MODEM OPERATION

The MARC 166-100 Dial-Up modem for Allen-Bradley SLC500 PLCs standard configuration sets up the modem for auto answer operation only. This application note describes the modem connections and an optional "DTR Dial Out" option that can be set up by the user.

The standard configuration (Board Rev. C and above) uses port 1 (upper connector) for RS232 communication and the RJ11 jack for the telephone line connection. Port 2 is not used.

STANDARD JUMPER CONFIGURATION

J1 3-4
    7-8   P1= RS232
    10-12

J2 3-4
    7-8   P2= RS232
    10-12

J3 2-3
J4 2-3
J5 1-2   2-wire operation
J6 1-2

J7-1-2   P1-Pin 4 is active

J8 1-2   P2-Pin 4 is active

J10   1-3, 4-6, 7-9, 10-12, 13-15 &16-18 P1 is DCE Pinout

P5 1-2   P1-Pin 4 (DTR) controls dial out
    5-6   P1-Pin 6 is DCD
    9-10   On-Line LED is DCD
    11-12   P1-Pin 8 is CTS
    13-14   P1-Pin 2 is Received Data
    15-16   P1-Pin 7 is RTS
    17-18   P1-Pin 3 is Transmit Data

P4 1-2   Error LED is enabled
    5-21   Modem is enabled
    13-14   DTR Dialing enabled
    25-24   On-Line LED is DCD

CONNECTOR PINOUT

Connector P1 is used for RS232 communication. The pin-out of connector P1 with standard jumpers installed is shown below. The connections shown below are "DCE" connections. Connector P1 can be setup to have "DTE" connections by changing jumper J10 to have the following connections: 2-4, 3-5, 8-10, 9-11,14-16 and 15-17. This will effectively reverse the signals on pins 2 and 3, 4 and 6 and 7 and 8. Connector P2 is always a DTE connector.

```
1  NC    Used only for RS422/RS-485 operation
2  RD    OUTPUT Data received by modem
3  TD    INPUT Data to be transmitted from modem
4  DTR   INPUT Data Terminal Ready (can be used to initiate dial-out)
5  GND   Signal reference
6  DCD   OUTPUT Data Carrier Detected (connection established)
7  RTS   INPUT Request to send to modem
8  CTS   OUTPUT Clear to Send from modem
9  NC    Used only for RS-422/RS-485 operation
```

The RJ-11 connector is used for connection to the telephone line. A standard modular line cord can be used for the telephone connection. The RJ-11 pin-out is shown below.

```
1  NC
2  NC
3  TIP
4  RING
5  NC
6  NC
```

DIAL-OUT PHONE NUMBER INITIALIZATION

The modem must be configured with a telephone number if the DTR Dial feature is to be used. To initialize the modem connect a standard terminal to port 1. Set the terminal for operation at 2400 baud, 8 data bits, no parity and one stop bit (2400,8,N,1). Apply power to the 166-100 modem. Hit the ESC key on the terminal several times while the modem is performing its power-on initialization. When the modem recognozes the ESC key it will abort its normal sequence, turn on the red ERROR LED and prompt for the number to be used. Enter the complete "AT" dial string for the modem including any control commands required. Don't forget a carriage return at the end. Terminate the entry with a period. When the period is entered the ERROR LED will go off and the modem will complete its initialization sequence. If an error is made you must start over by cycling the power and restarting the initialization procedure. The following example shows a typical dial string that will tone dial area code 713 number 472-6272.

ATDT7134726272(cr).

In addition to the dialing digits (0-9, *, # and A-D) the following characters can be entered to modify the dial string when required:
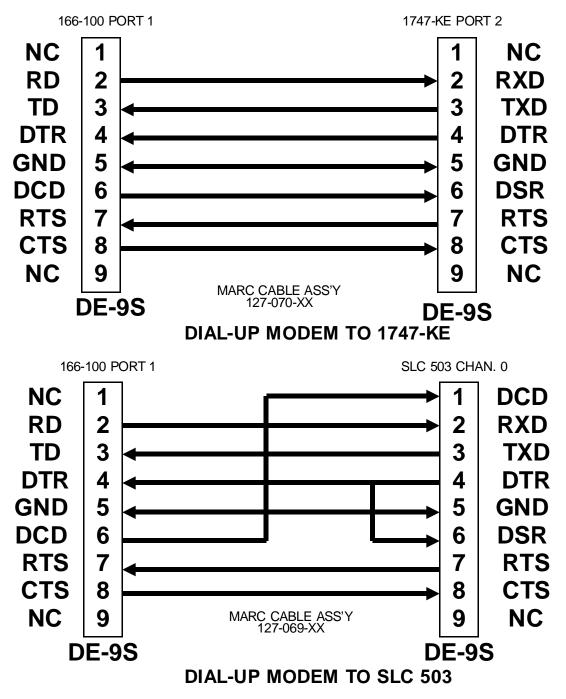
P Pulse Dial the following digits
T Tone Dial the following digits
W Wait for second Dial tone
,   Pause for 2 seconds
!   Flash Hook-modem pulses on-hook
@ Wait for quiet answer (wait for 5 seconds of quiet before continuing)
;   Return to command state after dialing

DTR DIAL OPERATION

The DTR pin on connector P1 can be used to initiate a call sequence. A dial-out telephone number must first be configured as described above for this feature to operate. The state of the DTR input is saved when the modem completes its initialization sequence and the modem starts looking for transitions on the DTR line. When the DTR line transitions from OFF to ON the dial-out string will be used to dial a number. When the DTR transitions from ON to OFF a hang-up sequence will be initiated. A hang-up sequence consists of 3 steps. First the RS-232 port is disabled for 2 seconds. Then the modem is forced back to command mode and a hang up string sent. Transitions of the DTR signal during the hang-up sequence are ignored.

TYPICAL CONNECTIONS

The following two diagrams detail the most common cable connections to the Dial-up modem. Other configurations are possible depending on the application. Please contact the ccustomer support department at the numbers listed below for assistance when building custom cable assemblies.

166-100 PORT 1   1747-KE PORT 2

166-100 PORT 1				1747-KE PORT 2
NC	1		1	NC
RD	2	→	2	RXD
TD	3	←	3	TXD
DTR	4	←	4	DTR
GND	5	←	5	GND
DCD	6	→	6	DSR
RTS	7	←	7	RTS
CTS	8	→	8	CTS
NC	9		9	NC

DE-9S   MARC CABLE ASS'Y 127-070-XX   DE-9S

DIAL-UP MODEM TO 1747-KE

166-100 PORT 1   SLC 503 CHAN. 0

166-100 PORT 1				SLC 503 CHAN. 0
NC	1		1	DCD
RD	2	→	2	RXD
TD	3	←	3	TXD
DTR	4	←	4	DTR
GND	5	←	5	GND
DCD	6	→	6	DSR
RTS	7	←	7	RTS
CTS	8	→	8	CTS
NC	9		9	NC

DE-9S   MARC CABLE ASS'Y 127-069-XX   DE-9S

DIAL-UP MODEM TO SLC 503