

**LUDLUM MODEL 375-10  
DIGITAL WALL-MOUNT AREA MONITOR  
WITH INTERNAL SCINTILLATOR**

**June 2025**

**Serial Number 338297 and Succeeding  
Serial Numbers**

**LUDLUM MODEL 375-10  
DIGITAL WALL-MOUNT AREA MONITOR  
WITH INTERNAL SCINTILLATOR**

**June 2025**

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Serial Numbers**



**LUDLUM MEASUREMENTS, INC**  
501 OAK STREET, P.O. BOX 810  
SWEETWATER, TEXAS 79556  
325-235-5494, FAX: 325-235-4672



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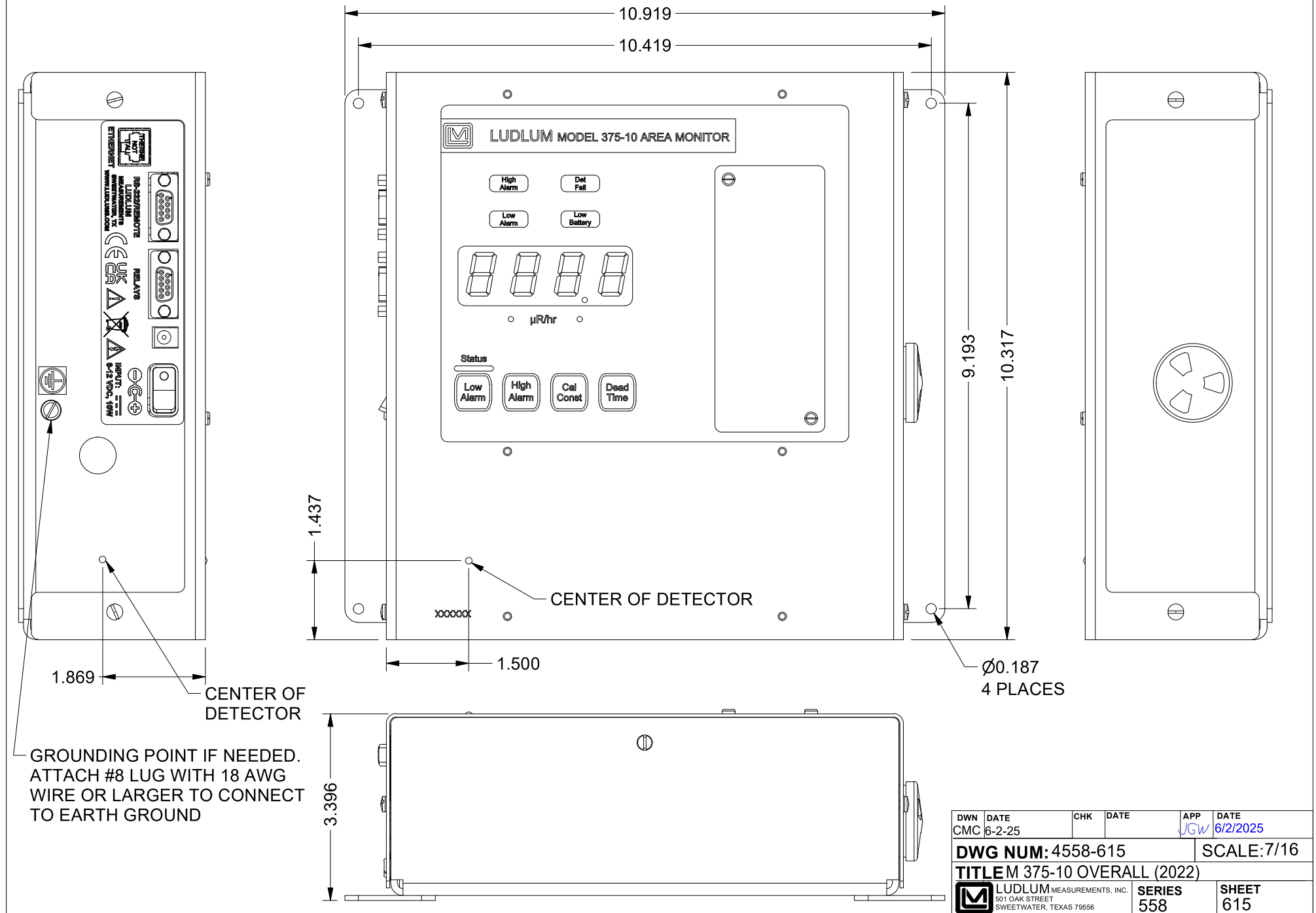
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| REVISION HISTORY |             |          |     |
|------------------|-------------|----------|-----|
| REV              | DESCRIPTION | DATE     | BY  |
| 1                | VALID       | 11-21-22 | CMC |



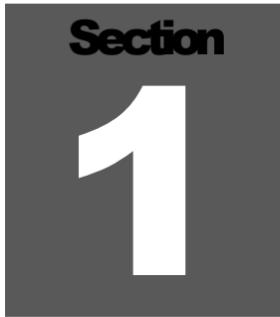
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| DWN  | DATE   | CHK | DATE | APP           | DATE         |
| CMC  | 6-2-25 |     |      | JGW           | 6/2/2025     |
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## Introduction

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The Model 375-10 Digital Wall-Mount Area Monitor is designed for visibility and ease of use. Featuring a wall-mount chassis, the Model 375-10 has a four-digit LED display that is readable from 9 m (30 ft) away. Backlit indicators warn of low radiation alarm (yellow), high radiation alarm (red), instrument failure (red), and low battery (yellow). A green status light is a positive indication of instrument operation.

Parameters are protected under a calibration cover. Calibration is easily accomplished by moving the CAL dipswitch to the right, and using the push buttons to increment or decrement the calibration constant, dead time correction and alarm point parameters. Parameters are stored in non-volatile memory (retained even with power disconnected).

A five-decade logarithmic analog output is provided as is a battery backup for providing up to 48 hours of additional use after the primary power is removed. An Ethernet interface is supplied for use with the optional Model 375 Ethernet Network Software or the Ludlum Webpage and Service Software.

The Model 375-10 comes equipped with an internal 5.1 x 5.1 cm (2 x 2 in.) (Dia x L) NaI (sodium iodide) scintillation detector, which is normally calibrated to be non-sensitive to low energy medical isotopes.

As an option, a removable lead shield for the detector can be installed, providing greater resistance to alarm on low-energy sources.

# Section 2

## Getting Started

The Model 375-10 Digital Wall-Mount Area Monitor is designed for ease of use. This section of the manual is designed to help the first-time user get started. Initial power-up and basic features of the Model 375-10 will be discussed in this section. Other sections of the manual provide more detailed information.

### Power Up

#### Caution!

Verify instrument voltage input rating before connecting to a power converter. If the wrong power converter is used, the instrument and/or power converter could be damaged.

Plug the wall-mounted 9 Vdc power supply into a suitable wall (mains) outlet.

If the RS-232 feature is used, plug in a suitably wired 9-pin connector cable. (See Page 4-4 for the pin assignment of the 9-pin connector.) Turn power ON with the left side panel switch. Do not turn power OFF unless the unit is to be removed from service.

Please set the alarm point(s) on this instrument to conform to your requirements. The factory-set alarm points may be incorrect for your use.

Refer to the instrument manual for more information on setting alarm points.

**FAILURE TO RESET THE ALARM POINT(S)  
MAY RESULT IN EXCESSIVE ALARMS OR  
LACK OF SENSITIVITY.**

Read and then remove the sticker (illustrated to the left) from the instrument calibration cover. Checking and setting of the alarm-point(s) is discussed in detail on pages 2-3 and 7-1 of this manual.

Initial power-up will momentarily activate the internal front-panel lights (except LOW BAT), sound the audio, and display "8888" on the four-digit LED display. The firmware version number (39665Nyy) is then displayed as "396" and "65yy" (where "yy" represents the current version number).

When the instrument has finished measuring background, it will display the current radiation reading and begin checking for an alarm condition.

## Radiation Units

The Model 375-10 may be calibrated for almost any desired radiation units of measure. Common units of measure include mR/hr,  $\mu$ R/hr, R/hr, mSv/h,  $\mu$ Sv/h, cps, cpm, and kcpm. In each case, the unit of measure is indicated underneath the four-digit display. Throughout the rest of this manual, the notation <units> will be used as a substitute.

## Checking Parameters

Check the low-alarm point setting by pressing the LOW ALARM button. The low-alarm point will be displayed as long as the button is pressed. The low-alarm point is in units of <units>. The low-alarm point can be set from 0.1 <units> to 9999 <units>.

Check the high-alarm point setting by pressing the HIGH ALARM button. The high-alarm point will be displayed as long as the button is pressed. The high alarm point is in units of <units>. The high-alarm point can be set from 0.1 <units> to 9999 <units>.

Check the calibration constant by pressing the CAL CONST button. The calibration constant will be displayed as long as the button is pressed. The calibration constant is in units of cpm (counts per minute) per <units>. The calibration constant can be set from 0.1 cpm/<units> to 9999 cpm/<units>.

Check the detector dead time correction by pressing down on the DEAD TIME button. The dead time correction will be displayed as long as the button is pressed. The dead time correction is in units of microseconds. The dead time correction can be set from 0.1 microseconds to 9999 microseconds.

Press both LOW ALARM and HIGH ALARM buttons simultaneously to view and change the unit ID number (a parameter from 1-999). This ID number is broadcast with the serial or Ethernet broadcast. If the Ethernet interface is connected to a network, a unique ID number must be assigned to each Model 375-10 in order for the instruments to work properly.

## Setting Alarm Points

The LOW ALARM and HIGH ALARM points can only be changed while the instrument is in calibration mode. Switch the top dipswitch CAL MODE (behind the calibration cover) to the right to place the instrument into calibration mode.

Changing alarm points is done by holding down the corresponding parameter key and pressing the up or down arrow buttons. Alarm points can be set in the range of 0.1 to 999.9. When an alarm point is changed the instrument will sound an audible beep to confirm the saving of the parameter, and will then return to displaying the current radiation level.

**Note:**

Once the alarm point(s) is set, it is important to remember to switch the CAL MODE switch back to the left. This action protects the parameters from inadvertent changes.

## Operational Check (optional)

The operational check is an important assurance that the radiation detector and electronics are working correctly.

**Note:**

Ludlum Measurements suggests that an operational check be performed on a regular basis. Local procedures may supersede this suggestion.

For an operational check it is necessary to use a radiation check source (not included, but available). When not being used, store the check source in a secure area.

**Note:**

LMI check sources present very minimal risks and are therefore unlicensed (Exempt Quantity Sources reference: 10 CFR 30.71 Schedule B). The radioactive element is sealed (permanently bonded or fixed inside a capsule) so you need not wash your hands after handling. Radiation exposure while handling this source is very minimal with no identified long or short-term risks. Although the amount of radiation given off by exempt sources is so low that it presents no significant hazard, they should be handled with care and respect. Time, distance, and shielding are the best ways to control exposure.

1. Taking the source in hand, place it so that it is located on the center (same location each time) of the detector (crystal), as indicated on the instrument left-side panel. Hold it there for approximately five seconds or until the reading stabilizes. Take note of the displayed level of radiation.
2. Verify that the reading is within 20% of the last reading obtained. Remove the source from the detector.
3. If an alarm is activated, ensure that all visual and audible devices (if applicable) work correctly.

# Section 3

## Specifications

**Display:** four-digit LED display with 2 cm (0.8 in.) character height.

**Display Range:** 000.0-9999

**Display Units:** can be made to display in  $\mu\text{R/hr}$ ,  $\text{mR/hr}$ ,  $\text{R/hr}$ ,  $\mu\text{Sv/h}$ ,  $\text{mSv/h}$ ,  $\text{Sv/h}$ ,  $\mu\text{rem/hr}$ ,  $\text{mrem/hr}$ ,  $\text{rem/hr}$ ,  $\text{cpm}$ ,  $\text{cps}$ , and others

**Display Blanking:** under non-alarm conditions when under battery power; or when CAL MODE dipswitch is placed to the right

**Detector:** internal, 5.1 x 5.1 cm (2 x 2 in.) NaI(Tl) Scintillator; Ludlum Model 44-10-18

**Optional Detector Shield:** removable lead shield for resistance to alarm on low-energy sources; 6.7 x 10.2 x 20.3 cm (2.6 x 4 x 8 in.) (Dia x W x L)

**Operating Range:** typically 0.1-2000  $\mu\text{R/hr}$ , or equivalent

**Linearity:** readings within 10% of true value with detector connected

**Response:** typically 3 seconds from 10% to 90% of final reading

**Status (green light):** indicates the instrument is functioning properly

**Low Alarm:** indicated by a yellow light and slow-beep (1 per second) audible tone (can be set at any point from 0.0-9999)

**High Alarm:** indicated by a red light and a fast-beep (4 per second) audible tone (can be set at any point from 0.0-9999)

### Note:

Audible indicators can be configured as a single beep if desired. Audio intensity is controlled by rotating the baffle on the audio device. Audio intensity may also be adjusted by moving an internal connector.

**LOW BAT:** indicated by a yellow light; two hours of battery life remain

**DET Fail:** indicated by a red light and an audible tone greater than 68 dB at 60 cm (2 ft) for conditions of detector overload, no count from detector or instrument failure, also triggered by the LOW BAT light

**Overload:** A display reading of “-OL-” and audible FAIL alarm indicate detector saturation, usually set to initiate just above the highest range of the detector.

**Ethernet:** 10 Base-T connection for use with Ludlum software

**High Voltage:** adjustable from 450-2500 V

**Dead Time:** adjustable to compensate for dead time of the detector and electronics (can be read on the display)

**Over-range:** A display reading of “----” and activated low and high alarms indicate that the radiation field being measured has exceeded the counting range of the instrument (or when dead time correction accounts for more than 75% of the displayed reading).

**Data Output:** a 9-pin connector providing five-decade log output, RS-232 output, signal ground connection, FAIL and HIGH ALARM signals (current sink) and direct connection to battery and ground

**RS-232 Output:** a two-second dump for computer data logging

**Remote (optional):** Ludlum Model 271 or 272 remote units

**Audio:** Intensity can vary from approximately 68 dB to 100 dB through operation of the external rotary baffle and the internal voltage connection. Frequency is approximately 3 kHz.

**Power:** 9 Vdc wall-mount adapter, handles any mains voltage in the world, supplied with four sets of prongs for almost any wall receptacle

**Battery Life:** typically 8 hours in non-alarm condition

**Battery Charger:** battery is continuously trickle charged when the instrument is connected to line power and turned on

#### **Warning!:**

Only certified technician or calibration personnel should replace battery.

---

**Construction:** aluminum housing with ivory powder-coat finish

**Size:** 26.2 x 24.6 x 8.4 cm (10.3 x 9.7 x 3.3 in.) (H x W x D)

**Weight:** 4.7 kg (10.3 lb)

# Section 4

## Operator Controls and Setup

### Calibration Controls

Remove the calibration cover to expose the calibration controls. The calibration controls include the up/down buttons, five calibration potentiometers, and the option dipswitch (detailed in the following subsection). The five potentiometers are detailed below.

#### Warning!

Do not touch the circuit board in the calibration window due to potential for electric shock.

**ANALOG:** used to adjust the logarithmic analog voltage output, adjusted in calibration mode to the full-scale voltage reading or adjusted to a known point at some given reading.

**HV:** used to set the high voltage required for detector operation. Adjustable from 450-2500 Vdc. Be sure to check the high voltage with a high-impedance (1000-Mohm impedance) voltmeter only. A high-voltage checkpoint is located next to the HV potentiometer.

**DISC:** internal discriminator used to set pulse threshold for counting pulses from the detector. The pad allows direct measurement of threshold voltage. Set the DISC voltage to 2.5 times the desired pulse height threshold. The pulse height threshold is adjustable from 2.0 mVdc to 100 mVdc.

**BAT CHARGE:** used to set the backup battery, trickle-charging voltage. It is set to 6.9 Vdc while the battery is disconnected.

**OVERLOAD:** used to set the detector current overload point. When excessive radiation causes the detector to overload, this set point will cause the FAIL light to engage, and the display will be forced to -OL-.

## Dipswitch (under calibration cover)

When the calibration cover is removed, a four-pole dipswitch is accessible that can activate or deactivate options. These four options are CAL MODE, LATCH ALARM, RANGE, and SINGLE BEEP.

**Dipswitch 1:** Switching the top **CAL MODE** switch to the right, places the instrument into calibration mode. Parameters can only be changed while the instrument is in calibration mode. Calibration mode also changes the analog output to full-scale so that the full-scale voltage may be set by the ANALOG potentiometer. Calibration mode also slows the response time of the display and increases the accuracy. If the display seems too erratic, leaving this switch in the calibration mode during operation will help. Moving the CAL MODE switch back to the left locks the parameters and disables any further changes.

**Dipswitch 2:** The second switch, **LATCH ALARM**, changes the high alarm to a latching alarm. This switch does not affect the low alarm, which is always non-latching. When switched to the left, the high alarm is non-latching; the alarm automatically turns off when the radiation level drops below the alarm point. When switched to the right, the high alarm light and audio signals are latched until either the LOW ALARM or HIGH ALARM button is pressed.

**Dipswitch 3:** The third switch, **RANGE**, selects the range of the instrument. To select the 0.1- 999.9 <units> range, switch the RANGE switch to the left. To select the 1-9999 <units> range, switch the RANGE switch to the right.

**Dipswitch 4:** Switching the fourth switch to the right places the instrument into **SINGLE-BEEP** mode. This option limits the audio output to a single half-second beep on LOW ALARM and HIGH ALARM. DET FAIL audio output (steady tone) is not limited.

## Ethernet Output

The Model 375-10 uses UDP (User Datagram Protocol) for basic communications on an Ethernet network. The software listens on port 5554 for incoming broadcast information. This port *must not* be blocked on your local network (contact your local network administrator for more information). A UDP packet is broadcast every two seconds, transmitting the unit ID number, current reading and alarm status.

## RS-232 Output

With the CAL MODE dipswitch in the left position, the Model 375-10 dumps RS-232 data onto pin 4 of the 9-pin connector every two seconds.

An example program, which shows how an IBM compatible PC can be used to collect the data, is given on following page.

The RS-232 data includes the current radiation readings and the current condition of the status lights. The data is presented in the following format:

|        |                        |      |
|--------|------------------------|------|
| BYTE1  | 0                      | x    |
| BYTE2  | x                      | x    |
| BYTE3  | x                      | OR x |
| BYTE4  | x                      | x    |
| BYTE5  | .                      | .    |
| BYTE6  | x                      | 0    |
| BYTE7  | Audio Status =1=on     |      |
| BYTE8  | High Alarm Status=1=on |      |
| BYTE9  | Low Alarm Status =1=on |      |
| BYTE10 | Over Range Status=1=on |      |
| BYTE11 | Monitor Status =1=on   |      |
| BYTE12 | Error Code             |      |
| BYTE13 | Carriage Return (ODH)  |      |

## 9-Pin Remote Data Connector (female sockets)

The 9-pin connector provides output signals from the instrument and input voltage to the instrument. The pin assignments are:

|       |              |
|-------|--------------|
| pin1- | +BATTERY     |
| pin2- | GND IN       |
| pin3- | FAIL_L       |
| pin4- | RS232 DUMP   |
| pin5- | ANALOG OUT   |
| pin6- | NA           |
| pin7- | HIGH ALARM_L |
| pin8- | EXT RESET_L  |
| pin9- | +5VDC OUT    |

The FAIL and HIGH ALARM digital signal outputs are open drain 2N7002 outputs, able to sink about 50 mA each.

## 9-pin Relays Connector (male pins)

The 9-pin relay connector provides a Form C (common, normally open, and normally closed) contact for the three fail-safe relays of LOW ALARM (alert), HIGH ALARM, and FAIL. The pin assignments are (shown energized):

|       |          |
|-------|----------|
| pin1- | FailNO   |
| pin2- | FailNC   |
| pin3- | AlertCOM |
| pin4- | AlarmNO  |
| pin5- | AlarmCOM |
| pin6- | FailCOM  |
| pin7- | AlertNO  |
| pin8- | AlertNC  |
| pin9- | AlarmNC  |

## Typical Detector Setup

**Note:**

For proper calibration, the center of the detector crystal is located by the dimple on the instrument's lower, left front-panel and the silk-screened mark on the side panel.

Typical response and set points for the model 375-10 with internal 5.1 x 5.1 cm (2 x 2 in.) scintillator are as follows:

Operating Voltage: as determined by plateau and  $^{133}\text{Ba}$  response  
(typically 500-1250 Vdc)

Threshold: 15 mVdc

Calibration Constant: 300 cpm/ $\mu\text{R/hr}$

Dead Time Correction: 2  $\mu\text{sec}$

Linear Range with DTC: 100  $\mu\text{R/hr}$  – 2000  $\mu\text{R/hr}$

## Typical Checkpoints:

|                       |                                  |
|-----------------------|----------------------------------|
| 100 $\mu\text{R/hr}$  |                                  |
| 150 $\mu\text{R/hr}$  | - calibration constant set point |
| 200 $\mu\text{R/hr}$  |                                  |
| 500 $\mu\text{R/hr}$  |                                  |
| 1000 $\mu\text{R/hr}$ |                                  |
| 1500 $\mu\text{R/hr}$ | - dead time correction set point |
| 2000 $\mu\text{R/hr}$ |                                  |

**Note:**

An earth grounding wire to the marked connection on the bottom of the Model 375 may be necessary for some sensitive external radiation detectors with a pulse threshold of less than 4 mV to improve noise levels. This is recommended for beta and neutron gas proportional detectors or other similar detectors. It is not necessary for most GM or scintillator detectors.

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# Section 5

## Common Options and Modifications

### Removable Lead Shield around Detector

The Model 375-10 may be equipped with a lead shield around the internal detector for better resistance to alarming on low-energy sources. This lead shield may be removed if high-energy-only calibration is not desired. The following test results show the effects of both a shielded and unshielded detector.

|  | <u>SHIELDED</u>                                  | <u>UNSHIELDED</u>                                |
|--|--|--|
| With $^{241}\text{Am}$ at 25 mR/hr             | 5 $\mu\text{R/hr}$ reading<br>above background   | 250 $\mu\text{R/hr}$ reading<br>above background |
| With $^{137}\text{Cs}$ at 500 $\mu\text{R/hr}$ | 500 $\mu\text{R/hr}$ reading<br>above background | 500 $\mu\text{R/hr}$ reading<br>above background |

### Relay Options

#### ***Internal Circuit-Board-Mounted Relays***

A 9-pin connector with male pins provides connection to three fail-safe form C relays, activated by the LOW ALARM (alert), HIGH ALARM, and instrument FAIL. These contacts are potential-free (non-powered), but can handle 125 Vac at 0.3 A or 30 Vdc at 1 A.

For additional flexibility, additional relay options are available at extra cost:

#### **Form C Relay (3 pin connector added) PN4558-036:**

This option allows the user to access one set of fail-safe form C contacts (normally open, normally closed, and common), which activate upon HIGH ALARM. This is achieved by using an additional 3-pin connector with male pins, located at the bottom of the instrument. This option

keeps the 9-pin D female connector dedicated for the use of a remote (Model 271 or 272) or RS-232 signal.

### RL1 Relay

The added 3-pin connector has the following connections (shown energized):

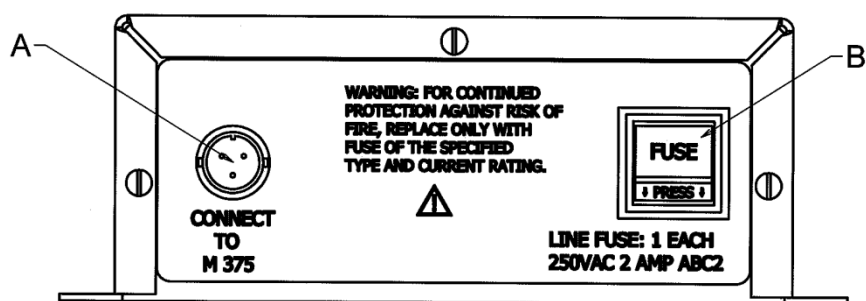
- Pin 1- normally open (NO)
- Pin 2- common
- Pin 3- normally closed (NC)

### External Mains (120 or 240 VAC) Alarm Relay Out (using 3 pin connector) PN4558-038:

Allows the use of the 9-pin D female connector for RS-232 or remote use and does not interfere with the internal form C relays.

This option includes a small enclosure connected to the Model 375 via a short cable, that accepts a standard mains power cord (conduit option is 4558-038-1). In an ALARM condition, the mains voltage is relayed to a set of terminals. Only a licensed electrician should install this option.

Figure 1. Mains Relay Box Back Panel.

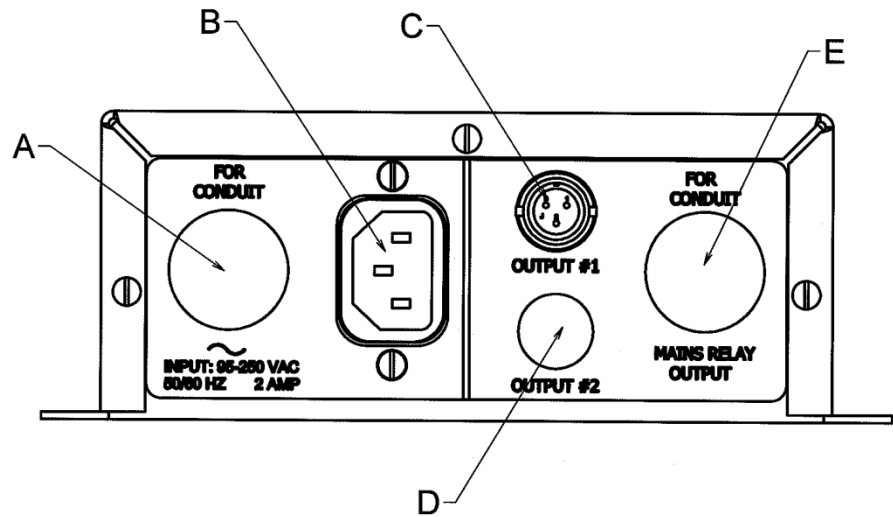


*See below for description of noted parts in drawing above.*

**A** – connector for cable (Part # 8303-879) that connects the mains relay box to the Model 375.

**B** – Use fuse that is noted in drawing above.

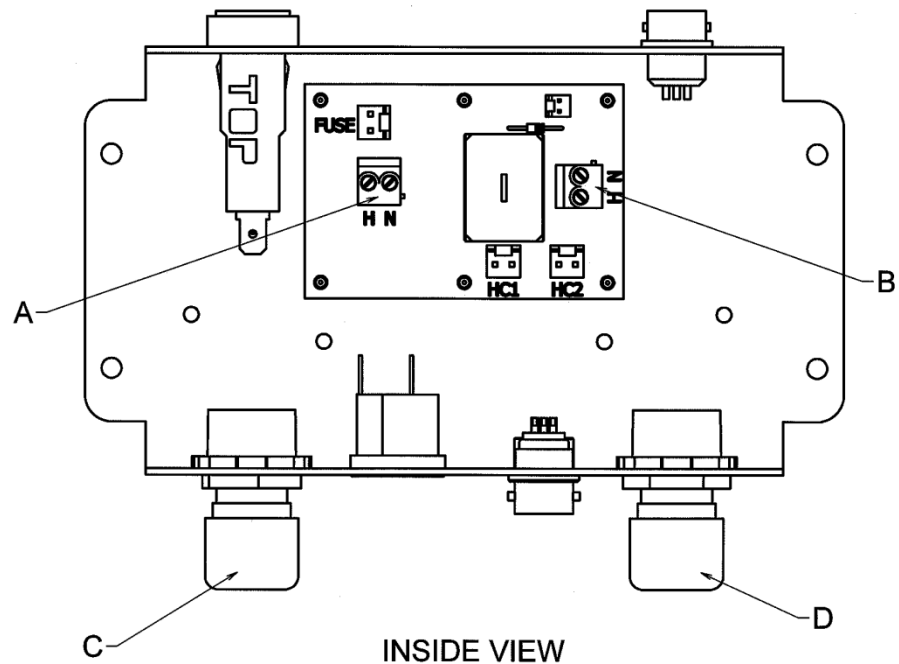
Figure 2. Mains Relay Box Front Panel.



*See below for description of noted parts in drawing above.*

- A – conduit connector to the box if necessary.
- B – AC receptacle (removed if using conduit).
- C – mains relay output 3-pin connectors.
- D – optional extra output.
- E – relay output for conduit if necessary.

Figure 3. Mains Relay Box Inside View.



*See below for description of noted parts in drawing above.*

**A** – 110/220 Vac conduit AC input. “H” = hot and “N” = neutral. For 220 Vac, H = L1 and N = L2.

**B** – relay output. “H” = hot and “N” = neutral. For 220 Vac, H = L1 and N = L2.

**C** – optional conduit connector input.

**D** – optional relay output for conduit.

Strobe lights and/or horns are also available through Ludlum Measurements.

## Ethernet Interface Option

A 10-BaseT Ethernet interface may be added internally for network reporting, using Ludlum software:

- 4558-098 LMI “Ethernet” Hardware Interface
- 4558-105 LMI “Webpage” Hardware Interface

Either the Ethernet software (1370-055) or the Webpage software (1370-077) must be purchased separately (site-licensed).

## Time and Date Stamp Option

### **Description:**

When an alarm or failure occurs, the Model 375-10 will print the current reading, date, time, and either ALARM or FAIL to the RS-232 port. The Model 375-10 will print once every 30 seconds as long as the alarm or fail condition is present.

### **Setup:**

You will need the following: a Model 375-10 instrument, a 1220 40-column printer, and a cable (8303-674).

The printer should be configured at 2400 BPS (baud), no parity, 8 data bits, 1 stop bit, and no handshaking. See printer manual for proper setup instructions.

### **Setting the date and time:**

Check the month and day (MMDD) by pressing the LOW ALARM and HIGH ALARM buttons simultaneously. The month and day will be displayed as long as those buttons are pressed. The month and day can be set from 0101 to 1231.

Check the year (YYYY) by pressing the LOW ALARM and CAL CONST buttons simultaneously. The year will be displayed as long as those buttons are pressed. The year can be adjusted from 0000 to 9999.

Check the hours and minutes (HHMM) by pressing the LOW ALARM and DEAD TIME buttons simultaneously. The hours and minutes will be displayed as long as those buttons are pressed. The hours and minutes can be adjusted from 0000 to 2359.

**RS-232 Data Format:**

The data will be sent to the RS-232 port as:

|         |             |      |         |                       |
|---------|-------------|------|---------|-----------------------|
| Byte 1  | 0           | x    | Byte 18 | Space (20H)           |
| Byte 2  | x           | x    | Byte 19 | H                     |
| Byte 3  | x           | OR x | Byte 20 | H                     |
| Byte 4  | x           | x    | Byte 21 | :                     |
| Byte 5  | .           | .    | Byte 22 | M                     |
| Byte 6  | x           | 0    | Byte 23 | M                     |
| Byte 7  | Space (20H) |      | Byte 24 | :                     |
| Byte 8  | Space (20H) |      | Byte 25 | S                     |
| Byte 9  | Space (20H) |      | Byte 26 | S                     |
| Byte 10 | M           |      | Byte 27 | Space (20H)           |
| Byte 11 | M           |      | Byte 28 | A      Space          |
| Byte 12 | /           |      | Byte 29 | L      F              |
| Byte 13 | D           |      | Byte 30 | A    OR A             |
| Byte 14 | D           |      | Byte 31 | R      I              |
| Byte 15 | /           |      | Byte 32 | M      L              |
| Byte 16 | Y           |      | Byte 33 | Carriage Return (0DH) |
| Byte 17 | Y           |      | Byte 34 | Line Feed (0AH)       |

**Example Output:**

```
0642.1 04/21/95 16:56:24 ALARM
0000.0 04/21/95 08:32:16 FAIL
```

## Sigma Alarm Modification Option

With this option, special firmware allows the Model 375-10 to have a sigma-based alarm point in addition to a regular fixed alarm point. This sigma-based alarm point allows the user to have a floating alarm point that will stay at “x” sigma above the radiation background. As the background changes, the sigma alarm also changes. The sigma alarm, when activated, activates a rapid beeping and activates the HIGH ALARM indicator on the front panel of the Model 375-10.

To set the sigma alarm, one first needs to consult a probability table showing one-sided sigma values. If the sigma alarm (read or set by the LOW ALARM button) is set to 3.0, that setting statistically means that 99.87% of normal background readings would be less than the alarm point. To look at the false alarm rate, it means that 0.13% or 1 out of 769 comparisons would result in a false alarm. Since comparisons are made every second, a setting of 3.0 will result in a false alarm about every 13 minutes. Similarly, a setting of 5.0 would result in a false alarm every 38 days. To actually calculate the sigma alarm point, it is necessary first to determine the background radiation level in cps (counts per second). The sigma alarm point is then  $BKGND + (x \text{ sigma} * \text{square root of } BKGND)$ .

The HIGH ALARM has *not* been changed; it is still a fixed alarm point and will be activated when the radiation level exceeds that set point. This feature allows the sigma alarm to trigger quickly if a small amount of radiation is present, and allows the fixed alarm to warn that the background radiation is too high. Since the sigma alarm is allowed to rise if the background rises, the HIGH ALARM is necessary to have an absolute value or ceiling for the radiation level. The time constant for the background radiation level and the displayed radiation reading is 20 seconds. The sigma alarm is not activated until 60 seconds after the Model 375-10 is turned ON, in order to allow the Model 375-10 to accumulate a stable background radiation reading.

Two other changes were made to the Model 375-10. The first change was to deactivate the LOW ALARM indicator. Both the sigma-based alarm (set by the LOW ALARM button) and the fixed alarm (HIGH ALARM button) trigger the HIGH ALARM indicator. The second change was to lower the detector loss-of-count time frame to 15 seconds. This change means that the DET FAIL indicator is activated if no pulses are received from the radiation detectors in 15 seconds. Since the sigma alarm is most useful for scintillation detectors that have several hundred pulses per minute, this change allows a faster determination of detector failure.

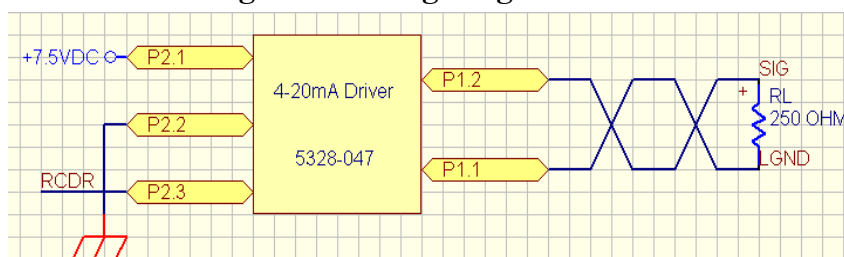
## 4 to 20 mA Isolated Output Driver Option

### 4 – 20 mA Driver (Isolated) Modification Kit Part Number 4558-104

This circuit may be added to the Model 375-10 analog output, providing an isolated 4 to 20 mA output capability. The circuit board (LMI Part Number 5396-754) accepts an analog input, varying between 0 and 5.00 volts, yielding a current output of 4 to 20 mA.

The circuit has an internal loop supply, generating +12 Vdc from the RAWDC of the Model 375-10. It is designed for a two-wire configuration, with one conductor carrying the 4-20 mA current signal and the second conductor providing a return (isolated loop ground). See Wiring Diagram, Figure 4 (below).

Figure 4: Wiring Diagram.



| Decade | “Base” Display | mA Value |
|--------|----------------|----------|
| 0      | 0.1            | 4 mA     |
| 1      | 1              | 7.2 mA   |
| 2      | 10             | 10.4 mA  |
| 3      | 100            | 13.6 mA  |
| 4      | 1000           | 26.8 mA  |
| 5      | 10,000         | 20 mA    |

mA value =

$$4 \text{ mA} + (3.2 \text{ mA} * \text{Decade}) + 3.2 \log (\text{display reading}/\text{base})$$

$$\text{Display reading} = 10^{\frac{\text{mA value} - 4 - (3.2 * \text{decade})}{3.2}} * \text{base}$$

## SPECIFICATIONS

**Power Required:** 7.5 Vdc at 100 mA, minimum  $V_{in} = 5.5$  V and maximum  $V_{in} = 15$  V

**Terminating Resistor:** 250 ohm

### Model 375-10 Recorder Output Connections (9-pin D-sub connector)

Pin 5 is “SIG”, current output (was voltage output).

Pin 6 is “LGND”, isolated loop return or loop ground.

### Board Header Pinout

P1-1) Loop GND (Isolated)

P1-2) 4-20 current output (Isolated)

P2-1) +7.5 Vdc , RAWDC from main circuit board number 5396-160  
(may range from +5.5 to 15 Vdc)

P2-2) GND

P2-3) RCDR voltage in or analog input (0-1.25VDC).

## CALIBRATION

Apply 0 counts or RESET the Model 375-10.

Check for a voltage of  $1.00\text{ V} \pm 5\%$  across  $R_{term}$ , typically a 250 ohm ( $V = 0.004 \times R_{term}$ ) terminating resistor. The resistor should be placed between Pin 5 (the 4-20 mA output) and Pin 6 (loop ground).

### Note:

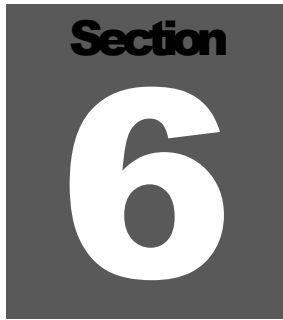
Loop ground is isolated from instrument ground.

Now apply a full-scale meter reading to the analog input, or move the CAL dipswitch to the right. The voltage at full-scale must be set to  $5.00\text{ V} \pm 0.1\text{ V}$  between the analog input and instrument ground.

### Note:

Instrument ground is not the same as loop ground.

Adjust the SPAN trimmer, R5, until the voltage across the 250-ohm terminating resistor is  $5\text{ V} \pm 5\%$  ( $V = .020 \times R_{term}$ ).



# Section 6

## Safety Considerations

---

### Environmental Conditions for Normal Use

Indoor use only

No maximum altitude

Temperature range of -20 to 50 °C (5 to 122 °F); may be certified for operation from -40 to 65 °C (-40 to 150 °F)

Maximum relative humidity of less than 95% (non-condensing)

Mains supply voltage range of 100-240 Vac,  
50/60Hz single phase (less than 150 mA typical, 1 amp max) to wall-mounted DC adapter supplying 9-12 Vdc

Maximum transient voltage of 1500 Vac

Installation Category II (Overvoltage Category as defined by IEC 1010-1)

Pollution Degree 2 (as defined by IEC 664)

### Cleaning Instructions and Precautions

The Model 375-10 may be cleaned externally with a damp cloth, using only water as the wetting agent. Do not immerse the instrument in any liquid. Observe the following precautions when cleaning:

1. Turn the instrument OFF and disconnect the instrument power cord.
2. Allow the instrument to sit for one minute before cleaning.

## Warning Markings and Symbols

### Caution!

The operator or responsible body is cautioned that the protection provided by the equipment may be impaired if the equipment is used in a manner not specified by Ludlum Measurements, Inc.

**The Model 375-10 is marked with the following symbols:**



**DIRECT CURRENT (DC)** (IEC 417, No. 5032) - designates an input receptacle that accommodates a power cord intended for connection to DC voltages. This symbol appears on the side panel.



**PROTECTIVE CONDUCTOR TERMINAL** (per IEC 417, No. 5019) – designates the central grounding point for the safety ground. This symbol is visible inside the chassis.



**CAUTION** (per ISO 3864, No. B.3.1) – designates hazardous live voltage and risk of electric shock. During normal use, internal components are hazardous live. This instrument must be isolated or disconnected from the hazardous live voltage before accessing the internal components. This symbol appears on the front panel. **Note the following precautions:**

### Caution!:

Do not touch the circuit board in the calibration window due to possible electric shock.

### Warning!

The operator is strongly cautioned to take the following precautions to avoid contact with internal hazardous live parts that are accessible using a tool:

1. Turn the instrument power OFF and disconnect the power cord.
2. Allow the instrument to sit for one minute before accessing internal components.



The “**crossed-out wheellie bin**” symbol notifies the consumer that the product is not to be mixed with unsorted municipal waste when discarding; each material must be separated. The symbol is placed near the DC receptacle. See section 8, “Recycling,” for further information.



The “CE” mark is used to identify this instrument as being acceptable for use within the European Union.

## Electrical Safety Precautions

### Warning!

Please follow the instructions below. If you do not, a potentially hazardous situation could develop, which could result in death or serious personal injury.

- Do not expose the unit to rain or an environment where it may be splashed by water or other liquids, as doing so may result in fire or electric shock.
- Use the unit only with the voltage specified on the unit. Using a voltage higher than that which is specified may result in fire or electric shock.
- Do not cut, kink, otherwise damage nor modify the power supply cord. In addition, avoid using the power cord in close proximity to heaters, and never place heavy objects – including the unit itself – on the power cord, as doing so may result in fire or electric shock.
- Avoid installing or mounting the unit or its power supply in unstable locations, such as a rickety table or a slanted surface. Doing so may result in the unit falling down and causing personal injury and/or property damage.

### Caution!

Verify instrument voltage input rating before connecting to a power converter. If the wrong power converter is used, the instrument and/or power converter could be damaged.

## Replacement of Main Fuse (Side Panel)

**Warning!**

For continued protection against risk of fire, replace only with fuse of the specified type and current rating!

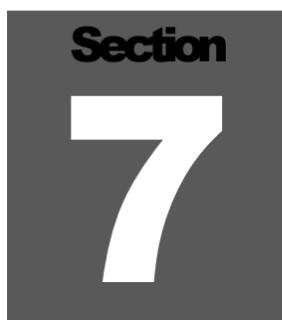
---

## Battery Replacement

**Warning!:**

Only certified technicians or calibration personnel should replace battery.

---



## Calibration

---

### High Voltage

The high voltage is adjustable from 450-2500 Vdc using the HV potentiometer located under the calibration cover. The internal scintillation detector usually requires a voltage of 500-1250 Vdc. Ensure that the high voltage is checked with a high impedance ( $\geq 1000$  megohm) voltmeter only. A high voltage checkpoint is located next to the HV potentiometer.

### Instrument Calibration Parameters

The calibration parameters, LOW ALARM, HIGH ALARM, CAL CONST, and DEAD TIME can only be changed while in calibration mode. Switch the top dipswitch CAL MODE to the right to switch into calibration mode. Changing any parameter is done by holding down the parameter key and pressing the up or down arrow buttons. Any parameter can be set in the range of 0.1 to 9999. If a parameter is changed, the instrument will beep to confirm the saving of the parameter, and then return to displaying the current radiation level.

The calibration constant (CAL CONST) is set when the detector is exposed to a "low" radiation field. A "low" radiation field in this case is defined as a field where dead time losses do not exceed 5%. The calibration constant is usually given for a certain detector. A Ludlum Model 133-4 detector, for example, has a calibration constant of approximately 150 cpm/mR/hr. Once the calibration constant is set and checked at a low radiation field, the dead time correction can be set.

The dead time correction (DEAD TIME) is set when the detector is exposed to a "high" radiation field. A "high" radiation field in this case is defined as a field where dead time losses exceed 30%. The dead time correction will elevate the ratemeter reading to account for counts arriving at the detector during the detector's dead time. GM tubes typically have long dead times from 50-150 microseconds. Neutron and scintillation detectors generally have short dead times of 1-5 microseconds.

**Note:**

Once parameters are set, it is important to remember to switch the CAL MODE switch back to the left. This action protects the parameters from inadvertent changes.

## Analog Output

The analog output is a five-decade logarithmic voltage-out. The maximum voltage-out while under primary power is 6 V. The maximum voltage out while under battery backup power is 4.5 V. When the CAL MODE dipswitch is set to the right, the analog output goes full-scale (as in a DET FAIL condition). The five decades are:

0.1 <units> - 1.0 <units>  
1 <units> - 10 <units>  
10 <units> - 100 <units>  
100 <units> - 1000 <units>  
1000 <units> - 10000 <units>

When the CAL MODE dip switch is switched to the right, the analog output goes to full scale. The analog output goes to full scale during a DET FAIL condition.

## Discriminator

The DISC potentiometer located under the calibration cover is used to set the threshold for pulses coming from the detector. The desired pulse threshold depends on the type of detector used. It is adjustable from 2.0 mVdc to 100 mVdc.

## Battery Charge

The potentiometer labeled BAT, located under the calibration cover, is used to set the backup battery, trickle-charge voltage. This is typically set to 6.9 Vdc with the battery disconnected.

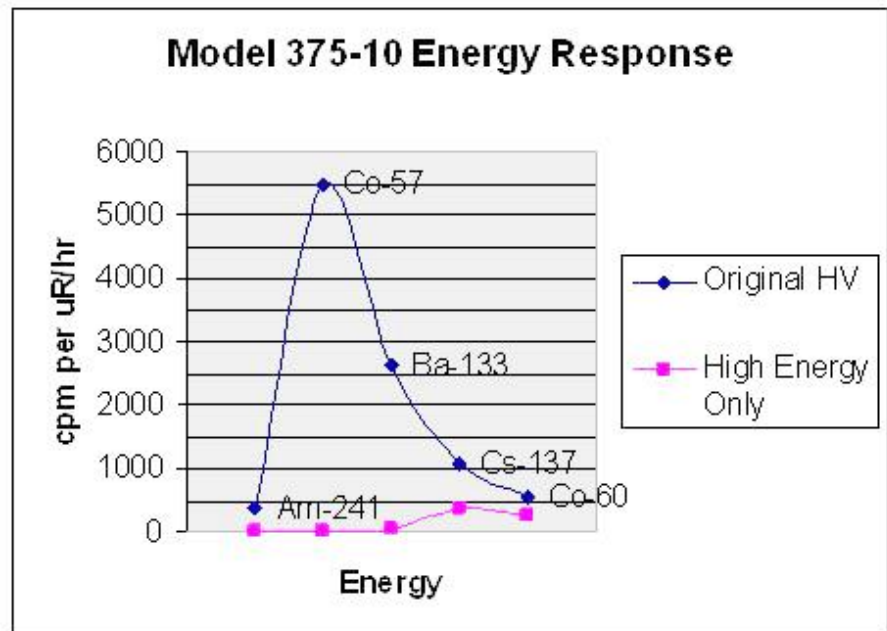
## Detector Calibration

The internal sodium iodide (NaI) detector is energy dependent, meaning the detector will not respond the same to like energies of photons and gamma rays.

Normally, the instrument is calibrated to have a good low-energy response to  $^{241}\text{Am}$  (59 keV).

Optionally, a special calibration is performed to reduce the response to low-energy medical isotopes. By lowering the high voltage from typical operation (approximately 100-150 volts), energies below  $^{131}\text{I}$  (364 keV) can almost be completely ignored. This provides an advantage in medical environments where normal detector response would result in frequent false alarms. This special calibration has little effect on upper-energy photons. In addition, a thin (0.081 cm {0.032 in.}) lead shield may be added around the detector to provide additional rejection of low-energy photons.

For further details on detector calibration, refer to the calibration certificate supplied with the detector and the energy graph displayed below.



# Section 8

## Recycling

Ludlum Measurements, Inc. supports the recycling of the electronics products it produces for the purpose of protecting the environment and to comply with all regional, national, and international agencies that promote economically and environmentally sustainable recycling systems. To this end, Ludlum Measurements, Inc. strives to supply the consumer of its goods with information regarding reuse and recycling of the many different types of materials used in its products. With many different agencies – public and private – involved in this pursuit, it becomes evident that a myriad of methods can be used in the process of recycling. Therefore, Ludlum Measurements, Inc. does not suggest one particular method over another, but simply desires to inform its consumers of the range of recyclable materials present in its products, so that the user will have flexibility in following all local and federal laws.

The following types of recyclable materials are present in Ludlum Measurements, Inc. electronics products, and should be recycled separately. The list is not all-inclusive, nor does it suggest that all materials are present in each piece of equipment:

|                |          |                              |
|----------------|----------|------------------------------|
| Batteries      | Glass    | Aluminum and Stainless Steel |
| Circuit Boards | Plastics | Liquid Crystal Display (LCD) |

Ludlum Measurements, Inc. products, which have been placed on the market after August 13, 2005, have been labeled with a symbol recognized internationally as the “crossed-out wheelie bin.” This notifies the consumer that the product is not to be mixed with unsorted municipal waste when discarding; each material must be separated. The symbol will be placed near the DC receptacle, except for portable equipment where it will be placed on the battery lid.

The symbol appears as such:



# Section 9

## Parts List

|   | <u>Reference</u> | <u>Description</u>   | <u>Part Number</u> |
|---|------------------|--|--------------------|
| <b>Model 375-10<br/>Digital Wall-Mount<br/>Area Monitor</b> | UNIT             | Completely Assembled<br>Model 375-10 Area Monitor          | 48-3443            |
|   | BOARD            | Completely Assembled Main<br>Circuit Board (common to all) | 5558-001           |
| CRYSTAL   | Y211             | 6.144 MHZ  | 01-5262            |
| CAPACITORS  | C1-C2            | 100 $\mu$ F, 16V   | 04-5794            |
|   | C3               | 0.1 $\mu$ F, 25V   | 04-5744            |
|   | C4               | 100 $\mu$ F, 16V   | 04-5794            |
|   | C5-C6            | 10 $\mu$ F, 25V  | 04-5728            |
|   | C7               | 100 $\mu$ F, 16V   | 04-5794            |
|   | C8               | 10 $\mu$ F, 25V  | 04-5728            |
|   | C9-C11           | 100 $\mu$ F, 16V   | 04-5794            |
|   | C12-C21          | 0.1 $\mu$ F, 500V  | 04-5696            |
|   | C22-C23          | 0.01 $\mu$ F, 3kV  | 04-5762            |
|   | C24-C33          | 0.1 $\mu$ F, 500V  | 04-5696            |
|   | C35              | 100pF, 100V  | 04-5743            |
|   | C36              | 10 $\mu$ F, 25V  | 04-5728            |
|   | C37              | 100pF, 100V  | 04-5743            |
|   | C38              | 100 $\mu$ F, 16V   | 04-5794            |
|   | C39-C40          | 10 $\mu$ F, 25V  | 04-5728            |
|   | C41-C43          | 10 $\mu$ F, 25V  | 04-5655            |
|   | C44-C53          | 0.1 $\mu$ F, 25V   | 04-5744            |
|   | C54              | 10 $\mu$ F, 25V  | 04-5655            |
|   | C55-C56          | 0.1 $\mu$ F, 25V   | 04-5744            |
|   | C57              | 4.7pF, 200V  | 04-5787            |
|   | C201             | 10 $\mu$ F, 25V  | 04-5655            |

|                        | <u>Reference</u> | <u>Description</u> | <u>Part Number</u> |
|------------------------|------------------|--------------------|--------------------|
|                        | C211             | 27pF, 100V         | 04-5658            |
|                        | C221             | 100μF, 16V         | 04-5794            |
|                        | C222             | 27pF, 100V         | 04-5658            |
|                        | C301-C303        | 10μF, 25V          | 04-5655            |
|                        | C401             | 100μF, 16V         | 04-5794            |
|                        | C441-C442        | 100μF, 16V         | 04-5794            |
|                        | C531             | 0.047μF, 16V       | 04-5729            |
|                        | C541-542         | 10μF, 25V          | 04-5655            |
|                        | C543             | 2700μF, 35V        | 04-5621            |
|                        | C611             | 10μF, 25V          | 04-5655            |
|                        | C711-C12         | 10μF, 25V          | 04-5655            |
|                        | C721             | 10μF, 25V          | 04-5655            |
|                        | C722             | 0.001μF, 100V      | 04-5659            |
|                        | C731             | 100pF, 3kV         | 04-5735            |
| TRANSISTORS            | Q1-Q3            | 2N7002L            | 05-5840            |
|                        | Q4               | CMXT3904TRLF       | 05-5888            |
|                        | Q5               | CMXT-3906TRLF      | 05-5890            |
|                        | Q6               | CMXT3904TRLF       | 05-5888            |
|                        | Q7               | 2N7002L            | 05-5840            |
|                        | Q151-Q154        | 2N7002L            | 05-5840            |
|                        | Q321-Q322        | 2N7002L            | 05-5840            |
|                        | Q331             | MJD200RLG          | 05-5844            |
|                        | Q431             | 2N7002L            | 05-5840            |
| VOLTAGE<br>REGULATOR   | VR341            | LT1129CQ-5         | 06-6372            |
| INTEGRATED<br>CIRCUITS | U2               | MAX985EUK+T        | 06-6459            |
|                        | U3               | LT1304CS8          | 06-6394            |
|                        | U4               | ICL7660SCBAZ       | 06-6437            |
|                        | U5               | TCM810LVNB713      | 06-6424            |
|                        | U31              | SA08-11EWA         | 07-6389            |
|                        | U32              | KB-2785YW          | 07-6371            |
|                        | U41              | KB-2685EW          | 07-6400            |
|                        | U111             | ICM7218CIQI-LFT    | 06-6311            |
|                        | U131             | SA08-11EWA         | 07-6389            |
|                        | U201             | MAX220ESE+T        | 06-6329            |
|                        | U231             | SA08-11EWA         | 07-6389            |
|                        | U232             | KB-2785YW          | 07-6371            |
|                        | U233             | SA08-11EWA         | 07-6389            |
|                        | U241             | KB-2685EW          | 07-6400            |
|                        | U251             | TLC372IDR          | 06-6290            |

|               | <u>Reference</u> | <u>Description</u>   | <u>Part Number</u> |
|---------------|------------------|----------------------|--------------------|
|               | U321             | M24C02-WMN6TP        | 06-6299            |
|               | U331             | ICL7663SCBAZA-T      | 06-6302            |
|               | U411             | P89V51RD2FA          | 06-6303            |
|               | U521             | CD74HC4538M96        | 06-6297            |
|               | U531             | OPA2343UA2K5         | 06-6582            |
|               | U611             | MAX985EUK+T          | 06-6459            |
|               | U711             | LM285DR-1-2          | 05-5845            |
| DIODES        | CR1              | CMSH1-40M            | 07-6411            |
|               | CR2              | P0640SCMCLRP         | 21-9028            |
|               | CR3              | MMBD914LT1G          | 07-6353            |
|               | CR4-CR5          | US1M-E3              | 07-6530            |
|               | CR6              | P0640SCMCLRP         | 21-9028            |
|               | CR7-CR10         | US1M-E3              | 07-6530            |
|               | CR11             | P0640SCMCLRP         | 21-9028            |
|               | CR12             | MMBD914LT1G          | 07-6353            |
|               | CR13-CR14        | US1M-E3              | 07-6530            |
|               | CR15             | CMSH1-40M            | 07-6411            |
|               | CR16             | MMBD914LT1G          | 07-6353            |
|               | CR17-CR21        | P0080SC              | 21-9004            |
|               | CR22-CR31        | CMPD2005SLF          | 07-6468            |
|               | CR32             | CMSH1-40M            | 07-6411            |
|               | CR33-CR34        | CMPD2005SLF          | 07-6468            |
|               | CR35             | CMSH1-40M            | 07-6411            |
|               | CR36             | P0080SC              | 21-9004            |
|               | CR38             | US1M-E3              | 07-6530            |
|               | CR341-CR342      | CMSH1-40M            | 07-6411            |
| LED           | DS11             | KB-2550SGD           | 07-6370            |
| SWITCHES      | S001             | ALERT POINT          | 08-6728            |
|               | S101             | ALARM POINT          | 08-6728            |
|               | S201             | CALIBRATION CONSTANT | 08-6728            |
|               | S301             | DEADTIME CORRECTION  | 08-6728            |
|               | S501             | DOWN                 | 08-6728            |
|               | S511             | UP                   | 08-6728            |
|               | S512             | OPTION DIPSWITCH     | 08-6709            |
|               | SW1              | POWER                | 08-6840            |
| POTENTIOMETER | R13              | 1M, BAT CHG ADJ      | 09-6778            |
|               | R16              | 1M, HV ADJ           | 09-6778            |
|               | R523             | 1M, OVLD ADJ         | 09-6778            |

|           |           |                    |         |
|-----------|-----------|--------------------|---------|
|           | R535      | 200K, THR ADJ      | 09-6949 |
|           | R537      | 5K, RCDR           | 09-6849 |
| RESISTORS | R1-R4     | 301ohm, 1%, 250mW  | 12-7863 |
|           | R5-R6     | 1M, 1%, 250mW      | 11-7251 |
|           | R7        | 4.75M, 1%, 250mW   | 12-7995 |
|           | R8        | 500M, 2%, 3kV      | 12-7031 |
|           | R9        | 562K, 1%, 125mW    | 12-7929 |
|           | R10       | 500M, 2%, 3kV      | 12-7031 |
|           | R11       | 100ohm, 1%, 250mW  | 12-7840 |
|           | R12       | 301ohm, 1%, 250mW  | 12-7863 |
|           | R14       | 165K, 1%, 250mW    | 12-7877 |
|           | R15       | 1M, 1%, 250mW      | 11-7251 |
|           | R17       | 2.2ohm, 5%, 250mW  | 12-7932 |
|           | R18       | 82.5K, 1%, 250mW   | 12-7849 |
|           | R19-R22   | 2.2ohm, 5%, 250mW  | 12-7932 |
|           | R23       | 100K, 1%, 250mW    | 12-7834 |
|           | R24       | 1M, 1%, 250mW      | 11-7251 |
|           | R25       | 10ohm, 1%, 125mW   | 12-7836 |
|           | R26       | 100ohm, 1%, 100mW  | 12-7142 |
|           | R27       | 100k, 5%, 333mW    | 12-7747 |
|           | R41       | 2.2ohm, 5%, 250mW  | 12-7932 |
|           | R42       | 60.4ohm, 1%, 250mW | 12-7962 |
|           | R141      | 2.2ohm, 5%, 250mW  | 12-7932 |
|           | R142      | 60.4ohm, 1%, 250mW | 12-7962 |
|           | R151-R152 | 100K, 1%, 250mW    | 12-7834 |
|           | R201      | 24.3K, 1%, 250mW   | 12-7867 |
|           | R241      | 2.21K, 1%, 250mW   | 12-7835 |
|           | R251      | 10K, 1%, 250mW     | 12-7839 |
|           | R252      | 24.3K, 1%, 250mW   | 12-7867 |
|           | R253      | 82.5K, 1%, 250mW   | 12-7849 |
|           | R331      | 1K, 1%, 250mW      | 12-7832 |
|           | R332      | 165K, 1%, 250mW    | 12-7877 |
|           | R341      | 2.2ohm, 5%, 250mW  | 12-7932 |
|           | R431      | 1K, 1%, 250mW      | 12-7832 |
|           | R421-R422 | 100K, 1%, 250mW    | 12-7834 |
|           | R432      | 1M, 1%, 250mW      | 11-7251 |
|           | R531      | 10K, 1%, 250mW     | 12-7839 |
|           | R532      | 100K, 1%, 250mW    | 12-7834 |
|           | R533      | 10K, 1%, 250mW     | 12-7839 |
|           | R534      | 2.21K, 1%, 250mW   | 12-7835 |
|           | R611      | 47.5K, 1%, 250mW   | 12-7872 |
|           | R621      | 4.75K, 1%, 250mW   | 12-7858 |
|           | R622      | 10K, 1%, 250mW     | 12-7839 |
|           | R623      | 1K, 1%, 250mW      | 12-7832 |

|                  | <u>Reference</u> | <u>Description</u>            | <u>Part Number</u> |
|------------------|------------------|-------------------------------|--------------------|
|                  | R631             | 47.5K, 1%, 250mW              | 12-7872            |
|                  | R713-R714        | 10K, 1%, 250mW                | 12-7839            |
|                  | R721             | 10K, 1%, 250mW                | 12-7839            |
|                  | R722             | 165K, 1%, 250mW               | 12-7877            |
|                  | R723             | 1K, 1%, 250mW                 | 12-7832            |
|                  | R724             | 4.75K, 1%, 250mW              | 12-7858            |
|                  | R732-R733        | 100K, 1%, 250mW               | 12-7834            |
|                  | R735             | 10K, 1%, 250mW                | 12-7839            |
| RESISTOR NETWORK | RN411            | 220K                          | 12-7831            |
| CONNECTOR        | P1               | RAPC712                       | 13-8445            |
|                  | P2               | 640457-3 BAT                  | 13-8165            |
|                  | P3               | FRJAE-468 LF                  | 21-9007            |
|                  | P4               | 9 PIN D CONN-747197-4         | 13-8364            |
|                  | P5               | 640456-3 MTA 100X4 ETHERNET   | 13-8088            |
|                  | P6               | 747020-2 9 PIN D FEMALE       | 13-8555            |
|                  | P7               | 640456-3 MTA 100X3 4-20mA     | 13-8081            |
|                  | P8               | 640457-4 MTA 100X4RA SONALERT | 13-8089            |
|                  | P9               | 640456-3 MTA 100X3 4-20mA     | 13-8081            |
|                  | P10              | 640457-2 MTAX2RA ALARM OUT    | 13-8147            |
| INDUCTORS        | L1               | 1Kohm                         | 21-9008            |
|                  | L3-L4            | 2700ohm                       | 21-9009            |
|                  | L8               | 2700ohm                       | 21-9009            |
|                  | L9               | 1Kohm                         | 21-9008            |
|                  | L411             | 220μHY                        | 21-9678            |
| RELAY            | RL1-RL3          | G6K-2FY DC5                   | 22-9332            |
| TRANSFORMER      | T1               | 32377R                        | 21-9925            |
| MISCELLANEOUS    | *                | SOCKET 44P PLCC               | 06-6613            |
|                  | S2               | SHIELD-M4500 PREAMP           | 7436-142           |
|                  | U1               | RABBIT RCM 3700               | 23110915           |
|                  | W1               | COAX, WIRE                    | *                  |
|                  | W3-W5            | WIRE                          | *                  |
|                  | TP1-TP3          | COAX, WIRE                    | *                  |

|  | <u>Reference</u> | <u>Description</u>                            | <u>Part Number</u> |
|--|------------------|---|--------------------|
| <b>EXTG Board,<br/>Drawing 396 × 581</b>                 | BOARD            | Completely Assembled<br>EXTG Circuit Board    | 5396-581           |
| CAPACITORS   | C1               | 0.1uF, 25V                                    | 04-5744            |
|  | C2               | 4.7uF, 25V                                    | 04-5653            |
|  | C3               | 10uF, 25V                                     | 04-5655            |
|  | C4               | 4.7uF, 25V                                    | 04-5653            |
|  | C5               | 10uF, 25V                                     | 04-5655            |
|  | C6               | 68uF, 10V                                     | 04-5654            |
| INTEGRATED<br>CIRCUITS                                   | U1               | RCM3700 Microprocessor                        | 2310915            |
|  | U2               | MAX220  | 06-6329            |
| CONNECTOR  | P1               | 640456-3 MTA100                               | 13-8081            |
| <b>Voltage Divider Board,<br/>Drawing 2 × 359</b>        | BOARD            | Completely Assembled<br>Voltage Divider Board | 5002-571           |
| CAPACITOR  | C111             | 0.01uF, 2KV                                   | 04-5525            |
| RESISTORS  | R001-R004        | 4.75 MEG, 1/8W, 1%                            | 12-7995            |
|  | R011-R013        | 4.75 MEG, 1/8W, 1%                            | 12-7995            |
|  | R101-R104        | 4.75 MEG, 1/8W, 1%                            | 12-7995            |
|  | R111             | 10 MEG, 1/8W, 1%                              | 12-7996            |
| PHOTOMULTIPLIER<br>TUBE                                  | *                | M 44-10-18 GMMA SCIN                          | 47-3442            |
|  | V001             | TU/SKT-PM2”<br>W/SHRT TUBE                    | 4002-861           |
|  | *                | PM TUBE -2”<br>B51D08W                        | 01-5761            |
| <b>Chassis Wiring<br/>Diagram, Drawing<br/>396 × 596</b> |                  |   |                    |
| AUDIO  | DS1              | TXC-V86-515-Q                                 | 21-8802            |
| MISCELLANEOUS  | B1               | BATTERY-PS630                                 | 21-9705            |
|  | F1               | RUEF110, 1.1A, 30V                            | 21-8989            |

|                   | <u>Reference</u> | <u>Description</u>                            | <u>Part Number</u> |
|-------------------|------------------|---|--------------------|
|                   | *                | CBL-MODEL 375 ETHERNET TO MTA                 | 8396-932           |
|                   | *                | MODEL 375-10 DET LEAD SHIELD (optional)       | 7396-837           |
| INTERNAL DETECTOR | *                | MODEL 44-10-18 GAMMA SCINTILLATOR (2 X 2 IN.) | 47-3442            |



## **Drawings and Diagrams**

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Main Circuit Board, Drawing 558 x 1 (5 sheets)

Main Circuit Board Component Layout Drawing 558 x 2 (2 sheets)

EXTG Circuit Board, Drawing 396 × 581

EXTG Circuit Board Component Layout, Drawing 396 × 582

Voltage Divider Board, Drawing 2 × 359 ( 2 sheets)

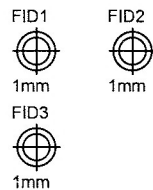
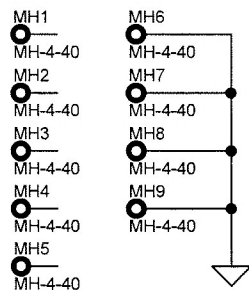
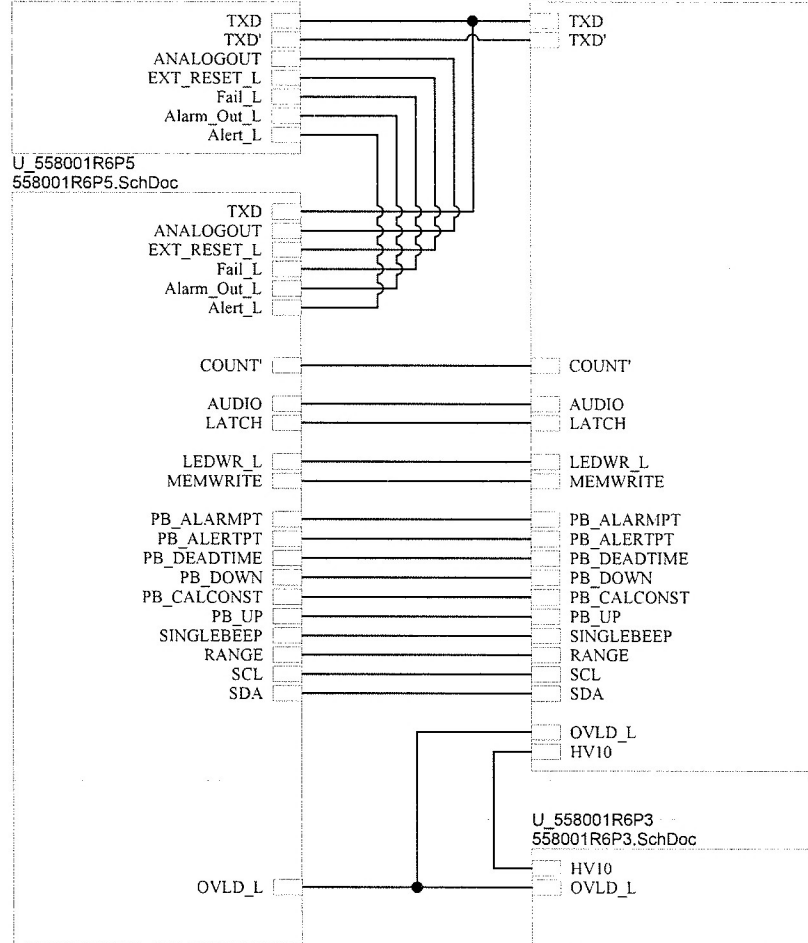
Wiring Diagram, Drawing 396 × 596

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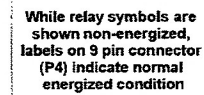
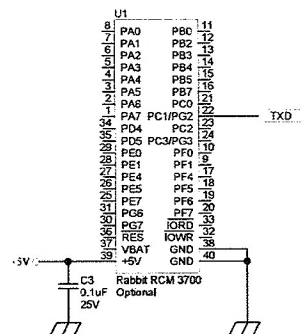
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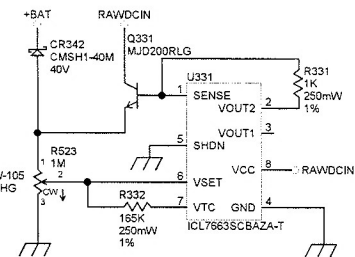
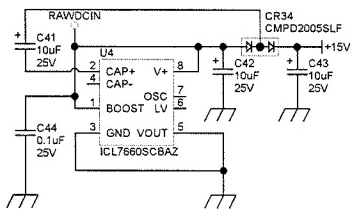
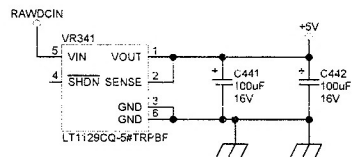
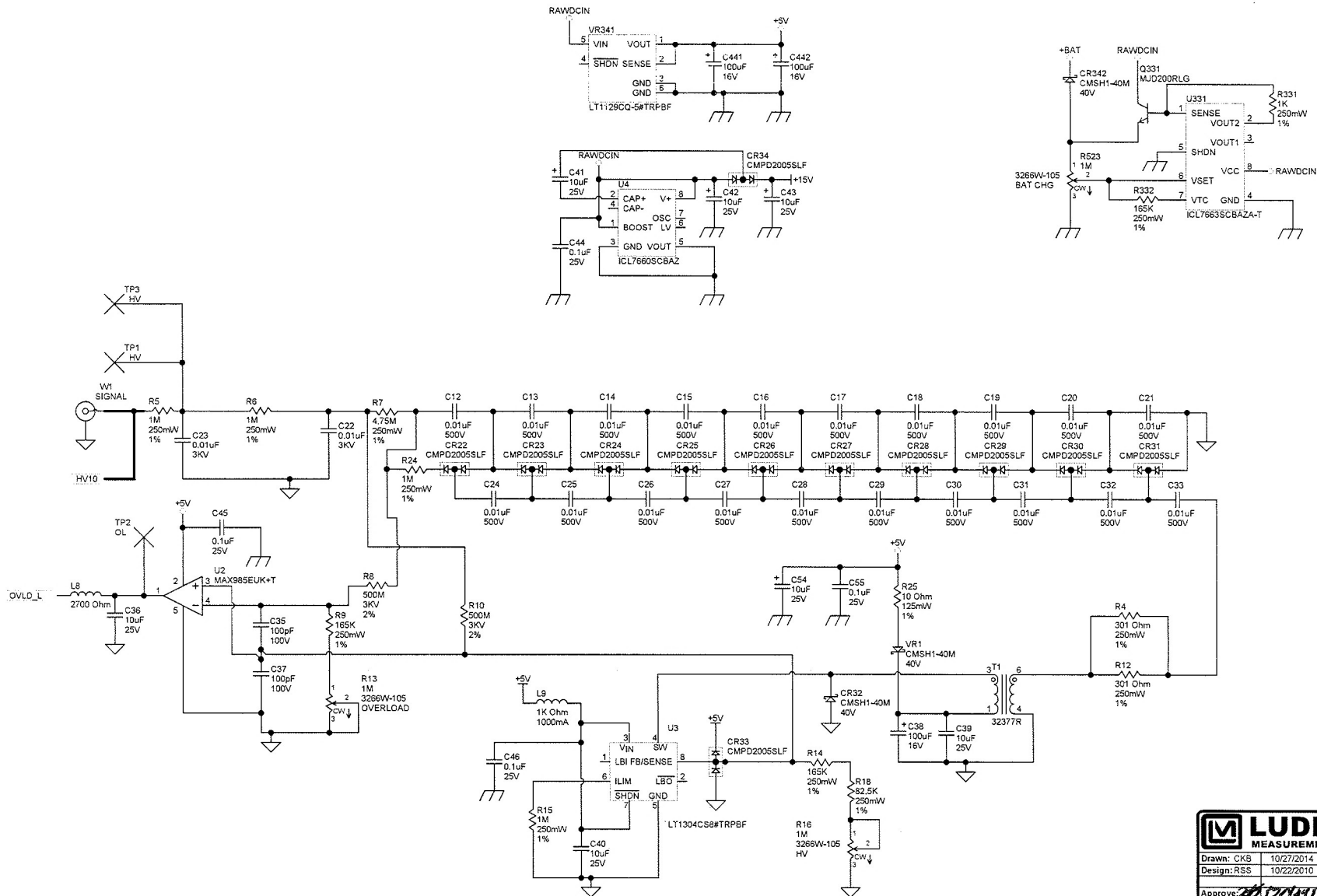
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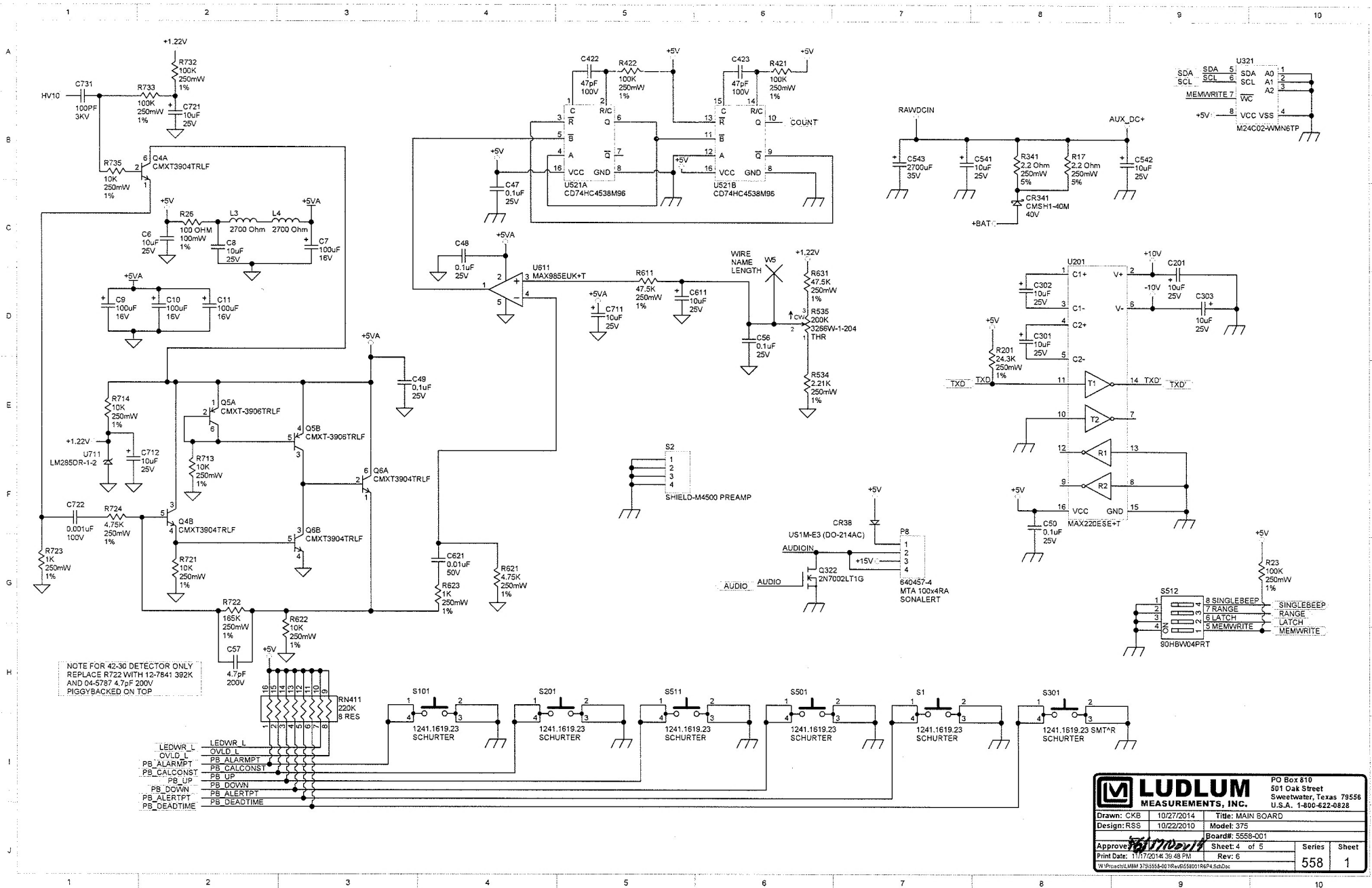
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| Design: RSS  | 10/22/2010 | Model: 375   |         |
|  |            | Board#: 5558-001   |         |
| Approve: <i>RSB</i>                                | 11/17/2014 | Sheet: 1 of 5  | Series  |
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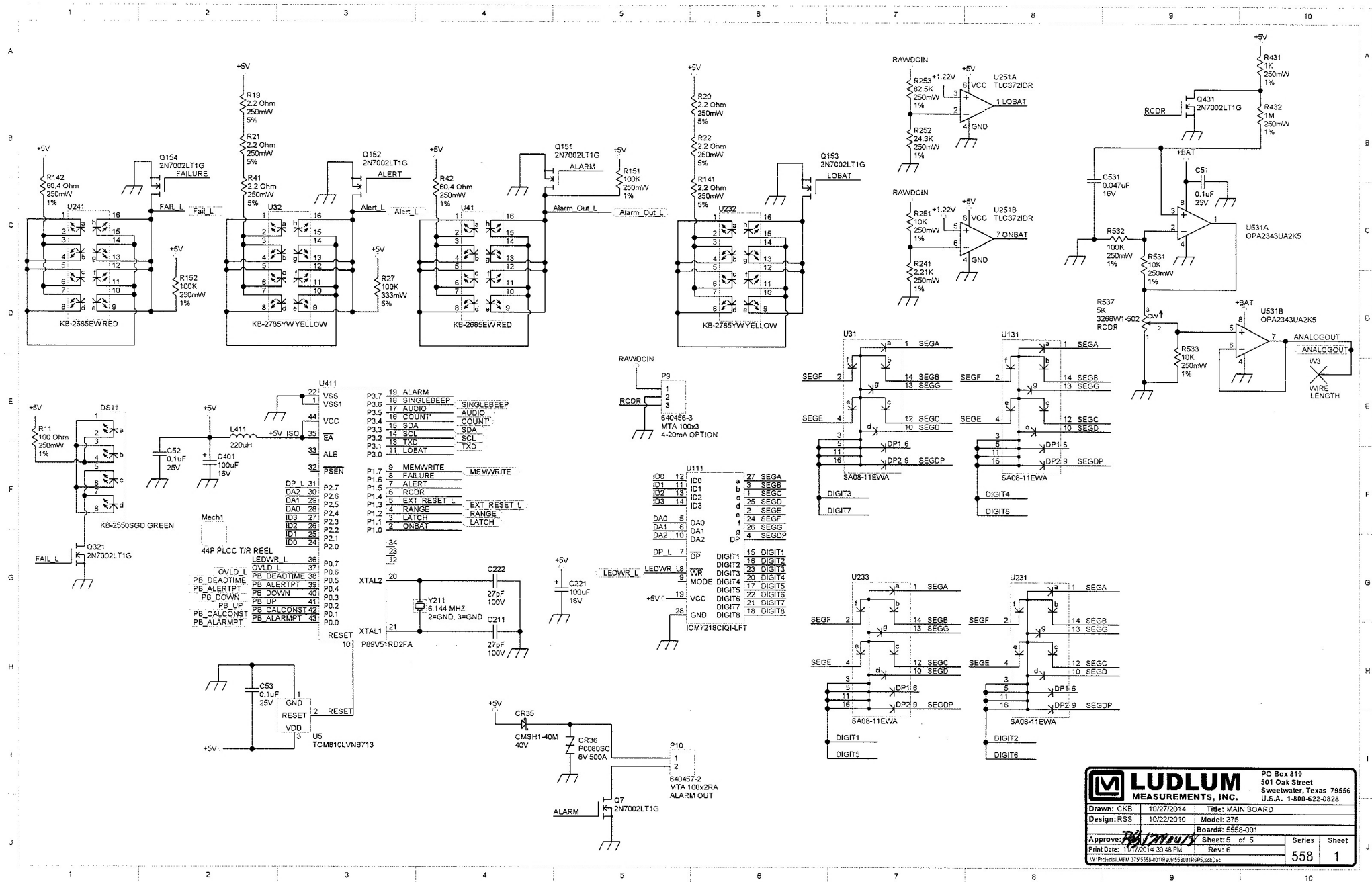
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| Drawn: CKB   | 10/27/2014                          | Title: MAIN BOARD  |
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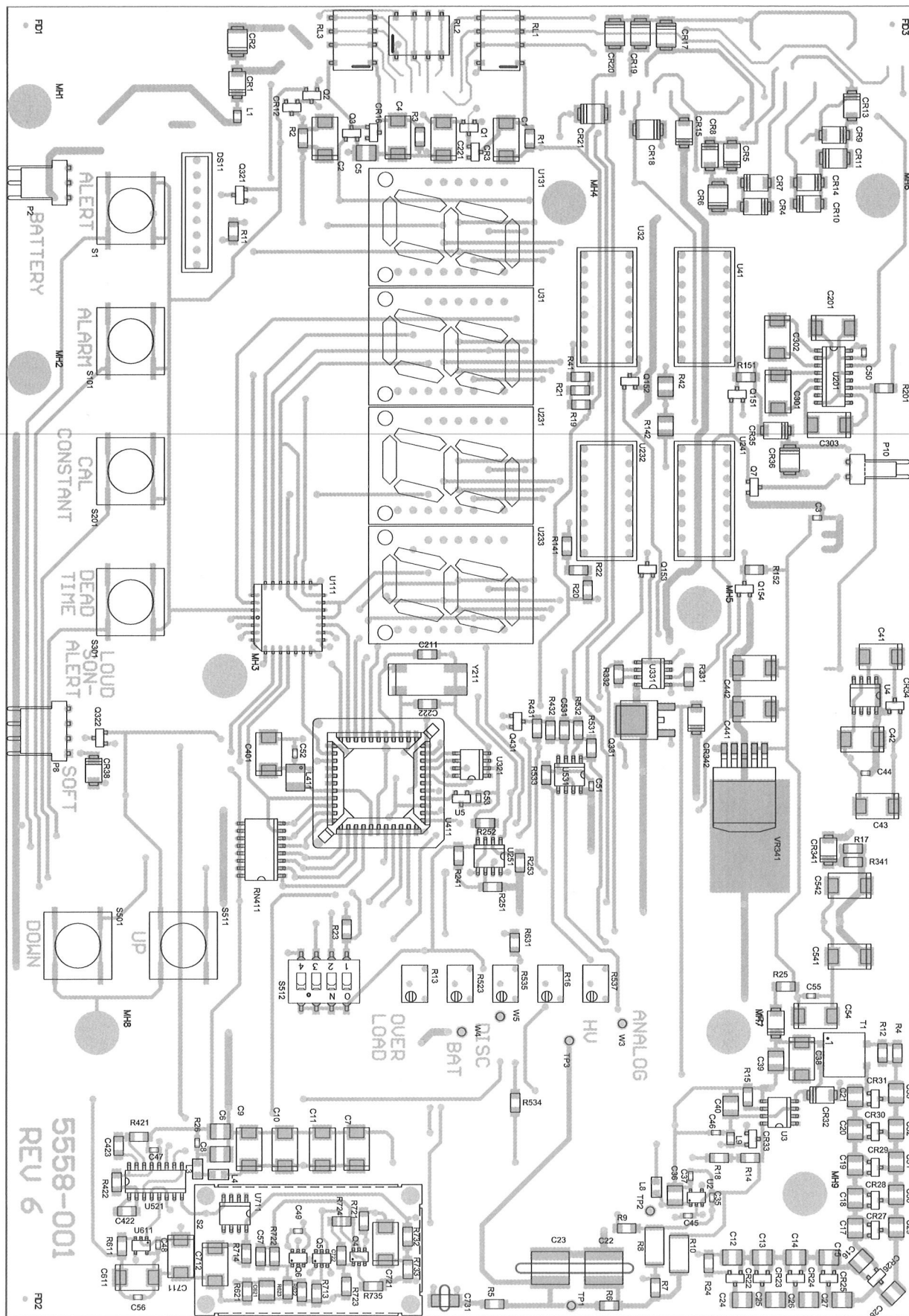



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| Drawn: CKB   | 10/27/2014 | Title: MAIN BOARD  |        |
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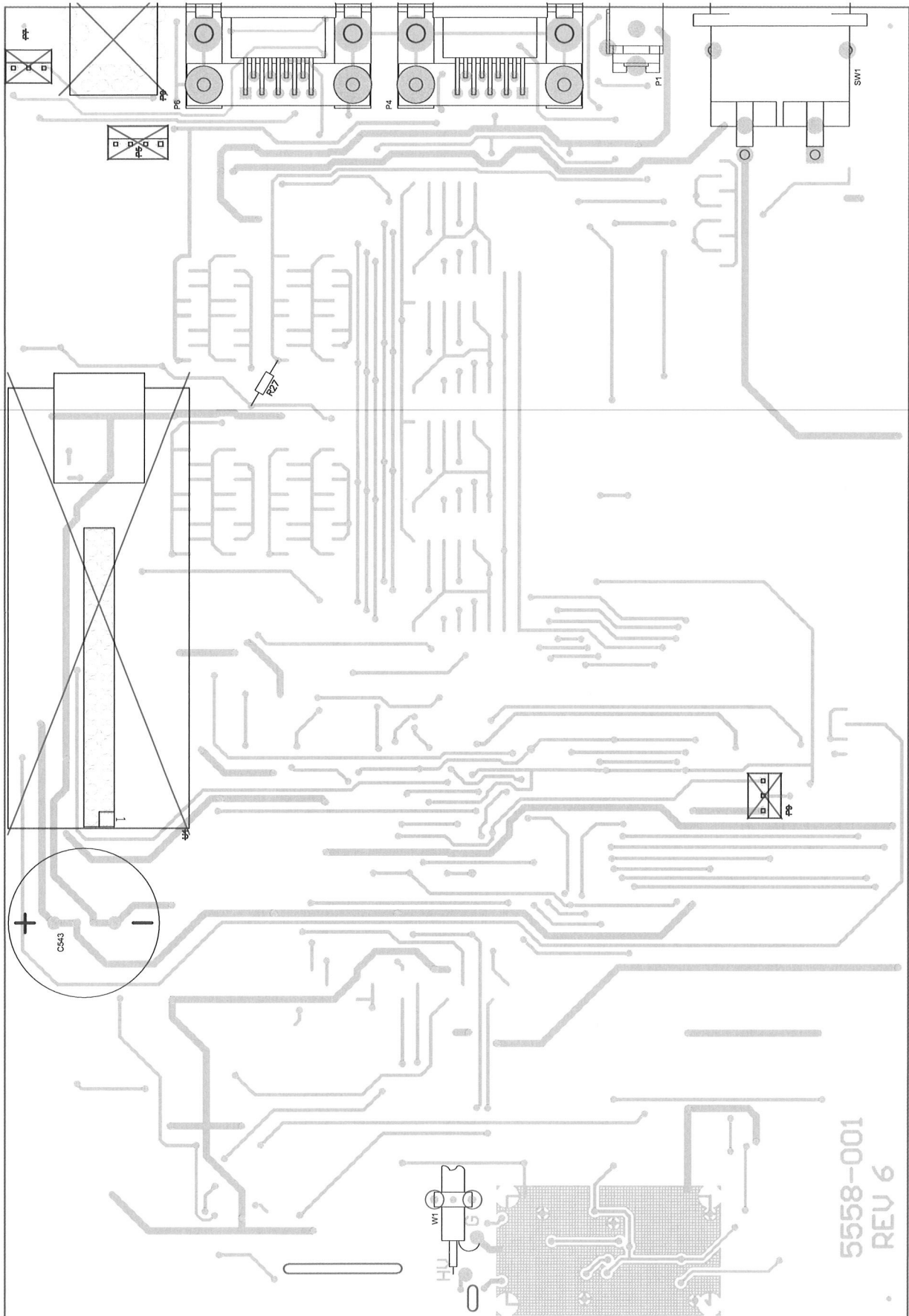
**LUDLUM**  
MEASUREMENTS, INC.

PO Box 810  
501 Oak Street  
Sweetwater, TX 79556  
U.S.A. 1-800-622-0828


|   |            |                         |                    |                 |          |
|---|------------|-------------------------|--------------------|-----------------|----------|
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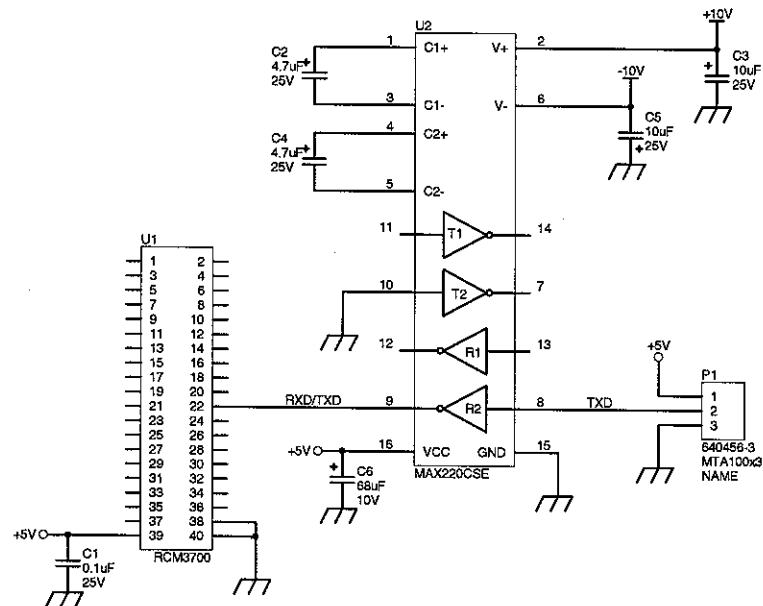
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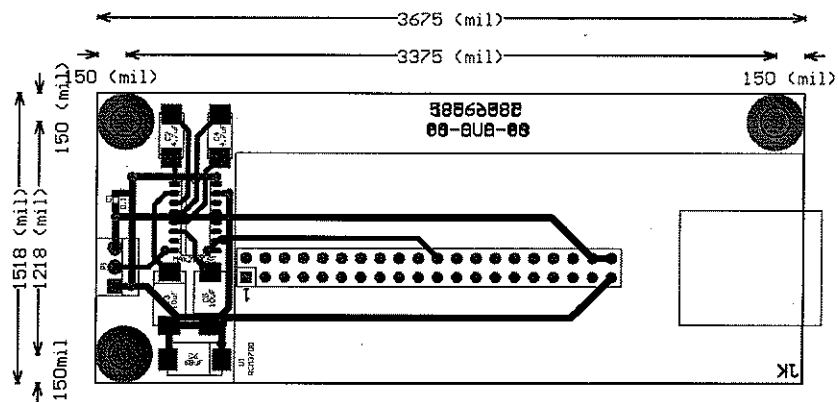


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REV 6

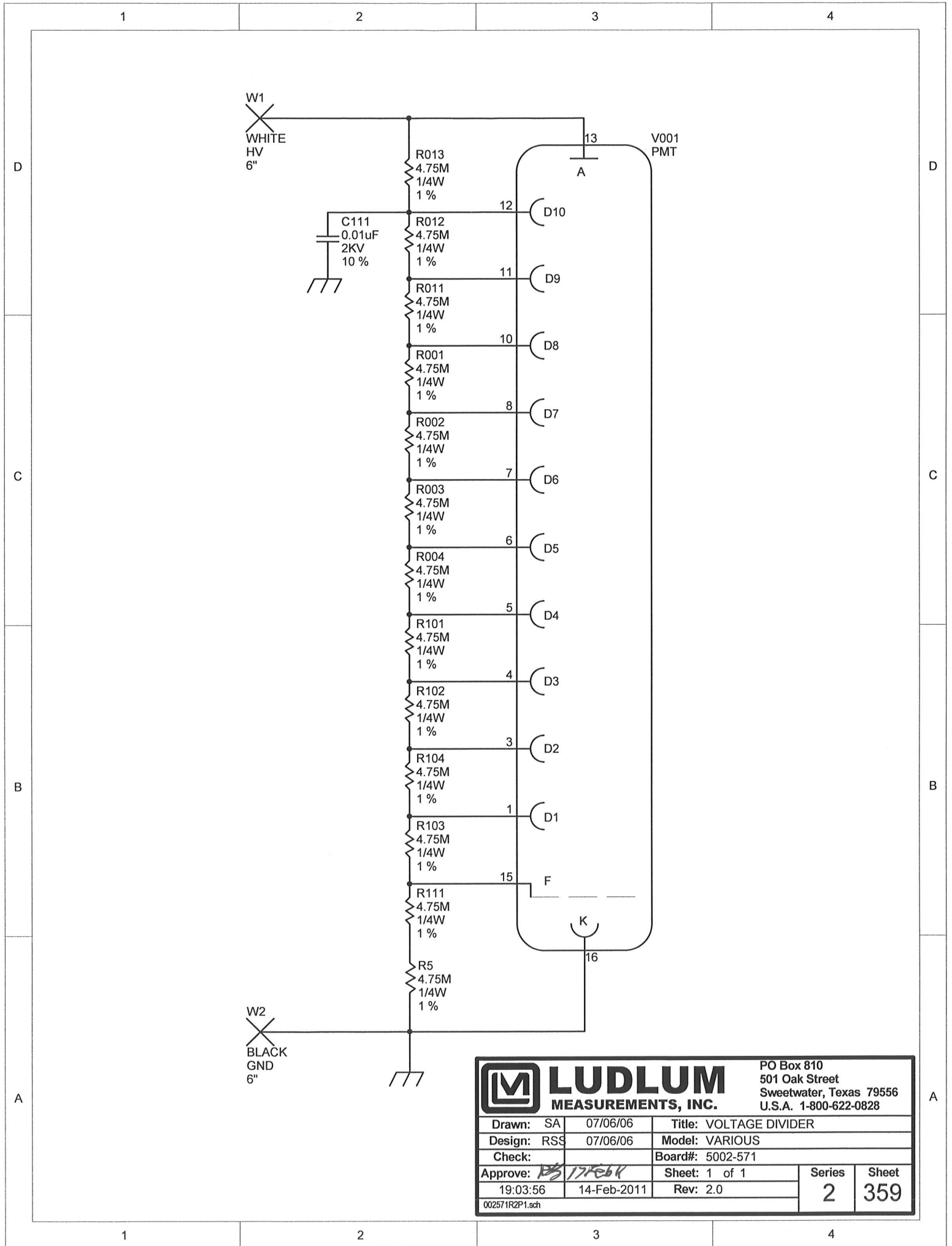
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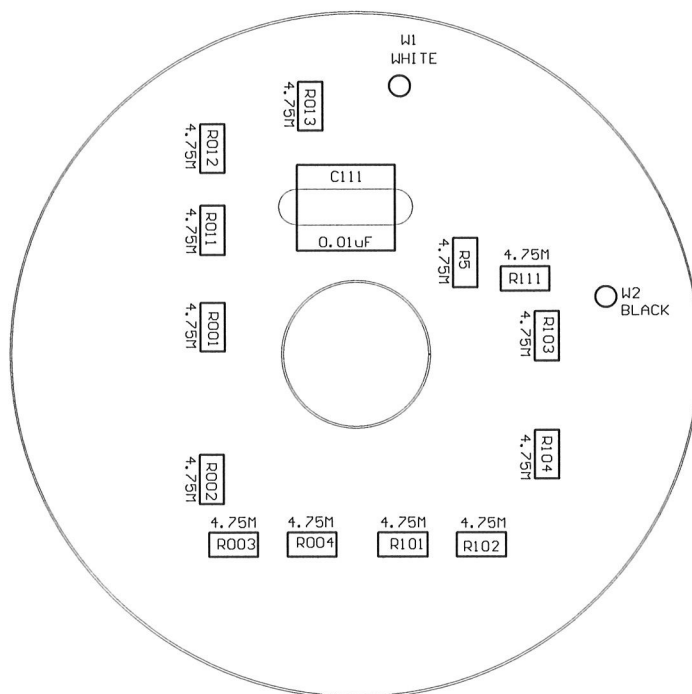
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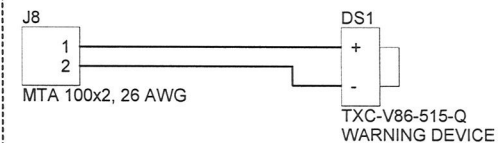
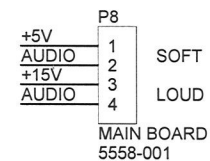
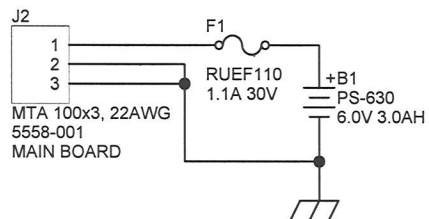
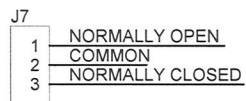


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| Approve: <i>PS</i>  | <i>17 Feb 11</i> | Sheet: 1 of 1  | Series    |
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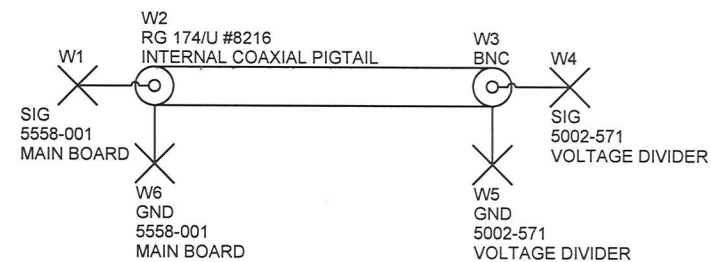
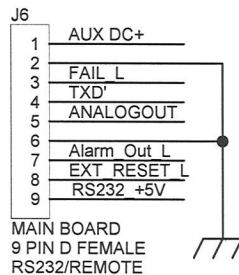
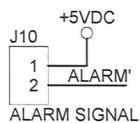


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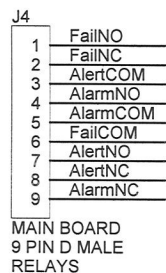
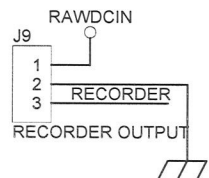
OPTIONAL  
FORM C RELAY (3 PIN CONNECTOR ADDED)




OPTIONAL ALARM SIGNAL



OPTIONAL RECORDER OUTPUT



|   |            |  |        |
|---|------------|--|--------|
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