

OnSite RF Telemetry Manual

PN 14372817



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OnSite RF TELEMETRY INSTALLATION MANUAL

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EQUIPMENT

HARDWARE REQUIRED:

1. Board Scout RF Telemetry Interface PN 14308823

- i. RobertShaw RF Monitor [included in package]ii. RF Telemetry interface board [included in package]
- iii. Permanent Magnet [included in package]

2. RobertShaw Controller (any option below)

Analo	g Phone Controller (4 ch.)	PN 13645511
Analo	g Phone Controller (1 ch.)	PN 13503504
Etherr	net Controller (40 ch.)	PN 14308807
i.	Power Supply	[included with Controller
ii.	RJ11 cable (Analog Phone	e) [included with Controller

iii. or CAT5 Cable (Ethernet) [included with Controller]

3. Cyl-Tel (or Tank-Tel) Liquid Level Gauge

ALSO REQUIRED:

1. Connection

- Analog Phone outlet

or

- LAN connection (with internet access)
- 2. OnSite Telemetry web server access (http://www.onsitetelemetry.net)
 - Setup Controller on Centeron <u>BEFORE</u> telemetry hardware installation.



OnSite Tank Setup

OnSite Tank Setup (<u>www.onsitetelemetry.net</u>)

I. Adding Object to OnSite Webview

To add any object Navigate Webview to the appropriate folder. Click on the 🛱 to start the add object module.



II. Adding a Folder

Select Add a Folder from the list in the report panel. Fill out the relevant information and click Save. If the add folder icon doesn't appear you cannot create a folder at this level. Tanks, controllers and devices can only exist in the bottom folders. Therefore, you cannot create a folder within a folder that already contains tanks, controllers or devices.

New Folder	Current View:
	Setup
Folder Name:	
Address:	
City:	
State/Province: Zip Code:	
Email:	
Phone:	
Bulk storage tanks only? C Yes C No	

III. Adding Controllers

Click on the 🙀 to start the add object module. Select 'Add a Controller' from the list, or you can also add a controller directly from the Tank Setup page by clicking on the + next to the controller drop down. The controller setup page is broken down into three sections.

IV. Controller Setup

This section displays the serial number and model of the controller. It also displays the transfer status, which displays transferred when the device has confirmed that it has received the settings. There is also an active – in active setting which allows you to change the current status from late to okay for a specified period of time.

Current Location: Lube Distribute	r\Knoxville\East Knoxville\Alma Station\		
D000000184	Information Setup	🔗 History	Current View:
Controller S/N: D000000184 - Transfer Status: Complete Schedule Status: Active Dear	Controller Model: TC001	LEBINNF9000 - 4-1 Controller	
Alert on Data: No	• 🔊	Dial	In Settings

V. Controller Type Specific Settings

Based on the type of controller there are different setting that may be set in this section. Examples include data record time for store and forward controllers, next data alerts, reset controllers, etc.

VI. Schedule Settings

This section allows you to configure the controllers reporting schedule. Different models allow different schedules, but typical schedule options include:

Hourly schedules – The controller reports every x hours, x times a day.

Daily schedules – The controller reports on specified days at specified hours.

Monthly schedules – The controller reports every x days.

Custom schedules – These schedules allow you various customized settings.

terval: ax Reports:	24 Hours • 1 per day •					
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
01:00 AM	01:00 AM	01:00 AM	01:00 AM	01:00 AM	01:00 AM	01:00 AM
illed Calls Pe	er Month: 30 (:	1.00×)				

VII. Adding a Tank

Click on the 🙀 to start the add object module. Select 'Add a Tank' from the list in the report panel. The tank setup page is broken down into several sections.

VIII. RF Monitor Setup

In the Tank Setup page, select the controller from the drop-down menu, and enter the SN of the monitor (remember to use the specific monitor SN associated with the specific tank). Depending on the monitor type you might also have to select the measuring device for the tank. For RF telemetry used with the Cyl-Tel or Tank-Tel gauges, the below parameter MUST be used.

MUST USE: Measuring Type - CO₂ (regardless of actual tank liquid)

			Monitor Setup
Controller S/N:	6000005166 💌 🛟	Model:	Ethernet Controller
Monitor S/N:	G040360	Model:	GM240EI0000F900 - Gauge Monitor
Measuring Type:	CO2		

IX. Tank Setup

In this section you choose the tank configuration and enter the appropriate details based on the chosen configuration. These dimensions are needed to calculate the capacity and to interpret the data from the monitor. For RF telemetry used with the Cyl-Tel or Tank-Tel gauges, the below parameter MUST be used.

						Tarik S	ешр
Tank Name:	Nitrogen Bulk M	edica	Tank Type:	Chart Cryogenic	v Units:	Gallons	~
Product:	LN2	V 4		C02 Tank	Capacity:	1575	
Orientation:	Down	~	Offset:	495	Max Fill:	90	Percent 💌
Bulk Storage:					Unuseable Amt.:	200	
					Useable Amt.:	1218 Gal	lons
					Base Usage:		

MUST USE: Tank Type - Chart Cryogenic

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X. Tank Offset Setting

NOTE: This step must be followed after the first tank reading has successfully updated to Webview (Centeron). Meaning, the Controller has successfully made a call (transmission) and the tank information page shows a tank level. Also, it is recommended that the tank is at full level (100% liquid level).

For RF telemetry used with the Cyl-Tel or Tank-Tel gauges, the 'offset' (in the Tank Setup) might have to be adjusted for accurate level readings. Follow the below procedure to find the appropriate tank **OFFSET** number.

- 1. Using the Cyl-Tel/Tank-Tel gauge, note the **Actual Tank Level** (in % Full) of the tank.
- 2. In Centeron, browse to the specific tank History.
- 3. Select 'Data View' from the pull-down menu (default is 'Chart View').
- Under 'Data View' a table with the Monitor information (such as Monitor SN, Date, Percent Full, Status, Temp, Reading, etc.) is populated.

Level	History Usage History F	ill History Alerts History	
Days: Date Bange	15 From 6/3/2009 to		READING #
Monitor S	/N Date Percent Full Ar	Export Excel	

- Note the Reading (number) of the most recently updated Monitor information. Check time of reading to verify the Reading (#) is associated with the actual tank level (ATL) taken from the Cyl-Tel/Tank-Tel gauge.
- 6. If **actual tank level (ATL) = 100%** taken from Cyl-Tel/Tank-Tel, then:

```
OFFSET = 1000 - READING
```

If actual tank level (ATL) < 100% taken from Cyl-Tel/Tank-Tel, then:

$$OFFSET = 1000 - \left[\frac{(Reading - 36)}{ATL} + 36\right]$$

Example:

$$Cyl-Tel reads 95\% \qquad (ATL = 95\% => 0.95)$$

Reading on Centeron is 277 (Reading = 277)

$$OFFSET = 1000 - [((READING - 36)/ATL) + 36]$$

$$OFFSET = 1000 - [((277-36)/0.95) + 36]$$

$$OFFSET = 1000 - [(241/0.95) + 36]$$

$$OFFSET = 1000 - [253.68 + 36]$$

$$OFFSET = 1000 - 289.68$$

$$OFFSET = 710.32 => 710 \text{ (rounded to nearest whole number)}$$

7. Use this Tank Offset number in the Offset field (in Tank Setup)

Setpoint Setup

In this section you enter the tank levels at which you would like to be alerted, you also choose the type of alert you would like. You can configure the controller to immediately report in when the level crosses these points, you can have email alerts sent to one or more email addresses, and have the tank status change colors.

	Status	Color:
etpoint 1: 30 % (89.1 Gallons)		
rigger alert when tank is: Disabled 📃 🎑		Green w
· · · · · · · · · · · · · · · · · · ·		144444
etpoint 2: 20 % (59.4 Gallons)		
rigger slert when tank is: Disabled	30 % -	Yellow .
	20 %	Red .
Don't set controller to immediately report on setpoint.		
Show Advanced Options.	Use Setpoints	

Abnormal Usage Alerts

In this section you can establish alerts for low or excessive usage. These calculations can be based on an entered usage value, or the system calculated usage. You can also set the period of time that the alert uses to calculate the current usage rate.

Abnormal Usage		Alerts
Base Usage:	Gallons 🔽 Use Average Usage	
Low Usage: Alert when usage less than: IF Include weekends	Disabled 🖃 of Average Usage 🔊	
Excessive Usage: Alert when usage more than: IF Include weekends	Disabled 🔹 of Average Usage 🚳	
Calculate usage based on pas	t 48 - Hours	
	Constant of Theorem (1997)	

Other Information

The other information section allows you to enter additional information about the tank. Information like longitude and latitude, other comments and three user defined fields are available for you to enter this information into. The user defined fields can be re-labeled at the company level to allow consistency for the company. These fields are can be displayed in the tank detail reports.

atitude:	Longitude:	
serDefine1:	Comments:	2
serDefine3:		<u>×</u>



OnSite RF Telemetry Hardware

Installation

XI. RF Telemetry Board Installation

 Open the Cyl-Tel/Tank-Tel gauge face (by removing the 4 plastic screws) and disconnect the DP Sensor from the Cyl-Tel/Tank-Tel board/face. Set the Cyl-Tel/Tank-Tel front face aside.

INSIDE CYL-TEL (Follow Step 2-3, 6-8)

Cyl-Tel Installation

2. Mount the *RF Telemetry board* in the Cyl-Tel enclosure. Use the screws provided to secure the RF Telemetry Interface board to the back of the Cyl-Tel enclosure (Fig. 1).

Cyl-Tel Installation **3.** Connect the Sensor wire harness to the connector labeled 'Sensor' on the *RF Telemetry board*. Attach the connector labeled 'Cyl-Tel' (on the *RF Telemetry board*) to the Cyl-Tel or Tank-Tel board.



Figure 1. Installation of RF Telemetry Board inside Cyl-Tel gauge.

INSIDE TANK-TEL (Follow Steps 4-8)

Tank-Tel Installation

4. For Tank-Tel installations, follow Fig. 2 and Fig. 3 to install the *RF Telemetry board*. No mounting screws should be used when installing the *RF Telemetry board* inside the Tank-Tel gauge.



Figure 2. Installation of RF Telemetry Board inside Tank-Tel gauge. - *Remove all screw terminals from the Tank-Tel board.*



Figure 3. Installation of RF Telemetry Board inside Tank-Tel gauge.

Tank-Tel Installation

5. Connect the Sensor wire harness to the connector labeled 'Sensor' on the RF Telemetry board. Attach the connector labeled 'Cyl-Tel' (on the RF Telemetry board) to the Tank-Tel board.

FINAL STEPS FOR BOTH CYL-TEL & TANK-TEL INSTALLATION (Steps 6-8):

- Press the ON button (on the Cyl-Tel/Tank-Tel front panel) to verify the connections.
 The reading should be as accurate as before the installation.
- Place the Cyl-Tel/Tank-Tel face back onto the enclosure. ALL of the components and wiring should fit back into the enclosure.
- 8. Follow Step III for Analog phone Controllers, or Step IV for Ethernet Controllers.
 - NOTE: The Cyl-Tel or Tank-Tel CANNOT be powered with a 12Vdc power supply when using RF Telemetry. Only 9V batteries must be used to power the Cyl-Tel or Tank-Tel gauge. Lithium 9V batteries can also be used.

XII. RobertShaw Controller Installation

A. Analog Phone Controller

- **1.** Verify that the facility has an analog (POTS) phone line. (The phone line MUST be an analog POTS line, NOT using a digital phone system).
- Find a suitable phone outlet. The RF Telemetry system has a radio range of 1 mile lineof-sight, or 500 ft. obstructed. Refer to Centeron Controller Instruction Manual (Doc # 040004A0001 Rev. C; pg. 5-6) for further detail on range.
- **3.** Connect the *RobertShaw Controller* to the phone line using the provided RJ11 cable. (Connect one end of the RJ11 cable to the Controller, and the other end to the phone outlet.)
- **4.** Connect the provided Power Supply to an electrical outlet (120V AC), and then to the *RobertShaw Controller*.
- 5. Verify both power and phone connections by observing the LED's on the *RobertShaw Controller*. (Refer to the quick installation guide that is provided with the *Controller*.)
- NOTE 1: The phone line MUST be a POTS (plain old telephone service) analog line. The analog phone line can be verified or tested using the Smart6 Modular Tester (PN 14370521 available from ChartParts.com). Refer to Appendix C for testing instructions.
- NOTE 2: If the analog phone system requires a prefix such as '8' or '9' to reach an outside line, then refer to *Appendix A*. More complete information for Controller setup can be found in the Controller Instruction Manual (RobertShaw Document # 040004A0001 Rev C), which is included with the Controller hardware.
- NOTE 3: The signal strength of the RobertShaw RF Monitor can be tested using the Controller (analog phone) and a Serial Interface Cable (PN 14370547 available from ChartParts.com). Refer to *Appendix B* for instructions. Full instructions can be found in the RobertShaw Document # 040019A0001 Rev. A.

B. Ethernet Controller

- Verify that the facility has a LAN (Local Area Network) and internet capability. The facility network must be able to accept static IP address devices (Contact the facility IT staff if unsure).
- Find a suitable network outlet. The RF Telemetry system has a radio range of 1 mile line-of-sight, or 500 ft. obstructed. Refer to Centeron Controller Instruction Manual (Doc # 040004A0001 Rev. C; pg. 5-6) for further detail on range.
- **3.** Connect the *RobertShaw Ethernet Controller* to the LAN using the provided CAT5 cable. (Connect one end of the CAT5 cable to the RJ45 jack on the *Controller*, and the other end to the network connection.)
- **4.** Connect the provided Power Supply to an electrical outlet (110V AC), and then to the *RobertShaw Ethernet Controller*.
- Verify both power and network connections by observing the LEDs on the *RobertShaw Ethernet Controller*. (Refer to the quick installation guide that is provided with the *Controller*.)
- NOTE:Refer to Appendix D for complete instructions/troubleshooting guidefor the RobertShaw Ethernet Controller. Information can also be foundin the RobertShaw Document # 040005B0001 Rev. B.

XIII. Initiate Telemetry

- **1.** Go back to the Cyl-Tel (or Tank-Tel) where the *RF Telemetry board* is installed.
- 2. Remove the Cyl-Tel/Tank-Tel face to access the *RF Telemetry board*.
- 3. Remove the permanent magnet from the holster (on the top left corner of the *RF Telemetry board*). This forces a sample reading to be sent to the *Controller*. DO NOT place the magnet back into the holster (store the magnet outside of the Cyl-Tel/Tank-Tel enclosure for future use).

XIV. Check OnSite Website

- 1. Access the OnSite Telemetry website (<u>http://www.onsitetelemetry.net</u>).
- 2. Login
- 3. Browse to your specific folder (in the explorer window).
- 4. Check the 'Last Update' timestamp to verify data transmission.
- 5. Setup tank (dependant on tank specifications and user settings).

XV. CONTACTS

Chart Customer Service:	(800) 400-4683
Centeron Technical Support:	(865) 981-3118

XVI. WEBSITES/LINKS

OnSite Telemetry	http://www.onsitetelemetry.net
	Access telemetry setup and tank data.
Chart Parts	http://www.chartparts.com
	Order products including OnSite Telemetry hardware and other Chart, Inc. products.
Chart, Inc.	http://www.chart-ind.com

Informational company website.

Appendix A. RobertShaw (analog phone) Controller Programming for Prefix Dialing

The dial prefix can be changed by pushing in and holding the reset button while applying power to the controller. During the first three seconds, the controller will go through its standard red, yellow, and green LED initialization sequence. After the initialization sequence, all three LED's will turn off, then all LED's will turn green, then yellow. When all LED's turn yellow, release the reset button and the controller will automatically search for the proper dial prefix. After the dial prefix has been selected, the controller will automatically call the Data center then return to ready mode. Once the controller has reached ready mode, perform a long reset on the controller by pushing in and holding the reset button for 6 seconds. Please note this procedure will only write None, 9, and 8, dial prefixes.

Test LED	Connection LED	Power LED	Selected function when reset button is released after power is applied
Off	Off	Off	Exits test (without modification)
Green	Green	Green	Runs modem communication test
Yellow	Yellow	Yellow	Tries to communicate with the data center using prefixes sequentially: • None • 9, • 8, The first prefix, which gives an access to data center, will be stored in the EEPROM.

Controller LED Sequence:

Appendix B. RobertShaw RF Signal Strength Testing

RobertShaw Document 040019A0001 Rev. A

Overview

The Centeron[™] Controller provides a serial interface for communication with the user. The interface can be used to check the configuration and operation of the Controller. The interface can also be used to configure some of the "personality" parameters of the Controller. While the serial interface cable is connected to the Controller, the Controller will not service the radio receiver or the modem.

This document is intended to show the reader how to use the CenteronTM Controller's serial interface port. This document will describe the necessary hardware and software to provide the serial interface between the Controller and a platform with a RS-232 compatible port.

1 Interface Requirements

The following hardware and software are required for the serial interface with the Controller.

1.1 Hardware Requirements

1.1.1 Platform with a RS-232 Compatible Communications Port

The communications (COM) port must be capable of RS-232 compatible communication at 9600 baud. Note: This information does not apply to Handheld Palm Units.

1.1.2 Robertshaw Serial Interface Cable

One of the following Robertshaw Serial Interface Cables is required. (Robertshaw p/n 086640A0001) is required for communication between the PC's COM port and the Controller's serial interface port. (Robertshaw p/n 086642A0001) is required for communication between a Handheld Palm and the Controller's serial interface port.

1.2 Software Requirements

1.2.1 Terminal Emulation Software and Settings

The platform with the COM port must run a terminal emulator to communicate with the Controller. Most Microsoft® Windows platforms have Hilgraeve's HyperTerminal terminal emulator installed on them. The configuration for HyperTerminal is listed below. **Note:** The settings below dose not apply to the Handheld Palm Unit. A terminal emulator is available for the Palm at www.markspace.com/online.html

- 1. Click on HYPERTRM.EXE,
- 2. Enter a name (e.g. lc_controller) and choose an icon,
- On the next window, choose "Connect Using: Direct to Com#" where # is the COM port number where the serial interface cable is connected. Click "OK."
- 4. On the Port Settings window, make the selections shown in Table 1.

Table 1. Senai internace Fort Setting	Table 1:	: Seria	I Interface	Port	Setting
---------------------------------------	----------	---------	-------------	------	---------

Parameter	Setting
Bits Per Second	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

2 Operation

After configuring the terminal emulation software, the following procedures can be used to communicate with the Controller using the serial interface port.

2.1 Connecting To the Serial Interface Port

- Connect the serial interface cable (Robertshaw p/n 086640A0001) to the PC COM port, or (Robertshaw p/n 086642A0001) to a Handheld Palm Unit.
- 2. Open the terminal emulation software with the serial interface port settings previously listed.
- 3. Connect the serial interface cable to the Controller's serial interface port. (The Controller can be powered or not powered when the cable is connected. If the Controller isn't powered when the serial interface cable is connected, then apply power to the Controller.) Important Note: While the serial interface cable is connected to the Controller, the Controller will not service the RF receiver or the modem.
- After the Controller initializes the LEDs (indicated by all LEDs cycling through their colors followed by the "power" LED being set to green), the Controller will send a ">" to the terminal emulator's screen.
- 5. The user may now enter commands to the Controller using the serial interface. The command structure and a description of the available commands are detailed later in this document.

2.2 Serial Interface Commands

The serial interface uses a set of commands to allow the user to read and set various parameters of the controller. All of the commands are one or two characters in length.

2.2.1 Serial Interface Command Structure

To **read** a parameter, the user must enter the command and hit <ENTER>. For example, entering

> CI <ENTER> would display the controller's ID.

To write a parameter, the user must enter the command followed by the equal sign and the value to be assigned. For example, entering >TH=+90 < ENTER> would set the controller's high temp. setpoint to +90 °C.

2.2.2 Serial Interface Command Groupings

The serial interface commands are broken down into five groupings: general help, hardware/firmware information, controller setup, phone setup, and monitor information. The user can read all of the information under a group by typing in the corresponding group ID. For example, entering

>10 <ENTER> would display all of the information for the hardware/firmware group.

CenteronTM Serial Interface Cable Instruction Manual

2.2.2.1 General Help Command

The general help command is called by entering a question mark. The controller will respond with a listing of the other command groupings. A typical display using ? is shown below.

>?

- 10 Hardware/Firmware Info
- 11 Ctrl Setup
- 12 Phone Setup
- 13 Monitor Info

2.2.2.2 Hardware/Firmware Information Group (I0)

The hardware/firmware group provides information regarding the configuration and version of the hardware and firmware. A typical display using I0 is shown below.

> 10

* - Hardware/Firmware Info

11/11

This indicates that the controller is hardware version 1.1 and uses firmware version 1.1.

2.2.2.3 Controller Setup Group (I1)

The controller setup group lists the commands and information for the general controller configuration. In addition to the available commands, 11 will display the present controller status. A typical display using 11 is shown below.

> []

* - Ctrl Setup Status-Power Failure CI= 1234567890 TH=+70 TL==40 GT=>Get temperature ST=>Set temperature The status indicates that

The status indicates that the controller has just received power, its ID is 1234567890, its high temperature setpoint is +70 °C, and its low temperature setpoint is -40 °C.

2.2.2.4 Phone Setup Group (I2)

The phone setup group lists the commands and information for the phone configuration. In addition to the available commands, 12 will display the previous modem connection status. A typical display using 12 is shown below.

> 12 * - Phone Setup Connect-OK DP=18882345678 PP= PS= MI= MA= TR=2 SC= EC= PC=0 PT=T

The status indicates that the controller's last connection to its data collector completed successfully (OK). The additional commands are explained later in this section.

2.2.2.5 Monitor Information Group (I3)

The monitor information group lists the commands and information for the monitor(s) associated with the controller. A typical display using I3 is shown below.

> I3

* - Monitor Info MM=>Get Monit.Msg MC=>Clear Monit.Data MD=>Disp.Monit.Data

2.2.3 Serial Interface Commands

Table 2 provides a description of all of the serial interface commands.

	Table 2. Senai interface Comm	anus
Command	Description	Format
?	General help	?
	Lists all command groups	
10	Display hardware/firmware info	10
11	Display controller setup	11
CI	Display controller ID (10 digits)	CI
TH	Controller high temperature setpoint	TH (read)
	(sign & 2 digits)	TH=+90 (write)
	The value is temperature in degrees	
	Celsius.	
TL	Controller low temperature setpoint	TL (read)
	(sign & 2 digits)	TL=-40 (write)
	The value is temperature in degrees	
	Celsius.	
GT	Get controller temperature (sign & 2	GT
	digits)	
	The value is in degrees Celsius.	
ST	Set controller temperature (sign & 2	For example, if
	digits)	ambient temp =
	Allow unit to run 30 minutes before	+26 °C,
	setting the temperature.	S1=+18 (write)
12	Display phone setup	12
DP	Primary phone number (up to 12	DP (read)
	characters)	DP=18888234567
	This is the first number called by the	(write)
	controller.	DD (1)
PP	Dial prefix (up to 10 characters)	PP (read)
	Add a ',' after the prefix if waiting is	PP=9, (write)
DC	Fequired.	DS (read)
PS	Dial surfix (up to 10 characters)	PS (read)
		(write)
MI	Minimum time between calls in	MI (read)
	minutes (5 digits)	MI=00005 (write)
MA	Maximum time between calls in	MA (read)
	minutes (5 digits)	MA=00120 (write)
TR	Maximum number of calls per phone	TR (read)
	number (1 digit)	TR=2 (write)
	The maximum value is 2.	,
SC	Start of call window	SC (read)
	(2 digits with $00 = midnight \& 23 = 11$	SC=23 (write)
	pm)	
EC	End of call window	EC (read)
	(2 digits with $00 = midnight \& 23 = 11$	EC=00 (write)
	pm)	
PC	Call on power up (1 digit)	PC (read)
1	0 = call on power up, 1 = don't call on	PC=0 (write)
	power up	
PT	Pulse or tone phone line (1 character	PT (read)
	P or 1)	PI=T (write)
13	Display monitor information	13
MM	Get message directly from RF receiver	MM
MC	Clear monitor database	MC
MD	Display monitor database (monitor 1D,	MD
	i lost report time level and temperature)	

Appendix C. Phone Line Test Procedure (using the Smart6 Modular Tester)

The RobertShaw (analog phone) Controller will only function with an analog phone line. This requires some phone network knowledge and diagnosis skills to determine if the phone line is actually pure analog, or if there is a digital network behind the scene. This phone test procedure with the proper hardware, will give the technician the ability to distinguish between analog or digital phone lines.

Analog Phone Line

Analog phone lines carry data by using a pair of wires (2-wires for each line). The voice/data transmitted is represented in the wires by a continuous electrical signal. Four-wire RJ-11 connectors are used for telephone handsets and wall outlets (Figure 1). There is also a six-wire variation (RJ-16) for three-line phones. Typically a single line phone uses the red and green wires. The red wire supplies the signal while the green wire is used as a common.



Digital Phone Line

Digital phone lines transmit data in packets which have to be converted back into an analog signal at the receiving end. This is done by using IP (Internet Protocol) based communication; thus, it is named VoIP (Voice over IP). Digital phone systems (often called PBXs) also sometimes use RJ-11 connectors and receptacles. They can also use RJ-45 connectors (Ethernet connectors, Figure 2).



Figure 2. RJ-45 Connector

Appendix C. Phone Line Test Procedure (Cont.)

Since digital phone lines sometimes use RJ-11 connections, it is important to identify which type of phone system, analog or digital, is behind the wall. There are typically clues at the phone outlet location that immediately point to which system it is.

Telephone Line Test Procedure

- 1. Locate phone outlet.
 - a. Identify the type of receptacle (RJ-11/RJ-16, or RJ-45).
 - i. Presence of RJ-45 outlet and CAT-5 cable means Digital Phone System.
 - ii. Presence of RJ-11/RJ-16 does not conclude any system.
- 2. Identify any telephones or devices connected to outlet
 - a. Identify how to make calls on the telephone.
 - i. If you need to dial an extension such as '9' or '8' to reach an outside line, then it MIGHT be a Digital Phone System. Proceed with steps to determine.
 - b. Observe labels on the telephone or device.
 - i. Presence of "complies with part 68, FCC Rules" and Ringer Equivalence Number (REN), means Analog Phone System.
 - c. Observe front panel of telephone or device
 - i. Presence of multiple function keys, call transfer buttons, voice mail key means Digital Telephone System.

If there is an RJ-11 receptacle and there are no telephones or devices connected, you will need to use a RJ-11 phone line tester or modular tester, and a multi-meter (to measure voltage and current). An example device (Figure 3) will be referenced in this procedure; however, you may use whichever you prefer.



Appendix C. Phone Line Test Procedure (Cont.)

Smart6 Modular Tester Procedure

- 1. Connect the SMART6 Modular Tester to the RJ-11 outlet.
 - a. Depress the button on the SMART6
 - i. Green LED (by 3-4) indicates a good connection and the primary phone line uses the red and green wires (Pins 3 and 4 on the SMART6). This also means that an Analog Phone System is used.
 - ii. Red LED (by 3-4) indicates a reversed polarity (signal and ground are switched) in the red and green wires (Pins 3 and 4 on the SMART6).
 - iii. Green LED (by 2-5) indicates a good connection and the primary phone line uses the black and yellow wires (Pins 2 and 5 on the SMART6). This also means that an Analog Phone System is used. When installing the telemetry hardware, you must make sure to connect to the black and yellow wires. Both green LEDs indicate that both lines have good analog connections.
 - iv. Red LED (by 2-5) indicates a reversed polarity (signal and ground are switched) in the black and yellow wires (Pins 2 and 5 on the SMART6).
- 2. Once there is a 'good' connection (in either line), connect the telemetry hardware to the phone line. Use a multimeter to measure the voltage and current across the active line (i.e. red- wire and green+ wire). The current across the red and green wires should be around 25-30mA and have a potential of approximately 45Vdc, when there is no active call. When a call is being made by the telemetry hardware, you should see a fluctuation in the voltage at the same pins. When there is a call being made to the phone line, you should be able to observe an AC voltage.

Bandwidth	300 - 3.3 kHz (3 kHz BW)
Impedance	600 ohms
Connector	RJ-11
Cable	2-Wire (twisted pair)
DC Voltage	<u>48 V</u> (±6 V)
Polarity	Positive (tip or red wire) tied to earth <u>ground</u> so it measures 48 VDC (relative to ring or green wire)
DC Current	20-26 mA (typical)

Analog Phone Line Specifications

Appendix D. RobertShaw Ethernet Controller Activation

RobertShaw Document # 040005B0001 Rev. B

CONFIGURE THE ETHERNET CONTROLLER IN WEBVIEW AND ACTIVATE IT BEFORE INSTALLING MONITORS

Important Installation Considerations		
NEED	AVOID	
Indoor Mounting Location	Moisture	
110 VAC Power Outlet	Insects	
RJ-45 Network Connection with Internet Access	Excessive Dust	
Location as Close to Tanks as Possible	Temperatures Below 32°F or Above 140 °F	
Configure Controller in WebView and Activate Before Installing Monitors	Metal Enclosures	

- The Controller can be placed on a flat surface or mounted on a wall, if desired. Centeron Monitor Installation Manuals contain helpful information for improving radio communication between the Monitor and Controller.
- Using an Ethernet cable, connect the Controller to a port on a network switch or hub or any standard RJ-45 network jack where a computer could gain access to the Internet. Note: If the local network requires a static IP address for the ICE, see instructions on the back of this sheet. Longer Ethernet cables may be used, if necessary, but the total cable length including permanent wiring inside the building should not exceed 300 feet.
- 3. Activate the Controller by plugging in the 110VAC power supply and then connecting the power cable to the Controller. When power is applied the Ethernet Controller will enter a short test mode and then establish communication with the Data Center. Within three minutes the Controller will enter normal operating mode and the Connection light will blink Green approximately once per second.
- 4. Install and activate the Monitors. Refer to the Monitor Installation Manual for information and instructions.

The Ethernet Controller status indicator lights can be interpreted as follows:

"Power" Light Indicates Operating Status		
Blinking Green	Normal Operation	
Blinking Yellow	Connected to Data Center but time has not been set correctly	
Continuous Yellow	Controller in Upgrade Mode	
Blinking Red	Controller Powered but no Communication with Data Center	
Continuous Red	Controller Powered but not operating	

"Connection" Light Indicates Data Center Communication Status		
Continuous Green	Last Communication Successful	
Momentary Flash Yellow	Receiving or Transmitting Data to Data Center	
Blinking Red	No Communication with Data Center	

"Test" Light Indicates Monitor Communication Status		
Off	Not Currently Receiving a Transmission	
Blinking Green	Monitor Data Received Successfully	
Blinking Yellow	Monitor Data Received, Poor RF Link *	
Blinking Red	Corrupted Data Received * or incorrect Property Code	

* Installer should look for an alternate location for the Ethernet Controller to improve Monitor communications.

If you experience trouble with this equipment, please contact Robertshaw Industrial Products Technical Support at (865) 981-3118, Monday through Friday, 8:00 AM to 4:30 PM Eastern Standard Time.

CAUTION: Robertshaw Industrial Products does not support field changes or modifications to any of the Centeron Level Monitoring System equipment. Any modification to the equipment will void the manufacturer's warranty. This unit must be serviced by qualified service personnel only.

Appendix D. RobertShaw Ethernet Controller Activation (Cont.)

Ethernet Controller – Static IP Address Configuration

Introduction

The Centeron Ethernet Controller (TCE) is shipped with its network configuration set to use Dynamic Host Configuration Protocol (DHCP), a system employed by networked devices to obtain the information necessary for operation in an Internet Protocol network. The TCE should function without any further configuration if the local network at the site where the TCE is installed provides access to a DHCP server that supplies an IP configuration allowing outbound access to the Internet. However, if devices (clients) on the intended local network require static (fixed) IP addresses to access the Internet, then an IP address must be allocated and the TCE configured to use this static IP address. A qualified network engineer who has authorization to access and modify the network where the TCE will be installed can use the following procedure to configure the TCE for a static IP address.

Determining the current IP address

To change the TCE Controller IP configuration from its default settings, the TCE must initially have access to a DHCP server. Once the TCE is up and running on a DHCP enabled network, the specific IP address that the unit was assigned must be discovered. The IP address may be discovered by comparing the MAC address of the TCE (printed on the back label of the unit) to a listing of current DHCP IP leases (available on the DHCP server). The TCE's IP address may also be discovered by scanning the network for clients with an accessible TCP port 9999.

Changing the IP Configuration

The IP configuration may be changed using the Microsoft Windows® program, available for download at:

http://www.centeron.net/downloads/TCE_IP_Changer.exe

Execute this program and enter the current IP address assigned to the TCE by the DHCP server in the field labeled "Current IP". Fill in the remaining fields with the desired IP and network configuration information for the site where the TCE will be installed. *Be sure that the fields are filled in CORRECTLY since an unintended entry could make the device PERMANENTLY INACCESSIBLE.* When finished, click the "Set IP" button and the TCE will be updated with the new IP configuration.