

RMU16 Remote Monitoring Unit Installation and Operation Instructions

RMU-97070N
Revised 11-99
Section 50
00-02-0319



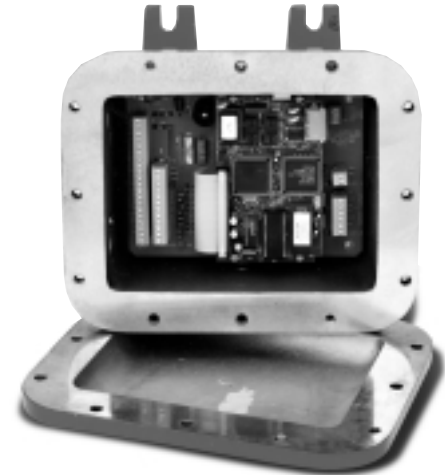
Please read the following information before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install this unit and make sure it conforms to NEC and local codes.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS MURPHY PRODUCT

- ✓ **Disconnect all electrical power to the machine.**
- ✓ **Make sure the machine cannot operate during installation.**
- ✓ **Follow all safety warnings of the machine manufacturer.**
- ✓ **Read and follow all installation instructions.**



Description

The RMU16 is a remote monitoring unit. The RMU16 performs all necessary functions including data acquisition, alarm processing, data logging and telecommunications. The RMU16 is powered by 10-32 VDC systems and comes loaded with operating software.

The RMU16 includes eight (8) analog inputs and two (2) relay outputs. Each of the eight inputs accepts 4-20 mA analog signals such as Murphy's PXMS pressure transmitters, RTDT and RTDTX temperature transmitters.

NOTE: PXMS, RTDT and RTDTX require a 24 VDC power source.

One of these inputs can be configured to accept a magnetic pick-up input for speed monitoring.

The RMU16 also accepts BCD inputs, such as those provided by Murphy's MARK III models, allowing for remote monitoring of the fault annunciator.

The RMU16 provides two (2) form "C" relay outputs for ON and OFF control applications.

The RMU16 module allows you to communicate in Data or Voice mode. Both the Data and Voice modes allow access to your equipment at anytime via standard telephone or personal computer.

When operating the RMU16 in Data mode, an ASCII terminal or computer is used to access various functions. Commands are entered on the keyboard, and response messages are displayed on the computer monitor.

In Voice mode, the RMU16 can be called to inquire into conditions status. When an alarm condition exists, the RMU16 will automatically call the telephone numbers programmed.

Specifications

Power Input (Operating Voltage): 10 to 32 VDC.

Power Consumption: 9 W.

Enclosure: 10-3/4 x 9 x 6 in. (273 x 229 x 152 mm).

Modem Speed: 2400 bps.

Analog Inputs: Eight (8) 8-bit resolution, 4-20 mA.

MPU Input: 1-48 Vrms, 0-10 kHz.

BCD Inputs: 8-bit, TTL logic level.

Digital I/O: Thru Murphy digital fault-annunciator (32-48).

Relay Outputs: Two (2), form "C", 8 A @ 250 VAC, 5 A @ 30 VDC.

Real Time Update: 2 seconds.

Data Log Size: 2000 events.

Data Log Format: Comma delimited ASCII file.

RJ-11 Ports: 2 (one passthru for handset).

Dial Out Numbers: Eight (8) (24-digit maximum).

Configuration Memory: Non-volatile, EEPROM.

Security Levels: Three (3), password protected.

Phone Line Protection: 500 Volts.

Operating Temperature: 32 to 140°F (0 to 60°C).

Storage Temperature: -4 to 185°F (-20 to 85°C).

Real Time Clock: Built-in for time stamps.

Humidity: 5 to 95% non-condensing.

Shipping Weight: 22 lb. (10 kg).

Shipping Dimensions: 17 x 10 x 9-3/4 in. (431 x 254 x 248 mm).

RMU16 Typical Mounting Dimensions



WARNING: PERFORM THE MOUNTING OPERATION WITH POWER SOURCE OFF. THE RMU16 IS DESIGNED TO BE MOUNTED ON A FLAT PANEL.

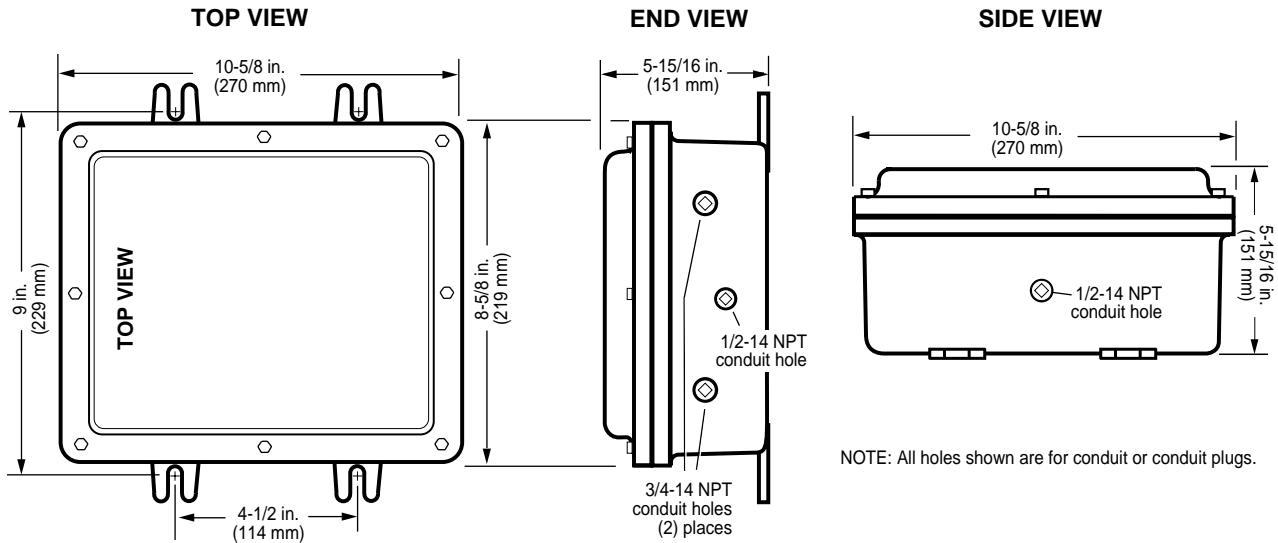
The RMU16 is shipped within a Class I, Division 1, Groups C & D, explosion-proof rated enclosure. See the dimensions, below, for installation. It is your responsibility to have a qualified person install the

RMU16 module and make sure it conforms to NEC and local codes. For non-hazardous location applications, the RMU16 module can be mounted within a general purpose weatherproof enclosure.

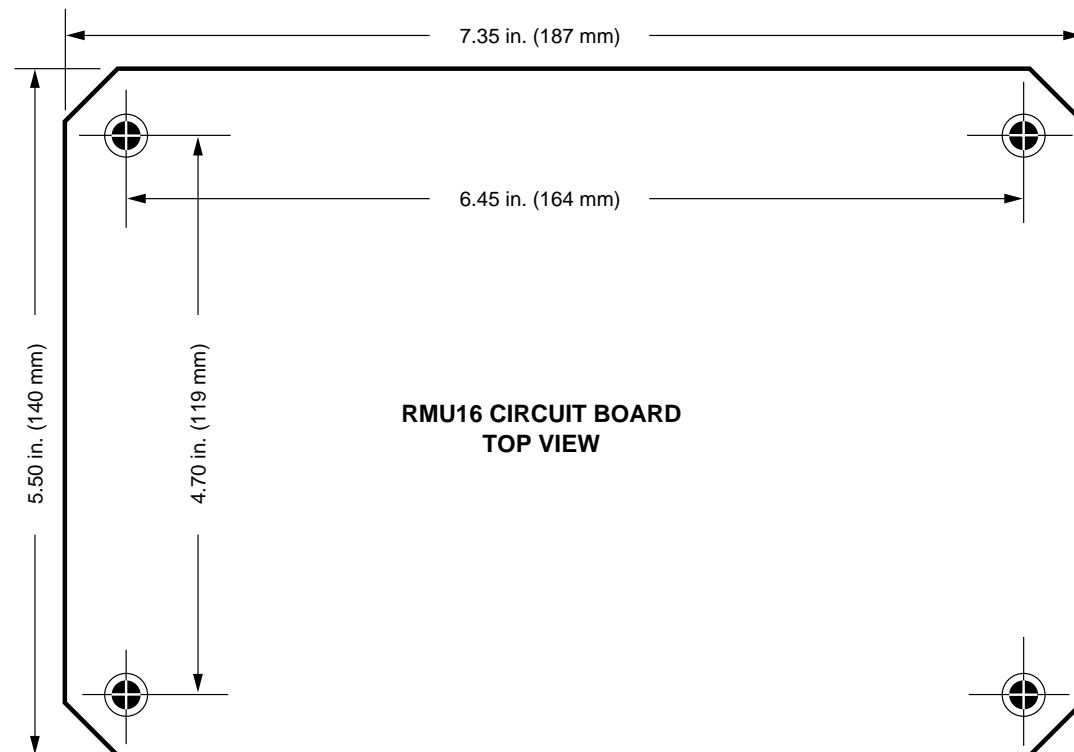


CAUTION: THE RMU16 ENCLOSURE IS NOT WEATHERPROOF. INSTALL THE ENCLOSURE IN A PROTECTED AREA.

RMU16 Enclosure



RMU16-LC (less case) Mounting Dimensions

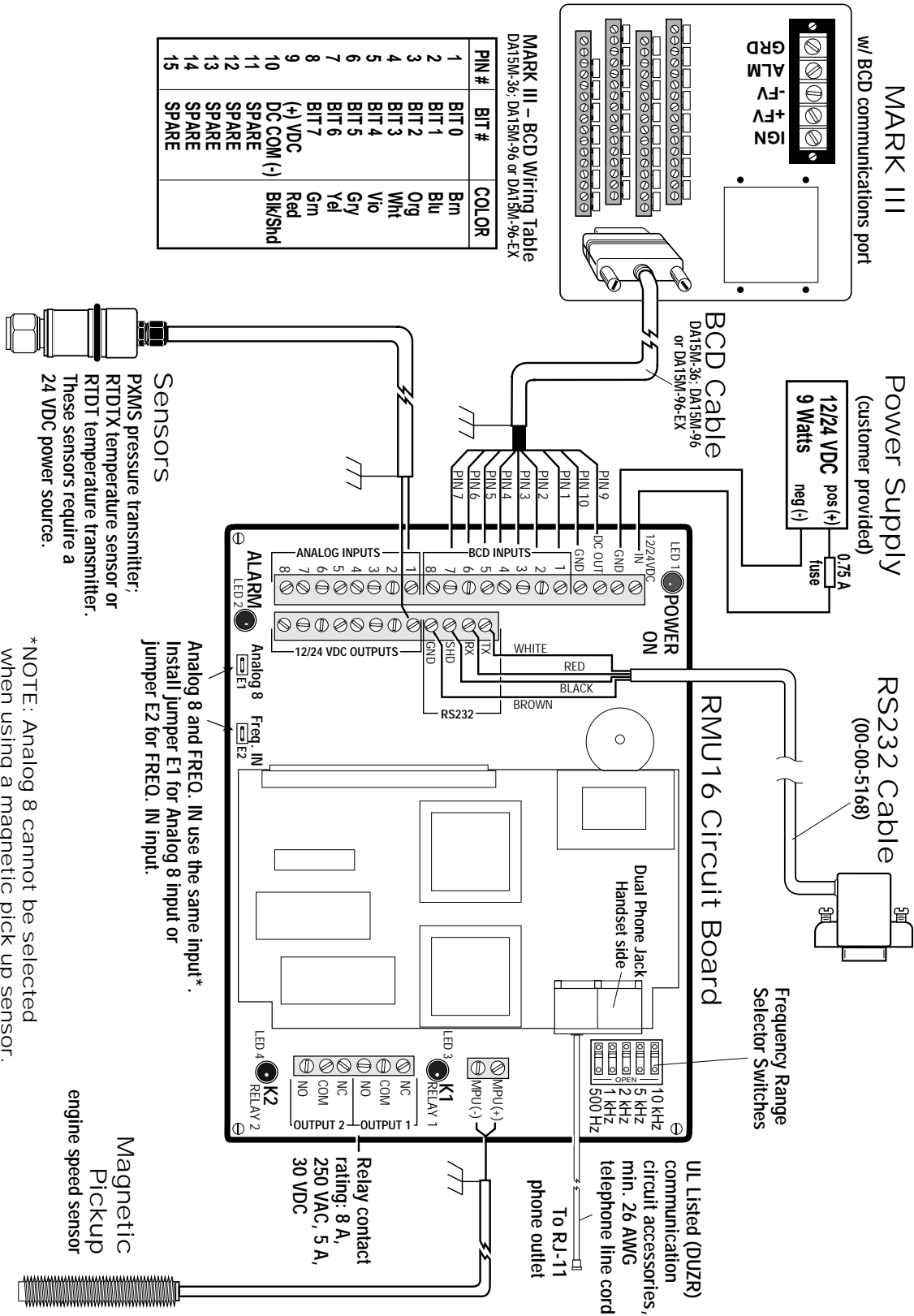


RMU16 Typical Wiring



WARNING: PERFORM THE WIRING OPERATION WITH POWER SOURCE OFF. FOR HAZARDOUS APPLICATION REQUIREMENTS, THE RMU16 COMPLETE SYSTEM MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) CLASS I, DIVISION 1, GROUP D (ARTICLE 504) SPECIFICATIONS. ROUTE INPUT WIRES IN CONDUIT AND KEEP A MINIMUM OF 2 IN. (51 MM) SEPARATION FROM OTHER WIRES.

ALSO, REFER TO FIELD INSTALLATION DRAWING PROVIDED WITH YOUR RMU16 SYSTEM.



MARK III - BCD Wiring Table
DA15M-36, DA15M-96 or DA15M-96-EX

PIN #	BIT #	COLOR
1	BIT 0	Brm
2	BIT 1	Blu
3	BIT 2	Org
4	BIT 3	Whi
5	BIT 4	Vio
6	BIT 5	Gry
7	BIT 6	Yel
8	BIT 7	Gm
9	(+) VDC	Red
10	DC COM (-)	Bk/Shd
11	SPARE	
12	SPARE	
13	SPARE	
14	SPARE	
15	SPARE	

*NOTE: Analog 8 cannot be selected when using a magnetic pick up sensor.

RMU16 Connections and Configuration

HARDWARE CONNECTIONS

Power Inputs

10 to 32 VDC is connected between the terminals labeled 12/24VDC IN and GND inputs.

Power Outputs

The terminals labeled DC OUT and 12/24VDC OUTPUTS are internally connected to the 12/24VDC IN. These outputs are provided to facilitate voltage connection to the MARK III BCD port and transducers as shown on the schematic (page 3).

Analog Inputs

The analog inputs are ground referenced and will accept 4-20 mA signals. Analog 8 and the MPU (speed) input share a common input, Input #8. A shunt jumper is provided to select the input, place the jumper in the Analog 8 (E1) position to select Input #8 as an analog input. See page 3.

MPU Input

Input #8 is also designated as the MPU Input. A shunt jumper (supplied) must be placed in the FREQ. IN (E2) position. See schematic on page 3.

Select the frequency range by closing the FREQ. RANGE selector switch (SW1) dip switch that corresponds to the signal frequency range.

BCD Input

Bits 0-3 are the least significant digit (one's or first digit) and bits 4-7 are the most significant digits (ten's or second digit). See page 3.

RS232 Connections

For local communication attach a three conductor shielded cable between the RMU16 terminals labeled RX, TX, GND, and SHD and the RS232 serial port on your PC. See table below.

RMU	9-PIN DSUB	25-PIN DSUB
RX	3(TX)	2(TX)
TX	2(RX)	3(RX)
GND	5(GND)	7(GND)

RJ-11 Connections

Connect one end of the telephone cord into the inner jack of the RMU16 dual phone jack. Connect the other end of the telephone cord into an RJ-11 telephone outlet. A standard phone may be plugged into the outer jack for local phone access.

Relay Outputs

Two (2) form "C" relay outputs provide NO and NC contacts. LED's #3 and #4 indicate when the outputs are turned ON. See schematic on page 3.

Data Commands Menu

```
-----  
COMMAND>  
COMMAND MENU  
-----  
ALM = Alarms  
BCD = BCD Reading  
BYE = End Session  
COM = Serial Port  
DAY = Day/Night Setup  
HLP = **HELP**  
INP = Inputs  
LOG = Data Recorder  
OUT = Outputs  
PHO = Phone Line/Modem  
RTU = Realtime Update  
SEC = Security  
TIM = Time of Day  
Choose a Number>  
-----
```

Command Format

```
-----  
COMMAND>  
COMMAND> HLP  
COMMAND FORMAT  
-----  
3 letter command followed by an operand.  
Example: INP R (INPut Report).
```

SPECIAL KEYS

```
-----  
BACKSPACE OR DELETE cancels a line.  
^C, ^Z or ESC interrupts a report.
```

ADDITIONAL COMMANDS

```
-----  
TST = Diagnostics - NOT USED  
XIN = Expanded Inputs - NOT USED  
XON = Extended On  
PRN = Printer  
SNP = 10 bit Snapshot  
HDR = Parameter Dump  
-----
```

ESTABLISHING COMMUNICATIONS

Data Mode

All popular communications software packages will work with the RMU16 Remote Monitor in Data Mode. It is suggested that HyperTerminal® or Terminal® programs supplied with Microsoft® Windows 95® or Windows 3.1® Versions be used.

For RS232 direct connections to a PC use an RS232 cable (see table above). Factory default baud rate is 4800 with no parity, 8 data bits and 1 stop bit.

NOTE: The RMU16 and the computer must have the same settings.

For phone modem (RJ-11) connections, you will need a standard telephone line. For telephone modem connections the baud rate is 2400. Error control and data compression must be turned off in the computer or set to "None".

From your PC equipped with a modem, dial the telephone number to which you have connected the RMU16.

In Data Mode, direct RS232 or phone modem connection, the RMU16 will connect, provide an optional status report, and prompt you for a security code. Enter the eight digit security code. Enter commands on the keyboard.

Voice Mode

For Voice Mode, you will need a standard telephone line. The RMU16 will respond to your call generating a carrier tone indicating that the system is attempting to connect. The tone will stop after 10 seconds and the RMU16 will give a synthesized voice message in English:

"Hello, this is the telephone number xxxxxxx". Enter security code.

Enter the security code using the telephone keypad. The RMU16 will respond "OK". You can now enter commands with the touch tone keypad.

NOTE: The RMU16 cannot operate over the telephone line if it is on-line with the RS232 terminal, and vice-versa. The RMU16 is shipped with security codes 11111111, 22222222, 33333333. These codes can be changed. See "Configuring The Security/ID Options", page 7.

Configuring RS232/Modem Communications

The RMU16 allows communications in Data Mode via direct connection to the RS232 port, or through the telephone modem. The RS232 port has two modes of operation "Dumb" and "Smart". In the "Dumb" mode with the RMU16 off line, any activity at the RS232 port will cause the system to go on line. In the "Smart" mode with the RMU16 off line, data going to the RS232 port will be ignored, except for certain control characters. These control characters issued by an external computer or I/O system, will cause the RMU16 to go on line or initiate an alarm dial-out sequence. Use COM S command to select the mode.

To connect via modem, set the maximum baud rate to 2400, then dial the number to which the RMU16 is connected. Connection will be automatic and you will be prompted for the security code just as with a direct connection.

RMU16 Configuration *continued*

For direct or modem connection if you do not see the security code prompt, press <ENTER>. If you still do not see the security code prompt, press <CTRL> A. If the Smart Gateway is enabled, <CTRL> A is required. The Smart Gateway mode can be turned off by the "COM S" command.

A gateway feature of the RMU16 allows you to communicate with external equipment through its RS232 port while connected through the modem, as if you were connected directly through the PC's RS232 port.

The "COM O" command allows you to select the baud rate of the RS232 port, and to enable the Gateway Echo. The changes will be effective on the next connection through the RS232 port.

```
-----
COMMAND>COM O
1 = Baud Rate
2 = Gateway Echo On/Off
3 = Previous Menu

Choose a Number>
```

Select 2 to view current status of the gateway echo. Set it to "On" and every character entering the RMU16 system through the modem or RS232 port will be "echoed" (re-transmitted) by the modem and the RS232 port. When the gateway echo is set "Off" the characters will not be re-transmitted (echoed) through the port which they entered.

```
-----
COMMAND>COM O
1 = Baud Rate
2 = Gateway Echo On/Off
3 = Previous Menu

Choose a Number>2

Gateway echo disable
Change present state?

Type Y or N
```

To open the gateway during a modem connection use the "COM R" command. After the gateway is opened, the RMU16 system transmits a "Control A" to the RS232 port to signal the beginning of the message.

The "COM R" gateway mode allows data to be transferred in either direction through the gateway. The RMU16 allows ASCII data to be transferred. The RS232 port can operate at a different baud rate than the phone line modem, provided the character rate does not exceed 25 evenly spaced characters per second.

```
-----
COMMAND>COM R

Connecting modem to RS232 port.
Two seconds of silence followed by Ctrl-D
will close gateway.

Closing gateway
```

Setting the Baud Rate

You can set the baud rate to communicate at 300, 1200, 2400, or 4800 baud. Select 1 to set, check or change the baud rate. This will take effect on the next connection. **NOTE:** 4800 baud is only for direct connection.

```
-----
COMMAND>COM O
1 = Baud Rate
2 = Gateway Echo On/Off
3 = Previous Menu

Choose a Number>1

SET/CHECK BAUD RATE
-----
Present Value: 4800
1 = 300 Baud
2 = 1200 Baud
```

```
3 = 2400 baud
4 = 4800 Baud
0 = Previous Menu
Choose a Number>
```

Extended On Command

When the RMU16 system is in Data mode, it will remain on line until the "BYE" command is issued or until a three-minute period of inactivity has been detected.

To override this automatic time-out feature, keeping the RMU16 on line until a BYE command is issued, type XON. The default state is disabled.

This feature is important in applications where the RMU16 is used as a data acquisition system and the automatic time-out feature is not desired.

NOTE: The override by XON command of the three-minute inactivity period remains in effect only for the current signed-on session with the RMU16.

NOTE: The extended-on operation applies only to data mode. In voice mode, the RMU16 will hang up after a one-minute period of inactivity.

```
-----
COMMAND>XON

EXTENDED ON
-----

System will stay "on line" until
a BYE command is issued.
Are you sure? Type Y or N
```

INPUT CONFIGURATION

The RMU16 includes eight inputs capable of accepting any combination of 4-20 mA sensors without the need for hardware changes.

Input #8 can accept a magnetic pickup input for engine speed sensing.

The RMU16 analog inputs can be configured and named for specific application requirements. Each input has separate alarm and control setpoints.

Configuring 4-20 mA sensor inputs (COMMAND INP S)
Type "INP S", the Inputs will be listed on the screen. Select the input number (i.e. Input #1). The input #1 present settings will be displayed:

```
-----
COMMAND>INP S

SET/CHECK INPUT SETTINGS
-----

1 = Input #1          <label>
2 = Input #2          <label>
3 = Input #3          <label>
4 = Input #4          <label>
5 = Input #5          <label>
6 = Input #6          <label>
7 = Input #7          <label>
8 = Input #8          <label>
0 = Previous Menu

Choose a Number>1

Input #1
PRESENT SETTINGS
-----

1 = Label              <label>
2 = Response Time     0 MIN
3 = Input Type         1
4 = Lo ALARM Setpoint 0
5 = Hi ALARM Setpoint 255
6 = Runtimer OFF      0
7 = Runtimer ON       255
8 = Calibration        0
0 = Previous Menu

Choose a Number>
```

To label the input(s), choose number #1. You will be allowed to assign an 8 character label to the input. You can also press "Enter" to select from a list of special labels.

ENTER AN 8 CHARACTER LABEL NAME, TYPE "=HIDE=" TO REMOVE THIS ITEM FROM ALL REPORTS, OR PRESS ENTER FOR A LIST OF SPECIAL LABELS

<ENTER>

- | | | |
|-------------|-------------|--------------|
| 01) Minor | 02) Major | 03) Critical |
| 04) Power | 05) Temp | 06) Humidity |
| 07) Contact | 08) Environ | 09) Network |
| 10) Line | 11) Battery | 12) Group |
| 13) Prssure | 14) Vibratn | 15) Conduct |
| 16) Alarm | 17) Flow | 18) pH |
| 19) Dischrg | 20) Gallons | 21) Level |
| 22) Speed | 23) Stage1 | 24) Stage2 |
| 25) Suction | | |

NOTE: These names are reported in the voice mode. If you do not choose one of these, the voice will only say channel #.

Next, return to the PRESENT SETTINGS menu. Choose number #3, Input Type, from the list of settings. Then choose "8" EEprom A as the input type for the 4-20 mA inputs. If the speed input (input #8) is chosen and configured, choose "7" Linear.

The input settings will now be displayed on the screen:

Choose a Number>3

Input #1

AVAILABLE CHOICES

- | | |
|---------------------|---|
| 1 = Temperature (F) | NOT USED |
| 2 = Reserved | NOT USED |
| 3 = Normally Closed | NOT USED |
| 4 = Normally Open | NOT USED |
| 5 = Rom Table A | NOT USED |
| 6 = Pulse Counter | NOT USED |
| 7 = Linear | FOR FREQUENCY (SPEED)
USE FOR ANALOG 8 |
| 8 = EEprom table A | 4-20 mA INPUT |
| 9 = EEprom table B | NOT USED |
| 0 = Previous Menu | |

Next, choose #8, Bottom of the Scale, from the list of setting options and enter the value that corresponds to a "4 mA" reading from your sensor. Now, choose #9, Top of the Scale, from the list of setting options and enter the value that corresponds to a "20 mA" reading from your sensor. Input #1 is now configured to accept a 4-20 mA sensor input. Repeat the above steps for the remaining inputs.

4-20 mA Input Filtering

Choose INP O to enable or disable input filtering. Without filtering the update time of the reading is fast. Filtering can make unsteady or "noisy" readings steady because the input is averaged over time. Filtering will cause the reading to respond to a full scale change in 20 seconds.

COMMAND>INP O

INPUT FILTERING OPTIONS

Input filtering is disabled
Change present state?

Type Y or N YES

Configuring Input 8 for MPU (magnetic pickup)

Place the "ANALOG 8 (E1)" shunt jumper in the "FREQ (E2)" position, see schematic on page 3. Select the frequency range by closing only the "FREQ RANGE" selector dip switch, (page 3), that corresponds to the signal's frequency for the "TOP OF SCALE" RPM value you will enter. Next, configure the Input #8 as a "LINEAR" type input as follows:

Type INP S, and choose Input #8, from the list of setting options. Type in an eight-character label name. Input #8 present settings will be displayed: Choose #3, Input Type, from the list of setting options and choose "LINEAR". Choose #8, Bottom of the Scale, from the list of setting options. Enter "0" for the Bottom of the Scale RPM.

Choose #9, Top of the Scale, from the list of setting options. Top of the Scale RPM will be the RPM corresponding to the top of the frequency you selected. To calculate this, use the following equation:

$RPM = 60 * (frequency / gear\ teeth)$. For instance, if you have 60 gear teeth, and have selected the 10000 Hz frequency range, the "Top of Scale" $RPM = 60 * (10000 / 60)$ or 10000 RPM. **NOTE:** Due to tolerance in the circuit, some adjustments of the Top Scale may be needed.

Configuring the Alarm Dialer

The RMU16 continually monitors all inputs for alarm setpoints that have been violated. If a setpoint has been exceeded for a designated period of time, the RMU16 recognizes this as the existence of an alarm condition. The RMU16 will respond by sending a local alarm, data message to a terminal or a voice message over the telephone.

The alarm dial out sequence will continue—even if the alarm condition has cleared—until the alarm has been externally acknowledged.

To fully configure the Alarm Dialer, you must enter the alarm setpoints and program the dialing directory.

Entering the Alarm Setpoints

After calibrating the input, it is time to enter in the Alarm Lo and Hi Setpoints. Lo setpoint is the point at which the RMU16 will flag a low alarm. Hi setpoint is the point at which a high alarm will be flagged.

To enter the Hi and Lo setpoints, type INP S. Select the input for which you would like to enter the setpoints. Select the Lo setpoint and enter the desired value. Repeat this operation for the Hi setpoint.

COMMAND>INP S

SET/CHECK INPUT SETTINGS

- | | |
|-------------------|----------|
| 1 = Input #1 | Temp |
| 2 = Input #2 | mAmps |
| 3 = Input #3 | Volts |
| 4 = Input #4 | Switch |
| 5 = Input #5 | Temp A |
| 6 = Input #6 | mAmps A |
| 7 = Input #7 | Volts A |
| 8 = Input #8 | Switch A |
| 0 = Previous Menu | |

Choose a Number>1

Input #1

PRESENT SETTINGS

- | | |
|-------------------------|-------|
| 1 = Label | Temp |
| 2 = Response Time | 1 Sec |
| 3 = Input Type | 1 |
| 4 = Lo Alarm Setpoint | 60 |
| 5 = Hi Alarm Setpoint | 88 |
| 6 = Output OFF Setpoint | 85 |
| 7 = Output ON Setpoint | 70 |
| 8 = Calibration | 0 |
| 0 = Previous Menu | |

RMU16 Configuration *continued*

Choose a Number>4

Enter New Value>32

```
COMMAND>INP S
Input #1
PRESENT SETTINGS
-----
1 = Label           Temp
2 = Response Time  1 Sec
3 = Input Type      1
4 = Lo Alarm Setpoint 32
5 = Hi Alarm Setpoint 88
6 = Output OFF Setpoint 85
7 = Output ON Setpoint 70
8 = Calibration     0
0 = Previous Menu

Choose a Number>5
Enter New Value>100
```

```
Input #1
PRESENT SETTINGS
-----
1 = Label           Temp
2 = Response Time  1 Sec
3 = Input Type      1
4 = Lo Alarm Setpoint 32
5 = Hi Alarm Setpoint 100
6 = Output OFF Setpoint 85
7 = Output ON Setpoint 70
8 = Calibration     0
0 = Previous Menu

Choose a Number>
```

NOTE: To disable the Lo setpoint, set it to the Bottom of the Scale value. To disable the Hi setpoint, set it to the Top of The Scale value.

The Response Time to act on the Alarm Setpoints can be programmed as well. This is the amount of time for which an alarm condition must be reached before the RMU16 will dial out. To enter the Response Time for the Alarm Setpoints, type INP S, select the Input, then select Response Time from the Menu. Enter the desired Response Time.

Entering Alarm Telephone Numbers

First, enter in the Location Name you will be calling. At the command prompt, type "PHO O". Type "Y" (yes) to the "Change Label Names?" prompt. Enter the names of the locations you will be calling.

```
-----
COMMAND>PHO O
CHANGE DIAL-OUT PHONE NUMBERS
-----
Change Label Names?
Type Y or N      Yes
Tom              >
Alice            >Sarah
Security         >
Phone 4          >
Phone 5          >
Phone 6          >
Phone 7          >
Phone 8          >
```

Next, enter the phone numbers. Type "Y" in response to the "Change Phone Numbers?" prompt. Enter the phone numbers you wish dialed, in

the order you wish them dialed.

```
-----
Change Phone Numbers?
Type Y or N      Yes
One or more of the following command
codes can be added to each phone number
"A" = 5 second pause
"B" = Bell 103 Data Mode          NOT USED
"D" = Autodetect Data Mode
To ERASE a phone number, type an "F"
Tom
  555-1111          NOTE: The hyphen (-) is optional.
>5553333
Sarah
  555-2222
>555-9999
Security
  9A1-610-543-8066
>
Phone 4
>
```

Type "D" as the first character in the phone number to direct the RMU16 to call out in data mode to a computer instead of a person. Finally, set the Dial out interval to specify the wait time before RMU16 starts another dial out sequence. Type ALM S and select Dialout Interval. Enter desired interval in minutes. The Alarm Dialer is now fully configured.

DAY/NIGHT SETUP COMMAND

The Day/Night Setup command enables you to specify a starting time and stop time for the "Track during Day" option of the output command. This start-stop time period also specifies when the RMU16 system will initiate an alarm dial-out sequence. The RMU16 is initially set up to dial out for a full 24-hour period. The start time is 0 (00:00:00). Stop time is 24 (23:59:59). Hours outside this start-stop period are considered the Track-at-night period.

NOTE: The "Day" command operates in "Data" mode only.

Day/Night Set up

The time period during which the RMU16 system is allowed to initiate an alarm dial-out sequence is controlled by the Day command. While an alarm condition can occur at any time during a 24-hour period, it will be reported only during the specific time period.

When the system clock reaches day start, all alarms will be cleared. If an alarm condition is still present, the RMU16 will then dial out.

```
-----
COMMAND>DAY
VIEW/EDIT DAY START/STOP TIME
-----
1 = Day Start Time
2 = Day Stop Time
0 = Previous Menu

Choose a Number>
```

At the "Choose A Number" prompt, press Enter or select 3-9 to terminate the command.

Start of Day

```
-----
VIEW/EDIT DAY START/STOP TIME
-----
1 = Day Start Time
2 = Day Stop Time
0 = Previous Menu

Choose a Number>1
Day Start Time (0-24 Hrs)
```

RMU16 Configuration *continued*

```
Present Value: 0
Enter New Value>
```

At the "Enter New Value" prompt:

- Press Enter to keep the present value and terminate the command.
- Only digits between 0 and 24 are accepted.
- The value is re-checked to be within 0-24. If out of range, an error message will be displayed, and you must re-enter a correct value.
- Press Backspace to cancel any entry and allow a new value to be entered.

End of Day

```
VIEW/EDIT DAY START/STOP TIME
```

```
1 = Day Start Time
2 = Day Stop Time
0 = Previous Menu
```

```
Choose a Number>2
```

```
Day Start Time (0-24 Hrs)
```

```
Present Value: 0
```

```
Enter New Value>
```

At the "Enter New Value" prompt:

- Press Enter to keep the present value and terminate the command.
- Only digits between 0 and 24 are accepted.
- The value is re-checked to be within 0-24. If out of range, an error message will be displayed, and you must re-enter a correct value.
- Press Backspace to cancel any entry and allow a new value to be entered.

CONFIGURING THE SECURITY/ID OPTIONS

The RMU16 has three levels of security, each permitting access to the system but with varying degrees of privilege. These security codes are also used when accessing the RMU16 from a touch-tone telephone.

Level Three security permits a user to access the report ("R") commands. Level Two security permits a user to access and change certain operational ("O") commands. Level One security permits a user to access and change the setup commands ("S"), as well as the operational ("O") and report ("R") commands.

To set or change security codes, you must have the Level One Security Code. At the command prompt, type SEC S and choose menu selections 1, 2, or 3. You will be prompted to enter a new security code. The security code is eight digits long, and all eight digits must be entered. Only the digits 0-9 are accepted. For security reasons, the RMU16 will ask you to re-enter your code.

You can program an eight-character alphanumeric code to provide your RMU16 a unique identity. The code will appear in the log-on message and it is typically an account number. At the command prompt, type SEC S, choose menu selection number 4 and type in your eight-character code. This code will be announced on an alarm dial-out condition.

To complete your RMU16 unique signature, you can program your RMU16 with a location name which, like your code number, will appear in the log-on message. Typically the location name is the address where the RMU16 is located. At the command prompt, type SEC S and choose menu selection number 6. Site Name, and type in the location name for your system.

ACCESSING INFORMATION

Input Report

To get a real-time report of the present condition of the eight inputs, including any that may have exceeded an alarm set point, type INP R at the command prompt. Analog inputs will provide LO, HI, and OK status: discrete will provide AL and OK indicators.

```
COMMAND>INP R
INPUT STATUS REPORT
```

```
-----
Temp           HI      86°F
mAmps          OK      4.000
```

```
Volts          OK      1.705
Switch         AL      OFF
Temp           A OK   0°F
mAmps          A OK   12.847
Volts          A OK   2.235
Switch         A OK   OFF
Time           03/15/96  15:31:42
NEW ALARMS EXIT - Type ALM R
```

Real Time Update

To get a continuous real time report, type RTU. The screen will be continuously updated with current values. Type any key to exit.

Alarm Report

To get a report of alarms, including those that have not yet been acknowledged, type "ALM R" at the command prompt.

```
COMMAND>ALM R
ACTIVE ACKNOWLEDGED ALARMS
```

```
-----
None
```

```
UNACKNOWLEDGED ALARMS
```

```
-----
Switch
Acknowledge Alarms?
Type Y or N
```

The RMU16 will report all alarms and give you the option to acknowledge any unacknowledged alarms.

Handling Alarms

The RMU16 constantly monitors all inputs to determine if alarm setpoints have been violated. If a setpoint has been violated for a specified amount of response time, an alarm condition exists. This alarm condition will continue until the input has returned to normal and has been externally acknowledged.

When an alarm occurs and the response time has expired, the RMU16 will begin its dial-out sequence as specified in the PHO R menu. The RMU16 can deliver an alarm in Voice or Data mode.

The RMU16 dials each number in succession. If the alarm is not acknowledged, the RMU16 will wait a specified Alarm Dial-Out interval and then re-starts the dial-out sequence with the same alarm message. Alarms can be acknowledged in either Data or Voice mode. There are 2 types of alarms:

Active Acknowledge Alarms: The input continues to violate an alarm set point but the condition has been acknowledged by an operator. The RMU16 continues to recognize the alarm condition but will not attempt to make an outgoing phone call.

Unacknowledged Alarms: Any alarms which have not been acknowledged. An unacknowledged alarm initiates an alarm dial-out sequence.

Responding to Alarms - Voice Mode

The RMU16 will call the pre-programmed numbers when an alarm condition is recognized. When the phone is answered, the RMU16 will repeat the alarm message up to six times:

"Hello, this is telephone number one two three four five six seven. Alert condition exists".

Recipients of such calls should press and hold any keypad button for one to two seconds. The RMU16 will respond with the following message:

"Ok. Enter security code".

When a correct security code has been entered, the RMU16 will acknowledge it saying: ***"Yes"***

You can now enter INP # to learn the cause of the input alarm condition and enter ALM # to acknowledge receipt of the alarm message.

Responding to Alarms - Data Mode

To respond to alarms in Data mode, type ALM R to see a list of alarms. Respond "Y" to the "Acknowledge Alarm?" prompt.

Automatic Report

To get an Automatic Status Report each time you log onto the RMU16, type SEC S, and turn on option 7 "Auto Report". This option is present in both, Voice and Data mode.

DATA LOGGING

It is often desirable to track certain parameters (such as tank level or ambient air temperature) over extended periods of time. The RMU16 provides this ability by recording and maintaining a history of input and output conditions. this information can be accessed through the RS232 port via telephone. The RMU16 can record information two ways, via "snapshot" datalogger and "expanded datalogger".

Snapshot Datalogger

The snapshot datalogger will sample Input #1 once an hour and maintain a 24-hour running history. This information is displayed in bar graph format and provides an excellent "quick check" of a critical parameter.

To get a graphic bar chart display of the activity on an input channel during the last 24 hours, type "LOG R" at the command prompt. The most recent hour is the right-most bar of the chart. Each bar shows the highest value on the hour. There is no setup required to create this report; it is generated automatically. The graph is automatically scaled.

```
-----
Oil Press
24 Hour History
-----
96| .....
94| .....
92| .....
90| .....
88| .....
86| .....
84| .....
82| .....
80| .....|
78| .....|.....|.....|
76| ..|.....|.....|.....|
74| |.....|.....|.....|.....|
-----
Time: 03/18/96 09:02:45
-----
```

Expanded Datalogger

An expanded datalogger is available for more demanding applications. It can store 2000 records of all input and output information at programmable time intervals and store a time-stamped history of all input and output conditions.

The information can be recorded at regular time intervals or in response to an alarm condition, or both. It is an excellent tool for long-term trend analysis and performance recording. To enable or disable logging functions and to set up log time, type the command LOG S.

```
-----
COMMAND>LOG S
Input #1
DATA RECORDER FUNCTIONS
-----
1 = Set/Check Log Time
2 = Periodic Log ON/OFF
3 = Alarm Log ON/OFF
4 = Clear Log
0 = Previous Menu
Choose a Number>
```

Log Time

To set the datalogging interval, type "LOG S" and choose the rate of logging when periodic recording occurs (see above). Intervals can be set to any time, from one second to 127 minutes. Default value is 60 minutes.

Periodic Recording

To enable or disable the periodic recording of all input and output conditions, type "LOG S" and choose #1. When turned ON, the RMU16 will automatically log all input and output conditions at regular intervals of time.

Log Operations

To download data from the RMU16, type "LOG O"

```
-----
COMMAND>LOG O
TRANSMISSION PROTOCOL
-----
1 = ASCII
2 = Compressed ASCII
3 = Compressed XMODEM
0 = Previous Menu
Choose a Number>
```

To use the extended datalogger simply tell it what to record and how often. When it becomes full, the most recent data will wrap around and erase previous data without any alarm or warning. It is up to the operator to set the log-time interval so that it will be possible to download the logged data before the expanded data logger becomes full. *For more details on data-logging, request "RMU16 Datalogging Application Note"*

Data Extraction

Whenever a log event occurs, the RMU16 will record 25 separate parameters and store them as a line of information. To display this information, type "LOG O" at the command prompt.

ASCII Data

The "LOG O" command displays the expanded datalogger memory data. This data can also be captured by a terminal program and saved in a text file. The first line of the log data, labeled "OLD" is the oldest entry in the log. Each succeeding line of data is the most recent entry, and progresses backward, providing a quick method to determine where any log full/wraparound condition has occurred. To obtain data, type "LOG O" at the command prompt and choose #1.

```
-----
COMMAND>LOG O
TRANSMISSION PROTOCOL
-----
1 = ASCII
2 = Compressed ASCII
3 = Compressed XMODEM
0 = Previous Menu
Choose a Number>1
-----
```

Each line of information represents 25 event parameters, as illustrated below:*

Log ID	Year	Month	Day	Hour	Min.	Sec.	Ack #	BCD	Input 1	Input 2	Input 3	Input 4	Input 5	Input 6	Input 7	Input 8
OLD	96	03	03	06	30	08	000	000	255	000	000	000	255	255	255	000
ON	96	03	15	16	50	10	000	000	255	111	137	000	000	085	000	085
OFF	96	03	15	16	48	55	000	128	255	111	137	000	000	085	000	085
ON	96	03	15	16	45	14	000	000	255	112	137	000	000	085	000	085
OFF	96	03	15	16	45	00	000	000	255	112	137	000	000	085	000	086
ON	96	03	15	16	41	58	000	000	255	112	137	000	000	085	000	085
OFF	96	03	15	16	40	58	000	000	255	112	138	000	000	085	000	085
ON	96	03	15	16	37	52	000	000	255	112	138	000	000	086	000	086
OFF	96	03	15	16	37	46	000	000	255	112	138	000	000	086	000	086
ON	96	03	15	16	33	33	000	128	255	113	139	000	000	086	000	086
OFF	96	03	15	16	20	06	000	000	255	113	139	000	000	086	000	086
NRM	96	03	15	16	14	53	000	128	255	114	140	000	000	087	000	085
ON	96	03	15	16	14	31	000	128	255	113	139	000	255	087	000	086

RMU16 Configuration *continued*

```
OFF 96 03 15 16 14 21 000 128 255 114 139 000 255 087 000 085
ACK 96 03 15 16 13 03 000 128 255 113 139 000 255 087 000 086
ON 96 03 15 16 12 28 000 000 255 113 139 000 255 086 000 086
OFF 96 03 15 16 12 20 000 000 255 113 139 000 255 087 000 086
LOG 96 03 15 16 12 00 000 000 255 113 139 000 255 086 000 086
ALM 96 03 15 16 06 36 000 000 255 113 139 000 255 086 000 086
```

**NOTE: The final eight field outputs are not shown or used for this application.*

Field Descriptions

The Log ID is a three-character field to describe the nature of the log entry:

```
-----
OLD      The oldest entry in memory
LOG      A time initiated recording
ON       The beginning of an on-line session
OFF      The end of an on-line session
HKR      (Hacker) Too many bad passwords entered
ALM      An alarm condition occurred
NRM      An alarm condition returned to normal
ACK      Acknowledged alarm
RST      Hardware reset
-----
```

- The next fields, Year, month, day, hour, minute, and second are each two-digit decimal numerical fields which constitute the date and time on which the entry was made.
- The next field, ACK#, points to the phone number that acknowledged the last alarm message (i.e. 2= second number in the phone directory).
- The next field, Flags, is a true decimal representation of the BCD port. Divide this value by 16, the equation result is the 10th digit, the remainder is the ones digit (i.e. 128/16=8.0; 8=10th digit, 0=ones digit).
- Inputs is the next field, three-digit values (0-255) representing inputs 1-8.

Compressing the Data

A reliable way to transfer large amounts of data from the RMU16 to a personal computer is with the XMODEM file transfer protocol. Communications programs such as PROCOMM support the XMODEM protocol.

If data error occurs during a file transfer (due to line noise, for example), XMODEM will detect the error and correct it.

Type "LOG O" at the command prompt and choose #3 to initiate an XMODEM data transfer. You may have 30 seconds to tell your communications pro-

gram to start the XMODEM transfer.

```
-----
COMMAND>LOG O
TRANSMISSION PROTOCOL
-----
1 = ASCII
2 = Compressed ASCII
3 = Compressed XMODEM
0 = Previous Menu

Choose a Number>3
-----
```

```
Are you sure? Type Y or N Yes
Transfer will timeout in 45 seconds
Ready to transmit file LOG.CMP
-----
```

Decompressing the Data

This procedure is applicable only if you have transferred data to a personal computer using the compressed XMODEM data option described above.

The data compression scheme used in the RMU16 strips out all commas and other punctuation, and converts the data from decimal to hexadecimal notation. The rest is a data file which is one fourth its original size and transfers in one fourth the time of its original data file.

To decompress the data to its original comma-delimited form, use the DOS decompression utility "D-COMP", which is available through Murphy.

The program will request the name of the input file. When the conversion is complete, you will be able to view the data with any text editor or load the data into a spreadsheet program such as Lotus 1-2-3 or Excel.

HDR Command

The HDR command is useful in interpreting the Data Log Report described above. The output of this command consists of four records. Each is a time-

RMU16 Command Summary

stamped, comma-delimited record with the same format as the standard LOG O data log record. The four sections are:

- TYP**– Contains the Sensor Type for each input and control type for each input.
- HDR**– Contains the label names for each of the inputs and outputs.
- TOS**– Contains the top of the scale for each linear input (sensor types 7, 8, & 9).
- BOS**– Contains the bottom of the scale for each linear input (sensor types 7, 8, & 9).

Data Mode Commands Summary

In Data Mode, commands are entered through the keyboard, and responses are displayed on the screen.

The commands to access the system are simple three-letter codes (e.g. INP = input; ALM = alarm; PHO = telephone), generally followed by a fourth letter (e.g. R = report; S = set). The system will automatically insert a blank space between the third and fourth characters.

If an incorrect command is entered, you will receive an “Invalid Command” message.

You may enter a command when the “COMMAND>” prompt is displayed.

To view a list of the available commands, press ENTER at the command prompt. To view a list of additional commands enter HLP.

The following commands are available in Data Mode:

- ALM R**= Alarm Report: To check the status of any alarms.
- ALM S**= Alarm Setup: To enable or disable the alarm siren or to set up the alarm dial-out interval.
- BCD R**= Data Mode BCD Reporting: This command, when entered in Data Mode, displays the status of the extended input port in binary coded decimal. The upper and lower four bits (upper and lower nibbles) are each represented by a value from “0” to “F”.
- BYE**= Go offline: It terminates access to Data Mode commands.
- COM O**= Allows for baud rate selection and enables gateway echo.
- COM R**= Opens the data gateway during modem connections.
- COM S**= Allows selection of “Dumb” or “Smart” modes for RS232.
- DAY**= Used to specify the time period during which the RMU16 is allowed to initiate an alarm dial-out sequence.
- FORMAT**= This is used to describe the command selected. It consist of 3 letter command followed by an operand for example: INP R (input report).
- HLP**= Help Menu: Displays a list of additional commands.
- INP O**= Used to enable or filtering. Without filtering the update time of the reading is fast. Filtering can make an unsteady or noisy reading steady because the input is averaged over time. Filtering will cause the reading to respond to a full scale change in 20 seconds.
- INP R**= Input Report: To get a real-time report for present condition of the eight input, including any inputs that may have exceeded an alarm setpoint.
- INP S**= Input Setup: Allows for configuration of the inputs.
- LOG R**= Data Logging Reporting: Display of the activity on an input channel during the last 24 hours.
- LOG O**= Data Logging Output: Specify Log Output Transfer protocol.
- LOG S**= Data Logging Setup: Enable or disable logging functions and to set up log time.
- OUT R**= Output Report for Relay #2. Gives the output state report. Logical ON means the relay is “ON”. Logical OFF means the relay is “OFF”.
- OUT O**= Output Operations for Relay #2. Allows user to change output states. Logical ON means Relay is “ON”. Logical OFF means Relay is “OFF”.
- PHO R**= Phone Report: View current names and phone numbers list.
- PHO S**= Phone Setup: Used to enter and change dial out phones and labels.
- RTU**= Real Time Update: This command causes the RMU16 to continuously display an input report.
- SEC R**= Security Code Report.
- SEC S**= Change/Set Security Codes and Enter Site information.

TIM R= Display Current Time.

TIM O= Set Current Time.

TIM S= Enable/Disable Clock.

XON = Disable Automatic Off Line time and wait for BYE command.

Voice Mode Commands Summary

The voice mode of the RMU16 system utilizes the built-in voice annunciator to access various functions via any standard touch tone dialing telephone. You may enter voice commands from the telephone keypad; response messages are spoken in English.

The Voice Mode commands consist of a three-letter code followed by either the (#) or the (*) key. For example, typing “I-N-P-#” performs the input report function. The following commands are available in the Voice Mode:

- BCD #**= BCD Input Status: This command causes the RMU16 to respond with the status of the BCD input port. Each four bits (or nibble) is represented by a value from “0” to “9”. Values above “9” in either nibble the unit will respond “ERROR”. All four bits of each nibble are used when reading the port. Therefore all unused bits must be tied low (0 VDC).
- BYE #**= Terminate the session: RMU16 responds “Have a good day”.
- O1 O #**= Turns Output #1 OFF (set to 0 VDC).
- O1 O #**= Turns Output #1 ON (set to 5 VDC).
- O2 O #**= Turns Output #2 OFF (set to 0 VDC).
- O2 O #**= Turns Output #2 ON (set to 5 VDC).
- INP #**= Performs an input report for each of the eight inputs.
- OUT #**= Generates Output Report that says “Number 1, ON or OFF”. “Number 2 “ON or OFF”.
- PHO #**= Phone Setup is used to enter and change dial out phone numbers and labels.
- TIM #**= Set Current Time.

Additional Commands

- PRN**= This is the printer command.
- SNP**= This is the 10 bit snapshot command.
- HDR**= This is the parameter dump command.

Special Keys

- BACKSPACE** or **DELETE** Cancels a line.
- ^C**, **^Z** or **ESC** Interrupts a report.

Warranty: A two year limited warranty on materials and workmanship is provided with this Murphy product.
Details are available on request and are packed with each unit.

In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.

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