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Multi-Drop Connections

The Series 110/120 PLC Workstation is capable of sharing one or more PLCs with other Series 30, 110 and 120 PLC Workstations. We refer to this as a "multi-drop" capability. You can multi-drop Workstations in any configuration except in those applications where you are using CBL-L1, CBL-L2, Allen-Bradley SLC 500 or Telemecanique.

Making a simple, low-cost multi-drop installation can be a challenge, because each Workstation is a "master" that treats one or more PLCs as "slaves." The PLC protocols do not ordinarily support a multiple master arrangement, although their data highways are typically true "peer-to-peer" networks. The Series 110/120 Workstations do not connect directly to a data highway except to Allen-Bradley's DH485 for the SLC 500.

Fortunately, a company called Black Box Electronics makes an "RS-232 Line Sharer" that allows multiple masters to share one or more slaves. There are 3 models available, depending on how many Workstations you want to multi-drop:

Black Box Model Number	Number of Workstations
TL601	2
TL553 or TL553-R2	4
TL554 or TL554-R2	8

Black Box Electronics' address and phone number are:

Black Box Corporation
P.O. Box 12800
Pittsburgh, Pennsylvania 15241
Ordering: 412-746-5530
Technical support: 412-746-5565

You can connect another Line Sharer to each Workstation port to expand the system's capacity to a total of 64 Workstations.

There are four jumpers in the Line Sharer which you must set:

Jumper	Setting	Function
W1	Optional	Signal ground tied to frame ground.
W2	A-B	RTS delay (setting A-B is no delay).
W3	B-C	Broadcast/gated mode (B-C is gated mode).
W4	A-B	Priority select (A-B is "polled" mode).

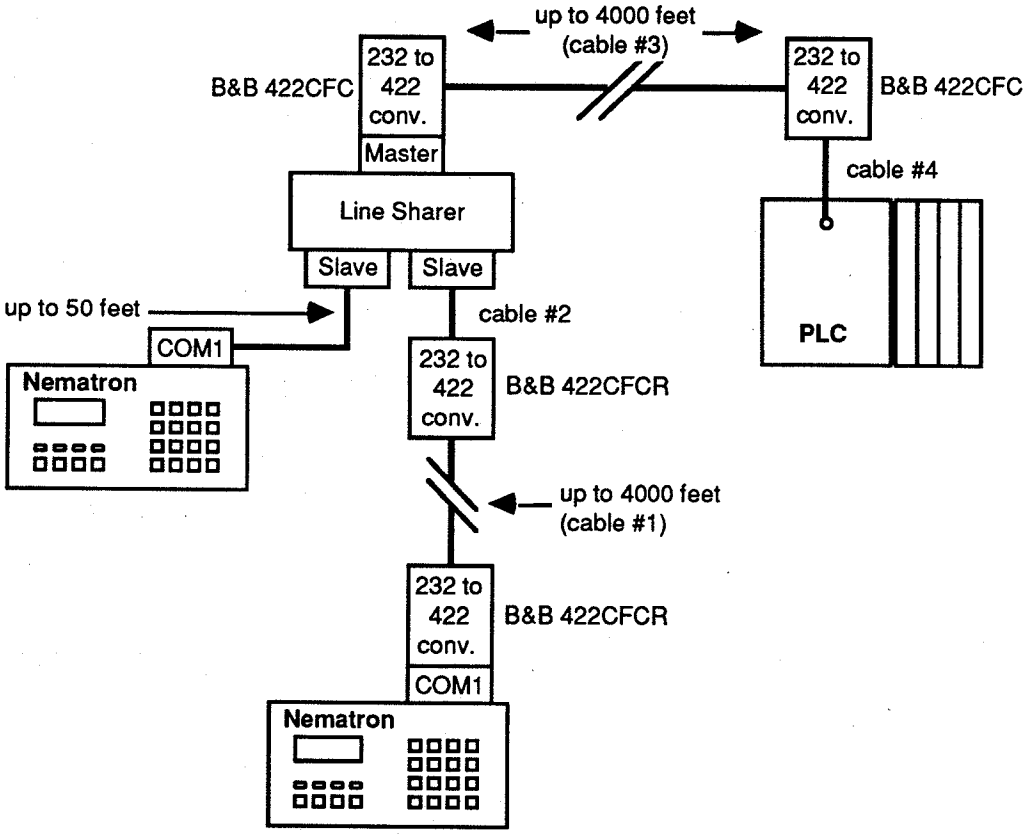
In order for multi-drop installations to operate properly, you must select *Yes* in the "Multi-drop" field on CP's Configuration screen.

Note Each Workstation you add to an installation slows down the other Workstations. For example, if you have one Workstation and add another one, each Workstation can then only communicate with the PLC half as often. This means that each Workstation's alarm response time and screen update time are cut in half. You should consider implementing the "Inactivity Delay" function on the Configuration screen.

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One of the drawbacks of the Line Sharer is that each connection is limited to 50 feet. If any connection exceeds 50 feet, or if the PLC requires an RS-422 input, then you must install additional RS-232 to RS-422 converters. The Workstation requires a 4-channel RS-232 to RS-422 converter because it lacks the CTS and RTS handshaking lines on its RS-422 side.

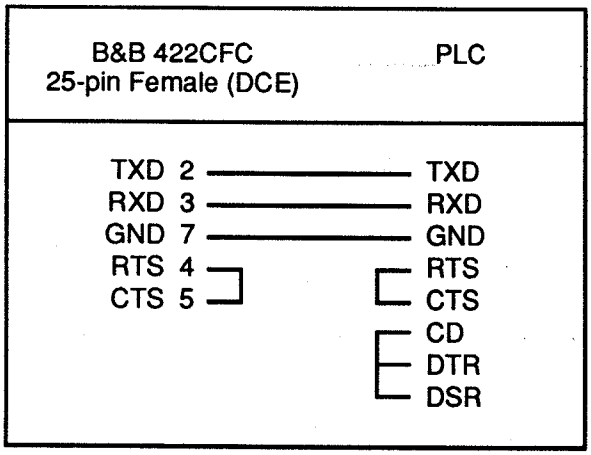
The following diagram shows the use of two models of RS-232 to RS-422 converters from B&B Electronics (their address and phone number are on page 22-1). These models differ only in the gender of the connectors, but using the right model simplifies cabling. As the diagram shows, you can plug the converter directly into the COM1 or COM2 port of the Workstation (set the Workstation's DIP switches for RS-232); you don't have to make a cable. Similarly, you can plug the converter directly into the Master port of the Line Sharer. You must make a short cable to connect the converter to the Slave port of the Line Sharer because there is no lucky combination.



The diagrams on the following pages show how to make cables to connect these devices together. You should plan to locate the converters near a power source, since each one needs a separate power supply (B&B part number 422PS).

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Cable #4



Cable #4: This cable connects the B&B converter to the PLC. The "DCE" designation means that the cable pins are backwards from the usual meaning, so TXD is actually an input on the left side of the schematic.

Troubleshooting

After you have made all the connections, each Workstation should operate normally. However, if you connect more than two or three Workstations, each Workstation may occasionally report a communications error. This happens because the Workstation doesn't know it's sharing the PLC with other Workstations, and must therefore wait longer for the PLC to be available.

If you see this error, try setting the "Communications Delay" on the Configuration screen to a higher number. Try a value of 0.1 seconds; if you still get an error, increase it by another 0.1 seconds until the errors stop. If you see an error with all other Workstations disconnected or turned off, then the error has nothing to do with Communications Delay. Ensure that you have selected *Yes* in the "Multi-drop" field on CP's Configuration screen.

If a Workstation's alarm response time becomes unacceptably long, try increasing the "Scan Ratio" on the Configuration screen. Increasing this ratio reduces the update speed of the register or on/off location the Workstation is currently displaying, but it increases the frequency that the Workstation scans alarms.

Another tactic to improve a Workstation's response time is to allow unused Workstations to become inactive. Consult the description of the "Inactivity Delay" field on the Configuration screen for more information.

Technical Note

The capability to multi-drop Workstations arises because when you select *Yes* for the "Multi-drop" field, the Workstation holds the RTS line high throughout a message/response with the PLC. If you select *No*, the Workstation holds RTS high all the time.

The Workstation raises RTS when it wants to talk to the PLC and keeps this line high throughout the conversation. At the end of the conversation, the Workstation briefly lowers RTS in order to allow the next Workstation to take its turn.

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Chapter 22A

Allen-Bradley

This chapter describes installation and configuration information for connecting the Series 110/120 PLC Workstations to Allen-Bradley's SLC-100, SLC-150, SLC-500, PLC-2, and PLC-5 programmable controllers.

SLC-100 and SLC-150

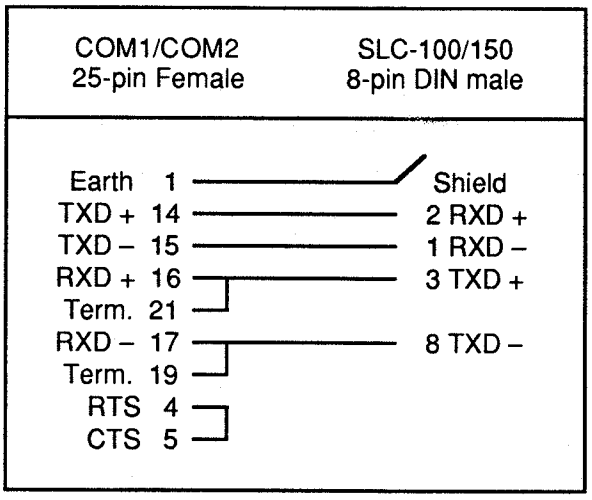
Models

The Series 110/120 PLC Workstations connect directly to the programming port of any Allen-Bradley SLC-100 and SLC-150 programmable controller. Your PLC must have firmware version 5 or later and you must load G2 firmware into your Workstation.

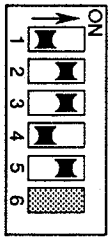
Connections

There are no communications settings for the SLC, so you should leave the settings on the Configuration screen at 9600 baud, even parity, 7 data bits, and 1 stop bit.

The Workstation connects directly to the programming port using the following cable:



COM1/COM2
DIP Switch Setting:



CBL-C5: Series 110/120 COM1/COM2 to SLC-100/150

Station Numbers

Because the SLC-100 and SLC-150 don't use station numbers, it doesn't matter what you enter in the "PLC station number" and "Workstation Station #" fields.

Addressing

When you set up a screen using the Edit function of CP software, you must enter the address within the PLC of the location to be shown on the screen in the "PLC address" field. For example, if you want to display the current value of timer/counter 901, you would enter the address *PRE901* for the "PLC address." The "Data size" for registers is always *Word* and the "Data format" is usually (but not always) *BCD*.

The table on the following page shows the format of every register and on/off location the Workstation can access:

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Allen-Bradley SLC-500

When used with the SLC-500, the Workstation incorporates patented technology which is licensed by Allen-Bradley Company, Inc. Allen-Bradley has not technically approved, nor does it warrant or support, this product. All warranty and support for this Workstation and its application is provided solely by Nematron.

Models

The Series 110/120 Workstations can connect to any SLC-500 model, either directly to the programming port or indirectly through an Isolated Link Coupler to a network. However, you must obtain the appropriate communications kit separately, because of Nematron's licensing agreement with Allen-Bradley.

For a direct connection between the Workstation and the programming port, you need COM-ABS-100. This kit includes CBL-C13, Rev. B, a six-foot cable that connects between the Workstations COM1 or COM2 port and the telephone-type connector on the front of the programmable controller.

To connect the Workstation via an AIC module to a DH485 network, you should use COM-ABN-100. This kit includes CBL-C15, an adapter that plugs into the Workstation's COM1 or COM2 port and provides a six-position terminal block identical to that of an AIC module. This kit eliminates the need to use a separate AIC module for each Workstation.

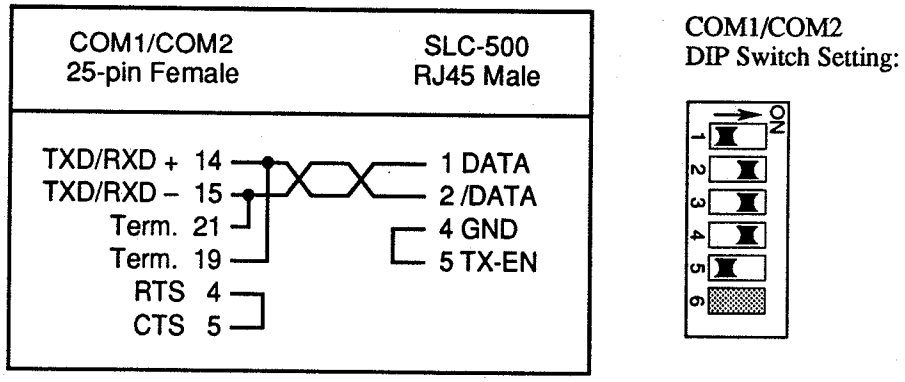
Each of these kits comes with a diskette that contains the G3.ROM firmware file. You must copy this file to your CP directory, so that CP can download this file to your Workstation.

Connections

You can connect the Workstation to the programming port of a single SLC-500, or to a network of programmable controllers via Allen-Bradley's Isolated Link Coupler (Allen-Bradley Catalog Number 1747-AIC). This section describes both connection schemes.

Programming Port Connections

The following diagram shows the cable between the Workstation and the programming port; this cable is available from Nematron under part number CBL-C13.



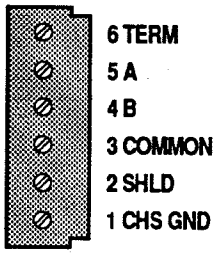
CBL-C13: Series 110/120 COM1/COM2 to SLC-500 programming port

You must *never* plug this cable into the Peripheral port of the 1747-AIC Isolated Link Coupler, or permanent damage to the AIC may result. However, CBL-C13, Rev. B, is compatible with both the AIC module's Peripheral port and the programming port. You cannot make your own Rev. B cable because it contains active components.

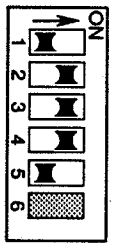
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Nematron's CBL-C15 cable adapter provides a simple way to connect the Workstation to a network of AIC modules. It provides a six-position terminal block identical to that of an AIC module. Allen-Bradley recommends using Belden #9842 cable, where the red/black pair is for communications, the white wire is reference ground, and the drain is the shield.

CBL-C15 adapter terminals (identical to AIC module's DH-485 terminals)



COM1/ COM2 DIP Switch Setting:



CBL-C15: Series 110/120 COM1/COM2 to DH-485 network

When wiring up the network, you must follow these rules:

- On the first node only, you must connect the shield to earth ground. In other words, you must install a jumper between pins "SHLD" and "CHS GND" on the terminal block. You must *always* connect the drain wire to pin "SHLD" on the terminal block.

- On both the first and last nodes in the network, you must terminate the communications wires. In other words, you must install the jumper between pins "A" and "TERM" as the dotted line in the previous wiring diagram illustrates.

Note We have learned that there is one exception to this rule: when you plug both a programmable controller and a PC-based programmer into a single AIC module, you should not install termination resistors at the Workstation.

You should refer to Allen-Bradley's SLC 500 documentation for further information about wiring, station numbers, and other considerations.

Station Numbers (Node Addresses)

The selection of node numbers is important! You should consult the Allen-Bradley documentation for specific information and advice. We strongly recommend that you start node numbering at 0 and that you assign node numbers consecutively, leaving no gaps.

You must enter node addresses for both the PLC and the Workstation on the Configuration screen in the CP software. Under the PLC Configuration, you can also enter a maximum node number; for best performance, we suggest you enter the highest node number that exists on your network.

For the "PLC node #," enter a number between 1 and 31. If your Workstation is connected to multiple PLCs, then you must enter the proper PLC node number on each of your Edit screens as well.

For the "Node #" field under "Workstation Configuration," enter a number between 0 and 31; this number must be *different* than any other node on the network.

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On/Off Type	Format	Range
Output file	O:*ee*/*bb* O:*ee*.*sss*/*bb* Read Only	*ee* = 0 to 2 (fixed I/O) or 0 to 30 (modular) *bb* = 0 to 23 for fixed I/O slot 0
Input file	I:*ee*/*bb* I:*ee*.*sss*/*bb*	*ee* = 0 to 2 (fixed I/O) or 0 to 30 (modular)
Status file	S*fff*:*nn*/*bb* S:*nn*/*bb*	*fff* must equal 2 or may be omitted
Bit file	B*fff*:*nnn*/*bb* B:*nnn*/*bb* B*fff*/*nnnn* B*fff*:*nnnn* B/*nnnn*	*fff* = 3 or 10–255; default file is 3 if *fff* omitted. B*fff*/*nnnn* selects bit *nnnn* from the start of file. B*fff*:*nnnn* selects the low bit of word *nnnn*.
Timer file	T*fff*:*nnn*/*bb* T*fff*:*nnn*.PRE/*bb* T*fff*:*nnn*.ACC/*bb* T*fff*:*nnn*.EN T*fff*:*nnn*.TT T*fff*:*nnn*.DN	*fff* = 4 or 10–255; default file is 4 if *fff* omitted
Counter file	C*fff*:*nnn*/*bb* C*fff*:*nnn*.PRE/*bb* C*fff*:*nnn*.ACC/*bb* C*fff*:*nnn*.CU C*fff*:*nnn*.CD C*fff*:*nnn*.DN C*fff*:*nnn*.OV C*fff*:*nnn*.UA C*fff*:*nnn*.UN	*fff* = 5 or 10–255; default file is 5 if *fff* omitted
Control file	R*fff*:*nnn*/*bb* R*fff*:*nnn*.LEN/*bb* R*fff*:*nnn*.POS/*bb* R*fff*:*nnn*.EN R*fff*:*nnn*.DN R*fff*:*nnn*.ER R*fff*:*nnn*.UL R*fff*:*nnn*.IN R*fff*:*nnn*.FD	*fff* = 6 or 10–255; default file is 6 if *fff* omitted
Integer file	N*fff*:*nnn*/*bb* N:*nnn*/*bb*	*fff* = 7 or 10–255; default file is 7 if *fff* omitted

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PLC-2

Models

The Series 110/120 PLC Workstations support all Allen-Bradley PLC-2 models and can access all register and I/O locations. You must load G1 firmware into your Workstation if you're connecting it directly to your PLC's programming port, or G0 firmware if you're connecting to the RS-232 port of a KG or KF2 module.

Connections

The Workstations connect to the Allen-Bradley PLC-2 programmable controllers either directly to the programming port or via a 1770-KF2, Series B, or 1771-KE module.

Direct (T3) Connections

The direct connection to the T3 programming port requires a special cable available only from Nematron under part number CBL-L1. This "smart" cable contains electronics to convert the signals from the Workstation to those that the PLC requires.

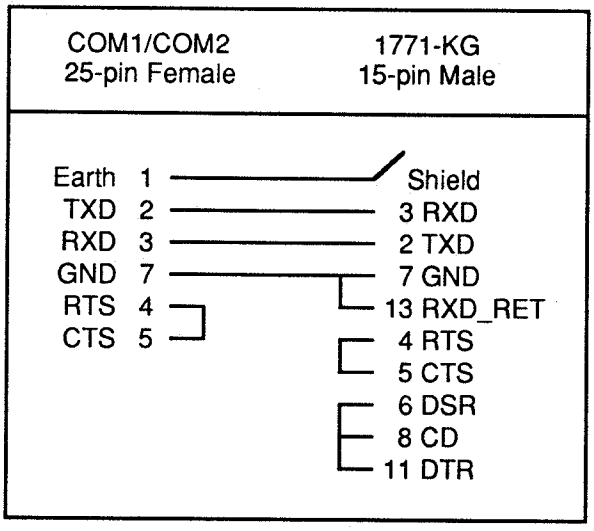
Allen-Bradley warns that the length of the cable connected to the T3 programming port must not exceed 10 feet (3 meters). If your application requires a cable length exceeding 10 feet, then we recommend you use a 1771-KG module instead.

If your PLC-2 rack contains a KG or KA module, then you must plug the Workstation into the available T3 port on that module.

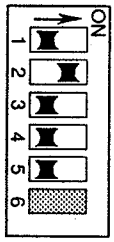
RS-232 Connections

There are two methods available to connect the Workstation to an RS-232 port on the PLC-2. You can use either a 1771-KG rack-mounted communications module or you can connect the Workstation to a 1770-KF2 module that in turn connects to a data highway consisting of one or more Allen-Bradley PLCs.

Following is the schematic for the cable to connect the Workstation to the 1771-KG:



COM1/COM2
DIP Switch Setting:



CBL-C3: Series 110/120 COM1/COM2 to Allen-Bradley 1771-KE/KF/KG

For installations using the 1770-KF2 module, you must also add a "Data Highway Interface" such as the 1771-KA module to each PLC, as shown in the following example:

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Your selections for handshaking signals and Data Highway Plus communications data rate do not affect the Workstation's operation.

Station Numbers

If you use CBL-L1 to connect your Workstation directly to the T3 programming port, then it doesn't matter which station numbers you select.

If you're using the 1771-KG module, then its station number must be the same as the PLC's station number on the Configuration and Edit screens. The Workstation's station number must be different from the 1771-KG's station number and can be any number greater than or equal to 10.

If you're using the 1770-KF2 module, its station number must be *different* than the PLC's station number and the same as the Workstation's station number. On the Configuration screen, you should enter the PLC's station number in the PLC station number field and the 1770-KF2 module's station number in the Workstation's station number field.

Programming

There is no special programming required in your PLC to enable communications. You do not have to add any special rungs to your relay ladder diagram.

Addressing

When you set up a screen using the Edit function of CP software, you must enter the address within the PLC of the location to be shown on the screen in the "PLC address" field.

Register addresses are always in the format *nnnn*, where the number is octal. You should usually select a data format of *BCD*, although the PLC-2 does support some binary functions. You should usually select a data size of *12-bit Word*, although the PLC-2 does support 16-bit Words, especially for analog values.

If you want the Workstation to access only the high byte of a word, then you select a data size of *Byte* and enter a PLC Address that uses the On/Off address format to refer to any bit in the high byte of the word. For example, if you want to access the high byte of 0100, you should set up a Register screen with a PLC Address of *0100/15*.

On/off addresses are always in the format *nnnn/bb*, where *nnnn* is an octal register address and *bb* is an octal bit number between 00 and 15.

Register Type	Format	Range	Data Size	Data Format
All types	*nnnn* (octal)	*nnnn* = 0 to max. depending on model	Usually 12-bit Word	Either

On/Off Type	Format	Range
All types	*nnnn/bb*	*nnnn* = 0 to max. word address depending on model; *bb* = 0 to 15

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PLC-5

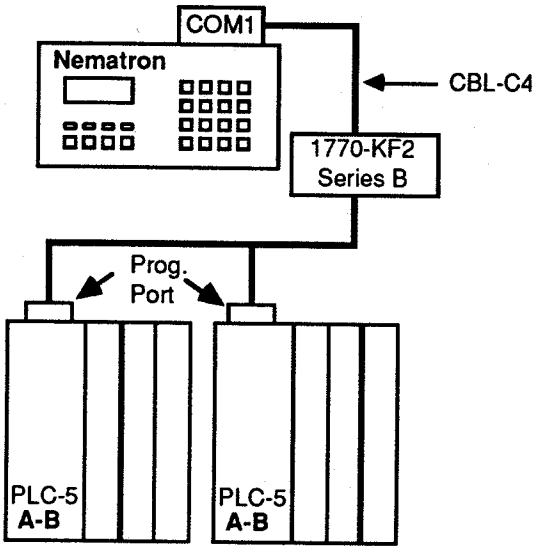
Models

The Series 110/120 PLC Workstations connect to the Allen-Bradley PLC-5 programmable controller via a 1770-KF2, Series B module; a 1785-KE module; or directly to the 25-pin communications port of the PLC-5/11, 5/20, 5/30, and 5/40. You must load G0 firmware into your Workstation. The Workstations can access any file type in a PLC-5 except floating point.

The Workstations do *not* connect directly to the PLC-5's programming port.

Connections

If you connect the Workstation to a 1770-KF2 module, then you must install a cable between the 1770-KF2 and the PLC. The following diagram illustrates this:



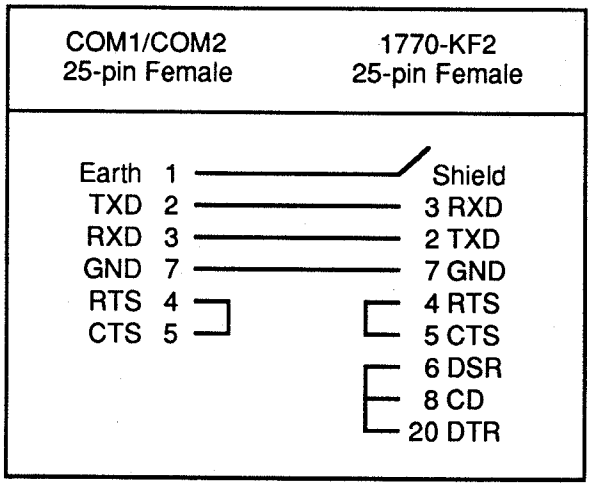
The Workstation can connect to one or more PLC-5 systems through the 1770-KF2; alternatives include the 1785-KE module and the built-in RS-232 communications port of newer PLC-5 models.

The communications settings for the Workstation depend on the DIP switch selections on the 1770-KF2 or 1785-KE module.

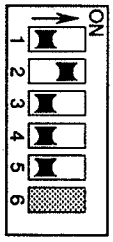
You must select the following parameters on your Allen-Bradley communications module:

- ✔ Full duplex
- ✔ BCC error checking
- ✔ Embedded responses enabled
- ✔ Local mode
- ✔ Duplicate messages accepted
- ✔ Execute diagnostic commands
- ✔ Octal digit 0 in the node address on 1785-KE Series B should be 0

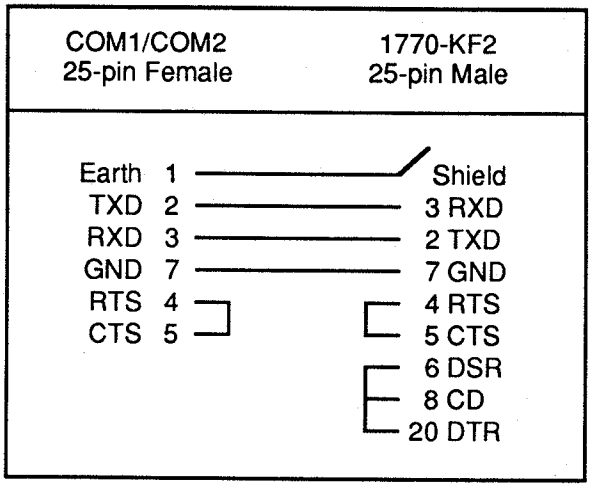
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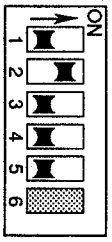
COM1/COM2
DIP Switch Setting:



CBL-C4: Series 110/120 COM1/COM2 to Allen-Bradley 1770-KF2



COM1/COM2
DIP Switch Setting:



CBL-C7: Series 110/120 COM1/COM2 to the built-in 25-pin serial communications port on some Allen-Bradley PLC-5 models

Station Numbers

The station number on the 1770-KF2 or 1785-KE module must be *different* than the PLC's station number and the same as the Workstation's station number.

You should enter the PLC's station number in the PLC station number fields on both the Configuration screen and the Edit screens. You should enter the 1770-KF2 or 1785-KE module's station number as the Workstation's station number on the Configuration screen.

Programming

There is no special programming required in your PLC to enable communications. You do not have to add any special rungs to your relay ladder diagram.

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On/Off Type	Format	Range
Output file	O*fff*:*xx*/*yy* O:*xx*/*yy*	*fff* must equal 0 or may be omitted
Input file	I*fff*:*xx*/*yy* I:*xx*/*yy*	*fff* must equal 1 or may be omitted
Status file	S*fff*:*nn*/*bb* S:*nn*/*bb*	*fff* must equal 2 or may be omitted
Bit file	B*fff*:*nnn*/*bb* B:*nnn*/*bb* B*fff*/*nnnnn*/ B/*nnnnn*/	*fff* = 3 to 999; default file is 3 if *fff* omitted
Timer file	T*fff*:*nnn*/*bb* T*fff*:*nnn*.PRE/*bb* T*fff*:*nnn*.ACC/*bb* T*fff*:*nnn*.EN T*fff*:*nnn*.TT T*fff*:*nnn*.DN	*fff* = 3 to 999; default file is 4 if *fff* omitted
Counter file	C*fff*:*nnn*/*bb* C*fff*:*nnn*.PRE/*bb* C*fff*:*nnn*.ACC/*bb* C*fff*:*nnn*.CU C*fff*:*nnn*.CD C*fff*:*nnn*.DN C*fff*:*nnn*.OV C*fff*:*nnn*.DN	*fff* = 3 to 999; default file is 5 if *fff* omitted
Control file	R*fff*:*nnn*/*bb* R*fff*:*nnn*.LEN/*bb* R*fff*:*nnn*.POS/*bb* R*fff*:*nnn*.EN R*fff*:*nnn*.EU R*fff*:*nnn*.DN R*fff*:*nnn*.EM R*fff*:*nnn*.ER R*fff*:*nnn*.UL R*fff*:*nnn*.IN R*fff*:*nnn*.FD	*fff* = 3 to 999; default file is 6 if *fff* omitted
Integer file	N*fff*:*nnn*/*bb* N:*nnn*/*bb*	*fff* = 3 to 999; default file is 7 if *fff* omitted

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Chapter 22B

GE Fanuc

This chapter describes connections to the GE Series Ninety (SNP), GE Series 1 (all models), and the GE Series 3, 5, and 6.

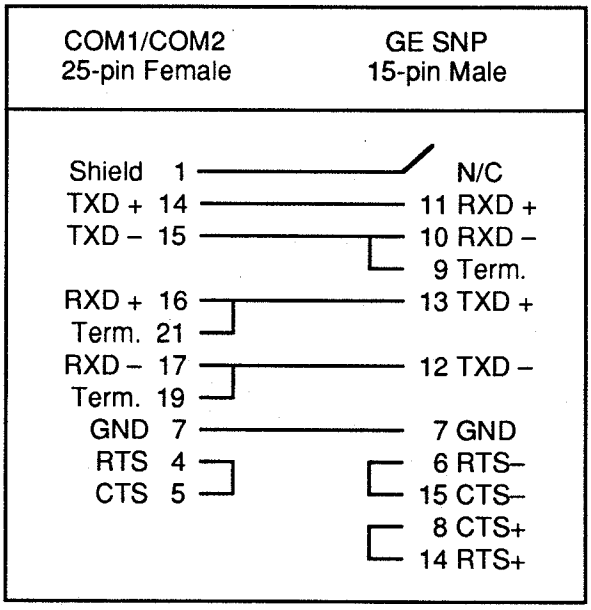
GE Fanuc Series Ninety

Models

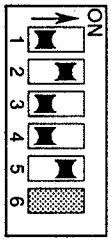
The Series 110/120 Workstations can connect to the programming port of any GE Series Ninety PLC. You must load G4 firmware into your Workstation.

Connections

You can connect the Workstation directly to the programming port of a GE Series Ninety programmable controller with a cable that matches the following:



COM1/COM2
DIP Switch Setting:



CBL-C16: Series 110/120 COM1/COM2 to GE Series Ninety programming port

You can also connect the Workstation to the PCM module's CCM port. Because this module emulates a GE Series 6, you should consult the description of the Series 6 later in this chapter.

To connect a Workstation to a network of two or more PLCs, you must follow GE's instructions for making connections.

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The table below shows the format of every register and on/off location the Workstation can access (numbers are all decimal):

Register Type	Format	Range	Data Size	Data Format
Discrete Inputs	%I*nnnnn*	Depends on model.	Byte	Either
Discrete Outputs	%Q*nnnnn*		Byte	Either
Discrete Temporaries	%M*nnnnn*		Byte	Either
Discrete Internals	%SA*nnnnn*		Byte	Either
%SA Discretes	%SA*nnnnn*		Byte	Either
%SB Discretes	%SB*nnnnn*		Byte	Either
%SC Discretes	%SC*nnnnn*		Byte	Either
%S Discretes	%S*nnnnn*		Byte	Either
Genius Global Data	%G*nnnnn*		Byte	Either
Analog Inputs	%AI*nnnnn*		Word	Binary
Analog Outputs	%AQ*nnnnn*		Word	Binary
Register	%R*nnnnn*		Word	Binary

On/Off Type	Format	Range
Discrete Inputs	%I*nnnnn*	Depends on model.
Discrete Outputs	%Q*nnnnn*	
Discrete Temporaries	%M*nnnnn*	
Discrete Internals	%SA*nnnnn*	
%SA Discretes	%SA*nnnnn*	
%SB Discretes	%SB*nnnnn*	
%SC Discretes	%SC*nnnnn*	
%S Discretes	%S*nnnnn*	
Genius Global Data	%G*nnnnn*	

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GE Fanuc Series One and Series Three

Models

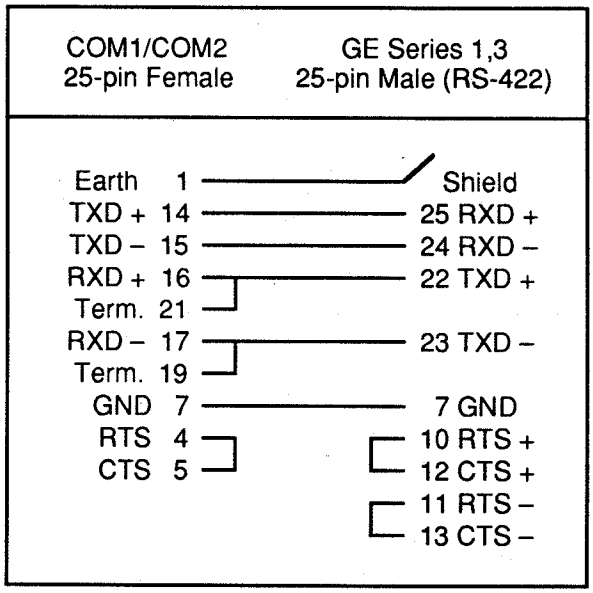
The Series 110/120 Workstations can connect to the communications module of any GE Fanuc Series 1 or Series 3 programmable controller. You must load G5 firmware into your Workstation.

Connections

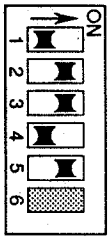
The Series 110/120 PLC Workstation can talk to one or more GE Fanuc programmable controllers via the communications modules listed below:

PLC	Communications Module
GE Series One (any model)	DCU (IC610CCM105)
GE Series Three	DCM (IC630CCM300)

The following cable shows how to connect the Workstation to the communications module; this shows only how to connect to the RS-422 version of the DCU module:



COM1/COM2
DIP Switch Setting:



CBL-C6: Series 110/120 COM1/COM2 to GE Fanuc Series One and GE Fanuc Series Three (RS-422 connection)

Station Numbers

You must enter station numbers for both the PLC and the Workstation on the Configuration screen in the CP software.

For the "PLC Station #," enter a number that matches the DIP switch setting on your communications module. If your Workstation is connected to multiple PLCs, then you must enter the proper PLC station number on each of your Edit screens as well.

For the "Station #" field under "Workstation Configuration," enter a station number that is *different* than your PLC station number.

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Timer/Counter Up Statuses	*nnn*	*nnn* = depends on model: 1: not available 1+: 60-67 1jr: not available 3: not available	Either	Usually BCD

On/Off Type	Format	Range
I/O Points	*nnn*	*nnn* = depends on model: 1: 0-157 1+: 0-157 and 700-777 1jr: 0-137 3: 0-617
Internal, Retentive, and Special Function Coils	*nnn*	*nnn* = depends on model: 1: 160-377 1+: 160-377 1jr: 140-377 3: 4000-4457 and 7000-7077
Shift Registers	*nnn*	*nnn* = depends on model: 1: 400-577 1+: 400-577 1jr: 140-377 3: 9000-9177
Timer/Counter Up Statuses	*nnn*	*nnn* = depends on model: 1: not available 1+: 600-677 1jr: not available 3: 0-177

Errors

When the Workstation encounters a problem in communicating with the PLC, it displays an error message; the error code is always 0. Following is a list of error messages and their possible causes:

NOT RDY ERR This message always indicates that the CTS input to the serial port is not active, which typically indicates that the cable to the PLC is not plugged into the Workstation.

NO RESPONSE ERR This message always indicates that the PLC is not responding to the Workstation's requests. This typically indicates that there is a mismatch between station numbers and DIP switch settings, the cable plugged into the Workstation is not connected to the PLC, or that the PLC is turned off or is in some other mode that makes it non-responsive.

MSG ERROR This message indicates that the PLC's response to the Workstation's request either indicates an invalid request or contains garbled data. If this message occurs continually on only certain screens, the selected location probably does not exist within the PLC. If this message occurs randomly, you probably have a noise problem caused by an inferior cable, improper routing, or inadequate grounding.

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Addressing

When you set up a screen using the Edit function of CP software, you must enter the address within the PLC of the location to be shown on the screen in the "PLC address" field. For example, if you want to display the first register, you would enter the address *R1* for the "PLC address." The "Data size" for registers is always *Word*; for I/Os, you can select *Word* or *Byte*.

If you specify an on/off address for a register, the Workstation returns the 8 or 16 locations starting at the specified address. However, you must specify an address on a 16-bit boundary. For example, the only valid addresses are 1, 17, 33, 49, 65, and so on.

The "Data format" of data registers can be either *BCD* or *Unsigned Binary*.

The following table shows the format of every register and on/off location the Workstation can access:

Register Type	Format	Range	Data Size	Data Format
Local Inputs	I*nnnnn*	*nnnnn* = 1 to max. in increments of 16 (max. by model)	Either	Either
Local Outputs	O*nnnnn*	*nnnnn* = 1 to max. in increments of 16 (max. by model)	Either	Either
Special Purpose Contacts	I1-*nnnnn*	*nnnnn* = 1 to max. in increments of 16 (Series 5 only; max. by model)	Either	Either
Internal Coils	O1-*nnnnn* O2-*nnnnn*	*nnnnn* = 1 to max. in increments of 16 (Series 5 only; max. by model)	Either	Either
Remote Inputs	I1+*nnnnn* I2+*nnnnn*	*nnnnn* = 1 to max. in increments of 16 (Series 5 only; max. by model)	Either	Either
Remote Outputs	O1+*nnnnn* O2+*nnnnn*	*nnnnn* = 1 to max. in increments of 16 (Series 5 only; max. by model)	Either	Either
Registers	R*nnnnn*	*nnnnn* = 1 to max. (max. by model)	Word	Either

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Chapter 22C

Hitachi

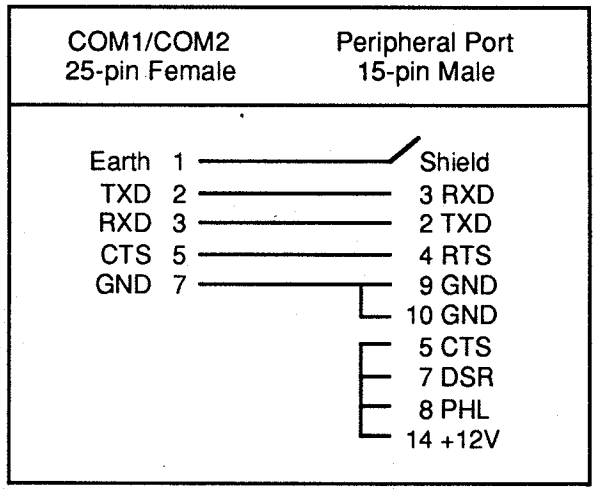
Models

The Series 110/120 PLC Workstations are compatible with the Hitachi H Series programmable controllers, including models H-100M, H-300, H-700, and H-2000. You must load G9 firmware into your Workstation.

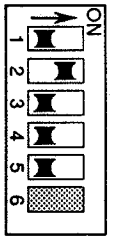
Connections

The Workstation connects either to the CPU's peripheral port or to the COMM-H intelligent serial port module. The COMM-H module allows you to connect multiple H Series programmable controllers to a single Workstation.

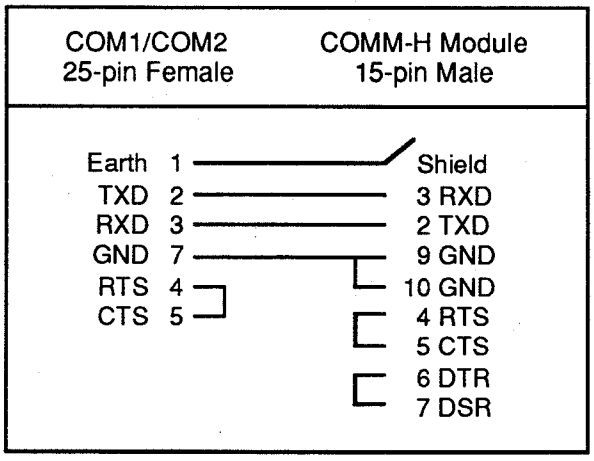
When you connect the Workstation to the H Series peripheral port, the communications settings are 19200 baud, even parity, 7 data bits, and 1 stop bit. The first diagram shows how to construct a cable; you can change the baud rate to 4800 by moving the wire at pin 14 to pin 13 instead. The second diagram shows how to connect the Workstation to the 15-pin RS-232 port on the COMM-H module:



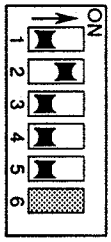
COM1/COM2
DIP Switch Setting:



Series 110/120 COM1/COM2 to Hitachi H Series Peripheral Port



COM1/COM2
DIP Switch Setting:



Series 110/120 COM1/COM2 to Hitachi H Series COMM-H Module

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Addressing

When you set up a screen using the Edit function of CP software, you must enter the address within the PLC of the location to be shown on the screen in the "PLC address" field. For example, if you want to display the current ("elapsed") value of timer/counter 1, you enter the address *TC1* for the "PLC address." The "Data size" for registers is always *Word* and the "Data format" is normally *Unsigned Binary* except the timers and counters in the H-100M, which are normally *BCD*.

The table below shows the format of every register and on/off location the Workstation can access; all numbers are decimal unless otherwise noted; the range depends on the model:

Register Type	Format	Range	Data Size	Data Format
Timer/Counter Elapsed	TC*nnn*	*nnn* = 0 to 511	Word	Unsigned Binary (except H-100M)
External Inputs	WX*nnnn*	*nnnn* = hex	Word	Unsigned Binary
External Outputs	WY*nnnn*	*nnnn* = hex	Word	Unsigned Binary
CPU Link	WL*nnnn*	*nnnn* = hex	Word	Unsigned Binary
Internal Word Outputs	WR*nnnn*	*nnnn* = hex	Word	Unsigned Binary
Data Area	WM*nnnn*	*nnnn* = hex	Word	Unsigned Binary

On/Off Type	Format	Range
External Inputs	X*nnnnn*	*nnnnn* = hex
External Outputs	Y*nnnnn*	*nnnnn* = hex
CPU Link Area	L*nnnn*	*nnnn* = hex
Internal Bit Outputs	R*nnn*	*nnn* = hex
Data Area	M*nnnn*	*nnnn* = hex
Rising Edge Detect	DIF*nnn*	*nnn* = 0 to 511
Falling Edge Detect	DFN*nnn*	*nnn* = 0 to 511
Timers		*nnn* = 0 to 255
On-Delay	TD*nnn*	
Re-Triggerable	SS*nnn*	
Watchdog	WDT*nnn*	
Monostable	MS*nnn*	
Accumulation	TMR*nnn*	

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Chapter 22D

IDEC

This chapter describes installation and configuration information for connecting Series 110/120 PLC Workstations to IDEC programmable controllers. You must load GA firmware into your Workstation.

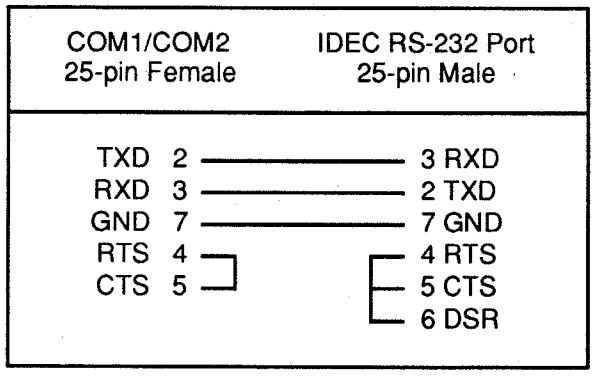
Models

The Series 110/120 PLC Workstations are compatible with IDEC models MICRO-1, FA-1, FA-1J, FA-2, FA-2J, FA-3S(CP11), FA-3S(CP12), and FA-3S(CP13).

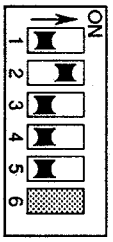
Connections

For 1:1 connections, the Workstation connects to the RS-232 port of IDEC's Computer Link Adapter PF2-CLA. For 1:N connections, the Workstation connects to the RS-232 port of the Fiber Link Main Unit PFJ-U12 or the Cable Link Main Unit PFJ-022.

The cable schematic below shows how to build a cable to connect your Unit or Adapter to the Workstation; you also need a cable from IDEC to connect your Unit or Adapter to your PLC:



COM1/COM2
DIP Switch Setting:



Series 110/120 COM1/COM2 to IDEC RS-232 port

IDEC's default communications parameters for all communications devices are 9600, 8 data bits, even parity, and 1 stop bit.

Station Numbers

For 1:1 connections, station numbers are not used, so it does not matter what station numbers you enter for the PLC and the Workstation.

For 1:N connections, you must enter a station number between 1 and 255 for the PLC on the Configuration screen in the CP software; the Workstation's station number is not used, so it does not matter what station number you enter for the Workstation Configuration.

If your Workstation is connected to multiple PLCs, then you must enter the proper PLC station number on each of your Edit screens as well.

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On/Off Type	Format
Inputs	*nnn* or I*xx*
Outputs	*nnn* or Q*xx*
Internal Relays	*nnn* or M*xx*
Shift Registers	*nnn* or R*xx*
Timers (actual)	*nnn* or T*xx*; this returns the "timed out" result
Counters (actual)	*nnn* or C*xx*; this returns the "counted out" result

Symbolic Ranges

Location	MICRO-1	FA-1	FA-2	FA-2J FA-3 (CP11) FA-3(CP11T)	FA-3 (CP12/13)
Inputs	I0-I17	I0-I157	I0-I317	I0-I157	I0-I317
Outputs	Q0-Q5, Q10-Q17	Q0-Q157	Q0-Q317	Q0-Q157	Q0-Q317
Internal Relays	M0-M317	M0-M297	M0-M617	M0-M317, M620-M637	M0-M1317
Data Registers	n/a	D0-D99	D0-D399	D0-D399	D0-D999
Counters	C0-C46	C0-C46	C0-C46	C0-C46	C0-C46; C48-C102
Timers	T0-T79	T0-T79	T0-T79	T0-T79	T0-T255
Shift Registers	R0-R127	R0-R127	R0-R127	R0-R127	R0-R223
Control Registers	n/a	n/a	n/a		D3000-D3071

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Chapter 22E

Mitsubishi

This chapter describes installation and configuration information for connecting the Series 110/120 PLC Workstations to Mitsubishi A Series, F Series and FX Series programmable controllers.

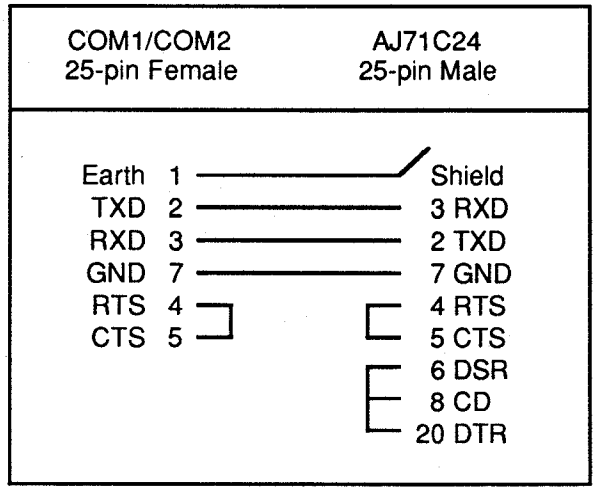
A Series

Models

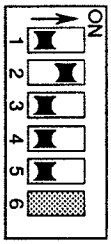
The Series 110/120 PLC Workstations are compatible with the Mitsubishi A Series, F Series and FX Series programmable controllers. This section describes the A Series connections and addressing. You must load G8 firmware into your Workstation.

Connections

The Workstation connects to the A Series through the RS-232 port of a separate module you must purchase from Mitsubishi; they offer two models: AJ71C24 and A1SJ71C24. The cables to connect the Workstation to the RS-232 ports of the Mitsubishi modules are shown below and on the following page:



COM1/COM2
DIP Switch Setting:



CBL-C7: Series 110/120 COM1/COM2 to Mitsubishi AJ71C24

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Addressing

When you set up a screen using the Edit function of CP software, you must enter the location's address in the "PLC address" field. For example, if you want to display the current (present) value of timer 1, you enter *T1* or *TP1* for the "PLC address." The "Data format" is always *Word* and the "Data format" is typically *Unsigned Binary*.

The table below show the format of every register and on/off location the Workstation can access; numbers are decimal except where noted:

Register Type	Format	Range	Data Size	Data Format
* Input Image	X*nnnn*	*nnnn* = hex number starting at 0; maximum depends on PLC model	Word	Unsigned Binary
* Output Image	Y*nnnn*	*nnnn* = hex number starting at 0; maximum depends on PLC model	Word	Unsigned Binary
* Internal and Special Relays	M*nnnn*	*nnnn* = 0 through 2047 and 9000 through 9255	Word	Unsigned Binary
* Latch Relay	L*nnnn*	*nnnn* = 0 through 2047	Word	Unsigned Binary
* Link Relay	B*nnn*	*nnnn* = hex 0 through 03FF	Word	Unsigned Binary
* Annunciator	F*nnn*	*nnn* = 0 through 255	Word	Unsigned Binary
Timer Present Value	TP*nnn* T*nnn*	*nnn* = 0 through 255	Word	Unsigned Binary
Counter Present Value	CP*nnn* C*nnn*	*nnn* = 0 through 255	Word	Unsigned Binary
Data and Special Registers	D*nnnn*	*nnnn* = 0 through 1023 and 9000 through 9255	Word	Unsigned Binary
Link Register	W*nnn*	*nnn* = hex 0 through 3FF	Word	Unsigned Binary
File Register	R*nnnn*	*nnnn* = 0 to maximum depending on model; the A1 CPU does not have file registers	Word	Unsigned Binary

* These address types are actually the same as the On/Off addresses listed in the next table. If you set up a Register screen that refers to an On/Off address, then the Workstation displays the entire byte or word (depending on the Data Size you select) that contains the bit.

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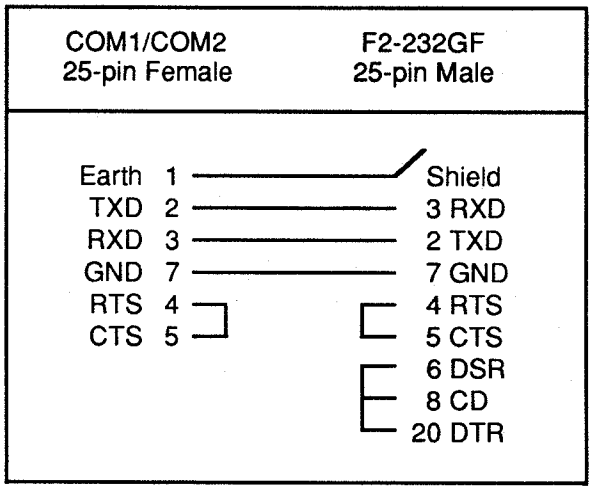
F Series

Models

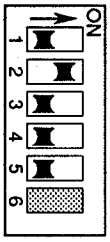
The Series 110/120 PLC Workstations are compatible with the Mitsubishi A Series, F Series and FX Series programmable controllers. This section describes the F Series connections and addressing. You must load G8 firmware into your Workstation.

Connections

The Workstation connects to the F Series through a separate module you must purchase from Mitsubishi; their model number is F2-232GF. The cable to connect the Workstation to the Mitsubishi F2-232GF is shown below:



COM1/COM2
DIP Switch Setting:



CBL-C7: Series 110/120 COM1/COM2 to Mitsubishi F2-232GF

Station Numbers

Because the F Series PLCs do not support station numbers, it doesn't matter what value you enter for the "PLC station number" and "Workstation Station #" fields; you can leave those fields set to the default values of *8* and *9* respectively.

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On/Off Type	Format	Range
Input Image	X*nnn*	*nnn* = octal 000-027, 400-427, 500-527
Output Image	Y*nnn*	*nnn* = octal 030-047, 430-447, 530-547
State	S*nnn*	*nnn* = octal 600-647, 800-877, 900-977 (800-977 are only available in the F2 CPU)
Internal, Latch and Special Relays	M*nnn*	*nnnn* = octal 070-077, 100-377, 470-477, 570-577
Timer Input Contact	TI*nnn*	*nnn* = octal 050-057, 450-457, 550-557, or 650-657
Timer Output Coil	TO*nnn* T*nnn*	*nnn* = octal 050-057, 450-457, 550-557, or 650-657
Counter Input Contact	CI*nnn*	*nnn* = octal 060-067, 460-467, 560-567, or 660-667
Counter Output Coil	CO*nnn* C*nnn*	*nnn* = octal 060-067, 460-467, 560-567, or 660-667

Errors

When the Workstation encounters a problem in communicating with the PLC, it displays an error message and an error code. Following is a list of messages along with the meaning of each code; error codes other than those listed are undefined:

NOT RDY ERR

This message always indicates that the CTS input to the serial port is not active, which typically indicates that the cable to the PLC is not plugged into the Workstation.

NO RESPONSE ERR

This message always indicates that the PLC is not responding to the Workstation's requests. This typically indicates that the cable plugged into the Workstation is not connected to the PLC, or that the PLC is turned off or is in some other mode that makes it non-responsive.

MSG ERROR

Except for those codes listed below, the error code displayed is the code that the PLC transmitted plus 1. To figure out the meaning of an error code that is not in the list below, you must subtract 1 from the number that the Workstation displays and refer to the F-series protocol tech notes, BR-5193A, section 2.4.

Error Code	Description
252	Workstation received undefined error code
253	Workstation received garbled data; probable noise problem
254	Workstation received incorrect response message
255	Workstation received too many characters in response
All Others	Error code plus 1 returned by the PLC

SCREEN ERROR

Error Code	Description
1	Address too large or Workstation attempted to write to read-only location
2	Data value too large to be written
All Others	Invalid PLC type, model, or PLC address

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The following table shows the format of every register and on/off location the Workstation can access. I/O addresses are octal; the rest are decimal.

Register Type	Format	Range	Data Size	Data Format
Input Image	X*nnn*	*nnn* = octal 000-177	Either	Unsigned binary
Output Image	Y*nnn*	*nnn* = octal 000-177	Either	Unsigned binary
State	S*nnn*	*nnn* = 0-999	Either	Unsigned binary
Auxiliary Relay	M*nnnn*	*nnnn* = 0-1023 and 8000-8255	Either	Unsigned binary
Counter Current Value	C*nnn*	*nnn* = 0-255	Word	Unsigned binary
Timer Current Value	T*nnn*	*nnn* = 0-255	Word	Unsigned binary
Data Register	D*nnnn*	*nnnn* = 0-511 and 8000-8255	Word	Unsigned binary

On/Off Type	Format	Range
Input Image	X*nnn*	*nnn* = octal 000-177
Output Image	Y*nnn*	*nnn* = octal 000-177
State	S*nnn*	*nnn* = 0-999
Auxiliary Relay	M*nnnn*	*nnnn* = 0-1023 and 8000-8255
Timer Input Contact	TI*nnn*	*nnn* = 0-255
Timer Output Coil	TO*nnn* T*nnn*	*nnn* = 0-255
Counter Input Contact	CI*nnn*	*nnn* = 0-255
Counter Output Coil	CO*nnn* C*nnn*	*nnn* = 0-255

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