
MODEM OPERATION

The MARC 166-010 Dial-Up modem for Allen-Bradley PLCs has several operating modes that are selected by the user prior to installing the modem in the chassis. The operating mode is set using rotary switch S2 which is accessible through a rectangular cut-out on the module cover. This application note describes the various modes of operation that are available and connector and swing arm connections for the modem.

CONNECTOR PINOUT

The modem communicates serially with the PLC. The only connection to the backplane is for DC power. A 15-pin D connector is used for connection to the PLC. This connector can be configured for RS232, RS422 or RS485 operation. Standard factory configuration sets the connector for RS232 operation. The connector pin assignments are detailed below. MARC sells standard cable assemblies for connection of the modem to many standard Allen-Bradley modules.

1	GND	Signal reference
2	RD	OUTPUT Data Received by Modem
3	TD	INPUT Data to be sent by Modem
4	CTS	OUTPUT OK to send data
5	RTS	INPUT Request to Send Data
6	DSR	OUTPUT Data Set (modem) Ready
7	GND	Signal Reference
8	DTR	INPUT Data Terminal Ready
9	422TX+	422 modem output
10	422TX-	422 modem output
11	DCD	OUTPUT Data Carrier Detect
12	422RX-	422 modem input
13	422RX+	422 modem input
14	NC	
15	NC	

NOTE: The 166-010 2400 baud modem always connects to the PLC at 9600 baud, 8 data bits and no parity, regardless of the modem connect speed. The 166-010-144 high speed modem connect and operate speeds are switch selectable as detailed in the following paragraphs.

SWING ARM CONNECTIONS

A standard Allen-Bradley 10-position swing arm (1771-WC) is provided with each modem. Terminate the telephone line and the modem digital I/O as shown below:

- A Phone Line Tip (red wire)
- 0 Phone Line Ring (green wire)
- 1 Contact output Common
- 2 Contact output Normally Open, Closed for .5 sec. on ring
- 3 Not Used
- 4 Not Used
- 5 Input # 1 minus side
- 6 Input # 1 positive side
- 7 Input # 2 minus side
- B Input # 2 positive side

The input circuits to the modem are optically isolated on the board. The circuits are configured for operation at a nominal 24 volts DC. If you have an output module that can supply 24V then connect the minus side of the input to ground and the module output to the positive side. If you have an output module that provides low side switching (switches to ground) then connect a 24 V source to the positive side input and the switch module to the minus side.

The contact output that is used for ringing indication is an isolated form A contact that is rated for 7 Amps 240 Volts AC or 30 volts DC.

MODEM AND PLC BAUD RATE SELECTION

The 166-010-144 high speed modem uses rotary switches SW3 and SW4 to select the modem and PLC communication baud rates. The low speed modem does not have this option. You may wish to limit the maximum baud rate to improve communications reliability on noisy telephone lines or for other reasons. SW3 and SW4 are 16-position rotary switches. Each position corresponds to a particular baud rate as detailed in the table below. SW3 sets the maximum modem connect baud rate and SW4 selects the baud rate used to communicate with the PLC. If both switches are set to position 8 (19.2K baud) then the modem will connect at the maximum baud rate permitted by the connection.

POSITION	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
RATE	9600	110	300	600	1200	2400	4800	9600	19.2	9600	9600	9600	9600	9600	9600	9600

RING NUMBER TO ANSWER ON

Rotary switch S1 is used to select the ring number to answer on. All operating modes use switch S1 to determine the number of rings to allow before answering the call. Setting the switch to 0 will disable the auto answer mode entirely.

OPERATING MODE

Rotary switch S2 is used to select the operating mode of the modem. Switch S2 is a sixteen position rotary switch. The table below summarizes the operating modes available:

POS	MODE
0	Auto-Answer, No dial out
1	Auto-Answer, Dial out from modem digital inputs input # 1 dials primary number input # 2 dials secondary number
2	Auto-Answer, Dial using AT commands
3	Reserved
4	Reserved
5-F	not used

ENTERING DIAL-OUT PHONE NUMBERS

Operating mode 1 dials one of two possible telephone numbers based on the state of the modem digital inputs. The numbers to dial must be entered into the modem's non-volatile memory in order for this option to work. Telephone numbers are entered by connecting the serial port of a PC to the programming terminal port located on the top of the module. The programming terminal port is a RJ11 connector that has RS232 voltage level signals on its pins as noted below.

WARNING:

DO NOT CONNECT A TELEPHONE LINE TO THE RJ11 CONNECTOR. DAMAGE TO THE MODEM AND POSSIBLY TO THE TELEPHONE CIRCUIT CAN OCCUR.

An adapter cable can be made by simply removing one end of a standard modular telephone cord and connecting the wires to a DB25S connector. Connect as follows:

GREEN Wire to Pin 2

RED Wire to Pin 3

YELLOW and BLACK wires to Pin 7

Insert the program diskette into a drive, make the drive the active drive and type DIAL (enter). Follow the instructions on the screen to enter the primary and secondary dial-out telephone numbers.