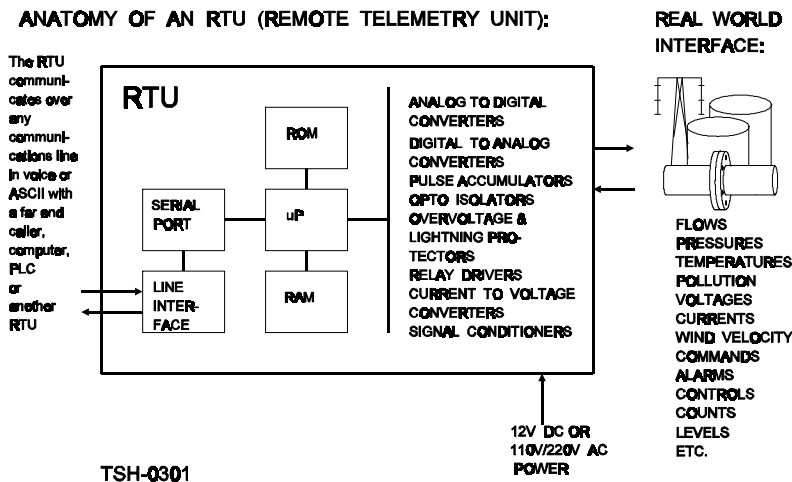## CHAPTER 3, WHAT IS AN RTU (Remote Telemetry Unit)?

3.A SUMMARY:

Simply put, the RTU converts (digitizes) real world input signals such as pressures, flows, levels, contacts, pulses, etc., into signals that can be transmitted over cable or radio.

ANATOMY OF AN RTU (REMOTE TELEMETRY UNIT):

TSH-0301

The RTU also converts incoming signals from another RTU or from a central computer into real world output signals to turn relays on and off, start and stop motors, position valves, etc.

RTUs are classified by the amount of inputs and outputs (I/Os) they can handle and whether they are 'dumb' RTUs, handling reports and commands only, or 'smart' programmable RTUs with math, flow calculation and other advanced capabilities.

The RTU faces the communications line (in Mode-A, -B or -C, see below) through a built in modem. The RTU also faces the real world sensors and actuators over Input and Output (I/O) circuits.

I/O capacities range from the low end ScanData SLR RTU with 1 pulse input) to the high end ScanData M-system RTU which can handle up to 4,000 inputs and outputs.

All ScanData RTUs interface directly to most real world sensors, transducers, relays and actuators. The RTUs come completely programmed, have built in modems and start operating automatically when power is applied. They are designed to be installed by untrained personnel and to perform well in harsh industrial climates.

USE TELEMETRY & SCADA TO :

REPORTS

COMMANDS

SUPERVISE ANY REMOTE INSTALLATION

TSH-0302
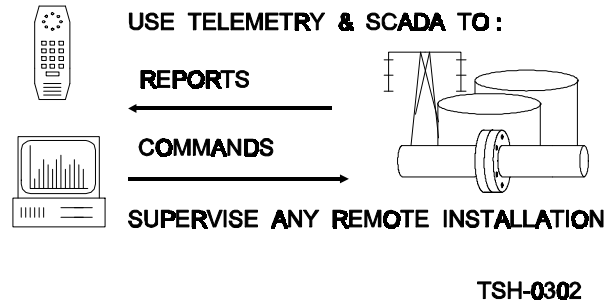
RTUs which cannot be serviced easily will prove very costly in the long run. The proper performance of ScanData RTUs is easily verified by checking the modem LEDs, the M-system I/O LEDs, by connecting a laptop computer to the service port or by simply listening to the received and transmitted signals over a telemetry test set such as the ScanData TTS unit.

3.B EXAMPLES OF DIFFERENT RTUs:

We live in the age of specialization. RTUs are also highly specialized, each one designed to perform certain functions.

HOW TO SELECT AN RTU.

Your first choice is voice or ASCII. If you need an RTU that speaks in voice and that you can access with your phone, use the VBX-7. If you need an RTU that speaks ASCII, use the SLR, LMR, LMX, SMR or M-system RTUs.

Your second choice is mode of operation, Mode-A is dialing the RTU, Mode-B is continuously scanning the RTU with a computer and Mode-C is multiplexing analog and digital signals between two or more RTUs.

For Mode-A operation, use the SLR, LMX, SMR or M-system RTU. For Mode-B and -C operation, use the LMR, LMX, SMR or M-system RTUs.

Your third choice is based on how many input and output signals you have to transmit and receive. Check the analog, digital and pulse signals you have and select the RTU accordingly. You have a very wide choice, from the SLR which handles one input signal to the M-system which can handle up to 4,000 input and output signals.

Your fourth choice is reporting only or programmable RTUs. If you need engineering conversions at the RTU, a math package, flow calculations, data logging, etc., choose the SMR or M-system RTU. Else choose any RTU with the required I/O capability.

Some RTUs are designed for low power consumption, operating on an internal battery for up to 5 years.

Other RTUs are designed for different I/O capacities and for different modes of operation (Modes-A, -B and -C)

Special RTUs are designed for voice operation, where you can use your telephone as a central station, hear the RTU report in voice and send commands out over the RTU using your phone's keypad.

The following ScanData RTUs are designed to perform these functions:

3.B.1 THE SLR RTU:

The SLR (Super Low power RTU) is designed to read and report accumulated gas and liquid flows from remotely installed gas and liquid flow meters. It is designed to share the telephone line with an existing telephone and has a built in modem. It is completely programmed and answers incoming calls only on the tenth ring so that personal calls to the station can still be made without interference from the SLR.

For ease of installation, the SLR needs no power supply. It operates on its internal lithium battery for up to 5 years.

3.B.1.a SUMMARY OF SLR FEATURES:

C   **Reports on accumulated gas and liquid flows.**

C   **Uses no external power.**

C   **Built in modem.**

C   **Shares a telephone line with other users.**

3.B.2 THE LMR RTU:

The LMR RTU is designed to handle up to 9 I/O signals in Mode-B and Mode-C operations, 2 analog inputs, 2 analog outputs, 2 digital inputs, 2 digital outputs and one pulse input. It is an ideal RTU when you need to transmit one or two analog and one or two digital signals from one RTU to another or to a central station. It is small, completely programmed, uses very little power and simple to install with its built in modem.

3.B.2.a SUMMARY OF LMR FEATURES:

C   **Small and cost effective.**

C   **Low power consumption.**

C **Built in modem.**

C **Handles analog, digital and pulse inputs.**

C **Handles 4-20 mA analog outputs.**

3.B.3 THE LMX RTU:

Use the LMX RTU when you need to handle more I/O signals in Mode-A, Mode-B and Mode-C operations. The LMX can handle up to 8 analog inputs, 2 analog outputs, 24 digital inputs, 8 digital outputs and 6 pulse inputs. It has a built in modem and offers very low cost per point.

3.B.3.a SUMMARY OF LMX FEATURES:

C **Low cost per point.**

C **Operates in all three Modes, -A, -B and -C.**

C **Built in modem.**

C **Handles analog, digital and pulse inputs.**

C **Handles 4-20 mA analog outputs.**

3.B.4 THE SMR RTU:

Use the SMR (Smart Meter Reader) RTU when you need intelligence at the RTU level, such as engineering conversion of analog values, phone numbers to dial, data storage, time of day reporting and other programming capabilities.

The SMR can be delivered with a complete floating point math package and is ideal for gas flow computing and gas flow chart recording replacement. It operates in all three Modes (-A, -B and -C) and has 6 analog inputs, 4 digital inputs, 4 digital outputs and three pulse inputs.

3.B.4.a SUMMARY OF SMR FEATURES:

C **Floating point math package.**

C **Use as an RTU and a flow computer.**

C **Replaces circular chart recorders.**

C **Handles all three Modes,-A, -B and -C.**

C **Built in modem.**

3.B.5 THE M-SYSTEM RTU:

The M-system RTU has all the programming capabilities of the SMR. In addition, the M-system plug in I/O modules allow you to expand the I/O capability up to 4,000 points. Various configurations of analog input, digital input, pulse input, analog output and digital output modules are available.

The M-system operates in all three Modes, -A, -B and -C. It can be configured as an RTU, a telemetry Mode-C master station, a data concentrator or as a combination of all three.

3.B.5.a SUMMARY OF M-SYSTEM FEATURES:

- **Operates in all three Modes, -A, -B and -C.**
- **Floating point math package.**
- **Operates as an RTU, a gas flow computer, a master station and a data concentrator.**
- **Built in modem.**
- **Up to 4,000 I/O points.**

3.B.6 THE VBX-7 VOICE TELEMETRY RTU:

The VBX-7 RTU is a specialized RTU that you can call (from anywhere in the world) and hear a complete report, in voice, from the installation. It uses 45 pre-recorded phrases to put together a message telling you the engineering values of 2 analog inputs, the status of 16 digital (alarm) inputs and the contents of two pulse accumulators.

You can remotely program the VBX-7 over the keypad on your phone (enter a secret guard code first) to alarm dial up to 6 telephone numbers and you can remotely open and close two relays.

3.B.6.a SUMMARY OF VBX-7 FEATURES:

- **Dial the VBX-7 installation from anywhere in the world.**
- **The VBX-7 gives you a complete report in voice.**
- **Use your keypad to program and to send commands to the VBX-7.**

    C   **Automatically alarm dials up to 6 telephone numbers.**

    C   **Set alarm limits for the analog values.**

    C   **A secret access code guards against unauthorized use.**

3.C RTU PROTOCOLS:

All RTUs have to communicate with a central station and with each other. How do they communicate and what language do they use? This is the single most important question any purchaser of Telemetry and SCADA systems should ask.

WHAT IS AN RTU PROTOCOL?

The RTU protocol is simply the language the RTUs use to communicate with each other, with PLCs, with Smart Transmitters, with central station computers and with the world.

The RTUs are intelligent devices and communicate (receive commands and send reports) much as humans do.

Would it not be nice if the whole world spoke one language, say English? That would be nice for the English speaking world. The Spanish speaking world would probably prefer Spanish.

Is there a universal language (protocol) for RTUs? Luckily, there is. ASCII. American Standard Code for Information Interchange. If you are at all interested in computers, you know that they all communicate with each other, all over the world, in ASCII. If your RTU speaks ASCII and if the manufacturer freely publishes information on the ASCII protocol, designing, maintaining and expanding your system will be made infinitely more easy.

Most reputable manufacturers, ScanData included, manufactures RTUs with open ASCII protocols.

RTUs that do not communicate well or that communicate in ways that are not compatible with other RTUs, PLCs and computers are difficult to install and maintain, to say the least.

RTUs that use special, proprietary protocols will prove to be impossible to service should the manufacturer decide to change his protocol or simply not to manufacture his RTUs any longer.

WHERE CAN I GET MORE INFORMATION?

The following descriptions, pertinent to this chapter, are included in the DESCRIPT directory on the SCADAtech(TM) CD:

pri-0901.pdf   Design Guide and Price List.

gui-0980.pdf   How to design SCADA and Telemetry systems.

app-1129.pdf How RTU protocols work.

app-1105.pdf Adding automatic controls to RTUs.

An easy way to get the latest and most recently updated versions of these descriptions is to go on our WEB site:

www.scan-data.com

When you are there, click on the blue button near the bottom of the WEB page that says **Technical Information.** Then click on the description # you need.