


CS4700/2700 Controllers

Technical Reference
for use with
46 and 66 Series Electric Fastening Tools
and SD25 Electric Screwdrivers

Rev 0.7 November 30, 2005

CP P/N :
Techmotive P/N : 39-30-43083

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NOTE: Chicago Pneumatic Tool Company (CP) in 2005 acquired and changed the name of GSE tech-motive tool to CP Techmotive. Product Information may be found on www.cp.com.

NOTE: The part number for the Visual Supervisor (VS) software program is 464000-03330 (CP part number 6150040915)

NOTE: A variety of related **technical manuals** in .pdf format may be downloaded from www.cp.com. Click on **the Technical Info link** on the left column. Select *Technical Documentation*. Scroll through the list to find the title of the product you require, and click!

Safety:

Working with fastening tools can be dangerous if safe and proper procedures are not followed. As with all machinery, certain hazards can be involved with the operation of the product. Using these tools with respect and caution will considerably lessen the possibility of personal injury. If, however, safety precautions are overlooked or ignored personal injury to the operator can result.
Always use common sense and exercise caution when using these tools. They can produce high torque that, unless properly compensated for, could cause personal injury. Remember, your personal safety is *your* responsibility.
If you are an operator or CP Techmotive qualified service technician, you should become familiar with the contents of this manual before operating, servicing, or maintaining any part of the 4700/2700 Controller. Familiarization with all components of the system can minimize the possibility that an accident or injury might occur.
CP Techmotive assumes no responsibility for personal injury or damage to equipment resulting from misuse of these tools. After reviewing this manual you should also review all safety procedures provided by your company and the equipment installer.

WARNING! ***Failure to follow these steps can result in serious personal injury.***

!

General Machine Safety

- FOR YOUR OWN SAFETY READ THE INSTRUCTION MANUAL THOROUGHLY PRIOR TO OPERATING THE TOOL.
- DO NOT WORK IN A DANGEROUS ENVIRONMENT. Do not use power tools in a damp or wet location or explosive atmosphere, or expose them to rain, oils, or corrosive fluids.
- KNOW THE LOCATION OF POWER DISCONNECTS AND EMERGENCY STOP BUTTONS PRIOR TO OPERATING THIS EQUIPMENT.
- KEEP ALL ELECTRICAL PANELS CLOSED DURING OPERATION. High voltage present inside enclosure panels can result in personal injury. Do NOT bypass or defeat electrical safety devices. Turn the power actuator to the OFF position prior to any servicing or maintenance of the controller.
- Observe all government and/or company power lockout standards.
- NEVER OPERATE SOLENOID VALVES, LIMIT SWITCHES OR RELAYS MANUALLY as this practice can create dangerous, unexpected machine movements.
- SECURE THE TOOL. Tools that develop torque can produce hazardous torque reactions. Always be sure that the tool is properly fixtured to absorb reaction as a fastener is tightened. Never operate a tool capable of high torque without proper fixturing.
- SECURE WORK. Avoid situations where the part being fastened breaks loose and can cause damage.
- NEVER TOUCH OR ATTEMPT TO STOP MOVING MACHINERY OR PARTS WITH YOUR HANDS, OTHER PARTS OF YOUR BODY, OR MAKESHIFT DEVICES.

- DO NOT OPERATE THE TOOL WHILE UNDER THE INFLUENCE OF ALCOHOL, DRUGS OR MEDICATION THAT CAN IMPAIR YOUR JUDGMENT.
- REPORT ALL UNSAFE WORKING CONDITIONS OR PRACTICES TO YOUR SUPERVISOR AND / OR SAFETY DEPARTMENT FOR CORRECTION.
- WEAR APPROVED SAFETY GLASSES AT ALL TIMES.
- DO NOT WEAR JEWELRY, especially bracelets and rings, while operating the fastening tools. Keep hands and fingers away from all rotating parts and avoid situations where clothing can become tangled in the tool. Secure loose fitting clothing, neckties, and long hair. Wear medical alert identification cautiously.
- DO NOT OVERREACH. Keep proper footing and balance at all times.
- KEEP YOUR WORK AREA CLEAN. Do not work on or near slippery floors or surfaces. Avoid situations where the tool reacts against unexpected obstacles. Do not operate electrical equipment while standing on a wet floor.
- MAINTAIN TOOLS IN TOP CONDITION. Keep tools properly lubricated and clean. If any wires become frayed or exposed, replace them immediately. Prevent dirt, grease or contaminants from getting into the tool.
- REDUCE THE RISK OF UNINTENTIONAL STARTING. Be careful how the tool is left unattended. Avoid resting it on its throttle lever to prevent false starts.
- CONTROL THE DIRECTION OF ROTATION. The reaction torque changes direction when going from forward to reverse. Always be aware in which direction the tool will rotate prior to using it. If the tool is not fixtured this will allow you to brace for the proper direction of torque reaction.
- CHECK DAMAGED PARTS. Before further use of a tool, any part of the tool that is damaged should be carefully checked to ensure that it will operate properly and perform its intended function. Check for alignment of moving parts, breakage of parts, mounting, and any other conditions that may affect its operation. Never operate a tool that has damaged or exposed wires. Never operate a tool that has any part of the powertrain, other than the output spindle, exposed.

Electrical Safety

Only qualified and properly trained personnel should perform electrical/electronic troubleshooting and repair. Consider the following electrical system safety guidelines:

- Before you troubleshoot or service a fastening system station, be sure you have an up-to-date and appropriate set of electrical drawings for that station.
- Remove metal items, such as rings, metal necklaces, wristwatches and jewelry, as these can create electrical hazards. Wear medical alert identification cautiously.
- Wear safety glasses, but avoid wearing those that have metal rims or metal side shields.
- It may be necessary to troubleshoot equipment while the power is ON. ONLY qualified, trained personnel should do this. During these instances, open only the

panels, doors, or covers, which need to be opened. Know the voltage present at all points before you begin troubleshooting.

- Use properly insulated tools when working on electrical equipment to reduce the possibility of shock. Make sure the insulation is adequate to safeguard against the high voltages present.
- If you must work on the electrical system, be sure the main disconnect switch on the power panel is in the OFF position and locked out with locks from each trade involved in the repair.
- Do not attempt to modify or repair the machine without the approval of the proper authorities.
- Uses approved fuse pullers when changing fuses.
- Never use jumper wires or fuse substitutes to replace specified fuses.
- Always use fuses of a capacity smaller than or equal to the safe capacity of the line or the equipment it serves.
- Before you work on any circuit, check it with an appropriate testing device to be sure voltage is not present.
- Install temporary wiring as safely as possible and replace it with permanent wiring as soon as possible. Install grounding wherever it is needed in the final installation. If modifications are made to the system wiring, drawings must be revised to illustrate this change.
- Know how to deal with electrical fires properly. Keep carbon dioxide and powder extinguishers handy.

Earth Connection

Make sure that the controller is properly grounded via a protective conductor. The tool is connected to earth by means off a ground wire internal to the cable via the controller. This protects the operator from any electric shock.

Differential circuit breaker

The controller is fitted with a differential circuit breaker for user protection. This device detects any insulation defect in the cable or in the tool. The tool will stop when a leakage current is 30 mA or more; is detected by the device. The device will protect the operator from any electric shock and protects the servo drive from deterioration of the power stages. The device can be reset manual by resetting the trip switch to the “ON” position. See Exterior Component Section for location.

Software Features

Their are several feature build into the software to protect the operator from being injured because of joint, servo and tool problems; Lock rotor, high limit torque shutoff, high limit angle shutdown, temperature shutdown, tool communication failures, 120 % of the tools capacity. Any of these failures will be displayed on the tool control module.

Locked rotor – Power being supplied to tools motor but no rotation on the output spindle
Temperature shutdown – Motor temp sensor open because of excessive heat build in motor
High Limit Shutdown – Tool shutdown because high limit torque was exceeded
High Angle Limit Shutdown – Tool shutdown because high limit angle was exceeded
Tool Communication – Cable bad, Intelligence tool interface printed circuit board failed

Preface

The CS4700/2700 controllers are functionally equivalent to the CS4100/2100. In fact, most of the internal electronics and software is identical. The CS4700/2700 packaging has been improved to be smaller and lighter.

The CS4700/2700 Controller manufactured by CP *techmotive tool* is a component of one of the most powerful DC electric nutrunner fastening control systems available. The system uses 100% digital technology from the tool to ensure accurate and reliable fastening and data acquisition. Microprocessors in both the fastening tool and the controller's tool control module (TCM) enable the system to perform to levels of accuracy while providing easy set-up and operation previously unattainable. With Intelligent tool technology you no longer need to enter tool identification, calibration, angle counts, speed and other information. You simply plug in the tool, power on the system, program the desired tightening specifications and begin production.

A complete nutrunner fastening control system is made up of one of the following:

* A CS4700 Controller with a *CP techmotive tool* 56, 66 or 116 Series nutrunner, 27 A tool control module (TCM) and cable
* A CS4746 Controller with a 46 Series nutrunner, 8 A TCM and cable
* A CS2700 Controller with a SD25 electric screwdriver, 6 A TCM and cable

The *CP techmotive tool* Visual Supervisor software program is used for system setup, fastening, data collection, and diagnostics although basic programming can be done by a local keypad and display on some models.

Who Should Use This Manual

This manual is written for the engineers, technicians and users who will set-up and/or operate the CS4700/4746/2700 Controller with their respective nutrunner or screwdriver models listed above.

How to Use This Manual

This manual provides installation, maintenance and technical information about the CS4700/2700 Controllers.

This Preface provides conventions and abbreviations used throughout this manual.
It is recommended that you read this manual entirely before you use a CS47XX/2700 Controller.

This manual may have some illustrations and text that applies to the latest firmware:
CCM 1.13
DCM 6.16
VS 3.33

Conventions

The following conventions are used throughout *CP techmotive tool* manuals for the safety of personnel, equipment, software, and data. (Not all of these conventions are used in every manual or guide.) The conventions include warnings, cautions and notes, as follows:

WARNING! ***It can be dangerous to personnel and/or machine systems, if operating instructions are not followed. The information appears in a box in italicized boldface type.***

CAUTION! ***There may be damage to equipment, and loss of software and data, if operating instructions are not followed. The information is indented and in italicized boldface type.***

NOTE: *Information that adds to your knowledge of the equipment and/or software. The information is indented and italicized.*

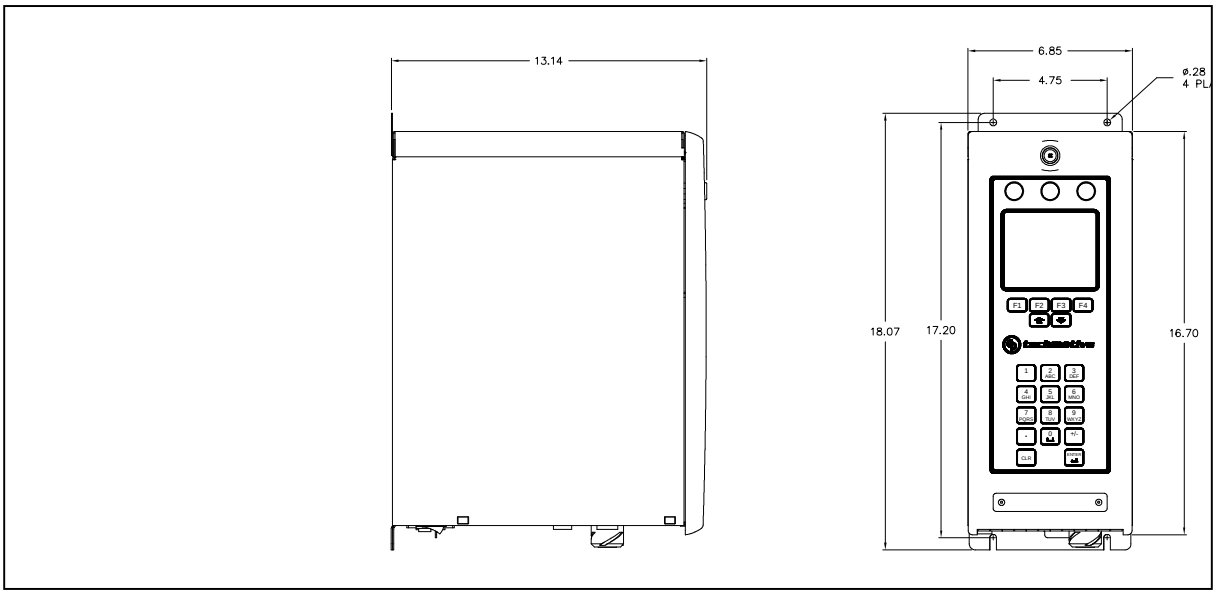
Abbreviations

Some of the most common abbreviations used throughout this manual include the following:

AIM	Anybus© Interface Module (a PC board) used whenever a Field-bus option is added
API	application program interface (Usually a PC based program generic interface)
CCM	Communications control module (a PC board) used to add Ethernet and other options
E^2PROM	electrically-erasable programmable read-only memory (holds the program on the DCM, CCM, TDM and AIM)
I/O	input/output
IEEE	Institute of Electrical and Electronic Engineers
EPR	error-proofing ready
IP	internet protocol
LED	light emitting diode
PLC	programmable logic controller
TCM	tool control module (the central box which contains tool controller CPU & Servo)
TCP/IP	transmission control protocol/internet protocol
TDM	*techmotive*® display module (a PC board)
SDLC	synchronous data link control (CP *techmotive tool's* RS-485 protocol)
V	volts
VS	Visual Supervisor - the setup, fastening, data collection, and diagnostics software program developed by CP *techmotive tool*

Table of Contents

Product Dimensions and Weight



DIMENSIONS in INCHES

Weight:

Approximate Weight = 30 LBS. (Weight will vary slightly depending on configuration)

Input Voltage Requirements:

CS2700 (115v) - 115vac +15%,-10%; 50/60 Hz (.5 to .75 kva recommended)
CS2700 (230v) - 230vac +15%,-10%; 50/60 Hz (.5 to .75 kva recommended)

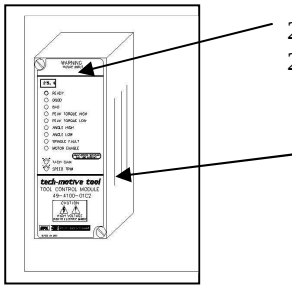
(If supplied with 230v only TCM's)
CS4746 - 230vac +15%, -10%; 50/60 HZ (.75 to 1 kva recommended)
CS4700 - 230vac +15%, -10%; 50/60 HZ (.75 to 1 kva recommended)

(If supplied with 115/230v Dual voltage TCM's)
CS4746 - 115vac or 230vac +15%, -10%; 50/60 HZ (.75 to 1 kva recommended)
CS4700 - 115vac or 230vac +15%, -10%; 50/60 HZ (.75 to 1 kva recommended)

Note: Voltage levels can effect the maximum speed capability. The supply (kva) can effect the ability of the tool to achieve rated torque especially on soft joints.

Product Compatibility Information

TCM compatibility



It is generally recommended that 230vac (versus 115vac) be used in most industrial applications since periodic power loading can result in supply-line drops that could limit torque capability on soft-joint (demanding) torque applications

The 4700 and 4746 (66 and 46 series tools) can be equipped with TCM's which are dual voltage capable (115v or 230vac nominal). Please consult factory if 115v (or dual voltage capability is required). (See table below)

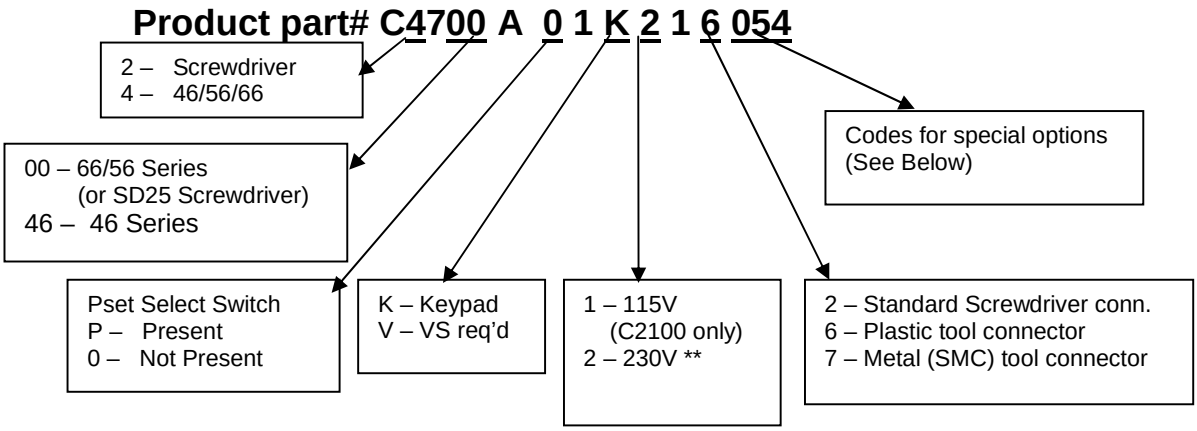
The TCM models (dual voltage capable) are backward compatible which means they will work in any current or older controller. Please notice that some CS4700 models require a revision K or higher TCM to operate properly.

Generally, plugging in an incompatible TCM will not cause any damage but will result in the following:

1. It will work fine (but it may only run at 230vac)
2. It won't power-up at all (If TCM older than rev. K and that model required rev. K)

CONTROLLER	TCM requirements
115v CS2700 (Screwdriver)	49-4100-01C2 All revisions
230v CS2700 (Screwdriver)	49-4100-01C3 Revision K or higher
CS4700 plastic-connector (230v) (115/230v)	49-4100-03C5 All revisions (But 230v operation only) **49-4100-03C5D** Dual Voltage capable
CS4746 plastic-connector (230v) (115/230v)	49-4100-01C5L All revisions (But 230v operation only) **49-4100-01C5LD** Dual Voltage capable
CS4700 SMC metal conn. (230v) (115/230v)	49-4100-03C5 Rev. K or higher (But 230v operation only) **49-4100-03C5D** Dual Voltage capable
CS4746 SMC metal conn. (230v) (115/230v)	49-4100-01C5L Rev. K or higher (But 230v operation only) **49-4100-01C5LD** Dual Voltage capable

Product Part Number Codes



Notes: ** - The 4700 & 4746 models are capable of DUAL voltage (115/230v) if supplied with Dual-voltage capable TCM's.

Special SUFFIX Codes

ASSIGNMENTS: (Subject to change)

1-PFCS (Ethernet)	6-Interbus-S
2-Reserved	7-Modbus-Plus
3-Reserved	8-Profibus-DP/DPV1
4-DeviceNet	9-Reserved
5-Ethernet (10 Base-T)	A-Ethernet-IP /Modbus TCP
	B- PFCS (RS232 Terminal Server)

Other Letters: Future use

NOTE: *When Ethernet is present, DaimlerChrysler PFCS Ethernet is always available. Likewise GM and Ford interfaces are available on Ethernet-capable units.*

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CS4700 General Information

Units with Keypad/Display

If the controller has a Keypad/Display, you may simply connect the tool, go into the Menu and select Defaults (pick TOOL I/O). This provides a quick way to get up and running immediately. On these units, you may prefer to use the Visual Supervisor (VS) program initially for even easier setup especially if the process is complex.

NOTE:

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When setting up these defaults it is also possible to select the source of the TOOL commands (fieldbus or the tool switches) and the source of the parameter selections (fieldbus, physical I/O or the keypad menu). If you require I/O mapping that is not among the default selections, VS will be required to customize these input sources.

Use +/- key on RUN screen to adjust contrast
Use Decimal-pt. on RUN screen to REVERSE blue/white

Units without Keypad/Display

Controllers without the Keypad/Display must be configured using the VS software. If the unit is Ethernet capable, some of the configuration (like setting up IP addresses, etc.) must be done via the RS-232 console port. The default selections can also be done via the RS-232 console if necessary. VS should be used to fine-tune selections/parameters.

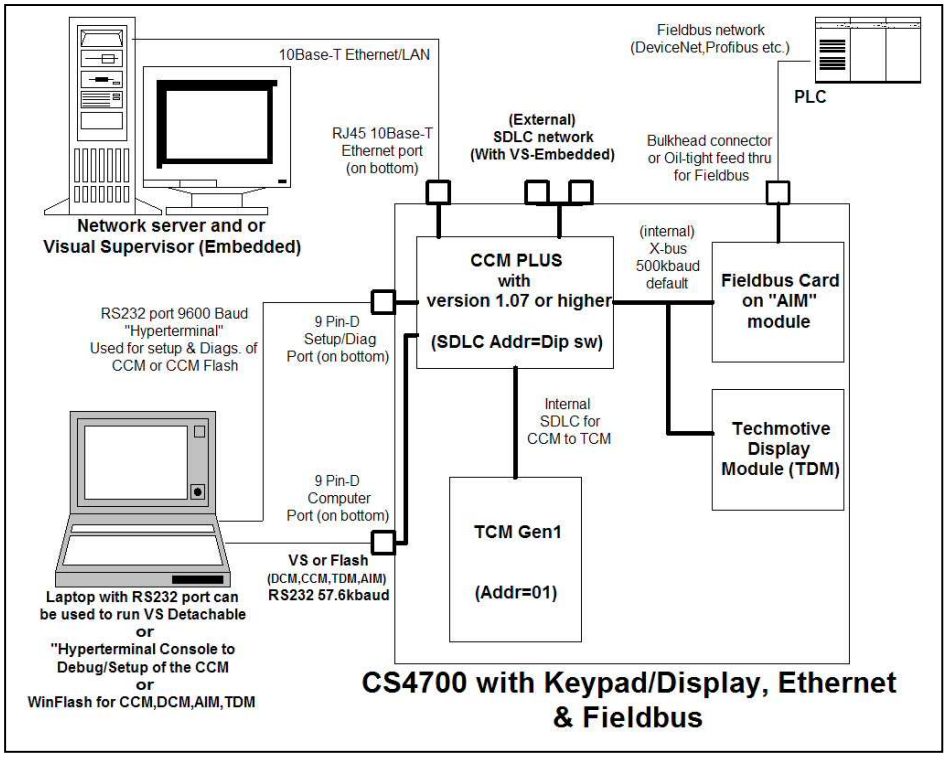
Units with Ethernet/Fieldbus Capability

Many models are supplied with Ethernet capability. This Ethernet link can go to *CP techmotive tool's* VS-embedded system software or to an API interface or to a number of selectable custom software interfaces for Ford, GM and DaimlerChrysler. The controller can also be upgraded with one of a number of standard fieldbus interfaces. These will enable interfacing to PLCs via a standard bus to provide data and I/O exchange.

All Units with CCM's

A Communications Control Module (CCM) is added whenever Ethernet, a keypad/display or a fieldbus is required. Whenever the CS4700 has a CCM, you may need to connect to the CCM via the DIAGNOSTICS RS-232 port on the bottom panel of the controller. By running Hyperterminal-CONSOLE (at 9,600 baud), a text-based dialog will allow you to set the TCP/IP address and other parameters as well as to perform extended diagnostics. Examples of this dialog are found later in this document. Remember: when making critical changes be sure to initiate the "COMMIT" command to store all of the requested changes permanently into E^2PROM. Note that newer revisions of software permit editing of various Ethernet parameters via the keypad/display.

CCM+ Based Block Diagram

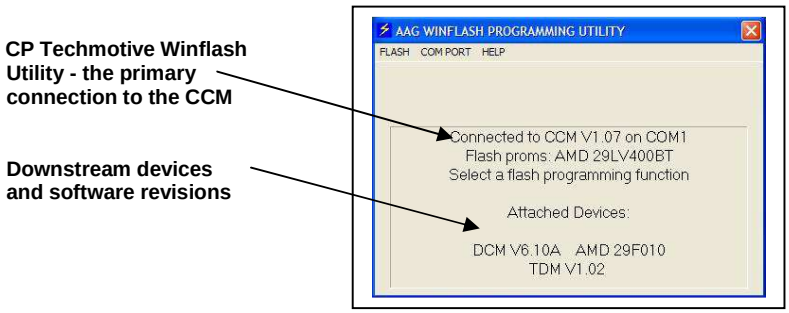


FIELD Upgrade Considerations

CS4700/4746/2700 Controllers are considered BASIC models if they have only a TCM. Adding a CCM makes the unit "Ethernet capable." With the CCM in place, it is possible to add the Fieldbus capability and/or the Keypad/Display option. Keep in mind that E^2PROMs exist on the TCM, CCM, Anybus Interface Module (AIM) and *techmotive* device module (TDM), which may be updated periodically. Beginning with CCM version 1.07 and with "WinFlash 1.12 or higher, it is possible to flash upgrade the TDM, AIM or even the TCM via the CCM Flash port connection.

Units with CCM+ (Ethernet capable)

All Flash updates can be done simply from the CS4700 Controller RS-232 computer port without going inside the box or moving any cables (as required of the original CCM units).



NOTE: *WinFlash is CP techmotive tool's software update utility applicable to the CCM, CCM+, or direct TCM connection.*

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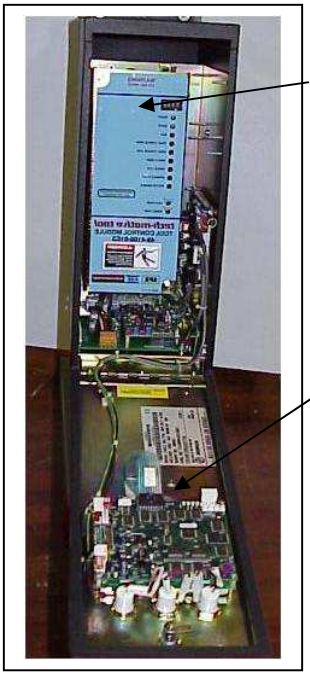
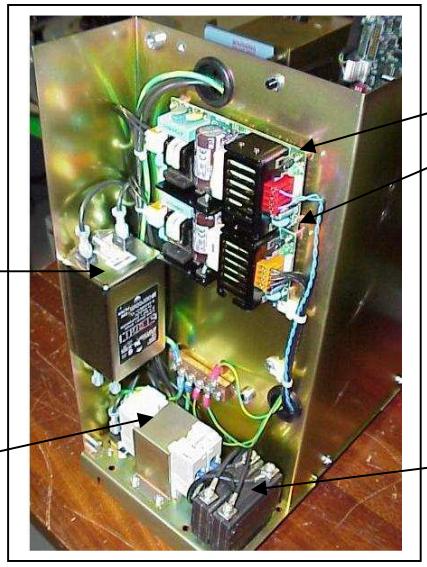
Save/Restore with VS3.33 & CCM1.11 (or higher rev.)

Upgrading to VS3.33 and CCM1.11 provides the ability to save and restore the complete CS4700 setup. Previous versions of software would not save the settings associated with the CCM and Fieldbus entities. Within VS files such as .vsc and .dev can save the CS4700 configuration and restore it. These files contain this additional information as extended data. If trying to restore a CS4700 from a file and it didn't have the hardware for this extended data, the CCM will still restore but it will just throw away the extended setup data that it cannot use.

Location of Major Components

CS2700 with Door open





Keypad/Display Operation

Entering SETPOINTS Via the Keypad

The *detachable* version of VS (VS loaded onto a laptop PC that is connected to the controller) can be used as an *enhanced* local programming facility, as not all setpoint functions are available via the keypad. Connecting detachable VS will 'disable' the ability to change setpoints via the controller keypad until the computer running detachable VS is disconnected.

VS Embedded Connections

Embedded VS (available when a controller has a built-in industrial computer and monitor) can be used via the Ethernet port or SDLC (RS-485 port).

NOTE:

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If the unit is Ethernet-capable, SDLC (RS-485) is available only on CCM+ based units. Changes made by the controller keypad or detachable VS will be immediately reflected on the embedded VS screen. The VS Embedded PC can also be used to change the settings. In these environments, it may be desirable to implement security (refer to the next paragraph).

SECURITY: Visual Supervisor and the Keypad

The CS4700 with Keypad/Display can be set up with passwords and multiple access levels. Security is set up using the VS program VsUserMgt (VS3.28 or higher is required). VS allows an almost infinite number of users with individual levels of security to use the system. However, only five special passwords can be sent to the controller for security at the keypad and VS-Detachable level. These special passwords are called "Plant Floor Security Passwords, and they must be numeric. You must use the VsUserMgt utility and a USB key to set these up.

NOTE:

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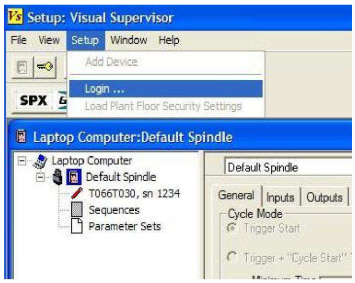
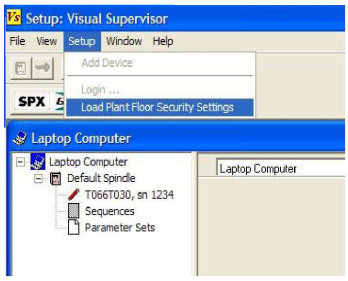
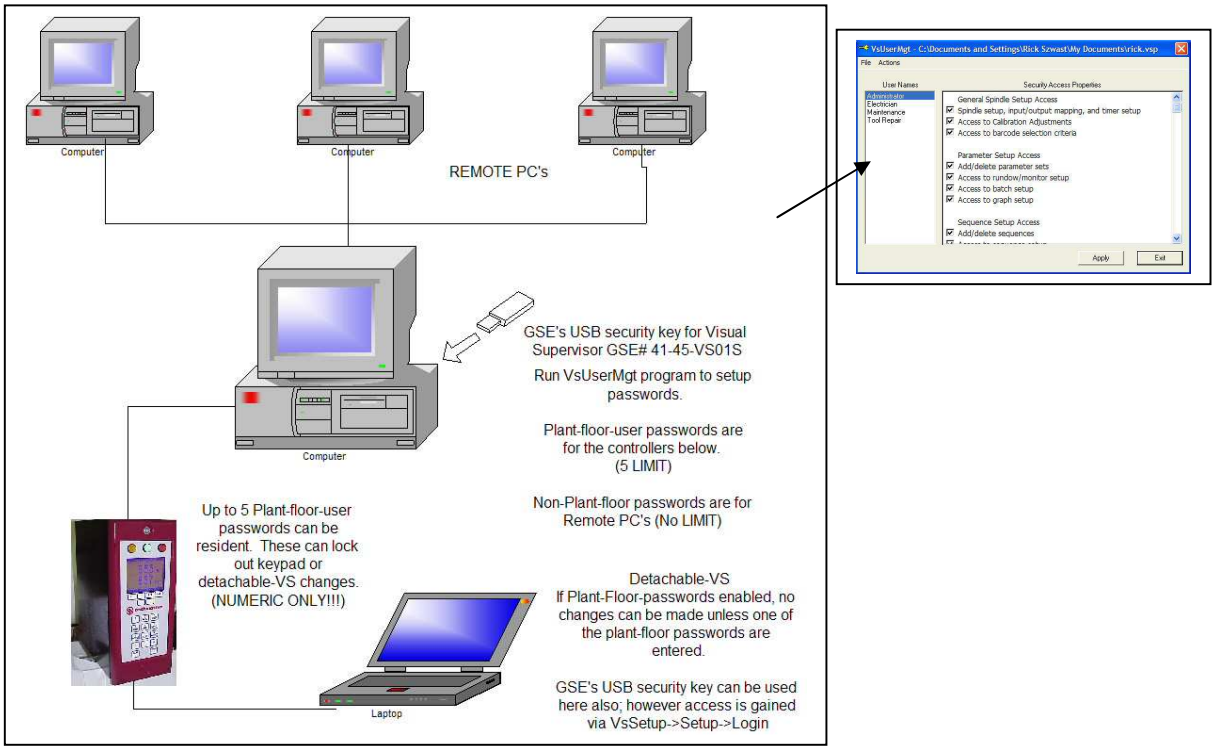
The "embedded" version of VS will load the Plant Floor Security passwords into the CS4700 Controller when VsMain starts.

Make sure the VS Icon  *is removed from the tool tray and re-start VsStart to have the Plant Floor Security settings transferred.*

The "detachable" version of VS can also load the CS4700 with the passwords, but the mechanism is different. You must enter into VsSetup and click "setup," and then select "Load Plant Floor SecuritySettngs." The lock icon indicates that the Plant Floor Security Password is resident in the controller.







LIMITATIONS of the Keypad

The optional Keypad/Display provides continuous information about torque, angle, parameter sets (psets) and cycle counts. It also allows you to select psets and change many setpoints from the keypad. Special programming configurations and many of the less frequently used parameters are not available via the keypad, so if these must be changed then VS must be connected to the controller. Additionally, some very application-specific functions (and TCP/IP setup) must be done via Hyper-terminal on the RS-232 setup/diagnostics port.

STATISTICS – Available on Controller with Keypad/Display

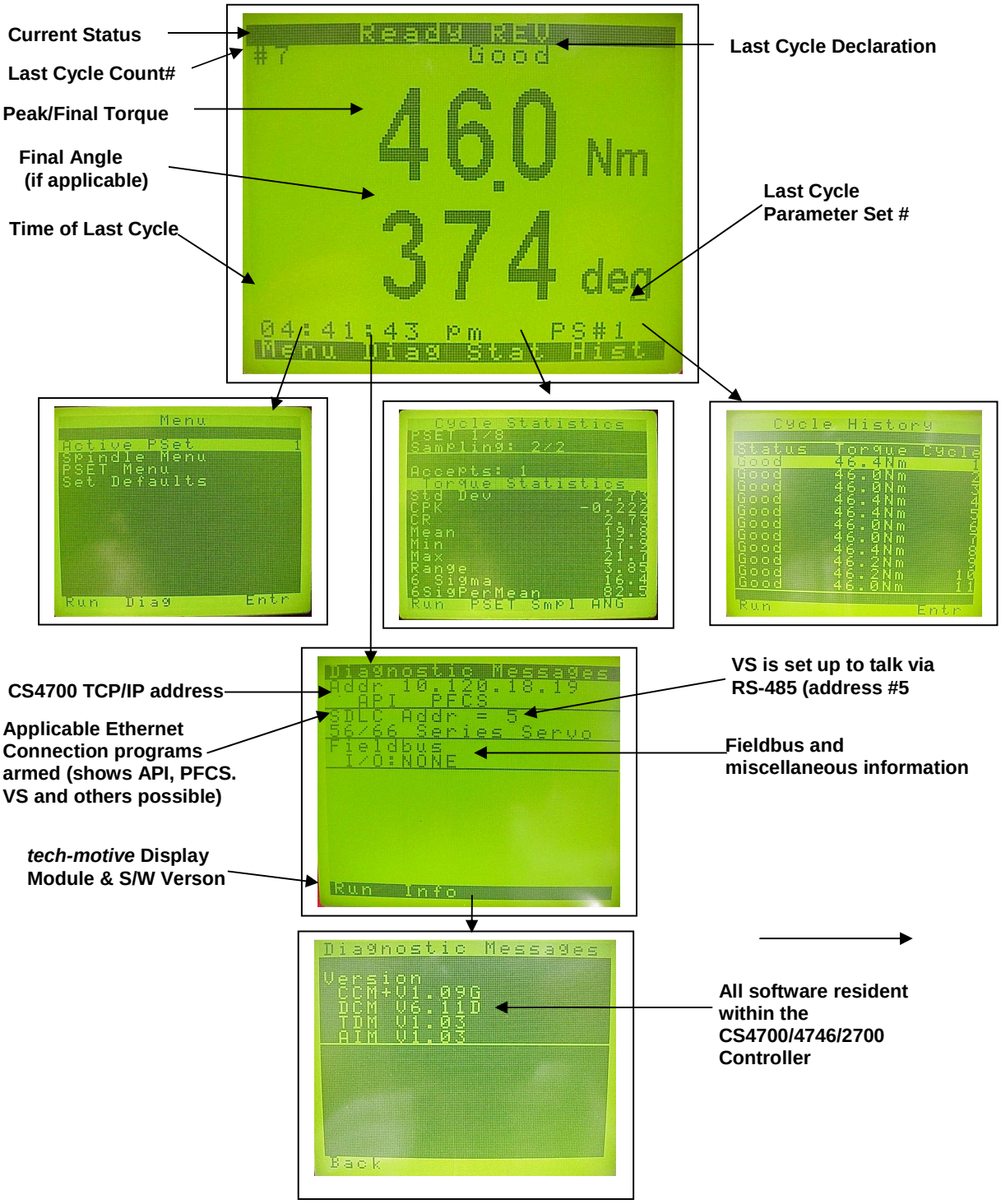
A statistics function has been provided to show torque and angle statistics based on a selected sample size. The top of the screen shows the active parameter set and the number of samples that have been collected in the current sample "data group." The rest of the screen shows the statistics from the previously completed data group.

HISTORY – Available on Controller with Keypad/Display

In the history mode, the user can view the results of the last 10 cycles. Note that the TCM maintains a much larger history buffer which can be extracted via Visual Supervisor software. Also note that the size of the TCM history depends on the History mode setting.

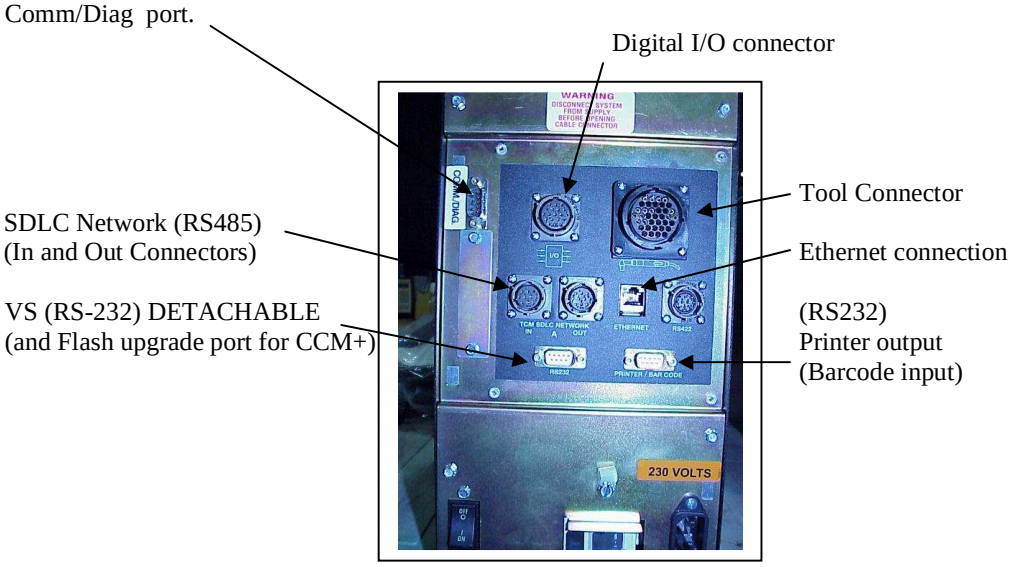
Keypad Display Characteristics

If a setpoint falls outside of the tool's capability or internally contradicts the operation of the tool, the setpoint change will be rejected. You may still need to connect the VS program to address some setup issues.



Comm/Diag (Comm. RS232 Setup & Diagnostics)

A null-modem cable that provides an RS-232 connection (typically 9 pin-d female on both ends) is required for setup of the CCM module. This cable plugs into the CS4700 Mini Controller Comm/Diag port.



For the Debug/Setup port, use 9600 baud, 8 data, no parity and one stop bit. (Typically COM1 will be used for the RS-232 serial connection.) When you press the ENTER key, a ">" should appear. Press "?" to display a list of available commands. (In the captured text on the next page, the user entered the "larger-bold" text, and the rest was the response from the CCM.) Future CCM revisions may may add or modify the commands.

CAUTION! ***DO NOT TURN OFF POWER*** to the CS4700 controller while making setup changes on the Console (Debug/Setup) port, as the setting changes may be lost. You must issue one of the **"*COMMIT*"** commands to enact/save most of configuration settings. Any of the **"*COMMIT*"** commands will preserve all of the setting change categories.

Printer/Barcode (RS232 Printer output & barcode input)

PRINTER PORT Characteristics: OUTPUT ONLY 9600 baud (8 data, no parity, 1 stop bit).
Data stream is sent without handshaking following each cycle.

----------SAMPLE PRINTER OUTPUT FORMAT (TCM backplane DIP Sw # 8 OFF)----------
#0110 Sp:01-01 H 15.1 Nm L 3 Deg

#0110	Cycle count	(5 bytes)
	Space	(1 byte)
Sp:	Spindle header	(3 bytes)
01	Spindle number	(2 bytes)
-	Dash	(1 byte)
01	Parameter number	(2 bytes)
	Space	(1 byte)
H	Torque Pass/Fail*	(1 byte)
XX15.1	Peak torque	(6 bytes)
	Space	(1 byte)
NmXXX	Torque Units	(6 bytes)
	Spaces	(1 bytes)
L	Angle Pass/Fail	(1 byte)
XXXXX3	Angle result	(6 bytes)
	Space	(1 byte)
Deg	Angle Units	(3 bytes)
	Carriage return	(1 byte)
	Line feed	(1 byte)

----------SAMPLE PRINTER OUTPUT FORMAT (TCM backplane DIP Sw # 8 ON)----------
#0095 Sp:01-01PP 13.0 4.0 10.1P 9999 40 36

#0095	Cycle count	(5 bytes)
	Spindle name*	(5 bytes)
Sp:	Spindle header	(3 bytes)
01	Spindle number	(2 bytes)
-	Dash	(1 byte)
01	Parameter number	(2 bytes)
P	Overall Pass/Fail	(1 byte)
P	Torque Pass/Fail	(1 byte)
X13.0	High Limit	(5 bytes)
XX4.0	Low Limit	(5 bytes)
X10.1	Torque Peak	(5 bytes)
P	Angle Pass/Fail	(1 byte)
X9999	Angle High Limit	(5 bytes)
XXX40	Angle Low Limit	(5 bytes)
XXX36	Angle Result	(5 bytes)
	Carriage return	(1 byte)
	Line feed	(1 byte)

*If Spindle Name $\geq$ 6 then the Spindle name field will increase to that length (up to 32 characters).

BARCODE PORT Characteristics: INPUT ONLY 9600 baud (8 data, no parity, 1 stop bit).

Note that this RS232 INPUT port will watch for specially formatted input strings for the purpose of Auto-Cal. from an instrument such as the M290 Torque Audit device.

Refer to Visual Supervisor Manual for Barcode setup and capability details. Some of the selectable modes and options are as follows:

1. Attaching an identifier (Part ID, Model# or both) to each cycle
2. Forcing a barcode read before allowing the tool to run
3. Using a barcode to select a parameter set
4. Discriminate barcodes with Masking and Min/Max Length options
5. Use a barcode to attach to data continuously or one-barcode per cycle
6. Assignable I/O for clearing, bypassing and monitoring the barcode statuses

Note: In addition to this RS232 port, barcodes can also enter into the TCM for marrying to cycle data via Fieldbus and from VS (PC software).

Date, Time and Time Zone Settings

When the controller is connected to a PC running Visual-Supervisor, the controller will synchronize to the computer's date, time and Time-zone settings automatically.

If the controller is setup up totally independent of Visual-Supervisor (Like the unit with Keypad/Display) the user should either link to Visual-Supervisor momentarily (to synchronize to the local time settings of the PC) or go into the console settings and set the Date, Time and Time-zone settings. These settings can be found under the "DATE" section of the console.

Connecting to Visual Supervisor (Ethernet)

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Setting Up and Configuring the Single-Channel Controller

1. Determine the TCP/IP address information that will be designated for CS47XX/2700 Controller.
2. On the console session above, use the "ipconfig" command to enter in this information. Typically; the mask may be something like 255.255.255.0; the Gateway 0.0.0.0 Keypad/Display units allow entering in this information via the keypad.
3. Verify that the VS bridge is enabled. The command "ipconfig +vseth" might be needed if not.
4. Be sure to use the "commit" command to save the settings permanently if using the console.

Linking VS to the Single-Channel Controller on Ethernet

1. At the VS Host Computer run VsSystemSettings.
2. Set up the controller as an Ethernet connection and enter in the IP address (from above) VS should now link to this controller. Some computer software FIREWALLS may try to block this connection depending on how they are configured.
3. If you have problems, use the PING command to debug, and observe the CCM's LED's.)

NOTE :

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Once a CCM has linked to a VS-embedded host on Ethernet, the CCM will ignore any other attempted VS connections (other than IP addresses) over the Ethernet. Powering the controller down and then up is required to clear the CCM of the expected IP address for its VS host connection.

Connecting to Visual Supervisor (SDLC – RS-485)

Use the console command "ipconfig +vssdlc" to enable VS on SDLC (RS-485).

UNITS WITHOUT CCM+

CS2700	TCM backplane DIP switches set SDLC address
CS4700/4746	TCM backplane DIP switches set SDLC address

UNITS WITH CCM+

CS2700	NOT SDLC capable
CS4700/4746	CCM+ Dip switches set SDLC address

Connecting to Visual Supervisor (RS-232)

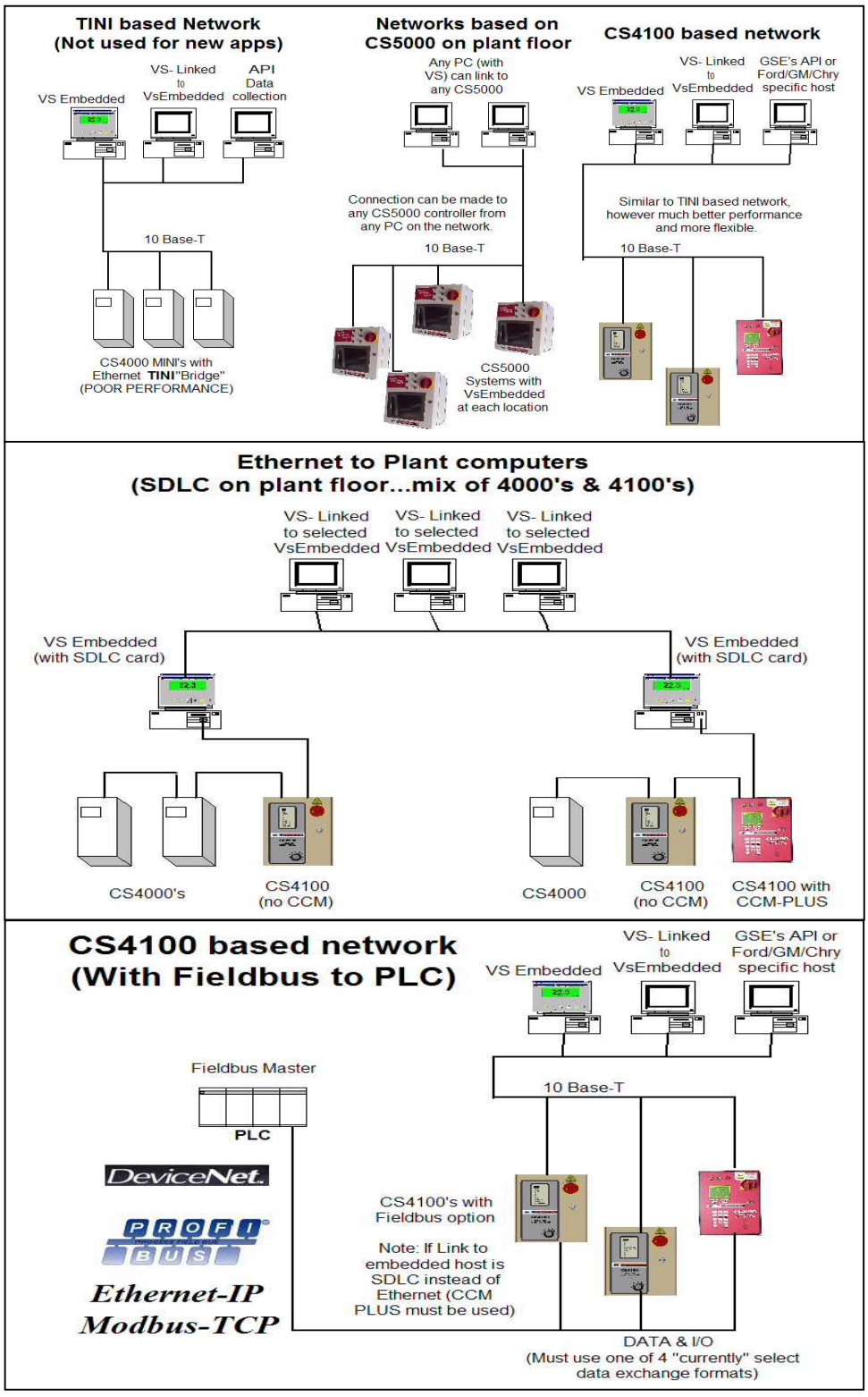
The RS-232 "computer port" on the bottom of the CS4700 Controller provides an RS-232 (laptop PC "Detachable VS") connection. Typically the baud rate is set for 57.6 kbaud, provided that TCM backplane DIP switch #7 is on; otherwise, the baud rate is 9,600 baud. On units with the CCM+, the baud rate will be 57.6 kbaud regardless of the TCM backplane DIP switch.

Sample Console Session

```
?                              <HELP>
CCM Commands:
hello     - displays version information.
status    - displays CCM status information. 'status ?' for details.
date      - Read or set the date and time. 'date ?' for details.
xbus      - X-Bus Bus diagnostic utility. 'xbus ?' for details.
default   - Set Default Parameters in TCM. 'default ?' for details.
ipconfig  - displays or modifies TCP/IP configuration. 'ipconfig ?' for details.
netstat   - lists all open IP ports & connections.
ping      - tests TCP/IP connectivity to a remote machine.
arp       - Displays the Ethernet Address Resolution table.
api       - displays or modifies API configuration. 'api ?' for details.
pfcs      - displays or modifies PFCS configuration. 'pfcs ?' for details.
ford      - displays or modifies Ford configuration. 'ford ?' for details.
gm        - displays or modifies GM Protocol configuration. 'gm ?' for details.
aim       - displays AIM status or modifies configuration. 'aim ?' for details.
tdm       - displays TDM status. 'tdm ?' for details.
commit    - saves configuration changes to eeprom.
>
>ipconfig                  <Ethernet Configuration>
Ethernet Adapter CS8900A
   Physical Address : 00-50-6B-07-02-73
   IP Address       : 10.120.18.19
   Subnet Mask      : 255.255.252.0
   Default Gateway  : 0.0.0.0

External Interfaces Enabled:
   Techmotive API
   Visual Supervisor SDLC Bridge
   PFCS Client
>
>ipconfig ?              <Ethernet Related Settings>
Usage:
   'ipconfig'          - Displays TCP/IP configuration.
   'ipconfig addr <ip addr> mask <subnet mask> gateway <gateway>'
                       - Modifies TCP/IP configuration.
   'ipconfig +api'     - Enables the Techmotive API Server.
   'ipconfig -api'     - Disables the Techmotive API Server.
   'ipconfig +ford'    - Enables the Ford interface.
   'ipconfig -ford'    - Disables the Ford interface.
   'ipconfig +gm'      - Enables the GM interface.
   'ipconfig -gm'      - Disables the GM interface.
   'ipconfig +pfcs'    - Enables the PFCS interface.
   'ipconfig -pfcs'    - Disables the PFCS interface.
   'ipconfig +vseth'   - Enables the Visual Supervisor Ethernet bridge.
   'ipconfig -vseth'   - Disables the Visual Supervisor Ethernet bridge.
   'ipconfig +vssdlc'  - Enables the Visual Supervisor SDLC bridge.
   'ipconfig -vssdlc'  - Disables the Visual Supervisor SDLC bridge.
   'commit'            - Commits IP configuration to EEPROM.
>
```

Examples of Network Topologies (CS4100 = CS4700)



Fieldbus Capabilities

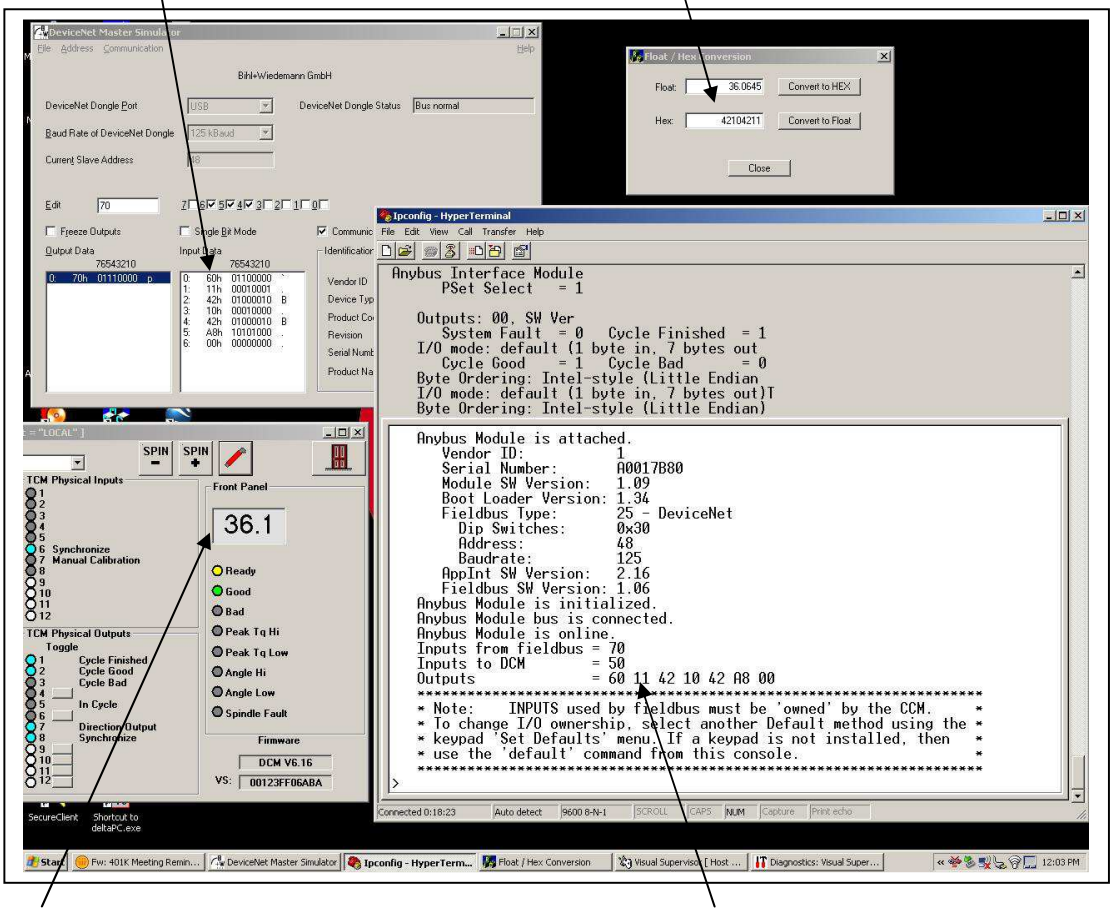
The CS4700 Contoller can interface to one field bus: DeviceNet, Profibus, Ethernet-IP and others are available in order to exchange I/O and data with PLCs and other devices.

Only certain hard-coded data mapping configurations are available over fieldbus. Presently, enabling the fieldbus I/O and selecting the data type can be done via the Console/Debug port. And some functions can be enabled (by default) via the Keypad/Display if the controller is so equipped. Most of the specific setup for the fieldbus is done via the console "AIM" category.

Under this category there is a **"BYTE-ORDER"** setting also known as "Little Endian and Big Endian". This is done as some PLC's and computers expect the high byte/low byte to be sent in different order. This setting will effect the 4- byte FLOAT values as well as the 2-byte INTEGER values. The sample below shows an example of a system running "Little Endian" which is the DEFAULT mode.

Sample DeviceNet Host program
Showing CS4700 output bytes (Default data config.) (See next page…)

"42104211" converted to FLOAT = 36.0645 (Ntm)



CS4700 shows torque = 36.1 (Ntm)

CS4700 Console (Comm/Diag) AIM Diagnostics
1st byte=Output bits, 2nd-5th bytes=Torque, 6th&7th byte=Angle
"60" "11 42 10 42" "A8 00"

FieldBus Data Mapping Types:

Default - …….. Small General purpose data mapping
Std (Standard) –…. Expanded output data and setpoints
GM8 & GM4 - …….. Special purpose for specific customer
Bcin (Barcode in) – Expanded I/O with 2 barcode inputs
SEQ (Sequences) – Expanded I/O with Full Sequence bits

TYPE: Default:

Outputs

Byte	Bit	Description
0	0	Parameter Set Selected Bit 0
	1	Parameter Set Selected Bit 1
	2	Parameter Set Selected Bit 2
	3	Parameter Set Selected Bit 3
	4	System Fault
	5	Cycle Finished
	6	Cycle Good
	7	Cycle Bad
1-4	0-7	Peak Torque (IEEE Floating Point)
5-6	0-7	Final Angle (16 bit integer, 0 to 65535)

Inputs

Byte	Bit	Description
0	0	Parameter/Sequence Select Bit 0
	1	Parameter/Sequence Select Bit 1
	2	Parameter/Sequence Select Bit 2
	3	Parameter Set Select Bit 3
	4	Cycle Enable
	5	Cycle On
	6	Forward
	7	Clear Outputs

TYPE: Std (standard)

Outputs

Byte	Bit	Description
0	0	Parameter Set Selected Bit 0
	1	Parameter Set Selected Bit 1
	2	Parameter Set Selected Bit 2
	3	Parameter Set Selected Bit 3
	4	System Fault
	5	Cycle Finished
	6	Cycle Good
	7	Cycle Bad
1-4	0-7	Peak Torque (IEEE Floating Point)
5-6	0-7	Final Angle (16 bit integer, 0 to 65535)
7-10	0-7	Torque HighLimit (IEEE Floating Point)
11-14	0-7	Torque Target (IEEE Floating Point)
15-18	0-7	Torque LowLimit (IEEE Floating Point)
19-22	0-7	Torque Fastening Threshold (IEEE Floating Point)
23-26	0-7	Torque Control Reference (IEEE Floating Point)
27-28	0-7	Angle HighLimit (16 bit integer, 0 to 65535)
29-30	0-7	Angle Target (16 bit integer, 0 to 65535)
31-32	0-7	Angle LowLimit(16 bit integer, 0 to 65535)
33-34	0-7	Speed Rundown (16 bit integer, 0 to 65535)
35-36	0-7	Speed Downshift (16 bit integer, 0 to 65535)
37-40	0-7	Tool Serial Number (Hex value) * see Note 1
41-47	0-7	VIN# (7 characters) * see Note 2

NOTE 1:

Most CP techmotive tool *serial numbers are 4 characters (1234), however, some are represented in 8 characters (2C03 1234) which includes year and month information.*

NOTE 2:

History Mode (in VsSystemSettings) must be set to a setting other than "Standard":

- *If a VIN is received that is greater than 20 characters, and "Reduced Rundown with **PartId**-Barcode" is configured, the lower 7 characters of the **right-most 20** will be selected.*
- *If "Reduced Rundown with **Model** # Barcode" is configured, the lower 7 characters of the **left-most 20** will be selected.*
- *If History mode is set to Standard, the VIN# will NOT be sent over fieldbus.*
- *If History mode is set to Standard with Both barcodes the MODEL# barcode will be sent.*

Inputs

Byte	Bit	Description
0	0	Parameter/Sequence Select Bit 0
	1	Parameter/Sequence Select Bit 1
	2	Parameter/Sequence Select Bit 2
	3	Parameter Set Select Bit 3
	4	Cycle Enable
	5	Cycle On
	6	Forward
	7	Clear Outputs

TYPE: GM8/GM4

Outputs

NOTE: *The difference between GM4 & GM8 is that GM8 mode adds the PVI on the inputs*

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Byte	Bit	Description
0	0	Bypass
	1	Release 1 Job
	2	Unused
	3	Unused
	4	Parameter Set Selected Bit 0
	5	Parameter Set Selected Bit 1
	6	Parameter Set Selected Bit 2
	7	Global Accept
1	0	InCycle
	1	Unused
	2	System Fault
	3	Cycle Finished
	4	EPR
	5-7	Unused
2	0	Good
	1	GM Red
	2	GM Yellow
	3-7	Unused
3	0-7	Unused

Inputs

Byte	Bit	Description
0	0	Stack Light Green
	1	Stack Light Yellow
	2	Stack Light Red
	3	Stack Light Alarm
	4	Parameter Set Select Bit 0
	5	Parameter Set Select Bit 1
	6	Parameter Set Select Bit 2
	7	unused
1	0	Cycle On
	1	Reverse
	2	EPR
	3	Stop/Disable
	4-7	Unused
2	0-7	Unused
3	0-7	Unused
4-7	0-7	PVI *GM8 mode only

For any INPUTS entering the controller via fieldbus, make sure that these functions are not mapped to physical inputs into the controller (via VS). Currently, if the CCM recognizes a fieldbus connection with “inputs” it will not allow inputs via OPC.

TYPE: Bcin (Barcode input)

NOTE: *This option is 1st available in CCM version 1.10.*

?

Outputs

Byte	Bit	Description
0	0	Parameter Set Selected Bit 0
	1	Parameter Set Selected Bit 1
	2	Parameter Set Selected Bit 2
	3	Parameter Set Selected Bit 3
	4	System Fault
	5	Cycle Finished
	6	Cycle GOOD
	7	Cycle BAD
1	0	Ready
	1	Bypassed
	2	Sequence GOOD
	3	Sequence BAD
	4	Part-ID barcode received ok
	5	Model# barcode received ok
	6	Spare
	7	Output#4 (Mappable via VS)
2-5		Peak Torque (IEEE Floating Point)
6-7		Final Angle (16 bit integer, 0 to 65535)

Inputs

Byte	Bit	Description
0	0	Parameter Set Selected Bit 0
	1	Parameter Set Selected Bit 1
	2	Parameter Set Selected Bit 2
	3	Parameter Set Selected Bit 3
	4	Cycle Enable
	5	Cycle On
	6	Forward
	7	Clear Outputs
1	0	Clear Barcode
	1	Clear Barcode Requirement
	2	Batch/Sequence Abort
	3-7	Spare
2-21		MODEL# Barcode (20 Characters)
22-41		PART-ID Barcode (20 Characters)

TYPE: SEQ (Sequence Support)

Outputs

Byte	Bit	Description
0	0	Sequence Set Selected Bit 0
	1	Sequence Set Selected Bit 1
	2	Sequence Set Selected Bit 2
	3	Sequence Set Selected Bit 3 (Gen2 only…..otherwise zero)
	4	System Fault
	5	Cycle Finished
	6	Cycle GOOD
	7	Cycle BAD
1	0	Ready
	1	Sequence Finished
	2	Sequence GOOD
	3	Sequence BAD
	4	Sequence Declared (In process)
	5	Batch Finished
	6	Batch Good
	7	Batch Bad
2	0	Parameter Set Selected Bit 0
	1	Parameter Set Selected Bit 1
	2	Parameter Set Selected Bit 2
	3	Parameter Set Selected Bit 3
	4	Parameter Set Selected Bit 4
	5	Bypassed
	6	Spare
	7	Yield Fault Detected
3	0-7	Spare
4-7	0-7	Peak Torque Result
8-9	0-7	Final Angle Result
10-13	0-7	Torque High Limit
14-17	0-7	Torque Target Limit
18-21	0-7	Torque Low Limit
22-23	0-7	Angle High Limit
24-25	0-7	Angle Target Limit
26-27	0-7	Angle Low Limit
28-31	0-7	Spare

Inputs

Byte	Bit	Description
0	0	Parameter/Sequence Select Bit 0
	1	Parameter/Sequence Select Bit 1
	2	Parameter/Sequence Select Bit 2
	3	Parameter/Sequence(Gen2 only) Select Bit 3
	4	Cycle Enable
	5	Cycle On
	6	Forward
	7	Clear Outputs
1	0	Parameter Select bit 4 (When using psets 17-32)
	1	Reject Lockout Clear
	2	Batch/Sequence Abort
	3-7	Spare
2-5	0-7	Spare

Determining INPUT Sources

It is possible that INPUTS can enter into the single-channel CS4700 Controller from several sources. Below is a list of some potential sources and their relative priority.

1. VsSetup assignments
   a. Tool switches
   b. Digital inputs (via a 19-pin connector etc.)
   c. Auto-increment or barcode-based pset selections
2. Ford specific I/O (but only if the Ford interface is enabled via the console port)
3. Keypad pset selection (if a keypad is resident and enabled by default or via the console)
4. Fieldbus **(which must be enabled by "defaults" via keypad or console)**
   Note that if no keypad is present (Defaults should be set via the console)
5. OPC inputs via Visual Supervisor/Applicaton programs

NOTE: *Enabling Fieldbus will block all INPUTS from OPC.*

Examples:
You want to start the tool via Fieldbus. Set Default#1 below.

NOTE: *If VsSetup is run and "Cycle-On" is mapped to a tool trigger or an input, it will then override the Fieldbus input.*

You want to start the tool via OPC. Set Default#3 below. You must run VsSetup and unmap the cycle-On input from the tool switch.

DEFAULTS INPUT Mapping from the Keypad (or RS-232 Console)
In order to initiate a CS47XX/2700 Controller to operate without using VS, several "Default" modes have been provided. These can be selected via the Main Menu screen or by invoking the console "Default" command. The Default selections allow the user to select the source of the pset-selects and the location from which the tool will be controlled. The 4 selections are:

DEFAULT#	Parameter Set select	Tool Running control
1	Fieldbus	Fieldbus
2	Fieldbus	Operator switches on tool
3	DCM physical I/O (or OPC)	Operator switches on tool (or OPC)
4	Keypad	Operator switches on tool

IMPORTANT NOTE: *Selecting Default 1 or 2 (Fieldbus) will block any OPC changes. This is important if VS is connected to a system running any Fieldbus I/O.*

Also, Default #1 is SUGGESTED for any variations of Fieldbus control, such as "Cycle-enable" from the PLC but the operator wants to run the tool from the tool switches etc.

For reference, the table below shows the input mapping for the DCM when one of the above defaults (in the prior table) is selected. (For GM- or FORD-specific default input mapping, see the GM/Ford special applications section).

DCM Input	DEFAULT#1	DEFAULT#2	DEFAULT#3	DEFAULT#4
Input#1		Cycle-on,Enable, Clear outputs	Cycle-on,Enable, Clear outputs	Cycle-on,Enable, Clear outputs
Input#2		Forward	Forward	Forward
Input#3			Pset select 0	
Input#4			Pset select 1	
Input#5			Pset select 2	
Input#6	Sync.	Sync.	Sync.	Sync.
Input#7	Calibrate	Calibrate	Calibrate	Calibrate
Input#8				
Tool Cycle trig.		Cycle-on,Enable, Clear outputs	Cycle-on,Enable, Clear outputs	Cycle-on,Enable, Clear outputs
Tool Direction Sw		Forward	Forward	Forward
Tool Aux. Sw.				

OPC INPUTS for the CS4700 Controller

The OPC inputs (Cycle-On, Pset Select, etc.) via the computer through VsMain, although seldom used, are available and have been used in some applications. A CS4700 Controller without a CCM will work as it always has. However, a CS4700 with a CCM and either a Keypad/Display or Fieldbus connection may or may not allow OPC inputs. In order for specific OPC inputs to operate the CS4700 Controller, Default #3 above must be selected via defaults (and those specific inputs unmapped accordingly by VS).

Fieldbus INPUTS for the CS4700 Controller

In order for inputs to be sourced from a fieldbus, the controller must be equipped with the appropriate AIM and fieldbus hardware. It is important to select “DEFAULT” (via keypad or console) for the source of the inputs. For example, DEFAULT 1 or DEFAULT 2 would be necessary selections for achieving reliable fieldbus inputs, especially if DEFAULT 3 or DEFAULT 4 can later override the selected “inputs” and basically “take away” the fieldbus input via OPC.

Input Ownership

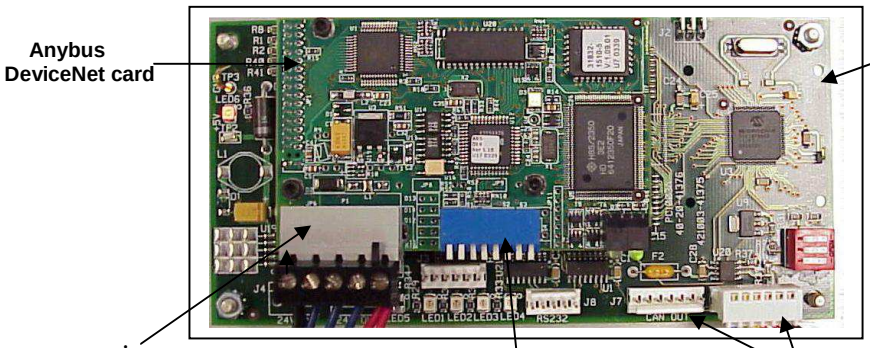
The Console command “Status” will report the ‘owner’ of the most popular inputs. The CCM will “own” the input if the keypad, fieldbus or the Ford-function has control. The DCM will “own” the input if the input is sourced from the tool, physical inputs, OPC, or (barcode or auto-increment).

OUTPUTS (When Defaults are Selected on Keypad/Console)

(For GM specific default-output mapping see later section).

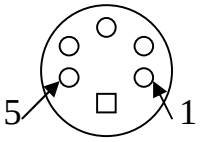
DCM Output	DEFAULT#1,2,3 or 4
Output#1	Finished
Output#2	Good
Output#3	Bad
Output#4	
Output#5	In-Cycle
Output#6	
Output#7	Direction
Output#8	Sync.
Tool YELLOW	U.S. Standard Yellow
Tool GREEN	U.S. Standard Green
Tool RED	U.S. Standard Red

DeviceNet (Slave) Setup and Configuration



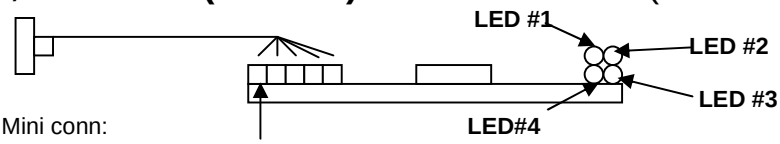
DeviceNet Baud Rate	SW.1	SW. 2
125k	OFF	OFF
250k	OFF	ON
500k	ON	OFF
(Reserved)	ON	ON

MAC	Sw3	Sw4	Sw5	Sw6	Sw7	Sw8
0	Off	Off	Off	Off	Off	Off
1	Off	Off	Off	Off	Off	On
2	Off	Off	Off	Off	On	Off



5-pin Mini (male)
(Bulkhead)

(Internal) DeviceNet Card (Side View)



Mating cable for Mini conn:
Turck# B4151-0113.5
CP Techmotive#26-20-6740

Pin #1 of 5 position connector on PC board

PIN	SIGNAL
1	Shield
2	V+ (+24vdc)
3	V- (0 volt)
4	CAN_H
5	CAN_L

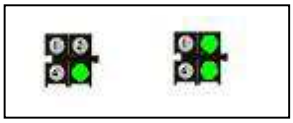
5 pin "Mini-style" Bulkhead connector

PIN	SIGNAL
1	V-
2	CAN_L
3	Shield
4	CAN_H
5	V+

5 pin "Phoenix" style connector on pc board

	STATE	Description
LED1-Reserved	---	
LED2- Network Status	Off	Off or Not online
	Green steady	Line OK, online, connected
	Green flash	On-line, not connected
	Red steady	Critical link failure
	Red flash	Connection timeout
LED3- Module Status	Off	No power to device
	Green steady	Device Operational
	Green flash	Data size bigger than config.
	Red steady	Unrecoverable fault
	Red flash	Minor Fault
LED4- Reserved	---	

By Default, 24vdc is expected to be supplied from the DEVICENET network (See pin-2 above).



Status Indicators

Once the controller is powered up and the Devicenet module is initialized, LED #3 will be green, and all others will be off (#2 may be flashing green, this is OK). Once communications is established with the master, LED#2 will be steady green and LED#3 will remain on (as shown, above).

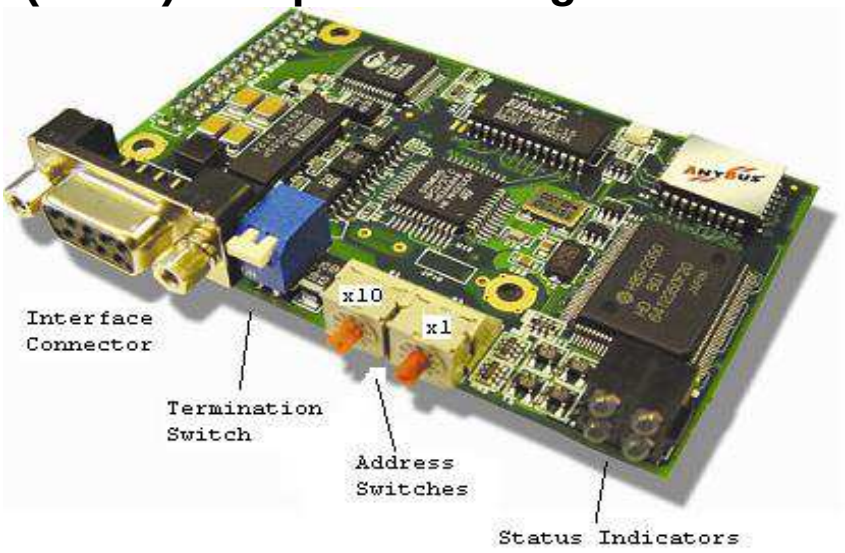
EDS file

An EDS file is available upon request which is applicable to this DeviceNet ANYBUS card.

Fieldbus Diagnostics Example for DeviceNet (Debug Console)

```
>aim
Anybus Interface Module is active.
  HW Config: 00, SW Version:  1.01
  I/O mode: gm4 (4 bytes in, 4 bytes out)
  Anybus Module is attached.
    Vendor ID:          1
    Serial Number:      A0017B83
    Module SW Version:  1.09
    Boot Loader Version: 1.34
    Fieldbus Type:      25 - DeviceNet
      Dip Switches:     0xBC
      Address:          60
      Baudrate:         500
    AppInt SW Version:  2.16
    Fieldbus SW Version: 1.06
  Anybus Module is initialized.
  Anybus Module is online.
  Inputs from fieldbus = 00 00 00 00
  Inputs to DCM        = 00 00 00 00
  Outputs              = 00 00 00 00

>aim ?
  'aim'              - Displays AIM status.
  'aim io'           - Display the current state of the AIM I/O.
  'aim +diag'        - Output AIM diagnostic data to the console.
  'aim -diag'        - Turn off AIM diagnostic output.
  'aim setmode <mode>' - Sets fieldbus mode.
                       modes:
                         default (1 byte in, 7 bytes out)
                         std     (1 byte in, 48 bytes out)
                         gm4     (4 bytes in, 4 bytes out)
                         gm8     (8 bytes in, 4 bytes out)
  'aim config'       - Display DeviceNet node configuration.
  'aim config addr<0 to 63>  baud< 125,250,or 500 >'\n"
                     - Modifiy DeviceNet address/baud rate.
  'aim config setmode <mode>'
                       modes:
                         ccm     (get addr/baud from the ccm)
                         switches1 (get addr/baud from switches)
                         switches2 (switches reverse ordered)
  'aim byteorder big'  - Configure for big endian (Motorola style) byte order

  'aim byteorder little' - Configure for little endian (Intel style) byte order
  'aim commit'       - Commit AIM settings to EEPROM storage.

>aim config
  address      : 60
  baud         : 500
  mode         : switches1
```

Profibus (Slave) Setup and Configuration



Profibus Module Status Indicators:

Once the controller is powered up and the profibus module is initialized, LED #3 will be red, and all others will be off. Once communications is established with the master, LED#2 will be green, and all others will be off. (as shown)

LED 1 - Acyclic Traffic

This led indicates that a DPV1 service is currently being executed.

Colour	State	Indicates:
Green	On	A DPV1 request is currently being executed
	Off	No power on the module No DPV1 request is currently being executed

LED 2 - Fieldbus ON-Line

This led indicates if the module is online on the fieldbus or not.

Colour	State	Indicates:
Green	On	Bus is online and data exchange is possible
	Off	Bus is not online no power on the module
	Flashing, 1 Hz	Clear mode

LED 3 - Fieldbus Off-line

This led indicates if the module is off-line and is thus the opposite compared to led 2.

Colour	State	Indicates:
Red	On	Bus is OFF-line
	Off	Bus is not OFF-line No power on the module

LED 4 - Fieldbus Diagnostics

This led indicates certain faults on the fieldbus side.

Colour	State	Indicates:
Red	Off	No diagnostics present. No power on the module.
	Flashing, 1 Hz	Error in configuration data
	Flashing, 2 Hz	Error in parameter data
	Flashing, 4 Hz	Error in initialisation of the Profibus communication ASIC

Profibus Network Configuration

Before the module can be used on a Profibus-DP network some basic settings must be configured.

Baud Rate

The baud rate on a Profibus-DP network is set during configuration from the master. The module features auto baud rate detection and the user does not have to configure the baudrate.
Supported baud rates:
1. 9.6 kbit/s
2. 19.2 kbit/s
3. 45.45 kbit/s
4. 93.75 kbit/s
5. 187.5 kbit/s
6. 500 kbit/s
7. 1.5 Mbit/s
8. 3 Mbit/s
9. 6 Mbit/s
10. 12 Mbit/s

Node Address

The switches can be used when selecting a node address in the range 00-99.

Termination

Each bus segment in a Profibus network must be terminated properly to ensure error-free operation. If the module is used as the first or last node in a network, the termination switch has to be in ON position. Otherwise the switch has to be in OFF position.

NOTE: *If an external termination connector is used, the switch must be in the OFF position.*

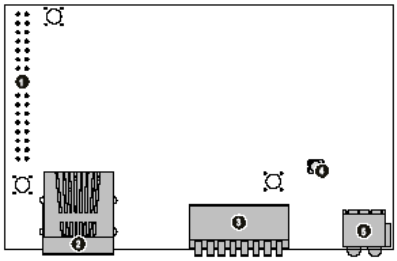
GSD Configuration file

A GSD file is available upon request which is applicable to this Profibus-DPV1 ANYBUS card.

Fieldbus Diagnostics Example for Profibus (Debug Console)

```
==========================================================================
Profibus
==========================================================================
>aim
Anybus Interface Module is active.
  HW Config: 00, SW Version:  1.02E
  I/O mode: default (1 byte in, 7 bytes out)
  Anybus Module is attached.
    Vendor ID:          1
    Serial Number:      A001B143
    Module SW Version:  1.00
    Boot Loader Version: 1.34
    Fieldbus Type:      5 - Profibus-DPV1
     Switches          25
     Node Address      25
    AppInt SW Version:  3.00
    Fieldbus SW Version: 1.35
  Anybus Module is initialized.
  Anybus Module is not online.

>aim ?
  'aim'              - Displays AIM status.
  'aim io'           - Display the current state of the AIM I/O.
  'aim +diag'        - Output AIM diagnostic data to the console.
  'aim -diag'        - Turn off AIM diagnostic output.
  'aim setmode <mode>' - Sets fieldbus mode.
                       modes:
                         default (1 byte in, 7 bytes out)
                         std      (1 byte in, 48 bytes out)
                         gm4    (4 bytes in, 4 bytes out)
                         gm8    (8 bytes in, 4 bytes out)
  'aim config'              - Display Profibus node address
  'aim config addr<0 to 126>'  - Modify Profibus node address
  'aim config setmode <mode>'
                       modes:
                         ccm     (get addr from the ccm)
                         switches (get addr from switches)
  'aim byteorder big'  - Configure for big endian (Motorola style) byte order

  'aim byteorder little' - Configure for little endian (Intel style) byte order
  'aim commit'       - Commit AIM settings to EEPROM storage.


>aim config
  address      : 25
  mode         : switches
```

Ethernet/IP or Modbus/TCP (Slave) Setup and Configuration



#	Description
1	Application Connector (See general AnyBus-S Parallel Design Guide)
2	Ethernet Connector
3	Configuration Switch
4	AnyBus Watchdog (See general AnyBus-S Parallel Design Guide)
5	Status Indicators

LED 1 - Link (Activity) for EthernetIP & ModbusTCP

Colour	State	Indicates:
Green	On	The module has a link
	Off	The module does not sense a link
	Flashing	The module is receiving/transmitting on ethernet

LED 2 - Module Status for EthernetIP & ModbusTCP

State	Summary	Description
Steady Off	No power	No power applied to the module.
Steady Green	Device operational	The module is operating correctly.
Flashing Green	Standby	The module has not been configured
Flashing Red	Minor fault	A minor recoverable fault has been detected
Steady Red	Major fault	A major internal error has been detected
Flashing Green/Red	Self-test	The module is performing a power on self test

LED 3 - Network Status

- Led 3 configuration **for EthernetIP**

State	Summary	Description
Steady Off	No power or no IP address	The module has no power or no IP address has been assigned.
Steady Green	Connected	The module has at least one established EtherNet/IP connection.
Flashing Green	No connections	There are no EtherNet/IP connections established to the module.
Flashing Red	Connection timeout	One or more of the connections in which this module is the target has timed out. This state is only left if all timed out connections are re-established or if the module is reset.
Steady Red	Duplicate IP	The module has detected that its IP address is already in use.
Flashing Green/Red	Self-test	The module is performing a power on self test

- Led 3 configuration **for Modbus**

In this configuration, this led indicates the number established Modbus/TCP connections to the module. The number of established connections is equal to the number of flashes on this led.

LED 4 - Not used

NOTE: *Ethernet-IP/Modbus-TCP are considered fieldbus entities. Look for the settings to be "AIM" commands rather than "ipconfig" commands.*

How to change between Ethernet IP and Modbus TCP Server Modes

To set to Modbus mode using the diags console, at the console prompt type aim config +modbus, then press enter. This will disable the EthernetIP server on the anybus module.

```
>aim config +modbus
```

To set to EthernetIP mode using the diags console, type aim config +ethip, then press enter. This will disable the Modbus-TCP server on the anybus module.

```
>aim config +ethip
```

LED functionality

For EthernetIP mode:
LED#3 will be solid green when the Master is connected (online).
LED#3 will flash green (at 1hz) when the Master is not connected (offline).

For ModbusTCP mode:
LED#3 will flash green when the Master is connected (online).
LED#3 will be off when the Master is not connected (offline).

DIP switch functionality

These switches are generally not used. It is possible to select the ARP setting (instead of CCM) in the Console setup ("AIM CONFIG SETMODE" command). However the settings will be forced to 192.168.0.n with a Mask of 255.255.255.0. Typically, the CCM mode is selected and the user can have full control of setting the IP, Mask and Gateway settings.

```
>aim config setmode ccm
```

EDS configuration file

An EDS file is available upon request which is applicable to this Ethernet-IP capable card.

Modbus-TCP Special Information

Reading Outputs

The start address (byte zero) for reading outputs begins at address 0hex.

Writing Inputs

The start address (byte zero) for writing inputs begins at address 400hex (1024 decimal).

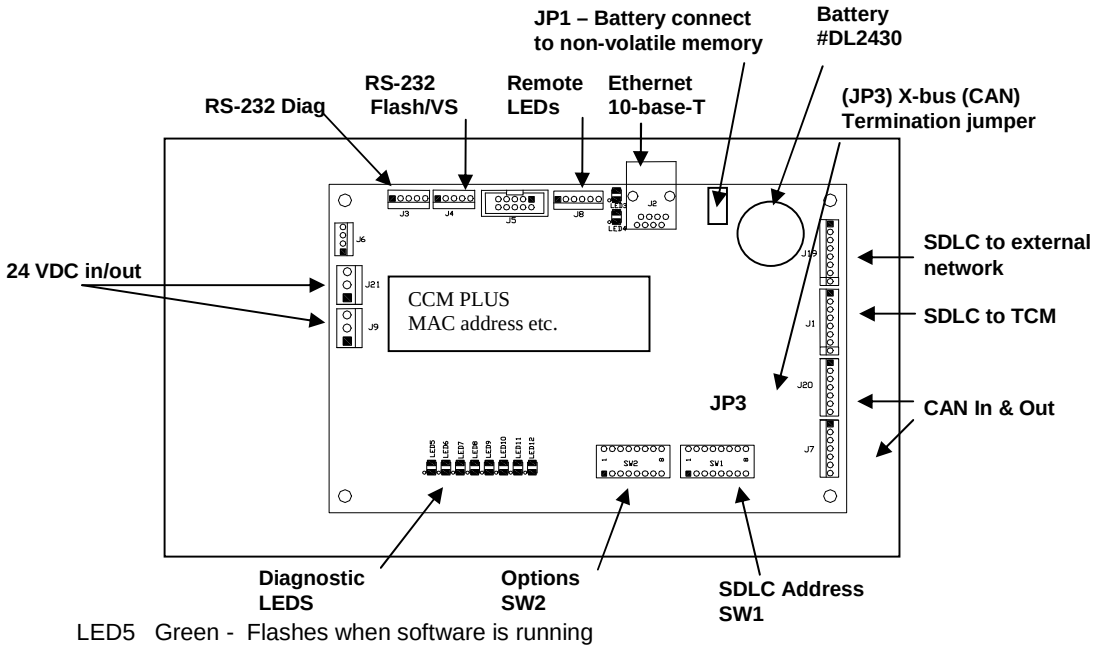
Fieldbus Diagnostics Example for Ethernet-IP Setup (Debug Console)

```
=====================================================================
EthernetIP   (or Modbus-TCP)
=====================================================================
>aim
Anybus Interface Module is active.
  HW Config: 00, SW Version:  1.01
  I/O mode: gm4 (4 bytes in, 4 bytes out)
  Anybus Module is attached.
    Vendor ID:          1
    Serial Number:      A001B126
    Module SW Version:  1.23
    Boot Loader Version: 1.18
    Fieldbus Type:      83 - Ethernet IP+IT
     Dip Switches:      0x0
    AppInt SW Version:  3.01
    Fieldbus SW Version: 1.23
  Anybus Module is initialized.
  Anybus Module is online.

>aim ?
  'aim'              - Displays AIM status.
  'aim io'           - Display the current state of the AIM I/O.
  'aim +diag'        - Output AIM diagnostic data to the console.
  'aim -diag'        - Turn off AIM diagnostic output.
  'aim setmode <mode>' - Sets fieldbus mode.
                       modes:
                         default (1 byte in,  7 bytes out)
                         std     (1 byte in, 48 bytes out)
                         gm4     (4 bytes in, 4 bytes out)
                         gm8     (8 bytes in, 4 bytes out)
  'aim config'   - Displays anybus module  TCP/IP configuration.
  'aim config addr <ip addr> mask <subnet mask> gateway <gateway>'
              - Modifies anybus module TCP/IP configuration.
  'aim config setmode <mode>' - Determines where to get the IP settings
                       modes:
                         ccm    - IP settings from the ccm
                         arp    - IP settings from External source
                                  See module document
  'aim byteorder big'     - Configure for big endian (Motorola style) byte order

  'aim byteorder little'    - Configure for little endian (Intel style) byte order
  'aim config +EthIP'         - connection type is EthernetIP
  'aim config +Modbus'        - connection type is Modbus
  'aim commit'     - Commit AIM settings to EEPROM storage.


>aim config
   Physical Address : 00-30-11-02-15-56
  IP Address       : 10.120.18.31
  Subnet Mask      : 255.255.252.0
  Default Gateway  : 10.120.16.1
  mode             : ccm
  connection       : EthIP  <-------------------  or "Modbus" if setup for Modbus-TCP
```

Optional PC-boards (Technical Details)

.

Communications Control Module (+) (CCM - CP p/n 420981-40311)



LED5 Green - Flashes when software is running
LED6 Yellow - Comm. to TCM via RS485/SDLC
LED7 Red – Future
LED8 Red - VS Comm. on Ethernet activity
LED9 Red - Specialty interface activity (PFCS, GM or FORD)
LED10 Red - Techmotive API activity
LED11 Red - (Internal) X-bus activity
LED12 Red - Future

Options SW2

Switch #1 - Force CCM into FLASH mode

Switch #2,3,4

Sw #2	Sw #3	Sw #4	Special Forced Comm. protocol
0	0	0	No Forced protocol (Console can change protocol)
1	0	0	Enable Chrysler PFCS Protocol
0	1	0	Enable GM Ethernet Protocol
1	1	0	Enable FORD Ethernet Protocol
0	0	1	Reserved
1	0	1	Reserved
0	1	1	Reserved
1	1	1	No Forced protocol (Console cannot change protocol)

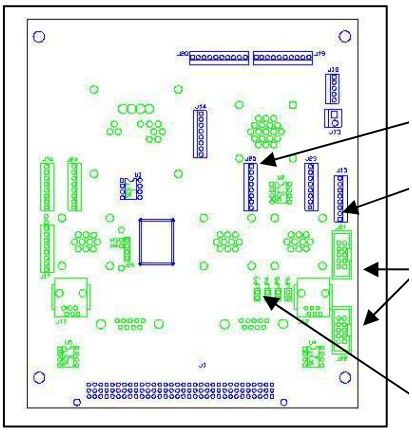
Switch #7 & 8 - Sets internal CAN bus baud rate (Set for 500k default….see table)

Sw #7	Sw #8	CAN baud rate
0	0	125k
1	0	250k
0	1	500k *
1	1	20k

CCM FIELD UPDATES

The CCM may require software updates in the field. CP Techmotive's Winflash utility should work as it does normally with the existing TCM product.

When the CCM PLUS is used, the RS-232 port that is used for VS-detachable now also becomes the FLASH port for DCM,CCM and all internal boards downstream from the CCM. Therefore, it is not necessary to go inside the CS47XX/2700 and move cables to FLASH upgrade.



Bottom Connector board connector layout
(This version is required for CCM+ with SDLC capability.)

External SDLC (connects to CCM+ "SDLC-B"

CCM to TCM SDLC Connection
(connects to CCM+ "SDLC-A"

(RS-232) COM2: connects to CCM+ "Com0"
Note that COM2: might be the upper or lower connector, depending on the assembly.

Thes jumpers must be open so that the External RS-232 does not go to the TCM when a CCM+ is present, etc.

EXTERNAL SDLC Networking on CS4700's Equipped with a CCM+

CS4700s can be networked with RS485/SDLC multi-drop communications. This is true even for units that are equipped with CCM+ for ethernet capability. (However the CS2700 equipped with the CCM+ is NOT capable of SDLC communications.

Additionally, when the CCM+ is used in conjunction with VS3.30 or higher, the CCM's real time clock will get time-synchronized automatically with the computer that is connected to it that is running VS (either embedded or a detachable).

Make sure to set the proper SDLC (RS-485) address on the CCM. This is different than on CS4700's that are not supplied with a CCM, as the SDLC (RS-485) address on these units is set on the TCM's backplane. On CS4700's equipped with a CCM, the address of the tool control module (TCM), which is on its own backplane, must be set to 1.

Internal (CAN-BUS) Operation

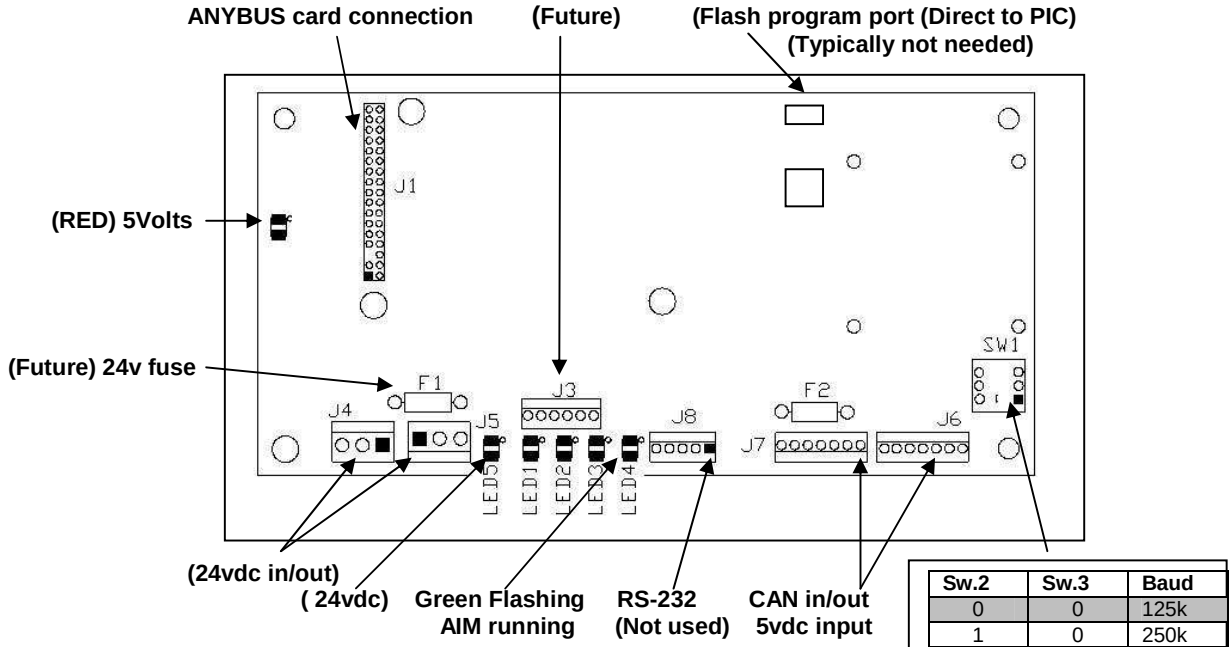
The CCM communicates to downstream devices – the AIM for Fieldbus and TDM for the keypad/display – via an internal CAN bus. The Communication is based on CANBUS. When upgrading or debugging, it is important to understand some of the characteristics of this bus.

Make sure that the CCM and all downstream devices are talking at the same baud rate. The recommended setting is 500 kbaud (see the DIP switches on the PC boards etc.). Also be sure that a "Termination Resistor" is turned-on at opposite ends of the CAN-Bus network. If the CCM has no

downstream devices, the baud rate and the termination resistor do not matter. Typically, these will be set properly at the factory, but this could become an issue on a field-upgrade. If the baud rates are wrong, the devices will not communicate at all. If the baud rate is correct, but the termination is wrong, communication may be intermittent; for example, it may appear to operate properly but flashing downstream will not work, etc.

AIM Module (CP part# 421003-41375)

(Used in Fieldbus options)

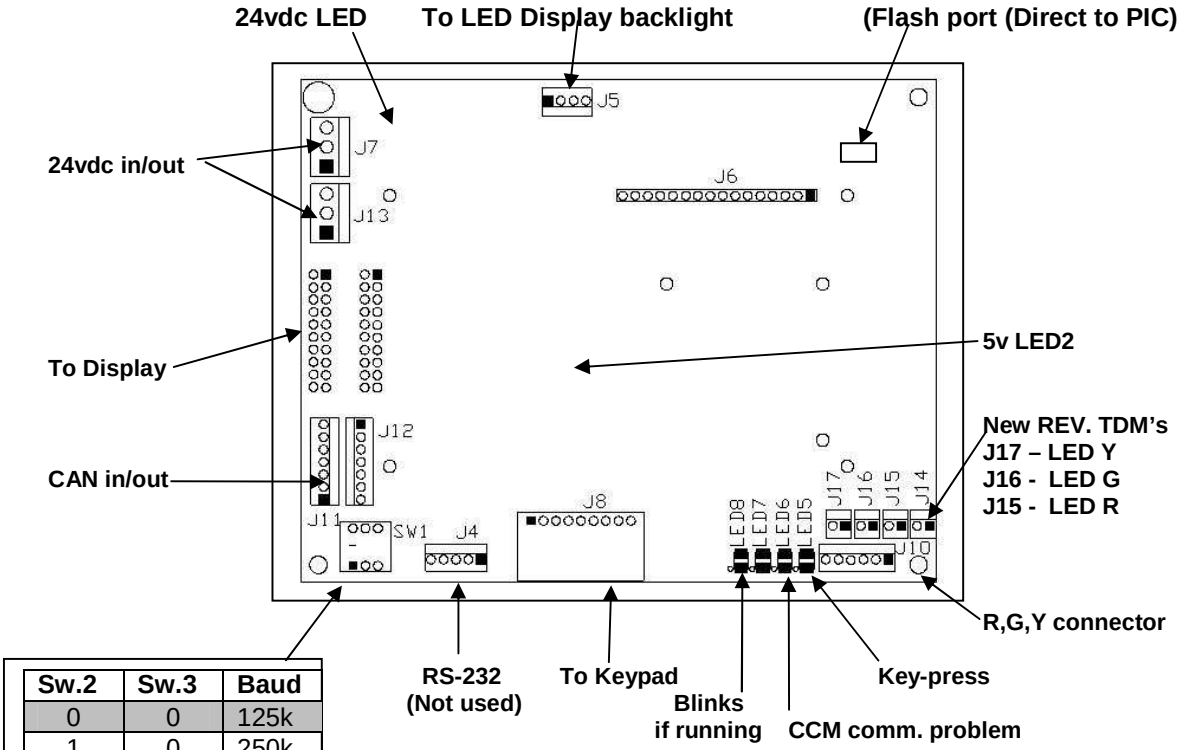


Sw.2	Sw.3	Baud
0	0	125k
1	0	250k
0	1	500k*
1	1	20k

Sw.1 = CAN Termination

TDM Module (CP part# 421000-41298)

(Used in Keypad/Display option)



Sw.2	Sw.3	Baud
0	0	125k
1	0	250k
0	1	500k*
1	1	20k

Sw.1 = CAN

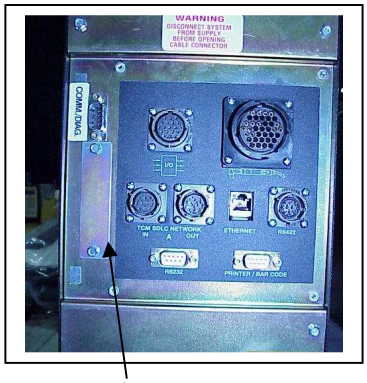
SPECIAL APPLICATION: PFCS (Ethernet or Terminal Server)

Important note: CCM1.12 adds the ability to configure PFCS without the need to enter into the console for units with a keypad/display. The CCM's **SW2 (2nd dip switch) can force PFCS to be enabled**. A special menu will then be available which will permit all of the PFCS configurations.

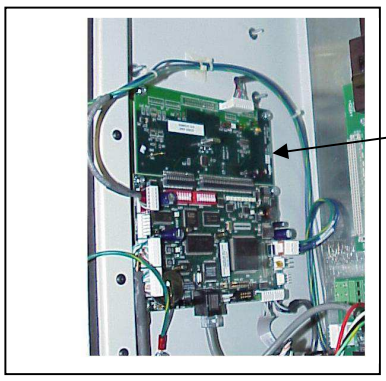
Setting up to Link to a PFCS Host on Ethernet

1. Type "ipconfig +pfcs" to enable the PFCS client in the CS47XX/2700 Controller.
2. Type "pfcs mode ethernet" to configure PFCS for Ethernet operation
3. Use the "pfcs addr <ip addr>" and "pfcs port <port> " to enter the PFCS server info.
4. See below for details in using the Barcode/Buffer or Custom Machine-ID options.
5. When complete be sure to use the "pfcs commit" command
6. Use the "pfcs +diag" command to assist in debugging

Setting up to Link to a PFCS Host on Terminal Server (RS232)



Location of 25Pin-D
PFCS Terminal Server connector



Asynch Daughter

(Attached to CCM)

1. Verify the controller has the add-on Asynch Daughter board & DB25 connector on the enclosure
2. Connect the DB25 cable from the PFCS Terminal Server to the controller
3. Type "ipconfig +pfcs" to enable the PFCS client in the controller
4. Type "pfcs mode terminalserver" to configure the PFCS client for (RS232)
5. See "pfcs ?" for details to set one of several options (ACK timeouts, Retries & other options)
6. When settings are complete type "commit" to save the settings
7. You can use the "pfcs start" or "pfcs stop" command although on power up PFCS will start auto.

Using Barcodes, Buffering and Machine IDs with PFCS

In order for the "avi" or "vin" data to be included in the packets to PFCS, the Model-Number or Part-ID functions must be enabled with VS "system settings."

NOTE:

?

PFCS buffering will not work unless either the "avi" or "vin" is enabled. Also, the TCM may need to be set up for "VIN" history mode with the VS "system settings" program (for model number applications).

When using the "+psetid", the Machine ID will be derived from the first four characters of the TCM's parameter set name that ran the cycle. VS must be used to establish parameter set names etc.

If controller is equipped with a “Keypad Display”

The DIAG screen on the display will show the condition of the PFCS connection as either “OK” or “Err”. Whether the unit has a “Keypad Display” or not, the console can provide more extensive diagnostics information.

PFCS Ethernet Setup example: <Debug Console>

```
============================================================
```

>***ipconfig ?***

```
  'ipconfig'       - Displays TCP/IP configuration.
  'ipconfig addr <ip addr> mask <subnet mask> gateway <gateway>'
                - Modifies TCP/IP configuration.
  'ipconfig +api'   - Enables the Techmotive API Server.
  'ipconfig -api'   - Disables the Techmotive API Server.
  'ipconfig +ford'  - Enables the Ford interface.
  'ipconfig -ford'  - Disables the Ford interface.
  'ipconfig +gm'    - Enables the GM interface.
  'ipconfig -gm'    - Disables the GM interface.
  'ipconfig +pfcs'  - Enables the PFCS interface.
  'ipconfig -pfcs'  - Disables the PFCS interface.
  'ipconfig +vseth'    - Enables the Visual Supervisor Ethernet bridge.
  'ipconfig -vseth'    - Disables the Visual Supervisor Ethernet bridge.
  'ipconfig +vssdlc'    - Enables the Visual Supervisor SDLC bridge.
  'ipconfig -vssdlc'    - Disables the Visual Supervisor SDLC bridge.
  'ipconfig commit' - Commits IP configuration to EEPROM.
```

>***ipconfig +pfcs***

```
Starting PFCS Client.
Ethernet Adapter CS8900A
  Physical Address : 00-05-6B-07-01-00
  DHCP Enabled     : No
  IP Address       : 10.120.17.27
  Subnet Mask      : 255.255.252.0
  Default Gateway  : 0.0.0.0

External Interfaces Enabled:
  Visual Supervisor Bridge
  PFCS Client
```

>***pfcs ?***

```
  'pfcs'                    - Displays PFCS client configuration.
 ‘pfcs mode <mode>   -Sets mode to « Ethernet » or « Terminal Server »
  'pfcs start'              - Connect to the PFCS server.
  'pfcs stop'               - Disconnect from the PFCS server.
   pfcs stats'              - Display PFCS communication statistics.
  'pfcs stats clear'          - Clear PFCS communication statistics.
  'pfcs +diag'              - Output PFCS diagnostic data to the console.
  'pfcs -diag'             - Turn off PFCS diagnostic output.
  'pfcs addr <ip addr>' - Sets PFCS server IP address.
  'pfcs port <port>'       - Sets PFCS server port.
  'pfcs retries <n>'      - Sets Max Retries to <n> (1<=n<=10).
  'pfcs ack <n>'           - Sets Ack Timeout to <n> seconds (1<=n<=10).
  'pfcs keepalive <n>'  - Sets Keep Alive Interval to <n> seconds (30<=n<=240)
  'pfcs reconnect <n>'  - Sets Reconnect Interval to <n> seconds.
  'pfcs +psetid'           - Machine ID for rundowns will use PSet Name.
  'pfcs -psetid'           - Machine ID for rundowns will be assigned by PFCS.
  'pfcs avi'                 - PFD will send AVI barcode with results.
  'pfcs vin'                - PFD will send VIN barcode with results.
  'pfcs nobarcode'        - PFD will not send barcode with results.
  'pfcs +buffer'           - Enables buffering of rundowns.
  'pfcs -buffer'             - Disables buffering of rundowns.
  'commit'                  - Commit PFCS settings to EEPROM storage.
```

>***pfcs addr 10.120.16.116*** [Note: This is the IP address of the PFCS host]

```
PFCS is enabled.
 PFCS Server Address : 10.120.16.116
 PFCS Server Port    : 16101
```

Max Retries : 3
Ack Timeout : 5 seconds
Keep Alive Interval : 120 seconds
Reconnect Interval : 10 seconds
Machine ID assigned by PFCS.
Barcode disabled.
Result buffering disabled.

>***pfcs port 16101***
PFCS is enabled.
PFCS Server Address : 10.120.16.116
PFCS Server Port : 16101
Max Retries : 3
Ack Timeout : 5 seconds
Keep Alive Interval : 120 seconds
Reconnect Interval : 10 seconds
Machine ID assigned by PFCS.
Barcode disabled.
Result buffering disabled.

[Enter any other applicable pfcs commands (MachID,Buffer options etc.]

>***pfcs commit***
Writing changes to EEPROM...
*** WARNING! DON'T POWER DOWN UNTIL EEPROM WRITE IS DONE!
>EE
Initalizing CCM
Loading FPGA...
Initalizing EEPROM Data...
Initializing System Time: Wed Aug 20 13:43:22 2003
Starting TCP/IP.
IP Address 10.120.17.27
Starting VS Bridge on port 5000.
Initializing RS-232 Communication.
Initializing SDLC Communicaton.
System is coming up...
****
Communication Control Module CCM Debugging Console V1.01
Copyright© 2003 CP-GSE Techmotive Tool
****
Hello.
>***pfcs +diag*** [Use this command to view PFCS running diagnostics]

SPECIAL APPLICATION: GM (General Assembly Engineering)

The CS47XX/2700 Controller has an Ethernet interface that complies with the latest specification for sending data to the GM server. It also has a DeviceNet interface that complies with the GM specification.

Note that it with Keypad/Display units that much of the below configurations can be done by setting the CCM SW2 DipSwitch #3 to force the GM Driver to be enabled and using the keypad to make the appropriate setups.

Here are the general setup instructions (If using the console):
1. Enable the GM Ethernet interface via the RS-232 console {"ipconfig +gm"}
2. Enter the GM Server IP address via the RS-232 console

NOTE: *The CS4700 Controller is considered the "slave" in this configuration.*

3. Set up the appropriate GM I/O fieldbus mapping via the RS-232 console. Refer to the Fieldbus Section (GM4 or GM8 I/O) {"aim setmode gm4"}
4. Set defaults using either the RS-232 console or the keypad. You should select one of the "fieldbus" defaults to block "OPC."
5. Set up the fastening strategy and parameter limits using the keypad or VS.
   a. If GM (PVI's) are being used, the Model# Barcode must be enabled and the minimum length must be set to "1" in the VsSetup-barcode setup tab-mask.
   b. In order for the GM host to be able to see the PVI, make sure the VIN-History mode for Model# barcodes is enabled. This is done in VsSystemSettings.

IMPORTANT GM Information

The GM specification requires that certain algorithms and setpoints be used for compliance. In general, when setting the defaults through the keypad, these are appropriately set except for application customization of specific setpoints.

GM has adopted a general 'standard' which gives special meanings to the lights presented to the operator.

LIGHT	GENERAL PROCEDURE (Conditions applicable to torque control)
Yellow	The fastener can be rerun *TORQUE-LOW* (unless *ANGLE-HIGH)*
Red	The fastener must be backed out and replaced. *ANGLE-HIGH* failure (or) *REMOVE-TORQUE-LIMIT* exceeded
Red & Yellow	The fastener must be backed but can be re-run Failure conditions that do not show above.

In order to meet this specification and the required light patterns for all of the various conditions (not shown here) here are some rules to setting up the controller:

1. The “GM” Red/Yellow/Green lights must be mapped instead of the standard R/Y/G lights (This should already be done if “Defaults” were loaded after the box was set to GM mode)

2. The “REHIT” algorithm can be enabled if it is desired for the application. This is a special monitor function to detect if an operator is trying to tighten an already tight fastener.

   NOTE: *The REHIT “Stop Torque” parameter should be above the “Threshold (ZDR)” limit and if you are using Torque Control, it should be below the “Target Torque.”*

3. The “*REMOVE-TORQUE-LIMIT*” (on the pset Torque Monitor tab) must be set higher than the “*Torque-High”* limit.

4. In order to guarantee the I/O timing over DeviceNet, a “*Minimum Time between cycles”* of a half second should be entered (keypad defaults should set this already etc.).

5. “Slip – Detect” (on the pset Torque/Angle Control tab) can be enabled, if desired. This algorithm is intended to stop the tool if the torque drops off significantly (for example, due to a broken bolt or because a socket has slipped off, etc.)

   For this “Slip-Detect” to function per the GM Specification, the controllers “Control Ref Torque” must be equal to ZDR (or Threshold torque).

In most instances, VS should not be needed for the GM-required setup on units with a keypad/display; Rather, select the GM Mode and use the set defaults as instructed above. If a VS-embedded controller/PC is connected, be sure to select VIN History (Model#) mode as the GM host requires it.

The CS47XX controller for GM is special in that it must also be fitted with the appropriate GM specified I/O connectors. Additionally, special provisions within the enclosure provide an isolated 24vdc supply for the DeviceNet function.

Console/keypad based Default selections: 3* - Typical Selection

DEFAULT#	Parameter Set Select	Tool Running control
1	Fieldbus	Fieldbus
2	Fieldbus	Operator switches on tool
3*	DCM physical I/O	Operator switches on tool
4	Keypad	Operator switches on tool

Default Selection (DCM inputs) table (GM MODE):

DCM Input	DEFAULT#1	DEFAULT#2	DEFAULT#3	DEFAULT#4
Input#1			Pset select 0	
Input#2			Pset select 1	
Input#3			Pset select 2	
Input#4		Cycle-on	Cycle-on	Cycle-on
Input#5	Release One Job	Release One Job	Release One Job	Release One Job
Input#6		Forward	Forward	Forward
Input#7		Cycle Enable	Cycle Enable	Cycle Enable
Input#8	Bypass	Bypass	Bypass	Bypass
Tool Cycle trig.		Cycle Enable	Cycle Enable	Cycle Enable
Tool Direction Sw		Forward	Forward	Forward
Tool Aux. Sw.				

Default Selection (DCM outputs) Table (GM MODE):

DCM Output	DEFAULT#1,2,3 or 4
Output#1	Light - GM Green
Output#2	Pass-thru STACK Light - Yellow
Output#3	Light - GM Red
Output#4	Light - GM Yellow
Output#5	Pass-thru STACK Light - Green
Output#6	Pass-thru STACK Light - Red
Output#7	In-cycle
Output#8	Pass-thru GM STACK Alarm
Tool YELLOW	Light - GM Yellow
Tool GREEN	Light - GM Green
Tool RED	Light - GM Red

CONNECTOR PIN DEFINITIONS

5 Pin-DIN male Device-Net Connector
Turck #RSF 571-2M/S630

PIN	Description
1	Shield
2	No connection within CS4100 (24v field)
3	Isolated Common (Device-Net Ground)
4	CAN_H
5	CAN_L

Optional Bypass/Release Pendant Connector

4-pin Micro Female Connector
Crouse-Hinds #5000118-4
Field mate: Turck # FKFD4.4-X

PIN	Description
1	+24vdc
2	Bypass (DI8)
3	N/C
4	Release One Job (DI5)

Optional Stack-Light Connector

5-pin Micro Female Connector
Crouse-Hinds #5000129-332
Field mate: Turck#FKB5-X

PIN	Description
1	Pass-thru GM Green (DO5)
2	Pass-thru GM Yellow (DO2)
3	0 volt - Common
4	Pass-thru GM Red (DO6)
5	Pass-thru GM Stack Alarm (DO8)

Optional Remote-Handle

10-pin Bendix#PT02A-12-105
Field mate: PT06A-12-10P (SR)

PIN	Description
A	24vdc from CS4100
B	Cycle-on (DI4)
C	Cycle enable (DI7)
D	In-Cycle (DO7)
E	Pset select 0 (DI1)
F	Pset select 1 (DI2)
G	Pset select 2 (DI3)
H	Forward (DI6)
J	Common
K	Shield

Optional Remote-Light Box

Bendix#PT02A-14-19S
Field mate: PT06A-14-19P (SR)

PIN	Description
A	Good (remapped stack alarm**) (DO8)
B	GM Red (DO3)
C	GM Yellow (DO4)
U	+24vdc
D	Common
V	GM Green (Flash EPR) (DO1)

Note: On the single channel CS4100, the remaining pins are unused.
**DO8 must be remapped with VS to be “GOOD” (non-flashing).
EPR – “Error Proofing Ready” function…flashes when “READY.”

SPECIAL APPLICATION: FORD

The CS47XX has an Ethernet interface compliant with Ford specification PF3000.The basic steps to setup a CS47XX controller for Ford follows:

Note that the CCM DipSwitch SW2 Swtich# 2 & 3 can force the FORD drivers without the console. Also, units with the keypad/display can be used to setup most/all of the required settings.

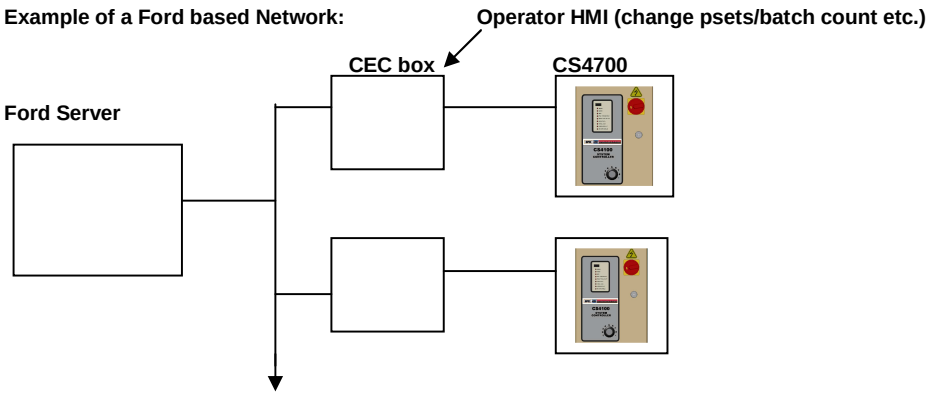
1. Enable the FORD Ethernet interface via the RS-232 console.
2. Determine what IP address this controller must have, and enter it via the RS-232 console.

NOTE: *The CS4700 Controller is considered the Ethernet "server" in this configuration.*

3 Either set defaults from the RS-232 console or via the keypad, or use the VS program to set up the appropriate I/O sources. This must be done to provide proper functionality (Tool runs from switches on tool, where are the psets selected etc.)

4 Set up the fastening strategy and setpoints either from the keypad or Visual Supervisor.

NOTE: *It may be necessary to assign a batch count that corresponds with the pset number. (Example: Pset#1 has a batch of 1, Pset#2 has a batch of 2, etc.)*



SPECIAL APPLICATION: Screwdrivers

When setting up the CS2700 Controller for use with an SD25 Series screwdriver the VS Default settings are used to map the I/O to fit typical screwdriver applications. A typical function times the operation of the headlights to the Cycle Start mode of operation.
However, when it is set up for typical operation, the CS2700 Controller does not comply with GM specifications. The I/O configuration mandated by GM Assembly does not match those that are typically mapped for convenient screwdriver operation.
Here are the *general* setup instructions:

1. Enable the specific Ethernet interface via the RS-232 console (if applicable).
2. Set up the appropriate I/O fieldbus mapping via the RS-232 console.
   Set defaults from the RS-232 console or via the keypad, OR VS to set up the appropriate I/O sources. This must be done to provide the proper functionality (The tool runs from the switches on tool, where are the psets selected etc.)
3. Set up the fastening strategy and setpoints either from the keypad or VS.

At the present time, CS2700 Screwdriver Controllers that have Ethernet capability do NOT support SDLC networking (via the RS-485 port).

SPECIAL APPLICATION: Tubenut and Offset Tools

With the current revision of software, these applications may require VS to modify the I/O to operate the Tool in the manner desired. Setting “Defaults” from the Keypad/Display or CCM console may not provide the Final desired configuration for these tool types.

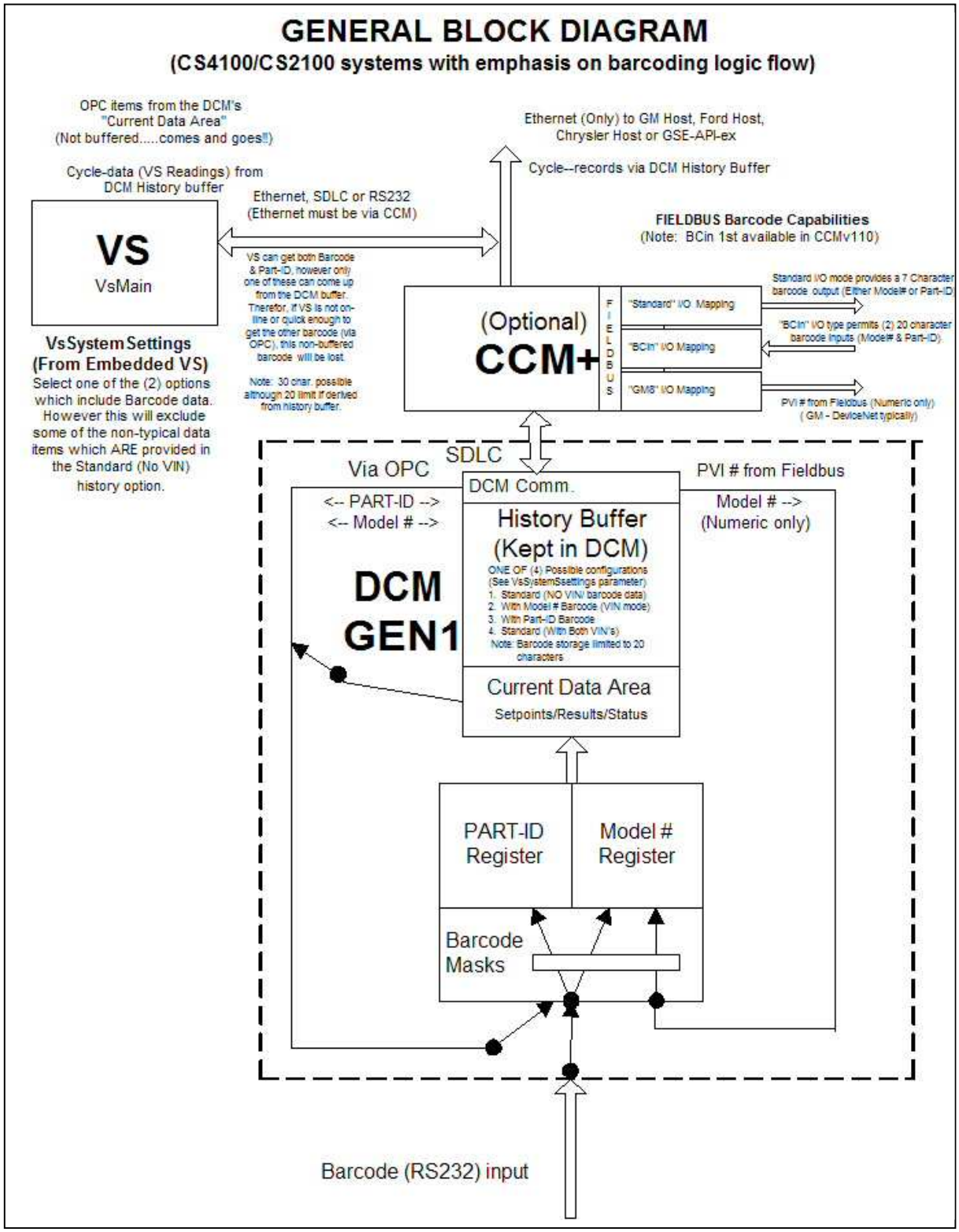
Tubenut and Offset Nutrunners

You may need to uncheck the left-hand tightening option from keypad-based default settings

General Troubleshooting (Basic)

CONTROLLER TYPE	Symptom	Possible Solution
CS4700/2700 Controller (Any configuration)	Tool Won't run	1. ***No tool detected*** scrolling message * Suspect tool/ITI board * Suspect TCM 2. ***Invalid Parameters*** scrolling message * Hook up VS (run VsSetup & Correct) 3. ***No LIGHTS on TCM*** * Verify circuit breaker/GFCI * If TCM is Rev.K or higher, the fuse on the TCM servo may be blown. (Note: Prior to Rev. K, the display might still light even if the Servo fuse is blown). 4. TCM looks OK with READY light * Suspect INPUTs mapping (Use VsSetup) * If external cycle-on, suspect 24vdc source * If unit has Ethernet capability, improper Defaults may have been selected blocking INPUT source.
CS2700 with Ethernet capability (Screwdriver controller)	Won't communicate to VS on SDLC port	If CS2700 is configured for Ethernet capability, the SDLC port WILL NOT work. See the section "Connecting to Visual Supervisor" in this manual.
Any controller with Fieldbus (DeviceNet, Profibus etc.)	Controller won't respond to INPUT commands via Fieldbus (Cycle Enable, Cycle Start etc.)	It is critical to have selected the correct default which will allow INPUTS to enter in via Fieldbus. See this manual "Determining Input Sources" and selecting Default#1 (Via Keypad or Console) should then allow inputs from Filedbus
	Data is ok except for FLOAT and INTEGER values	Possibly need to change the ENDIAN (Byte Order) setting.

General Block Diagram (Data/History/Barcodes)



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