# UCBS

# Universal Checkback Stand-Alone

System Manual

CS44–VER01

**Pulsar**
Technologies, Inc.

# UCBS System Manual

**Product Description**
(September 2000)

**1** ▶

**Universal Checkback Module**
(September 2000)

**2** ▶

**Power Supply & Interface Module**
(September 2000)

**3** ▶

**UCBS External Connections**
(September 2000)

**4** ▶

**Pulsar**
Technologies, Inc.



⚠ *IMPORTANT*

*W*e recommend that you become acquainted with the information in this manual before energizing your UCBS system. Failure to do so may result in injury to personnel or damage to the equipment, and may affect the equipment warranty. If you mount the UCBS in a cabinet, it must be bolted to the floor or otherwise secured before you swing out the equipment, to prevent the installation from tipping over.

*You should not remove or insert printed circuit modules while the UCBS is energized. Failure to observe this precaution can result in unwanted tripping output and can cause component damage.*

*All integrated circuits used on the modules are sensitive to and can be damaged by the discharge of static electricity. You should observe electrostatic discharge precautions when handling modules or individual components.*

*PULSAR does not assume liability arising out of the application or use of any product or circuit described herein. PULSAR reserves the right to make changes to any products herein to improve reliability, function, or design. Specifications and information herein are subject to change without notice. All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If you desire further information regarding a particular installation, operation, or maintenance of equipment, please contact your local Pulsar Technologies, Inc. representative.*

## *Preface*

### Scope

This manual describes the functions and features of the UCBS universal Checkback. It is intended primarily for use by engineers and technicians involved in the installation, alignment, operation, and maintenance of the UCBS.

### Equipment Identification

The UCBS equipment is identified by the catalog number (UCBS CAT NO.) on the UCBS Power Supply front panel. You can decode the catalog number using Table 1-1, "UCBS Catalog Numbers" (see "Ordering Information" in Chapter 1).

### Production Changes

When engineering and production changes are made to the UCBS equipment, a revision notation (rev number) is reflected on the style number, related schematic diagram, and associated parts information. A summary of all rev numbers for the particular release is shown on the following page.

### Warranty

Our standard warranty extends for 60 months after shipment. For all repaired modules or advance replacements, the standard warranty is 90 days or the remaining warranty time, whichever is longer. Damage clearly caused by improper application, repair, or handling of the equipment will void the warranty.

### Equipment Return & Repair Procedure

To return equipment for repair or replacement:

1. Call your PULSAR representative at **1–800–785–7274**.

2. Request an **RMA number** for proper authorization and credit.

3. Carefully pack the equipment you are returning.

   Repair work is done most satisfactorily at the factory. When returning any equipment, pack it in the original shipping containers if possible. Be sure to use anti-static material when packing the equipment. Any damage due to improperly packed items will be charged to the customer, even when under warranty.

   Pulsar Technologies, Inc. also makes available interchangeable parts to customers who are equipped to do repair work. When ordering parts (modules, mounting hardware, etc.), always give the complete PULSAR style number(s).

4. Make sure you include your return address and the RMA number on the package.

5. Ship the package(s) to:

   **Pulsar Technologies, Inc.**
   **Communications Division**
   **4050 NW 121st Avenue**
   **Coral Springs, FL 33065**

## Document Overview

The circuitry for a UCBS assembly is divided into two (2) modules: (1) a Power Supply and Interface Module and (2) a Universal Checkback Module.

Chapter 1 provides the Product Description, which includes an overview of UCBS applications, possible configurations, system specifications, installation, maintenance procedures, installation tests, and ordering information.

Chapter 2 gives you a complete description of the application, operation, testing, circuitry, and troubleshooting for the Universal Checkback Module.

Chapter 3 gives you a complete description of the application, operation, testing, circuitry, and troubleshooting for the Power Supply and Interface Module.

Chapter 4 shows you how to connect the UCBS to a variety of carrier systems. Numerous examples are provided.

## Contents of a UCBS Assembly

The UCBS assembly includes the style numbers, listed below, with appropriate rev numbers representing revision levels. Note that each assembly will include a Power Supply/Interface Module and a Universal Checkback Module.

| Module | Style Number | Rev Number |
|---|---|---|
| Power Supply & Interface | CS20-PWRMN-00x | 01 |
| Universal Checkback | CC20-UCBMN-001 | 05 |

# FIGURES

# FIGURES, Continued

# TABLES

# *USER NOTES*

# Chapter 1. Product Description

## 1.1 Introduction

The Universal Checkback Standalone (UCBS) System is a stand alone system designed for use with carrier sets *other than the TC–10B Power Line Carrier*. (With the TC–10B, you can perform checkback operations by installing the same Universal Checkback module directly into the available slot in the TC–10B system chassis.)

Using the UCBS system tests, you can quickly determine whether or not the transmitters, receivers, and associated equipment for your carrier sets are operational.

You can conduct several types of tests:

a) Coded - where a series of ones & zeros are transmitted

**1**

**Chapter Contents**

## 1.2 System Application

b) Timed - where a single timed pulse is transmitted

c) High-Level (for each of the above)

d) Low-Level (for each of the above)

The High-Level test maintains the transmitter at the high-level power you set; the Low-Level test maintains the transmitter at the low-level power you set.

If the tests result in any of the following three failure modes, you should troubleshoot your carrier system:

• A test is not functioning

• Tests are functioning, and the carrier system has passed the High-Level test(s) but has failed the Low-Level test(s) (minor alarm)

• Tests are functioning, but the carrier system has failed a High-Level test (major alarm)

You can perform checkback functions on any transmitter or receiver. A typical application is shown in Figure 1-1. You can use any receiver output from 15 to 250 Vdc to drive the Universal Checkback Assembly. The UCBS assembly will recognize the code and retransmit HL (High-Level) or LL (Low-Level) to key any transmitter with the desired voltage.

*For examples and further information on applications using the UCBS, please see Chapter 4, "UCBS External Connections."*
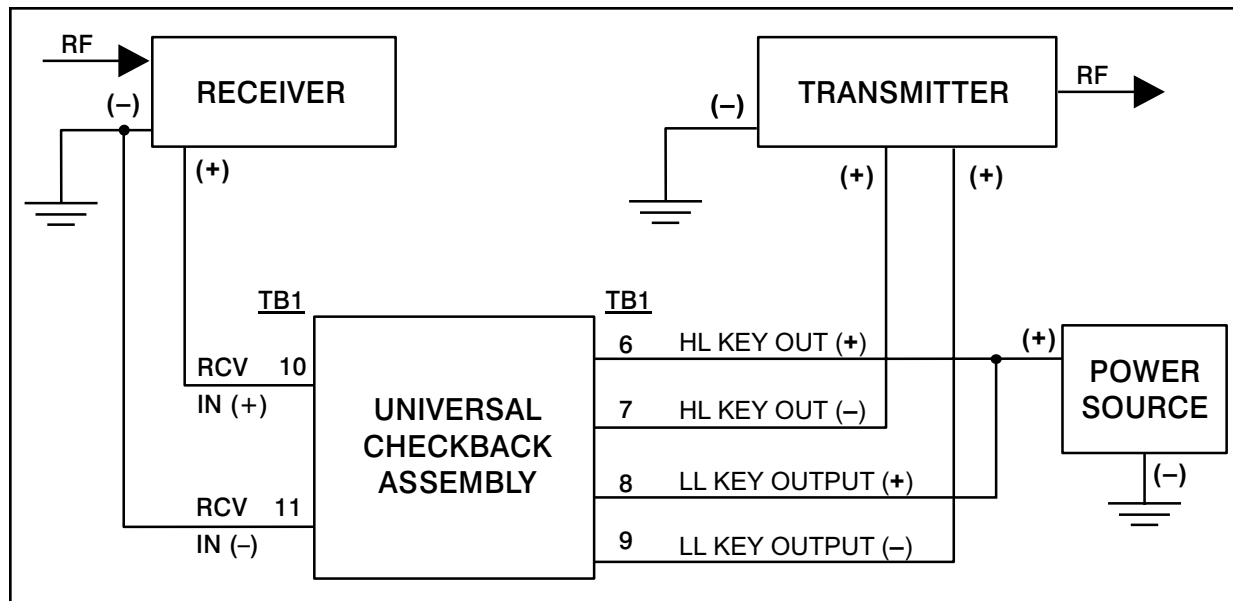


*Figure 1-1. Typical Universal Checkback Standalone Application.*

## *1.3 System Configuration*

The Universal Checkback (UCBS) Assembly comprises the following major components:

- Chassis, 3-inch or 19-inch (see Figures 1-2, 1-4, 1-6, and 1-7 for the 3" chassis and Figures 1-5 and 1-8 for the 19" chassis)

- Universal Checkback Module, which can be configured as either a Master or a Remote.

- Power Supply and Interface Module (see Chapter 3, Figure 3-2 for the schematic)

The basic system configuration is a UCBS Assembly with a UCB (Universal CheckBack), configured as a Master, at the Master Carrier Station and a UCBS assembly with a UCB, configured as a Remote, at the Remote Carrier Station. Communication between the master unit and remote unit(s) allow for remote retrival of settings, targets and events. Also, remote setting changes, from all units within the line terminals, are possible. The inputs and outputs for the UCBS modules are located on the rear panel terminal blocks (see the block diagrams in Figures 1-3 and 1-9); they are either relay or optically isolated to prevent malfunctions caused by ground reference differences.

The master unit communicates with up to four separate remote units in Timed mode. Also, up to ten different remote units can communicate with the master unit in Coded mode.

You can program the UCB Module for master or remote test sequence, checkback interval, number of remotes — up to ten, as well as several other features.

For more information see Chapter 2.

**1**

CHECKBACK

POWER SUPPLY
& INTERFACE

## UCBS

PC
INTERFACE

POWER

| | HOLD 2 SEC |
|---|---|
| TST CHECK | LOOP |
| RST ALARM | RECOVER |

INPUT

OUTPUT

RCV DATA

XMIT LL DATA

XMIT HL DATA

1 MAJOR ALRM

2 MINOR ALRM

3 RECOVERY

4 NOISE

C CHECK OK

+20V

COMMON

PRGM
SET

UCBS
CATALOG NUMBER
UCBS1N

MANUAL
CS44

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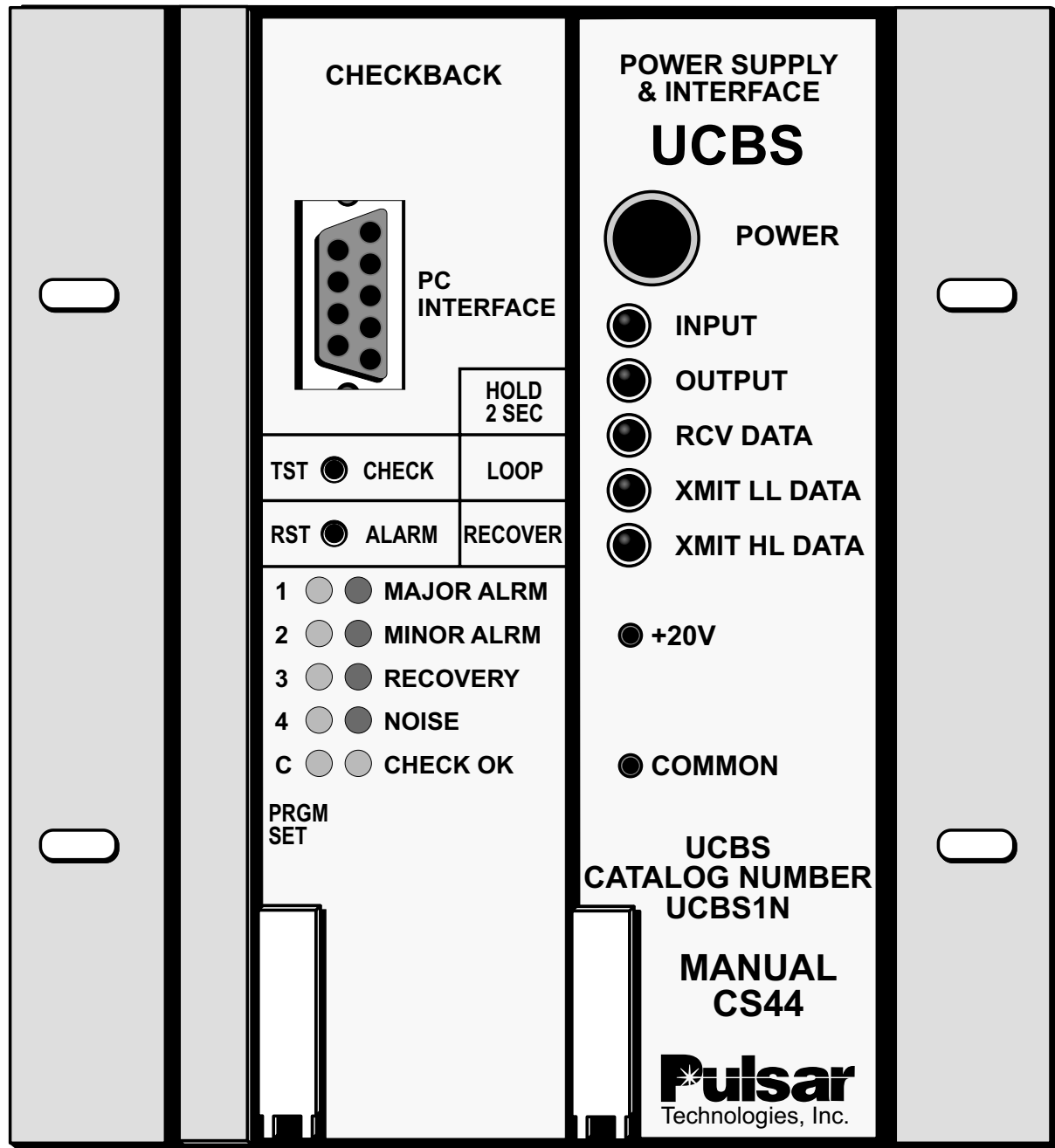
*Figure 1–2. Universal Checkback Assembly (Front view).*
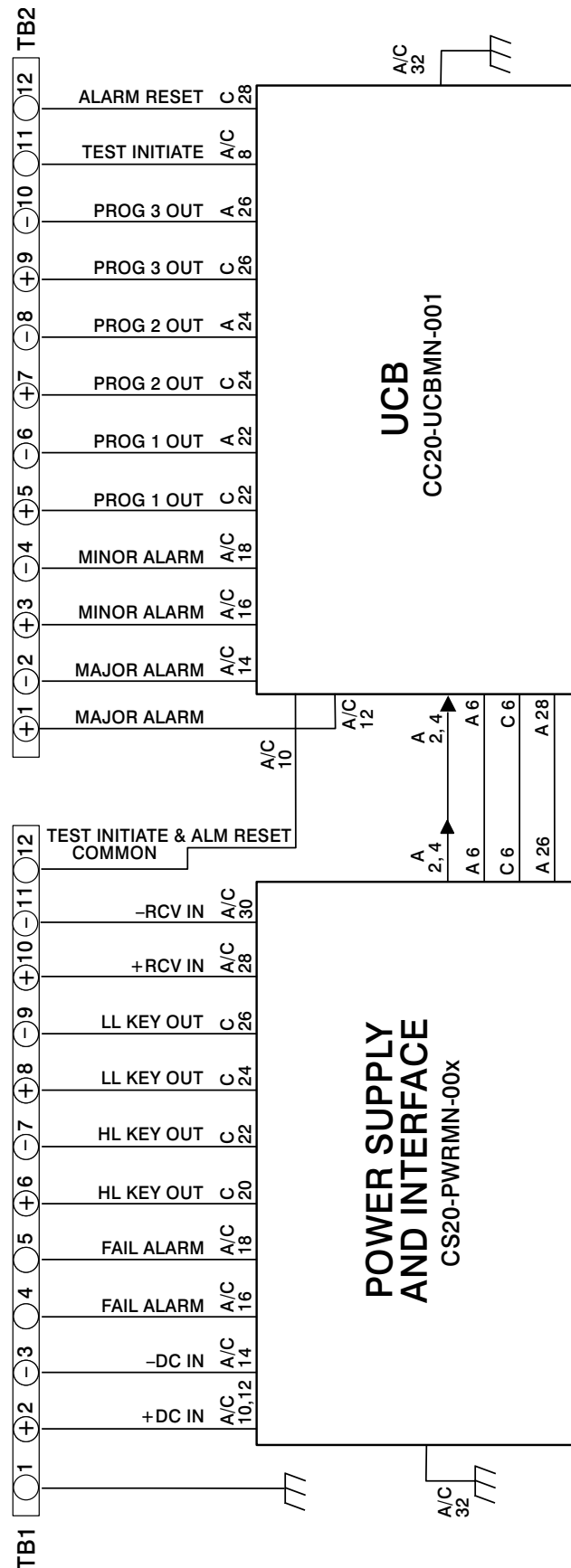
*Figure 1–3. UCBS Functional Block Diagram.*

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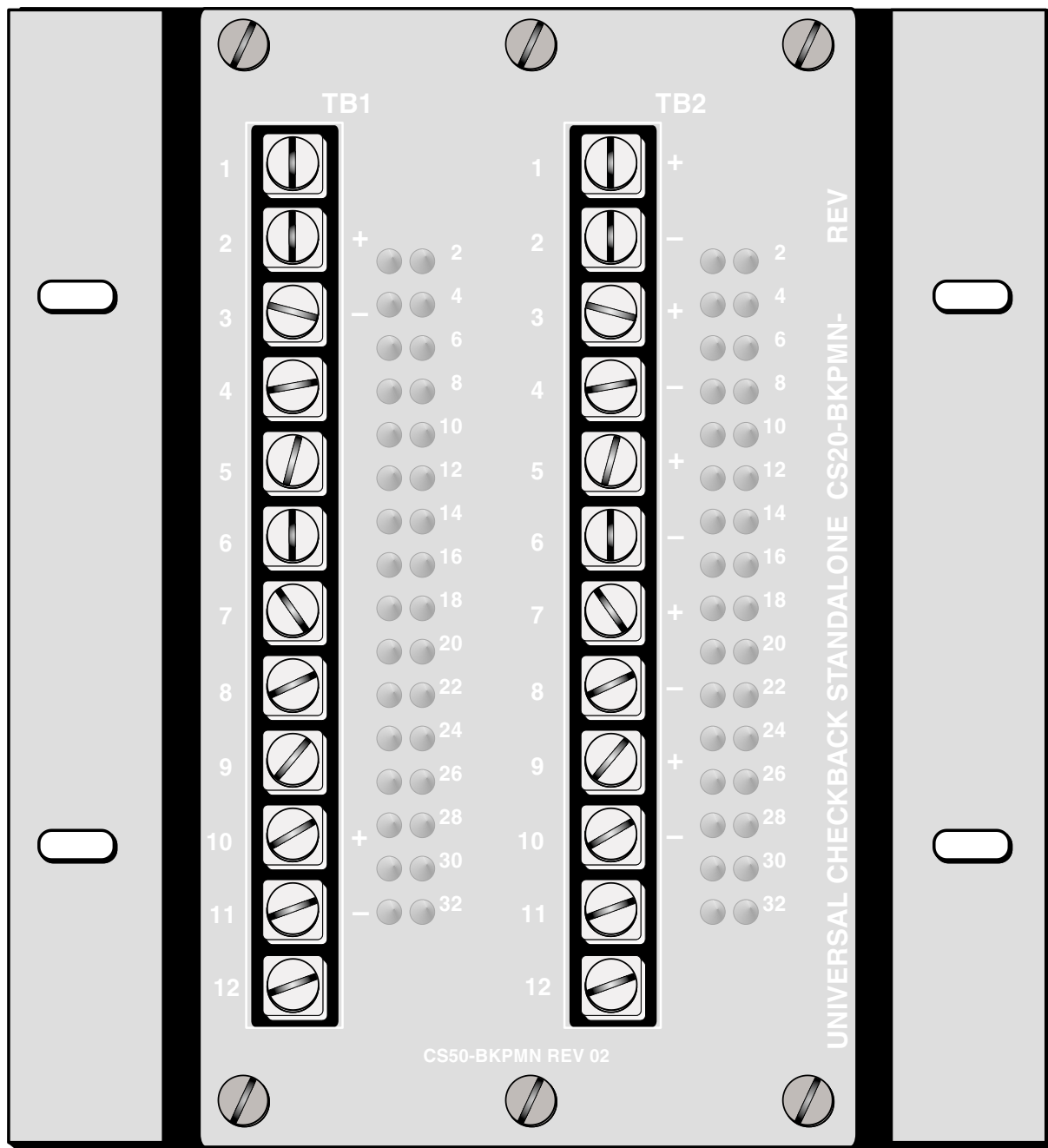


*Figure 1–4. UCBS 3" Wide Rack Mount Chassis (Rear View).*

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**FRONT VIEW**
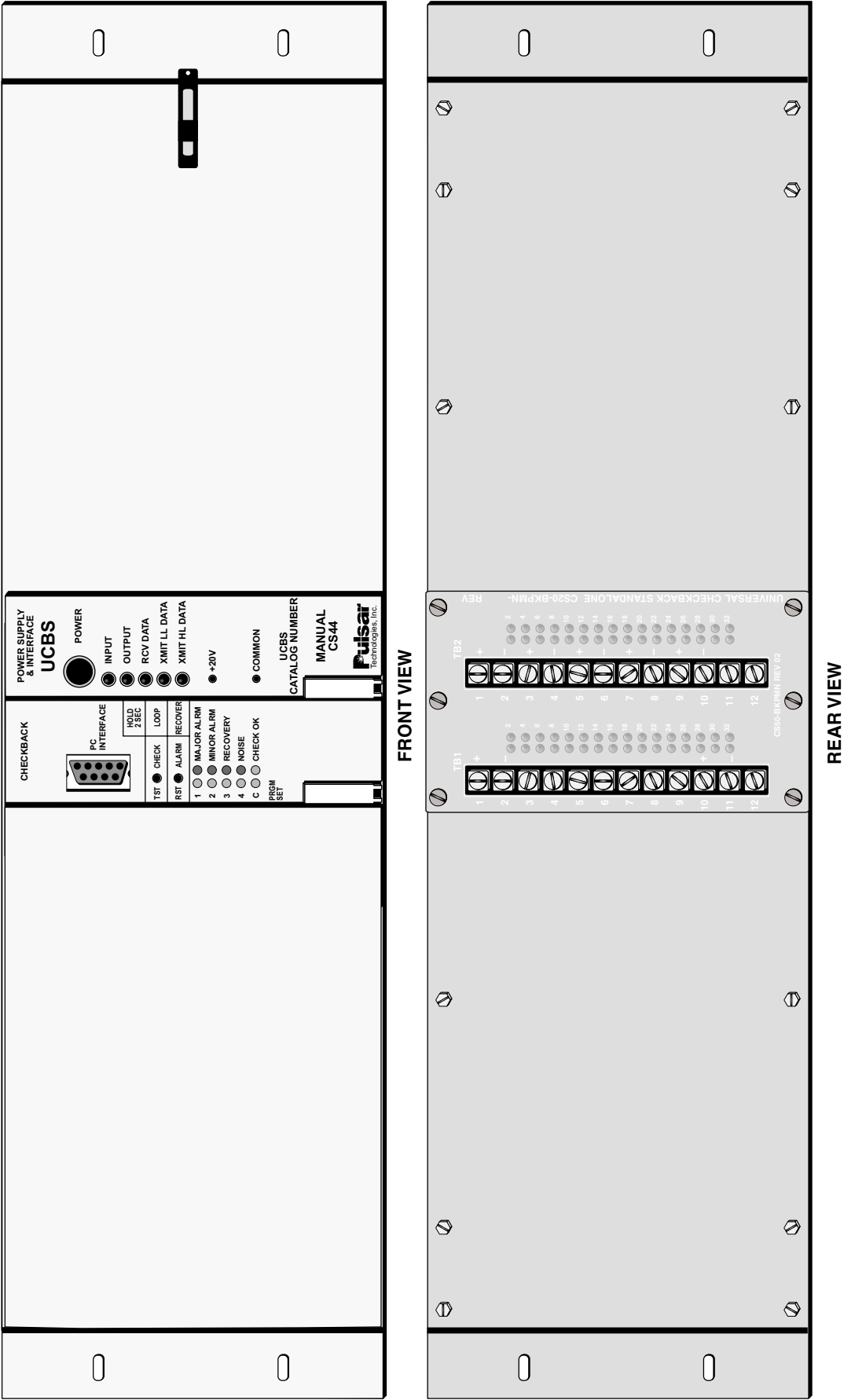
**REAR VIEW**

*Figure 1–5. UCBS 19" Wide Rack Mount Chassis (Front & Rear View).*

## *1.4 Ordering Information*

The UCBS's equipment identification number (catalog number) is located on the front panel, just to the left of the Checkback Module. The UCBS catalog number comprises six (6) characters, each in a specific position. This number identifies the modules installed in the unit, as well as the type of chassis or mounting hardware.

Table 1-1 provides a complete listing of the options for ordering a UCBS assembly, as well as a sample catalog number. To order one or more UCBS assemblies, simply identify the modules and features you want for each assembly. For example, the typical catalog number shown in Table 1-1 —U C B S 1 C — orders a UCBS assembly comprising the following:

- Universal Checkback Module/PC programmable

- Power Supply and Interface Module – 110/125 Vdc

- 19" Chassis with Front Cover

*Table 1–1. UCBS Catalog Numbers.*

| | Catalog Number Position | 1 2 3 4 | 5 | 6 |
|---|---|---|---|---|
| | **Typical Catalog Number** | **U C B S** | **1** | **C** |

**Application**

| Universal Checkback with Contact Interface | **UCBS** |
|---|---|

**DC/DC Converter Power Supply**

| 24 Vdc battery input | **3** |
|---|---|
| 48/60 Vdc battery input | **4** |
| 110/125 Vdc battery input | **1** |
| 220/250 Vdc battery input | **2** |

**Mounting**

| 3" Chassis with 19" Rack Mount Extension | **S** |
|---|---|
| 3" Chassis with Rear Mounted Angle Bracket | **R** |
| 3" Chassis with No Mounting Adapter | **N** |
| 19" Chassis with Front Cover | **C** |

In addition to the catalog number identifying a complete UCBS assembly, each module and chassis component has its own style number. You can use the style number to order individual modules and chassis components. A complete listing of the style numbers that make up the UCBS is provided in Table 1-2.

*Table 1–2. UCBS Module and Chassis Style Numbers.*

| Part Type | Module/Item Description | Style Number |
|---|---|---|
| Module | Universal Checkback Module/PC programmable | CC20-UCBMN-001 |
| Module | Power Supply & Interface Module – 48/60 Vdc | CS20-PWRMN-001 |
| Module | Power Supply & Interface Module – 110/125 Vdc | CS20-PWRMN-002 |
| Module | Power Supply & Interface Module – 220/250 Vdc | CS20-PWRMN-003 |
| Module | Power Supply & Interface Module – 24 Vdc | CS20-PWRMN-004 |
| Chassis | UCBS 3-inch wide Chassis | 1345D45G01 |
| Nameplate | For UCBS 3-inch wide Chassis | 1497B98H01 |
| Cover | Lexan cover for UCBS 3-inch wide Chassis | 1608C09G02 |
| Plate | 19" Rack Mount Extension for 3-inch wide Chassis | 1608C07H01 |
| Bracket | Rear-mounted Angle Bracket for 3-inch wide Chassis | 1608C59H01 |
| Mtg. Hardware | For UCBS 3-inch wide Chassis | 9654A93G01 |
| Chassis | UCBS 19-inch wide Chassis | 1354D45G01 |
| Nameplate | For UCBS 19-inch wide Chassis | 1496B80H05 |
| Cover | Lexan cover for UCBS 19-inch wide Chassis | 1606C49G01 |

## 1.5 UCBS System Specifications

The UCBS system meets or exceeds all applicable ANSI/IEEE standards. Tables 1-3 through 1-6 depict the system's size and weight dimensions, power requirements, alarm contact ratings, and environmental specifications.

### 1.5.1 Equipment Dimensions

Table 1-3 shows the UCBS equipment's (3"wide chassis) weight and dimensions.

*Table 1–3. Weight and Dimension Specifications.*

| Net Weight | | Height | | Width | | Depth | | Rack |
|---|---|---|---|---|---|---|---|---|
| lbs | Kg | inches | mm | inches | mm | inches | mm | Space |
| 6.0 | 2.72 | 5.25 | 133.4 | 4.75 | 120.7 | 12.0 | 304.9 | 3 RU |

### 1.5.2 Ratings

#### 1.5.2.1 Power Requiremnts

Table 1-4 shows the UCBS power requirement specifications.

*Table 1–4. Power Requirements.*

| Nominal Battery Voltage | Permissible Voltage Standby (Vdc) | Max Supply Current at Nominal Voltage (mA) |
|---|---|---|
| 24 | 19 – 35 | 150 |
| 48 | 38 – 70 | 80 |
| 125 | 72 – 145 | 50 |
| 250 | 170 – 290 | 35 |

#### 1.5.2.2 Output Ratings

- HL Key output Max current of 250mA continuous or switched at 15-300Vdc

- LL Key output Max current of 250mA continuous or switched at 15-300Vdc

### 1.5.2.3 Input Ratings

*Table 1–5. Power Supply/Interface Module Receive Input Ratings*

| Keying Voltage | | |
|---|---|---|
| Receive Input Jumper Setting | No Key < | Key at > |
| 24V (15V) | 8.5V | 10.5V |
| 48V | 32V | 38V |
| 125V | 80V | 91V |
| 250V | 160V | 182V |

< =less than > =greater than

**Ext. Test Init. & Alarm Reset Inputs**    Keying voltage 25-300Vdc (no jumpers)

Input current: <5mA for all voltages

### 1.5.2.4 Alarm Output Ratings

Table 1-6 shows the UCBS alarm output rating specifications.

*Table 1–6. Alarm Output Ratings.*

| **Power Supply Alarm** | Resistive 150W, 250Vac |
|---|---|
| **Major, Minor Alarms & 3 Prog. Outputs** | 15–300 Vdc, 1A Max. cont. or switched |

## 1.5.3 Environmental Specifications

Table 1-7 shows the UCBS environmental specifications.

*Table 1–7. Environmental Specifications.*

| **Ambient temperature range of air-contacting equipment** | –20 to +60°C |
|---|---|
| **Relative humidity** | Up to 95% at 40°C |
| **Altitude** | Up to 10,000 feet (3,048 meters) with 7°C reduction in maximum ambient temperature for each 5,000 feet (1,524 meters) of elevation above 2,500 feet (762 meters) |
| **Transient withstand Capability** | All external user interfaces meet SWC specifications of ANS C37.90.1 (1978) |
| **Dielectric** | Only isolated inputs and outputs, and all alarms; 2,500 Vdc from each terminal to ground, derated 100 Vdc for each 1,000 feet (305 meters) above 1,000 feet altitude. Meets requirements of IEEE STD 281-1984. |

## *1.6 Installation*

### 1.6.1 Unpacking

The UCBS is shipped in specifically designed cartons that protect the equipment against damage.

> ### ⚠ CAUTION
>
> *UNPACK EACH PIECE OF EQUIPMENT CAREFULLY SO THAT NO PARTS ARE LOST. INSPECT THE CONDITION OF THE UCBS AS YOU REMOVE IT FROM ITS CARTONS. ANY DAMAGE TO THE UCBS MUST BE REPORTED TO THE CARRIER. DAMAGES ARE THE RESPONSIBILITY OF THE CARRIER, AND ALL DAMAGE CLAIMS ARE MADE GOOD BY THE CARRIER. SEND A COPY OF ANY CLAIM TO PULSAR TECHNOLOGIES, INC.*

### 1.6.2 Storage

If you are setting the equipment aside before use, be sure to store it in its specific carton (in a moisture-free area) away from dust and other foreign matter.

### 1.6.3 Installation Location

Install the UCBS in an area which is free from:

- Temperature exceeding environmental limits (See "Environmental Requirements" in Chapter 1)
- Corrosive fumes
- Dust
- Vibration

### 1.6.4 Assembly

You can assemble the UCBS for use in any of the following configurations:

- Mounted in a fixed-rack cabinet.
- Mounted in a swing-rack cabinet
- Mounted on an open rack.

or in your own, customer-specified configuration. Refer to Figures 1-6, 1-7, and 1-8 for mounting dimensions.

> ### ⚠ CAUTION
>
> *IF YOU ARE USING THE UCBS WITH A SWING-RACK CABINET, MAKE SURE THAT THE CABINET IS FIRMLY FASTENED BEFORE OPENING THE RACK (TO PREVENT TIPPING).*

### 1.6.5 UCBS Rear Panel Connectors

You can make all connections to terminal block connectors that are accessible from the UCBS's rear panel. (See Figures 1-3 and 1-9)

**Universal Checkback Module Connections**

> TB2　Terminals 1–12
>
> TB1　Terminal 12

**Power Supply and Interface Module Connections**

> TB1　Terminals 2–11

Note that the maximum wire gauge you can use for the terminal block connections is #12 AWG, which requires a special rectangular lug to fit on the terminal block. For #14 AWG to #18 AWG wire, which is more commonly used, you can use standard ring tongue wire lugs.

If for any reason a lead goes to or comes from the switchyard, it should be a shielded twisted pair to reduce transients to below the surge withstand capability of ANS C37.90.1.

**MOUNTING EARS**

3.126

11.22

12.000

**REMOVABLE LEXAN COVER**

**PANEL CUT-OUT**

4.27

3.30

0.48

1.52

2.25

5.30

4.736

4.266

1.485

2.250

5.219
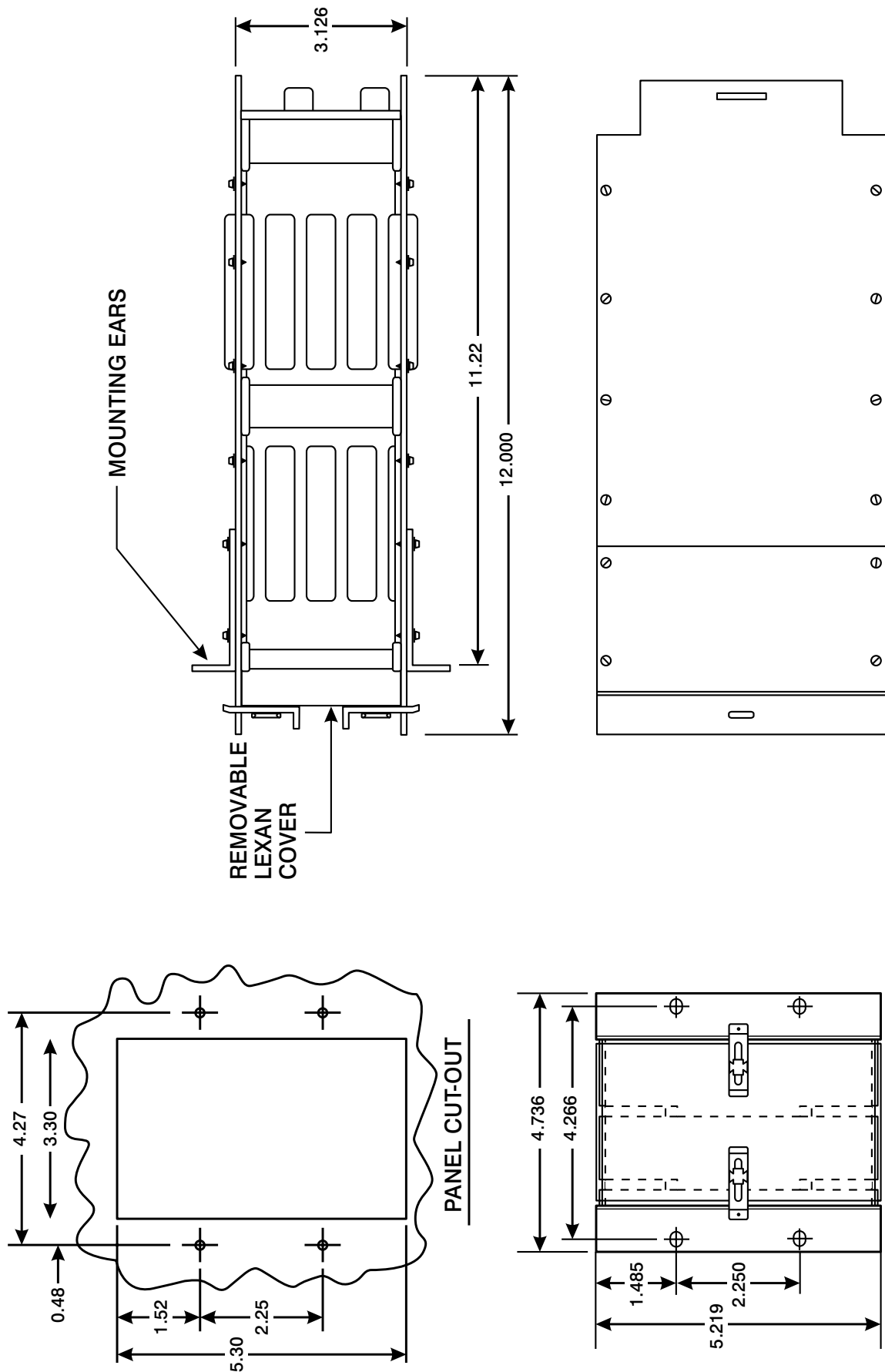
*Figure 1–6. UCBS 3" Wide Chassis Mechanical Outline Drawing and Mounting Configuration. (Sheet 1 of 2).*

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*Figure 1–7. UCBS 3" Wide Chassis Mechanical Outline Drawing and Mounting Configuration. (Sheet 2 of 2).*

REAR MOUNTING BRACKET (1608C59)

UNITSTRUT

**REAR MOUNTING**

19" OFFSET MOUNTING PLATE (1608C07)

MOUNTING HARDWARE (9648A93G01)

**19 INCH RACK MOUNTING**
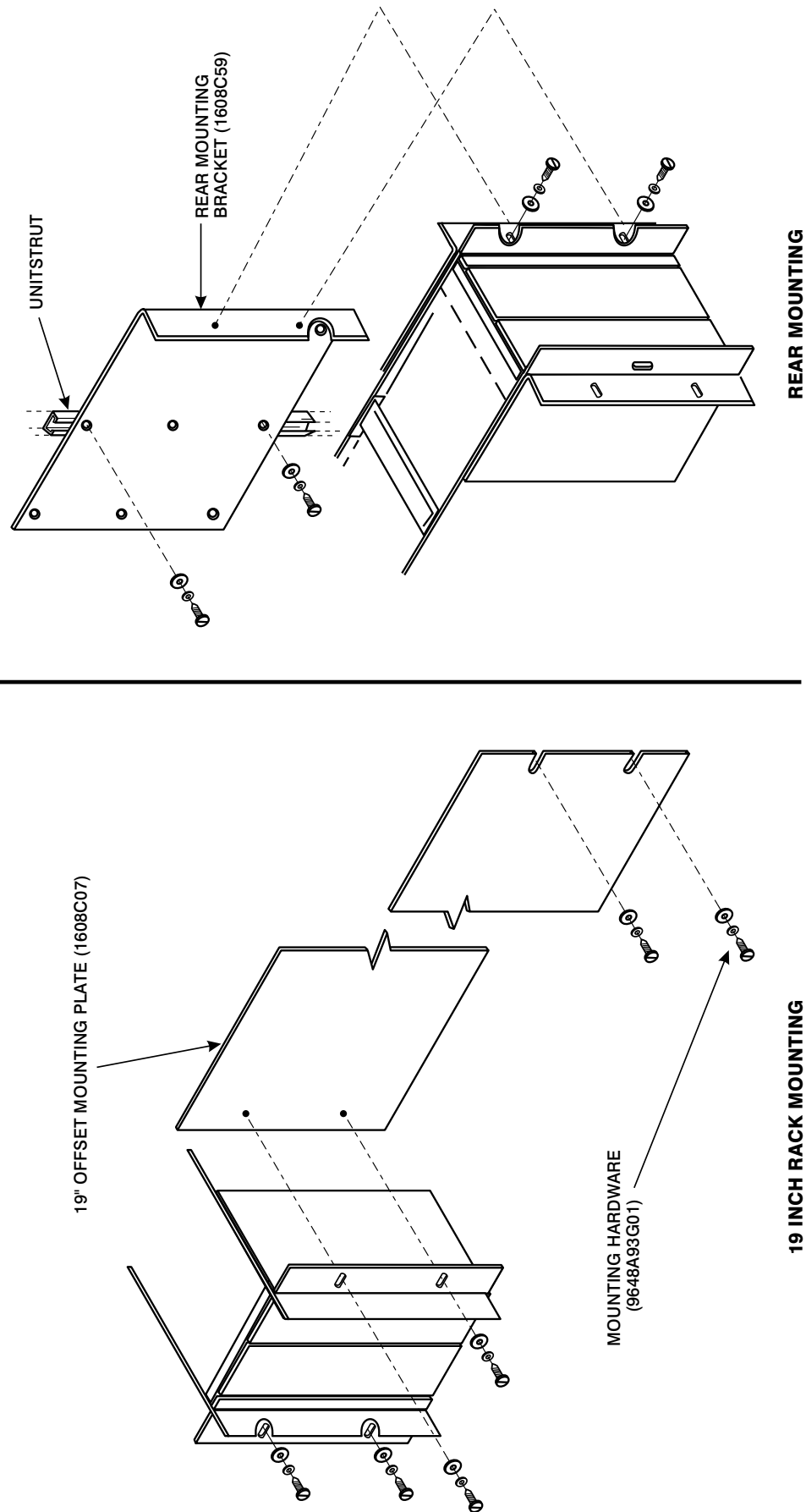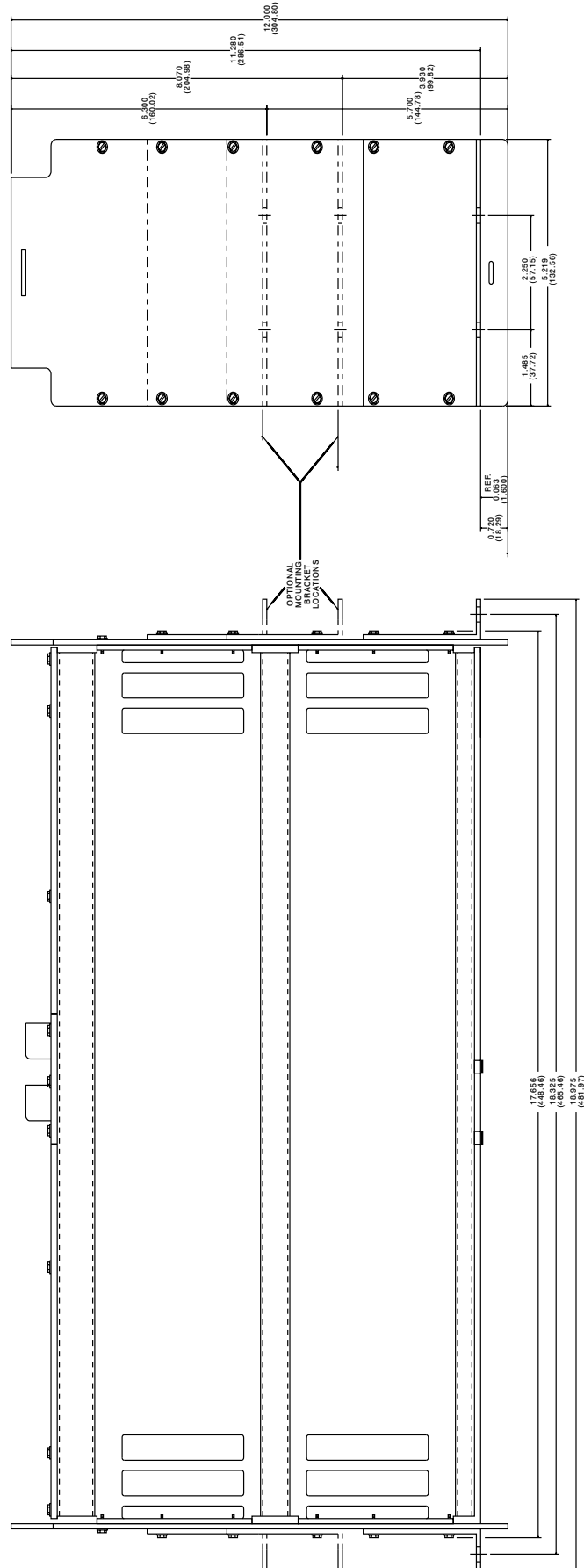
*Figure 1–8. UCBS 19" Wide Chassis Mechanical Outline Drawing.*

### Input/Output Pins of Modules

Pins labeled C and A provide 16 input/output connections per module (using even numbers 2 through 32 for all modules) as follow, when viewing the rear of the chassis:

- Power Supply and Interface (pins are to the right of TB2)

- Universal Checkback (pins are to the right of TB1)

## 1.6.6 DIP switch Controls

You set the dip switches during installation, according to your particular UCBS's features and applications (see Chapter 4).

### Power Supply and Interface PC Board

Refer to Chapter 3, Power Supply and Interface Module, for proper jumper selection. The following jumpers are provided on the Power Supply and Interface Module:

JMP1        dc fail alarm (NO/NC)

JMP2        A- Normally not conducting
            B- Normal conducting

JMP3        A- Normally not conducting
            B- Normal conducting

JMP4        Checkback receive input voltage
            (15/24, 48, 125, 250 V)

### Checkback PC Boards

Refer to Chapter 2, Universal Checkback Modules, for proper DIP switch selection. The Universal Checkback Module's DIP switch (SW3) provides five choices. The choices are one custom setting and four different factory settings. Refer to Table 1-7 for settings options.

*Table 1–8. Universal Checkback Module DIP Switch Settings.*

| S1 | S2 | S3 | S4 | Settings Option |
|----|----|----|----|-----------------|
| off | off | off | not used | Custom Settings Enabled |
| on | off | off | not used | Factory Preset #1 Settings |
| off | on | off | not used | Factory Preset #2 Settings |
| on | on | off | not used | Factory Preset #3 Settings |
| off | off | on | not used | Factory Preset #4 Settings |
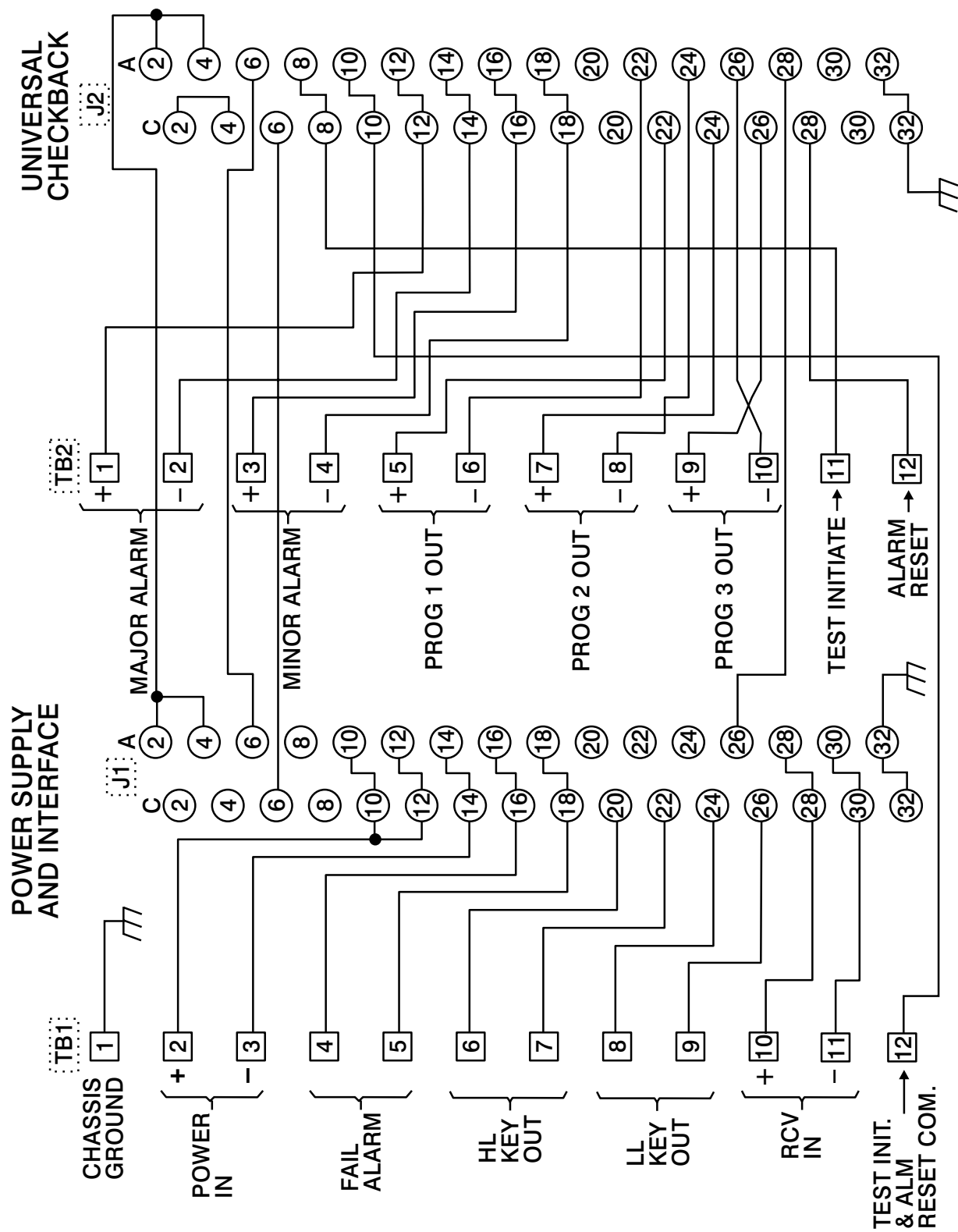
*Figure 1–9. UCBS Rear Panel Terminal Block Diagram.*

# *1.7 UCBS Maintenance*

For best results in operating your UCBS system, follow the maintenance procedures described below.

## 1.7.1 Periodic Checks

We recommend that you perform the following procedures every six months:

**Test Jacks (Power Supply and Interface Module front panel)**

- +20 Vdc, Red (TP1)
- Common, Black (TP2)

## 1.7.2 Routine Visual Inspection

Your routine visual inspection program should include checking for the following:

- Condition of the cabinet or other housing
- Tightness of the mounting hardware and fuses
- Proper seating of plug-in relays and subassemblies
- Condition of internal and external wiring (the point at which the external wiring enters the cabinet should be sealed)
- Appearance of printed circuit boards and components
- Signs of overheating in equipment:
  - Interference with proper heat dissipation from surfaces
  - Clogged air vents (air filters should be removed and washed out)
- Dust, which may cause short circuits

## 1.7.3 Solid State Maintenance Techniques

Use the following techniques when servicing solid state equipment.

> ### ⚠ CAUTION
>
> *YOU SHOULD NEITHER REMOVE NOR INSERT PRINTED CIRCUIT MODULES WHILE THE UCBS IS ENERGIZED. FAILURE TO OBSERVE THIS PRECAUTION CAN RESULT IN COMPONENT DAMAGE.*
>
> *ALL INTEGRATED CIRCUITS USED ON THE MODULES ARE SENSITIVE TO AND CAN BE DAMAGED BY THE DISCHARGE OF STATIC ELECTRICITY. BE SURE TO OBSERVE ELEC-TROSTATIC DISCHARGE PRECAUTIONS WHEN HANDLING MODULES OR INDIVIDUAL COMPONENTS.*

**Preliminary Precautions**

- To avoid damage to circuits and components from a current surge, disconnect the power before replacing or removing components or circuits.
- Before placing new components into a defective circuit, check the circuit so that it cannot damage the new components.

**Trouble Detection Sequence**

1. Evaluate test jack readings and other records of routine alignment.
2. Evaluate any symptoms detected audibly or visually.
3. Replace any suspected plug-in components.
4. Check the following to further isolate any faults:
   - Voltage readings
   - Resistance readings
   - Signal injection
   - Re-alignment

- Sensitivity measurements
- Gain measurements

5. Replace any suspected faulty components.

6. Check out and adjust any affected circuits.

## Servicing Components Soldered Directly to Terminals

When servicing components which are soldered directly to terminals, we recommend the following:

- Avoid overheating from soldering by using a low-wattage soldering iron (60 watt maximum).

- Make sure there is no current leakage from the soldering iron.

- When soldering leads from transistors or diodes, use a heat sink (such as alligator clips) to dissipate the heat from your device.

- Remove molten solder from the board with a solder sucker.

- When removing a multi-lead component from a printed circuit board, cut all leads first and then remove the leads individually to prevent overheating. If there are only a few leads, you can use a broad-tip soldering iron.

## Servicing Components Mounted Directly on Heat Sinks

When servicing components which are mounted directly on heat sinks, we recommend the following:

- Remove the heat sink and bracket from the chassis by loosening the securing devices.

- Remove any transistors or other devices from the heat sink.

- When replacing the transistor, diode, or other device, make certain that the device and the heat sink make secure contact for good heat dissipation. Also, make sure that you replace all insulators, washers, spring

washers, and other mounting hardware as you originally found them.

---

### ⚠ CAUTION

**AVOID THE POSSIBILITY OF ELECTROSTATIC DISCHARGE WHEN SERVICING METAL OXIDE SEMICONDUCTOR (MOS) DEVICES.**

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## Servicing Metal Oxide Semiconductor (MOS) Devices

MOS devices may be vulnerable to electrostatic discharge. We strongly recommend that you take the following special precautions before and during assembly.

Take these precautions before assembly:

- Avoid wearing silk or nylon clothing, as it contributes to static buildup.

- Avoid carpeted areas and dry environments.

- Discharge body static by placing both hands on a metal, earth-grounded surface.

Take these precautions during assembly:

- Wear a ground strap.

- Avoid touching electrically conductive circuit parts by hand.

- When removing a module from the chassis, always place it on a conductive surface which is grounded through a resistance of approximately 100 kilohms.

- Make sure that all electrically powered test equipment is properly grounded.

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**NOTE**

Before touching a module with a test probe, connect the ground lead from the test equipment to the module; always disconnect the test probe before removing the ground lead.

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## 1.8 Installation Tests

You may perform the following acceptance tests at your installation to determine compliance of your UCBS assembly with factory specifications, as described earlier in this chapter.

### 1.8.1 Preliminary Checks

We recommend that you begin the acceptance tests by performing the following preliminary checks:

**Check the Chassis Nameplate.**

- Verify that the proper dc supply voltage and module options are on the chassis nameplate.

- Check to ensure that all required modules are supplied and are installed in the proper chassis slots. The slots are labeled on the top edge of the chassis.

**Inspect for the Correct dc Voltage**

- With the power "OFF," remove the Power Supply Module and inspect it for the correct dc voltage, as specified in Table 1-8.

*Table 1–9. Voltage Specifications.*

| Specified | Style #<br>CS20-PWRMN |
|---|---|
| 48/60 V | 001 |
| 110/125 V | 002 |
| 220/250 V | 003 |
| 24 V | 004 |

### 1.8.2 Preliminary Settings

Typically, the Universal Checkback Module is already assembled when you receive it from the factory. By default, the module's DIP switch (SW3) is set to the Factory Preset #1 setting (see Table 1-7). If your Universal Checkback Module is already installed and the Factory Preset #1 setting is the configuration you want, skip step #2.

**To install and configure a new Universal Checkback Module**, complete the following steps.

### Step 1. Unpack the module.

Open the carton and remove the Universal Checkback Module assembly.

### Power Supply and Interface Module

Make the following preliminary settings for the Power Supply and Interface Module:

- JMP1  N.O./N.C. (loss of power condition)
- JMP2  Set according to your application
- JMP3  Set according to your application
- JMP4  Set according to your application

### Step 2. Set the UCBS DIP switch.

The DIP switch, labeled "SW3", is on the bottom left of the UCBS Module's PC board. The module reads the switch's setting at power-up to determine its configuration. Any changes to the switch's setting after power-up are ignored until you turn the power off and on again.

Referring to Table 1-7, set the DIP switch to the desired setting. Note that only S1-S3 are used; S4 is reserved for future use. To set S1-S3, put them in the up position for OFF and the down position for ON. You can set the DIP switch to one of five possible configurations. All other switch combinations (of S1-S3) are invalid. If you mistakenly set a different combination, the module assumes the "CUSTOM" mode.

If you set the DIP switch to one of the factory preset settings, the module is locked into that configuration. You cannot then customize the settings. The four factory preset configurations are

shown in Table 2-X. For descriptions of the individual settings, please see the "*Configuration Settings*" section in chapter 2.

If you set the DIP switch to the "CUSTOM" option, you can use your PC or laptop to configure the module any way you want. (See "*Using your PC to Communicate with the Universal Checkback Module*" for complete configuration instructions.)

> **NOTE**
>
> If you're not using a PC to access and program the UCBS module, please skip to step 8.

## Step 3. Connect your computer and establish communications.

Connect one end of a standard serial cable to the serial communications port on your computer and the other end to the DB9 (female) connector labeled "PC INTERFACE" on the module's front panel (see Figure 1-2). You don't need a null modem here, just a simple, straight cable.

Start a terminal emulation communication program (e.g., "Hyper Terminal" in Windows '95/98/NT, "Winterm" in Windows 3.1, or "Procomm" in DOS). Set the program's communication parameters as follows:

- Bits per second (data rate) = 9600
- Data bits (per word) = 8
- Stop bits = 1
- Parity = none
- Flow control (handshaking) = none

Because these are very common settings, you may only have to set the first one, bits per second (data rate).

Once you are connected, powered up and the communication program is set correctly, the module should return some information. If your screen seems to display part of the information but contains garble, you probably started your communication program right in the middle of the checkback module saying something. To clean it

up, clear the screen on your computer and give the checkback module a couple of seconds to redisplay.

At the password prompt (Enter password:), enter your password and press the ENTER key. The default password is "pulsar".

After you enter your password, the module displays the general settings on your computer screen.

## Step 4. Set the password.

Now is a good time to set your own password. You can change the password at any time using the "set password" command (see "*Issuing Checkback Commands*" in chapter 2 for complete instructions). Passwords can be from 0 to 10 characters long and are not case sensitive. That is, the module sees no difference between "ABC" and "abc". You can use both numbers and letters in a password, e.g., "abc123".

To change the password from "pulsar" to "mypassword", for example, type the following on the command line (Enter command:) and press the ENTER key:

**set pwd mypassword**

After you enter your new password once (or no password) the checkback module asks you to re-enter it for verification. When you re-enter it, the module completes the password change and tells you "Command Accepted".

Setting a password to nothing (i.e., just entering set pwd and pressing the ENTER key, then responding to the verification prompt by pressing ENTER again) disables the password system. Then just the ENTER key or any entry becomes a valid password. If you disable the password, the module flashes this warning: "Note: password will be disabled for this module".

If you later forget what the password is, see the "*Recovering Your Lost Password*" section 2.5.7 in chapter 2.

## Step 5. Set the time.

Set the module's time using the "set clock" command. For example, if the current time is

3:45:13 in the afternoon, type this and press the ENTER key:

> **set clock 15:45:13**

### Step 6. Set the date.

Set the module's date using the "set date" command. Because the checkback module is Y2K ready, you must enter a four-digit year. For example, if today's date is December 10, 2000, type this and press the ENTER key:

> **set date 12/10/2000**

### Step 7. Adjust other settings if needed.

At this point you can modify any other settings that are specific to your system, if the DIP switch is set to the "CUSTOM" setting. (See the "*Using Your PC to Communicate with the Universal Checkback Module*" and "*Configuration Settings*" sections in chapter 2.)

### Step 8. Initiate a manual checkback test.

If you have already installed the other module at the other terminal, and both are set (one to a Master function and the other(s) to a remote function), you can initiate a manual checkback test. Just press the upper momentary switch (labeled "TST") on the module's front panel. It does not matter if you are at a master or a remote; any module can initiate a checkback test. This final step proves whether the communications channel between all active modules is working.

Once you have set up your checkback modules, they may not need much attention. They will perform their automatic checkback tests for a long time without any special input from you. Sometimes, however, there may be a problem, or you may want to run special tests requiring you to interface with a checkback module. You can do that in one of three ways:

- Front panel switches
- Rear panel inputs
- Your PC or laptop computerPlease refer to chapter 2 for more information on how to use these methods of communicating with the Universal Checkback Module.

### 1.8.3 Checkback Module Tests

Program the Universal Checkback Modules as desired for your applications. (See Chapter 2 for complete settings information and testing instructions).

### 1.8.4 Power Supply and Interface Module Tests

1. Remove the Universal Checkback Module; leave the Power Supply and Interface Module in the chassis.

2. Turn "ON" the dc power.

   Both the Input (LED1) and Output (LED5) LEDs should be "ON".

   Measure the dc voltage at test jacks TP1 and TP2. The reading should be 20 Vdc ± 1 Vdc.

3. Turn "OFF" the dc power. Insert the Universal Checkback Module into its slot in the chassis.

4. Repeat Step 2 (above).

   Both LEDs (LED1 and LED5) should be "ON".

5. Place a current meter (Simpson 260 or equivalent) in series with the dc supply, and check the current for the appropriate voltage source, as follows:

| Voltage | Current |
|---------|---------|
| 24 Vdc | < 0.26 Amp |
| 48 Vdc | < 0.13 Amp |
| 125 Vdc | < 0.05 Amp |
| 250 Vdc | < 0.025 Amp |

## *1.9 Design Verification Test*

### 1.9.1 Optional Checkback Stand-alone system tests

**UCBS Setup Procedure**

Connect battery positive TB1-2, and battery negative to TB1-3..

**RS232 Communication setup**:

1. Connect one end of a standard serial cable to the serial communications port on your computer and the other end to the DB9 (female) connector labeled "PC INTERFACE" on the module's front panel. (Null modem not required).

2. Start a terminal emulation communication program (e.g., "Hyper Terminal" in Windows '95/98/NT, "Winterm" in Windows 3.1, or "Procomm" in DOS).

3. Set the program's communication parameters as follows:

   - Bits per second (data rate) = 9600

   - Data bits (per word) = 8

   - Stop bits = 1

   - Parity = none

   - Flow control (handshaking) = none

Once you are connected, powered up and the communication program is set correctly, the module should return some information. If your screen seems to display part of the information but contains garble, you probably started your communication program right in the middle of the checkback module saying something. To clean it up, clear the screen on your computer and give the checkback module a couple of seconds to redisplay.

At the password prompt, type "super". This will bring you to the Super Users Menu. Enter "5" to select the Manufacturing Tests mode. In this mode, most of the hardware of the UCB is being exercised.

**Using the Factory Tests mode:**

- Verifies the front panel LEDs.
- Verifies the LL keying.
- Verifies the HL keying.

**Pulsar**
Technologies, Inc.

• Verifies transfer of text data.

• Verifies the Received input.

• Verifies the front panel and external keying inputs.

• Verifies the DIP switch Position.

• Verifies all output circuits.

The display on your computer should look like Figure 1-10

**Verifying the front panel LEDs:**

You will see all the LEDs on the front panel of the UCB module cycling thru, one at a time along with the display on your PC.

```
  + -----------+
1 |   G   R   | MAJOR ALRM
2 |   G   R   | MINOR ALRM
3 |   G   R   | RECOVERY
4 |   G   R   | NOISE
C |   G   G   | CHECK OK
  + -----------+
(G=Green, R=Red)
```

```
                                                        Cycling Outputs
+------------------------------+              +----------------------+
| DIP switch now:  1111  |                    | User Output 1     |
+------------------------------+              +----------------------+
                              +---------------+
                  Factory 1  |   0      0   | Major Alarm
                         2  |   0      1   | Minor Alarm
                         3  |   0      0   | Carrier Recovery Mode
                         4  |   0      0   | High Noise
                  Custom  |   0      0   | Passed Checkback Test
                              +--------------+
 Panel Switches                                         Keying Outputs
+----+----------+                             +-----------------+
| 0 | Check |                                 |      Off        |
|    |            |              RX  Data Test   +-----------------+
| 0 | Alarm |    +--------------------------------------------------------+
+----+----------+  |                                                    |
                   +--------------------------------------------------------+

                  Hit ESC to quit
=================================================================
```

*Figure 1–10. UCBS Manufacturing tests mode.*

**Verifying the keying outputs:**

```
    Keying Outputs
+ ----------------+
|  Low Level  |
+ ----------------+
```

The keying outputs will cycle, High Level, Low Level, and Data Test.

You should see the corresponding LEDs (XMIT HL DATA and XMIT LL DATA) on the power supply/interface module come on, as the as the display cycles through. Using a DC voltmeter, reference to the battery neg., verify both 0 volts & battery pos. at TB1-7 (HL KEY OUT) and TB1-9 (LL KEY OUT).

**Verifying transfer of text data and the receive input circuits:**

```
                   RX  Data  Test
+ -----------------------------------------------------------+
|    The quick brown fox jumped over the lazy dog.  |
+ ----------------------------------------------------- +
```

During the "Data Test" cycle, the Rx Data Test box will begin to fill up with characters. ASCII characters are being transmitted to the 50 ohm load. Since we are setup for 2-wire operation, the received data is being sent back to the UCB module.

**Verifying the front panel and external keying inputs:**

```
     Panel Switches
+ ---+ --------------+
| 0 |  Check      |
|    |              |
| 0 |   Alarm    |
+ ---+ --------------+
```

Press the top pushbutton, "TST CHECK" on the front panel of the module being tested, and verify the following display, while the pushbutton is held in.

```
    Panel Switches
+ ---+ --------------+
| 1 |  Check      |
|    |              |
| 0 |   Alarm    |
+ ---+ --------------+
```

To verify external test input connections, apply 30 to 300Vdc (POS) to TB2-11 and verify the above display.

Press the bottom pushbutton, "RST ALARM" on the front panel of the module being tested, and verify the following display , while the pushbutton is held in.

```
    Panel Switches
+ ---+ --------------+
| 0 |  Check      |
|    |              |
| 1 |   Alarm    |
+ ---+ --------------+
```

To verify external Alarm reset connections, apply 30 to 300Vdc (POS) to TB2-12 and verify the above display.

**Verifying the DIP switch Position:**

```
+ -------------------------------+
|   DIP  Switch  now :  1111  |
+ -------------------------------+
```

The display is showing the status of SW3. A "1" is displayed for switches that are in the off (or up) position. With the UCB on an extender card, close one switch at a time. The "1" should change to a "0". After you have closed all 4 of the switches, you should see this.

```
+ -------------------------------+
|   DIP  Switch  now :  0000  |
+ -------------------------------+
```

**Verifying all output circuits:**

All of the Universal Checkback's output circuits are going to the terminal blocks at the rear of the carrier chassis. Using a DC voltmeter reference to the battery negative, verify both 0 volts and battery positive at each of the following terminal blocks.

- • TB2-1    Major Alarm Output
- • TB2-3    Minor Alarm Output
- • TB2-5    User Output 1
- • TB2-7    User Output 2
- • TB2-9    User Output 3

This concludes the Design Verification Test of the Universal Checkback Standalone assembly.

# Chapter 2. Universal Checkback Module

Table 2–1. Universal Checkback Module Style and Description.

| | |
|---|---|
| Schematic: | CC30-UCBMN |
| Parts Lists: | CC40-UCBMN |

| Style Number | Description |
|---|---|
| CC20-UCBMN-001 | Universal Checkback/PC programmable |

**Chapter Contents**

**2**

## *2.1 Description*

The Universal Checkback Module provides various ways to automatically or manually test the carrier channel. This new version of the module is a microprocessor-based design that can function either as a master or remote unit. It replaces the master (style numbers 1606C37G01 and 1606C37G02) and remote (style number 1606C38G01) Checkback Modules used in older systems. The module is designed for use both with the TC-10B "ON/OFF" carrier system and with other "ON/OFF" carrier systems using a UCBS. Its major features include:

- PC interface for controlling settings and operation
- On-line help
- User selectable encoded or timed carrier operation
- Three user programmable outputs
- Optional timed communication fallback
- Optional low power tests
- Optional carrier recovery
- Automatic checkback tests done either period- ically or at user-specified times
- Loopback test capability
- Remote communications
- Automatic clock synchronization

### PC Interface for Controlling Settings and Operation

You can control the module (and any other Universal Checkback Module in the network) by connecting your PC or laptop to the RS-232 interface on the module's front panel. If a PC or laptop is unavailable to the user then the on-board DIP switch can be used to select the standard factory settings.

### On-line Help

Valid commands and features are displayed when you enter "help" on the command line. You can get help at the level you need, from general help to command-specific help.

### Encoded or Timed Carrier Operation

The Universal Checkback Module lets you set your communication to a simple keyed on/off timed carrier or a more powerful encoded data message.

### Optional Timed Communication Fallback

The Primary Communication mode is initially used for checkback tests. If the primary mode is "encoded" and it fails and Timed Fallback Communication is enabled, the module attempts one more try using a simple timed communication mode. If that succeeds, the module only issues a minor alarm.

### Optional Low Power Tests

When enabled, the Universal Checkback Module performs checkback tests at both high and low power. The module issues a minor alarm if only the low power test fails, and a major alarm if the high power test fails.

### Optional Carrier Recovery

When enabled, the Universal Checkback Module starts "carrier recovery mode" after a failed checkback test. In carrier recovery mode, the "master" module initiates a checkback test using a more frequent user interval, for example, every 15 minutes. After three consecutive successful checkback tests, the "master" reverts to normal operation and sets the "carrier recovery output". Remotes in carrier recovery mode suspend all checkback tests and wait until they receive three good checkback tests from the "master". At that time they also resume normal operation.

### Automatic Checkback Tests done Periodically or at User-Specified Times

You can set the "master" checkback module to perform automatic checkback tests after the

interval you specify has elapsed (e.g., six hours), or at each of four specific times (e.g., 1:00, 13:00, 5:00, and 23:00). These four times specify the hour during which you want an automatic checkback test to occur.

### Loopback Test Capability

You can command a distant checkback module to energize its carrier for a duration you specify (e.g., 30 seconds), giving you time to set your local receiver's sensitivity or perform other tasks. Loopback tests are performed at both high and low power. In this case, the carrier is keyed on high power for 30 seconds, then low power for 30 seconds.

### Remote Communications

You can access a distant checkback module while connected to any checkback module in the network. This lets you get settings, events and counts, and allows you to change a module's settings, clear events, etc. from a module many miles away.

### Automatic Clock Synchronization

When enabled, the "master" checkback module synchronizes the clocks of all remotes in the network starting at 12:30 a.m.

### 2.1.1 Operating Controls

Unlike previous versions of the checkback module, the Universal Checkback Module has just one jumper, JMP1, which is reserved for future use. Instead, the module provides the following configuration and control options:

- A DIP switch that lets you select either one of four factory preset configurations or a "CUSTOM" option that allows you to set your own configuration

- Front panel switches that let you initiate checkback and loopback tests, clear alarms and the carrier recovery mode, and enable or disable the automatic testing functions

- Rear panel input connections that let you connect external switches to perform the same functions as the front panel switches

- A standard RS-232 (DB9 female) PC interface that lets you control the settings and operation of the module - as well as the other modules in the network - from your PC

**2**

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### ⚠ CAUTION

*Care should be taken when inserting or removing modules from the UCBS chassis. Modules should not be inserted or removed while the chassis has power supplied to it.*

---

Figure 2-1 provides a simplified look at the module's function as part of a UCBS. The UCBS Power Supply/Interface Module, after receiving checkback data from another carrier set, sends it to the Universal Checkback Module. You can also send, or input, data directly to the module through the "input" connections on the rear panel or, using your PC, through the RS-232 interface connection on the module's front panel. Regardless of the method of input, the module responds to the incoming data as it is configured to do. The module outputs its data back through the UCBS Power Supply/Interface Module. The module also has five output connections, located on the rear panel. Two of these are permanently set to MAJOR ALARM and MINOR ALARM. You can configure the remaining three with one of five choices:

- Delayed alarm
- Test in progress
- Successful test
- Successful carrier recovery
- Disable automatic tests

### 2.1.2 System Assemblies

To test the carrier signal for a TC-10B carrier system, or network, install a Universal Checkback Module in the "Checkback" slot of each TC-10B chassis in the network. For other "ON/OFF" carrier systems, install a Universal Checkback Module in each "Universal Checkback Standalone (UCBS)" chassis in the network.
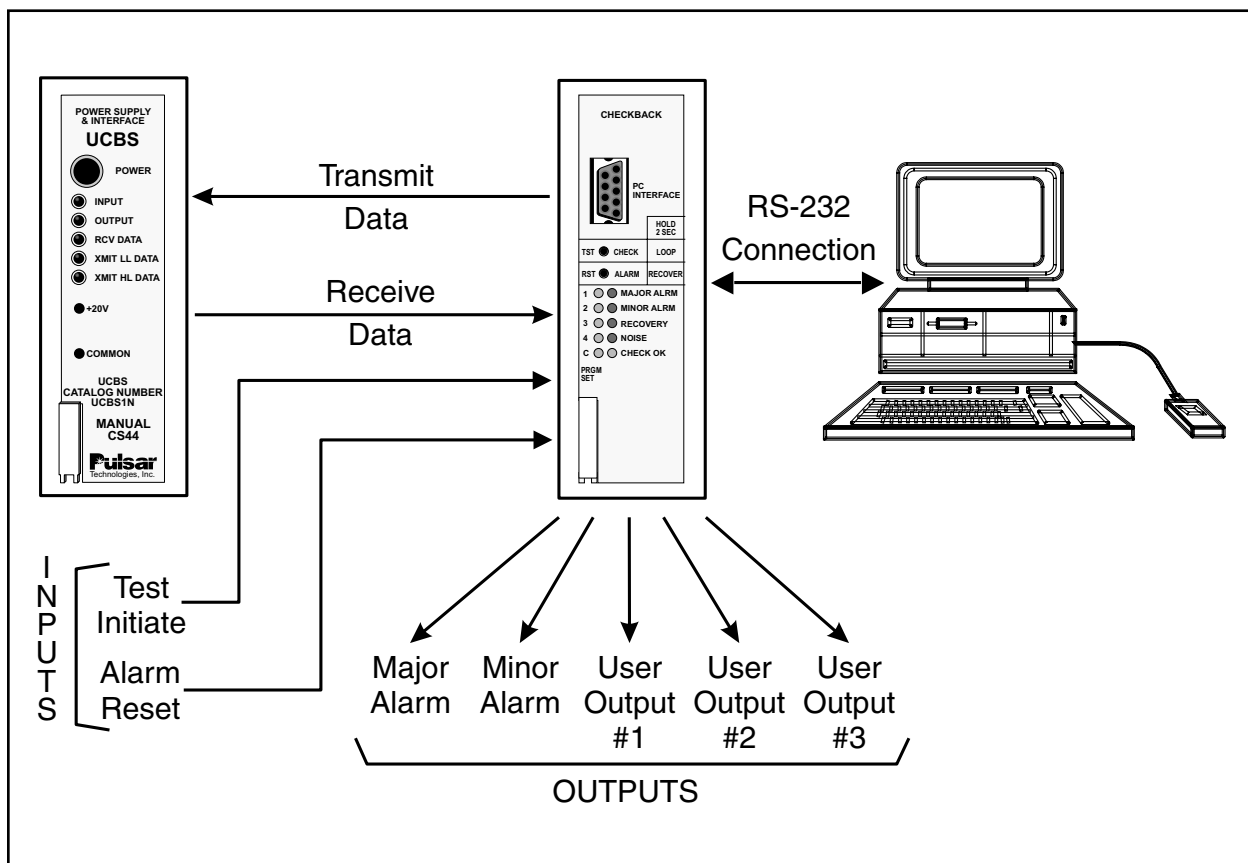


*Figure 2–1. Universal Checkback as part of a UCBS*

### 2.1.3 System Configuration

The simplest network configuration for the Universal Checkback Module comprises two modules: one designated as the master; the other as the remote. The maximum number of modules you can have in a network depends on their Primary Communication Mode setting. This setting may be either "timed" or "coded". With the "timed" setting, you can have up to five checkback modules in a network,: one master and four remotes, as shown in Figure 2-2. With the "coded" setting, you can have up to eleven checkback modules in a network: one master and ten remotes, as shown in Figure 2-3.

**2**
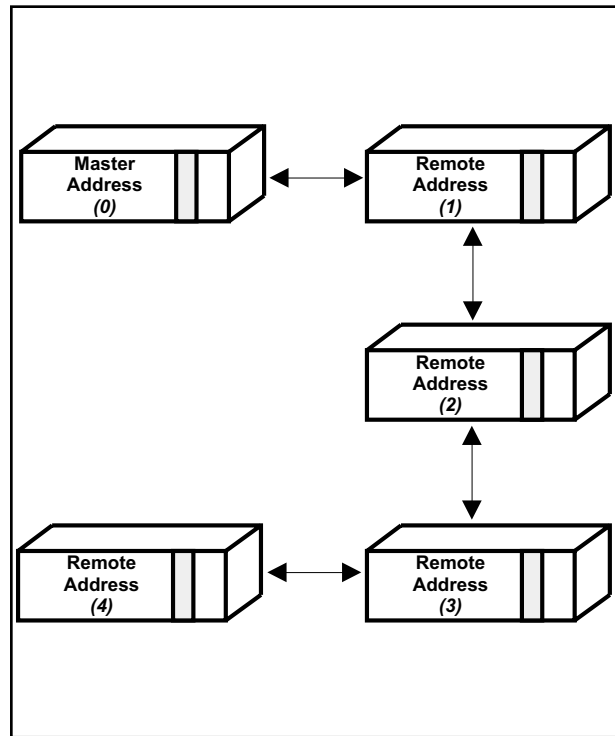
*Figure 2–2. Maximum Checkback Configuration with Timed Communications Mode*
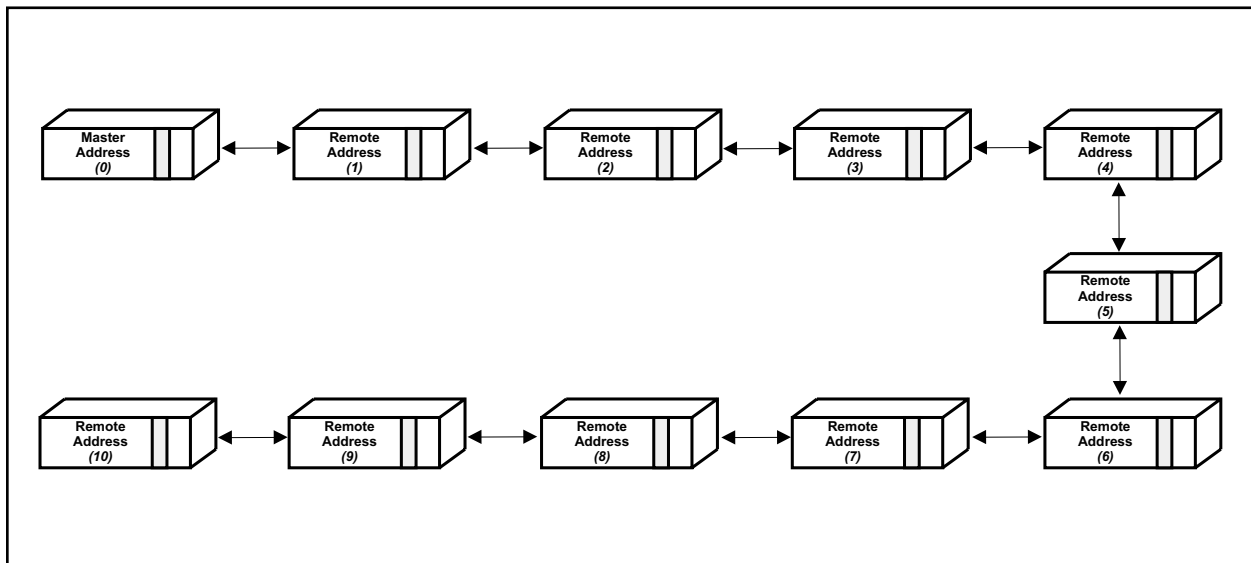
*Figure 2–3. Maximum Checkback Configuration with Coded Communications Mode*

### 2.1.4 Front Panel

The front panel (see Figure 2-4) of the Universal Checkback Module has a PC connector, two momentary switches, and ten LEDs. All of these are described later in this chapter.

### 2.1.4.1 PC Interface

The top of the front panel has a DB9 female connector labeled "PC INTERFACE" (see Figure 2-4). This connector is provided so that you can plug in a serial cable connected to a serial communication port on your PC or laptop. This should be a standard cable without a null modem. Once connected, you can control the module (and any other Universal Checkback Modules in the network) from your PC or laptop. For complete information on using your PC to control the module, please see the "*Using Your PC to Communicate with the Universal Checkback Module*" section later in this chapter.

### 2.1.4.2 Front Panel Switches

Just beneath the PC interface on the front panel are two recessed, momentary switches labeled "TST" and "RST" (see Figure 2-4). As shipped from the factory, the simplest way to interface with the Universal Checkback Module is through these two switches. You can use the top switch ("TST") to initiate tests and the bottom ("RST") for clearing data or canceling the carrier recovery mode. Here is how they work:

TST (TEST)    Pressing and releasing this switch initiates a checkback test. Pressing and holding this switch for at least two seconds initiates a loopback test.

RST (RESET)    Pressing and releasing this switch clears any (major or minor) alarms. Pressing and holding this switch for at least two seconds clears the carrier recovery mode.
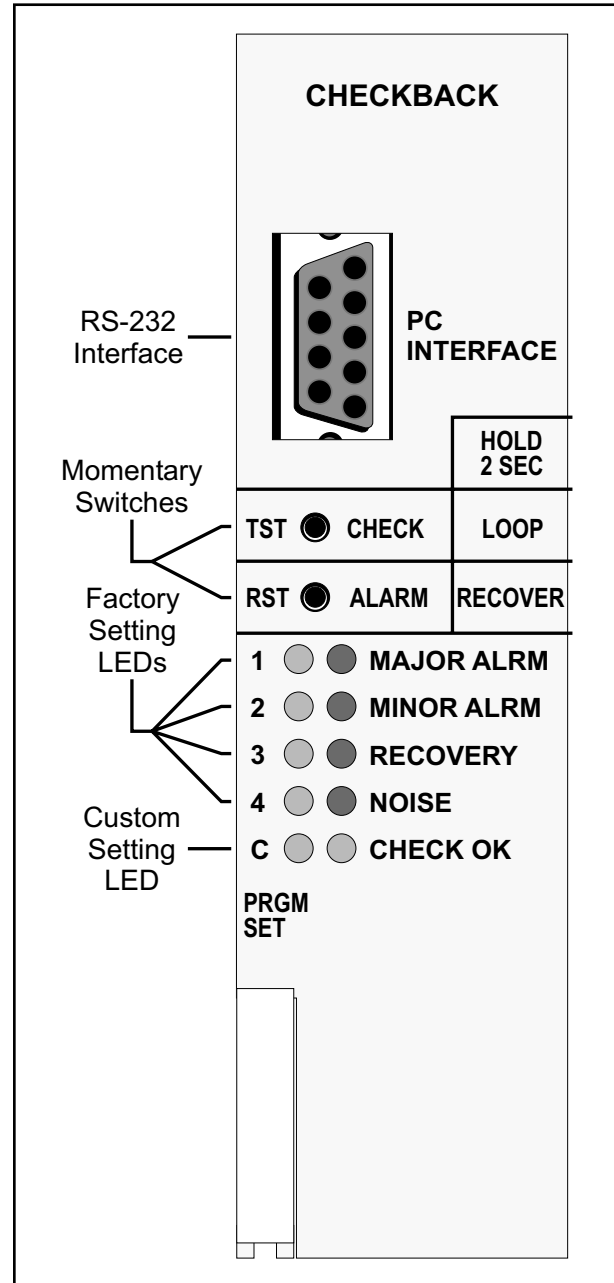


*Figure 2–4. Universal Checkback Module — (Front panel Controls and Indicators)*

**TST+RST**  Pressing and releasing both switches simultaneously toggles the automatic test state. For example, if auto tests are enabled, they become disabled. They are re-enabled after you press these two again. Note that when you disable automatic testing, all front panel LEDs, except the one labeled "CHECK OK" and the one representing the active settings option, begin to flash. When you press the switches again and re-enable automatic testing, the LEDs stop flashing.

### 2.1.4.3 Front Panel LEDs

The module's front panel has ten LEDs. When you first power up the module, all ten LEDs flash momentarily. After that, they all go off, except the green LED on the left that indicates the current DIP switch settings. The LEDs work as follows:

LED   Function

1   When lit, this green LED indicates that the module's DIP switch is set to Factory Preset #1.

2   When lit, this green LED indicates that the module's DIP switch is set to Factory Preset #2.

3   When lit, this green LED indicates that the module's DIP switch is set to Factory Preset #3.

4   When lit, this green LED indicates that the module's DIP switch is set to Factory Preset #4.

C   When lit, this green LED indicates that the module's DIP switch is set to Custom Settings Enabled.

**MAJOR ALRM–**When lit, this red LED indicates that the module has failed the high power (10 W) checkback test.

**MINOR ALARM–**When lit, this red LED indicates that the module has failed the low power (1W) checkback test.

**RECOVERY–**When lit, this red LED indicates that the module is in carrier recovery mode (after a failed checkback test).

**NOISE–**When flashing, this red LED indicates that the module has experienced a high number of spurious messages within a two-minute period.

**CHECK OK–**When lit, this green LED indicates that the most recent checkback test (since the module was activated) was successful. When not lit, it indicates either that the most recent checkback test was not successful or that no checkback test has occurred since the module was activated.

### 2.1.5 Rear Panel Connections

The module's rear panel terminal block connections are shown in Figure 3-5 and Figure 3-6. As described below, the module has both input and output connections.

### 2.1.5.1 Inputs

TB2-12 & TB1-12

**RESET–**Momentarily closing the switch connected here clears any (major or minor) alarms. Closing the switch connected here for more than two seconds clears the module from carrier recovery mode.

TB2-11 & TB1-12

**TEST**–Momentarily closing the switch connected here initiates a checkback test. Closing the switch connected here for more than two seconds initiates a loopback test.

2

Note that closing both of the connected switches above at the same time toggles the module's automatic test state setting. For example, if auto tests are enabled, they become disabled. They are re-enabled after you close these two again. Note that when you disable automatic testing, all front panel LEDs, except the one labeled "CHECK OK" and the one representing the active settings option, begin to flash. When you press the switches again and re-enable automatic testing, the LEDs stop flashing.

## 2.1.5.2 Outputs

Although all checkback module outputs are actually solid state circuits, you can configure each of the five outputs to be either a normally open or a normally closed relay output. The module's Energized State setting (see "*Using Your PC to Communicate with the Universal Checkback Module*" later in this chapter) shows what an output does when its condition is true. For example, if a module fails a high power checkback test, it sets the major alarm. If you've programmed the MAJOR ALARM output to close when energized, this output closes immediately after the module fails the checkback test. After the module has passed a test, this output opens.

The MAJOR ALARM and MINOR ALARM outputs described below are permanently set. You can configure the remaining three with one of five choices:

**Delayed Alarm**–(Output set after a module fails to recover from auto recovery before the Carrier Recovery Window expires.)

**Test In Progress**–(Output set by the module initiating a checkback test for the duration of the test.)

**Successful Test**–(Output set after passing a checkback test.)

**Successful Carrier Recovery**–(Output set for one second after a successful recovery from automatic recovery mode.)

**Disable Automatic Tests**–(Output set when the user has disabled automatic checkback tests.)

You can program the two alarm outputs to seal or just momentarily toggle when an alarm occurs. When you select sealed operation, the alarm outputs stay in their true, or energized, states as long as the alarm exists. If you select momentary, the outputs go to their true states for only five seconds, then return to their previous states. For example, assume alarms are set to momentary action and the major alarm active state is closed. Normally this output is open. When a major alarm occurs, the MAJOR ALARM output closes for five seconds then opens again. The MAJOR ALARM output does not change (again) when the major alarm is cleared.

TB2-1(+) & TB2-2(−)

**MAJOR ALARM**–This output is energized (i.e., opened or closed) when the module fails a high power (10W) checkback test. If it is set for sealed operation, the output returns to its un-energized state when the module passes a high power checkback test. If it is set for momentary operation, it returns to its un-energized state after five seconds.

TB2-3(+) & TB2-4(−)

**MINOR ALARM**–This output is energized (i.e., opened or closed) when the module fails a low power (1W) checkback test. If it is set for sealed operation, the output returns to its un-energized state when the module passes a low power checkback test. If it is set for momentary operation, it returns to its un-energized state after five seconds.

TB2-5(+) & TB2-6(−)

**USER DEFINED 1**–This output is energized when the condition (one of the five listed above) you have programmed it to monitor becomes true. It remains energized until the condition is no longer true. It then reverts to its former state.

TB2-7(+) & TB2-8(–)

> **USER DEFINED 2**–This output is energized when the condition (one of the five listed earlier) you have programmed it to monitor becomes true. It remains energized until the condition is no longer true. It then reverts to its former state.

TB2-9(+) & TB2-10(–)

> **USER DEFINED 3**–This output is energized when the condition (one of the five listed earlier) you have programmed it to monitor becomes true. It remains energized until the condition is no longer true. It then reverts to its former state.

### 2.1.6 PC Board

The component layout for the Universal Checkback Module's PC board is shown in Figure 2-11. The module's PC board does not have any operator controls. The only "user" settings are those on the DIP switch labeled "SW3." This switch lets you select either one of four factory preset configurations or a "CUSTOM" option that allows you to set your own configuration, using a connected PC or laptop. For complete instructions on setting the DIP switch, please see the "*Installation and Setup*" section later in this chapter.

## *2.2 Installation and Setup*

Typically, the Universal Checkback Module is already installed in the TC-10B Carrier set or UCBS chassis when you receive it from the factory. By default, the module's DIP switch (SW3) is set to the Factory Preset #1 setting (see Table 2-3). If your Universal Checkback Module is already installed and the Factory Preset #1 setting is the configuration you want, skip the first three steps.

**To install and configure a new Universal Checkback Module**, complete the following steps.

### Step 1. Unpack the module.

Open the carton and remove the Universal Checkback Module.

### Step 2. Set the DIP switch.

The DIP switch, labeled "SW3", is on the bottom left of the Module's PC board. The module reads the switch's setting at power-up to determine its configuration. Any changes to the switch's setting after power-up are ignored until you turn the power off and on again.

Using Table 2-2 & Fig. 2-11 as guides, set the DIP switch to the desired setting. Note that only S1-S3 are used; S4 is reserved for future use. To set S1-S3, put them in the up position for OFF and the down position for ON. You can set the DIP switch to one of five possible configurations. All other switch combinations (of S1-S3) are invalid. If you mistakenly set a different combination, the module assumes the "CUSTOM" mode.

If you set the DIP switch to one of the factory preset settings, the module is locked into that configuration. You cannot then customize the

**2**

*Table 2–2. Universal Checkback Module DIP Switch Settings.*

| S1 | S2 | S3 | S4 | Settings Option |
|---|---|---|---|---|
| off | off | off | not used | Custom Settings Enabled |
| on | off | off | not used | Factory Preset #1 Settings |
| off | on | off | not used | Factory Preset #2 Settings |
| on | on | off | not used | Factory Preset #3 Settings |
| off | off | on | not used | Factory Preset #4 Settings |

*Table 2–3. Factory Preset Configuration Options.*

| Setting | Factory #1 | Factory #2 | Factory #3 | Factory #4 |
|---|---|---|---|---|
| Address | Master | Remote #1 | Master | Remote #1 |
| Primary Comm | coded | coded | Timed | Timed |
| Fallback Time Mode | enabled | enabled | disabled | disabled |
| Last Remote | 1 | 1 | 1 | 1 |
| Interval Type | periodic | periodic | periodic | periodic |
| Auto Carrier Recovery | enabled | enabled | enabled | enabled |
| Auto Checkback Tests | enabled | enabled | enabled | enabled |
| Retries | 3 | 3 | 3 | 3 |
| Low Power Tests | enabled | enabled | enabled | enabled |
| User Output 1 Energized State | Closed | Closed | Closed | Closed |
| User Output 2 Energized State | Closed | Closed | Closed | Closed |
| User Output 3 Energized State | Closed | Closed | Closed | Closed |
| Major Alarm Energized State | Closed | Closed | Closed | Closed |
| Minor Alarm Energized State | Closed | Closed | Closed | Closed |
| User Output 1 Definition | delayed alarm | delayed alarm | delayed alarm | delay alarm |
| User Output 2 Definition | test in progress | test in progress | test in progress | test in progress |
| User Output 3 Definition | passed test | passed test | passed test | passed test |
| Alarm Output Action | sealed | sealed | sealed | sealed |
| Checkback Time 1 | 6:00 | 6:00 | 6:00 | 6:00 |
| Checkback Time 2 | 12:00 | 12:00 | 12:00 | 12:00 |
| Checkback Time 3 | 18:00 | 18:00 | 18:00 | 18:00 |
| Checkback Time 4 | 0:00 | 0:00 | 0:00 | 0:00 |
| Checkback Period | 8 hours | 8 hours | 8 hours | 8 hours |
| Loopback Duration | 20 sec. | 20 sec. | 20 sec. | 20 sec. |
| Carrier Recovery Period | 60 min. | 60 min. | 60 min. | 60 min. |
| Carrier Recovery Window | 3 hours | 3 hours | 3 hours | 3 hours |
| Automatic Clock Sync | enabled | enabled | enabled | enabled |

settings. The four factory preset configurations are shown in Table 2-3. For descriptions of the individual settings, please see the "*Configuration Settings*" section later in this chapter.

If you set the DIP switch to the "CUSTOM" option, you can use your PC or laptop to configure the module any way you want. (See "*Using your PC to Communicate with the Universal Checkback Module*" for complete configuration instructions.)

### Step 3. Insert the module into the carrier chassis.

Power down your UCBS chassis. Carefully insert the Universal Checkback Module into the top and bottom grooves of the slot labeled "CHECKBACK". Lock it into place using the white inject/eject lever on the front of the module. Power up the chassis. After a few seconds, all Checkback LEDs come on. Within a second, they all turn off except for one of the five DIP switch LEDs. This LED indicates which configuration the DIP switch is set to (see "*Front Panel LEDs*" earlier in this chapter).

### Step 4. Connect your computer and establish communications.

Connect one end of a standard serial cable to the serial communications port on your computer and the other end to the DB9 (female) connector labeled "PC INTERFACE" on the module's front panel (see Figure 2-4). You don't need a null modem here, just a simple, straight cable.

Start a terminal emulation communication program (e.g., "Hyper Terminal" in Windows '95/98/NT, "Winterm" in Windows 3.1, or "Procomm" in DOS). Set the program's communication parameters as follows:

- Bits per second (data rate) = 9600
- Data bits (per word) = 8
- Stop bits = 1
- Parity = none
- Flow control (handshaking) = none

Because these are very common settings, you may only have to set the first one, bits per second (data rate).

Once you are connected, and the communication program is set correctly, the module should return some information. Your computer screen should look something like the one in Figure 2-5.

```
+-------------------------+   Locally Logged on to 1  +----------------------------------+
| Bad Msg Rate: 0   |                               | 10:44:16     12/10/1998     |
| Normal Noise      |                               |   Periodic Time: 0:02:10    |
+-------------------------+                          +----------------------------------+

              Remote 1  Checkback  Module  Configuration
Primary  Comm.  Mode: Coded    Fallback Timed Comm: Enabled     Last Remote:
1
Interval  Type: Periodic  Carr Recovery:  On    Retries: 3   Auto Tests: On
DIP Switch: Custom  -   Settings match: Factory 2  Low Power Tests: Enabled


 Outputs       Energized State      User Definition  Alarm Action
User defined 1    Close           Test in Progress  Sealed (fixed)
User defined 2    Close             Delayed Alarm    Sealed (fixed)
User defined 3    Close            Successful Test  Sealed (fixed)
Major Alarm       Close             -----       Sealed
Minor Alarm       Close             -----       Sealed

Checkback Time 1-4:  6:00,  12:00,  18:00,  0:00  - Inactive
Checkback Period:  8 hours    Loopback Duration:  20 secs
Carrier Recovery Period: 60 mins   Carrier Recovery Window:  3 hours
Auto Sync Time:  Enabled   Clock: 10:44:35  12/10/1998

Enter command:
```

*Figure 2–5. Initial Communication with the Checkback Module.*

The box in the upper left corner gives some idea of the amount of noise on the carrier line. When a checkback module receives a spurious message, it is usually due to line noise. The "Bad Msg Rate" shows how many spurious messages a module has seen in the last fifteen seconds. Also, the front panel LED labeled "NOISE" flashes if a module has seen a high number of spurious messages within a two-minute period. If the noise level gets too high, you will have problems communicating between checkback modules, and non-checkback communications may be affected as well.

The box in the upper right corner shows the module's current time and date. Beneath that you can see the amount of time elapsed since the last checkback test was sent or received. This timer is reset when a module is powered up.

If your screen seems to display part of the above information but contains garble, you probably started your communication program right in the middle of the checkback module saying something. To clean it up, clear the screen on your computer and give the checkback module a couple of seconds to redisplay.

At the password prompt (Enter password:), enter your password and press the ENTER key. The default password is "pulsar".

After you enter your password, the module displays the general settings on your computer screen. The module you are logged on to is identified at the top of the screen. Figure 2-6 shows a sample configuration.

## Step 5. Set the password.

Now is a good time to set your own password. You can change the password at any time using the "set password" command (see "*Issuing Checkback Commands*" later in this chapter for complete instructions). Passwords can be from 0 to 10 characters long and are not case sensitive. That is, the module sees no difference between "ABC" and "abc". You can use both numbers and letters in a password, e.g., "abc123".

To change the password from "pulsar" to "mypassword", for example, type the following on the command line (Enter command:) and press the ENTER key:

**set pwd mypassword**

After you enter your new password once (or no password) the checkback module asks you to re-enter it for verification. When you re-enter it, the module completes the password change and tells you "Command Accepted".

Setting a password to nothing (i.e., just entering set pwd and pressing the ENTER key, then responding to the verification prompt by pressing ENTER again) disables the password system. Then just the ENTER key or any entry becomes a valid password. If you disable the password, the module flashes this warning: "Note: password will be disabled for this module".

If you later forget what the password is, see the "*Recovering Your Lost Password*" section 2.5.7 later in this chapter.

```
+-------------------------+   Locally Logged on to 1   +----------------------------------+
| Bad Msg Rate: 0    |                                 | 10:44:16     12/10/1998    |
| Normal Noise       |                                 |   Periodic Time: 0:02:10     |
+-------------------------+                             +----------------------------------+
Event 1)  Communications Error          11/24/1998  Time:  12:58:49.026



Enter command:

```

*Figure 2–6. Sample Checkback Module Configuration.*

## Step 6. Set the time.

Set the module's time using the "set clock" command. For example, if the current time is 3:45:13 in the afternoon, type this and press the ENTER key:

**set clock 15:45:13**

## Step 7. Set the date.

Set the module's date using the "set date" command. Because the checkback module is Y2K ready, you must enter a four-digit year. For example, if today's date is December 10, 2000, type this and press the ENTER key:

**set date 12/10/2000**

## Step 8. Adjust other settings if needed.

At this point you can modify any other settings that are specific to your system, if the DIP switch is set to the "CUSTOM" setting. (See the "*Using Your PC to Communicate with the Universal Checkback Module*" and "*Configuration Settings*" sections later in this chapter.)

## Step 9. Initiate a manual checkback test.

If you have already installed another module in the system, and both are set, you can initiate a manual checkback test. Just press the upper momentary switch (labeled "TST") on the module's front panel. It does not matter if you are at a master or a remote; any module can initiate a checkback test. This final step proves whether the communications channel between all active modules is working.

Once you have set up your checkback modules, they may not need much attention. They will perform their automatic checkback tests for a long time without any special input from you. Sometimes, however, there may be a problem, or you may want to run special tests requiring you to interface with a checkback module. You can do that in one of three ways:

- Front panel switches
- Rear panel inputs
- Your PC or laptop computer

The following sections tell you how to use these three methods of communicating with the Universal Checkback Module.

## *2.3 Communicating through the Front Panel*

As shipped from the factory, the simplest way to interface with a Universal Checkback Module is through the two momentary switches on the front panel. The top switch is used to initiate tests and the bottom for clearing data or canceling the carrier recovery mode. The instructions are simple:

**To initiate a checkback test manually:** Press and release the top switch (TST).

**To request a loopback test:** Press and hold the top switch (TST ) for at least two seconds.

**To clear alarms:** Press and release the bottom switch (RST).

**To clear "carrier recovery mode":** Press and hold the bottom switch (RST) for at least two seconds

**To enable/disable the automatic testing functions:** Press both switches simultaneously. (This toggles the automatic test state. When you disable automatic testing, all front panel LEDs, except the one labeled "CHECK OK" and the one representing the active settings option, begin to flash. When you press the switches again and re-enable automatic testing, the LEDs stop flashing.)

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## 2.4 Communicating through the Rear Panel

An alternative method of communicating with the Universal Checkback Module is through its rear panel. You can connect two external "input" switches to the rear panel (see "*Rear Panel Connections*" earlier in this chapter). You can use these switches to perform the same functions as the module's own front panel switches. Here is how:

**To initiate a checkback test manually:** Close and quickly open the switch connected to TB6-1 & TB6-2.

**To request a loopback test:** Close for at least two seconds the switch connected to TB6-1 & TB6-2.

**To clear alarms:** Close and quickly open the switch connected to TB7-5 & TB6-2.

**To clear "carrier recovery mode":** Close for at least two seconds the switch connected to TB7-5 & TB6-2.

**To enable/disable the automatic testing functions:** Close both switches simultaneously. (This toggles the automatic test state. When you disable automatic testing, all front panel LEDs, except the one labeled "CHECK OK" and the one representing the active settings option, begin to flash. When you press the switches again and re-enable automatic testing, the LEDs stop flashing.)

## 2.5 Using Your PC to Communicate with the Universal Checkback Module

The most comprehensive method of communicating with the Universal Checkback Module is through the PC interface on its front panel. The amount of control you have over the module with this method of communication depends on the module's DIP switch setting. As noted earlier (see "Installation and Setup" earlier in this chapter), the DIP switch setting can be one of four factory presets or a "CUSTOM" option. (See "Installation and Setup" earlier in this chapter for more detail.)

If you select one of the factory presets, you can still issue all the "non-setting" commands to the module (e.g., checkback tests, clearing alarms). As for the setting commands themselves, you will only be able to use the following:

• Set password

• Set date

• Set clock

Selecting the "CUSTOM" option, on the other hand, allows you to change any setting at will.

The following sections tell you how to establish communications with the checkback modules in your network, configure their settings, perform checkback tests, issue checkback commands, and even recover your password if you forget it.

### 2.5.1 Establishing Communications

Once the Universal Checkback Module is installed (see "*Installation and Setup*" earlier in this chapter), establishing communications is simple. First, connect one end of a standard serial cable (no null modem) to the serial communications port on your computer and the other end to the DB9 (female) connector labeled "PC INTERFACE" on the module's front panel. Then, start a terminal emulation communication program (e.g. Hyperterminal) with the following communication parameters:

- Bits per second (data rate) = 9600
- Data bits (per word) = 8
- Stop bits = 1
- Parity = none
- Flow control (handshaking) = none

Once you are connected, the module should return the following information:

- Bad message rate
- Noise level
- Current date and time
- Elapsed time since the last checkback test

If your screen seems to display part of the above information but contains garble, you probably started your communication program right in the middle of the checkback module saying something. To clean it up, clear the screen on your computer (there should be some command or mouse click in the communications program to do this) and give the checkback module a couple of seconds to redisplay.

At the password prompt (Enter password:), enter your password and press the ENTER key. The default password is "pulsar".

After you enter your password, the module displays the general settings on your computer screen. The module you are logged on to is identified at the top of the screen.

If this is the first time you are communicating with the module, it is a good idea to set the password, time, and date, as well as any other settings that

require changing. (See "*Issuing Checkback Commands*" below for complete instructions).

You can change, or set, the password at any time using the "set password" command. For example, to change the password from "pulsar" to "mypassword", type the following on the command line (Enter command:) and press the ENTER key:

**set pwd mypassword**

After you enter your new password once, you are prompted to re-enter it for verification. When you re-enter it, the module completes the password change and tells you "Command Accepted".

Setting a password to nothing (i.e., just entering set pwd and pressing the ENTER key, then responding to the verification prompt by pressing ENTER again) disables the password system. Then just the ENTER key or any entry becomes a valid password. If you disable the password, the module flashes this warning: "Note: password will be disabled for this module".

If you later forget what the password is, see the "*Recovering Your Lost Password*" section later in this chapter.

To set the module's time, use the "set clock" command. For example, if the current time is 3:45:13 in the afternoon, type this and press the ENTER key:

**set clock 15:45:13**

To set the module's date, use the "set date" command. Because the checkback module is Y2K ready, you must enter a four-digit year. For example, if today's date is December 10, 2000, type this and press the ENTER key:

**set date 12/10/2000**

At this point, you can modify any other settings (see "*Configuration Settings*" later in this chapter) that are specific to your system, if the DIP switch is set to the "CUSTOM" setting.

The Checkback Module is now waiting for your commands. These can include manual checkback requests, settings changes (see "*Customizing Settings*" later in this chapter), and requests for data from another checkback module. (For a complete list of commands, see "*Issuing*

**2**

*Checkback Commands*" and "*Checkback Command Quick Reference*" later in this chapter.)

You will remain logged on to the module as long as you continue communicating with it. After fifteen minutes of inactivity, the module automatically logs you off. You can also log off deliberately with the "logoff" command; this prevents unauthorized access to the checkback module.

Each Checkback Module in the carrier network should have a unique address. By definition, remote #1's address is "1", remote #2's address is "2", and so on. The master is always assigned address "0". These addresses are used to define how a checkback module behaves, as well as to allow distant communication between modules (see "*Distant Checkback Communications*" later in this chapter). You assign module addresses with the "set address" command (see "*Configuration Settings*" later in this chapter for details on how to assign a new address).

Let's say you want to examine the most recent target events at both the local checkback module and a distant module, and you are logged on to remote #1. To get the most recent event from the local module, type this and press the ENTER key:

**get event 1**

At this point your screen should look something like Figure 2-7, displaying event 1. You could also type "get event" without indicating a particular event or range and you'd get the most recent 16 events. (See "*Issuing Checkback Commands*" later in this chapter for more details on this command.)

Now you want to get the most recent event from the master module, which is across town. First you need to

log onto this distant module. Type this and press the ENTER key:

**logon password>0**

Here, "password" is the password stored at the master. The redirection symbol, ">", tells the checkback module that you want to redirect this command to another module, in this case module "0" (which is always the master). ***Do not insert any spaces between the word "password" and the redirection symbol (>) or between the redirection symbol (>) and the "0".***

Note that if the password is disabled at the master, you could simply type this and press the ENTER key:

**logon>0**

Again, type "logon>0" as one word without any spaces.

Once you have successfully logged on, your screen displays all the checkback modules you are logged on to at the top center of your screen, something like Figure 2-8.

```
+---------------------+  Locally logged on to 1    +---------------------------+
| Bad Msg Rate: 0  |                               | 15:09:19  10/13/1999     |
| Normal Noise     |    Remotely logged on to:     | Time since last: 0:02:08 |
+---------------------+      Master                 +---------------------------+


            Remote 1 Checkback Module Configuration
Primary Comm Mode: Coded    Fallback Timed Comm: Enabled  Last Remote: 1
Interval Type: Periodic   Carr Recovery: On   Retries: 3   Auto Tests: On
DIP Switch: Factory 2   Low Power Test: Enabled


   Outputs      Energized State  User Definition   Alarm Action
User defined 1      Close        Delayed Alarm     Sealed (fixed)
User defined 2      Close        Test in Progress  Sealed (fixed)
User defined 3      Close        Successful Test   Sealed (fixed)
Major Alarm         Close           ----           Sealed
Minor Alarm         Close           ----           Sealed

Checkback Time 1-4: 6:00, 12:00, 18:00, 0:00  - Inactive
Checkback Period: 8 hours    Loopback Duration: 20 secs
Carrier Recovery Period: 60 mins   Carrier Recovery Window: 3 hours
Auto Clock Sync: Enabled     Clock: 15:08:47  10/13/1999


Enter command:
Command OK
```

*Figure 2–7. Result of "Get Event 1" Command.*

To get the most recent event from the distant master, you would enter this command and press the ENTER key:

**get event 1>0**

As before, the redirection symbol sends this command to module "0", the master.

During a typical session you might get several local and distant events, examine distant settings, and maybe perform a manual checkback test.

## 2.5.2 Configuration Settings

As noted earlier in this chapter (see "*Installation and Setup*"), the Universal Checkback Module includes four preset factory configurations that you can select with the module's internal DIP switch. Your needs, however, may require a somewhat different setup. You can change the settings to your own configuration only if the DIP switch is set to the "CUSTOM" position.

### 2.5.2.1 Enabling the Custom Settings Option

To change the DIP switch to the "CUSTOM" setting, power down the unit and remove the module from the chassis. Set switches 1 through 3 to the "off" (up) position. (Note that this switch is only read at power-up; the module ignores any DIP switch changes once it is running.) Replace the module and power up the chassis. Then connect your computer to the module's 9-pin serial connector on the front panel.

Next, log onto the checkback module by entering its password. The module displays the current settings with the command prompt at the screen bottom. If you are setting the module for the first time, it is probably easiest to

start with one of the four factory configurations and modify that; for example, type this and press the ENTER key:

**set factory 1**

to change all settings to the factory 1 settings. The module displays the new settings. You can now pick and choose which settings you want to change. For example, to make this module remote #1, type this and press the ENTER key:

**set address = 1**

For a complete list of commands and settings see "*Issuing Checkback Commands*" later in this chapter.

After making the necessary changes, do not put the DIP switch back into one of the four factory settings. If you do, your carefully crafted setting modifications will be overwritten by the factory settings.If a setting is invalid, it is rejected by the checkback module, which displays a warning. For example, if you attempt to set the recovery window to 1,000 hours, the module displays a warning that indicates you can only set it between 1 and 24 hours.

```
+--------------------+ Locally logged on to Master +-----------------------------+
| Bad Msg Rate: 0  |                              |  15:09:19  10/13/1999    |
| Normal Noise     |   Remotely logged on to:     |  Time since last: 0:02:08 |
+--------------------+     2                        +-----------------------------+


            Master Checkback Module Configuration
Primary Comm Mode: Coded    Fallback Timed Comm: Enabled  Last Remote: 1
Interval Type: Periodic   Carr Recovery: On   Retries: 3   Auto Tests: On
DIP Switch: Factory 2   Low Power Test: Enabled


   Outputs      Energized State  User Definition    Alarm Action
User defined 1     Close         Delayed Alarm      Sealed (fixed)
User defined 2     Close         Test in Progress  Sealed (fixed)
User defined 3     Close         Successful Test   Sealed (fixed)
Major Alarm        Close            ----           Sealed
Minor Alarm        Close            ----           Sealed


Checkback Time 1-4: 6:00, 12:00, 18:00, 0:00  - Inactive
Checkback Period: 8 hours    Loopback Duration: 20 secs
Carrier Recovery Period: 60 mins   Carrier Recovery Window: 3 hours
Auto Clock Sync: Enabled    Clock: 15:08:47  10/13/1999


Enter command:
Command OK
```

*Figure 2–8. Example of a Remote Logon*

### 2.5.2.2 Setting Descriptions

The checkback module can be configured in many ways. You can show a module's current settings by entering the "get settings" command (see "*Issuing Checkback Commands*" later in this chapter) while logged on. Figure 2-8 shows a typical settings screen. Following are descriptions of each setting.

The first line shows which module these settings are from. In this case we are looking at remote #1's settings. When installing modules, you assign each checkback module in your system a unique address. By definition, remote #1 is address "1", remote #2 is address "2", and so on. The master is always assigned address "0". When assigning remote addresses, always start with 1, then 2, etc. Do not leave any permanent gaps in the addresses, or you may see errors during checkback tests.

### Primary Comm Mode

This setting shows the communication mode that is initially used when this module attempts a checkback test. There are two options: coded and timed. In coded mode, five-byte data messages are sent back and forth between modules. In timed mode, the carrier is simply held on for several seconds; the actual time specifies which module we are trying to communicate with: the master responds to a five-second carrier burst, remote #1 to 10 seconds, remote #2 to 15 seconds, and so on.

### Fallback Timed Comm

When this setting is enabled and the Primary Comm Mode is set to "coded", the module shifts communications mode to timed communication once it has failed all attempts to perform a coded checkback test. If the primary communications mode is already set to timed, the fallback feature is ignored.

Examples: **set fall off; set fall disable**

### Last Remote

Your network may contain more than two checkback modules (i.e., one master and one remote). Among other things, this setting lets the module know the final address to which it needs to send a checkback test request. If the primary communication mode is set to "timed", you can have up to four (4) remotes. If it is set to "coded", you can have up to 10 remotes.

Example: **set last 1**

### Interval Type

This setting specifies how you want automatic checkback tests to be performed. You have two options: Timed and Periodic. In "timed" mode, automatic checkback tests are performed at your four user-specified times. These might be, say, 6:00, 12:00, 17:00, and 23:00. In "periodic" mode, automatic tests are performed every so many hours, for example, every eight (8) hours.

Example**: set interval timed**

### Carrier Recovery

You can set a module to start "automatic carrier recovery" mode after failing a checkback test. In this mode, the module initiates more frequent automatic checkback tests until it has three successful, consecutive tests. It then reverts to the normal checkback schedule, that is, "timed" or "periodic" checkback tests.

A remote also starts its version of automatic recovery after failing its own checkback attempts. Once in automatic recovery mode, a remote does not initiate any automatic checkback requests. It remains in automatic recovery mode until it passes three checkback tests. Normally, these tests are issued automatically by the master, but you can speed things up by executing manual tests at a remote or the master. After three good tests, remotes also resume normal operation.

When starting automatic recovery mode, a module slowly flashes the front panel carrier recovery

LED (labeled "RECOVERY"). If the module has not recovered before the carrier recovery window expires (see below), this LED begins to flash rapidly, and the module sets the "delayed alarm".

Examples: **set recovery enable; set reco on**

### Retries

During noisy line conditions, remote messages may contain errors that cannot be fixed at the destination module. With this setting, you can specify the maximum number of times you want the module to automatically resend a message. The valid range is zero (0) to 15 (times). A good compromise between communication speed and robustness is a setting of "3" to "5".

Example**: set retries 5**

### Auto tests

Automatic checkback tests can be enabled or disabled. Normally, you would probably want them to be enabled. But if, for example, you are installing new checkback modules, you might want to disable automatic checkback tests until all units are in place. When auto tests are disabled at a module, it does not issue checkback tests unless manually commanded by you, the user. In addition, the master module does not issue the automatic clock update at around 12:30 AM. In other words, no module sends any command, unless you specifically command it. You can enable/disable Auto tests in three ways: (1) with this command, (2) by pressing and releasing both front panel switches simultaneously, or (3) by momentarily closing the two external switches connected to the rear panel inputs. When auto tests are disabled, all the module's LEDs flash on and off every second.

Example**: set auto on**

### DIP Switch

This shows the current DIP switch setting. This can be "CUSTOM" or one of the four factory presets. If this switch is set to CUSTOM, but the current settings are identical to one of the factory presets, it shows the matching preset. In Figure 2-8, this module's settings matched those we would get if the DIP switch were set to factory preset #2.

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### Low Power Tests

Here, you can enable or disable the low power setting during checkback tests. When enabled, all checkback tests initiated by this module are first performed on low power, then high power. When disabled, only the high-power test is performed.

Examples**: set low enable; set low on**

### Outputs

Each checkback module has five outputs. Two of these are permanently set to major and minor alarms. You can configure the remaining three with one of five choices:

> **"delay" (Delayed Alarm):** Output set after a module fails to recover from auto recovery before the "carrier recovery window" expires.

> **"testing" (Test In Progress):** Output set by the module initiating the checkback test for the duration of the test.

> **"pass" (Successful Test):** Output set after passing a checkback test.

> **"recover" (Successful Carrier Recovery):** Output set for one second after a successful recovery from automatic recovery mode.

> **"disable" (Disable Automatic Tests):** Output set when the user has disabled automatic checkback tests.

Examples:

> **set out1 test** - Set user output 1 to show when a checkback test is in progress.

> **set out3 recover** - Set output 3 to show successful automatic carrier recovery.

> **set out2 pass** - Set output 2 to show a successful checkback test.

> **set out1 delay** - Set output 1 to activate when a delayed alarm is initiated.

> **set out2 disable** - Set output 2 to activate when a user disables auto tests.

Although all checkback module outputs are actually solid state circuits, each the five outputs can be set to act as either a normally open or a normally closed relay output. The Energized State shows how an output acts when its condition is true. For example, if a module fails a checkback test, it sets the major alarm. If you have programmed the major alarm output to close when energized, this output closes immediately after failing the checkback test. After the module has passed a test, this output opens.

Conversely, if you had programmed the major alarm output to open when energized, this output would open immediately after the module failed a checkback test and would close after it passed.

Examples:

> **set state1 open**–Set user output 1 to open when the condition it is set to monitor becomes true.

> **set state2 close**–Set user output 2 to close when the condition it is set to monitor becomes true.

> **set major open**–Set the major output to open when the major alarm is active.

> **set minor close**–Set the minor output to close when the minor alarm is active.

You can also program the two alarm outputs to seal or just momentarily toggle when an alarm occurs. When you select "sealed" operation, the alarm outputs stay in their "true" states as long as the alarm exists. If you select "momentary", the outputs go to their true states for only five seconds, then return to their previous states. For example, assume alarms are set to momentary action and the major alarm active state is closed. Normally this output is open. When a major alarm occurs, the major alarm output closes for five seconds, then opens again. The major alarm output does not change when the major alarm is cleared.

Examples:

> **set alarm sealed** - Sets the major and minor alarms to remain in their active, or true, states as long as a major/minor alarm condition exists.

**set alarm momentary**–Sets the major and minor alarms to shift to their active, or true, states for five seconds when a major/minor alarm condition occurs.

### Checkback Time 1-4

These settings let you set the four times at which you want to execute automatic checkback tests for timed checkback tests. When you set the Interval Type to "timed", the master initiates a checkback test at each of these times. You can set these times only to the nearest hour, using a 24-hour format. The master actually executes a timed test five minutes after the hour (e.g. 4:05). This delay provides some "fudge" room to compensate for unsynchronized checkback module clocks. Remotes that have their Interval Types set to Timed also use these times to initiate their own checkback tests, if they do not hear from the master within a grace period. The grace period is ten minutes after the hour for remote #1, fifteen minutes for remote #2, and so on.

If you do not want to use all four times, say you are only interested in three tests per day, you can simply set one of the times equal to another. For example, you could set time 1 to 12:00, time 2 to 6:00, time 3 to 18:00, and time 4 to 18:00 as well.

Example:

**set time1 4**–The module executes a checkback test at 4:05 a.m. if it is a master. If it is remote #1, it executes a test at 4:10, if it does not receive a checkback request from the master before this time.

If the current Interval Type is Periodic, the word "Inactive" is displayed next to the checkback times. This means that these times are disabled and checkback tests occur according to the periodic interval (e.g., in the above example, every 8 hours). When you set the Interval Type to "timed", these times become active and the Periodic time is inactive.

**2**

## Checkback Period

As mentioned above, the checkback period is enabled when the Interval Type is set to "periodic". If you wanted three tests per day and really did not care about the time of day when they occurred, you could set this time to, say, 8 hours. Masters attempt periodic checkback tests at exactly this time, in our case eight hours since the last test. Remotes have a grace period before they, too, attempt a checkback test, if they have not heard from the master. For example, remote #1 would do a checkback test after eight hours and five minutes, if it did not receive a checkback test from another module.

Example:

> **set period 8**–The module executes a checkback test eight hours after the last test, if it is a master. If it is remote #1, it executes a test at 8:05, if it does not receive a checkback request from the master before this time.

## Loopback Duration

The loopback duration specifies how long a module holds the carrier on during a loopback test. Loopback tests are performed at both high and low power. If you are at remote #1 and request a loopback test at the master, it turns the carrier on high power then on low power for the duration of the time. You can use loopback tests to set the sensitivity of your local receiver or other such tasks. The range of times is four to 60 seconds. You can request loopback tests in three ways: (1) with this command (e.g., **do loop > 1** requests remote #1 to do a loopback test), (2) by pressing and holding the top front panel switch, or (3) by closing the switch connected to the rear input TB6-1/TB6-2 for five seconds.

Example:

> **set loop 25**–Sets the loopback duration to 25 seconds.

## Carrier Recovery Period

When the master is in carrier recovery mode after failing a checkback test, it begins initiating checkback tests according to the carrier recovery period. For example, if the carrier recovery period is 15 minutes, the master tries another checkback test every 15 minutes. It remains in carrier recovery mode and continues to initiate tests every 15 minutes, until it has successfully completed three checkback tests. At that time, it shifts back to the normal mode, either periodic or timed checkback tests.

Example:

> **set carrier 45**–Sets the carrier recovery period to 45 minutes

## Carrier Recovery Window

The carrier recovery window is a time limit for the delayed alarm. If a module goes into carrier recovery mode and does not recover before this time limit, it sets the delayed alarm. If any user-programmable output is set to delayed alarm, it becomes active. The main reason for having a carrier recovery window and delayed alarm is to cut down on nuisance alarms. With this window and the delayed alarm, you can design a system that only alerts you when a true, long-term problem exists. The valid range for this window is 1 to 24 hours.

Example:

> **set window 3**–Sets the window to three hours.

## Auto Clock Sync

When the auto clock sync is enabled, the master synchronizes all remote clocks to its own time, starting at 12:30 a.m. In practice, the synchronization is rough, within about +/- 2 seconds. But that is sufficiently accurate for Timed checkback testing.

Examples:

**set sync off** (or)

**set sync disable**

**Clock**

This shows the module's time and date. Use the set clock command to set the time, using the 24-hour format. Use the set date command to set the date, specifying all four digits for the year.

Examples:

> **set clock 0:02:45**–Sets the time to 12:02:45 a.m.

> **set date 12/29/2003**–Sets the date to December 29, 2003.

## 2.5.3 Performing Checkback Tests

The Universal Checkback Module's primary function is to perform checkback tests, verifying that your carrier communication path is operating. You can perform checkback tests in several ways:

- Physical switch request
- Manual request from your PC
- Automatic timed test
- Automatic periodic test
- Automatic carrier recovery
- Remote-initiated periodic tests
- Remote-initiated timed tests

### 2.5.3.1 Physical Switch Request

As noted earlier, you can physically initiate a checkback test from the module's front or rear panel. At the front panel, push and release the "TST" switch. At the rear panel, momentarily close the external switch connected to TB6-2/TB6-2. This works with both a remote or master module.

### 2.5.3.2 Manual Request from Your PC

Using your computer, you can manually request a test using the **do checkback** command. See "*Issuing Checkback Commands*" later in this chapter for details on using your PC to issue commands.

### 2.5.3.3 Automatic Timed Test

When this option is enabled, the master checkback module initiates checkback tests at four user-specified times. For example, you might set these times to be 4:00, 13:00, 14:00, and 23:00. You can only set times to the nearest hour. The test then occurs at the start of the hour plus five minutes, unless the module is busy with another message.

To enable this option, you must do the following:

1. Turn on the automatic test feature: **set auto on**

   This changes the "Auto Tests" setting to "On".

2. Set the interval type to "timed": **set int time**

   This changes the "Interval Type" setting to "Timed".

3. Set the four checkback test times: **set time[#] [hh]**

Where "#" is the time's place in the daily sequence (i.e., 1, 2, 3, or 4), and "hh" is the desired hour in 24-hour format (e.g., 8, 12, 16, 20). This changes the "Checkback Time 1-4" setting to reflect the four times you specified.

You can only make these settings changes if the module's DIP switch is set to "CUSTOM".

### 2.5.3.4 Automatic Periodic Test

Instead of a timed test, you can set the master checkback module to initiate tests periodically, say, every four hours. The shortest interval you can set is one hour, and the longest is 120 hours. The periodic interval is reset after one of the following:

- Sending or receiving a good checkback test, including manual tests
- Attempting to execute a checkback test at the Periodic Interval.

**2**

To enable this option:

1. Turn on the automatic test feature: **set auto on**

This changes the "Auto Tests" setting to "On".

2. Set the interval type to "periodic": **set int period**

This changes the "Interval Type" setting to "Periodic".

3. Set the interval for the checkback tests: **set period[#]**

Where "#" is the number of hours between tests. This changes the "Checkback Period" setting to the time you specified.

You can only make these settings changes if the module's DIP switch is set to "CUSTOM".

## 2.5.3.5 Automatic Carrier Recovery

Using the set recovery command, you can set a module to begin after failing any of the above checkback tests. With the carrier recovery mode enabled, the master module, after failing a test, switches to carrier recovery mode. In carrier recovery mode, checkback tests are performed periodically, but much more frequently than otherwise, for example, every 20 minutes. You can set this time from five minutes to one hour. After three consecutive successful tests, the carrier recovery output is set, and the master reverts to the normal automatic tests.

You can accelerate recovery by performing manual tests at the master module. After you execute three successful manual checkback tests, the master module counts these as carrier recovery tests and reverts to normal mode. Note that while in recovery mode, the master only sends low-power checkback tests. This ensures that the line conditions are good before resuming normal operation.

The module's local carrier recovery LED flashes while in carrier recovery mode. After passing the three tests, this LED changes to solidly on, and any user defined outputs set to carrier recovery are set for five seconds.

To enable the automatic carrier recovery mode, use the set recovery command:

**set recovery on**

This changes the "Carr Recovery" setting to "On".

## 2.5.3.6 Remote-Initiated Periodic Tests

In some cases, a remote module initiates its own checkback test. Obviously, you can always manually request a test by pressing the remote's test switch (TST), closing the external switch connected to the rear panel's TB6-1/TB6-2, or entering the **do checkback** command. But the remote automatically does a checkback test if it detects the master is late. When a remote is set to do automatic periodic tests, it determines the master is late if it does not receive a checkback request within the user period plus some delay, or grace period. For remote #1, this grace period is five minutes.

For example, let's say your remote is set for automatic periodic testing, with a period of eight hours. If it does not receive a checkback test within eight hours and five minutes, it executes a checkback test. If this test is successful, both the master and the remote's periodic timers are restarted at roughly the same time, and the master takes over for subsequent checkback tests, if both modules are set for the same periodic interval. Note that this situation can occur when you are first installing the checkback modules. The periodic timer starts as soon as the module is powered, so that one module will have a head start on the others. After the first successful checkback test, all the periodic timers in the network are synchronized, and the master initiates any future tests.

If you have more than one remote in your system, each has its own unique grace period. Remote #1 waits five (5) minutes, remote #2 waits 10 minutes, remote #3 waits 15 minutes, and so on.

For example, if neither remote #1 nor the master has initiated a checkback test for the interval plus 10 minutes, remote #2 executes a test.

*Table 2–4. Primary/Fallback Communications Options.*

| Primary Mode | Fallback Timed | Description |
|:---:|:---:|:---:|
| Coded | Disabled | No more tries after max retry count |
| Coded | Enabled | Makes one last try using Timed Mode |
| Timed | Disabled | No more tries after max retry count |
| Timed | Enabled | No more tries after max retry count |

For this scheme to work properly, it is important to keep all the module settings similar. If the master is set for automatic periodic testing, all remotes should also be set this way. If not, you may have more checkback tests occurring than you would expect at equally unexpected times. Also, the four execution times should be the same for all modules in the system.

### 2.5.3.7 Remote-Initiated Timed Tests

Just as with remote-initiated periodic testing, remotes set to timed testing initiate their own checkback tests if the master does not do a test in time. The "grace" period is longer for this mode: user time + 10 minutes for remote #1, user time + 15 minutes for remote #2, etc. That allows this scheme to work even when there is up to five minutes difference between the checkback modules' clocks.

For automatic timed testing, the clocks in the master and the remotes should be fairly close.

You can enable the automatic clock synchronization feature to keep your clocks synchronized (**set sync on**). When enabled, the master synchronizes all remote clocks to its own time starting at 12:30 a.m. In practice, the synchronization is rough, within about +/- 2 seconds, but that is sufficiently accurate for timed checkback testing.

### 2.5.4 Checkback Test Options

A single checkback test is a set of encoded data messages, a simple keyed carrier signal, or a mixture of both. You have several options for performing this test:

- Keyed carrier timed test
- Encoded carrier test
- Primary and fallback communication modes
- Communication retries

**2**

### 2.5.4.1 Keyed Carrier Timed Tests

This is the classic method where the checkback module simply turns on the carrier for a specific interval of time. Each module in the system is assigned a unique time and can recognize when the carrier has been on for the correct interval. The correct module responds by keying the carrier for a predetermined interval.

The module identifying times are:

- Master module recognizes a five-second carrier
- Remote #1- recognizes a 10-second carrier
- Remote #2- recognizes a 15-second carrier
- Remote #3- recognizes a 20-second carrier
- Remote #4- recognizes a 25-second carrier

In older systems, the first remote was assigned a five-second carrier. Universal Checkback Module remotes, however, are able to initiate checkback tests themselves. Thus, they must have a way of signaling the master module. For a graphical representation of the Carrier timed tests, please see Figures 2-9 & 2-10.

### 2.5.4.2 Encoded Carrier Tests

Encoded tests involve sending serial data messages back and forth between checkback modules. This method has two advantages over the keyed carrier method: (1) it is usually faster and (2) you can communicate with more modules. The disadvantage with this method is that it is more vulnerable to noisy line conditions that may result in a failure to send a good message. To prevent errors in the received data, the module sends a 16-bit CRC code with each message. This error detecting code enables the module to detect bad messages and, in some cases, repair them.

### 2.5.4.3 Primary and Fallback Communications Modes

A Universal Checkback Module first uses the primary communications mode when performing a checkback test. It makes several attempts to communicate, up to the number in the "Retries" setting. If all attempts fail, it switches to the timed communication mode, if "Fallback Timed Comm" is enabled and the "Primary Comm Mode" is coded.

Once in timed communication mode, the module makes one final attempt to get through. If that fails, it sets a major alarm. If it passes, no alarm is issued. Table 2-4 shows how all the communication combinations work.

### 2.5.4.4 Communication Retries

To increase the communication robustness, the checkback system can make repeated attempts to get a message or signal through to another module. When the channel is noisy or weak, multiple attempts are often successful. Setting a high retry number, say 15, increases the likelihood of success (slightly), but can cost a lot of time waiting for a failure. We think that three (3) to five (5) is a good compromise between speed and robustness.

### 2.5.5 Issuing Checkback Commands

Checkback commands are composed of English phrases, for example:

**set clock 1:59:02 ↵**

Here, the "↵" symbol means that, after typing the command, you must press the "ENTER" key to send it to the module.

Commands have several rules and properties:

1) You may combine several distinct commands on one line, if you separate each command with a comma. For example:

    **set clock 1:59:02, set retries = 4, set minor alarm open**

2) The total command line length must be fewer than 60 characters.
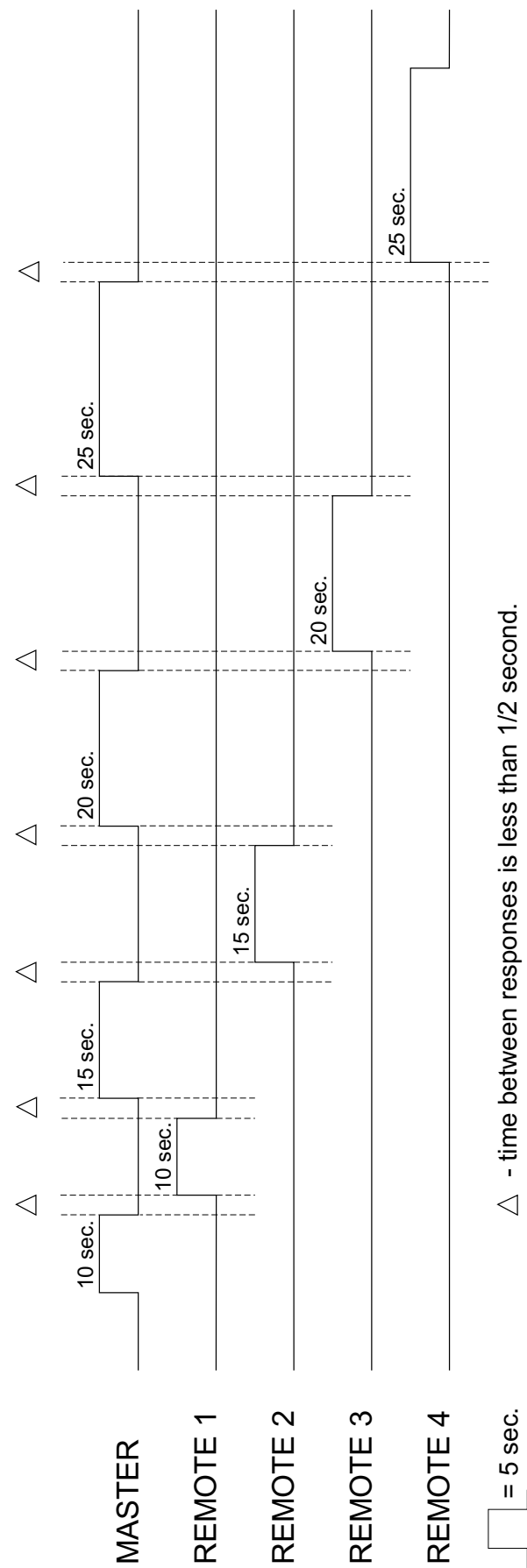
*Figure 2–9. Universal Checkback Module – Timed Checkback Sequence (Master Initiation).*

MASTER

REMOTE 1

REMOTE 2

REMOTE 3

REMOTE 4

10 sec.

10 sec.

15 sec.

15 sec.

20 sec.

20 sec.

25 sec.

25 sec.

15 sec.

△ - time between responses is less than 1/2 second.

⌐_ = 5 sec.

**2**

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*Figure 2–10. Universal Checkback Module – Timed Checkback Sequence (Remote 1 Initiation).*

MASTER

REMOTE 1

REMOTE 2

REMOTE 3

REMOTE 4

◁ - time between responses is less than 1/2 second.

⌐_⌐ = 5 sec.

5 sec.

5 sec

15 sec.

15 sec.

20 sec.

15 sec.

20 sec.

25 sec.

20 sec.

25 sec.

25 sec.
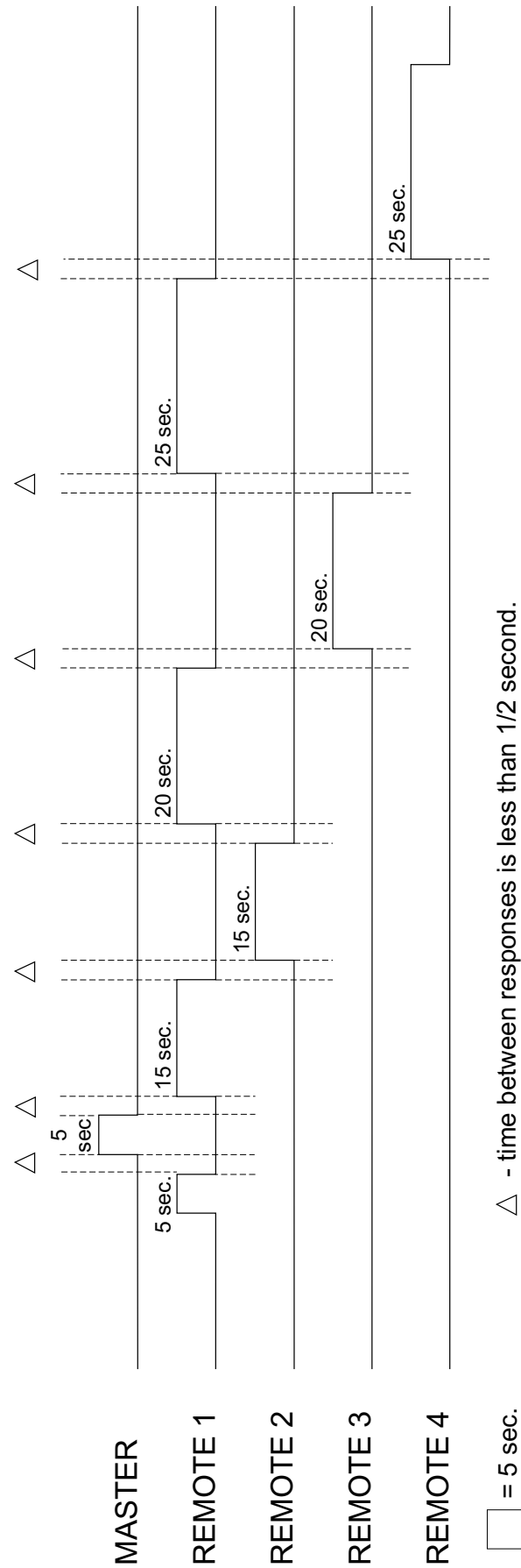
3) You may use an equal sign (=)with any command to increase clarity, but it is not required. For example: **set retries = 4** is identical to **set retries 4**.

4) Leading spaces and embedded spaces are permitted. For example: **set last 1** is the same as **set last 1**. The lone exception to this rule is the **logon** command. It must appear like this:

   **logon password>0**

The rule for the logon command is: Do not insert any spaces between the word "password" and the redirection symbol (>) or between the redirection symbol (>) and the "0".

5) Commands are not case-sensitive; you can use either upper or lower case.

6) To save typing, you can recall recent commands using the up and down arrow keys. You can then edit these commands by backspacing and changing as needed.

7) You can abbreviate most commands using the first few command characters. Acceptable abbreviations are shown in the command lists below.

Checkback commands can have three formats:

- No parameters - Example: do checkback
- Non-numeric parameter - Example: set primary timed
- Numeric parameter(s) - Examples: set clock 13:59:45 and set address = 2

Commands can be grouped into several functional categories:

| | |
|---|---|
| • Set | • Action |
| • Get | • Help |
| • Clear | • Logon/Logoff |

In the following command lists, "{}" brackets indicate an optional parameter and "|" indicates that you must include either the parameter before the "|" symbol or the one after. For example, **set primary time | coded** means that you enter either **set primary time** or **set primary coded**. Remember that after typing any command, you

must press the ENTER key to send it to the module.

## 2.5.5.1 Set Commands

These commands configure the checkback module for service. Settings include communication modes, active output states, and clock time and date.

### Set Address

Minimum abbreviation: **set addr n**

Sets a module's address. Addresses are used to direct a command into a specific checkback module. To specify the master module, assign it address "0". Set remote addresses sequentially with no gaps, starting with address "1". For example, in a three-module system, you would have address "0" at the master module, and remote #1 and #2 at the two remotes.

In coded communication mode, up to ten remotes are allowed, permitting a maximum address of "10". In timed communication mode, only four remotes are allowed, limiting the highest address to "4".

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

**set address 0**–The local module becomes the master.

**set address 2**–The local module becomes remote #2.

**set addr 2 > 1**–Remote #2's address changes to "1".

### Set Primary Communication Mode

Minimum abbreviation: **set prim time | code**

Sets a module's primary communication mode. The primary mode is the default format for module to module communication. You can set this mode to either "timed" or "coded". Coded mode is less reliable than timed mode, but adds more communication features.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set prim timed**–Sets the local module's primary communications mode to timed.

> **set primary code > 1**–Sets remote #1's primary communications mode to coded.

## Enable Fallback Timed Communication Mode

Minimum abbreviation: **set fall on | off**

Enables/disables a module's fallback timed communication mode for checkback tests. This mode is automatically invoked if communication problems occur during checkback testing.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set fall on**–Enables the local module's fallback timed communications.

> **set fall off > 0**–Disables the master's fallback timed communications mode.

## Set Interval Type for Automatic Checkback

Minimum abbreviation: **set int peri | time**

Checkback modules perform automatic checkback tests either periodically or at user-specified times (see "*Set Time1-4 for Timed Checkback*" and "*Set Period for Automatic Checkback*" below). This setting lets you specify which mode you want to use.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set check periodic**–Sets automatic checkback tests to occur periodically using the interval specified in the "Checkback Period" setting.

> **set chec time**–Sets automatic checkback tests to occur at the four times specified in the *"Checkback Time 1-4" setting.*

## Enable Automatic Carrier Recovery Mode

Minimum abbreviation**: set reco on | off**

You can set the master module to start automatic carrier recovery mode after failing a checkback test. In this mode, the master initiates more frequent checkback tests until it gets three consecutive successful tests. It then reverts to the normal automatic test mode. You can set the frequency for these tests with the set carrier recovery period command. Successful manual tests while in this mode count toward recovering and can be used to speed up carrier recovery.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Example:

> **set recovery on**–Enables the automatic carrier recovery mode.

## Enable Automatic Checkback Tests

Minimum abbreviation**: set auto on | off**

You can enable or disable a module's ability to automatically initiate checkback tests. When auto tests are disabled, a module only sends checkback tests when you manually command it to, either through a do checkback command or through the front or rear panel switches. In **addition, the** master module does not send the clock synchronization command at 12:30 a.m. This means that when auto tests are disabled, a module does not send any commands unless you specifically command it. This feature might be useful when you are installing checkback modules and the system is not complete. You can also toggle this setting by pressing both front panel switches simultaneously.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Example:

> **set auto on**–Enables automatic checkback tests.

## Set Factory Preset

Minimum abbreviation**: set fact n**

There are four factory defined preset configurations which you can select. Using this command replaces your current settings with the factory configuration you specify. After this command, you can edit this configuration to your needs or leave it alone and use the factory defaults.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Note that you can also select one of the factory presets by changing the internal DIP switch from "CUSTOM" to Factory 1, 2, 3, or 4, and then energizing the module. Changes with this method, however, are blocked until you put the DIP switch back to the "CUSTOM" position.

Example:

> **set fact 2**–Replaces all settings with factory preset 2 settings.

## Set Password

Minimum abbreviation: **set pwd pppppppppp**

Passwords can be from one to ten characters; you can include both numbers and letters in your password. Letters are not case sensitive. Each checkback module can have a unique password, or you can set them all the same. As usual, it is a good idea to write new passwords down, as you will be unable to log on without the correct password. If you do lose your password, you can recover it using the procedure described in "*Recovering Your Lost Password*" later in this chapter.

Unlike most settings, you can change the password no matter which setting the DIP switch is on.

Examples:

> **set pwd hello**–Sets the local module's password to "hello".
>
> **set pwd bigdarnpwd**–Sets the local module's password to the maximum size.
>
> **set pwd 9**–Sets the local module's password to just "9".
>
> **set pwd pass1 > 1**–Sets remote #1's password to "pass1".

## Set Major Alarm Relay State

Minimum abbreviation: **set majo open | close**

Sets a module's major alarm relay state. You can set relays to either open or close on a major alarm condition.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set major closed**–Closes the major alarm relay upon a major alarm.
>
> **set majo open>1**–Opens remote #1's major alarm relay upon a major alarm.

## Set Minor Alarm Relay State

Minimum abbreviation: **set mino open | close**

Sets a module's minor alarm relay state. You can set relays to either open or close on a minor alarm condition.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set mino open**–Opens the minor alarm relay upon a minor alarm.
>
> **set mino close>0**–Closes the master module's minor alarm relay upon a minor alarm.

## Set Output State 1-3

Minimum abbreviation: **set state# open | close**

Similar to the above major and minor relay output states, you can set the active state of each of the three user-programmable outputs. The active state of each user output is independent of what you have defined it to monitor. For example, let's say you have programmed output 2 to monitor "test in progress." Then you set the output 2's active state to **close**. Now when this module initiates a checkback test, output 2's contacts closes. If you then changed the definition of output 2 to "passed test", then this output contact closes when the module passes a checkback test.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

**2**

Examples:

> **set state1 close**–Closes output 1 contact when it is active.
>
> **set state3 open>2**–Opens output 3 at remote #2 when it is active.

## Set Output Definition 1-3

Minimum abbreviation:
**set defi reco|delay|test|pass|disab**

Checkback modules include three user-programmable outputs. You can set each of these to monitor one of five items:

**"delay" (Delayed Alarm):** Output set after a module fails to recover from auto recovery before the carrier recovery window expires

**"testing" (Test In Progress):** Output set by the checkback test-initiating module for the duration of the test

**"pass" (Successful Test):** Output set after initiating and passing a checkback test

**"recover" (Successful Carrier Recovery):** Output set for one second after a successful recovery from automatic recovery mode

**"disable" (Disable Automatic Tests):** Output set when the user has disabled automatic checkback tests. As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set out1 test**–Sets user output 1 to show when a checkback test is in progress.
>
> **set out3 recover**–Sets output 3 to show successful automatic carrier recovery.
>
> **set out2 pas**–Sets output 2 to show a successful checkback test.
>
> **set out1 delay**–Sets output 1 to activate when a delayed alarm is initiated.
>
> **set out2 disable**–Sets output 2 to activate when users disables auto tests.

## Set Alarm Outputs Sealed/Momentary

Minimum abbreviation: **set alar seal | mome**

You can set the major and minor alarm outputs to remain sealed after an alarm condition or to close for five seconds and then release.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set test open**–Opens "test in progress" relay during a checkback test.
>
> **set testing close>0**–Closes the master module's "test in progress" relay during a checkback test.

## Set Retries Before Reporting a Failure

Minimum abbreviation: **set retr nn**

The retry number sets the number of times the checkback module attempts to communicate with another module after failing a message. If the module fails all the retry attempts, it logs a communications error. The default value is "3", but in a noisy system, you probably want to crank this number up. A maximum of "20" is allowed.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set retries 5**–Allows five retries before logging an error.
>
> **set retr 0**–Disables all retries.
>
> **set retries 20**–Sets the module to the maximum number of retries.

## Set Low Power Test On|Off

Minimum abbreviation: **set low on | off**

You can run low power checkback tests to determine system margins. When enabled, low power checkback tests precede the full power checkback tests.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set low on > 1**–Enables low power tests at remote #1.
>
> **set low power off**–Disables low power tests.

## Set Time1-4 for Timed Checkback

Minimum abbreviation: **set time# hh**

You can set automatic checkback tests to execute up to four specific times during the day. These times, time1-time4, indicate the hour to perform a test. Tests are performed near the start of the hour, unless the carrier system is busy with some other task.

If you do not want to use all four times, set the extra times the same as those already set. For example, if you want time1 to be 1:00 and time2 to be 15:00, but do not want to use time3 and time4, set time3 and time4 to 15:00 or 1:00.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set time1 3**–Sets time1 to execute an auto checkback test at 3:00 a.m.

> **set time2 2, time4 2**–Sets time2 to execute an auto checkback test at 2:00, and disable time4.

> **set time1 = 13>1**–Sets remote #1's time to 13:00 (note the optional equal sign for clarity).

## Set Period for Automatic Checkback

Minimum abbreviation: **set peri hh**

Sets the interval or elapsed time between automatic checkback tests when they are set to execute periodically. This time is specified to the hour, and zero (0) hours are rejected.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Example:

> **set period 4**–Executes periodic auto checkback tests every four hours.

## Set Loopback Duration

Minimum abbreviation: **set loop ss**

Loopback duration specifies in seconds how long a module keeps the carrier on during a loopback test. You can set this time from four (4) to 60 seconds. You start loopback tests either with the

**do loopback** command (see "Do Loopback Test") or with the front and rear panel loopback switches.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Examples:

> **set loopback duration 5**–Sets the local module's duration to five (5) seconds.

> **set loop 60 > 2**–Sets remote #2's loopback duration to 60 seconds.

## Set Automatic Clock Synchronization

Minimum abbreviation: **set sync on | off**

When enabled, the master module synchronizes the clocks of all remotes in the network starting at 12:30 a.m.

As with most settings, you can only change this one if the DIP switch is set to "CUSTOM".

Example:

> **set sync on**–Enables automatic clock synchronization by the master.

## Set Clock

Minimum abbreviation: **set cloc hh:{mm:{ss}}**

Updates the checkback module's clock. With this command, you can set the clock to the nearest second. Remember to enter times in 24-hour format.

Unlike most settings, you can set the clock no matter which setting the DIP switch is on.

Examples:

> **set clock 1:02:56**–Sets the local module's clock to 1:02:56 a.m.

> **set cloc 13:00:00 > 1**–Sets remote #1's clock to 1:00 p.m.

> **set cloc 3**–Sets the local module's clock to 3:00:00 a.m.

**2**

## Set Date

Minimum abbreviation: **set date mm/dd/yyyy**

Updates the date setting for the checkback module's clock. You must enter all four digits for the year, e.g., 2005, or the command is rejected.

Unlike most settings, you can change the date no matter which setting the DIP switch is on.

Examples:

> **set date 1/2/2000**–Sets the local module's date to January 2, 2000.

> **set date 1/2/2000 > 1**–Sets remote #1's date to January 2, 2000.

## Set All

Minimum abbreviation: **set all > n**

Set all allows you to update all of a distant module's settings at once with the local module's settings. Thus, it should always be directed to some other node (e.g., **set all > 2**). All settings except address, password, time, and date are set identical to the module making this command.

For example, if you're at remote #1 and you enter **set all > 0**, the master changes all its settings, like number of retries, and primary communication mode, to match remote #1's, but it remains a master because the address is not changed.

As with most setting commands, you can only execute this one if the DIP switch is set to "CUSTOM".

Examples:

> **set all > 1**–Sets remote #1 to match the local module's settings.

> **set all > 0**–Sets the master to match the local module's settings.

## 2.5.5.2 Get Commands

Get commands read a checkback module's current settings, events, status, or counts.

## Get Settings

Minimum abbreviation: **get set**

Displays a checkback module's current settings. This includes its address, primary and fallback communication modes, alarm output control, and various times.

Examples:

> **get set**–Gets and displays the local module's settings.

> **get set > 1**–Gets and displays remote #1 settings.

## Get Events

Minimum abbreviation: **get eve {nn {-mm}}**

Displays a module's stored events. Up to 250 events are stored in a Universal Checkback Module. You can call this command with a range of events (e.g., 10-45), a single event (e.g., 2), or you can supply no events. If you supply no events, the module displays the next event each time you request distant events or the next 10 events each time you request local events. When you enter a command to a distant module other than **get events**, the event display counter is reset to event 1 for that module.

Examples:

> **get event 100-107**–Gets and displays local events 100 through 107.

> **get event 6**–Gets and displays local event 6.

> **get event**–Gets and displays the next 10 local events.

> **get eve 4 > 1**–Get and displays remote #1's event 4.

> **get eve 1-10 > 1**–Gets and displays remote #1's events 1 through 10.

> **get eve >1**–Gets and displays remote #1's next event.

## Get Status

Minimum abbreviation: **get sta**

Displays the status of a module's front panel LEDs.

Examples:

> **get status**–Gets and displays the status of the local module's LEDs.

> **get status > 1**–Get and displays the status of remote #1's LEDs

## Get Counts

Minimum abbreviation: **get cou**

Displays a module's event counts. This shows the number of major and minor alarms, communication errors, checkback retries, checkback tests performed, successful checkback tests, and the elapsed time since these counts were reset (see "*Clear Event Counts*" and "*Set Retries Before Reporting a Failure*").

Examples:

> **get count**–Gets and displays the local module's event counts.

> **get count > 2**–Gets and displays remote #2's event counts.

## Get All

Minimum abbreviation: **get all > n**

**Get all** compliments **set all** and allows you to replace all your local module's settings with those of a distant module. Like **Set All**, this command should always be redirected to some other module, e.g., **get all > 1**. All settings except address, password, time, and date are set identical to the distant module.

Examples:

> **get all > 1**–Sets the local module's settings to match remote #1's.

> **get all > 0**–Sets the local settings to match the master's.

## 2.5.5.3 Clear Commands

Clear commands let you clear the stored events or counts, or reset the alarm outputs

## Clear alarms

Minimum abbreviation: **clr a** or **clear a**

Clears the alarm relays and display LEDs.

Examples:

> **clear alarms**–Clears local alarms.

> **clr alarm > 1**–Clears remote #1's alarms.

> **clr a>1**–Clears remote #1's alarms.

## Clear Events

Minimum abbreviation: **clr e** or **clear e**

Clears all stored events from the non-volatile memory. Make sure you really want to do this command before you actually do it, because you may delete a considerable amount of data.

Examples:

> **clr events**–Clears all locally stored target events.

> **clear eve> 1**–Clears remote #1's events.

> **clr e>1**–Clears remote #1's events.

## Clear Event Counts

Minimum abbreviation: **clr c** or **clear c**;

Clears the event counts which show the number of major and minor alarms, communication errors, communication retries, and the number of checkback test attempts and successes.

Examples:

> **clr c**–Clears local counts.

> **clr c> 2**–Clears remote #2's counts.

## 2.5.5.4 Action Commands

You can command a Universal Checkback Module to execute a loopback or checkback test with an action command.

**Do Loopback Test**

Minimum abbreviation: **do loop**

You can instruct a module to initiate a loopback mode for several seconds. During this time, the module's carrier remains on. The duration of this transmission is specified by the module's "Loopback Duration" setting (see "*Set Loopback Duration*").

Examples:

> **do loopback**–Turns on the local carrier for the specified time.
>
> **do loop >1**–Turns on remote #1's carrier for the specified time.

**Do Checkback Test**

Minimum abbreviation: **do chec**

You can initiate a manual checkback test with this command. As with automatic checkback tests, the last module in the system should be specified before executing this command - this tells the initiating Checkback Module which distant modules it needs to test.

Example:

> **do checkback**–Performs a manual checkback test on all the other checkback modules in the network.

## 2.5.5.5 Logon/Logoff Commands

Checkback access is controlled by the **logon** and **logoff** commands. Before you can change or view settings, you must log onto a checkback module. When done, you can log off manually or wait fifteen minutes, when the system logs off automatically if there has been no activity.

**Logon**

Minimum abbreviation: **logon pwd**

**Logon** commands enable you to access a Universal Checkback Module to change settings or perform various tests. Logons are password protected (see "*Set Password*"), preventing unauthorized access.

Before communicating with a local checkback module, you must first log on. You then must log onto any distant module you want to access.

When entering any password, the characters you type are shown only as asterisks, e.g.,logon ****.

*When logging onto distant modules, do not insert any spaces between the "password" and the redirection symbol (>) or between the redirection symbol (>) and the distant module's address.*

Examples:

> **logon mypass**–Logs onto the local checkback module using password "mypass".
>
> **logon city1>1**–Logs onto remote #1 with password "city1". Again, do not insert any spaces after you begin typing the password.

Note that "mypass" is displayed as "******" and "city1" as "*****" when you enter them.

**Logoff**

Minimum abbreviation: **logoff**

The **logoff** command ends a session with a checkback module (see "Logon"). Logging off prevents unauthorized changes to the checkback module's configuration. The checkback module also automatically logs off all modules after fifteen minutes of no user activity.

Examples:

> **logoff**–Logs off local and all distant checkback modules.
>
> **logoff > 2**–Logs off remote #2 only; remains locally logged on.

## 2.5.5.6 Help Commands

Online help is available when you enter a **help** command. The checkback module can provide both general and command-specific help to simplify field use.

**Help**

Minimum abbreviation: **help**

Online help goes from general to specific.

Examples:

**help**–General help, lists all commands briefly.

**help set**–Discusses all the setting commands in more detail.

**help retries**–Gives examples and specific usage for the set retries command.

All commands are summarized in Tables 2-5 through 2-13 (see "*Checkback Command Quick Reference*" on the following page).

## 2.5.6 Distant Checkback Communications

Universal Checkback Modules can communicate with any others on the same network. Any command that you can execute at the module you are connected to can also be redirected to some distant module. For example, if you are at remote #2 and you want to change remote #1's major alarm output state to "closed" on alarm, you could type the following and press the ENTER key:

**set major = closed > 1**

The redirection character (>) tells the local checkback module to send this command on to remote #1, rather than execute this command locally. The master and all remote modules have the same communication privileges. That is, any module can redirect a command to any other module.

To communicate with a distant module, you must first log onto that module. This is a security measure designed to limit access. A checkback module's distant logon password is always the same as its local logon password, although every checkback module can have a unique password.

For example, let's say you are at remote #1. You want to log onto the master and its password is "dilbert". You type: **logon dilbert > 0** and press the ENTER key.

Note that this appears on the screen as: **logon ******>0**

Remember that address "0" is reserved for the master checkback module.

The distant logon remains in effect until you do one of the following:

- Log off the distant module

- Log off locally

- Do not communicate with the remote module for 15 minutes

If you want, you can log onto all checkback modules in the network at once. To remain logged on, however, you have to talk to each module before it times out.

### 2.5.6.1 Limitations and Concerns

1. The data rate is slow, 60 bits per second. A long command like get settings from a distant checkback module takes 30 seconds or more to complete, depending on the quality of the communication channel.

2. The system is only intended to support one module communicating at a time. If multiple modules attempt to talk, commands may fail, although any data that gets through will be accurate.

3. Changing a distant module's address is permitted, but avoid assigning it an address that is already in use - or you will not be able to talk to either module at that address until you can locally change one or the other's address.

## 2.5.7 Recovering Your Lost Password

Checkback modules are inaccessible when you do not know the correct password. If you somehow lose or forget yours, there is a way to recover it. From the "enter password" prompt, type **super** and press the ENTER key. This identifies you as a "super user". These letters (s u p e r) are displayed as asterisks, just as a normal password would be. This pops up the Super User Menu. Press "1" and the module displays ten four-character, hexadecimal numbers. For example:

**d203    f659    26ac    b4ed    1158    5302
1bf4    1d86    8ab3    98e9**

Following the screen directions, contact Pulsar, and we can decode these numbers and determine your current password.

## 2.5.8 Checkback Command Quick Reference

*Table 2–5. Test and General Settings.*

| Command String | Function | Abbreviation |
|---|---|---|
| Set address  n | Set node address - address 0 = master | Set addr n |
| Set primary comm  timed | Simple, timed carrier communication | Set prim time |
| Set primary comm coded | Serial stream communication | Set prim code |
| Set fallback comm timed | Timed carrier for retry fallback comm. | Set fall time |
| Set fallback comm  coded | Serial stream for retry fallback comm. | Set fall code |
| Set interval periodic | Do checkback at regular intervals | Set int peri |
| Set interval timed | Do checkback at specified hours | Set int time |
| Set recovery off | Enable automatic failure recovery | Set reco off |
| Set recovery on | Disable automatic failure recovery | Set reco on |
| Set auto off | Enable automatic checkback tests | Set auto off |
| Set auto on | Disable automatic checkback tests | Set auto on |
| Set factory default n | Configure to factory setting n, 0 = none | Set fact n |
| Set pwd password | Sets module password, 10 chars max. | Set pwd p |
| Set all | Sets all a distant module's settings | Set all > m |
| Get all | Sets local settings to match distant settings | Get all > m |
| Set sync on | Enables automatic clock synchronization | Set sync on |
| Set sync off | Enables automatic clock synchronization | Set sync on |

*Table 2–6. Output States.*

| Command String | Function | Abbreviation |
|---|---|---|
| Set major alarm open | Output opens for Major Alarm | Set majo open |
| Set major alarm close | Output close  for Major Alarm | Set majo close |
| Set minor alarm open | Output open for Minor Alarm | Set mino open |
| Set minor alarm close | Output close for Minor Alarm | Set mino close |
| Set pass checkback open | Output opens for successful checkback | Set pass open |
| Set pass checkback close | Output  closes for successful checkback | Set pass close |
| Set recovered open | Output opens for successful recovery | Set reco open |
| Set recovered close | Output closes for successful recovery | Set reco close |
| Set testing open | Output opens when test in progress | Set test open |
| Set testing close | Output closes when test in progress | Set test close |
| Set alarm contacts seal | Seal in alarm contacts | Set alar seal |
| Set alarm contacts momentary | Momentary alarm contacts | Set alar mome |

*Table 2–7. Test and Communications Options.*

| Command String | Function | Abbreviation |
|---|---|---|
| Set retries nn | Retries before reporting a failure, max = 20 | Set retr nn |
| Set low power tests off | Do only the both high power tests | Set low off |
| Set low power tests on | Do both high and low power tests | Set low on |
| Set id failed off | Don't identify the failed end | Set id off |
| Set id failed on | Identify the failed end | Set id on |

**2**

*Table 2–8. Times and Intervals.*

| Command string | Function | Abbreviation |
|---|---|---|
| Set time1 checkback hh | Time 1 to do checkback test | Set time1 hh |
| Set time2 checkback hh | Time 2 to do checkback tests | Set time2 hh |
| Set time3 checkback hh | Time 3 to do checkback test | Set time3 hh |
| Set time4 checkback  hh | Time 4 to do checkback test | Set time4 hh |
| Set periodic hours hh | Periodic checkback interval | Set peri hh |
| Set loopback duration ss | Seconds to do loopback test | Set loop  ss |
| Set self test frequency mm | Minutes between self  test recovery tries | Set carrier mm |
| Set time hh:mm:ss | Set node time - hours, min, sec | Set clock hh:mm:ss |
| Set date mm/dd/yy | Set node date - month, day, year | Set date mm/dd/yy |

*Table 2–9. Information Commands.*

| Command String | Function | Abbreviation |
|---|---|---|
| Get event n{-m} | Gets event n or events n to m | Get eve n{-m} |
| Get counts | Gets the node's current alarm & event count | Get cou |
| Get status | Displays the status of front panel leds | Get sta |
| Get settings | Gets the node's current settings | Get set |

*Table 2–10. Clearing Commands.*

| Command String | Function | Abbreviation |
|---|---|---|
| Clear alarms | Clears major and minor alarm outputs | Clr a |
| Clear events | Clears all stored events | Clr e |
| Clear counts | Clears event counts | Clr c |

*Table 2–11. Action Commands.*

| Command String | Function | Abbreviation |
|---|---|---|
| Do loopback | Initiates a loopback test | Do loop |
| Do checkback | Initiates a checkback test | Do chec |

*Table 2–12. Logon Commands.*

| Command String | Function | Abbreviation |
|---|---|---|
| Logon pwd | Logs onto a local or distant module | Logon pwd |
| Logoff | Logs off a local or distant module | Logoff |

*Table 2–13. Help Commands.*

| Command String | Function | Abbreviation |
|---|---|---|
| Help | General help display | Help |
| Help (command type) | Help (command type) | Command type (set, do, get, clear) |
| Help (command) | Any valid command | Help (command) |

*Table 2–14. Network Troubleshooting.*

| ALARMS | | | | |
|---|---|---|---|---|
| **Master Module** | | **Remote Module** | | **Probable Situation** |
| **Major** | **Minor** | **Major** | **Minor** | |
| clear | clear | clear | clear | All OK |
| clear | clear | clear | set | Weak/noisy line |
| clear | clear | set | clear | Master or line failed |
| clear | clear | set | set | Remote failed |
| clear | set | clear | clear | Weak/noisy line |
| clear | set | clear | set | Weak/noisy line |
| clear | set | set | clear | Weak/noisy line or master failed |
| clear | set | set | set | Remote failed |
| set | clear | clear | clear | Remote or line failed |
| set | clear | clear | set | Remote or line failed |
| set | clear | set | clear | Line failed |
| set | clear | set | set | Remote failed |
| set | set | clear | clear | Master failed |
| set | set | clear | set | Master failed |
| set | set | set | clear | Master failed |
| set | set | set | set | Master and remote failed |

## 2.6 Troubleshooting

You can identify and solve many checkback network problems by examining the major and minor alarms. If both high and low power checkback tests are enabled, the major and minor alarms work like this:

- If a module fails only the low power test, it sets the minor alarm

- If a module fails the high power test, it sets the major alarm

- If a module fails the high power test and can not receive its own messages, it sets both major and minor alarms

Armed with this information, you can usually identify a failed module or line problem. Table 2-14 lists all combinations for a two-module system and the probable situation.

To get the complete picture, you must wait long enough for all remotes to initiate their own checkback tests. For example, if the master has a major alarm, but the remote has no alarms, you can not determine if it failed to receive the command due to a bad line or because its receiver is dead. By waiting for the remote to initiate a checkback, you can tell if it is the line (major alarm) or the module (both alarms).

## 2.7 Drawings

The Universal Checkback Module's simplified component layout is shown in Figure 2-11. The schematics are available upon request. Figure 2-12 shows a simplified schematic with labeled inputs and outputs.
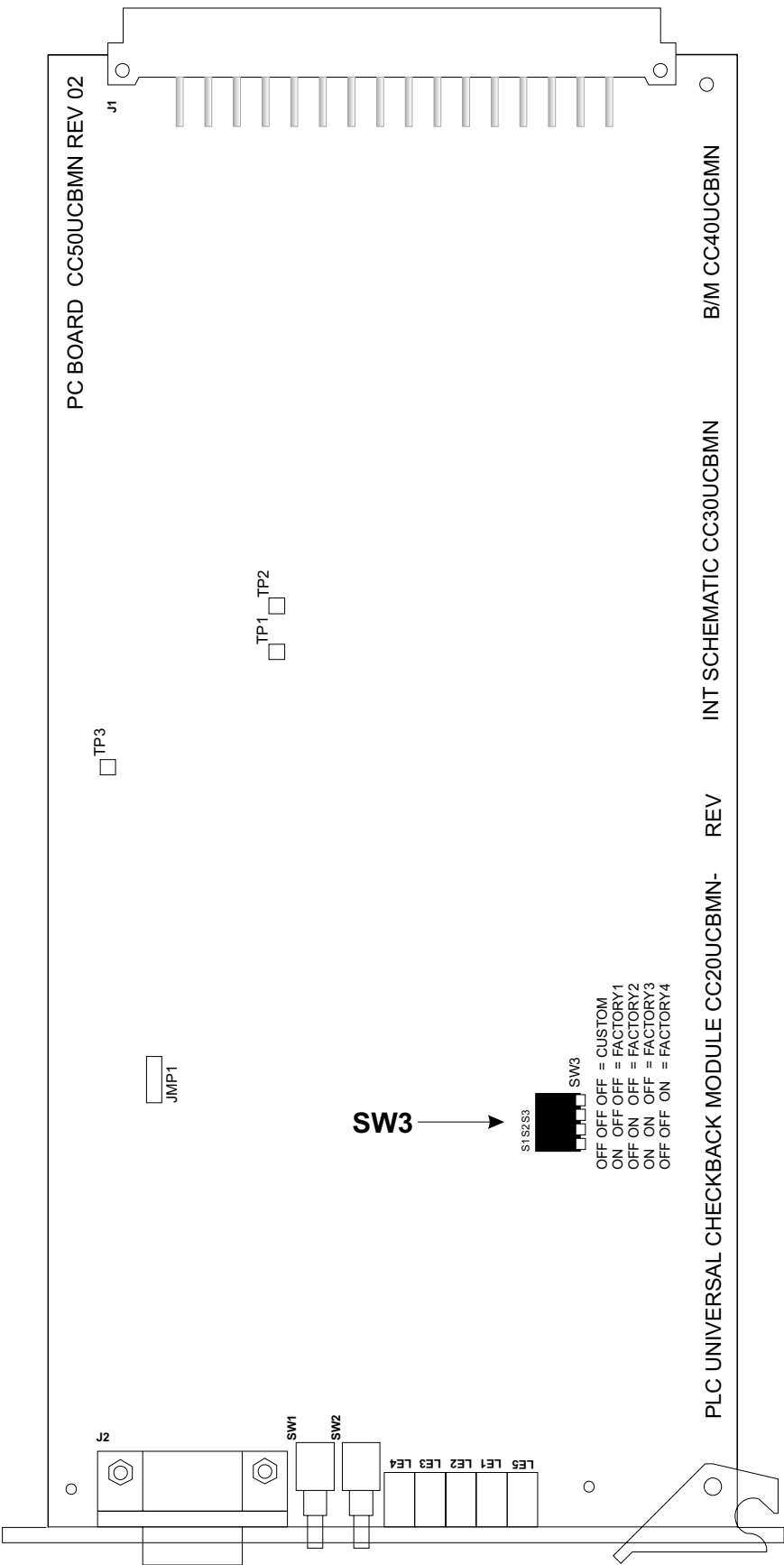
PC BOARD CC50UCBMN REV 02

B/M CC40UCBMN

INT SCHEMATIC CC30UCBMN

REV

PLC UNIVERSAL CHECKBACK MODULE CC20UCBMN-

J1

TP3

TP1 TP2

JMP1

SW3

SW3

S1 S2 S3

OFF OFF OFF = CUSTOM
ON  OFF OFF = FACTORY1
OFF ON  OFF = FACTORY2
ON  ON  OFF = FACTORY3
OFF OFF ON  = FACTORY4

J2

SW1

SW2

LE5 LE1 LE2 LE3 LE4

*Figure 2–11. Universal Checkback Module – Simplified Component layout*

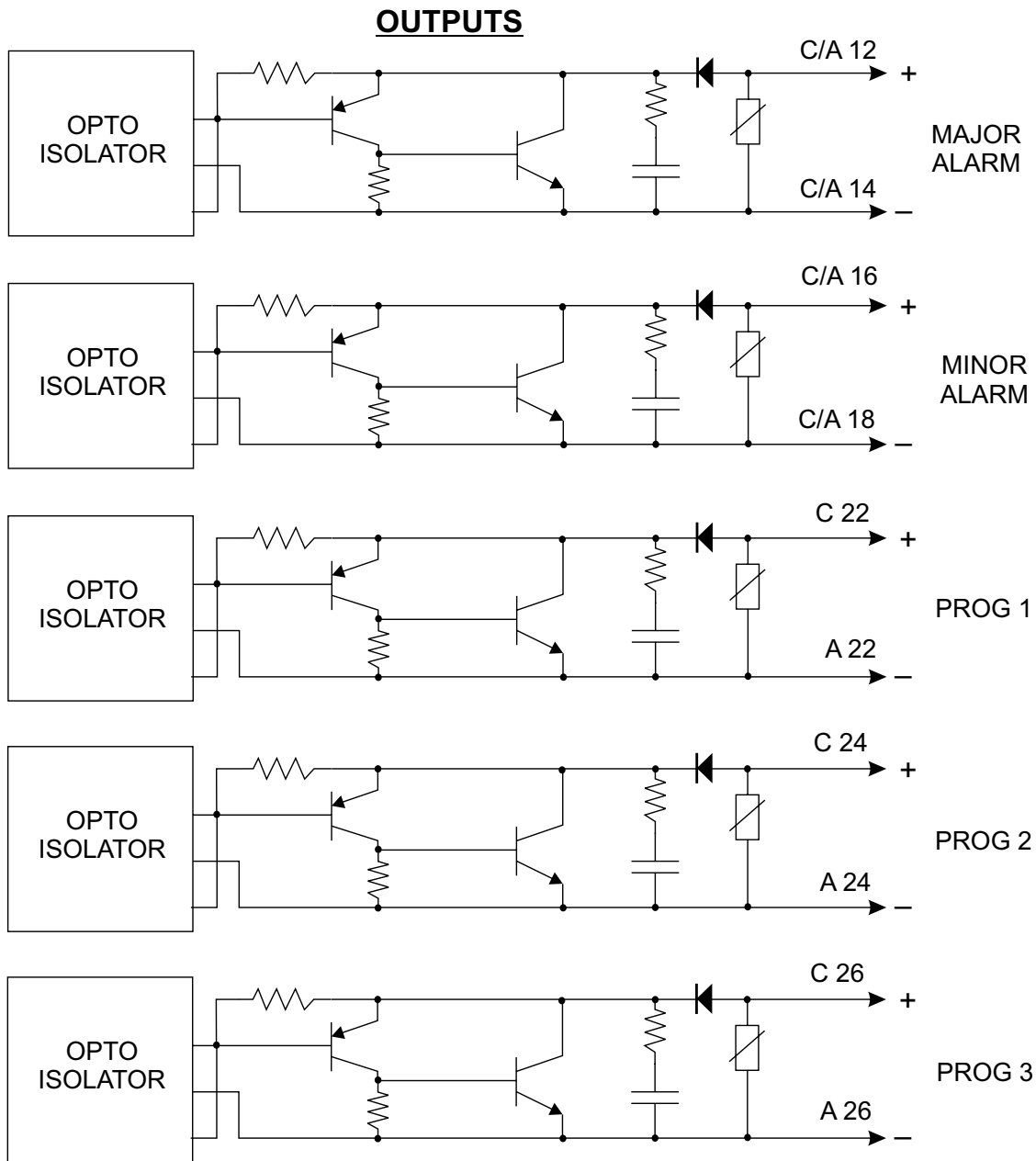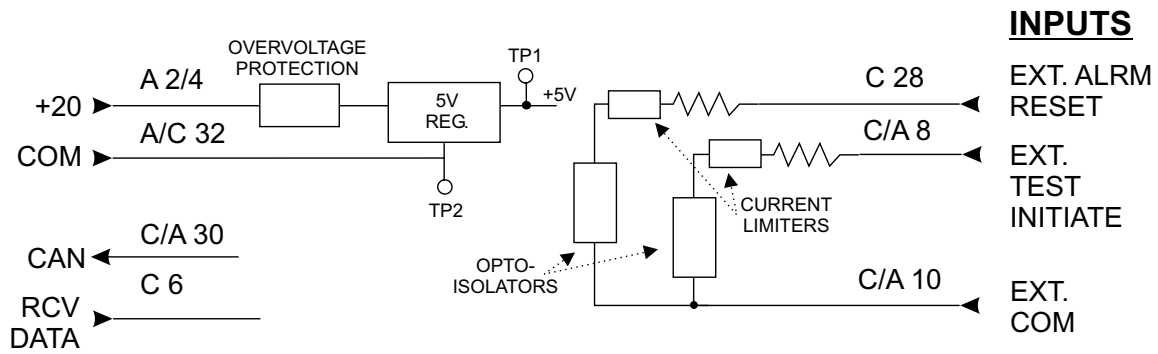2

**Pulsar**
Technologies, Inc.



*Figure 2–12. UCB Module Block diagram.*

# Chapter 3. Power Supply and Interface Module

*Table 3–1. Power Supply & Interface Module Styles and Descriptions.*

| Style | Description |
|---|---|
| CS20-PWRMN-001 | 48 V |
| CS20-PWRMN-002 | 125 V |
| CS20-PWRMN-003 | 250 V |
| CS20-PWRMN-004 | 24 V |

Schematic:  CS30-PWRMN

Parts List:  CS40-PWRMN

## 3.1 Power Supply and Interface Module Description

The Power Supply and Interface Module is a dual function module, First it is a dc/dc high-frequency switching regulator which generates a regulated output voltage of 20 Vdc (between 0.3 and 0.5 amps) to power the Universal Checkback Assembly's operation. The module also provides protection from battery surge and transients, and can receive input from four available groups of station batteries:

- 20 – 28  Vdc
- 30 – 70  Vdc
- 72 – 145  Vdc
- 170 – 290  Vdc

Secondly, it interfaces the ON/OFF carrier's transmit input and receive output to the Universal Checkback Module.

**3**

**Chapter Contents**

### 3.1.1 Front Panel

The operator controls on the Power Supply and Interface Module's front panel are as follows (see Figure 1-2 or Figure 1-4):

### Pushbutton Switch

The topmost switch on the module's front panel is the "ON/OFF" (SW1) pushbutton.

### LEDs

The module's front panel provides the following five red LEDs as power and signal indicators:

| | |
|---|---|
| **INPUT** | LE4 |
| **OUTPUT** | LE5 |
| **RCV DATA** | LE1 (Receive Data) |
| **XMIT HL DATA** | LE2 (Transmit High-Level Data) |
| **XMIT LL DATA** | LE3 (Transmit Low-Level Data) |

> **NOTE**
> The alarm relay (K2) indicates loss of power. When the alarm is activated, LE4 (INPUT) or LE5 (OUTPUT) is "OFF".

### Test Jacks

There are two test jacks on the module's front panel:

| | |
|---|---|
| **+20V** | +20 Vdc, Red (TJ2) |
| **COMMON** | Common, Black (TJ2) |

### 3.1.2 Power Supply PC Board

The operator controls on the Power Supply and Interface Module's PC Board are as follows (see Figure 3-1 & 3-2):

### Jumpers

Jumper JMP1 is for the alarm relay. It indicates a loss-of-power condition (NO/NC).

Jumpers JMP2 & JMP3 determine if the output is normally conducting or normally non-conducting. The output can be set up so it's normally conducting and when a signal is applied it becomes non-conducting. It is selectable to bypass Q5 and go to Q4. This is similar to normally open and normall closed relay contacts.

Jumper JMP4 is for receiver input voltage, which may be one of the following:

- 15/24 Vdc (over 10.5V)
- 48 Vdc (over 38V)
- 125 Vdc (over 91V)
- 250 Vdc (over 182V)

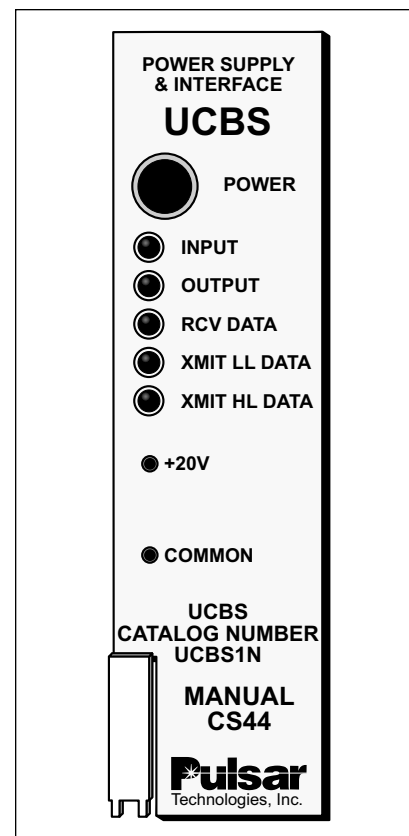> **NOTE**
> Jumper JMP1 is shipped in the "NC" state.



*Figure 3–1. UCBS Power Supply Front Panel.*

## *3.2 Module Circuits*

The Power Supply and Interface Module schematic is shown in Figure 3-2. The module has five separate circuits, as follows:

- Power Supply Input

- Switching dc–dc Converter

- Output Power Alarm Relay

- Transmit

- Receive

### 3.2.1 Power Supply Input Circuitry

Input power (less than 20mA) is applied to the PC Board at pins 10-A/C and 12-A/C (positive) and 14-A/C (negative). Fuses F1 and F2 protect the unit in case of failure. These fuses have different values for each supply voltage:

$$250 \text{ V (G03)} = 0.5 \text{ A}$$
$$125 \text{ V (G02)} = 0.5 \text{ A}$$
$$48 \text{ V (G01)} = 1.0 \text{ A}$$
$$24 \text{ V (G04)} = 2.0 \text{ A}$$

Switch S1 provides "ON/OFF" power. Capacitor C4 and diodes Z4 and Z5 provide transient and reverse voltage protection. Capacitor C2 with choke T1 are used to filter input voltage and prevent any power supply switching transients from returning on the input power bus. LE4 (INPUT) provides an indication of primary power.

### 3.2.2 Switching dc–dc Converter

The module's switching dc–dc converter (U3) is a prefabricated encapsulated package. It comes in four different versions, one for each of the four input voltages (i.e., 24 V, 48 V, 125 V, and 250 V). The output voltage for all four versions of the device is always 24 Vdc. This 24 Vdc is then trimmed by R30 to produce the +20 V output for the power supply. Because this device is encapsulated, there are no serviceable parts. If it fails, it must be replaced.

### 3.2.3 Output Power Alarm Relay

Relay K1 is used as a jumper-selected alarm (NO/ NC) in the event of power supply failure.

Clamp diode D3 is used to reduce the spike when the power supply is de-energized.

The OUTPUT LED (LE5) on the front panel indicates when the module is delivering power output.

Test jacks TJ1 (Red) and TJ2 (Black) are also located on the front panel (labeled "+20V" and "COMMON", respectively) so that you can easily measure the voltage.

### 3.2.4 Transmit Circuitry

The transmit circuits comprises Q2, Q3, Q4, Q5, U1 & U2, and associated circuitry.

The Low-Level Transmitter input is fed from the Checkback Module through pin 26A to drive the base of the transistor Q4 or Q5 depending on jumper setting JMP3. For an LL Transmit keying input to cause the output to close or conduct, JMP3 should be set to the "A" position. This is similar to a N.O. contact in this setting. For an LL Transmit keying input to cause the output to open into the non-conducting state, JMP3 should be set to the "B" position. This is similar to a N.C. contact in this setting.

The XMIT LL DATA LED (LE3), located on the front panel, is illuminated when low-level data is being transmitted.

In a similar manner, High-Level Transmitter input is fed from the Checkback Module through pin 6A to drive the base of transistor Q2 or Q3 depending on the jumper setting of JMP2. For an HL Transmit keying input to cause the output to close

---

**NOTE**

Opto-couplers U1 & U2 are fast enough to follow the keying rate of the checkback.

---

or conduct, JMP2 should be set to the "A" position. This is similar to a N.O. contact in this setting. For an HL Transmit keying input to cause the output to open or in the non-conducting state, JMP2 should be set to the "B" position. This is similar to a N.C. contact in this setting.

### 3.2.5 Receive Circuitry

The receive circuit comprises opto-isolator U4, transistor Q1 and associated circuitry. This circuit is optically coupled to the Universal Checkback module through opto-isolator U4. Four input voltages are link-selectable (using JMP4):

- 24V (15V)
- 48V
- 125V
- 250V

The receive input command is applied across 28-A/C (+) and 30-A/C (-), and causes current to flow in the diode in U4. This action causes the transistor Q1 to saturate.

The RCV DATA LED (LE1) on the front panel indicates, by illuminating, when data is being received. The receive output is fed to pin 6C, which is connected to the receive input on the Universal Checkback module.

## 3.3. Troubleshooting

If the power supply fails and requires repair, we recommend the following procedure. (Use Extender Board 1353D70G01.)

Check for a +20 Vdc output at the front panel jacks (labeled "+20V" and "COMMON").

If there is a +20 Vdc output, the OUTPUT LED (LE5) should be lit and relay K1 energized. Verify that the transmit and receive circuits are working.

If there is no +20 Vdc output, verify the presence of battery voltage across C2. Also verify that the fuses (F1 and F2) are good.
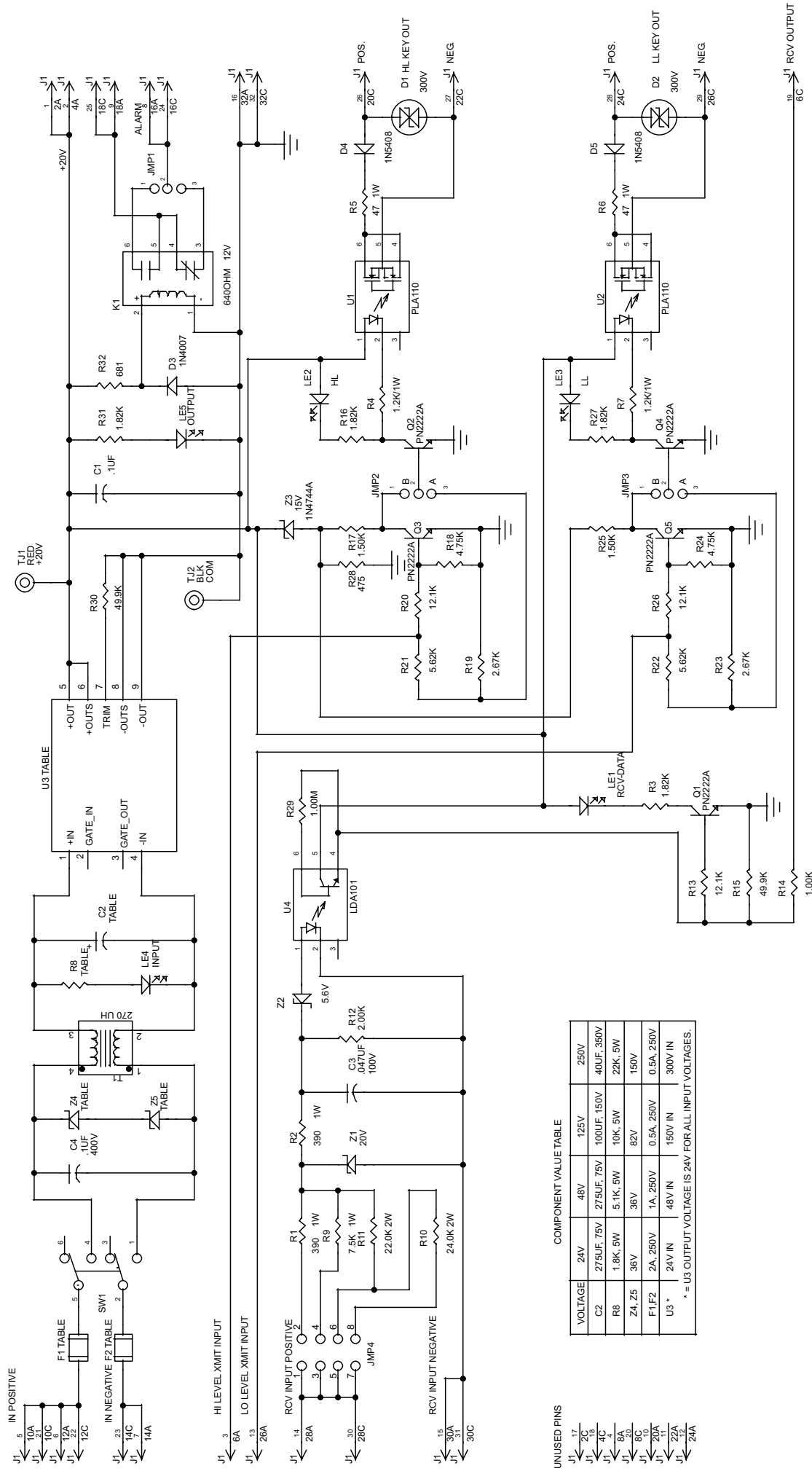
*Table 3–2. Power Supply/Interface Module Receive Input Ratings*

| Keying Voltage | | |
|---|---|---|
| Receive Input Jumper Setting | No Key < | Key at > |
| 24V (15V) | 8.5V | 10.5V |
| 48V | 32V | 38V |
| 125V | 80V | 91V |
| 250V | 160V | 182V |

< =less than > =greater than

*Figure 3–2. UCBS Power Supply and Interface PC Board.*

**3**

Figure 3–3. UCBS Power Supply and Interface schematic (CS30-PWRMN).



COMPONENT VALUE TABLE

| VOLTAGE | 24V | 48V | 125V | 250V |
|---|---|---|---|---|
| C2 | 275UF, 75V | 275UF, 75V | 100UF, 150V | 40UF, 350V |
| R8 | 1.8K, 5W | 5.1K, 5W | 10K, 5W | 22K, 5W |
| Z4, Z5 | 36V | 36V | 82V | 150V |
| F1,F2 | 2A, 250V | 1A, 250V | 0.5A, 250V | 0.5A, 250V |
| U3 * | 24V IN | 48V IN | 150V IN | 300V IN |

\* = U3 OUTPUT VOLTAGE IS 24V FOR ALL INPUT VOLTAGES.

# Chapter 4. UCBS External Connections

## 4.1 External Connections

Due to the variety of relaying systems installed, not all applications can be represented in this manual. The information provided here is a brief overview of the most typical applications for the UCBS. This is in no way a comprehensive delineation of the entire spectrum of applications.

If you have a system that does not lend itself to any of the systems exemplified here, please contact Pulsar for application assistance.

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## 4.2 UCBS to KDAR/TC Connections

Figure 4-1 represents the connections required in the KDAR system to utilize the checkback features. Alarm outputs are not shown for simplicity.



*Figure 4–1. UCBS to KDAR/TC Connections (CS31-SYS01).*

## *4.3 UCBS to KDAR/KR Connections*

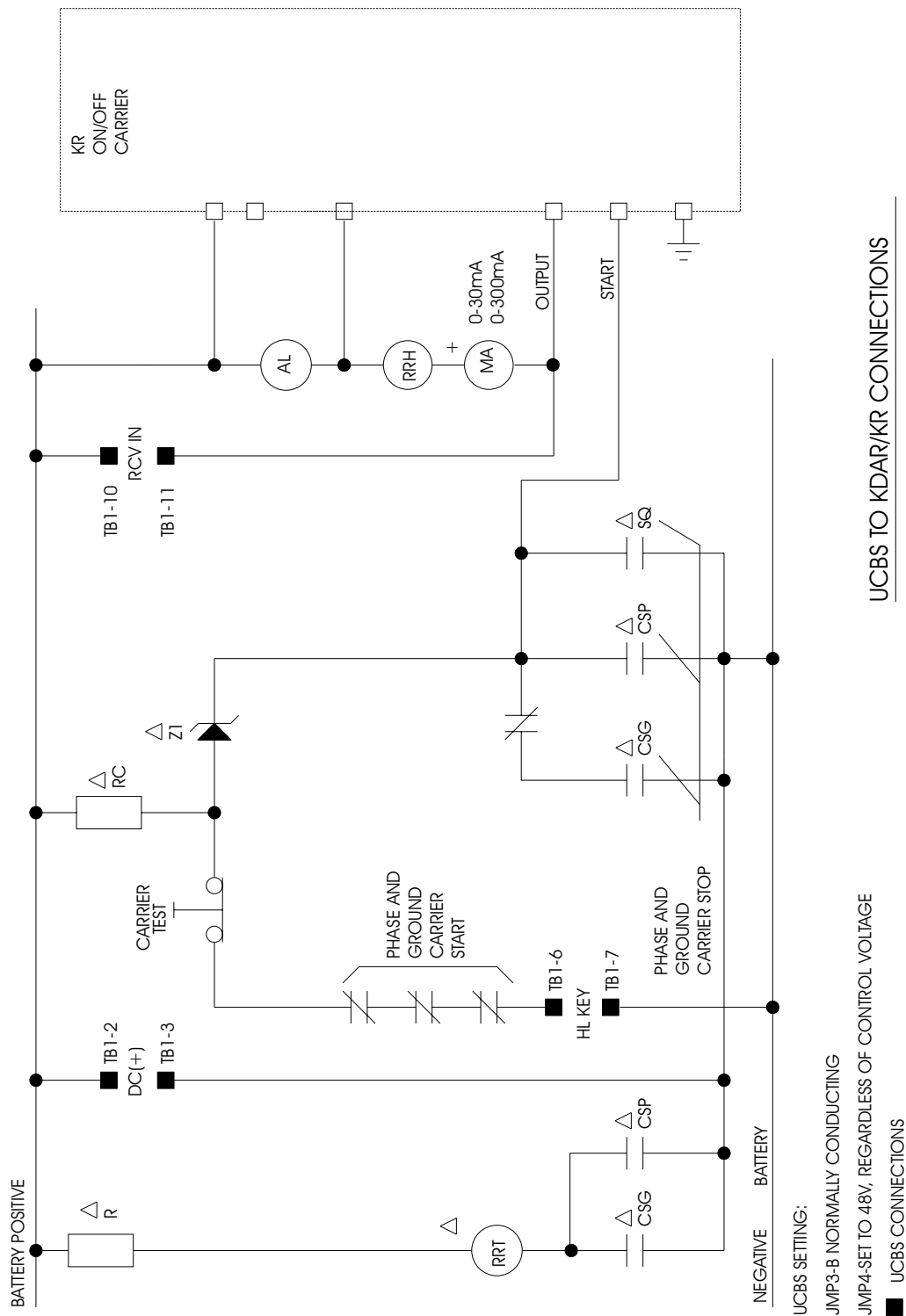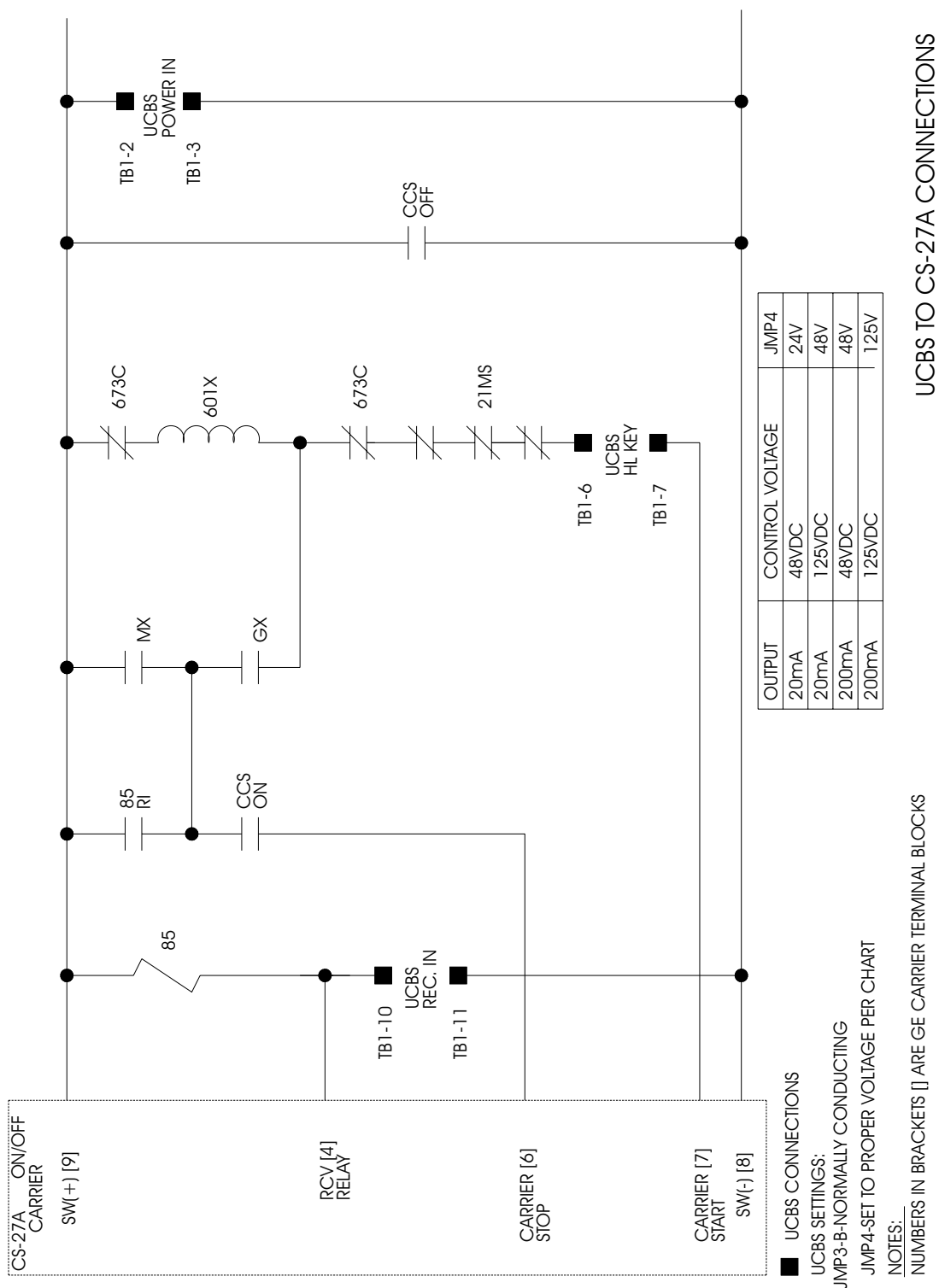Figure 4-2 represents the connections required in the KDAR system when using a KR carrier.



*Figure 4–2. UCBS to KDAR/KR Connections (CS31-SYS01).*

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## *4.4 UCBS to GE CS-27A Connections*

Figure 4-3 represents the connections required in the GE CS-27A system to utilize the checkback features.



*Figure 4–3. UCBS to GE CS-27A Connections (CS31-SYS01).*

UCBS TO CS-27A CONNECTIONS

| OUTPUT | CONTROL VOLTAGE | JMP4 |
|--------|-----------------|------|
| 20mA | 48VDC | 24V |
| 20mA | 125VDC | 48V |
| 200mA | 48VDC | 48V |
| 200mA | 125VDC | 125V |

■ UCBS CONNECTIONS
UCBS SETTINGS:
JMP3-B-NORMALLY CONDUCTING
JMP4-SET TO PROPER VOLTAGE PER CHART

NOTES:
NUMBERS IN BRACKETS [] ARE GE CARRIER TERMINAL BLOCKS

## *4.5 UCBS to UCBS Connections*

Figure 4-4 shows you how to connect two UCBSs back-to-back for testing.



*Figure 4–4. Connections for Back-to-Back Testing of UCBSs.*
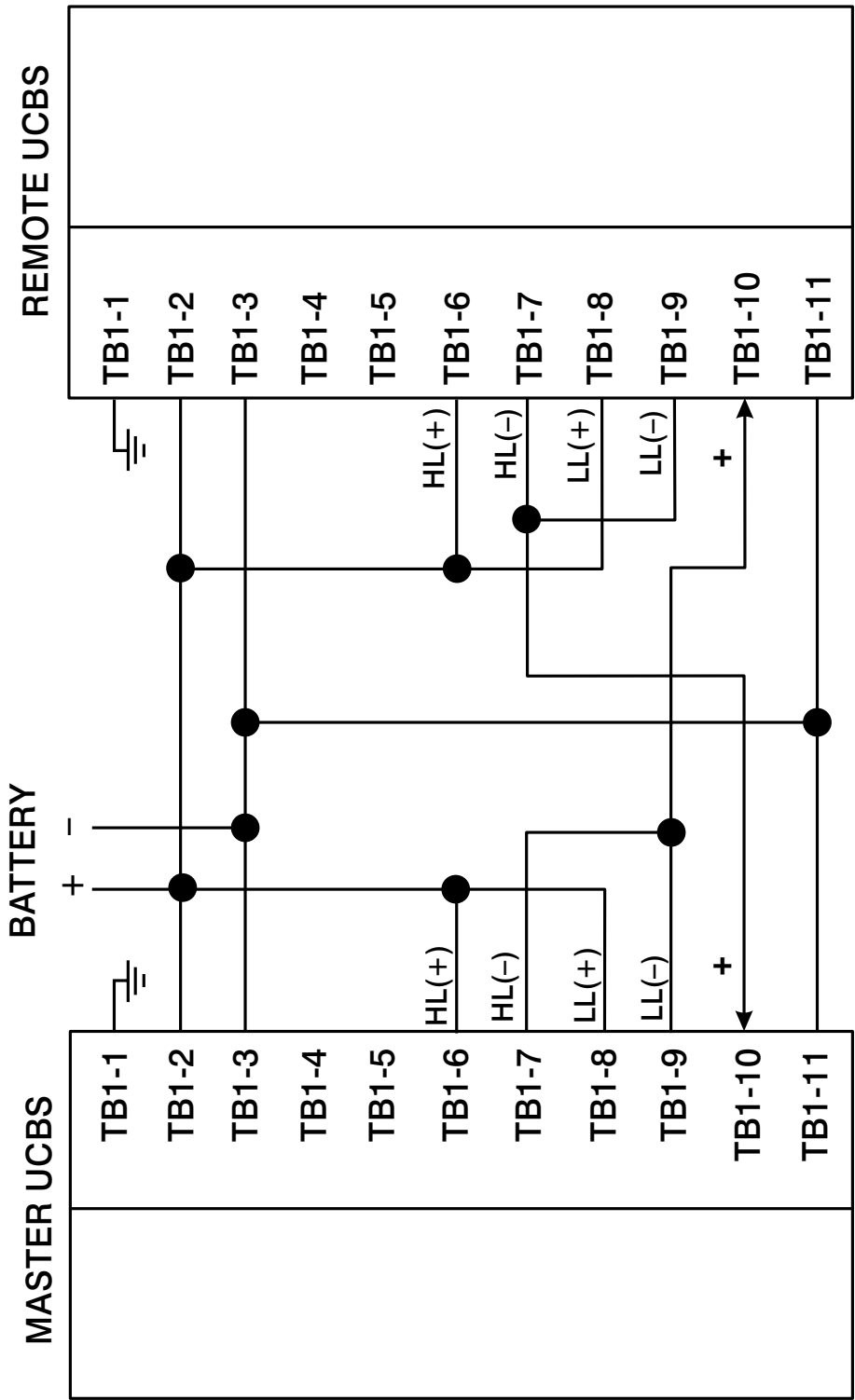
**NOTE: Set the Receiver Input Jumper (JMP4) on the UCBS Power Supply & Interface Module to the proper battery voltage for each unit.**

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