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5 030 Processor Module

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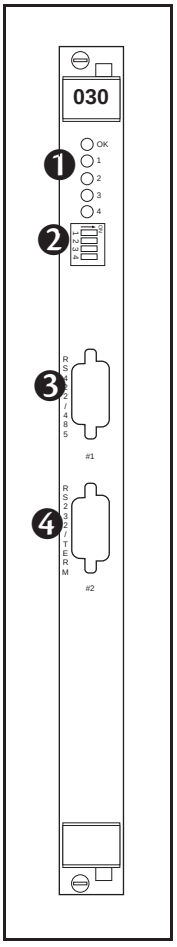
5.1 Introduction

All Adept MV controllers require at least one system processor module; the module can be an 030 or an 040. You can have both 030 and 040 modules installed, up to a maximum of 4 modules. The 030 is a single-slot 6U VME module that can serve as the main system processor for an Adept MV controller. The CPU for this module is a Motorola 68EC030 microprocessor running at 40 MHz. The module can be configured with 2, 4, or 8 MB of DRAM. This module also includes a Motorola 68882 math coprocessor. See the next chapter for information on the 040 module.

The 030 has two serial I/O connectors on the front of the module: one is an RS-232 port and the other is an RS-422/485 port. In an S-Series Adept MV controller, the programmer's terminal connects through the RS-232 port on the 030 module. (In an A-Series controller, the monitor and keyboard connect to the Adept VGB module.)

The 030 can be used either as the main system processor, or as an auxiliary processor in Adept MV controller systems; see section 5.7.

5.2 Connections and Indicators



❶ Status LED's. When lit:

OK indicates this module has passed V^+ start-up test.

1 - 4 are for Adept Service use only.

❷ DIP Switch (4 position) –

1, 2, 3 are not used and should be set to OFF.

4 is for Adept internal use only and should be set to OFF.

❸ **RS-422/485** connector – for general serial communication.

❹ **RS-232/Term** connector – terminal connection with an S-Series controller; can be used for serial communication with an A-Series model. See page 62 for more information on this connector when used with an A-Series model.

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5.3 Serial I/O Connections, 030 Module

RS-422/485 Connector (on 030 Module)

The RS-422/485 connector is a DE-9F 9-pin female connector. The pin assignments and locations are shown below. RS-422 is a point-to-point protocol for connection to a single destination. This port can also be configured as a "multi-drop" port (RS-485).

To change the configuration use the CONFIG_C utility program or the V+ FSET program instruction. This port is designated LOCAL.SERIAL:1.

Table 5-1. RS-422/485 Connector Pin Assignments

Pin	Signal	Pin	Signal
1	RTS+	6	RTS–
2	RXD+	7	RXD–
3	TXD+	8	TXD–
4	CTS+	9	CTS–
5	Ground		

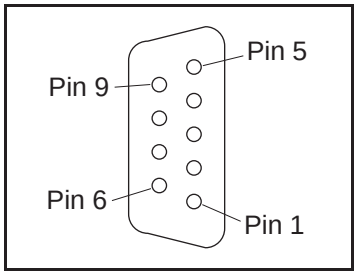


Figure 5-1. RS-422/485 Female Connector Pin Locations (on 030 module)

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RS-232/Term Connector (on 030 Module)

The RS-232/Term connector is a DE-9P 9-pin male connector that is pin-compatible with the serial connector for AT compatible computers. The pin assignments and locations are shown below.

The port supports DTR, DSR, RTS, and CTS signals, used for "hardware handshake", also known as "modem control". By default, these signals are not enabled. To configure the port speed and other communications parameters, use the CONFIG_C utility program, the V+ FSET program instruction or the FSET monitor command. This port is designated LOCAL.SERIAL:2.

Used in an S-Series System

If the controller is an S-Series model, then the customer-supplied ASCII or ANSI terminal plugs into this connector on the main system processor; see Table 5-3 and the terminal installation information in section 3.9. If you have more than one processor module, the terminal is always connected to the main system module (in slot 1).

Used in an A-Series System

If the controller is an A-Series model, then this connector can be used for general serial communication. However, you can redirect the monitor output of an A-Series system to this connector on the 030 module using a DIP switch on the SIO module; see section 7.2 for information on that switch.

Table 5-2. RS-232/Term Connector Pin Assignments

Pin	Signal	Type	Pin	Signal	Type
1	not used		6	DSR (DCE Ready)	Input
2	RXD (From Device)	Input	7	RTS (Request to Send)	Output
3	TXD (To Device)	Output	8	CTS (Clear to Send)	Input
4	DTR (DTE Ready)	Output	9	not used	
5	SG (Signal Ground)				

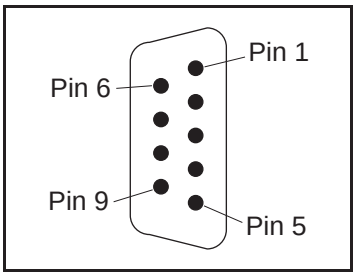


Figure 5-2. RS-232/Term Male Connector Pin Locations (on 030 module)

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Typical Cable Connections

For many applications, including connecting to a serial printer or terminal, 25-pin or 9-pin adapter cables may be required. The next few tables give some examples. Because the Adept MV controller uses the same connector and compatible pinouts as the IBM PC-AT computer, suitable cables may be available from your local computer dealer.

- Table 5-3, “Pin Assignments for 9-Pin to 25-Pin (DCE) Cable”
- Table 5-4, “Pin Assignments for 9-Pin to 25-Pin (DTE) Cable”
- Table 5-5, “Pin Assignments for 9-pin to 25-pin (Wyse WY-60 Terminal) Cable”
- Table 5-6, “Pin Assignments for 9-pin to 9-pin (AT-Compatible) Cable”
- Table 5-7, “Typical 25-pin Null-Modem Adaptor Pinout”

Typical Cable Connections, 9-pin to 25-pin (DCE)

The following connections will work for many applications, including most modems and other DCE (Data Circuit-terminating Equipment) devices. See next page for typical connections to a terminal or other 25-pin DTE device.

Table 5-3. Pin Assignments for 9-Pin to 25-Pin (DCE) Cable

030 RS-232 9-Pin Female Pin Number	Function	25-Pin Male (DCE) Pin Number
not used	Shield	1
1	(CD carrier detect - not used)[a]	8
2	RXD (from DCE device)	3
3	TXD (to DCE device)	2
4	DTR[b] (to DCE device)	20
5	Signal ground	7
6	DSR[b] (from DCE device)	6
7	RTS[b] (to DCE device)	4
8	CTS[b] (from DCE device)	5
9	(RI ring indicator - not used)[a]	22

[a] Pins 1 and 9 are not connected inside the Adept MV Controller. No connection is required, but if you are using a standard cable that connects to these pins no damage should occur.

[b] Pins 4, 6, 7, and 8 are used for “hardware handshake”, also known as “modem control”. To enable them, use the CONFIG_C utility program, the V+ FSET program instruction, or the FSET monitor command. In some applications you can omit some or all of these lines; consult the documentation for the device that you are connecting to the Adept controller.

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Typical Cable Connections, 9-pin to 25-pin (DTE)

Most terminals and some computers use DTE (Data Terminal Equipment) pinouts. Remember to enable "modem control" (using CONFIG_C) if you are using the DTR, DSR, RTS, or CTS signals.

Table 5-4. Pin Assignments for 9-Pin to 25-Pin (DTE) Cable

9-Pin Female Pin Number	Function	25-Pin DTE Pin Number	Function
—	not used	1	Shield
2	RXD	2	TXD
3	TXD	3	RXD
4	DTR	6 and 8	DSR and CD
5	Signal ground	7	Signal ground
6	DSR	20	DTR
7	RTS	5	CTR
8	CTS	4	RTS

Recommended Connections, 9-pin to 25-pin (Wyse WY-60 Terminal)

Adept recommends the use of a Wyse WY-60 terminal on S-Series Adept MV controllers. The previous table shows a full "7-wire" DTE interface with hardware handshaking (flow control). The following simplified connections will work with most terminals using DTE pinouts, such as the Wyse WY-60 terminal. The WY-60 has a female 25-pin connector. This "3-wire" interface uses software flow control (XON and XOFF control characters).

Table 5-5. Pin Assignments for 9-pin to 25-pin (Wyse WY-60 Terminal) Cable

030 RS-232		Wyse WY-60 Terminal	
9-Pin Female Pin Number	Function	25-Pin Male Pin Number	Function
—	not used	1	Shield
2	RXD	2	TXD
3	TXD	3	RXD
5	Signal ground	7	Signal ground
		 4 5 6 20 (Pins 4, 5, 6, & 20 linked together)	RTS CTS DSR DTR

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Typical Cable Connections, 9-pin to 9-pin (AT-Compatible)

The 030 module uses AT-compatible pinouts. Therefore, to connect it to another AT-compatible 9-pin device, the following connections are required to swap over signals as required. Remember to enable "modem control" (using CONFIG_C) if you are using the DTR, DSR, RTS, or CTS signals.

Table 5-6. Pin Assignments for 9-pin to 9-pin (AT-Compatible) Cable

030 RS-232		AT-Compatible	
9-Pin Female Pin Number	**Function**	**9-Pin Female Pin Number**	**Function**
2	RXD	3	TXD
3	TXD	2	RXD
4	DTR[a]	6 and 1	DSR and CD
5	Signal ground	5	Signal ground
6 and 1[b]	DSR[a]	4	DTR
7	RTS [a]	8	CTR
8	CTS[a]	7	RTS

[a] Pins 4, 6, 7, and 8 are used for "hardware handshake", also known as "modem control". In some applications you can omit some or all of these lines; consult the documentation for the device that you are connecting to the Adept controller.

[b] Pin 1 is not connected inside the Adept MV Controller. No connection is required, but if you are using a standard cable that connects to this pin no damage should occur.

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DTE, DCE, or AT-style?

There are two ways to make an RS-232 connection: detailed research and full understanding; or a try-it-and-see method. In general, you will do no harm if you make an incorrect connection between two genuine RS-232 ports. Try either of the connection types described above (DTE or DCE) and see which works. If neither works, either the other device has a non-standard pinout, or the devices are incorrectly configured (for example, different speeds or different handshake methods).

The following information may assist if you want to attempt the research method. Otherwise, we recommend you skip the rest of this sub-section.

The RS-232C standard (and its successors, EIA-232-D and ANSI/EIA/TIA-232-E) define two types of apparatus:

- DTE: Data Terminal Equipment
- DCE: Data Circuit-terminating Equipment (used to be known as "Data Communications Equipment.")

Modems are supposed to be DCE devices. Terminals are supposed to be DTE. Both are supposed to use 25-pin D-Sub connectors. The standard only defines the connector and pinout at the “point of demarcation”, which is to be no more than 3 meters from the DCE device. Computers and printers are not explicitly addressed by the standard. In practice, they often have a DTE-type pinout. Some have a DCE pinout. Increasingly, many computer devices use an IBM PC-AT style 9-pin connector, which is strictly neither DTE nor DCE.

The standard assumes that you have two devices, one DTE, the other DCE. If you need to connect two DTE devices, the standard assumed that you would use a pair of modems or other DCE devices. To directly connect two DTE devices, you need to use a null modem to make the necessary connections. A null modem is an adaptor connector (or cable) that has DCE pinouts at each end. Null modems are readily available at most computer stores. If you need to build your own null modem, the table below shows the typical pinouts.

Table 5-7. Typical 25-pin Null-Modem Adaptor Pinout

25-Pin D (male)		25-Pin D (female)		25-Pin D (male)		25-Pin D (female)	
1	Shield	1	Shield	5	CTS	4	RTS
2	TXD	3	RXD	6 & 8	DSR & CD	20	DTR
3	RXD	2	TXD	20	DTR	6 and 8	DSR & CD
4	RTS	5	CTS	7	Ground	7	Ground

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5.4 Memory

The 030 system processor can be ordered with 2, 4, or 8 MB of DRAM. Contact Adept Customer Service for information regarding memory upgrade options for 2 MB and 4 MB processors.

5.5 VMEbus Address

Each processor module in an Adept MV controller must have a unique module address. The address is set on switch SW2 on the 030 PC board. Table 5-8 shows the switch settings for multiple processor modules. See Figure 5-3 for the location of SW2.

If you are using both 040 and 030 processor modules, each module must have a unique address. You cannot set an 040 and an 030 to the same address. For example, if you have an 040 and an 030 installed, one of them must be set as module #1 and the other as module #2. See section 5.7 for additional information.

Table 5-8. Address Settings for the 030 Processor Module

Module Number	SW2 Switch Position[a]							
	1	2	3	4	5	6	7	8
1 (main proc)	Off	on	on	on	on	on	on	on
2 (auxiliary)	Off	on	on	on	on	on	Off	on
3 (auxiliary)	Off	on	on	on	on	Off	on	on
4 (auxiliary)	Off	on	on	on	on	Off	Off	on

[a] The position notation on DIP switches can vary. If the switch is marked open/closed, then open = off and closed = on.

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5.6 030 Jumper Settings

There are two jumpers on the 030 module that must be set correctly, depending on if it is used as the main processor or an auxiliary processor. See the table below and Figure 5-3.

Table 5-9. Jumper Settings for 030 Processor Module

Processor Type	Jumper Setting
030 #1 used as main processor	SCON (JP1) = ON
	SCLK (JP3) = ON[a]
030 #2-4, used as auxiliary processor	SCON (JP1) = OFF
	SCLK (JP3) = OFF

[a] SCLK (JP3) jumper is ON for the main processor when used with newer SIO modules – 30330-12350, 30330-11351, 30332-12350, or 30332-12351. All SIO modules manufactured after 1994 require JP3. It must be OFF when used with older SIO modules – 30330-00301 or 30330-10351.

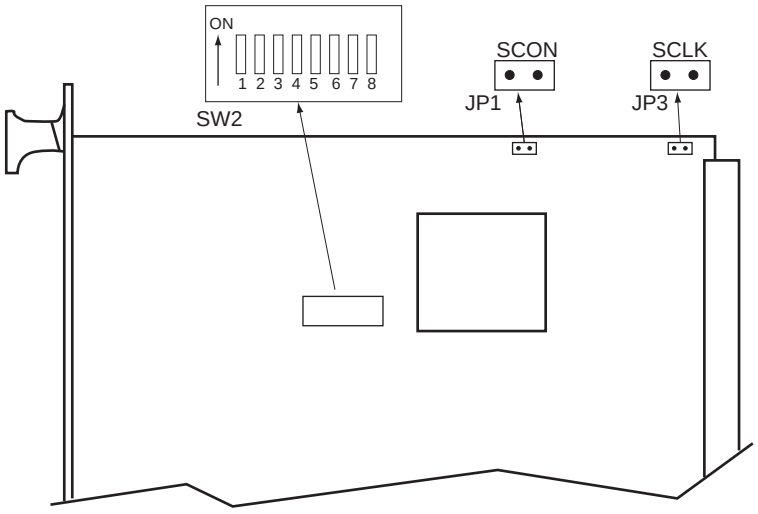


Figure 5-3. Switch and Jumper Locations on the 030 Module

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5.7 Use as an Auxiliary Processor

Additional 030 System processor modules can be installed in an Adept MV controller and used as auxiliary processors to handle specific functions in an Adept automation system. For example, you can have an auxiliary 030 dedicated to handling processing for the motion or vision portion of a system, while the main 030 handles the V+ system processing. The CONFIG_C utility program is used to specify which portions of the system software are handled by each processor. See the *V+ Release Notes* for more information on multiple processor systems. See Table 5-8 and Table 5-9 for switch and jumper settings required for auxiliary processors.

The serial ports on an auxiliary processor cannot be accessed by V+ programs running on the main processor (processor #1).

5.8 030 Processor Module Specifications

Table 5-10. 030 Technical Specifications[a]

Processor	68030 @ 40 MHz
Math Coprocessor	68882 @ 32 MHz
Dynamic RAM	2, 4, or 8 Mb
Serial Ports	one RS-232, at 300 – 38,400 bps one RS 422/485, at 300 – 38,400 bps
Electrical Power Consumption	5 VDC (+0.25V/–0.15 V) at 3.0 A max +12 VDC (± 2 V) at 10 mA –12 VDC (± 2 V) at 10 mA
Width	Occupies one backplane slot

[a] Specifications subject to change.

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