

CPU300

User Manual



compatible with **OCS-I/O**

HG-1376

MAN1519_01_EN_CPU300_UM



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NOTE: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.



PREFACE

This manual explains how to use the CPU300 OCS.

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Safety and Compliance



Chapter 1: Safety and Compliance

1.1: Warnings

When found on the product, the following symbols specify:

WARNING:  Consult user documentation.

WARNING:  Electrical Shock Hazard.

WARNING: EXPLOSION HAZARD – Substitution of components may impair suitability for Class I, Division 2.

WARNING: EXPLOSION HAZARD – Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

1. To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.
2. To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.
3. Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.
4. In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.
5. Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

WARNING: BATTERY MAY EXPLODE IF MISTREATED. DO NOT RECHARGE, DISASSEMBLE, OR DISPOSE OF IN FIRE.

WARNING: BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.

WARNING: The USB parts are for operational maintenance only. Do not leave permanently connected unless area is known to be non-hazardous.

WARNING: If the equipment is used in a manner not specified by Horner APG, the protection provided by the equipment may be impaired.

NOTE: All applicable codes and standards must be followed in the installation of this product.

NOTE: For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG, or larger.

NOTE: See Electrical Installation for more details.

1.2: FCC Compliance

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

1.3: Safety Precautions

All applicable codes and standards need to be followed in the installation of this product.

Adhere to the following safety precautions whenever any type of connection is made to the module:

1. Connect the safety (earth) ground on the power connector first before making any other connections.
2. When connecting to the electric circuits or pulse-initiating equipment, open their related breakers.
3. Do NOT make connection to live power lines.
4. Make connections to the module first; then connect to the circuit to be monitored.
5. Route power wires in a safe manner in accordance with good practice and local codes.
6. Wear correct personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
7. Ensure hands, shoes, and floor are dry before making any connection to a power line.
8. Make sure the unit is turned OFF before making connection to terminals.
9. Make sure all circuits are de-energized before making connections.
10. Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.
11. Use copper conductors in Field Wiring only, 60/75°C.
12. Use caution when connecting controllers to PCs via serial or USB. PCs, especially laptops may use “floating power supplies” that are ungrounded. This could cause a damaging voltage potential between the laptop and controller. Ensure the controller and laptop are grounded for maximum protection. Consider using a USB isolator due to voltage potential differences as a preventative measure.

CPU300

Introduction



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2.1: Visual Overview

Touch Screen - Press upper right corner to bring out the function keys and SYSTEM key to access the Main Menu.



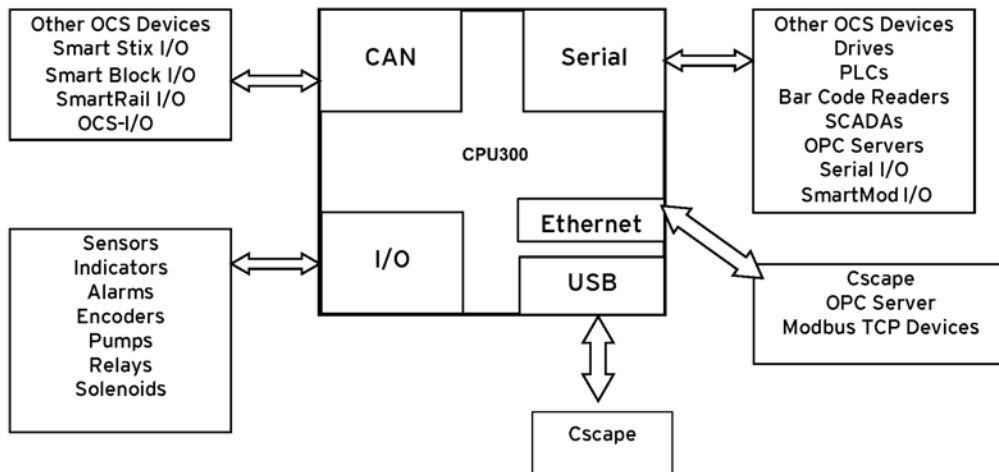
- | | |
|--------------------|-----------------------|
| 1. Power | 7. CAN Port |
| 2. USB Type C Port | 8. Serial Port |
| 3. Ethernet Port 1 | 9. microSD Slot |
| 4. Ethernet Port 2 | 10. HMI Connect Port* |
| 5. USB Type A Port | 11. LED Status Lights |
| 6. OCS-I/O Port | 12. System Menu Panel |

*For additional information on cables and displays, see the HMI Connect Displays Datasheet (MAN1517) .
[Horner Documentation Search](#)

2.2: Where to find more information for the CPU300

Datasheet - The datasheet is the first documents to refer to for key information related to specific models. (A basic datasheet is provided in the box with the unit.) . Find **MAN1138** via the [Documentation Search](#) page on the Horner website.

2.3: Connectivity to the CPU300



HG-575

Connectivity				
CAN	I/O	USB	Serial	Ethernet
Other OCS Devices	Sensors	Cscape	Other OCS Devices	Cscape
SmartStix I/O	Indicators		Drives	OPC Server
SmartBlock I/O	Alarms		PLCs	Modbus TCP Devices
SmartRail I/O	Encoders		Bar Code Readers	Ethernet I/P PLC
OCS-I/O	Pumps		SCADA	FTP
	Relays		OPC Servers	ASCII/TCP
	Solenoids		Serial I/O	Other OCS devices
			SmartMod I/O	

2.4: Features of CPU300

The CPU300 OCS is all-in-one industrial control devices. It combines control, I/O, and networking into a single, integrated package.

Unique features of the CPU300 OCS include the following:

- Small, sleek profile saves space and resources.
- Physical Specifications
 - Metric (mm): 114.8 mm x 117.5 mm x 74.3 mm
 - US (inch): 4.52" x 4.63" x 2.92"
 - Weight: 12.35 oz (350g)
- Advanced control capabilities including floating point, multiple auto-tuning PID loops and string handling capabilities
- Intuitive interface
- Removable media for storage of programs, data logging, or screen captures
- CsCAN networking port for communication with remote I/O, other controllers or PCs
- Cscape programming software that allows all aspects of the CPU300 to be programmed and configured from one integrated application
- Fail-Safe System which allows an application to continue running in the event of "Soft" failures such as (Battery power loss or Battery Backed register RAM/Application flash corruption)
- Clone Unit allows the user to "clone" the OCS. This feature "clones" application program and unit settings stored in Battery backed RAM of an OCS. It can then be used to clone a different OCS (but must be the exact same model).
- Suited for most applications across a diverse range of industries.

Mechanical Installation



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3.1: Mounting Overview

The mechanical installation greatly affects the operation, safety, and appearance of the system. Information is provided to mechanically install the unit such as cut-out sizes, mounting procedures, and other recommendations for the correct mechanical installation of the unit.

3.2: Requirements

- Each module is compact and mounts on the DIN rail. Each I/O module installed adds width in increments of 19mm. The distance between wiring duct and surrounding modules must be at least 50mm apart.
- The DIN rail clip adds to the overall measurements. The CAN, power, LAN, and serial connectors also add to the measurements.
- Modules can be added after the base has been installed on the DIN rail and can be hot swapped with power applied.

NOTE: I/O scanning will stop until the correct modules for the system are detected in all slots.

Din Rail Alignment Requirements

1. Confirm that the DIN rail is in a horizontal position before installing the unit. Horizontal orientation is required to avoid module slippage on the DIN rail.
2. Align the unit on the DIN rail then push the DIN rail clip to until it clicks into place. Check to ensure that the unit is secure on the DIN rail.

3.3: Mounting Orientation

NOTE: Do NOT mount the unit on its side as this may cause the unit from slipping off the DIN rail.

- Mount the CPU300 with the locking DIN tab facing down.
- As modules mount on a DIN rail, be certain that the DIN rail is in a horizontal position before installing the unit. A horizontal orientation is required to prevent the unit from slipping off the DIN rail.

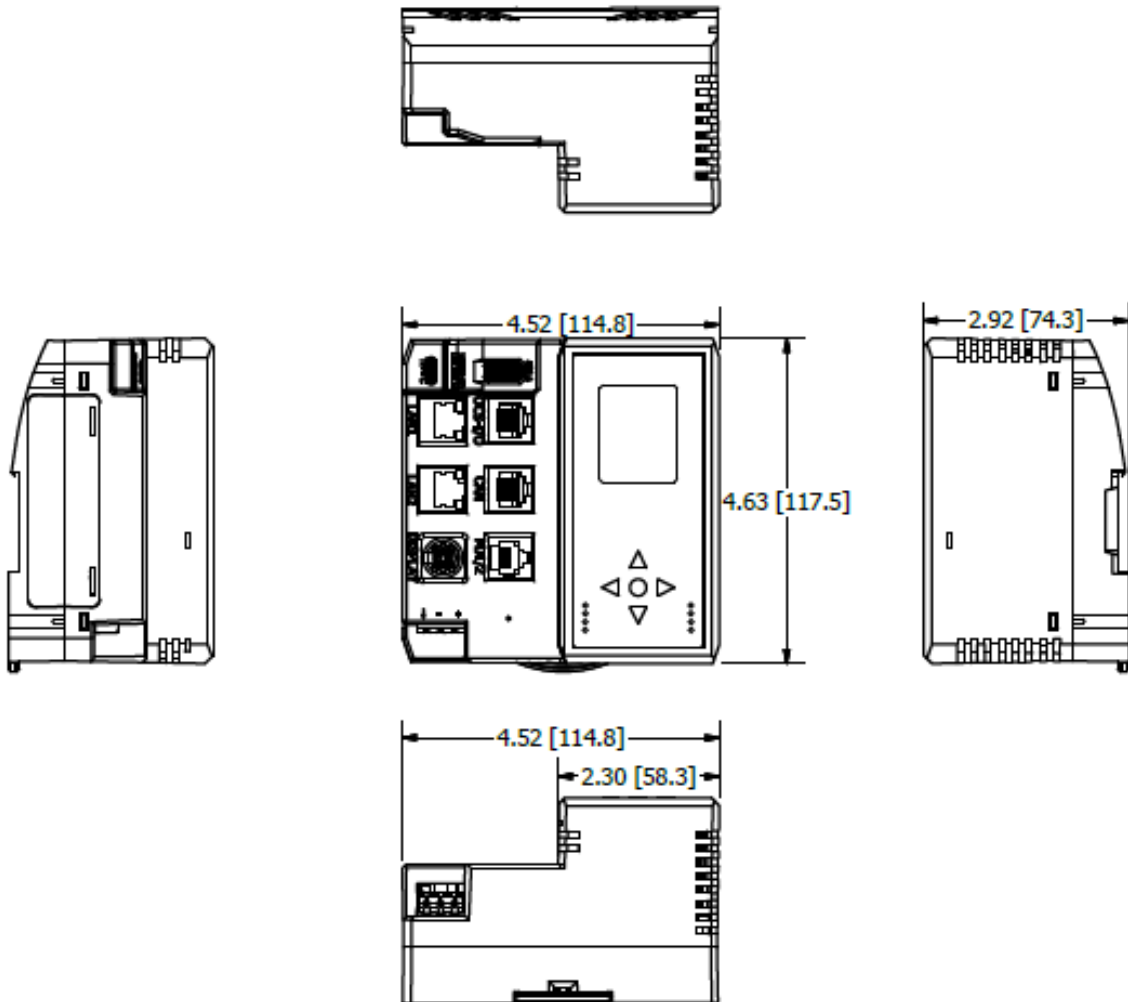
3.4: Module Removal

Modules may be removed while powered; however, I/O scanning on the remaining modules will stop and I/O will go into the default state until a new module is inserted and all modules in the configuration are present.

1. Insert a flat-blade screwdriver into the DIN rail latch at the bottom of the module.
2. Pry downwards on the release latch.
3. Rock the module up and off the DIN Rail.

3.5: Dimensions

The CPU300 must be mounted inside a NEMA 4X enclosure.



3.6: Factors Affecting Panel Layout Design and Clearances

WARNING: Follow the requirements of the panel manufacturer and to follow all applicable electrical codes and standards.

The designer of a panel layout must assess the requirements of a particular system and to consider the following design factors.

3.6.1: Clearance/Adequate Space

Install devices to allow sufficient clearance to open and close the panel door.

Minimum Clearance Requirements for Panel Box and Door	
Minimum Distance between base of device and sides of cabinet	2" (50.80mm)
Minimum Distance between base of device and wiring ducts	1.5" (38.10mm)
If more than one device installed in panel box (or on door): Minimum Distance between bases of each device	4" (101.60mm) between bases of each device
When door is closed: Minimum distance between device and closed door (Be sure to allow enough depth for the OCS.)	2" (50.80mm)

3.6.2: Grounding

Panel Box: The panel box must be correctly connected to earth ground to provide a good common ground reference.

Panel Door: Tie a low impedance ground strap between the panel box and the panel door to ensure that they have the same ground reference.

WARNING: Ensure the ground requirements of the panel manufacturer are met, and also meet applicable electrical codes and standards.

3.6.3: Temperature/Ventilation

Ensure that the DIN Rail layout design allows for adequate ventilation and maintains the specified ambient temperature range. Consider the impact on the design if operating at the extreme ends of the ambient temperature range. For example, if it is determined that a cooling device is required, allow adequate space and clearances for the device in the panel box or on the panel door if DIN rail is mounted inside.

3.6.4: Noise

Consider the impact on the panel layout design and clearance requirements if noise suppression devices are needed. Be sure to maintain an adequate distance between the CPU300 and noisy devices such as relays, motor starters, etc. For details on output protection, especially when using contactors and solenoids, see MAN0962.

3.6.5: Shock and Vibration

The CPU300 has been designed to operate in typical industrial environments that may inflict some shock and vibration on the unit. For applications that may inflict excessive shock and vibration, use the correct dampening techniques or relocate the CPU300 to a location that minimizes shock and/or vibration.

3.6.6: Panel Layout Design and Clearance Checklist

The following list provides highlights of panel layout design factors:

- Meets the electrical code and applicable standards for correct grounding, etc.?
- Meets the panel manufacturer's requirements for grounding, etc.?
- Is the panel box correctly connected to earth ground? Is the panel door correctly grounded? Has the appropriate procedure been followed to correctly ground the devices in the panel box and on the panel door?
- Are minimum clearance requirements met? Can the panel door be easily opened and closed? Is there adequate space between device bases as well as the sides of the panel and wiring ducts?
- Is the panel box deep enough to accommodate the controller?
- Is there adequate ventilation? Is the ambient temperature range maintained? Are cooling or heating devices required?
- Are noise suppression devices or isolation transformers required? Is there adequate distance between the base of the controller and noisy devices such as relays or motor starters? Ensure that power and signal wires are not routed in the same conduit.
- Are there other requirements that impact the particular system, which need to be considered?

Electrical Installation



Chapter 4: Electrical Installation

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NOTE: The datasheet is the first document to refer to for model-specific information. Refer to the [Documentation Search](#) on the Horner website.

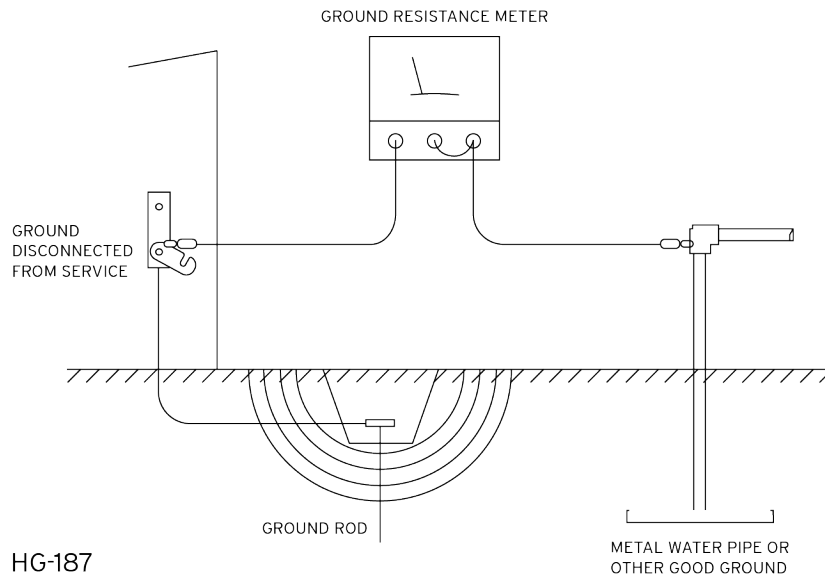
4.1: Ground Specifications

Ideally, a ground resistance measurement from equipment to earth ground is 0Ω. In reality it typically is higher. The US National Electrical Code (NEC) states the resistance to ground shall not exceed 25Ω. Horner Automation recommends less than 15Ω resistance from the equipment to ground. Resistance greater than 25Ω can cause undesirable or harmful interference to the device.

Grounding Definition - The term **ground** is defined as a conductive connection between a circuit or piece of equipment and the earth. Grounds are fundamentally used to protect an application from harmful interference causing either physical damage such as by lightning or voltage transients or from circuit disruption often caused by radio frequency interference (RFI).

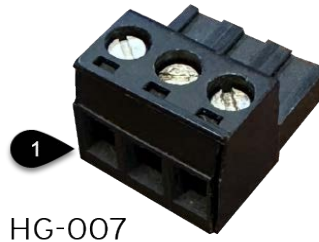
4.2: How to Test for Good Ground

In order to test ground resistance, a Ground Resistance Tester must be used. A typical Ground Resistance Meter Kit contains a meter, two or three wire leads, and two ground rods. Instructions are supplied for either a two-point or a three-point ground test. The figure shows a two-point ground connection test.



4.3: Primary Power Port

The Primary Power Range is 10-30VDC.



HG-007

Primary Power Port Pins		
PIN	Signal	Description
1	Ground	Frame Ground
2	DC-	Input Power Supply Ground
3	DC+	Input Power Supply Voltage

4.3.1: DC Input/Frame

- Solid/Stranded Wire: 12-24 AWG (0.511 - 2.5 mm²)
- Strip length: 0.28" (7mm)
- Torque, Terminal Hold-Down Screws: 4.5 – 7 in•lbs (0.50 – 0.78 N•m)
- DC- is internally connected to I/O V-, but is isolated from the V- connection of both CAN1 and CAN2 ports. A Class 2 power supply must be used.

4.3.2: Power Up

1. **OPTIONAL:** Attach ferrite core with a minimum of two turns of the DC+ and DC- signals from the DC supply that is powering the controllers.



HG-006

2. Connect to earth ground.
3. Apply recommended power.

NOTE: Refer to datasheet for power specifications

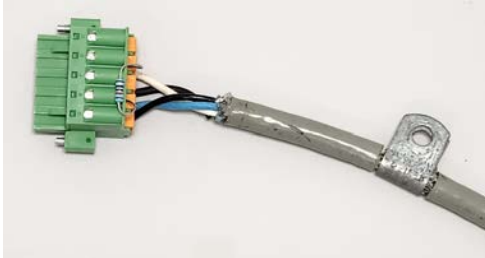
4.4: Installation Notice

When products are installed in environments of extreme Electromagnetic Interference (EMI), it is advised to take extra measures to ensure correct operation. In addition to the installation procedures, Horner APG recommends the following steps to ensure additional immunity in potential extreme EMI situations:

1. Always use a high-quality power supply. EMC ratings that include both EN61000-6-2 and EN55022 Class B can provide a reasonable amount of immunity with minimal emissions.

NOTE: Power supplies that permit or create occasional transients can disrupt a system and can be nearly impossible to troubleshoot.

2. Power lines should be twisted and as short as possible.
3. Always attach ground wire with the heaviest gauge and shortest wire as possible.
4. Route cabling perpendicular to peripheral equipment wiring. Never install cabling parallel to any power or high voltage lines.
5. CAN cabling used should be Belden DeviceBus 3084A or 3082A. If CAN power is required externally, apply power as close to the CAN port as possible. Avoid powering CAN through the network cable. Always connect the common (0V, black) wire between devices and leave the +24 volt (Red) wire open when independently powering each node.
6. The CAN cabling should have a 360° clamp installed on the braid shield at both ends of the cable and attached to ground. In certain noise environments, attaching the shield at one end only provides the necessary immunity.



7. All analog input and output cabling should be Belden 8441 or equivalent, and in some noise environments may require a clamp as shown in the previous step.
8. Run all cable in metal conduit, separate from power and high voltage lines
9. Attach a ferrite with a minimum of two turns to interconnect lines to the device. This includes power, analog and communication lines. Horner offers a Ferrite Core (part number HE-FBD001) on the Horner APG website



System Settings and Adjustments



Chapter 5: Local System Settings

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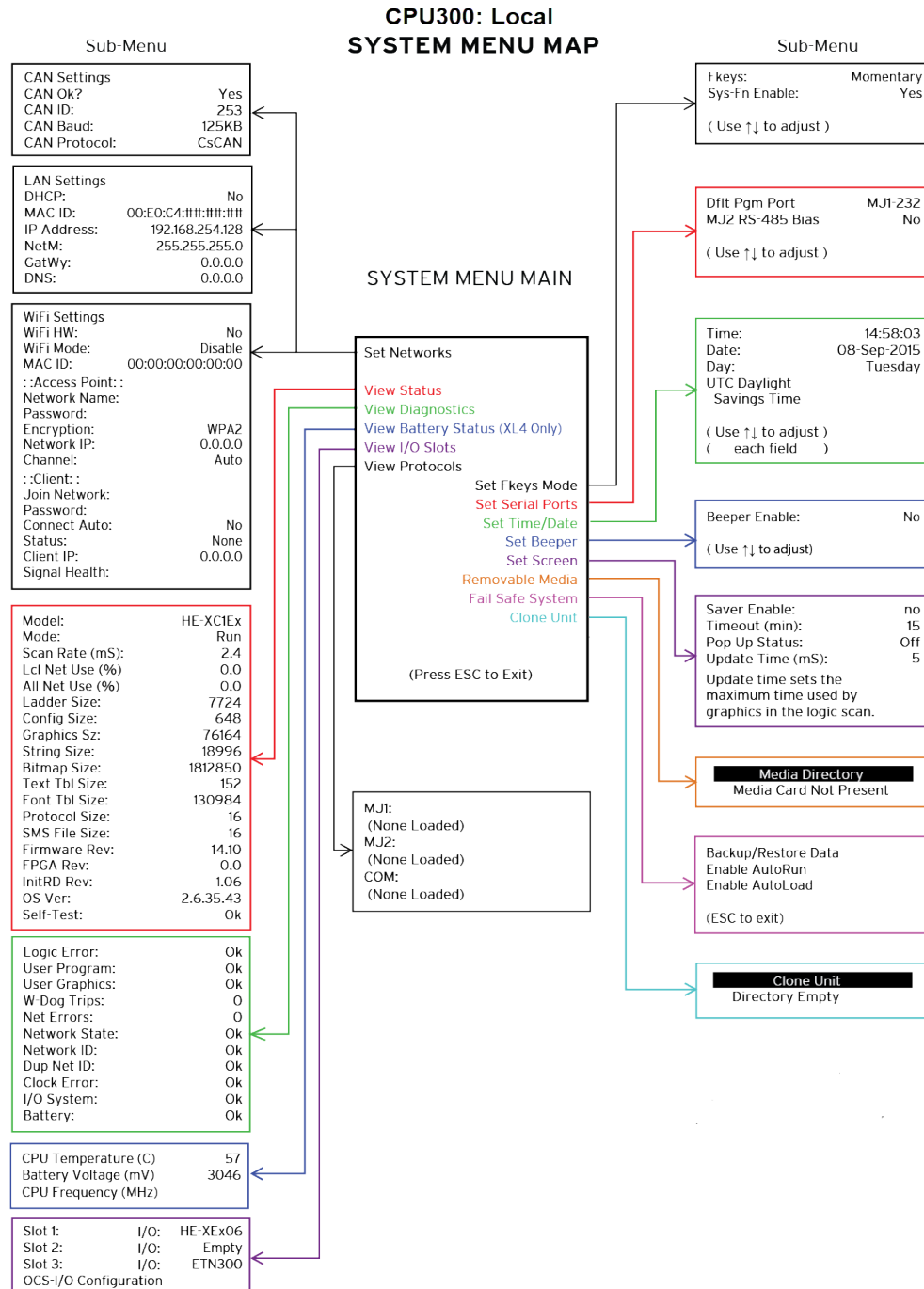
OCS LED Indicator Lights

The CPU300 has a built-in System Menu that can be used to view and make adjustments to the System Settings.

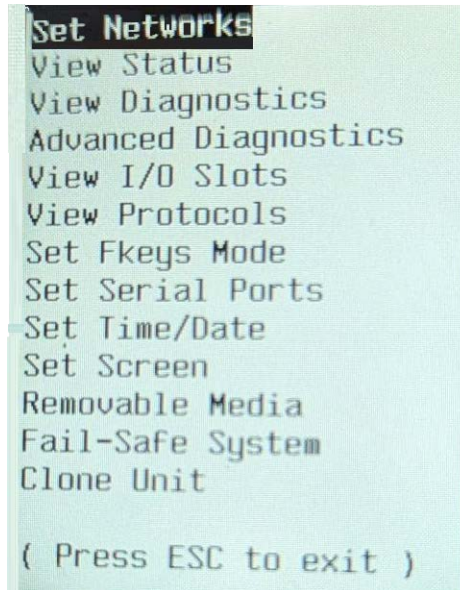
1. To start the System Menu, press the ENTER key (or set %SR3 to 1), which will display the Main Menu.
2. Use the ↑ and ↓ (Up Arrow or Down Arrow) keys to select a Main Menu item and press Enter (Return Arrow) to display the item's submenu.

OCS LEDs	
RUN	<ul style="list-style-type: none"> ▪ OFF indicates OCS is in IDLE/STOP mode. ▪ Flashing indicates DO / IO mode or RUN with no ladder program. ▪ ON indicates ladder code running.
OK	<ul style="list-style-type: none"> ▪ OFF indicates one or more self-tests failed. ▪ ON indicates all self-tests passed. ▪ Flashing at 1 Hz indicates forcing is active.

System Menu



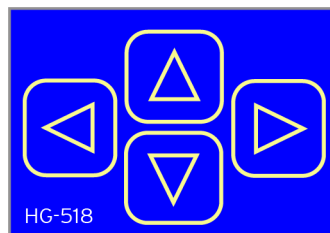
Navigation and Editing



Following pressing the System key on the CPU300, the following navigation is available:

- Press ESC to exit the System Menu or submenus
- Press ↑ and ↓ to select an item and press the **Enter** key to display the item submenu.
The submenu shows a list of System Settings and the associated values. After opening a submenu, if the System Settings are editable, the first System Setting that can be edited is highlighted. Use the ↑ and ↓ to select different System Settings for editing, after which pressing ESC will return the user to the previous System Menu.

When modifying a System Setting's value, use either the arrow keys (↓ ↑ → ←), numeric keys, or the touch screen icons to select a new value.

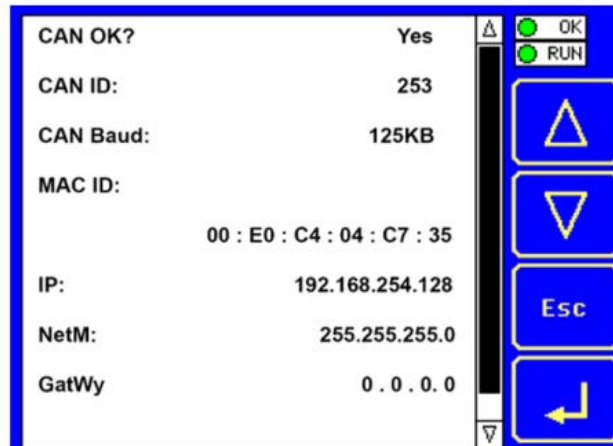


The arrow keys are used to edit System Settings that have just a few possible values.

- Each time the arrow key is pressed, a new possible value is displayed.
- When the desired value appears, press the **Enter** key to save it; otherwise press the **ESC** key to cancel the edit.

In addition, to edit a single numeric digit, use the → or ← key to select the digit and then either press a numeric key or use ↓ or ↑ to modify the digit. In any case, after entering the new desired value, press the Enter key to save it; otherwise press the ESC key to cancel the edit.

Set Networks



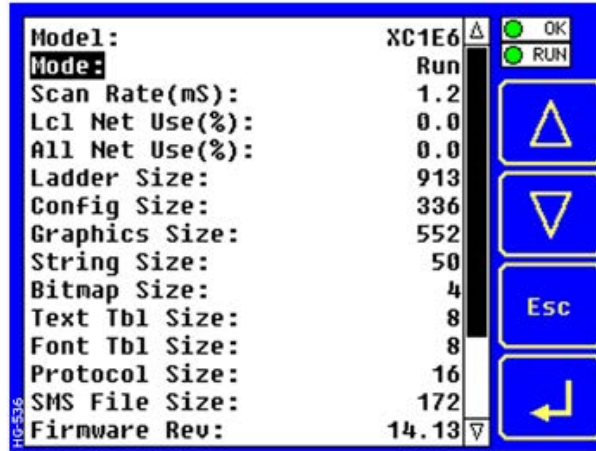
This submenu allows settings for the CAN and Ethernet network to be viewed or changed.

CAN Ok?	Yes = CAN1 connected to a CAN network and functioning properly No = Not ready to communicate on CAN network	
CAN ID	1 to 253 = This node's CsCAN Network ID; must be unique on network	
CAN Baud	125kB = 125kBd CAN network 250kB = 250kBd CAN network	500kB = 500kBd CAN network 1MB = 1MBd CAN network
MAC ID	Displays the Ethernet MAC ID of the unit	
IP	Displays the Ethernet IP address of the unit	
NetM	Displays the Ethernet net mask of the unit	
GatWy	Displays the Ethernet gateway of the unit	

NOTE: The IP address, Net Mask, and Gateway can be changed from the System Menu. This is designed for commissioning or temporary field changes. The actual parameters are defined in Cscape under the Ethernet configuration.

View Status & Diags

View Status

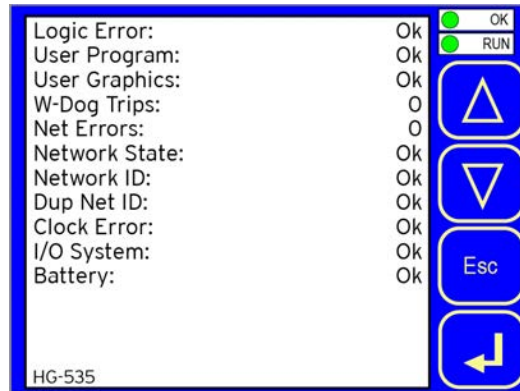


The View Status submenu displays up to 19 System Settings. Only the Mode System Setting is editable.

Model:	XL1yz = Model number of this CPU300 OCS unit 1yz = indicates the installed I/O module 00 = no I/O module
Mode:	Idle = CPU300 OCS is in Idle mode DoIO = CPU300 OCS is in Do I/O mode Run = CPU300 OCS is in Run mode
Scan Rate (mS):	0.0 = CPU300 OCS is not in Run mode 0.1 to 999.9 = Average number of mS for each ladder scan
Lcl Net Use %:	0.0 to 100.0 = CAN network bandwidth % used by this CPU300 node
All Net Use %:	0.0 to 100.0 = CAN network bandwidth % used by all nodes
Ladder Size:	x = Number of bytes in application ladder program
Config Size:	x = Number of bytes in application I/O configuration
Graphics Size:	x = Number of bytes in application graphic screens
String Size:	x = Number of bytes in application string table
Bitmap Size:	x = Number of bytes in application bitmaps
Text Tbl Size:	x = Number of bytes in application text tables
Font Tbl Size:	x = Number of bytes in application font tables
Protocol Size:	x = Number of bytes in application downloaded protocols
SMS File Size:	x = Number of bytes in application SMS protocol configuration
Firmware Rev:	xx.yy = Current firmware version

FPGA Rev:	x.y = Current FPGA version (High Speed IO Sub System)
InitRD Rev:	x.yz = Bootloader version
OS Ver:	a.b.cd.yz = Current Operating System version
Self-Test	Ok = All power-on self-tests passed Fault = One or more power-on self-tests failed

View Diags



The View Diags submenu displays up to 11 System Diagnostics, none of which are editable. The first two System Diagnostics are critical. If any of them indicate a Fault condition, the CPU300 will not enter or remain in Run mode, and the problem must be investigated and corrected.

Logic Error:	Ok = All executed ladder instructions are legal for loaded firmware Fault = A ladder instruction not supported by firmware was found
User Program:	Ok = Ladder program and I/O configuration loaded successfully Fault = Ladder program or I/O configuration not loaded or load failed

The last nine System Diagnostics are informational. If any of them indicate a Warning condition, the CPU300 can still enter and remain in Run mode, but the problem should be investigated and corrected.

User Graphics	Ok = Application graphics objects loaded successfully Fault = Application graphics objects not loaded or load failed
W-Dog Trips	0 = Watchdog timer has not tripped since the last power-up x = Number of times watchdog timer has tripped
Net Errors	0 = No CAN network bus-off errors have occurred x = Number of CAN network bus-off errors that have occurred
Network State	Ok = At least one other node was found on the CAN network Warning = No other nodes were found on the CAN network
Network ID	Ok = This node's CAN Network ID is in the range 1 to 253 Warning = This node's CAN Network ID was out of range at power-up
Dup Net ID	Ok = This node's Network ID is unique on the CAN network Warning = This node's Network ID is duplicated in another node
Clock Error	Ok = Time and date have been set Warning = Time and date need to be set
I/O System	Ok = I/O configuration matches the installed I/O and COM modules

	Warning = I/O configuration needs updating to match installed modules
Battery	Ok = Backup battery operating properly Warning = Backup battery needs to be replaced

View Advanced Diagnostics, I/O Slots and Protocols

View Advanced Status



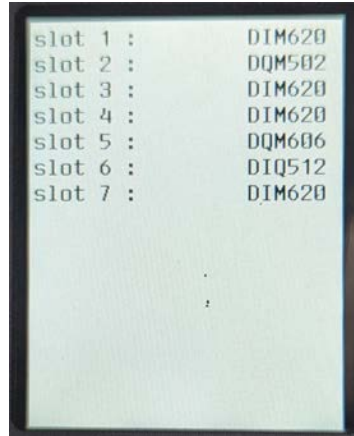
View Advanced Diagnostics to obtain the following information.

Display	
*Internal Mem A:	<p>Device lifetime estimation type A: lifetime estimation for eraseblocks configured as <u>MLC</u> - which is the default for the user area partition (where the OS and data are stored) of MLC eMMCs.</p> <ul style="list-style-type: none"> • If the device is not configured as pSLC, this value may increase over time. • Data is provided in steps of 10%; For example, 0x02 means 10%-20% device lifetime reached.
*Internal Mem B:	<p>Device lifetime estimation type B: lifetime estimation for eraseblocks configured as <u>SLC</u> - usually the boot area partition (where the bootloader is stored) blocks and those configured by the user in pSLC mode.</p> <ul style="list-style-type: none"> • The bootloader area is barely touched and users most likely will not see this indicator value change significantly over the product lifespan. • Data is provided in steps of 10%; For example, 0x02 means 10%-20% device lifetime reached.
CPU Temperature	The heat generated by the central processing unit (CPU).
Min CPU Temp	The lowest temperature (minimum) a CPU can reach and continue functioning safely.
Max CPU Temp	The highest temperature (maximum) a CPU can reach and continue functioning safely.
RTC Battery Age	The length of time that an RTC (Real Time Clock) battery has been in use.

* Pre EOL information: overall status for reserved blocks. This indicator signalizes that the eMMC lifespan is near its end. Possible values are:

- 0x00 - Not defined.
- 0x01 - Normal: consumed less than 80% of the reserved blocks.
- 0x02 - Warning: consumed 80% of the reserved blocks.
- 0x03 - Urgent: consumed 90% of the reserved blocks.

View I/O Slots



The View I/O Slots submenu displays three System Settings, all of which are **not** editable.

Internal to the CPU300, there is a CPU board, and up to two installed modules. Model 0 has no installed I/O or COM modules. All other models have an I/O module and can have a user-installed COM module.

Depending on which I/O module is installed and which I/O module has been configured by Cscape, one of the following six System Settings should appear for Slot 1:

Slot 1: I/O: Empty	= No I/O module installed or configured
Slot 1:*Unsupported	= Unsupported I/O module installed
Slot 1:-I/O Missing	= No I/O module installed but an I/O module is configured
Slot 1:+I/O: XExyy	= yy I/O module installed but no I/O module configured
Slot 1:?I/O: XExyy	= yy I/O module installed but another I/O module configured
Slot 1: I/O: XExyy	= yy I/O module installed and configured properly

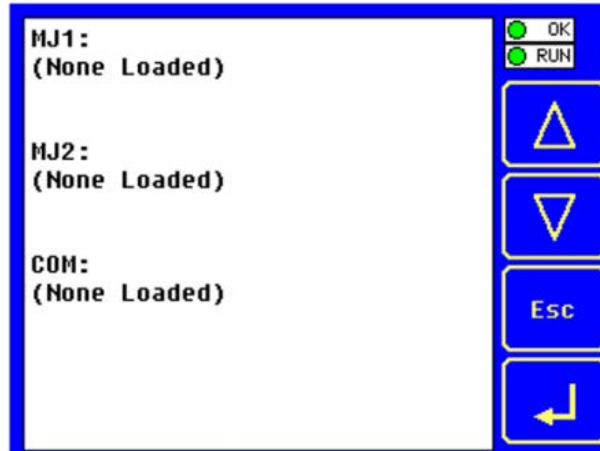
Depending on the COM module that is installed and the COM module that has been configured by Cscape, one of the following six System Settings appears for Slot 2:

Slot 2: I/O: Empty	= No COM module installed or configured
Slot 2:*Unsupported	= Unsupported COM module installed
Slot 2:-I/O Missing	= No COM module installed but a COM module is configured
Slot 2:+I/O: XzC	= z COM module installed but no COM module configured
Slot 2:?I/O: XzC	= z COM module installed but another COM module configured
Slot 2: I/O: XzC	= z COM module installed and configured properly

Slot 3: I/O: ETN300	= ETN300 has been configured through Cscape
---------------------	---

View Protocols

See also: "Protocol Configuration " on page 23



The View Protocols submenu displays three System Settings, none of which are editable.

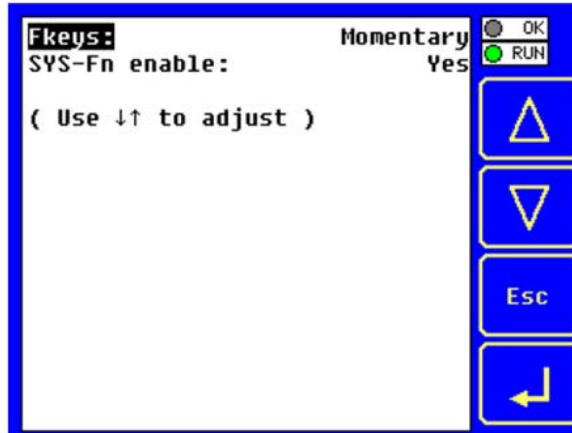
As mentioned in Downloadable Serial Communication Protocols section, both the MJ1 (Port 1) and MJ2 (Port 2) serial ports support downloadable protocols. To assign a downloadable protocol to an CPU300 serial port, select the Protocol Config item in Cscape's Program menu and then setup a protocol for Port 1 or Port 2 (or both).

In the View Protocols submenu, the currently downloaded protocol, if any, and its version number are displayed for both Port 1 and Port 2.

Port 1	
Protocol Name	(None Loaded) or name of the protocol assigned to MJ1
Protocol Version	Blank or version of the protocol assigned to MJ1
Port 2	
Protocol Name	(None Loaded) or name of the protocol assigned to MJ2
Protocol Version	Blank or version of the protocol assigned to MJ2

Set Keys, Serial Ports, Ethernet, Time/Date, Beeper & Screen

Set Fkeys Mode

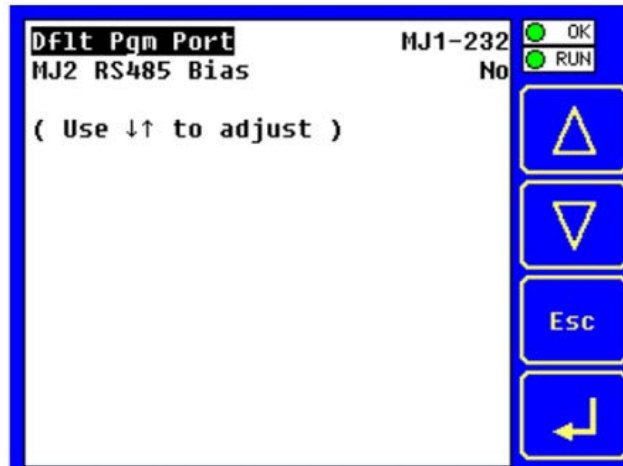


The Set Fkeys submenu displays two System Settings, both of which are editable.

Fkeys	Momentary = %K1-5 bits go On & Off as F1-F5 are pressed & released Toggle = %K1-5 bits toggle each time F1-F4 are pressed
SYS_Fn enable	Yes = Reset and all clear system functions enabled No = Reset and all clear system functions disabled

Set Serial Ports

See also: "Serial Communications"



The Set Serial Ports submenu displays three System Settings, all of which are editable, and one optional item. For the **Dflt Pgm Port** System setting, only MJ1-232 can be selected, unless a Modem (XMC) COM module is installed.

Dflt Pgm Port	MJ1-232 = MJ1 RS232 port is the default programming port Modem = Modem COM module is the default programming port
MJ2 RS485 Bias	No = MJ2 RS485 bias resistors are not switched in Yes = MJ2 RS485 bias resistors are switched in

Set Time/Date

The following instructions are to set and display the real-time clock in the controller. More details can be found in the Help File in Cscape.

Clock and Time Setting Terms	
Coordinated Universal Time (UTC)	Abbreviated to UTC, Coordinated Universal Time is the primary time standard by which the world regulates clocks and time.
Time Offset	In order to obtain the local time (anywhere in the world), the user needs to subtract / add a certain number of hours from UTC depending on how many time zones user is away from Greenwich.
Network Time Protocol (NTP)	A Networking Time Protocol (NTP) for clock synchronization between computer systems over packet-switched, variable latency data networks.
Daylight Saving Time	Time as adjusted to achieve longer evening daylight, especially in summer, by setting the clocks an hour ahead of the standard time.
Apply Daylight Saving (DST)	Daylight Saving Time (DST) is the practice of setting the clocks forward one hour from standard time during the summer months, and back again in the fall, in order to make better use of natural daylight. Selecting this option increases the Time offset by 1 hour.

System Registers for UTC (Coordinated Universal Time)	
%SR210 (R/W)	Time Zone: set in hours + / - UTC.
%SR211 (R/W)	Daylight Saving: YES = 1 Daylight Saving: NO = 0 (If daylight saving is enabled, one hour will be added to the local time).
%SR212 (R)	UTC – Seconds
%SR213 (R)	UTC – Minutes
%SR214 (R)	UTC – Hours
%SR215 (R)	UTC – Date
%SR216 (R)	UTC – Month
%SR217 (R)	UTC – Year



To Set Time Zone: The Time Zone setting is an hourly offset from UTC time. If using the Time Zone setting, set it first, then set the local time. UTC time will be automatically set based on the time zone and local time settings. If using NTP: NTP utilizes UTC time, therefore when using NTP, the appropriate hourly offset from UTC time must entered into the time zone setting.

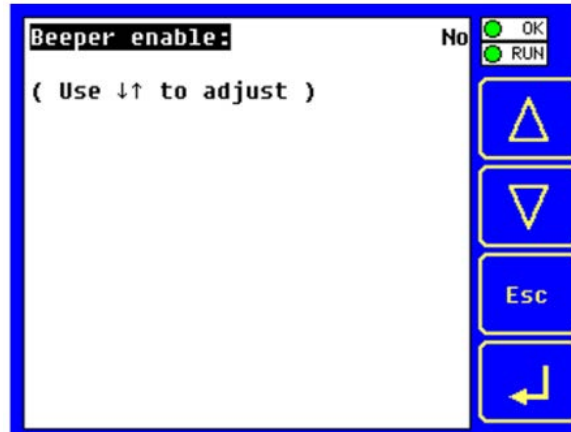
Daylight Saving Time: If currently observing Daylight Saving Time, set to Yes. If not currently observing Daylight Saving Time, set to No. The OCS controller does not automatically switch to daylight saving time; however, program logic can be written to accomplish an automatic switchover using system register %SR211. In program logic, move a "1" (INT) into %SR211 to enable Daylight Saving Time. Move a "0" (INT) into %SR211 to disable Daylight Saving Time. Trigger the move to %SR211 based on a compare function to the RTC date according to daylight saving practices in your desired region.

To Set Local Time: The Set Time/Date submenu displays three system settings. Time and Date may be edited, and Day is automatically calculated from the Date setting.

NOTE: Time and Date are split into three fields each, all of which may be edited. Touch the field or use ↓ or ↑ buttons to select a field, then use the ↓ or ↑ buttons to edit the field.

Time	16:09:49 = Current time (hours:minutes:seconds in 24-hour format)
Date	10-Jun-2013 = Current date (day-month-year)
Day	Monday = Current day of week calculated from the Date setting

Set Beeper

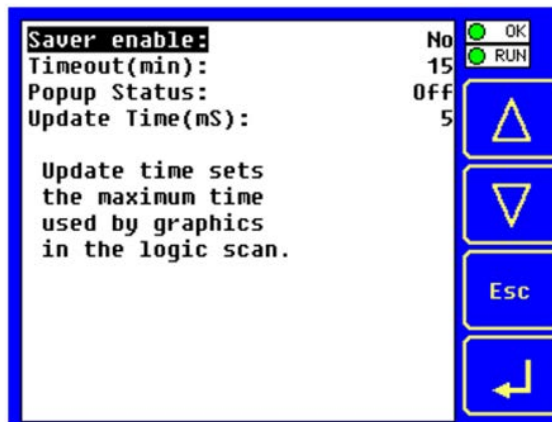


The Set Beeper submenu displays one System Setting, which is editable.

Beeper Enable	Yes (default) = Enables beeper No = Disables beeper (does NOT affect ladder access)
---------------	--

Set Screen

The Set Screen submenu displays four System Settings, all of which are editable.



Saver enable	Yes = Enable screen saver No (default) = Disable screen saver
Timeout (min)	5 - 1200 = Amount of time in minutes to expire with NO touch activity before activating screen saver (black screen)
Popup Status	Off (default) = Disable popup status Warning = Display popup status only if controller status changes to NOT Ok or NOT Run mode. On = Display popup status on any controller status change.
Update Time (mS)	2 - 50 = Maximum amount of time to allow for graphics update per scan

Removable Media

See also: "Removable Media" on page 33

Media Directory				
WEBMI	<DIR>		09-22-15	11:07 a
AUTOLOAD.PGM		218545	09-22-15	10:17 a
CLONE	.DAT	109178	09-22-15	10:17 a
EXL10E		1797901	08-14-15	10:02 a
FILE	.INF	9	09-21-15	4:52 p
FIRMWARE.LIC		128	09-21-15	5:24 p
OEM	.INF	9	09-21-15	4:52 p
OEMINFO	.TXT	168	04-13-12	7:16 p
PIC2	.BMP	153654	12-21-15	11:20 a
WEBMI				
Free:	7630148	Total:	7688120	
<input type="button" value="⏏"/> <input type="button" value="⬆"/> <input type="button" value="⬇"/> <input type="button" value="Del"/> <input type="button" value="Del All"/> <input type="button" value="For mat"/> <input type="button" value="Save Pgm"/> <input type="button" value="Esc"/>				

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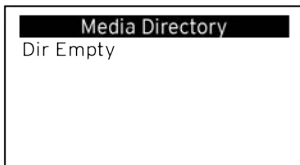
The Removable Media submenu displays the Removable Media Manager. After selecting Removable Media from the Main Menu, one of four submenu screens will appear:



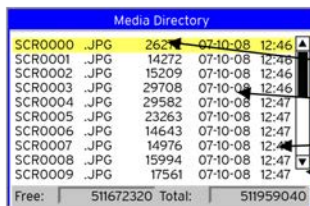
= No microSD card has been installed in the Memory slot



= microSD card is installed, but it is still initializing



= microSD card is installed and initialized, but contains no files



= microSD card is installed and initialized, and it contains files

- Shows size of highlighted file or shows <DIR> if directory is highlighted.
- Shows the date file or directory was created or last modified.
- Shows the time file or directory was created or last modified.
- Scrollbar

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If a directory name is highlighted, pressing Enter will switch to that directory showing its files and sub-directories. In a sub-directory, highlighting .. (dot dot) and pressing Enter will move up one directory.

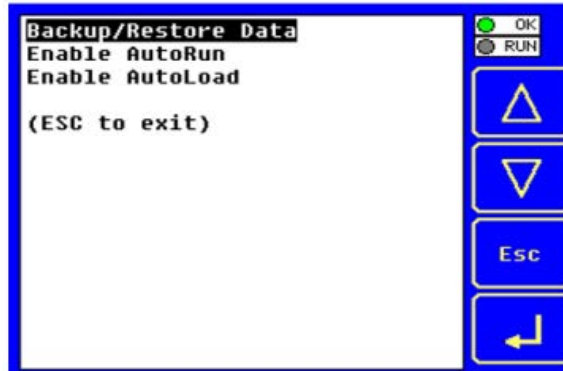
Fail – Safe System

See also: "Fail-Safe System" on page 40

The Fail-Safe System is a set of features that allow an application to continue running in the event of certain types of "soft" failures. These "soft" failures include:

- Battery power loss
- Battery-Backed Register RAM or Application Flash corruption due to, for example, an excessive EMI, Electromagnetic Interference, event.

Selecting "Fail-Safe System" menu will open the following menu screen:



Selecting Backup/Restore Data displays the following screen in:



Backup	= Copies battery-backed RAM contents on to the onboard flash memory of the OCS.
Restore	= Copies the backed-up data from onboard flash to the battery-backed RAM.
Clear Backup	= The backup data will be erased from the onboard flash.
Exit	= Goes back to previous menu

Enable AutoRun

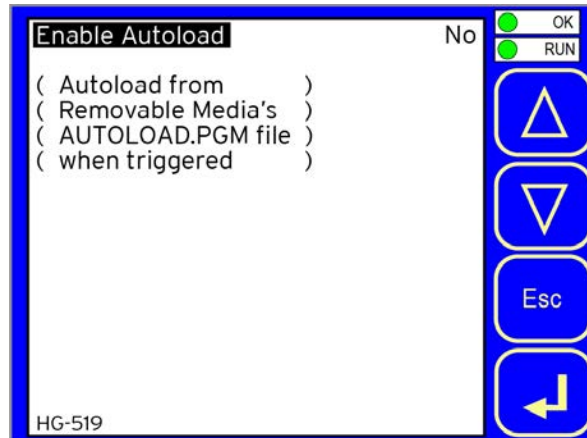
“Enable AutoRun” displays the following options which can be selected:



Enable AutoRun	<p>No = OCS will be in IDLE mode after AutoLoad or Automatic Restore.</p> <p>Yes = OCS will automatically be placed into RUN mode after AutoLoad or Automatic Restore.</p>
----------------	--

Enable AutoLoad

"Enable AutoLoad" displays the following options which can be selected:



Enable AutoLoad	<p>No = Does not load AUTOLOAD.PGM automatically when application program is absent or corrupted.</p> <p>Yes = Loads AUTOLOAD.PGM file automatically from RM when application program is absent or corrupted.</p>
-----------------	---

Clone Unit

See also: "Clone Unit" on page 38

'Clone Unit' feature allows the user to "clone" the OCS of the exact same model. This feature "clones" application program and unit settings stored in battery-backed RAM of an OCS into the RM. Refer to "Removable Media" on page 33 for details on using RM. It can then be used to clone a different OCS (same model).

This feature can be used for:

- Replacing an OCS by another unit of the same model.
- Duplicating or "clone" units without a PC.

Make Clone

Selecting "Clone Unit" menu will open the following menu screen:



Load Clone and **Make Clone** virtual buttons are below the screen. **Free/Total**: Displays number of Free and Total bytes in Removable Media.

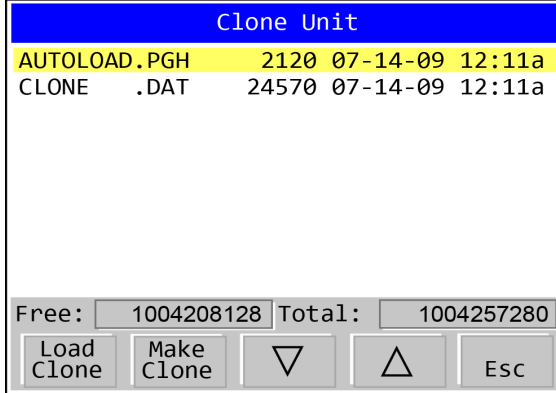
Selecting Make Clone brings up the screen below for the user:

Clone Unit				
WEBMI	<DIR>		09-22-15	11:07a
AUTOLOAD.PGM		218545	09-22-15	10:17a
CLONE.DAT		109178	09-22-15	10:17a
EXL10E		1797901	08-14-15	10:02a
FILE.INF		9	09-21-15	4:52p
FIRMWARE.LIC		128	09-21-15	5:24p
OEM.INF		9	09-21-15	4:52p
OEMINFO.TXT		168	04-13-12	7:16p

WEBMI

Free: 7629540 Total: 7688120

After confirmation, the OCS will create two new files in the root directory of the Removable Media Drive as shown below:



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AUTOLOAD.PGM	Application file
CLONE.DAT	File having all unit settings and register values from battery-backed RAM

Load Clone

Selecting "Clone Unit" menu will open the following menu screen. Select "Load Clone" (one of the virtual buttons beneath the screen).

Clone Unit			
AUTOLOAD.PGH	2120	07-14-09	12:11a
CLONE .DAT	24570	07-14-09	12:11a

Free:	1004208128	Total:	1004257280
-------	------------	--------	------------

Load Clone	Make Clone	▽	△	Esc
------------	------------	---	---	-----

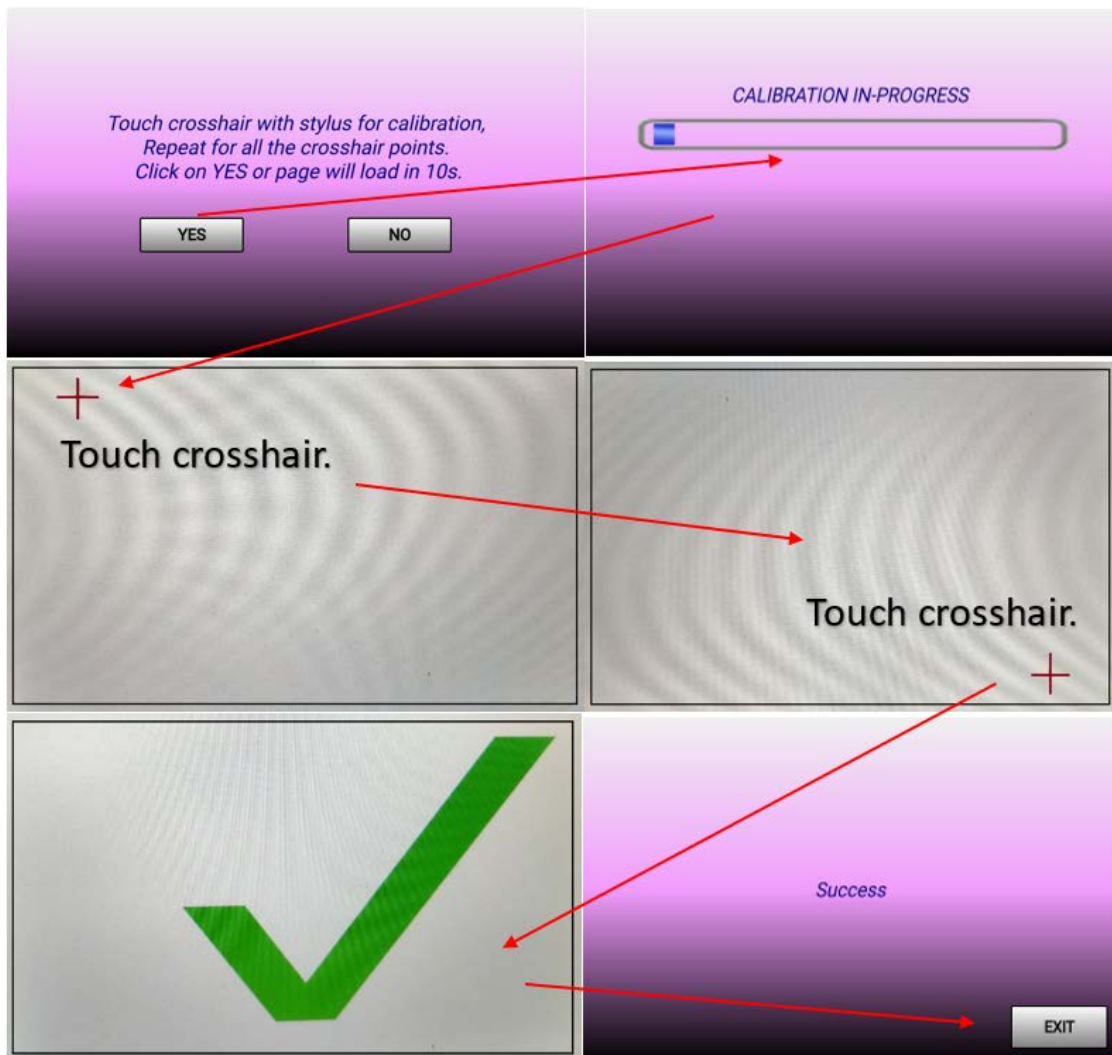
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NOTE: For security enabled files, Load Clone asks for password validation before loading the application.

Touch Screen Calibration

The touch screen is calibrated at the factory and rarely needs modification. However, if actual touch locations do not appear to correspond with responding objects on the display, field adjustment is available. Ensure SYS_fn Enable is set to YES in System Menu. To access the field adjustable touch screen calibration dialog, press and hold both the SYS and F1 key for longer than 2 seconds and a dialog similar to the figure below will appear.

For best results in screen calibration, use a stylus with a plastic tip. When the crosshair appears, touch the center of the crosshair as exactly as possible and release. A small “+” should appear and will move closer to the center of the crosshair. Once it has done so and disappeared again, repeat the process until “+” appears in the center of the crosshair. Then move on to the next step.



Chapter 6: HMI Connect System Settings

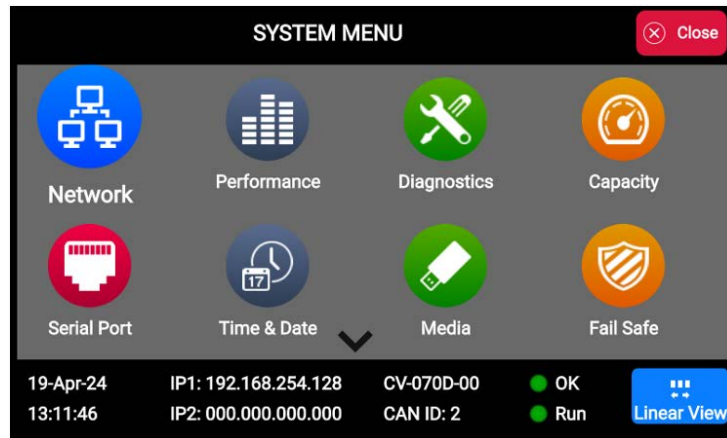
- 5.1 System Menu – Overview, Navigation, and Editing 45
- 5.2: LED Indicator Lights 47
- 5.3: System Menu Map 48
- 5.4: Set Networks 49
- 5.5: View Status & Diags 52
- 5.6: View I/O Slots & Protocols 54
- 5.7: Removable Media 61
- 5.8: Fail – Safe System 62
- 5.9: User Interface 66
- 5.10: Touch Screen Calibration 67

5.1 System Menu – Overview, Navigation, and Editing

System Menu Overview

HMI Connect has a built-in System Menu. Use the System Menu to view and adjust the System Settings.

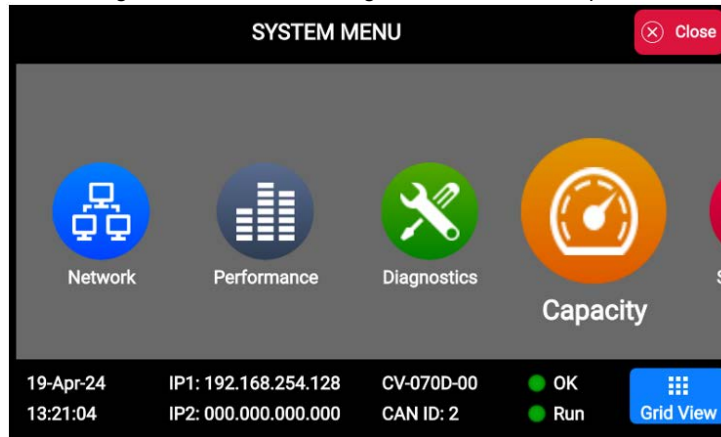
- **To Start the System Menu:** Press the **SYSTEM** key (or set %SR3 to 1). This will display the Main Menu.
- **To Navigate the Main Menu:** On the **Main Menu**, use ↑ and ↓ (click the sliding for up & down) to select a Main Menu item and to display the submenu for the item.
- **To Close the System Menu:** Press **Close** to exit the System menu.



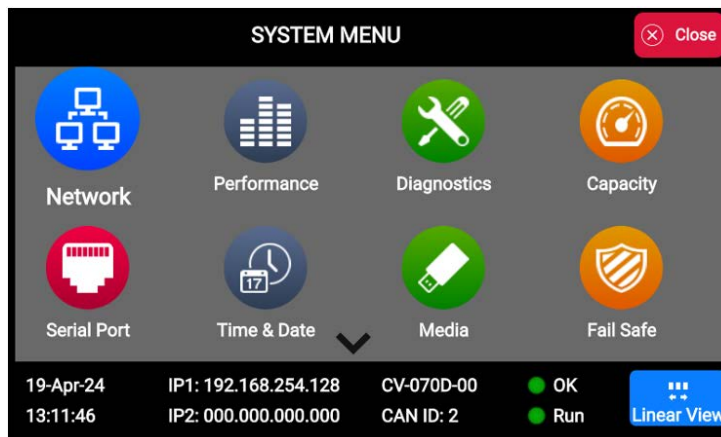
System Menu View Options

There are two available System Menu views: Linear and Grid.

- **System Menu - Linear View:** On the System Menu screen, select Linear View to display the System Menu items in a single line. Scroll left and right to view all menu options.



- **System Menu - Grid View:** On the System Menu screen, select Grid View to display the System Menu items in a table containing multiple items.



System Menu Navigation

Note: Select **Close** to exit submenus and return to the Main Menu, and to exit the Main Menu to return to the System Menu screen.

Following accessing the System Menu, use the up and down sliders to select an item and display the submenu of the item. The submenu contains a list of choices for the System Settings and their values.

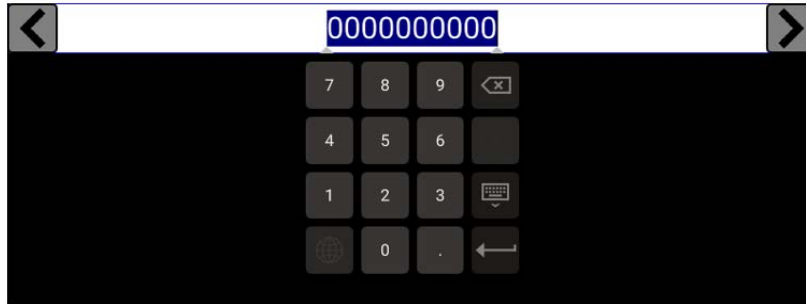
System Settings that can be edited are highlighted. Use the up & down sliders to scroll through the available System Setting options. Use the touchscreen icons to select new values. Tap the touchscreen to change the values.

- Select **Enter** to save the changes.
- Select **Back** to cancel the edit.

Numeric Keys

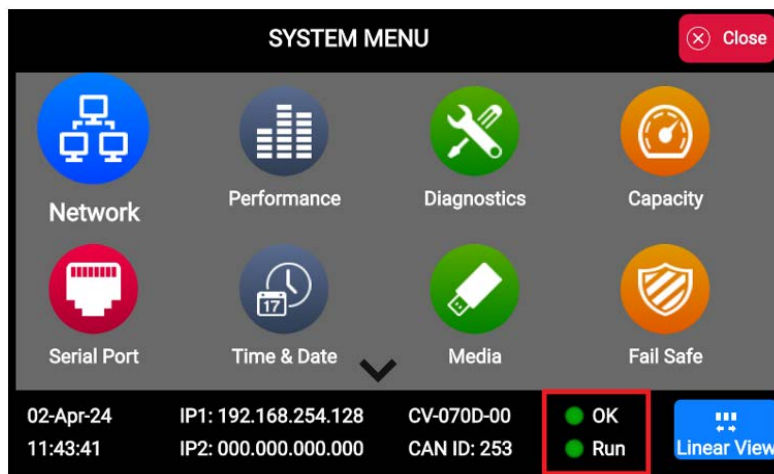
The numeric keys are used to enter number values into the System Settings. Use the arrows on the display to select digits and the number keys to change the values.

Press **Enter** to save or **Back** to cancel the change.



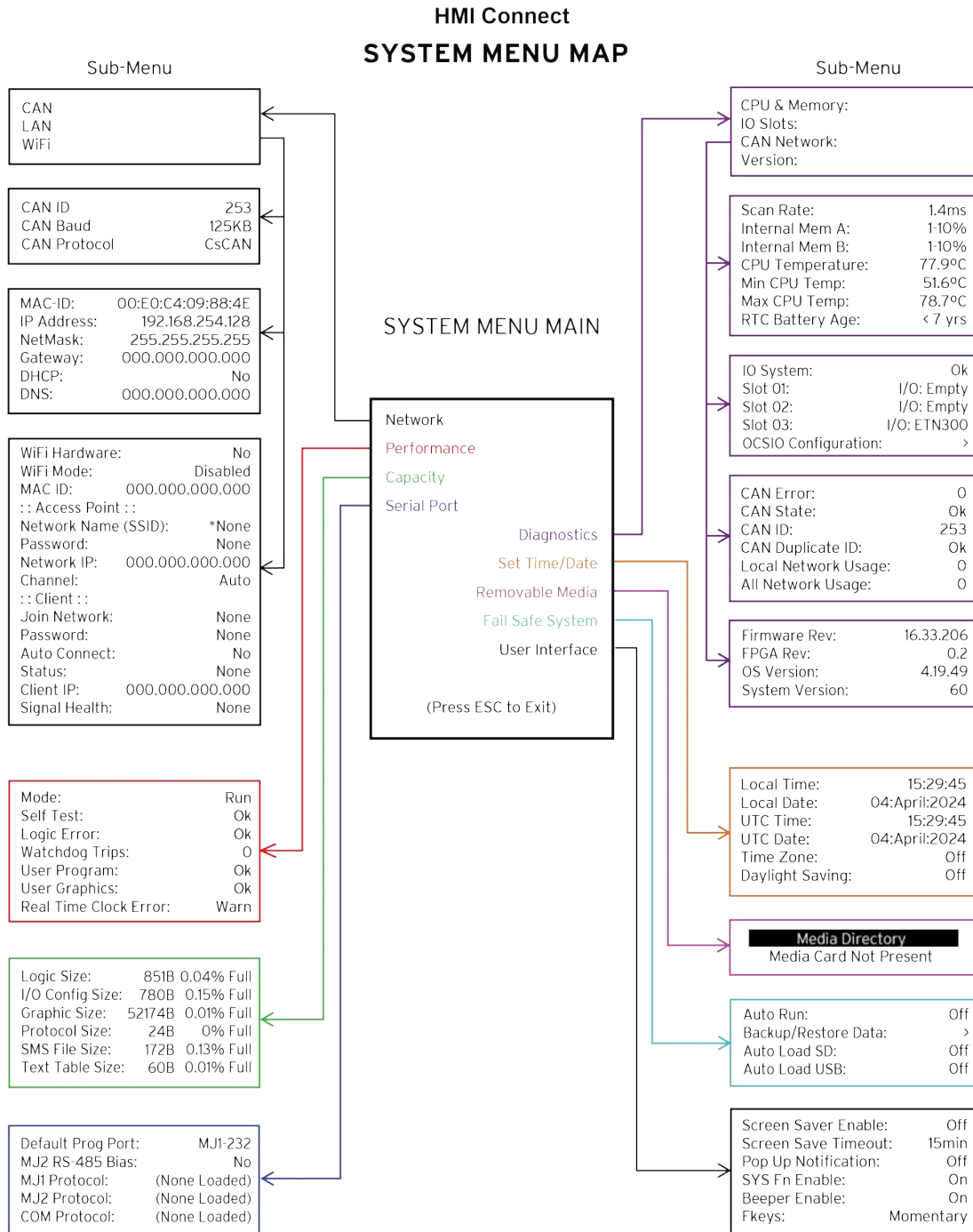
5.2: LED Indicator Lights

HMI Connect has virtual OK and Run LEDs in the System Menu as shown in the following image.



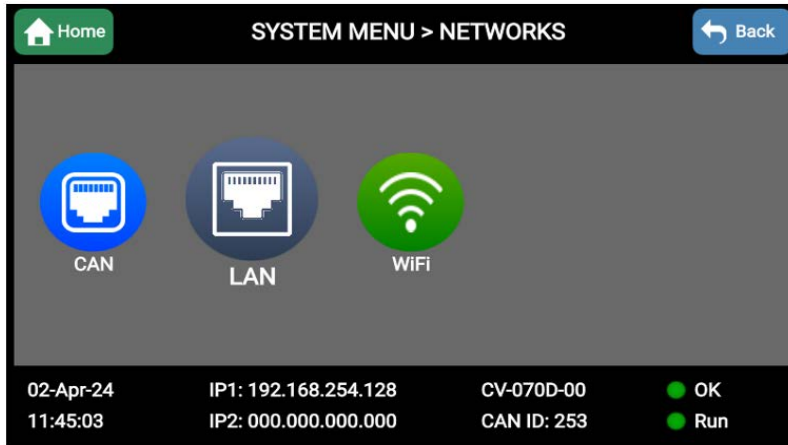
LEDs	
RUN	<ul style="list-style-type: none"> OFF indicates HMI Connect is in IDLE/STOP mode. Flashing indicates DO / IO mode or RUN with no ladder program. ON indicates ladder code running.
OK	<ul style="list-style-type: none"> OFF indicates one or more self-tests failed. ON indicates all self-tests passed. Flashing at 1 Hz indicates forcing is active.

5.3: System Menu Map



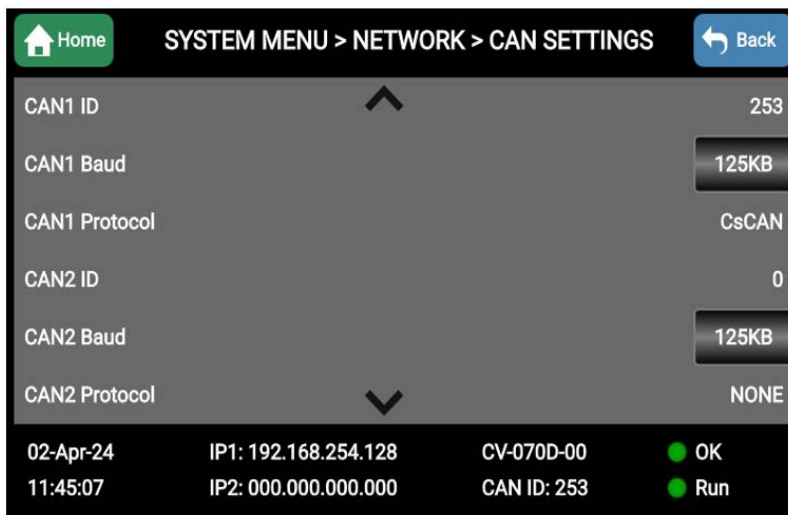
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5.4: Set Networks



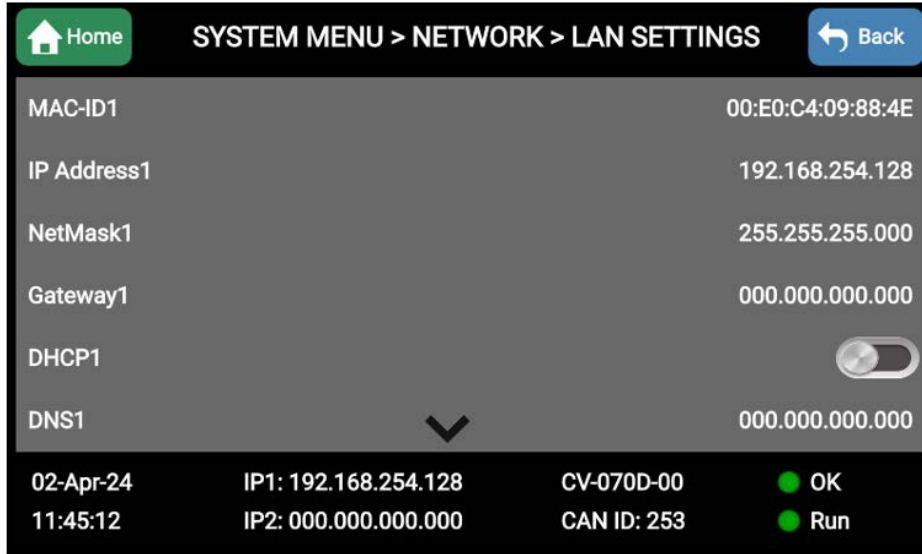
This submenu allows setting for the CAN, LAN and WiFi network to be viewed or changed.

CAN Settings



CAN Ok?	Yes = CAN1 connected to a CAN network and functioning properly No = Not ready to communicate on CAN network	
CAN ID	1 to 253 = This node's CsCAN Network ID 1 to 127 = This node's CANopen or J1939 Network ID 0 to 63 = This node's Device network ID; must be unique on network	
CAN Baud	125kB = 125 kBd CAN network 250kB = 250 kBd CAN network	500kB = 500 kBd CAN network 1MB = 1 MBd CAN network
CAN Protocol	CsCAN/CANopen/Device Net scanner/J1939	

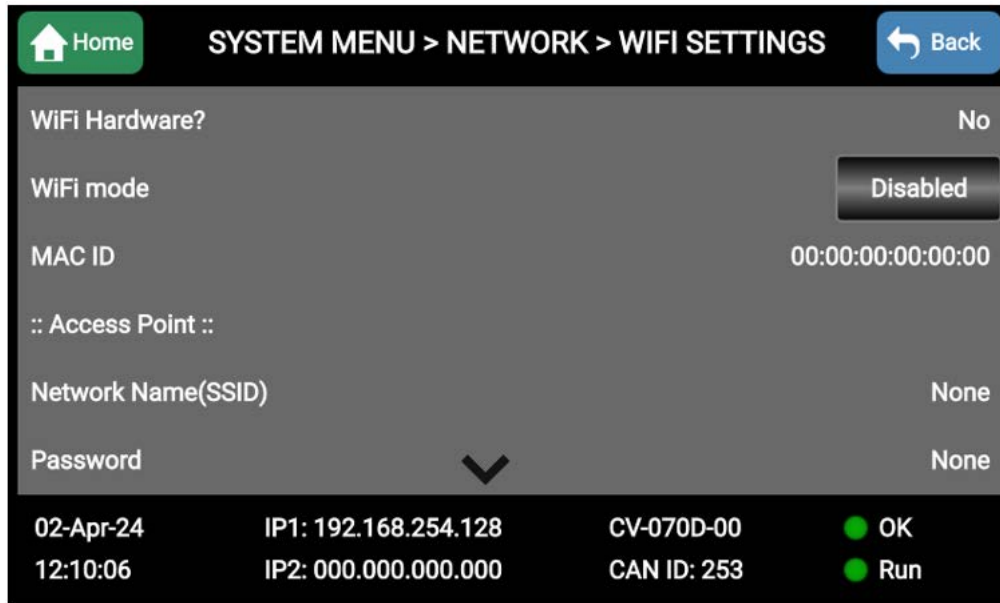
LAN Settings



MAC ID	Displays the Ethernet MAC ID of the LAN
IP Address	Displays the Ethernet IP Address of the LAN
Netmask	Displays the Ethernet Netmask of the LAN
Gateway	Displays the Ethernet Gateway of the LAN
DHCP	Enable/Disable DHCP of the LAN
DNS	Displays the DNS server of the LAN

NOTE: The IP address, Net Mask, and Gateway can be changed from the System Menu. This is designed for commissioning or temporary field changes. The actual parameters are defined in Cscope under the Ethernet configuration.

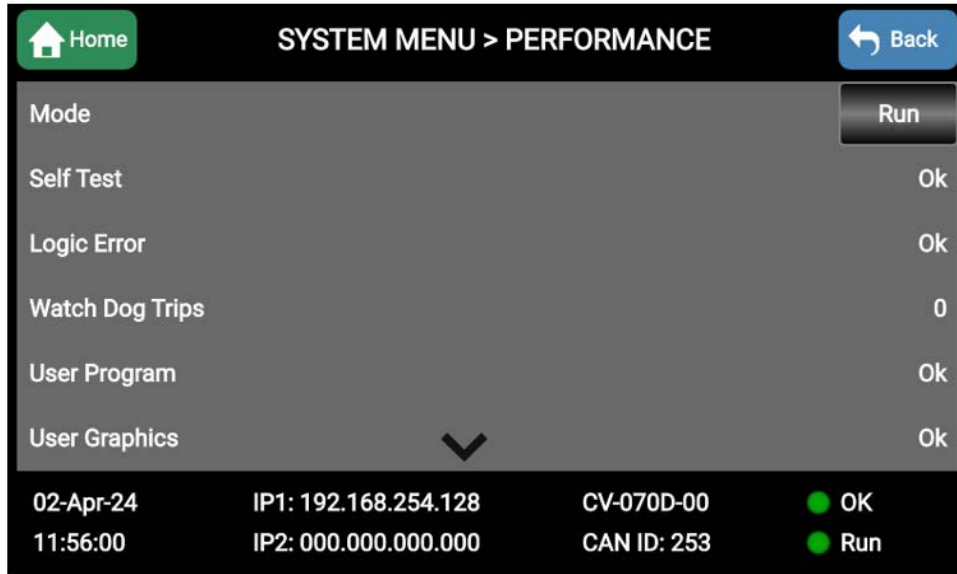
WiFi Settings



WiFi Hardware	Displays Hardware Present or /not
WiFi Mode	Displays as None/AccessPoint/Client
MAC ID	Displays the MAC ID of the WiFi Hardware, if installed
Access Point	
Network Name (SSID)	View/Modify the Network Name
Password	View/Modify the Password
Encryption	View/Modify the Encryption standard
Network IP	View/Modify the Network IP
Channel	View/Modify the Channel
Client	
Join Network	View/Select the list of available Networks to join
Auto Connect	Set the network to Auto Connect or None
Status	Displays the Status as Connected or None
Client IP	Displays the Client IP Address
Signal Health	Displays the Signal Health

5.5: View Status & Diags

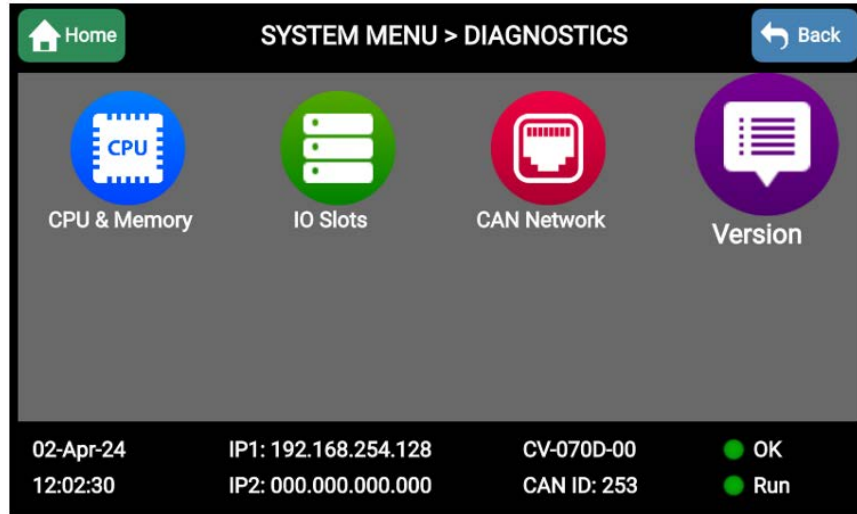
View Status Performance



The View Status submenu displays up to 19 System Settings. Only the Mode System Setting is editable.

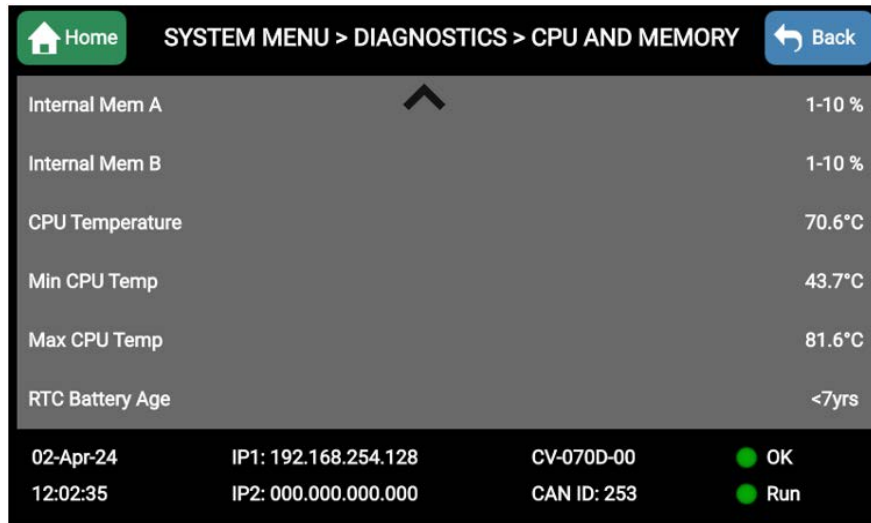
Mode	Idle = Idle mode DoIO = HMI Connect is in Do I/O mode Run = HMI Connect is in Run mode
Self-Test	Ok = All power-on self-tests passed Fault = One or more power-on self-tests failed
Logic Error	Ok = All executed ladder instructions are legal for loaded firmware Fault = A ladder instruction not supported by firmware was found
Watchdog Trips	0 = Watchdog timer has not tripped since the last power-up x = Number of times watchdog timer has tripped
User Program	Ok = Ladder program and I/O configuration loaded successfully Fault = Ladder program or I/O configuration not loaded or load failed
User Graphics	Ok = Application graphics objects loaded successfully Fault = Application graphics objects not loaded or load failed
Real Time Clock Error	Ok = Time and date have been set Warning = Time and date need to be set

View Diags Diagnostics



This submenu displays the CPU and Memory, I/O Slots, CAN Network and Version to be viewed.

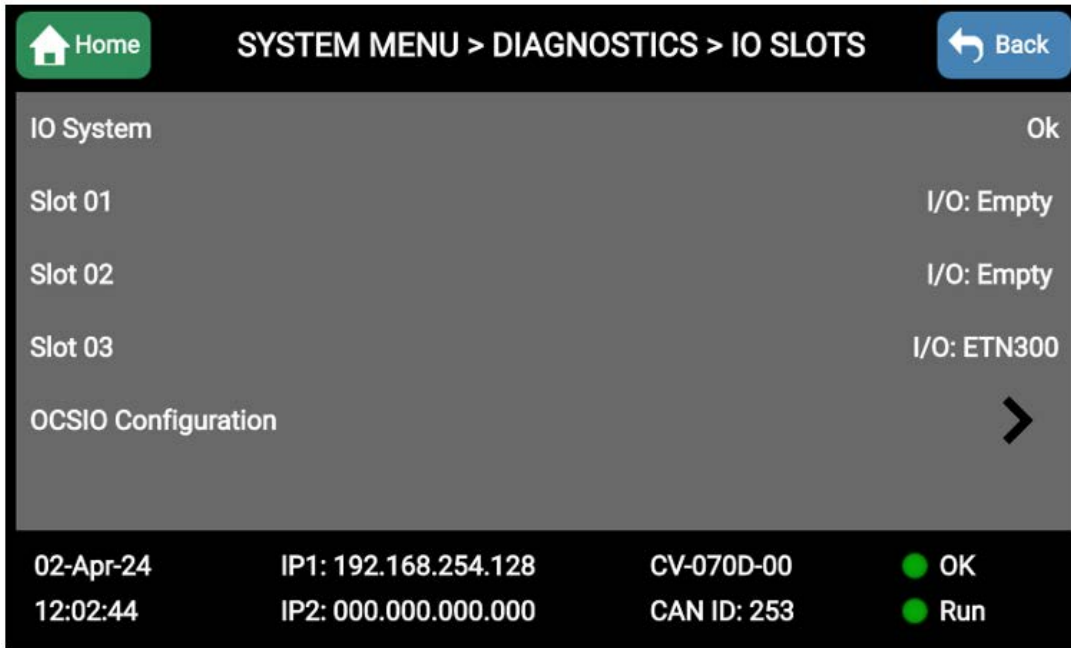
CPU and Memory



Scan Rate (mS)	0.0 = HMI Connect is not in Run Mode 0.1 to 999.9 = Average timefor each ladder scan, in milliseconds (ms)
Internal Memory A	1 to 10% = Internal memory A percent used by this node
Internal Memory B	1 to 10% = Internal memory B percent used by this node
CPU Temperature	x = Displays CPU in degrees Celsius (°C)
Minimum CPU Temperature	x = Displays CPU minimum in degrees Celsius (°C)
Maximum CPU Temperature	x = Displays CPU maximum in degrees Celsius (°C)
RTC Battery Age	x = Displays RTC battery age in years

5.6: View I/O Slots & Protocols

View I/O Slots



I/O System	Ok = I/O configuration matches the installed I/O and COM modules Warning = I/O configuration needs updating to match installed modules
------------	---

The View I/O Slots submenu displays four System Settings, all of which are not editable.

Internal to the OCS, there is a CPU board, and up to two installed modules. Model 0 has no installed I/O or COM modules. All other models have an I/O module and can have a user-installed COM module.

Depending on which I/O module is installed and which I/O module has been configured by Cscope, one of the following six System Settings should appear for Slot 1:

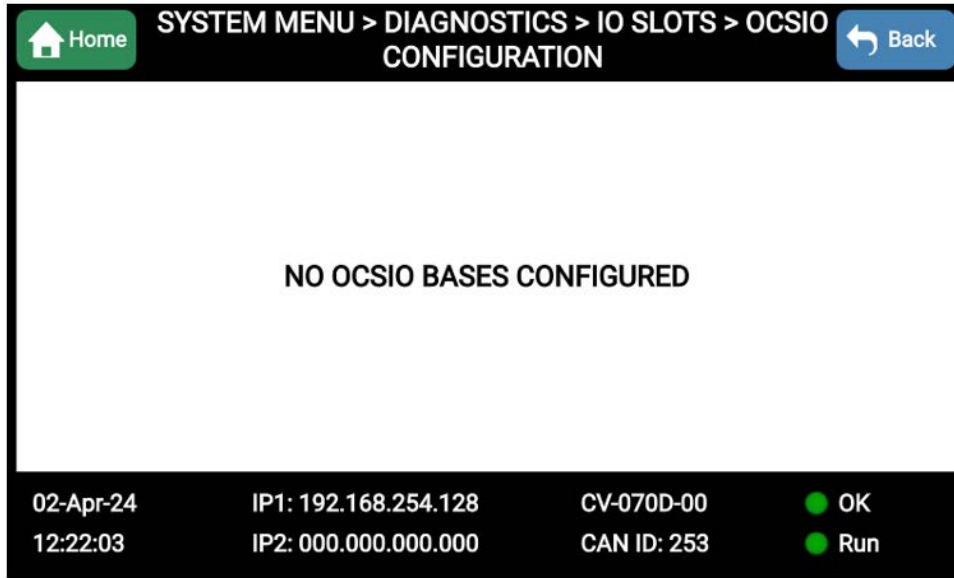
Slot 1: I/O: Empty	= Note I/O module installed or configured
Slot 1: *Unsupported	= Unsupported I/O module installed
Slot 1: -I/O Missing	= No I/O module installed but an I/O module is configured
Slot 1: +I/O: XExyy	= yy I/O module installed but no I/O module is configured
Slot 1: ?I/O: XExyy	= yy I/O module installed but another I/O module is configured
Slot 1: I/O: XExyy	= yy I/O module installed and configured properly

Depending on the COM module that is installed and the COM module that has been configured by Cscope, one of the following six System Settings appears for Slot 2:

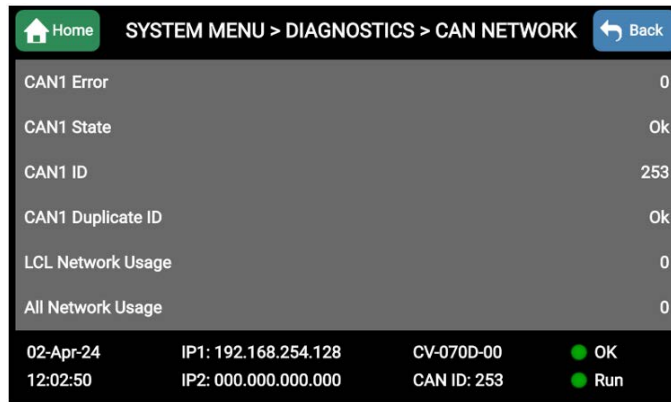
Slot 2: I/O: Empty	= Note COM module installed or configured
Slot 2: *Unsupported	= Unsupported COM module installed
Slot 2: -I/O Missing	= No COM module installed but aCOM module is configured
Slot 2: +I/O: XzC	= z COM module installed but no COM module is configured

Slot 2: ?/O: XzC	= z COM module installed but another COM module is configured
Slot 2: I/O: XzC	= z COM module installed and configured properly
Slot 3: I/O : ETN300	= ETN300 has been configured through Cscape
OCS-I/O Configuration	= OCS-I/O has been configured through Cscape

OCS-I/O Configuration

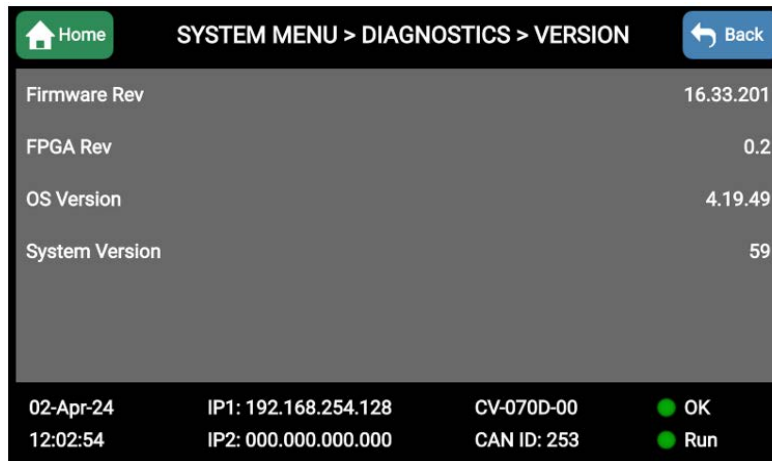


CAN Network



CAN1 Error	0 = No CAN network bus-off errors have occurred x = Number of CAN network bus-off errors that have occurred
CAN1 State	Ok = At least one other node was found on the CAN network Warning = No other nodes were found on the CAN network
CAN1 ID	Ok = This node's CAN Network ID is in the range 1 to 253 Warning = This node's CAN Network ID was out of range at power-up
CAN1 Duplicate ID	Ok = This node's Network ID is unique on the CAN network Warning = This node's Network ID is duplicated in another node
Clock Error	Ok = Time and date have been set Warning = Time and date need to be set
Local Network Usage	0.0 to 100.0 = CAN network bandwidth percent used by this OCS node
All Network Usage	0.0 to 100.0 = CAN network bandwidth percent used by all nodes



Version



Firmware Rev	xx.yy.zz = Current firmware version
FPGA Rev	x.y = Current FPGA version (High Speed IO Sub System)
OS Version	a.bc.yz = Current Operating System version

System Version	xx = Current System version
----------------	-----------------------------

Capacity

 Home
SYSTEM MENU > CAPACITY
 Back

Logic Size	851 B	0.04% Full
I/O Config Size	780 B	0.15% Full
Graphics Size	48079 B	0.01% Full
Protocol Size	24 B	0% Full
SMS File Size	172 B	0.13% Full
Text Table Size	60 B	0.01% Full

02-Apr-24
12:14:37

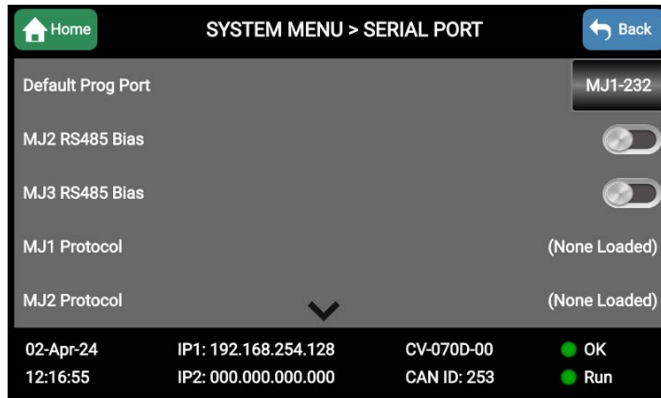
IP1: 192.168.254.128
IP2: 000.000.000.000

CV-070D-00
CAN ID: 253

● OK
● Run

Logic Size	x = Number of bytes in application ladder program
I/O Configuration Size	x = Number of bytes in application I/O configuration
Graphics Size	x = Number of bytes in application graphic screens
Protocol Size	x = Number of bytes in application downloaded protocols
SMS File Size	x = Number of bytes in application SMS protocol configuration
Text Table Size	x = Number of bytes in application text tables

5.6.1 Set Serial Ports



The Set Serial Ports submenu displays three System Settings, all of which are editable & displays three System Settings (View Protocol), none of which are editable.

The Set Serial Ports submenu displays three System Settings, all of which are editable, and one optional item. For the Default Prog Port System setting, only MJ1-232 can be selected.

Default Prog Port	MJ1-232 = MJ1 RS-232 port is the default programming port Modem = Modem COM module is the default programming port
MJ2 RS-485 Bias	No = MJ2 RS-485 bias resistors are not enabled Yes = MJ2 RS-485 bias resistors are enabled

As mentioned in Downloadable Serial Communication Protocols section, both the MJ1 (Port 1), MJ2 (Port 2), & COM serial ports support downloadable protocols. To assign a downloadable protocol to an OCS serial port, select the Protocol Config item in Cscope's Program menu and then setup a protocol for Port 1, Port 2, or COM (or All).

The currently downloaded protocol, if any, and its version number are displayed for both Port 1, Port 2, and COM.

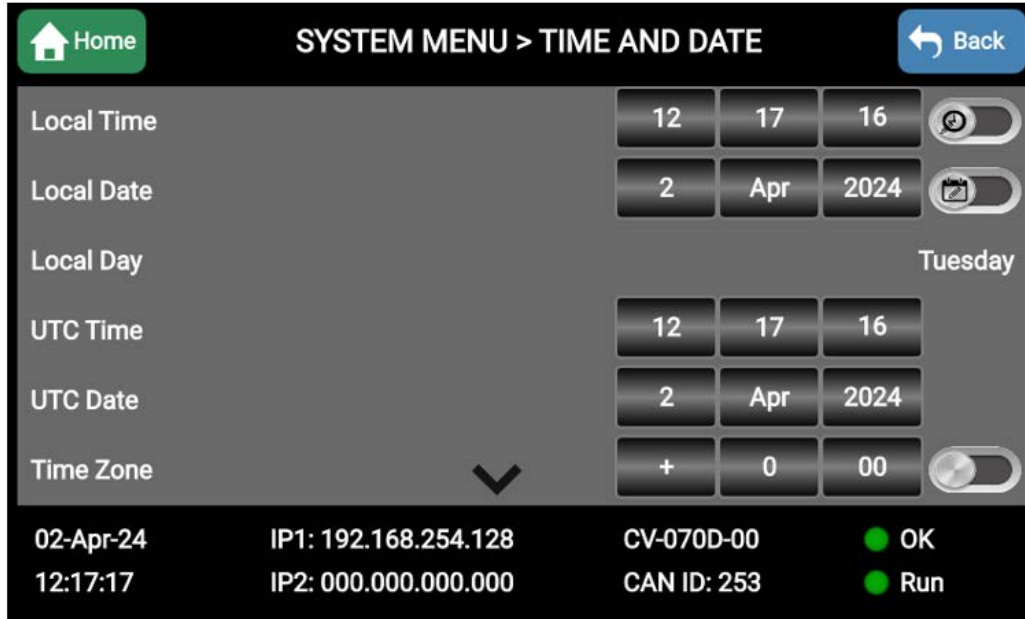
Port 1	
Protocol Name	(None Loaded) or name of the protocol assigned to MJ1
Protocol Version	Blank or version of the protocol assigned to MJ1
Port 2	
Protocol Name	(None Loaded) or name of the protocol assigned to MJ2
Protocol Version	Blank or version of the protocol assigned to MJ2
COM	
Protocol Name	(None Loaded) or name of the protocol assigned to COM
Protocol Version	Blank or version of the protocol assigned to COM

5.6.2 Set Time/Date

The following instructions are to set and display the real-time clock in the controller. More details can be found in the Help File in Cscape.

Clock and Time Setting Terms	
Coordinated Universal Time (UTC)	Abbreviated to UTC, Coordinated Universal Time is the primary time standard by which the world regulates clocks and time.
Time Offset	In order to obtain the local time (anywhere in the world), the user needs to subtract / add a certain number of hours from UTC depending on how many time zones user is away from Greenwich.
Network Time Protocol (NTP)	A Networking Time Protocol (NTP) for clock synchronization between computer systems over packet-switched, variable latency data networks.
Daylight Saving Time	Time as adjusted to achieve longer evening daylight, especially in summer, by setting the clocks an hour ahead of the standard time.
Apply Daylight Saving (DST)	Daylight Saving Time (DST) is the practice of setting the clocks forward one hour from standard time during the summer months, and back again in the fall, in order to make better use of natural daylight. Selecting this option increases the Time offset by 1 hour.

System Registers for UTC (Coordinated Universal Time)	
%SR210 (R/W)	Time Zone: set in hours \pm UTC.
%SR211 (R/W)	Daylight Saving: YES = 1 Daylight Saving: NO = 0 (If daylight saving is enabled, one hour will be added to the local time).
%SR212 (R)	UTC – Seconds
%SR213 (R)	UTC – Minutes
%SR214 (R)	UTC – Hours
%SR215 (R)	UTC – Date
%SR216 (R)	UTC – Month
%SR217 (R)	UTC – Year



To Set Time Zone: The Time Zone setting is an hourly offset from UTC time. If using the Time Zone setting, set it first, then set the local time. UTC time will be automatically set based on the time zone and local time settings.

If using NTP: NTP utilizes UTC time, therefore when using NTP, the appropriate hourly offset from UTC time must be entered into the time zone setting.

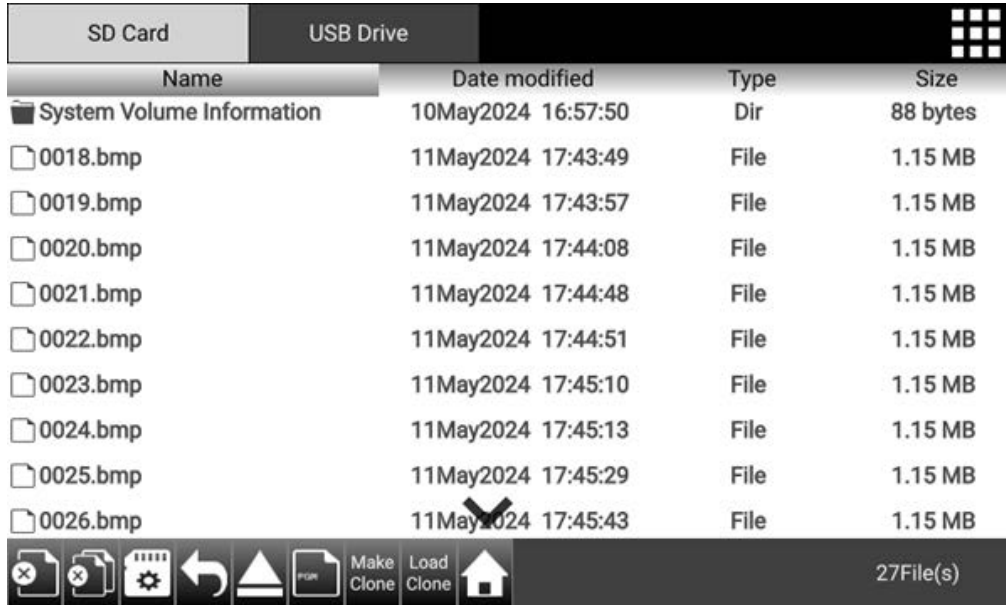
Daylight Saving Time: If currently observing Daylight Saving Time, set to Yes. If not currently observing Daylight Saving Time, set to No. The OCS controller does not automatically switch to daylight saving time; however, program logic can be written to accomplish an automatic switchover using system register %SR211. In program logic, move a "1" (INT) into %SR211 to enable Daylight Saving Time. Move a "0" (INT) into %SR211 to disable Daylight Saving Time. Trigger the move to %SR211 based on a compare function to the RTC date according to daylight saving practices in your desired region.

To Set Local Time: The Set Time/Date submenu displays three system settings. Time and Date may be edited, and Day is automatically calculated from the Date setting.

NOTE: Time and Date are split into three fields each, all of them are editable. Toggle the edit enable buttons of Local Time / Local Date to edit all these three fields.

Time	16:09:49 = Current time (hours:minutes:seconds in 24-hour format)
Date	10-Jun-2013 = Current date (day-month-year)
Day	Monday = Current day of week calculated from the Date setting

5.7: Removable Media

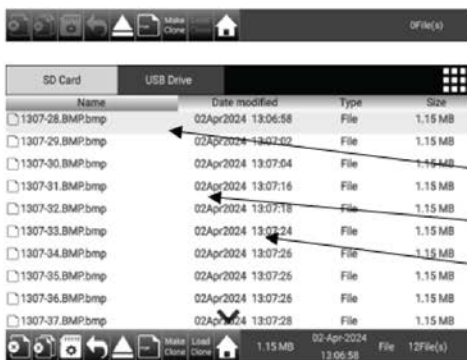


The Removable Media submenu displays the Removable Media Manager. After selecting Removable Media from the Main Menu, one of three submenu screens will appear.



Directory Empty

MicroSD card is installed and initialized, but contains no files.



MicroSD card is installed and it contains files.

Shows size of highlighted file or <DIR> if directory is highlighted.

Shows the date file or directory was created or last modified.

Shows the time file or directory was created or last modified.

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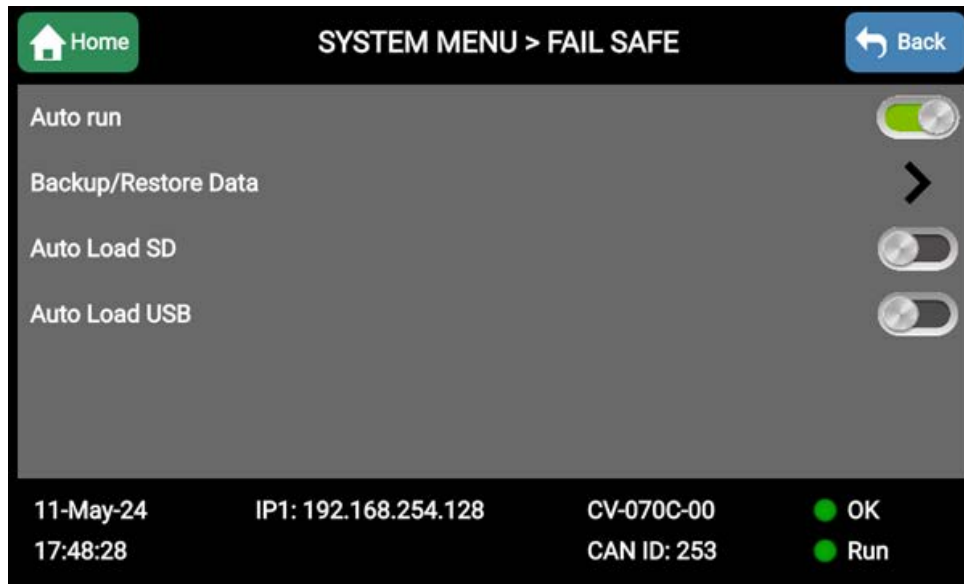
If a directory name is highlighted, touch pressing on the folder will switch to that directory showing its files and sub-directories. In a sub-directory, highlighting.. (dot dot) and pressing Enter will move up one directory.

5.8: Fail – Safe System

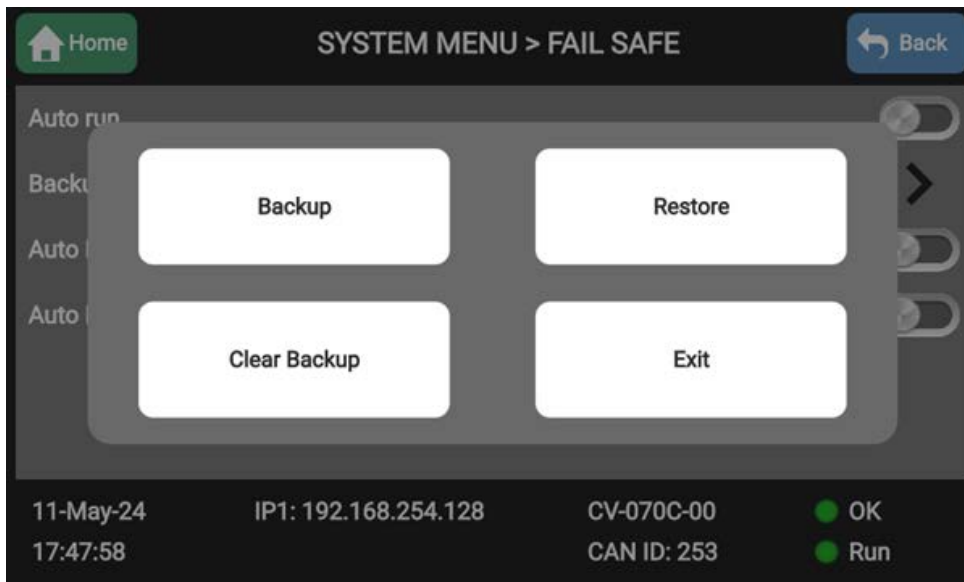
The Fail-Safe System is a set of features that allow an application to continue running in the event of certain types of "soft" failures. These "soft" failures include:

- Battery-Backed Register RAM or Application Flash corruption due to, for example, an excessive EMI, Electromagnetic Interference, event.

Selecting "Fail-Safe System" menu will open the following menu screen:



Selecting Backup/Restore Data displays the following screen in:

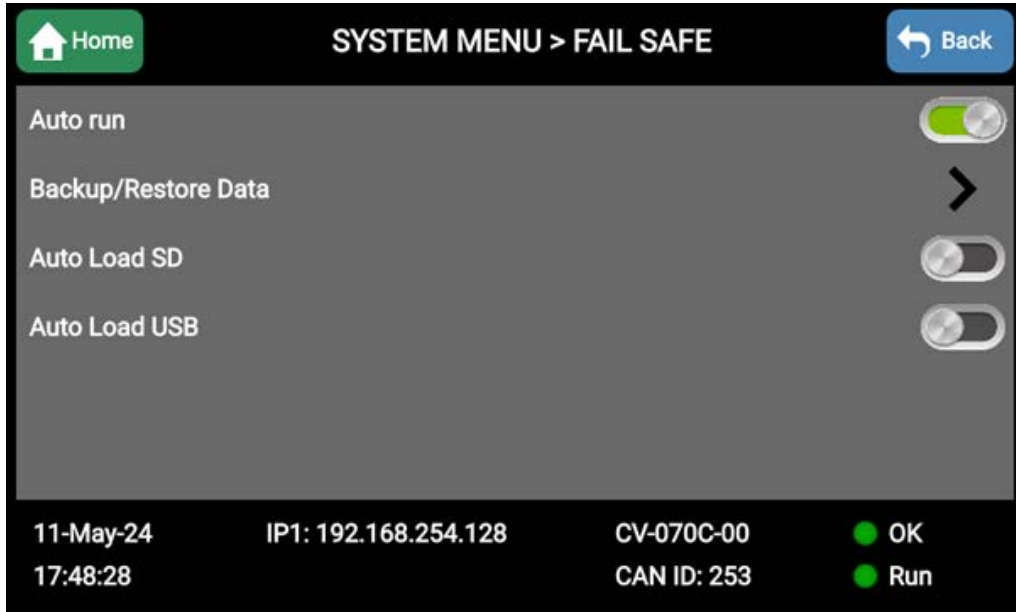


Backup	Copies battery-backed RAM contents on to the onboard flash memory of the OCS.
--------	---

Restore	Copies the backed-up data from onboard flash to the battery-backed RAM.
Clear Backup	The backup data will be erased from the onboard flash.
Exit	Goes back to previous menu

5.8.1 Enable AutoRun

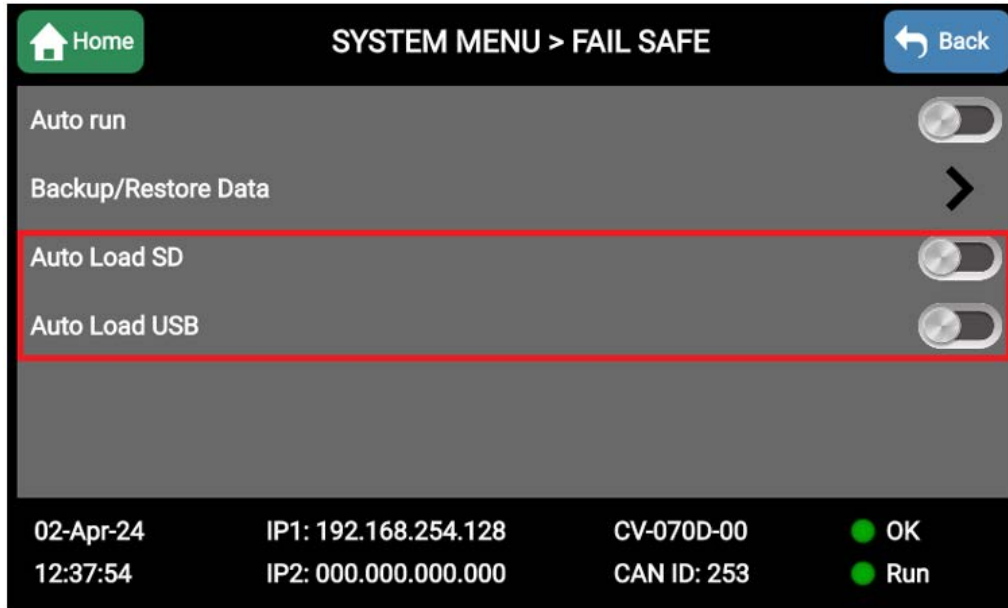
“Enable AutoRun” displays the following options which can be selected:



Enable AutoRun	No = OCS will be in IDLE mode after AutoLoad or Automatic Restore. Yes = OCS will automatically be placed into RUN mode after AutoLoad or Automatic Restore.
----------------	---

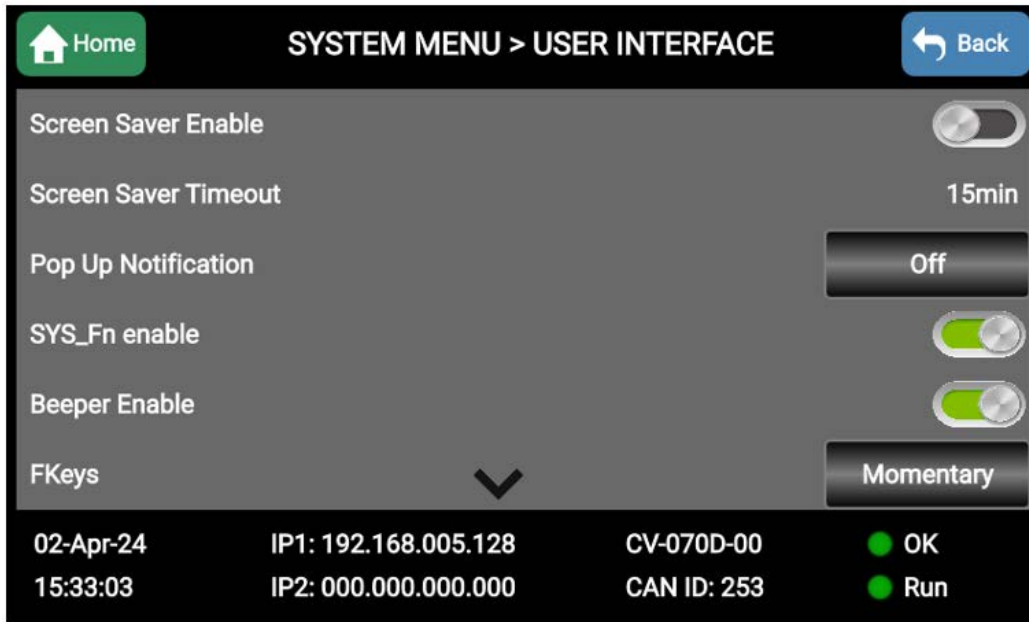
5.8.2 Enable AutoLoad

“Enable AutoLoad” displays the following options which can be selected:



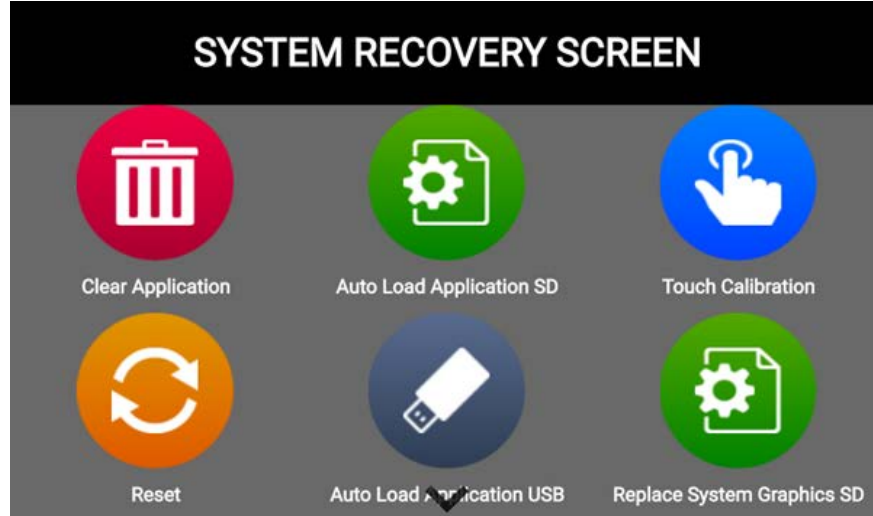
Auto Load SD Auto Load USB	No = Does not load AUTOLOAD.PGM automatically when application program is absent or corrupted. Yes = Loads AUTOLOAD.PGM file automatically from RM (SD card/USB) when application program is absent or corrupted.
-------------------------------	--

5.9: User Interface



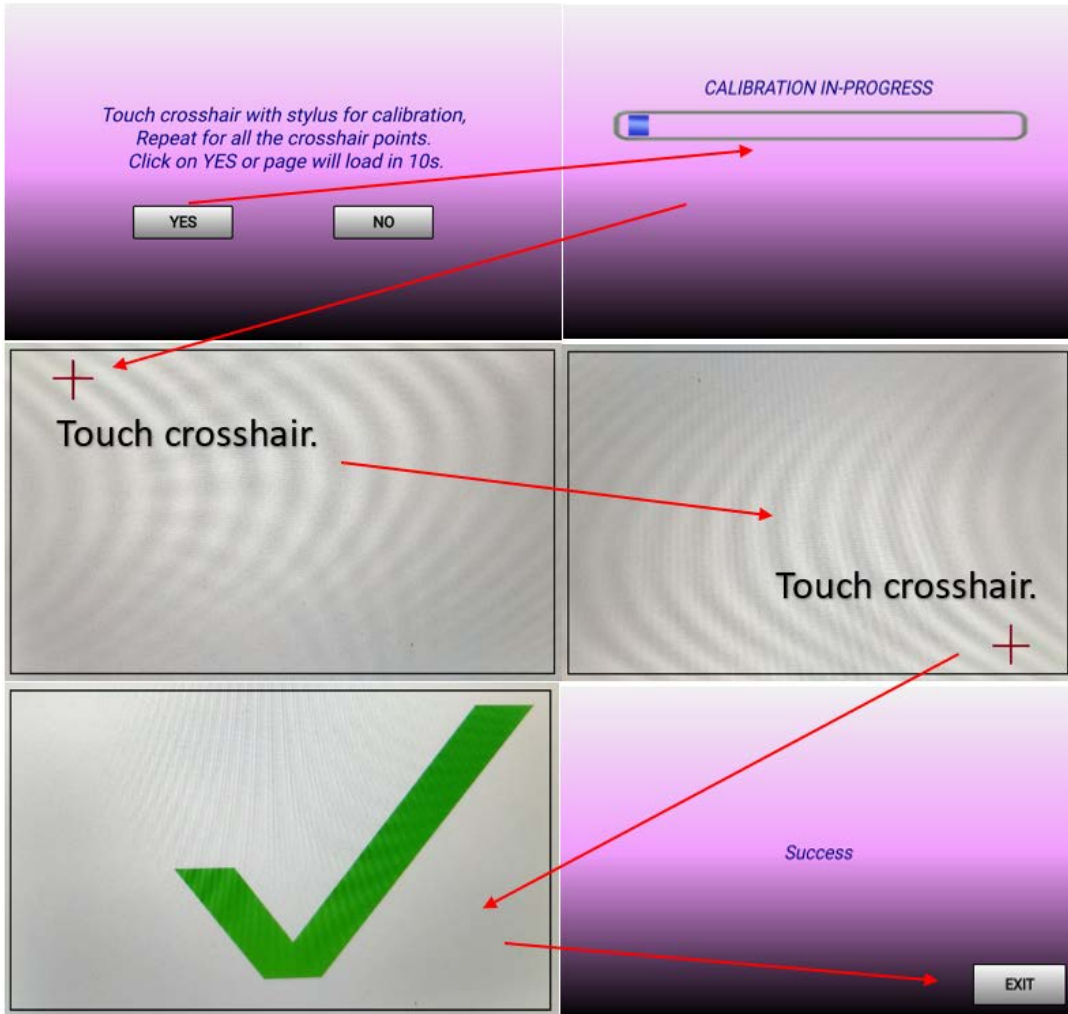
Screen Saver Enable	Yes = Enable screen saver No (default) = Disable screen saver
Screen Saver Timeout	5 - 1200 = Amount of time in minutes to expire with no touch activity before activating screen saver (black screen)
Pop Up Notification	Off (default) = Disable popup status Warning = Display popup status only if controller status changes to NOT Ok or NOT Run mode. On = Display popup status on any controller status change.
System Function Enable	Yes = Reset and all clear system functions enabled No = Reset and all clear system functions disabled
Beeper Enable	Yes (default) = Enables beeper No = Disables beeper (does NOT affect ladder access)
Fkeys	Momentary = %K1-4 bits go On & Off as F1-F4 are pressed & released Toggle = %K1-4 bits toggle each time F1-F4 are pressed

5.10: Touch Screen Calibration



The touch screen is calibrated at the factory and rarely needs modification. However, if actual touch locations do not appear to correspond with responding objects on the display, field adjustment is available. Ensure SYS_fn Enable is set to YES in System Menu. To access the field adjustable touch screen calibration dialog, press and hold both the SYS and F1 key for longer than 2 seconds and a dialog similar to the figure below will appear.

For best results in screen calibration, use a stylus with a plastic tip. When the crosshair appears, touch the center of the crosshair as exactly as possible and release. A small "+" should appear and will move closer to the center of the crosshair. Once it has done so and disappeared again, repeat the process until "+" appears in the center of the crosshair. Then move on to the next step.



OCS-I/O



HG-1372

Chapter 7: OCS-I/O Installation

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7.2: OCS-I/O Installation	7
7.3: Removing an OCS-I/O	7

7.1: OCS-I/O Overview

OCS-I/O is a modular, flexible CsCAN I/O platform that can be applied as a local expansion I/O. The OCS-I/O can be seamlessly integrated with CPU200/250 to build-in even more custom functionality.

OCS-I/O Details

The CPU200/250 can use OCS-I/O modules as local I/O up to 7 modules. Up to 16 racks of OCS-I/O can be added via CAN for asynchronous I/O that is added to the controller.

7.2: OCS-I/O Installation

The OCS-I/O is compact and mounts on DIN-rail. Each I/O module installed adds width in increments of 19mm.

NOTE: The distance between wiring duct and surrounding modules, above and below each module, should be at least 50mm apart.

Modules can be added after the CPU200/250 base has been installed on the DIN-rail and cannot be hot swapped with power applied.

NOTE: I/O scanning will stop until the correct modules for the system are detected in all slots.

1. Connect the bus connectors together to form a backplane that can accept up to 8 modules including the CPU200/250 or another base.
2. Snap the bus connectors into the DIN rail. The DIN rail should be 35 mm × 7.5 mm and made to EN 60715 standards.
3. Place the CPU200/250 to the leftmost connector.
4. Insert OCS-I/O modules by latching at the top of the DIN rail first and rocking down until the latch at the bottom of the DIN rail engages.

7.3: Removing an OCS-I/O

1. To remove a module, insert a flat blade screwdriver through the orange loop and into the metal DIN rail latch at the bottom of the module.
2. Pry down to release the latch, then rock the module up and off the DIN Rail. Modules may be removed while powered; however, the I/O scanning on the remaining modules will stop and I/O will go to the default state until a new module is installed.

Register Mapping



Chapter 8: Register Mapping

8.1: Register Definitions	9
8.2: %S Registers	10
8.3: %SR Registers	10

For I/O Register Maps for individual controllers, refer to the Horner website [Document Search](#) page.

There are two types of System Registers that may be used during programming. %S registers indicate the status of several system operations. %SR registers indicate the state of many system operations and can be used to control them in several cases. Some of the system registers have predefined I/O names, though they may still be changed if desired.

8.1: Register Definitions

When programming the an OCS, data is stored in memory that is segmented into different types. This memory in the controller is referred to as registers. Different groups of registers are defined as either bits or words (16 bits). Multiple registers can usually be used to handle larger storage requirements. For example, 16 single-bit registers can be used to store a word, or two 16-bit registers can be used to store a 32-bit value.

Types of Registers	
%AI = Analog Input	16-bit input registers used to gather analog input data such as voltages, temperatures, and speed settings coming from an attached device.
%AQ = Analog Output	16-bit output registers used to send analog information such a voltages, levels or speed settings to an attached device.
%D = Display Bit	These are digital flags used to control the displaying of screens on a unit which has the ability to display a screen. If the bit is SET, the screen is displayed.
%I = Digital Input	Single-bit input registers. Typically, an external switch is connected to the registers.
%K = Key Bit	Single-bit flags used to give the programmer direct access to any front panel keys appearing on a unit.
%M = Retentive Bit	Retentive single-bit registers.
%Q = Digital Output	Single-bit output registers. Typically, these bits are connected to an actuator, indicator light or other physical outputs.
%R = General Purpose Register	Retentive 16-bit registers.
%S = System Bit	Single-bit bit coils predefined for system use.
%SR = System Register	16-bit registers predefined for system use.
%T = Temporary Bit	Non-retentive single-bit registers.

8.2: %S Registers

%S registers indicate system status as follows:

%S Registers			
S#	Name	Predefined I/O Name	Notes
%S1	First Scan	FST_SCN	On for 1 scan only each time the program is first run
%S2	Network OK	NET_OK	If on, the Network is OK
%S3	10ms pulse	T_10MS	Cycling pulse that is high for 5ms and low for 5ms
%S4	100ms pulse	T_100MS	Cycling pulse that is high for 50ms and low for 50ms
%S5	1 second pulse	T_1SEC	Cycling pulse that is high for 500ms and low for 500ms
%S6	I/O OK	IO_OK	If on, the I/O system is OK
%S7	Always On	ALW_ON	This bit is always on
%S8	Always OFF	ALW_OFF	This bit is always off
%S9	Pause Scan	PAUSING_SCN	On for at least 1 scan prior to Pause 'n Load
%S10	Resume Scan	RESUMED_SCN	On for 1 scan only after Pause 'n Load is done
%S11	Forcing Present	FORCE	If on, I/O is presently being forced
%S12	Forcing Enabled	FORCE_EN	If on, I/O forcing is been enabled
%S13	Net I/O OK	NET_IO_OK	If on, Network I/O is OK

8.3: %SR Registers

%SR registers are special word-length registers that display and/or control system operations in the controller. Not all controllers support all defined system registers.

See the Cscape help file for a complete list of registers.

Serial Communications



Chapter 9: Serial Communications

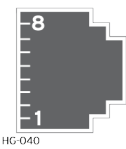
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9.2: Wiring—MJ1/MJ2 Serial Ports	12
9.3: RS-485 Termination and Biasing	13
9.4: Cscope Programming via Serial Port	13
9.5: Ladder-Controlled Serial Communication	13
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All OCS Controller models provide two serial ports, which are implemented with a single 8-position modular jack that is labeled **MJ1/2**. The MJ1 serial port is RS-232 while the MJ2 port is RS-485. MJ1 defaults to OCS programming by connecting it to the COM port of a PC running Cscope. In addition, both MJ1 and MJ2 can be used for application-specific communication, using a variety of standard data exchange protocols.

9.1: Port Descriptions

- The MJ1 serial port contains a RS-232 interface with RTS/CTS handshaking.
- The MJ2 serial port contains half-duplex RS-485 interface with no handshaking. The MJ2 RS-485 interface provides switchable termination and bias resistors internally.

9.2: Wiring—MJ1/MJ2 Serial Ports

	<p>2 Serial Ports on 1 Modular jack (8p8c)</p> <p>MJ1: RS-232 w/Full Handshaking MJ2: RS-485 Half-Duplex - RS-485 termination and biasing via System Register</p>	MJ1 & MJ2 PINS		
		PIN	SIGNAL	DIRECTION
		8	TXD (MJ1)	OUT
		7	RXD (MJ1)	IN
		6	0V	COMMON
		5	+5V @ 60mA	OUT
		4	RTS (MJ1)	OUT
		3	CTS (MJ1)	IN
		2	RX-/TX-/- (MJ2)	IN/OUT
		1	RX+/TX+/- (MJ2)	IN/OUT

9.3: RS-485 Termination and Biasing

Termination - Proper RS-485 termination minimizes reflections and improves reliability.

The MJ2 serial port allows an internal termination resistor to be placed across pins 1 and 2 by software control. Only the two devices physically located at the endpoints of the RS-485 network should be terminated.

This termination is only in place when the OCS Controller is powered on. This would typically only be an issue if the OCS Controller is being used as a slave on the RS-485 network. In that case, the electronic termination should not be used, but a physical external termination resistor should be used instead.

Biasing - RS-485 biasing passively asserts a line-idle state when no device is actively transmitting, which is useful for multi-drop RS-485 networking. The MJ2 serial port allows internal bias resistor to be activated by software control, pulling pin 1 up to 3.3V and pulling pin 2 down to ground.

NOTE: If biasing is used, it should be enabled in only one of the devices attached to the RS-485 network.

Biasing Details:

- %SR152.3 enables RS-485 Port Termination
- %SR164.1 enables RS-485 Port Biasing

9.4: Cscape Programming via Serial Port

MJ1 is the serial port available for programming. The connection is RS-232 and is compatible with the Horner programming cable kits HE-XCK or HE-XCPK. Unlike some other OCS models, the MJ2 port cannot be configured as a programming port. The USB port is also available for programming.

The "Set Serial Ports" option in the OCS System Menu contains an entry for Default Programming Port (Dflt Pgm Port). However, the entry is fixed at MJ1-232. No OCS configuration is required to use either the MJ1 serial port or USB port for programming.

NOTE: Only one Cscape software connection is allowed at a time.

9.5: Ladder-Controlled Serial Communication

Using Serial Communication function blocks, both MJ1 and MJ2 support Generic, Modbus Master and Modbus Slave Protocols. In addition, external modems can be connected and accessed using Init, Dial and Answer Modem function blocks.

9.6: Configuration by USB

NOTE: The unit must be connected via the USB port to the PC or laptop.

It is possible to load the program and monitor data via the USB. To load by USB, configure the communications port in Cscape as follows:

Navigate to: **Home Tab > Controller** and select the **Connection Wizard**.

It is possible to download or upload and use the data monitoring functions once connected.

NOTE: It is advisable to use an isolated USB cable between the PC or laptop and the OCS Controller when third party devices are connected to the OCS Controller to avoid damage to the PC or laptop and/or the OCS Controller.

CAN Communications



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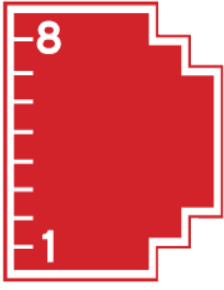
NOTE: For additional CAN information, refer to the CAN Networks manual (**MAN0799**) via [Documentation Search](#) for more details .

10.1: Overview

The CPU300 provides a CAN networking port, which is implemented with an 8-position RJ-45 modular jack. The connector is labeled CAN and is red.



CAN Port Wiring

 <p>HG-042</p>	Modular jack (8p8c)	CAN Pin Assignments	
		PIN	SIGNAL
		8	No Connection
		7	Ground
		6	[CAN] Shield
		5	No Connection
		4	No Connection
		3	Ground
		2	CAN Data Low
		1	CAN Data High

Cscape Programming by CAN

The CAN port supports CsCAN Programming Protocol. If a PC has a CAN interface installed (by PCI card or USB), and the PC CAN port is connected to the CPU300 CAN port, then Cscape can access the CPU300 for programming and monitoring.

In addition, the CPU300 supports single-point-programming of all CPU300 and other Horner controllers that are connected to a CAN network. If the PC COM port is connected to the CPU300 programming port, then the CPU300 can act as a pass-through gateway allowing Cscape to access all CPU300 and Horner controllers that are attached to the CAN network.

Ladder-Controlled CAN Communication

Using Put and Get Network Words function blocks, the CAN port can exchange digital and analog global data with other CPU300, or Horner controllers attached to the CAN network.

In addition, Put and Get Network Heartbeat function blocks allow nodes on the CAN network to regularly announce their presence and to detect the presence (or absence) of other nodes on the network.

Using CAN for I/O Expansion (Network I/O)

Connecting remote I/O to the CPU300 CAN port allows the CPU300 I/O to be economically expanded and distributed. A variety of remote I/O modules is available for this purpose.

CAN and Termination and Bias

If there is a controller-to-controller communication on a network, and a CPU300 will be at either end, then it is recommended that onboard electronic termination NOT be used. Physical external resistors should be used instead. In this case, utilizing RJ-45 to open-style connector will make termination easier.

NOTE: %SR152 enables CAN port termination.

NOTE: When powered down, the biasing and termination is no longer in effect.

Ethernet Communication



Chapter 11: Ethernet Communications

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NOTE: Refer to the Ethernet Supplement (**SUP0740**) on the [Document Search](#) page for more details.

11.1: Ethernet Module Protocols

The following table describes the Ethernet Module Protocols and features supported by the Ethernet port on an OCS controller.

Protocol/Feature	Protocol/Feature Description
ASCII over TCP/IP	ASCII Data over Ethernet
EGD	Ethernet Global Data
Ethernet /IP	ODVA CIP over Ethernet
FTP (File Server)	File Transfer Protocol
ICMP (Ping)	Internet Control Message Protocol
Modbus Slave	Modbus over Ethernet
NTP Protocol	Network Time Protocol

11.2: Ethernet System Requirements

Full Ethernet functionality requires:

- PC running Cscape Programming Software Version 9.8 or later (for configuration).
- OCS controller with onboard Ethernet port.

11.3: Ethernet Module Specifications

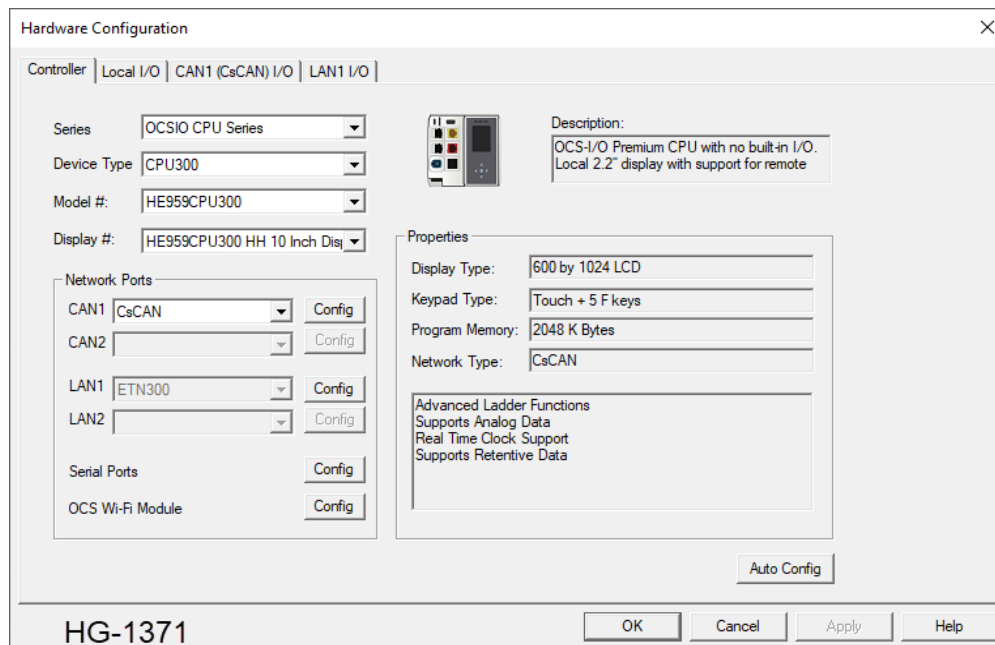
Speeds	10 BASE-T Ethernet (10Mbps), 100BASE-Tx Fast Ethernet (100Mbps)
Modes	Half or Full Duplex
Auto-Negotiation	Both 10/100Mbps and Half/Full Duplex
Connector Type	Shielded RJ-45
Cable Type (Recommended)	CAT5 (or better) UTP
Port	Auto MDI/MDI-X (Auto Crossover)

11.4: Ethernet Module Configuration

NOTE: The following configuration is required for all applications regardless of the protocols used. Additional configuration procedures must be performed for each protocol used.

To configure the Ethernet Module, use Cscape Programming Software to perform the following steps:

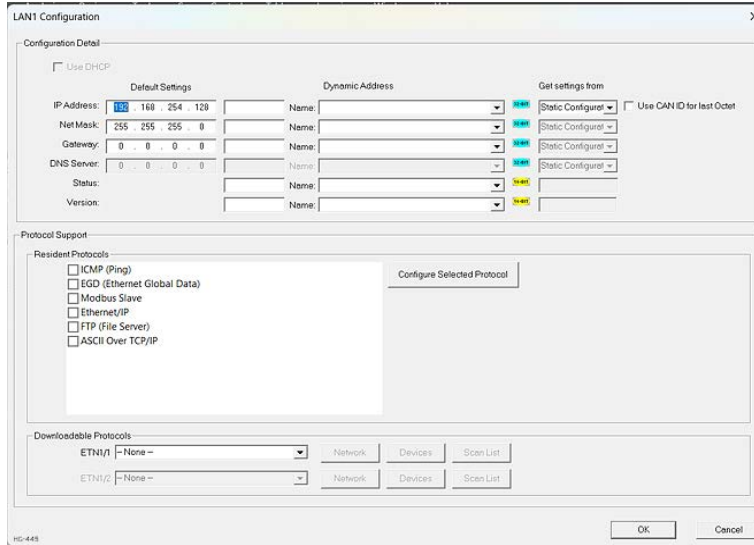
- **Step 1:** On the main Cscape screen, select the **Home Tab > Controller** menu and its **Hardware Configuration** sub-menu to open the Hardware Configuration dialog.
- **Step 2:** If configuring a different OCS Model than the one shown in the **Hardware Configuration** dialog, click on the topmost Config button, select the desired OCS Model, and then click **OK**.
- **Step 3:** Click **Config** to the right of the LAN1 for LAN 1 or LAN2 for LAN 2, revealing the Ethernet Module Configuration dialog.



Configure the following:

- **IP Address:** Enter the static IP Address for the Ethernet Module being configured.

NOTE: IP Addresses are entered as four numbers, each ranging from 0 to 255. These four numbers are called octets, and they are always separated by decimal points. See also: "Ethernet Configuration – IP Parameters" on page 21
- **Net Mask:** Enter the Net Mask (sometimes called Subnet Mask) being used by all nodes on the local network. Typical local networks use Class C IP Addresses, in which case the low octet (rightmost number) is used to uniquely identify each node on the local network. In this case, the default Net Mask value of 255.255.255.0 should be used.
- **Gateway:** Enter the IP Address of a Gateway Server on the local network that allows for communication outside of the local network. To prevent the Ethernet Module from communicating outside the local network, set the Default Gateway IP Address to 0.0.0.0 (the default setting).



- Status Register:** Enter an OCS Register reference (such as %R100) to indicate which 16-bit OCS register will have the Ethernet Status word written to it. The table shows how this register value is formatted and explains the meaning of each bit in the Status Word.

Ethernet Status Word Register Format															
High Byte								Low Byte							
Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
0	0	Dup	Spd	0	Rx	Tx	Link	TCP Connections							
Status Bit		Status Indication										Status Values			
												Minimum	Maximum		
0		Reserved										Always 0			
Dup		Link Duplex (Auto-Negotiated)										0 = Half Duplex	1 = Full Duplex		
Spd		Link Speed (Auto-Negotiated)										0 = 10 Mbps	1 = 100 Mbps		
Rx		Receive State										0 = Inactive	1 = Active		
Tx		Transmit State										0 = Inactive	1 = Active		
Link		Link State										0 = Down	1 = Up		
TCP Connections		Total Number of Active TCP Connections (CsCAN, SRTP, Modbus, Ethernet IP, FTP, HTTP)										0	40		

- Version Register:** Enter an OCS Register reference (such as %R101) to indicate which 16-bit OCS register will have the Ethernet Firmware Version written to it. The value stored in the Version Register is (Ethernet Firmware Version * 100). For example, for Ethernet Firmware Version 4.30, the Version register will contain 430.
- Get Setting From:** “Get settings from” allows the programmer to either configure the IP Address, Net Mask, or Gateway for two functions: Configuration or Register.
- Configuration:** The configuration for the IP Address, Net Mask, Gateway, or DNS Server will be assigned using the value in the Default Settings in this window.
- Register:** The configuration for the IP Address, Net Mask, Gateway, or DNS Server will be assigned using the values in the registers assigned.

11.5: Ethernet Configuration – IP Parameters

For primary operation, the IP address, Net Mask, and Gateway should be set in the LAN config of the **Cscape Hardware Configuration**. There are options to get IP parameters from the LAN Config or to get parameters from registers. The following points on IP parameter configuration should be considered.

IP Parameters in Non-Volatile RAM: The IP parameters of the Cscape LAN Config are written to non-volatile RAM on power down.

“Cscape LAN Config”/“Get Settings from” Configuration: When ‘Get settings from’ is set to Configuration, the IP parameters specified under ‘Static Configuration’ is used after downloading to the controller.

- The IP parameters always follow the values in the registers unless the OCS unit is placed in idle mode. Then the IP parameters can be edited in System Menu/Set Networks. When the OCS is placed back into run mode, it reverts to the registers for IP parameters.

DHCP: When the 'Use DHCP' box is checked, the IP Address, Net Mask, Gateway, and DNS Server are automatically set, obtaining their parameters from the connected server. The parameters obtained by the server are accessible by the addressing assigned under the dynamic configuration.

11.6: Ethernet Module Protocol Configuration

The Protocol Support area contains a list of all the resident protocols supported by the platform being configured. To activate a protocol, check its checkbox.

For protocols that require additional configuration, click on a listed protocol to select it and then click the Configure Selected Protocol button. This will open a new dialog with configuration options for the selected protocol.

NOTE: Refer to the Ethernet Supplement (**SUP0740**) on the [Document Search](#) page for more details.

Downloadable Protocols



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12.1: Overview

Through loadable protocol device drivers, certain models of the OCS family can provide the ability to exchange data with remote devices such as variable-frequency drives, PLCs, and remote I/O devices. This feature greatly expands OCS control capability with negligible effect on OCS ladder scan time.

Remote devices that communicate serially must do so under certain rules of data transfer known as a protocol. Many device manufacturers have created their own protocol for communications with their device. For a OCS to communicate with a specific device, it must be loaded with the corresponding serial communications protocol device driver that supports that protocol.

A limited number of protocol device drivers are packaged with the Cscape distribution; however, as more are developed, they will be made available as add-on packages. A device driver is typically distributed as a Windows module, which contains the configuration menus, help files and the target executable driver code. When updating device drivers, an install routine loads the device driver to the Cscape directory structure and makes that driver available to Cscape applications.

Once installed, the protocol device driver can be included as part of a Cscape application by selecting it from a list of installed protocol device drivers and attaching it to the desired serial port (**Home > Protocols**). Only one protocol device driver can be associated with a serial port, though some OCS models support multiple protocols on a single EtherNet port.

Once the protocol is selected for a specific port, that port must be configured to match the bit transfer size and rate of the target device(s). This is configured under the **Network Config** menu, which contains port specific information such as the basic serial port parameters (i.e. baud rate, stop bits parity, retries, etc.). In addition to the serial port parameters, this menu also contains the transaction scan update control configuration and any network level protocol specific configuration.

Once the network is configured, each device on the serial communications network must be configured. For some communications (i.e. RS-232), the network can be limited to one device. The devices are configured under the **Device Config** menu, which contains an arbitrary device name, the device ID and optionally a OCS status register that contains any device fault information.

Once each device(s) is configured, a Scan List of entries must be created which defines the transfer of data between a local (OCS) register(s) and a remote device register(s). These entries are created under the Data Mapping menu, which contains a OCS register, a target device ID, a target device register address, the number of registers to transfer, and update type.

Each entry can be configured for one of two types of initiating a transaction: **Polled and Triggered**. Polled type entries initiate a transaction with the remote device on every transaction scan. Triggered type entries only initiate a transaction when a corresponding local (OCS) binary trigger register is set. Once a triggered type transaction completes, the protocol device driver resets the local (OCS) binary register to indicate completion.

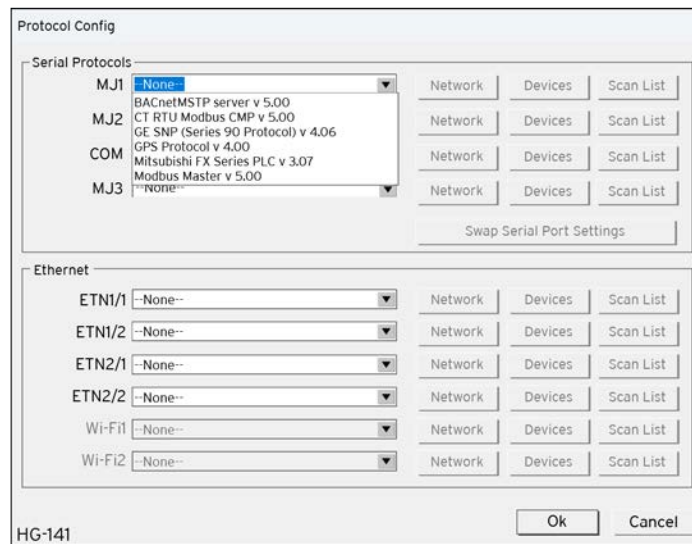
These basic types are also subdivided into read or write operations. For polled operations, a Read operation only reads from a remote device. Likewise a Read/Write operation continuously reads from the remote device unless the target OCS register value changes from one ladder scan to another. In this case, the new OCS value is written to the target device. For triggered operations, only a read or write action is available.

When downloaded to the OCS, the Scan List is scanned sequentially to generate data transactions with the remote device. This transaction scanning can be on a continual basis (**automatic**) or controlled from ladder logic (manual) once a complex connection is created via a program. The specific transaction-scanning mode is selected from the **Network Config** menu.

Refer to the Cscape Help file for more information on Downloadable Protocols Configuration.

12.2: Protocol Device Driver Selection

From the Cscape **Home > Protocols** menu, select the port drop-down box to select a protocol device driver. All protocol device drivers currently loaded in Cscape are displayed in the drop down selection along with their version numbers. A selected protocol can be removed by selecting **None** from the drop-down selection. Some OCS models can be limited in the number of ports or number of protocol device drivers that can be selected. Once a protocol is selected, the Network, Devices and Data (Scan List) must be configured through corresponding dialogues accessible through the respective buttons (Network, Devices and Scan List).

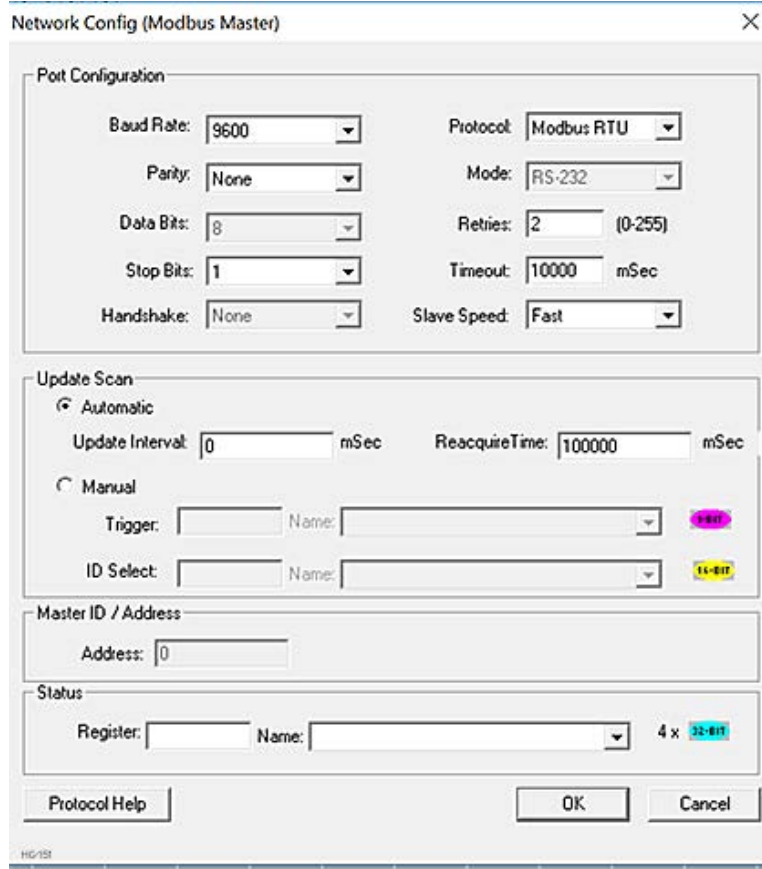


NOTE: If the MJ1 port is to be used in the Protocol Config, it will no longer be available for Cscape programming unless the controller is put into IDLE mode.

Three fields must be configured after a protocol is selected:

1. Network
2. Devices
3. Scan List

12.3: Network Configuration



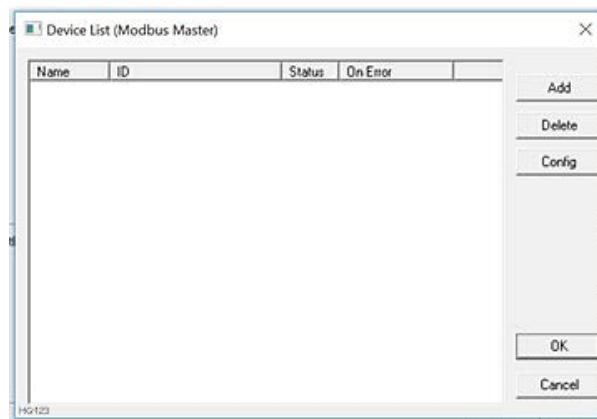
Network Configuration provides the required parameters to configure the network. Each protocol is different and may not require the entire Network Config field. Refer to the table below for the options in the Network Config field.

Network Protocols	
Baud Rate, Data Bits, Stop Bits, Parity	These field define the bit level transfer over the serial port.
Handshake	<p>None – No handshake lines are used</p> <p>Multidrop Full – Rx remains active while Tx is occurring.</p> <p>Multidrop Half – Rx is shut off while Tx is occurring.</p> <p>Radio Modem – Wait for CTS acknowledgment before transmitting (legacy radio modem support).</p>
Protocol	If a driver supports multiple protocols, it is selected here, (i.e., Modbus-TCP/UDP supports RTU or ANSI).
Mode	Specifies if port operates in RS-232 or RS-485 mode.
Retries	Specifies number of times a transaction is retried on a failed response.
Timeout	Specifies the amount of time for a device to wait for a valid response.
Update Scan	<p>Automatic</p> <p>Update Interval – Specifies the update interval at which all the mapped entries are executed.</p> <p>Reacquire Time – Specifies the amount of time to wait before attempting communications with an offline device.</p>
	<p>Manual</p> <p>Trigger – Specifies the binary register that a single transaction scan of the</p>

Network Protocols	
	<p>Scan List.</p> <p>ID Select – If an analog is specified in the field, the ID Select filter is enabled.</p>
Status Register	Specifies the starting OCS register of eight (8) consecutive registers (4-32bit counters), which provide an indication of the network health.
Scanner Address	Specifies the OCS's device (network) ID if a master ID is required by the protocol.
Protocol Help	Provides protocol specific help.

12.4: Device List and Device Configuration

12.4.1: Device List



This configuration list is reached from the Device button on the Protocol Config screen and provides a list of the configured devices on the Network. Devices must be created and exist in this list before corresponding Scan List entries can be created for this device. Typically, the number of entries is limited to **64 devices**.

- **Add** - Opens the Device Config dialog to add a new device to the list.
- **Delete** - Remove selected device from list (all corresponding Scan List entries are also removed).
- **Config** - Invoke the Device Config dialog for the currently selected device. This can also be accomplished by double-clicking a device entry.
- **Mapping** - Invoke the Scan List limiting the entries displayed for the selected device.

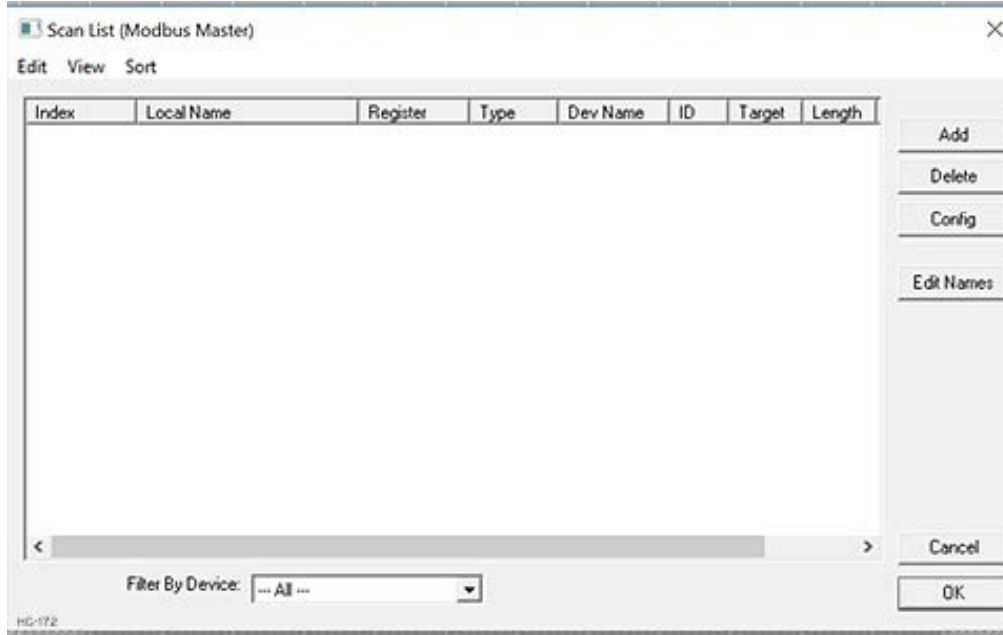
12.4.2: Device Configuration



This configuration is reached from the device list when adding or modifying an existing device. While each protocol is somewhat different and can contain protocol specific field, all protocols typically support at least:

- **Device Name** - Specifies a tag name for this device. This tag name is used in the Data Mapping configuration to identify this device. This allows device addresses to be modified without the need to update all associated Data Mapping entries.
- **Device ID** - Specifies the target device communications ID or station address.
- **Swap Words on 32-bit Data** - If a Scan List entry is configured to transfer 32-bits and this option is checked, the high and low 16-bit values are swapped when transferred between the target and OCS.
- **Disable Device** - From Cscape 9.90 SP3 and firmware 15.40 onwards, disable device feature has been added in protocol device configuration. This option is used to disable a particular slave configured in the network. Single bit register has to be configured to use this function. Setting the bit high disables the slave and OCS will not send any serial (TCP for EtherNet/IP protocols) packets only to this slave until the bit is high. Setting the bit low enables the communication with the slave again.
- **Status Enable** - This checkbox enables device status to be displayed and controlled from two consecutive 16-bit registers.
- **Status Address** - Enter the starting 16-bit OCS register of two consecutive registers used for device status. The first register contains the protocol device driver specific error code while the second register contains the index of the offending Scan List entry.
- **Status Modes:**
 - a. **Stop on Error** - Specifies that communications be only reattempted after offline status when the corresponding device status register is cleared.
 - b. **Retry on Error** - Specifies that communications be reattempted either during the reacquire interval or when the corresponding device status register is cleared.

12.5: Scan List



This configuration list is reached from the Scan List button on the Protocol Config screen or the **Mapping** button on the Device List screen and provides a Scan List of the Data Mapping entries. To transfer data between the OCS and remote target, a Scan List must be created that defines each transaction. Each mapping entry (transaction) contains the source and destination registers, the number of consecutive registers transferred, the direction of the transfer and what triggers the transfer. Typically, **the number of entries is limited to 512**.

NOTE: The order of the Scan List is the order in which the transactions occur. Sort functions are provided to change the order of the list. Each entry also has an identifying index. If the device status register is enabled and a transaction failure occurs, the status register indicates the index number of the transaction that failed.

12.5.1: Menu

- **Edit > Copy All** - Copies Scan List to clipboard in a tab delimited format suitable for pasting into an application like Microsoft Excel.
- **Edit > Paste** - Loads Scan List from clipboard. Pasted items are added to the scan list even if they are duplicates.
- **View > Toggle All Name View** - Expands Scan List such that each point and corresponding local name is displayed.
- **Sort** Scan List by different criteria. The firmware will scan the devices based on the order they are displayed or sorted. There are four ways to sort the scan list:
 - a. **By Local Address** – Sorts the list by local register address in increasing order.
 - b. **By Target Address** – Sorts the list by target register address in increasing order.
 - c. **By Device Name** – Sorts by device name, then target address.
 - d. **Interleave Devices** – This sort evenly distributes request among the different devices. Instead of requesting 100 blocks from device A, then 100 blocks from device B, one requests is sent to device A, then one request is sent to device B until all the data has been requested. This is useful for devices that may have a timeout timer because the time between each scan for a particular device is minimized. This sorting options usually doesn't affect performance.

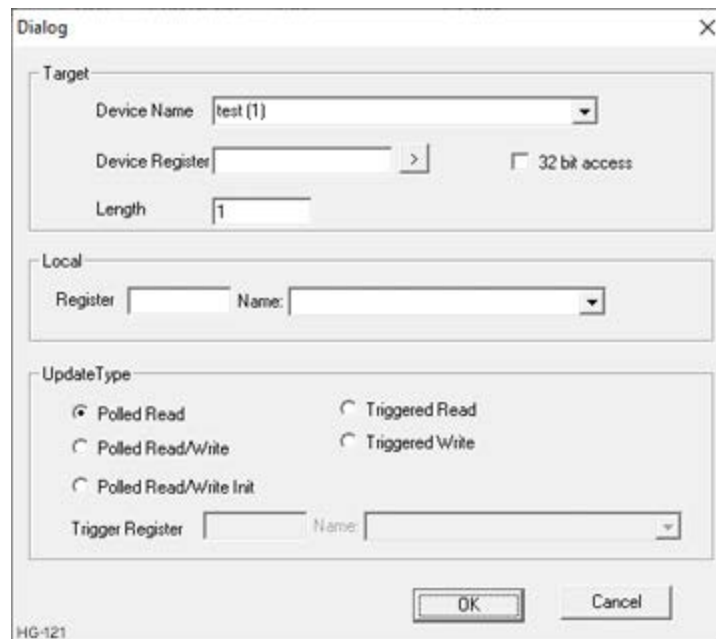
12.5.2: Buttons

- **Add** - Opens the Data Mapping dialog to add a new entry to the Scan List.
- **Delete** - Removes selected entry from Scan List
- **Config** - Opens the Data Mapping dialog for the currently selected entry. This can also be accomplished by double-clicking an entry.
- **Edit Names** - Invokes the Edit Names dialog for the currently selected entry. The Edit Names dialog provides the ability to create OCS program names for each point in the transaction.

12.5.3: Display Control

Filter by Device - Limits displayed entries to only those assigned to the indicated device. To show all entries select **-All-**.

12.5.4: Data Mapping Configuration (Scan List Entry)



Target

- **Device Name** - Selects the target device (by tag name) to use for this transaction. Only those device entries previously created from the Device Config menu are available.
- **Device Register** - Specifies the target device's register to use for this transaction. This designation is target-specific. The configuration menu displays an error if a specified address is unacceptable. **Generally, the data type of the local (OCS) register must match the data type of the device register.**
- **The Right Arrow button** - Displays protocol device driver specific help for the target addressing. Note that some devices can require register addresses that exist on 8-bit, 16-bit or 32-bit boundaries.
- **Local Register** - Specifies the local (OCS) register that is the source or destination for the transaction.
- **Local Name [Optional]** - Optionally allows selection of a OCS register by name <or> creation of a name for a register already selected by direct reference. Created names can be used thereafter to specify the local (OCS) register in ladder or graphics address fields.
- **32-Bit Access** - Allows two local (OCS) 16-bit registers to be treated as a single 32-bit value. For example, if the value in either 16-bit register is modified, both registers are written to the device. Device-specific, 32-bit word swapping options also apply to this designation. Since the transaction is treated as a 32-bit access, the length is generally limited to 16. Note that some protocols can disable this feature.

- **Length**
 - a. Specifies the number of consecutive device registers that are transferred in this transaction. Note that some protocols can limit the length that can be transferred. However, typically the **length is limited to 32**. The configuration menu displays an error if a specified length is unacceptable.
 - b. **If allowed, specifying a length greater than one (multiple consecutive register transfers per transaction) is more efficient than creating a single transaction for each register.** This grouping of registers per transaction can significantly reduce the transaction scan time; however, **update types that include writing on a polled basis require additional consideration.**
 - c. On **Read/Write** and **Read/Write/Init** update types, the write transaction only occurs when the local (OCS) register value changes. If the length is greater than 1 for Read/Write and Read/Write/Init types, only the local register(s) that change in value are written. More specifically, only one write transaction occurs per scan per mapping entry for the register or consecutive sub-group of local registers that changed in value. Depending on the protocol, the number of points written with that write transaction are limited either to one or the number of consecutive points that changed value.
 - d. **Therefore, if several local registers (specified in a single mapping entry) change in value prior to a transaction scan, it takes SEVERAL transaction scans to complete all the write operations. Furthermore, all write operations are completed before a read operation is scheduled.**
 - e. **For Manual Update (transaction) scans (i.e. dialup modem), it is recommended that all Read/Write Scan List entry lengths be limited to 1.**

Update Type

This field specifies the direction and what triggers the transfer of data between the OCS and target device for a mapping entry.

- **Polled Read** - On every transaction scan, a read-only target device register(s) transaction occurs.
- **Polled Read/Write**
 - a. On every transaction scan, a read target device register transaction occurs unless a local register value has changed. The write transaction only updates those local registers that have changed in value. If several non-consecutive local registers (contained in a single mapping entry) change value between transaction scans, it takes several consecutive transaction scans to write each changed register.
 - b. When the OCS is placed in RUN mode, **the initial action for this mapping type is a read target register transaction.** This transaction initializes the local (OCS) register(s) to match that of the remote device register(s). Thereafter, any change to the corresponding OCS register(s) triggers a write operation to the remote device.
- **Polled Read/Write/Init**
 - a. On every transaction scan, a read target device register transaction occurs unless a local register value has changed. The write transaction only updates those local registers that have changed in value. If several non-consecutive local registers (contained in a single mapping entry) change value between transaction scans, it takes several consecutive scans to write each changed register.
 - b. On every transaction scan, a read target device register transaction occurs unless a local register value has changed. The write transaction only updates those local registers that have changed in value. If several non-consecutive local registers (contained in a single mapping entry) change value between transaction scans, it takes several consecutive scans to write each changed register.
 - c. When the OCS is placed in RUN mode, **the initial action for this mapping type is a write target register transaction.** This transaction initializes the target device register(s) to match that of the local (OCS) register (s). Thereafter, any change to the corresponding OCS register(s) triggers a write operation to the remote device.
 - d. The initial write transaction does not occur until after the first logic scan of the OCS . This allows registers to be initialized locally before Writing to the target device register(s).
- **Triggered Read** - A read transaction is triggered by a high level on a separately designated OCS (binary) trigger register. Once the read transaction is complete (or the device is offline), the OCS trigger register is cleared by the OCS . This update type can be used for occasional data accesses such as retrieving trend data. Note that this operation increases the associated transaction scan time and can cause the **Update Interval Exceeded Counter** to increment on a tightly adjusted update interval.

- **Triggered Write** - A write transaction is triggered by a high level on a separately designated OCS (binary) trigger register. Once the write transaction is complete (or the device is offline) the OCS trigger register is cleared by OCS . This function can be used for occasional data accesses such as sending recipe data. Note that this operation increases the associated transaction scan time and can cause the **Update Interval Time Exceeded Counter** to increment on a tightly adjusted update interval.

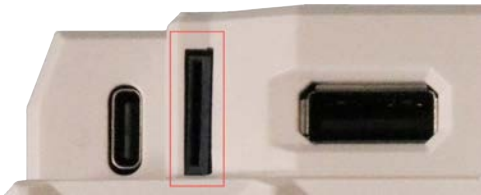
Removable Media



Chapter 13: Removable Media

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All Horner controllers models provide a Removable Media slot, which supports standard microSD flash memory cards. microSD cards can be used to save and load applications, and to log data for later retrieval.



13.1: microSD Cards

MicroSD cards (Memory Cards) with up to 32GB of flash memory, are compatible with the Horner controller Memory Card slot. A microSD card can be safely inserted into the Memory Card slot whether the Horner controller power is On or Off.

Installing the microSD Card

To Install a microSD card: align the gold edge connector toward the switch and carefully push it all the way into the slot. To remove, gently pull up on the card.

13.1.1: microSD File System

The microSD Memory Card slot uses the PC-compatible FAT32 File System. This means that a PC, with a microSD-compatible card reader, can read files that have been written by the Horner controller and can write files that can be read by the Horner controller.

However, the Horner controller does not support long filenames, but instead implements the 8.3 filename format. This means that all file and directory names must consist of up to eight (8) characters, followed by an optional dot, and an optional extension with up to three (3) characters.

Directories and sub-directories can be nested up to 16 levels deep as long as each path name string does not exceed 147 characters.

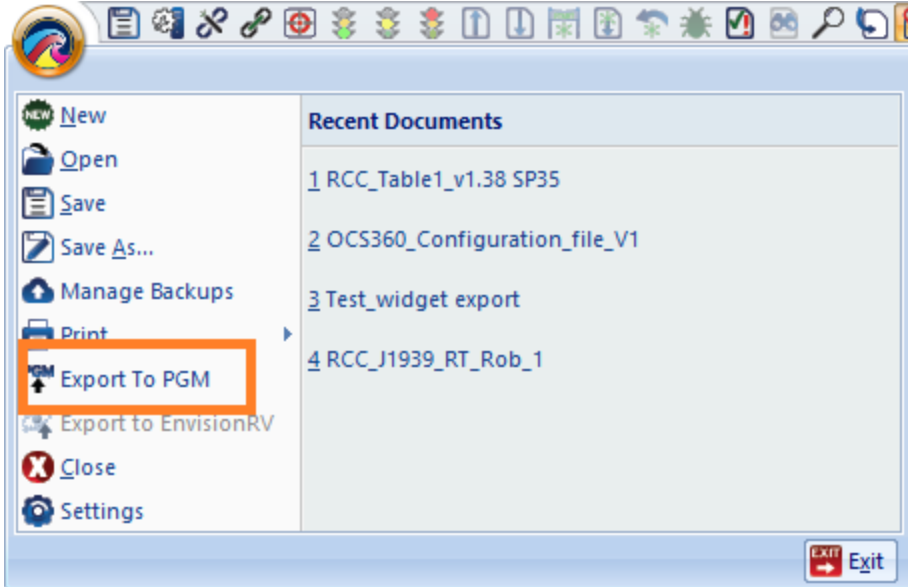
13.2: Log Data

Using Read and Write Removable Media function blocks, an application ladder program can read and write Horner controller register data in the form of comma-delimited files, with a .csv extension. These files are compatible with standard database and spreadsheet PC programs. In addition, an application ladder program can use Rename and Delete Removable Media function blocks to rename and delete files.

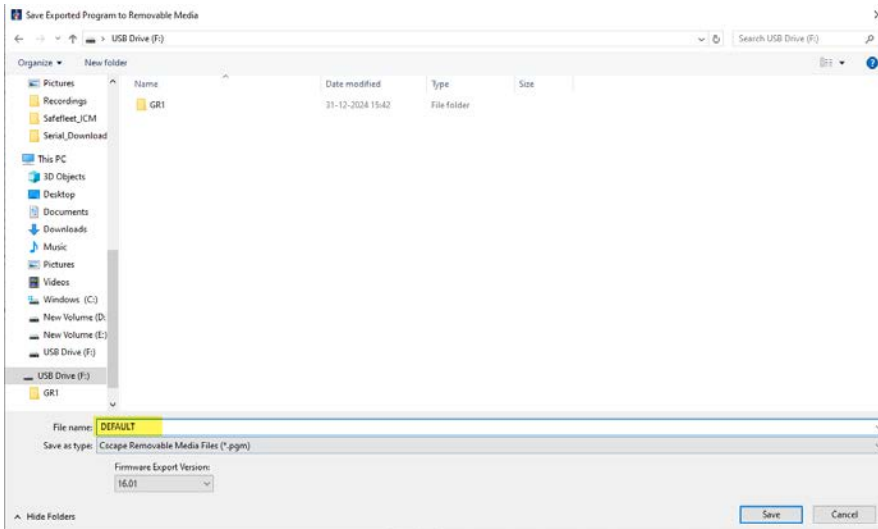
13.3: Loading Program from microSD Card Using Switch

Use the following steps to load a program from microSD card:

1. Copy the .PGM file from Cscape using the **Export To PGM** option.



2. Select the correct Firmware Export Version.
3. Rename the file to **DEFAULT.PGM**.



4. Copy DEFAULT.PGM to root of a MicroSD Card.

13.4: Clear Application Using the Switch

To clear an application, do the following:

1. Press and hold the right navigation key for a few seconds, then release. The System Recovery screen will appear.
2. Scroll down and select Clear application. A warning message will appear
3. Press Enter to confirm the warning message. The device will clear the application and will restart automatically.

13.5: Function Blocks in Cscape

NOTE: For detailed information regarding RM function blocks and parameters, refer to the Help File in Cscape Software. Refer to 'USB flash Media support for RM Functions' for USB flash drive access details.

The following RM functional blocks are available in Cscape Software. These function blocks will reference:

- a. microSD when filename is prefixed with 'A:' or nothing
- b. USB A flash drive when filename is prefixed with 'B:'

Read RM csv	Allows reading of a comma-separated value file from the microSD interface into the controller register space.
Write RM csv	Allows writing of a comma-separated value file to the microSD interface from the controller register space.
Rename RM csv	Allows renaming a file on the RM card. The data in the file is not changed.
Delete RM csv	Allows deleting a file on the RM card
Copy RM csv	Allows copying a file on the RM card. The data in the file is not changed.

13.5.1: Program Features

- a. **Datalog Configuration** - This feature allows the controller to periodically log register values to Removable Media. The register data is stored in .csv (comma separated value) format, which is compatible with 3rd party PC applications, such as Microsoft Excel.
- b. **Report Editor** - This feature allows the OCS to be configured to generate text printouts which incorporate data from the registers embedded in the text. The reports can be printed using a serial interface printer through any of the serial ports of the OCS or can be saved on the removable media of the device.
- c. **Recipes Editor** - Recipes allow the user to send or update multiple registers simultaneously.

13.6: Filenames

The RM function blocks support the flash with a Windows standard FAT-16 file system. All names must be limited to the "8.3" format where the filename contains eight characters a period then a three-character extension.

The entire filename including any path must be less than or equal to 147 characters.

When creating filenames and directories, it is sometimes desirable to include parts of the current date or time. There are six special symbols that can be entered into a filename that are replaced by the OCS with current time and date information.

Filename Special Symbols		
Symbol	Description	Example

Filename Special Symbols		
\$Y	Substitutes the current 2-digit year	2015 = 15
\$M	Substitutes the current month with a 2-digit code	March = 03
\$D	Substitutes the current day	22nd = 22
\$h	Substitutes the current hour in 24-hour format	5 pm = 17
\$m	Substitutes the current minute	45 = 45
\$s	Substitutes the current second	34 = 34

NOTE: All the symbols start with the dollar sign (\$) character. Date symbols are in upper case, time symbols are in lower case.

The following are examples of the substituted time/date filenames:

Current date and time: March 1, 2015 5:45:34 PM

Filename: Data\$M\$D.csv = Data0301.csv

Filename: Year\$Y\Month\$M\aa\$D_\$h.csv = Year15\Month03\aa01_17.csv

Filename: Month_\$M\Day_\$D\\$h_\$m_\$s.csv = Month_03\Day_01\17_45_34.csv

13.7: System Registers and Removable Media

%SR174 – Removable Media Protect. Write a one (1) to %SR174 to prohibit read/write access to the removable media card. Write a zero (0) to allow access.

%SR175 Status – This shows the current status of the RM interface.

%SR176 Free Space – This 32-bit register shows the free space on the RM card in bytes.

%SR178 Card Capacity – This 32-bit register shows the total card capacity in kilobytes.

Possible status values are shown in the table:

RM Status Values	
0	RM interface OK
1	Card present but unknown format
2	No card in slot
3	Card present, but not supported
4	Card swapped before operation was complete
5	Unknown error

Clone Unit



Chapter 14: Clone Unit

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"Clone Unit" feature allows the user to "clone" the OCS of the exact same model. This feature "clones" application program and unit settings stored in the following:

- Prime Series: retentive memory
- Non-Prime controllers: battery-backed RAM/register/variable memory of an OCS into the RM

This feature can be used for:

- Replacing an OCS by another unit of the same model.
- Duplicating or "clone" units without a PC.

14.1: Make Clone

Make/Create clone can be triggered by setting %SR164.9 bit to "1" from the Ladder program or graphics. When the operation is completed, this bit is made zero by the firmware. When the Make Clone operation is triggered by this SR bit, it does not ask the user for confirmation for making clone.

In case of failure, %SR164.11 bit is set to "1" by the firmware and never reset.

NOTE: Backup of registers in flash memory is not performed by Clone Feature. Refer to "Fail-Safe System" on page 40.

14.2: Load Clone

Load Clone can also be triggered by setting %SR164.10 bit to "1" from the Ladder program. When the operation is completed, this bit is made zero by the firmware. When the Load Clone operation is triggered by this SR bit, it does not ask the user for confirmation for loading clone.

In case of failure, %SR164.12 bit is set to "1" by the firmware and never reset.

Fail-Safe System



Chapter 15: Fail-Safe System

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15.1: Fail-Safe Features

The Fail-Safe System is a set of features that allow an application to continue running in the event of certain types of "soft" failures. These "soft" failures include:

- Retentive Register or Application flash corruption due to, for example, an excessive EMI, Electromagnetic Interference, event.
- Battery-Backed Register RAM or Application flash corruption due to, for example, an excessive EMI, Electromagnetic Interference, event.

15.2: Fail-Safe System Overview

The Fail-Safe System has the following capabilities:

- Manually backup the current retentive register settings into flash memory.
- Manually restore register settings from the values previously backed up in flash memory to retentive registers.
- Detect corrupted register settings at power-up and then automatically restore them from flash.
- Detect corrupted or empty application in flash memory at power-up and then automatically load the AUTOLOAD.PGM application file from Removable Media (Compact flash or microSD).
- If an automatic Register Restore or Application Load occurs, the OCS can automatically be placed in RUN mode.

15.3: Settings

To use the Fail-Safe feature, the following steps are required:

1. From Cscape, create AUTOLOAD.PGM for the application program using **Export to Removable Media**.
2. Place the Removable Media with AUTOLOAD.PGM in the device.
3. Set the **Enable AutoLoad** option by setting HIGH %SF164.6.
4. Enable the AUTORUN option by making High %SR164.5. if the controller needs to be placed in RUN mode automatically after automatic restore of data or AutoLoad operation.
5. Backup the current primary memory register contents in the onboard flash memory.

15.3.1: Backup OCS Data

When initiated, the user can manually copy register contents onto the an alternate section of onboard flash memory of the OCS. This will have result in backing up all the registers and controller settings (Network ID, etc.) that would otherwise be lost due to a memory failure. %SR164.4 is set to 1 when backup operation is performed.

15.3.2: Restore OCS Data

Automatic Restore Operation

When initiated, the user can copy the backed-up data from the onboard flash to the battery-backed RAM.

A restore operation is automatically initiated if 1) a backup has been previously created and 2) on power-up the battery-backed RAM registers fail their check.

The following process will be followed for restoring data:

- The controller will be placed in IDLE mode.
- Data will be copied from onboard flash memory to OCS battery-backed RAM •
- The controller will reset.
- The controller will be put in RUN mode if the AutoRun setting is 'Yes', or else it will remain in IDLE mode.

%SR164.3 is set to 1 when an automatic restore operation is performed. This bit is reset to the value of "0" when a new backup is created.

Manual Restore Operation

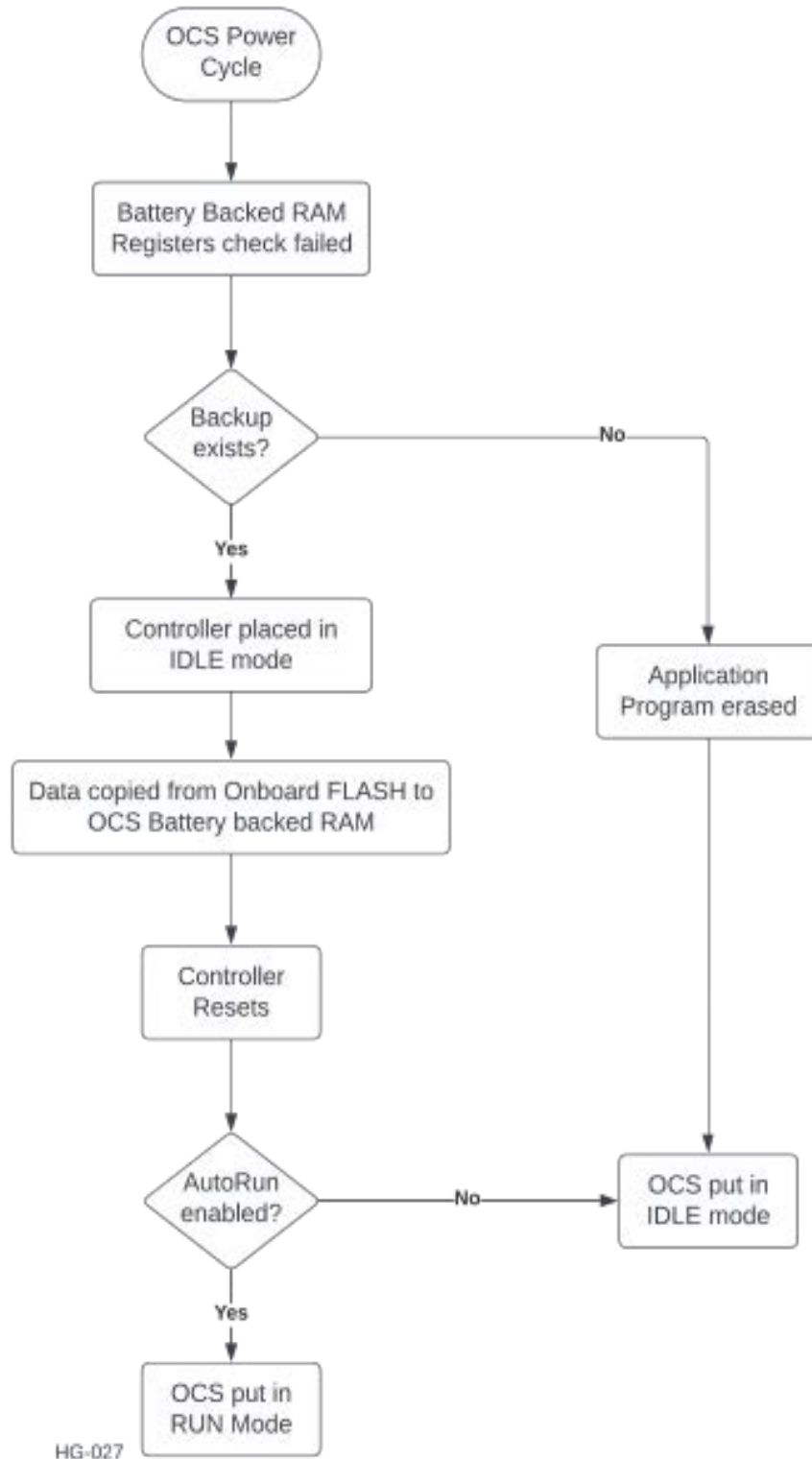
- Restoring of data can be manually performed by setting %SR164.14 to 1, this in turn sets %SR164.15 to 1.
- The user needs to set %SR164.15 to 0 complete the restore operation or set %SR164.14 to 0 to abort

%SR164.3 is set to 1 only when an automatic restore operation is performed, not on a manual one. This bit is reset to the value of "0" when a new backup is created.

15.4: Clear Backup Data

When initiated, the backup data will be erased from the onboard flash and no backup will exist. %SR164.4 and %SR164.3 are reset to 0 when backed-up data is erased.

The OCS follows the following sequence in execution of Automatic Restore:



15.5: AutoLoad

This option allows the user to specify whether the OCS automatically loads the application AUTOLOAD.PGM located in Removable Media.

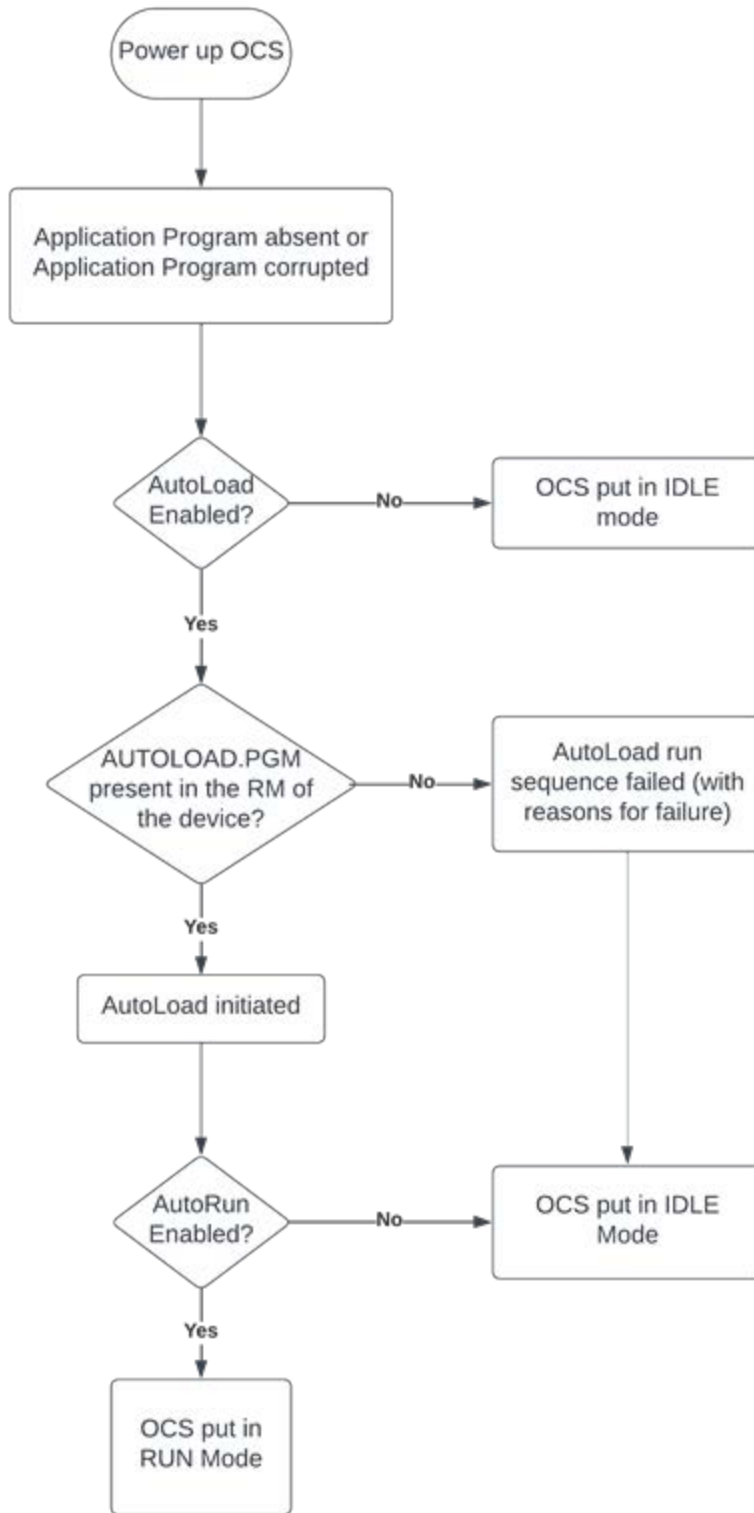
When the AutoLoad setting is enabled (%SR164.6=1), it can be automatically initiated at power-up.

The automatic initiation will happen only in the following two cases:

- When there is no application program in the OCS and a valid AUTOLOAD.PGM is available in the removable media of the device.
- When the program residing in onboard memory is corrupted and a valid AUTOLOAD.PGM is available in the removable media of the device.

When the AutoLoad setting is not enabled (%SR164.6=0), OCS will be in IDLE mode and the application is not loaded. %SR164.6 can be set to enable AutoLoad feature.

The OCS follows the following sequence in execution of AutoLoad:



HG-026

15.6: AutoRun

This option, when enabled (%SR164.5=1), allows the user to automatically place the OCS into RUN mode after the AutoLoad operation or automatic Restore Data operation. When the AutoRun setting is disabled (NO), the OCS remains in the IDLE mode after a Restore Data or AutoLoad operation. %SR164.5 can be set for putting the system into RUN mode automatically, once an AutoLoad has been performed or an Automatic Restore has occurred.

Modbus-TCP/UDP Communications



Chapter 16: Modbus Communications

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For complete Modbus instructions, see the Help file in Cscape.

Modbus (serial) is a popular, de-facto standard protocol that allows industrial devices from multiple manufacturers to easily share data in real-time. For Modbus serial communications, the OCS controller can act as either a Master or a Slave.

Modbus protocol (serial) allows for one master and multiple slaves. The master always initiates the conversation by sending a request to a particular slave. Only the addressed slave will send a response when the request is completed. Should the slave be unable to complete the request, it returns the appropriate error response. Should the slave be unable to respond, the master's timeout timer expires to provide an indication of No Response.

16.1: Modbus Slave Overview

The Modbus slave function block, when used with the appropriate Modem and/or Open Function Blocks, allows the primary serial port on the controller to act as a Modbus slave. The Modbus function supports both ASCII and RTU modes of operation across a range of baud rates and protocol frames. Also supported is port activity status, an inactivity timer, support for call-on exception, and support for store and forward (repeater) operation for radio modems.

The Modbus Addressing section describes the supported Modbus Commands as well as the Modbus Map for OCS controller references (%R, %M, etc.).

16.2: Modbus Master Overview

For complete Modbus Master instructions, please refer to the Help file in Cscape.

When acting as a Modbus master, there are two primary mechanisms used by the OCS controller to allow the user to specify the data to be read/written from/to the slaves.

Modbus Master Function Block—This is for serial only. This is an advanced feature that should only be used in rare occasions.

Protocol Config—The Protocol Config is configured in the Hardware Configuration dialog box in Cscape (serial). Refer to the Modbus Addressing section. This is the preferred method in most applications.

After the protocol has been selected from the dropdown menu, the Network, Devices, and Scan List become available. The Protocol Config is configured on three different levels:

- **Network**—Parameters, such as the polling rate of the data scan, are specified along with timeout values, retry, and re-acquisition settings. Serial configuration, baud rate, parity, etc. are also set here.
- **Devices**—For every slave to be polled, configuration details are added in the Devices dialog box. This includes Slave ID (serial). Under Device Type, the Modbus addressing style matching that specified in the slave's user documentation may be selected. For instance, some slaves specify Modbus addresses (i.e. 40,001), and others specify offsets (i.e. 0000).
 - **Hex or Decimal**—Some specify addresses in hex, and others in decimal. By allowing the user to select the Modbus addressing style for each slave on the network, minimal address conversion is required. Also, if the slave is another Horner product (i.e. another OCS), the "Native Addressing" option can be selected (i.e. %R1, %M17, etc.), and this skips the conversion to Modbus style altogether.
- **Scan List**—This is where the specific Modbus addresses to be read/written from/to each slave are specified. Up to 32 words of data can be read at the same time.

16.3: Modbus Addressing Table

To access the registers, a Modbus Master must be configured with the appropriate register type and offset. This is usually accomplished with one of two methods:

Method 1: The first method uses Traditional Modbus References, in which the high digit represents the register type, and the lower digits represent the register offset (starting with Register 1 for each type). Since only four register types can be represented in this manner, OCS controller Modbus Function Blocks pack several register types into each Modbus register type. Starting addresses of each register type are shown in the Traditional Modbus Reference column of the Modbus Table.

Method 2: The second method requires the Modbus Master to be configured with a specific Modbus Command and Modbus Offset. The supported Modbus commands and the associated offsets are also illustrated in Modbus Table.

OCS Controller Modbus Master Mapping					
Reference	Maximum Range	Trad. Modbus Reference (5 Digits)	Expanded Modbus Ref. (6 Digits)	Modbus Command (s)	Modbus Offset
%I1	1024	10001	010001	Read Input Status (2)	0
%IG1	256	13001	013001		3000
%S1	256	14001	014001		4000
%K1	10	15001	015001		5000
%Q1	1024	00001	000001	Read Coil Status (1) Force Coil (5) Force Multiple Coils (15)	0
%M1	1024	03001	003001		3000
%T1	1024	06001	006001		6000
%QG1	256	09001	009001		9000
%AI1	256	30001	030001	Read Input Register (4)	0
%AIG1	32	33001	033001		3000
%SR1	200	34001	034001		4000
%AQ1	256	40001	040001	Read Holding Register (3) Load Register (6) Load Multiple Registers (16)	0
%R1	2488	40513	040513		512
%R1	2048	43001	043001		3000
%AQG1	32	46001	046001		6000
%R1	5000	--	410001		10000

Battery



Chapter 17: Battery

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17.1: Safety

The OCS has an improved memory architecture that does not require a battery for program or register retention. The onboard lithium coin-cell battery runs the **real time clock** and is user replaceable with an expected lifetime of seven (7) to ten (10) years. Environmental conditions, including extreme temperatures and humidity, can affect battery life. If the battery older than seven (7) to ten (10) years old, it is recommended that it be replaced as preventative maintenance. NOTE: Use only the proper battery type listed.

NOTE: Use only the proper battery type listed.

WARNING: DO NOT USE IF BATTERY IS LEAKING OR HAS BEEN DAMAGED.

WARNING: LITHIUM BATTERIES MAY EXPLODE OR CATCH FIRE IF MISTREATED.

WARNING: DO NOT RECHARGE, DISASSEMBLE, HEAT ABOVE 100° C (212° F) INCINERATE, OR PUNCTURE.

WARNING: EXPLOSION HAZARD – BATTERIES MUST BE ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.

WARNING: Disposal of lithium batteries must be done in accordance with federal, state, and local regulations. Be sure to consult with the appropriate regulatory agencies before disposing batteries. In addition, do not recharge, disassemble, heat or incinerate lithium batteries.

WARNING: Do not make substitutions for the battery. Be sure to only use the authorized part number to replace the battery.

17.2: Replacing the Battery

The OCS uses a lithium coin-type battery with part no. **HE-BAT013**, with harness and connector available from Horner APG.

WARNING: Replacing the battery is a delicate procedure. If unsure about the procedure, please contact Horner Tech Support via [Horner Contact Us](#).

The following are the steps for replacing the battery:

1. Ensure that the user program and any data stored in retentive memory is backed up.
2. Disconnect all power from the OCS unit including I/O power.
3. On the back of the OCS model, remove the back cover.
4. Connect the new battery into the adjacent connector first and then carefully remove the old battery. With a small piece of tape provided, attach the new battery to the board
5. Dispose of the old battery properly; see the above warning on disposal regulations.
6. Carefully place the back panel.
7. Apply power to the unit. Confirm that the battery error is no longer reported. If the unit still reports the error, remove the battery immediately and contact Technical Support.

Troubleshooting & Tech Support



Chapter 18: Troubleshooting

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18.1: Connecting to the OCS

Cscape connects to the local controller automatically when the serial connection is made. The status bar below shows an example of a successful connection. This status bar is located in the bottom right-hand corner of the Cscape window.



In general, the **Target** number should match the **Local** number. The exception to this is when the controller is being used as a "pass through" unit where other controllers on a CsCAN network could be accessed through the local controller. See Cscape Help File for more details.

Determine connection status by examining feedback next to Local & Target in the status bar of Cscape.

Cscape Target & Local Numbers	
Local: ###	If a number shows next to Local then communication is established to the local controller.
Local: No Port	Cscape is unable to access the COM port of the PC. This could mean that Cscape is configured for a COM port that is not present or that another program has control of the COM port. Only one Cscape window can access a port at a time. Subsequent instances of Cscape opened will indicate No Port.
Local: No Com	Cscape has accessed a PC COM port but is not communicating with the controller. This typically occurs when the controller is not physically connected.
Local: ???	Unknown communication error. Close Cscape, power cycle the controller and reopen Cscape with a blank project. Check Local.
Target: #(I,R,D)	If I (idle), R (run), or D (do I/O) shows next to Target number , then communication is established to the target controller.
Target: #(?)	Communication is not established to the target controller. Check node ID of controller and set Target to match. Make sure local connection is established.

18.1.1: Serial Port – MJ1 Programming

1. Controller must be powered up.
2. Ensure that the correct COM port is selected in Cscape. **Tools > Applications Settings > Communications**.
3. Ensure that a cable with proper pinout is being used between PC and controller port MJ1.
4. Check that a Loaded Protocol or ladder is not actively using MJ1. Taking the controller out of Run Mode will make MJ1 available to Cscape.
5. Successful communications with USB-to-serial adapters vary. If in doubt, Horner APG offers a USB to serial adapter: part number [HE-CPK](#).

18.1.2: USB-C Port Programming

1. Power-up the controller.
2. Ensure that the correct COM port is selected in Cscape. **Tools > Applications Settings > Communications > Configure**
3. Confirm that the USB cable is connected between the PC and the controller.
4. Examine the Windows Device Manager to confirm that the USB driver is correctly installed and to verify the port number.
5. The USB port driver installs.

18.1.3: ETN Port Programming

1. Controller must be powered up.
2. Ensure that the correct IP address is given in the Ethernet field and correct Mode is selected, in Cscape: **Tools > Applications Settings > Communications > Configure** Home tab / Controller Group > Connection Wizard.
3. Ensure that an Ethernet connection has been established by pinging the controller from the Windows DOS prompt.
4. The PC and the OCS should be on the same IP subnet.

18.2: Local Controller and Local I/O

18.2.1: Local I/O Troubleshooting Checklist

1. Verify the controller is in RUN mode.
2. Check diagnostics to ensure controller passed self-tests. View Diags in Cscape, click Controller/Diagnostics.
3. Check data sheets to ensure proper wiring.
4. Ensure that hardware jumpers and software configuration for I/O match.
5. Check data sheets for voltage and current limits.
6. Take ladder out of the picture. From Cscape set controller to "Do I/O" mode. In this mode inputs can be monitored, and outputs set from a data watch window in Cscape without interference from the ladder program. Some I/O problems are only a result of a mistake in the ladder program.

WARNING: Setting outputs ON in Do I/O mode can result in injury or cause machinery to engage in an unsafe manner depending on the application and the environment.

18.3: CsCAN Network

For complete information on setting up a CsCAN network, refer to CAN Networks manual (MAN0799) by using Horner's [Documentation Search](#) page.

Network status, node ID, errors, and baud rate in the controller System Menu are all in reference to the CsCAN network. These indications can provide performance feedback on the CsCAN network and can also be used to aid in troubleshooting.

18.3.1: CsCAN Network Troubleshooting Checklist

1. Use the proper Belden wire type or equivalent for the network as specified in the [CAN Networks Manual](#), MAN0799.
2. The Horner OCS does not provide 24VDC to the network. An external voltage source must be used for other devices such as SmartStix I/O.
3. Check voltage at both ends of the network to ensure that voltage meets specifications of attached devices.
4. Proper termination is required. Use 121 Ω (or 120 Ω) resistors at each end of the network. The resistors should be placed across the CAN_HI and CAN_LO terminals.
5. Measure the resistance between CAN_HI and CAN_LO. If the network is properly wired and terminated, there should be around 60 Ω .
6. Check for duplicate node ID's.
7. Keep proper wires together. One twisted pair is for V+ and V- and the other twisted pair is used for CAN_HI and CAN_LO.
8. Make sure the baud rate is the same for all controllers on the network.
9. Assure shields are connected at one end of each segment—they are not continuous through the network.
10. Do not exceed the maximum length determined by the baud rate and cable type.
11. Total drop length for each drop should not exceed 6m (20'). A drop may include more than one node. The drop length adds to the overall network length.
12. Network should be wired in "straight line" fashion, not in a "star" pattern.
13. In applications requiring multiple power supplies, make sure the V- of all supplies is connected and to earth ground at one place only.
14. In some electrically noisy environments, it may be necessary to add repeaters to the network. Repeaters can be used to add additional nodes and/or distance to the network and protect the signal against noisy environments.

18.4: Basic Removable Media Troubleshooting

Description	Action
OCS does not read media card.	Attempt reformatting the media card.
OCS will not download a program file from removable media.	<p>When downloading to the OCS from removable media the program file must have a .pgm extension. A program file with the typical .csp extension will not work. A .pgm file is created either by exporting to .pgm in Cscape or by doing a save program or make clone from an OCS controller.</p> <p>The filename must follow the short filename convention which is an 8.3 format; For example, program.pgm is a valid filename. Programming.pgm is not a valid filename as characters left of the point exceed the maximum of 8 characters.</p>

18.5: Technical Support Contacts

For manual updates and assistance, contact Technical Support at the following locations:

North America:

Tel: (317) 916-4274

Fax: (317) 639-4279

Website: <https://hornerautomation.com>

Email: APGUSATechSupport@heapg.com

Europe:

Tel: (+) 353-21-4321-266

Fax: (+353)-21-4321826

Website: <https://www.hornerautomation.eu>

Email: technical.support@horner-apg.com