

# *Verbatim* **Gateway**

## *Owner's Manual*



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The defective product should be returned, insured and freight prepaid, securely packaged to the address listed below. Please include a copy of your sales receipt, the dialers serial number, and a detailed description of the problem you are experiencing.

Raco Manufacturing and Engineering Co. Inc.  
Service Department  
1400 62nd Street  
Emeryville, CA 94608

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### Response Card

# 1

## Overview

### 1.1

## Product Description

The Verbatim® Gateway autodialer functions as a remote alarm monitor, typically monitoring critical facilities which are not staffed 24 hours a day.

The Verbatim Gateway autodialer may be factory configured for different input and output configurations. Your Verbatim Gateway may have as many as 32 discrete inputs, 16 analog inputs, 8 digital outputs and 96 Remote Channels. The minimum configuration of the Verbatim Gateway autodialer monitors 4 internal input channels and 32 Remote Channels (RCs).

The internal inputs are sometimes called Physical Channels (PCs). PCs monitor user-supplied external sensors such as float switches, limit switches, etc. Sensors connected to discrete inputs are usually dry (non-powered), isolated contacts which close or open to indicate the sensed condition. In many cases, the outputs of logic controllers may be connected directly to Physical Channel inputs without the need for interfacing relays or other signal conditioning.

Remote Channels (RCs) do not directly connect to sensors. RCs monitor PLC I/O and data table locations as defined by the user. RC data is kept current by the Verbatim Gateway constantly making queries to PLC data registers over one or more industrial network connection.

An alarm condition can be indicated by change at a sensor, by new data from a Remote Channel (RC), or by loss of AC power. When an alarm occurs, the Verbatim Gateway accesses the standard phone line to which it is connected, dials the appropriate phone numbers and delivers the user's own pre-recorded voice message corresponding to those particular alarm conditions that are currently active.

Dialing continues repeatedly through the entire list of up to 16 programmed phone numbers, until the alarm is acknowledged by touch tone command or by calling the Verbatim Gateway autodialer back.

The Verbatim Gateway autodialer incorporates many flexible, voice-supported programming and message recording options, to meet a wide range of user requirements. Yet, in most cases, the user may rely on pre-existing default programmed parameters, greatly simplifying programming. Even default voice alarm messages are provided.

**Note:**

All user programming except access code and voice message recording may be entered, reviewed or changed either from the front panel or from a remote telephone at any time. Thus, installation and programming may easily be done by separate personnel at separate times.

Most programming is entered in the form of 3-digit codes as described in this manual. All user programming, including recorded messages, is maintained in permanent non-volatile memory.

The Verbatim Gateway autodialer incorporates extremely thorough and effective electrical surge protection and overall rugged construction, to deliver reliable operation under real-world conditions.

## 1.2 Manual Description

This manual guides you through the following procedures:

- Location and mounting
- Initial programming
- Configuring Remote Channels to monitor PLCs
- Voice message recording
- Using Your Verbatim Gateway autodialer
- Advanced programming

A glossary explaining the terms used in this manual is included the end of the manual, along with a troubleshooting guide, an index, a return authorization form, and FCC notice to users.

Worksheets are provided to document and clarify your programming and message recording steps.

Please take a moment to read, complete, and mail the warranty registration card at the back of this manual.

### 1.2.2 Conventions

Throughout this manual various icons are used to visually identify information. They are as follows:

- ◆ The solid diamond symbol shows a list of procedures, decisions, or single step tasks.
- The bullet symbol shows a list of items.





The bomb indicates a warning message. The information concerns a process that may result in damage to equipment or harm to a person.



The hand indicates a caution message. The information concerns a process that may result in equipment failure.



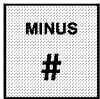
The pencil indicates general information.



The open diamond pattern indicates one or more exceptions or special considerations for a process.



The phone indicates that you can access the Verbatim Gateway autodialer through your phone.



Other icons include button or keys on the Verbatim Gateway autodialer front panel.

“items in quotes”      Quotation marks indicate titles of sections and messages.

*italic*      Italic text indicates items for emphasis, message text, and sample text.

ALL CAPITALS      Capital letters reference the names of keys, lights, and LEDs.

Initial Capital Letters      Capitalization of the first letter of a set of words indicates mode and function types.



# 2

## Installation

This section describes how to install the Verbatim Gateway autodialer and how to install a parallel printer to use the Parallel Printer Local Data Logging feature.

### 2.1

## Location and Mounting

Choose a mounting location which is not exposed to condensing humidity or temperatures beyond the limits of 20°-130°F. This location should ideally be within 5 feet of a standard RJ-11 phone jack and a *grounded* 120 VAC power outlet.

1. Mount the Verbatim Gateway autodialer on centers of 6" x 11 3/8" using the external mounting ears on the enclosure. #10 or 3/16" bolt sizes are best.
2. Install the NEMA 4X weatherproof outer enclosure, (optional purchase).  
This allows the Verbatim Gateway autodialer to be mounted outdoors as long as temperature limits are not violated. It is best to provide at least an overhead shelter to minimize direct precipitation and solar heating effects.
3. Install the heater/thermostat for cold or humid environments, (optional purchase).

The 120 VAC heater dissipates 75 watts, providing a temperature rise of approximately 30 degrees, or 60 degrees when enclosed in the optional NEMA 4X enclosure.

### 2.2

## Wiring

Refer to the diagram for an example of the wiring connections.

1. Inspect and remove any foreign materials which might create short circuits.
2. Connect the black (negative) battery lead to the negative terminal on the gel-cell battery.
3. Plug the power cord into a *grounded* 120 VAC *outlet*.

Or, remove the power cord from the Verbatim Gateway autodialer and install well-grounded 120 VAC power to terminal strip TS3, located on the lower right of the main circuit board.

If there are any green grounding wires in place on TS3 originating from plug-in expansion cards, leave those green grounding wires in place on the terminal marked GRN (Green). If the Verbatim Gateway autodialer turns on when power is applied, turn it off with the red POWER ON/OFF key.

4. Connect dry (unpowered) contacts to the terminal strip connection points.

The connection point for basic four-channel units is terminal strip TS1, located on the lower left of the main circuit board. Note that there are four common return terminals marked "C"; any combination of these internally grounded terminals may be used. Terminal strip TS1 may be unplugged for convenience. All terminal points are screw clamp type, eliminating the need for wire termination lugs.

The contact input wires should ideally be light (18 to 24 gauge) signal wire rather than heavy power wire. This reduces problems of bulk and stiffness.

5. If your unit has 8 or more inputs, the VX32 Channel Expansion Card should be plugged into connector J4.

If your unit has this card installed, then use TS1 for common return connections only, and connect one side of each contact to the appropriately marked channel input number on the VX32 card. Leave TS1 terminals 1,2,3 and 4 disconnected.



### **Notes:**

- ◆ The common *return* side of the contacts will need to be consolidated into not more than four wires coming into the TS1 terminals marked "C".
- ◆ Route the wires to the VX32 card so that they do not protrude above the top of the card, other wise they will interfere with the front panel board when the door is closed.
- ◆ Terminal strip TS1, and the terminal strips on the VX32 card if any, are not removable terminal blocks. Be sure that wire stresses do not result when a terminal strip becomes unplugged when the door is closed, etc.



### **Caution:**

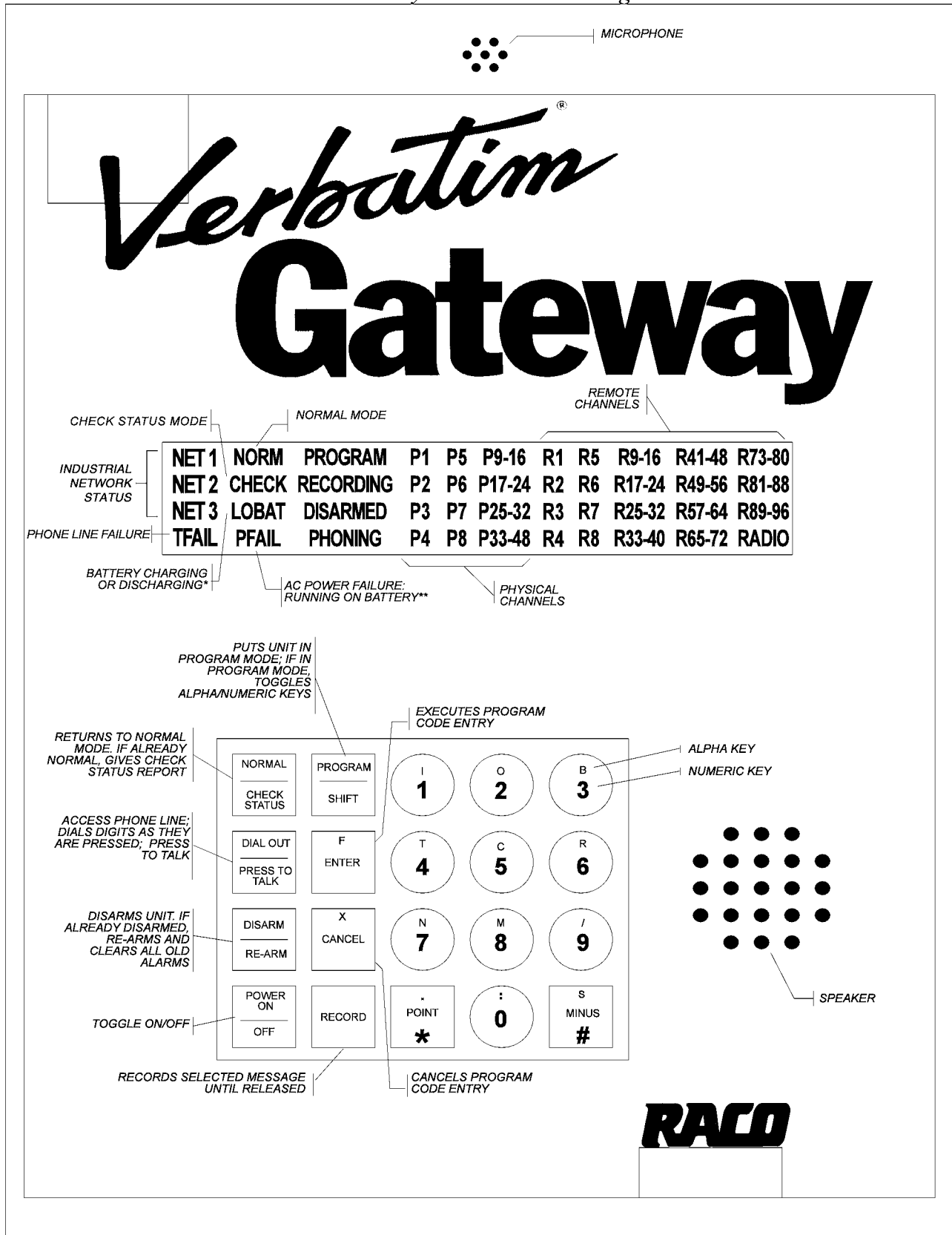
In all cases, be sure that the contact inputs are *dry* and do not provide power of their own, or the Verbatim Gateway autodialer will be damaged!



### **Exception:**

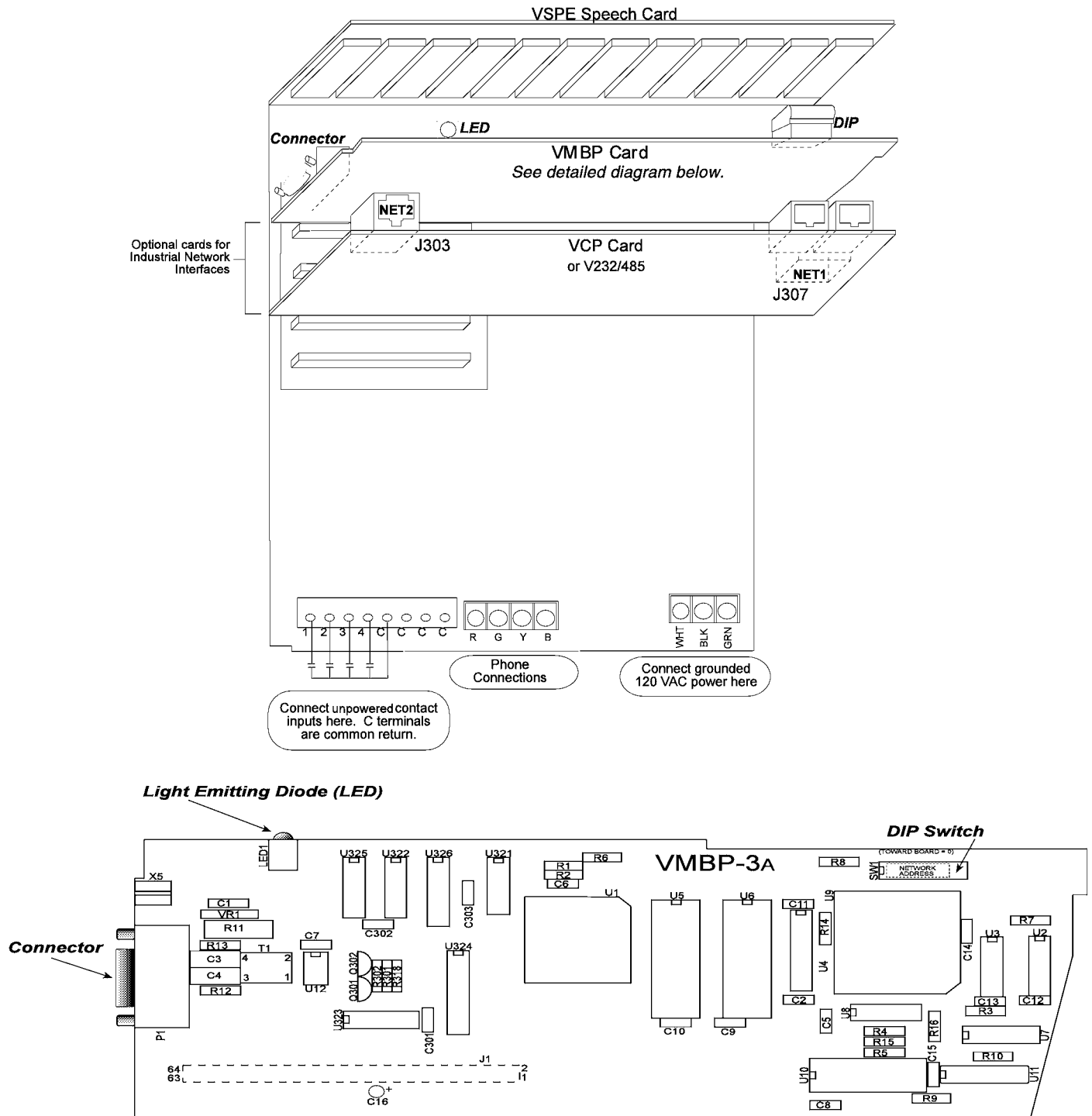
If your inputs are coming from a logic controller with TTL, CMOS or 5-volt DC logic outputs, direct connection may be made as long as the controller has the same electrical ground as the Verbatim Gateway autodialer.

## Front Panel Keys and Indicators Diagram



\* A discharged battery may take up to a day to fully charge. \*\* During AC power failure, all illuminated LED's will flash to conserve battery power.

# *Verbatim Gateway Electrical Connection Diagram*



# 3

## Programming and Testing

### 3.1

### Starting Up and Clearing the Unit

Basic set-up and testing of the Verbatim involves:

- ◆ Program at least one phone number.
- ◆ Program the input channels to reflect alarm conditions.
- ◆ Test the alarm conditions to be sure wiring and programming are correct.
- ◆ Record voice messages, trip delays and other programming as desired.



All programming operations must be done with the unit in the Program mode.

1. To put the Verbatim Gateway autodialer in the Program mode, press PROGRAM.

Program mode is indicated by the lighted PROGRAM LED.



#### **Note:**

Before you begin programming the Verbatim Gateway for your monitoring application it is best to first clear the unit's memory of any old programming. This step also ensures that memory corruption, which might have occurred during shipment or due to anomalous power disturbances, will be wiped away. See Step 2 below.



#### **Caution:**

The following step erases all user programming including recorded messages so normally it is done only at initial start-up.

2. To clear the system memory, press:

9 35 9 11 ENTER

If you make an error in code entry, press CANCEL and start again.

### 3.2

### Programming Phone Numbers

Refer to Programming Worksheet A (See Appendix B). You are encouraged to write down the phone numbers you want to program, along with a person's name for each phone number.

- ◆ To program the first dial-out phone number, press:

7 01 (then the complete phone number) ENTER

For example, to program 1 (510) 658-6713 as the first phone number, press:

7 01 1 5 1 0 6 5 8 6 7 1 3 ENTER

- ◆ To program a second phone number:

Use code 7 02 instead of 7 01, progressing to a maximum of code 7 16 for the 16th phone number.

Each number may be up to 60 digits in length. Be sure to include any necessary area codes or “1” prefixes.



### **Exceptions:**

- ◆ To use touch tone dialing, press:

9 01 1 ENTER

- ◆ To go back to standard pulse dialing, press:

9 01 0 ENTER

- ◆ To insert delays between dialed digits.

Press the MINUS key once for each one second delay desired in the phone number programming process.

- ◆ Refer to Section 6, “Advanced Programming,” for specialized programming such as *grouping* phone numbers with input channels, *Call Progress Monitoring* phone fault detection, etc., or to establish and use a *call forward* phone number, etc.



## **3.3**

## **Programming Input Channels**

Your Verbatim Gateway autodialer needs to know whether its input channels are to be *normally closed* (alarm on Open Circuit), or *normally open* (alarm on Closed Circuit).

All contact inputs are initially set normally closed (i.e. they will alarm on Open Circuit). This is the default setting and, therefore, any open circuits, including any inputs left disconnected during installation, will appear as alarms until the inputs are programmed.

- ◆ To automatically program the inputs:

Make sure all inputs are in their normal (non-alarm) state. Then press:

5 0 0 ENTER



The Verbatim Gateway autodialer automatically examines all inputs and programs them to alarm on the opposite input state from their present status.



### **Warning:**

Code 500 does not affect any channels that have been programmed for Disabled Channels, No Alarm/Status Only, Run Time Meter, or Pulse Totalizer function.



### **Exceptions**

In most cases, no further programming of contact inputs is necessary. However, the following configuration options are available:

- ◆ To set any input to be disabled and never be annunciated, press:

5 ZZ 0 ENTER

where ZZ is the 2 digit channel number you are programming. Be sure to always use a leading 0 for channels 1 through 9 to keep the channel number a two-digit entry.

- ◆ To set an individual contact input for normally closed operation (i.e. to alarm on Open Circuit), press:

5 ZZ 1 ENTER

- ◆ To set an individual contact input channel for normally open operation (i.e. to alarm on Closed Circuit), press:

5 ZZ 2 ENTER

- ◆ To set inputs to report status only, program each individual channel as follows:

5 ZZ 3 ENTER

This setup never causes an alarm to dial out.

- ◆ To set contact inputs for the run-time meter function, program each channel as follows:

5 ZZ 4 ENTER

See Section 6.2.3, “Channel Programming (Configuring).” This setup never causes an alarm to dial out but reports the total accumulated hours that the input contact is closed.

- ◆ To set any of your contact inputs for the Pulse Totalizer function, see Section 6.2.3, “Channel Programming (Configuring).”

## 3.4

### Initial Testing

Perform the following steps to ensure that your Verbatim Gateway autodialer is properly installed.



1. First, temporarily disarm the unit by pressing:

DISARM/RE-ARM until the DISARM LED is flashing. This prevents the unit from dialing out.

2. Next, physically trip each sensing device in turn (manipulate float switches, relays, etc.).

Verify that the corresponding input channel LED lights at the front panel, and then restore all sensors to their normal state.



3. Now press DISARM/RE-ARM. This will clear out the channel input LEDs and restore the unit to a ready condition.

4. To test the phone line connection, with the unit's phone cord plugged into its phone jack, temporarily remove the AC power cord to the unit.

The PFAIL LED will illuminate. At this point all illuminated LEDs will flash on and off in order to conserve battery power. Since the unit is not disarmed this time, after a 0.1 minute Alarm Trip Delay the PHONING light will illuminate and the unit will access the phone line and will begin dialing the first phone number.



The unit will recite its station ID and power failure messages. You may converse with the person answering by pressing and releasing DIALOUT/PRESS TO TALK. Press this key again when you wish to speak, and release this key to listen. This action will suspend message recital. In this case, when the conversation is done, you should end the call by pressing NORMAL. Ordinarily the alarm call would end automatically.



5. Now press DISARM/RE-ARM twice.

This step disarms and then rearms the unit clearing all acknowledged alarms. This clearing also occurs automatically after the Alarm Reset Time has elapsed (default value 1 hour). See Section 5.6, "Alarm Reset Time-out After Acknowledgment."



6. Your Verbatim Gateway autodialer is now able to operate, having at least one dialout phone number programmed and having its input channels configured.

However, you may wish to record your own voice messages (see the next section) or perform special advanced programming items. See Section 6, "Advanced Programming," before referring to Section 5, "Using Your Verbatim Gateway Autodialer."

# 4

## Recording Voice Messages

This chapter describes how to record your own voice messages. Messages may be recorded for the Station ID and for the Alarm and Normal condition for every channel in your Verbatim Gateway Autodialer.



### **Note:**

Be sure to complete the programming of the input channels as described in the previous chapter before recording any messages.

### **Using Default Messages Instead of Recording Your Own**

Recording messages is an optional step. Your Verbatim Gateway Autodialer comes with built-in default normal and alarm messages for all channels. Recording voice messages can be postponed until you have become more familiar with your unit. You may even choose to record or re-record your own messages from a remote telephone at any time.

Using default messages for selected channels or for the Normal condition of channels is an excellent way to conserve speech memory for certain important and lengthy alarm messages.

### **Types of Default Messages**

- Discrete (i.e. digital, contact) physical channel inputs:  
“Channel N Normal” and “Channel N Alarm.”
- Discrete remote channel inputs:  
“Remote Channel N Normal” and “Remote Channel N Alarm.”
- Discrete Status-only or Run-time meter physical channel inputs:  
“Channel N is ON” when input circuit is closed, and “Channel N is OFF” when input circuit is open.
- Discrete Status-only remote channel inputs:  
“Remote Channel N is ONE” or “Remote Channel N is ZERO.”
- Analog (integer) physical or remote channel inputs:  
“Channel N, present reading is . . .” followed by the recited analog value.
- Station ID message:  
“ID Number N.”

There is also a default Network ID message. See Section 7 for details.

## 4.1

### Planning Messages

Worksheet C in Appendix B is provided to assist you with this. Please use the Worksheet! Not only will you then have a written record of your messages for future reference, you will also then be prepared to record your messages with the greatest ease and efficiency.

In general, two different messages are used for each input channel: One message for the Normal Condition, and another for the Alarm (fault) Condition.

When you have written down the messages that you want to record, you are ready to verify/extend your recording time.



#### **Exceptions:**

- ◆ Status-only or Run-time Metering Channels. See Section 6.2.3, “Channel Programming (Configuring).”

To record your own messages for these specially configured channels rather than relying on the default “Channel N is ON” or “Channel N is OFF” messages:

- Plan a message for the Closed Circuit condition and another message for the Open Circuit condition for each channel.

For Run-time channels, the unit will add a report of the run-time in hours, using built-in speech, after the Closed or Open Circuit message.

- ◆ Pulse Totalizer Channels

See Section 6.2.3, “Channel Programming (Configuring),” for special guidance in planning Pulse Totalizer messages.

## 4.2

### Managing Available Speech Memory

The table below shows the total available message recording time for units with differing total number of channels. The available message recording time may be extended in two ways. First, you may explicitly change the recording rate from the default Rate 1 to Rates 2, 3, or 4. See Chapter 6. Secondly, you may automatically extend the message recording time by using the Autoextend™ feature described in this section.

Unit type	Initial recording time (at Rate 1)*:	Extendable to: (Rate 2, 3 or 4)*
4-8	26 sec	40, 54 or 79 sec
16-32	104 sec	160, 216 or 318 sec
33-40 chan. unit	130 sec	200, 270 or 399 sec
41-48 chan. unit	156 sec	240, 324 or 476 sec
49-56 chan. unit	182 sec	280, 378 or 555 sec
57 or more	208 sec	320, 432 or 624 sec

\*Recording times may vary +/- 10%.

## 4.2.1

### Verifying/Extending Recording Time

Initially, the unit is set for the fastest memory use rate (“Rate 1”), giving the highest fidelity sound recording. If you are sure that your messages take less than the “initial” time shown above for your unit (14 seconds total for a 4-channel unit), go to Section 4.3, “Record Your Messages.” You may also verify your unit’s current rate setting and corresponding total message recording time by pressing:

9 1 1 ENTER

If, after performing this step, you think you may need more recording time perform the Autoextend™ step described next. The Autoextend™ feature will automatically extend the available recording time, selecting the optimum recording rate (speech memory rate) to give you the highest possible recording sound quality for your length of recording.



#### **Warning:**

The following step will erase any existing recorded messages.

To use the Autoextend™ feature to extend recording time, have your message Worksheet handy as you press:

9 1 2 ENTER

The Verbatim Gateway Autodialer will prompt you to immediately begin reciting your entire list of messages at the sound of the beep, one after another, at the same speed that you will want to later record them.

During this time, the Verbatim Gateway Autodialer will *not* be recording your spoken messages. Instead, it will be timing you.

When you have finished reciting (not recording) the last message, immediately press ENTER.



Over the phone, press ZERO to start the timing, and ZERO again to end the timing. See Section 5.7, “Programming by Phone.”

Based on how long your message recital took, the Autoextend feature will automatically calculate which recording rate is optimum for your length of recording time, and will then automatically select that rate. It will tell you how many seconds your message took, and how much total recording time it has now given you.

## 4.3

# Record Your Messages

First, minimize any background sounds. Then proceed as follows:

- ◆ Have your message Worksheet in front of you and be prepared to recite the first Alarm (fault) Condition message in a loud clear voice within about 6 to 12 inches of the microphone located at the top of the front panel. Press:

1 ZZ ENTER

where ZZ is the appropriate 2-digit channel number, such as 01 for channel 1. Be sure to use leading zeroes, in order to keep ZZ a 2-digit entry. Use 00 for the Station ID message.



The voice specifically identifies the message you are about to record, and then prompts you to press the RECORD key and hold it just for the duration of your spoken message. Note that the RECORDING light comes on during recording.

Over the phone, since there is no RECORD key, the voice will prompt you to press ZERO to begin recording, and press ZERO again to stop recording. See Section 5.7, “Programming by Phone.”

The Verbatim Gateway Autodialer will immediately play back the message you have just recorded, allowing you to determine if you need to re-record it louder, softer or more clearly, etc.

Experiment with different volume levels to get the best message clarity. If there is too much background noise at the Verbatim Gateway autodialer site, record your messages over the phone.

Always stop the recording promptly to avoid wasting recording time.

- ◆ To record an alternate “Normal Condition” message for channel ZZ, press:

2 ZZ ENTER

and follow the same procedure as above.

- ◆ To review both existing messages for channel ZZ, press:

3 ZZ ENTER

The Verbatim Gateway Autodialer will replay both existing messages for channel ZZ. This will include any default messages remaining in use.



### ***Exceptions:***

- ◆ For any channels programmed for “Status Only” or for Run Time Meter function, use code 1 ZZ for the Open Circuit message, and 2 ZZ for the Closed Circuit message.
- ◆ If you run out of recording time, you will hear the message “No more message time.” See Section 4.2 above to re-establish total available recording time. You may elect to shorten some messages, or rely more on selected default messages, or you may Autoextend the available recording time. Then, re-record all messages.
- ◆ If you wish to extend the available time for a specific message while leaving the other messages unaffected, enter the code for recording that message, but add an extra digit 1 through 4, before pressing ENTER.  
The digit 1 (Rate 1) gives the shortest time and the best sound quality, while 4 (Rate 4) gives the longest time with poorest sound quality.
- ◆ If you wish to reinstate a default message, enter the code for recording that message, and an extra POINT before pressing ENTER. For example:  
1 ZZ POINT ENTER
- ◆ If you wish to use the default Station ID message but with a different ID number in place of the “one”, press:  
9 1 4 N ENTER  
  
where N is the desired ID number which may be up to 16 digits long. Some users program the Verbatim Gateway Autodialer’s own phone number as its ID number.
- ◆ If you want to set a specific recording rate rather than letting Autoextend do it, press:  
9 1 3 N ENTER  
  
where N is the desired recording rate 1, 2, 3 or 4.
- ◆ You will then need to re-record any messages that were previously recorded at a different rate.



### ***Warning:***

Changing the recording rate will erase any existing recorded messages.



### ***Note:***

Only user-recorded speech uses up the available record time. Some people conserve this time by recording only the alarm message, leaving the default normal message.





# 5

## Using Your Verbatim Gateway Autodialer

### 5.1

### Placing Inquiry Calls to the Verbatim Gateway Autodialer



You may call the Verbatim Gateway autodialer at any time from any phone. The unit will wait the programmed number of rings before answering and then will begin a full status report. The status report starts with the Station ID Message, followed by any special warning messages (e.g.: no phone numbers programmed, or the unit is disarmed, etc.), and concludes with the listing of the status of each channel input.

If there are no alarm conditions on any channel, then the Verbatim Gateway autodialer will say “All channels normal” just prior to beginning the complete channel status report.

If there are channels with unacknowledged alarms conditions prior to the call, placing a call to the unit will result in the acknowledgement of these alarms. The Verbatim Gateway autodialer will say “Alarm is acknowledged” immediately after reciting the Station ID message.



#### ***Exception:***

The Call in Acknowledge Mode command (Code 925) may be used to set the Verbatim Gateway so that calls *to* the unit will not automatically acknowledge alarms.

The channel status report will be recited the programmed number of message repeats (default is 3 times). Between each recital the Verbatim Gateway autodialer will issue a prompting beep and then wait a few seconds for you to optionally enter a special Command Tone. See Section 5.7, “Programming by Phone.” After all message repeats, if you have not entered a tone, the unit will say “Goodbye” and terminate the call.

See Section 6.2, “Programming Operations.”

### 5.2

### CHECK STATUS Inquiry at Panel



When the NORM LED is lit, you may hear a report of current conditions by pressing the NORMAL/CHECK STATUS key. You may cut this report short by again pressing the NORMAL/CHECK STATUS key.

## 5.3 Receiving Alarm Calls

When any input condition violates the programmed alarm criteria for an interval longer than the Alarm Trip Delay for that input (See Section 6.2.6), the unit goes into an Unacknowledged Alarm state. The unit begins dialing the first of up to 16 programmed phone numbers. See Section 6.1, “Program Codes,” about optional Alarm Call Grouping if you want the numbers dialed to depend on which channel is in alarm. Whenever there is an Unacknowledged Alarm the corresponding channel alarm LED begins flashing.

The voice messages follow the same format as an inquiry call, including the prompting beep, except the channels having no alarm activity are not included in the alarm report. If there is no acknowledgment, the Verbatim Gateway autodialer will replay the message for the programmed number of repeats (default is 3) and then will say, “Goodbye,” before terminating the call.

See Appendix I for information on alternate annunciator state models. Annunciator state models support various Return To Normal (RTN) calling sequences.

### **Phrases Appended to Alarm Messages**

(user recorded or default)

*These appending phrases will continue to be included in any status reports until the Alarm Reset time expires for that channel.*

#### **ALERT**

Any channel with an input violation which has not been present longer than the Alarm Trip Delay for that channel will have its status message appended with the word “Alert.”

#### **NOW NORMAL**

If the violation which originally caused the alarm has gone away the phrase “Now Normal” will be appended to the alarm status message.

#### **ACKNOWLEDGED**

Any channel which was in an unacknowledged alarm state but became acknowledged will have its status message appended with the word “Acknowledged.”

#### **NOW NORMAL, ACKNOWLEDGED**

Any channel which is both acknowledged and whose input violation has gone away will have its status messages appended with the phrase “Now Normal, Acknowledged.”

**Note:**

When the autodialer goes into alarm, it dials each phone number in sequence until it receives an acknowledgement. The alarm may be acknowledged after the warble tone by pressing a touch tone “9”; by calling the unit back after it says, “goodbye,” or by pressing NORMAL on the front panel. After acknowledgement, the dialer will not call out again on that channel until it is reset. This is usually done automatically after a set period of time called the *Alarm Reset Time*, which allows the person who acknowledged the alarm time to go fix the source of the problem without further callouts from the dialer. After the reset time, the unit is automatically reset, and any alarms present at that time will cause a dial out.

**Exception:**

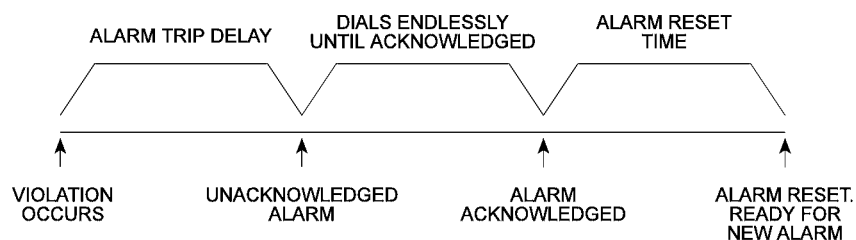
Power Failure alarms only cause two spoken messages: 1) When power has been off for longer than the Power Failure Trip Delay, “Power is Off” is reported. 2) When power has been off and is later restored the message, “Power has been Off. Power is Now On,” is reported.

## 5.4 Continued Dialing in the Absence of Acknowledgment

The Verbatim Gateway autodialer will then wait for the programmed Time Between Alarm Calls (default 2 minutes) See Section 6.2.18, “Miscellaneous Programming Tips,” to change default time, during which you may call the Verbatim Gateway autodialer back to acknowledge the alarm. If no acknowledgment is received at the end of this period, the next phone number will be dialed. The process will be repeated indefinitely, repeatedly going through all the designated phone numbers, until acknowledgment is received.

**Exception:**

If you want further calling terminated when channels return to normal you may so program the unit by using the “Set Return to Normal” command (Code 923). See Section G.2.

**ANATOMY OF AN ALARM**

## 5.5

### Acknowledging the Alarm Call

To acknowledge the alarm during the alarm call wait to hear the prompting “warble” tone then enter a touch tone “9” (Also 1, 2, 3, 4, will acknowledge in this situation). The Verbatim Gateway autodialer will say “Alarm is acknowledged, Goodbye” and terminate the call. See Section 5.7, “Programming by Phone,” for additional ways of acknowledging an alarm without ending the call.

Alternative methods of Acknowledging:

- Wait for the alarm call to end then place a call to unit.
- At the front panel press NORMAL, PROGRAM, DISARM, or DIALOUT .

Upon acknowledgment, the channel LED changes from flashing to steady illumination.

At the end of the Alarm Reset period the channel alarm LED turns off, the Acknowledged Alarm status is cleared for that particular channel input, and it is again ready to go into Unacknowledged Alarm whenever a violation occurs at that input. In particular, if a violation has not been removed (prior to timeout), dialing begins immediately upon the Alarm Reset period timeout. To reactivate the alarm before the alarm reset timeout period is over, re-arm the alarm.

## 5.6

### Alarm Reset Timeout After Acknowledgment

As shown in the figure, “Anatomy of an Alarm,” p. 5-3, when an acknowledgment is received, the Verbatim Gateway autodialer begins timing out the Alarm Reset Time, (default 1 hour).

Further calling on behalf of that channel is suspended, regardless of further activity at that particular input during this period. If new alarms occur on other channels during this period, the unit will go back into the Unacknowledged Alarm state and dial the first appropriate phone number, with dialing continuing until a new acknowledgment is received.

## 5.7



### Programming by Phone

During any phone call (inquiry call or alarm call), at the end of each round of messages, the prompting warble tone is issued. If you press a Command Tone “1” at the sound of the beep, the Verbatim Gateway autodialer will prompt you to enter a program code. (Or, if you have established a Security Access Code, you will first be prompted for this code).

To enter programming codes over the phone:

- Enter a touch tone “1” after the warble tone.
- Enter the program code followed by # #.
- Enter an additional # # when you are ready to hang up.

You may enter codes for most of the programming operations described in this manual except reading or changing the optional security access code. See Section 6 for more information about the 910 Security Access feature.

Since some of the front panel keys are not found on a touch tone keypad, some special conventions apply for over-the-phone programming:

In Place Of:	Enter:
CANCEL	* *
ENTER	# #
POINT	*
MINUS	#

- ◆ To enter the Program Mode press “1” after the warble tone.
- ◆ To end a phone call after programming:

Press # # without a prior digit entry.

The Verbatim Gateway autodialer will then issue a prompting beep which is another opportunity to enter a “1” if you didn’t want to end the call. It will then say “Goodbye” and end the call.



### ***Exception:***

Over the phone, you may not program more than one consecutive dialing delay, because # # (two in a row) is interpreted as ENTER when programming. However, you may extend this delay using code 928. See *Program Code Table* p. 6-9.

- ◆ If you initially enter a Command Tone “2” in place of the “1”, you will be in a special Program Review Mode, which allows you the safety of checking any of the programming items or messages, without the possibility of altering any of them.
- ◆ If you initially enter a Command Tone “3” in place of the “1”, you will hear a report of each channel that has any acknowledged or unacknowledged alarm condition.
- ◆ If you initially enter a Command Tone “4” in place of the “1”, you will hear a listing of all programmed phone numbers, plus any other basic programming items that you have altered from their default values. This is particularly useful in diagnosing operating problems.

- ◆ If you initially enter a Command Tone 0, 5, 6, or 7, 8 in place of the "1", the unit will not be acknowledged and will immediately say "goodbye" and end the phone call.
- ◆ If you initially enter a Command Tone "9", in place of the "1", the alarms will acknowledge an alarm and the unit will immediately say "goodbye" and end the phone call.



### ***Warning:***

Command tones 1, 2, 3, and 4 will acknowledge all alarms, even those not in their Alarm Call Group (ACG). See Section 6.2.13. Command tone 9 will only acknowledge alarms in their ACG. Command tones 0, 5, 6, 7, and 8 will not acknowledge any alarms, but will give the status of all alarms.



### ***Note:***

The DTMF command tones may be entered at any time by pressing and holding the tone until the unit stops speaking.

## **5.8**

# **Dialing Out and Conversing Through the Verbatim Gateway Autodialer**

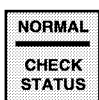
At the panel, starting in the Normal Mode, press the DIALOUT/PRESS TO TALK key. Next press the digits of the phone number you want to dial. Each digit you press will be dialed as you press it. You will then hear the sound of the ringing.



When you hear the phone answered, press and hold the same DIALOUT/PRESS TO TALK key as you speak to the person on the line, and release the key to listen. Continue the conversation in this manner.

- ◆ To end the call press NORMAL. If the DIALOUT/PRESS TO TALK key is not pressed for more than 2 minutes (or as previously set), the Verbatim Gateway autodialer will automatically end the call.

If you are at the panel when a phone call is in progress, you may suspend the message report and converse with the person on the other end by pressing the DIALOUT/PRESS TO TALK key as described above. There will be no additional dialing, since connection has already been established. To end the call, press NORMAL.



# 6

## Advanced Programming

### 6.1

### Program Codes

This chapter provides the Program Codes table which summarizes the wide variety of available programming operations, along with a description and comments. Additional information may be found in referenced notes below as well as in the referenced sections elsewhere in the manual.

When the overall programming is cleared out at initial start-up, all programming is automatically set to factory default values as shown in the table. Most of these default values are quite suitable for most users and only selected items may need to be programmed to different values.



- ◆ To read the existing programmed settings:

*Enter a code* and then ENTER without any intervening value. This reads the existing programmed setting without changing it.

- ◆ To clear a program:

Enter POINT *after the code* and before ENTER. This clears the program item, or returns it to its default value.

In the Program Codes table, several forms of numeric value entries are shown:

Value	Definition
V	A value of one or more digits which may include a decimal point or minus. Examples: .5, 2.8, 300.6, 60.
N	One or more digits giving a whole number; no decimal points allowed. Examples: 1, 5, 20.
DN	A two-digit Designation Number for phone numbers (01 for first number, 02 for second, etc.).
1/0	Used to turn a function ON (1) or OFF (0).
ZZ	2-digit channel number (use ZZ=00 for ID message).

## 6.1.1

**Notes for Programming Code Table**

Refer to these numbered items under the "Notes" column in the following *Programming Code Table*.

1. ZZ = 2 digit channel number. Use ZZ=00 for Station ID message.
2. For any channels you have programmed as "Status Only" or "Run Time Meter", use code 1 ZZ for the Open Circuit message, use code 2 ZZ for the Closed Circuit Message. See Section 6.2, "Programming Operations," for message information for any Pulse Totalizer channels.
3. DN (Designation Number) is 01 for first dialout phone number, 02 for second number, etc. DN = 00 for special "callback" phone number. Use MINUS to insert any needed delays between digits. Each such delay is 1 second unless extended using code 928.
4. Actual power failure trip delay may be a fraction of a second longer than programmed value, due to power supply discharge time which varies with the number of option boards.

**Caution:**

5. If Alarm Reset Function is turned OFF, acknowledged alarms will NEVER RE-ARM, preventing further alarm calls after acknowledgment for each channel.
6. Speaker always operates during front panel programming, even if programmed to be off.
7. Cannot be read or changed over the phone.
8. Does not change channels that have been configured for "Status Only," "Run Time Meter," or "Pulse Totalizer."

**Caution:**

9. High Speed Dialing setting may not work reliably with some telephone company exchanges.
10. Add POINT to restore default message.
11. To pre-set a Run Time value, include the value before ENTER.
12. Maximum value that can be entered is 4,294,967,294.
13. Omits all mention of disabled channel. Restore by setting for Normally Closed, Normally Open, etc.
14. Will not reprogram channels that are Disarmed, No Alarm/Status Only channels.



*Programming Code Table (Page 1 of 7)*

<i>Code</i>	<i>Description &amp; Comments</i>	<i>Default</i>	<i>Range/Values</i>	<i>Notes</i> <i>See p. 6-2</i>	<i>Section</i>
<b>Channel Status Reading</b>					
0ZZ	Reads status of channel ZZ				6.2.1
0ZZ0	Reads actual open/closed circuit status directly				6.2.1
<b>Message Recording and Reviewing</b>					
100	Records Station ID message			1, 2, 10	4.3, 6.2.2
1ZZ	Records channel ZZ alarm message			1, 2, 10	4.3, 6.2.2
2ZZ	Records channel ZZ normal message			1, 2, 10	4.3, 6.2.2
3ZZ	Reviews channel ZZ both messages ZZ=00 for Station ID msg			1	4, 4.3, 6.2.2
911	Reads current record rate and available record time				4.2.1
912	Autoextend: sets optimum record rate for recited msg				4.2.1
913 N	Sets recording rate	Rate 1	Rate 1-4		4.3
914 N	Inserts N in place of 1 in canned station ID message	Station 1	1-16 digits		4.3
<b>Channel Programming (Configuration)</b>					
500	Sets current status as normal for all channels			14	3.3, 6.2.3
500 N	Sets all inputs to config parameter N	normally closed	0/1/2/3 1 = normally closed (default) 2 = normally open 3 = no alarm		3.3, 6.2.3
5ZZ	Reads alarm criteria for channel ZZ	1			6.2.3
5ZZ 0	Disables channel ZZ			13	3.3, 6.2.3
5ZZ 1	Sets chan ZZ normally closed			1	3.3, 6.2.3
5ZZ 2	Sets chan ZZ normally open			1	3.3, 6.2.3
5ZZ 3	Sets chan ZZ for no alarm (status report only)			1	3.3, 6.2.3
5ZZ 4	Sets chan ZZ for run time meter operation			1	3.3, 6.2.4
5ZZ 4 V	Preset starting value	0.0 hrs	0.0-99,999.9 hrs	1	6.2.4
5ZZ 7 N	Pulse totalizer: ACTIVATES with starting value N	0		12, 2	6.2.5
5ZZ 8 N	Pulse totalizer: sets scale factor N	1		12	6.2.5
5ZZ 6 N	Pulse totalizer: sets alarm setpoint N with starting value N	0		12	6.2.5

*Programming Code (Page 2 of 7)*

<i>Code</i>	<i>Description &amp; Comments</i>	<i>Default</i>	<i>Range/Values</i>	<i>Notes</i> <i>See p. 6-2</i>	<i>Section</i>
<b>Alarm Trip Delays</b>					
600	Reads power failure alarm trip delay				6.2.6
600 V	Sets power failure alarm trip delay to V	0.1 min	0.1-999.9 min		6.2.6
6ZZ	Reads chan ZZ alarm trip delay				6.2.6
6ZZ V	Sets chan ZZ individual alarm trip delay to V	2 sec	0.1-9999.9 sec	1	6.2.6
6ZZ POINT	Returns chan ZZ individual alarm trip delay to default	2 sec		1	6.2.6
902 V	Sets global (all channels) alarm trip delay to V seconds	2 sec	0.1-9999.9 sec		6.2.6
902 POINT	Returns global (all channels) alarm trip delay to default	2 sec			6.2.6
<b>Phone Numbers and Pulse/Tone Dialing</b>					
700	Reads special "callback" phone number				6.2.18
700 N	Sets special "callback" phone # to N		1 - 60 digits		6.2.18
7DN	Reads phone number DN		01 - 16 DN = 01-16		3.2, 6.2.7
7DN N	Sets phone number DN to N phone #		1 - 60 digits N can = up to 60 digits	3	3.2, 6.2.7
7DN POINT	Clears out phone number DN				3.2, 6.2.7
900 0/1	Read/Set Call Progress Monitoring	0 (OFF)	0/1 0 = OFF 1 = ON		6.2.12
901 0/1/2	Sets dialing mode	Pulse mode	0/1/2 0 = pulse 1 = tone 2 = high speed	9	6.2.7
903 V	Sets time between callouts to V	2 min	0.1-99.9 min		6.2.18
906 N	Sets ring answer delay to N N = whole number	1 ring	1 - 20 rings		6.2.18
908 0/1	Sets Autocall ON/OFF	OFF	0/1 0 = OFF 1 = ON		6.2.18
909 V	Sets Autocall interval to V	24 hrs	0.1-99.9 hrs		6.2.18
916 N	Set Automatic Phone Fault Detect frequency	0(OFF)	0 = OFF 0.1 - 24 hrs		6.2.10
918	CPM Ring Count	10 rings	5 - 20 rings		6.2.12
928 N	Extends length of inserted dialing delays to N sec	1 sec	1 - 10 sec		6.2.7
981	Return To Normal (RTN) calling	0	0/1	See Code 923	G.3

## Programming Code (Page 3 of 7)

Code	Description & Comments	Default	Range/Values	Notes <i>See p. 6-2</i>	Section
<b>Alarm Call Grouping</b>					
5ZZ 9	Reads channel ZZ alarm call grouping linkage			1	6.2.13
5ZZ 9 DN	Links channel ZZ to phone numbers DN.	Calls all phone #s	01 - 16 DN = 01-16	1	6.2.13
5ZZ 9 POINT	Clears channel ZZ alarm call grouping linkage.			1	6.2.13
<b>Alarm Ready Scheduling</b>					
935 7	Initializes real-time clock chip to 8:00:00 on 1/6/92 2				D.1.3 6.2.19, 8.9
941 MMDDYYD	Sets date		01/01/96- 12/31/20 <u>D (Day Code) is optional:</u> 1 = Sunday 2 = Monday 3 = Tuesday 4 = Wednesday 5 = Thursday 6 = Friday 7 = Saturday		D.1.3, 8.9
942 HHMMSS	Sets time		00:00-23:59:59 (military-24-hour-clock)		D.1.3, 8.9
961	Read weekday rearm/disarm times				8.10
961 RRRR DDDD	Sets weekday rearm/disarm times	1700, 0800		RRRR=rearm time, DDDD=disarm time (military-24-hour-clock)	8.10
962	Reads weekend rearm/disarm times				8.10
962 RRRR DDDD	Sets weekend rearm/disarm times	1700, 0800		RRRR=rearm time, DDDD=disarm time (military-24-hour clock)	8.10
963	Reads weekend rearm/disarm day of week				8.10
963 R D	Sets weekend rearm/disarm day of week	6 Friday, 2 Monday	1-7 R = rearm day D = disarm day		8.10
964	Reads holiday rearm date				8.10
964 MMDDYY	Sets holiday rearm date	12/24/90	Today - 12/31/20 MM = month DD = day YY = year		8.10
965	Reads holiday disarm date				8.10
965 MMDDYY	Sets holiday disarm date	12/24/90	The day after the holiday rearm date (see Code 964) - 12/31/20		8.10

*Programming Code (Page 4 of 7)*

<i>Code</i>	<i>Description &amp; Comments</i>	<i>Default</i>	<i>Range/Values</i>	<i>Notes</i> <i>See p. 6-2</i>	<i>Section</i>
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**Alarm Ready Scheduling . . . Continued from p. 6-5**

966	Reads alarm ready schedule control number				8.11
966 N	Sets alarm ready schedule control number 0 = OFF 1 = Weekday 2 = Weekend 3 = Weekday and Weekend 4 = Holiday 5 = Weekday and Holiday 6 = Weekend and Holiday 7 = Weekday, Weekend and Holiday	0	N control 0-7		8.11

**Local Data Logging Programming Codes**

935 7	Initialize real-time clock chip to 1/6/92 2 and 8:00:00				D.1.3 6.2.19, 8.9
941 MMDDYYD	Sets date.		01/01/96-12/31/20 <u>D (Day Code) is optional:</u> 1 = Sunday 2 = Monday 3 = Tuesday 4 = Wednesday 5 = Thursday 6 = Friday 7 = Saturday		D.1.3, 8.9
942 HHMMSS	Sets time		00:00-23:59:59 (military-24-hour clock)		D.1.3, 8.9
943 V	Sets regular interval local printing	OFF	0 = OFF .1 - 999.9 hrs		D.1.4
944	Prints all current programming immediately				D.1.4

**Analog Input Programming**

5 ZZ 1 XXXX	Sets low signal input value				F.1.5
5 ZZ 1 POINT	Sets low signal input value to real world point				F.1.5
5 ZZ 2 XXXX	Sets low signal input spoken value				F.1.5
5 ZZ 3 XXXX	Sets high signal input value				F.1.5
5 ZZ 3 POINT	Sets high signal input value to real world point				F.1.5
5 ZZ 4 XXXX	Sets high signal input spoken value				F.1.5

*Programming Code (Page 5 of 7)*

<i>Code</i>	<i>Description &amp; Comments</i>	<i>Default</i>	<i>Range/Values</i>	<i>Notes</i> See p. 6-2	<i>Section</i>
<b>Analog Input Programming . . . Continued from p. 6-6</b>					
5 ZZ 5 X.XX	Sets low setpoint alarm value				F.1.6
5 ZZ 6 X.XX	Sets high setpoint alarm value				F.1.6
5 ZZ 7	Sets analog input signal type	0	0/1/2 0 = 4-20 ma signal 1 = 0-1 VDC signal 2 = RACO TS-705A		F.1.3

**Remote Supervisory Control****For all items in this section: N = output number, Range = 01, 02, 03, 04, 05, 06, 07, 08**

95 N	Reads RSC output #N ON/OFF condition			14	F.2.3
95 N 0	Turns RSC output #N OFF				F.2.3
95 N 1	Turns RSC output #N OFF				F.2.3
95 N 2 V	Turns RSC output #N ON for V seconds only	1 sec	1 - 99,999 sec		F.2.3
95 N 3 V	Turns RSC output #N OFF for V seconds only	1 sec	1 - 99,999 sec		F.2.3
9500	Reports ON/OFF status of all outputs				F.2.3
9500 0	Turns OFF all outputs				F.2.3
9500 1	Turns ON all outputs				F.2.3
9500 8 V	Establish default pulse duration in minutes (When using 95 N 2 or 95 N 3)		1 - 1,666 min		F.2.3
9500 9 V	Establish default pulse duration in seconds (When using 95 N 2 or 95 N 3)		1 - 199,999 sec		F.2.3

**Miscellaneous Programming Items**

902 V	Sets global (all channels) alarm trip delay to V	2 sec	0.1-9999.9 sec		6.2.6
904 V	Sets alarm reset time to V	1 hour	0.1-99.9 hr		5.6, 6.2.18
905	Clears all acknowledged alarms and clears reset timers				6.2.18
907 N	Sets number of alarm message repeats to N N = whole number	3 repeats	1-20 repeats		5.3, 6.2.18
910 N	Establishes a security access code N	None	up to 8 digits	7	6.2.18
920 V	Power failure trip delay (duplicates function of code 600)	0.1 min	0.1-999.9 min	4	6.2.6

*Programming Code (Page 6 of 7)*

<i>Code</i>	<i>Description &amp; Comments</i>	<i>Default</i>	<i>Range/Values</i>	<i>Notes</i> <i>See p. 6-2</i>	<i>Section</i>
<b>Miscellaneous Programming Items . . . Continued from p. 6-7</b>					
921 0/1	Sets power failure alarm	ON	0/1 0 = off 1 = on		6.2.6
922 0/1	Sets alarm reset timers	ON	0/1 0 = off 1 = on	5	6.2.18
923	Clear On Return To Normal (RTN)	1	1-4 <u>Values:</u> 1 = Calls until alarm is acknowledged. 2 = Clears unacknowledged RTN alarms between alarm calls. 3 = Clears acknowledged RTN alarms while unit is in Normal state. 4 = Clears unacknowledged RTN alarms between alarm calls. Clears acknowledged RTN alarms while unit is in Normal state.	See also Code 981	G.2
924	Initiates test callback to phone # 00			unit must be ARMED	6.2.18
925 0/1	Turns on/off alarm acknowledgment on call-in to dialer.	ON	0/1 0 = OFF 1 = ON		5.1
926 V	Sets delay before return to normal (Exit Delay) to V	2 min	1-99.9 min	Nonrecurring Function	6.2.18
927 0/1	Sets intercall delay parameter	0	0/1 <u>Values:</u> 0 = Normal operation of intercall delay. 1 = If new Unacknowledged alarms occur during the intercall delay period, the unit will begin a new dialout immediately. The unit will dial the next phone number in the dialing sequence. It will not start over at the top of the list.	** Firmware version 2.01+ only**	
928 N	Extends length of inserted dialing delays to N sec	1 sec	1-10 sec		5.7, 6.2.7
930 0/1	Sets arm or disarm unit for alarm callouts	armed	0/1 0 = disarms 1 = arms unit		6.2.18
932	Invokes one-time 15-second listening period	OFF			6.2.18
933 0/1	Sets local microphone ON or OFF	OFF	0/1 0 = OFF 1 = ON		6.2.18
934 0/1	Sets speaker ON or OFF	ON	0/1 1 = ON 0 = OFF	6	6.2.18

*Programming Code (Page 7 of 7)*

<i>Code</i>	<i>Description &amp; Comments</i>	<i>Default</i>	<i>Range/Values</i>	<i>Notes</i> <i>See p. 6-2</i>	<i>Section</i>
<b>Clear Out Operations</b>					
935 0	Clears out phone numbers; sets all delays to defaults				6.2.19
935 1	Clears out phone numbers only				6.2.19
935 2	Clears out all alarm call grouping linkage				6.2.19
935 3	Sets the following delays to their factory default values: 902, 903, 904, 920, 921, 926, 928			921 sets power failure alarm ON	6.2.19
935 4	Clears all user recorded messages				6.2.19
935 5	Clears all programming except messages			does not clear 913, 930, 941, 942	6.2.19
935 6	Clears all totalizers to 0 (not to preset) reading				6.2.19
935 7	Clears real-time clock chip (reinitialize)		1/6/92 2		6.2.19, 8.9
935 9	Total clearout: Erases all programming and messages	All programming goes to default		does not clear 941, 942	6.2.19
935 911	Completely reboots the unit	All programming goes to default with the exception that Auto Tone/Pulse Selection will occur.		does not clear 941, 942	3.1, 6.2.19
<b>Diagnostic Readouts</b>					
940	Reads all 4 diagnostic counts (add 0 to clear all 4)				6.2.20
940 1	Reads call in count (add 0 to clear)				6.2.20
940 2	Reads dial out count (add 0 to clear)				6.2.20
940 3	Reads acknowledged alarm count (add 0 to clear)				6.2.20
940 4	Reads power failure alarm count (add 0 to clear)				6.2.20
<b>Local Alarm/Line Seizure</b>					
960 0	Read local alarm relay/line seizure				E.6, E.7
960 00/01	Set local alarm relay/line seizure 00 = local alarm relay 01 = line seizure	00	00/01		E.6, E.7

**6.2****Programming Operations**

The following descriptions show the relevant program codes in parenthesis, and are organized according to their appearance in the preceding Program Codes table located in Section 6.1, "Program Codes."

Refer also to Section 5, "Using Your Verbatim Gateway Autodialer," for a description of over-the-phone programming, etc.

### 6.2.1

## Channel Status Reading

Code	Function	Description
0 ZZ	Read Status of Channel ZZ	Plays the message that corresponds to the present input condition of Channel ZZ.
0 ZZ 0	Read Open/Closed Circuit Status Directly	Says "Channel ZZ is closed" if channel ZZ input is presently Closed Circuit, or "Channel ZZ is open" if the input is Open Circuit. Useful in troubleshooting, especially at setup time.



### Note:

If a channel is disabled, its status will never be mentioned.

### 6.2.2

## Message Recording and Reviewing

Be sure to refer to Section 4, "Record Voice Messages," for important details on message recording, including codes 911, 912, 913, and 914.

Code	Function	Description
100	Record Station Message	
1 ZZ	Record Channel ZZ Alarm Message	Used for Open Circuit message for channels programmed for NO ALARM (status only), or for Run Time Meter operation. Also used for a preamble message for channels programmed for Totalizer or Analog function.
2 ZZ	Record Channel ZZ Normal Message	Used for Closed Circuit message for channels programmed for NO ALARM (Status Only) or for Run Time Meter operation. Also used for "units of measure" portion of a message following preamble and digit readings, for channels programmed for Totalizer or Analog function.
3 ZZ	Review Channel ZZ Messages	Use 3 00 to review Station ID message

### 6.2.3

## Channel Programming (Configuring)

Also see Section 3.3, "Programming Input Channels."

Code	Function	Description
500	Set Present Input Status as Normal Condition for All Contact Input Channels	Used at setup time as the most expedient way of programming the Normally Open/Normally Closed configurations ("Alarm Criteria") of contact input channels. Special configurations such as No Alarm/Status Only, Run Time Meter or Totalizer may then be programmed for specific individual channels. This code does not affect channels already programmed for No Alarm/Status Only, Run Time Meter, or Pulse Totalizer. <b>APPLIES ONLY TO CONTACT INPUTS.</b>



Code	Function	Description
500 1	Sets the Alarm Criteria for all contact channels to NORMALLY CLOSED	Same as above
500 2	Sets the Alarm Criteria for all contact channels to NORMALLY OPEN	Same as above
500 3	Sets the Alarm Criteria for all contact channels to STATUS ONLY	Same as above
5 ZZ	Read Channel ZZ Programming ("AlarmCriteria")	
5 ZZ 0	Disables Channel from Being Monitored and Reported	
5 ZZ 1	Set Channel ZZ for Normally Closed Operation	An Open Circuit condition will cause an alarm. <b>APPLIES ONLY TO CONTACT INPUTS.</b>
5 ZZ 2	Set Channel ZZ for Normally Open Operation	A Closed Circuit condition will cause an alarm. <b>APPLIES ONLY TO CONTACT INPUTS.</b>
5 ZZ 3	Set Channel ZZ for No Alarm (Status Only)	<b>APPLIES ONLY TO CONTACT INPUTS.</b>

## 6.2.4 Run Time Meter Programming

You may program any of the ordinary contact (digital or discrete) input channels to accumulate and report the number of hours that their respective input circuits have been closed. Any such channels will never cause an alarm, but on inquiry will recite the channel's Closed Circuit message or the Open Circuit message according to the status of the input, and will then report the accumulated Closed Circuit time (run time) to the tenth of an hour.

- ◆ To program channel ZZ for Run Time Meter operation, press:

5 ZZ 4 ENTER

- ◆ To preset a starting value, press:

5 ZZ 4 V ENTER

where V may be any value from 0 to 99,999.9.

- ◆ To delete the Run Time Meter programming, you must reprogram the channel for any other type of alarm criteria.

As with channels programmed for NO ALARM (Status Only) operation, the default Open Circuit message is “Channel N is off.” To record your own Open Circuit message for channel ZZ, use program code 1 ZZ. The default Closed Circuit message is “Channel N is on.” To record your own Closed Circuit message for channel ZZ, use program code 2 ZZ.

## 6.2.5

### Pulse Totalizer Function Programming

The Totalizer function counts the accumulated number of pulses (momentary contact closures) occurring at the contact input for a channel which you have programmed for Totalizer operation. This function is typically used to accumulate the pulse output of rotary flow meters.

An alarm set-point may be programmed to create an alarm call upon reaching a particular total value. Scale and offset factors are programmable, and user-recorded messages may be used.

Any contact input channel may be programmed for the Totalizer function, up to a total of 8 Totalizers. The input pulse rate must not exceed 100 pulses per second, and if the rate is over 50 pulses per second, the pulses must have a 50% duty cycle.

- ◆ To program channel ZZ for Totalizer operation, press:

5 ZZ 7 ENTER.



#### **Note:**

This function must be done to Activate the Totalizer. It is only possible to program up to 8 contact input channels for Pulse Totalizer. However, any 8 inputs may be used from the full set of contact inputs in your unit.

- ◆ To establish a non-zero starting value for the spoken reading, add the desired starting spoken value after the 7 and before ENTER.
- ◆ To establish a scale factor (so that a number of pulses will be translated into a single spoken unit count), press:

5 ZZ 8 N ENTER

where N is the number of pulses corresponding to a single spoken unit count. For example, if a pulse from a flow meter occurs for each 1/10 gallon of water flow, but the desired report is needs to be in thousands of gallons, a value of 10,000 would be used for N. The unit uses the word “percent” in speaking of the scale factor.

The spoken scaled value will “roll over” to zero upon reaching 4,294,967,294 ( $2^{32}$ ). Values above this should not be entered at the keyboard.

The default message for Totalizer channels is “Channel N Totalizer count is N.” User-recorded messages are normally done in two segments. Use program code 1 ZZ to record a preamble message such as “The total water flow reading is”. Use program code 2 ZZ to record an ending units-of-measure message such as “thousand gallons”. During the report, the unit will insert the digits comprising the actual scaled value. In this example, the resulting complete report would be “The total water flow reading is (spoken value) thousand gallons”.

- ◆ To establish a Totalizer alarm set-point, press:

5 ZZ 6 N ENTER.

When the scaled value reaches N, the unit will go into Unacknowledged Alarm and begin dialing. After the initial alarm has occurred, a new alarm will not occur until the user has reset the criteria. You may program a value of zero for N to cancel any previously programmed Totalizer alarm set-point for channel ZZ.

- ◆ To clear out all Totalizer readings to zero in one step, press:

9 3 5 6 ENTER.

## 6.2.6

### Alarm Trip Delays

The Alarm Trip Delay is the length of time after a violation occurs before the unit goes into Unacknowledged Alarm and begins dialing. The default value is 2 seconds for all inputs and 0.1 minute for power failure. During this time, if a status is read, the message will be the ALARM message, with the extra word “alert” appended. If the violation is corrected before the Alarm Trip Delay times out, no alarm or dialout will occur.

There are two ways to change this Alarm Trip Delay: global (common for all channels except power failure) programming, and individual programming for each channel and power failure.

- ◆ To program a new global Alarm Trip Delay, press:

9 0 2 V ENTER

where V is a value consisting of 1 to 4 digits, between .1 and 9999.9 seconds. For example, possible entries include .1, 5, 5.1, and 600.1 (seconds).

- ◆ If you wish to program a new Alarm Trip Delay for an individual ZZ channel, press:

6 ZZ V ENTER

- ◆ To set a different Power Failure Trip Delay, press:

6 00 V ENTER (code 920 does the same thing)

- ◆ To turn off the Power Failure Alarm function, press:

9 2 1 0 ENTER

- ◆ To turn on the Power Failure Alarm function, press:

9 2 1 1 ENTER



### **Note:**

The global code 902 overrides any previously set individual channel Alarm Trip Delays. Therefore, if you wish to establish a different global Alarm Delay and also program selected inputs for still different individual trip delays, perform the global programming first, and then any individual trip delay programming.

The default trip delay is 2 seconds for the contact channels and 6 seconds (.1 hour) for power failure. If you are getting a lot of "nuisance" alarms, with a call saying, "alarm now normal," you might think about setting the alarm trip delay up a bit. A good example of this would be the power fail trip delay. In some areas of the country, it is very common to have short periods of power failure -- ten seconds or less. These may not be of particular concern, so setting the power fail trip delay to .2 or .3 hours could save unnecessary phone calls.



### **Caution:**

When leaving program mode all timers for unacknowledged alarms and violations will be reset.

## **6.2.7**

### **Phone Numbers and Pulse/Tone Dialing**

Also see the section 6.2.13, "Alarm Call Grouping," and Section 3.1, "Starting Up and Clearing the Unit."



### **Note:**

DN is the 2-digit Designation Number: 01 for the first phone number, 02 for the second number, up to 16 for the 16th phone number.

Refer to Programming Worksheet A. Write down each phone number you wish to program, along with a person's name, for future reference.

- ◆ To program the first phone number to be dialed on alarm, press:

7 01 (then the complete phone number) ENTER.

- ◆ To program the second phone number to be dialed on alarm:

Use code 7 02 in place of 7 01, progressing to a maximum of code 7 16 for a 16th phone number.

Each phone number may be up to 60 digits in length. Be sure to include any necessary area codes or "1" prefixes.

- ◆ To erase phone number DN, press:

7 DN POINT ENTER

- ◆ If you need Touch Tone dialing, press:

9 01 1 ENTER

- ◆ For high speed dialing, press:

9 01 2 ENTER



### **Caution:**

"High speed dialing" may not work reliably with some older telephone company exchanges.

- ◆ To switch back to pulse dialing, press:

9 01 0 ENTER

- ◆ To insert delays between dialed digits (e.g. after a leading "9" in PBX systems), in the programming process, press the MINUS key once for each one-second delay desired. To extend the length of each delay beyond 1 second, press:

9 28 N ENTER

where N is the number of seconds of delay desired for each delay invoked with the MINUS key.

## **6.2.8**

### **Enhanced Telephone Interface Features**

The Enhanced Telephone Interface features give the user additional power to solve unusual telephone system interface problems and to provide more reliable and expeditious notification of alarms.

The Enhanced Telephone Interface Features include the following functions:

- ◆ 60 Digit Phone Numbers - See Section 6.2.9
  1. For all 16 telephone numbers and the call-back number.
- ◆ Telephone Line Fault Detection (Phone Fault) - See Section 6.2.10
  1. Tests phone line at regular programmed interval
  2. Flashes TFAIL LED on dialer front panel upon failure
  3. Logs Phone Faults and phone line restoration to Local Printer

- ◆ Automatic Selection of Tone versus Pulse Dialing - See Section 6.2.11
  1. Tests for tone capability upon power up without user intervention
  2. May be overridden for PBXs with “non-standard” dialtones
- ◆ Call Progress Monitoring (CPM) - See Section 6.2.12
  1. Detects busy and ringing signals
  2. Waits until phone is answered to annunciate voice reports
  3. Abandons call if busy or no answer and tries next number in 30 seconds.
- ◆ Numeric Pager Support - See Section E-10
  1. Designate Pager only numbers - no voice annunciation
  2. Insert pager system terminator characters such as ‘#’ or ‘\*’
  3. Insert DTMF A, B, C & D tones in phone number strings for unique IDs
- ◆ PBX Support - See Section E-10
  1. Ignore “non-standard” PBX dialtones
  2. Insert “wait for outside line” dialtone into phone number strings

The Enhanced Telephone Interface Features are included on Verbatims and Verbatim Gateway autodialers with a mainboard Revision of VMP-5a and above and firmware revisions 2.09 and above.

Contact your RACO Representative about upgrading if the Enhanced Telephone Interface is required.

## **6.2.9 60 Digit Phone Numbers**

Telephone numbers may be as long as 60 digits. This allows, for instance, the Verbatim Gateway autodialer to make calls using long distance companies which require entry of access codes. Even with many digits occupied by long distance numbers and access codes there will still be sufficient digits remaining for calls to pager systems requiring complex sequences of terminators, ID numbers, time delays, tone detects, etc.

## **6.2.10 Telephone Line Fault Detection (Phone Fault)**

The Phone Fault Detection feature tests the telephone line whenever the unit needs to make a phone call and at a regular programmable time interval (as long as there are phone numbers programmed).

Phone Fault is turned OFF by default but may be enabled if so desired. Also, the Phone Fault Detection interval is user programmable.

The command code 916 is used to set the Automatic Phone Fault Detection interval. This time interval can range from 0.1 hour to 24 hours. The factory default setting is 0/OFF. Enter the command 916 followed by a value from 0.1 to 24.0 to program the Phone Fault Detection interval.

- ◆ For example, to set the Phone Fault Detection interval to 0.3 hour., enter:  
916 0.3

Whenever a Phone Fault is first detected, a Local Data Logger (LDL) message will be sent to the printer with date and time stamp. Additionally, the Phone Fault LED, labeled TFAIL, will begin to blink.

If a Phone Fault is detected at the beginning of an outgoing phone call the TFAIL LED will flash and the unit will return to the NORMAL state. Then, while still in the NORMAL state, the unit will continually check the telephone line every 30 seconds for restoration of the telephone service.

When telephone service is restored, a message will be sent to the Local Data Logger's printer and the TFAIL LED will go from flashing to solid ON. The Verbatim Gateway autodialer will then resume making any pending phone calls. The TFAIL LED will remain ON until a voice message about the Phone Fault is communicated via the phone or to an operator at the front panel by pressing the CHECK STATUS button. The TFAIL LED and pending voice annunciation of the Phone Fault condition may also be cleared at the front panel by pressing the DISARM/RE-ARM button twice. No Phone Fault Detection will be performed if there are no phone numbers programmed.

If the unit needs to make an alarm call when there is a Phone Fault the numbered channel LEDs will blink continuously even though the unit is in the NORMAL state. This unusual condition will only be seen while there is a Phone Fault and the unit is constantly testing for the return of telephone service.

## 6.2.11

### Automatic Tone/Pulse Selection

The unit automatically tests for the ability to use tone dialing. The automatic tone/pulse selection is done when the power is turned on, after programming 935 911, and when jumper blocks JB3 or JB5 are shorted together. Note that 935 911 and shorting JB3 pins will erase programming.

If the dialing mode (901) has been programmed, cycling power or shorting the pins at JB5 will not change the dialing mode programming.

Clearing programming using 935 9 will set the dialing mode to pulse.

## 6.2.12

### Call Progress Monitoring (CPM)

Call Progress Monitoring (CPM) operates by listening for the presence or absence of busy and ringing signals. These are the same signals you hear after you dial a phone number. Proper operation of CPM requires that the busy and ringing signals are composed of standard Call Progress frequencies.

The possibility exists that CPM may not function properly because the CPM tones on a particular phone system are not standard.

Unlike other equipment with Call Progress Monitoring, CPM on the Verbatim Gateway autodialer does not include detection for the dial tone at the beginning of the dialout session. However, dialtone detection is an integral part of Phone Fault Detection. This allows CPM to be operational even when the Verbatim Gateway autodialer is installed inside of a PBX phone system which has a non-standard dialtone.

CPM is intended to detect the following phone line states:

- phone line is busy - both subscriber and trunk busy signals are detected
- non-existent phone number
- phone unanswered - still ringing
- phone answered - ringing stopped

When CPM determines that a call is not complete, an appropriate report will be sent to the local printer.

Reasons for a non-completed call:

- CPM determines the line is busy
- CPM does not detect cessation of ringing before end of programmed CPM ring count
- CPM does not detect either busy signal or valid ring signals

Reason for a completed Call:

- CPM detects at least one ring followed by cessation of ringing

If a call is not completed, the Verbatim Gateway autodialer will disconnect the call and enter the intercall delay state. At the end of the intercall delay, the next programmed telephone number will be dialed.

When a call is not completed, the intercall delay will always be shortened to 30 seconds. This CPM altered intercall delay is fixed at 30 seconds and is not affected by the user-programmed intercall delay. The normal programmable intercall delay will apply only to the delay between completed calls.



Call Progress Monitoring is set to ON by factory default. If CPM is OFF the Verbatim Gateway will deliver voice messages without regard to any ringing or busy signals. This unit will simply dial the number, then after a short delay, start annunciating voice reports.

As noted above, dialtone detection is actually a part of the Phone Fault Detection feature. It is possible to have CPM turned OFF and Phone Fault Detect turned ON. In this case, the unit will test for a dialtone but not for busy or ringing signals.

Use code 900 to read or set CPM programming. Use code 900 followed by a 1 or 0 parameter to program CPM ON (1) or OFF (0).

The CPM ring count is the number of rings Verbatim Gateway autodialer will wait for an answer before considering the call to be incomplete. Use code 918 to read or set the number of CPM rings. The factory default is 10 rings and the user may program any number of rings from 5 to 20.

- For example, to program the CPM ring count to 10 rings, enter:

918 10 then ENTER

## 6.2.13

### Alarm Call Grouping

This is a programming step that “links” selected channels to selected dialout phone numbers, so that when a given channel goes into alarm, only the phone numbers “linked” to that channel will be dialed. Ordinarily, an alarm on any channel will cause dialing of the entire list of phone numbers.

Alarm Call Grouping is typically done when certain channels are associated with a specific category of personnel, such as electrical, plumbing, security, etc. However, Power Failure to the Verbatim Gateway autodialer causes dialing of all phone numbers. If you need to limit Power Failure alarm calls to selected numbers:

1. Turn off the regular Power Failure alarm function using code 9 2 1 0, (described below)
2. Then connect an unused input channel for power failure monitoring, using the contacts of a relay.



#### **Warning:**

Command tones 1, 2, 3, and 4 will acknowledge all alarms, even those not in their Alarm Call Group (ACG). See Section 6.2.13. Command tones will acknowledge only alarms in their ACG. Command tones 0, 5, 6, 7, and 8 will not acknowledge any alarms, but will give the status of all alarms.

To program for Alarm Call Grouping:

1. Enter your phone numbers. It is important to first write in your entire list of phone numbers on Programming Worksheet A in Appendix B.



**Note:**

There is a 2-digit “Designation Number” on the Worksheet associated with each phone number (01 for the first number, etc.). This number corresponds with the 3-digit program code for entering phone numbers (701 for the first number, etc.).

2. Group them by using code 5 ZZ 9 DN. Begin by filling in Programming Worksheet B in Appendix B.

Refer to the filled-in examples for guidance. The right-hand column will now contain the actual program code strings which you should now enter, terminating each string entry with the ENTER key.

For example, to link channel 1 to the second and fifth phone numbers, following the filled-in example, you would press:

```
5 01 9 02 05 ENTER
```

3. Phone numbers will always be dialed in ascending order of the 2-digit Designation Numbers, regardless of their order in your program code entry. Note that an alarm on any channel that is not “linked” with a program code entry will cause dialing of the entire list of phone numbers.
4. If an alarm call is not acknowledged, after the intercall delay, the next phone number on the phone list will be called. Because of this pattern, you may want to alternate the call group numbers.

For example, let's say that channel 1 calls phone numbers 02 and 06. We'll call that group 1. Channel 2 calls phone numbers 04 and 08, which we'll call group 2. Channel 3 will not be programmed in a call group so it calls all phone numbers. If channel 2 goes into alarm, phone number 04 (group 2) will be called. If the alarm is not acknowledged and an alarm occurs on channel 1, after the intercall delay, phone number 06 (group 1) will be called. If that alarm is not acknowledged and channel 3 should then go into alarm, phone number 07 will be called. If that alarm is not acknowledged, then phone number 08 (group 2) will be called again. The numbers dialed will continue down the phone list until all of the programmed phone numbers are called. The calls will then start at the top of the phone number list.

If the alarm call is acknowledged, the unit will immediately start calling the call group numbers at the top of the phone list.

- ◆ To read the linkage programming on channel ZZ, press:  
5 ZZ 9 ENTER
- ◆ To “un-link” channel ZZ so that it again calls all phone numbers, press:  
5 ZZ 9 POINT ENTER
- ◆ To undo all existing linkage on all channels, press:  
9 35 2 ENTER

**Note:**

Alarm Call Grouping is incompatible with RTN (981 1) calling. They both cannot be used together, or unexpected calls will result.

## 6.2.14 Alarm Ready Scheduling

Refer to Section 8, "Using the Alarm Ready Schedule Feature," for use and application information.

## 6.2.15 Local Data Logging Programming Codes

Refer to Chapter 2, "Installation," for use and application information.

## 6.2.16 Analog Input Programming

Refer to Appendix F, "Analog Signal Input, Remote Supervisory Control Output, and Printer Options," for use and application information.

## 6.2.17 Remote Supervisory Control

Refer to Appendix E, "Analog Signal Input, Remote Supervisory Control Output, and Printer Options," for use and application information.

## 6.2.18 Miscellaneous Programming Tips

### (903) Time Between Alarm Call Outs

This is the length of time after ending one alarm call-out and before beginning the next call-out. Default value is 2 minutes; range is 0.1 to 99.9 minutes.

- ◆ To program a different number of minutes V, press:  
9 03 V ENTER

**(904, 922) Alarm Reset Time**

This is the length of time after acknowledgment before a given channel (or Power Failure) is automatically reset to a clear condition, ready to act on a new alarm condition. Refer to the diagram “Anatomy of an Alarm” in Section 5, “Using Your Verbatim Gateway Autodialer,” for a depiction of the various events involved in association with the Alarm Reset Time. Default value is 1 hour; range is 0.1 to 99.9 hours.

- ◆ To program a different number of hours V, press:

9 04 V ENTER

- ◆ To turn the Alarm Reset Timer function off, press:

9 22 0 ENTER

**Caution:**

You should not turn the alarm reset timer function off under normal circumstances because once a given channel's alarm has been acknowledged, it would never again cause an alarm call out.

- ◆ To turn the Alarm Reset Timer function on again, press:

9 22 1 ENTER

**(905) Clear All Acknowledged Alarms and Alarm Reset Timers**

Especially during setup and testing, it is useful to be able to re-trip an alarm after it has previously been tripped and acknowledged, without having to wait for the Alarm Reset Time to expire.

- ◆ To perform this clear out, press:

9 0 5 ENTER

At the panel, the same result may be more easily obtained by pressing DISARM/RE-ARM to disarm the unit, then pressing it again to rearm the unit.

**(906) Ring Answer Delay**

Represents the number of rings required when calling the Verbatim Gateway unit, before the unit will answer. A long ring delay might be programmed if you wish personnel to have the opportunity to answer a regular telephone on the same line, before the Verbatim Gateway autodialer would answer. Default value is 1 ring; range is 1 to 20 rings.

- ◆ To program a different number of rings N, press:

9 06 N ENTER

### (907) Number of Alarm Message Repeats

Represents the total number of times each message or set of messages is spoken during each alarm call out. Normally a value of 3 repeats (strictly speaking, the alarm message plus 2 repeats) should be programmed. The reason for this is that there needs to be adequate message recital time to allow adequate time to answer the phone call and hear at least one complete set of messages. Default value is 3 repeats; range is 1 to 20 repeats.

- ◆ To program a different number of repeats N, press:

9 07 N ENTER

### (908) Autocall Test Function

The Autocall Test Function causes the unit to place test calls at regular intervals for the purpose of ongoing verification of Verbatim Gateway autodialer and phone line functioning. Calls are placed only once for each interval, to each regular phone number programmed (7 01 through 7 16). The exception being the acknowledgement of a test call, where additional calls will not be placed for that time interval. Each call gives the station ID message and a statement that this is a test call, plus a report of all inputs.

- ◆ To turn this function on, press:

9 08 1 ENTER

- ◆ To turn it off, press:

9 08 0 ENTER

The first series of calls begins as soon as the Autocall Test Function is turned on. Therefore, if you want the unit to call at 5 PM each day, you will need to turn this function on at that time. The default interval is 24 hours; range is 0.1 to 99.9 hours.

- ◆ To program a different interval V, press:

9 09 V ENTER



#### **Note:**

If the Verbatim autodialer is in the disarmed mode, call-outs/autocalls will not be made.

### (910) Security Access Code

Once you establish a Security Access Code, unauthorized personnel are prevented from altering your programming or messages over the phone without first entering the Access Code. This does not affect programming access at the panel.

- ◆ To establish an Access Code N of up to 8 digits, press:

9 10 N ENTER (at the panel)

Once established, whenever you press a Command Tone 1 at the prompting beep, the unit first prompts you to enter the Access Code before allowing you to perform programming or message recording operations. You may still read existing programming without using the Access Code by pressing a Command Tone 2 at the prompting beep. However, the Access Code itself cannot be read over the phone.

- ◆ To delete the Security Access Code so that no code is required in order to perform over the phone programming, press:

9 1 0 POINT ENTER (at the panel) **ONLY**

### **(921, 930) Power Failure Alarm Function ON/OFF; DISARM/RE-ARM All Alarms**

- ◆ To turn off the Power Failure Alarm function, press:

9 21 0 ENTER

- ◆ To turn the Power Failure Alarm function on again, press:

9 21 1 ENTER

- ◆ To disarm the unit, preventing any alarm call outs, press:

9 30 0 ENTER

- ◆ To rearm the unit, press:

9 30 1 ENTER

At the front panel, the same result is more easily obtained by using the DISARM/RE-ARM key.

### **(700, 924) Callback/Callforward**

This feature causes the unit to dial a special “zeroth” phone number on command. This is typically initiated over the phone, causing the unit to call back to the person who invoked the command, in order to verify the ability of the unit to successfully dial out. The unit gives a status report of all channels as part of this call.

- ◆ To program this special callback number, press:

7 00 (then the complete phone number) ENTER

- ◆ To initiate the actual dialing, press:

9 2 4 ENTER

If you have executed this command over the phone, the unit will advise you that it will be calling the callback number in 15 seconds. Then it will end the current call in preparation for placing the callback call. If you have executed this command at the front panel, the dialing will occur immediately.



**Note:**

If the Verbatim Gateway autodialer is in the disarmed mode, call-outs/autocalls will not be made.

**(926) Delay Before Return to Normal (Exit Delay)**

Sometimes it is desirable to prepare the unit for the ability to detect violations and dial out, but with an “exit delay” that allows the user time to exit or remove temporarily existing alarm violations before the unit becomes active.

To set delay before Return to Normal:

1. Press:

9 26 V ENTER

where V is the desired delay in minutes (range 1.0 to 99.9 minutes).

2. Then press DISARM/RE-ARM if necessary to extinguish the flashing DISARMED legend light. However, do not press NORMAL, but instead leave the unit in PROGRAM mode, with the PROGRAM light illuminated. The unit cannot go into alarm while in PROGRAM mode.

When the delay period times out, the unit will automatically return to NORMAL mode and will then be ready to act on any alarm violations that occur after that time. This code must be re-entered each time you wish an exit delay, since the delay value automatically returns to the default value of 2 minutes upon timeout.

The 2 minute default value provides protection against the possibility that someone might walk away leaving the unit in PROGRAM mode, or perhaps hang up the phone after performing over-the-phone programming without properly ending the call.

**(932, 933, 934) Microphone and Speaker Operation**

If you enable the front panel microphone using program code 933 as described below, the microphone will be automatically activated for a 15 second listening period at the end of each alarm or on an inquiry call after entering Remote Program Mode (press 1 at prompting beep) press # #, allowing you to hear the sounds near the unit from a remote telephone.

An additional prompting beep is issued at the end of this listening period, allowing you to postpone tone acknowledgment until after the listening period.

- ◆ To turn this function on, press:

9 33 1 ENTER

- ◆ To turn this function off, press:

9 33 0 ENTER

- ◆ To turn microphone on for a one time listening period, during any phone call, enter Remote Program Mode (press 1 at the prompting beep) and then enter:

9 3 2 # #

- ◆ To turn off the speaker so that neither alarm call or inquiry call activity is heard at the unit, press:

9 34 0 ENTER

The speaker will still be heard when operating keys at the front panel.

- ◆ To turn the speaker on again, press:

9 34 1 ENTER



### **Note:**

The speaker volume may be adjusted via the trimpot marked SPKR VOL shown on the Electrical Connection Diagram. See Section G.1, "Adjusting Internal Speaker Volume."

## **6.2.19**

### **Program Clear Out Operations**

The following list of program codes provides a flexible variety of operations to conveniently clear selected programming items in order to allow for a fresh start.

Code	Function
935 0	Clears out phone numbers; sets all delays to default.
935 1	Clears out phone numbers only.
935 2	Clears out all alarm call grouping linkage.
935 3	Sets the following delays to their factory default values: 902, 903, 904, 920, 921, 926, 928 (921 sets power failure alarm ON)
935 4	Clears all user recorded messages.
935 5	Clears all programming except messages. (Does not clear 913, 930, 941, and 942)
935 6	Clears all Totalizer counts to zero.
935 7	Clears and initializes clock.
935 9	Total clear out (Does not clear 941 and 942). All features go to the default values.

*Continued on next page*



Code	Function
935 911	Completely hardware and software reset. All features will go to the default values with the exception that an automatic Tone/Pulse Selection will occur.

**Caution:**

Code 9 35 9 erases all programming and messages. 935 9 and 935 911 can be performed over the phone, however, a 935 911 will hang up the phone without saying, "Goodbye." When the unit is called back it will answer the call.

**6.2.20****(940) Diagnostic Readouts**

To assist in analyzing the way the unit is operating, the following list of diagnostic count codes is provided.

Code	Function
940	Reads all 4 diagnostic counts (add 0 to clear all 4)
940 1	Reads Call In Count (add 0 to clear)
940 2	Reads Dial Out Count (add 0 to clear)
940 3	Reads Acknowledged Alarm Count (add 0 to clear)
940 4	Reads Power Failure Alarm Count (add 0 to clear)
940 0	To Clear all Counts

**6.2.21****Personnel Identification Numbers (48)**

The personnel identification number (PIN) feature is provided as a way both to limit telephone access to the Verbatim Gateway Autodialer and to provide an audit trail of acknowledgments. The use of PINs is always optional, and the default configuration omits them. PINs do not alter operations of the programming mode security feature (code 910) in any way.

Each authorized operator is assigned a unique PIN to identify them. This PIN will appear in the printed reports of telephone sessions and alarm acknowledgments. See Section 7.8.6 for programming information.

**6.2.21.1****PIN Operations**

A PIN consists of 1-5 digits. It is not possible to use any letters or other symbols. Up to 32 distinct PINs may be configured. The configuration commands for creating, erasing, and listing PINs are detailed in section 7.8.6. For security, those commands are only accepted at the front panel.

Once any PIN has been configured, then all over-the-phone sessions will require entry of a valid PIN. The session begins with the station ID message followed by a prompt to enter a PIN. The entry is made by pressing the DTMF keys, followed by the double pound-key termination.

This prompt is given a maximum of three times at 10 second intervals. If no valid PIN is entered, the autodialer says *goodbye* and then hangs up. The calling sequence then proceeds as if the call had not been answered at all.

If a valid PIN is entered, that event is logged and the session continues as standard. Entry of the PIN does not automatically acknowledge anything. Use of the usual DTMF tones is still required. Any acknowledgments during the session will cause that operator's PIN to become associated with the acknowledgment status of the channel. That PIN will then be printed as part of any subsequent LDL status reports. Voice status reports omit this PIN information.

Only the most recent PIN to have acknowledged a channel (either ALARM or RTN) will be logged. Any operator working from the front panel is always given the PIN of 00000. Standard operations may be restored at any time by clearing all PINs (code 48\*).

### 6.2.21.2

#### Log Output Examples

The following text provides a sample of the LDL output when PINs are active. All PIN-specific entries are shown in boldface italics. The first segment shows a sample alarm session:

ALARM MODE 13:39:10 Mon. 8/14/95

Alarm session with phone #1. # is 1. 13:39:16 Mon. 8/14/95

***Valid PIN 50000 entered 13:39:39 Mon. 8/14/95***

CHANNEL	STATUS
-----	
1	ALARM
2	ALARM
3	ALARM

Acknowledgment for linked alarms via phone #1(1) ***PIN was 50000.***  
13:39:46 Mon. 8/14/95

HUNG-UP at 13:39:47 Mon. 8/14/95

NORMAL MODE at 13:39:47 Mon. 8/14/95

This next segment shows a sample phone-in session. Note that the PIN '00000' indicates operator acknowledgment from the front panel.

CALL-IN MODE 13:41:52 Mon. 8/14/95

Valid PIN 50000 entered 13:42:02 Mon. 8/14/95

CHANNEL	STATUS
---------	--------

-----

1	ALARM, Acknowledged <b>by PIN 50000</b>
---	---

2	ALARM, Acknowledged <b>by PIN 00000</b>
---	---

3	ALARM, Acknowledged <b>by PIN 40032</b>
---	---

4	NORMAL
---	--------

HUNG-UP at 13:42:19 Mon. 8/14/95



# 7

## Industrial Network Interface

This chapter discusses the industrial networking interfaces of the Verbatim Gateway Autodialer. Section 7.1 provides a general overview of this functionality and capabilities. Section 7.2 describes operations and applications at a conceptual level. The actual steps for installation and configuration are presented in sections 7.3 through 7.5. The remaining sections contain further technical information for more detailed references.

If the reader is not already familiar with the basic Verbatim operations, please take the time now to review the previous sections of this manual. The discussion will also use many technical terms specific to industrial network operations. If any of these are unfamiliar, please refer to the Glossary or Index.

### 7.1

## Overview

Previous chapters have discussed the alarm monitoring and notification capabilities of the Verbatim Gateway Autodialer. The discussion there centered on inputs and outputs whose sources are physical sensors hardwired directly into the unit. This configuration works extremely well in many situations.

Other applications arise where the IO points are already wired to some other device, such as a Programmable Logic Controller (PLC). Sometimes the points to monitor exist only in the registers or data tables of such devices. It is either inconvenient, expensive or impossible to duplicate these points by wiring them into an autodialer. The ideal solution would have an industrial network that allows PLCs and other devices to share their data.

Fortunately, most PLC manufacturers do support and encourage such networking with their products. One of the powerful and unique features of the Verbatim Gateway Autodialer is its extensive support and compatibility with many of these industrial protocols.

All of the previously discussed features of the autodialer are brought to the industrial network arena. They allow convenient, inexpensive bidirectional communication with your PLC network via dial-up phone lines. So you can call in and check the status of any channel. Modify alarm conditions and set points. Alter process variables and monitor values. So you can be called and receive clear voice message reports of alarm situations.

The Gateway product may be easily integrated into an existing process. Points or data in any device anywhere on the network may be monitored. A single serial communications cable connection is all that is required. The Gateway automatically requests the information it needs from the other nodes. These can be any device that support the protocol, including PLCs, DCS and SCADA systems, or intelligent IO modules. No additional equipment or ladder logic reprogramming is necessary.

The Verbatim Gateway Autodialer brings three additional features that are specific to networked applications. The first of these is the ability to monitor the health of the network itself and trip alarms when communications break down. The second involves support for up to three simultaneous and distinct network connections. And the third is the ability to transfer data between any of these networks, automatically providing all necessary protocol conversions. The next section discusses all of this in more detail.

## 7.2 General Concepts and Operations

This section sketches Verbatim Gateway Autodialer operations in an industrial network environment. This information helps to understand specific applications and their limitations. It also provides motivation for the configuration sequences presented in later sections. Sections 7.3 through 7.8 provide complete instructions and examples for setting up a given application.

### 7.2.1 Remote Channel

The general mission for the autodialer is to use the industrial network to gather and monitor information about the occurrence of alarmable situations. The system provides monitoring of 32, 64 or 96 points. These points may reflect any combination of inputs, outputs, discrete, analog, timer, counter or other data objects. There are only 2 limitations:

- a point must consist of 1, 16 or 32 bits
- the point must be accessible using a supported network protocol.

Other terms with essentially the same meaning as *point* are *PLC register*, *data table location* or *channel*. It is helpful here to distinguish between two sorts of channels. A *physical channel* is a point from an IO module physically located inside of the autodialer. A *remote channel* is a point that exists in a remote device, whose value is obtained over an industrial network.

All channels, of either type, are assigned a number for identification. These channel numbers are used in command codes, alarm reports and status logs. They are also imprinted on the front panel LED display.

It is possible to have physical channels and remote channels with the same identification number. This was necessary in order to have backwards compatibility with other products in the Verbatim Autodialer line. The following conventions are used to avoid any ambiguity:

Command codes that begin with the digit '4' operate on a remote channel. Codes that do not begin with the digit '4' assume a physical channel. All reports that say, "remote channel x," are referring to the remote channel numbered "x." If the report just says "channel x," then it is referring to a physical channel. The front panel LED channel status display indicates physical channels with the letter **P**, and the remotes with the letter **R**. Since the total number of channels is greater than the number of LEDs, channels are combined into groups. An unacknowledged alarm for any channel in the group will cause the LED to blink.

## 7.2.2 Net Address

The Verbatim Gateway Autodialer supports up to three simultaneous and distinct network interfaces. Each network may have hundreds of nodes. Each node may have thousands of words of data. Any of which may be used as the point a particular RC is monitoring. A method for specifying any one of these millions of possible points is needed.

The autodialer solves this by re-inventing the notion of *net address*. A net address consists of separate elements. One specifies which of the three possible networks should be used. The next specifies which node on that net contains the point. Finally, the point within that node is specified. Those familiar with computer systems may see that the net address of a point is conceptually quite similar to the pathname of a file.

Explicit detail regarding net address formats may be found under section 7.5. These formats depend on what protocols are being used, the sorts of commands the nodes support, and can be complicated by internetwork routing.

Of necessity, net addresses tend to be rather lengthy. Since each RC monitors only one point, and each point has a unique net address, the RC number can serve as an abbreviation for the full net address in reports and commands. This works just the same as speed-dial numbers on certain telephones serve to represent much longer dialing sequences.

Once an RC has been configured with a net address, the autodialer is ready to monitor that point for alarm situations. It is also possible to interrogate the value of that point at any time, from either the front panel or over the phone. You may also write a value back to that point in order to remotely control the process.

### 7.2.3

## Data Type

The data type of the RC controls which alarm conditions are appropriate, how channel values are formatted, and how the user-recorded messages are used in reports. The determination of a channel's data type is simple: the net address determines the point, and the data type of that point automatically becomes the type of the RC. Changing the net address of a channel may change the type. If the type does change, then the alarm condition and messages may need to be changed as well.

If the net address specifies a single bit, then the RC is *discrete*. The only alarm conditions that may be applied are the codes 45zz1 and 45zz2. Report messages consist of either the alarm or normal message, depending on the channels' status. Values are always reported as either 0 or 1.

If the net address specifies 16-bit data, then the RC is *analog*. The only alarm conditions that may be applied are the codes 45zz5 and 45zz6. Report messages use the alarm message (code 41zz) as a preamble, followed by the channel value, followed in turn by the normal message (code 42zz). Values are always reported as an unsigned integer in the range 0-65535.

If the net address specifies a 32-bit point, then the RC is also analog. However, values are interpreted as a floating point number according to the IEEE specifications. Values always have 7 significant decimal digits and can range from 1.18 E-38 to 3.4 E+38.

### 7.2.4

## Differences Between Physical and Remote Channels

For the most part, the physical and remote channels behave the same. This includes the way normal and alarm messages are used in reports, the operation of alarm conditions, trip delays, phone call grouping, alarm reporting sequences, and just about every feature described in earlier chapters.

There are a few important differences. The following list summarizes them:

- Any RC may have any net address, and hence be any data type. Physical channels, always have a specific hardware connection and associated data type. RCs do not support runtime or totalizer functionality. These are best done within the PLC ladder logic.
- The value of an RC cannot be scaled. Such scaling needs to be performed within the PLC ladder logic. Floating point data type would then most likely be preferred.
- Physical analog channels can report high and low setpoint violation history. Remotes can not. Equivalent functionality may be obtained by configuring two RCs, each monitoring the same point, but with different setpoints.



- RCs can have the comalarm condition (section 7.2.7) and the network error alarm condition. Physical channels can't.
- The value of a discrete RC is reported as 0 or 1. The value of a physical RC is reported as ON or OFF and sometimes as OPEN or CLOSED. See Table 7.5.6.

### 7.2.5

## Network Polling Transactions

The points associated with each remote channel are continuously monitored for alarm situations. A request for the current value of the point is transmitted across the network to the appropriate node. That node then responds with the desired data. This transaction is referred to as *polling* the RC. The current value of that point is then compared against the alarm conditions.

These steps are then repeated for each RC. This entire process is referred to as the *RC scan*. The scan continues in an infinite loop. When an alarm condition violation is detected the autodialer begins its alarming sequence, as described in chapter 5. Even then the scan loop continues so that alarm situations may be registered as they subsequently arise.

Because the scan depends on transactions across the industrial network, alarming may be affected by various network failures. For example, a node may become disconnected or otherwise disabled. Other traffic on the network may cause arbitrary delays in the exchange of information packets. Ambient electrical disturbances can corrupt the information being transferred.

The Verbatim Gateway Autodialer has been carefully engineered to reliably detect and deal with these situations. Specifically:

- The protocol drivers all have state of the art error detection and correction algorithms, so data is guaranteed to be reliable.
- There are many timers and protocol-specific parameters to control traffic flow and adapt to specific networking environments.
- Polling delays for one RC will not delay the polling of other RCs.
- Failed communications for an extended period will trip an alarm.

### 7.2.6

## Scan Time and Channel Latency

Network applications must always be concerned with *bandwidth* and *latency*. The bandwidth available to the autodialer will determine how fast the scan loop can complete. In practice, the scan time will be a function of such things as baud rate, protocol overhead, network loading and contention for specific nodes. Typical values are 2-10 seconds.

The latency for a channel is a measure of how long it has been since the value for that point was updated. It is a function of the RC scan time, the response time of the remote node and the occurrence of communications glitches.

Command 49401 is available to report the actual time it took to complete the previous scan. At that moment, the latency for any non-comalarming RC will be less than or equal to this value. There is one exception to this statement: when the unit is first powered up, the latency for an RC may be as great as the time period elapsed since the unit was turned off.

## 7.2.7

### Failed Communication Alarms

Whenever an RC poll fails, for whatever reason, it becomes impossible to determine if that channel is in reality violating the alarm condition. Since most network problems are spurious and random, the next poll is likely to succeed. Persistent failures require some sort of notification. The term *comalarm* is used to distinguish this situation from alarms based on condition violations.

More precisely, an RC will register a comalarm violation whenever the following two conditions are met:

- The RC is configured with an alarmable condition
- The RC's latency exceeds the *comalarm trip delay* (see code 4907)

Once in violation, the comalarm condition must then persist for the alarm trip delay period before the alarm call sequence begins. The occurrence of a comalarm tells personell that there is a persistent network problem preventing access to channel data. It gives absolutely no indication of whether the point is violating the conditions or not. Still, for status reports, alarm calls, LED indicators and acknowledgments, a comalarm is treated just the same as regular alarms. A comalarm is annunciated as follows:

- If only one of many RCs configured on a given node are in the comalarm state, the message consists of *Remote Channel Number zz Communication Failure Code xxx*, where *zz* gives the channel number and *xxx* is one of the codes in section 7.7.5.
- If all RCs configured on a given node are in the comalarm state, the message is simplified to *Communication Failure at Node x*, where *x* is the given node.
- The comalarm message is not user recordable.

It is important that the comalarm not mask other alarm conditions that may appear once communications are restored. And vice versa, prior alarms must not mask comalarms as they arise. So, the following special rules apply:

- If the prior alarm is unacknowledged, the calling sequence continues.

- If the prior alarm was acknowledged, the alarm is immediately reset and the calling sequence begins anew.
- If the prior alarm condition had returned to normal and then later returned to the same type of violation as before, then the calling sequence is not impacted at all.
- At all times, regardless of history, reports will only mention the current condition.

The occurrence of comalarms ought to be a rare occurrence. If they happen often or without obvious reason (e.g. the cable is disconnected) then the timing and protocol parameters may need adjustment.

## 7.2.8 Remote Channel Interlinks and Network Bridging

It is possible to connect two remote channels together so that they act as an information pipe. One channel provides the source and the other the destination. Data is read from the source channel's net address and then written to the destination once per scan loop. The two channels are said to be *interlinked*.

The interlinked RCs may be on different nets. Any required protocol conversions are performed automatically. The user must be sure that the destination values are not overwritten by other sources, such as the ladder logic itself. There are several other configuration issues, detailed in section 7.8.5.

These interlinks may operate in one of two modes: data or alarm. The *data mode* simply pipes data directly between the channels. If the interlinked RCs have different data types, then specific conversion rules apply (see table 7.8.5.A).

With *alarm mode* the value at the destination reflects the alarm status of the source. Here the source data is first interpreted against the alarm conditions configured for the source. The results of this interpretation are then encoded into a 16-bit hexadecimal number as specified by table 7.8.5.B. Finally, this integer is written to the destination, where each bit may be interpreted by logic there.

There are many possible applications for these capabilities. One is the ability to bridge data across incompatible networks. Another is the ability to trigger conditions in other equipment, such as a DCS or SCADA system. A third is the ability to expand the IO capabilities of remote devices by exporting the autodialer's physical IO module data (see section 7.5.6 for how to address these channels). A fourth is to acknowledge back alarm conditions as they occur.

## 7.2.9

### Front Panel Usage

Chapter 2 provides a picture of the unit's front panel. Chapters 3, 4 and 5 describe the operation of many of the buttons and discuss the front panel LEDs. The paragraphs below describe usage of these that are specific to industrial networking applications.

Some operations require use of letters and other symbols in command code sequences. These letters are imprinted in white at the top of each key on the front panel. They are termed *upper case keys*. The **program/shift** key is used to determine the operation of these keys as follows:

- If the unit is not in program mode, depressing the **program** key will cause the unit to enter program mode.
- While in program mode, depressing the **program** key once will terminate any speech in progress and cause the word *shift* to be spoken.
- The next key press will speak and enter the upper case key symbol.
- Consecutive use of the **program** key without intervening key strokes acts as a toggle. Thus, pressing the key twice is the same as "unshift". The unit will only say *shift* every other press, when the upper case keys are activated.

There is one exception to the above. This involves the '\*' key. In lower case, the '\*' key is spoken as *point*. It is used to enter the '\*' character, a decimal point in numbers, or the point in command codes. In upper case, the '\*' key is spoken as *star*. This is used ONLY while entering a decimal point for an Allen Bradley net address.

All of this may seem rather confusing in print, but a short time practicing with the actual unit shows how easy it is to learn. In fact, all upper case keys except for the **X** key are used only for Allen Bradley net addresses. The **X** key is used only for entering floating point numbers using exponential notation. So, many applications will never require use of the shift key at all.

Any programming code that does not involve use of the shift key may be entered remotely, over the phone, using the DTMF keypad. Code sequences requiring the upper case symbols cannot be used remotely. See section 5.7 for further information about remote programming and the security access feature.



#### **Note:**

When entering commands over the phone, the DTMF '\*' key may be used the same as the front panel '\*' key, but the word *point* is not spoken.

## 7.2.10 Network Diagnostic Capabilities

The Verbatim Gateway Autodialer offers many features to help with the inevitable complexities of a networked environment. The following list gives a brief sketch of these capabilities.

- Ability to perform end-to-end network connectivity selftest. See code 4930.
- May obtain a list of all nodes currently active on any net. See code 4946.
- Status reports and the front panel LED indicators announce the overall health of each network. See section 7.7.1.
- May easily suspend and later resume all scanning activity on a specific net. This is useful for disabling alarms on one network while still scanning the others. See code 493\*.
- Generate reports about communication diagnostics and history for any RC. This includes current status and comalarm count. See code 4941.
- Generate summary status reports for any net. This includes configuration, diagnostic or performance information. See code 4940.

Procedures for troubleshooting network problems are detailed in section 7.7.

## 7.3 Initial Installation Roadmap

This section provides an overview for the initial installation of a Verbatim Gateway Autodialer. The remaining sections in this chapter present all the technical information needed. A complete reference for all configuration command codes is contained in section 7.8.

Some of the installation procedures are necessary for all users and applications. Others depend on the specific network and equipment being used. The information here is organized so that users may easily skip topics irrelevant to their purposes.

- The general procedure during initial installation is as follows:
- Mount and wire the unit as described in in Section 2.
- Connect the autodialer to the industrial network as described in Section 7.4. This includes protocol and device specific procedures as detailed in further subsections.
- Test the network connection. See section 7.7.

- Configure the physical channels and general autodialer parameters as appropriate for your application. These procedures are described in the other chapters of this manual.
- Configure the remote channels as appropriate for the application. This is described in section 7.5.
- Thoroughly test overall operations to validate connections, alarm configuration, and performance. See section 7.7.

Section 7.6 contains several application examples, for different protocols, interfaces and network configurations. Section 7.7 describes steps to follow while trouble shooting problems. Section 7.8 provides a complete reference for all of the industrial network command codes.

## 7.4 Connecting to the Network

This section details procedures for establishing the communications link between the Verbatim Gateway Autodialer and an industrial network.

The autodialer supports four industrial protocols: Modbus, Modbus Plus, DF1, and DH-485. It is possible to interface with over 99% of the available industrial automation equipment by using one of these four. There is also a simple ASCII protocol, termed Local Data Logging protocol (LDL). This is used only for connections with logging terminals and printers.

The Modbus protocol is a de facto industry standard and supports interfaces with Modicon/AEG, GE, TI, Bristol-Babcock and other vendor's equipment. Modbus Plus is a high-performance network supported by many Modicon/AEG and compatible devices. DF1 supports interfaces with most any Allen-Bradley PLC or network. The DH-485 protocol will interface to most any Allen-Bradley SLC (series 1747). These are each discussed further in subsections below.

Port Name	NET1	NET2	NET3	NET4
<b>Location</b>	expansion bus card (diagram in section 2)	expansion bus card (diagram in section 2)	expansion bus card (diagram in section 2)	front panel card (see section 2.3)
<b>Connector Type</b>	RJ-45	RJ-45	DB-9	VPPC-1
<b>Interface Specification</b>	RS-232C (VCP4 cards) RS-485 (V232/485 cards)	RS-232C	Modbus Plus	Centronics
<b>Supported Protocols</b>	DF1 Modbus LDL DH-485 (V232/485 card)	DF1 Modbus LDL	Modbus Plus	LDL

Table 7.4: Network Device Ports

The autodialer supports four device ports, named NET1-4. Connections to any of these ports are completely separate from the others. Each will need to be configured independently. Table 7.4 on the previous page describes how they may be used.

The general steps for connecting the autodialer to an industrial network are as follows:

- Determine which network interfaces are needed for the application. This step is beyond the scope of this manual. Consult the equipment vendors, or contact RACO Customer Service for advice.
- Prepare the external network connection. The following subsections describe usage and configuration for many interfacing devices. Follow the vendor's procedures for installation and configuration.
- Connect the correct cable between the autodialer and the network. Section 2 provides a diagram. Appendix F contains wiring diagrams for all cables. It now ought to be safe to power up all equipment.
- Use code 4906 to configure the desired protocol driver on the autodialer port.
- Use the other 490 codes to alter default settings for the autodialer's baud rate, data bits, stop bits, parity, node number, and communications timers as appropriate. If necessary, use the 495 codes to further optimize performance.
- Use procedures in section 7.7.2 for testing and troubleshooting.

Please refer to the subsections below which are appropriate to your application (or Appendix D for the local data logging capability). They may contain recommendations or requirements for successful configuration. **All remaining information under this section may be skipped.** The installation sequence continues in section 7.5.

## 7.4.1

### DF1 Protocol

The DF1 protocol provides connectivity to any Allen-Bradley device which has an asynchronous serial communications port. This includes the PLC2, PLC5 and SLC500 product lines as well as a wide variety of interface modules and protocol converters. When the DF1 port is built into a processor it is called *Channel 0*. Otherwise the port is sometimes labeled *DF1* but might also be labeled as *RS232C*, *RS422*, or *RS423*.

DF1 is a derivative of ANSI X3.28 subcategories D1 and F1. Other terms sometimes used for this protocol are **full-duplex**, **1 link-level**, or **asynchronous data highway**. A complete specification is contained in the Allen-Bradley Publication 1770-6.5.16, *Data Highway / Data Highway Plus / DH-485 Communication Protocol and Command Set*.



### Note:

There are many minor variations of the DF1 protocol. The autodialer only supports the **full-duplex** protocol with **CRC** error detection and **no handshaking**.

The DF1 protocol can always be configured on the autodialer's NET2 port. If a VCP4 card is installed then the NET1 port may also be used. The serial communications settings of the DF1 device and the autodialer port must match exactly. Timing parameters must be compatible. See table 7.4.1 below for the autodialer's default settings, recommendations and requirements. The recommendations will usually provide optimal performance.

Parameter	Command	Default Setting	Requirement
Baud Rate	4901	19200	Recommended
Data Bits	4902	8	Can't alter
Stop Bits	4903	1	Recommended
Parity	4904	Even	Recommended
Autodialer Node Address	4905	1	Application Dependent
Link Timeout	4908	200 msec	Application Dependent
Message Timeout	4909	2000 msec	Application Dependent
Scan Delay	4955	0	Recommended

Table 7.4.1: Defaults for DF1 Protocol

The information in Table 7.4.1 applies to the autodialer side of the connection. There are additional recommendations and requirements for specific equipment on the other side of the connection. For complete details, please refer to the appropriate subsection below and skip the others.

#### 7.4.1.1

#### PLC-5 Channel 0

PLC-5 processors which have a channel 0 port include the 5/11, 5/20, 5/30, 5/40 and 5/60. Please consult your Allen-Bradley representative for others. The port's serial communications parameters must be configured by using the PLC-5 programming software, commonly called 6200 software. The table below describes required and recommended settings. Depending on network traffic, adjustments to the timeouts may be necessary.



Parameter	Setting	Requirement
ACK Timeout	10 msec	Recommended
Msg Application Timeout	2 sec	Recommended
Duplex	Full	REQUIRED
Error Check	CRC	REQUIRED
Handshaking	Disabled	REQUIRED

Table 7.4.1.1: PLC-5 Channel 0 Configuration

The electrical connection to the channel 0 port is set by DIP switches on the PLC-5 processor module. Configure this for EIA RS-232C (versus RS-422 or RS-423). Use the Racal supplied cable, P/N VAB5-C0 or an equivalent (see Appendix F.7). It connects to the DB-25S connector labeled CH 0 on the PLC-5 processor module.

The Channel 0 connection is a point-to-point connection only. This means that the autodialer may only monitor points within the PLC providing the Channel 0 interface. It is unable to access any other devices which may exist on the DH+ network. The ladder logic in the PLC will have access to those DH+ nodes, and may make local copies of their data for autodialer access. Alternatively, a 1785-KE or 1770-KF2 module may be used for a multi-point connection.

#### 7.4.1.2

#### 1785-KE or 1770-KF2 Module

The 1785-KE and 1770-KF2 modules may be used to provide multi-point connectivity between the autodialer and all devices on a DH+ network. These modules are actually protocol converters which bridge the DF1 and DH+ networks. The 1785-KE occupies a slot in the PLC-5 chassis. The 1770-KF2 is a stand alone desktop unit, and is less commonly used.

These two units are functionally equivalent. Both have DIP switches for communication parameter settings. Please refer to the module's user manual for details. The table below describes required and recommended settings. Depending on network traffic, adjustments to the timeouts may be necessary.

Parameter	Setting	Requirement
Diagnostic Command	Pass Thru	REQUIRED
Error Check	CRC	REQUIRED

Table 7.4.1.2: 1785-KE or 1770-KF2 Module Configuration

Connect these modules to the autodialer using the VAB5-KE or VAB5-KF cable or the equivalent (see Appendix C.8 or C.9).



**Note:**

When using either of these modules, it is imperative that the autodialer's DF1 node address (code 4905) be identical to the module's own DH+ node address. This allows the protocol converter to route information packets through the module to the autodialer. Otherwise, responses to polling transactions will never be received.

These devices have limited buffer space and processing abilities. Furthermore, the DH+ networks are often already heavily used and may have limited bandwidth available for the autodialer. As a result, there may be relatively long delays in polling transactions. Symptoms for these conditions are:

- 1785-KE: LED labeled ERR blinks or is on solid.
- 1770-KF2: LED labeled CPU blinks or is on solid.
- Autodialer: reports unexpected errors and comalarms.

If any of the above appear, they may be cured by setting the autodialer's link-level timer (code 4908) to a larger value. If so, then the message limit timer (code 4909) should be increased as well. Some experimentation may be necessary to find the optimal values.



**Warning:**

Any increment to timer values may directly affect the RC scan time. One should rarely have to raise the timers above 5000 milliseconds.

### 7.4.1.3

#### **1747-KE Module**

The 1747-KE module is a protocol converter bridging the DF1 and DH-485 protocols. It is commonly used to interface modems and other RS-232C devices to Allen-Bradley's SLC product line. See Allen-Bradley publication #1747-NU001 SeriesB, *DH-485 / RS-232C Interface Module* (Catalog No. 1747-KE), for configuration instructions.



**Note:**

The autodialer supports direct connection to DH-485 networks. For most applications involving DH-485 networks, this is probably the best approach.

Connect the autodialer to the module using the VAB-1 cable or equivalent (See Appendix C.6).

The table below identifies the recommended settings for parameters under each of the Top-Level Setup Menus presented by the 1747-KE configuration interface. Note that some parameter settings are recommended for performance reasons while other settings are required.

Menu	Parameter	Setting	Requirement
<b>CONFIG PORT</b>	all	no recommendation	
<b>DF1 PORT</b>	all	no recommendation	
<b>DH-485 PORT</b>	Node Address Max Node Address Message Timeout Pass Through Baud Rate	no recommendation small as possible 2000 msec enabled must be compatible	Recommended Recommended REQUIRED
<b>DF1 PROTOCOL</b>	Duplex	Full	REQUIRED
<b>Full Duplex Setup</b>	Duplicate Packet Detection Checksum Constant Carrier Detect Modem Init String Embedded Response Detect ACK Timeout ENQuiry Retries NAK Retries	Enabled CRC Disabled no recommendation Auto .01 3 3	Recommended REQUIRED REQUIRED  REQUIRED Recommended Recommended Recommended

Table 7.4.1.3: 1747-KE Module Settings

#### 7.4.1.4

#### SLC Channel 0

SLC processors which have a channel 0 port include the 5/03 and 5/04 models. This port may be used as a DF1 protocol connection point for the Verbatim Gateway Autodialer. Configuration of the serial port and communications parameters for the SLC-5/03 Channel 0 is done using the APS Software.

Connect the autodialer to the module using the VAB-1 cable or equivalent (See Appendix C.6).

Configure Channel 0 for DF1 FULL DUPLEX then enter the **CH 0 SYSTEM CONFIG.** menu and set parameters according to the following table:

Parameter	Setting	Requirement
Duplicate Detect	ENABLED	Recommended
ERROR CHECK	CRC	REQUIRED
ACK Timeout	2(x 20 msec.)	Recommended
NAK Retries	3	Recommended
ENQ Retries	3	Recommended
Control Line	NO HANDSHAKING	REQUIRED
Embedded Responses	ENABLED	REQUIRED

Table 7.4.1.4: SLC Channel 0 Configuration Parameters

## 7.4.2

### DH485 Protocol

DH485 Protocol DH-485 provides connectivity to Allen-Bradley's SLC-500 product family. It is a proprietary, low cost, peer-to-peer, token-passing protocol with rotating mastership.

The DH485 port on the processor is always an RJ-45 type connector, and is usually not labeled. The processor's communications parameters are configured using Allen-Bradley's Advanced Programming Software (APS) software product. Procedures here may be found in Allen-Bradley's documentation.

If there is more than one other device on the network, the 1747-AIC Link Coupler device may be required for electrical isolation. The autodialer does not supply power to the AIC module. Please refer to the Allen-Bradley Publication 1770-6.2.2, *Data Highway / Data Highway Plus / Data Highway II / Data Highway-485 Cable Installation Manual* for further specifications regarding isolation, cable lengths, signals, and network configuration in general.

The DH485 port on the autodialer may only be NET1 on a V232/485 communications card. See section 2 for a diagram. The physical connection is completed by use of the VAB500-1 cable or equivalent (see appendix C.3). Run this cable between the NET1 port and the RJ-45 port on the SLC processor or AIC module.

It is necessary to configure the DH485 protocol on the NET1 port using code 4906. For DH485, code 4906 will conduct an external loop back test. This completely tests end-to-end functionality at all protocol layers. The default values, recommendations and requirements for other settings are shown in table 7.4.2 and discussed briefly below.

Parameter	Command	Default Setting	Requirement
Baud Rate	4901	19200	Recommended
Data Bits	4902	not used	Can not set
Stop Bits	4903	not used	Can not set
Parity	4904	not used	Can not set
Autodialer Node Address	4905	1	Application Dependent
Link Timeout	4908	not used	Can not set
Message Timeout	4909	2000 msec	Application Dependent
Max Node Address	4951	31	Application Dependent
Token Hold Factor	4952	1	Application Dependent
Token Exercise Factor	4953	1	Application Dependent
Scan Delay	4955	0	Recommended

Table 7.4.2: Autodialer Default DH485 Settings

Values for the data bits, stop bits, parity and link timeout are dictated by the DH485 specification and can not be altered. The only baud rates allowed are 19200, 9600, 4800, 2400, 1200 and 300.

The Message Timeout (code 4909) must be greater than the maximum time for any single network transaction to complete. The value here depends on worst case loading and interactions between all nodes. When network usage becomes bandwidth limited the default of 2000 msec may be too small. If error codes 356 or 1561 are seen, this timer will need to be increased.

Contention for access to specific nodes may exist between the autodialer and other devices, such as APS. Since some PLCs are only able to buffer one network transaction at a time, the contention can be severe. Symptoms include error code 1011 or extreme slowness or timeout in competing applications. If these are seen, then the following suggestions may help.

- Increase the scan delay (code 4955) so the autodialer will slow its polling rate. Do something similar at the competing device.
- The Max Node Address (code 4951) should be set equal to the network node with the largest address. All nodes should have the smallest available addresses.

- Use the Token Exercise Factor (code 4953) to allow the competing application more bandwidth. Increase the 4907 and 4909 timers to reduce chances of communications alarms when this contention occurs. All of these will increase channel latency.
- The Token Hold Factor (code 4952) must be used with care. If contention is suspected, this must be set to 1. Otherwise, the autodialer's scan loop may be optimized by increasing the value.

APS may be used to monitor the network and the autodialer in particular. Use the "Who Active" function to get to the "Diag Status" screen. APS currently refuses to alter the Max Node Address, Token Hold Factor, or Run Mode of the autodialer. The Verbatim Gateway Autodialer fully supports these commands, however, and will respond to other applications which use them.

Please refer to other A-B documents mentioned above and "APS User's Manual", 1747-PA2E or your Allen-Bradley technical expert for more information on network cautions, configuration, optimizations and the capabilities of specific PLC devices.

#### 7.4.2.1

#### 1785-KA Modules

The 1785-KA modules are protocol converters bridging DH485 and DH+ networks. They are rack-mounted in the PLC5 chassis. It may be useful to use this module in applications that have devices on both of these networks. Please refer to the Allen-Bradley documentation for further information about configuration and connections.

The autodialer supports the 1785-KA *gateway mode*. It does not currently support *router mode*. Thus, it is currently impossible for the autodialer to directly scan devices on the DH+ network using this module.

If this is necessary, please use the 1785-KE module (see section 7.4.1.2). Alternatively, it may be possible for one of the processors on the DH+ net to copy the points of interest to some node on the DH485 net. Then the KA module is used to support this copying, and the autodialer may directly interface to the DH485 network as documented above.

#### 7.4.3

#### Modbus Protocol

Modbus is a simple master-slave protocol originally used for connectivity between Modicon products. Now, almost every vendor of industrial equipment supports a Modbus interface. In fact, it has become something of a *de facto* industry standard for open systems interconnection.

Specific procedures for physical network connection are impossible to provide for this diverse equipment base. In general, the VMB-2 or VMBM-1 cables or their equivalents are used (see Appendix C.4 or C.5). The subsections below describe the most common devices in some detail. Please refer to the *Modicon Modbus Protocol Reference Guide*, PI-MBUS-300, for further information.

There are two important restrictions regarding use of Modbus protocol:

- All nodes on the network must use the RTU mode.
- The autodialer must be the network master.

The Modbus protocol may be configured on the NET2 port of any card. If a VCP4 card is installed then it may also run on the NET1 port. The serial communications settings of the autodialer port must match the network or other device exactly. See table 7.4.3 for the default settings, recommendations and requirements.

Parameter	Command	Default Setting	Requirement
Baud Rate	4901	9600	Recommended
Data Bits	4902	8	Can't Alter
Stop Bits	4903	1	Recommended
Parity	4904	none	Recommended
Autodialer Node Address	4905	1	Application Dependent
Link Timeout	4908	not used	Can't Alter
Message Timeout	4909	100 msec	Application Dependent
Link Delay	4954	0	Application Dependent
Scan Delay	4955	0	Recommended

Table 7.4.3: Autodialer Defaults for Modbus Protocol

### 7.4.3.1

#### Modicon 984 Programmable Controllers

This family of devices are all Modbus compatible. The communications parameters may be configured using the appropriate *Modsoft* programming tool. Please refer to documentation there for details.

Connect the autodialer to compact 984 controllers using the VMB-2 cable or equivalent (see F.4). The 984 Micro controllers will need the VMBM-1 cable with a special connector (see note in F.5). If connecting to an existing network, be sure it is possible for the autodialer to be the master.

The defaults in table 7.4.3 exactly match the default communications parameters for the 984 devices. This makes connection and configuration for this family extremely simple. If any changes are desired, be sure the DEF/MEM switch is in the MEM position. If the switch is set to DEF, it will be impossible to change the PLC's network communications parameters.

### 7.4.3.2

## Generic Modbus Interface

Many different vendors of industrial equipment and software provide Modbus compatibility. The autodialer may interface to any such devices. Examples include DCS and SCADA systems as well as equipment whose native protocols are not supported. The steps generally necessary for connecting such systems with the autodialer are listed below.

- Establish a serial connection with the autodialer. This will usually involve installation of communications port hardware and configuring it with the desired parameters. A cable will need to be fabricated for connection to the autodialer's net1 or net2 port.
- Configure a Modbus driver on the equipment. It must allow the autodialer to be master and implement RTU mode.
- Implement a mapping scheme between the equipment's registers and the standard Modbus-style references (see section 7.5.4). The Modbus commands received from the autodialer are then interpreted to read and write the correct locations.
- Configure the autodialer's communications parameters to match the capabilities of the equipment. This often involves increasing the scan delay and link delay timers.

Each of the steps above will need to be performed according to the equipment vendor's instructions. To date this approach has successfully interfaced to TI/Siemens, Bristol Babcock, Westinghouse and General Electric controllers as well as several SCADA systems.

### 7.4.4

## Modbus Plus Protocol

Modbus Plus is a high performance, token passing, peer-to-peer protocol. It supports a wide variety of Modicon controllers and compatible devices, including much of the 984 family. There are capabilities for broadcasting global data to all nodes on the network. Modbus Plus networks may be combined to form internets of essentially unbounded size. Please refer to the *Modicon Modbus Plus Network Planning and Installation Guide*, GM-MBPL-001 for details.

The autodialer only supports Modbus Plus on the NET3 port. This port is available only on the VMBP co-processor card. This card will only fit into slot 2 of especially prepared cases. See chapter 2 for a diagram.

Cabling and connectors between the autodialer and the net must conform to specifications found in the *Planning and Installation Guide*. The cable connector on the VMBP card extends outside of the left side of the autodialer.



None of the serial communication parameters apply to this protocol. Table 7.4.4.A shows the default and recommended values for the remaining parameters which do apply.

Parameter	Command	Default Setting	Requirement
Autodialer Node Address	4905 (read only)	1	Application Dependent
Comalarm Trip Delay	4907	20	Greater than 3 seconds
Link Timeout	4908	not used	Can't Alter
Message Timeout	4909	2000 msec	Must be greater than 1 second.
Global Data Size	4954	0	Application Dependent
Scan Delay	4955	0	Application Dependent

Table 7.4.4.A: Autodialer Defaults for Modbus Plus Protocol

Use the dipswitches located at the upper left edge of the VMBP card to set the autodialer's Modbus Plus node number. It will be necessary to cycle power to the autodialer before any new settings will take effect. Code 4905 may be used to read the node number, but not to set it.

Determine the switch settings as follows:

- Subtract one from the desired node number.
- Compute the binary representation on of this number.
- Set the switches to match this representation. The ON position is closest to the VMBP board and forms a logical 0. Switch 1 is the least significant bit. Switches 7 and 8 are not used.

The LED located at the upper right edge of the VMBP card gives indications of the link status. The LED is visible through a small hole drilled in the autodialer's front door. The blinking patterns are interpreted as shown in table 7.4.4.B.

Flashing Pattern	Interpretation
Every 160 msec	Node is working normally.
Every 1 second	Node is preparing for connection.
2 flashes, off 2 seconds	Node is permanently out of the ring.
3 flashes, off 1.7 seconds	Node is not hearing any other nodes.
4 flashes, off 1.4 seconds	Node has detected another node with the same address.

Table 7.4.4.B: Modbus Plus Diagnostic LED Indications

**7.4.4.1****Bridge Multiplexer**

Modicon's Bridge Multiplexer device (part number BM85) is used to establish Modbus Plus connections for devices that only support the Modbus protocol. It has one Modbus Plus port and four Modbus ports. For more information refer to the *Modicon Modbus Plus Network Planning and Installation Guide* (GM-MBPL-001), and *Modicon BM85 Modbus Plus Bridge/Multiplexer User's Guide* (GM-BM85-001).

The autodialer may access points in any device connected to the BM85 if the following conditions are met:

- The device is able to operate as a Modbus slave.
- The net addresss the correct routing path. See section 7.5.5.1 for details.

**7.4.4.2****Bridge Plus**

Bridge PlusModicon's Bridge Plus device is used to connect two Modbus Plus networks together. Several bridge devices may be used to connect multiple networks. For more information refer to the *Modicon Modbus Plus Network Planning and Installation Guide* (GM-MBPL-001).

The autodialer may access points in devices anywhere on the Modbus Plus internet by specifying the correct routing path in the net address. The autodialer may only access global data on the local network. Please refer to sections 7.5.5.1 and 7.5.5.2 for details.

**7.5****Configuring the Remote Channels**

After the Verbatim Gateway Autodialer is successfully connected to the networks each of the remote channels must then be configured. In general, this involves the steps listed below.

Set the net address. See remainder of this section, 7.2.2 and 7.8.3.2, code 45zz\*. Use Worksheet D of Appendix B.

- ◆ **Set the alarm conditions.** See section 7.8.3.3, code 45zz. Use Worksheet E of Appendix B.
- ◆ **Set the phone number call groups and trip delays.** See section 7.8.3.4 and 7.8.3.5, codes 45zz9 and 46zz. Use Worksheets A and B of Appendix B.
- ◆ **Record the alarm and normal messages.** See section 7.8.3.1, code 41zz and 42zz. Use Worksheet C of Appendix B.
- ◆ **Establish necessary channel Interlinks.** See section 7.2.6 and 7.8.4, code 47zz. Use Worksheet F of Appendix B.



### Notes:

These steps assume the other programming steps detailed in sections 3 through 6 have already been performed, as necessary.

In many situations it will be possible to use the default configuration and skip some of these steps. When this is not possible, the worksheets in Appendix E may be used to help build the necessary command codes. They will also serve as a permanent reference for any future re-programming that may be necessary.

Complete details for the steps above may already be found in the sections mentioned. The remaining sections in this chapter focus on net address issues.

## 7.5.1

### General Net Address Format

One configuration step that must always be performed is setting the RC's net address. Please see section 7.2.2 for an overview of net addresses. This section discusses the net address format. Certain protocols and devices require exceptions and details which are discussed in sub-sections.

The general form for the RC net address consists of up to four separate fields separated by the '\*' character as follows:

\* mode \* **net** \* **node** or **route** \* **addr** \*

The **addr** field is the only mandatory field in the net address. It specifies which point within a single piece of equipment is to be accessed. The format depends on the equipment vendor's conventions. The remaining sections in this chapter discuss details here. Generally, any standard Allen-Bradley or Modicon name that identifies 1-, 16- or 32-bit data objects may be used for this field. There is no default.

The **node** field specifies which piece of equipment on the net contains the point to be accessed. It usually consists of a single number, in the range supported by the protocol. The special **route** form for this field is used only for Modbus Plus addresses needing internetwork paths to access the point. See section 7.5.5.1 for details. A default is supplied according to the most recent 4911 command.

The **net** field specifies which autodialer device port provides access to the point. It consists of the number 1, 2 or 3, depending on which port is connected to the network in question. A default is supplied according to the most recent 4910 command. If this field is present, then the node field must also be present, delimited by the '\*' character.

The **mode** field *is used only for Allen-Bradley protocols*. It controls the command set used for polling packets. Normally the mode is automatically selected and need never be specified by the user. Exceptions are:

- The autodialer cannot access the equipment and are addressing a PLC5 using DH485.
- The autodialer cannot access the equipment and are addressing a SLC500 using DF1.

If any of the above apply, the mode component may be required. If so, the net and node components must also be included, each delimited by the ‘\*’ character. The supported modes are listed in table 7.5.1 below.

Value	Interpretation
1	SLC500 command set
2	BASIC command set, PLC5 style
3	BASIC command set, SLC500 style
5	PLC5 command set

Table 7.5.1: Net Address Modes

Each net address entered is validated against many criteria. If any fail, an appropriate error code is announced. These are presented in section 7.7.5. It is possible for an address to pass all tests yet still not point to a real data table location. Once configured, all RCs must be carefully tested to be certain that they are in fact associated with the correct data.

Section 7.6 shows many examples of the different net address formats. The remaining sections in this chapter discuss some of the issues and wrinkles involved with addressing points in specific equipment. Please read those that apply and skip the others.

## 7.5.2

### PLC5 and SLC500

AddressesThis section discusses the formation of net addresses for Allen-Bradley products in the SLC500 and PLC5 product lines. This information applies regardless of the protocol being used to implement the network connection.

The *net* and *node* fields are determined by the autodialer port used and the node number of the targetted equipment. Note that DF1 allows nodes in the range 1-64, whereas DH485 only allows nodes 0-31. The *mode* field may need explicit specification, according to the conditions listed in section 7.5.1.

The *addr* component is fully compatible with the *logical* and *I/O image* addressing schemes for this equipment. The *indirect*, *indexed* or *symbolic* addressing schemes are not supported. See section 7.5.3 for information about support for the *PLC2 compatibility* addressing scheme. Complete information about all these schemes may be found in the Allen-Bradley *Programming Software* or *Hand Held Terminal* manuals.

Table 7.5.2 lists the supported file types. Only 1, 16 or 32 bit objects within these files may be addressed. The addr field consists of mixed alpha and numeric characters. Non-numerical characters must be entered at the front panel using upper-case keys. See section 7.2.9 for procedures. It is not possible to enter those symbols over the phone.



**Note:**

The ‘.’ character in addresses, such as T:1.0, must be entered using the <shift><point> key combination. This combination is spoken as *star*, but really the ‘.’ character is entered. See section 7.6.1 for examples.

Identifier	File Type	Example
<b>O</b>	Output	O:1.0/0 (SLC500) O:017/10 (PLC5)
<b>I</b>	Input	I:0.1/0 (SLC500) I:013/07 (PLC5)
<b>S</b>	Status	S:2 (word) S:2/0 (bit)
<b>B</b>	Bit	B:0 (word) B9:0/1 (bit)
<b>T</b>	Timer	T4:0.2 (word) T:0.0/1 (bit)
<b>C</b>	Counter	C5:0.2 (word) C10:0.0/1 (bit)
<b>R</b>	Control	R6:2.1 (word) R:2/15 (bit)
<b>N</b>	Integer	N:1 (word) N:1/0 (bit)
<b>F</b>	Floating Point	F:2 (32-bit word)
<b>NOTE: Cannot specify 16 or 1-bit points with F file type.</b>		
<b>D, G, M1, etc. . . .</b>	All other types	Not Supported

Table 7.5.2: Supported Allen-Bradley Logical Addresses

There are often many synonyms for the same address. For example, B:0/16, B3:0/16, B3:1/0, B/16 all refer to the same 1-bit point. Allen-Bradley mnemonics for specific fields such as *PRE*, *ACC*, or *DN* must be translated to their numeric equivalents.

Input points (I file addresses) have the following idiosyncracies:

- It is always possible to write a value to an input.
- If the PLC is in the run mode, that value will be overwritten by the ladder logic.
- If the PLC is in program mode, it is possible to read back the value written.

Output points (O file addresses) have the following idiosyncracies:

- If the PLC is in run mode, writes will fail with the “file protection” error code, 1211.
- If in program mode, writes will succeed.
- If the output is not under ladder logic control, then the value written will be retained when the PLC goes to run mode. It will not be possible to write another value until the PLC returns to program mode. If that output is connected to equipment, this may create an unexpected and dangerous situation.



### **Note:**

If the ladder logic controls an output with a writable register, such a bit in file 3, then the autodialer may alter the output state by writing to that register.



### **Caution:**

Always use caution and follow Allen-Bradley’s recommendations when altering any I/O points or data table locations controlling them.

It is not possible to use the autodialer to set or enable ‘forces’. Forces set or enabled by some other node may cause unexpected values to be read by the autodialer. Inputs read while forces are active and the PLC is running will read the forced value. Outputs are not affected by forces, and the autodialer always reads the unforced state. Thus, forced outputs can not cause alarms.

## **7.5.3**

### **PLC2 and Common Interface File Addressing**

This section describes how to form net addresses for the Allen-Bradley PLC2 product family. These same rules apply to addresses for points in Common Interface Files (CIFs). Please refer to the appropriate Allen-Bradley documents for information about CIFs and their usage. It is possible to address points in CIF files using the logical addressing scheme of section 7.5.2.

The *net* and *node* fields are determined by the autodialer port and the node number of the targetted equipment. The *mode* field may need explicit specification, according to the conditions found in section 7.5.1.

The *addr* field is of the following form: **word/bit**. The **word** element is an octal (base 8) number specifying the word offset of the point from the beginning of the CIF or the PLC2 processor's data space. The **bit** element is optional. If omitted, the address refers to 16 bits of data at the word offset. If present, it must be a decimal number from 0-15 preceded by the '/' symbol (<shift><9> key combination). It specifies a single bit within the word, so the data type is discrete. 32-bit data types are not supported with this form of net address.

For examples:

- **010/10** refers to the eleventh bit of the eighth word.
- **0732** refers to the 474th word.

If addressing a CIF file in a PLC5 processor, the following special rules apply:

- The autodialer can only access data in a CIF whose file number is equal to the local node number of the autodialer itself. For example, suppose the autodialer is node 12 and the net address is **1\*5\*010**. The actual point is the eighth word in file 12 of the processor with node number 5 on net 1.
- Writing values to discrete remote channels with a net address of this form uses the *Unprotected Bit Write* command. This implies that some bits may unintentionally be overwritten. Please refer to Allen-Bradley documents for details.

If addressing a CIF file in a SLC500 processor, the following special rules apply:

- The autodialer can only access data in file number 9. For example, the addresses **011/10** and **B9:9/10** refer to exactly the same point.
- It is impossible to write a value to a discrete channel with a net address of this form. Instead, use the logical addressing scheme described in section 7.5.2.
- Some SLC500 processors use bit S:2/8 to control the CIF addressing mode. The autodialer always assumes word addressing is in effect.

## 7.5.4

### Modbus Addresses

This section describes the formation of net addresses for all equipment using the Modbus protocol. The *net* and *node* fields are determined by the autodialer port and the node number of the targetted equipment. Modbus allows nodes in the range 1-256.

The *addr* component is fully compatible with the standard Modbus register reference scheme. This has been extended to include floating point and global data. Table 7.5.4 presents this scheme. In the table, 'x' represents a digit in the range 0-9. Except as noted, the autodialer will accept any values for 'xxxx'.

Register Address	Description	Size/Limitation
0xxxx	Coil number xxxx	1-bit
1xxxx	Input number xxxx	1-bit
3xxxx	Input register number xxxx	16-bit
4xxxx	Output register number xxxx (Also called holding register)	16-bit
5xxxx	Floating Point register	32-bit
<b>NOTE: The 5x and 4x references share the same data space. That is, an address of the form 5nnnn takes the 32 bits beginning at location 4nnnn and extending through 4nnnn+1. These 32 bits are then interpreted as an IEEE floating point number.</b>		
6xxxx	External Memory	Not Supported
70xxx	Global data bit xxx xxx from 1 to 512	1-bit Modbus Plus only
800xx	Global data word xx xx from 1 to 32	16-bit Modbus Plus only
900xx	Floating Point Global data xxx from 1 to 16	32-bit Modbus Plus only
<b>NOTE: The 7x, 8x, and 9x references refer to the same Modbus Plus Global data block. For example, 70001 is the least significant bit of 80001 which is the least significant word of 90001.</b>		

Table 7.5.4: Modbus and Modbus Plus Addressing Scheme

The following list identifies special issues with regard to this addressing scheme:

- If any address is out of range for a particular processor, that processor will issue an error diagnostic, which will be passed on to the user.
- 1x and 3x references may **not** be written by the autodialer.
- The 5x, 7x, 8x and 9x references are non-standard, and specific to the Verbatim Gateway Autodialer.
- The controller's memory protect switch may prevent writing to a 0x or 4x reference.



- A controller not in run mode may prevent writing or report unexpected values.
- The *Modsoft* reference data screen can enable and disable specific points. Those operations may impact autodialer operations.

## 7.5.5 Modbus Plus Addresses

For the most part Modbus Plus addresses are exactly the same as Modbus addresses. The *net* component must always be 3, since this is the only device supporting the network link. The node component may be in the range 1-64. All information about the *addr* component in section 7.5.4 applies.

Significant differences with plain Modbus involve internet routing and global data. These are discussed in subsections below, with examples provided in section 7.6.3.

### 7.5.5.1 Modbus Plus Routing

The Verbatim Gateway Autodialer fully supports Modbus Plus internet routing. This allows access to nodes on remote networks connected via Bridge Plus or Bridge Multiplexer devices. Routing information is specified by substituting a string of the following form for the *node* field in the net address:

```
r1 # r2 # r3 # r4 # r5
```

The r1 through r5 components are the routing nodes, and may be omitted if zero. The routing path is announced only up to the first zero value. All the other rules about format and defaults for other fields apply. See section 7.6.3 for examples.



#### **Note:**

The ‘#’plain character is entered using the (unshifted) <minus> key

### 7.5.5.2 Modbus Plus Global Data

The Verbatim Gateway Autodialer fully supports the Modbus Plus network global data functionality. Readers unfamiliar with this may refer to the *Global Database Transactions* and other sections in the *Modicon Modbus Plus Network Planning and Installation Guide* document.

Remote channels referencing global data are configured and used in exactly the same fashion as any other remote channel. The following paragraphs detail several distinguishing properties.

**Local Net Only:** Global data references can only be made to nodes on the local Modbus Plus network. Routing paths in the net address will generate an error. Each node on the local net can broadcast up to 32 words of global data. The actual amount of data present depends on logic internal to that node.

**Net Address:** Use the *node* field to specify which node's global data block to access. Use the *addr* field to specify a point at a given offset from the beginning of the block. Use 7x references for bit offsets and bit values, the 8x for words and the 9x for 32-bit floating point words.

**Global Data Read:** The autodialer may read any available global data through a remote channel configured with the net addresses described above. If the requested point is not broadcast by the requested node, an error code will be announced.

**Global Data Write:** Values may only be written to the autodialer's own global data block. Again, simply configure a remote channel with the appropriate net address.

**Global Data Create:** The first write to a specific global data point will, if necessary, create all lower-addressed data in the block. The value for the specified point will be the value contained in the write command. The value for the lower-addressed objects will be the last value written, however long ago. In the case where a lower-address object has never been written, the default value is zero.

**Global Data Erase:** Once the autodialer's own global data has been created, it is necessary to use command 4954 to erase it. This command will shrink the size of the block, but not alter any values. Hence, if the size is ever re-extended by a subsequent write command, all lower-address objects will again be present, and have their prior values.

## 7.5.6 Physical Channel Addresses

It is possible to configure remote channels that point to the autodialer's own physical channels. These RCs may be used as any others: the only difference is that they don't require an industrial network for polling. In particular, they may become the source channel in RC interlinks used to extend the IO capabilities of other equipment. See section 7.8.5 and 7.6 for details and examples.

Any net address with the *net* field equal to 0 refers to a physical channel. The *node* field distinguishes inputs from outputs. All inputs are node 0, all outputs (RSC) node 1. The *addr* field specifies which physical channel number to use. The valid ranges depend on the hardware configuration of the autodialer.

### **Example:**

\*0\*0\*1\* is the first physical input. \*0\*1\*1\* is the first physical output.

The data type of the RC will be the same as that of the physical channel. Again, this depends on the autodialer's hardware configuration. It is only possible to write to RSC output channels. Contention may exist if an RSC channel is destination for an interlink and also configured for pulse mode operations. Reconfigure as required to avoid this situation.

The values of net0 analog channels are essentially 64-bit floating point numbers. The values of other floating point remote channels are 32-bits. Hence, overflow may result if the net0 value is interlinked to a 32-bit destination. This situation may be avoided by checking that the scaling for the physical channel is within bounds of the IEEE 32-bit floating point format.

Finally, the terminology used for the values of discrete net0 channels may vary depending on whether they are reported as a remote or a physical channel. Table 7.5.6 provides the interpretations.



**Note:**

The discrete physical channels are active low. Most discrete PLC inputs and outputs are active high.

Remote Channel Reports (all codes)	Physical Channel Reports (code 0zz)	Physical Channel Reports (code 0zz0)
1	OPEN not grounded	OFF
0	CLOSED grounded	ON

Table 7.5.6: Reported Values for Net0 Discrete Channels

## 7.6 Applications and Examples

This section provides several examples for the configuration and operation of industrial applications involving the Verbatim Gateway Autodialer. The introduction for each example lists the specific topics covered.

### 7.6.1 Typical Application Example

This example illustrates the following:

- General procedure for setting up an autodialer application.
- How to configure remote channels using Allen-Bradley logical addressing scheme.
- How to configure and use floating point channels and constants.
- How to remotely monitor and control an industrial process.

This application involves an existing DH485 network. It runs at 9600 baud and connects two PLCs controlling an industrial process. Node number 0 has been reserved for the APS configuration software. Node 3 is available for the autodialer. Node 1 is an SLC5/01 with the following points of interest:

B3/0	Conveyor belt on/off switch
B3/1	Emergency process shutdown
C4:1.2	Total number of items produced

Node 2 is an SLC5/03 with the following points of interest:

B3/0	Oven on/off control
F8:1	Temperature setting for the oven (degrees F)
F8:2	Current temperature of the oven (degrees F)

The following steps illustrate the installation and use of the autodialer for this application.

- ◆ **Mount and wire the autodialer:** see section 2.
- ◆ **Network Connection:** see section 7.3
  1. Power off to the unit
  2. Install the V232/485 card.
  3. Connect VAB-485 cable between NET1 port and the AIC “peripheral” port.
  4. Power on to the unit
  5. Enter program mode:
 

4906*3	Configure DH485 protocol on NET1
4901*9600	Alter default baud rate to 9600
4905*3	Set node number for autodialer to 3
4930	Perform network connection test

At this point, if the connection test reports “normal”, then the network connection is complete. Otherwise will need to trouble shoot using procedures in section 7.7.

- ◆ **Configure general parameters:** see sections 3, 4,5 6
  1. Enter program mode, if necessary:
 

701 6586713	Configure phone number 1
702 5551234	Configure phone number 2
500 0	Disarm all physical channels, since they aren’t used in this application.
- ◆ **Configure the remote channels:** see sections 7.5 and 7.5.2
  1. Enter program mode, if necessary

**A. Net Address Configuration**

4911 1                    Set default node to 1. This step allows the next several command sequences to be shortened.

4501\*B/0\*                Set net address for RC01 to \*1\*1\*B/0\*

◆ The actual key strokes for this command are:

<4> <5> <0> <1> <point> <shift> <3>  
<shift> 9> <0> <point> <enter>

4502\*B/1\*                Set net address for RC02 to net 1, node 1, addr B/1

4503\* C:1.2\*            Set net address for RC03 to net 1, node 1, addr C:1.2

◆ The actual key strokes for this command are:

<4> <5> <0> <3> <point> <shift> <4>  
<shift> <0> <1> <shift> <point> <2>  
<point> <enter>

4911 2                    Set default node to 2. This step allows the next two command sequences to be shortened.

4504\*B/0\*                Set net address for RC04 to net 1, node 2, addr B/0

4505\*F:1\*                Set net address for RC05 to net 1, node 2, addr F:1

4506\*F:2\*                Set net address for RC05 to net 1, node 2, addr F:2

**B. Alarm Condition Configuration**

4501 3                    No Alarm for RC01. Used for control only.

4502 2                    Normally 0. Will alarm if 1 (process shutdown).

4503 3                    No Alarm. Used for monitoring production count.

4504 3                    No Alarm. Used for monitoring oven on/off.

4505 6 1X3                Alarm when oven setting exceeds 1000 degrees F.

4506 6 950

Alarm when oven temperature exceeds 950 degrees F.

### C. Record Messages

*Keep the record button depressed while recording the following messages:*

4101 <enter> <record>	"Conveyor belt is on"
4201 <enter> <record>	"Conveyor belt is off"
4102 <enter> <record>	"Emergency process shutdown active"
4202 <enter> <record>	"Process running"
4103 <enter> <record>	"Production line count is"
4203 <enter> <record>	"pieces"
4104 <enter> <record>	"Oven is off"
4204 <enter> <record>	"Oven is on"
4105 <enter> <record>	"Oven temperature setting is"
4205 <enter> <record>	"degrees fahrenheit"
4106 <enter> <record>	"Current oven temperature is"
4206 <enter> <record>	"degrees fahrenheit"

#### ◆ Test operations See section 7.7

Use code 4930 to perform a network selftest. This will verify that network connection and configuration are correct.

Press the <normal> key to get a status report. Verify that all channel readings are accurate by comparing with readings from APS or other equipment.

Verify that alarm calls occur as expected by using APS to artificially create all alarm conditions.

#### ◆ Monitor and control process over the phone

1. Dial the autodialer from another phone.
2. At the warble prompt, press the '1' key to hear a complete status report.
3. At the warble prompt, press the '3' key to enter program mode.
4. Enter command code 4006 to hear the current oven temperature.
5. Enter command code 4005\*800 to set oven temperature to 800 degrees.

## 7.6.2

### Interlinking Examples: Protocol Bridging, IO Export and Alarm Registration

The examples in this subsection illustrate the following:

- How to pass data across distinct networks.

- How to export the autodialer's physical inputs to another PLC.
- How to inform SCADA systems and other devices of alarm situations.

These examples assume two distinct networks have been connected to the autodialer. The ports and protocols used are irrelevant. Any necessary protocol conversions will be handled automatically. The general steps for any interlink are always the same:

- ◆ Determine the net address of the point to export.
- ◆ Determine the net address of the point to receive the exported value.
- ◆ Configure two remote channels — one for each of those net addresses.
- ◆ Configure a data mode or alarm mode interlink between those two remote channels.

For example, suppose the contents of register 40001 on node 1 of network 1 are to be exported to register N:5 of node 6 on network 2. The following commands will cause this data transfer to occur once each scan loop:

4501*1*1*40001*	Set RC01 net address to net 1, node 1, register 40001
4502*2*6*N:5*	Set RC02 net address to net 2, node 6, register N:5
47 01 * 02 *	Configure data mode interlink from RC01 to RC02

For another, suppose the reading of the autodialer's physical channel 33 is to be exported to register N:5 of node 6 on network 2. The following commands will accomplish this:

4501*0*0*33*	Set RC01 net address to net 0, node 0, register 33, the autodialer's 33rd (analog) physical input
4502*2*6*N:5*	Set RC02 net address to net 2, node 6, register N:5
47 01 * 02 *	Configure data mode interlink from RC01 to RC02

Note that the only difference between these two examples is the net address of the source channel. In the first, the source is a point on an incompatible network. In the second, the source is the physical IO of the autodialer.

As a final example, suppose node 2 on net 1 is a SCADA system used to monitor and log the occurrence of alarms registered by the autodialer. Assuming that the SCADA system supports a modbus slave interface and that register 40001 has been allocated to track the alarm state of RC01 in the autodialer, the following commands support this:

4502*1*2*40033*	Set RC02 net address to net 1, node 2, register 40033
-----------------	---

47 01 \* 02                      Configure alarm mode interlink from RC01 to RC02

Now the contents of the SCADA system register 40033 will be continuously updated with the alarm status for remote channel 01. Logic internal to the SCADA system will need to perform any necessary translations of the status code and take the desired actions for alarms as they arise.

### 7.6.3

## Modbus Plus Network Examples

The examples in this subsection illustrate the following:

- How to configure remote channels using Modicon addressing scheme.
- How to configure and use Modbus Plus global data.
- How to specify a Modbus Plus internet route.

These examples assume the following:

- The autodialer is node number 5 on the local network.
- Node 64 on the local network is a BM85 Bridge Plus device.
- A remote network consisting of several nodes is connected to the BM85 device.

To configure RC01 to monitor register 40001 of node number 30 on the local network use code:

**4501 \* 3 \* 30 \* 40001 \***

To configure RC31 to monitor register 40001 of node number 30 on the remote network use:

**4531 \* 3 \* 64 # 30 \* 40001 \***

Suppose now that node number 32 on the remote network is also a BM85 device offering a bridge to yet another remote network. To configure RC61 to monitor register 40001 of node 30 on that remote/remote network, use:

**4561 \* 3 \* 64 # 32 # 30 \* 40001 \***

To configure RC05 to monitor the 3rd word of global data broadcast by (local) node number 30 use: (it is impossible to directly monitor global data on remote networks)

**4505 \* 3 \* 30 \* 80003 \***

To cause the autodialer to broadcast the (constant) value of '12345' as word 1 of its own global data use:

**40 \* 3 \* 5 \* 80001 \* 12345**



It is possible for the autodialer to broadcast the current alarm state of a remote channel as global data. Doing this requires dedicated use of an RC and establishment of an alarm mode interlink. The codes below assume the alarm state of RC10 needs to be broadcast as word number 10 of the autodialer's global data:

<b>4506 * 3 * 5 * 80010 *</b>	RC06 is word 10 of autodialer's global data.
<b>47 10 * 06</b>	Alarm state of RC10 linked to RC06.

## 7.6.4 PLC5, PLC2 and KE Module Examples

These examples illustrate the following:

- Use of KE module for DH+ network connection.
- Use of the PLC2 addressing mode.

The application here has an Allen-Bradley DH+ network with a PLC5 as node 5, a PLC2 as node 2 and a KE module as node 10. All node numbers used in this example are in decimal, rather than octal.

The KE module must be configured for CRC error checking and Pass Thru of diagnostic commands. Then, the following commands will configure a network connection between the autodialer's net 2 port and the KE module:

◆ Install Cable	Use correct cable and connect to net 2 port
◆ 4906 2 * 3	Configure DF1 protocol driver on net 2
◆ 4905 2 * 10	Set autodialer's node number to match that of the KE
◆ As necessary	Set autodialer's serial parameters to match the KE
◆ 4930 * 2	Perform selftest: should report 'normal'
◆ 4946 2	Scan for active nodes: should report 2 and 5

To configure RC01 for monitoring register N:8 of the PLC5, use the following command:

**4501 \* 2 \* 5 \* N:8 \***

To configure RC02 for monitoring bit 5 of register 8 (decimal) in the PLC2, use the following:

**4502 \* 2 \* 2 \* 010/5 \***

## 7.7

## Testing and Troubleshooting

This section discusses procedures for identifying and solving communications problems that may occur. These problems typically involve the interworkings of many pieces of equipment and many configuration parameters. Successful troubleshooting requires specific information and control of the network to isolate the source of the problem.

The first indication of a problem is usually the reporting of one communications error code or another. The most common codes are listed in section 7.7.4, together with a short description. One of them is registered whenever the scan for a particular RC fails. When such an event occurs, the code is pushed onto the diagnostic history stack (code 49406) and copied into the RC status word (code 4941zz). These may be interrogated at any time.

If a problem occurs during selftesting or RC configuration, the code is reported immediately. During normal scanning, problems must persist for the comalarm trip delay period before status or alarm reports will mention them. The programming code 4941 will always report the most recent errors, without regard for trip delays.

Problems involving all remote channels on a particular net or node usually indicate problems with the network connection itself. Procedures here are discussed in section 7.7.3. Problems with one or just a few remote channels may indicate configuration problems or inconsistencies. These are discussed in section 7.7.4.

### 7.7.1

### Network Status LED and Alert Message

Other indications of a problem are provided by the network alert message and the network status LEDs. The first of these consists of the message *<network ID> network status alert*. This message is spoken at the beginning of any alarm or status report whenever all channels using that network link are in the comalarm state.

The network status LEDs are located in the first column of the autodialer's front panel LED display. There is one LED for each network port, labelled NET1-3. They are interpreted as described in Table 7.7.

### 7.7.2

### Before Calling Technical Service

Before consulting the RACO Customer Service Department or your local RACO Representative for assistance, please have the following information and abilities for manipulating equipment available:

- Information on autodialer configuration and symptoms. This includes the worksheets in appendix E, or their equivalents and the performance history of the unit.
- Information on network operating parameters. This includes cabling specifications, protocol, node addresses and equipment types, baud rate, loading patterns and usage by other applications.
- Addresses and properties of all data table locations of interest to the application.
- Ability, as required, to access the autodialer itself and specific nodes, their ladder logics or program listings.

### 7.7.3 Network Connection Testing

Procedures in this section should always be conducted after the network connection (section 7.4) is established. They may also be useful when symptoms indicate a network connection problem, or after recovering from such a problem.

The general network connection test procedure is as follows:

1. Verify that the Network Status LED is steady ON. Trouble shoot using table 7.7.
2. Run command 4930. Any report other than *normal* may need resolution.
3. Run command 4946. If any nodes are missing, trouble shoot using the common causes listed below.
4. Use command 4940 to get summary status and history report. May help to use command 49358 to clear out old errors, wait a while, then re-issue the 4940 command to get recent status and history.

Symptoms of a network connection problem are as follows:

- The front panel Network Status LED is blinking.
- The network alert message is delivered.
- All channels on a particular node are comalarming.
- Communications errors indicate timeouts or no responses to polling requests.

The most common causes of a network connection problem are listed below:

- Incorrect communications card, network port, or cabling. Verify correct physical and electrical connections on both the autodialer and network side of the connection.
- Incompatible configuration of the network port. Verify autodialer parameters such as protocol, baud rate, parity, etc. match those of the network. Use codes 4900 and 4950 to get summary reports of autodialer configuration.
- If using a KE module to access a DH+ network, the autodialer does not have its local node number equal to the DH+ node number of the KE module. See section 7.4.1.2. Or, the KE module is not configured for CRC and full-duplex.
- Autodialer may be over-running the network or interface device. Solutions here are protocol and device dependent, and are listed in the appropriate subsections of 7.4.
- If problems are isolated to only one of many nodes, suspect a problem local to that node. Examples include cable disconnection, power off, or a PLC fault. Other causes may be that the node has been taken out of run mode or commandeered by other activity on the net.
- Unexpected heavy network usage may trigger timeouts on normally stable configurations. This may happen when one or more users of configuration software become active or increase their loading on the net. Solution involves adjusting timers and parameters to handle the worst case loading.

## 7.7.4 Remote Channel Operations Testing

Procedures in this section should be conducted after the remote channel configuration (section 7.5) is completed. They may also be useful when analyzing specific problems that may arise.

The general remote channel operations test procedure is as follows:

1. Do whatever is most practical to create alarm conditions on each RC.
2. Verify that the correct calls are made and reports are clear.

The troubleshooting tools available include:

- code 43zz to verify messages are clear and make sense.
- code 4945zz to get summary configuration report for the RC.



- code 4941zz\* to get count of problems for that RC. May need to clear this count to see if problems are spurious or persistent.

### **Note:**

Occasional communication errors are to be expected. Frequent occurrence or conditions that persist through trip delay periods indicate problems.

Symptoms of a remote channel operations problem are as follows:

- A comalarm occurs.
- Net address configuration reports an error code.
- Any alarm condition goes unreported.

The most common causes of a remote channel operations problem are:

- A network connection problem exists. See section 7.7.2.
- Scanning on the network has been disabled. See table 7.7.
- Comalarm or other trip delays are too large (no alarms) or too small (too many comalarms).
- The RC is not configured with alarmable conditions. Setpoints or other violation conditions are not correct.
- Channel latency is larger than the application assumed. Use code 49401 to measure scan time. Follow recommendations in section 7.4 to optimize the scan time.
- Other autodialer configuration parameters, such as phone numbers, trip delays or alarm call groupings, are not correct.

## **7.7.5**

### **Diagnostic Code Listing**

This section lists the values and interpretations for the most common error situations. Note that some codes are derived directly from standard error codes supported by sepecific protocols. The documentation for those products is then necessary for interpretation.

0	no error condition detected
351	rc flag not recognized; attempt to write a read only address
352	specified net is invalid
354	protocol doesn't support the net address format
356	request timed out with no feedback
357	node address is invalid for selected protocol
359	node/driver incompatible with address mode
360	miscellaneous error parsing address string

361	some field was duplicated in address string
362	file type specifier in address string not supported
363	couldn't parse file number field in address string
364	couldn't map the I/O slot specified in address string
365	couldn't parse element field in address string
366	couldn't parse subelement field in address string
367	couldn't parse bit field in address string
368	too many routing nodes specified in address string
369	some routing node has illegal syntax
370	transaction aborted at user request
390	source channel data not available for RC link
410	no traffic received from the net
430	timeout with no recognizable response
431	timeout with no response at all
450	valid framing, unknown command or response
501	transaction took too long to transmit
601	Modbus exception: Illegal function
602	Modbus exception: Illegal data address
603	Modbus exception: Illegal data value
604	Modbus exception: Failure in associated device
605	Modbus exception: Acknowledge
606	Modbus exception: Slave device busy
607	Modbus exception: Negative acknowledge
608	Modbus exception: Memory parity error
700	device has not been opened
705	DUART not present
710	net not configured with PLC-type protocol
715	bad serial io configuration parameter
725	background noise on network substrate
730	another modbus master already active
731	mbplus peer in monitor-on-line state
732	mbplus peer never getting token
735	diagnostic loopback test failed
750	a remote node has same node address
755	could not find any nodes on network
1000-1192	Allen Bradley STS error codes. Values in this range indicate a response was received with a non-zero STS byte. The STS byte itself can be reconstructed by subtracting 1000 from the reported value and converting to hex.

Most of these codes are device-dependent. See chapter 4 of the *DH/DH+/DH485 Communication Protocol and Command Set Reference Manual* for interpretations and additional information. The most common device-independent codes are listed below.

1002	Cannot guarantee delivery; KE module not connected or timeouts incompatible.
1003	Duplicate token holder detected
1005	Application (message) layer timeout waiting for response
1006	Duplicate node detected
1009	Unexpected or illegal link-level response
1011	Remote node out of memory
1012	Message too large
1016	Remote node does not support command
1017	Timeout with no response
1200-1500	Allen Bradley EXT STS error codes. The EXT STS byte can be reconstructed by subtracting 1200 from the reported error and converting to hex. See chapter 4 of the <i>DH/DH+/DH485 Communication Protocol and Command Set Reference Manual</i> for interpretations and additional information.
1540	NAK count limit exceeded for transmit msg
1541	ENQ count limit exceeded for transmit msg
1550	Destination byte not equal to the local node number
1551	Unexpected source byte in response
1561	timeout waiting for response to command
2278	RAM allocation failed
2279	hardware failed self-test at warmstart
2280	cannot access net hardware
2290	node not transmitting any global data
2291	more than 16 bits of MBPLUS global data requested
2292	MBPLUS global data word/bit does not exist
2293	MBPLUS global data address for inactive node
2294	MBPLUS remote node's global data is read only
2295	MBPLUS routing path ignored for global data
10000-19255	Codes in this range are allocated for MBPLUS routing failed responses. Such codes are of the form '1xyyy' where x indicates the routing byte number (1-5) that caused the error, and yyy is the sum of codes indicating routing failure conditions as follows: <ul style="list-style-type: none"> <li>1 — no response received</li> <li>2 — program access denied</li> <li>4 — exception response received</li> <li>8 — invalid node type in routing path</li> <li>16 — slave rejected the modbus command</li> <li>32 — initiated transaction forgotten by slave</li> <li>64 — unexpected master output path received</li> <li>128 — unexpected response received</li> </ul> See Modicon documentation for further details.

## 7.8

# Programming Code Reference

This section provides a complete technical reference for all commands used in configuring and controlling the industrial networking capabilities of the Verbatim Gateway Autodialer. The commands are partitioned into functional categories. See section 7.8.10 for a numerical listing.

Procedures for configuring and using the remote channels are similar to those used for the physical channels. The major differences are:

- remote channels require configuration of the network interface.
- remote channels require a net address.

In general, commands that operate on a network interface or a remote channel will begin with the digit '4'. Commands that perform functions similar to existing physical channel commands will use the same key sequences, except for the leading digit '4'.



### Note:

Only those codes beginning with the digit 4 are listed here. All others are in section 6.1.1.

Other commands that apply globally to all physical channels will apply globally to all the remote channels as well. These are: 900, 902, 904, 917, 923, 927, 930, 935, 966, 9403 and 9404. The 4935 codes apply globally to all remote channels and will not touch the physicals.

The autodialer must be in program mode to accept any command codes. Codes may be entered either directly from the front panel, or remotely over the phone. Non-numeric characters may not be entered over the phone. Any code sequence that is unrecognized or out of range will result in the "enter program code" response. Additional error information will sometimes be provided.

## 7.8.1

# Typographic Conventions and Abbreviations

Table 7.8.1.A lists the abbreviations used in the following subsections and elsewhere in this manual. Table 7.8.1.B lists the key sequences used to obtain upper case symbols. The key strokes and symbols used in the command codes are typed in **bold face**. Verbal responses made by the autodialer are typed in *italics*.



Code	Description
<b>ZZ or YY</b>	Any two-digit remote channel number, from 01 to 96, depending on the hardware configuration.
<b>N</b>	An integer from 0 to 65535, or as specifically noted.
<b>V</b>	A floating point number with a maximum of 7 significant figures. The decimal point uses the <point> key NEVER the <shift><point> key. Scientific notation is possible using the "X" key. The maximum exponent (positive or negative) is 38. Examples: 1.23, -1.0, .000001, 1.0X-6.
<b>net</b>	The autodialer network or port number: 0 to 4. Except as noted, specification of this parameter is optional. If not specified, then the value set by command 4910 is used.
<b>node</b>	The node address, as appropriate for a given protocol. Except as noted, specification of this parameter is optional. If not specified, then value set by command 4911 is used.
<b>addr</b>	The PLC address, as appropriate for the given PLC.
<b>net address</b>	The entire net address, with fields delimited by "*" key as required.
<b>NetID</b>	The default or user-recorded network ID message (code 4100).
<b>DN</b>	A two-digit code indicating a specific phone number, or list of such codes.
<b>*</b>	Same as <point> key.
<b>#</b>	Same as <minus> key.
<b>.</b>	Same as <shift><*> key combination. Note: this combination is spoken as "star."

Table 7.8.1.A: Code Listing Abbreviations

Sequence	Symbol	Sequence	Symbol
<shift> <1>	<b>I</b>	<shift> <8>	<b>M</b>
<shift> <2>	<b>O</b>	<shift> <9>	<b>/</b>
<shift> <3>	<b>B</b>	<shift> <POINT>	<b>.</b>
<shift> <4>	<b>T</b>	<shift> <0>	<b>:</b>
<shift> <5>	<b>C</b>	<shift> <MINUS>	<b>S</b>
<shift> <6>	<b>R</b>	<shift> <ENTER>	<b>F</b>
<shift> <7>	<b>N</b>	<shift> <CANCEL>	<b>X</b>

Table 7.8.1.B: Key Combinations for Upper Case Symbols

**Note:**

The <shift><point> sequence is spoken as *star*. And the <\*> sequence as *point*.

## 7.8.2

### Remote Channel Status, Reading, and Writing

#### 40ZZ

Function	Read alarm status of Remote Channel ZZ. (See code 49402 for Network Alarm Status)
Response	<i>remote channel &lt;ZZ&gt; &lt;alarm status&gt;</i>

#### 40ZZ\*

Function	Read current value of RC number ZZ
Response	<i>remote channel &lt;ZZ&gt; is &lt;N&gt; (success)</i> <i>remote channel &lt;ZZ&gt; communications error &lt;code&gt;(failure)</i>

#### 40ZZ\* value

Function	Writes value to PLC address associated with channel ZZ.
Response	<i>remote channel &lt;ZZ&gt; set to &lt;N&gt; (success)</i> <i>remote channel &lt;ZZ&gt;communications error &lt;code&gt;(failure)</i>
Notes	This command will execute without any “are you sure?” checking. <b>Users must be certain that value being written will not create an unsafe condition.</b> Value may be any integer or floating point value. See table 7.8.5.A for information about data type conversions.

#### 40\* netaddress \*

Function	Reads value at <i>netaddress</i>
Response	<i>net &lt;net&gt; node&lt;node&gt; address &lt;addr&gt; is &lt;value&gt;</i> <i>(success) communications error &lt;code&gt;(failure)</i>

#### 40\* netaddress \* value

Function	Writes <i>value</i> to net address, doing type conversions as required.
Response	<i>net &lt;net&gt; node&lt;node&gt; address &lt;addr&gt; is &lt;value&gt;</i> <i>(success) communications error &lt;code&gt;(failure)</i>
Notes	If <i>netaddress</i> and <i>value</i> are of floating point type and a parsing error occurs, then it is impossible for the autodialer to deduce whether the net address or the value was causing the problem. Diagnostic codes may then be ambiguous.

## 7.8.3

### Remote Channel Configuration

Command codes in this section determine characteristics and operations of individual remote channels. For the most part, these commands work exactly the same as the corresponding commands for physical channels (see chapters 3-6).

All remote channel parameters under this sub-section may be configured and re-configured independently except for the alarm condition and the net address. Rules involving that case are discussed in section 7.8.3.3.

## 7.8.3.1

**Message Recording and Reviewing**

Refer to chapter 4 for general information about recording and reviewing messages. The alarm and normal messages for discrete and analog remote channels the same way as for discrete and analog physical channels. The network ID message is spoken at the beginning of any report whose content is specific to a particular industrial network connection.

*4100 net*

Function	Record network ID message for specified net. Append a '*' to set network ID message to the default.
Default	<i>Gateway net &lt;net number&gt;</i>
Response	Whatever was recorded or the default message.
Note	ID messages may only be recorded for ports configured with an industrial protocol (code 4906).

*41ZZ N*

Function	Record channel ZZ alarm/preamble message. N, if present, specifies the recording rate to use. If N is not present, the default recording rate is used. Append with a '*' to set alarm message to the default. Default For discrete channel type: <i>remote channel &lt;ZZ&gt; alarm .</i> For non-discrete when code 4979 is OFF: <i>remote channel &lt;ZZ&gt; &lt;high, low&gt; setpoint exceeded.</i> For non-discrete when code 4979 is ON: <i>remote channel &lt;ZZ&gt;</i>
Response	Whatever was recorded or the default message.

*42ZZ N*

Function	Record channel ZZ normal/epilogue message. N, if present, specifies the recording rate to use. If N is not present, the default recording rate is used. Append with a '*' to set normal message to the default.
Default	For discrete channels type: <i>remote channel &lt;ZZ&gt; normal</i> For non-discrete type: <i>&lt;silence&gt;</i>
Response	Whatever was recorded or the default message.

*43ZZ*

Function	Review both messages for channel ZZ. If ZZ is 00 then all active network ID messages are reviewed.
Response	Whatever was recorded or the default messages.

## 7.8.3.2

**Net Address Assignment**

The details about net address formats may be found in section 7.5. The net address determines channel type. A net address must be assigned before any alarm conditions may be configured. If altering the net address changes the data type, then alarm conditions may need to be reconfigured.

**4910 N**

Function	Set default net number to N. Omit N to read current setting. Range for N 0-5, consistent with the hardware options.
Default	1
Response	<i>Default net address network is &lt;N&gt;</i>
Note	The <i>net</i> parameter in most command codes below may be omitted, and the value here will be automatically substituted.

**4911 N**

Function	Set default node number to N. Allowable values for N are protocol dependent.
Range for N	0-256
Default	1
Response	<i>Default net address node is &lt;N&gt;</i>
Note	The <i>node</i> parameter in most command codes below may be omitted, and the value here will be automatically substituted.

**45ZZ \* mode \* net \* node or route \* addr \***

Function	Associate remote channel number ZZ with specified network address.
Response	<i>communication error code &lt;diagnostic&gt;</i> (if any problem) <i>remote channel &lt;ZZ&gt; No Alarm</i> (new channel type incompatible with existing alarm condition) <i>remote channel &lt;ZZ&gt; mode &lt;mode&gt; net &lt;net&gt; node &lt;node or route&gt; address &lt;addr&gt;</i>
Notes	Any time the net address is spoken, then the net address has been accepted. If first time the channel has been configured, then the <i>no alarm</i> condition will automatically be set. Each field except for <i>addr</i> is optional. Mode is usually deduced automatically. See table 7.5.1. If specified, net and node must be also. If omitted, net and node will be filled in according to current settings of 4910 and 4911. If any field is omitted, must also omit the trailing '*' character for that field. Further information and details in section 7.5.

**45ZZ\***

Function	Read the network address which is currently associated with RC number ZZ.
Response	<i>remote channel &lt;ZZ&gt; mode &lt;mode&gt; net &lt;net&gt; node &lt;node or route&gt; address &lt;addr&gt; remote channel &lt;ZZ&gt; no net address programmed</i> (not yet configured)
Note	<i>mode</i> field announced only if: <ul style="list-style-type: none"> <li>a) the user specified mode when setting the netaddress.</li> <li>b) RC has an Allen-Bradley <i>addr</i> and an error occurred on the latest poll.</li> </ul>

## 7.8.3.3

**Alarm Conditions**

Alarm conditions for the remote channels operate exactly the same as detailed in chapters 3-6. A net address must always be configured before setting any alarm condition. The first time a net address is configured, the alarm condition is set to '3' which is the no alarm condition. If the net address should ever change to a data type incompatible with existing conditions, then the condition will again be set to '3'. This conversion will be announced.

**45ZZ**

Function	Read alarm condition for channel ZZ.
Response	<i>remote channel &lt;ZZ&gt; &lt;condition description&gt;</i> <i>remote channel &lt;ZZ&gt; no net address programmed</i>

**45ZZ 0**

Function	Disarms remote channel number ZZ. This eliminates the channel from all status reporting
Response	<i>remote channel &lt;ZZ&gt; disarmed</i>

**45ZZ 1**

Function	Set remote channel number ZZ alarm condition to normally 1.
Response	<i>remote channel &lt;ZZ&gt; normally 1 error, remote channel number &lt;ZZ&gt; is not a bit channel (type incompatible)</i>

**45ZZ 2**

Function	Set remote channel number ZZ alarm condition to normally 0.
Response	<i>remote channel &lt;ZZ&gt; normally 0 error, remote channel number &lt;ZZ&gt; is not a bit channel (type incompatible)</i>

**45ZZ 3**

Function	Set remote channel number ZZ alarm condition to no alarm. Channel is scanned and listed in all status reports but will never cause an alarm sequence.
Response	<i>no alarm condition for remote channel &lt;ZZ&gt;</i>
Note	This condition is set when a remote channel is initially given a net address. This is also set whenever the net address changes to a type incompatible with prior conditions.

**45ZZ 4**

Function	Set remote channel number ZZ to alarm only on the comalarm condition.
Response	<i>remote channel &lt;ZZ&gt; alarm on communication failure</i>

**45ZZ 5 N**

Function	Set remote channel number ZZ low setpoint to N. Setpoint must be <b>exceeded</b> to alarm. Replace N with <b>-0</b> to clear existing setpoint. Omit N to read current set point value.
Response	<i>remote channel &lt;ZZ&gt; low set point is &lt;N&gt;error, remote channel number &lt;ZZ&gt; is a bit channel (type incompatible).</i>

**45ZZ 6 N**

Function	Set remote channel number ZZ high setpoint to N. Setpoint must be <b>exceeded</b> to alarm. Replace N with -0 to clear existing setpoint. Omit N to read current set point value.
Response	<i>remote channel &lt;ZZ&gt; high set point is &lt;N&gt; error, remote channel number &lt;ZZ&gt; is a bit channel (type incompatible)</i>

**7.8.3.4****Alarm Call Grouping**

Commands in this section determine the phone number call groups for the remote channels. This feature operates exactly the same as documented in chapter 6.

**Note:**

Linking Remote Channels to phone numbers is different than interlinking one Remote Channel to another Remote Channel. The latter is discussed in section 7.9.

**45ZZ 9**

Function	Read RC number ZZ alarm call grouping linkage.
Response	<i>remote channel &lt;ZZ&gt; calls &lt;list&gt;</i>

**45ZZ 9 DN**

Function	Link RC number ZZ to phone number list DN.
Response	<i>remote channel &lt;ZZ&gt; calls &lt;list&gt;</i>

**45ZZ 9\***

Function	Resets the alarm call grouping for RC number ZZ.
Response	<i>remote channel &lt;ZZ&gt; calls all phone numbers</i>

**7.8.3.5****Alarm Trip Delays**

The alarm trip delay applies to all violations, including comalarm violations. Use code 4907 to set the comalarm trip delay.

**46ZZ**

Function	Reads channel number ZZ alarm trip delay.
Response	<i>remote channel &lt;ZZ&gt; alarm trip delay is &lt;V&gt; seconds</i>

**46ZZ V**

Function	Sets RC ZZ individual alarm trip delay to V.
Response	<i>remote channel &lt;ZZ&gt; alarm trip delay is &lt;V&gt; seconds</i>

**46ZZ \***

Function	Sets channel number ZZ alarm trip delay to 2.0 seconds.
Response	<i>remote channel &lt;ZZ&gt; alarm trip delay is 2.0 seconds</i>

## 7.8.4

### Network Interface Parameters

The following notes apply to all commands under this section:

- If the protocol currently configured on any specific net forbids alteration of a parameter, then the command is ignored and the *Enter program code* message is announced.
- The default values for each parameter depend on the protocol. Please see the tables in sections 7.4.1 through 7.4.5 for details.

#### 4900 net

Function	Announces the current setting of all applicable parameters.
Response	See all codes below

#### 4900 net \*

Function	Resets all applicable parameters to their protocol-dependent defaults.
Response	See all codes below
Note	The protocol itself (code 4906) is not altered.

### 7.8.4.1

#### Protocol and Node Number

##### 4905 net \* N

Function	Set autodialer's own node address for net to N. Omit N to reset to default value. Omit *N to just read the value.
Range	protocol dependent. Illegal values are ignored.
Default	protocol dependent.
Response	<net ID message> node number is <N>

##### 4906 net \* N

Function	Sets protocol for network. Omit N to reset to default value.
Range	See Table 7.8.4.1
Default	NONE. <b>All other protocols must be explicitly configured by the user.</b>
Response	<net ID> protocol is <current protocol>
Note	Please read the following information.

If there is any error setting a protocol then the error response is made, and the prior protocol and operations are restored. If the configuration is successful the following things happen:

- All network parameters are set to their default values, and all diagnostics are cleared. These default values depend on the protocol. See tables 7.4.1-5 for specifics.
- If the new protocol is different than the old, all RCs using that device are completely cleared down. If the old and new protocols are identical, then only the defaults and diagnostic information are cleared.

- If the new protocol is DH485, DF1, Modbus, or Modbus Plus, RC scanning on the net is enabled.
- If the new protocol is LDL then the prior LDL device (if any) is closed and output will continue immediately on the new device.
- If the old protocol is LDL and the new one is not, then all unprinted data will be lost.

N	Protocol	Reference	Description	Nets
0	NONE		Device disabled	All nets
2	DH485	7.4.2	Allen-Bradley DH485 protocol	Net1 on V232/485 only
3	DF1	7.4.1	Allen-Bradley serial interface	Net1 on VCP only Net1
4	MBPLUS	7.4.4	Modbus Plus	Net3
5	MODBUSM	7.4.3	Modbus Master	Net1 on VCP only Net2
128	LDL	7.4.5	Local Data Logging May only be used on one device	Net1 on VCP only Net2, 4

Table 7.8.4.1: Protocol Identifiers

### 7.8.4.2

#### Serial Parameters

##### 4901 net \* N

Function	set serial baud rate for net to N. Omit N to reset to default value. Omit *N to just read the value.
Range for N	Depends on protocol, but normally 50, 75, 110, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 57600
Default	Protocol dependent, see tables 7.4.1-5.
Response	<net ID message> baud rate is <N>.

##### 4902 net \* N

Function	Set serial data bits for net to N. Omit N to reset to default value. Omit *N to just read the current setting.
Range for N	protocol dependent, usually 5, 6, 7, or 8, see tables 7.4.1-5.
Default	8
Response	<net ID message> data bits are <N>

##### 4903 net \* N

Function	Set serial stop bits for net to N. Omit N to reset to default value. Omit *N to just read the current setting.
Range for N	protocol dependent, usually 1 or 2. See tables 7.4.1-5.
Default	1
Response	<net ID message> stop bit is <N>



*4904 net \* N*

Function	Set parity for net. Omit N to reset to default value. Omit n *N to just read the current setting.
Range for N	Protocol dependent: See tables 7.4.1-5. 0 is NO parity 1 is ODD parity 2 is EVEN parity 3 is SPACE parity 4 is MARK parity
Default	protocol dependent
Response	<i>&lt;net ID message&gt; parity is &lt;even, odd, space, mark&gt;</i>

**7.8.4.3****Timers**

Correct setting of the various protocol timers are essential for correct and efficient RC scanning. They also help avoid conflicts with other network traffic. The default values have been selected to provide “plug and play” capability for each specific protocol.

Most applications can be significantly optimized by fine tuning the values. If the timers are severely out of whack with the network environment, then many communication errors will result. See sections 7.7.3 for specific hints.

In general, decreasing a timer will reduce channel latency. However, lower latencies will always increase the autodialer’s load on the network. Increasing timers, especially the 4909 and 4955 timers, will increase latencies but decrease loading.

See section 7.8.4.4 for other commands that control latencies and loading.

**Warning:**

Changing any timer value may require corresponding changes to other timers for correct operation.

*4907 net \* V*

Function	Sets communications alarm trip delay. Units are seconds. A comalarm is tripped whenever the latency for any RC on net exceeds this value. Omit V to set to default value. Omit *V to read current setting.
Range for V	9999.9 seconds
Default	20 seconds
Response	<i>&lt;net ID&gt; communication alarm trip delay is &lt;V&gt; seconds</i>
Note	The comalarm trip delay should usually be 3 times the typical scan time. Whenever value is altered, all existing comalarms are reset. The other trip delay timer (code 46ZZ or 902) only begins running <b>after</b> this timer trips.

**4908 net \* N**

Function	Sets the link-level timer. Units are milliseconds. Usage of this timer is protocol dependent and described in section 7.4. In general, this controls the maximum time the autodialer will wait for any acknowledgment. Omit N to set to default value. Omit *N to read current setting.
Range for N	0-65535
Default	protocol dependent. See tables 7.4.1-5.
Response	<i>&lt;net ID&gt; link limit time is &lt;N&gt; mseconds</i>
Warning	Incrementing this timer may increase channel latencies. One should rarely have to raise value above 5000 milliseconds.

**4909 net \* N**

Function	Sets application-level (message) timer. Units are milliseconds. Controls maximum period the autodialer will wait for another node to respond to any command. Omit N to set to default value. Omit *N to read current setting.
Range for N	0-65535
Default	protocol dependent. See tables 7.4.1-5.
Response	<i>&lt;net ID&gt; message limit time is &lt;N&gt; mseconds</i>
Warning	Incrementing this timer may increase channel latencies. One should rarely have to raise value above 5000 milliseconds.
Note	The message limit timer should be significantly greater than the scan delay plus the link timer.

**4955 net \* N**

Function	Sets scan delay timer. Units are milliseconds. Polls for each RC on this net will be spaced at least this many milliseconds apart. However, the driver may transmit polls for different RCs without regard to this value. Useful for preventing the autodialer from causing network congestion. Omit N to set to default value. Omit *N to read current setting.
Range for N	0-32535
Default	0
Response	<i>&lt;net ID&gt; RC scan delay is &lt;N&gt; mseconds</i>
Warning	Incrementing this timer may increase channel latencies. One should rarely have to raise value above 5000 milliseconds.

**7.8.4.4****Protocol-Dependent Parameters**

The following commands are all protocol-specific. They enable further user control over various protocol parameters. They may be used to optimize network performance.

**4950 net \***

Function	Sets all protocol specific parameters applicable to <i>net</i> to the default values. Omit * to read current settings.
Response	See codes below.

*4951 net \* N**DH485 ONLY:*

Function	Sets the Maximum Node Address. Sets a limit on how many other nodes will be solicited into the token ring. Omit N to set to default value. Omit *N to read current setting.
Range for N	1-31
Default	31
Response	<net ID> MNA is <N>

*4952 net \* N**DH485 ONLY:*

Function	Sets the Token Hold Factor. Used to limit the number of commands the autodialer may transmit per token hold. Omit N to set to default value. Omit *N to read current setting.
Range for N	1-96
Default	1
Response	<net ID> THF is <N>
Warning	Any value other than the default may cause network-wide congestion and other problems.

*4953 net \* N**DH485 ONLY:*

Function	Sets the Token Exercise Factor. Used to force the autodialer to pass the token without using it. Omit N to set to default value. Omit *N to read current setting.
Range for N	1-31
Default	1
Response	<net ID> TEF is <N>
Note	The scan time will be increased by a factor equal to the TEF. The additional bandwidth available to other nodes on the network.

*4954 net \* N**Modbus Plus ONLY:*

Function	Erases the autodialer global data block. If the current size of the global data block is greater than N, it is truncated to N words. If the current size is less than or equal to N, the size of the block is unchanged. Omit N to set to default value. Omit *N to read current setting.
Range for N	0-32
Default	0
Response	<net ID> link data limit is <N>

*Modbus ONLY:*

Function	Sets Modbus delay. Units are milliseconds. Controls the minimum time to delay before transmitting any frame. Omit N to set to default value. Omit *N to read current setting.
Range for N	0-1000 (msec)
Default	0
Response	<net ID> Modbus delay time is <N>
Note	Useful for interfacing to slower devices.

## 7.8.5

### Remote Channel Interlinking

Please refer to section 7.2.8 for an overview of the RC interlink feature. The commands below establish the channel interlinkage configurations. There are several rules and restrictions, listed below. If any of them are violated, the command will be ignored or an error message reported.

- *Both the source and destination RCs must have net addresses.* The net address for either channel may be reconfigured at any time.
- *Chaining is illegal.* The source RC must not be configured as destination for any other interlinked pair. Similarly, the destination RC must not be configured as a source.
- *Multiple sources for a single destination are illegal.* If the destination RC is already configured as the destination for another source, then the new configuration supersedes the old one. Also be sure that distinct destination channels never write to the same point.
- *Multiple destinations for a single source are allowed.*
- *Neither the source nor destination may be disarmed.* If either currently is then the alarm condition is reset to 4. Once an interlink has been configured, any attempt to set the alarm condition to 0 results in an error message. All other modifications are allowed.
- *Destination channel can not be read only.* Comalarms will result if the destination channel is read-only (i.e. a PLC input register).
- *Source and destination do not need to be the same type.* Conversions are performed according to table 7.8.5.A below.
- *No totalizer or runtime values.* If the source channel is a physical channel configured for either runtime or totalizer, the values exported will be the discrete channel state.

#### 47ZZ\*YY\*

Function	Establishes a data mode interlink with RC ZZ as the source channel and YY as the destination. The value from ZZ's net address is written to YY's net address once per scan loop.
Response	<i>remote channel ZZ data link to remote channel YY</i> (success) <i>remote channel (ZZ,YY) not programmed</i> (no net address) <i>remote channel (ZZ,YY) already linked</i> (if chain would result)
Note	See section 7.2.8 for an overview of linking functionality.

#### 47ZZ\*YY

Function	Establishes an alarm mode interlink with ZZ as the source and YY as the destination. Remote channel ZZ's alarm status (see table 7.8.5.B) will be written to YY once per scan loop.
----------	---

- Response** *remote channel ZZ alarm link to remote channel YY*  
(success)*remote channel (ZZ,YY) not programmed* (no net address) *remote channel (ZZ,YY) already linked* (multiple sources, or a chain would result)
- Note** The alarm status codes are bit mapped and intended for interpretation by software.
- Examples** Destination channel reads 117, which is in decimal.  
Convert to hex and decompose as follows:  
 $117 = x75 = x40 + x20 + x10 + 0x05$   
Thus, the source has an acknowledged high setpoint alarm, channel now normal. Destination channel reads  $30 = x1E = x10 + x08 + x06 =$  unacknowledged low setpoint alarm.

**47ZZ**

- Function** Reports all interlinked channel pairs using ZZ as either source or destination channel. If ZZ is 00, then the set of all interlinked channel pairs is listed.
- Response** *remote channel <ZZ,XX> <data,alarm> link to remote channel <YY,ZZ>*

Source	Destination	Destination Value
1 bit	16 bit	0 if source is 0, otherwise 1
1 bit	32 bit	0.0 if source is 0, otherwise 1.0
16 bit	32 bit	Floating point number with integer value equal to the source value.
16 or 32 bit	1 bit	0 if source is 0, otherwise 1
32 bit	16 bit	Signed integer value of truncated floating point value. Overflow will result in undefined behavior. USE WITH CAUTION (see below)
<b>WARNING!</b> Conversions from 32 to 16 bit where the floating point number is negative will preserve the sign of the integer. This provides compatibility with PLCs that understand negative integers. The autodialer, however, interprets all integers as unsigned. For example, the conversion of -1.23 will be reported as 65535 by the autodialer, but may be understood as -1 by the destination node.		
<b>WARNING!</b> It is possible for drastically different 32 bit values to be converted to identical integers. For example, -1.0 and 65535.1 will both have integer representation 65535.		
<b>WARNING!</b> If using data from a physical (Net0) analog channel as the source, be sure the scaling bounds are within the IEEE 32-bit floating points limits. Otherwise, the conversions can overflow, resulting in undefined behavior.		

Table 7.8.5.A: Data Conversion Rules

**47ZZ -0**

Function	Clears all interlinked channel pairs using ZZ as either source or destination channel. If ZZ is 00, then <b>all</b> interlinks are cleared.
Response	<i>remote channel ZZ link to remote channel YY is cleared</i> <i>remote channel ZZ is not linked</i> (no such interlink existed) <i>all remote channel links cleared</i> (ZZ was 00)
Note	All other existing remote channel configuration is preserved. The destination channel(s) will stop writing data. It (they) will to read their netaddress, and will alarm according to existing conditions.

**47ZZ \* YY -0**

Function	Clear specific interlink using ZZ as source and YY as destination.
Response	<i>remote channel ZZ &lt;data,alarm&gt; link to remote channel YY is cleared no link</i> (no such interlink exists)
Note	See note for 47zz-0 command above.

Value (hex)	Interpretation
x0000	no alarm or violation
x0001	channel not configured with alarm conditions
x0002	latest violation was a communications alarm
x0003	latest violation was the normally 0 criterion
x0004	latest violation was the normally 1 criterion
x0005	latest violation was the high setpoint criterion
x0006	latest violation was the low setpoint criterion
x0007	reserved (illegal channel)
x0008	channel currently in violation
x0010	alarm state tripped
x0020	alarm state acknowledged
x0040	alarm state returned to normal
x0080	return to normal state acknowledged
others	reserved for future extensions

Table 7.8.5.B: Channel Status Code Bit Map

## 7.8.6

### Personnel Identification Numbers

The following command codes are provided for configuring and controlling the PIN functionality, described in section 6.2.21. For security reasons all commands in this group are available only from the front panel. If entered over the telephone, the *error, enter program code* response is made.

#### 48 dddd

Function	Establishes 'dddd' as a valid PIN. 'dddd' must consist of 1 to 5 numeric digits.
Response	<i>P-I-N is dddd</i> (success). <i>P-I-N exceeded</i> (32 PINs already configured, invalid characters, too long, or '00000' is specified).
Note	The sequence '00000' is reserved to indicate any front panel operator.

#### 48 dddd \*

Function	Deletes 'dddd' as a valid PIN.
Response	<i>P-I-N dddd is cleared</i> (success). <i>P-I-N error</i> (failure)
Note	Any channels currently acknowledged by PIN 'dddd' will thereafter appear acknowledged "by PIN 00000."

#### 48

Function	Lists all PINs currently configured
Response	<i>All P-I-N programmed are ...list...</i> (PINs currently configured) <i>No P-I-N is programmed</i> (No PINs currently configured)

#### 48 \*

Function	Erases all PINs currently configured
Response	<i>All P-I-N programmed are cleared</i>
Note	This effectively turns off all PIN functionality. No more "acknowledged by PIN . . .," messages will be logged.

## 7.8.7

### Clear-Out Operations

Use the commands in this section to quickly clear out large blocks of remote channel configuration information. Use them with caution since there is no simple recovery from mistakes.



#### **Note:**

See section 7.8.4.4, code 4954, for Modbus Plus global data clear down.

#### 4935 4

Function	Clears all RC user recorded messages.
Response	<i>All remote channel messages cleared</i>

**4935 5**

Function	Clears all RC configuration data: network addresses, alarm condition, alarm call grouping, interlinks, trip delays and default net, node, and analog flag.
Response	<i>All remote channels reset</i>

**4935 8**

Function	Clears out all communications failure codes and counts.
Response	<i>Communication error count overall reset</i>

**4935 9**

Function	Does all the 4935 functions, plus clear down all ports with industrial network protocols.
Response	<i>Gateway overall reset</i>
Note	The LDL port, if any, is not reset.

**7.8.8****Network Diagnostic Commands**

Use these codes for testing configuration and troubleshooting problems that may arise. See section 7.7 for advice and strategy.

**492**

Note	This command is no longer available.
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**493 \* net**

Function	Globally disables/enables RC polling. Acts as a toggle, so two consecutive entries cancel each other out. No RC programming is erased.
Response	<i>&lt;net ID&gt; communication is (off, on)</i>
Note	Useful for stopping autodialer scan activity while troubleshooting elsewhere on the network.

**4930 \* net**

Function	Perform a diagnostic self-test on specified network. All available network diagnostic counters and information will be reset. If an LDL device is configured, additional information may be printed.
Response	<i>&lt;net ID&gt; communication test is &lt;normal, errcode&gt;</i>
Note	May take a long time to complete. Will beep every 5 seconds while running. Modbus only: comalarms may trip, but will be reset when exit program mode.

**4940**

Function	Read all 4940x diagnostic info for all networks.
Response	See the following.
Note	All counts may be quickly cleared using code 49358



**4940 \* net**

Function Read all 4940 diagnostic info for **net**  
 Response See commands below.  
 Note Remember that the net parameter is almost always optional. If omitted, the default net parameter set by code 4910 will automatically be inserted.

**4940 1 net**

Function Read time to complete scan for the RCs using net.  
 Response *scan time limit is <scan time> seconds*  
 Note An RC not in comalarm is guaranteed have latency less, possibly much less, than the scan time. If in comalarm, latency is greater than the comalarm trip delay timer for that net.  
 Exception After powering on and until the unit has been operating for longer than the comalarm trip delay timers, the latency may actually be as great as the period elapsed since the unit was turned off.

**4940 2**

Function Reads network status code. Interpret this code as follows:  
 0 No remote channels are in communications alarm.  
 1-95 That many remote channels are in communications alarm.  
 101-196 That many nodes on the network are in communications alarm.  
 200 Unable to communicate with any node on the network.  
 Response *<net ID> network status code is <code>*  
 Note The network status LED will blink whenever the code is 200.

**4940 3 net**

Function Read network alert count. (see section 7.7.1)  
 Append -0 to clear the count.  
 Response *<net ID > network alert count is <count>*  
 Note Refer to Section 7.7.1 for more information.

**4940 4 net**

Function List the nodes all of whose RCs are currently experiencing communication failure.  
 Response *<net ID > communication failure at node(s) <list>*

**4940 5 net**

Function List all RCs on net currently having communications failure.  
 Response *<net ID > remote channel(s) now in communication alarm are <list>*  
 Note Code 49405 does not report alarm condition-tripped alarms. The check status command, 40ZZ, checks all alarm conditions, communication or otherwise.

**4940 6 net**

Function Read diagnostic codes for the last 10 distinct problems on net. Append -0 to clear the history stack.

Response *recorded error numbers are code <n>...*

Note The problem need not have caused a comalarm to be placed on the stack.No time or frequency of occurrence information is reported.

**4941 ZZ**

Function Read instantaneous communications status for channel number ZZ.

Response *remote channel <ZZ> communication alarm code is <diag code>*

Note Status reported is result of latest scan loop poll, not the communications alarm status (see 40zz). Code 49401 will telltime since the latest poll.

**4941 ZZ \***

Function Read count of communication errors for RC ZZ. Append -0 to clear the count.

Response *remote channel <ZZ> communication alarm count is <count>*

Note Any error during scan loop poll is counted. Errors that persist cause a comalarm. All counts for all RCs may be quickly cleared using code 49358.

**4942**

Function Read list of RCs configured with both a net address and disarmed.

Response *remote channels now disarmed are <list>*

**4943**

Function Read list of RCs currently not configured with a net address.

Response *remote channel(s) not programmed are <list>*

Note This command is useful for finding RC numbers available for new uses.

**4944**

Function Read list of all RCs with a net address and not disarmed.

Response *remote channels armed are <list>*

Note Useful for finding out which RCs are currently in use.

**4945 ZZ**

Function Reports configuration summary for ZZ. This includes net address, criterion, setpoints, alarm call grouping, interlinks, trip delay and current alarm status.

Response See commands 45zz\*, 45zz, 47zz\*, 4941zz, 46zz and 45zz9.

**4946 net**

Function Read list of all active nodes on net.

Response *node numbers present on network <net> over 0 are: <list>*

Notes	This report may take a very long time. The autodialer will beep at 5 second intervals while running. May halt execution at any time by pressing the <b>enter</b> key. Allen Bradley's Channel 0 connections and Modbus with DEF switch will list all possible nodes. Any comalarms that trip during this process will be automatically reset when exit program mode.
<b>4946 net * N</b>	
Function	Reads list of all active nodes on net greater than or equal to N. Omit N to resume listing from where previous 4946 command left off.
Response	<i>node numbers present on network &lt;net&gt; over &lt;N&gt; are: &lt;list&gt;</i>
Note	Useful for continuing a previous 4946 command that was interrupted or skipping around.

### 7.8.9

### Miscellaneous

Commands in this section were not easily categorized with the others. Some are mentioned in other sections as well. They offer short cuts.

#### 49\*

Function	Repeats the previous successful command which began with a '4'. It is possible to add key strokes after the * and before enter, subject to limit of 65 total keystrokes. The added key strokes are not concatenated for subsequent 49* commands.
Response	appropriate to actual command resulting.

#### 493\* net

Function	Globally disables/enables RC polling. Acts as a toggle, so two consecutive entries cancel each other out. No RC programming is erased.
Response	<i>&lt;net ID&gt; communication is (off, on)</i>
Note	Useful for stopping autodialer scan activity while troubleshooting.

#### 4910 N

Function	Set default net number to N. Omit N to read current setting.
Range for N	0-5, consistent with the hardware options.
Default	1
Response	<i>Default net address network is &lt;N&gt;</i>
Note	The 'net' parameter may be omitted, and the value here substituted in almost all command codes.

#### 4911 N

Function	Set default node number to N. Allowable values for N are protocol dependent.
Range for N	0-256
Default	1

	Response	<i>Default net address node is &lt;N&gt;</i>
	Note	The 'node' parameter may be omitted, and the value here substituted in almost all command codes.
<b>4979</b>		
	Function	Toggles the analog alarm flag. If on, then every alarm report for an analog RC will include the phrase <i>high &lt;low&gt; set point</i> . If off, then this phrase is omitted.
	Response	<i>high-low mode is ON &lt;OFF&gt;</i>
	Default	ON

## 7.8.10 Gateway Programming

Refer to *Table 7.8.1.A* on p. 7-45 for Code Listing Abbreviations in the table below.

*PLC Programming Code Table (Page 1 of 6)*

<i>Code</i>	<i>Description</i>	<i>Default</i>	<i>Section</i>
<b>Remote Channel Status, Reading and Writing</b>			
40ZZ	Read alarm status of Remote Channel ZZ		7.6.1, 7.8.2
40ZZ *	Read current value of RC number ZZ		7.6.1, 7.8.2
40ZZ *	Write value to PLC address associated with channel ZZ		7.6.1, 7.8.2
40 * net address *	Read value at <i>netaddress</i>		7.6.1
40 * net address *	Write <i>value</i> to net address		7.6.1
<b>Message Recording and Reviewing</b>			
4100 net	Record network ID message		7.8.3.1
4100 net *	Set network ID message to default		7.8.3.1
41ZZ	Record channel ZZ alarm/preamble message at default recording rate		7.2.3, 7.5, 7.6.1, 7.8.3.1
41ZZ *	Set alarm message to the default		7.8.3.1
41ZZ N	Record channel ZZ alarm/preamble message at recording rate N		7.8.3.1
42ZZ	Record channel ZZ normal/epilogue message to the default		7.2.3, 7.5, 7.6.1, 7.8.3.1
42ZZ *	Set normal/epilogue message to the default		7.8.3.1
42ZZ N	Record channel ZZ normal/epilogue message at recording rate N		7.8.3.1
43ZZ	Review both messages for channel ZZ		7.7.4, 7.8.3.1
4300	Review all active network ID messages		7.8.3.1

*PLC Programming Code Table (Page 2 of 6)*

<i>Code</i>	<i>Description</i>	<i>Default</i>	<i>Section</i>
<b>Net Address Assignment</b>			
4910 N	Set default net number to N	1	7.5.1, 7.6.1, 7.8.3.2, 7.8.9
4910	Read current value of default net number		7.8.3.2, 7.8.9
4911 N	Set default node number to N	1	7.5.1, 7.6.1, 7.8.3.2, 7.8.9
4911	Read current value for default node number		7.8.3.2, 7.8.9
45ZZ * mode*net *node, or route*addr*	Associate remote channel number ZZ with specified net address		7.6.1, 7.6.4, 7.8.3.2
45ZZ *	Read the net address which is currently associated with RC number ZZ		7.5, 7.8.3.2
<b>Alarm Conditions</b>			
45ZZ	Read alarm conditions for channel ZZ		7.8.3.3
45ZZ 0	Disarm remote channel number ZZ		7.8.3.3
45ZZ 1	Set remote channel number ZZ alarm condition to normally 1		7.2.3, 7.8.3.3
45ZZ 2	Set remote channel number ZZ alarm condition to normally 0		7.2.3, 7.8.3.3
45ZZ 3	Set remote channel number ZZ alarm condition to no alarm		7.8.3.3
45ZZ 4	Set remote channel number ZZ to alarm only on the comalarm condition		7.8.3.3
45ZZ 5	Read current set point value		7.8.3.3
45ZZ 5 N	Set remote channel number ZZ low setpoint to N		7.8.3.3
45ZZ 5-0	Clear existing low setpoint		7.8.3.3
45ZZ 6	Read current high set point value		7.2.3, 7.8.3.3
45ZZ 6 N	Set remote channel number ZZ high setpoint to N		7.8.3.3
45ZZ 6-0	Clear existing high setpoint		7.8.3.3
<b>Alarm Call Grouping</b>			
45ZZ 9	Read RC number ZZ alarm call grouping linkage		7.8.3.4
45ZZ 9 DN	Link RC number ZZ to phone number list DN		7.8.3.4
45ZZ 9 *	Reset the alarm call grouping for RC number ZZ		7.8.3.4
<b>Alarm Trip Delays</b>			
46ZZ	Read channel number ZZ alarm trip delay		7.8.3.5, 7.5
46ZZ V	Set RC ZZ individual alarm trip delay to V		7.8.3.5
46ZZ *	Set channel number ZZ alarm trip delay to default of 2.0 seconds	2 sec	7.8.3.5

PLC Programming Code Table (Page 3 of 6)

<i>Code</i>	<i>Description</i>	<i>Default</i>	<i>Section</i>
<b>Network Interface Parameters</b>			
4900 net	Announce the current settings of all serial parameters		7.7.3, 7.8.4
4900 net *	Reset all serial parameters to their protocol-dependent defaults		7.8.4
<b>Protocol and Node Number</b>			
4905 net	Read current value of autodialer's own node address for net		7.4.1.2, 7.4.4, 7.8.4.1
4905 net *	Set autodialer's own node address for net	protocol dependent	7.8.4.1
4905 net * N	Set autodialer's own node address for net to N		7.6.1, 7.8.4.1
4906 net	Read current value of protocol for net		7.8.4.1, 7.4
4906 net * N	Set protocol for network to N		7.6.1, 7.8.4.1, D.1.1, D.1.2
<b>Serial Parameters</b>			
4901 net	Read current value of baud rate for net		7.8.4.2
4901 net *	Set serial baud rate for net to default	protocol dependent	7.8.4.2
4901 net * N	Set serial baud rate for net to N		7.6.1, 7.8.4.2, D.1.1
4902 net	Read current value of data bits for net		7.6.1, 7.8.4.2
4902 net *	Set serial data bits for net to default	8	7.8.4.2
4902 net * N	Set serial data bits for net to N		7.8.4.2, D.1.1
4903 net	Read current value of stop bits for net		7.6.1, 7.8.4.2
4903 net *	Set serial stop bits for net to default	1	7.8.4.2
4903 net * N	Set serial stop bits for net to N		7.8.4.2, D.1.1
4904 net	Read current value of parity for net		7.8.4.2
4904 net *	Set parity for net to default	protocol dependent	7.8.4.2
4904 net * N	Set parity for net to N		7.8.4.2, D.1.1
<b>Timers</b>			
4907 net	Read current value of communications alarm trip delay		7.2.7, 7.8.4.3
4907 net *	Set communications alarm trip delay to default	20 sec	7.8.4.3
4907 net * V	Set communications alarm trip delay to V		7.2.7, 7.8.4.3
4908 net	Read current value of the link-level timer		7.4.1.2, 7.8.4.3
4908 net *	Set the link-level timer to default	protocol dependent	7.8.4.3
4908 net * N	Set the link-level timer to N		7.8.4.3

PLC Programming Code Table (Page 4 of 6)

Code	Description	Default	Section
<b>Timers. . . Continued from p. 7-66</b>			
4909 net	Read current value of application-level (message) timer.		7.4.1.2, 7.4.2, 7.8.4.3
4909 net *	Set application-level (message) timer to default	protocol dependent	7.8.4.3
4909 net * N	Set application-level (message) timer to N		7.8.4.3
4955 net	Read current setting of scan delay		7.8.4.3
4955 net *	Set scan delay to default value		7.8.4.3
4955 net * N	Set scan delay timer to N		7.8.4.3
<b>Protocol-Dependent Parameters</b>			
4950 net	Read current settings of all protocol specific parameters		7.7.3, 7.8.4.4
4950 net *	Set all protocol specific parameters applicable to <i>net</i> to the default values		7.8.4.4
4951 net	<b>DH485 ONLY:</b> Read current setting of the Maximum Node Address		7.4.1.4, 7.8.4.4
4951 net *	<b>DH485 ONLY:</b> Set default value of the Maximum Node Address	31	7.8.4.4
4951 net * N	<b>DH485 ONLY:</b> Set the Maximum Node Address		7.8.4.4
4952 net	<b>DH485 ONLY:</b> Read current setting of the Token Hold Factor		7.4.1.4, 7.8.4.4
4952 net *	<b>DH485 ONLY:</b> Set default value of the Token Hold Factor	1	7.8.4.4
4952 net * N	<b>DH485 ONLY:</b> Set the Token Hold Factor		7.8.4.4
4953 net	<b>DH485 ONLY:</b> Read current setting of Token Exercise Factor		7.8.4.4
4953 net *	<b>DH485 ONLY:</b> Set Token Exercise Factor to default value	1	7.8.4.4
4953 net * N	<b>DH485 ONLY:</b> Set the Token Exercise Factor		7.8.4.4
4954 net	<b>Modbus ONLY:</b> Read current value of Modbus delay <b>Modbus Plus ONLY:</b> Read current size of global data block		7.4.1.4, 7.5.5.2, 7.8.4.4
4954 net *	<b>Modbus ONLY:</b> Set Modbus delay to default value <b>Modbus Plus ONLY:</b> Set global data block to default value	0	7.8.4.4
4954 net * N	<b>Modbus ONLY:</b> Set Modbus delay <b>Modbus Plus ONLY:</b> Erases the autodialer global data block		7.8.4.4

*PLC Programming Code Table (Page 5 of 6)*

<i>Code</i>	<i>Description</i>	<i>Default</i>	<i>Section</i>
<b>Remote Channel Interlinking</b>			
4700	List the set of all interlinked channel pairs		7.8.5
4700-0	Clear <b>all</b> interlinks.		7.8.5
47ZZ * YY	Establish an alarm mode interlink with RC ZZ as the source and YY as the destination		7.6.2, 7.6.3, 7.8.5
47ZZ * YY *	Establish a data mode interlink with RC ZZ as the source and YY as the destination		7.6.2, 7.8.5
47ZZ	Report all interlinked channel pairs using ZZ as either source or destination		7.5, 7.8.5
47ZZ -0	Clear all interlinked pairs using ZZ as either source or destination		7.8.5
47ZZ * YY -0	Clear specific interlink using ZZ as source and YY as destination		7.8.5

**Personnel Identification Numbers**

48	List all PINs currently configured		6.2.21, 7.8.6
48 *	Erase all PINs currently configured		6.2.21, 7.8.6
48 ddddd	Establish "dddd" as a valid PIN		6.2.21, 7.8.6
48 ddddd *	Delete "dddd" as a valid PIN		6.2.21, 7.8.6

**Clear-Out Operations**

4935 4	Clear all RC user recorded messages		7.8.7
4935 5	Clear all RC configuration data: network addresses, alarm conditions, phone number links and interlinks		7.8.7
4935 8	Clear out all communication failure codes and counts		7.7.3, 7.8.7
4935 9	Do all the 4935 functions, plus clear down all ports with industrial network protocols		7.8.7

**Network Diagnostic Commands**

493 * net	Globally disable/enable RC polling		7.2.10, 7.8.8
4930 * net	Perform a diagnostic self-test on net		7.2.10, 7.6.1, 7.7.3, 7.8.8
4940	Read all 4940xdiagnostic info for all networks		7.2.10, 7.7.3, 7.8.8
4940 * net	Read all 4940 diagnostic info for <i>net</i>		7.8.8
4940 1 net	Read time to complete scan for the RCs using net		7.8.8
4940 2	Read network status code		7.8.8
4940 3 net	Read network alert count		7.8.8
4940 3 net-0	Clear the network alert count		7.8.8
4940 4 net	List all the nodes whose RCs are currently experiencing communication failure		7.8.8



*PLC Programming Code Table (Page 6 of 6)*

<i>Code</i>	<i>Description</i>	<i>Default</i>	<i>Section</i>
<b>Network Diagnostic Commands. . . Continued from p. 7-68</b>			
4940 5 net	List all RCs on net currently having communication failure		7.8.8
4940 6 net	Read diagnostic codes for last 10 network problems		7.7, 7.8.8
4940 6 net-0	Clear the diagnostic history		7.8.8
4941 ZZ	Read instantaneous communications status for channel number ZZ		7.2.10, 7.7, 7.8.8
4941 ZZ *	Read count of communication errors for RC ZZ		7.8.8
4941 ZZ *-0	Clear the communication error count		7.8.8
4942	Read list of RCs configured with both a net address and disarmed		7.8.8
4943	Read list of RCs currently not configured with a net address		7.8.8
4944	Read list of all RCs with a net address and not disarmed		7.8.8
4945 ZZ	Report configuration summary for RC ZZ		7.7.4, 7.8.8
4946 net	Read list of all active nodes on net		7.2.10, 7.7.3, 7.8.8
4946 net * N	Read list of all active nodes on net greater than or equal to N		7.8.8
<b>Miscellaneous</b>			
49 *	Repeat the previous successful command which began with a "4."		7.8.6, 7.8.9
4979	Toggle the analog alarm flag		7.8.9



# 8

## Using the Alarm Ready Schedule Feature

### 8.1

#### Definition

An Alarm Ready Schedule is defined as an interval of time during which the Verbatim Gateway autodialer is ARMED and “Ready” to respond to alarm conditions. Alarm Ready Schedules can be automatically started according to times and dates entered by the operator. An Alarm Ready Schedule commences with the Verbatim Gateway autodialer becoming REARMED. (If the Verbatim Gateway autodialer was previously not DISARMED then the schedule will still be commenced at that time.) Once the Alarm Ready Schedule has commenced the Verbatim Gateway autodialer will continue in an ARMED state until the end of the Alarm Ready Schedule, at which time the Verbatim Gateway autodialer will be automatically DISARMED. Once an Alarm Ready Schedule has commenced it is said to be “active.”

There are three steps to programming for Alarm Ready Scheduling:

- ◆ Date and time setting
- ◆ Enter alarm start and stop times
- ◆ Enable the Alarm Ready Scheduling feature using code 966 N.

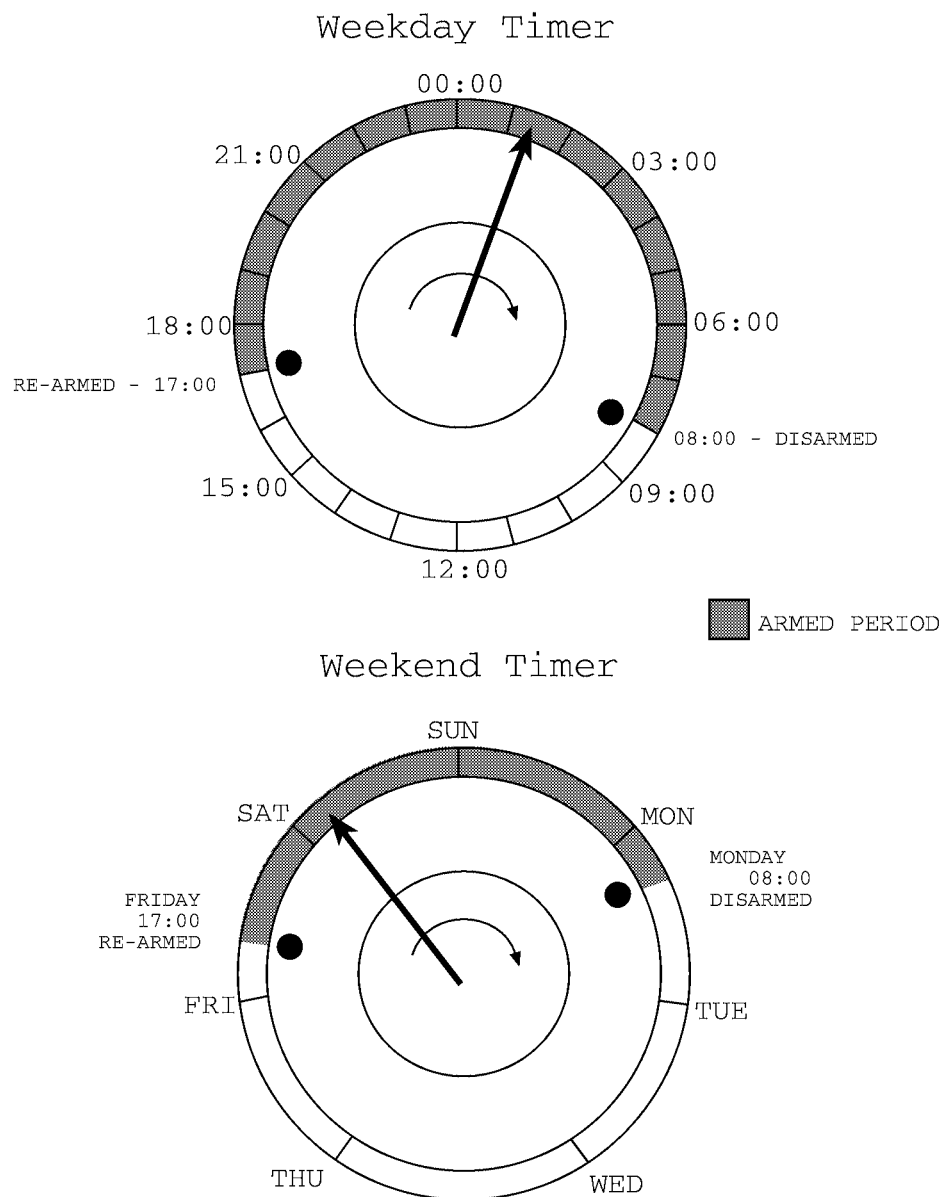
### 8.2

#### General Descriptions

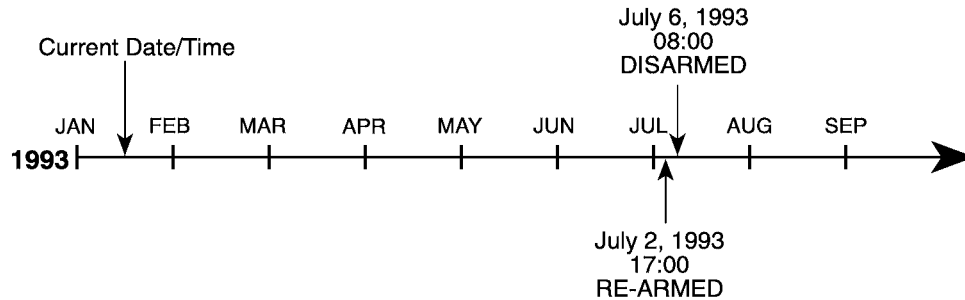
Alarm Ready Schedules can be viewed as really nothing more than an automated way of pressing the REARM/DISARM button. Therefore, if an alarm occurs while the Verbatim Gateway autodialer is DISARMED, no dial-outs will be made and the alarm will be automatically acknowledged. Correspondingly, if there is an acknowledged alarm when the Verbatim Gateway autodialer becomes REARMED and the input violation is still present then the Verbatim Gateway autodialer will begin calling after the trip delay has elapsed.

If the Verbatim Gateway autodialer is doing a sequence of alarm calls or Autocall calls at the time when an Alarm Ready Schedule should change the Verbatim Gateway autodialer’s REARM/DISARM state the change will be delayed until after the end of the calling sequence.

Alarm Ready Schedules can be temporarily overridden by the operator pressing the REARM/DISARM button. However, if the REARM/DISARM button is pressed during an active Alarm Ready Schedule the schedule still remains active. If the operator DISARMS the Verbatim Gateway autodialer in the middle of an Alarm Ready Schedule the schedule will actually continue to it's ending time. It will then deactivate itself and attempt to DISARM the Verbatim Gateway autodialer just as if the Verbatim Gateway autodialer was still ARMED. If the operator DISARMS the Verbatim Gateway autodialer in the middle of an active Alarm Ready Schedule, then REARMS the Verbatim Gateway autodialer once again before the end of the Alarm Ready Schedule, the schedule will remain active until its ending time. The schedule will then be deactivated and the Verbatim autodialer will be DISARMED.



## Holiday Timer is Linear



### 8.3 Alarm Ready Schedule Modes

There are three possible Alarm Ready Schedules modes: Weekday, Weekend & Holiday. Any combination of these three possible schedules may be enabled at one time, however, the Verbatim may only become REARMED or DISARMED by one mode at a time. (See Alarm Ready Schedule Priorities below.) For example, you may have both weekday & weekend schedules enabled at the same time or you may have all three enabled at the same time. When the Verbatim becomes DISARMED or REARMED by an Alarm Ready Schedule it will verbally announce which mode caused the REARM/DISARM action. The Alarm Ready Schedule modes are as follows:

Mode	Schedule
Mode 1	Weekday Schedule
Mode 2	Weekend Schedule
Mode 3	Holiday Schedule

For example, if there was a weekday schedule enabled to REARM the Verbatim Gateway at 1700 daily, when the weekday schedule became active the Verbatim Gateway would say, "REARMED for mode 1". Also, when there is a local printer connected to the Verbatim Gateway, the mode of the Alarm Ready Schedule causing the REARM/DISARM (WEEKDAY, WEEKEND, or HOLIDAY) will be printed along with the current time.

### 8.3.1

#### **Weekday Schedule Mode 1**

The weekday schedule will REARM the Verbatim Gateway autodialer daily at the programmed weekday REARM time and DISARM the Verbatim Gateway autodialer daily at the programmed DISARM time. If no weekend schedule is enabled (via the Alarm Ready Control Number settings) then the weekday schedule applies everyday, Monday through Sunday. As noted below, the weekend schedule is overridden by the weekend and holiday schedules.

### 8.3.2

#### **Weekend Schedule Mode 2**

If programmed, the weekend schedule operates once a week. The weekend schedule is set by factory default to be Friday through Monday. If the defaults are used the Verbatim Gateway autodialer could be REARMED every Friday afternoon at 1700 and DISARMED again every Monday morning at 0800. The weekend schedule could be changed from the defaults, for example, so that the Verbatim Gateway autodialer would be REARMED on Saturday and DISARMED on Monday (for organizations with 6 day work-weeks).

When the weekend schedule is enabled the weekday schedule will be overridden. In other words, there would be no DISARMING of the unit at 0800 Saturday morning.

By default, the weekend REARM/DISARM times are set to be the same as the weekday REARM/DISARM times. However, non-default weekend REARM/DISARM times may be entered if the operator so chooses.

Therefore, if personnel regularly leave early on Fridays then the REARM time could be set to 1500 instead of the usual 1700.

### 8.3.3

#### **Holiday Schedule Mode 3**

The Holiday schedule is a one-shot, non-recurring schedule which overrides all of the other schedules.

The Holiday schedule will be set by factory default to some Holiday period in the past (such as last Christmas).



#### ***Note:***

For the Holiday schedule only, the exact date is entered including the year. Once, the Holiday schedule has been run it is complete and finished until a new schedule, for some date in the future, is entered.

To use the Holiday Alarm Ready Schedule, the operator must enter the REARM date (month/date/year) and DISARM date (month/date/year).

For the time-of-day, the Holiday Alarm Ready Schedule always uses the Weekend REARM/DISARM times.

## 8.4 Alarm Ready Schedule Priorities

There is a priority among the Alarm Ready Schedules. The Holiday Alarm Ready Schedule has the highest priority, then comes the weekend schedule and finally the weekday schedule.

If all three Alarm Ready Schedules are to be active, a Holiday schedule will always start at its scheduled time & date regardless of the state of the other schedules. When the Holiday schedule is over then the other schedules will resume.

Likewise, the Weekend Alarm Ready Schedule has priority over the Weekday Alarm Ready Schedule. The weekend schedule will always start at its programmed day-of-week and time regardless of the state of the weekday schedule. When the weekend schedule is over then the weekday schedule will resume.

## 8.5 Programming Alarm Ready Schedule Parameters

The following section explains the Verbatim Gateway autodialer codes to be used for programming Alarm Ready Schedules and the Alarm Ready Schedule Control Numbers. Alarm Ready Schedule parameters may be entered either at the front panel or over the phone.

There are some restrictions which must be remembered when entering DISARM/REARM times and ALARM READY SCHEDULE CONTROL NUMBERS.

1. When entering new schedule times, the REARM time must be later than the time the operator is programming the schedule. However, it may not be possible to "jump" into a schedule when exiting the programming mode. For example, if the current time is 1700 hours and the operator enters a weekday schedule to REARM daily at 1630 and DISARM daily at 0730, this new schedule would not start until the following day at 1630 hours.

Conversely, assume that the current time is 1700 hours and that the operator goes into PROGRAM mode and enters a new weekday schedule to REARM at 1705 and DISARM at 0800. At this time, the operator can either return to NORMAL mode or continue in PROGRAM mode and do other programming. Even though it may be after 1705 when finally returning to the NORMAL mode, the weekday schedule will still begin (or have begun) at 1705 hours.

2. You cannot enter any holiday date values which will cause the holiday REARM or DISARM date and time to be earlier than the current date and time. As explained below, the holiday schedule uses the weekend times for the time-of-day of the holiday REARM and DISARM.
3. It's useful to understand that the Verbatim Gateway autodialer's internal count-down timers used for REARM/DISARM times are re-calculated as a result of the operator making certain Alarm Ready Schedule programming changes. Anytime a new REARM or DISARM date/time is entered, a calculation is made to determine the next REARM and DISARM for that particular schedule.

Also, when the ALARM READY SCHEDULE CONTROL NUMBER is changed all REARM and DISARM date/times are re-calculated. Further, whenever the current date or time is set or changed by the operator, all REARM and DISARM date/times will be re-calculated.

## 8.6 Starting the Real-Time Clock Chip/Time and Date Setting

Use Program Code 935 7 ENTER to start the real time clock chip. This needs to be done only once at the time of the installation of the chip.

Time and date may be set or corrected with the following programming code entries:

- ◆ To check the date:

941 ENTER

- ◆ To set the date:

941 MM DD YY D ENTER

MM is the month (03 for March); DD is the date (07 for the 7th day of the month); YY is the year (96 for 1996); and D is the day of the week (1 for Sunday; 2 for Monday, etc.). Entry of D is optional.

- ◆ To check the time:

942 ENTER

- ◆ To set the time:

942 HH MM SS ENTER

HH are the hours in military time (13 for 1 PM); MM are the minutes; and SS are the seconds. Entry of SS is optional.

- ◆ To clear the time and date back to 80:00:00 on 01/01/92:

935 7 ENTER



## 8.7

# Setting Alarm Start & Stop Times

### (961) Read/Set Weekday REARM & DISARM Time

- ◆ To hear the Weekday REARM & DISARM times recited, press:

9 6 1 then ENTER

Times will not be altered and new REARM & DISARM values will not be calculated. The defaults are 1700 and 0800.

- ◆ To set the Weekday REARM & DISARM time, press:

9 6 1 (plus REARM & DISARM time) then ENTER

For example:

961 1600 0700 then ENTER (to set REARM time to 1600 [4:00 P.M.] & DISARM time to 0700 [7:00 A.M.])

The user is allowed to enter just the REARM time, i.e.; 961 1600 ENTER. But, if the user wants to change the DISARM time then both the REARM & DISARM times must be entered.

### (962) Read/Set Weekend REARM & DISARM Time

- ◆ To hear the Weekend REARM & DISARM times recited, press:

9 6 2 then ENTER

Times will not be altered and new REARM & DISARM values will not be calculated. The defaults are 1700 and 0800.

- ◆ To Set Weekend REARM & DISARM time, press:

9 6 2 (plus REARM & DISARM time) then ENTER

For example:

962 1500 0700 then ENTER (to set REARM time to 3:00 P.M. and DISARM time to 7:00 A.M.)

The user is allowed to enter just the REARM time, i.e.; 962 1500 ENTER. But, if the user wants to change the DISARM time, then both the REARM & DISARM times must be entered.

### (963) Read/Set Weekend REARM & DISARM Day-of-Week

- ◆ To hear to hear the Weekend REARM & DISARM day-of-week (d-o-w) recited as a number from 1 to 7, press:

9 6 3 then ENTER

Note: Sunday = 1, Monday = 2, etc. Day-of-week will not be altered and new REARM & DISARM values will not be calculated. The defaults are Fri. & Mon.

- ◆ To Set Weekend REARM & DISARM Day-of-Week, press:

9 6 3 (plus REARM & DISARM d-o-w) then ENTER

For example:

963 6 1 then ENTER (to set the weekend REARM day-of-week to Friday & REARM day-of-week to Sunday.)

The user is allowed to change only the REARM d-o-w if so desired, e.g.; 963 7 ENTER to set the REARM d-o-w to Saturday. But, if the user wants to change the DISARM d-o-w then both the REARM d-o-w & DISARM d-o-w must be entered.

#### **(964) Read/Set Holiday REARM Date**

- ◆ To hear the Holiday REARM date recited, press:

9 6 4 then ENTER

The Holiday REARM will not be altered. The default is 12/24/90.

- ◆ To set the Holiday REARM date, press:

9 6 4 plus REARM date.

For example:

964 12 24 96 ENTER (to set holiday REARM date to December 24, 1996.)

The new REARM date can not be before today's date.



#### ***Note:***

The day-of-week date cannot be entered for a Holiday schedule.

#### **(965) Read/Set Holiday DISARM Date**

- ◆ To hear the Holiday DISARM date recited, press:

9 6 5 then ENTER

The Holiday DISARM will not be altered. The default is 12/26/90

- ◆ To set Holiday DISARM date, press:

9 6 5 plus REARM date

For Example:

9 6 5 1 2 2 6 9 5 ENTER (to set holiday DISARM date to December 26, 1995.)

The new DISARM date can not be before today's date.



**Note:**

The day-of-week date cannot be entered for a Holiday schedule.

## 8.8

# Enabling the Alarm Ready Schedule Feature

## (966) Read Alarm Ready Schedule Control Number

- ◆ To hear the Alarm Ready Schedule Control Number recited, press:

9 6 6 then ENTER

The Control number will not be altered and new REARM & DISARM values will not be calculated. The default is 0.

- ◆ Alarm Ready Schedule Control Number has the following meaning:
  - 0 OFF No Alarm Ready Schedules executed. Also used to reset all active Alarm Ready Schedules.
  - 1 Only the Weekday Alarm Ready Schedule will be active. (Daily: Monday-Sunday) Default: REARMED everyday 1700 & DISARMED everyday 0800.
  - 2 Only Weekend Alarm Ready Schedule will be active. Default: REARM every Friday 1700 & DISARM every Monday 0800.
  - 3 Both Weekday & Weekend Alarm Ready Schedules will be active. Default: REARM daily at 1700 Monday-Thursday & DISARM daily at 0800 Tuesday-Friday. REARM Friday at 1700 & DISARM Monday at 0800.
  - 4 Only Holiday Alarm Ready Schedule will be activated. Default: REARM at 1700 December 24, 1990 then DISARM at 0800 December 26, 1990
  - 5 Both Holiday & Weekday Alarm Ready Schedules will be activated. Default: REARM daily at 1700 & DISARM daily at 0800. REARM at 1700 December 24, 1990 then DISARM at 0800 December 26, 1990.

- 6 Both Holiday & Weekend Alarm Ready Schedules will be activated. Default: REARM every Friday at 1700 then DISARM every Monday at 0800. REARM at 1700 December 24, 1990 then DISARM at 0800 December 26, 1990.
- 7 Holiday, Weekend & Weekday Alarm Ready Schedules will be activated. Default: REARM daily at 1700 Monday-Thursday then DISARM daily at 0800 Tuesday-Fri. REARM every Friday at 1700 then DISARM every Monday at 0800. REARM at 1700 December 24, 1990 then DISARM at 0800 December 26, 1990.

**Note:**

Whenever a new Alarm Ready Schedule Control Number is entered all REARM & DISARM values will be recalculated. Any active Alarm Ready Schedules will be halted and the Verbatim Gateway autodialer will be left in which ever REARM/DISARM state it was last in.

**8.9****Factory Defaults**

Activity	Schedule
Weekday REARM time	1700
Weekday DISARM time	0800
Weekend REARM day-of-week	Friday
Weekend DISARM day-of-week	Monday
Weekend REARM time	1700
Weekend DISARM time	0800
Holiday REARM date	12/24/90
Holiday DISARM date	12/26/90
Holiday REARM time	always same as Weekend REARM time
Holiday DISARM time	always same as Weekend DISARMtime
Alarm Ready Control Number	0 (all schedules disabled)

**Note:**

Both Weekend times are initially the same as their respective Weekday times, but can be reprogrammed.

**8.10****Weekday and Weekend Alarm Ready Schedule Programming Example**

For the following example assume that personnel are present at a plant being monitored by the Verbatim Gateway autodialer during normal business hours, Monday through Friday, 7 A.M. to 4 P.M. Assume further that there is someone at the plant every Saturday from 7 A.M. until 12 Noon and that the

personnel would be aware of any alarm conditions at the plant and would not want the Verbatim Gateway autodialer to be making calls to phone numbers in its phone number list.

In this example, the Verbatim Gateway autodialer should be:

- REARMED every weekday evening at 1600
- DISARMED every weekday morning at 0700
- REARMED every Saturday at 1200 noon
- Stay in the ARMED state until it is DISARMED every Monday at 0700

For the example, use the following steps:

1. Verify that the current time is one of the times when the Verbatim Gateway autodialer is DISARMED, i.e.; during normal workday hours. It is important that the time be the current time, since any Alarm Ready Schedule begins with the Verbatim Gateway autodialer becoming REARMED and ends with the Verbatim Gateway autodialer becoming DISARMED.

If a user were to set up a repeating Alarm Ready Schedule (weekday or weekend) during the time the Verbatim Gateway autodialer was to be ARMED, the programmed schedule would not actually begin until the next time that schedule was to take effect. For example, if the current time was 1630 and a weekday schedule was being programmed, that weekday schedule would not actually start until the next day at 1600.

2. Press the PROGRAM key to put the Verbatim Gateway autodialer into the program mode.
3. Set the current date and time: (if not already set)

- a. Enter CODE “941 MM DD YY d” followed by ENTER

Where:

MM = 2 digits for month, DD = 2 digits for date,

YY = 2 digits for year, and d = 1 digit for day-of-week.

- b. Enter CODE “942 HH MM SS” followed by ENTER

Where:

HH = 2 digits for hours, MM = 2 digits for minutes,

SS = 2 digits for seconds.

4. Set the Weekday REARM/DISARM times:

Enter CODE “961 1600 0700” followed by ENTER to set the REARM time to 1600 and the DISARM time to 0700.

5. Set the Weekend REARM/DISARM times:

Enter CODE “962 1200 0700” followed by ENTER to set the weekend REARM time to 1200 and the weekend DISARM time to 0700.

6. Set the Weekend REARM/DISARM day-of-week:

Enter CODE “963 7 2” followed by ENTER to set the weekend REARM day-of-week to Saturday and the Weekend DISARM day-of-week to Monday.

7. Enable both the Weekday and Weekend Alarm Ready Schedules:

Enter CODE “966 3” followed by ENTER to set the Alarm Ready Schedule Control Number to 3 to enable both the Weekday and the Weekend Alarm Ready Schedules.



**Note:**

If the Verbatim Gateway autodialer is configured with a local printer, a summary of all of the REARM and DISARM times will be printed.

8. Return to the Normal mode and make sure the Verbatim Gateway autodialer is DISARMED.

# 9

## Maintenance, Testing, and Battery Replacement

Regular testing is the main element of a maintenance program for ongoing Verbatim Gateway autodialer reliability. The test should include interrupting AC power to the Verbatim Gateway autodialer for at least 4 hours to verify the gel cell battery maintains Verbatim Gateway autodialer operation for that time. You may wish to disconnect the phone cord to avoid nuisance calls during the test period.



### **Note:**

The LOBAT light on the Verbatim Gateway activates whenever the charge or discharge current for the rechargeable battery exceeds a certain level. If the battery is not fully charged (as following installation or following a power failure) then the charging current will activate the light. If the battery is currently being discharged (as during a power failure) the light will be activated. The LOBAT light does not necessarily warn of a battery wearing out. It should be considered a secondary indication of battery and charger activity.

The gel cell battery is much like a car battery. That is, at the end of its life when called on to deliver power, it discharges very quickly without prior warning. The best protection is to replace the battery every 3 years regardless of any test results.

The battery is a *Power Sonic PS 640, 4 AH 6 volts*

You may order a replacement battery from RACO at the address below:

RACO Manufacturing and Engineering Co.  
1400 62nd Street  
Emeryville, CA 94608

Or from:

Power Sonic, Redwood City, CA; (415) 364-5001

See Section 10.2, "Phone Support Procedures," and Section 10.3, "Returning Parts to the Factory," for more information.





# 10

## Troubleshooting Tips

### 10.1

### What's The Problem?

#### **Unit is dead: no lights or voice.**

If the unit will not respond to the ON/OFF key, verify that the battery is connected. Verify that there is 120 volts AC between the WHITE and BLACK wire terminals on TS3. Verify that the fuse (1/4 amp slow blow) is not blown.

#### **Unit seems OK but will neither answer nor dial out on phone line.**

This assumes that you hear a voice report at the panel when you press CHECK STATUS. With the NORMAL light lit, test the phone line by pressing DIAL-OUT. The PHONING light should light and you should hear a dial tone.

If you do not hear a dial tone, open the door of the unit and verify that relay K1 is correctly seated in its socket, with its indentation mark facing downward. Check the phone line and its connection with a DC voltmeter and/or a separate telephone handset. Verify the presence of about 50 volts DC between the RED and GREEN conductors on phone line terminal strip TS2. This voltage will drop to just a few volts when the Verbatim Gateway autodialer or other connected phone device goes off hook (PHONING light lit).

If you do hear the dial tone after pressing DIALOUT, press the digits of a valid phone number. You should hear the loud clicks of relay K1 (for pulse dialing) or else the tones of tone dialing, as you press each digit. The dial tone should cease after you have entered the first digit. Continue until you have dialed the complete phone number. You should now hear the sound of ringing and someone answering at the other end. End the call by pressing NORMAL.

#### **Unit answers incoming calls, and also goes into alarm when it should and attempts to dial out, but does not reach dialed number.**

First, verify whether the unit is actually attempting to dial out, as evidenced by pulse dialing clicks or tone dialing sounds followed by message recital. If not, then see the separate problem below, "Unit does not go into alarm when it should."

If your unit has previously been programmed for Automatic Tone/Pulse select (via code 917 2 or 917 3) and has been left connected to a phone line for several minutes, then you can assume that the correct dialing mode for your phone line has already been selected. Again, refer below to "Unit does not go into alarm when it should."

If Automatic Tone/Pulse select is programmed OFF (via code 917 0 or 917 1) and you hear the clicks or tone dialing sounds, but the dial tone does not cease, perhaps your phone system requires the opposite mode of dialing (pulse vs tone) from its presently set mode. Read the present mode by pressing PROGRAM 9 0 1 ENTER. Then set the opposite by entering 9 0 1 1 (to change to tone dialing), or 9 0 1 0 (to change to pulse dialing). Then press NORMAL and repeat the manual DIALOUT procedure as described above.

Verify that you have programmed complete phone numbers including any area codes or “1” prefixes that might be required to complete the call.

Consider whether your phone system requires a prefix such as 9 to be dialed, followed by a delay period (to access an outside phone line) before dialing out. If so, see Section 3.2, “Programming Phone Numbers.”

### **Unit dials out, but will not answer incoming calls.**

Check programmed ring delay by pressing PROGRAM 9 0 6 ENTER. If it is set for a number larger than one, the Verbatim Gateway autodialer is not supposed to answer until the corresponding number of rings has been received. Try setting it back to 1 using code 9 0 6 1 ENTER. If the unit still will not answer incoming calls but is able to dial out, try plugging a regular telephone into the same phone jack in place of the Verbatim Gateway autodialer and see if it rings. If the problem is not the phone line, try temporarily connecting test point C to test point D on the main circuit board, for a period of about 5 seconds and see if it “answers” with the PHONING light and a voice report, then call the factory for advice.

### **Unit will not go into alarm when it should.**

This is usually the result of incomplete understanding of how the Verbatim Gateway autodialer manages alarms.

For the Verbatim Gateway autodialer to go into Unacknowledged Alarm and Dial Out, a violation must be continuously present for the Alarm Trip Delay time. At least one phone number must be programmed. The unit must not be in the DISARMED state. And, the channel that has the violation must not already be in an acknowledged alarm state, since acknowledged alarm status for a given channel (including power failure) precludes further activity on that channel until that status is cleared. Refer to Section 5, “Using Your Verbatim Gateway Autodialer,” for a discussion of how the unit manages alarms.

To clear the acknowledged alarm status of all channels including power failure, starting with the NORMAL light lit, press DISARM/RE-ARM to get the flashing DISARMED indication, then press it again to re-arm the unit with all acknowledged alarm statuses cleared. Now any violations lasting longer than the Alarm Trip Delay will cause unacknowledged alarms and dialing.

Unacknowledged alarm status is indicated by the corresponding channel number flashing. Acknowledged alarm status is indicated by the same light remaining on continuously without flashing.

If you don't observe this, press PROGRAM and then press 7 0 1 ENTER to check your first phone number. Press 9 0 2 to check the Global (overall) Alarm Trip Delay. For the specific channel ZZ (2 digits) that you are attempting to create an alarm on, also press 6 ZZ to check for any longer Individual Alarm Trip Delay setting.

Check the Normally Open/Normally Closed alarm criteria programming for this channel by pressing 5 ZZ. Make sure it is not set for No Alarm or for Run Time Meter, since these settings would not allow an alarm. Now, for example, if the channel is configured Normally Open, you will want to temporarily provide a Closed Circuit at its input to trip the alarm. You can directly read and verify the Open/Closed status you are applying by pressing 0 ZZ 0. You may also use a DC voltmeter to trace your circuit connections. With the Verbatim Gateway autodialer turned on, an Open Circuit to a channel contact input reads 5 volts DC with respect to the "C" terminals or electrical ground. A Closed Circuit reads zero volts.

### **Unit keeps calling when it should not.**

Be sure that the initial alarm call is in fact being acknowledged. The unit will specifically state "alarm is acknowledged" at the moment you successfully acknowledge the call. The unit will accept a tone acknowledge only following the prompting warble beep.

Also, be sure that the alarm violation has been corrected. Otherwise, even if the alarm is acknowledged, when the Alarm Reset period times out, dialing will begin again.

Write down exactly what the unit recites when it gives the unwanted call. This provides valuable guidance as to the cause and correction of the problem. You may need to lengthen the Alarm Trip Delay in order to minimize nuisance alarms, particularly the power failure Alarm Trip Delay (code 920). If you hear an alarm message with the phrase "now normal" added at the end, it means that the violation occurred long enough to trip the alarm but has returned to normal by the time you are hearing the report. In the case of power failure, if the power has been restored by the time the message is being heard, the message will be "Power is on". The fact that power is mentioned at all lets you know that there has been a power failure lasting longer than the power failure Alarm Trip Delay. Power will continue to be mentioned in any phone call or front panel status check, until the Alarm Reset time expires.

**Unit is continuously "locked" in on state, or is behaving erratically.**

Environmental factors such as lightning or power surges may have caused program lockup. With the unit turned on, use a screwdriver blade to momentarily connect the two pins on Jumper Block JB5 (see Component Layout Diagram).

If this does not return the unit to normal operation, next try jumping the 2 pins on JB3. This latter step will erase all user programming and recorded messages, so all user programming and messages will need to be re-entered.

## 10.2 Phone Support Procedures

**Make sure you have the following before you call:**

- Serial #: Found inside front panel. If you are not at the unit, call the unit up and enter program code 968. This will give you a number that our Customer Support Department can reference.
- Note the unit's symptoms: Exact speech pattern, what it is saying, if it is calling or not. The more specific and accurate you are in describing the symptoms, the quicker the Customer Support Department will be able to diagnose and troubleshoot the problem. In many cases, it may save a return to the factory.

**THEN** call 1-800-449-4539 for Customer Support.

If Customer Support determines that the unit needs repair, you will be given a Return Materials Authorization (RMA) number.

## 10.3 Returning Parts to Factory

**Pack all parts well!** To avoid extra charges, return any removed chips or unneeded card guides or daughter boards to the factory at the address below:

RACO Manufacturing and Engineering Co.  
1400 62nd Street  
Emeryville, CA 94608

**Remember to:**

- Put return address on package.
- Include a packing slip.
- Have serial # and RMA # handy when you call in for tracking.

# A

## Verbatim® Gateway Series VPLC Autodialer Specification

### A.1 Description & Phone Number Dialing

The autodialer shall be a solid state component capable of dialing up to 16 phone numbers, each up to 60 digits in length. Phone numbers and Standard pulse dialing or Touch Tone DTMF dialing are user programmable via the system's keyboard or Touch Tone phone. Further, the autodialer shall be capable of connecting, via a single serial interface cable, to a variety of Programmable Logic Controllers (PLCs), Distributed Control Systems (DCSs) & SCADA systems. Serial interfacing methods shall incorporate commonly used standard industrial network protocols such as Modicon, Inc. Modbus RTU, Allen-Bradley DH-485 network & others.

### A.2 Solid State Voice Message Recording and Playback

The unit shall have two different categories of speech message capability, all implemented with permanent non-volatile solid state circuitry with no mechanical tape mechanisms. The unit shall allow for message recording from a remote telephone as well as from the front panel.

#### A.2.1 User Field Recorded Messages

The user may record and re-record his own voice messages, for each input channel and for the Station ID.

1. *There shall be no limit on the length of any particular message*, within the overall available message recording time, which shall be 409 seconds for 36 total channel units and 624 seconds for 57 total or more channel units.
2. The unit shall allow selective recording of *both Normal and Alarm advisory messages* for each input channel.
3. The unit shall provide for *automatic setting of the optimum speech memory usage rate* for the total set of messages recorded, in order to achieve optimum recording sound quality.
4. Circuit board switches or jumper straps shall not be acceptable means of manipulating message length or recording rates.

**A.2.2****Permanent Resident Non-Recorded Messages**

Permanent built-in messages shall be included to support user programming operations, to provide supplemental warning messages such as advising that the alarms have been disabled, and to allow the unit to be fully functional even when the installer has not recorded any messages of his own.

**A.3****Local & Remote Programming Capabilities**

The user may optionally elect to alter the following parameters from their standard normal default values via keyboard entry or remotely from any Touch Tone phone.

<b>Capability</b>	<b>Setting/Description</b>
Alarm Call Grouping	On alarm, system shall selectively call the correct phone numbers according to the current alarm(s).
Alarm response delay	.1 to 9999.9 seconds.
Delay between alarm call outs	.1 to 99.9 minutes.
Alarm reset time:	0.1 to 99 hours or "NO RESET".
Incoming ring response (answer) delay	1 to 20 rings.
Input alarm criteria	Each channel shall be independently configured for "Normally Closed," "Normally Open," "No Alarm," or "Disabled."
Autocall Test	When enabled, the unit shall place a single round of test calls, both at the time this function is enabled and also at regular subsequent intervals until this function is disabled at the keyboard.
Run Time Meter	Selected physical channel inputs shall accumulate and report the number of hours that its input contacts have been closed.
Remote system microphone activation.	
Remote and local arming and disarming of system.	
Pulse Totalizer Function.	Selected physical input channels shall be capable of counting pulses of up to 100Hz. at 50% duty cycle.

## **A.4 Nonvolatile Program Memory Retention**

User-entered programming and voice messages shall be kept intact even during power failures or when all power is removed for up to ten years.

## **A.5 Acknowledgment**

Acknowledgment of an alarm phone call is to be accomplished by pressing a Touch Tone® “9” as the alarm call is being received, and/or by returning a phone call to the unit after having received an alarm call.

## **A.6 Remote (PLC) Channel Monitoring Function**

The unit shall continuously scan all properly configured Remote Channels. The unit shall monitor remote channels which physically reside in other industrial equipment interfaced to the Verbatim Gateway via the serial interface. The unit shall be capable of interfacing to at least two PLC networks simultaneously. The unit shall be capable of monitoring any PLC data register regardless of register type, whether digital, analog, input, output or status point. Alarm criteria shall be settable according data register type. For digital remote channels, alarm criteria shall be settable for normally ‘0’ or normally ‘1’. For analog remote channels, both a high setpoint and a low setpoint alarm criteria shall be settable. Violation of alarm criteria at any remote channel shall cause the unit to go into alarm state and begin dial-outs. All remote channel alarm criteria shall be settable either at the front panel of the unit or over the telephone using touch-tone commands. The unit shall be capable of writing data to any PLC data register to which writing data is a legal operation. The unit shall monitor any failure of the active serial communications channels. Upon failure of any communications channel the unit shall enter the alarm state and begin dial-outs. The unit shall be capable of transferring data between one remote channel on one serial communications network and another remote channel on a second serial communications network. The unit shall also be capable of transferring data between remote channels on a serial communications network and physical channels within the unit. The unit shall be optionally upgradable to incorporate provision for 32, 64 or 96 total remote channels.

## A.7 Input Monitoring Function

The unit shall continuously monitor the presence of AC power and the status of four contact closure inputs. Unit shall optionally be field upgradeable to incorporate a total of 8, 16, 24, or 32 dry contact inputs. AC power failure, or violation of the alarm criteria at any input, shall cause the unit to go into alarm status and begin dial-outs. Unit shall, upon a single program entry, automatically accept all input states as the normal non-alarm state, eliminating possible confusion about Normally Open versus Normally Closed inputs. Further, as a diagnostic aid, unit shall have the capability of directly announcing the state of any given input as currently “Open Circuit” or “Closed Circuit,” without disturbing any message programming. Each input channel shall also be independently programmable, *without need to manipulate circuit board switches or jumpers*, as Normally Open or Normally Closed, or for No Alarm (Status Only), or for Pulse Totalizing, or for Run Time Metering.

## A.8 Run Time Meter Inputs

Any dry contact input can be programmed to accumulate and report the number of hours their respective input circuits have been closed. Any such channels will never cause an alarm, but on inquiry will recite the channel’s message according to the status of the input and then report the closed circuit time to the tenth of an hour. The input will accumulate and report in tenths of hours up to a total accumulated running time of 99,999.9 hours. The initial value of the Run Time Meter shall be programmable in order to agree with existing electromechanical Run Time Meters. Up to a total of 8 Run Time Meters may be programmed.

## A.9 Pulse Totalizer Inputs

Any dry contact input can be programmed to accumulate the number of pulses (momentary contact closures) occurring at the input. The maximum input pulse rate must not exceed 100 pulses per second, and if the rate is over 50 pulses per second, the pulses must have a 50% duty cycle. The user shall be able to program an initial starting value and a scale factor for each pulse totalizer input. The pulse totalizer input shall cause an alarm call upon reaching a user defined alarm setpoint.

## A.10 Alarm Message

Upon initiating an alarm phone call, the system is to “speak” only those channels that are currently in “alarm status”.



## **A.11      Communications Protocol**

The unit shall interface to standard networks commonly used in industrial installations. The unit shall be capable of network communications using the Modbus RTU protocol, the Allen-Bradley DF-1 protocol, the Allen-Bradley DH-485 protocol and the Modicon Modbus Plus protocol. Additional communications protocols shall be supplied from the factory upon request.

## **A.12      Diagnostics**

The unit shall include user commands to execute diagnostics of the PLC network to determine the health of the network. The unit shall inform the user of the length of scan time for the set of all configured remote channels. The unit shall provide a complete verbal report of all programmable functions and their programmed values on command from any remote Touch Tone phone.

## **A.13      Speakerphone**

The unit shall be capable of dialing any phone number on command and function as a speakerphone.

## **A.14      Inquiry Message and Function**

Inquiry phone calls can be made directly to the unit at any time from any telephone, locally or long distance, for a complete status report of all variables being monitored, including power status.

## **A.15      Power Battery Backup**

Normal power shall be 105-135 VAC, 15 watts nominal. The product is to contain its own gel cell rechargeable battery which is automatically kept charged when AC power is present. The system shall operate on battery power for a minimum of 13 continuous hours in the event of AC power failure. A shorter backup time shall not be acceptable. The built-in charger shall be precision voltage controlled, not a “trickle charger,” in order to minimize recharge time and maximize battery life available.

## **A.16      Phone Line**

The autodialer is to use a standard rotary pulse or Touch Tone “dial-up” phone line (direct leased line not to be required) and is to be F.C.C. approved. Connection to the telephone is through a 4-pin modular jack (RJ-11).

the main circuit board shall not be an acceptable substitute. The installer shall provide a good electrical ground connection point near the unit to maximize the effectiveness of the surge protection.

## **A.17 Local Data Logging**

The system shall include a parallel printer interface for local data logging. The local printer will automatically print out, with date and time stamp, each activity that occurs; alarms, acknowledgements, programming entries, inquiry calls, etc.. For the purpose of easy program review the user shall be able to printout on demand all user entered programming.

## **A.18 Public Address Broadcast**

The standard dialer shall provide a mini phone jack for optional connection to a local public address system. If connected to the PA system the dialer shall broadcast all alarm messages over the PA system and the telephone simultaneously.

## **A.19 Integral Surge Protection**

*All power, phone line, dry contact, and analog signal inputs shall be protected at the circuit board to IEEE Standard 587, category B (6,000 volts open circuit/ 3,000 amps closed circuit). Gas tubes followed by solid state protectors shall be integral to the circuit board for each such line. Protectors mounted external to the main circuit board shall not be an acceptable substitute. The installer shall provide a good electrical ground connection point near the unit to maximize the effectiveness of the surge protection.*

## **A.20 Warranty**

The dialer shall be covered by a five (5) year warranty covering parts and labor performed at the Factory.

## **A.21 Modular Upgrades**

The system shall include expansion connectors to accommodate field upgrades for additional internal dry contact inputs, remote supervisory control outputs, and internal analog inputs.

## **A.22 Additional Features: Sealed Switches, LED Indicators, Alarm Disable Warning, TalkThrough**

All keyboard and front panel switches shall be sealed to prevent contamination. Front panel LED's shall indicate: Normal Operation, Program Mode, Phone Call in Progress, Status for each channel, AC Power Present, AC Power Failure, and Low, Discharging or Recharging Battery. On any Inquiry telephone call or On Site status check, the voice shall provide specific warning if no dialout phone numbers are entered, or if the unit is in the "alarm disable" mode, or if AC power is off or has been off since last reset. A built-in microphone shall allow anyone at a remote phone to listen to local sounds and have a two-way conversation with personnel at the dialer.

## **A.23 Special Order Items**

The following options shall be available on specific order:

- a) 4, 12, 20, or 28 extra contact channels (8,16,24, or 32 respectively, total.)
- b) 1, 4, 8, or 16 analog channels.
- c) Remote supervisory control (4 or 8 outputs).
- d) Cellular telephone communications.
- e) Radio communications interface.
- g) NEMA 4X (sealed) enclosure.
- h) Thermostatically controlled heater.

**Specifications subject to change without notice.**



# B

## Worksheets

## Worksheet A Programming

### Part 1: Phone Number Programming

2-Digit Phone Number Designation	Use Program Code	Phone Number (Including any necessary prefixes or area codes)	Person
01 (First)	701		
02 (Second)	702		
03 (Third)	703		
04 (Fourth)	704		
05 (Fifth)	705		
06 (Sixth)	706		
07 (Seventh)	707		
08 (Eighth)	708		
09 (Ninth)	709		
10 (Tenth)	710		
11 (Eleventh)	711		
12 (Twelfth)	712		
13 (Thirteenth)	713		
14 (Fourteenth)	714		
15 (Fifteenth)	715		
16 (Sixteenth)	716		

### Part 2: Optional Programming

Record of any optional programming to alter selected parameters from their normal default values. (*Sample highlighted*)

Program Code	Parameter Description	Default Value	Write In Any Altered Values YouProgram
<b>902</b>	<b>Alarm Trip Delay</b>	<b>2 seconds</b>	<b>40 seconds</b>

## Worksheet B Alarm Call Grouping Programming

*Purpose: To “link” certain input channels to call only selected phone numbers.*

*See Section 6.2.13*

### Part 1: Group Description Naming

As an organizational step, write in a Group Description Name (Electrical, Security, etc.) for each of your phone number groups, and the two-digit designation number of the phone numbers you want included in each group. Refer to the filled-in example below. This should be done only after you have already entered your entire list of up to 16 phone numbers on Worksheet A.

*(Sample highlighted)*

<b>Group Description (Electrical, etc.)</b>	<b>2-Digit Phone # Designation (Taken from Worksheet A)</b>
<i>Maintenance</i>	<i>01, 04, 05, 06</i>
<i>Electrical</i>	<i>03, 04</i>
<i>Security</i>	<i>02, 05</i>

## Worksheet B Alarm Call Grouping Programming Cont. . .

### Part 2: Linking Channels To Groups

For each input channel that you wish to have “linked” to one of your groups, write in your chosen Group Description Name (Electrical, etc.), and the corresponding set of 2-digit Phone Number Designations which you established above. Finally, write in these same sets of 2-digit codes, without the separating commas, to the right of the printed program code (501, etc.). This establishes the complete program code to enter for each channel that you want “linked” to call only a selected group of phone numbers. (*Sample highlighted*)

The filled-in sample, below, is for an 8-channel unit. Three groups were established, and 5 of the channels were linked to a group. The remaining 3 channels were not linked to any group, and therefore, those 3 “unlinked” channels would dial the entire list of phone numbers in regular order.



#### Note:

Any channels that you do not enter such a program code for, will cause dialing of the entire list of phone numbers, when that channel goes into alarm.

Channel	Linked to Group	Corresp. Phone # Desig's Est. Above	Program Code to Enter
<i>01</i>	<i>Security</i>	<i>02, 05</i>	<i>50190205</i>
<i>02</i>	<i>Security</i>	<i>02, 05</i>	<i>50290205</i>
<i>03</i>	<i>Electrical</i>	<i>03, 04</i>	<i>50390304</i>
<i>04</i>	<i>Maintenance</i>	<i>01, 04, 05, 06</i>	<i>504901040506</i>
<i>05</i>	_____	_____	<i>5059</i>
<i>06</i>	<i>Electrical</i>	<i>03, 04</i>	<i>50690304</i>
<i>07</i>	.....	.....	<i>5079</i>
<i>08</i>	_____	_____	<i>5089</i>



*Worksheet B Alarm Call Grouping Programming Cont. . .**(Page 1 of 6)*

<b>Internal Input Channels</b>	<b>Linked to Group</b>	<b>Corresp. Phone # Desig's Est. Above</b>	<b>Program Code to Enter</b>
<i>01</i>			<i>501 9</i>
<i>02</i>			<i>502 9</i>
<i>03</i>			<i>503 9</i>
<i>04</i>			<i>504 9</i>
<i>05</i>			<i>505 9</i>
<i>06</i>			<i>506 9</i>
<i>07</i>			<i>507 9</i>
<i>08</i>			<i>508 9</i>
<i>09</i>			<i>509 9</i>
<i>10</i>			<i>510 9</i>
<i>11</i>			<i>511 9</i>
<i>12</i>			<i>512 9</i>
<i>13</i>			<i>513 9</i>
<i>14</i>			<i>514 9</i>
<i>15</i>			<i>515 9</i>
<i>16</i>			<i>516 9</i>
<i>17</i>			<i>517 9</i>
<i>18</i>			<i>518 9</i>
<i>19</i>			<i>519 9</i>
<i>20</i>			<i>520 9</i>
<i>21</i>			<i>521 9</i>
<i>22</i>			<i>522 9</i>
<i>23</i>			<i>523 9</i>
<i>24</i>			<i>524 9</i>

*Worksheet B Alarm Call Grouping Programming Cont. . .*  
*(Page 2 of 6)*

<b>Internal Input Channels</b>	<b>Linked to Group</b>	<b>Corresp. Phone # Desig's Est. Above</b>	<b>Program Code to Enter</b>
25			525 9
26			526 9
27			527 9
28			528 9
29			529 9
30			530 9
31			531 9
32			532 9
33			533 9
34			534 9
35			535 9
36			536 9
37			537 9
38			538 9
39			539 9
40			540 9
41			541 9
42			542 9
43			543 9
44			544 9
45			545 9
46			546 9
47			547 9
48			548 9

*Worksheet B Alarm Call Grouping Programming Cont. . .*  
*(Page 3 of 6)*

<b>Remote Channels</b>	<b>Linked to Group</b>	<b>Corresp. Phone # Desig's Est. Above</b>	<b>Program Code to Enter</b>
01			4501 9
02			4502 9
03			4503 9
04			4504 9
05			4505 9
06			4506 9
07			4507 9
08			4508 9
09			4509 9
10			4510 9
11			4511 9
12			4512 9
13			4513 9
14			4514 9
15			4515 9
16			4516 9
17			4517 9
18			4518 9
19			4519 9
20			4520 9
21			4521 9
22			4522 9
23			4523 9
24			4524 9

*Worksheet B Alarm Call Grouping Programming Cont. . .**(Page 4 of 6)*

<b>Remote Channels</b>	<b>Linked to Group</b>	<b>Corresp. Phone # Desig's Est. Above</b>	<b>Program Code to Enter</b>
25			4525 9
26			4526 9
27			4527 9
28			4528 9
29			4529 9
30			4530 9
31			4531 9
32			4532 9
33			4533 9
34			4534 9
35			4535 9
36			4536 9
37			4537 9
38			4538 9
39			4539 9
40			4540 9
41			4541 9
42			4542 9
43			4543 9
44			4544 9
45			4545 9
46			4546 9
47			4547 9
48			4548 9

*Worksheet B Alarm Call Grouping Programming Cont. . .*  
*(Page 5 of 6)*

<b>Remote Channels</b>	<b>Linked to Group</b>	<b>Corresp. Phone # Desig's Est. Above</b>	<b>Program Code to Enter</b>
49			4549 9
50			4550 9
51			4551 9
52			4552 9
53			4553 9
54			4554 9
55			4555 9
56			4556 9
57			4557 9
58			4558 9
59			4559 9
60			4560 9
61			4561 9
62			4562 9
63			4563 9
64			4564 9
65			4565 9
66			4566 9
67			4567 9
68			4568 9
69			4569 9
70			4570 9
71			4571 9
72			4572 9

*Worksheet B Alarm Call Grouping Programming Cont. . .**(Page 6 of 6)*

<b>Remote Channels</b>	<b>Linked to Group</b>	<b>Corresp. Phone # Desig's Est. Above</b>	<b>Program Code to Enter</b>
73			4573 9
74			4574 9
75			4575 9
76			4576 9
77			4577 9
78			4578 9
79			4579 9
80			4580 9
81			4581 9
82			4582 9
83			4583 9
84			4584 9
85			4585 9
86			4586 9
87			4587 9
88			4588 9
89			4589 9
90			4590 9
91			4591 9
92			4592 9
93			4593 9
94			4594 9
95			4595 9
96			4596 9

## *Worksheet C Message Planning & Recording (Page 1 of 11)*

<b>Input Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Station ID</i>	<i>100</i>		
<i>Ch 01 Alarm</i>	<i>101</i>		
<i>Ch 01 Normal</i>	<i>201</i>		
<i>Ch 02 Alarm</i>	<i>102</i>		
<i>Ch 02 Normal</i>	<i>202</i>		
<i>Ch 03 Alarm</i>	<i>103</i>		
<i>Ch 03 Normal</i>	<i>203</i>		
<i>Ch 04 Alarm</i>	<i>104</i>		
<i>Ch 04 Normal</i>	<i>204</i>		
<i>Ch 05 Alarm</i>	<i>105</i>		
<i>Ch 05 Normal</i>	<i>205</i>		
<i>Ch 06 Alarm</i>	<i>106</i>		
<i>Ch 06 Normal</i>	<i>206</i>		
<i>Ch 07 Alarm</i>	<i>107</i>		
<i>Ch 07 Normal</i>	<i>207</i>		
<i>Ch 08 Alarm</i>	<i>108</i>		
<i>Ch 08 Normal</i>	<i>208</i>		
<i>Ch 09 Alarm</i>	<i>109</i>		
<i>Ch 09 Normal</i>	<i>209</i>		
<i>Ch 10 Alarm</i>	<i>110</i>		
<i>Ch 10 Normal</i>	<i>210</i>		
<i>Ch 11 Alarm</i>	<i>111</i>		
<i>Ch 11 Normal</i>	<i>211</i>		
<i>Ch 12 Alarm</i>	<i>112</i>		
<i>Ch 12 Normal</i>	<i>212</i>		
<i>Ch 13 Alarm</i>	<i>113</i>		
<i>Ch 13 Normal</i>	<i>213</i>		
<i>Ch 14 Alarm</i>	<i>114</i>		
<i>Ch 14 Normal</i>	<i>214</i>		

Total estimated recorded message length in seconds, this page \_\_\_\_\_

## *Worksheet C Message Planning & Recording (Page 2 of 11)*

Input Channel Message Designation	Program Code	Message Content	Approx. Length
<i>Ch 15 Alarm</i>	<i>115</i>		
<i>Ch 15 Normal</i>	<i>215</i>		
<i>Ch 16 Alarm</i>	<i>116</i>		
<i>Ch 16 Normal</i>	<i>216</i>		
<i>Ch 17 Alarm</i>	<i>117</i>		
<i>Ch 17 Normal</i>	<i>217</i>		
<i>Ch 18 Alarm</i>	<i>118</i>		
<i>Ch 18 Normal</i>	<i>218</i>		
<i>Ch 19 Alarm</i>	<i>119</i>		
<i>Ch 19 Normal</i>	<i>219</i>		
<i>Ch 20 Alarm</i>	<i>120</i>		
<i>Ch 20 Normal</i>	<i>220</i>		
<i>Ch 21 Alarm</i>	<i>121</i>		
<i>Ch 21 Normal</i>	<i>221</i>		
<i>Ch 22 Alarm</i>	<i>122</i>		
<i>Ch 22 Normal</i>	<i>222</i>		
<i>Ch 23 Alarm</i>	<i>123</i>		
<i>Ch 23 Normal</i>	<i>223</i>		
<i>Ch 24 Alarm</i>	<i>124</i>		
<i>Ch 24 Normal</i>	<i>224</i>		
<i>Ch 25 Alarm</i>	<i>125</i>		
<i>Ch 25 Normal</i>	<i>225</i>		
<i>Ch 26 Alarm</i>	<i>126</i>		
<i>Ch 26 Normal</i>	<i>226</i>		
<i>Ch 27 Alarm</i>	<i>127</i>		
<i>Ch 27 Normal</i>	<i>227</i>		
<i>Ch 28 Alarm</i>	<i>128</i>		
<i>Ch 28 Normal</i>	<i>228</i>		

Total estimated recorded message length in seconds, this page \_\_\_\_\_



## *Worksheet C Message Planning & Recording (Page 3 of 11)*

Input Channel Message Designation	Program Code	Message Content	Approx. Length
<i>Ch 29 Alarm</i>	<i>129</i>		
<i>Ch 29 Normal</i>	<i>229</i>		
<i>Ch 30 Alarm</i>	<i>130</i>		
<i>Ch 30 Normal</i>	<i>230</i>		
<i>Ch 31 Alarm</i>	<i>131</i>		
<i>Ch 31 Normal</i>	<i>231</i>		
<i>Ch 32 Alarm</i>	<i>132</i>		
<i>Ch 32 Normal</i>	<i>232</i>		
<i>Ch 33 Alarm</i>	<i>133</i>		
<i>Ch 33 Normal</i>	<i>233</i>		
<i>Ch 34 Alarm</i>	<i>134</i>		
<i>Ch 34 Normal</i>	<i>234</i>		
<i>Ch 35 Alarm</i>	<i>135</i>		
<i>Ch 35 Normal</i>	<i>235</i>		
<i>Ch 36 Alarm</i>	<i>136</i>		
<i>Ch 36 Normal</i>	<i>236</i>		
<i>Ch 37 Alarm</i>	<i>137</i>		
<i>Ch 37 Normal</i>	<i>237</i>		
<i>Ch 38 Alarm</i>	<i>138</i>		
<i>Ch 38 Normal</i>	<i>238</i>		
<i>Ch 39 Alarm</i>	<i>139</i>		
<i>Ch 39 Normal</i>	<i>239</i>		
<i>Ch 40 Alarm</i>	<i>140</i>		
<i>Ch 40 Normal</i>	<i>240</i>		
<i>Ch 41 Alarm</i>	<i>141</i>		
<i>Ch 41 Normal</i>	<i>241</i>		
<i>Ch 42 Alarm</i>	<i>142</i>		
<i>Ch 42 Normal</i>	<i>242</i>		

Total estimated recorded message length in seconds, this page \_\_\_\_\_

*Worksheet C Message Planning & Recording (Page 4 of 11)*

<b>Input Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Ch 43 Alarm</i>	<i>143</i>		
<i>Ch 43 Normal</i>	<i>243</i>		
<i>Ch 44 Alarm</i>	<i>144</i>		
<i>Ch 44 Normal</i>	<i>244</i>		
<i>Ch 45 Alarm</i>	<i>145</i>		
<i>Ch 45 Normal</i>	<i>245</i>		
<i>Ch 46 Alarm</i>	<i>146</i>		
<i>Ch 46 Normal</i>	<i>246</i>		
<i>Ch 47 Alarm</i>	<i>147</i>		
<i>Ch 47 Normal</i>	<i>247</i>		
<i>Ch 48 Alarm</i>	<i>148</i>		
<i>Ch 48 Normal</i>	<i>248</i>		
<b>Remote Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>NET 1 ID</i>	<i>41001</i>		
<i>NET 2 ID</i>	<i>41002</i>		
<i>NET 3 ID</i>	<i>41003</i>		
<i>Ch 01 Alarm</i>	<i>4101</i>		
<i>Ch 01 Normal</i>	<i>4201</i>		
<i>Ch 02 Alarm</i>	<i>4102</i>		
<i>Ch 02 Normal</i>	<i>4202</i>		
<i>Ch 03 Alarm</i>	<i>4103</i>		
<i>Ch 03 Normal</i>	<i>4203</i>		
<i>Ch 04 Alarm</i>	<i>4104</i>		
<i>Ch 04 Normal</i>	<i>4204</i>		

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## *Worksheet C Message Planning & Recording (Page 5 of 11)*

<b>Remote Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Ch 05 Alarm</i>	<i>4105</i>		
<i>Ch 05 Normal</i>	<i>4205</i>		
<i>Ch 06 Alarm</i>	<i>4106</i>		
<i>Ch 06 Normal</i>	<i>4206</i>		
<i>Ch 07 Alarm</i>	<i>4107</i>		
<i>Ch 07 Normal</i>	<i>4207</i>		
<i>Ch 08 Alarm</i>	<i>4108</i>		
<i>Ch 08 Normal</i>	<i>4208</i>		
<i>Ch 09 Alarm</i>	<i>4109</i>		
<i>Ch 09 Normal</i>	<i>4209</i>		
<i>Ch 10 Alarm</i>	<i>4110</i>		
<i>Ch 10 Normal</i>	<i>4210</i>		
<i>Ch 11 Alarm</i>	<i>4111</i>		
<i>Ch 11 Normal</i>	<i>4211</i>		
<i>Ch 12 Alarm</i>	<i>4112</i>		
<i>Ch 12 Normal</i>	<i>4212</i>		
<i>Ch 13 Alarm</i>	<i>4113</i>		
<i>Ch 13 Normal</i>	<i>4213</i>		
<i>Ch 14 Alarm</i>	<i>4114</i>		
<i>Ch 14 Normal</i>	<i>4214</i>		
<i>Ch 15 Alarm</i>	<i>4115</i>		
<i>Ch 15 Normal</i>	<i>4215</i>		
<i>Ch 16 Alarm</i>	<i>4116</i>		
<i>Ch 16 Normal</i>	<i>4216</i>		
<i>Ch 17 Alarm</i>	<i>4117</i>		
<i>Ch 17 Normal</i>	<i>4217</i>		

Total estimated recorded message length in seconds, this page \_\_\_\_\_

*Worksheet C Message Planning & Recording (Page 6 of 11)*

<b>Remote Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Ch 18 Alarm</i>	<i>4118</i>		
<i>Ch 18 Normal</i>	<i>4218</i>		
<i>Ch 19 Alarm</i>	<i>4119</i>		
<i>Ch 19 Normal</i>	<i>4219</i>		
<i>Ch 20 Alarm</i>	<i>4120</i>		
<i>Ch 20 Normal</i>	<i>4220</i>		
<i>Ch 21 Alarm</i>	<i>4121</i>		
<i>Ch 21 Normal</i>	<i>4221</i>		
<i>Ch 22 Alarm</i>	<i>4122</i>		
<i>Ch 22 Normal</i>	<i>4222</i>		
<i>Ch 23 Alarm</i>	<i>4123</i>		
<i>Ch 23 Normal</i>	<i>4223</i>		
<i>Ch 24 Alarm</i>	<i>4124</i>		
<i>Ch 24 Normal</i>	<i>4224</i>		
<i>Ch 25 Alarm</i>	<i>4125</i>		
<i>Ch 25 Normal</i>	<i>4225</i>		
<i>Ch 26 Alarm</i>	<i>4126</i>		
<i>Ch 26 Normal</i>	<i>4226</i>		
<i>Ch 27 Alarm</i>	<i>4127</i>		
<i>Ch 27 Normal</i>	<i>4227</i>		
<i>Ch 28 Alarm</i>	<i>4128</i>		
<i>Ch 28 Normal</i>	<i>4228</i>		
<i>Ch 29 Alarm</i>	<i>4129</i>		
<i>Ch 29 Normal</i>	<i>4229</i>		
<i>Ch 30 Alarm</i>	<i>4130</i>		
<i>Ch 30 Normal</i>	<i>4230</i>		

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## Worksheet C Message Planning & Recording (Page 7 of 11)

Remote Channel Message Designation	Program Code	Message Content	Approx. Length
Ch 31 Alarm	4131		
Ch 31 Normal	4231		
Ch 32 Alarm	4132		
Ch 32 Normal	4232		
Ch 33 Alarm	4133		
Ch 33 Normal	4233		
Ch 34 Alarm	4134		
Ch 34 Normal	4234		
Ch 35 Alarm	4135		
Ch 35 Normal	4235		
Ch 36 Alarm	4136		
Ch 36 Normal	4236		
Ch 37 Alarm	4137		
Ch 37 Normal	4237		
Ch 38 Alarm	4138		
Ch 38 Normal	4238		
Ch 39 Alarm	4139		
Ch 39 Normal	4239		
Ch 40 Alarm	4140		
Ch 40 Normal	4240		
Ch 41 Alarm	4141		
Ch 41 Normal	4241		
Ch 42 Alarm	4142		
Ch 42 Normal	4242		
Ch 43 Alarm	4143		
Ch 43 Normal	4243		
Ch 44 Alarm	4144		
Ch 44 Normal	4244		
Ch 45 Alarm	4145		
Ch 45 Normal	4245		

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## *Worksheet C Message Planning & Recording (Page 8 of 11)*

<b>Remote Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Ch 46 Alarm</i>	<i>4146</i>		
<i>Ch 46 Normal</i>	<i>4246</i>		
<i>Ch 47 Alarm</i>	<i>4147</i>		
<i>Ch 47 Normal</i>	<i>4247</i>		
<i>Ch 48 Alarm</i>	<i>4148</i>		
<i>Ch 48 Normal</i>	<i>4248</i>		
<i>Ch 49 Alarm</i>	<i>4149</i>		
<i>Ch 49 Normal</i>	<i>4249</i>		
<i>Ch 50 Alarm</i>	<i>4150</i>		
<i>Ch 50 Normal</i>	<i>4250</i>		
<i>Ch 51 Alarm</i>	<i>4151</i>		
<i>Ch 51 Normal</i>	<i>4251</i>		
<i>Ch 52 Alarm</i>	<i>4152</i>		
<i>Ch 52 Normal</i>	<i>4252</i>		
<i>Ch 53 Alarm</i>	<i>4153</i>		
<i>Ch 53 Normal</i>	<i>4253</i>		
<i>Ch 54 Alarm</i>	<i>4154</i>		
<i>Ch 54 Normal</i>	<i>4254</i>		
<i>Ch 55 Alarm</i>	<i>4155</i>		
<i>Ch 55 Normal</i>	<i>4255</i>		
<i>Ch 56 Alarm</i>	<i>4156</i>		
<i>Ch 56 Normal</i>	<i>4256</i>		
<i>Ch 57 Alarm</i>	<i>4157</i>		
<i>Ch 57 Normal</i>	<i>4257</i>		
<i>Ch 58 Alarm</i>	<i>4158</i>		
<i>Ch 58 Normal</i>	<i>4258</i>		

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## *Worksheet C Message Planning & Recording (Page 9 of 11)*

<b>Remote Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Ch 59 Alarm</i>	<i>4159</i>		
<i>Ch 59 Normal</i>	<i>4259</i>		
<i>Ch 60 Alarm</i>	<i>4160</i>		
<i>Ch 60 Normal</i>	<i>4260</i>		
<i>Ch 61 Alarm</i>	<i>4161</i>		
<i>Ch 61 Normal</i>	<i>4261</i>		
<i>Ch 62 Alarm</i>	<i>4162</i>		
<i>Ch 62 Normal</i>	<i>4262</i>		
<i>Ch 63 Alarm</i>	<i>4163</i>		
<i>Ch 63 Normal</i>	<i>4263</i>		
<i>Ch 64 Alarm</i>	<i>4164</i>		
<i>Ch 64 Normal</i>	<i>4264</i>		
<i>Ch 65 Alarm</i>	<i>4165</i>		
<i>Ch 65 Normal</i>	<i>4265</i>		
<i>Ch 66 Alarm</i>	<i>4166</i>		
<i>Ch 66 Normal</i>	<i>4266</i>		
<i>Ch 67 Alarm</i>	<i>4167</i>		
<i>Ch 67 Normal</i>	<i>4267</i>		
<i>Ch 68 Alarm</i>	<i>4168</i>		
<i>Ch 68 Normal</i>	<i>4268</i>		
<i>Ch 69 Alarm</i>	<i>4169</i>		
<i>Ch 69 Normal</i>	<i>4269</i>		
<i>Ch 70 Alarm</i>	<i>4170</i>		
<i>Ch 70 Normal</i>	<i>4270</i>		
<i>Ch 71 Alarm</i>	<i>4171</i>		
<i>Ch 71 Normal</i>	<i>4271</i>		

Total estimated recorded message length in seconds, this page \_\_\_\_\_

*Worksheet C Message Planning & Recording (Page 10 of 11)*

<b>Remote Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Ch 72 Alarm</i>	<i>4172</i>		
<i>Ch 72 Normal</i>	<i>4272</i>		
<i>Ch 73 Alarm</i>	<i>4173</i>		
<i>Ch 73 Normal</i>	<i>4273</i>		
<i>Ch 74 Alarm</i>	<i>4174</i>		
<i>Ch 74 Normal</i>	<i>4274</i>		
<i>Ch 75 Alarm</i>	<i>4175</i>		
<i>Ch 75 Normal</i>	<i>4275</i>		
<i>Ch 76 Alarm</i>	<i>4176</i>		
<i>Ch 76 Normal</i>	<i>4276</i>		
<i>Ch 77 Alarm</i>	<i>4177</i>		
<i>Ch 77 Normal</i>	<i>4277</i>		
<i>Ch 78 Alarm</i>	<i>4178</i>		
<i>Ch 78 Normal</i>	<i>4278</i>		
<i>Ch 79 Alarm</i>	<i>4179</i>		
<i>Ch 79 Normal</i>	<i>4279</i>		
<i>Ch 80 Alarm</i>	<i>4180</i>		
<i>Ch 80 Normal</i>	<i>4280</i>		
<i>Ch 81 Alarm</i>	<i>4181</i>		
<i>Ch 81 Normal</i>	<i>4281</i>		
<i>Ch 82 Alarm</i>	<i>4182</i>		
<i>Ch 82 Normal</i>	<i>4282</i>		
<i>Ch 83 Alarm</i>	<i>4183</i>		
<i>Ch 83 Normal</i>	<i>4283</i>		
<i>Ch 84 Alarm</i>	<i>4184</i>		
<i>Ch 84 Normal</i>	<i>4284</i>		

Total estimated recorded message length in seconds, this page \_\_\_\_\_



## *Worksheet C Message Planning & Recording (Page 11 of 11)*

<b>Remote Channel Message Designation</b>	<b>Program Code</b>	<b>Message Content</b>	<b>Approx. Length</b>
<i>Ch 85 Alarm</i>	<i>4185</i>		
<i>Ch 85 Normal</i>	<i>4285</i>		
<i>Ch 86 Alarm</i>	<i>4186</i>		
<i>Ch 86 Normal</i>	<i>4286</i>		
<i>Ch 87 Alarm</i>	<i>4187</i>		
<i>Ch 87 Normal</i>	<i>4287</i>		
<i>Ch 88 Alarm</i>	<i>4188</i>		
<i>Ch 88 Normal</i>	<i>4288</i>		
<i>Ch 89 Alarm</i>	<i>4189</i>		
<i>Ch 89 Normal</i>	<i>4289</i>		
<i>Ch 90 Alarm</i>	<i>4190</i>		
<i>Ch 90 Normal</i>	<i>4290</i>		
<i>Ch 91 Alarm</i>	<i>4191</i>		
<i>Ch 91 Normal</i>	<i>4291</i>		
<i>Ch 92 Alarm</i>	<i>4192</i>		
<i>Ch 92 Normal</i>	<i>4292</i>		
<i>Ch 93 Alarm</i>	<i>4193</i>		
<i>Ch 93 Normal</i>	<i>4293</i>		
<i>Ch 94 Alarm</i>	<i>4194</i>		
<i>Ch 94 Normal</i>	<i>4294</i>		
<i>Ch 95 Alarm</i>	<i>4195</i>		
<i>Ch 95 Normal</i>	<i>4295</i>		
<i>Ch 96 Alarm</i>	<i>4196</i>		
<i>Ch 96 Normal</i>	<i>4296</i>		

Total estimated recorded message length in seconds, this page \_\_\_\_\_

***See next page to complete calculations***

***Worksheet C Message Planning & Recording Calculations:***

Total estimated recorded message length in seconds, page 11 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 10 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 9 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 8 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 7 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 6 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 5 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 4 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 3 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 2 of 11 \_\_\_\_\_  
 Total estimated recorded message length in seconds, page 1 of 11 \_\_\_\_\_

Total estimated recorded message length in seconds, **all** pages \_\_\_\_\_  
 See Code 912 for alternate method of timing spoken messages.

***Note:***

For any channels that you have programmed for Status Report Only or for Run Time Metering, the message to be spoken on Open Circuit input is recorded with the Program Code ordinarily used for the Alarm Message; the message to be spoken on Closed Circuit input is recorded with the program code ordinarily used for the Normal Message.

## Worksheet D Net Address Configuration Codes

*Purpose:* Use this worksheet to assemble the net address configuration codes..

*Instructions:* Fill in fields as necessary for mode/net/node/addr. See section 7.5 for details. The addr field is mandatory, all other optional. Be sure to append '\*' to optional fields as necessary.

(Page 1 of 3)

Prefix	Remote Channel	mode*	net*	node/route*	addr
45	01	*			*
45	02	*			*
45	03	*			*
45	04	*			*
45	05	*			*
45	06	*			*
45	07	*			*
45	08	*			*
45	09	*			*
45	10	*			*
45	11	*			*
45	12	*			*
45	13	*			*
45	14	*			*
45	15	*			*
45	16	*			*
45	17	*			*
45	18	*			*
45	19	*			*
45	20	*			*
45	21	*			*
45	22	*			*
45	23	*			*
45	24	*			*
45	25	*			*
45	26	*			
45	27	*			

*Worksheet D Net Address Configuration Codes Cont. . .**(Page 2 of 3)*

Prefix	Remote Channel	mode*	net*	node/route*	addr
45	28	*			*
45	29	*			*
45	30	*			*
45	31	*			*
45	32	*			*
45	33	*			*
45	34	*			*
45	35	*			*
45	36	*			*
45	37	*			*
45	38	*			*
45	39	*			*
45	40	*			*
45	41	*			*
45	42	*			*
45	43	*			*
45	44	*			*
45	45	*			*
45	46	*			*
45	47	*			*
45	48	*			*
45	49	*			*
45	50	*			*
45	51	*			*
45	52	*			*
45	53	*			*
45	54	*			*
45	55	*			*
45	56	*			*

## *Worksheet D Net Address Configuration Codes Cont. . .*

(Page 3 of 3)

Prefix	Remote Channel	mode*	net*	node/route*	addr
45	86 *				*
45	87 *				*
45	88 *				*
45	89 *				*
45	90 *				*
45	91 *				*
45	92 *				*
45	93 *				*
45	94 *				*
45	95 *				*
45	96 *				*

## *Worksheet E Alarm Condition for Remote Channels*

(Page 1 of 7)

Prefix	Remote Channel	Disarmed enter 0 No Alarm enter 3 NetErr mode enter 4	1-bit points: Normally 1 enter 1 Normally 0 enter 2	16 or 32-bit points: enter 5 followed by low setpoint enter 6 followed by high setpoint
45	01 *			5
				6
45	02 *			5
				6
45	03 *			5
				6
45	04 *			5
				6
45	05 *			5
				6
45	06 *			5
				6
45	07 *			5
				6
45	08 *			5
				6
45	09 *			5
				6
45	10 *			5
				6
45	11 *			5
				6
45	12 *			5
				6
45	13 *			5
				6
45	14 *			5
				6

# *Worksheet E Alarm Condition for Remote Channels Cont. . .*

(Page 2 of 7)

Prefix	Remote Channel	Disarmed enter 0 No Alarm enter 3 NetErr mode enter 4	1-bit points: Normally 1 enter 1 Normally 0 enter 2	16 or 32-bit points: enter 5 followed by low setpoint enter 6 followed by high setpoint
45	15 *			5
				6
45	16 *			5
				6
45	17 *			5
				6
45	18 *			5
				6
45	19 *			5
				6
45	20 *			5
				6
45	21 *			5
				6
45	22 *			5
				6
45	23 *			5
				6
45	24 *			5
				6
45	25 *			5
				6
45	26 *			5
				6
45	27 *			5
				6
45	28 *			5
				6

*Worksheet E Alarm Condition for Remote Channels Cont. . .*  
 (Page 3 of 7)

Prefix	Remote Channel	Disarmed enter 0 No Alarm enter 3 NetErr mode enter 4	1-bit points: Normally 1 enter 1 Normally 0 enter 2	16 or 32-bit points: enter 5 followed by low setpoint enter 6 followed by high setpoint
45	29 *			5
				6
45	30 *			5
				6
45	31 *			5
				6
45	32 *			5
				6
45	33 *			5
				6
45	34 *			5
				6
45	35 *			5
				6
45	36 *			5
				6
45	37 *			5
				6
45	38 *			5
				6
45	39 *			5
				6
45	40 *			5
				6
45	41 *			5
				6
45	42 *			5
				6



*Worksheet E Alarm Condition for Remote Channels Cont. . .*  
 (Page 4 of 7)

Prefix	Remote Channel	Disarmed enter 0 No Alarm enter 3 NetErr mode enter 4	1-bit points: Normally 1 enter 1 Normally 0 enter 2	16 or 32-bit points: enter 5 followed by low setpoint enter 6 followed by high setpoint
45	43 *			5
				6
45	44 *			5
				6
45	45 *			5
				6
45	46 *			5
				6
45	47 *			5
				6
45	48 *			5
				6
45	49 *			5
				6
45	50 *			5
				6
45	51 *			5
				6
45	52 *			5
				6
45	53 *			5
				6
45	54 *			5
				6
45	55 *			5
				6
45	56 *			5
				6

*Worksheet E Alarm Condition for Remote Channels Cont. . .*  
 (Page 5 of 7)

Prefix	Remote Channel	Disarmed enter 0 No Alarm enter 3 NetErr mode enter 4	1-bit points: Normally 1 enter 1 Normally 0 enter 2	16 or 32-bit points: enter 5 followed by low setpoint enter 6 followed by high setpoint
45	57 *			5
				6
45	58 *			5
				6
45	59 *			5
				6
45	60 *			5
				6
45	61 *			5
				6
45	62 *			5
				6
45	63 *			5
				6
45	64 *			5
				6
45	65 *			5
				6
45	66 *			5
				6
45	67 *			5
				6
45	68 *			5
				6
45	69 *			5
				6
45	70 *			5
				6

*Worksheet E Alarm Condition for Remote Channels Cont. . .*  
 (Page 6 of 7)

Prefix	Remote Channel	Disarmed enter 0 No Alarm enter 3 NetErr mode enter 4	1-bit points: Normally 1 enter 1 Normally 0 enter 2	16 or 32-bit points: enter 5 followed by low setpoint enter 6 followed by high setpoint
45	71 *			5
				6
45	72 *			5
				6
45	73 *			5
				6
45	74 *			5
				6
45	75 *			5
				6
45	76 *			5
				6
45	77 *			5
				6
45	78 *			5
				6
45	79 *			5
				6
45	80 *			5
				6
45	81 *			5
				6
45	82 *			5
				6
45	83 *			5
				6
45	84 *			5
				6

*Worksheet E Alarm Condition for Remote Channels Cont. . .*  
 (Page 7 of 7)

Prefix	Remote Channel	Disarmed enter 0 No Alarm enter 3 NetErr mode enter 4	1-bit points: Normally 1 enter 1 Normally 0 enter 2	16 or 32-bit points: enter 5 followed by low setpoint enter 6 followed by high setpoint
45	85 *			5
				6
45	86 *			5
				6
45	87 *			5
				6
45	88 *			5
				6
45	89 *			5
				6
45	90 *			5
				6
45	91 *			5
				6
45	92 *			5
				6
45	93 *			5
				6
45	94 *			5
				6
45	95 *			5
				6
45	96 *			5
				6

## Worksheet F Remote Channel Interlinks

[illegible]



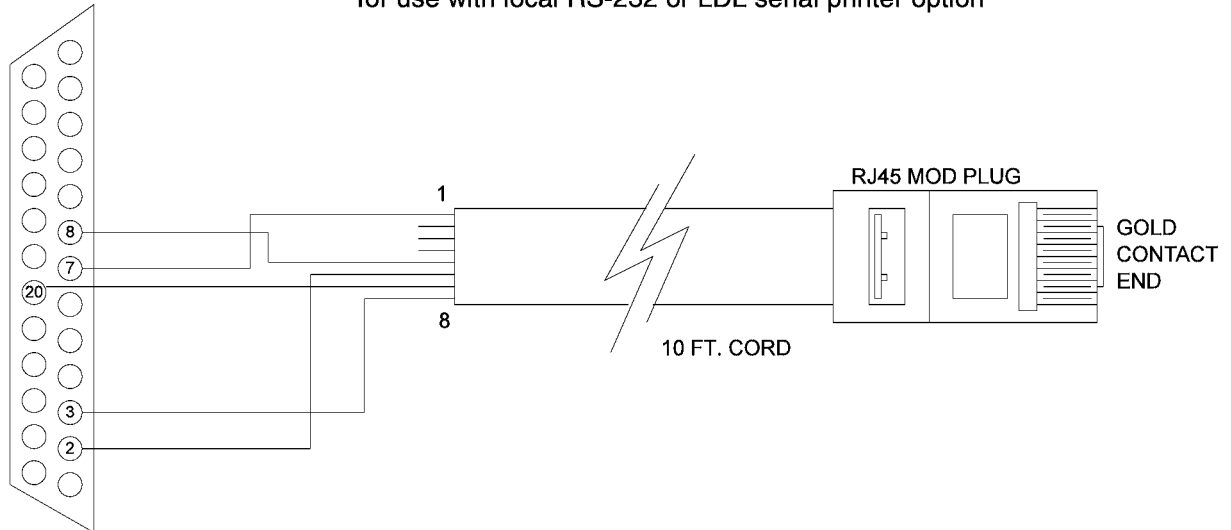
# C

## Cabling Diagrams

## C.1 RACO VSER-01 Serial Cable Connection Diagram

REAR (SOLDER SIDE) OF  
DB25P (MALE) CONNECTOR

for use with local RS-232 or LDL serial printer option



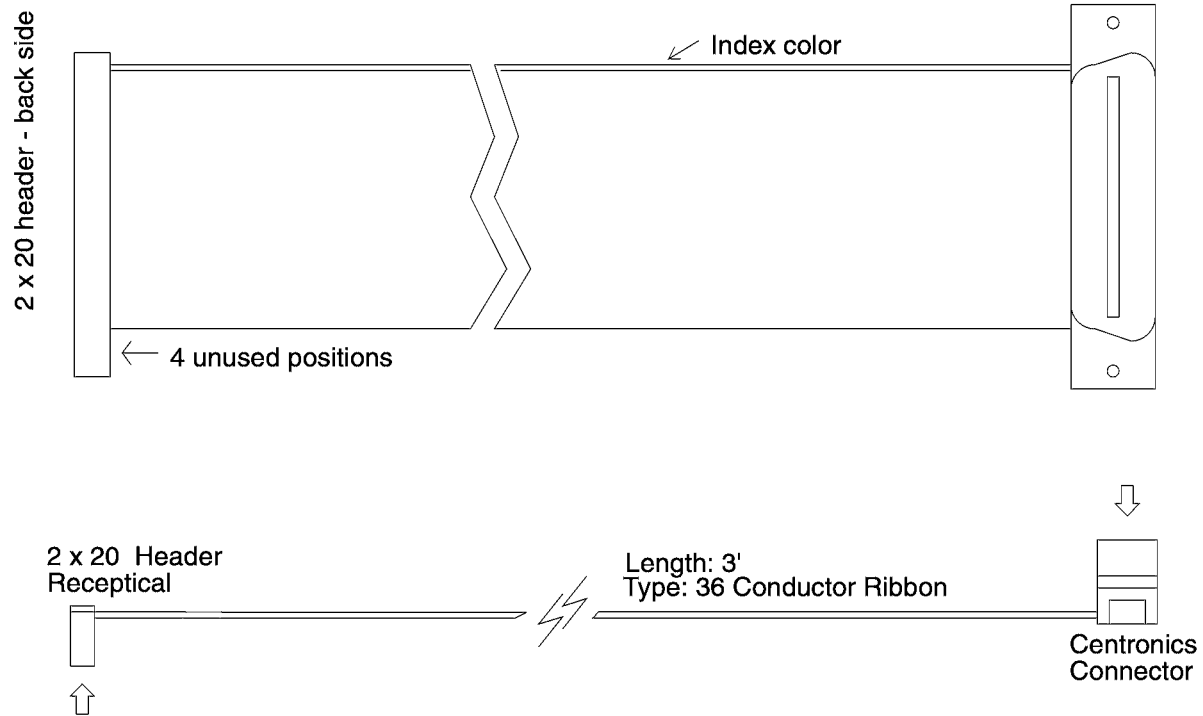
25 Pin Connector Pin-Out

Pin	Signal	Description
2	RXD	Data to VB (or Gateway)
3	TXD	Data from VB (or Gateway)
7	SGND	Signal Ground
8	DCD	Carrier Detect - Handshake Out (not used)
20	DTR	Data Terminal Ready - Handshake In (not used)



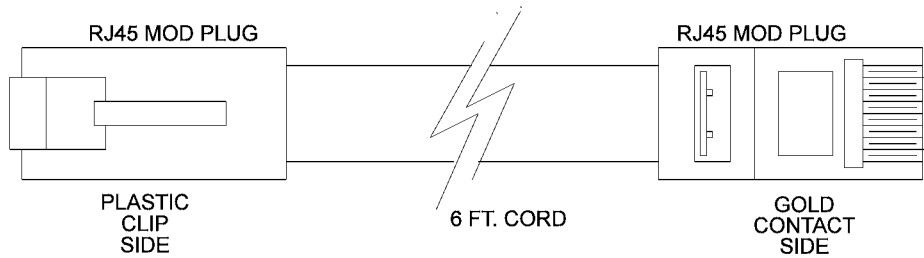
## C.2 RACO VPPC-1 Parallel Cable Connection Diagram

for use with LDL parallel printer option



## C.3 RACO VAB500-1 Serial Cable Diagram

for use with Allen Bradley DH485 protocol



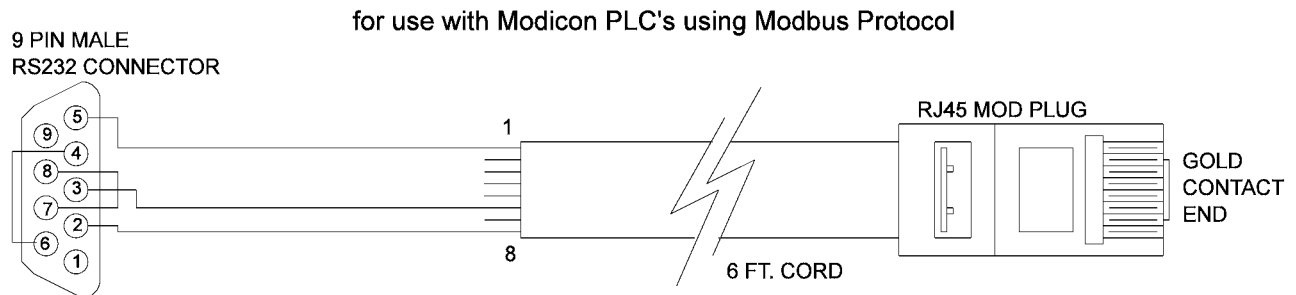
RJ-45 Connector Pinout		
1	SGND	Signal Ground
4	TXD	Data from Gateway
6	RXD	Data from Gateway

Note opposite orientation of mod plugs which maintains pin number consistency from end to end

RJ-45 Straight through pinout

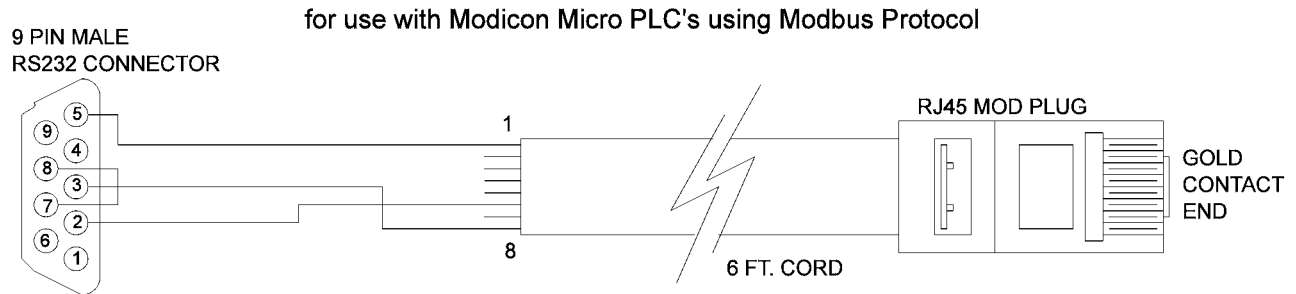
1	_____	1
2	_____	2
3	_____	3
4	_____	4
5	_____	5
6	_____	6
7	_____	7
8	_____	8

## C.4 RACO VMB-2 Serial Cable Connection Diagram



9 Pin Connector Pin-Out		
2	TXD	Data from Gateway
3	RXD	Data to Gateway
4	DSR	Data Set Ready - Jumpered to DTR at 9 pin conn. only
5	SGND	Signal Ground
6	DTR	Data Terminal Ready - Jumpered to DSR at 9 pin conn. only
7	RTS	Request to Send - Jumpered to CTS at 9 pin conn. only
8	CTS	Clear To Send - Jumpered to RTS at 9 pin conn. only

## C.5 RACO VMBM-1 Serial Cable Connection Diagram



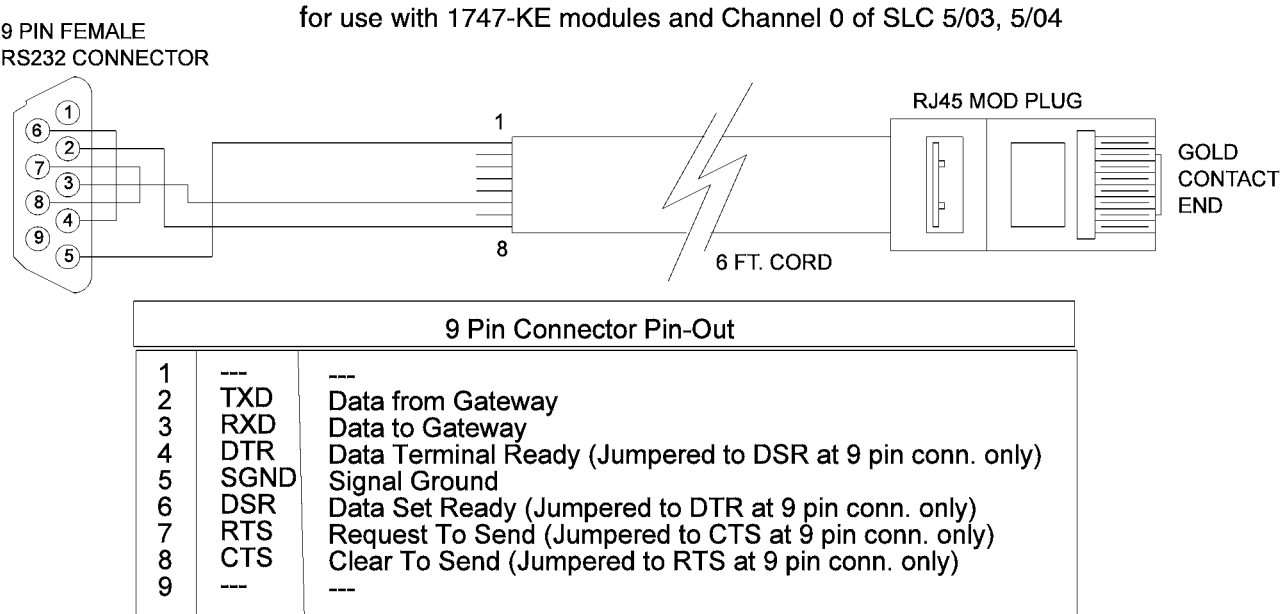
9 Pin Connector Pin-Out		
2	RXD	Data to Gateway
3	TXD	Data from Gateway
5	SGND	Signal Ground
7	RTS	Request to Send - Jumpered to CTS at 9 pin conn. only
8	CTS	Clear To Send - Jumpered to RTS at 9 pin conn. only



### **Note:**

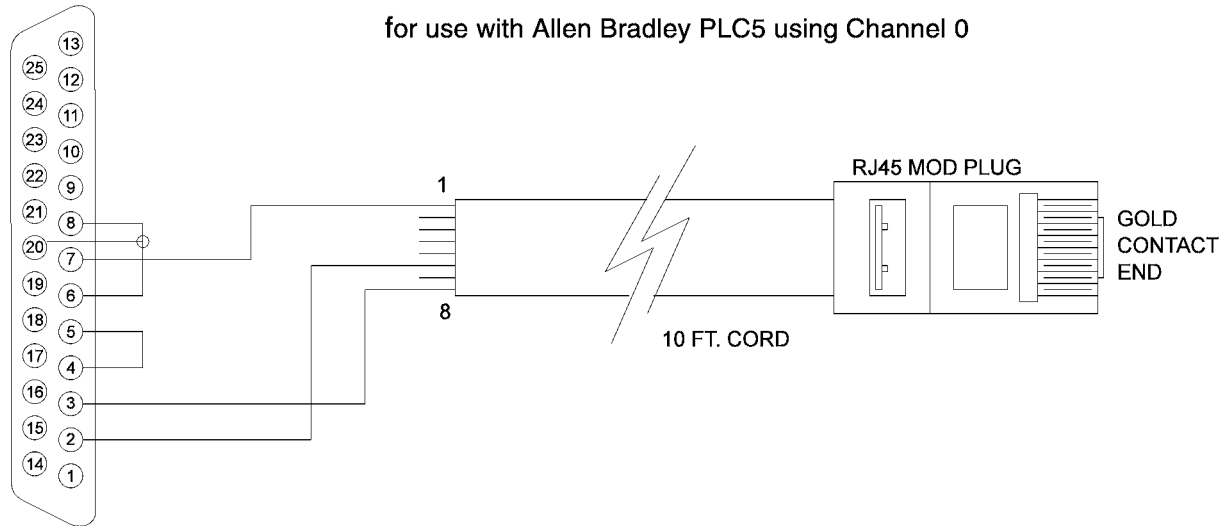
Connection to Modicon Micro PLC requires use of Modicon Cable Part Number 110XCA28201, 110XCA28202, or 110XCA28203 plus adaptor 110XCA20300. This combination of cable plus adaptor mates with above RACO cable. The Modicon cable is a flat, eight wire cable with RJ-45 male connectors on each end. The Modicon adaptor is an RJ-45 female to D-sub 9 Pin female adaptor.

# C.6 RACO VAB-1 Serial Cable Connection Diagram



## C.7 RACO VAB5-CO Serial Cable Connection Diagram

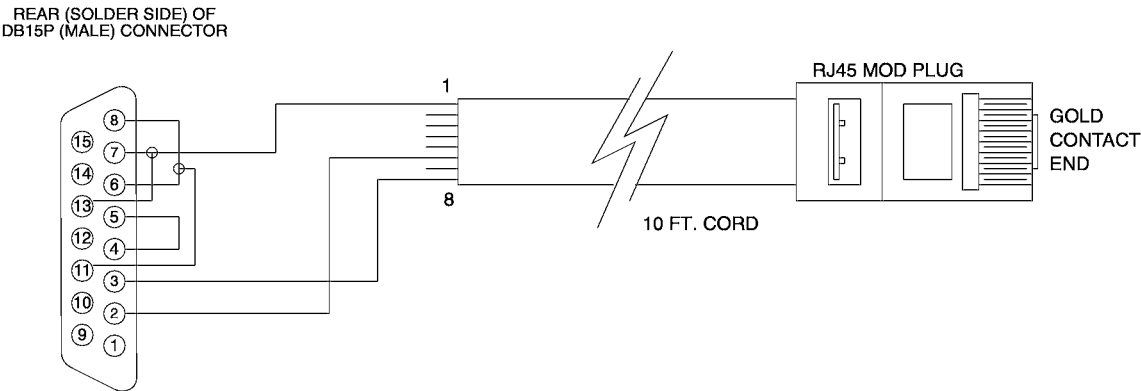
REAR (SOLDER SIDE) OF  
DB25P (MALE) CONNECTOR



25 Pin Connector Pin-Out			
2	RXD	Data to VB (or Gateway)	
3	TXD	Data from VB (or Gateway)	
7	SGND	Signal Ground	

# C.8 RACO VAB5-KE Serial Cable Connection Diagram

for use with Allen Bradley PLC5 using AB1785-KE

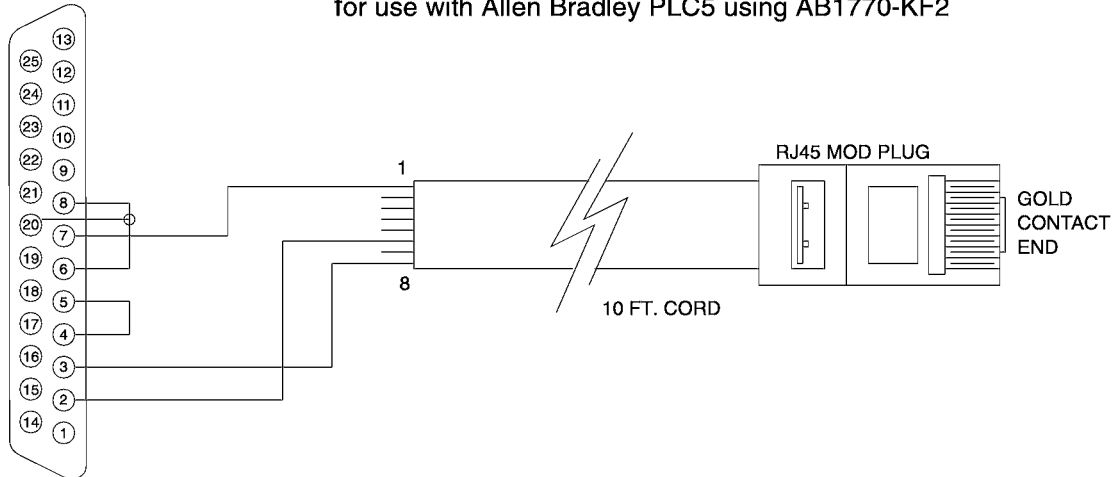


15 Pin Connector Pin-Out			
2	RXD	Data to VB (or Gateway)	
3	TXD	Data from VB (or Gateway)	
7	SGND	Signal Ground	

## C.9 RACO VAB5-KF Serial Cable Connection Diagram

REAR (SOLDER SIDE) OF  
DB25S (FEMALE) CONNECTOR

for use with Allen Bradley PLC5 using AB1770-KF2

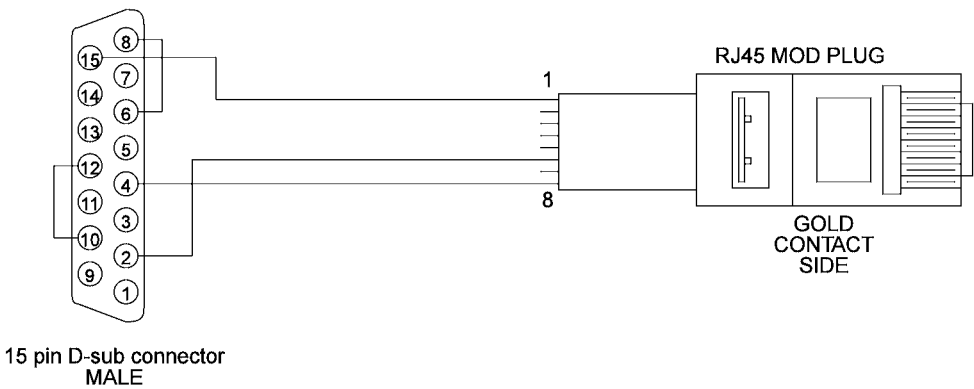


25 Pin Connector Pin-Out		
2	RXD	Data to VB (or Gateway)
3	TXD	Data from VB (or Gateway)
7	SGND	Signal Ground



# C.10 RACO VBB-1 Serial Cable Connection Diagram

for use with Bristol Babcock DPC 3330 or 3335

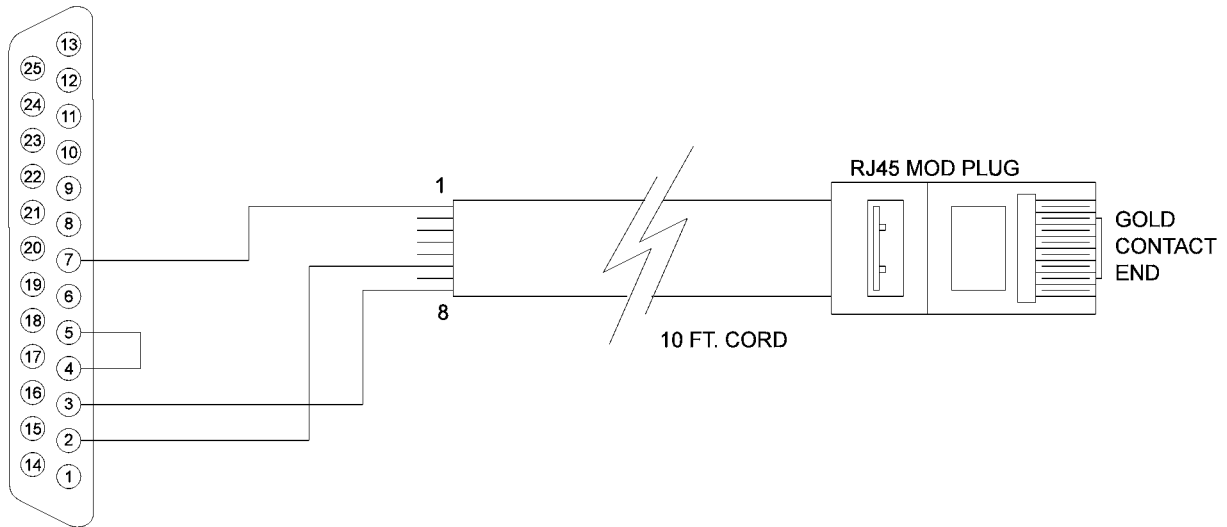


15 Pin Connector Pin-Out		
2	RXD	Data to Gateway
4	TXD	Data from Gateway
6	JUMP	Jumpered to pin 8
8	JUMP	Jumpered to pin 6
10	JUMP	Jumpered to pin 12
12	JUMP	Jumpered to pin 10
15	SGND	Signal Ground

## C.10 VTI 405/505-DCM Serial Cable Connection Diagram

REAR (SOLDER SIDE) OF  
DB25P (MALE) CONNECTOR

for use with Siemens TI405-DCM PLC  
Siemens Series 405 Data Communications Module



25 Pin Connector Pin-Out		
2	RXD	Data to VB
3	TXD	Data from VB
7	SGND	Signal Ground

# D

## Printer Options

### D.1 Local Data Logger (Local Printer) Option

The Local Data Logging protocol (LDL) is used for delivering autodialer status and configuration information to a logging terminal. Such terminals may be printers or computers using serial or parallel interfaces.

When active, the LDL protocol will automatically print a description of each activity that occurs: alarms, acknowledgments, programming entries, inquiry calls, etc.. A time and date stamp will be included with each report. The information is delivered in flat ASCII format. It may be displayed as delivered or filtered as desired by the receiver.

The LDL protocol may always be configured on the autodialer's NET2 (serial) or NET4 (parallel) port. If a VCP4 card is installed then it may also run on the NET1 port. Please refer to Table 7.4 for specific information about the autodialer's ports. LDL may be configured on any one, but only one, of these devices. Specific instructions for printer connections are given below.

The logging information buffer is normally 20 Kbytes, but may be sized at 212 Kbytes as a special order option. The buffer may overflow if the logging terminal is very slow, runs out of paper or flow controls the autodialer for an extended period of time. If it does overflow, logging information will be lost. Configuring a new protocol on an existing LDL port will erase all unprinted data.

#### D.1.1 Serial Printer Interface

Use of a serial printer for LDL requires the following steps:

- Decide which of the Net1 or Net2 ports to use.
- Connect the DB-25 connector end of a Raco SER-01 cable (see section C.1) to the input connector of the printer. Route the "modular" end of this same cable through one of the holes at the bottom of the autodialer, and plug it into the NET1 or NET2 jack (see diagram, section 2.2). Avoid routing this cable alongside power wiring and be sure that the front panel circuit board does not pinch it when the door is closed.

- Configure the LDL protocol on the selected port using code 49061\*128 (Net1) or 49062\*128 (Net2). This will establish the default serial parameters listed in table D.1.1 below.
- Adjust the serial parameters of either the autodialer or the printer so that they match exactly (section 7.8.4.2). If your printer was obtained through Racó, it will have been properly configured and tested at the factory.
- The serial interface uses XON/XOFF flow control. The XON character is fixed as ASCII character DC1 (0x11). The XOFF character is always DC3 (0x13). As required for compatibility, configure the printer's flow control method.
- Test operations by pressing the <normal> key once to get a status report. The printer should display the information.

Parameter	Command	Default Setting	Requirement
Baud Rate	4901	9600	serial interface only
Data Bits	4902	8	serial interface only
Stop Bits	4903	1	serial interface only
Parity	4904	none	serial interface only
Flow Control	Not Available	XON/XOFF	can not change

Table D.1.1: Autodialer Default Settings for Serial LDL Protocol

## D.1.2

### Parallel Printer Interface

Use of a parallel printer for LDL requires use of the Net4 port located on the inside of the unit front panel door. Perform the following steps:

- ◆ Connect the 2x20 header end of the VPPC-1 Parallel Printer Cable (or equivalent, see section C.2) to the VSS front panel port with the “red striped edge” on the right side. Connect the Centronics end of the cable to the parallel port on your printer.



#### **Caution:**

If you connect any other way, you may damage the parallel connection on your printer.

- ◆ Configure the LDL protocol on the Net4 port using code 49064\*128 (see section 7.8.4.1). There are no other parameters to set in the autodialer.

- ◆ The parallel interface uses both the XON/XOFF and the standard Centronics hardware flow control. The XON character is fixed as ASCII character DC1 (0x11). The XOFF character is always DC3 (0x13). As required for compatibility, configure the printer's flow control method.
- ◆ Test operations by pressing the <normal> key once to get a status report. The printer should display the information.



**Note:**

Some parallel printers tend to “leak” electrical current through the parallel cable. It is possible that this will cause the autodialer to turn itself on a few seconds after turning power off. To remedy this condition simply turn off power to the printer before turning power off to the autodialer.

### D.1.3

## Time and Date Setting

Time and date may be set or corrected with the following programming code entries:

- ◆ To check the date

941 ENTER

- ◆ To set the date

941 MM DD YY D ENTER

where:

MM is the month (03 for March)

DD is the date (07 for the 7th day of the month)

YY is the year (96 for 1996)

D is the day of the week (1 for Sunday, 2 for Monday, etc.). Entry of D is optional.

- ◆ To check the time

942 ENTER

- ◆ To set the time

942 HH MM SS ENTER

where:

HH are the hours in military time (13 for 1 PM)

MM are the minutes (09 for 9 minutes)

SS are the seconds. Entry of SS is optional.

- ◆ To clear the time and date back to 80:00:00 on 01/01/92.

935 7 ENTER

**D.1.4****Printout at Regular Intervals**

The unit may also be programmed to automatically log (printout) all input conditions at regular intervals, by entering code:

```
943 XXX.X ENTER
```

XXX.X is the desired printing interval in hours, from 0.1 to 999.9.

The first such printout will occur when the period elapses, rather than immediately upon programming.

- ◆ To check programmed printing interval

```
943 ENTER
```

- ◆ To turn off regular interval printing function

```
943 0 ENTER
```

- ◆ To printout All User-Entered Programming

```
944 ENTER
```

# E

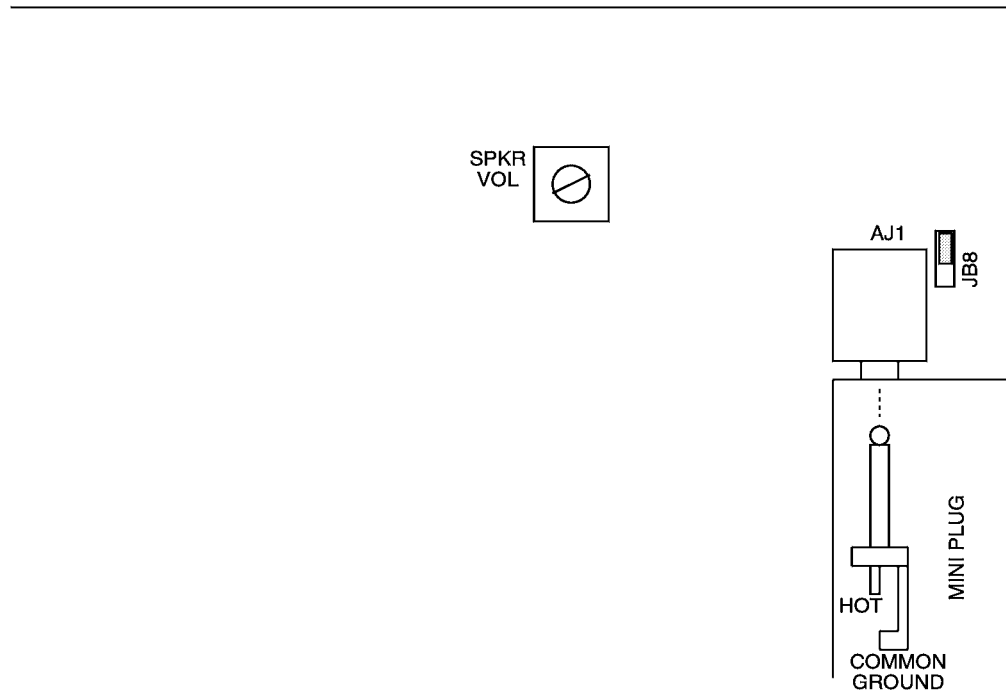
## Verbatim Gateway Floobydust

### E.1

### Adjusting Internal Speaker Volume

Speaker volume may be adjusted via the trimpot marked SPKR VOL located in the upper right hand area of the main circuit board.

This trimpot also adjusts the level of the audio signal that can be obtained via jack AJ1. However, sensitive audio systems may require an additional signal level attenuator in order to prevent overloading.



E.2

External Speaker Connections

An audio output suitable for driving an external speaker of 4 to 16 ohms impedance, headphones, or other audio system, is available via jack AJ1, located in the upper right hand area of the main circuit board. This jack must be configured to deliver audio signal output by placing a jumper shunt across the upper pair of pins on the three-pin header JB8, located next to AJ1.

Note that AJ1 is a dual purpose jack which may be used either for audio output or DC power input, but not for both simultaneously.

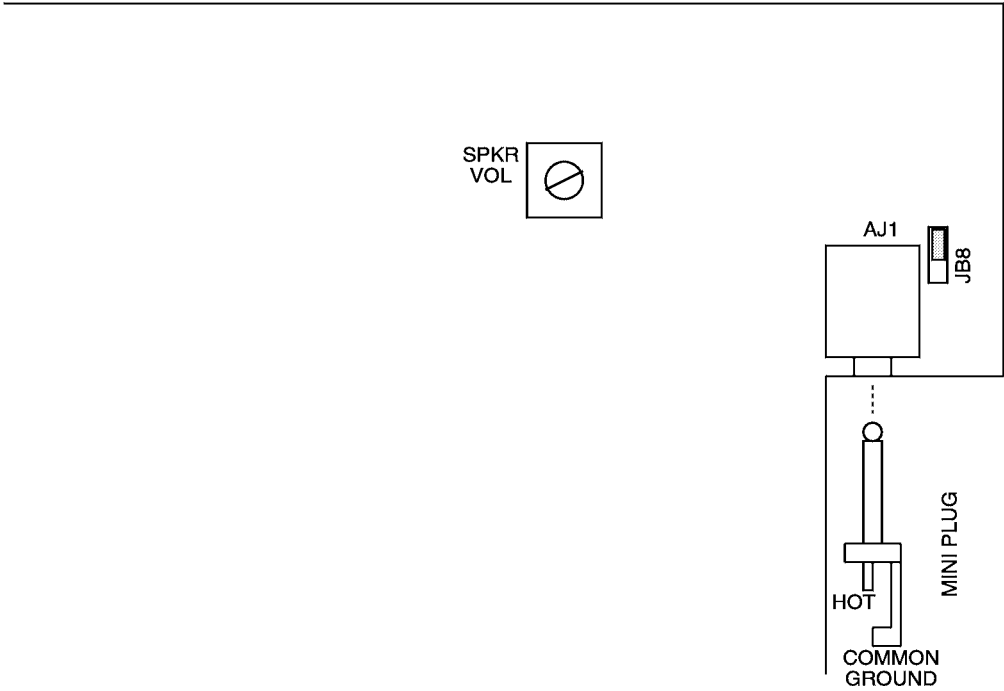
To make connection with AJ1, use a standard single-circuit “MINI” plug. The tip end will be the audio signal; the shell will be ground.

The output signal has a nominal impedance of 8 ohms and a nominal average amplitude of 1 volt RMS, when the audio level trimpot, described below, is set to full clockwise position.

E.2.1

Specifications for Audio Output from Jack AJ1

Nominal output impedance	8 ohms
Nominal average output amplitude with 8 ohm load	1 VRMS





## E.3

## Alternative Power Sources

As an alternative to the 120 VAC input, an external DC power source can be used. The DC power source should have a current capacity of at least 500 ma DC and a voltage from 8 to 14 VDC. Actual current consumption will be approximately 250 ma standby and 375 ma while phoning and speaking, plus whatever current is required to charge the internal 6 volt, 4 AH gel-cell battery. This supplemental charging current will be roughly 25 ma when the battery is already fully charged, and up to 200 ma if the battery is being recharged after a discharge. Option cards such as analog, remote supervisory control etc. will also moderately increase the current being drawn.

DC power should be connected via a standard single-circuit “MINI” plug, inserted into jack AJ1 located in the upper right hand corner of the main circuit board. This jack must be configured to accept DC power input by placing a jumper shunt across the lower pair of pins on the three-pin header JB8, located next to AJ1. **The positive (plus) side of the power source must go to the end “tip” of the plug; reversing this polarity can damage the product.**



### **Note:**

Note that AJ1 is a dual purpose jack which may be used either for audio output or DC power input, but not for both simultaneously. Note also that the AC power fuse FU1 is bypassed with this configuration. It should be removed to avoid confusion.

The front panel ON/OFF control will operate as with standard 120 VAC power input. If the external power source is interrupted, the unit will switch to gel cell battery power and go into power failure alarm.

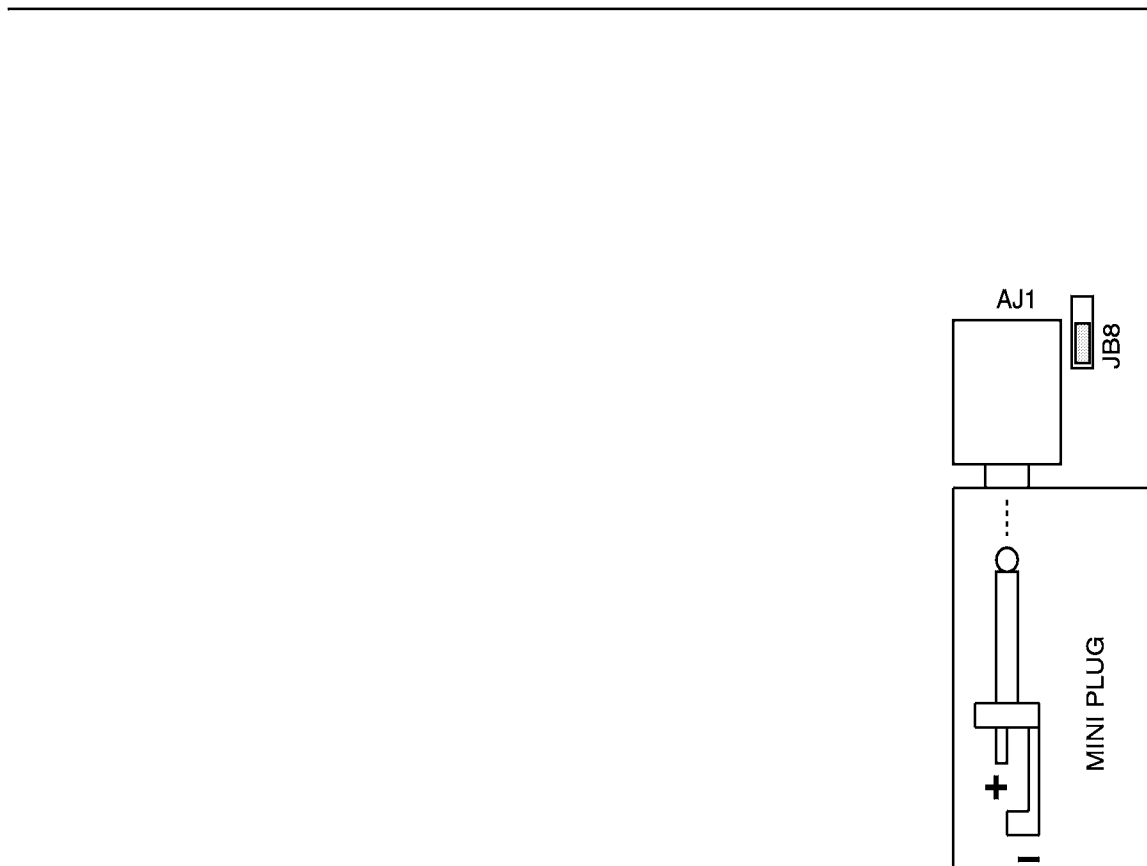
The Verbatim Gateway autodialer is capable of being powered by other types of power source, including 240 VAC, on special order. Contact factory for details.

### E.3.1

### Standard DC Power Power Specifications

Input voltage range	8-14 VDC
Recommended minimum current capacity	500 ma DC
VPLC-4C-32 current drawn, less battery, standby	275 ma
VPLC-4C-32, less battery, phoning/talking	400 ma
Added current to maintain charged battery	25 ma
Added current to charge discharged battery	200 ma

*DC Power Connection Diagram*



## E.4

### Speech Recording Times

The following is a table of available speech recording times on Verbatim Gateway autodialer.

To find the available amount of speech recording time, first determine the total number of channels on the unit, then find the corresponding row indicating the number of seconds of speech recording time at the various recording rates.

Example: A VPLC-4C-32, has a total of 36 channels (4 contact and 32 plc channels). Therefore the available recording times are 130, 200, 270 or 399 seconds, depending upon which recording rate is selected by the user.

Total# OF Channels	# OF RAM CHIPS	# OF Seconds @ Rate1	# OF Seconds @ Rate2	# OF Seconds @ Rate3	# OF Seconds @ Rate4
1-8	1	26	40	54	79
9-16	2	52	80	108	159
17-24	3	78	120	162	237
25-32	4	104	160	216	318
33-40	5	130	200	270	399
41-48	6	156	240	324	476
49-56	7	182	280	378	555
57 UP	8	208	320	432	624

Recording times may vary +/- 10%.

The above table indicates the recording times that are shipped standard. However on special order, the available recording time can be increased to correspond with any row in the table.

## E.5

### PBX Support

Interfacing the Verbatim Gateway to PBX or PABX phone systems can occasionally present problems. Some PBXs have a non-standard dialtone. Additionally, in many PBXs, you must first press a special key, like a '9' to get an outside line. After pressing the '9' there may be a short delay followed by the dialtone for the outside line.

By turning OFF Phone Fault Detection you can avoid problems with non-standard dialtones from your PBX system. Then Phone Fault Detect will not falsely indicate a telephone line interruption.

Even with Phone Fault Detect OFF you can still accomplish dialtone detection on outside lines. Simply add the Tone Detect key sequence to the phone number string after the '9' or other digit to request an outside line.

### E.5.1

#### Cautionary Notes About Interfacing to PBXs

##### Must Be an Analog Line

Some PBX systems are either partially or entirely digital. That is, voice and signaling information is converted to a digital representation. Voice information arriving at the PBX from the outside is converted from analog to digital. Voice information leaving the PBX to the outside is converted from digital to analog. Phone sets within a digital system may be interfaced by digital signals only. In such systems it may be difficult, but usually not impossible, to obtain a "standard" analog phone line to use in interfacing devices such as a Verbatim Gateway. It may be necessary to contact the vendor of your PBX system for information on addition of analog lines.



##### ***Warning:***

##### **Lines Can Cause Damage**

Caution is advised. Some telephone lines within digital PBXs present voltages which can be dangerous to RACO's equipment. If you are attempting to interface a Verbatim Gateway inside of a PBX it would be a good practice to have the phone line you intend to use checked for "unusual" voltages and signals.

With few exceptions, if you can get a standard telephone set to work on a PBX line then you will be able to make the Verbatim Gateway work as well.

## E.6 Local Alarm Relay Option

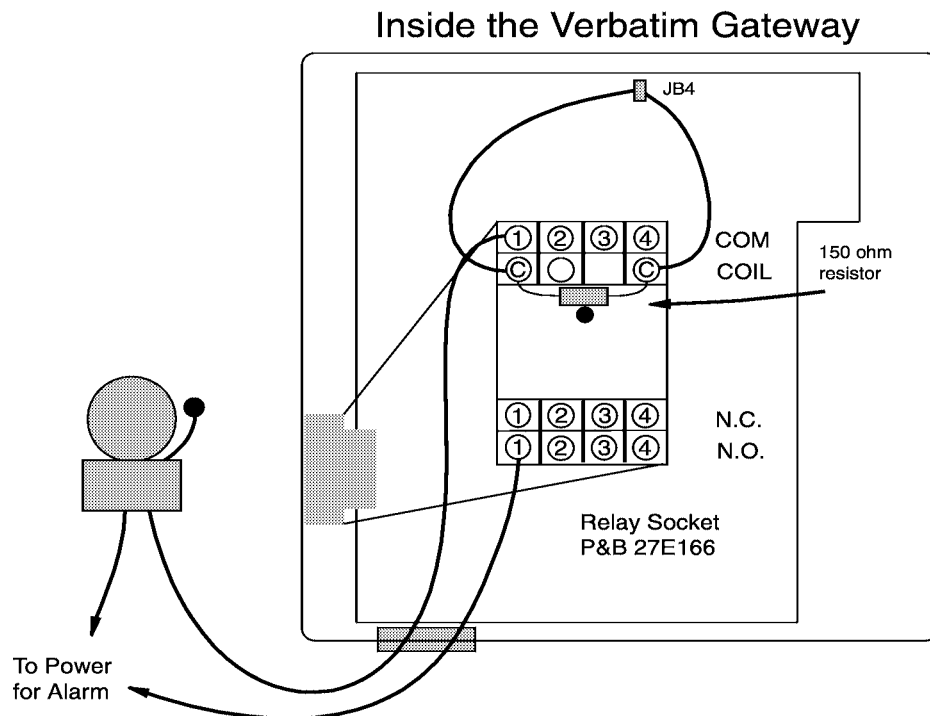
The Verbatim Gateway provides a 5 volt output that is turned on whenever the unit goes into alarm. This is available at JB4, located at the top center of the main board. Use a molex style 2 pin connector to plug onto the JB4 pins. This output can activate a sensitive (500 ohm +) relay such as a Potter & Brumfield KHU-17D11-6). Connect a 150 ohm, 1/4 watt resistor across the relay coil. The Potter & Brumfield relay plugs into a socket (#27E166) which is shown in the accompanying figures. Note that it has four separate circuits in SPDT form. This relay may be used for local alarm, line seizure, or both.

### E.6.1 Local Alarm Configuration

1. Wire the relay coil as described in the introduction.
2. Wire the local alarm to one of the four circuits of the relay. In the illustration, the numbers refer to the four separate circuits, and C refers to the coil terminals.
3. Note that the Verbatim Gateway does not provide the power for the alarm, it functions only as a switch.
4. The program code for Local Alarm Relay configuration is  

```
960 00 ENTER
```

 which is the factory default.



## E.7

### Line Seizure Option

Line Seizure is a feature that ensures that the dialer will seize the phone line when it goes into alarm, cutting off any phones, FAX, or answering machines that may be on line at the time (these are called the *downstream* phones, as they are *downstream* from the Verbatim Gateway). The unit waits two seconds to allow a dial tone to come up, then dials out. These phones will remain cut off until the alarm is acknowledged.

The Verbatim Gateway provides a 5 volt output that is turned on whenever the unit goes into alarm. This is available at JB4, located at the top center of the main board. Use a molex style 2 pin connector to plug onto the JB4 pins. This output can activate a sensitive (500 ohm +) relay such as a Potter & Brumfield KHU-17D11-6. Connect a 150 ohm, 1/4 watt resistor across the relay coil. The Potter & Brumfield relay plugs into a socket (#27E166) which is shown in the accompanying figures. Note that it has four separate circuits in SPDT form. This relay may be used for local alarm, line seizure, or both.

The phone jack must be an RJ-31X, which is available from the phone company or a phone supply outlet. In operation, the Verbatim Gateway plugs into the RJ-31X jack and makes contact with the middle four pins, which are the standard red, green, yellow and black wires.

Note that you may combine the Local Alarm Relay with Line Seizure feature simply by using one of the spare circuits (3 or 4) for the local alarm. It breaks the downstream connections, thereby seizing the line, then waits two seconds to allow a dial tone to come up, then dials out.

**E.7.1****Installation**

1. Wire the relay coil as described in the introduction.
2. Wire the four terminals of the telephone input terminal strip to the relay as follows (please refer to accompanying figures):

<b>Terminal Strip</b>	<b>Relay</b>
R	COM circuit #2
G	COM circuit #1
Y	N.C. circuit #1
B	N.C. circuit #2

3. Wire the special RJ-31X line seizure jack as follows (refer to the accompanying figures):

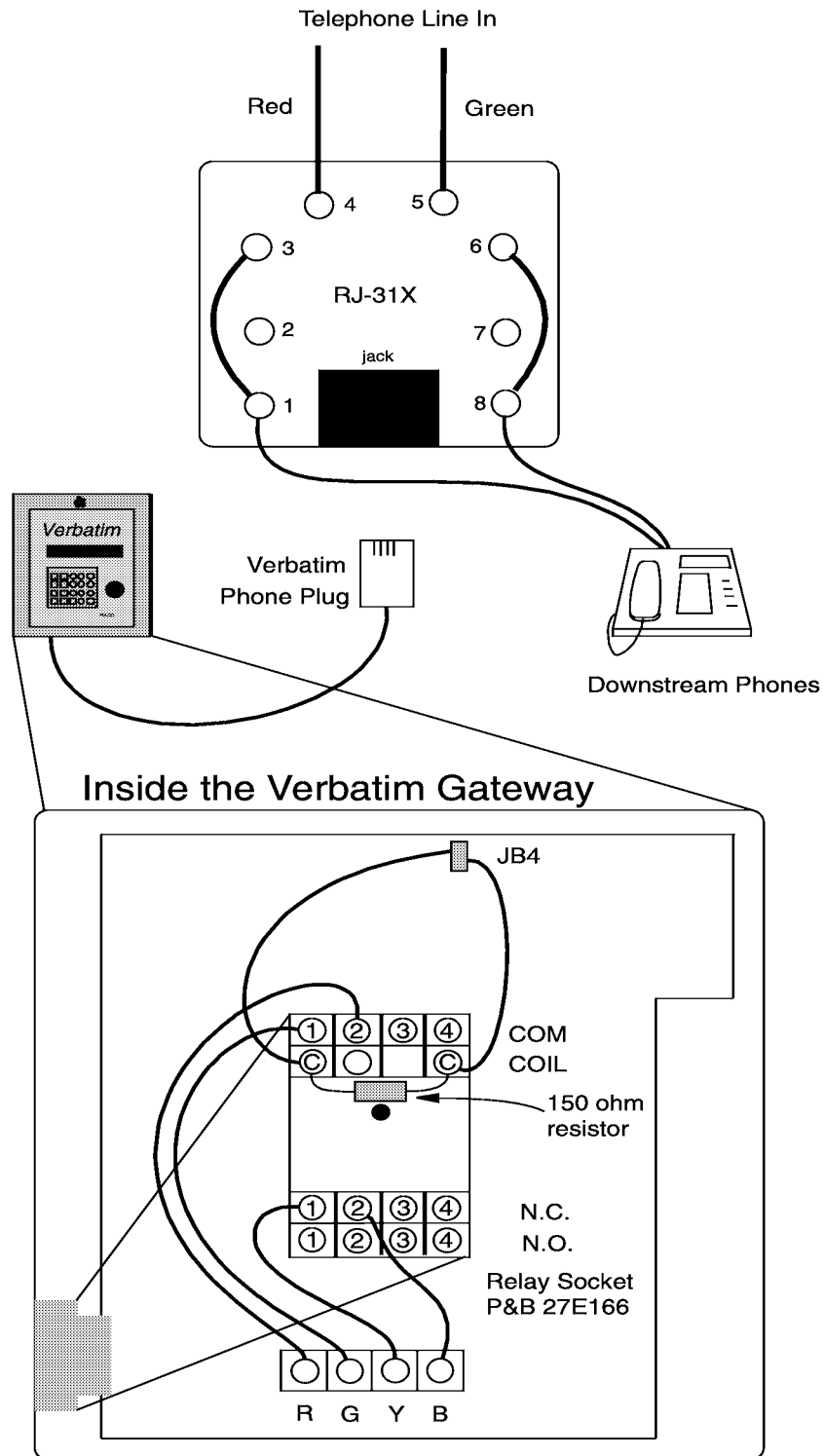
Connect a jumper wire from terminals 1 to 3 and a second jumper wire from terminals 6 to 8.

Connect the incoming telephone line red wire to terminal 4 and the green wire to terminal 5.

Connect the downstream extension phones to terminals 1 and 8.

4. Plug the Verbatim Gateway into the RJ-31X socket.
5. Program the Verbatim Gateway with code:  
960 01 ENTER  
This is the code for Line Seizure configuration of the Local Alarm Relay.

*Wiring the RJ-31X Line Seizure Jack Diagram*





# E.8

## Heater / Thermostat Option

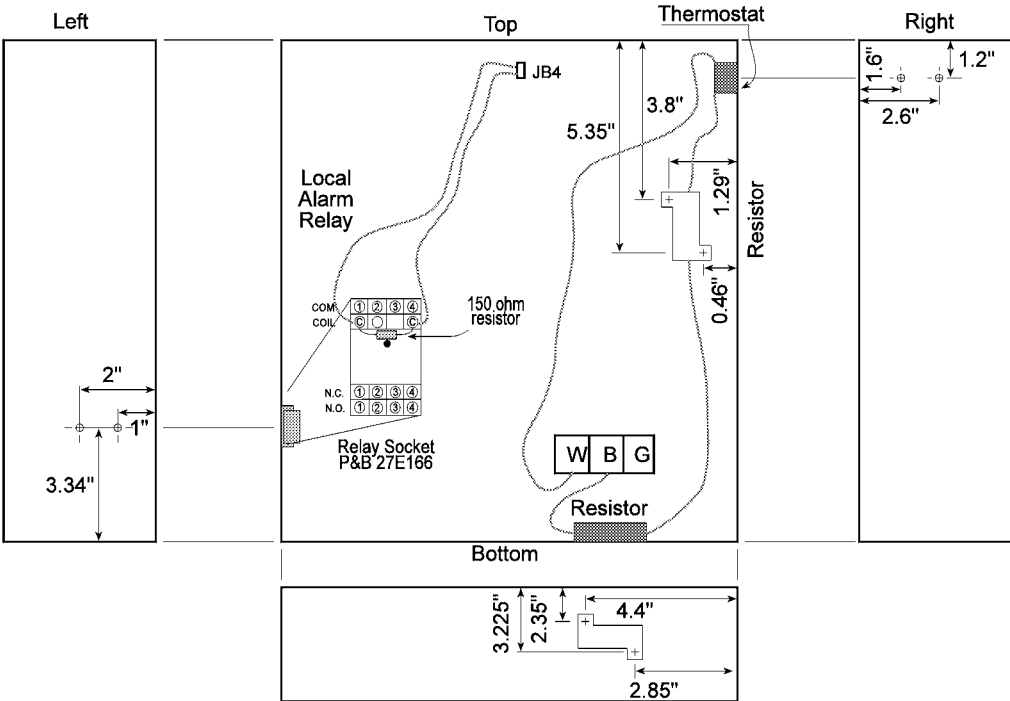
The heater/thermostat option is intended to provide warming of the product when it is exposed to particularly cold ambient temperatures.

The thermostat applies 120 VAC power to two chassis-mounted resistors, when it senses temperatures below approximately 40 degrees F. The resistors dissipate a combined 75 watts of power. The amount of temperature elevation above ambient temperature that this provides depends on the thermal insulation of the enclosure and “heat sinking” into the surface which the unit is mounted to. The unit’s aluminum enclosure provides relatively little thermal insulation by itself. However if RACO’s fiberglass NEMA 4X enclosure option is used, a temperature elevation of about 75 degrees is provided.

If the unit is to be powered by something other than 120 VAC and you need a heater/thermostat, consult factory.

Heater/Thermostat Option	
Power source required	120 VAC
Power dissipated when activated	75 watts
Nominal activation temperature	40 deg F
Nominal heat rise in fiberglass NEMA 4X enclosure	75 deg F

### Mounting and Wiring Diagram for Local Alarm Relay and Heater/Thermostat options on the Verbatim



## E.9

### Connecting to a Radio Transmitter

If you have a radio transmitter that can provides for external connection of an audio signal input and also for connection of an external contact closure to key on the transmitter, you may connect it to the Verbatim Gateway autodialer. However you should also consider the alternative of using RACO's CELLULARM cellular phone system, which provides a superior means of signalling where regular land line phone service is not available.

Note that the radio operation described below is not compatible with installation of the Telephone Line Seizure option.

To obtain the contact closure used to key on the transmitter, it is necessary to solder some special connections on the back of the main circuit board. **This step is not necessary if your unit has been supplied from the factory with the RF Interface option.**

First, disconnect the gel cell battery and remove all AC power connections. Remove any option cards. Then carefully remove the speech card located at the top of the unit, via its two mounting screws. Be careful to retain the plastic spacers located behind these screws, for use when replacing this speech card. Flex the card slightly to clear the two mounting pegs and pull the card straight outward.

Remove the main circuit board by removing the six 6-32 mounting screws. You may also wish to unplug the contact input terminal strips and the ribbon cable which leads to the front panel. Solder a pair of jumper wires to the back of the board as indicated in the Jumper Wires for RF Link Diagram. This step connects the auxiliary contacts of off-hook relay K1, to the Y and B terminals of telephone terminal strip TS2.

Re-assemble the unit and restore any connections which were removed. Be sure that the ribbon cable's connector is accurately and firmly seated.

Connect the Y and B terminals on TS2, to the external keying input of your transmitter. The transmitter will now be keyed on whenever the off-hook relay is activated.

The method of audio connection depends on whether the product is to be connected to a regular phone line in addition to the radio transmitter. If a sensitive microphone input is used, additional attenuation may be required to avoid overloading the audio input.

**If phone line operation is required** in addition to radio operation, establish the audio connection into the transmitter via jack AJ1, as described in the section on EXTERNAL SPEAKER CONNECTIONS.

**If no phone line operation is required**, you may instead remove the phone cord and obtain an isolated 600 ohm, line-level audio signal at the TIP and RING terminals of TS2.

In operation, the transmitter will be keyed on whenever the off-hook relay is activated -- i.e. whenever the product is attempting to place or answer a phone call. Thus, if an ordinary phone line is also used, all phone activity will also be transmitted.

**If no phone line is used**, it will still be necessary to program a "dummy" phone number consisting of a single digit "1", using program code 7 0 1 1. Also, program for touch tone dialing using program code 9 0 1 1. When the unit goes into alarm, it will activate the off-hook relay and therefore the transmitter. Then it will issue the single digit tone, and a few seconds later it will begin the speech message, continuing as it would for a regular phone call. The number of message repeats may be altered if desired, using program code 907.

**If a phone line is also used**, program the appropriate phone numbers as you would ordinarily do. All phone calls will also be transmitted by radio. If you desire to have selected "calls" go out only over the air and not to any real phone number, program the single "dummy" phone number as described above. This single digit will silence the dial tone which would otherwise be broadcast along with the speech message.

Alarm calls will continue until acknowledged, unless the unit is programmed to cease calling when the alarm violation ceases, using program code 9 2 3 2.

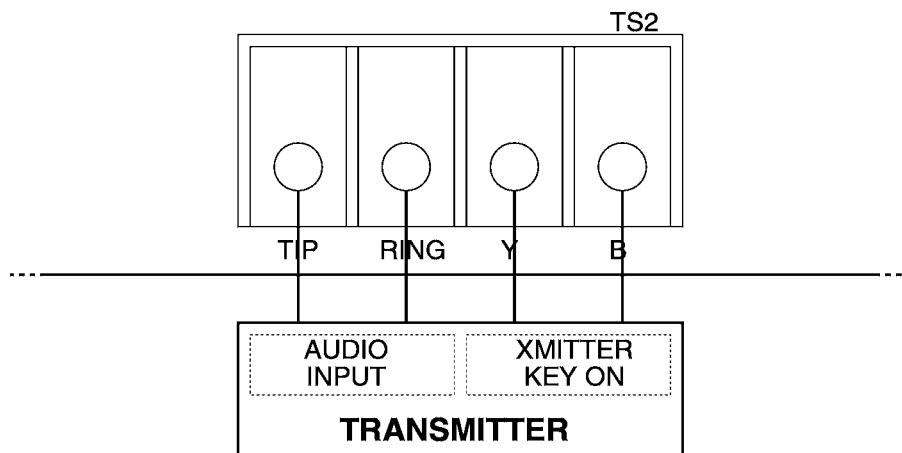
In order to acknowledge alarms, it will be necessary to phone the unit back (if a phone line connection is also being used), or else press one of the keys on the front panel.

If a two-way transceiver is available which includes some kind of tone signalling and detection feature that results in momentary closure of a local relay contact at the autodialer locations, this contact may be used to place inquiry calls to the unit and also to acknowledge alarms, by radio. Contact factory for details.

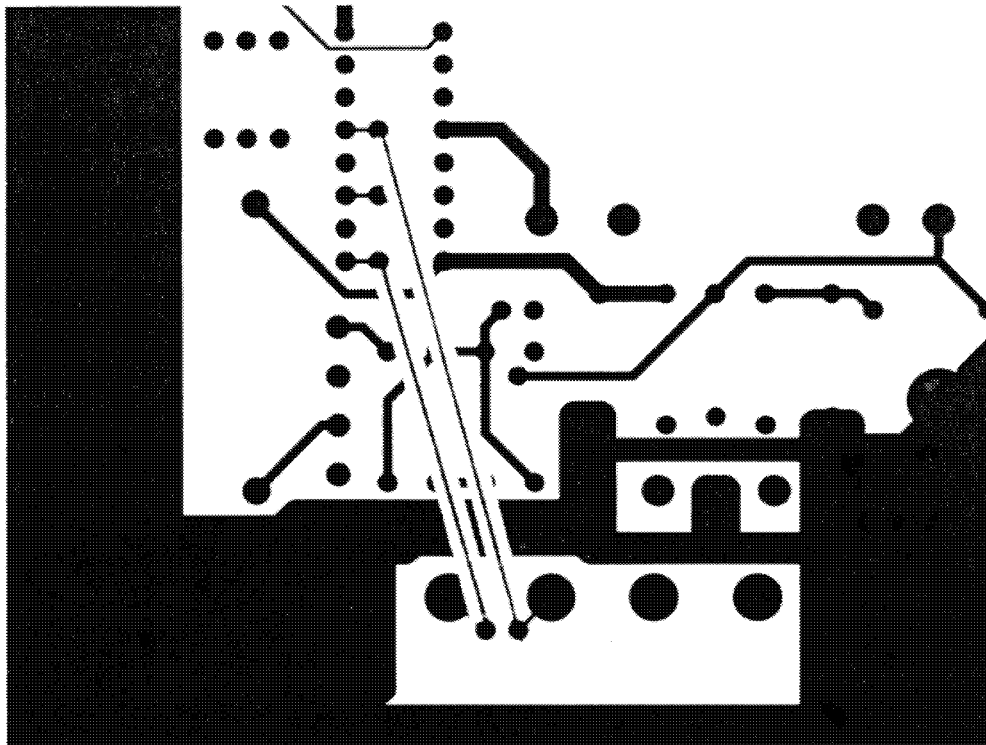
Note that it will not be possible to perform remote programming of the unit with these radio connections.

A CELLULAR cellular system eliminates all such constraints.

*TS2 Connection Diagram*



*Jumper Wires For RF Link Diagram*



## E.10 Calling a Pager

### E.10.1 Introduction

It has become fairly common to have the autodialer call a pager system with an alarm call. The dialer is well equipped to handle many of the current pager protocols, and an overall understanding of the sequence of events will make the required programming go smoother.

Typically, a call to the pager is placed. After a short period (usually 5-12 seconds), the pager answers then gives a beep or a short burst of beeps. This is the signal to begin entering the number you want to be received and displayed by the beeper. When the information is complete, the pager terminal will hang up.



#### **Note:**

RACO strongly recommends that you program other personnel phone numbers at the appropriate place in the dialing list. This is to insure that if for some reason the pager system cannot be activated, you will get a timely warning from your autodialer.

### E.10.2 General Programming Considerations

In most cases, the entire pager calling sequence is handled within the dialing string of the Verbatim Gateway. That is, it is all part of the phone number. The unit will handle up to 60 digits, including any timing delays you insert. The dialer must be programmed for touch tone dialing (program code 9011), as a pager terminal will not recognize pulse dialing.

#### **Numeric Pager Support**

Support for Numeric Pagers is comprised of a number of Verbatim Gateway autodialer features:

- Ability to add delays into a phone number string  
Often needed to pause after dialing the pager system's digits and emitting the caller's ID digits in the phone string.
- Ability to add DTMF # (or DTMF\*) into a phone number string  
Often needed as a terminator character to inform the paging system that the last digit has been entered.
- Ability to add a pause for tone detect anywhere in the phone number string  
Sometimes used to detect the paging system's beep(s) heard after it answers.

- Ability to defeat voice annunciation for a specific phone number  
Often just dialing the pager system and emitting a DTMF ID sequence is sufficient for that phone call. Voice reports only delay the calling of subsequent numbers.
- Ability to add DTMF A, B, C, and D tones to phone number string  
These DTMF characters don't appear on standard telephones and may be used to differentiate automation equipment from humans calling the paging system.

Except for simple delays, entry of these additional digits into a phone number string requires a two key sequence. For example, to enter a '#' character into a phone number string, either at the front panel or over the phone, press the '\*' key followed by the 8 key. This two key sequence will enter the single '#' character into phone number string.

The complete list of special digits is as follows:

Desired Result	User Enters	Voice Speaks
DTMF 'A' in phone string	*1	A
DTMF 'B' in phone string	*2	B
DTMF 'C' in phone string	*3	C
DTMF 'D' in phone string	*4	D
No voice annunciation for this number	*5	PHONE
Pause for tone detect	*6	TONE
DTMF '*' in phone string	*7	STAR
DTMF '#' in phone string	*8	POUND

### Case 1: Simplest Case Pager

The simplest case is when you only have to call the pager and can hang up as soon as it answers, with no information being passed to the pager except that someone called. If you have only one dialer (and no one else uses the number!) you assume that any call from the pager is a Verbatim Gateway alarm call, and proceed from there. Of course, if you had two possible callers, you wouldn't know which one had called.

#### *Example:*

Set the first phone number to call the pager, the second phone number to call the plant foreman. Program 701 9 \*6 1 713 235 3456 ENTER. (here, 701 signifies the first phone number, 9 to get an outside line, \*6 to get an outside line dial tone, 1 713 235 3456 our hypothetical long distance call to a pager, and ENTER to complete the phone number). Program 702 9 \*6 548 7632 ENTER (this is the second phone number, to call the foreman in case the pager call doesn't get through).

## Case 2: Passing a Phone Number to a Pager

Some pager systems will allow the caller to enter a phone number (or other ID number), which is then relayed on to the beeper. When the person with the beeper gets the call, he will know immediately from the number which dialer has called. This is a good system if you are using multiple dialers, or have other pager calls in addition to autodialers.

### *Example:*

Consider the following example of initiating a call to a paging system. We will assume here we don't have to dial 9 to get an outside line for this example. The paging terminal phone number is entered, followed by a CPM wait \*6 to wait for the pager to beep. After that, an ID number is entered. Often the ID number is simply the phone number at the Verbatim Gateway autodialer site.

A # terminator \*8 is inserted. Finally, the characters \*5 are added to designate this phone session as a pager call and not a voice annunciation. Entry of additional delay digits may be required for proper timing of the pager call session.

The phone number string for this example with the first phone number calling a pager, is:

701 2352456 \*6 5481234 \*8 \*5

Program 702 548 7632 ENTER (this is the second phone number, to call the foreman in case the pager call doesn't get through).



### *Exception:*

With some pager systems, Call Progress Monitoring (CPM) on may cause a delay that will not allow the pager message to be transmitted in the time allowed. If this is the case with your paging system, either have CPM in the default off state or, if you want CPM on, time delays can be used in the place of \*6 pause for tone detect. The critical task here is to time the delay from the last digit dialed until the pager beeps. The delay time needed can be determined by using a stopwatch or a clock with a second hand. You want to time this delay to the nearest second, then add 1 second to be sure. Consult the diagram on page E-20 to see the time line of events, then program the dialer.

### *Example 1:*



Delays are added by pressing the MINUS # key on the front panel. Each delay is normally 1 second, but can be programmed (using 928 N) to be any length from 1 to 10 seconds.

We made each delay 2 seconds long by programming code 928 to be 2 seconds for each delay used: program 928 2 ENTER. We then called the pager, and determined the delay between the last digit dialed and the pager beep was 6 seconds.

We programmed our pager phone number: 701 6586713 #### 18007226999 \*8 \*5, where # are delays inserted.

*Example 2:*

In this example we will enter an ID number before entering a phone number into the pager. The pager phone number is 1 713 2352456. The ID number is 7711. The dialer is at 5481234. Calling the pager by hand from the dialer site, we find the following:

- dial pager
- wait for pager to answer (6 seconds)
- pager beep
- enter ID (7711)
- wait for new pager prompt (2 seconds)
- enter dialer phone number (5481234)
- hang up

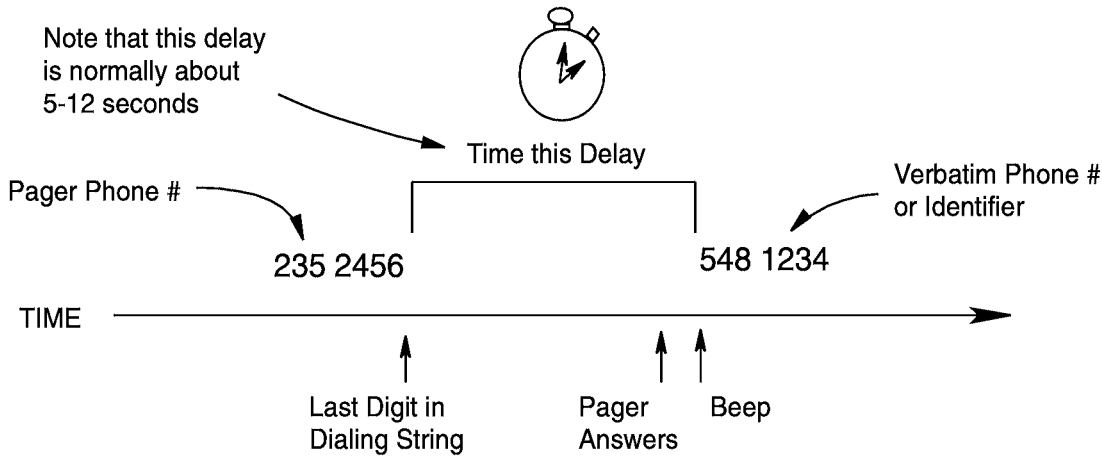
The phone number to enter will look something like:

1 713 235 2456 (delay 1) 7711 (delay 2) 548 1234

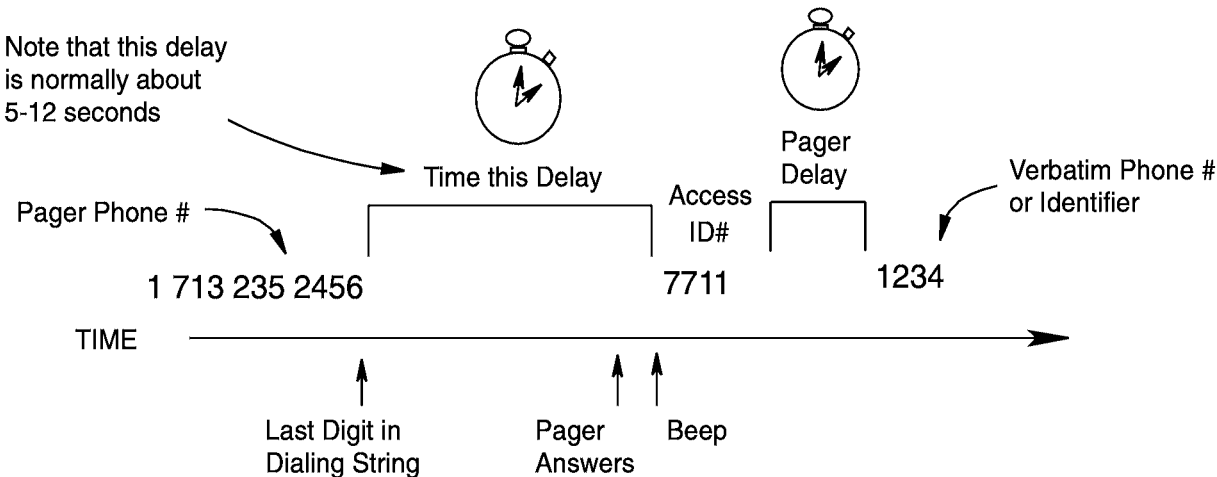
- In our example we programmed Phone #1:  
701 1 713 235 2456 #### 7711 # 548 1234 ENTER  
(Remember that each # represents a 3 second delay).
- and Phone #2:  
702 548 7632 ENTER (our foreman again)



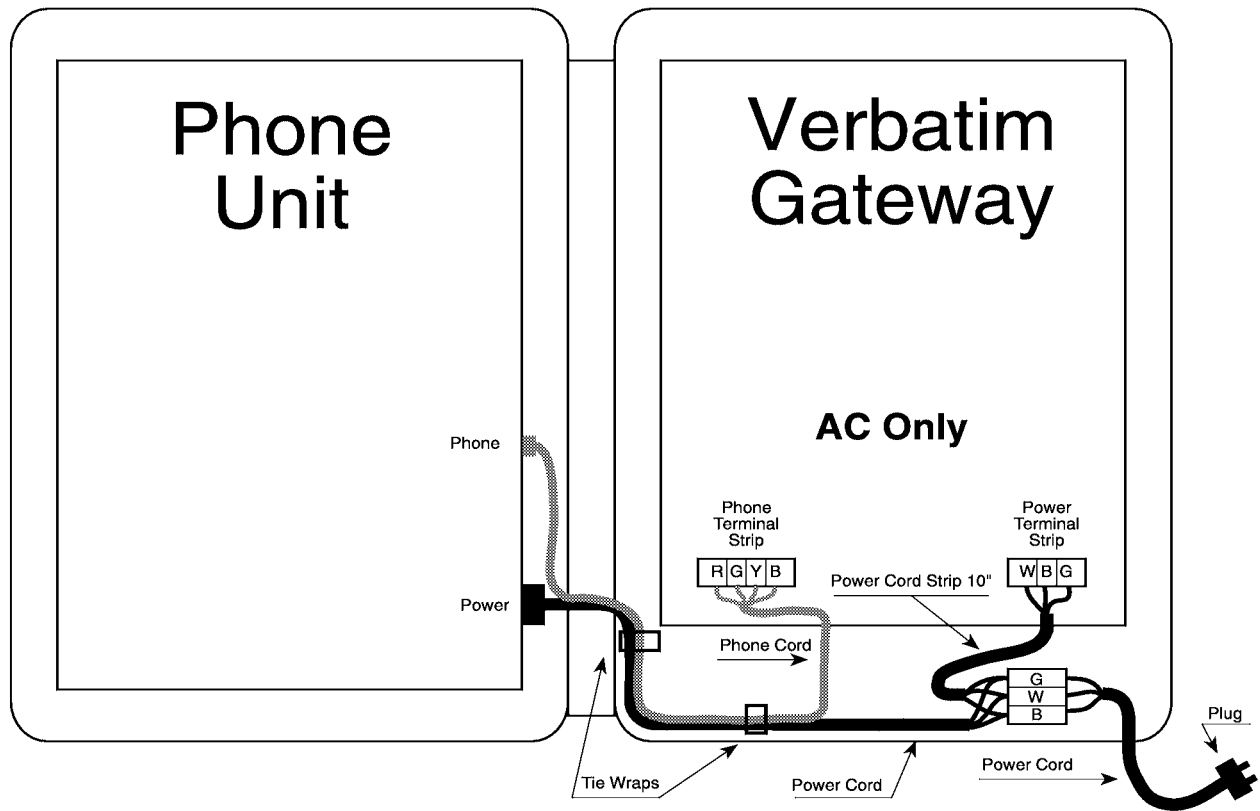
*Case 2: Pager Calling Sequence Using Delays (Example 1)*



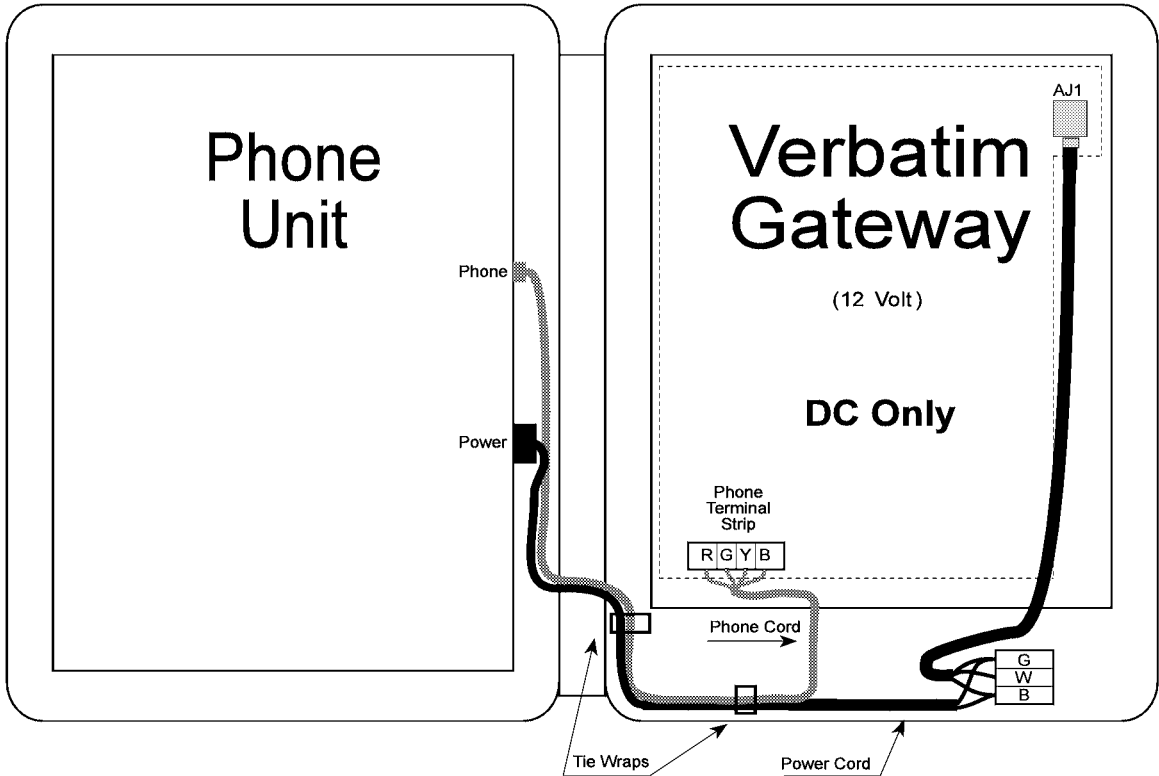
*Case 2: Pager Calling Sequence Using Delays (Example 2)*



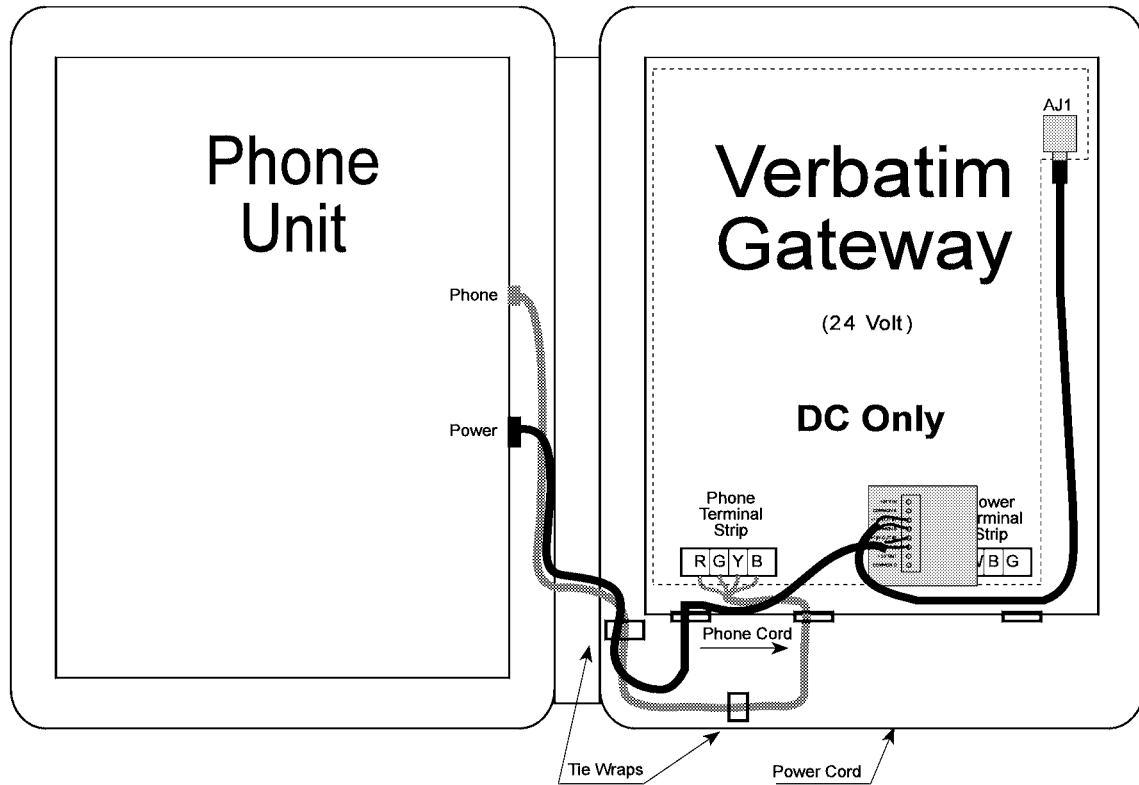
*Cellularm Cellular Communications Diagram (AC Only)*



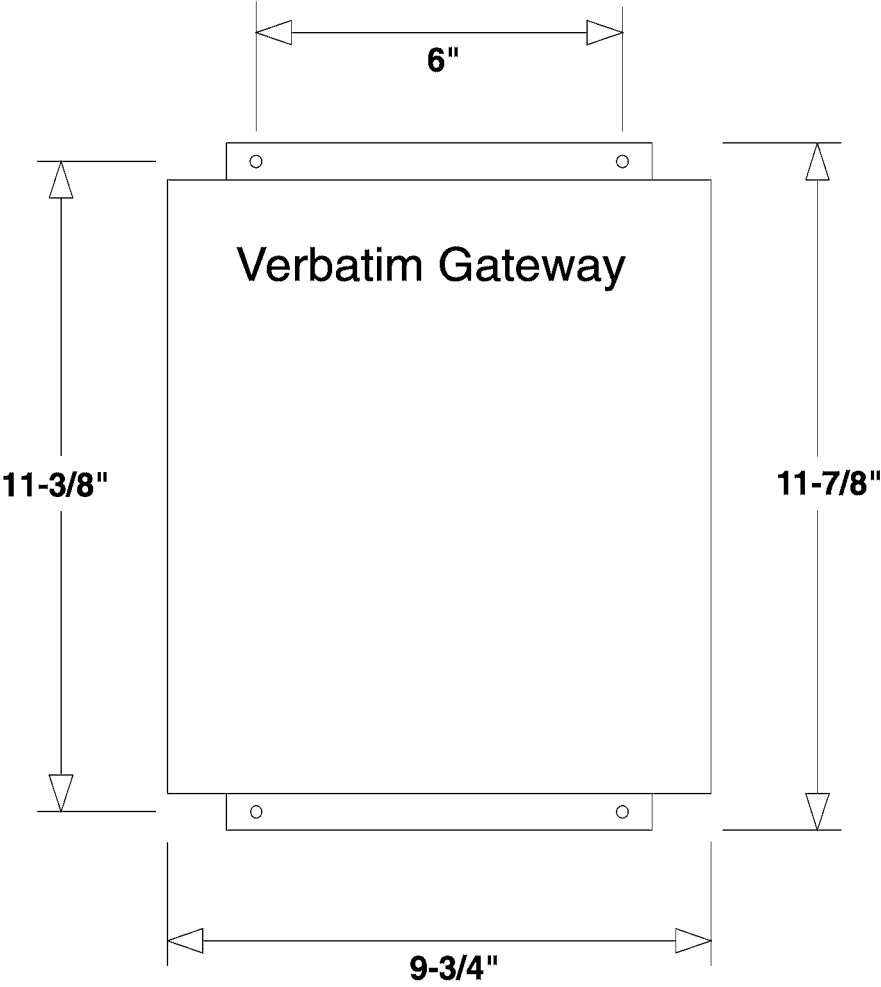
*Cellularm Cellular Communications Diagram (DC Only - 12 Volt)*



*Cellularm Cellular Communications Diagram (DC Only - 24 Volt)*

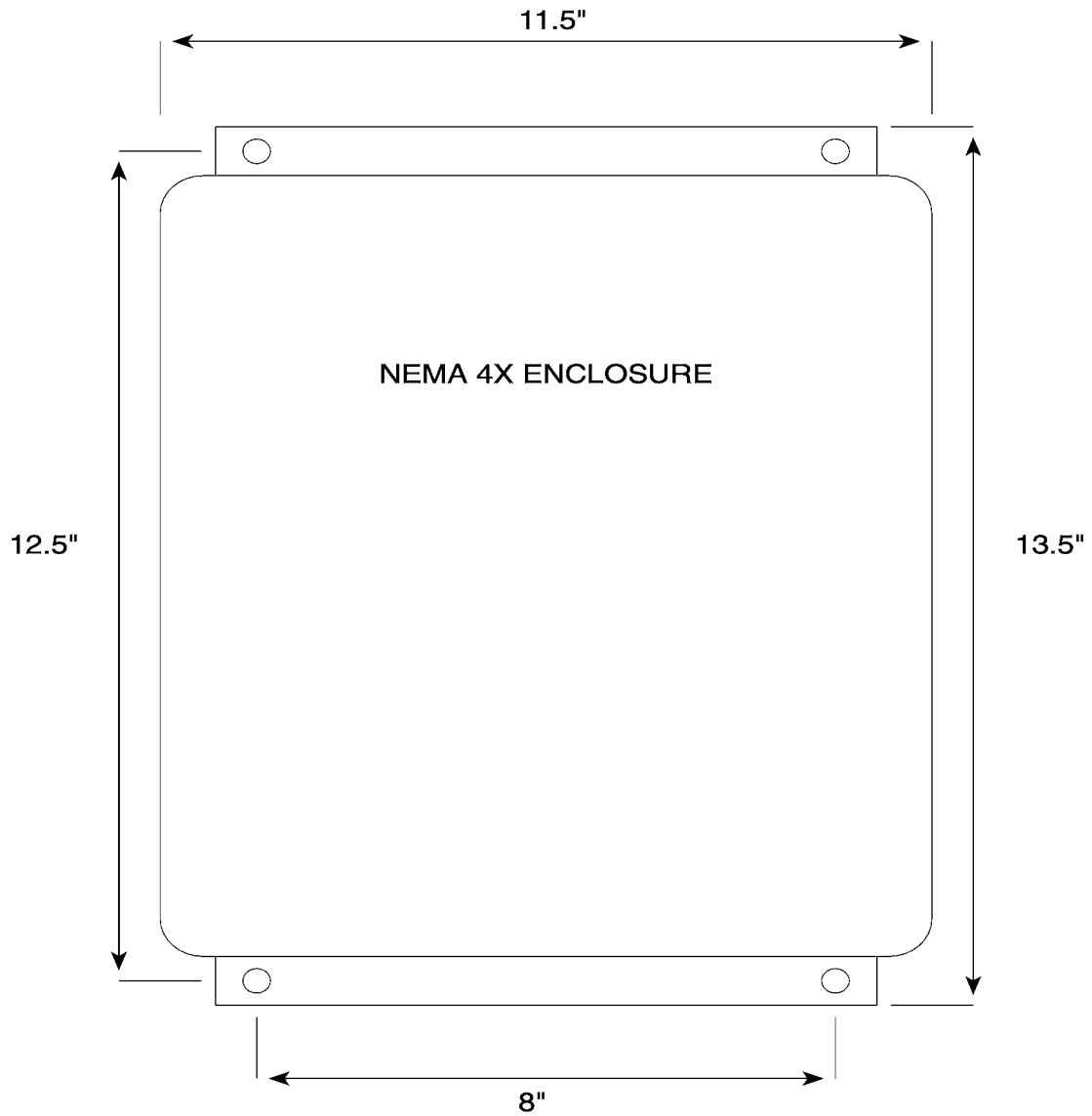


*Verbatim Gateway Enclosure Diagram*



RECTANGULAR MOUNTING CENTERS: 6" W x 11-3/8" H  
OVERALL DIMENSIONS: 9-3/4" W x 11 7/8" H x 5" D

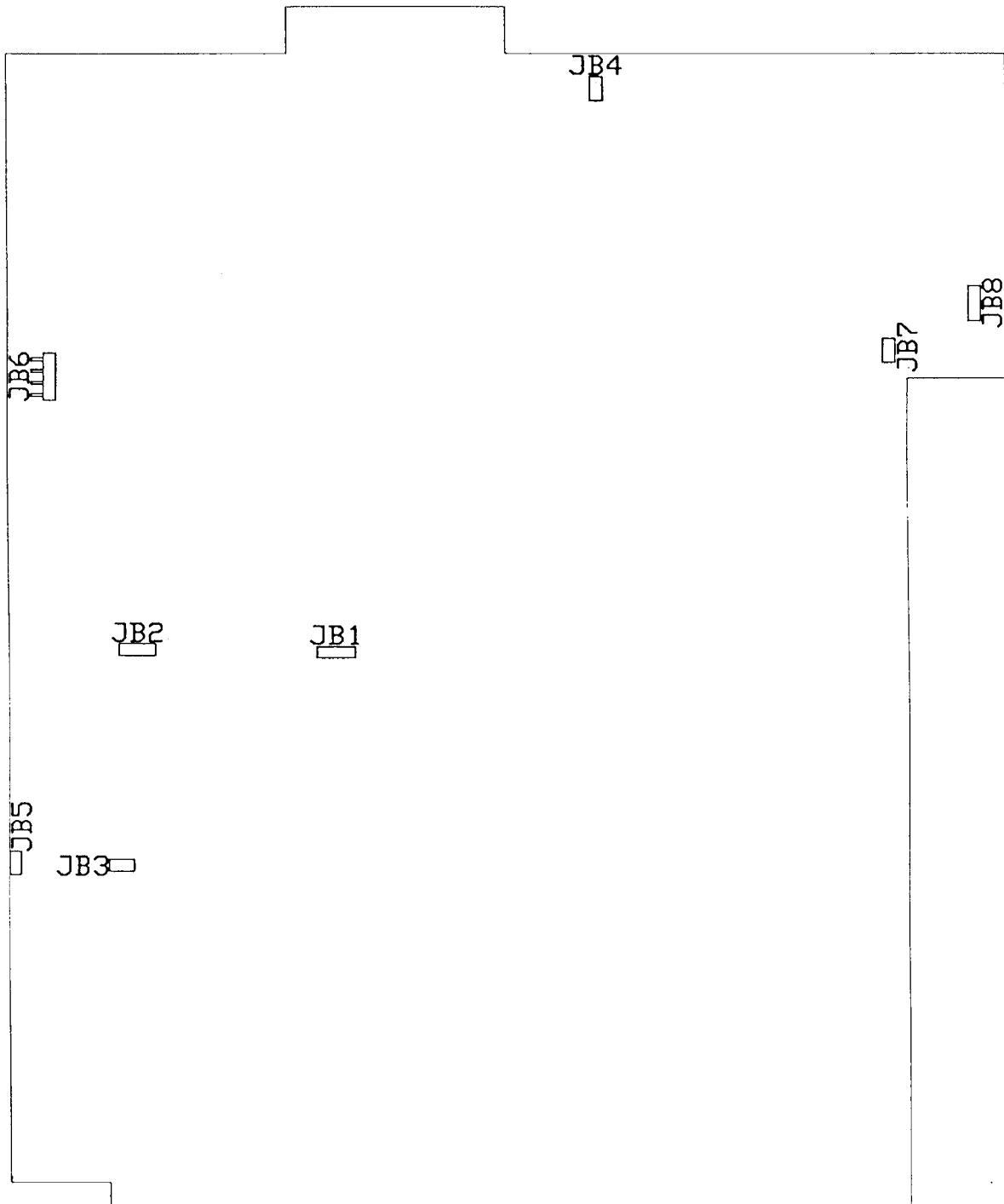
*NEMA 4X Enclosure Diagram*



RECTANGULAR MOUNTING CENTERS: 8" W x 12.5" H  
OVERALL DIMENSIONS 11.5" W x 13.5" H x 5.5" D



*Jumper Block Diagram*





## E.11

# Jumper Configurations

### Main Board VMP-5A

- JB1 - configures sockets U3 and U4 for the size of EPROM chip used.  
 Placement of shorting block:
  - a. left hand two pins- 2 meg EPROMs (for future use)
  - b. right hand two pins- 1meg and 512k EPROMs (factory default)
- JB2 - configures sockets U1 and U2 for the size of RAM chip used.  
 Placement of shorting block:
  - a. left hand two pins- 1 meg or 256k RAMs (factory default)
  - b. right hand two pins- 2 meg RAMs (for future use)
- JB3 - RESET. Short these two pins together for about 2 seconds (a screwdriver works fine) to clear the programming back to factory defaults.
- JB4 - Local Alarm Relay/ Line Seizure Relay output. Upper pin is ground, lower pin supplies 5vdc on alarm to activate the relay.
- JB5 - SYSTEM RESET. Short these two pins together for about two seconds to reset the system hardware.
- JB6 - factory use only
- JB7 - factory use only
- JB8 - configures jack AJ-1 to be either an audio output jack or a 12vdc power input jack.  
 Placement of shorting block:
  - a. upper two pins makes AJ-1 an audio output jack, for using an external speaker or connecting to another audio system.
  - b. lower two pins makes AJ-1 a 12vdc power input jack for powering the unit from an external source.
- JB9 - factory use only

## Speech Board VSPE-2

- JB101 - position of jumper varies with the firmware version  
Placement of shorting block:
  - a. left hand two pins if the firmware version is 2.00 or higher. Speech RAM is to be placed in the board beginning with U103 then U104 and so on up to 8 RAM chips.
  - b. right hand two pins if the firmware version is 1.36 or below. A maximum of two speech RAM may be used. If using just one RAM chip, it goes in socket U104. A second one if used can go in U105 (U103 is skipped).

# F

## Analog Signal Input, Remote Supervisory Control Output, and Printer Options

### F.1

### Analog Connections

Refer to the diagram (page F-10) showing the VAN analog boards for connection of analog inputs. Be sure you follow the indicated positive and negative polarity indications, except in the case of TS705 temperature sensor inputs, for which positive and negative polarity does not matter. Two signal wires are required for each input. The terminal blocks can be unplugged for convenience. Because of the space constraints, it is best to use small gauge wire like telephone wire. If bulkier wire is needed outside the dialer, it is best to install a terminal strip outside the dialer to make the transition from the bulkier wire to the more compact wiring going into the analog input connection points.



#### *Note:*

Take care to route the incoming signal wires to one side of the enclosure or the other so that they do not interfere with the front panel circuit board when the unit's door is closed. Also, try to route the analog signal wires away from power wiring to minimize noise pickup.

#### F.1.1

### Programming for Analog Channels

Each analog input will need to be programmed to specify:

1. The analog Input Signal Type (if other than standard 4-20 ma input).
2. The numerical value to be spoken at a corresponding minimum signal level.
3. The numerical value to be spoken at a corresponding maximum signal level. Items 2 and 3 amount to programming the translating scaling factors for each analog input.
4. In many cases you will also want to program high and low setpoint limits for each analog input.
5. You may also elect to replace the generic default voice message with your own recorded messages for any analog channel, as described in section 4.

**F.1.2****Assignment of Input Channel Numbers**

The unit automatically assigns the lowest channel numbers to whatever number of contact input channels exist on the unit (whether or not you are using them) and the analog channels are assigned channel numbers beginning with the next available number.

For example, the first analog input on a unit with 24 contact inputs and 16 analog inputs would be “channel 25” and the last analog input would be “channel 40”. Note that since the unit’s maximum LED display capacity is a total of 32 channels, on such a unit the final 8 analog channels would not have corresponding LED status indicators on the front panel. Further, note that on units with remote channels, the LED display may group inputs into a single indicator.

It is important that you have correctly determined the channel number assigned for each analog input channel before performing the following programming steps.

**F.1.3****Programming the Input Signal Type**

(You may skip this step if you are using 4-20 ma inputs).

The analog inputs are very flexible and can accommodate a variety of Input Signal Types, but the unit needs to know which type each input is being used for a given analog input. Note that in addition to programming the Input Signal Type, the physical component configurations on the VAN plug-in circuit card must match the Signal Type used. Normally this will have been handled in the process of ordering the unit and will not require additional user attention. If there is any doubt about this, refer to the markings on the rear of the VAN circuit board. If there is still any question, refer to the markings you find and also your unit’s serial number, when contacting the factory.

- ◆ To program the Input Signal Type for input channel ZZ:

5 ZZ 7 N ENTER

where ZZ is the two-digit channel number, and N is a single digit as follows:

- 0 for a 4-to-20 milliamp current loop input. This is the default setting, so if your inputs are 4-20 milliamp current loops, you may skip this step.
- 1 for 0 to 1 volt DC signal input. In the case of larger signal levels, such as 0 to 10 volts DC, the hardware input circuitry on the VAN card will have been factory configured to pre-scale the signal to a range within 0 to 1 volt DC, and corresponding special scaling information will be provided to fit the particular application.

- 2 for a RACO Temperature Sensor input (sensor model TS705A), used to measure temperatures from -20 to +120 degrees F.
- 3 for additional types of special custom-specified signals.

Summary of Codes for Input Signal Type	
0 (default)	4-20 ma current loop
1	0-1 volt DC
2	RACO temperature sensor
3	Other special inputs

## F.1.4

### Programming the Scaling and Offset Factors

This set of steps is not necessary for inputs using a RACO Temperature Sensor, since these values will be automatically inserted if the parameter 2 is selected in the above step.

In the above step, accepting the default parameter of 0 for 4-20 milliamp inputs automatically provides for a spoken reading of 0.0 percent for the minimum (4 ma) signal input value, and 100.0 percent for the maximum (20 ma) signal, until you enter different factors.

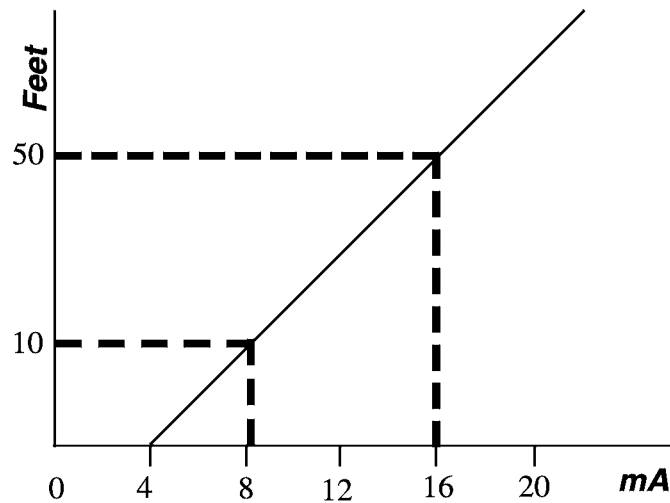
In most cases, you will want to program the unit to give spoken reports in terms of the actual physical variables being monitored, such as water level in feet, etc. In general, you will need to determine the desired spoken numerical values corresponding to two widely separated (low end and high end) signal input values. Often this will be available from the overall system specifications. In other cases, this will be determined (or revised) based on actual on-the-spot observations. The Verbatim Gateway autodialer offers the unique option of entering this scaling information based either on your particular system specifications (the System Specification method) or else on your real world observations (the Real World Method). Also, scaling information which you may have originally entered based on your system specifications may later be easily “fine tuned” based on real world observation.

In addition, you may wish to record your own identifying message to replace the default message, as described in the message recording section of the manual.

**F.1.4.1****Additional Perspective on Scaling Factors****Analog Math**

It may be useful, in comprehending the process of establishing the scaling factors, to visualize a graph which relates the water level in a tank to the input from a 4-20 ma transducer. To establish the relationship on such a graph, it is necessary to define two separate points, or coordinate pairs ideally at two widely separated points on the graph. For such a linear relationship any point on the “reading” (Y) may be calculated from the formula:

$$y = mx + b$$



where  $m$  is the gain and  $b$  is the zero crossing point or Input (ma  $\rightarrow$  offset). The gain may be calculated from:  $m = (y_2 - y_1) / (x_2 - x_1)$

where  $x_1, y_1$  is one coordinate pair on the graph and  $x_2, y_2$  is the other.

Therefore, when you have chosen to enter non-default coordinates you are in fact setting the gain factor. This gain factor is taken along with the input signal type you have chosen which will define both the gain and offset.

Notice that each of the two points requires two separate coordinate pieces of information to define: the signal level and the corresponding water level. With two such points defined, an entire line or linear equation is defined, so that given any new signal level, we could use the graph to “look up” the corresponding water level. In operation, the Verbatim Gateway autodialer measures the signal level presented to it, and then calculates the corresponding physical value, all based on the line or linear equation defined by your entry of the high end and low end scaling information whether done by the System Specification Method or the Real World Method.

Be sure that the correct Input Signal Type setting is entered as described above, because changing the Signal Type setting will overwrite the programming described next.

#### F.1.4.2

### System Specification Method of Programming Scaling Factors

*The following four codes must be entered to invoke scaling:*

- ◆ For the low-end portion of the data for channel ZZ, enter the following pair of codes:

```
5 ZZ 1 X.XXXX ENTER
```

where X.XXXX is the low input signal value chosen, within the bounds of input signal type.

```
5 ZZ 2 YYYYY.YYYY ENTER
```

where YYYYY.YYYY is the desired spoken numerical value

- ◆ Then to complete the scaling factors for this channel, enter the following pair of codes for the high-end portion of the data:

```
5 ZZ 3 X.XXXX ENTER
```

or

```
5 ZZ 3 POINT ENTER
```

for the high-end signal value

```
5 ZZ 4 YYYYY.YYYY
```

for the high-end corresponding spoken value



#### **Note:**

For all analog value entries you may enter up to four digits before an optional decimal point, and up to four digits after, but simple entries (such as -20, 3.45, 500, 4, etc.) work as well.

#### F.1.4.3

### Alternative Real World Method of Programming Scaling Factors

If the system specifications for the scaling factors are not known, or if you wish to adjust a previous entry to reflect real-world as opposed to system specification conditions, wait until the input signal or the physical variable happens to be near the low end of the scale. Enter the following pair of codes:

```
5 ZZ 1 POINT ENTER
```

which will automatically accept the present moment signal value as the low input signal value, rather than having to enter the value shown as X.XXXX above. Then, enter:

```
5 ZZ 2 YYYY.YYYY ENTER
```

where YYYY.YYYY is the corresponding low-end physical value which you observe in real-world terms.

At another time, when the signal or physical variable is toward the high end of the scale, enter the following pair of codes:

```
5 ZZ 3 POINT ENTER
```

which accepts the present signal level as corresponding to the high-end physical value which you enter as:

```
5 ZZ 4 YYYY.YYYY ENTER
```

### ***Example:***

It may already be known from your system's specification that for channel 6, a low-end signal of 4 milliamps corresponds to a desired spoken value of 34.5 feet of tank water level. In such a case, you would use the System Specifications Method to enter:

- ◆ for 4 milliamps

```
5 06 1 4 ENTER
```

- ◆ for a spoken reading of 20.5

```
5 06 2 20.5 ENTER
```

- ◆ for 20 milliamps

```
5 06 3 20 ENTER
```

- ◆ for a spoken reading of 34.6

```
5 06 4 34.6 ENTER
```

Then, suppose with the system in operation, you observe that the tank level is 31.7 feet, but the Verbatim Gateway reports a value of 31.45 feet. The discrepancy will most likely be due to a discrepancy of the sensor's actual output versus the theoretical system specification. Regardless, to correct for it, keeping in mind that the signal is presently near the high end of the scale, you would use the Real-World Method, entering:

- ◆ To reference the present signal level

```
5 06 3 POINT ENTER
```

- ◆ To recalibrate 31.7 as the corresponding spoken value

```
5 06 4 31.7 ENTER
```



Continue the example, there might also be a discrepancy toward the low end of the scale. Suppose on another day you observe a tank level of 22.5 feet but the Verbatim Gateway report 2293 feet. Since this signal is at the low end of the range, you would enter:

```
5 06 1 POINT ENTER
```

and

```
5 06 2 22.5 ENTER
```



**Note:**

These Real-World Method adjustments did not require you to measure any actual signal levels!

From that time on, assuming that the sensor maintains its calibration and has a linear output, the spoken value should track the actual value very closely. The Verbatim Gateway itself is much more accurate and consistent than almost any sensor available to connect to it. Note that the signal does not need to be exactly at the end of its range (e.g. 4 ma or 20 ma) for these programming steps.

However, in general the wider the spread between the signal levels used, the better informed the Verbatim will be to reflect the actual relationship between the sensor's output and the real value being measured.



**Note:**

While the unit reports with very high accuracy and resolution, you do not need to enter your programming value to the same high degree of accuracy unless you choose to.

#### F.1.4.4

#### For TS705 Temperature Sensor Inputs

Selecting signal type “2” (TS705 sensor) will automatically load scaling factors as describe earlier. However, these automatically loaded scaling factors are not adjustable. If you want to be able to do Real World calibration adjustments for temperature sensor inputs, then instead of selecting sensor type “2”, select sensor type “1” (0-1 VDC input) and enter scaling factors as follows:

```
5 ZZ 7 1 ENTER (Selects signal type 1)
```

```
5 ZZ 1 .843 ENTER
```

```
5 ZZ 2 -19.8 ENTER
```

```
5 ZZ 3 .316 ENTER
```

```
5 ZZ 4 120.1 ENTER
```

This gives the same scaling factors as would otherwise automatically result from selecting signal type 2, but it allows for subsequent adjustments using the Real-World adjustment method.

## F.1.5

### Programming High and Low Analog Setpoints

You should first enter the gain, offset and scaling factor programming described above before entering setpoints. Later, if you adjust the factors as described above, you may also need to adjust the setpoints correspondingly. Changing setpoint values after scaling is set could cause changes in the scaling values.

- ◆ To program a low limit setpoint for channel ZZ, use code:

```
5 ZZ 5 X.XX ENTER
```



#### *Note:*

X.XX is the desired setpoint in terms of spoken units, rather than in terms of the signal value. You do not need to enter all four possible leading and trailing digits. Simple entries like 7 and 3.68 work as well.

- ◆ To program a high limit setpoint for channel ZZ, use code:

```
5 ZZ 6 X.XX ENTER
```

Thereafter, whenever the measured value exceeds the setpoint for a continuous period exceeding the alarm trip delay, the unit will go into unacknowledged alarm and begin dialing to report the specific violation, also reporting the current measured value. As with contact inputs, if the input is no longer in violation at the moment of the report, the phrase “Now Normal” will be appended to that channel's report.

- ◆ To check an existing setpoint value, use the above codes but omit the value (X.XX).
- ◆ To turn off (completely disable) an unused analog channel so that it will not be included in status report, enter code:

```
5 ZZ 0 ENTER
```

where ZZ is the 2-digit channel number.

- ◆ To turn the channel on again, you must enter some high or low setpoint value for that channel.
- ◆ To turn off (disable) a high or low analog setpoint, while still leaving the channel able to report readings, enter a setpoint value of -0 for that particular setpoint. If you try to enter a setpoint value outside a wide signal range, the Verbatim Gateway will say “Error in number.”



### Note

The scanning time required by the unit to check all analog readings against established setpoints increases with the number analog channels. With 16 channels, the time can total on the order of one second, and this imposes a limit on how fast the unit can detect analog setpoint violations. Normally, this will not be noticed unless you set Alarm Trip Delays of less than two seconds, and there is no effect on the trip delay for contact channels in any case.

**Analog values are reported as 5 significant figures.**

Refer to the following section for recording the corresponding voice messages other than the spoken numerical values.

## F.1.6

### Summary of Analog Programming Codes

Code	Description
<b>Signal Type:</b>	
5 ZZ 7 N	Select input signal type. 0 is default for 4-20 ma
<b>Scaling:</b>	
5 ZZ 1 X.XX or POINT	Low end signal value
5 ZZ 2 YYYY.YYYY	Corresponding low end spoken value
5 ZZ 3 X.XX or POINT	High end signal value
5 ZZ 4 YYYY.YYYY	Corresponding high end spoken value
<b>Setpoints:</b>	
5 ZZ 5 X.XX	Low alarm limit setpoint
5 ZZ 6 X.XX	High alarm limit setpoint
5 ZZ 5(6) -0	Disable low (high) setpoint
<b>Disable Channel:</b>	
5 ZZ 0	Turn off (disable) channel ZZ

## F.1.7

### Recording Speech Messages for Analog Channels

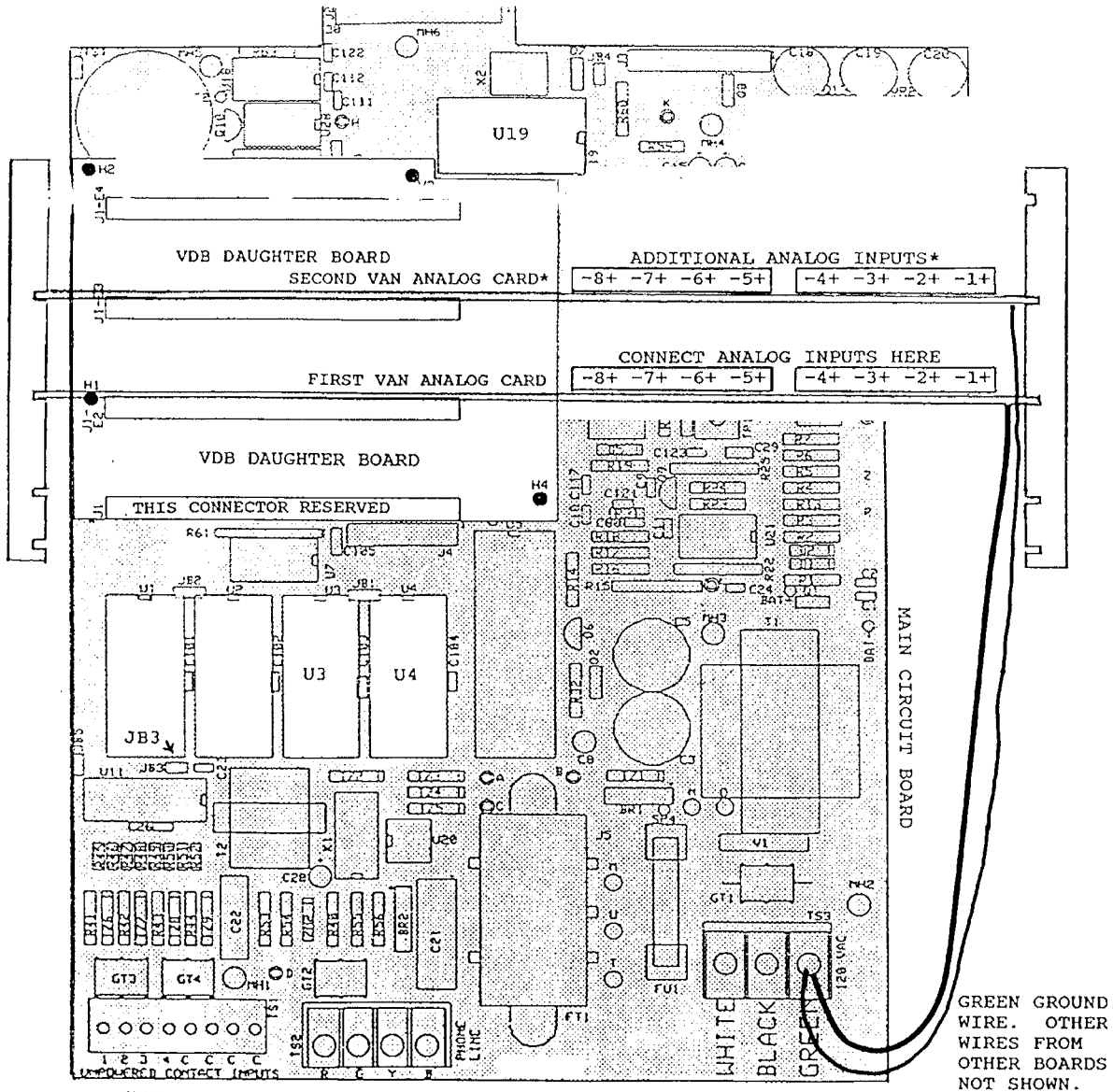
This information supplements the basic information in the manual on recording speech messages. Refer to that information before attempting to record any speech messages.

**For analog input channels**, the default message is “The present channel N reading is ...”

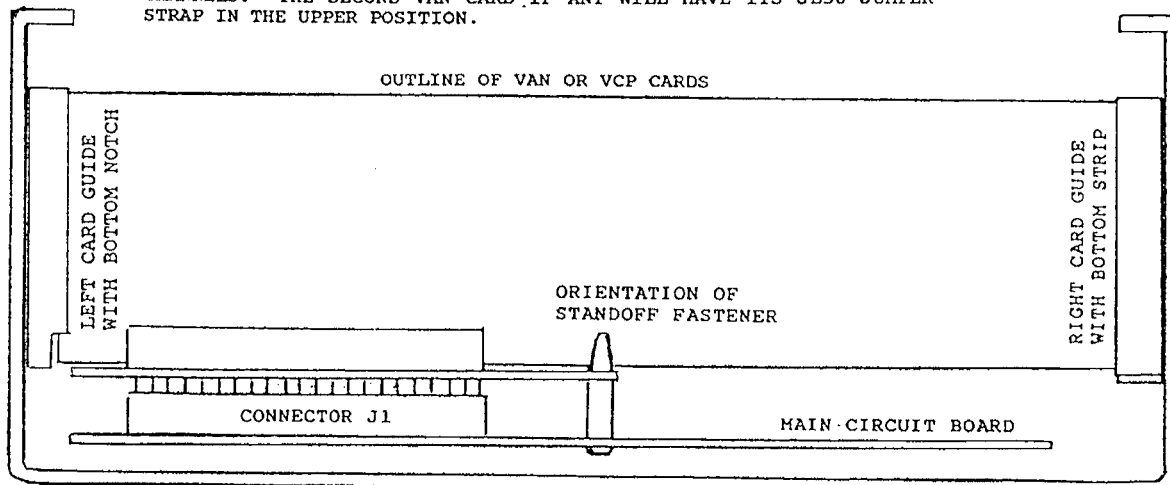
**For any analog inputs**, in place of the default messages you may plan to record a preamble message of the general form “The total water flow in gallons is” or “the main tank water level in feet is.”

Use program code 1 ZZ to record the analog preamble message.

# Analog Option Card Installation Diagram



\*UNITS EQUIPPED FOR 16 ANALOG CHANNELS WILL REQUIRE 2 VAN CARDS. THE SECOND (UPPER) CARD WILL BE FOR THE HIGHER NUMBERED ANALOG CHANNELS. THE SECOND VAN CARD IF ANY WILL HAVE ITS JB50 JUMPER STRAP IN THE UPPER POSITION.



### **F.1.8 If Analog Inputs Do Not Work Correctly**

Recheck programming settings, especially the Input Signal Type setting. Verify that the polarity of your input connections is correct.

In the case of 4-20 ma input, does the spoken value always reflect a 0 ma signal level? If so, the problem is presumably with the connection or the signal source. Use a DC meter to verify that both sides of the offending input are within 10 VDC of ground. A 4-20 ma current loop input should give a meter reading of about .07 volt per milliamp of current as measured across the two signal input terminals.

Are other instruments included in the same current loop? If they read correctly, temporarily disconnect the input to the Verbatim Gateway autodialer. This should throw the readings of the instruments off scale. If there is no such effect, your wiring is not including the Verbatim autodialer in the loop. Verify that the type of signal source agrees with the physical configuration on the VAN card according to the marking on the back of the card.

## **F.2 Remote Supervisory Control (VRSC) Output Installation and Operation Instructions**

This option allows you to turn connected equipment on and off from any remote Touch Tone telephone, or from an non-Touch Tone telephone with the use of a portable tone generator. Option VRSC-4 provides 4 outputs, VRSC-8 provides 8 outputs. The unit's voice guides and confirms your operations. Advanced features such as programmable length momentary activations are included. Control operations may also be performed from the unit's keyboard.

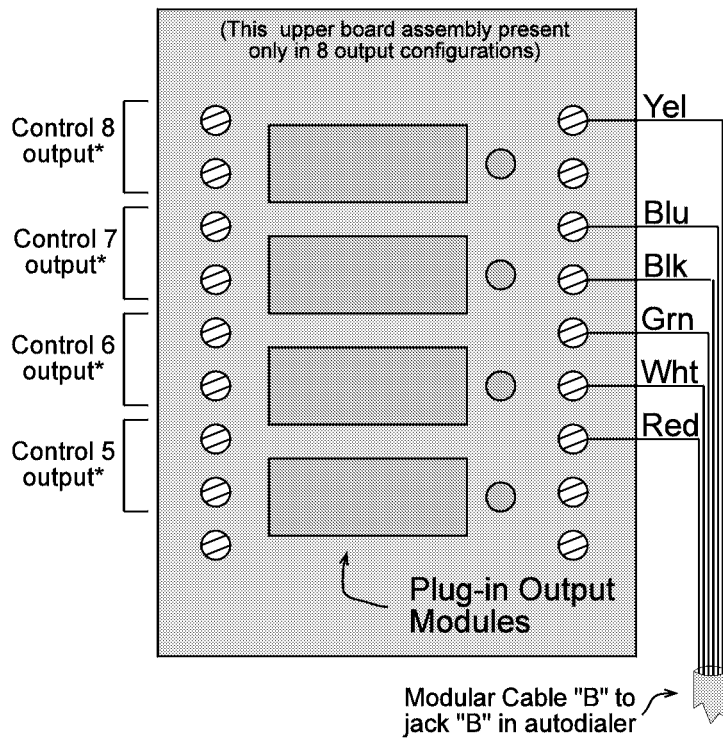
Connections are normally made by means of optically isolated solid state relays housed in a separate Output Relay Enclosure which requires its own 120 VAC power connection. In some situations, the user may choose to make connections directly to the transition outputs within the main unit.

If your unit was not originally equipped with this option, refer to the separate instructions for adding this option.

### **F.2.1 Mounting and Wiring Connections for Remote Supervisory Control**

If you are using the separate Output Relay Enclosure normally supplied with this option, mount the enclosure within 3 feet of the Verbatim autodialer, and make your output connections to the left hand row of terminal strip points within the separate enclosure, as shown in the diagram of the VRSC Output

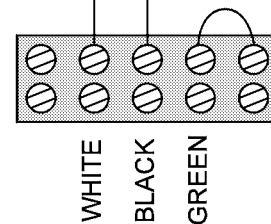
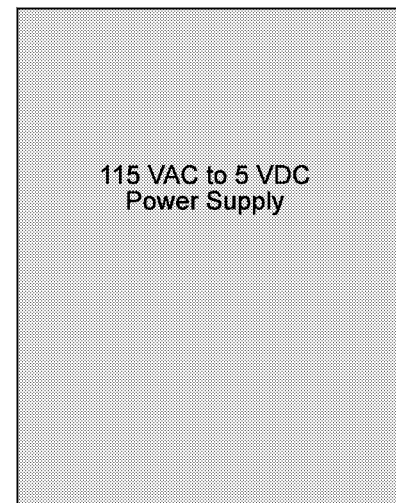
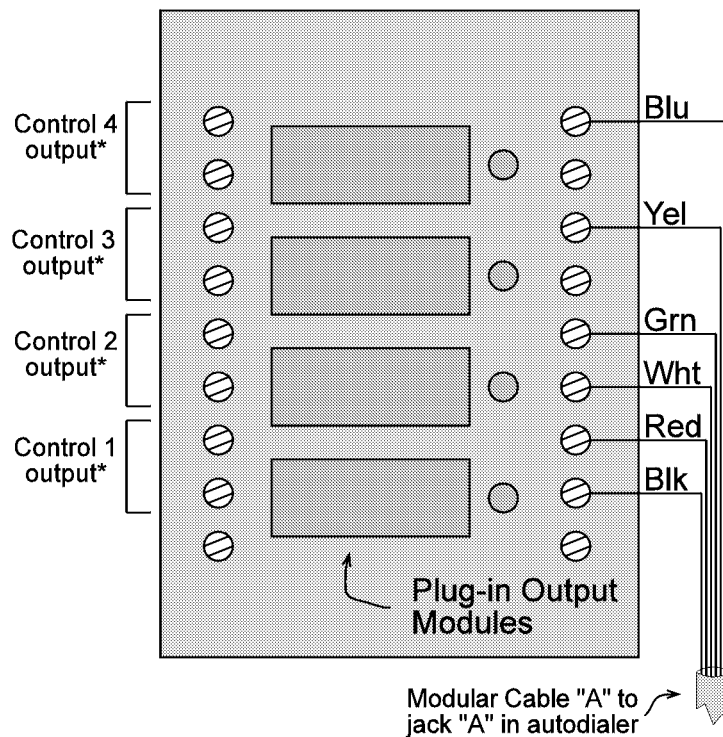
*RSC Supervisory Remote Control Output Box Diagram*



**OUTPUT MODULE TYPES:**

OAC5	12 to 140 VAC, 2 amps
OAC5A	24 to 280 VAC, 2 amps
ODC5	5 to 60 VDC, 2 amps
ODC5A	5 to 200 VDC, 0.67 amps
ORR5	Reed Relay Output

\* If DC output modules are used, the lower terminal is the positive terminal, for each control output.



Connect 120VAC here

Relay Enclosure. Be sure that the correct type of plug-in Opto 22 relays are in place. The available types are:

Type	Value
OAC5	12 to 140 VAC, 2 amps
OAC5A	24 to 280 VAC, 2 amps
OAC5A5	120/240 volt AC, Normally Closed
ODC5	5 to 60 VDC, 2 amps
ODC5A	5 to 200 VDC, 2 amps
ORR 5	Reed relay dry contact output

Unless ordered otherwise, type OAC5 is normally provided from the factory. Connect 120 VAC power as shown on this same diagram. Route modular “Cable A” through one of the entrance holes on the bottom of the Verbatim autodialer, and plug it into J301 (the right-hand jack on the VCP circuit card, see diagram). The 8-output VRSC-8 option also includes a second modular “Cable B”, connect this to the adjacent jack J302 on the VCP circuit card. Avoid routing these cables alongside power wiring and route them so that the front panel circuit board does not pinch them when the door is closed.

## F.2.2

### Optional Direct Connection Without Use of Output Relay Enclosure

The outputs on the VCP circuit card are NPN transistor open collectors capable of switching up to 12 volts DC at up to 500 ma, and thus these outputs may in some cases be connected directly to logic inputs of logic controllers, etc, although external pullup resistors may be required. Consult RACO for details. The color codes for VRSC cables “A” and “B” are:

Cable	Color Code
<i>Cable A</i>	
Common Return	Black
Output # 1	Red
Output # 2	Green
Output # 3	Yellow
Output # 4	Blue
<i>Cable B</i>	
Output # 5	Red
Output # 6	Green
Output # 7	Blue
Output # 8	Yellow

**F.2.3****Remote Supervisory Control Operation**

- ◆ To check the on/off status of output # N, use program code  
`9 5 N ENTER`  
 where N is a 2 DIGIT output number (e.g. 01 for output # 1).
- ◆ To turn output # N ON, use program code  
`9 5 N 1 ENTER`
- ◆ To turn output # N OFF, use program code  
`9 5 N 0 ENTER`
- ◆ To turn output # N on for a specific number of seconds, use code  
`9 5 N 2 XXXXX ENTER`  
 where XXXXX is the desired number of seconds, from 1 to 99999.
- ◆ To turn output # N off for a specific number of seconds, use code  
`9 5 N 3 XXXXX ENTER`  
 where XXXXX is the desired number of seconds, from 1 to 99999.
- ◆ To establish a default pulse time duration in seconds for a given output N (2 digits), use code  
`9 5 N 9 XXXXX ENTER`  
 where XXXXX is 1 to 99999 seconds.
- ◆ Alternatively, to establish a default pulse time duration in minutes, for individual output N (2 digits), use code  
`9 5 N 8 XXXX ENTER`  
 where XXXX is 1 to 1666 minutes.  
  
 Then you may use code 9 5 N 2 (or 3) without need to enter the digits. The unit will use the pre-stored value for that output's pulse length.
- ◆ To hear a report of the on/off status of ALL outputs in one operation, use program code  
`9 5 0 0 ENTER`
- ◆ To turn ALL outputs OFF in one operation, use code  
`9 5 0 0 0 ENTER`
- ◆ To turn ALL outputs ON in one operation, use code  
`9 5 0 0 1 ENTER`



- ◆ To establish a default pulse time duration for ALL outputs in one operation, use code

9 5 0 0 8 XXXX (XXXX = 1 to 1666 minutes)

or

9 5 0 0 9 XXXXX (XXXXX = 1 to 99999 seconds)



### **Warning:**

Because the devices under control would not normally be operational during AC power failures, the Output Relay Enclosure does not include battery backup for the output relays during AC power failures. Upon restoration of AC power, the outputs will return to the state dictated by the Verbatim autodialer.

When the Verbatim autodialer itself is first turned on, and at certain other times when a microprocessor reset occurs, all the outputs will be turned ON for a fraction of a second, before assuming the state dictated by the Verbatim autodialer. In some installations this could cause problems, and in such cases external time delay relays or other measures may be required to prevent unwanted momentary activation of controlled devices.

## **F.3 Local Data Logger (Local Printer) Option**

If your unit was not originally equipped with this option, refer to the separate instructions for installing this option. (See Section 2.3 for LDL parallel). The local printer will automatically print out each activity that occurs: alarms, acknowledgments, programming entries, inquiry calls, etc.. A time and date stamp will be included with each report. The local printer may be either serial or parallel as discussed below.

### **F.3.1 Serial Printer Interface**

- If your printer was obtained through RACO, it will have been properly configured and tested at the factory...
- The printer must have a “serial” input.
- Printers not specified by or purchased through RACO are not guaranteed to be compatible for this application.
- Connect the DB-25 connector end of a RACO SER-01 cable (the specific type required will depend upon the printer type) to the input connector on the back of the printer.

- Route the small “modular” plug end of this same cable through one of the holes at the bottom of the Verbatim autodialer, and plug it into the NET 2 port of the V232/485 card, or the NET 1 or NET 2 port of a VCP card.
- Avoid routing this cable alongside power wiring, and route it so that the front panel circuit board does not pinch it when the door is closed.
- Improper configuration settings will result in “garbage” being printed, or possibly no printing at all.
- Give the 4906 net\*128 command. See Section 7.4.5 and 7.8 for details.

### F.3.2

### Parallel Printer Interface

Some newer models of the VSS Series autodialer (including all Gateway units) have a standard Parallel Printer Interface. This interface is accessed via the parallel printer port located on the inside of the unit front panel door. This printer port is already activated. (See Section 7.3)

- ◆ To activate this port, attach a RACO VPPC-1 Parallel Printer Cable (or equivalent) to the front panel port and to the parallel port on your printer.



#### **Caution:**

Attach the parallel printer cable to the VSS front panel port with the “red striped edge” on the right side. If you connect any other way, you may damage the parallel connection on your printer.

### F.3.3

### Time and Date Setting

Time and date may be set or corrected with the following programming code entries:

- ◆ To check the date

941 ENTER

- ◆ To set the date

941 MM DD YY D ENTER

where:

MM is the month (03 for March)

DD is the date (07 for the 7th day of the month)

YY is the year (89 for 1989)

D is the day of the week (1 for Sunday, 2 for Monday, etc.). Entry of D is optional.

- ◆ To check the time

942 ENTER

- ◆ To set the time

942 HH MM SS ENTER

where:

HH are the hours in military time (13 for 1 PM)

MM are the minutes (09 for 9 minutes)

SS are the seconds. Entry of SS is optional.

- ◆ To clear the time and date back to 00:00:00 on 01/01/89.

935 7 ENTER

### F.3.4

#### Printout at Regular Intervals

The unit may also be programmed to automatically log (printout) all input conditions at regular intervals, by entering code:

943 XXX.X ENTER

XXX.X is the desired printing interval in hours, from 0.1 to 999.9.

The first such printout will occur when the period elapses, rather than immediately upon programming.

- ◆ To check programmed printing interval

943 ENTER

- ◆ To turn off regular interval printing function

943 0 ENTER

- ◆ To printout All User-Entered Programming

944 ENTER



## G

## Annunciator Sequences and Options

This appendix discusses Verbatim Gateway operations in the context of the *ANSI/ISA-S18.1 Annunciator Sequences and Specifications* standard. It also describes the options available for configuring the Verbatim Gateway to support a variety of sequence models. This information will be useful for users needing calling sequences different from the one discussed in Chapter 5.

Note that the ANSI specification uses slightly different terminology from that used here and elsewhere in this manual. Hopefully, this won't cause much confusion.

One concept central to this discussion is that of *channel state*. At any given time every armed channel is in one of the following 5 states: *normal*, *alarm*, *acknowledged alarm*, *return to normal (RTN)*, *acknowledged RTN*. The precise meaning of these terms will be clarified later on.

The term *annunciator state* is used here to describe the actions and indications of the Verbatim Gateway. These include LED illumination, voice reporting and status logging.

An *annunciator sequence* consists of specifying how transitions between the channel states occur and how they impact the annunciator state. The Verbatim Gateway supports three distinct types of annunciator sequences. These are each discussed in the subsections below. The next several paragraphs discuss the properties they all share in common.

The normal, alarm and RTN states are determined by comparing the channel's value with the criteria settings. A transition into these states requires that the condition persist for a time period referred to as the *alarm trip delay*. This provides hysteresis, or debouncing between the real-world signals and the channel state.

The two acknowledged states are determined by operator actions. Unacknowledged alarms and RTNs transit to the acknowledged states by pressing keys on the front panel or entering DTMF tones over the phone.

The Verbatim Gateway gives visual indications for the state of each channel or group of channels. If normal, the LED is OFF. When alarmed, the LED is blinking. When acknowledged the LED is steady ON. The visual indications for the RTN states are sequence dependent, and described later.

Audible indications for the channel states are also given. These take the form of voice reports either from the speaker or over the phone. These reports may be requested at any time by pressing the CHECK STATUS key, or phoning the unit.

Whenever any channel is in the unacknowledged alarm or RTN state, the Verbatim Gateway will solicit acknowledgment by phoning personnel. The calling sequence itself is determined by the alarm call grouping and alarm ready scheduling configuration.

All audible indications can be silenced by pressing the ARM/DISARM key on the front panel. This action will also always acknowledge all unacknowledged conditions. Also, all annunciator state transitions and actions are suspended whenever the box is in program mode. Channel state transitions will still occur.

The annunciator state may at any time be completely reset by pressing the ARM/DISARM key twice. This action will also reset the state of each channel.

In terms of *ANSI/ISA-S18.1*, there is one more property that all Verbatim Gateway annunciator sequences share: there is no support for the *first out* sequence designations (**F1, F2, F3**). Groups of alarms and RTNs are always registered, reported and reset without regard to which one tripped out first.

## G.1

### Standard Annunciator Sequence (Manual Reset)

This section describes the default annunciator sequence used by the Verbatim Gateway. It is a minor variant of the *ANSI/ISA-S18.1* designation **M-1** (Manual Reset with silence pushbutton). It may be configured by entering code **923 1** in program mode.

Operations in this sequence are detailed in Chapter 5. Briefly, channel states transit from normal to alarm when criteria violations persist for the trip delay. The alarm state is then locked in until acknowledgment is made. The transition from acknowledged back to normal happens upon manual reset or expiration of the alarm reset timer. The RTN states are omitted from the sequence.

The annunciator states include only those visual and audible indications described above. Also, the annunciator sequence follows the transitions described there too.

This sequence differs from the vanilla **M-1** designation in two ways. The first involves the operation of the automatic reset timer. The true **M-1** sequence is obtained by turning the alarm reset timers off (code **922**). The second distinction involves configurations where no phone numbers are programmed. Here the transition from alarm to acknowledged happens automatically and immediately. There are never any audible or visual indications of the unacknowledged state. This sequence has ANSI designation **M-1-5-6**.

## G.2

### Clear On Return To Normal (Automatic Reset)

This section describes annunciator sequence options that are variants of the ANSI designation **A-1** (automatic reset with silence pushbutton). The main distinction of these from the **M-1** sequence is that the alarm state is automatically reset when the channel enters the RTN state. The Verbatim Gateway sequences in this category differ amongst themselves mainly in when this RTN transition is allowed to occur.

The basic **A-1** sequence is obtained by executing code **923 3**. Channel states transit from normal to alarm when criteria violations persist for the trip delay. The alarm state is then locked in until acknowledgment is made. If no phone numbers are configured, then this transition happens automatically and immediately (**A-1-5-6**). Otherwise, operator action is required. The transition from acknowledged back to normal happens via manual reset or expiration of the alarm reset timer. It also happens whenever the criteria violation for an acknowledged alarm returns to normal.

A variant of **A-1** is obtained by code **923 2**. This sequence differs from **A-1** only in that the unacknowledged alarms are not locked in, but acknowledged alarms are coded in. All visual and audible indications are automatically reset whenever the criteria violations return to normal for the trip delay period.

Another minor variant of **A-1-4** is obtained by code **923 4**. Here, the indications for an acknowledged alarm will not be reset until it has been reported once, regardless of RTN status. Unacknowledged alarms will be reset completely without any lock-in whatsoever.

The implementation of these A-designates involves one wrinkle. The check for RTN condition is not performed continuously, but rather only at specific times. Hence, changes that happen in the midst of a report may not be reflected in the annunciator state until some time later.

#### (923) Automatic Reset

- ◆ To program Clear on Return to Normal, press:

923 V

Where V is on the following:

1. (Default) Dialer will continue to call until the alarm is acknowledged. (ANSI: M-1)
2. Clears the unacknowledged alarms which have returned to normal. The check for this transition occurs only between alarm calls. (ANSI: A-1-4)

3. Clears the acknowledged alarm if the channel returns to normal. The check for acknowledged alarm returning to normal is only performed while the unit is in the normal state. (ANSI: A-1)
4. Clears the unacknowledged and acknowledged alarms if the channel returns to normal. The check for unacknowledged alarms is only done while the unit is in the normal state. (ANSI: A-1-4 variant)



**Note:**

The 923 and 981 RTN modes are incompatible and cannot be used at the same time.

## G.3

### Report Return To Normal (Ringback)

This section describes the annunciator sequence option that provides explicit indications of RTN conditions. This is a variant of the **R-1-8** designation (ringback with silence pushbutton and common ringback audible). There are two differences between **R** and **M** or **A** designations. First is that the RTN state can be entered only from the acknowledged alarm state. **M** has no notion of RTN at all, and **A** allows the transition at any time. Second is that **R** locks in RTN states until acknowledged, whereas **A** immediately resets.

A variant of the **R-1-8** sequence is obtained by executing code **981 1**. Channel states transit from normal to alarm when criteria violations persist for the trip delay. The alarm state is then locked in until acknowledgment is made. If no phone numbers are configured, then this transition happens automatically and immediately (**R-1-5-6**). Otherwise, operator action is required.

The transition from acknowledged alarm to unacknowledged RTN is made whenever the criteria violation goes away for the trip delay period. The RTN state is then locked in until acknowledged. RTN acknowledgment is made in the same fashion as alarm acknowledgments. The channel states are reset either manually or by expiration of the reset timer. The reset timer begins running when the original alarm condition is acknowledged. This means that if a sufficiently long interval exists between acknowledgment of the alarm and the RTN, then the reset will happen immediately.

The main differences between this variant and the standard **R-1-8** sequence are as follows. First, there is no registration of momentary alarms once the RTN state is entered. Once the RTN state is acknowledged, no further calls will be triggered until the channel is reset. This is to say transitions in the channel state may continue, but will not be reflected in the annunciator state. Still, all reports will reflect the current state of the channels. Second, there is no visual indication for the RTN states. The LEDs will continue to reflect the



acknowledged alarm status. Third, the silence pushbutton stops all flashing LED indications. Fourth, there is the automatic reset timer.

Unlike the implementation for the A designations, RTN conditions are checked continuously for all channels. So long as any unacknowledged alarm or RTN condition exists, the Verbatim Gateway will be making calls. Alarm conditions have priority. Hence, if an alarm is one call group and an RTN is in another, no calls will be placed to the RTN group until the alarm is acknowledged.

If the trigger for a call is an RTN, then the report will explicitly mention this before reporting the status of all channels in the group. An RTN report mentions RTN conditions only. Any acknowledgment while in RTN calling state acknowledges RTN conditions only. In contrast, any operator acknowledgment during an alarm call will also acknowledge all RTNs. But, the alarm reports do mention all unacknowledged RTN conditions.

If a new alarm occurs on any channel while in the RTN calling state, a change from RTN to alarm calling will occur as soon as possible. This can happen no sooner than the completion of any report in progress. Such reports may or may not include mention of the new condition depending on whether that channel has already been announced.

### **(981) Return To Normal (Ringback)**

You may program the autodialer to place calls when an input returns to its normal state.

- ◆ To program Return-to-Normal calls, press:

981 V

Where V is one of the following:

1. 0 = OFF: No return-to-normal calls will be made (Default is OFF).
2. 1 = ON: Return-to-normal calls will be made for channels in the ALARM ACKNOWLEDGED state whose input returns to normal (non-violation).



#### ***Note:***

981 RTN and Alarm Call Grouping are incompatible. If they are used together, unexpected results may occur. The 923 and 981 RTN modes are incompatible and cannot be used at the same time.



# Glossary

**ACCESS CODE** See Security Access Code.

**ACKNOWLEDGMENT** The act of advising the Verbatim Gateway autodialer that its alarm message has been heard. This is done either by pressing a touch tone 9 at the prompting beep, or by calling the unit back after the alarm call has ended. Once acknowledged, further activity on that particular channel will not cause further dialing until the expiration of the Alarm Reset Time. See Section 5.1, "Placing Inquiry Calls to the Verbatim Gateway Autodialer," and Section 5.5, "Acknowledging the Alarm Call."

**ALARM CALL GROUPING** Special programming established to cause specific input channels to cause dialing of only selected phone numbers. Used to provide separate alarm functions according to category of personnel, such as maintenance, security, plumbing, etc. See Section 6.1, "Program Codes."

**ALARM CONDITION** For contact input channels, the Alarm Condition is the Open or Closed circuit condition opposite to that which was established as the Normal Condition for that channel. For example, for a channel programmed as Normally Open, the Alarm Condition would be Closed Circuit. Also see Violation. See Sections 3.3, "Programming Input Channels" and 5.3, "Receiving Alarm Calls."

**ALARM CRITERIA** The chosen determination of what will constitute an alarm condition (violation) for a given channel. See Normally Closed.

**ALARM READY SCHEDULING** A program setting which causes the Verbatim autodialer automatically disarm for certain time periods. This function prevents the product from sending alarm telephone calls during periods when personnel are stationed at the site and are able to deal with the problem directly.

**ALARM RESET TIME** The period of time, beginning at the moment an alarm is acknowledged, during which alarm dialing on behalf of that specific channel is suspended regardless of further activity of its input circuit. At the end of this period, the Acknowledged Alarm status is cleared for that channel. See Section 5.6, "Alarm Reset Timeout After Acknowledgment" and Section 6, "Advanced Programming."

**ALARM TRIP DELAY** The time required for an input violation to remain in violation before the unit trips into the Unacknowledged Alarm state. See Section 6, "Advanced Programming."

**APS** Allen-Bradley's Advanced Programming Software.

**ANALOG** Analog signals have variable values of current or voltage, with the specific value generally representing some physical parameter such as water level or pressure. The most common type of analog signal is a 4-20 milliamperes current loop, with a transmitter (transducer and associated power supply) governing the current in a loop. This current is detected by one or more receiving devices in the loop, such as an optional analog input channel on a Verbatim autodialer.

**AUTOCALL** A special test calling function. When Autocall is turned on, the unit places test calls at regular intervals to provide ongoing assurance of Verbatim Gateway autodialer and phone line operation. See Section 6, "Advanced Programming."

**AUTODIALER** A device which constantly monitors a set of inputs from various external sensors, and places outgoing alarm calls when there is an alarm condition. It also allows inquiry calls.

**AUTOEXTEND** A unique feature on the Verbatim Gateway autodialer which automatically extends the available message recording time as required, selecting the optimum speech memory rate for the user's voice message recording. See Section 4.2.1, "Verifying/Extending Recording Time."

**CALL BACK** See Call Forward.

**CALL FORWARD** The unit may be commanded from the panel or over the phone, to place a call to a specific phone number. This is called Call Forwarding. If the number called is that of the person commanding the call from a remote telephone, then it is termed Call Back. This is typically done for test purposes. See Section 5.8, "Dialing Out and Conversing Through the Verbatim Gateway autodialer," and Section 6, "Advanced Programming."

**CALL OUT** The action of the Verbatim Gateway autodialer placing calls to outside personnel or facilities.

**CDL (Central Data Logger)** The combination of a modem, a serial interfaced printer and a special RACO-built interface box is called a Central Data Logger (CDL). A RACO autodialer/RTU may be configured to call and log data to the CDL printer. CDL RTUs first call the CDL printer to log alarm and status information then proceed on to calling personnel by voice.

**CLOSED CIRCUIT CONDITION** One of two possible states of a contact closure input circuit. Closed Circuit is the condition in which the contacts complete the electrical circuit connection. Open Circuit is the opposite condition, in which the contacts do not complete the electrical circuit connection. The Open Circuit condition is electrically equivalent to having no connection to the input circuit. A Closed Circuit input will measure zero volts DC from the input connection to the common connection point. An Open Circuit input will measure 5 volts DC. The Open or Closed Circuit status may

also be read without a voltmeter, by use of Program Code 0 ZZ 0, where ZZ is the 2-digit channel number. See Section 3.3, "Programming Input Channels" and 5.3, "Receiving Alarm Calls".

**COMMON** The combined electrical return connection point for all contact closure inputs. One side of all contact inputs are connected to Common. Physically, this Common connection point is any of the 4 terminals marked C on terminal strip TS1. The circuit board internally connects Common to the AC ground (GREEN) terminal on terminal strip TS3. See Section 2, "Installation."

**DCS** Distributed Control System

**DEFAULT** Programming values which are built into the unit and remain in effect until the user alters them. Also, permanently available speech messages which are utilized when the user has not recorded his own messages.

**DEFAULT VALUE** The initial setting of a configurable parameter.

**DELAY BETWEEN DIGITS** In some applications, an extra waiting time is needed between dialed digits. For example in some PBX systems, a 9 must be dialed, followed by a waiting time of several seconds before the main phone number may be dialed. See Section 3.2, "Programming Phone Numbers," Section 7, "Programmable Logic Controller Interface," and Section 6, "Advanced Programming."

**DESIGNATION NUMBER** The two-digit "order number" of a phone number in the overall set of phone numbers programmed. For example, the designation number for the third phone number is 03. See Programming Worksheet A. See Section 3.2, "Programming Phone Numbers," 6.1, "Program Codes," and 6.2, "Programming Operations."

**DIALER** See autodialer.

**DRY** Description of a sensor contact circuit that is not connected to any power source.

**EXIT DELAY** A delay period after a user arms the unit, before the unit will actually accept new alarms. Used to allow user to exit a protected entrance without tripping the unit into alarm. See Section 6, "Advanced Programming."

**FLOOBYDUST** Miscellaneous. A contemporary term derived from the archaic Latin *miscellaneus*, whose disputed history probably springs from Greek origins (influenced, of course by Egyptian linguists) -- meaning here "a mixed bag."

**FULL DUPLEX** A particular variant of the DF1 protocol.

**GLOBAL** Essentially "over all" or "universal". Programming that simultaneously sets the same value for all channels, but excluding the Power Failure Alarm function.

**GROUPING** See Alarm Call Grouping.

**ID MESSAGE** See Station ID Message.

**INDUSTRIAL NETWORK** A network using DF1, DH485, Modbus, Modbus Plus or other industrial protocol.

**INQUIRY CALL** A call placed by personnel to the Verbatim Gateway autodialer. See Section 5.1, "Placing Inquiry Calls to the Verbatim Gateway Autodialer."

**IO** Input/Output. A point or channel that senses or controls real-world device.

**LED** A lighted legend indicator on the front panel.

**LINK** See Alarm Call Grouping.

**MEMORY USE RATE** See Speech Memory Rate.

**MODEM** A device which allows digital data (as opposed to voice) to be transmitted between two sites, usually via public telephone lines. In the case of a Verbatim autodialer equipped with the CDL or SCADA option, a modem is built into the option card so that no external modem is required.

**MODSOFT** Modicon's controller programming software package.

**NETWORK** A collection of devices, called nodes, connected in a way that allows information to be exchanged between the nodes. The physical and higher level protocols for a specific vendor's PLC data communications. The Verbatim Gateway can support a maximum of 3 networks simultaneously. The actual number of networks and type of protocol are hardware options and software configurable.

**NETWORK ADDRESS** The concatenation of the network ID, node, and PLC address. It is sometimes symbolized by '/net/node/addr' where net is the network ID, node is the node address, and addr is the PLC address. The network address suffices to uniquely identify any data object which the Verbatim Gateway can access.

**NETWORK ID** A voice message identifying a specific network. By default, the message is "Gateway Net X", where 'X' is a number from 0 to 5. Custom messages, such as "Building 320 LAN" may be recorded. See 'NETWORK' entries below for more details.

**NETWORK 0** Refers to the discrete, analog, and RSC points internal to the VSS.

**NETWORK 1** Refers to devices connected to the 'NET1' port on the serial communications card. Protocols may vary.

**NETWORK 2** Refers to devices connected to the 'NET2' port on the serial communications card. Protocols may vary.

**NETWORK 3** Refers to devices connected to the MBPLUS port on the MBPLUS communications coprocessing card.

**NETWORK 4** Refers to devices connected to the Parallel port.

**NETWORK 5** Refers to devices connected to the Modem port on the serial communications card.

**NODE** The address of a specific PLC on the network. Each PLC is already configured with a unique integer as its node address. The Verbatim Gateway must also be given a unique number as its node address on each network to which it interfaces. The network ID and node together suffice to uniquely identify any PLC.

**NORMAL CONDITION** For contact closure inputs, the Normal Condition is that condition (open or Closed Circuit) which normally exists. The opposite condition would create an alarm. See Section 3.3, “Programming Input Channels” and 5.3, “Receiving Alarm Calls.”

**NORMALLY CLOSED** Describes a monitored “contact type” input signal circuit, for which the normal, non-alarm state is associated with the circuit being closed (i.e. a completed connection being established between the two conductors of the input circuit). An alarm condition causes the circuit to be opened (broken), which the Verbatim autodialer would detect and begin placing alarm calls. This requires that this input be programmed as Normally Closed on the Verbatim autodialer.

**NORMALLY OPEN** Opposite of a Normally Closed circuit. The input signal is open in the normal, non-alarm state and closes when an alarm occurs. This requires that this input be programmed as Normally Open on the Verbatim autodialer, which is the default setting for a contact type input.

**NON-VOLATILE MEMORY** When AC power fails, the unit continues to operate for several hours on its internal Gel Cell battery. When this battery is near discharge, the unit automatically turns itself off. However all the user’s programming and all user recorded messages are kept intact by Non-volatile Memory for up to ten years, so when power is later restored, no reprogramming or message recording will be required.

**OPEN CIRCUIT CONDITION** See Closed Circuit Condition.

**PHYSICAL CHANNEL (PC)** Internal inputs are sometimes call Physical Channels (PCs). PCs monitor user-supplied external sensors such as float switches, limit switches, etc. In most cases, the outputs of logic controllers may be connected directly to Physical Channel inputs without the need for interfacing relays or other signal conditioning. The normal Verbatim Gateway inputs, as distinguished from the RCs when necessary. The semantics are such that all RCs on network 0 are PCs.

**PLC** Programmable Logic Controller.

**PLC ADDRESS** The data table location of an object within a specific PLC's internal memory. The format of the PLC address is vendor dependent. For network 0, the PLC address is the physical channel number.

**POINT** A source of data. Includes PLC registers, data table locations, IO, or channels.

**POWER FAILURE** The disappearance of 120 VAC power to the unit. The unit will continue to operate under power failure until its internal Gel Cell battery is discharged.

**PULSE TOTALIZER** The totalizer function accumulates a continuing count of the number of cycles of a train of pulses presented to the input. The pulses may be in the form of an open and closed circuit, or they may be in the form of a 5-volt logic signal.

**RECORDING RATE** In the process of digitally recording the user's voice messages into speech memory, the message is recorded into memory at one of four possible rates. The faster this rate of memory usage, the higher the recording fidelity. However, this results in less total available recording time than at slower rates. Rate 1 is the fastest rate giving the best sound quality. The Auto-extend feature automatically selects the optimum rate to allow adequate recording time for the user's own set of messages at the best possible sound fidelity. See Section 4.2.1, "Verifying/Extending Recording Time," and Section 4.3, "Record Your Messages."

**REMOTE CHANNEL (RC)** A Verbatim Gateway I/O point whose value mirrors the value at some network address. Each active RC is associated with one and only one network address. The RC number can be viewed both as a 'speed dial' abbreviation for the lengthy network address and as a 'virtual' I/O point that supports alarm criteria. Different RCs can refer to the same network address. All data objects referenced by any RC are either 1 or 16 bits in length. 1-bit objects are termed "discrete" or "digital" points. 16-bit objects are sometimes termed "analog" points even though the data may actually be a discrete counter or timer. The type of object is implicit in the RC's network address. This is to say, any RC can be either discrete or analog.

Analog RCs are NEVER scaled to engineering units within the Verbatim Gateway. They can only have decimal integer values in the range 0 to 65535. Any desired must be done within the PLCs program. Floating point, hexadecimal, and octal data formats are not supported.

**REPEATS** The number of times a series of messages (including Station ID message) is spoken when an alarm call is placed. As used here, this number includes the first recital of the messages. For example, 3 repeats means 3 times total, not 4. See Section 5.3, "Receiving Alarm Calls" and Section 6.1, "Program Codes."



**RING ANSWER DELAY** The number of rings required before the Verbatim Gateway autodialer will answer an inquiry call. See Section 5.3, “Receiving Alarm Calls,” and 6.1, “Program Codes.”

**RTU (Remote Telemetry Unit)** A monitoring device, interfaced to a communications medium, whose mission is to communicate conditions at a remote or inaccessible site. RTUs are usually polled by a central computer on some schedule or interval. Additionally, RTUs may request polling to report any exceptions such as alarms or other events which require the attention of the central computer or its operators. When a RACO Verbatim autodialer is configured with the asynchronous communications module it is known as an RTU. The Verbatim RTU does not lose any of the basic features of the Verbatim autodialer. In addition, the Verbatim RTU is capable of receiving polling calls from the RACO SCADA Central Computer. Furthermore, alarms may be communicated to the RACO SCADA Central Computer or to a RACO Central Data Logger (CDL) printer.

**RUN TIME METER** A feature which, when turned on, accumulates the total number of hours that an input channel is in the Closed Circuit condition. Typically used to monitor equipment operation time, particularly alternating pump systems. See Section 3.3, “Programming Input Channels,” and Section 6, “Advanced Programming.”

**SCADA** Supervisory Control and Data Acquisition System.

**SCALE FACTOR** A translation factor which may optionally be entered in conjunction with the Pulse Totalizer function. The spoken Totalizer reading will be the actual number of pulses accumulated, divided the programmed scale factor. See Section 6, “Advanced Programming.”

**SECURITY ACCESS CODE** A code optionally programmed by the user at the front panel. Once programmed, this code is required in order to perform any program operations over the phone. See Section 5.7, “Programming by Phone,” and Section 6, “Advanced Programming.”

**SPEECH MEMORY RATE** See Recording Rate.

**STATION ID MESSAGE** A message which is always included in all phone calls to or from the unit, intended to identify the unit. The default Station ID Message is “ID number is 1”. See Section 4.1, “Planning Messages” and 4.3, “Record Your Messages.”

**TIME BETWEEN ALARM CALLS** With the unit in Unacknowledged Alarm status, the waiting time from the time the unit terminates a given alarm call, until the time when the unit again accesses the phone line to place the next call. During this interval (default 2 minutes), personnel may call the unit back, which will acknowledge the alarm and suspend further calling. See Section 5.4,

“Continued Dialing in the Absence of Acknowledgment,” and Section 6, “Advanced Programming.”

**VIOLATION** For contact closure inputs, a violation (also called Alarm Condition) is the Open or Closed Circuit condition which is opposite the condition which has been programmed as Normal for that channel. For example, if a given input channel is programmed for Normally Open operation, then a Closed Circuit is a violation for that input. If the violation persists for the Alarm Trip Delay time, the unit will go into Unacknowledged Alarm state and begin placing alarm calls. See Section 3.3, “Programming Input Channels,” 5.3, “Receiving Alarm Calls,” and 5.6, “Alarm Rest Timeout After Acknowledgment.”

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<b>40* netaddress * value</b>	Writes <i>Value</i> To Net Address
<b>4100 net</b>	Record Network ID Message
<b>41ZZ</b>	Record RC Alarm/Preamble Message
<b>42ZZ</b>	Record RC Normal/Epilogue Message
<b>4300</b>	Review Network ID Messages
<b>43ZZ</b>	Review RC Messages
<b>45ZZ</b>	RC Channel Programming (Default: no alarm)
<b>45ZZ 9</b>	RC Alarm Call Grouping
<b>45ZZ * mode * net * node or route * addr *</b>	Associate RC with Net Address
<b>45ZZ *</b>	Read Associated Net Address
<b>46ZZ</b>	RC Alarm Trip Delay (Default: 2.0 sec)
<b>47ZZ</b>	Interlinks
<b>48</b>	PIN
<b>49*</b>	Repeat Previous Command
<b>4900 net</b>	Network Serial Parameters
<b>4901 net</b>	Baud Rate
<b>4902 net</b>	Data Bits
<b>4903 net</b>	Stop Bits
<b>4904 net</b>	Parity
<b>4905 net</b>	Autodialer Node Address
<b>4906 net</b>	Network Protocol
<b>4907 net</b>	Communications Alarm Trip Delay
<b>4908 net</b>	Link-Level Timer
<b>4909 net</b>	Application-Level (Message) Timer
<b>4910</b>	Default Net Number
<b>4911</b>	Default Node Number
<b>493* net</b>	Globally Disables/Enables RC Polling
<b>4930 * net</b>	Diagnostic Self-Test On Net
<b>4935</b>	RC Clearout Operations
<b>4940</b>	Network Diagnostics
<b>4946 net</b>	Lists Active Nodes
<b>4950 net</b>	Protocol Specific Parameters
<b>4951 net</b>	DH485 ONLY: Maximum Node Address (Default: 31)
<b>4952 net</b>	DH485 ONLY: Token Hold Factor (Default: 1)
<b>4953 net</b>	DH485 ONLY: Token Exercise Factor (Default: 1)
<b>4954 net</b>	Modbus Plus ONLY: Global Data Block (Default: 0)

<b>4954 net</b>	Modbus ONLY: Modbus Delay (Default: 0)
<b>4955 net</b>	Scan Delay Timer (Default: 0)
<b>4979</b>	Toggles Analog Alarm Flag
<b>500 N</b>	Sets All Contact Inputs (Default: Normally Closed)
<b>5ZZ N</b>	Channel Programming (Default Contact: Normally Closed) 3-3, 6-10 thru 6-12
<b>5ZZ 9</b>	Alarm Call Grouping 6-19
<b>600</b>	Power Failure Alarm Trip Delay (Default: 0.1 min) 6-13
<b>6ZZ</b>	Channel Alarm Trip Delay (Default: 2.0 sec) 6-13
<b>700</b>	Callback Phone Number 6-21
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<b>900</b>	Call Progress Monitoring (Default: 0 off) 6-18
<b>901</b>	Dial Out Mode. (Default: 0 Pulse Mode) 6-14
<b>902</b>	Global Alarm Trip Delay (Default: 2.0 sec) 6-13
<b>903</b>	Time Between Callouts (Default: 2.0 min) 6-21
<b>904</b>	Alarm Reset Time (Default: 1.0 Hr.) 5-4, 6-21
<b>905</b>	Clear All Acknowledged Alarms 6-21
<b>906</b>	Ring Answer Delay (Default: 1 ring) 6-21
<b>907</b>	Alarm Message Repeats (Default: 3 repeats) 5-4, 6-21
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<b>909</b>	Autocall Interval (Default: 24.0 Hr) 6-21
<b>910</b>	Security Access Code (Default: no code) 6-21
<b>911</b>	Reads Current Recording Rate 4-3
<b>912</b>	Autoextend 4-3
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<b>920</b>	Power Fail Trip Delay (Default: 0.1 min.) 6-13
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<b>922</b>	Alarm Reset Timers (Default: ON) 6-21
<b>923</b>	Return To Normal Annunciator Sequence (Default: 1) G-3
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<b>925</b>	Alarm Acknowledge at Callin (Default: ON) 5-1
<b>926</b>	Exit Delay Before Return To Normal. 1 time only. (Default: 2 min) 6-21
<b>927</b>	Intercall Delay Parameter (Default: 0) 6-3
<b>928</b>	Inserted Dialing Delays (Default: 1 sec) 5-4, 6-14
<b>930</b>	Arms/ Disarm Unit (Default: ARMED) 6-21
<b>932</b>	15 Second Listening Period. 933 must be On. 6-21
<b>933</b>	Local Microphone for 932 functioning (Default: OFF) 6-21
<b>934</b>	Speaker On/Off. (Default: ON) 6-21
<b>935</b>	Clearout Operations 6-26
<b>940</b>	Diagnostic Readouts 6-27
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# FCC Notice to Users

1. You must notify your telephone utility as follows:
  - a. Intention to install an FCC Part 68-registered device.
  - b. The FCC registration number: HKS-23J06304-AL-R
  - c. The ringer equivalence number: 0.3A
  - d. When the device is disconnected from the telco network and will not be reconnected.
2. These units may not be used on party lines.
3. The telco has the right to make changes in their network which may affect the operation of your unit, provided adequate notice is given to you in advance to permit continued correct operation.
4. In the event of operational problems, disconnect your unit by removing the modular plug from the modular telephone jack. To test the phone line, temporarily plug a working rotary-dial telephone into the jack normally used by the Verbatim. If the substitute telephone works correctly, your Verbatim has a problem and should be returned for repairs (in or out of warranty). If the substitute telephone does not work correctly, notify the telco that they have a problem and request prompt repair service (at no cost to the user).
5. The user may not under any circumstances (in or out of warranty) attempt any service or repairs on the Verbatim. It must be returned to RACO for all repairs.



# Warranty Registration Card

K E E P   T H I S   F O R   Y O U R   R E C O R D S



## ***Important:***

Within 14 days of purchase, please complete this Warranty Registration.  
Detach the top portion, fold in half and drop in the mail. Postage is paid if  
mailed in the U.S. Otherwise, please return to:

Raco Manufacturing and Engineering Co. Inc.  
Service Department  
1400 62nd Street  
Emeryville, California 94608

Detach here before mailing

Model	VERBATIM GATEWAY
Serial number	
Date of Purchase	
Name	
Title/position	
Company/Organization	
Division/Department	
Address	
Telephone	
Dealer's Name	
Address	





# Response Card

The following additional information will assist us in our continuing efforts to provide you with products that meet your specific requirements.

**Please send me more information on the following quality products from RACO Manufacturing:**

1. This Autodialer is used in:

- |  |   |
|--|---|
| <input type="checkbox"/> wastewater        | <input type="checkbox"/> gas pipeline           |
| <input type="checkbox"/> cold storage      | <input type="checkbox"/> chemical manufacture   |
| <input type="checkbox"/> energy generation | <input type="checkbox"/> agriculture            |
| <input type="checkbox"/> Chatterbox CB-4/8 | <input type="checkbox"/> Chatterbox CB-16,24,32 |
| <input type="checkbox"/> Verbatim          | <input type="checkbox"/> remote equipment       |

\_\_\_\_\_ other

2. It uses the following types of transducers:

- |   |  |
|---|--|
| <input type="checkbox"/> pressure                   | <input type="checkbox"/> temperature       |
| <input type="checkbox"/> Remote Supervisory Control | <input type="checkbox"/> flow              |
| <input type="checkbox"/> electrical detection       | <input type="checkbox"/> gas (all types)   |
| <input type="checkbox"/> intrusion                  | <input type="checkbox"/> Analog Inputs     |
| <input type="checkbox"/> float level                | <input type="checkbox"/> NEMA 4X enclosure |
| <input type="checkbox"/> Local Data Logging         | _____ other                                |

3. I first became aware of this Autodialer from:

- |   |   |
|---|---|
| <input type="checkbox"/> dealer showroom          | <input type="checkbox"/> colleague        |
| <input type="checkbox"/> Central Data Logging     | <input type="checkbox"/> trade show       |
| <input type="checkbox"/> professional association | <input type="checkbox"/> magazine inquiry |
| <input type="checkbox"/> Extended Warranty        | _____ other.                              |

4. I read the following publication(s) regularly:

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