

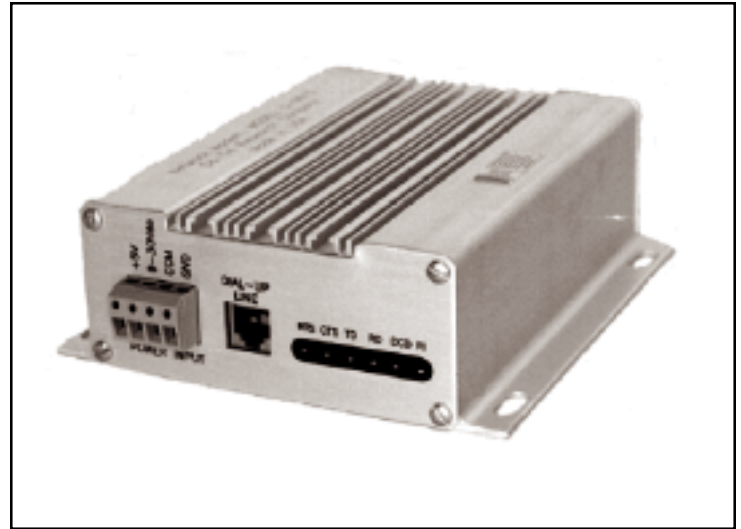


# INSTRUCTION INFORMATION

## DIAL-UP NETWORK MODEM G-9615A

### GENERAL DESCRIPTION

The Dial-Up Network Modem, model G-9615A, is designed to communicate either RS-232 or RS-485 serial data over the public dial-up telephone system. Powered from either +5Vdc regulated power or unregulated 9-30Vdc, the G-9615A communicates at various baud rates over the 2-wire dial-up telephone lines. The installed OEM modem determines the maximum baud rate with a maximum of 33.6kBPS over RS-232 or 9600BPS over RS-485 network lines. The four optional modems generate TTL level serial data which can be field directed to either the RS-232 port or the optional RS-485 port by a mode selector switch.



### INSTALLATION

#### Power Connections:

For installations where regulated 5Vdc is available, connect the +5V to P3, terminal 1, and the power common to COM on P3, terminal 3. If only 9-30Vdc is available, typically 12Vdc or 24Vdc, an internal regulator will generate the 5Vdc. For this type of installation, connect the + to the 9-30Vdc, terminal 2, and the power common again to terminal 3, all of P3. For the internal protective circuitry to be active in protecting the dial-up line input and RS-485 lines, a good ground should be connected to P3 GND, terminal 4.

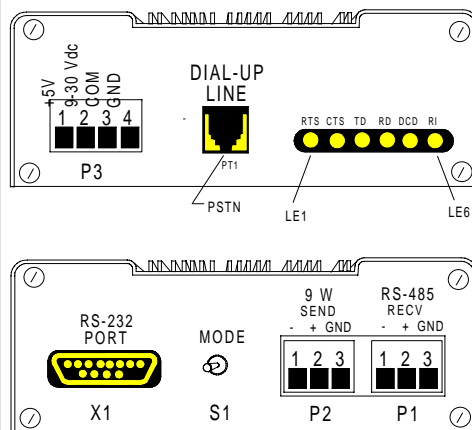
#### Dial-Up Line Connections:

The 2-wire communication pair is terminated on an RJ-11 jack with the 2-wire lines on the center pair. These two wires are both send and receive.

#### RS-232 Port Connections:

The RS-232 port exhibits  $\pm 10V$  levels for interfacing to the customer device. The modem has a 9-pin D-shell, female connector and, therefore, requires the device connection to be a 9-pin male-type connector. The signalling is as in

Table 1. The RTS/CTS signalling affects the modem control while DCD indicates when modems have connected. The RI line is connected to pin 9 only if J1 is installed. Some devices are confused by the presence of RI on pin 9. Note that the RD designation is for



data flowing out of the modem and TD is for data flowing into the modem.

#### RS-485 Port Connections:

The RS-485 4-wire port is an isolated 5V signalling system typically used on networked devices of up to 32 in number. P2 is the send port of the RS-485 and signals to the devices while P1 is

TABLE 1

9-PIN TERM.	DESCRIPTION
1	Data Carrier Detect
2	Received Data out of Modem
3	Transmit Data into Modem
4	N/C
5	Circuit Common
6	N/C
7	Request-to-Send
8	Clear-to-Send
9	Ring Indication

the receiver port of the RS-485 and takes in signals from the devices. The receiver of the devices is connected to the send of the modem (P2) and the send of the devices is connected to the receive of the modem (P1). The polarity is usually opposing as in Table 2.

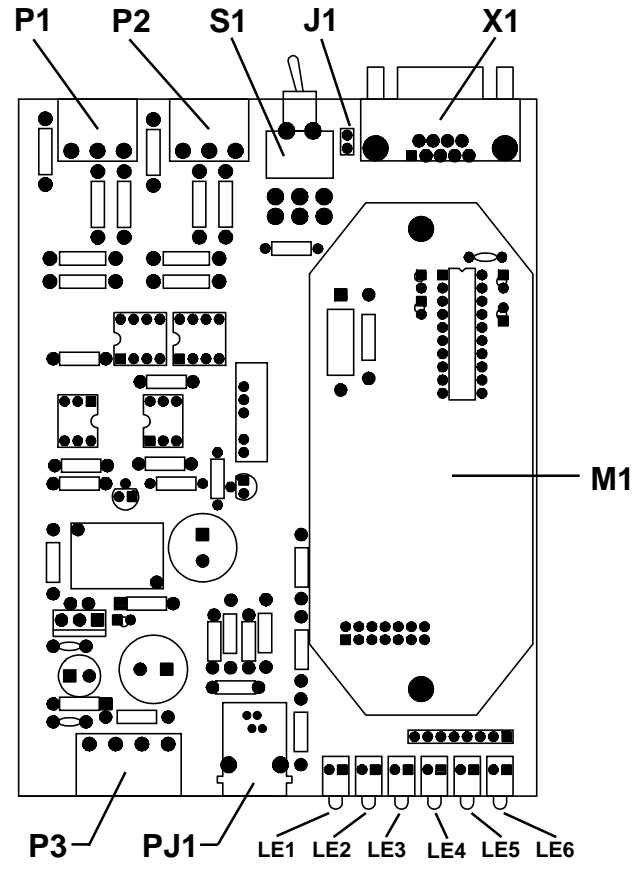
TABLE 2

	DEVICE	G-9615A RS-485 PORT	
SEND	+	-	P1
	-	+	
RECV	+	-	P2
	-	+	

The polarity can be the most confusing. If it is observed that the front panel LED for RD glows with no response from the device on TD, swap the polarity and try again.

**Indicators:**

- LE1, RTS (Request-to-Send): signal from device to indicate wanting to send data, ON for RTS high, >3V.
- LE2, CTS (Clear-to-Send): signal to device indicating modem okay to send data, ON for CTS high, >3V.
- LE3, TD: Transmitted Data into modem to be sent over dial-up line, ON for TD Data, >3V.
- LE4, RD: Received Data out of modem from tones on dial-up line, ON for RD Data, >3V.
- LE5, DCD (Data Carrier Detect): signal indicating both modems synced and operating, ON for DCD high, >3V.
- LE6, RI (Ring Indication): indicates an incoming ring, ON for RI low, 0V.



*Simplified layout of the G-9615A*

**Mode Switch (S1):**

The mode switch selects which port communicates serial data. When S1's bat is toward the 9-pin D-shell, RS-232 data is accepted. When there is no RS-485 port installed, the mode switch is jumpered to the RS-232 port.

**PROGRAMMING**

In order for the dial-up modem to properly handshake with the connected device, the profile must be stored into the modem via the RS-232 port. A terminal program communicating over the RS-232 port is able to properly signal the modem to store the profile. The proper profile is many times a trial-and-error process with lots of educated guessing. Table 3 offers some guidelines and a description of the program parameters. Also, refer to the AT Command Set that accompanies this documentation.

**TABLE 3**

PARAMETER	DESCRIPTION/COMMENTS
\Q0	Disable Flow Control. Some devices do their own flow control by hardware or buffering; therefore, the flow control must be disabled.
Q1	Result Codes Disabled. As the modem steps through sequences it throws codes at the device and those often must be disabled.
&C0	DCD Always Active. Some devices don't want to see the DCD bouncing on when the modems have connected. They must be made to be high always. Other devices want to see DCD to activate the next control command once the hardware DCD says the modems are connected.
\N7	Set Auto-reliable Mode. Some devices look for some coding to get more reliable data such as LAPM, MNP enabled.
%CO	No Data Compression. Sometimes data compression algorithms foul the devices.
%B9600	Modem Port Rate=9600. Most devices cannot negotiate higher baud rates on the fly so the baud rate must be set.
S00=1	Set S-Register 00 to 1. In a typical situation the modem needs to be in an auto-answer mode.
AT&V	Observe stored profile.
AT&W0	Store new profile to stored profile 0.

**SPECIFICATIONS**

ENCLOSURE: 5.3"L x 3.95"W x 1.75"H  
extruded aluminum housing.

WEIGHT: 16 oz.

MOUNTING HOLE PATTERN:  
4.75" x 4.25", 4 holes, 0.156" x 0.5"  
slots.

TEMPERATURE RANGE: 0° to +70°C.

**MODEM:**

- 0° to +50°C standard
- 'AT' command structure with extensions
- Nonvolatile configuration setup
- V.42 Bis, V.42, V.32 Bis, V.32, V.22, Bell 212, V.21 and Bell 103
- Asynchronous 10-bit operation (including start, stop, parity)
- Error correction and data compression
- FCC approved
- 2-Wire, full-duplex over PSTN
- Sensitivity -45dBm.

**RS-232 INTERFACE:**

- ±3V to ±10V levels, not isolated
- 9-pin DB-9S female D-shell
- RTS, CTS, DCD, TD, RD, RI supported
- Full-duplex, 33.6kBPS, maximum
- RI is TTL

**RS-485 INTERFACE:**

- 5V levels, 500V isolation
- Transient protected
- Two 3-wire removable screw connections
- Full-duplex, 4-wire with shield
- 9600BPS, maximum

**POWER:**

- +5Vdc, 9-30Vdc, 2W, maximum
- All specifications are subject to change.

**TESTING AND CALIBRATION**

To functionally test the modem construct the setup in Figure 1 using a telephone line simulator such as the Teltone TLC-4. Connect the PC and internal modem to port 1 of the line simulator while running a terminal program. Connect another port of the line simulator to the G-9615A at PJ1. Connect the PC which is running another terminal program, to X1 of the G-9615A using a serial cable. With the mode switch connecting the RS-232 port and the G-9615A powered-up, dial the G-9615A using the line simulator line # as such:

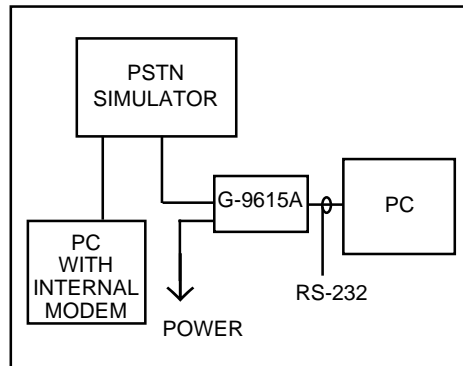
atdt102.

The units should synchronize. Once both units connect, keyboard data should key through properly in both directions. Issue an Alt-H to hang up

both ends and then dial the other direction. Data should again pass without a problem.

To check the RS-485 port operation a device must be connected and the proper profile loaded in the modem to talk to that device. Once the above check of the RS-232 port is complete, the RS-485 port must only be checked in a receive mode as a device that is downloading data.

**FIGURE 1**



**THEORY OF OPERATION**

The OEM modem M1 requires only a

small amount of support circuitry to function as a complete modem. The OEM modem M1 is a 5V device and must either be powered from 5V or have a converter to provide the 5Vdc. A simplified switching regulator converts the 9-30Vdc to +5V to power the support circuitry. Avalanche diodes and an MOV lend some protection beyond FCC typical protection since the installed environment is quite harsh. A single chip TTL to RS-232 converter generates the ±10V levels of the RS-232 internally and then converts to the RS-232 TTL levels of the modem.

The RS-485 converter isolates the TTL levels of the OEM modem with optoisolators and then uses the power from a dc-dc converter to convert the optoisolator outputs to RS-485 levels using RS-485 level transceivers. Note that the RS-485 port provides no handshaking similar to the RS-232 and, therefore, can only operate in a full-duplex, 4-wire mode. The mode selector switch moves data between the interface section via the TD and RD lines only.

**REPLACEABLE PARTS LIST**

CIRCUIT SYMBOL	DESCRIPTION	STOCK #
LE1-LE6	LED, Red, 550-0406	010001
CR10	Diode, IN4004	010020
CR4-CR9	Diode, P6KE10CA	010337
CR1-3	Diode, P6KE200CA	010339
CR11	Diode, UF4002	010351
C3	Capacitor, EL., 150uf, 16V	020030
C9	Capacitor, EL., 330uf, 16V	020110
C6,C8	Capacitor, EL., 470uf, 50V	020111
C11-C14	Capacitor, TAN., 10uf, 16V TAP	030152
C7	Capacitor, TAN., 6.8uf, 16V TAP	030161
C1,C2	Capacitor, CER., .003uf, 3KV	040060
C5,C10,C15	Capacitor, CER., .1uf, 50V	040080
C4	Capacitor, MYLAR, .01uf, 100V	050010
U3,U5	I.C., 4N35	080320
U1	I.C., MC145407P	081121
U2,U4	I.C., MAX483CPA	081422
VR1	I.C., LM2575T-5.0	081450
VR2	Voltage Reg., 105S5FS	081529
Q1	Transistor, 2N3903	090050
Q2	Transistor, 2N3905	090060
R14	Resistor, COMP., 1/4W, 100	130020
R7,R13	Resistor, COMP., 1/4W, 1K	130030
R3	Resistor, COMP., 1/4W, 10K	130040
R8	Resistor, COMP., 1/4W, 470	130250
R10,R15,R16	Resistor, COMP., 1/4W, 4.7K	130260
R5,R6,R11,R12	Resistor, COMP., 10Ω, 1/2W	130731
RN1	Resnet, 8-1-102	139967
L2	Inductor, PE-52647	150460
L1,L3	Inductor, Miller 77F100K	150461
P3	Phoenix, 1757491 (4P VRTCLS)	171200
P1,P2	Phoenix, 1754465 (3P Plug)	171217
P1,P2	Phoenix, 1754452 (3P VRTOPN)	171219
P3	Phoenix, 1769036	171225
X1	AMP, 745395-2	171241
S1	Switch, MTM206NRA AUGAT	180760
MO1	MOV, V250LA20A	250143

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**NOTICE**

As of the date of this printing, the specifications for the G-9615A in this Instruction Information sheet apply to all G-9615A Network Modem, except as indicated. Because all Da-Tel products are continually being refined and improved, these specifications are subject to change without notice.