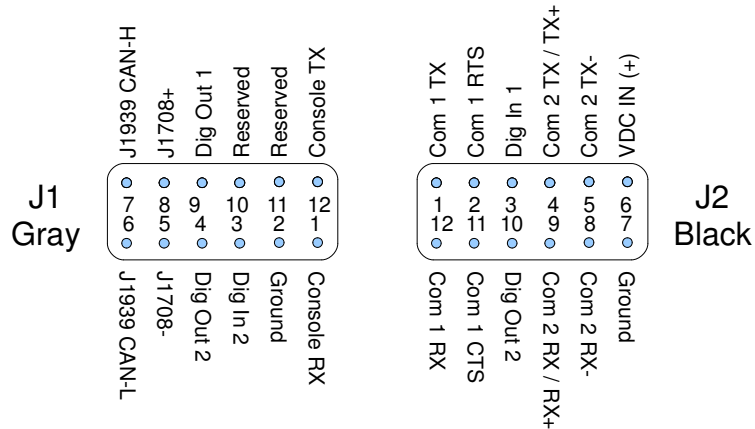
J2 Pin	RS232 Signal	RS485 Signal	Description
4	Com 2 TX	Com 2 TX+	COM 2 Transmit Data (B TX)
5	NC	Com 2 TX-	Com 2 A TX
8	NC	Com 2 RX-	Com 2 A RX
9	Com 2 RX	Com 2 RX+	COM 2 Receive Data (B RX)
10	GND		Ground

Digital Input 1

The CT630 has 2 digital inputs. Digital Input 1 is on the J2 (Black) connector and Digital Input 2 is on the J1 (Gray) connector. The digital inputs can be programmed so that they are either active low or active high. Following are the connector pin assignments for Digital Input 1 found on the J2 (Black) connector:

J2 Pin	Signal	Description
3	Dig In 1	Digital Input 1
10	GND	Ground (also used for RS-232 ground)

Please refer to the Digital I/O section of this manual for more information.



J1 (Gray Connector) - Input/Output Ports

Console Serial Port

The CT630 has a console RS-232 serial port that is used for connecting to a host computer. The console port may also be used for application where additional serial I/O is required. It is found on the J1 (Gray) connector. Following are the pin assignments on the J1 (Gray) connector:

J1 Pin	Signal	Description
1	Console RX	Console Receive Data
2	GND	Ground
12	Console TX	Console Transmit Data

J1708

The SAE J1708 protocol is used on heavy-duty trucks for engine control module (ECM) and vehicle data. It is based on the RS-485 electrical levels but is wired for open collector operation. The following are the CT630 pin assignments on the J1 (Gray) connector:

J1 Pin	Signal	Description
5	J1708 -	J1708 - (B)
8	J1708 +	J1708 + (A)

J1939

SAE J1939 is a newer vehicle data bus used on newer heavy-duty vehicles and is based on the CAN 2.0b specification. The bus operates at 250 kb/s. It is gradually replacing the J1708 data bus. Following are the pin assignments on the J1 (Gray) connector:

J1 Pin	Signal	Description
6	J1939 CAN-H	J1939 -
7	J1939 CAN-L	J1939 +

Digital Input 2

The CT6xx has 2 digital inputs. Digital Input 1 is on the J2 (Black) connector and Digital Input 2 is on the J1 (Gray) connector. The digital inputs can be programmed so that they are either active low or active high. They can also be programmed for pull up or pull down resistors. The following is the connector pin assignment for Digital Input 2:

J1 Pin	Signal	Description
3	Dig In 2	Digital Input 2

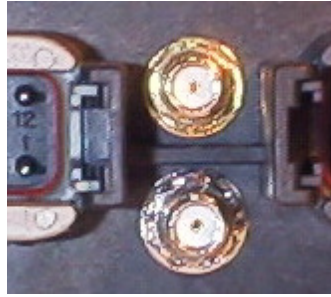
Please refer to the Digital I/O section of this manual for more information.

Digital Outputs

The CT630 has 2 digital outputs. These outputs can be programmed so that they are either current “sourcing” or “sinking” outputs. Following are the connector pin assignments:

J1 Pin	Signal	Description
2	GND	Ground
4	Dig Out 2	Digital Output 2
9	Dig Out 1	Digital Output 1

Note: Digital outputs are open drain switching transistors. A short circuit condition will damage the outputs. Please refer to the Digital I/O section of this manual for more information.



GPS (Optional)

The optional GPS connector is an SMA type connector that is used to connect to an external GPS antenna. A 3.3 V active antenna is required.

The GPS is the top antenna connector.

See the GPS section for information on suitable antennas.

Cell Phone (Optional)

The optional cell phone connector is an SMA type connector that is used to connect to an external cell phone antenna. The selected antenna should match the cell phone radio band (i.e. 800 MHz, 900 MHz, 1800 MHz, or 1900 MHz.)

The cell phone is the bottom antenna connector.

See the GSM Phone Module section for information on suitable antennas.

Status LEDs

The CT630 has two, software controlled status LEDs (CR3, which is a red LED and CR2, which is a green LED) that can be controlled by the application. When power is first applied, the LEDs blink on momentarily and then turn off.

The cell phone has one additional LED (CR1, which is a blue LED) that can be controlled by the phone.

The Bluetooth transceiver also has an LED (CR4, Yellow).

A cutout on the case of the CT630 that allows the status LEDs to be viewed.

Part Name	Color	Controlled By
CR1	Red	Application
CR2	Green	Application
CR3	Blue	Cell phone
CR4	Yellow	Bluetooth

CT630 Development Kit

For first time developers, the CT630 typically ships out as a kit that includes the following:

Item	Description
CT630	CT6xx module
CT6xx BOB	CT6xx Break-Out Board
Power Brick	12 Volt power brick that connects to the CT6xx BOB, used for powering the CT630.
Null Modem Cable	Cable used to connect between the console port of the CT6xx BOB and a serial port on the host computer.
Development Tools CD	Developers Tools disk
Cables	Set of power and data cables

Development Tools Disk

The development tools disk includes the following:

Tool	Description
OBCLink	OBCLink is a windows-based utility program used to communicate between the CT630 and the host computer.
GNU X-Tools	30-Day evaluation of the GNU X-Tools by Microcross. To purchase these tools, contact Microcross at MicroCross.com .
Examples	Various example programs are included on the development disk along with their source code.

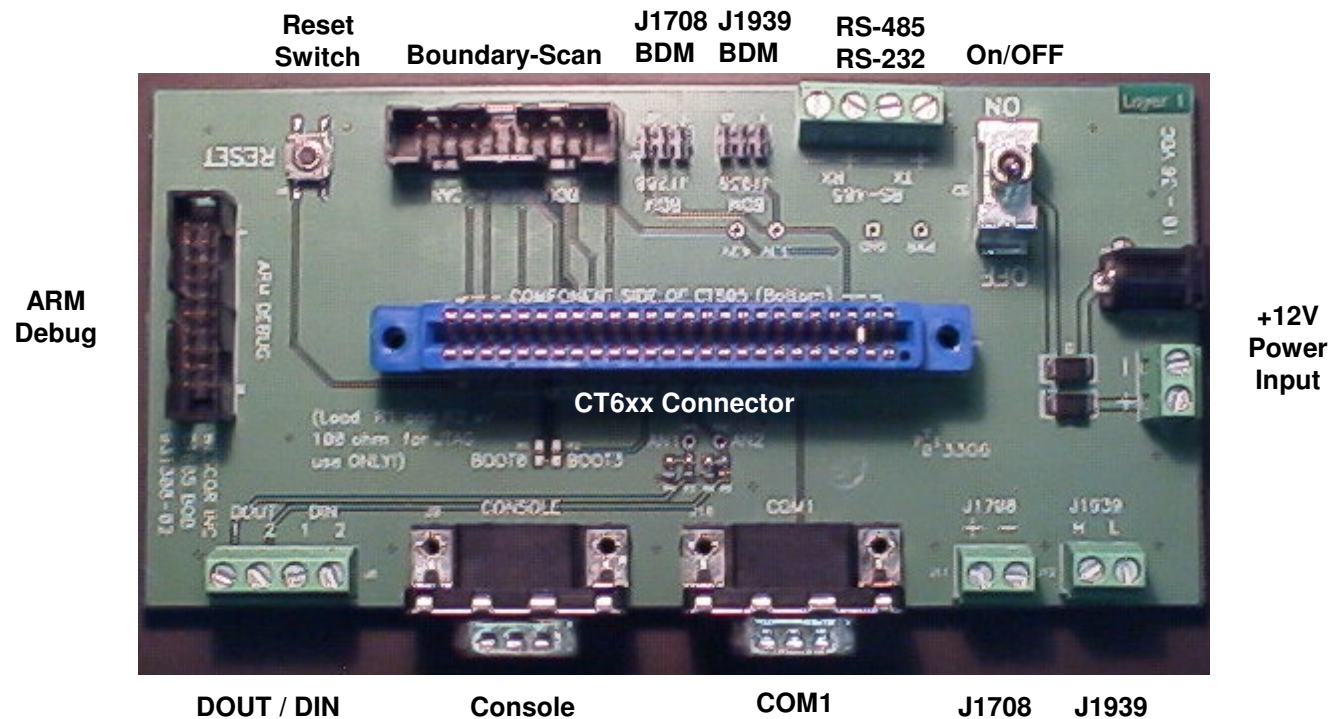
Refer to the CT630 Quick Start Guide for information regarding the environment installation and quick start tutorial.

CT630 BREAK-OUT-BOARD (BOB)

Overview

The CT6xx Break-Out-Board (BOB) was designed to connect the com ports, power, and I/O signals to a PC and other equipment for application development, service, manufacturing, and testing. A reset button and headers for testing are also included on the CT630 BOB. The following picture is of the 52-5033-02 PCBA.

Note: The CT630 BOB is intended to be used as an engineering tool for application development and testing purposes only and should only be used by qualified personnel. The CT6xx BOB is not for resale.



CT630 Connector

The CT630 motherboard is designed to mate with the edge connector on the CT630 BOB. This method of connection facilitates the testing of the board as well as a convenient and inexpensive method for use in application development. The board is keyed so that it cannot be plugged in backwards.

DOUT

Two digital outputs are available on the CT630. Terminal block connector provided for connecting the digital outputs to an external device. Refer to the specification section for additional details.

DIN

Two digital inputs are available on the CT630. Terminal block connector provided for connecting to the digital inputs. Refer to the specifications for additional details.

CONSOLE

9-Pin Sub-D connector used for development purposes when connecting to a console. Typically a null-modem cable is used for this connection between the console serial port on the CT630 and the host computer serial port.

COM1

9-Pin Sub-D connector used to connect to COM1. COM1 is configured as a DTE device. COM1 has limited hardware handshaking. Refer to the specifications for additional details.

J1708

Terminal block connector provided to connect to a J1708 bus. Make sure to check for the correct polarity when connecting.

J1939

Terminal block connector provided to connect to a J1939 (CAN) bus. Make sure to check for the correct polarity when connecting.

Power

Power to the CT630 BOB can be between 10 V and 36 V, typically 12 V. A standard DC jack is provided so that a power source, such as a wall brick, may be directly connected. A terminal block is also provided for hard wiring to a power source such as a bench power supply or a 12 V battery.

OFF/ON

A toggle switch is provided for turning the power On and Off to the CT630.

COM2 RS-232 or RS-485

A terminal block connector is provided for connecting to COM2. When connecting to a CT630 for COM2 RS-232 port, use the TX+ and RX+ pins on the connector. When connecting to a CT630 for COM2 RS-485 port, make sure to observe the polarity of the TX and RX signals.

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J1939 BDM

Not used for application development.

J1708 BDM

Used by Dyacon to program the J1708 processor. It is not used for application development.

BOUNDARY-SCAN

This connector is used for testing and Dyacon development purposes. Typically application developers do not use this connector. Additional hardware and software is required.

RESET

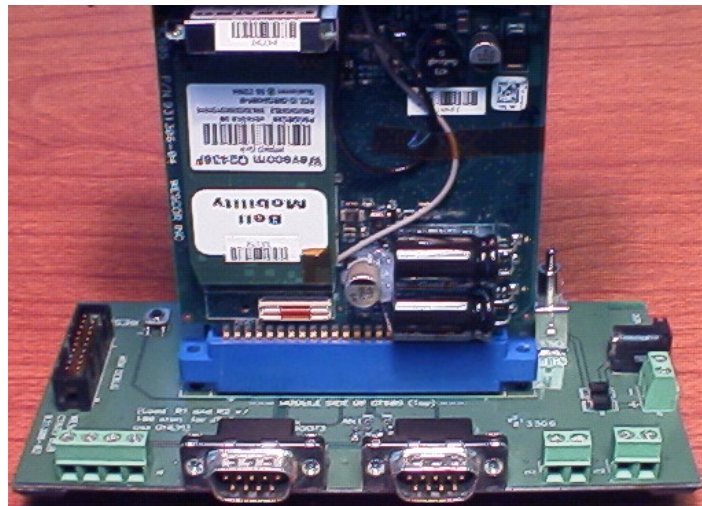
The push button reset switch is used to reset the CT630. Press and hold the switch depressed for a couple of seconds to reset the CT630.

ARM DEBUG

Connector provided for debugging purposes, typically associated with the development of the motherboard. Typically application developers do not use this connector. If application developers would like to use this port, additional hardware and software is required. Contact Dyacon for additional information.

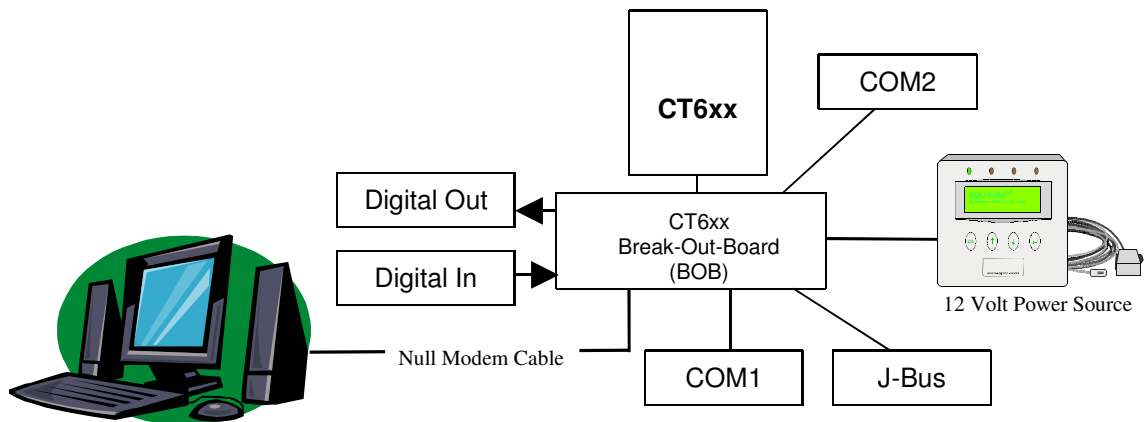
CT630 BOB with CT630 PCBA

Following is a picture of the CT630 BOB with the CT630 PCBA attached. For development purposes, all necessary ports on the CT630 can be accessed from the BOB.



Connecting to the BOB

Following is a block diagram for connecting the CT630 BOB to external devices:



Following is a general overview of the connections that are typically made.

1. Make sure that the power switch is in the OFF position.
2. Connect the CT630 module to the CT630 BOB.
3. Connect a null modem cable between the host computer (computer that is running OBCLink) and the Console port on the CT630 break out board.
4. Connect a power source to the CT630 BOB using either the DC connector or the terminal blocks.
5. Connect additional external devices as desired.

OBCLINK

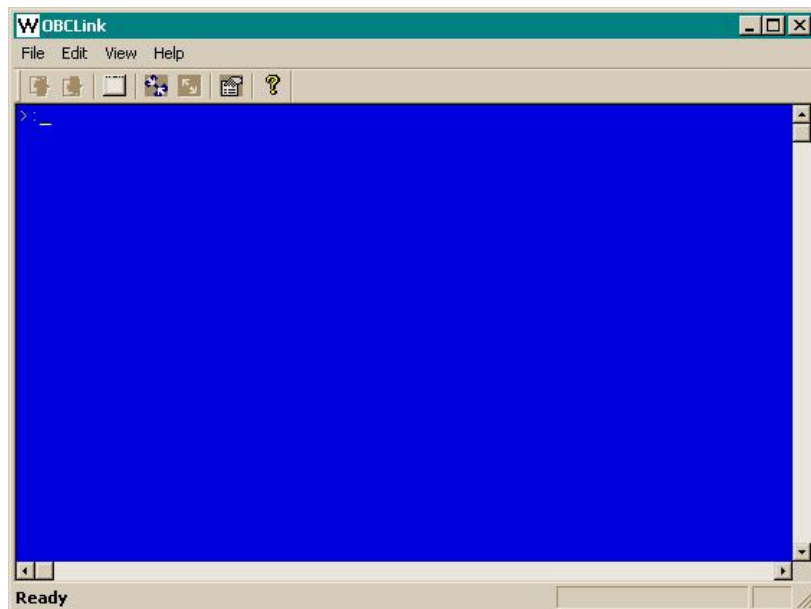
OBCLink Overview

*** Preliminary Section to be Updated with Terminal Program Update.

OBCLink is a Windows-based user interface for Dyacon's CT630 products. OBCLink runs under Win32 (Windows 95, 98, 2000, XP or ME). OBCLink on the host computer provides an easy to use interface in establishing a communications link and in allowing the host computer to act as a console (keyboard and/or display) for the CT630.

OBCLink does not replace user specific serial communication software, but is an interface tool used to become familiar with the products, and for applications where the interface is manual instead of automated. Specific communication applications can be developed using other communication packages or development languages such as C++.

OBCLink allows the host computer to communicate with the CT630 module. Files can be transferred back and forth between the CT630 module and host computer. CT630 shell commands can also be issued from the host computer.

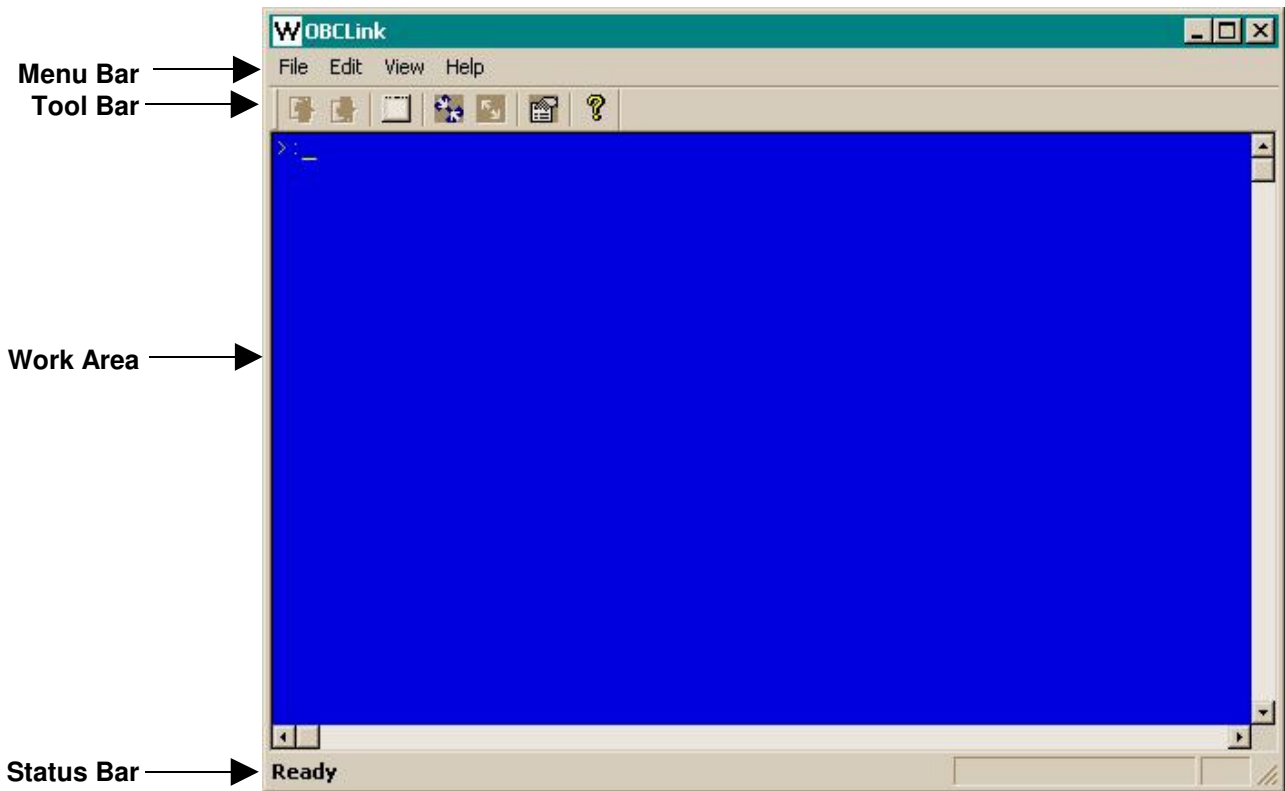


OBCLink on the Host PC

Overview

To begin the OBCLink application program on the Host, once it has been set up as a shortcut, double click on the OBCLink.exe icon. It is assumed that the CT630 module is powered on and that the CT630 module is connected to the Host computer with a null modem cable. It is also assumed that a mouse is used when running the OBCLink program from the Host.

The Menu Bar and Tool Bar located near the top of the screen allow access to menu items and tasks to be performed. The Status Bar located near the bottom of the screen displays status information about the tasks being performed. Once a communication link has been established, the work area displays information about the tasks being performed and can also be used to enter shell commands directly. Refer to the Shell Command Set section of the CT630 Software Developers Manual for additional information.



Menu Items

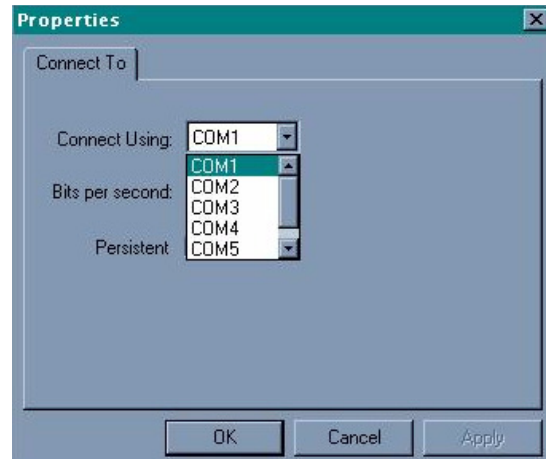
There are four menu items, File, Edit, View, and Help with each having their own drop down menu.

Properties

Clicking on the Properties icon allows the user to select the desired communication port on the Host computer and also the baud rate. The default serial port is COM1 and the default baud rate is 38400.

Select the desired port by clicking on it. Valid COM ports include:

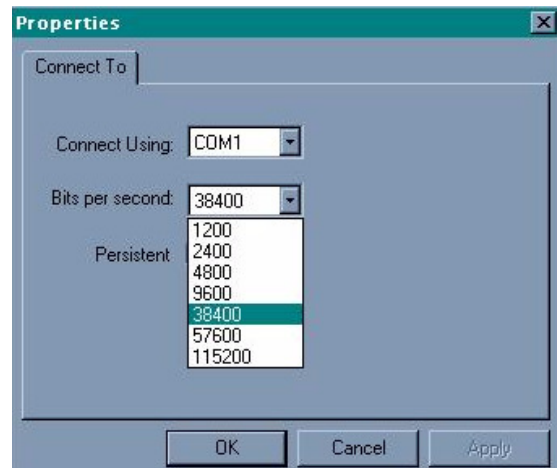
- COM1
- COM2
- COM3
- COM4
- COM5
- COM6



Select the desired baud rate (bits per second).

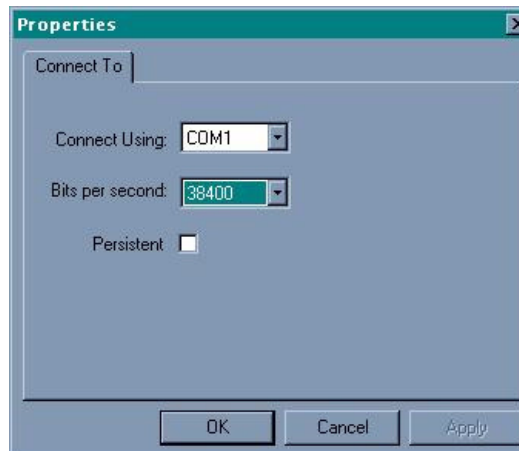
Valid baud rates include:

- 1200
- 2400
- 4800
- 9600
- 38400
- 57600
- 115200



Click on the Apply button to apply the current settings.

Checking Persistent saves the changes for future use. The settings are save in the Windows Registry until the check box is selected again.



File Menu

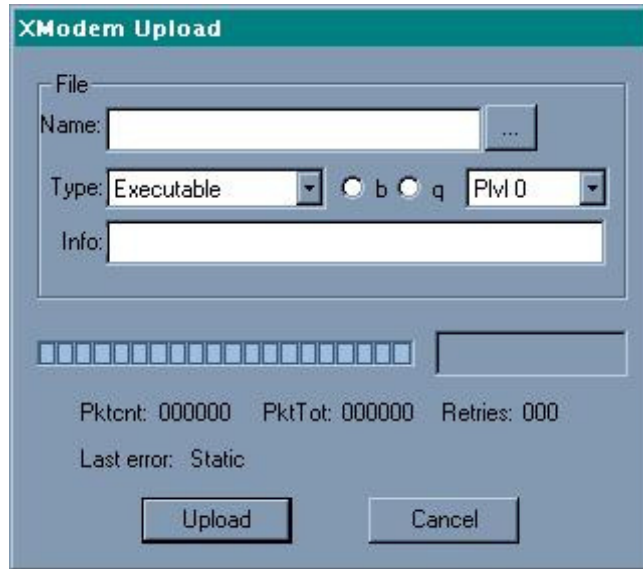
The File menu has the following selections that can be made:

- File Upload
- File Download
- Start Recording
- Stop Recording
- Exit



File Upload

The File Upload menu item allows files to be sent or uploaded from the Host computer to the CT630 (target). Click File Upload to display the following screen:



File Types and File Extensions

There are four types of files that can be used with the CT6xx. The file types are: Executable, Script, Data, and Firmware update. File type must be specified for each file that gets uploaded to the CT630. A “type” pick list is available for selecting the type of file to upload, or file extensions can be used for the executable and script files to set the file type and the file attributes. The following file extensions are recognized by the OBCLink interface (the file extensions do not have any meaning on the CT6xx):

Extension	Description
.x	Executable (binary elf file)
.xb	Executable file, which runs on boot
.xq	Executable file, which queries on boot before running
.s	Script file
.sb	Script file, which runs on boot
.sq	Script file, which queries on boot before running

Notes:

File extensions are case sensitive. All characters must be in lower case.

Files with any other extension are considered data files.

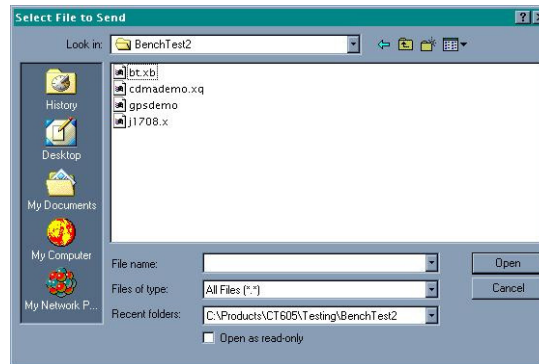
The extensions are used to set the file attributes and also can be used to remind the user what type of files they are and what attributes get set.

If a file has no extension, the last flags settings on the dialog box are used.

The file extensions do not have any meaning on the CT630, they are just for the OBCLink interface.

Single File Upload

Select the file to be uploaded by typing the path and file name, or use the Select File to Send button (button to the right of the Name field with three dots) to select the desired file to be uploaded.



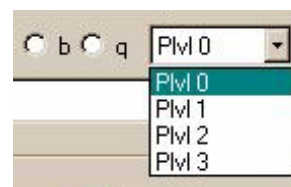
If file extensions are not being used, select the type of file that is going to be uploaded. Types of files include Executable, Script, Data, and Firmware update. Note that files get loaded in alphabetical order.

There are additional attributes that can be set for files that are either executable or script type files.

Clicking 'b' (boot) sets a flag that tells the file to execute on boot-up.

Clicking 'q' (query) sets a flag that prompts the user for two seconds before executing the file. During this two-second timeout, the user may press any key to stop the execution; otherwise the file gets executed after the timeout.

The privilege level (Plvl) can be set between 0 and 3, with 3 being the highest level or supervisor



level. The default level is 0. (Refer to the software manual for more information on privilege levels.)

Once the file type and file attributes have been set, click Upload to begin the uploading process using the Xmodem protocol. The progress of the file transfer is displayed on the screen including the packet count that has been sent (Pktcnt), the total number of packets to send (PktTot), and the number of retries (Retries) that has been made while uploading the file.

Click Cancel to exit out of the Upload process.

Multiple File Upload

Multiple files can be Uploaded by typing the path and file names or using the Select File to Send button (button to the right of the Name field with three dots) to select the desired files to be uploaded. If multiple files are typed, the following rules apply:

Multiple file entries are separated by semicolons.

In the upload dialog, only the first file can have a path (all files to be uploaded must reside in the same folder).

For example, to upload the following files:

c:\test\j1708.x

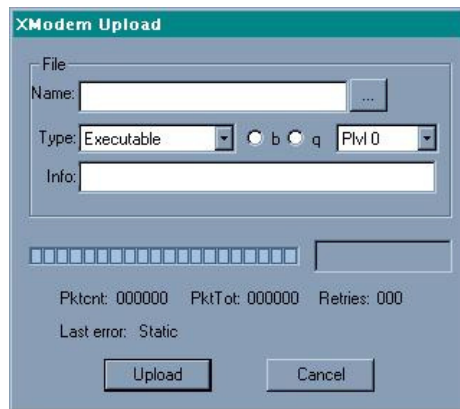
c:\test\gps.x

c:\test\led.x

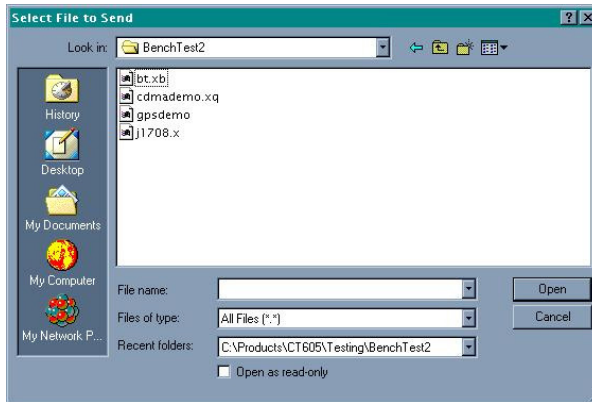
It should be entered as “c:\test\j1708.x;gps.x;led.x” (omit the quotes)

Following is an example of a multiple file upload:

Step 1 – Click the Upload icon or click File → Upload, the following screen appears.

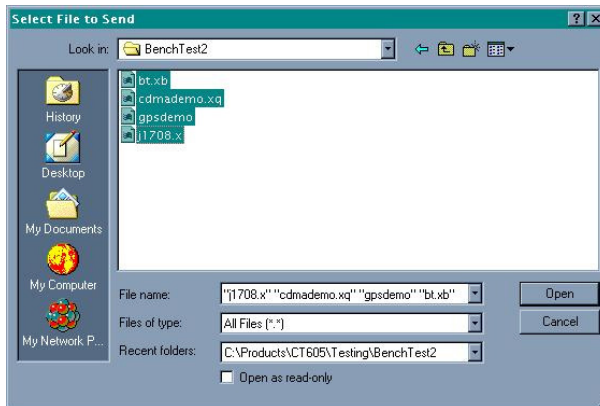


Step 2 – Click on the button with the three dots on the right side of the Name field. The Select File to Send dialog box appears. In this example there are four files in a folder called BenchTest2. The four files are:

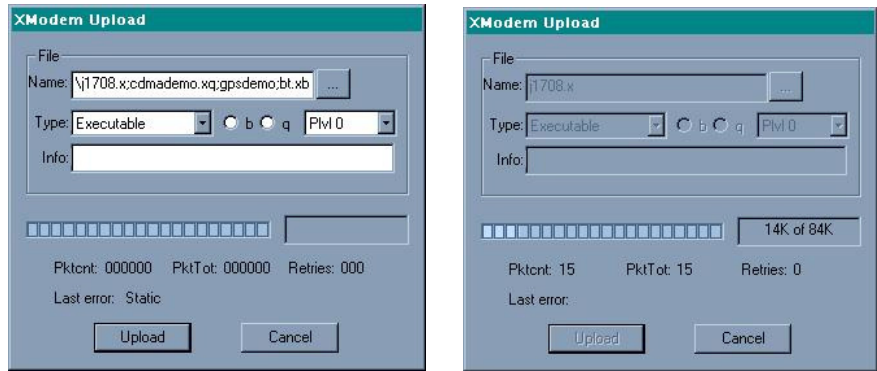


File	Description
bt.xb	Executable bench test file that has been set to run on boot.
cdmademo.xq	Executable CDMA demo file that has been set to run on boot and query before running.
gpsdemo	Executable GPS demo file (the default file type from above was executable).
j1708.x	Executable J1708 demo file.

Select all four files to be uploaded. This can be accomplished by holding down the CTRL key and clicking on each file.

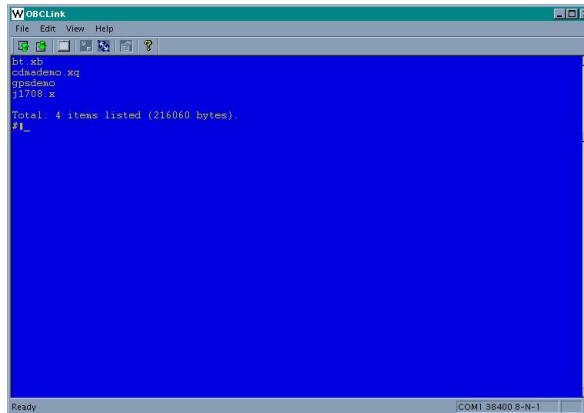


Step 3 – Click Open to select the files. Click Upload to begin uploading the files from the host computer to the CT6xx. The files upload in sequence until completed.

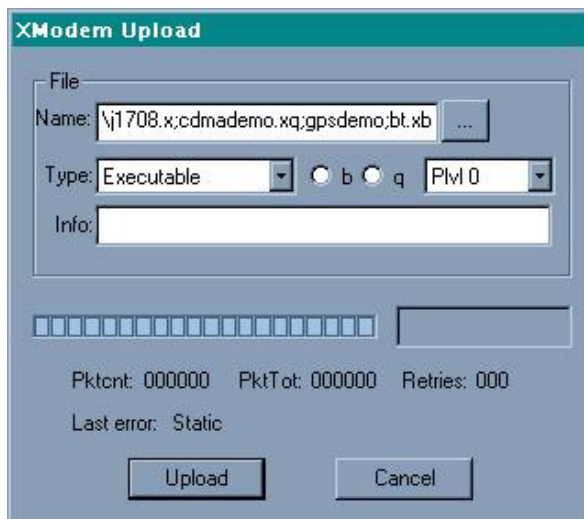


Drag and Drop

An alternative method for uploading files is drag and drop. Using Explorer, find the desired file or files to upload. Select the files and then drag and drop the selected files onto the work area of OBCLink.

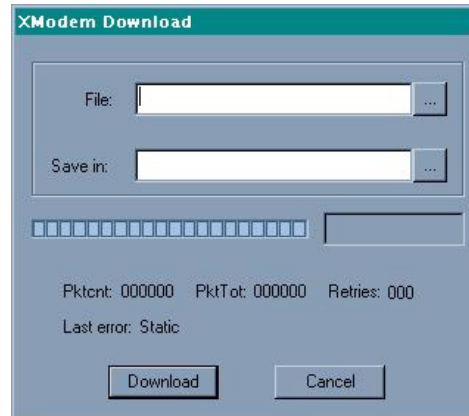


The Upload window gets displayed. If file extensions are not being used, file attributes can be set before uploading each file. If file extensions are being used just click Upload and the files are sequentially uploaded.



File Download

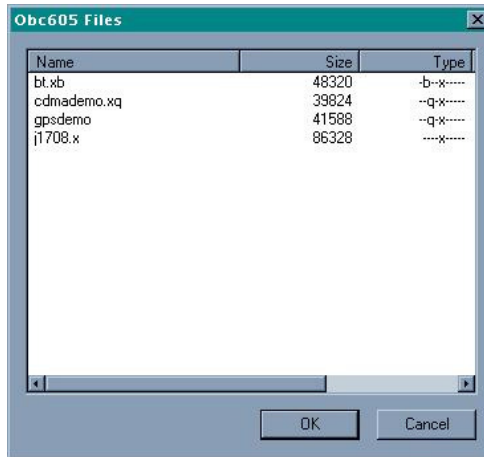
The File Download menu item allows files to be received or downloaded from the CT630 (target) to the host computer. Click File Download to display the following screen:



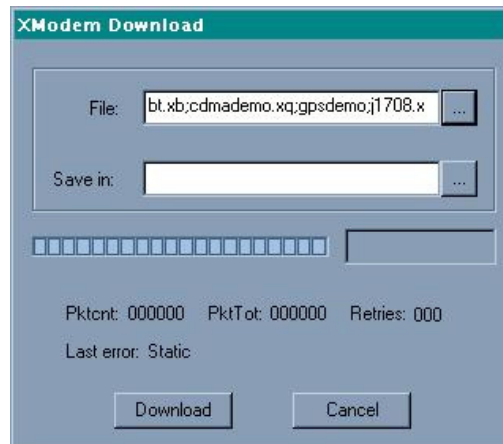
Type in the name of the file on the CT6xx that is to be downloaded or click on the button to the right of the File field. A listing of all the files on the CT6xx is displayed along with the size of each file and the type and attributes of each file.

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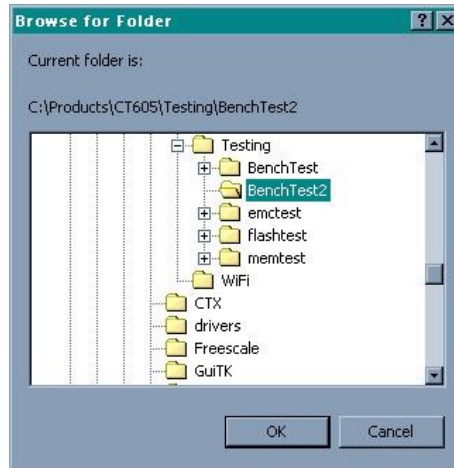
Select the desired files to be downloaded and click OK. The selected files get placed in the File field.



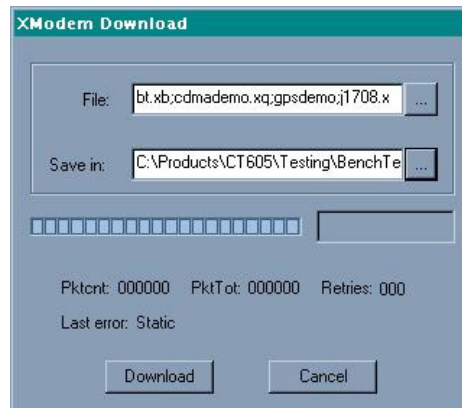
In the Save in field, type the location where the files are to be downloaded to on the host computer or click on the button to the right of the field to browse for the desired location.



Select the desired folder where the files are to be saved and click OK.



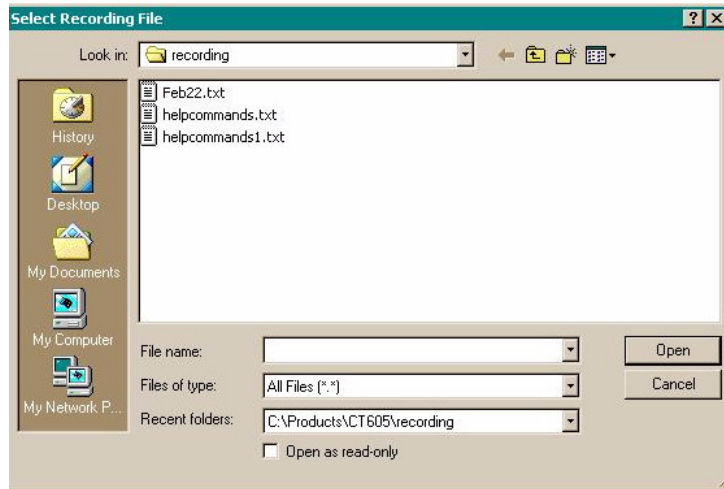
After the File and Save in fields have been entered, click the Download button to begin the download process. The progress of the file transfer is displayed on the screen including the packet count that has been sent (Pktcnt), the total number of packets to send (PktTot), and the number of retries (Retries) that has been made while downloading the file.



Start Recording

The Start Recording menu item allows the session to be saved to a text file. This can be useful during application development to be able to capture what is taking place in the application.

Click on Start Recording, the following window appears:



Select a location and a file name where the session is to be recorded. Typically the type of file is text (.txt extension). Click on the Open button to begin the recording. Anything that is written or displayed in the OBCLink work area gets recorded. Once a session has been completed, select Stop Recording from the File menu.

Note: If a previous file is selected, the file gets appended.

Stop Recording

The Stop Recording menu item stops the recording session. The selection is not available unless a recording session has been started using the Start Recording selection. To stop recording, simply click on this menu item.

Exit

Select Exit to terminate the OBCLink application program.

Edit Menu

Clear

Clears the work area of OBCLink. There is also a Tool Bar icon that performs the same task.

View Menu

The View Menu has two selections that can be made, Toolbar and Status Bar. The default is to have both the Toolbar and Status Bar being displayed. Click on the desired selection to either activate or deactivate it. A check mark is displayed next to the selection indicating that it has been activated.



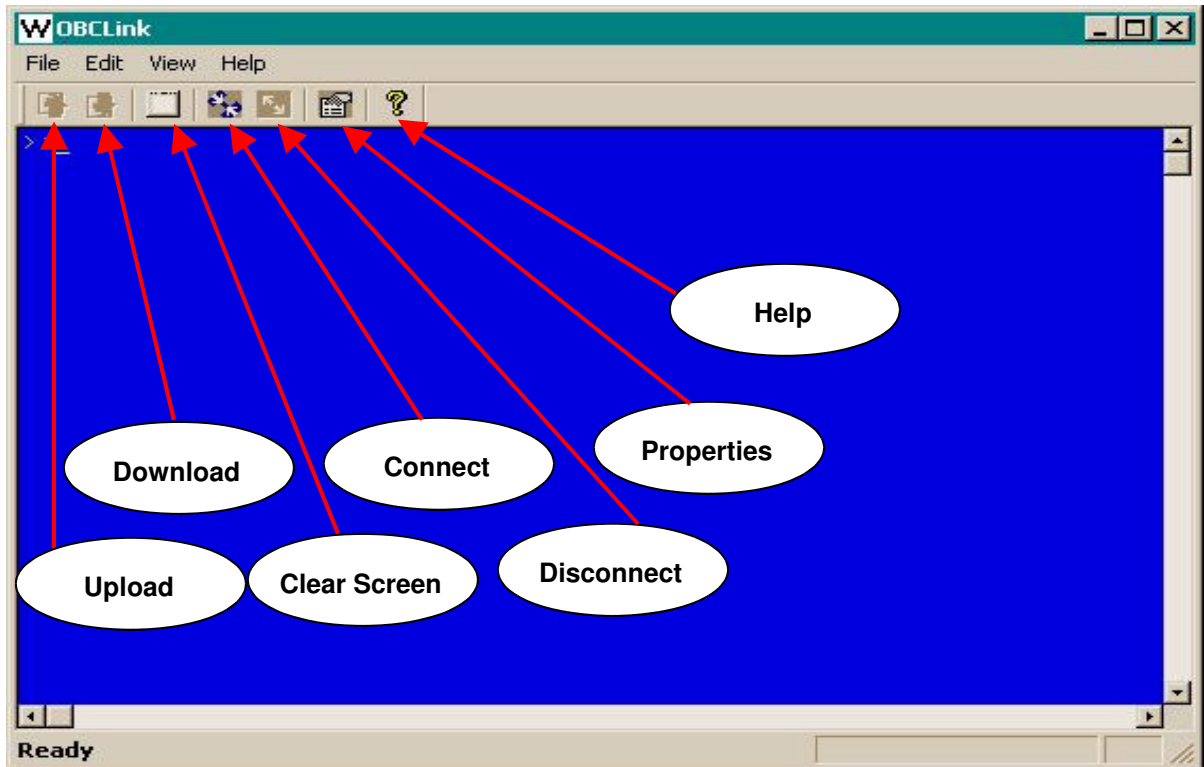
Help Menu

The Help Menu has one selection “About OBCLink . . .” that when selected displays version information about OBCLink.



Tool Bar

The tool bar allows quick access for many of the tasks to be performed. Some of the tasks can also be found from the menu items.



Upload

The Upload icon is the same as the File Upload menu item and allows files to be sent or uploaded from the Host computer to the CT630 (target). Refer to the previous menu item →File Upload section for additional information.

Download

The Download icon is the same as the File Download menu item and allows files to be received or downloaded from the CT630 (target) to the Host computer. Refer to the previous menu item →File Download section for additional information.

Clear Screen

Clicking on the Clear Screen icon clears the work area.

Connect

Clicking on the Connect icon establishes a communication link between the Host computer and the CT630.

Note: The default communication parameters are 38400 8-N-1.

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Disconnect

Clicking on the Disconnect icon terminates the communication link between the Host computer and the CT630.

Help

Clicking on the help icon displays the current version of the OBCLink application.

CT630 FIRMWARE/OS UPGRADES

OS Upgrade Procedure

1. Attach CT630 Console/debug RS232 port to a PC.
2. Start OBCLink on the PC and connect to the CT630.
3. Enter “flash unlock” command. This unlocks the protected flash memory space where the boot loader/OS resides.
4. On the PC, navigate to the location of the rom.bin file for the CT630.
5. Drag the rom.bin file into the OBCLink window.
6. Select “firmware” from the file type drop-down box.
7. Select the Upload button.
8. The firmware will be downloaded to the CT630. The user will be prompted to OK? the firmware change. Enter “y”.
9. The CT630 will load the rom.bin file and automatically reset.

J1708 CONTROLLER UPGRADES

The firmware on the J1708 controller can be programmed through the main processor using a small utility.

J1708 Update Procedure

The J1708 controller firmware can be upgraded by the following steps:

1. Save Project.abs.s19 to the flash drive of the CT6xx using OBCLink.
2. Save the jload executable to the flash drive of the CT6xx using OBCLink.
3. Execute “jload Project.abs.s19”.
4. Enter “y” at the prompt to program.

Contact Dyacon for upgrade files, support@dyacon.com

VEHICLE INSTALLATION

CT630 Installation Considerations

The CT630 is a rugged computer designed for use in applications beyond the desktop environment. Although the design is rugged, care should be taken when considering how the CT630 module is going to be mounted and used on a daily basis. The CT6xx should be installed in an environment that is protected from temperatures above 75 °C or below -35 °C. The unit must also be protected from water, moisture, and extreme shock. A few simple precautions can enhance the life of the product and minimize the potential for premature or environmentally induced failures.

Power Considerations

The CT630 requires a DC power source between 7.5 to 36 Volts (13 Volts nominal). The CT6xx draws approximately 80 mA @ 12 Volts for normal operation, excluding digital output current draw.

The CT6xx is not internally fused. A 1 Amp fuse should be installed in the power-input line to the CT6xx.

When routing the cables, consider the following:

Make sure that cables are not routed near sharp edges (which can cut through the cable) or routed near high heat sources (such as the exhaust), which can degrade or melt the cables.

Good connections are extremely important. Make sure that the connections and splices are properly protected for their environment.

If the connections are exposed to the outside environment, make sure that they are properly protected with waterproof heat shrink material or other materials that provide adequate protection from the elements.

The cables inside the vehicle should be routed so that they are not walked on, kinked, or closed in a door.

Pay careful attention to the installation and routing of coax cables so that they are not kinked or pinched.

Digital I/O Considerations

Installers should take care when wiring the digital inputs and outputs. Refer to the Specification section for additional details and circuit diagrams for the digital inputs and digital outputs. The following are general considerations when working with the digital I/O.

The CT6xx should be completely disconnected from any power source before wiring the outputs.

A fuse should be placed on the supply voltage line for connected devices, whether sourced from the CT6xx or some other vehicle location. Recommend 50 mA or less on the digital inputs and 200 mA or less on the digital outputs.

Temperature Considerations

The temperature specifications of the CT630 are:

Operating temperature	-35 to 75 °C
Storage temperature	-40 to 85 °C

Temperatures in the interior of a vehicle parked in the sun with the windows rolled up can exceed 110 °C. Conversely, in some locations during the winter months temperatures in a vehicle parked overnight can reach below -40 °C. Select a protected mounting location to minimize the extremes.

Mounting Considerations

The CT6xx has two mounting holes on the sides of the case that can be used for fixed mounting. The mounting holes are spaced four inches apart (on centers). When mounting the CT6xx keep the following considerations in mind:

Locate the mounting to minimize the effects of heat and cold.

Minimize the amount of shock and vibration the unit will see. In some installations it may be useful to use some type of vibration isolation.

Avoid locations that put the CT6xx in direct sunlight.

Make sure cables are connected securely to the CT6xx and proper strain relief techniques are used.

J1708 Vehicle Installation

See a general discussion of the architecture and J1708 in the software manual.

Connect the CT6xx directly to chassis ground. Excessive resistance in the ground path can shift the relative levels of the signals and cause data reading and sending errors.

Keep J1708 wires short. Do not extend the J1708 wires provided on the CT6xx cable assembly. If additional length is required, use 14 AWG twisted wire with 1 twist per inch.

J1939 Vehicle Installation

Due to the high data rate, proper impedance control is required. Splicing into the J1939 bus could cause unwanted disturbance. Keep J1939 connections as short as possible. Attaching directly to the vehicle diagnostics port may be a preferred connection point.

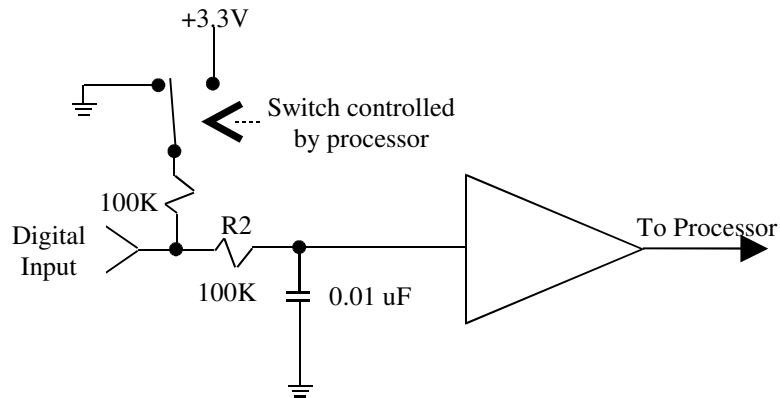
DIGITAL I/O

Digital Input

The digital inputs can be configured for pull-up or pull-down resistors. They can tolerate full vehicle input voltage to 36 V, but switch at 3.3 V logic levels; 0 or low is < 0.75 V, 1 or high is > 2.50 V.

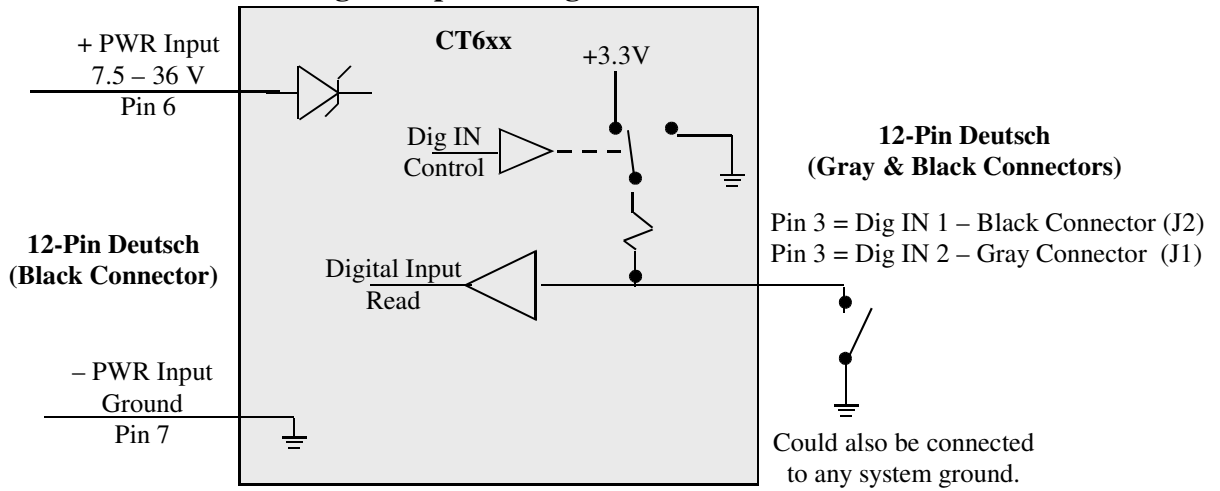
Installers should work closely with the software development team to select suitable input configuration.

The following is a simplified schematic of the Digital Input circuit.

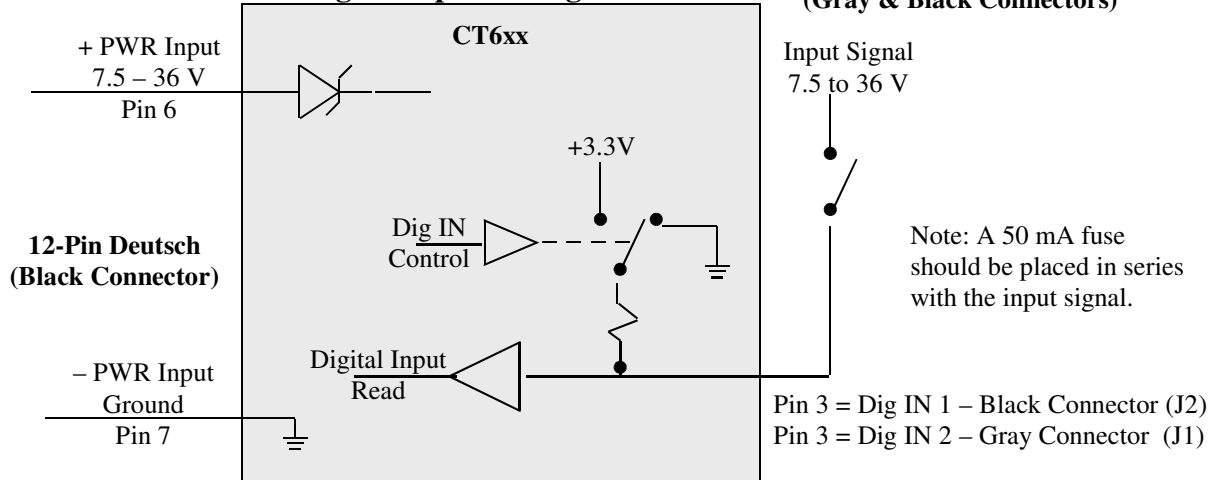


The digital inputs may be connected in active high or active low inputs. The following diagrams show these two configurations.

Active Low Digital Input Configuration



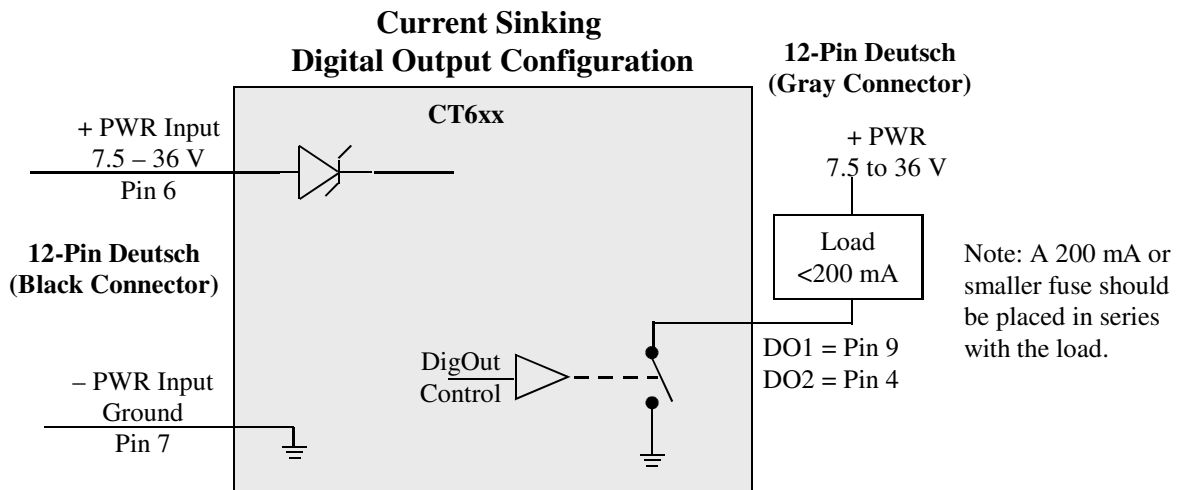
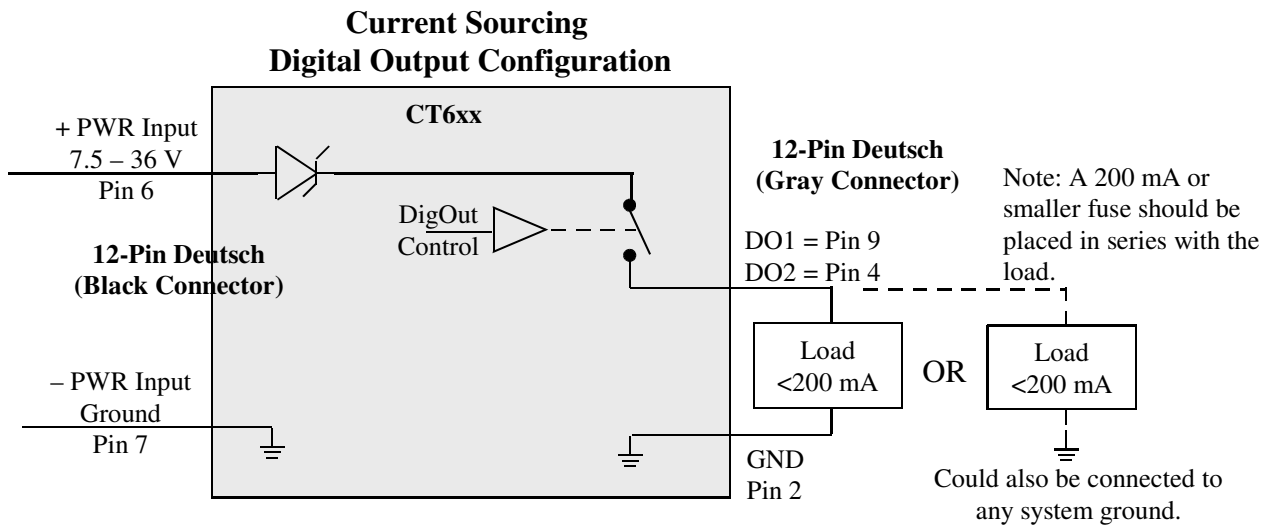
Active High Digital Input Configuration



Digital Output

The CT630 digital outputs are capable of sourcing or sinking 200 mA continuously to peripheral circuits such as driver indicators, buzzers, or even peripheral devices. The digital outputs are software configurable to act as sourcing or sinking. Care should be taken to properly fuse the external circuit otherwise over-current conditions may damage the CT630.

The following are simplified schematic diagrams of the sourcing and sinking configurations. Additional diagrams can be found in the software manual under the `dgtlout_set()` function.



GPS MODULE (OPTIONAL)

GPS Module Overview

The CT630 has an optional integrated high-performance, GPS receiver. Please refer to the software manual for specific information on the GPS receiver.

Antenna Selection

The CT630 requires a 3.3 V GPS receiver with a standard SMA connector.

The antenna may either be a magnetic mount or glass mount antenna. Other suitable antennas are available that may meet the unique circumstances of the vehicle installation.

Vehicle Installation Considerations

Care should be take to position the antenna for a good view of the sky, unobstructed by metal objects. Placing the antenna inside of the engine compartment has shown to result in poor GPS performance.

On the under side of a fiberglass vehicle cab or the inside of a windshield are common locations. The window tinting a the top of the windshield may block GPS signals, so windscreen antennas should be positioned well below any detectable tint.

GSM PHONE MODULE (OPTIONAL)

Enfora Enabler-IIIIG Module Introduction

The Enfora Enabler IIIIG is a fully certified quad band OEM module containing all GSM/GPRS functionality required for global GSM/GPRS networks. The Enfora Enabler IIIIG supports a comprehensive list of features including: Voice, SMS, Circuit Switched Data, GPRS Class 10 data integrated TCP/IP software stack, UDP (PAD), TCP/IP (PAD) and Enfora's event driven I/O engine.

The Enfora Enabler-IIIIG was selected for its native capabilities and the exceptional documentation and support. The module's capabilities are well suited for embedded applications, simplifying the tasks required of the host application.

The phone behaves much like any serial modem. It is internally connected to a "cell" serial port. The interface to the embedded cell phone is a standard serial port connection. If the application developers are familiar with using a serial port, they should be able to use the phone on the CT630.

Application developers interface directly to the phone on the CT630 modules through a serial port. AT commands are used for configuration and control. Other than library functions to control the power, no Dyacon drivers or tools are used to operate the phone. Refer to the CT630 Software Development Manual for additional information regarding application development.. Application developers should also go to the Enfora web site for additional information. (www.enfora.com)

GSM Overview

Antenna Selection

A standard SMA coaxial cable connector has been supplied on the CT630. This allows some flexibility in selecting the antenna that is most appropriate for the intended vehicle installation. However, some cell phone networks may restrict the antenna to those that have been specifically tested. Contact Dyacon for information regarding the GSM network that will be used for services.

To maintain compliance with FCC testing the selected antenna must meet the following guidelines.

GSM850 mode: Power at antenna port is +32 dBm. The maximum antenna gain is 4.5 dBi (2.35 dBd).

GSM1900 mode: Power at antenna port is 31.3 dBm. The maximum antenna gain is 2 dBi in order to meet the requirements of maximum 2 watts EIRP for mobile transmitters.

SIM Card Installation

ESD WARNING: The following procedure exposes electronic circuitry to the outside world. Care should be taken to ensure that there is a clean anti-static work area and the PCB is handled only by its edges.

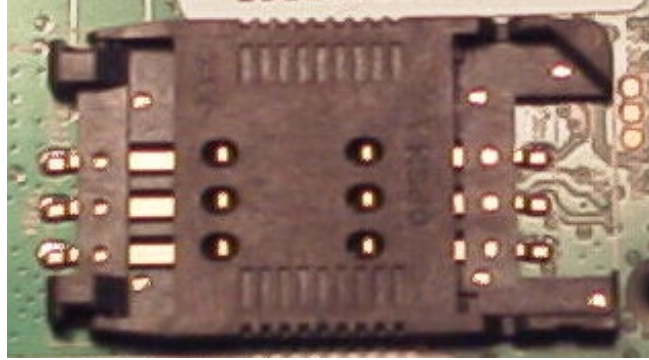
A SIM card is required for GSM operation. The SIM card contains all of the user account privileges and information. A SIM card must be inserted for the phone to be used. The account must be capable of the transmission mode desired. Some accounts may only have voice capability or the provider's system may be limited on the available services. If a GPRS connection is desired, an IP address for the service provider's gateway is required as well as your own host. The service providers gateway must be capable of the transmissions your device requires. Some WAP (Wireless Application Protocol) gateways may filter the packets. Most providers have several gateway options. A routable gateway may be required. It may take some experimentation to discover the correct combination for your application. It is beyond the scope of this manual to go into the details.

To install the SIM Card, perform the following steps:

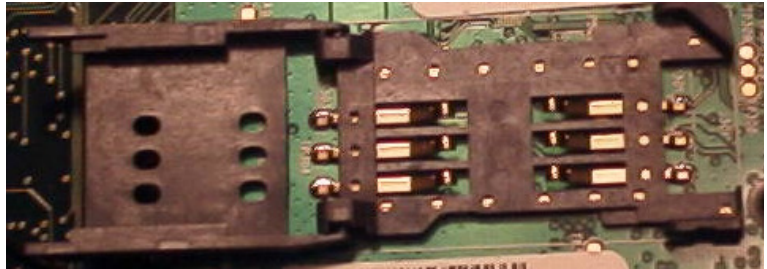
1. Installation must be performed in an anti-static environment and proper grounding techniques must be used.
2. On the **CT6xx** use a flat head screwdriver to release the latches on each side of the case. After the latches are released, carefully slide the PCB assembly out of the case.
3. Locate the Enfora phone module.



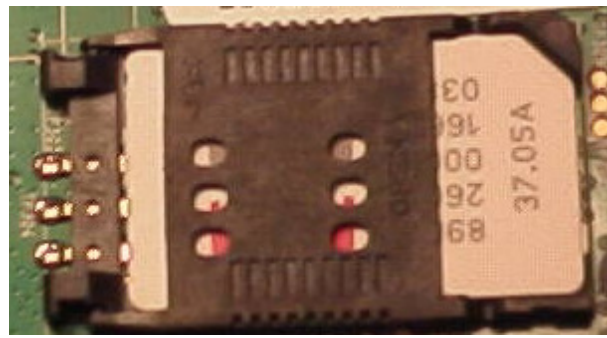
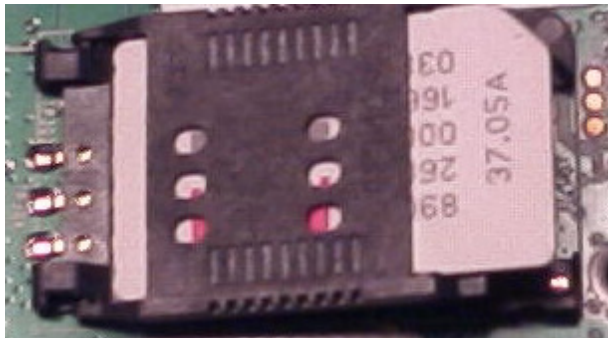
4. The black plastic SIM card holder has an "OPEN" arrow on it.
5. Slide the door in the direction of the arrow.



6. Gently lift open the SIM card holder.



7. Slide the SIM card into the card holder. Note the position of the corner that has been keyed.
8. Close the cover so that the contacts face down.



9. Slide the cover into the locked position.
10. Place a piece of tape over the SIM card to ensure that it is not dislodged from shock or extreme vibration.
11. Slide the **CT6xx** Printed Circuit Board Assembly back in the case and make sure the tabs snap in place and are secure.

CT630 FIRMWARE

Overview

Extensible Firmware Platform (EFP) is a very simple 32-bit operating system and does not support multiple users or multitasking. It is a target-resident environment that provides the developer with a suite of capabilities that enhance the development process and the environment for the application to execute.

EFP is the firmware that the CPU executes immediately after a reset or power-up. EFP resides in the non-volatile flash memory of the CT630. It is responsible for booting the CPU and getting the system to a state where a user can access the CT630 through an RS-232 interface. After EFP initializes the system, it presents itself as a command line interface to the user.

The command interpreter (shell) provides a set of internal commands, variables, command line editing and history, command output redirection, user levels, and password protection.

EFP also configures flash memory as a file system (Tiny File System). The file system provides the capability of accessing flash memory as name space or address space. The files may be data files, compiled binary files in ELF format, script files, or configuration script file.

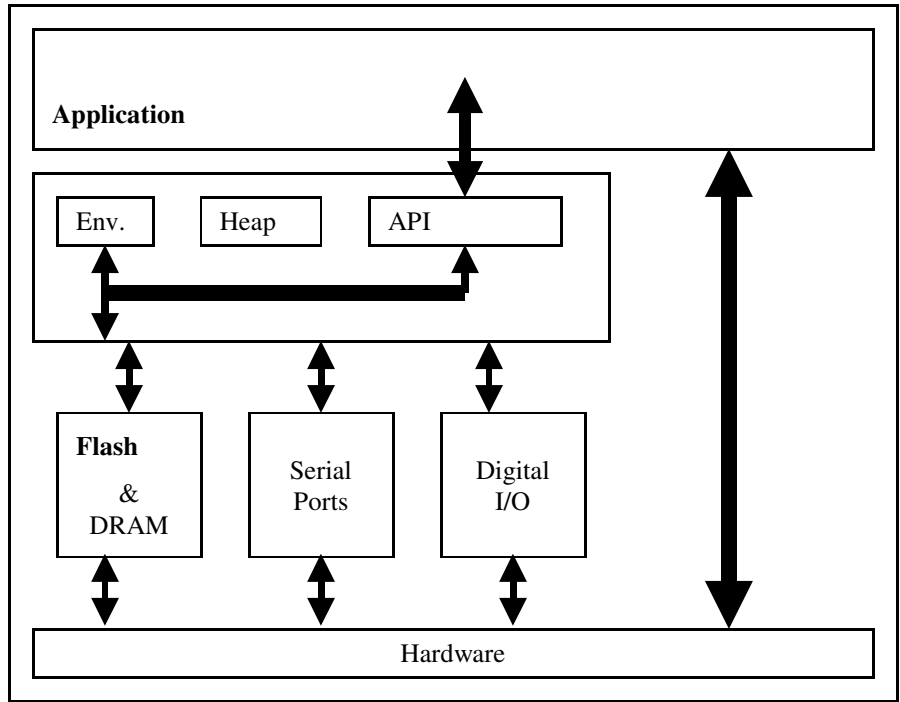
Executable files (ELF and scripts) may have an auto-bootable attribute, which the system uses to recognize files that need to be run at boot time. If more than one file has the auto-bootable attribute, they are executed sequentially and in alphabetical order.

In EFP, everything except the firmware itself is a file. When the application is running (as a result of it being loaded from TFS flash memory to DRAM by EFP), other files can be accessed by the active application.

EFP provides the capability of downloading and uploading files through a serial port. The transport protocol used is XMODEM and it also supports XMODEM 1K.

EFP has built in device drivers for all the system devices. The device drivers in turn interface with an application through a set of API's that are dynamically linked to the application at run time. The application has the capability to use the APIs or access the hardware directly if desired.

Firmware Block Diagram



MANUAL HISTORY

Preliminary Rev A, Initial Release, Sep 2009

Rev B

Correct J1939 pin references on pages 15 and 20.

Rev C

Update corporate address.

GLOSSARY OF TERMS

CAN (Controller Area Network)

Controller Area Network (CAN) is a multicast shared serial bus standard, originally developed in the 1980s by Robert Bosch GmbH, for connecting electronic control units (ECUs). CAN was specifically designed to be robust in electromagnetically noisy environments and can utilize a differential balanced line like RS-485. It can be even more robust against noise if twisted pair wire is used. Although initially created for automotive purposes (as a vehicle bus), it is also used in many embedded control applications (e.g., industrial) that may be subject to noise. Bit rates up to 1 Mbit/s are possible at network lengths below 40 m. Decreasing the bit rate allows longer network distances (e.g. 125 kbit/s at 500 m).

The CAN data link layer protocol is standardized in ISO 11898-1 (2003). This standard describes mainly the data link layer — composed of the Logical Link Control (LLC) sublayer and the Media Access Control (MAC) sublayer — and some aspects of the physical layer of the ISO/OSI Reference Model. All the other protocol layers are left to the network designer's choice.

Command Interpreter (Shell)

The command interpreter (shell) provides a set of internal commands, variables, command line editing and history, command output redirection, user levels, and password protection.

EFP (Extensible Firmware Platform)

Extensible Firmware Platform (EFP) is a very simple 32-bit operating system and does not support multiple users or multitasking. It is a target-resident environment that provides the developer with a suite of capabilities that enhance the development process and the environment for the application to execute.

EFP is the firmware that the CPU executes immediately after a reset or power-up. EFP resides in the non-volatile flash memory of the CT630. It is responsible for booting the CPU and getting the system to a state where a user can access the CT630 through an RS-232 interface. After EFP initializes the system, it presents itself as a command line interface to the user.

SAE J1708

This network is used in the heavy truck and bus industry. It is based on the RS-485 network.

SAE J1939

SAE J1939 is the Vehicle Network Communication standard used for communication and diagnostics, originally by the heavy-duty truck industry in the United States. SAE J1939 defines five layers in the 7-layer OSI network model, and this includes the CAN 2.0b specification (29-bit

header) for the physical and data-link layers. The session and presentation layers are not part of the specification.

SAE J1939 can be considered the replacement for the older SAE J1708 and SAE J1587 specifications. SAE J1939 has been adopted widely by diesel engine manufacturers. One driving force behind this is the increasing adoption of the engine ("black box") Electronic Control Unit (ECU), which provides one method of controlling exhaust emissions within US and European standards. Consequently, SAE J1939 can now be found in a range of diesel-powered applications: vehicles (on- and off-road), marine propulsion, power generation and industrial pumping.

TFS (Tiny File System)

EFP also configures flash memory as a file system (Tiny File System). The file system provides the capability of accessing flash memory as name space or address space. The files may be data files, compiled binary files in ELF format, script files, or configuration script file.

XMODEM

EFP provides the capability of downloading and uploading files through a serial port. The transport protocol used is XMODEM and it also supports XMODEM 1K.