

# APPENDIX A – TECHNICAL DATA

## SPECIFICATIONS

### Physical

**Size** (without mounting brackets)  
**Length:** 10.4"  
**Height:** 7.6"  
**Depth:** 3.4"  
**Weight**  
3.0lb.

### Environmental

**Storage**  
**Temperature:** -50 °C to 85 °C  
**Humidity:** 0 to 95%, non-condensing  
**Operating**  
**Temperature:** -40 °C to 72 °C  
**Humidity:** 0 to 95%, non-condensing

### Mounting

Shelf or backboard (includes mounting brackets)

### Construction

**Chassis**  
Fully enclosed, anodized aluminum  
Externally accessible keypad, LEDs and connectors  
**Electrical**  
All components mounted on conformal coated, internal PCBs

### Power

**Voltage**  
**Range:** 9 to 36 Vdc  
**Consumption**  
**Typical:** 2.3W  
**Maximum:** 3.8W (with GPS Receiver, Ethernet and Modem options)

### Isolation

**Power**  
**Minimum:** 3800 Vdc from B and N terminals to chassis and inputs  
**Digital Inputs**  
**Minimum:** 3800 Vdc to any terminal  
**Analog Inputs**  
**Minimum:** 3800 Vdc to any terminal  
**Input to Adjacent Input**  
**Digital:** minimum 3800 Vdc  
**Analog:** minimum 3200 Vdc  
**USB Host and Device Ports**  
**Minimum:** 3800 Vdc to any terminal  
**GPS Receiver and Ethernet Port (optional)**  
**Minimum:** 3800 Vdc to any terminal  
**Internal Modem (optional)**  
Designed to meet FCC part 68 standards

### Capacities

**Inputs**  
**Digital:** 64, all optically isolated  
**Analog:** 8, voltage or current (optional)  
**Virtual:** 32, user-assigned  
**Timer:** 32, user-assigned  
**Train Speed Monitor:** 4, user-assigned  
**Outputs**  
**Relay:** 2, form C, rated for 2A at 24Vdc or 1A at 125Vac, maximum switching capacity of 125VA or 60W, service life 1 million electrical (typical)

### Event Storage

**Standard:** 234,777 records  
**Maximum:** 2,947,289 records  
**Liquid Crystal Display**  
**Characters:** 80 total on 4 lines  
**Viewing Area:** 2.8" by .8"

### Front Panel Keypad

**Quantity:** 20 keys

### Physical Inputs

**Input Impedance**  
**Digital:** minimum 10KOhms, optically isolated  
**Analog:** minimum 10MOhms  
**Range**  
**Digital Input-On:** 9 to 36 Vdc  
**Digital Input-Off:** 0 to 1 Vdc  
**Analog DC Voltage:** 3 scales,  $\pm 25.5$  Vdc,  $+51.1$  Vdc,  $\pm 255$  Vdc  
**Analog AC Voltage:** 2 scales, 25.5 Vdc, 255 Vac  
**Analog Current:** 2 scales,  $\pm 25.5$  Adc, 25.5 Aac

### Event Validation Times

**Digital:** .01 to 327.67 seconds, compatible with fixed rate flashing circuits  
**Analog:** fast and slow filter settings

### Analog Limit Values

**Voltage**  
**High and Low Limits:** in multiples of .1V or 1V  
**Current**  
**High and Low Limits:** in multiples of .1A

### Analog Input Accuracy

**Typical Voltage:**  $\pm .15$  V or  $\pm 1.5$  V  
**Typical Current:**  $\pm .2$  A

### Virtual Inputs

**Definitions**  
Any logical association shared by 1 to 4 variables (i.e., Digital, Analog, Timer or other Virtual Inputs)  
Assigned by defining the state of the Virtual Input for each combination of variable states

### Virtual Inputs (continued)

#### Reporting

Creates standard Event Records  
Relay can be controlled by each Virtual Input  
Modem (optional) can be enabled to dial out Event Records

#### Timer Inputs

##### Programming

Any input can be assigned as a trigger or terminating source  
On or Off events can be assigned as a trigger or terminating source

#### Limit Values

**High and Low Limits:** in multiples of .1 seconds  
**Range:** 0.0 to 999.9 seconds

#### Reporting

Measured Time is reported in each Timer Input Event Record  
Violation of Limit Values are also reported

### Temperature Sensing

**Usage:** measures and reports internal temperature of recorder  
**High and Low Limits:** -67 °F to 257 °F

### Train Speed Monitor

#### Operation

Reports excessive train speed  
Logs standard Event Record

#### Sensors

**Digital Inputs:** 2 required  
**Distance:** 50' to 5280'

#### Limit Values

5 to 180mph

### Memory

#### Type

Non-volatile, Event Records and Setup Database are stored in flash memory chip  
Newest data over-writes oldest data, 129th day over-writes first day

#### Storage Longevity

Infinite with power off  
Rated for 100,000 write operations

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**Ports****RS-232**

**Quantity:** 1, for use with a PC

**Terminal Emulation:** ANSI

**Baud Rates:** 300, 600, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200

**Bit Format:** 8-N-1

**USB Host**

Compatible with any FAT-32 formatted flash drive

Can create a text file of Event Record data from any time span

Can be used to update firmware

**USB Device**

Eliminates need for serial comm port, data transfer rates of 4.71 Mbps

**Ethernet (optional)**

**Type:** 10/100 Base-T

**Protocols:** TCP/IP, Telnet, SNMP-Unicast, SNMP-Multicast

**Concurrent Sessions:** Telnet (2)

Provides remote or local access via TCP/IP

Data transfer rates of 4.70 Mbps

User-assignable IP Address, port, sub-net mask, Unicast IP Address

**Modem (optional)**

Provides remote access, auto-answer

**GPS Receiver (optional)**

Used to provide precise, real-time clock control, latitude and longitude coordinates

**Connectors****Power**

Detachable, tension clamp, 4-position, 12 to 22 AWG

Dual B and N terminals

**Digital Inputs**

Detachable, tension clamp, 8-position, 12 to 22 AWG

**Analog Inputs**

Detachable, tension clamp, 8-position, 12 to 22 AWG

**Relays (2)**

Detachable, tension clamp, 3-position, 12 to 22 AWG

Normally open, normally closed and common terminals per relay

**Terminal Port**

DE-9 male, configured as modified DCE

**USB Host Port**

USB Type A female

**USB Device Port**

USB Type B female

**Telephone Line**

RJ-11 female

**Ethernet Port (optional)**

RJ-45 female

**GPS Receiver (optional)**

MCX female

**Indicators****LCD Panel**

Includes LED back lighting for enhanced visibility

Displays numerous command menus for configuring the recorder and retrieving data

**Front Panel LEDs (3)**

**Power:** green

**Terminal:** green, flashes with send and receive data

**Modem:** green, flashes with send and receive data and ringing

**Ethernet Port LEDs (2 optional)**

**Green:** link established

**Yellow:** data activity

**Controls****Keypad**

Located on front panel, below LCD

**Keys:** 0-9, Browse, Alpha, Setup, Esc, Enter, Save/., left, right, up, down/-

**LCD Contrast Adjust**

Single-turn pot., accessible from front panel

**Internal Clock****Accuracy**

**Typical:** ±8 seconds per month (3ppm) when not synchronized

**Volatility:** maintains accuracy for minimum of 30 days with loss of power

**Resolution:** .01 seconds for all Event Records

**Sync Interval**

**SNTP-Unicast:** via time server, 5 minutes past each hour (requires Ethernet Port option)

**SNTP-Multicast:** per time server schedule (requires Ethernet Port option)

**GPS:** once per hour (requires GPS Receiver option)

**Operation**

**Time Zones:** selectable from 7 different North American settings

**Daylight Saving Time:** enable or disable automatic adjustment

**Leap Year:** automatically adjusted

**GPS Receiver (optional)**

Includes PCB and external antenna

**PCB**

Plugs into mating connector inside recorder

**Antenna**

**Size:** diameter 1.8", height .6" (not including mounting screw)

**Weight:** 2 oz. (less cable)

**Operating Temperature:** -40 °C to 85 °C

**Mounting:** bulkhead mountable to any surface less than 3/8" thick

**Location:** unobstructed skyward orientation, for use outdoors

**Password Protection****Administrative Level**

**Access:** unrestricted to all functions

**Length:** 8 characters

**Restricted Level**

**Access:** Event Record and Setup Database viewing only

**Length:** 8 characters

**Passcode**

**Access:** limited modifications to Setup Database via front panel

**Length:** 8 digits

**Internal Modem (optional)****Type**

V.34, 33,600 Baud, data compression and error correction

**Usage**

Remote access via auto-answer operation

Allows dial-out alarm reporting of Virtual Input records

**Compliance**

Designed to meet FCC part 68 standards

**Dial-out Alarms (optional)****Calling Method**

Primary and secondary dial numbers, multiple attempts

Tone or pulse dialing

**Data**

Issues Virtual Input Event Records if enabled by Virtual Input definition

# TRANSFER RATES

Table 13 on page 99 lists typical bit transfer rates for each of the CWR-72A's user-accessible ports. In each case the same 20,000 Event Records with no-detail formatting were either dumped to a PC file or saved directly to a flash drive. The times listed are normalized relative to 1,000 Event Records. If speed is a concern, using the USB Device Port is highly recommended.

| Port                    | Time to transfer 1,000 Event Records (sec) | Actual transfer rate (bps) | Relative speed compared to 38,400 |
|-------------------------|--|----------------------------|-----------------------------------|
| Terminal Port (38,400)  | 19.0                                       | 38,396                     | Used as reference                 |
| Internal modem          | 19.4                                       | 37,649                     | 1.0 times faster                  |
| Terminal Port (115,200) | 6.4  | 114,845                    | 3.0 times faster                  |
| USB Host                | .8   | n/a                        | 22.4 times faster                 |
| Ethernet Port           | .2   | 4,704,075                  | 122.5 times faster                |
| USB Device Port         | .2   | 4,714,063                  | 122.8 times faster                |

Table 13: Bit Transfer Rates by Port

# TERMINAL PORT CABLE

The following cable is included with every CWR-72A.

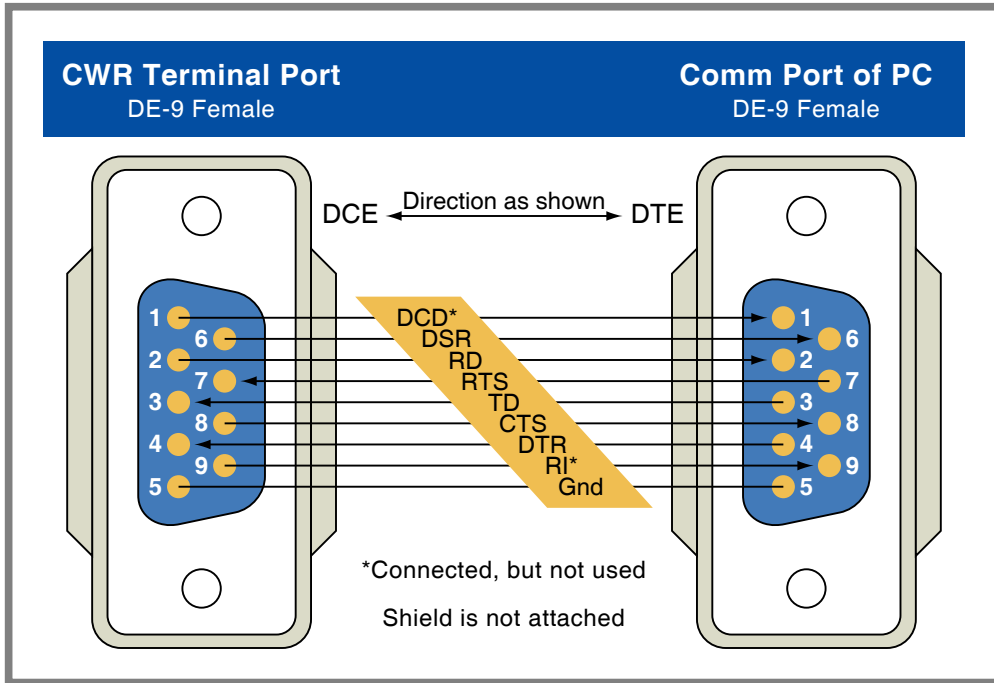


Figure 8: Terminal Port Cable - Wiring Diagram

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