Remote Facilities Controller

Model RFC-1/B

– Programming Book –

This documentation is valid for
Remote Facilities Controller firmware version 5.09

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10.1 GENERAL DESCRIPTION AND FUNCTION

The RFC-1 is a remote control system made by Sine Systems, Inc. In its most basic form, it consists of one RFC-1/B control unit and one RP-8 relay panel. A more elaborate system can consist of up to eight RP-8 relay panels and any of several optional accessories. The purpose of the RFC-1 is to allow remote monitoring and control of an industrial facility. This can be done in either or both of the following two ways:

10.1.1 Manual Operation

The RFC-1 allows the facility to be remotely operated from any ordinary telephone. The remote operator uses the telephone keypad to make monitoring and control selections and the RFC-1 reports telemetry and status information by means of a digitally synthesized voice. With an optional RS-232 adaptor, the RFC-1 can also be operated remotely with a modem and computer or data terminal. In addition to operation by an ordinary telephone line, provisions are included for operation by means such as dedicated lines or radio links.

10.1.2 Autonomous Operation

The RFC-1 can be user-programmed to operate a facility automatically. The RFC-1 can be user-programmed to take independent action based on either time-of-day and date or various monitored telemetry conditions. The action taken can be either a series of facility control functions, or a telephone calling sequence used to alert a remote operator, or both.

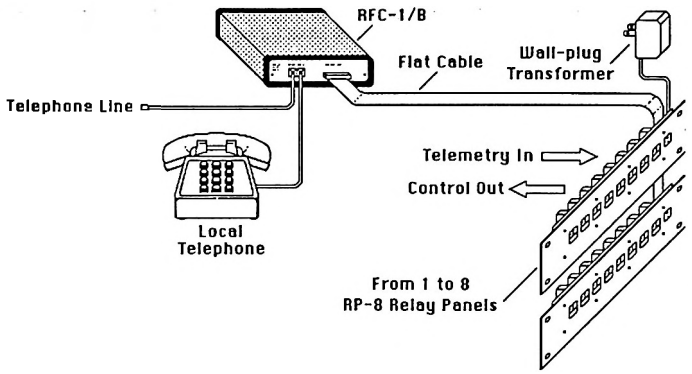
An alternate use of the RS-232 adaptor discussed above is to allow logging of activities at the facility. Telemetry and status conditions can be automatically printed at regular intervals with time and date notations. The printer may be located at the controlled facility or it may be located at a distant point with the addition of two modems.

Many references will be made in this manual concerning the application of the RFC-1 for remotely controlling broadcast transmitting facilities. While this is a common use, it is not the only application of the RFC-1. The RFC-1 is suitable for a wide range of industrial and commercial applications.

10.2 HARDWARE DESCRIPTION

10.2.1 Connection of System Components

The RFC-1/B control unit is connected directly to a regular telephone line and a local telephone. It is also connected to one or more RP-8 relay panels which are used to interface the remote control system to the rest of the facility. The following illustration shows a basic system:



To operate the system remotely, the operator first calls the appropriate telephone number. After a preset number of rings, the RFC-1 answers the telephone. The facility may then be monitored and controlled using the telephone keypad, with the RFC-1 reporting conditions in its synthesized voice. Optional security codes may be used to restrict operation of the facility to authorized personnel. When the RFC-1 is not being used, the local telephone may be used normally. The local telephone may also be used to locally operate and calibrate the system.

10.2.2 Alternate Communications Links

In addition to control and telemetry access by means of a dial-up telephone line, the RFC-1 also may be adapted for use with a non-dial-up communications link such as a dedicated line, a two-way radio, a pager, an STL/SCA link, etc. This additional control method may be used in place of a dial-up line or in addition to a dial-up line for the purposes of an alternate or back-up control and monitoring means.

10.2.3 RS-232 Operation

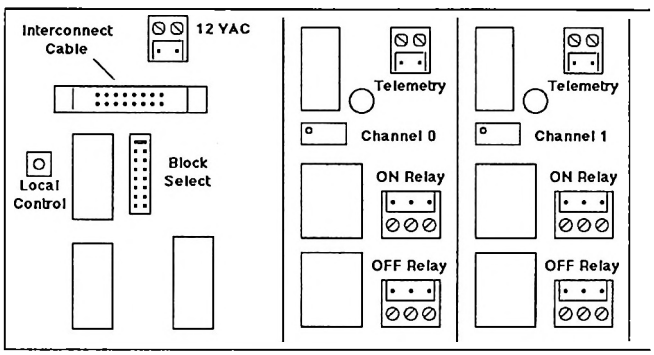
With an optional accessory, an RS-232 port can be added to the RFC-1. This can be connected to a printer for the purposes of automatic logging or it can be connected to a modem for remote printing or remote operation of the system by data terminal or computer.

10.2.4 Physical Details

The RFC-1 is "modem-sized" (6" x 7" x 1.75") and can be mounted in any convenient location such as on a wall, on a desk top, or it may be rack mounted with an optional kit (RK-3). The RFC-1 is connected to a telephone line and a local telephone with modular jacks located on the front panel. It is connected in "daisy chain" fashion with 16 conductor flat cable to one or more RP-8 relay panels and optional accessories such as auxiliary relay modules and temperature modules. Each RP-8 panel contains the necessary relays and analog inputs to interface 8 channels of telemetry and control. The RP-8 panels are 3.5" high and 19" wide, and mount in a standard 19" equipment rack. Two panels are shown in the illustration but anywhere from one to eight panels can be connected for a maximum system size of 64 channels. A 12-volt AC "wall plug" transformer is supplied with the RFC-1 and connects to any one of the RP-8 panels to provide power to the system.

The system is designed in this way to allow the user to purchase only the hardware necessary for their particular application. As few as eight channels can be installed initially, and system expansion up to 64 channels is easily accomplished later with the addition of more RP-8 panels. The interconnection cable used between the RFC-1 and the RP-8 panels uses insulation displacement connectors that can be field-installed in just a few seconds without special tools. Also, it is easy to add connectors to an existing cable for purposes of system expansion. The RFC-1 is supplied with eight feet of interconnection cable and one connector. An additional connector is supplied with each RP-8 panel.

Each RP-8 panel contains 8 reed relays for telemetry selection and 16 relays for control output (8 ON/8 OFF). The contacts on the control relays are rated at 5 amperes resistive/2 amperes inductive. The following illustration shows a partial view of the rear of an RP-8 panel:



Each RP-8 panel has a movable "Block Select" jumper plug that is used to select the block of channels assigned to that panel. The blocks are: 0-7, 8-15, 16-23, 24-31, 32-39, 40-47, 48-55, and 56-63. There is also a "Local Control" pushbutton, accessible from the front of the panel, which allows all control and telemetry functions to be accessed from the local telephone.

All telemetry and control connections are made to the relay panels by means of "pluggable" screw terminal blocks. These removable blocks can be installed so the wires emerge from the relay panel either horizontally or vertically and simplify both installation and future modification or testing.

Telemetry calibration is accomplished with a 22-turn cermet potentiometer, accessible from the front of the relay panel, for each telemetry channel. Calibration is done in the local control mode by adjusting the potentiometers for the desired telemetry indication. Because the telemetry constant for each channel is stored in a potentiometer, it is "nonvolatile" and is not affected by a power interruption.

10.3 SOFTWARE DESCRIPTION

The "heart" of the RFC-1 is a single-chip microcomputer. This microcomputer monitors and controls all actions of the RFC-1. The microcomputer chip contains a set of electronic instructions which are programmed into the chip at the factory. These instructions determine all the operating features and characteristics of the RFC-1. In currently used terms the RFC-1 itself is referred to as "hardware." "Hardware" is nuts, bolts, resistors, capacitors, integrated circuits, wiring, and so forth; physical things. The set of electronic operating instructions for the microcomputer chip is called "software." [Technically speaking, it is called "firmware" after it is loaded into the chip. However, to avoid confusion, in this manual it will still be referred to as "software."]

Since all the operating characteristics of the RFC-1 are determined by the software loaded in the microcomputer chip, as new developments are made and new features are added, it is simple for the user to upgrade their RFC-1 by replacing their microcomputer chip with another chip containing new software. It is for this reason that the RFC-1 instructions are divided into to separate books: the Hardware Book and the Software Book. A software upgrade kit consists of a new microcomputer chip and a new Software Book which documents the operating characteristics and features of the new software.

10.3.1 Manual Operation--by DTMF/Voice

10.3.1.1 From A Dial-Up Line. Manual operation of the RFC-1 begins with the operator making a telephone call to the number where the RFC-1 is located. The RFC-1 will answer after a preset number of rings. After the RFC-1 answers, the operator enters an optional security code using the keypad on the telephone. The operator can then request telemetry and status information from the RFC-1 (again, using the keypad on the telephone), and the RFC-1 will report the information in its digitally synthesized voice.

Manual control functions also can be made and user-programming can be modified but these may optionally require the entry of one or more additional security codes. The use of security codes to restrict access to various functions is an option of the user and is determined by the security requirements of the individual facility.

To assist in routine telemetry reading, the RFC-1 can be instructed to automatically scan a range of channels and report their telemetry values.

At the conclusion of the session, the operator simply hangs up the telephone. This causes the RFC-1 to also hang up and then wait for the next telephone call.

10.3.1.2 From The Local Telephone. Operation of the RFC-1 can also be accomplished from the local telephone (the telephone connected to the "Telephone" jack on the RFC-1). To use the local telephone for this purpose, the operator first pushes the "Local Control" pushbutton on any of the RP-8 Relay Panels. Operation in this mode is identical to remote operation except that the operator is not required to enter the main security code. Since operation from the local telephone is physically restricted, the need for the main security code is eliminated.

10.3.1.3 From The Dedicated Port. An alternate use for the jack on the RFC-1 normally connected to a local telephone is a dedicated control port. In this mode, the RFC-1 can be connected to both a dial-up line and a secondary dedicated communications link.

This could be a radio link, a dedicated line, or any system that will transmit voice-grade audio in both directions. Operation in this mode is exactly the same operation from the local telephone. DTMF (dual-tone-multi-frequency) tones are fed to the RFC-1 and synthesized speech comes out.

10.3.2 Manual Operation--by Serial Data

Using an optional RS-232 adaptor, the RFC-1 can be connected to a modem to allow remote operation by a computer or data terminal. This mode can be used in addition to, or in place of, the normal DTMF/Voice communications mode. In the Serial Data mode the RFC-1 generates and recognizes the standard "AT" command set and can therefore be directly connected to commonly available modems. The remote computer, or operator using a data terminal, operates the RFC-1 in exactly the same way as in the DTMF/Voice mode except that communications in both directions is done in typed or displayed words.

10.3.3 Autonomous Operation

10.3.3.1 Action Sequences. An Action Sequence, as the name implies, is a preprogrammed series of events (actions) the user wishes the RFC-1 to execute. The execution of an Action Sequence is triggered by a prearranged condition. Up to eight Action Sequences can be preprogrammed into the RFC-1's memory, each up to eight steps long. An example of an Action Sequence is: Channel 01 Control Relay ON for 0.5 seconds, pause 30 seconds, Channel 02 Control Relay ON for 0.5 seconds, Channel 04 Control Relay OFF for 0.5 seconds, Channel 06 Control Relay ON for 0.5 seconds, Call Telephone Number "A" once. The steps of an Action Sequence can be control (relay output) functions, pauses, telephone calls to report action or commands to enable or disable monitored channels.

The execution of Action Sequences can be triggered in any one of three ways:

First, they can be triggered manually by a specific command. This allows complex, frequently used command strings to be executed with a minimum of keystrokes and a reduced possibility of error.

Second, they may be triggered by telemetry conditions. Up to eight telemetry channels can be programmed for automatic monitoring and an Action Sequence can be programmed to execute based on the telemetry information. For example, if the power level of a transmitter exceeds a certain level, an Action Sequence could reduce the power level and then notify a remote operator that an adjustment had been made.

Third, an Action Sequence can be triggered by date and time-of-day. The RFC-1 contains an internal clock/calendar. Up to eighty times (or date/times) can be programmed in the RFC-1's memory. Each programmed time can be set to trigger an Action Sequence. Programming flexibility allows an Action Sequence to be triggered on a specific day of a specific month, or every day of a specific month, or a specific day of every month. Similarly, an Action Sequence can be programmed to occur at a specific minute of a specific hour, or a specific minute of every hour.

10.3.4 Telemetry Formats

The RFC-1 speaks analog telemetry as four digits. Several options are available which can custom tailor the format of the telemetry output. A choice of approximately 20 "unit" words

can be appended to the telemetry reading for each channel. For example, the telemetry for channel 01 can be made to report as "1345 Volts" or "1345 Kilowatts." Additionally, a decimal point can be added at any one of the four possible locations. Also, the full scale reading can be selected from four ranges and a logarithmic conversion factor can be added if desired. Each of these choices is made independently for all 64 possible channels. In other words, channel 01 can be made to report as "7.834 Kilovolts" using a linear scale and channel 02 can be made to report as "100.3 Percent Power" using a logarithmic scale. Provisions are included to report indirect power (volts x amperes x efficiency).

Any channel can be used to report analog telemetry or it can be used to report off/on status information. If a channel is used to indicate status information, it can be programmed to report "off/on", "open/closed", etc. Additionally, an Auto Status option is included which allows analog data to be reported unless the telemetry data falls at either the top or bottom extreme of the scale in which case it automatically reports the data as "Status: On" or "Status: Off."

Another option prevents telemetry from being spoken for a particular channel. This feature is useful for cases where an RFC-1 is used to put a person "on the air" at a broadcast station.

For applications where an independent contact closure is desired with a telemetry selection, the RFC-1 can be programmed to automatically operate the associated control relay for the selected channel. This is particularly useful in applications where the RFC-1 is used to monitor a directional AM antenna and an auxiliary contact closure is needed to select the appropriate tower to be monitored.

10.3.5 User Programming

The RFC-1 contains a large number of user-programmable operating characteristics. It is entirely feasible to install and operate the RFC-1 without changing any of these characteristics from their factory programmed values. However, many users will want to take advantage of the numerous operating features and conveniences that can be utilized by customizing the RFC-1 for a particular installation. The most often changed characteristics are accessible from a "Basic" programming mode using simple, easy to remember commands and voice prompting from the RFC-1. Less frequently modified characteristics are accessible from an "Advanced" programming mode. Programming in this mode is also simple, but because of the large number of data entries and operational choices that can be made, the operator will normally need the assistance of written documentation. If it is desired that the programming capability be restricted to certain operators, provisions are included to optionally require the entry of security codes before entering the basic and advanced programming modes.

All user programming in the RFC-1 is stored in a nonvolatile section of the internal microprocessor's memory. This memory remains intact during power outages and does not require the use of a back-up battery or "memory" capacitor. However, continued operation of the RFC-1's internal clock/calendar, if used, does require the use of some type of external back-up power. This is discussed in the "Installation" section of the Hardware Instruction Book.

10.4 OPTIONAL ACCESSORIES

10.4.1 SP-8 Heavy Duty Surge Protector

The SP-8 Heavy Duty Surge Protector is highly recommended for installations near a communications tower or any installation where the highest degree of reliability is required. The SP-8 mounts directly to an RP-8 Relay Panel and protects against high voltage surges (typically caused by lightning) from entering the RFC-1 from the LINE jack, the TELEPHONE jack, and eight telemetry inputs. The RFC-1's one year warranty covers damage from lightning if the SP-8 system is used. The SP-8/TO is a version of the SP-8 which protects eight telemetry inputs only. It is designed to protect additional RP-8 panels in installations with more than one RP-8.

10.4.2 ACM-1 AC Current Monitor

The ACM-1 AC Current Monitor is designed specifically to monitor communications tower obstruction lighting but it may be used for any application where AC current (up to 70 amperes) needs to be monitored. Special filter circuits in the ACM-1 average the current reading to a steady value, even if a flashing beacon is used. The DC output is fed to a telemetry input on an RP-8 panel for monitoring. In most cases, the resolution of the ACM-1 is more than sufficient to detect the failure of one bulb in a lighting system.

10.4.3 TS-1/PS Temperature Sensor

The TS-1/PS Temperature Sensor (with power supply) attaches to the RP-8 Relay Panel and allows room temperature monitoring from 5.0° F to 203.9° F with 0.1° resolution. Additional temperature sensors can share the same power supply (order TS-1).

10.4.4 AFS-1 Dual Channel Audio Failsafe

The AFS-1 Dual Channel Audio Failsafe may be useful for broadcast facilities which want to use the interruption of program audio as an alternate means to terminate transmission. This device has two bridging audio inputs and as long as audio is present on at least one input, a relay is closed. When audio is absent on both inputs for five minutes the relay opens and the transmitter (or other equipment) is turned off. Audio sources can be either an STL, a land-line, or a combination of the two.

10.4.5 RS-232 Serial Data Adaptor

The RS-232 Serial-Data Adaptor provides a means for the RFC-1 to communicate by means of serial data, in addition to its inherent DTMF/voice communications abilities. This adaptor may be used with a printer on site, or with the addition of a modem, it allows communication with a remote computer, data terminal or printer.

10.4.6 RK-3 Rack Kit

The RK-3 Rack Kit is a 1-3/4" high rack panel with cutouts to mount up to three units the size of the RFC-1, AFS-1 and DAI-1.

Section 11 — Basic Operation

11.1 OVERVIEW

The RFC-1 can be thought of as two different remote controls. The user has the option of choosing which one is wanted. The first is a simple, basic, dial-up remote control that gives the user the ability to monitor and control a remote facility and the convenience of a simple telephone alarm system. It has only the most basic operating features but it has the advantage that, once it is installed, even a non-technical user can learn to operate and program it very quickly; usually in less than an hour. The second remote control has all the operating capabilities of the first, plus a great many more. These include a wide choice of telemetry formats and options, automatic action sequences triggered by an internal clock/calendar or by telemetry conditions, options for serial-data operation, automatic logging, and much more. The user can spend hours, if not days, learning all about the many features and deciding how to incorporate them into the needs of their particular facility.

If the the "first" remote control is desired, the only operating information needed is contained in "Section 11—Basic Operation." This section was written for users with little or no technical training and teaches the basic operation of the RFC-1 in relatively simple terms. If you want the "second" remote control, you'll need to read "Section 12—Advanced Operation." This section was written for the more technically advanced user who wants to explore all the capabilities of the RFC-1. Unless you are already very familiar with the RFC-1, we recommend that you get your RFC-1 "up and running" using Section 11 first. Then as you become familiar with its operation, study the advanced information in Section 12 at your leisure. You'll probably find a number of very handy features that will be useful in your facility and you can learn about and implement them gradually.

The RFC-1 comes factory programmed with the features most likely wanted for a relatively simple facility operated by a mixture of technical and non-technical personnel. This includes a simple telephone alarm system and restrictions on remote programmability. The information in this chapter is based on the assumption that the original factory programming is unchanged. Portions of this chapter may not be accurate if the factory programmed values are modified. These programming values are accessible and modifiable only in the Advanced Programming mode.

11.2 OPERATION FROM A REMOTE TELEPHONE

11.2.1 Calling the RFC-1

The first step in operation from a remote telephone is to call the number where the RFC-1 is located. You can use a Touch Tone® (DTMF) telephone or you can use a rotary (pulse) dialed line if you have some way to generate DTMF tones after the RFC-1 answers. This is most easily accomplished by using a telephone with a "Tone/Pulse" switch.

The RFC-1 will answer the call after four rings and speak the word "Enter." The eight digit Main Security Code should be entered using the telephone keypad. This is factory programmed as "12345678." If it is entered correctly, the RFC-1 says "This is RFC-1/B." If the Main Security Code is not entered or incorrectly entered, the RFC-1 does not respond, cannot be operated, and hangs up the line.

11.2.2 Reading Telemetry

After the entry of the correct security code you may then read telemetry on any of the channels by pushing the two-digit number of the channel on the telephone keypad. The channels are numbered "00" through "63." For example, to select channel 02, simply push 02 on the keypad. The RFC-1 will then speak "Channel 02" followed by the telemetry information for that channel. This would be either four digits of telemetry data or the words "Status: On" or "Status: Off." Telemetry information is spoken in three circumstances: 1) when a channel is selected, 2) after a control function is used, and 3) automatically when the telemetry data on the selected channel changes significantly (more than 10% of full scale).

To simplify routine telemetry reading, the RFC-1 may be instructed to scan automatically all channels and report their telemetry values. To do this, push 64. The RFC-1 will respond with "Autoscan" and then begin to read the telemetry values for all channels beginning at channel 00, at intervals of 5 seconds. The "Autoscan" feature may be interrupted at any time by entering a channel number or programming function.

11.2.3 Operating the Control Relays

There are two control relays associated with each channel; one for "on/raise" functions and one for "off/lower" functions. Before the control relays can be operated, the Control Security Code must first be entered. This is done by pushing 66 on the keypad. The RFC-1 responds with "OK" and the control functions are enabled for the remainder of the call. If control functions are attempted without first entering the Control Security Code, the RFC-1 says "Enter Control Security Code." The operator should then push 66. If the correct Control Security Code (66) is not entered, the RFC-1 will not respond to further commands and will hang-up. This is the case with all security codes, so, when the RFC-1 asks for a security code, enter it carefully.

The control relays are operated with the * and # keys on the telephone keypad. The * key operates the off/lower relay and the # key operates the on/raise relay for the currently selected channel. The relays operate for as long as the key is pressed, or 0.3 seconds, whichever is longer.

The occasional user of the RFC-1 may have trouble remembering which key is the "on" key: the * or the #. An easy way to remember this is to think of the screen on a TV set. Think of "#" representing the set being "on" and "*" is what the screen looks like as it is turned "off." In other words, #=on and *=off.

The control relays are enabled as soon as the channel is selected. It is not necessary to wait for the telemetry reading before a control action is made. This feature is useful when it is desired that a series of control actions be taken rapidly. For example, if it is desired to turn one transmitter off, switch an antenna relay and turn another transmitter on, the key sequence (01*08*05#, for example) can be initiated as rapidly as the operator's fingers can push the keys. It is not necessary to wait for the channel number or telemetry readings to be spoken.

11.2.4 Ending a Telemetry/Control Session

When a telemetry/control session is finished, simply hang up the telephone. The RFC-1 will also hang-up and wait for the next call.

The RFC-1 will automatically hang up whenever two-and-a-half minutes elapses without receiving a DTMF tone. The RFC-1 warns that this is about to happen by speaking "Goodbye" ten seconds before it hangs up. If the operator wants to continue, a key must be pushed within ten seconds.

For special applications, the operator can cause the RFC-1 to hang-up and prevent the RFC-1 from answering a call for two minutes. To do this, push 98 and then hang up. The RFC-1 also hangs up and will not respond another call for the next two minutes. There are two common uses for this. First, it can be used to signal someone working at the remote facility that the person calling wishes to talk to them, and not the RFC-1. Second, it can be used to access a second device connected to the same telephone line as the RFC-1. For example, suppose the RFC-1 is set to answer after one ring and another device connected to the line is set to answer after three rings. To access the second device, a call is first place to the RFC-1 which is ended with the 98 command. A return call within the next two minutes will be answered by the second device.

11.3 OPERATION FROM THE LOCAL TELEPHONE

Local operation of the RFC-1 (using the telephone that is plugged into the "TELEPHONE" jack on the front panel of the RFC-1) is identical to remote operation except for the following: The operator should first push the "Local Control" pushbutton located on the right-hand end of the RP-8 relay panels. When pushed, the RFC-1 connects directly to the telephone plugged into the "Telephone" jack on the RFC-1. When the button is pushed, the RFC-1 speaks "OK." The system is now entered just past the point where the Main Security Code would have been entered if remote operation were taking place. In other words, it is not necessary to enter the Main Security Code. At the end of the local control session, push 99 to tell the RFC-1 you're through. It will say "Goodbye" and then connect the telephone back to the telephone line. Otherwise, operation is exactly the same as described above in the "Operation From a Remote Telephone" section.

If the RFC-1 is in the local control mode and an incoming call occurs, the RFC-1 will speak "Ring—Ring—Ring" when the line is ringing. To answer the call, push 99. The RFC-1 will say "good-bye" and connect the local telephone with the telephone line to answer the call.

The most common use for the Local Control mode will be the calibration of the telemetry channels. This is done by reading the telemetry for a particular channel and then adjusting the calibration control for that channel on the RP-8 panel until the desired reading is achieved. Re-enter the channel number as often as required to repeat the telemetry reading.

The RFC-1 has a full scale telemetry value of "2040" so if you are telemetering "17.46 amps," for example, you'll probably want to set the RFC-1 to read "1746." If, however, you are telemetering "22.3 amperes," you'll need to set the RFC-1 to "0223." Always take advantage of as much of the scale reading as possible. For example, if you use "0100" as a calibration for "100% power," you are only using the bottom 5% of the scale and only 1% resolution will result. If "1000" is used as a calibration, 0.1% resolution is obtained and the long term accuracy will be enhanced.

11.4 AUTOMATIC MONITORING SYSTEM

The RFC-1 can automatically monitor up to eight telemetry channels and originate telephone calls to report abnormal telemetry conditions. In the Basic Programming Mode three telephone numbers, up to twelve digits each, can be programmed for calling.

The Automatic Monitoring System is temporarily disabled while the RFC-1 is being used from either a remote telephone or the local telephone. This allows changes to be made without triggering an alarm sequence. About 10 seconds after each telemetry/control session, the channels designated for monitoring are automatically scanned by the RFC-1 and the telemetry readings are recorded. Afterward, at intervals of one channel every 10 seconds, the channels are rescanned and the telemetry readings are compared to the readings recorded at the end of the last telemetry/control session. If any reading crosses a user-programmed upper or lower limit an alarm sequence is initiated.

Instructions for programming the Automatic Monitoring System will be discussed in the "Programming Automatic Monitoring System" section.

11.4.1 Telephone Alarm Sequence

A telephone alarm sequence begins with a call to the first telephone number. The RFC-1 then speaks "This is RFC-1/B" and then the channel number responsible for tripping the alarm. The RFC-1 speaks this information, repeatedly, for 60 seconds and then hangs up. The RFC-1 then waits 60 seconds to permit incoming calls, and then makes a 60 second call to the second telephone number (if a number is programmed), speaking the same information. The RFC-1 then waits 60 seconds to permit incoming calls, and then makes a 60 second call to the third telephone number, speaking the same information. All calls are 60 seconds long followed by a 60 second pause. The sequence is repeated until each number has been called three times. If the programming for a particular telephone number is "blank," the RFC-1 skips this number in the calling sequence. When calling, the RFC-1 does not have the means to detect if a telephone call is answered. The call continues for 60 seconds even if the line is busy or if the line is not answered. The alarm sequence is terminated by any of three conditions:

(1) If an alarm call is answered by an operator and the unit is operated. Operation of the unit can occur simply by entering any channel number or entering the Control Security Code (66). It is not necessary to enter the Main Security Code.

(2) If an operator calls the unit during one of the pauses and enters the correct security code.

(3) After the RFC-1 makes three calls to each telephone number.

When an alarm sequence is terminated (or 10 seconds after the call, if the alarm sequence is terminated during a call), the Monitored Channels are scanned and new telemetry values are recorded. The RFC-1 then begins rescanning the Monitored Channels at a rate of one channel every 10 seconds.

11.4.2 Power Failure Alarm

To alert the remote operator that there has been a power failure at the remote site, the RFC-1 can be programmed automatically to initiate a telephone calling sequence 10 seconds after power returns. When the call is made, the RFC-1 speaks "This is RFC-1/B" and the words "Power Failure" repeatedly, for 60 seconds. If the "Power Failure" alarm is enabled and it is necessary temporarily to disconnect power to the unit, an alarm can be avoided by pushing the Local Control pushbutton within the first 8 seconds after power is reapplied.

11.4.3 Operating Examples

The Automatic Monitoring System can be thought of as a system that reports any change in conditions that existed at the end of the last telemetry/control session. This allows complete freedom of operation without the need for a complicated system of status checks and interlocks. It also greatly simplifies the setup and operation of the RFC-1. As an illustration of this, suppose that there is a site with a main and an auxiliary FM transmitter. During the last telemetry/control session the main transmitter was on and the auxiliary was off. Because the last recorded telemetry reading for the auxiliary transmitter power output was made when it was off, this would not cause an alarm as long as it continued to be off. Now, suppose the main transmitter failed. The RFC-1 initiates an alarm call, an operator answers the call and after not being able to get the main transmitter back on, turns on the auxiliary. When this telemetry/control session ends, new telemetry values are recorded and are then checked periodically. Now, the telemetry reading recorded for the main transmitter was made when it was off, so because it is off now will not cause an alarm. An alarm would be initiated, however, if the auxiliary transmitter were to fail.

This system is not without its limitations, however. For example, the application of power to the RFC-1 after a power interruption is treated exactly like the end of a telemetry/control session. Approximately 10 seconds after power is reapplied, the channels are scanned (if the Automatic Monitoring System is enabled) and new telemetry categories are recorded. If a transmitter went off when the power went off and did not come back on when power was restored, an alarm would not be reported since new reference readings were made with the transmitter off. This potential situation can be averted by instructing the RFC-1 to report all power failures. How to accomplish this is covered in the "Programming the Automatic Monitoring System" section.

Switching transmitters or changing operating conditions by a means other than the RFC-1 (for example, direct manual control or control by another remote control operating in "parallel" with the RFC-1) will cause an alarm. The only way to avoid this is to disable the Automatic Monitoring System in the RFC-1 temporarily while making the changes, or make the changes with the RFC-1 instead.

Keep in mind that the Automatic Monitoring System is not instantaneous in its operation. Since Monitored Channels are scanned at a rate of one channel every 10 seconds, it could take up to 80 seconds before an alarm condition is sensed.

Once an alarm starts, the RFC-1 stops scanning the channels and it makes no difference how the telemetry readings compare to the recorded reading. The alarm will continue until three call attempts are made to each number or until it is cancelled by an operator.

Remember to inform all personnel who are likely to receive an alarm call from the RFC-1 about the meaning of the various channel numbers that can trip an alarm. A completely different response would be required depending on whether the FM transmitter output power is a little low or the smoke alarm has gone off.

11.5 PROGRAMMING THE RFC-1

The RFC-1 can be programmed to suit the individual needs of the user. Alarm parameters, telephone numbers, and security codes are examples of values which are user-programmable. The RFC-1 has two programming modes: the Basic Programming Mode and the Advanced Programming Mode. Only the Basic Programming Mode will be discussed in this chapter. Some functions discussed in this section may be programmed either from the telephone

connected directly to the "Telephone" jack on the RFC-1 (the local telephone) or from a remote telephone. The others can be programmed only from the local telephone.

To prevent accidental programming changes and to limit programming authority to key personnel, programming the RFC-1 in the Basic Programming Mode requires the entry of a Basic Programming Security Code. The Basic Programming Security Code is factory programmed as 4088. As an example, to reprogram the Ring Number from a remote telephone first push 76, the Ring Number code. The RFC-1 responds with "Ring Number: 1; push # to reprogram." If you then push #, the RFC-1 speaks "Enter Basic Programming Security Code." Enter the number 4088. The RFC-1 speaks "Enter one digit Ring Number" and the new Ring Number can then be entered. Other changes can be made using the Basic Programming Mode for the remainder of the call without re-entering the Basic Programming Security Code .

11.5.1 Programming the Main Security Code

To program a new Main Security Code, push 72 or "SC" on the telephone keypad. When this code is entered the RFC-1 responds with "Main Security Code: 12345678; push # to reprogram." If you then push "pound" (#), the RFC-1 speaks "Enter eight digit Main Security Code." The operator should then enter the eight digits of the desired security code. The RFC-1 will then respond with "OK" to indicate that the programming has been accepted. Remember that the security code can be changed only from the local telephone. If 72 is entered from a remote telephone, the RFC-1 will respond with "Error—Local Programming."

11.5.2 Programming the Ring Number

To program the Ring Number (number of rings required before the RFC-1 answers the telephone), push 76 or "RN" on the telephone keypad. When this code is entered the RFC-1 responds with "Ring Number: 1; push # to reprogram." If you then push #, the RFC-1 speaks "Enter one digit Ring Number." The operator should then enter a number from 1 to 9 that corresponds to the desired number of rings before the RFC-1 answers the call. After the digit is entered, the RFC-1 responds with "OK" to indicate that the programming has been accepted.

11.5.3 Software Version

To determine the software version contained in the RFC-1, push 78 or "SV" on the telephone keypad. When this code is entered the RFC-1 speaks the number of the software version contained in its microprocessor.

11.5.4 Programming the Automatic Monitoring System

There are three programming functions that need to be done in order to use the Automatic Monitoring System. First, one or more telephone numbers should be programmed. Second, the channels to be monitored and their upper and lower limits should be programmed. Finally, the Automatic Monitoring System should be turned on by setting the Telemetry Alarm Status.

11.5.4.1 Programming Telephone Numbers. To program the first telephone number to be called, push 86 ("TN" on the telephone keypad). The RFC-1 responds with "Telephone Number: 555 1234 ten ten ten ten ten; push # to reprogram." The "tens" correspond to "blank" digits. If the # key is pushed, the RFC-1 says "Enter twelve digit telephone number." The telephone number should then be entered. If the number is less than 12 digits, fill in the

extra spaces with the * key. For example: 5551234*****. Two additional telephone numbers can be programmed by pushing 87 and 88. Any unused telephone numbers should be programmed with "**********" (all stars). "Stars" read back as "tens."

11.5.4.2 Programming the Channels to be Monitored. Up to eight telemetry channels can be designated for automatic monitoring. These can be any eight channels out of the 64 possible channels. The programming locations for the eight monitored channels are designated as "Monitored Channel A" through "Monitored Channel H." One channel number can be assigned to each Monitored Channel. It is not necessary to use all Monitored Channels nor is it necessary to program them in numerical order. For example, channel 07 could be assigned to Monitored Channel A, channel 03 could be assigned to Monitored Channel B, and Monitored Channels C through H could be left blank.

For each Monitored Channel, three things must be programmed: the telemetry channel to be monitored, upper telemetry limit, and the lower telemetry limit. The programming locations for Monitored Channel A through H are "90" through "97" respectively. To make a Monitored Channel "blank" or non-functional, "64" should be programmed as the channel number. To illustrate the programming of the Monitored Channels, the following example will be used: suppose an RFC-1 contains the original "blank" settings for the Monitored Channels. The user wishes to program the RFC-1 to automatically monitor plate current on channel 02 and antenna current on channel 03. Normal plate current is 0500 and normal antenna current is 0680. The user wishes an alarm to be triggered if the plate current varies more than 10% from normal or if the antenna current varies outside the range of +5%/-10%. To do this we first need to compute the upper an lower limits for each channel. For the plate current it works out to be 0550 and 0450. For the antenna current it is 0714 and 0612. Now, we can program the data into the RFC-1. Any two Monitored Channels may be used but we will pick Monitored Channels A and B. To program Monitored Channel A first push 90. The RFC-1 will then speak "Channel Number 64, Upper Limit 2040, Lower Limit 1020; push # to reprogram." The RFC-1 is factory programmed with channel 64 for all Monitored Channels. This is considered "blank" programming and inhibits their operation. To enter the new data, push #. If the RFC-1 asks for the Basic Programming Security Code, push 4088. The RFC-1 then says "Enter two digit channel number." Push 02. The RFC-1 then says "Enter four digit upper limit." Push 0550. The RFC-1 then says "Enter four digit lower limit." Push 0450. The RFC-1 then says "OK" to indicate that the programming has been accepted. To check the programming, push 90 again and listen to the data. Monitored Channel B is programmed exactly the same way but start by pushing 91. In our example, the data would be programmed as 03/0714/0612.

11.5.4.3 Programming the Telemetry Alarm Status. After the above information is programmed, the Automatic Monitoring System can be turned on and off by programming the "Telemetry Alarm Status." To program, push 82 on the keypad. The RFC-1 responds with, "Telemetry Alarm Status: 0; push # to reprogram." If the # key is pushed, the RFC-1 speaks "Enter one digit Telemetry Alarm Status." The operator should enter "0" for "off" or "1" for "on." The RFC-1 will then respond with "OK" to indicate that the programming has been accepted. If the Telephone Number(s) and Monitored Channel(s) have been programmed, when the Telemetry Alarm Status is set to "1" the Automatic Monitoring System becomes operational and will begin scanning the Monitored Channels about 10 seconds after the RFC-1 hangs up.

11.5.4.4 Enabling the Power Failure Alarm. To alert the remote operator that there has been a power failure at the remote site, the RFC-1 can be programmed automatically to initiate a telephone calling sequence 10 seconds after power returns. When the call is made, the RFC-1 speaks "This is RFC-1/B" and the words "Power Failure" repeatedly, for 60 seconds.

To enable or disable the Power Failure Alarm push 81. The RFC-1 responds with "Power Failure Alarm Status: 0; push # to reprogram." If the # key is pushed, the RFC-1 speaks "Enter one digit Power Failure Alarm Status." The operator should then enter "0" for "off" or "1" for "on." The RFC-1 will then respond with "OK" to indicate that the programming has been accepted.

11.6 SUMMARY OF BASIC CONTROL CODES

The following is a summary of the various control and programming codes discussed in this chapter.

The following commands operate from both the local telephone (the telephone at the RFC-1 site) and remotely.

00 to 63		Selects the desired channel for telemetry and control.
*		"OFF" command for the currently selected channel. Control Security Code must first be entered (66).
#		"ON" command for the currently selected channel. Control Security Code must first be entered (66).
64		Autoscan telemetry of all channels.
66		Control Security Code This enables the control (OFF/ON) functions for the remainder of the call.
70		Not recommended for use by non-technical personnel. See Section 12.
71		Not recommended for use by non-technical personnel. See Section 12.
76	(RN)	Read/Program Ring Number; number of rings required before the RFC-1 answers a call (1 to 9).
78	(SV)	Causes the RFC-1 to speak the software version residing in its microprocessor.
80		Not recommended for use by non-technical personnel. See Section 12.
81		Read/Program Power Failure Alarm Status. Enter "0" for off, "1" for on.
82		Read/Program Telemetry Alarm Status. Enter "0" for off, "1" for on.
85		Not recommended for use by non-technical personnel. See Section 12.
86	(TN)	Read/Program Telephone Number "A." Enter 12 digits; fill extra spaces with *.
87		Read/Program Telephone Number "B." Enter 12 digits; fill extra spaces with *.
88		Read/Program Telephone Number "C." Enter 12 digits; fill extra spaces with *.
90		Read/Program Monitored Channel A (Channel Number/Upper Limit/Lower Limit)
91		Read/Program Monitored Channel B (Channel Number/Upper Limit/Lower Limit)
92		Read/Program Monitored Channel C (Channel Number/Upper Limit/Lower Limit)
93		Read/Program Monitored Channel D (Channel Number/Upper Limit/Lower Limit)
94		Read/Program Monitored Channel E (Channel Number/Upper Limit/Lower Limit)
95		Read/Program Monitored Channel F (Channel Number/Upper Limit/Lower Limit)
96		Read/Program Monitored Channel G (Channel Number/Upper Limit/Lower Limit)
97		Read/Program Monitored Channel H (Channel Number/Upper Limit/Lower Limit)
98		Causes the RFC-1 to say "Goodbye" and hang-up. The RFC-1 will not answer another call for two minutes.
99		Causes the RFC-1 to say "Goodbye" and hang-up. Also answers call when in "Local" mode.

The following commands operate only from the local telephone (the telephone at the RFC-1 site).

72 (SC) Read/Program Main Security Code. Enter 8 digits.

73 Not recommended for use by non-technical personnel. See Section 12.

74 Read/Program Basic Programming Security Code. Enter 4 digits.

75 Not recommended for use by non-technical personnel. See Section 12.
84 Not recommended for use by non-technical personnel. See Section 12.

11.7 RECORDING DATA

11.7.1 Recording User-Programming/Factory Programming

It is suggested that a table be recorded of "normal" programming for the RFC-1. This serves not only as a reminder of the current programming but it also acts as a handy guide to remember how to change programming. Here is an example, which includes the data programmed initially at the factory:

		Factory Programming:	Current Programming:
72	Main Security Code	12345678	_____
74	Basic Programming Security Code	4088	_____
76	Ring Number	2	_____
81	Power Failure Alarm Status	0	_____
82	Telemetry Alarm Status	0	_____
86	Telephone Number A	* * * * * * * * * * * *	_____
87	Telephone Number B	* * * * * * * * * * * *	_____
88	Telephone Number C	* * * * * * * * * * * *	_____
90	Monitored Channel A	64 / 2040 / 1020	_____ / _____ / _____
91	Monitored Channel B	64 / 2040 / 1020	_____ / _____ / _____
92	Monitored Channel C	64 / 2040 / 1020	_____ / _____ / _____
93	Monitored Channel D	64 / 2040 / 1020	_____ / _____ / _____
94	Monitored Channel E	64 / 2040 / 1020	_____ / _____ / _____
95	Monitored Channel F	64 / 2040 / 1020	_____ / _____ / _____
96	Monitored Channel G	64 / 2040 / 1020	_____ / _____ / _____
97	Monitored Channel H	64 / 2040 / 1020	_____ / _____ / _____

11.7.2 Channel Assignment Table

To allow efficient operation, a table of information should be kept at the normal control point that documents the various control and telemetry channels. The following is an example of such a table:

Channel:

00 Telemetry: FM Transmitter #1 Filaments
Scale: Status
Control: FM Transmitter #1 Filaments; *=OFF, #=ON

01 Telemetry: FM Transmitter #1 Plate Voltage
Scale: Multiply reading by 10 volts to obtain actual value
Control: FM Transmitter #1 Plate Voltage; *=OFF, #=ON

02 Telemetry: FM Transmitter #1 Plate Current
Scale: Multiply reading by amperes/100 to obtain actual reading
Control: none

03 Telemetry: FM Transmitter #1 Power Output
Scale: 0948=minimum legal power, 1000=exact, 1024=maximum legal power
Control: FM Transmitter #1 Power Control; *=Lower, #=Raise

11.7.3 Recording Telemetry Data

This is an example of a table that might be used to record telemetry data:

Channel→	01	02	03	05	06	
Source→	FM#1 Plate V	FM#1 Plate A	FM#1 Power	FM#2 Plate V	FM#2 Plate A	F P
Time↓						
10.05A	0940	0410	1000			
11.55A	0941	0412	1005			
2.08P	0942	0413	1006			
4.05P	0941	0412	1004			
5.03P	0941	0412	1004			

Here, the data is recorded only as the four digits spoken by the RFC-1. A separate table of multipliers and units for each column can be included at a single location in the log book. This makes routine data collection a very simple operation with no decimal points, multipliers or units to record.

11.7.4 "Quick Card"

To save time and avoid the pressure of trying to remember the control codes in an emergency, it is suggested that a "Quick Card" be prepared and carried by key operating personnel. Such a card could be plastic laminated for durability. Here is an example of what could be included on the card:

(615) 228-7387 [Enter]		00	FM 1; Fils; off/on
12345678		01	FM 1; Plate Volts; off/on
66	Control Security Code	02	FM 1; Plate Amps
4088	Basic Prog. Sec. Code	03	FM 1; Power; lower/raise
64	Autoscan	04	Building Power
76	Ring Number	05	Building Temperature
81	Power Fail Alarm Status	06	
82	Telemetry Alarm Status	07	EBS Generator
86	Telephone Number A		
87	Telephone Number B		(all; off=*, on=#)
88	Telephone Number C		

Section 12 — Advanced Operation

WARNING! This chapter was written for users who are technically knowledgeable. A wide range of operating characteristics and programming procedures are covered rather quickly in this chapter and without extended explanation. Unless you are sure you understand the information in this chapter, we strongly suggest that Section 11—Basic Operation be used the primary operating guide.

12.1 OVERVIEW

Through user-programming, the RFC-1 can be configured as a simple, basic, dial-up remote control that gives the user the ability to monitor and control a remote facility and the convenience of a simple telephone alarm system. Once it is installed, even a non-technical user can learn to operate and program it very quickly; usually in less than an hour. If desired, the user may configure the RFC-1 to be much more sophisticated in its operation and capabilities. These capabilities include a wide choice of telemetry formats and options, automatic Action Sequences triggered by an internal clock/calendar or by telemetry conditions, options for serial data operation, automatic logging and much more. The user can spend hours, if not days, learning all about the many features and deciding how to incorporate them into the needs of their particular facility.

The RFC-1 is factory-programmed with very basic operating characteristics. These are covered in Section 11—Basic Operation. The more advanced capabilities of the RFC-1 are covered in this section.

In the following sections, the factory programmed values for the RFC-1 are assumed. This avoids the need for complicated parenthetical qualifiers in the explanations. For example, the main security code is stated to be "12345678." Actually, this can be reprogrammed to be any 1 to 8 digit number, or the use of the main security code can be eliminated altogether.

12.2 MANUAL OPERATION--BY DTMF/VOICE

12.2.1 From A Dial-Up Line

Operating the RFC-1 through a dial-up line typically involves the operator at one end of the line with a source of DTMF tones (usually a pushbutton telephone) and the RFC-1 at the other end. In this case, the operator sends commands to the RFC-1 via DTMF tones and receives responses via the RFC-1's synthesized voice.

12.2.1.1 Calling The RFC-1. The first step in operating the RFC-1 remotely is to call the telephone number where the RFC-1 is located. The call can be made with either a DTMF (Touch Tone®) dialed telephone line or a rotary (pulse) dialed telephone line as long as some method of generating DTMF tones is available after the RFC-1 answers the call. This could be done by using a telephone with switchable tone/pulse dialing or by using an acoustically coupled DTMF keypad.

The RFC-1 will answer a call after two rings, pause two seconds and then speak the word "Enter." This is the RFC-1's request for the operator to enter the main security code. The operator should then enter the eight-digit main security code: 12345678. If it is entered correctly the unit responds with, "This is RFC-1/B" and access to system telemetry is allowed. If the security code is not entered or incorrectly entered, the RFC-1 ignores further key

entries and hangs up after a pre-programmed period of time (factory set to 10 seconds).

12.2.1.2 Reading Telemetry Data. Depending on the number of RP-8 Relay Panels installed, the RFC-1 is capable of controlling and monitoring up to 64 individual "channels." The channels are numbered from 00 to 63. The first step in controlling or monitoring a channel is to "select" it. Only one channel can be selected at a time. When a channel is first selected, the telemetry values for that channel are automatically spoken by the RFC-1. After a channel is selected, control (relay output) commands can also be made. A channel remains selected until another channel is selected, another function is selected (discussed later), or until the operator hangs up.

To read telemetry, the operator simply selects the desired channel number. The RFC-1 switches to that channel and automatically speaks the telemetry. For example, suppose "output power" was monitored on channel 03. The operator pushes "03" on the telephone keypad. A moment later the RFC-1 speaks "Channel 03; 1007" indicating that the output power is 100.7%. The operator may hear the same reading again by pushing "03" again or a different channel may be selected.

When entering a two digit channel number, enter the second digit within 5 seconds of the first digit. Otherwise the RFC-1 will clear the first digit. This applies only when selecting channels. The speed of digit entry in other functions is not restricted.

Telemetry information is spoken by the RFC-1 at three times: when a channel is selected, when a control command is made, and if the telemetry reading for the selected channel changes significantly (more than 10% of the full scale reading). To illustrate the latter, suppose in the above example the operator had selected channel 03 and already heard the telemetry reading of 1007. A short time later, suppose the output power suddenly drops.. The RFC-1 detects this and automatically respeaks the telemetry data as "0852." The RFC-1 will respeak the telemetry data for a selected channel whenever the data changes significantly, and will remain silent if it does not change.

Some telemetry information is best reported with "off/on" status rather than analog information. For example, "Is the security system on or off?" By means of user-programming, the RFC-1 can be instructed to report telemetry for selected channels in this manner. Choices include: Off/On; Status: Off/Status: On; Open/Closed; and others.

To simplify routine telemetry reading, the RFC-1 may be instructed to scan automatically all channels and report their telemetry values. To do this, push 64. The RFC-1 will respond with "OK" and then begin to read the telemetry values for all channels beginning at channel 00, at intervals of 5 seconds. The "autoscan" feature may be interrupted at any time by entering a channel number or programming function. Optional programming can set an upper limit on the channel number scanned.

12.2.1.3 Operating Control Relays. Before the RFC-1's control relays can be operated, the (optional) Control Security Code must first be entered. Once entered, the control relays may be operated for the remainder of the call. The Control Security Code is factory programmed as "66." To enable control functions, push 66 at any time. After pushing 66, the RFC-1 will speak "OK" and the control relays are enabled for the remainder of the call. If a control function is attempted before the Control Security Code is entered, the RFC-1 will speak "Enter Control Security Code." If the correct Control Security Code is not entered (66), the RFC-1 will ignore further commands and hang-up.

For special applications, up to three Control Security Codes may be used. Each eight channel "block" of channels can be assigned any one of the three Control Security Codes. This feature is useful in multi-user applications where two or three users share one remote control system. In this application, each user can have an individual Control Security Code for their block of channels.

The RFC-1's control relays are operated by pushing the # key, for the "On/Raise" relay and the * key for the "Off/Lower" relay, for the channel currently selected. When a channel is selected, the two control relays associated with that channel are enabled. The control relays operate for as long as the * or # key is pressed, or the programmed Relay On time (factory programmed to 0.6 seconds), whichever is more. This is advantageous if calling from a telephone system which allows only short, fixed length DTMF tones to be sent. When the key is released, telemetry is automatically spoken by the RFC-1.

As an example, suppose that channel 03 is wired to control a transmitter's output power. The operator first selects the channel by pushing 03 on the keypad. The RFC-1 then speaks "Channel 03; 1007." Now, the operator pushes the * key down for a couple of seconds. The "Off/Lower" control relay for channel 03 at the remote facility operates for the time that the * key is pushed and lowers the output power. When the operator releases the key, the RFC-1 automatically speaks the new telemetry data: "1002" or 100.2%. The "Off" and "On" control relays can be operated as many times as desired as long as the appropriate channel is selected. When a new channel is selected, a new pair of control relays becomes available for use.

It is important to remember that once the Control Security Code is entered, the * and # are "live" at all times. Pushing either of these keys will initiate a control function (if connected) for the last selected channel and therefore appropriate care should be exercised.

Control is enabled as soon as the channel is selected. It is not necessary to wait for the telemetry reading before a control action is made. This feature is useful when it is desired that a series of control actions be taken rapidly. For example, if it is desired to turn one transmitter off, switch an antenna relay and turn another transmitter on, the key sequence (01*08*05#, for example) can be initiated as rapidly as the operator's fingers can push the keys. It is not necessary to wait for the channel number or telemetry readings to be spoken.

The occasional user of the RFC-1 may have trouble remembering which key is the "On" key: the * or the #. An easy way to remember this is to think of the screen on a TV set. Think of "#" representing the set being "on" and "*" is what the screen looks like as it is turned "off." In other words, #=on and *=off.

12.2.1.4 Ending the Call. When a telemetry/control session is finished, simply hang up the telephone. The RFC-1 will then hang up and wait for the next call. Alternately, the operator can push 99. The RFC-1 will speak "Goodbye" and then hang-up. The RFC-1 will automatically hang up whenever a pre-programmed period of time (factory programmed to 2.5 minutes) elapses without receiving a DTMF tone. The RFC-1 warns that this is about to happen by speaking "Goodbye" ten seconds before it hangs up. If the operator wants to continue, a key must be pushed within the next ten seconds.

For special applications, the operator can cause the RFC-1 to hang-up and prevent the RFC-1 from answering a call for a short period of time. To do this, the operator pushes 98 and then hangs up. The RFC-1 also hangs up and will not respond to another call for two minutes. There are two common uses for this. First, it can be used to signal someone working at the remote facility that the person calling wishes to talk to them, and not the RFC-1. Second, it

can be used to access a second device connected to the same telephone line as the RFC-1. For example, suppose the RFC-1 is set to answer after one ring and another device connected to the line is set to answer after three rings. To access the second device, a call is first place to the RFC-1 which ends with the 98 command. A return call will be answered by the second device.

12.2.2 From The Local Telephone

The RFC-1 can also be operated from the "local" telephone at the facility where the RFC-1 is installed. This is the telephone that is connected directly to the jack on the RFC-1/B labeled "TELEPHONE." Operation from the local telephone is almost identical to operation from a remote telephone. The operator begins by pushing the "Local Control" pushbutton located on any of the RP-8 relay panels. If the telephone is off hook when this is done, the dial tone goes away, the RFC-1 connects directly to the local telephone, and speaks "This is RFC-1/B." The operator may then monitor and control the facility in the same way that would be done from a remote telephone. The only differences are as follows:

(1) The Main Security Code does not have to be entered. After the Local Control pushbutton is pushed and the RFC-1 speaks "This is RFC-1/B", you are ready to go.

(2) The Basic Programming Security Code does not have to be entered to modify programming.

(3) The Control Security Code and Advanced Programming Security Code must be entered, just like in the remote mode, if control functions or advanced programming is desired.

(4) At the conclusion of the local control session it is usually desirable to push 99 before hanging up. The RFC-1's automatic hang up detection does not work in the local mode and it will be two-and-a-half minutes before it exits the local mode and is ready for an outside call.

(5) If someone is using RFC-1 from the local telephone and an incoming call occurs, the RFC-1 will speak "Ring, Ring, Ring" notifying the operator that the line is ringing. The operator may answer the call, if desired, by pushing 99. The RFC-1 will disconnect and the call will be connected to the local telephone.

12.2.3 From The Dedicated Port

If desired, the jack on the front panel of the RFC-1 labeled "Local Telephone" can be converted for another use: a dedicated control port. When enabled, this dedicated port may be used in place of the dial-up port ("LINE" jack) or in addition to it. This option is selected in the Advanced Programming mode, discussed later. The dedicated control port can be used to operate the RFC-1 from a dedicated communications link. This link could be a dedicated line, a radio link, or any other communications link with a bidirectional voice-grade audio path. Operation from the dedicated control port is identical to operation in the Local Control mode discussed previously. A means is required for feeding DTMF tones to the RFC-1 and hearing the voice response from the RFC-1. Technical details of how to use this port are covered in "Section 5—Installation" in the Hardware Book.

12.3 MANUAL OPERATION--BY SERIAL DATA

12.3.1 From A Dial-Up Line

Operation of the RFC-1 remotely with the optional RS-232 adaptor and a modem, is almost exactly like the DTMF/Voice operation described above. The only difference is that communication is by serial data. The basic serial communications options are controlled by programming the Communications Mode. The four choices are:

0 Answer in voice/DTMF mode only
1 Answer in serial data mode first; if no carrier, try voice/DTMF
2 Answer in voice/DTMF mode first; if no DTMF (tones), try serial data mode
3 Answer in serial data mode only

Instructions for changing this programming will be discussed in the Programming section of this chapter.

As a simple example of how the serial data communications mode works, suppose that an operator wishes to contact the RFC-1 with a modem and a simple data terminal. The first step is to type "ATDT" followed by the telephone number at the remote facility. "ATDT" is a standard modem command to tone-dial a telephone number. The call rings, the RFC-1 answers, and the two modems connect. The following is an example of a session:

Operator: ATDT 5551234
(modem dials number, line rings, RFC-1 answers)
Modem: CONNECT 2400
RFC-1: ENTER
Operator: 12345678
RFC-1: THIS IS RFC1B
Operator: 66
RFC-1: OK
Operator: 03
RFC-1: CHANNEL 03; 100.7 PERCENT
Operator: *
RFC-1: 100.4 PERCENT
Operator: 02
RFC-1: CHANNEL 02; 11.48 KILOVOLTS
Operator: 01
RFC-1: CHANNEL 01; STATUS: ON
Operator: 99
RFC-1 GOODBYE
+++ [disconnect]

12.4 AUTONOMOUS OPERATION

12.4.1 Action Sequences

An Action Sequence, as the name indicates, is a pre-programmed series of events (actions) the user wishes the RFC-1 to execute. The execution of an Action Sequence is triggered by a prearranged condition. Up to eight Action Sequences can be pre-programmed into the RFC-

1's memory, each up to eight steps long. Here is an example of an Action Sequence: Channel 01 Control Relay ON for 0.6 seconds, pause 30 seconds, Channel 02 Control Relay ON for 0.6 seconds, Channel 04 Control Relay OFF for 0.6 seconds, Channel 06 Control Relay ON for 0.6 seconds, Call Telephone Number "A" once. The steps of an Action Sequence can be control (relay output) functions, telephone alarm calls, or pauses. The programming of Action Sequences will be discussed in the Advanced Programming section of this chapter. If a new Action Sequence is triggered before the execution of a previously triggered Action Sequence is complete, it is stored in memory and its execution is begun when the previous one is finished. The following three subsections discuss the three ways an Action Sequence can be triggered.

12.4.1.1 Triggered Manually. Action Sequences can be triggered manually by a specific command. This allows complex, frequently used command strings to be executed with a minimum of keystrokes and a reduced possibility of error. To manually trigger an Action Sequence, push 85. The RFC-1 responds by speaking "Enter One Digit Action Sequence." The operator should then push a single key (1 to 8) corresponding to the Action Sequence to be executed. There are 8 possible Action Sequences. If no Action Sequence is desired, push * or 0 to abort the command. Because an Action Sequence can include operation of one or more control relays, Control Security Code (A) must be entered before requesting a manually triggered Action Sequence.

12.4.1.2 Triggered by Telemetry Conditions. Action Sequences can be triggered by telemetry conditions. Up to eight telemetry channels can be programmed for automatic monitoring and an Action Sequence can be programmed to execute based on the telemetry information. For example, if the power level of a transmitter exceeds a certain level, an Action Sequence could reduce the power level and then notify a remote operator that an adjustment had been made.

Any of the following ten rules can be used to trigger an Action Sequence:

1 Trigger an Action Sequence if the telemetry varies more than 2.5% from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

2 Trigger an Action Sequence if the telemetry varies more than 5% from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

3 Trigger an Action Sequence if the telemetry varies more than 10% from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

4 Trigger an Action Sequence if the telemetry varies more than 20% from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

5 Trigger an Action Sequence if the telemetry crosses either the Upper Limit or the Lower Limit. The Upper and Lower Limits are pre-programmed four digit numbers.

6 Trigger an Action Sequence if the telemetry exceeds the Upper Limit but only if the telemetry was between the Upper and Lower Limits at the end of the last control/telemetry session or Action Sequence.

7 Trigger an Action Sequence if the telemetry falls below the Lower Limit but only if the telemetry was between the Upper and Lower Limits at the end of the last control/telemetry session or Action Sequence.

8 Trigger an Action Sequence if the telemetry exceeds the Upper Limit or falls below the Lower Limit.

9 Trigger an Action Sequence if the telemetry exceeds the Upper Limit.

10 Trigger an Action Sequence if the telemetry falls below the Lower Limit.

The Automatic Monitoring System is automatically disabled from triggering an Action Sequence during a control/telemetry session. If Trigger Rules 1 through 7 are used, this allows deliberate changes in operating conditions without triggering an Action Sequence. The reference values for Trigger Rules 1 through 7 are recorded at two times:

(1) nine seconds after the end of each control/telemetry session, and
(2) at the end of each Action Sequence triggered by telemetry or the clock/calendar.

At these times, all of the up to eight channels designated as Monitored Channels are automatically scanned by the RFC-1 and the telemetry values for those channels are recorded. Then, at intervals of one channel every 10 seconds, each Monitored Channel is rescanned and tested against one of the above ten rules. If all eight Monitored Channels are used, and a 10 second scan interval is selected, each channel is checked once every 80 seconds. If the limits of a rule are exceeded, the designated Action Sequence is triggered. With optional programming, one channel may be designated for checking on a more frequent rotation than the other channels. When Monitored Channel programming is complete, use Basic Programming command 82 to enable the Telemetry Alarm system.

At the end of an Action Sequence that was triggered by telemetry conditions, new reference values are automatically recorded for each Monitored Channel. This prevents the anomalous telemetry condition from triggering additional Action Sequences. If necessary, the recording of new reference values can be inhibited. This is done by programming the step "8-15" anywhere in the Action Sequence. This is commonly done when an Action Sequence is used to control the power level of a transmitter.

A simple example might assist in understanding how this system works. Suppose a facility where channel 03 telemetered output power. The normal reading is "1000." Suppose that channel 03 is designated as a Monitored Channel and is to be monitored based on Rule #5 (above). The Upper and Lower Limits are set at 1100 and 900 respectively. A manual remote control session has just ended. About 15 seconds after the RFC-1 hangs up the line, the various Monitored Channels are scanned and the telemetry values are read. The reading for channel 03 is "0998;" between the Upper and Lower Limits. This value is recorded in the RFC-1's memory. Over the next couple of hours, the telemetry values are rescanned periodically and checked against the reference readings made at the end of the manual control session. The readings for channel 03 have wandered around between 0930 and 1080. Then, during one scan, a reading of 1103 is encountered. The RFC-1 consults the rule table to determine if action is required. It finds that an Action Sequence should be triggered because the telemetry has "crossed either the Upper or Lower Limit." The scanning of Monitored Channels is temporarily suspended and the RFC-1 executes the programmed Action Sequence.

For each of the eight Monitored Channels, five pieces of information are programmed by the

user. The following table illustrates an example of programming for three of the possible eight Monitored Channels:

	Channel #	Upper Limit	Lower Limit	Trigger Rule	Action Sequence
Monitored Channel "A"	03	1100	0900	5	1
Monitored Channel "B"	04	****	****	2	1
Monitored Channel "C"	06	1450	0000	8	2

In the above example, channel 03 is set to trip Action Sequence 1 using Trigger Rule 5. The upper and lower limits are set at 1100 and 0900 respectively. Channel 04 is also set to trip Action Sequence 1 but using Trigger Rule 2. Note that Trigger Rules 1 through 4 do not require the entry of Upper and Lower Limits so a "blank" entry is made using "****" for each ("*" is read back as a "ten'). Channel 06 is set to trip Action Sequence 2 using Trigger Rule 8.

It is possible to test one telemetry channel using two or more rules. The following example illustrates this:

	Channel #	Upper Limit	Lower Limit	Trigger Rule	Action Sequence
Monitored Channel "A"	03	1100	0900	5	1
Monitored Channel "B"	03	1080	0900	6	2
Monitored Channel "C"	03	1100	0920	7	3

In the above example Action Sequence 1 is a telephone call list, Action Sequence 2 activates a relay which lowers power and Action Sequence 3 activates a relay which raises power.

12.4.1.2.a Disabling It is possible to enable and disable the channels to be monitored automatically at specific times. For example, a tower lighting system could be monitored only between 8:00 PM and 6:00 AM each day. This is accomplished by programming special cases of Date/Time triggers called lock-outs. During the periods specified in a lock out, the programmed Monitored Channel is inhibited from triggering an Action Sequence. If an alarm attempt is suppressed by a lock-out, a telemetry is scanned and new values are recorded so that a false alarm does not trigger as soon as the lock period ends. Lock-outs are discussed in Note 4 of the Referenced Notes section of this book and Date/Time triggers are discussed below.

12.4.1.2.b Conditional Execution. A telemetry triggered Action Sequence can programmed so that a portion of the Action Sequence can be executed and the telemetry value rechecked. If the telemetry value is within limits, normal scanning continues. If the telemetry is out-of-limits during the recheck, the entire Action Sequence is executed. For example, suppose a transmitter overloads and turns off. An Action Sequence is triggered by the absence of plate current. The Action Sequence starts off with an overload reset and then rechecks plate current. If it has returned, no further action is taken. If the plate current has not returned, the entire Action Sequence is completed which warms-up the standby transmitter and puts it on the air.

12.4.1.3 Triggered by the Clock/Calendar. The RFC-1 contains an internal clock/calendar which gives it the ability to trigger an Action Sequence by date and/or time-of-day. Up to 80 Date/Time triggers can be programmed in the RFC-1's memory. Each programmed time can be set to trigger one Action Sequence. Programming flexibility allows an Action Sequence to be triggered on a specific day of a specific month, or every day of a specific month, or a specific day of every month. Similarly, an Action Sequence can be programmed to occur at a specific minute of a specific hour, or a specific minute of every hour. The following steps must be completed for an Action Sequence to be triggered by the clock/calendar:

(1) Program the calendar with the current date and the clock with the time-of-day using commands 70 and 71 respectively. Detailed descriptions of these commands can be found under Basic Programming in this book.

(2) If the events to be performed are already programmed as an Action Sequence, go on to the next step. Otherwise, program the Action Sequence using the advanced programming mode entered with command 80. (Advanced programming is discussed later in this section and Action Sequence programming details can be found in Note 6 of the Referenced Notes section of this book.) If the Action Sequence contains one or more phone calls, verify that the necessary telephone numbers have been programmed. Enter any missing telephone numbers using commands 86, 87, 88 or the Advanced Programming mode for more than three telephone numbers.

(3) Program the Date/Time trigger for the desired Action Sequence using the Advanced Programming mode. Programming details are discussed in Note 4 of the Referenced Notes section of this book.

At the end of an Action Sequence that was triggered by the clock/calendar, new reference values are automatically recorded for each Monitored Channel. This prevents the anomalous telemetry condition from triggering additional Action Sequences. If necessary, the recording of new reference values can be inhibited by programming the step "8-15" anywhere in the Action Sequence. This is commonly done when an Action Sequence is used to control the power level of a transmitter.

12.4.1.3.a Disabling. It is quite simple to temporarily disable Action Sequences that are tripped by the system clock/calendar without changing Action Sequence or Date/Time programming. Set the clock minutes to "99". This will stop the clock so that it is unable to trigger an Action Sequence.

12.4.2 Automatic Logging

As discussed earlier, an RS-232 adaptor is available for the RFC-1/B which can be connected to a modem for serial data communications. An alternate use for the RS-232 adaptor is for connection to a printer. The RFC-1 can be programmed to print the telemetry reading of selected channels at regular intervals with notations of date and time. The printing sequence is triggered as a step in an Action Sequence, which in turn can be triggered by time, by telemetry or manually. Details of the various options concerning this feature are discussed in the Programming section of this chapter.

12.5 TELEMETRY FORMATS

The RFC-1 comes factory programmed to read telemetry as four digits, from 0000 to 2040. By means of user-programming, the telemetry output for each of the 64 channels can be customized to better fit the needs of a particular installation. The various telemetry programming options are listed below and discussed in detail in the Advanced Programming section of this chapter.

12.5.1 Units

A "unit word" can be appended to a telemetry reading. These words can be selected from a list of about 25 commonly used units (kilovolts, amperes, degrees, percent, etc.) included in the Word Table. See Note 1 in the Referenced Notes for programming details.

12.5.2 Status

The channel can be converted to "status" operation with a selection of output formats. Telemetry readings are reported as one of a pair of descriptive phrases in status mode (status off/status on, open/closed, etc.). See Note 1 in the Referenced Notes for programming details.

12.5.3 Decimal Point Location

A decimal point can be added to telemetry readings in any one of four possible locations. See Note 2 in the Referenced Notes for programming details.

12.5.4 Full Scale Range

The full scale reading can be selected from any of four ranges. See Note 2 in the Referenced Notes for programming details.

12.5.5 Log Conversion

A logarithmic scale conversion can be applied to the telemetry reading. See Note 3 in the Referenced Notes for programming details.

12.5.6 Indirect Power

Indirect power can be automatically computed using the voltage and current from two other channels and an efficiency factor. See Note 3 in the Referenced Notes for programming details.

12.5.7 Automatic Relay Operation

The channel's control relay can be made to operate automatically when a channel is selected. See Note 3 in the Referenced Notes for programming details.

12.5.8 Telemetry Settling Time

Telemetry settling time is the amount of time after the telemetry relay is switched before the voltage is sampled by the analog-to-digital converter in the RFC-1. It can be changed to any value from 0.2 to 3.2 seconds. See Note 12 in the Referenced Notes for programming details.

12.6 USER PROGRAMMING

The RFC-1 contains a large number of user-programmable operating characteristics. It is entirely feasible to install and operate the RFC-1 without changing any of these characteristics from their factory programmed values. However, many users will want to take advantage of the numerous operating features and conveniences that can be utilized by customizing the RFC-1 for a particular installation. The most often changed characteristics are accessible from the Basic Programming Mode using simple, easy to remember commands and voice prompting from the RFC-1. Less frequently modified characteristics are accessible from the Advanced Programming Mode. Programming in this mode is also simple, but because of the large number of data entries and operational choices that can be made, the operator will normally need the assistance of written documentation. If it is desired that the programming capability be restricted to certain operators, provisions are included to optionally require the entry of security codes before entering the basic and advanced programming modes.

All user programming in the RFC-1 is stored in a nonvolatile section of the internal microprocessor's memory. This memory remains intact during power outages and does not require the use of a back-up battery or "memory" capacitor. However, continued operation of the RFC-1's internal clock/calendar, if used, does require the use of some type of external back-up power. This is discussed in the "Installation" section of the Hardware Instruction Book.

12.6.1 Basic Programming

The basic programming functions are invoked through a set of two digit commands entered from either the DTMF keypad or as serial data. The two digit commands are listed below in numeric order--each followed by a full description of the function performed. (sample data shown in all cases)

70 Read/Set Calendar. Push 70 and the RFC-1 responds with "Month: 09; Day: 23; Year: 92; push # to reprogram." If # is pushed the RFC-1 responds with "Enter two digit month/enter two digit day/enter two digit year" with an "OK" after the final data entry. The RFC-1 needs to know the year in order to know how many days there are in February.

71 Read/Set Clock. Push 71 and the RFC-1 responds with "Hours: 18; Minutes: 06; push # to reprogram." If # is pushed the RFC-1 responds with "Enter two digit hours/enter two digit minutes" with an "OK" after the final data entry. Use "24 hour time" e.g. 6 pm is equal to 6 plus 12 hours or 18 hours. The "seconds" in the RFC-1 are not readable externally but are reset to zero when the clock is set.

There are four possible security codes that can be used to restrict operation and programming of the RFC-1. These are the Main Security Code, the Control Security Code, the Basic Programming Security Code and the Advanced Programming Security Code. Any or all of these can be used. The four security codes can be programmed in either the Basic or Advanced Programming modes from the local telephone, or in the Advanced Programming mode from either the local or a remote telephone. The RFC-1 security codes are factory programmed as:

Main Security Code:	12345678
Control Security Code:	66
Basic Programming Security Code:	4088
Advanced Programming Security Code:	4150

72 Read/Program Main Security Code. This function is not operable from a remote telephone. From the local telephone, push 72 and the RFC-1 responds with "Main Security Code: 12345678; push # to reprogram." If # is pushed the RFC-1 responds with "Enter eight digits." When eight digits are entered, the RFC-1 responds with "OK." If desired, the Main Security Code can be fewer than eight digits. One to seven digit Main Security Codes can be selected by filling in the extra spaces with *. For example, programming "927****" produces a three digit Main Security Code. The use of the Main Security Code can be eliminated entirely by programming "********" (all stars). In this case the RFC-1 answers the telephone with "This is RFC-1/B." The following table may help to judge the relative security levels of various length security codes.

Digits	Possible Codes	Time to try all codes (one try each 100 seconds)
1	10	16.6 minutes
2	100	2.77 hours
3	1,000	27.7 hours
4	10,000	11.6 days
5	100,000	116 days
6	1,000,000	3.16 years
7	10,000,000	31.6 years
8	100,000,000	316 years

73 Read/Program Control Security Code. This function is not operable from a remote telephone. Push 73 and the RFC-1 responds with "Control Security Code: 66; push # to reprogram." If # is pushed the RFC-1 responds with "Enter four digits." When four digits are entered, the RFC-1 responds with "OK." If desired, the Control Security Code can be fewer than four digits (as in the case with the factory programming, 66). One to four digit Control Security Codes can be selected by filling in the extra spaces with *. For example, programming "900*" produces a three digit Control Security Code. The use of the Control Security Code can be eliminated entirely by programming "****" (all stars). In this case the RFC-1's control relays are always enabled.

Programming the Control Security Code to "66**" results in a special-case operating response from the RFC-1. To enter the Control Security Code, all that is necessary is to push 66 at any time during the call. If any other code is used, the operating procedure is a little different. If control authority is desired, the operator should push 66 on the keypad. If the Control Security Code is not "66**," the RFC-1 will respond with "Enter Control Security Code." After the correct code is entered, the RFC-1 will respond with "OK" and the control relays will be enabled. For example, if the Control Security Code is "1234" the operator should push "66" and then "1234." Alternately, the operator can first attempt to operate a control relay. The relay will not operate but the RFC-1 will speak "Enter Control Security Code." The code can then be entered and the control relays will become operative. In all the above cases, if the RFC-1 asks for a Control Security Code and the operator responds with the incorrect code, the RFC-1 will hang up the line.

74 Read/Program Basic Programming Security Code. This function is not operable from a remote telephone. Push 74 and the RFC-1 responds with "Basic Programming Security Code: 4088; push # to reprogram." If # is pushed the RFC-1 responds with "Enter four digits." When four digits are entered, the RFC-1 responds with "OK." If desired, the Basic Programming Security Code can be fewer than four digits. One to three digit Basic Programming Security Codes can be selected by filling in the extra spaces with *. For example, programming "94**" produces a two digit Basic Programming Security Code. The use of the Basic Programming Security Code can be eliminated entirely by programming "****" (all stars). In this case the RFC-1 Basic Programming mode is always enabled.

75 Read/Program Advanced Programming Security Code. This function is not operable from a remote telephone. Push 75 and the RFC-1 responds with "Advanced Programming Security Code: 4150; push # to reprogram." If # is pushed the RFC-1 responds with "Enter four digits." When four digits are entered, the RFC-1 responds with "OK." If desired, the Advanced Programming Security Code can be fewer than four digits. One to three digit Advanced Programming Security Codes can be selected by filling in the extra spaces with *. For example, programming "94**" produces a two digit Advanced Programming Security Code. The use of the Advanced Programming Security Code can be eliminated entirely by programming "****" (all stars). In this case the RFC-1 Advanced Programming mode is always enabled.

76 Read/Program Ring Number. Push 76 and the RFC-1 responds with "Ring Number: 1; push # to reprogram." If # is pushed the RFC-1 responds with "Enter one digit." When the digit is entered, the RFC-1 responds with "OK." The digits may be any number from 1 to 9 depending on how many rings are desired before the RFC-1 answers a call.

78 Read Software Version. Push 78 and the RFC-1 responds with "Software Version: X.XX." This is a read-only function to allow the user to determine the software version residing in the microprocessor.

80 Enter Advanced Programming Mode. The use of this function is discussed in the Advanced Programming Section.

81 Enable Power Failure Alarm. Push 81 and the RFC-1 responds with "Power Failure Alarm: 0; push # to reprogram." If # is pushed the RFC-1 responds with "Enter one digit." When one digit is entered, the RFC-1 responds with "OK." Program this with "0" to disable the system or "1" to "8" to automatically trip the corresponding Action Sequence when power is restored.

82 Read/Program Telemetry Alarm Status. Push 82 and the RFC-1 responds with "Telemetry Alarm Status: 0; push # to reprogram." If # is pushed the RFC-1 responds with "Enter one digit." When one digit is entered, the RFC-1 responds with "OK." Program with "0" to disable or "1" to enable the Telemetry Alarm system.

84 Manual Serial Data Commands. This function is not operable from a remote telephone. Push 84 and the RFC-1 responds with "Enter one digit command."

Push 0 to cause the RFC-1 to switch to the serial-data mode.
Push 1 to cause the RFC-1 to dump all 1024 nibbles of user-programming out the serial port.
Push any other digit for "no command."

85 Manually Trigger Action Sequence. Push 85 and the RFC-1 responds with "Enter one digit Action Sequence." Then push a single digit corresponding the the desired Action Sequence. Push 0 to exit without triggering an Action Sequence. Because an Action Sequence can include operation of one or more control relays, the Control Security Code must be entered before requesting a manually triggered Action Sequence.

86 Read/Program Telephone Number A. Push 86 and the RFC-1 responds with "Telephone Number: 5551234 ten ten ten ten ten; push # to reprogram." The "tens" are "blank" digits programmed with "*." If # is pushed the RFC-1 responds with "Enter twelve digits." Twelve digits should then be entered. If the telephone number has fewer than twelve digits, fill in the extra digits with * (e.g. 5551234*****) When twelve digits are entered, the RFC-1 responds with "OK." If "blank" programming is desired, enter "**********" (all stars).

87 Read/Program Telephone Number B. Telephone Number B programs exactly the same as Telephone Number A except start by pushing 87.

88 Read/Program Telephone Number C. Telephone Number C programs exactly the same as Telephone Number A except start by pushing 88.

90 Read/Program Monitored Channel A. Push 90 and the RFC-1 responds in one of two ways. If the channel is programmed to use Trigger Rule 5 through 9, it responds with "Channel Number 64; Upper Limit: 2040; Lower Limit: 1020; push # to reprogram." If # is pushed the RFC-1 responds with "Enter two digit channel number," "Enter four digit upper limit," and "Enter four digit lower limit" respectively, as the values are entered. When the final value (lower limit) is entered, the RFC-1 responds with "OK." If Trigger Rules 1 through 4 are used, the reference to the upper and lower limits is omitted and the channel number is all that is read and programmed.

91—Read/Program Monitored Channel B. Same as above, except push 91.

92—Read/Program Monitored Channel C. Same as above, except push 92.

93—Read/Program Monitored Channel D. Same as above, except push 93.

94—Read/Program Monitored Channel E. Same as above, except push 94.

95—Read/Program Monitored Channel F. Same as above, except push 95.

96—Read/Program Monitored Channel G. Same as above, except push 96.

97—Read/Program Monitored Channel H. Same as above, except push 97.

12.6.1.1 Command Summary. The following is a brief listing of all the two-digit commands recognized by the RFC-1.

00-63 select channel; * key operates off/lower relay, # key operates on/raise relay
64 autoscan
66 enable control relays (if Control Security Code=66)/request to enter Control Security Code
70 read/program Calendar
71 read/program Clock
72 read/program Main Security Code (up to 8 digits); local telephone only
73 read/program Control Security Code (up to 4 digits); local telephone only
74 read/program Basic Programming Security Code (up to 4 digits); local telephone only
75 read/program Advanced Programming Security Code (up to 4 digits); local telephone only
76 read/program Ring Number
78 read Software Version
80 enter Advanced Programming mode
81 enable Power Fail Alarm (0=off or sequence number)
82 read/program Telemetry Alarm Status (0=off, 1=on)
84 manual serial data commands; local telephone only
0 switch to serial mode
1 dump user-memory out serial port
* exit; no command
(The above commands can be executed regardless of Communications Mode programming)
85 manually trigger Action Sequence
86 read/program Telephone Number A (12 digits)
87 read/program Telephone Number B (12 digits)
88 read/program Telephone Number C (12 digits) (three more telephone numbers are programmable in the Advanced Programming mode)
90 read/program Monitored Channel A (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
91 read/program monitored channel B (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
92 read/program monitored channel C (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
93 read/program monitored channel D (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
94 read/program monitored channel E (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
95 read/program monitored channel F (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
96 read/program monitored channel G (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
97 read/program monitored channel H (CC/UUUU/LLLL or CC if Trigger Rule ≤4)
98 hang up with answer inhibit for 2 minutes
99 hang up

12.6.2 Advanced Programming

In the advanced programming mode, any programmable value in the RFC-1 can be modified, from either a remote telephone or the local telephone. This results in a great potential for convenience...and disaster. For this reason, we strongly recommend that the optional Advanced Programming Security Code be used and that only personnel who need this capability be given the code.

The Advanced Programming Mode allows the user to examine and modify all 512 bytes of the non-volatile EEROM contained in the RFC-1's microprocessor. This is the section of memory allocated for the various user-programmable features. To simplify things, the 512 eight-bit bytes of the EEROM are broken down into 1024 four-bit "nibbles." Each nibble, therefore, can have one of 16 values, 0 to 15.

To enter the Advanced Programming Mode, push 80 on the keypad. If the Advanced Programming Security Code has not been previously entered during this call the RFC-1 will respond with "Enter security code." The Advanced Programming Security Code should then be entered. Then the RFC-1 will say "Enter four digit address." The address of the first data nibble in question should then be entered (0672, for example). The RFC-1 will then respond with "Memory address: 0672." Now, any of four things can be done:

(1) Push * to exit the Advanced Programming Mode
(2) Push # to cause the RFC-1 to speak the data (0 to 15) at this address and advance to the next address.
(3) Push X# (or XX#) where X or XX is a number from 0 to 15. This modifies the data at this address (to the value entered) and advances to the next address.
(4) Push 80 to enter a new four digit address.

For example, to read Telephone Number D, the operator would first push 80. Assuming that the Advanced Programming Security Code had been previously entered, the RFC-1 would respond with "Enter four digit address." The address 0682 is entered. The RFC-1 speaks "Address 0682." Then the # key is pushed twelve times, allowing the RFC-1 to speak each time the key is pressed. The RFC-1 speaks "five, five, five, one, two, three, four, ten, ten, ten, ten, ten." In this case the number is 555-1234. The last five digits are "10" which is "blank" programming. To modify the number, push 80 again and once again enter the four digit starting address. Then, for example, push "2, #, 2, #, 8, #, 3, #, 5, #, 0, #, 0, #, 10, #, 10, #, 10, #, 10, #, 10, #" to program the telephone number "228-3500."

12.6.2.1 Referenced Notes. The following notes are referenced by number from the Advanced Programming section of this book and the Advanced Programming Address Table. In several sections of this book, the terms "V1," "V2," etc. are used. Each represent a "value" from 0 to 15.

Note 1; Telemetry Units or Status Format:

If the user memory map is unchanged from the factory setting (see Note 29), the following may be programmed for each telemetry channel from 00 to 15. Programming 0-0 causes the voice synthesizer to remain silent which is useful if the telephone line is "on the air" during a "remote" for example. 0-5 through 0-12 configure the channel for two-level detection (low/high) and designate words for each level. 1-0 through 9-14 choose four-digit telemetry reporting with a word from the word table to be spoken after the telemetry reading. "V1-V2" refers to Value 1 and Value 2 in the programming table.

V1-V2: Telemetry Format or Units:

0-0	channel number & telemetry not spoken
0-1	telemetry not spoken
0-2	units not spoken; auto status off
0-3	units not spoken; auto status on (factory programming)
0-4	reserved
0-5	"Status: Off" or "Status: On"; mid-scale trip point
0-6	"Off" or "On"; mid-scale trip point
0-7	"Main" or "Auxiliary"; mid-scale trip point
0-8	"Status: 1" or "Status: 2"; mid-scale trip point
0-9	"Night" or "Day"; mid-scale trip point
0-10	"Normal" or "Alarm"; mid-scale trip point
0-11	"Normal" or "Intrusion"; mid-scale trip point
0-12	"Normal" or "Fire"; mid-scale trip point
0-13	"Status: A" or "Status: B"; mid-scale trip point
0-14	"Power Failure" or "Normal"; mid-scale trip point
0-15	"Normal" or "EBS Alarm"; mid-scale trip point

1-0 to 9-14 words from Word Table; for example 4-2 = "Kilovolts"

Note 2; Full Scale Reading & Decimal Point Location:

The following programming sets the full-scale reading and decimal point location.

V1: Full Scale & Decimal Point:

0	8160
1	4080
2	2040 (factory programming)
3	1020
4	816.0
5	408.0
6	204.0
7	102.0
8	81.60
9	40.80
10	20.40
11	10.20
12	8.160
13	4.080
14	2.040
15	1.020

Note 3; Linear/Logarithmic Scale /Indirect Power Calculation; Auto Control Relay Activation:

This is programmable for each channel. "Linear" means if 1 volt produces a full-scale reading then 0.5 volt produces a 0.5 x full-scale reading. "Logarithmic" (log) means if 1 volt produces a full-scale reading then 0.5 volt produces a 0.250 x full-scale reading. This is useful to convert a voltage sampled from a transmission line to be "power-proportional" as in the case of an FM broadcast transmitter. Another application for logarithmic scaling is to convert a current sampling off the AC line to the tower lights to power consumption when using a Sine Systems ACM-1 AC Current Monitor.

If "indirect power" is chosen, the RFC-1 does not sample telemetry for this channel but computes the reading from two other channels. Programming the channel for indirect power requires special instructions discussed after the following "V1" table.

In some circumstances it is useful to have a set of auxiliary contacts to close whenever a telemetry channel is selected. This is commonly needed for directional AM antenna monitors. If the control relays for this channel are not needed for another purpose, they can be used to provide this auxiliary contact closure. If the "Auto Control Relay" is selected as "on," the "off" control relay will close whenever the channel is selected. It will remain closed until another channel is selected or until either an "Off" or an "On" command is given.

V1:	Linear/Log/Indirect:	Auto Control Relay:
0	linear	off
1	logarithmic	off
2	indirect power (see following)	off
3	indirect power (see following)	off
4	linear	on
5	logarithmic	on
6-up	reserved; do not use	

To set up a channel for indirect power, the voltage to be monitored should be two channels "down" and the current to be monitored should be one channel down. For example, if channel 03 is configured for indirect power, the transmitter's plate voltage should be on channel 01 and the plate current should be on channel 02. The "units" for the indirect power channel will be automatically spoken as "kilowatts" or "percent power" depending on programming.

The telemetry value for the indirect power channel can be any reading from 0000 to 9999. If the computed value exceeds 9999 or either the voltage or current channel reaches full-scale, the words "Upper Limit" will be spoken. The telemetry value for the indirect power channel is computed from the following equation:

$$P = \frac{E \times I \times Eff}{10,000,000}$$

where
P= the computed four-digit reading of power (disregarding decimal point)
E= the four-digit voltage reading (disregarding decimal point)
I= the four-digit current reading (disregarding decimal point)
Eff= the programmed efficiency, user-programmed from 1 to 1023 (for 1% to 1023%)
S= the scale multiplier, user-programmed to be either 1, 10 or 100

Efficiencies greater than 100% can be used to compute effective radiated power (ERP). For example, if an antenna has a gain of 6.5, the feedline has an efficiency of 75% and the transmitter has an efficiency of 72%, the overall efficiency (input power-to-ERP) is 6.5 x .75 x .72, or 3.51. In this example, if the actual ERP were to be computed, the efficiency should be programmed to 351%. If transmitter power output (TPO) is to be computed, the efficiency should be programmed to 72%.

The efficiency value can also be adjusted to allow the computed reading to express a percentage of authorized power. In this case, the efficiency resulting from the above formula should be multiplied by 100 and then divided by the normal transmitter output power in

kilowatts. The goal is for the reading to be "100.0" at 100% of authorized power. Select the option for "percent power" as the unit in the following programming table.

To determine "S," the scale multiplier, first do a trial calculation of the expected normal voltage, current and efficiency. Start by setting S to "1" and compute "P" using the equation above. Disregard decimal points and use only the four digits of data for voltage and current. For example, use "4130" for voltage if the voltage is metered as either "4130 volts" or "4.130 kilovolts." Use a calculator because the numbers will be quite large before the final division by 10,000,000. As an example suppose the expected plate voltage is 8.0 kilovolts, the expected plate current is 3.8 amperes and the efficiency is 72%. Using the above equation:

$$\frac{8000 \times 3800 \times 72 \times 1}{10{,}000{,}000} = 218.88$$

The telemetry reading will include only the digits to the left of the decimal point in the above equation (0218). Therefore, in our example it would be desirable to use the "S= x10" programming. This would scale the raw reading to 2188. An "S= x100" would be inappropriate in this case because it would produce a raw reading of 21888, well beyond the maximum of "9999." As an independent step, the location of the decimal point should then be chosen. In this case, the correct selection would be "XX.XX" to produce an output of "21.88 kilowatts."

There are four user-programmable values for each telemetry channel. In a "normal" channel these are:

Value 1: Telemetry Units Or Status Format, Value 1
Value 2: Telemetry Units Or Status Format, Value 2
Value 3: Full Scale & Decimal Point
Value 4: Linear/Log/Indirect & Auto Relay

When a channel is programmed for indirect power, these four values are still programmed but their meaning is completely different. The procedure to obtain the necessary values is not difficult but it does require a number of steps which must be carefully completed. Before you start, determine the desired efficiency and scale multiplier (S).

Use a calculator as necessary to complete the following steps. In all cases, write down the number when instructed, even if it is a zero. If a calculation is instructed, only write down the digits in the result that are to the left of the decimal point. For example, if the result is 0.28125, write down "0".

Step 1: Select the desired efficiency from 1% to 1023%, expressed as a number from 1 to 1023 (for example, for an efficiency of 72% use "72"). Write this number on line L1.

L1: 74.1

Step 2: Divide L1 by 256. Place the number in the result to the left of the decimal point on L2.

L2: 0

Step 3: Multiply L2 times 256 and place the result on L3.

L3: 0

Step 4: Subtract L3 from L1 and enter the result on L4.

L4: 74.1

Step 5: Divide L4 by 16 and place the number(s) in the result to the left of the decimal point on L5.

L5: 4

Step 6: Multiply L5 times 16 and place the result on L6.

L6: 64

Step 7: Subtract L6 from L4 and place the result on L7.

L7: 10.1

Step 8: Multiply L2 times 4 and place the result on L8.

L8: 0

Step 9: If the desired unit word is "kilowatts" add 2 to L8 and place the result on L9.
If the desired unit word is "percent power" add 3 to L8 and place the result on L9.

L9: 2

Step 10: Select the number (0 to 3) from the following table for the desired decimal point location and place it on L10.

0	1234
1	123.4
2	12.34
3	1.234

L10: 2

Step 11: Multiply L10 times 4 and place the result on L11.

L11: 8

Step 12: or Select "S," the scale multiplier from the following table and write the number (0, 1 2) on line L12.

0	x 1
1	x 10
2	x 100

L12: 2

Step 13: Add L11 to L12 and place the result on L13.

L13: 10

The indirect power channel should then be programmed using the following information:

Program Value 1 with the number on L5.	V1: 4
Program Value 2 with the number on L7.	V2: 16
Program Value 3 with the number on L13.	V3: 10
Program Value 4 with the number on L9.	V4: 7

Note 4; Date/Time/Action Sequence:

Depending on how the memory is configured, from 48 to 80 Date/Times can be programmed to trigger Action Sequences. Memory configuration for Date/Time/Action Sequences is discussed in Note 29.

Here are the steps in programming a Date/Time location:

V1	Action Sequence	Program from 1 to 8
V1	month	Program from 1 to 12 ; 15=default match (all months)
V1-V2	day	Program from 0-1 to 3-1; 15-15 = default match
V1-V2	hour (use 24 hour time)	Program from 0-0 to 2-3; 15-15 = default match
V1-V2	minute	Program from 0-0 to 5-9; default match not allowed

A "default match" means that this value <u>always</u> matches. For example, programming the month as "3" and the day as "15-15" causes an Action Sequence to be triggered at a specific time, <u>every day</u> in March.

Examples:

To trigger Action Sequence #8 on July 22 at 10:13 AM, program 8; 7; 2-2; 1-0; 1-3. To trigger Action Sequence #1 every day during the month of March at 6:15 AM program: 1; 3; 15-15; 0-6; 1-5. To trigger Action Sequence #4 every night at 8:00 PM, program 4; 15; 15-15; 2-0; 0-0.

In addition to triggering Action Sequences, the Date/Time programming can be used to "lock-out" Monitored Channels for certain portions of the day. Here are instructions to do this:

V1	Lock-out function	Program 10 for a "lock-out" function
V1	Monitored Channel	Program "1" to "8" for Monitored Channels "A" to "H"
V1-V2	hour (24 hour time)	Program first lock-out hour (0-0 to 2-3)
V1-V2	hour (24 hour time)	Program last lock-out hour (0-0 to 2-3)
V1-V2	not used	Minutes default as "0-0" regardless of programming

Note that the lock-out is programmed to block a Monitored Channel and not the telemetry channel directly. For instance, if a lock-out is programmed with "1" to lock-out Monitored Channel A, and Monitored Channel A is programmed to scan telemetry channel "01", then the lock-out blocks the alarm triggered by channel "01" telemetry. If, however, Monitored Channel A is programmed to scan telemetry channel "03", then the lock-out blocks the alarm triggered by channel "03".

Example:

Suppose that "Monitored Channel B" is set up to monitor a communications tower's lighting current and that is set to call a telephone number if the reading exceeds an upper limit or falls below a lower limit. Since the tower lights are turned off during the day by a photoelectric control, it is normal for them to be off during the day. To enable Monitored Channel B every

night from 8:00 PM to 5:00 AM the next morning, the following is programmed into a Date/Time location: 10; 2; 0-5; 2-0; 0-0. This causes the monitoring of tower lights to be "locked-out" or not monitored between 5:00 AM and 8:00 PM.

Note 5; Telephone Numbers:

Each telephone number consists of 12 digits. Program one value for each of the 12 digits. If a telephone number is shorter than 12 digits, program the extra values with "10" (for example, 5, 5, 5, 1, 2, 3, 4, 10, 10, 10, 10, 10). Modem dialing can be programmed with pauses in the dialing sequence by programming a "15" at the point in the number where the pause should occur. This sends a comma to the modem which Hayes® compatible modems interpret as a two-second pause. In the regular (voice) calling modes, programming an "11" generates a pause. In the pulse-dialing mode it causes a one-second pause and in the DTMF-dialing mode it causes a 4 second pause (for example, 9, 11, 5, 5, 5, 1, 2, 3, 4, 10, 10, 10).

Next, program the calling mode (Voice/Data/Pager Digit) using the following table. Note that voice calls are made by programming 0 or 3 through 12. The values 3 through 12 add a single DTMF tone to the alarm phrase that can be used to identify the calling site on a pager display. Since the alarm phrase is repeated several times during the call, this usually results in a string of digits on the pager display, "1111111" for example. Note: Software versions prior to 5.07 cannot generate DTMF tones and in this case values 3 through 12 should not be programmed.

V1:	Result:
0	Voice calling
1	Modem calling using tone dialing
2	Modem calling using pulse dialing
3	Voice calling with DTMF digit "0" in the alarm phrase
4	Voice calling with DTMF digit "1" in the alarm phrase
5	Voice calling with DTMF digit "2" in the alarm phrase
6	Voice calling with DTMF digit "3" in the alarm phrase
7	Voice calling with DTMF digit "4" in the alarm phrase
8	Voice calling with DTMF digit "5" in the alarm phrase
9	Voice calling with DTMF digit "6" in the alarm phrase
10	Voice calling with DTMF digit "7" in the alarm phrase
11	Voice calling with DTMF digit "8" in the alarm phrase
12	Voice calling with DTMF digit "9" in the alarm phrase

Next, program the number of calling attempts. This can be a number from 1 to 4. Numbers greater than 4 result in 4 attempts.

Note 6; Action Sequences:

An Action Sequence consists of a sequence of up to 8 events. Each event is programmed with two values (V1-V2). The following table contains a listing of the events that can be programmed.

V1-V2:	Result:	V1-V2:	Result:
0-0	Channel 00, On Relay	4-0	Channel 00, Off Relay
0-1	Channel 01, On Relay	4-1	Channel 01, Off Relay
0-2	Channel 02, On Relay	4-2	Channel 02, Off Relay
0-3	Channel 03, On Relay	4-3	Channel 03, Off Relay

0-4	Channel 04, On Relay	4-4	Channel 04, Off Relay
0-5	Channel 05, On Relay	4-5	Channel 05, Off Relay
0-6	Channel 06, On Relay	4-6	Channel 06, Off Relay
0-7	Channel 07, On Relay	4-7	Channel 07, Off Relay
0-8	Channel 08, On Relay	4-8	Channel 08, Off Relay
0-9	Channel 09, On Relay	4-9	Channel 09, Off Relay
0-10	Channel 10, On Relay	4-10	Channel 10, Off Relay
0-11	Channel 11, On Relay	4-11	Channel 11, Off Relay
0-12	Channel 12, On Relay	4-12	Channel 12, Off Relay
0-13	Channel 13, On Relay	4-13	Channel 13, Off Relay
0-14	Channel 14, On Relay	4-14	Channel 14, Off Relay
0-15	Channel 15, On Relay	4-15	Channel 15, Off Relay
1-0	Channel 16, On Relay	5-0	Channel 16, Off Relay
1-1	Channel 17, On Relay	5-1	Channel 17, Off Relay
1-2	Channel 18, On Relay	5-2	Channel 18, Off Relay
1-3	Channel 19, On Relay	5-3	Channel 19, Off Relay
1-4	Channel 20, On Relay	5-4	Channel 20, Off Relay
1-5	Channel 21, On Relay	5-5	Channel 21, Off Relay
1-6	Channel 22, On Relay	5-6	Channel 22, Off Relay
1-7	Channel 23, On Relay	5-7	Channel 23, Off Relay
1-8	Channel 24, On Relay	5-8	Channel 24, Off Relay
1-9	Channel 25, On Relay	5-9	Channel 25, Off Relay
1-10	Channel 26, On Relay	5-10	Channel 26, Off Relay
1-11	Channel 27, On Relay	5-11	Channel 27, Off Relay
1-12	Channel 28, On Relay	5-12	Channel 28, Off Relay
1-13	Channel 29, On Relay	5-13	Channel 29, Off Relay
1-14	Channel 30, On Relay	5-14	Channel 30, Off Relay
1-15	Channel 31, On Relay	5-15	Channel 31, Off Relay
2-0	Channel 32, On Relay	6-0	Channel 32, Off Relay
2-1	Channel 33, On Relay	6-1	Channel 33, Off Relay
2-2	Channel 34, On Relay	6-2	Channel 34, Off Relay
2-3	Channel 35, On Relay	6-3	Channel 35, Off Relay
2-4	Channel 36, On Relay	6-4	Channel 36, Off Relay
2-5	Channel 37, On Relay	6-5	Channel 37, Off Relay
2-6	Channel 38, On Relay	6-6	Channel 38, Off Relay
2-7	Channel 39, On Relay	6-7	Channel 39, Off Relay
2-8	Channel 40, On Relay	6-8	Channel 40, Off Relay
2-9	Channel 41, On Relay	6-9	Channel 41, Off Relay
2-10	Channel 42, On Relay	6-10	Channel 42, Off Relay
2-11	Channel 43, On Relay	6-11	Channel 43, Off Relay
2-12	Channel 44, On Relay	6-12	Channel 44, Off Relay
2-13	Channel 45, On Relay	6-13	Channel 45, Off Relay
2-14	Channel 46, On Relay	6-14	Channel 46, Off Relay
2-15	Channel 47, On Relay	6-15	Channel 47, Off Relay
3-0	Channel 48, On Relay	7-0	Channel 48, Off Relay
3-1	Channel 49, On Relay	7-1	Channel 49, Off Relay
3-2	Channel 50, On Relay	7-2	Channel 50, Off Relay
3-3	Channel 51, On Relay	7-3	Channel 51, Off Relay
3-4	Channel 52, On Relay	7-4	Channel 52, Off Relay
3-5	Channel 53, On Relay	7-5	Channel 53, Off Relay
3-6	Channel 54, On Relay	7-6	Channel 54, Off Relay
3-7	Channel 55, On Relay	7-7	Channel 55, Off Relay
3-8	Channel 56, On Relay	7-8	Channel 56, Off Relay
3-9	Channel 57, On Relay	7-9	Channel 57, Off Relay

3-10	Channel 58, On Relay	7-10	Channel 58, Off Relay
3-11	Channel 59, On Relay	7-11	Channel 59, Off Relay
3-12	Channel 60, On Relay	7-12	Channel 60, Off Relay
3-13	Channel 61, On Relay	7-13	Channel 61, Off Relay
3-14	Channel 62, On Relay	7-14	Channel 62, Off Relay
3-15	Channel 63, On Relay	7-15	Channel 63, Off Relay

8-0	Extra 1 second pause
8-1	Extra 2 second pause
8-2	Extra 5 second pause
8-3	Extra 10 second pause
8-4	Extra 20 second pause
8-5	Extra 40 second pause
8-6	Extra 80 second pause

8-8 Print time, date and telemetry for channels from 00 to the programmed "stop" channel using a "local" printer (i.e., a printer located near the RFC-1).

8-9 Print time, date and telemetry for channels from 00 to the programmed "stop" channel using a "remote" printer (i.e., a printer located remotely from the RFC-1). The serial port on the RFC-1 should be connected to a modem. The RFC-1 will call Telephone Number F. The remote printer should be connected to a modem set to the"auto answer" mode.

8-14 Stop Execution and Recheck Telemetry. This step should be used only in Action Sequences which are triggered by Telemetry Rules. This instruction stops execution of an Action Sequence and rechecks telemetry for the triggering telemetry channel without a new reference scan. If the same telemetry channel triggers again, the entire Action Sequence is executed and a new reference scan is made. Here is an example of how this can be used: Channel 02 monitors the plate current of the main transmitter. Alarm Channel B is set up to monitor Channel 02. If the plate current falls to zero, Action Sequence 3 is triggered. Action Sequence 3 consists of: 0-2, 8-14, 4-1, 4-4, 0-5, 0-6. When Action Sequence 3 is triggered by the failure of Channel 02, the first step is to reset the main transmitter overload circuit with 0-2. Then the 8-14 step causes Channel 02 to be checked again (after the scan delay interval, normally 10 seconds). If the plate current has returned to normal, no additional steps in the Action Sequence will be executed and the telemetry scanning process will resume. If the plate current is still zero, Action Sequence 3 will start again, this time completing the entire sequence: the overload will be reset (already done to no avail), the main transmitter turned off, the antenna relay switched to the backup transmitter and the backup transmitter turned on. A new set of telemetry reference readings will then be made and telemetry scanning will resume.

8-15 Inhibit new telemetry reference scan upon completion of Action Sequence. At the end of an Action Sequence that was triggered by telemetry or the clock/calendar, new reference values are automatically recorded for each Monitored Channel. Programming this value in the Action Sequence will suppress a new telemetry reference scan. As an example, this instruction step can be placed at the end of an Action Sequence used to control transmitter power. This will allow the power to be controlled on subsequent telemetry scans even if the first power trim did not bring the telemetry reading to within limits. The 8-15 instruction, if used, should be the last step in an Action Sequence.

9-0 Call all programmed numbers (rotation A, B, C, D, E, F, A, B, etc.) to programmed number of attempts.

9-1 Call all programmed numbers (rotation A, B, A, C, A, D, A, E, A, F, A, B, etc.) to programmed number of attempts.

9-2 Call Telephone Number A once

9-3 Call Telephone Number B once

9-4 Call Telephone Number C once

9-5 Call Telephone Number D once

9-6 Call Telephone Number E once

9-7 Call Telephone Number F once

When using Trigger Rules 5, 6, or 7, the following steps may be used to force the RFC-1 to record a telemetry reference between the upper and lower limits when the next reference scan is made. This will occur regardless of the actual telemetry present at the time of the reference scan. This is useful to create an alarm condition when an Action Sequence containing this step is to turn on some piece of equipment, and the equipment fails to turn on properly. These steps may be placed anywhere in the Action Sequence.

10-1 Force next telemetry reference for Alarm Channel A between upper/lower limits

10-2 Force next telemetry reference for Alarm Channel B between upper/lower limits

10-3 Force next telemetry reference for Alarm Channel C between upper/lower limits

10-4 Force next telemetry reference for Alarm Channel D between upper/lower limits

10-5 Force next telemetry reference for Alarm Channel E between upper/lower limits

10-6 Force next telemetry reference for Alarm Channel F between upper/lower limits

10-7 Force next telemetry reference for Alarm Channel G between upper/lower limits

10-8 Force next telemetry reference for Alarm Channel H between upper/lower limits

15-15 Blank (no programming)

If ON and OFF control relays are programmed, the relay operate time is defined by programming address 1006 (discussed in Note 21). The default time between steps in an Action Sequence is programmed at address 1007 (discussed in Note 22).

Note 7; Alarm Channel Programming:

Up to 8 of the 64 possible telemetry channels can be designated for automatic monitoring. The channels are selected and monitoring conditions defined by programming Monitored Channels "A" through "H." The following is a table showing how the Monitored Channels can be programmed:

V1-V2	Channel Number	For example, channel 07 = 0-7
V1	Trigger Rule	See table below
V1	Action Sequence	from 1 to 8
V1-V2-V3-V4	Upper Limit	four digit upper limit
V1-V2-V3-V4	Lower Limit	four digit lower limit

Trigger Rules:

1 Trigger an Action Sequence if the telemetry varies more than 2.5% (or 20 units minimum) from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

2 Trigger an Action Sequence if the telemetry varies more than 5% (or 20 units minimum) from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

3 Trigger an Action Sequence if the telemetry varies more than 10% (or 20 units minimum) from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

4 Trigger an Action Sequence if the telemetry varies more than 20% (or 20 units minimum) from the telemetry reading at the end of the last control/telemetry session or Action Sequence.

5 Trigger an Action Sequence if the telemetry crosses either the Upper Limit or the Lower Limit.

6 Trigger an Action Sequence if the telemetry exceeds the Upper Limit but only if the telemetry was between the Upper and Lower Limits at the end of the last telemetry/control session or Action Sequence.

7 Trigger an Action Sequence if the telemetry falls below the Lower Limit but only if the telemetry was between the Upper and Lower Limits at the end of the last telemetry/control session or Action Sequence.

8 Trigger an Action Sequence if the telemetry exceeds the Upper Limit or falls below the Lower Limit.

9 Trigger an Action Sequence if the telemetry exceeds the Upper Limit.

10 Trigger an Action Sequence if the telemetry falls below the Lower Limit.

Trigger Rules 1 through 4 are useful for situations where more than one reading is "normal" such as an AM broadcast transmitter which operates at three or four different power levels. If Trigger Rules 1 through 4 are used, the Upper and Lower Limits are not used. Also, in the Basic Programming Mode, the upper and lower limits are not requested.

Another approach to situations where more than one reading is normal is to use more than one Monitored Channel. One pair of limits could monitor one range and another pair of limits could monitor a different range.
Trigger Rule 5 is probably the best for most applications. It has the advantage of being able to monitor a channel with fixed trip points but it doesn't require a complicated set of interlocks to avoid an alarm condition if the equipment is deliberately turned off.

Trigger Rules 6 and 7 are similar to 5 but require a specific direction to trigger an alarm. These are useful for automatic power control and similar activities.

Trigger Rules 8, 9, and 10 should be used with great care. These can cause continuous triggering and are not based on prior conditions. For example, suppose that Trigger Rule 10 is used to monitor a transmitter's power output and automatically operate the "power raise" control if the output power falls below the lower limit. If the transmitter were to be deliberately turned off, the RFC-1 would continuously operate the "power raise" control. Trigger Rule 7 would probably be better for this application.

Note 8; Main Security Code Programming:

The Main Security Code starts at address 0948.

To program any security code, simply enter any values between "0" to "9" for each address in the code. If it is desired that the security code contain fewer that the maximum number of digits, program the extra spaces with "10." For example, the Main Security Code can be up to 8 digits long. Programming "4 7 2 10 10 10 10 10" programs the Main Security Code to be three digits long (472). The security code can be eliminated altogether by programming "10" in all the digit locations.

Note 9; Control Security Code Channel Assignment:

Control Security Code A starts at address 0956.
Control Security Code B starts at address 0960.
Control Security Code C starts at address 0964.
Control Security Code block assignments start at address 0976

As factory programmed, all 64 possible channels are assigned the Control Security Code: 66. However, each block of 8 channels can be assigned any of three different Control Security Codes. As an example, suppose one RFC-1 was shared at a common transmitter site with three radio stations. Station #1 uses channels 00-07, station #2 uses channels 08-15, and station #3 uses channels 16-23. By programming different numbers into Control Security Codes A, B and C, and assigning one to each of the three blocks of channels, each radio station can then have exclusive control of their group of channels.

When programming the Control Security Code for the eight block of channels (starting at address 0976), program "1" for Control Security Code A, "2" for Control Security Code B and "3" for Control Security Code C.

Note 10; Site Identification Phrase:

The Site Identification Phrase begins at address 0984.

This phrase is factory programmed to be "This is RFC-1/B." This is the phrase that is spoken after the Main Security Code is correctly entered and when a telephone call is originated by the RFC-1. The phrase can be programmed with any 6 words in the word table. Each word requires the entry of two values. This could be something official sounding like "This is site 27" or something less formal like "Hello, this is Billy Bob." Fill in unused words with "Voice Pause 1."

If word 6 is programmed as "Voice Pause 5" the RFC-1 will not say the word "Enter" when it answers a call in voice mode. This may be useful in cases where the RFC-1 shares the telephone line with other equipment.

If word 6 is programmed as "Voice Pause 4" the RFC-1 will pause an extra 2 seconds before it speaks the word "Enter" when it answers a call in voice mode. This is helpful in situations where the telephone network system is giving feedback that may emulate DTMF tones and thus make entering the Main Security Code difficult.

Note 11; Hardware Version:

The Hardware Version is programmed at address 0996.

The RFC-1 hardware falls into one of two categories: hardware version 1.05 and earlier, and

hardware version 1.99 and later. The software needs to know which hardware version is being used. The RFC-1 comes factory programmed for the latter version. If this software has been installed as an upgrade to an older hardware version, this programming needs to be changed. It should be changed in the Local Control mode without the RFC-1 being connected to a telephone line.

Address 0996 also provides a means to disable the pulse hang-up detector in the RFC-1. This option is indicated in the right-hand column.

V1:	Hardware Version:	Pulse Hang-Up Detection:
0	1.05 and earlier	Enabled
1	1.99 and later (factory programmed)	Enabled
2	1.05 and earlier	Disabled
3	1.99 and later	Disabled

Note 12; Telemetry Settling Time:

Telemetry Settling Time is programmed at address 0997.

This is the amount of time after the telemetry relay is switched before the voltage is sampled by the analog-to-digital converter in the RFC-1. Because of the telemetry smoothing capacitors, if the impedance of the telemetry sources is fairly high, a longer waiting time (telemetry settling time) may be required between the time a reed relay on the RP-8 panel switches and the time the telemetry is actually read by the RFC-1. If this is not long enough, the initial reading may be slightly different than subsequent readings on the same channel. Unless the telemetry source impedance is fairly high (>5K) this is not a problem. The telemetry settling time is factory set to 0.8 seconds and this should be satisfactory for most purposes. The telemetry settling time can be changed to any value from 0.2 to 3.2 seconds by programming a value of "0" to "15." The time in seconds is equal to .2 +(.2 x V) where V is the value from 0 to 15.

Note 13; Telemetry Lead Zero Suppression:

Leading Zero Suppression is programmed at address 0998.

V1:	Result:	
0	No leading zero suppression	Example: 0714
1	Leading zero suppression	Example: 714

Note 14; Voice Dialing Mode (Pulse/DTMF):

Voice Dialing Mode is programmed at address 0999.

V1:	Result:	
0	Pulse dialing	
1	DTMF dialing	(DTMF dialing is not available prior to software version 5.07)

Note 15; Idle Time Before Hang-Up:

Idle Time Before Hang-Up is programmed at address 1000.

This is the maximum time allowed that the RFC-1 goes without receiving a valid DTMF command before terminating the call. This is factory programmed to 2.5 minutes.

V1: Result:

0 30 seconds
1 60 seconds
2 2.5 minutes (factory programmed)
3 5 minutes
4 8.5 minutes
5 13 minutes
6 18.5 minutes
7 25 minutes
8 32.5 minutes
9 41 minutes
10 50.5 minutes
11 61 minutes
12 72.5 minutes
13 85 minutes
14 98.5 minutes
15 113 minutes

Note 16; Ring Number:

The Ring Number is programmed at address 1001.

This programming sets the required number of rings before the RFC-1 answers a telephone call. This can be any value between 1 and 15. Programming a "0" will result in one ring.

Note 17; Communications Mode:

The Communication Mode is programmed at address 1002.

V1: Result:

0 Answer in voice/DTMF mode only (factory programming)
1 Answer in serial data mode first; if no carrier within 10 seconds, try voice/DTMF
2 Answer in voice/DTMF mode first; if no DTMF within 10 seconds, try serial data mode
3 Answer in serial data mode only

If mode 1 or 2 is used, it is recommended that the Incorrect Security Code Lockout Time be programmed for 10 seconds. This is the amount of time the RFC-1 will wait before switching communications mode. See Note 30 for programming details.

Note 18; Duration of Alarm Call:

The Duration of Alarm Call is programmed at address 1003.

This programming applies to voice/DTMF calls only.

V1: Result:

1 to 15 10 to 150 seconds

Programming "0" results in 10 seconds.

Note 19; Wait Time Between Calls:

The Wait Time Between Calls is programmed at address 1004.

V1:	Result:
1 to 15	10 to 150 seconds

Programming "0" results in 10 seconds.

Note 20; Baud Rate:

The Baud Rate is programmed at address 1005.

V1:	Result (baud):
0	9600
1	4800
2	2400 (factory programmed)
3	1200
4	600
5	300
6	150
7	75

Note 21; Relay "On" Time In Serial Mode and Action Sequences:

The Relay "On" Time is programmed at address 1006.

This sets the relay "on" time in the serial data mode and in Action Sequences. It is also the minimum control relay "on" time for manual (DTMF) control tones.

V1:	Result:
0 to 15	0.3 to 4.8 seconds; T=.3+(.3 x V) ; factory programmed to 0.6 seconds

Note 22; Time Between Steps in Action Sequences:

The Time Between Steps in Action Sequences is programmed at address 1007.

This is the default pause between the steps in an Action Sequence.

V1:	Result:
0 to 15	0.2 to 3.2 seconds; T=.2+(.2 x V) ; factory programmed to 0.4 seconds

Note 23; Enable Power-Up Action Sequence:

The Enable Power-Up Action Sequence is programmed at address 1008.

This is the Action Sequence triggered 10 seconds after power is applied to the RFC-1.

V1:	Result:
0	Disabled (no Action Sequence)
1 to 8	Action Sequence 1 to 8

Note 24; Enable Telemetry Alarm System

The Telemetry Alarm Status is programmed at location 1009.

Program with "0" to disable the Telemetry Alarm System. Program with "1" to enable the Telemetry Alarm System. This address can also be programmed using command 82 in the Basic Programming Mode.

Note 25; Autoscan Stop Channel:

The Autoscan Stop Channel is programmed at address location 1010.

Program two digit channel number (V1-V2) for the highest channel number to be scanned by the Autoscan function and telemetry printing. For example, channel 15 is programmed as 1-5.

Note 26; Reserved

Note 27; Telemetry Scan Interval:

The Telemetry Scan Interval is programmed at address 1013.

The Monitored Channels are scanned at this interval. It is factory programmed to 10 seconds. At a scan interval of 10 seconds, it requires 80 seconds to scan all 8 channels. The normal scanning sequence is Monitored Channel A, B, C, D, E, F, G, H. If the second portion of the table is selected, Monitored Channel H is scanned every other channel. For example, Monitored Channel A, H, B, H, C, H, D, H, etc.

V1:	Result:	Frequent scan of Monitored Channel H:	
0	10 seconds	No	(factory programmed)
1	20 seconds	No	
2	50 seconds	No	
3	100 seconds	No	
4	10 seconds	Yes	
5	20 seconds	Yes	
6	50 seconds	Yes	
7	100 seconds	Yes	

The second portion of the table is used when a short time delay is desired between a telemetry change and its detection by the RFC-1. For example, if "4" were programmed, Monitored Channel H would be sampled every 20 seconds. Channels not programmed for scanning are skipped.

Note 28; Dedicated Port Control/Ring Sensitivity:

The Dedicated Port Control and Ring Sensitivity is programmed at address 1014.

See the Hardware Instruction Book for details about the Dedicated Control Port.
Ring sensitivity higher than the factory setting may be necessary when using the RFC-1 with

UHF radiotelephones (sometimes called "ranch phones"), cellular-to-RJ11 adaptors, or other devices which generate a square wave ring signal. Ring sensitivity lower than the factory setting may be necessary when used with telephone lines that have a large amount of "hum" present. This prevents the hum from generating what the RFC-1 thinks is a continuous ring.

The following table shows programming for the Dedicated Port and the Ring Sensitivity:

V1:	Result:
8	Dedicated Port Off / Ring Sensitivity = 10
10	Dedicated Port Off / Ring Sensitivity = 4.66
12	Dedicated Port Off / Ring Sensitivity = 3.04
14	Dedicated Port Off / Ring Sensitivity = 2.25
0	Dedicated Port Off / Ring Sensitivity = 1.79 (factory setting)
2	Dedicated Port Off / Ring Sensitivity = 1.48
4	Dedicated Port Off / Ring Sensitivity = 1.27
6	Dedicated Port Off / Ring Sensitivity = 1.11
9	Dedicated Port On / Ring Sensitivity = 10
11	Dedicated Port On / Ring Sensitivity = 4.66
13	Dedicated Port On / Ring Sensitivity = 3.04
15	Dedicated Port On / Ring Sensitivity = 2.25
1	Dedicated Port On / Ring Sensitivity = 1.79
3	Dedicated Port On / Ring Sensitivity = 1.48
5	Dedicated Port On / Ring Sensitivity = 1.27
7	Dedicated Port On / Ring Sensitivity = 1.11

Note 29; Exchange Channel Label for Programmed Date/Times:

The Exchange Channel Label for Programmed Date/Times is programmed at address 1015.

The RFC-1 comes factory-programmed to allow up to 72 Date/Times to be programmed and the ability to program Telemetry Units/Status Formats for channel 00 through 15. If circumstances permit, the user-memory can be reconfigured to reduce or expand the number of channels that can be programmed with Telemetry Units/Status Formats (TU/SF) with a corresponding shift in the number of Date/Time programming spaces. If this is done, some of the telemetry channels can not be programmed with telemetry units or special status formats. The channels can still be used but the format will default to the values programmed at addresses 1020 through 1023 (see Note 33). The following table contains the information necessary for programming:

V1:	TU/SF programmable on channels:	Number of Date/Times available:	
0	00 to 63	48	
1	00 to 55	52	
2	00 to 47	56	
3	00 to 39	60	
4	00 to 31	64	
5	00 to 23	68	
6	00 to 15	72	(factory programmed)
7	00 to 07	76	
8	none	80	

If TU/SF is exchanged for Date/Times, use the "Alternate Use" section for Date/Times 49 and

above in the "Advanced Programming Addresses" book.

Note 30; Incorrect Security Code Lockout Time:

The Incorrect Security Code Lockout Time is programmed at address 1016.

When any security code is incorrectly entered by the operator, the RFC-1 hangs-up the telephone line. The delay before the RFC-1 hangs-up is determined by this programming:

V1:	Result:
0 to 15	0 to 150 seconds (in increments of 10 seconds)

This value is factory programmed to 10 seconds.

This value also determines the length of time the RFC-1 will wait before switching communications mode when one of the intermediate modes is selected. The intermediate communications modes are those where the RFC-1 answers in one mode, voice or data, and automatically switches to the other mode if it does not receive an appropriate response. It is recommended that this value be programmed to 10 seconds if one of these modes are used. Communication mode programming details can be found in Note 17.

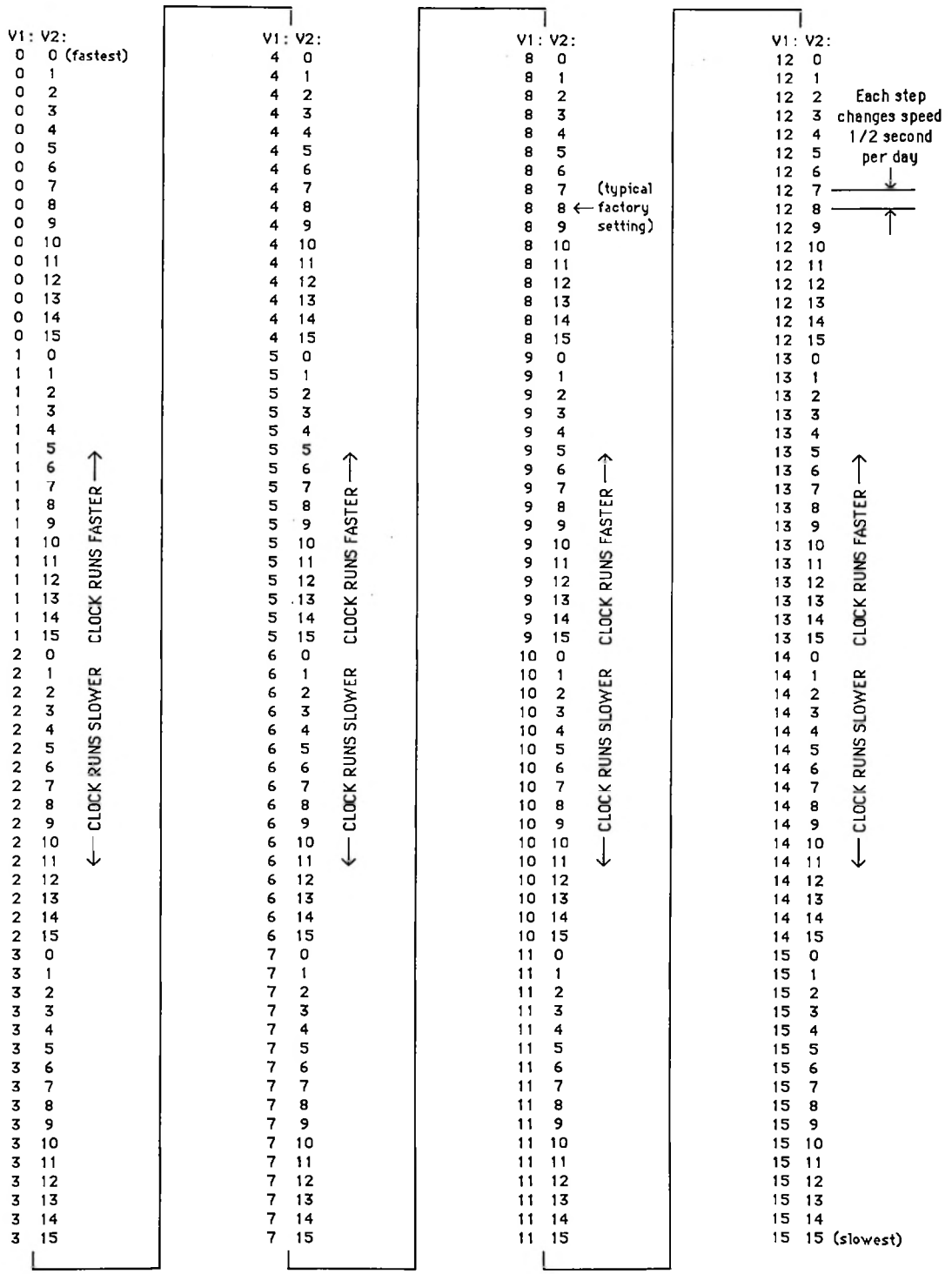
Note 31; Reserved

Note 32; Clock Speed Adjustment:

The Clock Speed Adjustment is programmed at addresses 1018-1019.

This adjustment has been included to compensate for variances in timing crystals. If the system clock runs fast, this value should be increased. If the system clock runs slow, this value should be decreased. Each step causes a one half second change over a 24 hour period.

The values required to change the clock speed can be easily found using the table on the following page. As an example, suppose the current value programmed at address 1018 (V1) is "8" and the value at address 1019 (V2) is also "8". This is the typical factory-setting shown on the table. Also suppose the clock has lost 25 seconds over a period of 5 days. This is equivalent to 5 seconds per day. To find the new values to program, we first find the setting on the table corresponding to V1=8, V2=8. Then, because we want to speed the clock up 5 seconds per day, we move backwards on the table 10 steps (each step equals 1/2 second per day). This puts us at V1=7, V2=14. We would then program a "7" at address 1018 and a "14" at address 1019.


V1: V2:
0 0 (fastest)
0 1
0 2
0 3
0 4
0 5
0 6
0 7
0 8
0 9
0 10
0 11
0 12
0 13
0 14
0 15
1 0
1 1
1 2
1 3
1 4
1 5
1 6
1 7
1 8
1 9
1 10
1 11
1 12
1 13
1 14
1 15
2 0
2 1
2 2
2 3
2 4
2 5
2 6
2 7
2 8
2 9
2 10
2 11
2 12
2 13
2 14
2 15
3 0
3 1
3 2
3 3
3 4
3 5
3 6
3 7
3 8
3 9
3 10
3 11
3 12
3 13
3 14
3 15
← CLOCK RUNS SLOWER CLOCK RUNS FASTER →
V1: V2:
4 0
4 1
4 2
4 3
4 4
4 5
4 6
4 7
4 8
4 9
4 10
4 11
4 12
4 13
4 14
4 15
5 0
5 1
5 2
5 3
5 4
5 5
5 6
5 7
5 8
5 9
5 10
5 11
5 12
5 13
5 14
5 15
6 0
6 1
6 2
6 3
6 4
6 5
6 6
6 7
6 8
6 9
6 10
6 11
6 12
6 13
6 14
6 15
7 0
7 1
7 2
7 3
7 4
7 5
7 6
7 7
7 8
7 9
7 10
7 11
7 12
7 13
7 14
7 15
← CLOCK RUNS SLOWER CLOCK RUNS FASTER →
V1: V2:
8 0
8 1
8 2
8 3
8 4
8 5
8 6
8 7 (typical
8 8 ← factory
8 9 setting)
8 10
8 11
8 12
8 13
8 14
8 15
9 0
9 1
9 2
9 3
9 4
9 5
9 6
9 7
9 8
9 9
9 10
9 11
9 12
9 13
9 14
9 15
10 0
10 1
10 2
10 3
10 4
10 5
10 6
10 7
10 8
10 9
10 10
10 11
10 12
10 13
10 14
10 15
11 0
11 1
11 2
11 3
11 4
11 5
11 6
11 7
11 8
11 9
11 10
11 11
11 12
11 13
11 14
11 15
← CLOCK RUNS SLOWER CLOCK RUNS FASTER →
V1: V2:
12 0
12 1
12 2
12 3
12 4
12 5
12 6
12 7
12 8
12 9
12 10
12 11
12 12
12 13
12 14
12 15
13 0
13 1
13 2
13 3
13 4
13 5
13 6
13 7
13 8
13 9
13 10
13 11
13 12
13 13
13 14
13 15
14 0
14 1
14 2
14 3
14 4
14 5
14 6
14 7
14 8
14 9
14 10
14 11
14 12
14 13
14 14
14 15
15 0
15 1
15 2
15 3
15 4
15 5
15 6
15 7
15 8
15 9
15 10
15 11
15 12
15 13
15 14
15 15 (slowest)
Each step changes speed 1/2 second per day
← CLOCK RUNS SLOWER CLOCK RUNS FASTER →

Note 33; Default Telemetry Formats

Telemetry Format Defaults are programmed at addresses 1020 - 1023.

V1-V2	Telemetry Format or Units See Note 1 for programming options.
V1	Full Scale Reading & Decimal Point Location See Note 2 for programming options.
V1	Linear/Logarithmic Scale/Indirect Power Calculation; Auto Control Relay See Note 3 for programming options.

User memory in the RFC-1 can be configured to store 48 to 80 Date/Times to trip Action Sequences. Factory programming is 48 Date/Times. When more than 48 Date/Times are programmed, some of the channels can not be programmed with telemetry units or special status formats. The channels can still be used but the format will default to the format stored in these memory addresses. In factory programming: the full-scale reading is set to "2040," the auto-status will be "on," and there will no units spoken.

12.6.2.2 Word Table

Note: V1 = Value 1, V2 = Value 2

Word:	V1:	V2:
zero	0	0
one	0	1
two	0	2
three	0	3
four	0	4
five	0	5
six	0	6
seven	0	7
eight	0	8
nine	0	9
ten	0	10
eleven	0	11
twelve	0	12
thirteen	0	13
fourteen	0	14
fifteen	0	15
A	8	7
action	1	0
address	1	1
advanced	1	2
alarm	1	3
AM	1	4
amperes	1	5
audio	1	7
auto	1	6
auxiliary	1	11
B	8	8
basic	1	8
Billy Bob	1	9
Bozo	1	10
C	8	9
channel	1	12
code	1	15
command	2	0
control	2	3
Curly	2	4
D	8	10
day	2	5
degrees	2	7
digit	2	8
E	8	11
enter	2	10
error	2	11
exit	2	13
F	8	12
failure	2	14
fire	3	0
FM	3	1
G	8	13
Gary	3	3
Gonzo	3	4
goodbye	3	5
H	8	14
Hal	3	7

Word:	V1:	V2:
hello	3	8
here	3	9
hours	3	11
I	8	15
Igor	3	12
intrusion	3	14
J	9	0
Joe	3	15
K	9	1
kilovolts	4	2
kilowatts	4	3
L	9	2
Larry	4	4
limit	4	5
local	4	6
lower	4	7
M	9	3
main	4	8
malfunction	2	1
manual	4	9
memory	4	10
milliamps	4	14
millivolts	4	15
milliwatts	5	0
minutes	5	1
Moe	5	3
month	5	5
N	9	4
network	5	4
night	5	7
normal	5	8
number	5	9
nyuk nyuk nyuk	2	9
O	9	5
off	5	10
OK	5	11
on	5	12
Oscar	5	14
P	9	6
percent	5	15
percent power	6	0
point	6	1
pound	6	3
power	6	5
programming	6	7
push	6	8
Q	9	7
R	9	8
ratio	6	10
reflected	1	14
reprogram	6	11
ring	6	12
S	9	9
scan	6	14

Word:	V1:	V2:
security	6	15
sequence	7	1
site	7	2
software	7	3
Spanky	7	4
speaking	7	5
status	7	8
T	9	10
telemetry	7	9
telephone	7	10
temperature	2	2
This is	7	11
time	7	12
to	7	13
transmitter	7	14
triggered	7	15
U	9	11
upper	8	1
V	9	12
version	8	2
volts	8	3
W	9	13
water	1	13
watts	8	4
Woofer	8	5
X	9	14
Y	9	15
year	8	6
Z	10	0
25 ms voice pause	10	5
50 ms voice pause	10	6
100 ms voice pause	10	7
200 ms voice pause	10	8
500 ms voice pause	10	9
,	10	14
;	10	2
:	10	3
/	10	1
=	10	13
CR	10	11
CR&LF	10	10
&	10	4
+++	10	12
DTMF 0	10	15
DTMF 1	11	0
DTMF 2	11	1
DTMF 3	11	2
DTMF 4	11	3
DTMF 5	11	4
DTMF 6	11	5
DTMF 7	11	6
DTMF 8	11	7
DTMF 9	11	8
3.95 second voice	11	9

Section 13 — Exceptions for Early Hardware Versions:

Software version 5.00 for the Sine Systems RFC-1/B Remote Facilities Controller was released in February 1994 and is suitable for use with RFC-1/B hardware versions 1.99 and later. The software resides in the unit's microprocessor and determines all the RFC-1/B's operating characteristics. This software may also be used with all hardware versions preceding 1.99 if appropriately programmed (see Advanced Programming in Section 12). Due to the slightly different hardware configuration of the earlier units, the following exceptions apply to the operating characteristics discussed in this book:

1. When in the Local Control mode, the RFC-1/B will not speak "Ring-Ring-Ring" as an indication that someone is calling on the telephone line.

2. The RFC-1 will have no automatic hang-up detection. The built-in timer will cause the RFC-1 to hang-up after 2.5 minutes (user-programmable) of disuse or the operator may cause the RFC-1 to hang-up manually by pushing 99.

3. With hardware versions 1.99 and later, both the dial-up port and the dedicated control port can be activated for use at the same time (although they may not actually be used concurrently). In hardware versions 1.05 and earlier, it is an "either/or" situation. The dial-up port can be activated (this is the normal case) or the dedicated port can be activated, but they cannot be used together. In hardware versions 1.05 and earlier, if the dedicated control port is activated, the RFC-1/B will not respond to a telephone call on the dial-up port.

Sine Systems RFC-1/B Advanced Programming Address Table:

(for software versions beginning 5.00)

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Alternate Use:	Note:
0000	Channel 00; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 80; Action Sequence	4
0001	Channel 00; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 80; Month	4
0002	Channel 00; Full Scale & Decimal Point	2	2	____	Date/Time 80; Day, Value 1	4
0003	Channel 00; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 80; Day, Value 2	4
0004	Channel 01; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 80; Hour, Value 1	4
0005	Channel 01; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 80; Hour, Value 2	4
0006	Channel 01; Full Scale & Decimal Point	2	2	____	Date/Time 80; Minute, Value 1	4
0007	Channel 01; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 80; Minute, Value 2	4
0008	Channel 02; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 79; Action Sequence	4
0009	Channel 02; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 79; Month	4
0010	Channel 02; Full Scale & Decimal Point	2	2	____	Date/Time 79; Day, Value 1	4
0011	Channel 02; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 79; Day, Value 2	4
0012	Channel 03; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 79; Hour, Value 1	4
0013	Channel 03; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 79; Hour, Value 2	4
0014	Channel 03; Full Scale & Decimal Point	2	2	____	Date/Time 79; Minute, Value 1	4
0015	Channel 03; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 79; Minute, Value 2	4
0016	Channel 04; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 78; Action Sequence	4
0017	Channel 04; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 78; Month	4
0018	Channel 04; Full Scale & Decimal Point	2	2	____	Date/Time 78; Day, Value 1	4
0019	Channel 04; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 78; Day, Value 2	4
0020	Channel 05; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 78; Hour, Value 1	4
0021	Channel 05; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 78; Hour, Value 2	4
0022	Channel 05; Full Scale & Decimal Point	2	2	____	Date/Time 78; Minute, Value 1	4
0023	Channel 05; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 78; Minute, Value 2	4
0024	Channel 06; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 77; Action Sequence	4
0025	Channel 06; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 77; Month	4
0026	Channel 06; Full Scale & Decimal Point	2	2	____	Date/Time 77; Day, Value 1	4
0027	Channel 06; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 77; Day, Value 2	4
0028	Channel 07; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 77; Hour, Value 1	4
0029	Channel 07; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 77; Hour, Value 2	4
0030	Channel 07; Full Scale & Decimal Point	2	2	____	Date/Time 77; Minute, Value 1	4
0031	Channel 07; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 77; Minute, Value 2	4
0032	Channel 08; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 76; Action Sequence	4
0033	Channel 08; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 76; Month	4
0034	Channel 08; Full Scale & Decimal Point	2	2	____	Date/Time 76; Day, Value 1	4
0035	Channel 08; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 76; Day, Value 2	4
0036	Channel 09; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 76; Hour, Value 1	4
0037	Channel 09; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 76; Hour, Value 2	4
0038	Channel 09; Full Scale & Decimal Point	2	2	____	Date/Time 76; Minute, Value 1	4
0039	Channel 09; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 76; Minute, Value 2	4
0040	Channel 10; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 75; Action Sequence	4
0041	Channel 10; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 75; Month	4
0042	Channel 10; Full Scale & Decimal Point	2	2	____	Date/Time 75; Day, Value 1	4
0043	Channel 10; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 75; Day, Value 2	4
0044	Channel 11; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 75; Hour, Value 1	4
0045	Channel 11; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 75; Hour, Value 2	4
0046	Channel 11; Full Scale & Decimal Point	2	2	____	Date/Time 75; Minute, Value 1	4
0047	Channel 11; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 75; Minute, Value 2	4
0048	Channel 12; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 74; Action Sequence	4
0049	Channel 12; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 74; Month	4
0050	Channel 12; Full Scale & Decimal Point	2	2	____	Date/Time 74; Day, Value 1	4
0051	Channel 12; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 74; Day, Value 2	4
0052	Channel 13; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 74; Hour, Value 1	4
0053	Channel 13; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 74; Hour, Value 2	4
0054	Channel 13; Full Scale & Decimal Point	2	2	____	Date/Time 74; Minute, Value 1	4
0055	Channel 13; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 74; Minute, Value 2	4
0056	Channel 14; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 73; Action Sequence	4
0057	Channel 14; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 73; Month	4
0058	Channel 14; Full Scale & Decimal Point	2	2	____	Date/Time 73; Day, Value 1	4
0059	Channel 14; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 73; Day, Value 2	4

Sine Systems RFC-1/B Advanced Programming Address Table:

(for software versions beginning 5.00)

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Alternate Use:	Note:
0060	Channel 15; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 73; Hour, Value 1	4
0061	Channel 15; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 73; Hour, Value 2	4
0062	Channel 15; Full Scale & Decimal Point	2	2	____	Date/Time 73; Minute, Value 1	4
0063	Channel 15; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 73; Minute, Value 2	4
0064	Channel 16; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 72; Action Sequence	4
0065	Channel 16; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 72; Month	4
0066	Channel 16; Full Scale & Decimal Point	2	2	____	Date/Time 72; Day, Value 1	4
0067	Channel 16; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 72; Day, Value 2	4
0068	Channel 17; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 72; Hour, Value 1	4
0069	Channel 17; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 72; Hour, Value 2	4
0070	Channel 17; Full Scale & Decimal Point	2	2	____	Date/Time 72; Minute, Value 1	4
0071	Channel 17; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 72; Minute, Value 2	4
0072	Channel 18; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 71; Action Sequence	4
0073	Channel 18; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 71; Month	4
0074	Channel 18; Full Scale & Decimal Point	2	2	____	Date/Time 71; Day, Value 1	4
0075	Channel 18; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 71; Day, Value 2	4
0076	Channel 19; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 71; Hour, Value 1	4
0077	Channel 19; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 71; Hour, Value 2	4
0078	Channel 19; Full Scale & Decimal Point	2	2	____	Date/Time 71; Minute, Value 1	4
0079	Channel 19; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 71; Minute, Value 2	4
0080	Channel 20; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 70; Action Sequence	4
0081	Channel 20; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 70; Month	4
0082	Channel 20; Full Scale & Decimal Point	2	2	____	Date/Time 70; Day, Value 1	4
0083	Channel 20; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 70; Day, Value 2	4
0084	Channel 21; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 70; Hour, Value 1	4
0085	Channel 21; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 70; Hour, Value 2	4
0086	Channel 21; Full Scale & Decimal Point	2	2	____	Date/Time 70; Minute, Value 1	4
0087	Channel 21; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 70; Minute, Value 2	4
0088	Channel 22; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 69; Action Sequence	4
0089	Channel 22; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 69; Month	4
0090	Channel 22; Full Scale & Decimal Point	2	2	____	Date/Time 69; Day, Value 1	4
0091	Channel 22; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 69; Day, Value 2	4
0092	Channel 23; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 69; Hour, Value 1	4
0093	Channel 23; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 69; Hour, Value 2	4
0094	Channel 23; Full Scale & Decimal Point	2	2	____	Date/Time 69; Minute, Value 1	4
0095	Channel 23; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 69; Minute, Value 2	4
0096	Channel 24; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 68; Action Sequence	4
0097	Channel 24; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 68; Month	4
0098	Channel 24; Full Scale & Decimal Point	2	2	____	Date/Time 68; Day, Value 1	4
0099	Channel 24; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 68; Day, Value 2	4
0100	Channel 25; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 68; Hour, Value 1	4
0101	Channel 25; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 68; Hour, Value 2	4
0102	Channel 25; Full Scale & Decimal Point	2	2	____	Date/Time 68; Minute, Value 1	4
0103	Channel 25; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 68; Minute, Value 2	4
0104	Channel 26; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 67; Action Sequence	4
0105	Channel 26; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 67; Month	4
0106	Channel 26; Full Scale & Decimal Point	2	2	____	Date/Time 67; Day, Value 1	4
0107	Channel 26; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 67; Day, Value 2	4
0108	Channel 27; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 67; Hour, Value 1	4
0109	Channel 27; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 67; Hour, Value 2	4
0110	Channel 27; Full Scale & Decimal Point	2	2	____	Date/Time 67; Minute, Value 1	4
0111	Channel 27; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 67; Minute, Value 2	4
0112	Channel 28; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 66; Action Sequence	4
0113	Channel 28; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 66; Month	4
0114	Channel 28; Full Scale & Decimal Point	2	2	____	Date/Time 66; Day, Value 1	4
0115	Channel 28; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 66; Day, Value 2	4
0116	Channel 29; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 66; Hour, Value 1	4
0117	Channel 29; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 66; Hour, Value 2	4
0118	Channel 29; Full Scale & Decimal Point	2	2	____	Date/Time 66; Minute, Value 1	4
0119	Channel 29; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 66; Minute, Value 2	4

Sine Systems RFC-1/B Advanced Programming Address Table:

(for software versions beginning 5.00)

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Alternate Use:	Note:
0120	Channel 30; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 65; Action Sequence	4
0121	Channel 30; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 65; Month	4
0122	Channel 30; Full Scale & Decimal Point	2	2	____	Date/Time 65; Day, Value 1	4
0123	Channel 30; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 65; Day, Value 2	4
0124	Channel 31; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 65; Hour, Value 1	4
0125	Channel 31; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 65; Hour, Value 2	4
0126	Channel 31; Full Scale & Decimal Point	2	2	____	Date/Time 65; Minute, Value 1	4
0127	Channel 31; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 65; Minute, Value 2	4
0128	Channel 32; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 64; Action Sequence	4
0129	Channel 32; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 64; Month	4
0130	Channel 32; Full Scale & Decimal Point	2	2	____	Date/Time 64; Day, Value 1	4
0131	Channel 32; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 64; Day, Value 2	4
0132	Channel 33; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 64; Hour, Value 1	4
0133	Channel 33; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 64; Hour, Value 2	4
0134	Channel 33; Full Scale & Decimal Point	2	2	____	Date/Time 64; Minute, Value 1	4
0135	Channel 33; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 64; Minute, Value 2	4
0136	Channel 34; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 63; Action Sequence	4
0137	Channel 34; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 63; Month	4
0138	Channel 34; Full Scale & Decimal Point	2	2	____	Date/Time 63; Day, Value 1	4
0139	Channel 34; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 63; Day, Value 2	4
0140	Channel 35; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 63; Hour, Value 1	4
0141	Channel 35; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 63; Hour, Value 2	4
0142	Channel 35; Full Scale & Decimal Point	2	2	____	Date/Time 63; Minute, Value 1	4
0143	Channel 35; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 63; Minute, Value 2	4
0144	Channel 36; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 62; Action Sequence	4
0145	Channel 36; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 62; Month	4
0146	Channel 36; Full Scale & Decimal Point	2	2	____	Date/Time 62; Day, Value 1	4
0147	Channel 36; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 62; Day, Value 2	4
0148	Channel 37; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 62; Hour, Value 1	4
0149	Channel 37; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 62; Hour, Value 2	4
0150	Channel 37; Full Scale & Decimal Point	2	2	____	Date/Time 62; Minute, Value 1	4
0151	Channel 37; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 62; Minute, Value 2	4
0152	Channel 38; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 61; Action Sequence	4
0153	Channel 38; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 61; Month	4
0154	Channel 38; Full Scale & Decimal Point	2	2	____	Date/Time 61; Day, Value 1	4
0155	Channel 38; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 61; Day, Value 2	4
0156	Channel 39; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 61; Hour, Value 1	4
0157	Channel 39; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 61; Hour, Value 2	4
0158	Channel 39; Full Scale & Decimal Point	2	2	____	Date/Time 61; Minute, Value 1	4
0159	Channel 39; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 61; Minute, Value 2	4
0160	Channel 40; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 60; Action Sequence	4
0161	Channel 40; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 60; Month	4
0162	Channel 40; Full Scale & Decimal Point	2	2	____	Date/Time 60; Day, Value 1	4
0163	Channel 40; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 60; Day, Value 2	4
0164	Channel 41; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 60; Hour, Value 1	4
0165	Channel 41; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 60; Hour, Value 2	4
0166	Channel 41; Full Scale & Decimal Point	2	2	____	Date/Time 60; Minute, Value 1	4
0167	Channel 41; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 60; Minute, Value 2	4
0168	Channel 42; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 59; Action Sequence	4
0169	Channel 42; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 59; Month	4
0170	Channel 42; Full Scale & Decimal Point	2	2	____	Date/Time 59; Day, Value 1	4
0171	Channel 42; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 59; Day, Value 2	4
0172	Channel 43; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 59; Hour, Value 1	4
0173	Channel 43; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 59; Hour, Value 2	4
0174	Channel 43; Full Scale & Decimal Point	2	2	____	Date/Time 59; Minute, Value 1	4
0175	Channel 43; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 59; Minute, Value 2	4
0176	Channel 44; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 58; Action Sequence	4
0177	Channel 44; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 58; Month	4
0178	Channel 44; Full Scale & Decimal Point	2	2	____	Date/Time 58; Day, Value 1	4
0179	Channel 44; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 58; Day, Value 2	4

Sine Systems RFC-1/B Advanced Programming Address Table:

(for software versions beginning 5.00)

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Alternate Use:	Note:
0180	Channel 45; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 58; Hour, Value 1	4
0181	Channel 45; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 58; Hour, Value 2	4
0182	Channel 45; Full Scale & Decimal Point	2	2	____	Date/Time 58; Minute, Value 1	4
0183	Channel 45; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 58; Minute, Value 2	4
0184	Channel 46; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 57; Action Sequence	4
0185	Channel 46; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 57; Month	4
0186	Channel 46; Full Scale & Decimal Point	2	2	____	Date/Time 57; Day, Value 1	4
0187	Channel 46; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 57; Day, Value 2	4
0188	Channel 47; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 57; Hour, Value 1	4
0189	Channel 47; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 57; Hour, Value 2	4
0190	Channel 47; Full Scale & Decimal Point	2	2	____	Date/Time 57; Minute, Value 1	4
0191	Channel 47; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 57; Minute, Value 2	4
0192	Channel 48; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 56; Action Sequence	4
0193	Channel 48; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 56; Month	4
0194	Channel 48; Full Scale & Decimal Point	2	2	____	Date/Time 56; Day, Value 1	4
0195	Channel 48; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 56; Day, Value 2	4
0196	Channel 49; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 56; Hour, Value 1	4
0197	Channel 49; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 56; Hour, Value 2	4
0198	Channel 49; Full Scale & Decimal Point	2	2	____	Date/Time 56; Minute, Value 1	4
0199	Channel 49; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 56; Minute, Value 2	4
0200	Channel 50; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 55; Action Sequence	4
0201	Channel 50; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 55; Month	4
0202	Channel 50; Full Scale & Decimal Point	2	2	____	Date/Time 55; Day, Value 1	4
0203	Channel 50; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 55; Day, Value 2	4
0204	Channel 51; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 55; Hour, Value 1	4
0205	Channel 51; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 55; Hour, Value 2	4
0206	Channel 51; Full Scale & Decimal Point	2	2	____	Date/Time 55; Minute, Value 1	4
0207	Channel 51; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 55; Minute, Value 2	4
0208	Channel 52; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 54; Action Sequence	4
0209	Channel 52; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 54; Month	4
0210	Channel 52; Full Scale & Decimal Point	2	2	____	Date/Time 54; Day, Value 1	4
0211	Channel 52; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 54; Day, Value 2	4
0212	Channel 53; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 54; Hour, Value 1	4
0213	Channel 53; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 54; Hour, Value 2	4
0214	Channel 53; Full Scale & Decimal Point	2	2	____	Date/Time 54; Minute, Value 1	4
0215	Channel 53; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 54; Minute, Value 2	4
0216	Channel 54; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 53; Action Sequence	4
0217	Channel 54; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 53; Month	4
0218	Channel 54; Full Scale & Decimal Point	2	2	____	Date/Time 53; Day, Value 1	4
0219	Channel 54; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 53; Day, Value 2	4
0220	Channel 55; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 53; Hour, Value 1	4
0221	Channel 55; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 53; Hour, Value 2	4
0222	Channel 55; Full Scale & Decimal Point	2	2	____	Date/Time 53; Minute, Value 1	4
0223	Channel 55; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 53; Minute, Value 2	4
0224	Channel 56; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 52; Action Sequence	4
0225	Channel 56; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 52; Month	4
0226	Channel 56; Full Scale & Decimal Point	2	2	____	Date/Time 52; Day, Value 1	4
0227	Channel 56; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 52; Day, Value 2	4
0228	Channel 57; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 52; Hour, Value 1	4
0229	Channel 57; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 52; Hour, Value 2	4
0230	Channel 57; Full Scale & Decimal Point	2	2	____	Date/Time 52; Minute, Value 1	4
0231	Channel 57; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 52; Minute, Value 2	4
0232	Channel 58; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 51; Action Sequence	4
0233	Channel 58; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 51; Month	4
0234	Channel 58; Full Scale & Decimal Point	2	2	____	Date/Time 51; Day, Value 1	4
0235	Channel 58; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 51; Day, Value 2	4
0236	Channel 59; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 51; Hour, Value 1	4
0237	Channel 59; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 51; Hour, Value 2	4
0238	Channel 59; Full Scale & Decimal Point	2	2	____	Date/Time 51; Minute, Value 1	4
0239	Channel 59; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 51; Minute, Value 2	4

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0240	Channel 60; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 50; Action Sequence 4
0241	Channel 60; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 50; Month 4
0242	Channel 60; Full Scale & Decimal Point	2	2	____	Date/Time 50; Day, Value 1 4
0243	Channel 60; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 50; Day, Value 2 4
0244	Channel 61; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 50; Hour, Value 1 4
0245	Channel 61; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 50; Hour, Value 2 4
0246	Channel 61; Full Scale & Decimal Point	2	2	____	Date/Time 50; Minute, Value 1 4
0247	Channel 61; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 50; Minute, Value 2 4
0248	Channel 62; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 49; Action Sequence 4
0249	Channel 62; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 49; Month 4
0250	Channel 62; Full Scale & Decimal Point	2	2	____	Date/Time 49; Day, Value 1 4
0251	Channel 62; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 49; Day, Value 2 4
0252	Channel 63; Telemetry Units Or Status Format; Value 1	1	0	____	Date/Time 49; Hour, Value 1 4
0253	Channel 63; Telemetry Units Or Status Format; Value 2	1	3	____	Date/Time 49; Hour, Value 2 4
0254	Channel 63; Full Scale & Decimal Point	2	2	____	Date/Time 49; Minute, Value 1 4
0255	Channel 63; Linear/Log/Indirect & Auto Relay Activation	3	0	____	Date/Time 49; Minute, Value 2 4
0256	Date/Time 48; Action Sequence	4	0	____	
0257	Date/Time 48; Month	4	0	____	
0258	Date/Time 48; Day, Value 1	4	0	____	
0259	Date/Time 48; Day, Value 2	4	0	____	
0260	Date/Time 48; Hour, Value 1	4	0	____	
0261	Date/Time 48; Hour, Value 2	4	0	____	
0262	Date/Time 48; Minute, Value 1	4	0	____	
0263	Date/Time 48; Minute, Value 2	4	0	____	
0264	Date/Time 47; Action Sequence	4	0	____	
0265	Date/Time 47; Month	4	0	____	
0266	Date/Time 47; Day, Value 1	4	0	____	
0267	Date/Time 47; Day, Value 2	4	0	____	
0268	Date/Time 47; Hour, Value 1	4	0	____	
0269	Date/Time 47; Hour, Value 2	4	0	____	
0270	Date/Time 47; Minute, Value 1	4	0	____	
0271	Date/Time 47; Minute, Value 2	4	0	____	
0272	Date/Time 46; Action Sequence	4	0	____	
0273	Date/Time 46; Month	4	0	____	
0274	Date/Time 46; Day, Value 1	4	0	____	
0275	Date/Time 46; Day, Value 2	4	0	____	
0276	Date/Time 46; Hour, Value 1	4	0	____	
0277	Date/Time 46; Hour, Value 2	4	0	____	
0278	Date/Time 46; Minute, Value 1	4	0	____	
0279	Date/Time 46; Minute, Value 2	4	0	____	
0280	Date/Time 45; Action Sequence	4	0	____	
0281	Date/Time 45; Month	4	0	____	
0282	Date/Time 45; Day, Value 1	4	0	____	
0283	Date/Time 45; Day, Value 2	4	0	____	
0284	Date/Time 45; Hour, Value 1	4	0	____	
0285	Date/Time 45; Hour, Value 2	4	0	____	
0286	Date/Time 45; Minute, Value 1	4	0	____	
0287	Date/Time 45; Minute, Value 2	4	0	____	
0288	Date/Time 44; Action Sequence	4	0	____	
0289	Date/Time 44; Month	4	0	____	
0290	Date/Time 44; Day, Value 1	4	0	____	
0291	Date/Time 44; Day, Value 2	4	0	____	
0292	Date/Time 44; Hour, Value 1	4	0	____	
0293	Date/Time 44; Hour, Value 2	4	0	____	
0294	Date/Time 44; Minute, Value 1	4	0	____	
0295	Date/Time 44; Minute, Value 2	4	0	____	
0296	Date/Time 43; Action Sequence	4	0	____	
0297	Date/Time 43; Month	4	0	____	
0298	Date/Time 43; Day, Value 1	4	0	____	
0299	Date/Time 43; Day, Value 2	4	0	____	
0300	Date/Time 43; Hour, Value 1	4	0	____	

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0301	Date/Time 43; Hour, Value 2	4	0	____	____
0302	Date/Time 43; Minute, Value 1	4	0	____	____
0303	Date/Time 43; Minute, Value 2	4	0	____	____
0304	Date/Time 42; Action Sequence	4	0	____	____
0305	Date/Time 42; Month	4	0	____	____
0306	Date/Time 42; Day, Value 1	4	0	____	____
0307	Date/Time 42; Day, Value 2	4	0	____	____
0308	Date/Time 42; Hour, Value 1	4	0	____	____
0309	Date/Time 42; Hour, Value 2	4	0	____	____
0310	Date/Time 42; Minute, Value 1	4	0	____	____
0311	Date/Time 42; Minute, Value 2	4	0	____	____
0312	Date/Time 41; Action Sequence	4	0	____	____
0313	Date/Time 41; Month	4	0	____	____
0314	Date/Time 41; Day, Value 1	4	0	____	____
0315	Date/Time 41; Day, Value 2	4	0	____	____
0316	Date/Time 41; Hour, Value 1	4	0	____	____
0317	Date/Time 41; Hour, Value 2	4	0	____	____
0318	Date/Time 41; Minute, Value 1	4	0	____	____
0319	Date/Time 41; Minute, Value 2	4	0	____	____
0320	Date/Time 40; Action Sequence	4	0	____	____
0321	Date/Time 40; Month	4	0	____	____
0322	Date/Time 40; Day, Value 1	4	0	____	____
0323	Date/Time 40; Day, Value 2	4	0	____	____
0324	Date/Time 40; Hour, Value 1	4	0	____	____
0325	Date/Time 40; Hour, Value 2	4	0	____	____
0326	Date/Time 40; Minute, Value 1	4	0	____	____
0327	Date/Time 40; Minute, Value 2	4	0	____	____
0328	Date/Time 39; Action Sequence	4	0	____	____
0329	Date/Time 39; Month	4	0	____	____
0330	Date/Time 39; Day, Value 1	4	0	____	____
0331	Date/Time 39; Day, Value 2	4	0	____	____
0332	Date/Time 39; Hour, Value 1	4	0	____	____
0333	Date/Time 39; Hour, Value 2	4	0	____	____
0334	Date/Time 39; Minute, Value 1	4	0	____	____
0335	Date/Time 39; Minute, Value 2	4	0	____	____
0336	Date/Time 38; Action Sequence	4	0	____	____
0337	Date/Time 38; Month	4	0	____	____
0338	Date/Time 38; Day, Value 1	4	0	____	____
0339	Date/Time 38; Day, Value 2	4	0	____	____
0340	Date/Time 38; Hour, Value 1	4	0	____	____
0341	Date/Time 38; Hour, Value 2	4	0	____	____
0342	Date/Time 38; Minute, Value 1	4	0	____	____
0343	Date/Time 38; Minute, Value 2	4	0	____	____
0344	Date/Time 37; Action Sequence	4	0	____	____
0345	Date/Time 37; Month	4	0	____	____
0346	Date/Time 37; Day, Value 1	4	0	____	____
0347	Date/Time 37; Day, Value 2	4	0	____	____
0348	Date/Time 37; Hour, Value 1	4	0	____	____
0349	Date/Time 37; Hour, Value 2	4	0	____	____
0350	Date/Time 37; Minute, Value 1	4	0	____	____
0351	Date/Time 37; Minute, Value 2	4	0	____	____
0352	Date/Time 36; Action Sequence	4	0	____	____
0353	Date/Time 36; Month	4	0	____	____
0354	Date/Time 36; Day, Value 1	4	0	____	____
0355	Date/Time 36; Day, Value 2	4	0	____	____
0356	Date/Time 36; Hour, Value 1	4	0	____	____
0357	Date/Time 36; Hour, Value 2	4	0	____	____
0358	Date/Time 36; Minute, Value 1	4	0	____	____
0359	Date/Time 36; Minute, Value 2	4	0	____	____
0360	Date/Time 35; Action Sequence	4	0	____	____

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0361	Date/Time 35; Month	4	0		
0362	Date/Time 35; Day, Value 1	4	0		
0363	Date/Time 35; Day, Value 2	4	0		
0364	Date/Time 35; Hour, Value 1	4	0		
0365	Date/Time 35; Hour, Value 2	4	0		
0366	Date/Time 35; Minute, Value 1	4	0		
0367	Date/Time 35; Minute, Value 2	4	0		
0368	Date/Time 34; Action Sequence	4	0		
0369	Date/Time 34; Month	4	0		
0370	Date/Time 34; Day, Value 1	4	0		
0371	Date/Time 34; Day, Value 2	4	0		
0372	Date/Time 34; Hour, Value 1	4	0		
0373	Date/Time 34; Hour, Value 2	4	0		
0374	Date/Time 34; Minute, Value 1	4	0		
0375	Date/Time 34; Minute, Value 2	4	0		
0376	Date/Time 33; Action Sequence	4	0		
0377	Date/Time 33; Month	4	0		
0378	Date/Time 33; Day, Value 1	4	0		
0379	Date/Time 33; Day, Value 2	4	0		
0380	Date/Time 33; Hour, Value 1	4	0		
0381	Date/Time 33; Hour, Value 2	4	0		
0382	Date/Time 33; Minute, Value 1	4	0		
0383	Date/Time 33; Minute, Value 2	4	0		
0384	Date/Time 32; Action Sequence	4	0		
0385	Date/Time 32; Month	4	0		
0386	Date/Time 32; Day, Value 1	4	0		
0387	Date/Time 32; Day, Value 2	4	0		
0388	Date/Time 32; Hour, Value 1	4	0		
0389	Date/Time 32; Hour, Value 2	4	0		
0390	Date/Time 32; Minute, Value 1	4	0		
0391	Date/Time 32; Minute, Value 2	4	0		
0392	Date/Time 31; Action Sequence	4	0		
0393	Date/Time 31; Month	4	0		
0394	Date/Time 31; Day, Value 1	4	0		
0395	Date/Time 31; Day, Value 2	4	0		
0396	Date/Time 31; Hour, Value 1	4	0		
0397	Date/Time 31; Hour, Value 2	4	0		
0398	Date/Time 31; Minute, Value 1	4	0		
0399	Date/Time 31; Minute, Value 2	4	0		
0400	Date/Time 30; Action Sequence	4	0		
0401	Date/Time 30; Month	4	0		
0402	Date/Time 30; Day, Value 1	4	0		
0403	Date/Time 30; Day, Value 2	4	0		
0404	Date/Time 30; Hour, Value 1	4	0		
0405	Date/Time 30; Hour, Value 2	4	0		
0406	Date/Time 30; Minute, Value 1	4	0		
0407	Date/Time 30; Minute, Value 2	4	0		
0408	Date/Time 29; Action Sequence	4	0		
0409	Date/Time 29; Month	4	0		
0410	Date/Time 29; Day, Value 1	4	0		
0411	Date/Time 29; Day, Value 2	4	0		
0412	Date/Time 29; Hour, Value 1	4	0		
0413	Date/Time 29; Hour, Value 2	4	0		
0414	Date/Time 29; Minute, Value 1	4	0		
0415	Date/Time 29; Minute, Value 2	4	0		
0416	Date/Time 28; Action Sequence	4	0		
0417	Date/Time 28; Month	4	0		
0418	Date/Time 28; Day, Value 1	4	0		
0419	Date/Time 28; Day, Value 2	4	0		
0420	Date/Time 28; Hour, Value 1	4	0		
0421	Date/Time 28; Hour, Value 2	4	0		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0422	Date/Time 28; Minute, Value 1	4	0		
0423	Date/Time 28; Minute, Value 2	4	0		
0424	Date/Time 27; Action Sequence	4	0		
0425	Date/Time 27; Month	4	0		
0426	Date/Time 27; Day, Value 1	4	0		
0427	Date/Time 27; Day, Value 2	4	0		
0428	Date/Time 27; Hour, Value 1	4	0		
0429	Date/Time 27; Hour, Value 2	4	0		
0430	Date/Time 27; Minute, Value 1	4	0		
0431	Date/Time 27; Minute, Value 2	4	0		
0432	Date/Time 26; Action Sequence	4	0		
0433	Date/Time 26; Month	4	0		
0434	Date/Time 26; Day, Value 1	4	0		
0435	Date/Time 26; Day, Value 2	4	0		
0436	Date/Time 26; Hour, Value 1	4	0		
0437	Date/Time 26; Hour, Value 2	4	0		
0438	Date/Time 26; Minute, Value 1	4	0		
0439	Date/Time 26; Minute, Value 2	4	0		
0440	Date/Time 25; Action Sequence	4	0		
0441	Date/Time 25; Month	4	0		
0442	Date/Time 25; Day, Value 1	4	0		
0443	Date/Time 25; Day, Value 2	4	0		
0444	Date/Time 25; Hour, Value 1	4	0		
0445	Date/Time 25; Hour, Value 2	4	0		
0446	Date/Time 25; Minute, Value 1	4	0		
0447	Date/Time 25; Minute, Value 2	4	0		
0448	Date/Time 24; Action Sequence	4	0		
0449	Date/Time 24; Month	4	0		
0450	Date/Time 24; Day, Value 1	4	0		
0451	Date/Time 24; Day, Value 2	4	0		
0452	Date/Time 24; Hour, Value 1	4	0		
0453	Date/Time 24; Hour, Value 2	4	0		
0454	Date/Time 24; Minute, Value 1	4	0		
0455	Date/Time 24; Minute, Value 2	4	0		
0456	Date/Time 23; Action Sequence	4	0		
0457	Date/Time 23; Month	4	0		
0458	Date/Time 23; Day, Value 1	4	0		
0459	Date/Time 23; Day, Value 2	4	0		
0460	Date/Time 23; Hour, Value 1	4	0		
0461	Date/Time 23; Hour, Value 2	4	0		
0462	Date/Time 23; Minute, Value 1	4	0		
0463	Date/Time 23; Minute, Value 2	4	0		
0464	Date/Time 22; Action Sequence	4	0		
0465	Date/Time 22; Month	4	0		
0466	Date/Time 22; Day, Value 1	4	0		
0467	Date/Time 22; Day, Value 2	4	0		
0468	Date/Time 22; Hour, Value 1	4	0		
0469	Date/Time 22; Hour, Value 2	4	0		
0470	Date/Time 22; Minute, Value 1	4	0		
0471	Date/Time 22; Minute, Value 2	4	0		
0472	Date/Time 21; Action Sequence	4	0		
0473	Date/Time 21; Month	4	0		
0474	Date/Time 21; Day, Value 1	4	0		
0475	Date/Time 21; Day, Value 2	4	0		
0476	Date/Time 21; Hour, Value 1	4	0		
0477	Date/Time 21; Hour, Value 2	4	0		
0478	Date/Time 21; Minute, Value 1	4	0		
0479	Date/Time 21; Minute, Value 2	4	0		
0480	Date/Time 20; Action Sequence	4	0		
0481	Date/Time 20; Month	4	0		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0482	Date/Time 20; Day, Value 1	4	0		
0483	Date/Time 20; Day, Value 2	4	0		
0484	Date/Time 20; Hour, Value 1	4	0		
0485	Date/Time 20; Hour, Value 2	4	0		
0486	Date/Time 20; Minute, Value 1	4	0		
0487	Date/Time 20; Minute, Value 2	4	0		
0488	Date/Time 19; Action Sequence	4	0		
0489	Date/Time 19; Month	4	0		
0490	Date/Time 19; Day, Value 1	4	0		
0491	Date/Time 19; Day, Value 2	4	0		
0492	Date/Time 19; Hour, Value 1	4	0		
0493	Date/Time 19; Hour, Value 2	4	0		
0494	Date/Time 19; Minute, Value 1	4	0		
0495	Date/Time 19; Minute, Value 2	4	0		
0496	Date/Time 18; Action Sequence	4	0		
0497	Date/Time 18; Month	4	0		
0498	Date/Time 18; Day, Value 1	4	0		
0499	Date/Time 18; Day, Value 2	4	0		
0500	Date/Time 18; Hour, Value 1	4	0		
0501	Date/Time 18; Hour, Value 2	4	0		
0502	Date/Time 18; Minute, Value 1	4	0		
0503	Date/Time 18; Minute, Value 2	4	0		
0504	Date/Time 17; Action Sequence	4	0		
0505	Date/Time 17; Month	4	0		
0506	Date/Time 17; Day, Value 1	4	0		
0507	Date/Time 17; Day, Value 2	4	0		
0508	Date/Time 17; Hour, Value 1	4	0		
0509	Date/Time 17; Hour, Value 2	4	0		
0510	Date/Time 17; Minute, Value 1	4	0		
0511	Date/Time 17; Minute, Value 2	4	0		
0512	Date/Time 16; Action Sequence	4	0		
0513	Date/Time 16; Month	4	0		
0514	Date/Time 16; Day, Value 1	4	0		
0515	Date/Time 16; Day, Value 2	4	0		
0516	Date/Time 16; Hour, Value 1	4	0		
0517	Date/Time 16; Hour, Value 2	4	0		
0518	Date/Time 16; Minute, Value 1	4	0		
0519	Date/Time 16; Minute, Value 2	4	0		
0520	Date/Time 15; Action Sequence	4	0		
0521	Date/Time 15; Month	4	0		
0522	Date/Time 15; Day, Value 1	4	0		
0523	Date/Time 15; Day, Value 2	4	0		
0524	Date/Time 15; Hour, Value 1	4	0		
0525	Date/Time 15; Hour, Value 2	4	0		
0526	Date/Time 15; Minute, Value 1	4	0		
0527	Date/Time 15; Minute, Value 2	4	0		
0528	Date/Time 14; Action Sequence	4	0		
0529	Date/Time 14; Month	4	0		
0530	Date/Time 14; Day, Value 1	4	0		
0531	Date/Time 14; Day, Value 2	4	0		
0532	Date/Time 14; Hour, Value 1	4	0		
0533	Date/Time 14; Hour, Value 2	4	0		
0534	Date/Time 14; Minute, Value 1	4	0		
0535	Date/Time 14; Minute, Value 2	4	0		
0536	Date/Time 13; Action Sequence	4	0		
0537	Date/Time 13; Month	4	0		
0538	Date/Time 13; Day, Value 1	4	0		
0539	Date/Time 13; Day, Value 2	4	0		
0540	Date/Time 13; Hour, Value 1	4	0		
0541	Date/Time 13; Hour, Value 2	4	0		
0542	Date/Time 13; Minute, Value 1	4	0		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0543	Date/Time 13; Minute, Value 2	4	0		
0544	Date/Time 12; Action Sequence	4	0		
0545	Date/Time 12; Month	4	0		
0546	Date/Time 12; Day, Value 1	4	0		
0547	Date/Time 12; Day, Value 2	4	0		
0548	Date/Time 12; Hour, Value 1	4	0		
0549	Date/Time 12; Hour, Value 2	4	0		
0550	Date/Time 12; Minute, Value 1	4	0		
0551	Date/Time 12; Minute, Value 2	4	0		
0552	Date/Time 11; Action Sequence	4	0		
0553	Date/Time 11; Month	4	0		
0554	Date/Time 11; Day, Value 1	4	0		
0555	Date/Time 11; Day, Value 2	4	0		
0556	Date/Time 11; Hour, Value 1	4	0		
0557	Date/Time 11; Hour, Value 2	4	0		
0558	Date/Time 11; Minute, Value 1	4	0		
0559	Date/Time 11; Minute, Value 2	4	0		
0560	Date/Time 10; Action Sequence	4	0		
0561	Date/Time 10; Month	4	0		
0562	Date/Time 10; Day, Value 1	4	0		
0563	Date/Time 10; Day, Value 2	4	0		
0564	Date/Time 10; Hour, Value 1	4	0		
0565	Date/Time 10; Hour, Value 2	4	0		
0566	Date/Time 10; Minute, Value 1	4	0		
0567	Date/Time 10; Minute, Value 2	4	0		
0568	Date/Time 9; Action Sequence	4	0		
0569	Date/Time 9; Month	4	0		
0570	Date/Time 9; Day, Value 1	4	0		
0571	Date/Time 9; Day, Value 2	4	0		
0572	Date/Time 9; Hour, Value 1	4	0		
0573	Date/Time 9; Hour, Value 2	4	0		
0574	Date/Time 9; Minute, Value 1	4	0		
0575	Date/Time 9; Minute, Value 2	4	0		
0576	Date/Time 8; Action Sequence	4	0		
0577	Date/Time 8; Month	4	0		
0578	Date/Time 8; Day, Value 1	4	0		
0579	Date/Time 8; Day, Value 2	4	0		
0580	Date/Time 8; Hour, Value 1	4	0		
0581	Date/Time 8; Hour, Value 2	4	0		
0582	Date/Time 8; Minute, Value 1	4	0		
0583	Date/Time 8; Minute, Value 2	4	0		
0584	Date/Time 7; Action Sequence	4	0		
0585	Date/Time 7; Month	4	0		
0586	Date/Time 7; Day, Value 1	4	0		
0587	Date/Time 7; Day, Value 2	4	0		
0588	Date/Time 7; Hour, Value 1	4	0		
0589	Date/Time 7; Hour, Value 2	4	0		
0590	Date/Time 7; Minute, Value 1	4	0		
0591	Date/Time 7; Minute, Value 2	4	0		
0592	Date/Time 6; Action Sequence	4	0		
0593	Date/Time 6; Month	4	0		
0594	Date/Time 6; Day, Value 1	4	0		
0595	Date/Time 6; Day, Value 2	4	0		
0596	Date/Time 6; Hour, Value 1	4	0		
0597	Date/Time 6; Hour, Value 2	4	0		
0598	Date/Time 6; Minute, Value 1	4	0		
0599	Date/Time 6; Minute, Value 2	4	0		
0600	Date/Time 5; Action Sequence	4	0		
0601	Date/Time 5; Month	4	0		
0602	Date/Time 5; Day, Value 1	4	0		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0603	Date/Time 5; Day, Value 2	4	0		
0604	Date/Time 5; Hour, Value 1	4	0		
0605	Date/Time 5; Hour, Value 2	4	0		
0606	Date/Time 5; Minute, Value 1	4	0		
0607	Date/Time 5; Minute, Value 2	4	0		
0608	Date/Time 4; Action Sequence	4	0		
0609	Date/Time 4; Month	4	0		
0610	Date/Time 4; Day, Value 1	4	0		
0611	Date/Time 4; Day, Value 2	4	0		
0612	Date/Time 4; Hour, Value 1	4	0		
0613	Date/Time 4; Hour, Value 2	4	0		
0614	Date/Time 4; Minute, Value 1	4	0		
0615	Date/Time 4; Minute, Value 2	4	0		
0616	Date/Time 3; Action Sequence	4	0		
0617	Date/Time 3; Month	4	0		
0618	Date/Time 3; Day, Value 1	4	0		
0619	Date/Time 3; Day, Value 2	4	0		
0620	Date/Time 3; Hour, Value 1	4	0		
0621	Date/Time 3; Hour, Value 2	4	0		
0622	Date/Time 3; Minute, Value 1	4	0		
0623	Date/Time 3; Minute, Value 2	4	0		
0624	Date/Time 2; Action Sequence	4	0		
0625	Date/Time 2; Month	4	0		
0626	Date/Time 2; Day, Value 1	4	0		
0627	Date/Time 2; Day, Value 2	4	0		
0628	Date/Time 2; Hour, Value 1	4	0		
0629	Date/Time 2; Hour, Value 2	4	0		
0630	Date/Time 2; Minute, Value 1	4	0		
0631	Date/Time 2; Minute, Value 2	4	0		
0632	Date/Time 1; Action Sequence	4	0		
0633	Date/Time 1; Month	4	0		
0634	Date/Time 1; Day, Value 1	4	0		
0635	Date/Time 1; Day, Value 2	4	0		
0636	Date/Time 1; Hour, Value 1	4	0		
0637	Date/Time 1; Hour, Value 2	4	0		
0638	Date/Time 1; Minute, Value 1	4	0		
0639	Date/Time 1; Minute, Value 2	4	0		
0640	Telephone Number A; Value 1	5	10		
0641	Telephone Number A; Value 2	5	10		
0642	Telephone Number A; Value 3	5	10		
0643	Telephone Number A; Value 4	5	10		
0644	Telephone Number A; Value 5	5	10		
0645	Telephone Number A; Value 6	5	10		
0646	Telephone Number A; Value 7	5	10		
0647	Telephone Number A; Value 8	5	10		
0648	Telephone Number A; Value 9	5	10		
0649	Telephone Number A; Value 10	5	10		
0650	Telephone Number A; Value 11	5	10		
0651	Telephone Number A; Value 12	5	10		
0652	Telephone Number A; Voice/Data/Pager Digit	5	0		
0653	Telephone Number A; Number Of Attempts	5	3		
0654	Telephone Number B; Value 1	5	10		
0655	Telephone Number B; Value 2	5	10		
0656	Telephone Number B; Value 3	5	10		
0657	Telephone Number B; Value 4	5	10		
0658	Telephone Number B; Value 5	5	10		
0659	Telephone Number B; Value 6	5	10		
0660	Telephone Number B; Value 7	5	10		
0661	Telephone Number B; Value 8	5	10		
0662	Telephone Number B; Value 9	5	10		
0663	Telephone Number B; Value 10	5	10		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0664	Telephone Number B; Value 11	5	10		
0665	Telephone Number B; Value 12	5	10		
0666	Telephone Number B; Voice/Data/Pager Digit	5	0		
0667	Telephone Number B; Number Of Attempts	5	3		
0668	Telephone Number C; Value 1	5	10		
0669	Telephone Number C; Value 2	5	10		
0670	Telephone Number C; Value 3	5	10		
0671	Telephone Number C; Value 4	5	10		
0672	Telephone Number C; Value 5	5	10		
0673	Telephone Number C; Value 6	5	10		
0674	Telephone Number C; Value 7	5	10		
0675	Telephone Number C; Value 8	5	10		
0676	Telephone Number C; Value 9	5	10		
0677	Telephone Number C; Value 10	5	10		
0678	Telephone Number C; Value 11	5	10		
0679	Telephone Number C; Value 12	5	10		
0680	Telephone Number C; Voice/Data/Pager Digit	5	0		
0681	Telephone Number C; Number Of Attempts	5	3		
0682	Telephone Number D; Value 1	5	10		
0683	Telephone Number D; Value 2	5	10		
0684	Telephone Number D; Value 3	5	10		
0685	Telephone Number D; Value 4	5	10		
0686	Telephone Number D; Value 5	5	10		
0687	Telephone Number D; Value 6	5	10		
0688	Telephone Number D; Value 7	5	10		
0689	Telephone Number D; Value 8	5	10		
0690	Telephone Number D; Value 9	5	10		
0691	Telephone Number D; Value 10	5	10		
0692	Telephone Number D; Value 11	5	10		
0693	Telephone Number D; Value 12	5	10		
0694	Telephone Number D; Voice/Data/Pager Digit	5	0		
0695	Telephone Number D; Number Of Attempts	5	3		
0696	Telephone Number E; Value 1	5	10		
0697	Telephone Number E; Value 2	5	10		
0698	Telephone Number E; Value 3	5	10		
0699	Telephone Number E; Value 4	5	10		
0700	Telephone Number E; Value 5	5	10		
0701	Telephone Number E; Value 6	5	10		
0702	Telephone Number E; Value 7	5	10		
0703	Telephone Number E; Value 8	5	10		
0704	Telephone Number E; Value 9	5	10		
0705	Telephone Number E; Value 10	5	10		
0706	Telephone Number E; Value 11	5	10		
0707	Telephone Number E; Value 12	5	10		
0708	Telephone Number E; Voice/Data/Pager Digit	5	0		
0709	Telephone Number E; Number Of Attempts	5	3		
0710	Telephone Number F; Value 1	5	10		
0711	Telephone Number F; Value 2	5	10		
0712	Telephone Number F; Value 3	5	10		
0713	Telephone Number F; Value 4	5	10		
0714	Telephone Number F; Value 5	5	10		
0715	Telephone Number F; Value 6	5	10		
0716	Telephone Number F; Value 7	5	10		
0717	Telephone Number F; Value 8	5	10		
0718	Telephone Number F; Value 9	5	10		
0719	Telephone Number F; Value 10	5	10		
0720	Telephone Number F; Value 11	5	10		
0721	Telephone Number F; Value 12	5	10		
0722	Telephone Number F; Voice/Data/Pager Digit	5	0		
0723	Telephone Number F; Number Of Attempts	5	3		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0724	Action Sequence 1; Step 1; Value 1	6	9		
0725	Action Sequence 1, Step 1; Value 2	6	0		
0726	Action Sequence 1; Step 2; Value 1	6	15		
0727	Action Sequence 1, Step 2; Value 2	6	15		
0728	Action Sequence 1; Step 3; Value 1	6	15		
0729	Action Sequence 1, Step 3; Value 2	6	15		
0730	Action Sequence 1; Step 4; Value 1	6	15		
0731	Action Sequence 1, Step 4; Value 2	6	15		
0732	Action Sequence 1; Step 5; Value 1	6	15		
0733	Action Sequence 1, Step 5; Value 2	6	15		
0734	Action Sequence 1; Step 6; Value 1	6	15		
0735	Action Sequence 1, Step 6; Value 2	6	15		
0736	Action Sequence 1; Step 7; Value 1	6	15		
0737	Action Sequence 1, Step 7; Value 2	6	15		
0738	Action Sequence 1; Step 8; Value 1	6	15		
0739	Action Sequence 1, Step 8; Value 2	6	15		
0740	Action Sequence 2; Step 1; Value 1	6	15		
0741	Action Sequence 2, Step 1; Value 2	6	15		
0742	Action Sequence 2; Step 2; Value 1	6	15		
0743	Action Sequence 2, Step 2; Value 2	6	15		
0744	Action Sequence 2; Step 3; Value 1	6	15		
0745	Action Sequence 2, Step 3; Value 2	6	15		
0746	Action Sequence 2; Step 4; Value 1	6	15		
0747	Action Sequence 2, Step 4; Value 2	6	15		
0748	Action Sequence 2; Step 5; Value 1	6	15		
0749	Action Sequence 2, Step 5; Value 2	6	15		
0750	Action Sequence 2; Step 6; Value 1	6	15		
0751	Action Sequence 2, Step 6; Value 2	6	15		
0752	Action Sequence 2; Step 7; Value 1	6	15		
0753	Action Sequence 2, Step 7; Value 2	6	15		
0754	Action Sequence 2; Step 8; Value 1	6	15		
0755	Action Sequence 2, Step 8; Value 2	6	15		
0756	Action Sequence 3; Step 1; Value 1	6	15		
0757	Action Sequence 3, Step 1; Value 2	6	15		
0758	Action Sequence 3; Step 2; Value 1	6	15		
0759	Action Sequence 3, Step 2; Value 2	6	15		
0760	Action Sequence 3; Step 3; Value 1	6	15		
0761	Action Sequence 3, Step 3; Value 2	6	15		
0762	Action Sequence 3; Step 4; Value 1	6	15		
0763	Action Sequence 3, Step 4; Value 2	6	15		
0764	Action Sequence 3; Step 5; Value 1	6	15		
0765	Action Sequence 3, Step 5; Value 2	6	15		
0766	Action Sequence 3; Step 6; Value 1	6	15		
0767	Action Sequence 3, Step 6; Value 2	6	15		
0768	Action Sequence 3; Step 7; Value 1	6	15		
0769	Action Sequence 3, Step 7; Value 2	6	15		
0770	Action Sequence 3; Step 8; Value 1	6	15		
0771	Action Sequence 3, Step 8; Value 2	6	15		
0772	Action Sequence 4; Step 1; Value 1	6	15		
0773	Action Sequence 4, Step 1; Value 2	6	15		
0774	Action Sequence 4; Step 2; Value 1	6	15		
0775	Action Sequence 4, Step 2; Value 2	6	15		
0776	Action Sequence 4; Step 3; Value 1	6	15		
0777	Action Sequence 4, Step 3; Value 2	6	15		
0778	Action Sequence 4; Step 4; Value 1	6	15		
0779	Action Sequence 4, Step 4; Value 2	6	15		
0780	Action Sequence 4; Step 5; Value 1	6	15		
0781	Action Sequence 4, Step 5; Value 2	6	15		
0782	Action Sequence 4; Step 6; Value 1	6	15		
0783	Action Sequence 4, Step 6; Value 2	6	15		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0784	Action Sequence 4; Step 7; Value 1	6	15		
0785	Action Sequence 4, Step 7; Value 2	6	15		
0786	Action Sequence 4; Step 8; Value 1	6	15		
0787	Action Sequence 4, Step 8; Value 2	6	15		
0788	Action Sequence 5; Step 1; Value 1	6	15		
0789	Action Sequence 5, Step 1; Value 2	6	15		
0790	Action Sequence 5; Step 2; Value 1	6	15		
0791	Action Sequence 5, Step 2; Value 2	6	15		
0792	Action Sequence 5; Step 3; Value 1	6	15		
0793	Action Sequence 5, Step 3; Value 2	6	15		
0794	Action Sequence 5; Step 4; Value 1	6	15		
0795	Action Sequence 5, Step 4; Value 2	6	15		
0796	Action Sequence 5; Step 5; Value 1	6	15		
0797	Action Sequence 5, Step 5; Value 2	6	15		
0798	Action Sequence 5; Step 6; Value 1	6	15		
0799	Action Sequence 5, Step 6; Value 2	6	15		
0800	Action Sequence 5; Step 7; Value 1	6	15		
0801	Action Sequence 5, Step 7; Value 2	6	15		
0802	Action Sequence 5; Step 8; Value 1	6	15		
0803	Action Sequence 5, Step 8; Value 2	6	15		
0804	Action Sequence 6; Step 1; Value 1	6	15		
0805	Action Sequence 6, Step 1; Value 2	6	15		
0806	Action Sequence 6; Step 2; Value 1	6	15		
0807	Action Sequence 6, Step 2; Value 2	6	15		
0808	Action Sequence 6; Step 3; Value 1	6	15		
0809	Action Sequence 6, Step 3; Value 2	6	15		
0810	Action Sequence 6; Step 4; Value 1	6	15		
0811	Action Sequence 6, Step 4; Value 2	6	15		
0812	Action Sequence 6; Step 5; Value 1	6	15		
0813	Action Sequence 6, Step 5; Value 2	6	15		
0814	Action Sequence 6; Step 6; Value 1	6	15		
0815	Action Sequence 6, Step 6; Value 2	6	15		
0816	Action Sequence 6; Step 7; Value 1	6	15		
0817	Action Sequence 6, Step 7; Value 2	6	15		
0818	Action Sequence 6; Step 8; Value 1	6	15		
0819	Action Sequence 6, Step 8; Value 2	6	15		
0820	Action Sequence 7; Step 1; Value 1	6	15		
0821	Action Sequence 7, Step 1; Value 2	6	15		
0822	Action Sequence 7; Step 2; Value 1	6	15		
0823	Action Sequence 7, Step 2; Value 2	6	15		
0824	Action Sequence 7; Step 3; Value 1	6	15		
0825	Action Sequence 7, Step 3; Value 2	6	15		
0826	Action Sequence 7; Step 4; Value 1	6	15		
0827	Action Sequence 7, Step 4; Value 2	6	15		
0828	Action Sequence 7; Step 5; Value 1	6	15		
0829	Action Sequence 7, Step 5; Value 2	6	15		
0830	Action Sequence 7; Step 6; Value 1	6	15		
0831	Action Sequence 7, Step 6; Value 2	6	15		
0832	Action Sequence 7; Step 7; Value 1	6	15		
0833	Action Sequence 7, Step 7; Value 2	6	15		
0834	Action Sequence 7; Step 8; Value 1	6	15		
0835	Action Sequence 7, Step 8; Value 2	6	15		
0836	Action Sequence 8; Step 1; Value 1	6	15		
0837	Action Sequence 8, Step 1; Value 2	6	15		
0838	Action Sequence 8; Step 2; Value 1	6	15		
0839	Action Sequence 8, Step 2; Value 2	6	15		
0840	Action Sequence 8; Step 3; Value 1	6	15		
0841	Action Sequence 8, Step 3; Value 2	6	15		
0842	Action Sequence 8; Step 4; Value 1	6	15		
0843	Action Sequence 8, Step 4; Value 2	6	15		
0844	Action Sequence 8; Step 5; Value 1	6	15		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0845	Action Sequence 8, Step 5; Value 2	6	15		
0846	Action Sequence 8; Step 6; Value 1	6	15		
0847	Action Sequence 8, Step 6; Value 2	6	15		
0848	Action Sequence 8; Step 7; Value 1	6	15		
0849	Action Sequence 8, Step 7; Value 2	6	15		
0850	Action Sequence 8; Step 8; Value 1	6	15		
0851	Action Sequence 8, Step 8; Value 2	6	15		
0852	Alarm Channel A; Channel Number; Value 1	7	6		
0853	Alarm Channel A; Channel Number; Value 2	7	4		
0854	Alarm Channel A; Trigger Rule	7	5		
0855	Alarm Channel A; Action Sequence	7	1		
0856	Alarm Channel A; Upper Limit; Value 1	7	2		
0857	Alarm Channel A; Upper Limit; Value 2	7	0		
0858	Alarm Channel A; Upper Limit; Value 3	7	4		
0859	Alarm Channel A; Upper Limit; Value 4	7	0		
0860	Alarm Channel A; Lower Limit; Value 1	7	1		
0861	Alarm Channel A; Lower Limit; Value 2	7	0		
0862	Alarm Channel A; Lower Limit; Value 3	7	2		
0863	Alarm Channel A; Lower Limit; Value 4	7	0		
0864	Alarm Channel B; Channel Number; Value 1	7	6		
0865	Alarm Channel B; Channel Number; Value 2	7	4		
0866	Alarm Channel B; Trigger Rule	7	5		
0867	Alarm Channel B; Action Sequence	7	1		
0868	Alarm Channel B; Upper Limit; Value 1	7	2		
0869	Alarm Channel B; Upper Limit; Value 2	7	0		
0870	Alarm Channel B; Upper Limit; Value 3	7	4		
0871	Alarm Channel B; Upper Limit; Value 4	7	0		
0872	Alarm Channel B; Lower Limit; Value 1	7	1		
0873	Alarm Channel B; Lower Limit; Value 2	7	0		
0874	Alarm Channel B; Lower Limit; Value 3	7	2		
0875	Alarm Channel B; Lower Limit; Value 4	7	0		
0876	Alarm Channel C; Channel Number; Value 1	7	6		
0877	Alarm Channel C; Channel Number; Value 2	7	4		
0878	Alarm Channel C; Trigger Rule	7	5		
0879	Alarm Channel C; Action Sequence	7	1		
0880	Alarm Channel C; Upper Limit; Value 1	7	2		
0881	Alarm Channel C; Upper Limit; Value 2	7	0		
0882	Alarm Channel C; Upper Limit; Value 3	7	4		
0883	Alarm Channel C; Upper Limit; Value 4	7	0		
0884	Alarm Channel C; Lower Limit; Value 1	7	1		
0885	Alarm Channel C; Lower Limit; Value 2	7	0		
0886	Alarm Channel C; Lower Limit; Value 3	7	2		
0887	Alarm Channel C; Lower Limit; Value 4	7	0		
0888	Alarm Channel D; Channel Number; Value 1	7	6		
0889	Alarm Channel D; Channel Number; Value 2	7	4		
0890	Alarm Channel D; Trigger Rule	7	5		
0891	Alarm Channel D; Action Sequence	7	1		
0892	Alarm Channel D; Upper Limit; Value 1	7	2		
0893	Alarm Channel D; Upper Limit; Value 2	7	0		
0894	Alarm Channel D; Upper Limit; Value 3	7	4		
0895	Alarm Channel D; Upper Limit; Value 4	7	0		
0896	Alarm Channel D; Lower Limit; Value 1	7	1		
0897	Alarm Channel D; Lower Limit; Value 2	7	0		
0898	Alarm Channel D; Lower Limit; Value 3	7	2		
0899	Alarm Channel D; Lower Limit; Value 4	7	0		
0900	Alarm Channel E; Channel Number; Value 1	7	6		
0901	Alarm Channel E; Channel Number; Value 2	7	4		
0902	Alarm Channel E; Trigger Rule	7	5		
0903	Alarm Channel E; Action Sequence	7	1		
0904	Alarm Channel E; Upper Limit; Value 1	7	2		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0905	Alarm Channel E; Upper Limit; Value 2	7	0		
0906	Alarm Channel E; Upper Limit; Value 3	7	4		
0907	Alarm Channel E; Upper Limit; Value 4	7	0		
0908	Alarm Channel E; Lower Limit; Value 1	7	1		
0909	Alarm Channel E; Lower Limit; Value 2	7	0		
0910	Alarm Channel E; Lower Limit; Value 3	7	2		
0911	Alarm Channel E; Lower Limit; Value 4	7	0		
0912	Alarm Channel F; Channel Number; Value 1	7	6		
0913	Alarm Channel F; Channel Number; Value 2	7	4		
0914	Alarm Channel F; Trigger Rule	7	5		
0915	Alarm Channel F; Action Sequence	7	1		
0916	Alarm Channel F; Upper Limit; Value 1	7	2		
0917	Alarm Channel F; Upper Limit; Value 2	7	0		
0918	Alarm Channel F; Upper Limit; Value 3	7	4		
0919	Alarm Channel F; Upper Limit; Value 4	7	0		
0920	Alarm Channel F; Lower Limit; Value 1	7	1		
0921	Alarm Channel F; Lower Limit; Value 2	7	0		
0922	Alarm Channel F; Lower Limit; Value 3	7	2		
0923	Alarm Channel F; Lower Limit; Value 4	7	0		
0924	Alarm Channel G; Channel Number; Value 1	7	6		
0925	Alarm Channel G; Channel Number; Value 2	7	4		
0926	Alarm Channel G; Trigger Rule	7	5		
0927	Alarm Channel G; Action Sequence	7	1		
0928	Alarm Channel G; Upper Limit; Value 1	7	2		
0929	Alarm Channel G; Upper Limit; Value 2	7	0		
0930	Alarm Channel G; Upper Limit; Value 3	7	4		
0931	Alarm Channel G; Upper Limit; Value 4	7	0		
0932	Alarm Channel G; Lower Limit; Value 1	7	1		
0933	Alarm Channel G; Lower Limit; Value 2	7	0		
0934	Alarm Channel G; Lower Limit; Value 3	7	2		
0935	Alarm Channel G; Lower Limit; Value 4	7	0		
0936	Alarm Channel H; Channel Number; Value 1	7	6		
0937	Alarm Channel H; Channel Number; Value 2	7	4		
0938	Alarm Channel H; Trigger Rule	7	5		
0939	Alarm Channel H; Action Sequence	7	1		
0940	Alarm Channel H; Upper Limit; Value 1	7	2		
0941	Alarm Channel H; Upper Limit; Value 2	7	0		
0942	Alarm Channel H; Upper Limit; Value 3	7	4		
0943	Alarm Channel H; Upper Limit; Value 4	7	0		
0944	Alarm Channel H; Lower Limit; Value 1	7	1		
0945	Alarm Channel H; Lower Limit; Value 2	7	0		
0946	Alarm Channel H; Lower Limit; Value 3	7	2		
0947	Alarm Channel H; Lower Limit; Value 4	7	0		
0948	Main Security Code; Value 1	8	1		
0949	Main Security Code; Value 2	8	2		
0950	Main Security Code; Value 3	8	3		
0951	Main Security Code; Value 4	8	4		
0952	Main Security Code; Value 5	8	5		
0953	Main Security Code; Value 6	8	6		
0954	Main Security Code; Value 7	8	7		
0955	Main Security Code; Value 8	8	8		
0956	Control Security Code A; Value 1	8	6		
0957	Control Security Code A; Value 2	8	6		
0958	Control Security Code A; Value 3	8	10		
0959	Control Security Code A; Value 4	8	10		
0960	Control Security Code B; Value 1	8	6		
0961	Control Security Code B; Value 2	8	6		
0962	Control Security Code B; Value 3	8	10		
0963	Control Security Code B; Value 4	8	10		
0964	Control Security Code C; Value 1	8	6		
0965	Control Security Code C; Value 2	8	6		

RFC-1/B Advanced Programming Address Table:

Address:	Use:	S.W.B. Note:	Factory Prog:	Current Prog:	Notes
0966	Control Security Code C; Value 3	8	10		
0967	Control Security Code C: Value 4	8	10		
0968	Basic Programming Security Code; Value 1	8	4		
0969	Basic Programming Security Code; Value 2	8	0		
0970	Basic Programming Security Code; Value 3	8	8		
0971	Basic Programming Security Code: Value 4	8	8		
0972	Advanced Programming Security Code; Value 1	8	4		
0973	Advanced Programming Security Code; Value 2	8	1		
0974	Advanced Programming Security Code; Value 3	8	5		
0975	Advanced Programming Security Code: Value 4	8	0		
0976	Control Security Code For Channels 00-07	9	1		
0977	Control Security Code For Channels 08-15	9	1		
0978	Control Security Code For Channels 16-23	9	1		
0979	Control Security Code For Channels 24-31	9	1		
0980	Control Security Code For Channels 32-39	9	1		
0981	Control Security Code For Channels 40-47	9	1		
0982	Control Security Code For Channels 48-55	9	1		
0983	Control Security Code For Channels 56-63	9	1		
0984	Site Identification Phrase, Word 1; Value 1	10	7		
0985	Site Identification Phrase, Word 1; Value 2	10	11		
0986	Site Identification Phrase, Word 2; Value 1	10	9		
0987	Site Identification Phrase, Word 2; Value 2	10	8		
0988	Site Identification Phrase, Word 3; Value 1	10	8		
0989	Site Identification Phrase, Word 3; Value 2	10	12		
0990	Site Identification Phrase, Word 4; Value 1	10	8		
0991	Site Identification Phrase, Word 4; Value 2	10	9		
0992	Site Identification Phrase, Word 5; Value 1	10	0		
0993	Site Identification Phrase, Word 5; Value 2	10	1		
0994	Site Identification Phrase, Word 6; Value 1	10	8		
0995	Site Identification Phrase, Word 6; Value 2	10	8		
0996	Hardware Version	11	1		
0997	Telemetry Settling Time	12	3		
0998	Telemetry Lead Zero Supression (0/1)	13	0		
0999	Voice-Call Dialing Mode (0=pulse/1=tone) (Soft. Ver. 5.07+)	14	0		
1000	Idle Time Before Hang-Up	15	2		
1001	Ring Number	16	2		
1002	Communications Mode	17	0		
1003	Duration Of Alarm Call	18	6		
1004	Wait Time Between Calls	19	6		
1005	Baud Rate	20	2		
1006	Relay On Time; Serial & Action Sequence; Manual Minimum	21	1		
1007	Time Between Steps In Action Sequence	22	1		
1008	Power-Up Action Sequence (0/1)	23	0		
1009	Enable Telemetry Triggered Action Sequences (0/1)	24	0		
1010	Autoscan Stop Channel, Value 1	25	0		
1011	Autoscan Stop Channel, Value 2	25	7		
1012	Reserved		0		
1013	Telemetry Scan Interval/Channel H Scan	27	0		
1014	Dedicated Control Port Control/Ring Sensitivity	28	0		
1015	Eerom Map (Channel Lable Exchange For Time Prog)	29	6		
1016	Incorrect Security Code Lockout Time	30	1		
1017	Reserved		0		
1018	Clock Adjust; Value 1	32	8		
1019	Clock Adjust; Value 2	32	8		
1020	Default Telemetry Units Or Status Format; Value 1	33	0		
1021	Default Telemetry Units Or Status Format; Value 2	33	3		
1022	Default Full Scale & Decimal Point	33	2		
1023	Default Linear/Log/Indirect & Auto Relay Activation	33	0		