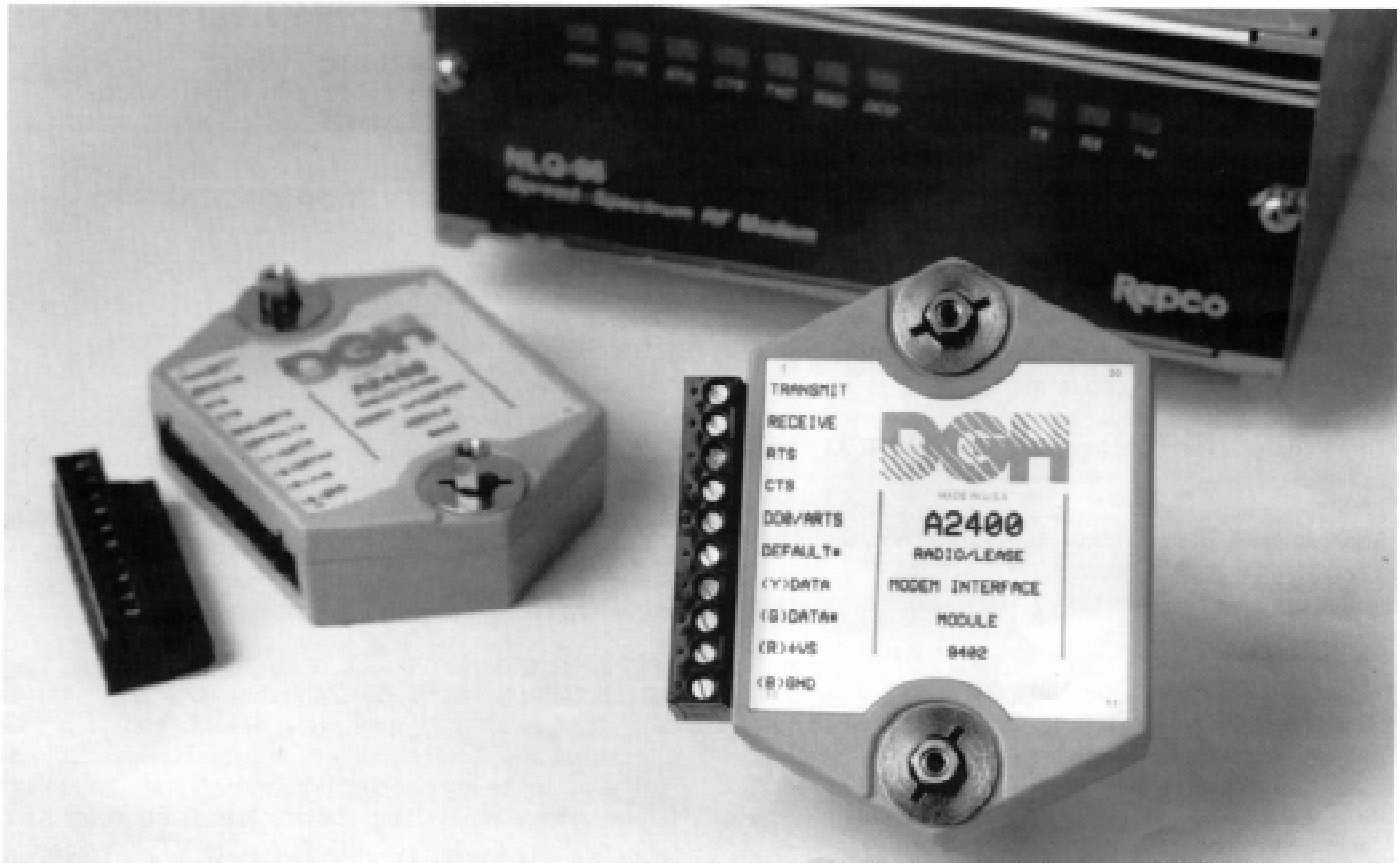
A2400 RADIO MODEM MODULE



FEATURES

- CTS/RTS support for radio and leased line modems.
- Standard baud rates: 300 to 38.4K baud.
- Automatic internal RS-485 bus supervision.
- Networking up to 4,000 feet.
- Transient suppression on RS-485 data lines.

APPLICATIONS

- Interface DGH RS-485 modules to any radio or leased line modem
- Expand existing RS-485 networks

GENERAL DESCRIPTION

The A2400 is an RS-232/RS-485 converter designed to interface all DGH RS-485 products to radio and leased telephone line modems. The DGH modules have a quick response turnaround time. After a module receives a valid command, it only takes 10ms for the module to begin transmitting data to the host. This response time is much too fast for the transmitter turn-on delays associated with radio and leased telephone line modems.

Many radio and leased line modems require an RS-232 signal to activate, or “key-up”, the transmitter. They also require adequate time for the transmitter to turn on before transmitting any data. This transmitter turn-on delay time mandates that the data be delayed while the transmitter is turning on. The amount of delay time required varies between modem types and manufacturers. Typical time periods range from 150ms for leased line modems to 500ms for radio modems.

The A2400 solves this problem by providing user-programmable delay times between the modem’s transmitter key signal (RTS) and the transmitted data. It also automatically performs bus arbitration to convert the unidirectional RS-232 signals to bidirectional RS-485 data.

The A2400 may be used to interface a radio modem to a string of DGH products using the multidrop RS-485 bus. The RS-485 bus is preferable to RS-232 because it is a true multidrop system that provides high communication speeds over long distances with superior noise immunity.

The A2400 is packaged in the same case as the D1000/2000 series.

SPECIFICATIONS (typical @ +25° C and nominal power supply unless otherwise noted)

Digital
- 8-bit CMOS microcomputer.

Digital outputs
- 0 to 5V, 30mA max. load.

Communications
- Communications in ASCII via RS-232C, RS-485 ports.
- Selectable baud rates: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.
- NRZ asynchronous data format; 1 start bit, 7 data bits, 1 parity bit and 1 stop bit.
- Parity: odd, even, none.
- User selectable channel address.
- ASCII format command/response protocol.
- Supports Clear to Send (CTS)/Request to Send (RTS).
- Communications distance up to 4,000 feet (RS-485).
- Transient suppression on RS-485 data lines.
- Communications error checking via checksum.
- Can be used with “dumb terminal”.
- Scan up to 250 channels per second.
- All communications setups stored in EEPROM.

Power
Requirements: Unregulated +10V to +30Vdc, 0.5W max.
Internal switching regulator.
Protected against power supply reversals.

Environmental
Temperature Range: Operating -25°C to +70°C.
Storage -25°C to +85°C.
Relative Humidity: 0 to 95% noncondensing.

Surge Protection
The A2400 RS-485 drivers contain internal high speed transient suppressors on each RS-485 data line to protect the driver from dangerous voltage levels, or spikes. Thermistors are in series with each RS-485 data line to protect the drivers against overcurrent and excessive voltage conditions. In a fault condition the normally low impedence thermistor reacts by rapidly increasing its impedance thereby limiting excessive current flow. Once the fault condition is corrected the thermistor will return to a low impedance.

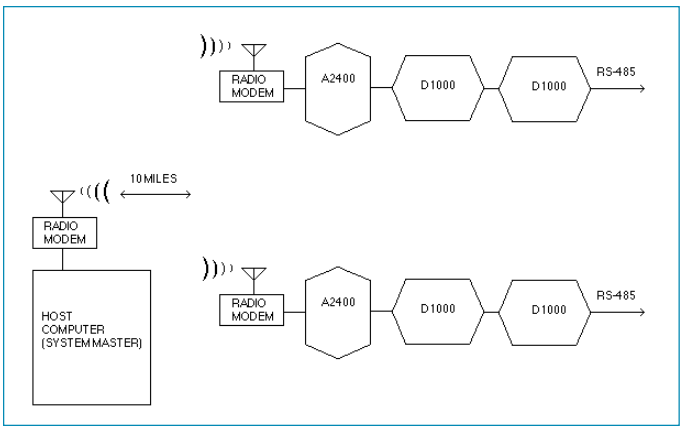


Figure 1. Typical system overview.

Table 1. DGH A2400 Command Set

Command	Definition	Typical Command Message	Typical Response Message
DO	Digital Output	$1DO01	*
RD	Read Data	$1RD	*+99999.99
REA	Read Ex. Address	$1REA	*3031
RID	Read Identification	$1RID	* TANK FARM 1
RS	Read Setup	$1RS	*31070000
RSU	Read Setup	$1RSU	*31070000
RT1	Read Time delay 1	$1RT1	*+00100.00
RT2	Read Time delay 2	$1RT2	*+00352.00
RT3	Read Time delay 3	$1RT3	*+00050.00
WE	Write Enable	$1WE	*
Write Protected Commands			
EA	Extended Address	$1EA3031	*
ID	IDentification	$1ID TANK FARM 1	*
RR	Remote Reset	$1RR	*
SU	Setup	$1SU31070000	*
T1	Set Delay Time 1	$1T1+00100.00	*
T2	Set Delay Time 2	$1T2+00352.00	*
T3	Set Delay Time 3	$1T3+00050.00	*

Radio Modems
Radio modems are used in data acquisition applications where the sensor data is inaccessible to the host computer due to large distances or the lack of telephone facilities to incorporate conventional dial-up modems. In some cases, sensor data may have to be monitored full time and telephone service may be cost-prohibitive.

Unfortunately, radio modems are designed for computer-to-computer communications and require a certain amount of intelligence at each radio site in order to construct useful systems. The cost of a local computer at each radio can easily make the concept impractical. The A2400 fills the need for a low-cost intelligent interface between the radio modem and the RS-485 data acquisition devices.

Figure 1 shows a typical system, there is one master computer and any number of slave sites. The primary function of the A2400 is to control the slave transmitter to allow multiple slave sites. In an idle condition all slave transmitters are turned off. Each slave site is assigned a unique address so that the master may direct commands to a particular site. To initiate communications, the master will transmit a command by radio which is received by all of the slaves. The transmitted command contains an address which directs the command to a particular slave site. The slave site with that address will respond to the command. Then the addressed slave site will turn on its radio transmitter and communicate back to the master in response to the command. Once the response is complete the slave will turn off the transmitter and wait for a new command. To avoid interference, only one slave transmitter can be on at any given time.

Leased Lines
Typically, leased lines do not have dial-up capability and a means of addressing and multiplexing must be employed if multiple stations are used. A2400’s may be used with leased telephone lines in the same way as radio modems.