

Remote Terminal Unit



INPUT/OUTPUT OPTIONS

The M1732 offers a full range of process interface capability for both analog and digital signals or “points” including analog inputs, analog outputs, digital contact inputs and outputs and relay outputs. All of the I/O signal conditioning cards are modular so that the RTU can be easily sized to meet system requirements.

The Analog Input Module measures +/-10 VDC or 4-20 mA signals with a high-accuracy 12 bit A/D. It can also be configured to function as an accumulator. The Analog Output Module can provide both 0-5 VDC and 4-20 mA signals. The Digital Input/Output Module allows individual points to be configured either as inputs or outputs and to specify whether the point is normally open (NO), normally closed (NC) or momentary. Digital inputs can also be configured as pulse counters. Provision is made to debounce both analog and digital signals.

FEATURES

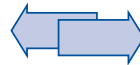
- Up to 455 Input/Output points/RTU
- Modular digital and analog I/O
- Programmable local logic, data logging and failsafe operation
- Conventional or trunked radio interface
- Telephone, cell-phone or wireline options
- Optional spread-spectrum radio
- Over-the-air programming (OTAP)

OVERVIEW

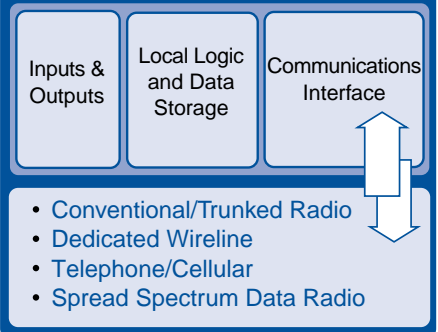
Zetron Model 1732 Remote Terminal Units (RTU) are the next generation SCADA/Telemetry system from Zetron. The M1732 is a cost-effective solution for applications that need to connect widely distributed remote sites to a central control program using radio, telephone or wireline communications media.

The M1732 interfaces easily with a wide variety of field equipment at the remote sites including inputs from analog and digital sensors as well as outputs to control devices such as contact switches and set-point controllers. System integrators can configure the M1732 to initiate alarm-on-exception reports to the central host controller, execute complex control algorithms based on sensor inputs, and store measurement data for later recall.

PROCESS

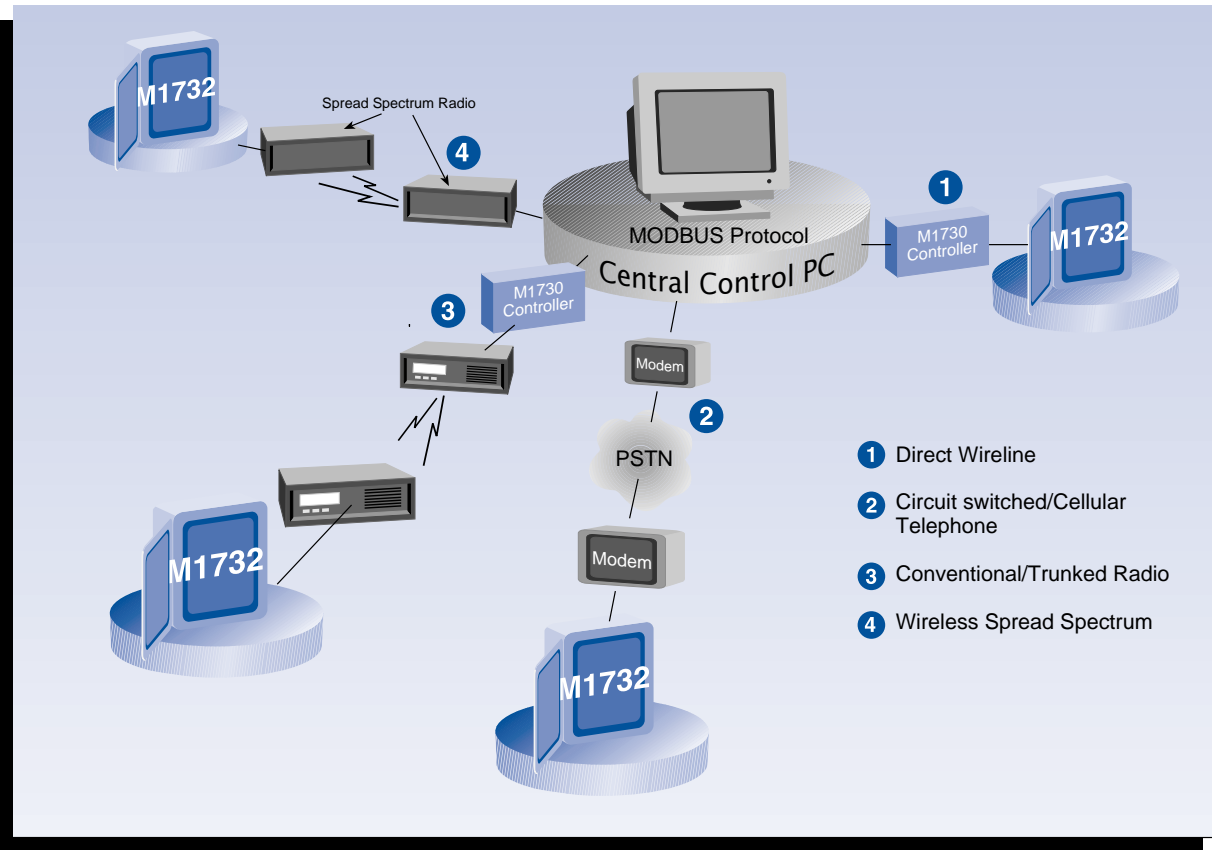


MODEL 1732 RTU



OPERATION

The M1732 typically operates with conventional or trunked radio systems, direct audio leased lines, or microwave to communicate with a Model 1730 System Controller for both periodic polling and alarm-on-exception reporting. In addition, the M1732 can be configured to report directly to the central control system over spread spectrum radio, cellular or conventional telephone. The M1730 supports most third party control systems using MODBUS protocol.



MODBUS Operation

The M1732 uses the MODBUS protocol in two ways. First, the Model 1732 can be configured as a MODBUS client with the central host system polling the RTU directly via spread spectrum data radio, telephone or serial data connection. Alternatively, the M1732 can communicate with a Zetron M1730 Controller via conventional or trunked radio. The M1730's MODBUS protocol serial interface presents a virtual RTU to the host controller. This configuration allows RTUs distributed over a wide area to be regularly polled and to immediately deliver alarm-on-exception information to the M1730 Controller. Rapid scanning of the M1730 by the host ensures timely delivery of alarm information.

COMMUNICATIONS OPTIONS

The M1732 can use a variety of wireless and wireline technologies to communicate to the central host controller. While most M1732s use trunked or conventional radio to provide wide-area coverage, options are also available for conventional or cellular telephone service, spread spectrum data radios and direct connection via audio wireline. It is even possible for a single system to use several different modes to communicate with different groups of RTUs.

Wireless Radio Modem

The standard M1732 Radio Interface transmits information using a packet switching technology, a

proven world standard optimized for wireless data operations. Each data transmission is error checked and acknowledged.

The Radio Interface interfaces easily with most popular conventional or analog trunked radios in all licensed and unlicensed spectra. Standard radio protocol is followed with conventional radios by listening for carrier or receiving the "go-ahead" signal from a trunking radio before transmitting. If acknowledgment is not received, the message is resent. Typical transmissions require only a few seconds of air time.

Coverage area for wireless SCADA is as extensive as the reach of the wireless communication infrastructure. To further extend the system into difficult areas, the Radio Interface has a multi-step "Store and Forward" capability. This allows RTUs out of range of the central controller to communicate through intermediate RTUs acting as relay points.

Spread Spectrum Radio Connection

Licenseless spread spectrum radio is often an attractive wireless alternative to conventional or trunked radio. The M1732 Spread Spectrum Radio module connects to the serial port of the M1732. A Spread Spectrum Radio module located with the central host allows communications with the remote M1732s using the MODBUS protocol.

Telephone Network Connection

An important capability of the M1732 is its ability to communicate over circuit-switched wireline or cellular telephone networks. The Telephone Interface module uses an industry standard command set to establish and control communications. The M1732 can respond to poll requests from a central host and initiate alarm-on-exception communications.

Dedicated Wireline Connection

Some applications require a M1732 connection to the host over dedicated wireline. This is easily done using audio grade circuits and the Radio Interface Module communicating with a M1730 Controller. For shorter distances, an RS-232 connection directly between the M1732 and the host system allows communication at speeds up to 19,200 baud.

LOCAL LOGIC AND DATA LOGGING

Local Control Functions

A very powerful capability of the M1732 is its ability to execute user-defined local control programs. These programs, written in a simple, BASIC-like language, allow the RTU to perform logical operations on measured inputs, to create combined or conditional inputs and to implement complex control algorithms. These "ladder logic" type operations make the M1732 a valuable addition to the overall system management solution.

Fail-safe/Lost Communications Operation

In the event of loss of communications between the RTU and the host controller, the M1732 can automatically switch to a "fail-safe" mode that may involve placing outputs in a pre-set states or operating control outputs based on local inputs. Similarly, other conditions such as the loss of primary power may be used to shut down equipment or turn-on auxiliary power supplies.

Data Logging

Many applications require the collection of data for archival or regulatory documentation. Often it is important that data collection continue during temporary loss of communications. Other systems may be interested only in data collected when specific or unusual events occur. The M1732 with its flexible logic can easily meet a wide variety of data logging requirements by storing measurement information for later retrieval over the communications link.

CONFIGURATION AND PACKAGING

The M1732's modularity is the key to its flexibility and expandability. All M1732s include the basic Core module that includes 8 Digital Inputs, 4 Digital Outputs and 1 Relay Output as well as processor, non-volatile memory, and battery-backed real-time clock. Option modules to meet specific system requirements are connected by a 10-pin ribbon cable and mount within a convenient housing.

Option Modules

Option modules add functionality and capacity to the basic system. Available options include:

- Radio Interface Module
- Telephone Interface Module
- Spread Spectrum Radio Module
- Analog Input Module
- Digital Input/Output Module.
- Analog Output Module
- Relay Output Module
- AC Power Module
- Battery Charger Module

Enclosure Options

The M1732 is suitable for installation in a wide range of environments. The Core Modules are available with three backplane configurations accommodating 4, 13 or 28 option modules. These may be mounted in customer supplied enclosures or in standard-sized NEMA 4 or 4X enclosures supplied by Zetron for the larger backplane sizes. These housings are intended for indoor or outdoor use and provide protection against dust, rain, splashing water and corrosion.

Field Expandability

The M1732 is easily field expandable to meet changing system needs. All that is required is to add the necessary modules and to make the necessary modifications software with the Configuration Utility.

RTU Programming

The M1732 is very flexible and readily adapts to specific application needs. Once the hardware modules are defined, the Configuration Utility is used to determine the specific operation and alarm limits of each input and output. Local control functions and data logging are important features of the M1732 and are invaluable in maintaining process operation in the event of temporary communications loss. The Configuration Utility is used to specify the local logical operations and data logging parameters.

The M1732 Configuration Utility allows users to program the M1732s off-line and download configuration parameters via direct local PC connection or remotely via the radio or telephone communication channel.

SPECIFICATIONS

AGENCY COMPLIANCE

FCC Part 15 for Electromagnetic Interference (EMI) and Part 68 for Telephony Interfaces

CE Approved

PHYSICAL SPECIFICATIONS (OPERATING)

Temperature 0 to 50 degrees C
Humidity 0 to 95% non-condensing

BASIC HARDWARE

Watchdog timer and power monitoring for failsafe operation
LED indicator of unit status

Battery backed Accuracy to ± 55 PPM at 30C,
Real Time Clock ± 120 PPM from -10 to 70C

Basic Hardware includes connections for 8 digital inputs, 4 digital outputs, and one relay output.

Unit Housing*

Zetron Case For up to 4 expansion modules
Approx. 7.5" x 12" x 7"

Medium NEMA* Case For up to 13 expansion modules
14" x 16" by 6"

Large NEMA* Case For up to 28 expansion modules
20" x 24" by 8"

*NEMA units are NOT included and must be purchased separately.

POWER SUPPLY

Standard 16VDC 2A max, 120VAC input

Optional 220VAC input

Battery Charger Module

7Ah sealed Gel Cell battery

Power Requirements

Core Module	250 mA max, 200 mA typical
Radio Interface Module	100 mA max, 40 mA typical
Phone Modem Module	100 mA max, 50 mA typical
Analog Input Module	50 mA max, 30 mA typical
Analog Output Module	50 mA max, 20 mA typical
Digital I/O Module	50 mA max, 20 mA typical
Relay Output Module	200 mA max, 20 mA typical

COMMUNICATIONS SPECIFICATIONS

Telephone Modem

Ringer equivalents 0.45B

Automatic line seizure

- Maximum voice power output to PSTN, -10 dBm
- Maximum DTMF power output to PSTN, -1 dBm

DTMF signal 100 msec on/100 msec off

Zetron Radio Interface

Input levels 50 mV to 5 Vpp,
Adjustable with two gain ranges

Input impedance > 50 kohms at 1 KHz

Output level 50 mV to 5 Vpp, Adjustable with two gain ranges

Zetron Radio Interface (continued)

Output impedance < 700 ohm at 1 KHz

— Flat audio in and flat audio out

— COR adjustable 0.1 to 4.5VDC

PTT output relay to ground < 300 mA max, normally open or closed position

Spread Spectrum Radio

Frequency Range 902 to 928 MHz

Modulation Type Spread spectrum GFSK

Spreading method Frequency hopping

RF Power Output Up to 1 watt

Data Rate 1200 bps to 115.2 kbps

RS-232 Connection

One RS-232 channel with full handshake (RTS, CTS, and DTR, RI). Speeds to 9600 bps.

I/O MODULE SPECIFICATIONS

The user configures I/O modules to meet the needs of each application. The M1732 can include up to 16 modules.

Digital I/O Module

16 digital inputs/outputs per module

Digital outputs - open collector 50VDC max, 100 mA Max.

Digital Inputs referenced to ground, Weak pull-ups provided (to +12V).

Contact closure to ground or 0-5V Voltage change.

Logic Low <600 ohms or < 1.0VDC

Logic High >2.5 kohms or >2.0VDC

Protected to +50VDC through 1 kohm

Relay Output Module

Six Relay outputs per module

Form C contacts 120VAC 1A, 24VDC 2A

Analog Output Module

Four Analog outputs per module

8 bit DAC, single ended referenced to ground 0-5V or 4-20 mA

Voltage output accuracy $\pm 0.5\%$ of values ± 40 mV at zero to 50 degrees C

Current output accuracy

— Max load 800 ohms

— Zero to 50 degrees C $\pm 3.75\%$ of value ± 0.16 mA

Analog Input Module

11 Analog Inputs per module, single ended, referenced to ground

12 bit resolution

Voltage Range ± 10 V

Accuracy $\pm 0.7\%$ of reading ± 40 mV (-20 to 50 degrees C)

Linearity ± 10 mV or ± 2 counts

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See Zetron price list for option pricing. Specifications subject to change without notice.

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