

# UPS3000, UPS3110 & UPS3210

*Portable & Rack-mountable Pneumatic Pressure Standards*

## Operation & Maintenance Manual



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## About This Manual

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The bench-top UPS3000 and the rack-mountable UPS3110 and UPS3210 pneumatic pressure standards are rugged, compact instruments manufactured by CONDEC. They are designed to provide superior accuracy, range of calibration and ease of operation when used to assist in the manufacture, test and/or calibration of a wide variety of pressure sensing and measuring devices.

These instruments utilize an extremely repeatable sensor coupled to microprocessor-based electronic circuitry and a selectable units display system. This provides easily readable and accurate digital representation of the measured pressure. If required for portable use, the optional battery models, are able to provide up to six hours of use.

The UPS3110 all electro-mechanical device has our precision Orion vernier and one test port. Some models contain a front panel gage, to show the operator the input pressure, as well as, a pressure regulator that will act as a pressure limiter so that the operator can not over pressure a unit under test. A test hose is supplied for the customer. Standard front panel buttons and switches provide selection of the desired pressure range, push-button zeroing and the unique internal self-check feature.

This manual has been written to give the user a simple and clear explanation of how to operate, calibrate and maintain these instruments.



*Before attempting to use either style, Pressure Standard, the following instructions must be carefully read and understood by personnel utilizing the equipment. This is a high-pressure system. While a substantial effort has been expended to make this equipment safe, simple and fool-proof to operate, it is strongly recommended that only personnel formally trained in the use of pneumatic pressure equipment be permitted to operate it. Potentially dangerous conditions could be produced through negligent handling or operation of the console due to the high pressure contained within the unit.*

*UPS3110 units are strictly for use with pneumatic pressures. Erroneous readings and potential damage could result from the introduction of hydraulic fluids into the internal tubing lines.*



Authorized distributors and their employees can view or download this manual from the Condec distributor site at [www.4condec.com](http://www.4condec.com).

# 1.0 Introduction

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Utilizing microprocessor technology, the UPS3000, rack-mountable UPS3110 and UPS3210 instruments offer a combination of features, performance, versatility and reliability not previously available in a single, self-contained pressure calibration instrument. The following list notes the features and benefits of each unit:

- Three independent switch-selectable pressure ranges per instrument.
- Nine button-selectable units (PSI, kPa, Bar, mBar, kg/cm<sup>2</sup>, mmHg, inHg, cmH<sub>2</sub>O, inH<sub>2</sub>O) plus percent of full scale may be displayed on instrument.
- Accuracy of each range equal to or better than  $\pm 0.05\%$  Full Scale.
- Both “Gage” and “Absolute” pressure calibrations available via front panel switch selection.
- Automatic self-check: Computer-controlled internal circuitry provides automatic maintenance of both zero and span calibration data to insure long-term stability and accuracy.
- Digital Display: Eliminates parallax, interpolation and operator judgement errors. Large, bright, red LED digits provide excellent readability under all lighting conditions.
- UPS3110 only - Using a manually adjustable regulator, the maximum system input pressure is adjusted to any desired value higher (typically 20 to 50%) than the full scale range of the device being tested. By virtue of this technique, the unit under test is fully protected from being inadvertently over-pressurized.
- Fast Response: Pressure data refreshed and updated at the rate of 12 times per second.
- Data Output: Serial Data, 20 mA loop, ASCII code format with start, stop and parity bits supplied as standard practice. RS232 Simplex output available as an option.
- Calibration Integrity: Tamper-proof design. Once calibrated, numerous safeguards guarantee the integrity of pressure readings obtained. Display prompting provides the operator with functional status information during both operation and calibration.
- Pressure Media: UPS3000 and UPS3210, any gas or fluid compatible with 17-4 PH stainless steel alloy. UPS3110, only gas compatible with 17-4 PH stainless steel alloy.
- Simple Operation: All controls and indicators are accessible from the front panel. Accompanying operator's manual provides clear, concise instructions for system operation
- Safe, Clean Operation: All pressure components are made of brass, copper, aluminum or stainless steel and proof-tested to at least 150% of maximum operating pressure. In addition, the UPS3110 system contains a high-pressure relief valve to protect both the operator and system components from harm in the event of inadvertent over-pressurization.

The heart of this indicator/calibration system is a highly stable and repeatable pressure transducer. These sensors produce an electrical output signal which is linearly proportional to the applied pressure. This transduction technique has been employed by CONDEC for many years and has realized hundreds of thousands of hours of reliable operation.

By combining these sensors with sophisticated microprocessor-based circuitry, an even higher degree of operational accuracy and precision has been accomplished. For example, computer-generated correction curves for both the non-linearity and the hysteresis of the sensors improve these characteristics by an order of magnitude or more. In addition, a “self-calibration” feature insures long-term accuracy by utilizing the computer to generate and control an internal “shunt calibration mode” of operation. The indicators full-scale reading is compared against, and if necessary, corrected to the digitally-stored value for full scale obtained at the time of initial pressure calibration.

The UPS3000 and UPS3210 indicators, as well as, the UPS3110 calibrator has capability for an internal, rechargeable 12 volt lead acid battery, which provides a minimum of 6 hours of complete usage, when battery is fully charged. An ON/OFF switch is provided to conserve energy when the instrument is not in use. It also has a *LO BATT* indicator. After receiving and prior to operating new battery models, reinstall (+) cable, red wire, on battery.

With all its sophistication however, a great deal of effort has been expended to make the instruments simple to operate and easy to calibrate.

Two micro-metering valves and vernier are provided to control the UPS3110 pressure source while the digital display indicates precisely the magnitude of the applied test pressure. Also, a pair of simple push-button switches provide both “zeroing” of the pressure display and the selection of either the “Gage” or “Absolute” calibration mode. In like manner, the “Range” selection is accomplished via a clearly marked rotary switch. Over-pressure protection is provided on lower pressure UPS3110 models via a fully adjustable pressure regulator which is manually set for each new device being tested.

With respect to calibration, the instruments have been designed and programmed to be very user friendly in that they provide the operator with various prompting symbols and legends during each phase of the calibration sequence. Also, to prevent unauthorized tampering or calibrations, numerous features have been incorporated which greatly minimize this potential danger. Also, the electronic circuitry has been designed without any potentiometers or adjustments which eliminates the possibility of unwanted changes. Finally, the computer has been programmed with a series of internal self-diagnostic routines which continually monitor and check every bit of data stored and processed by this system, and immediately either notes or shuts down operation in the event of an out-of-tolerance reading or outright failures.

The following schematic provides an overview of the UPS3110’s function.

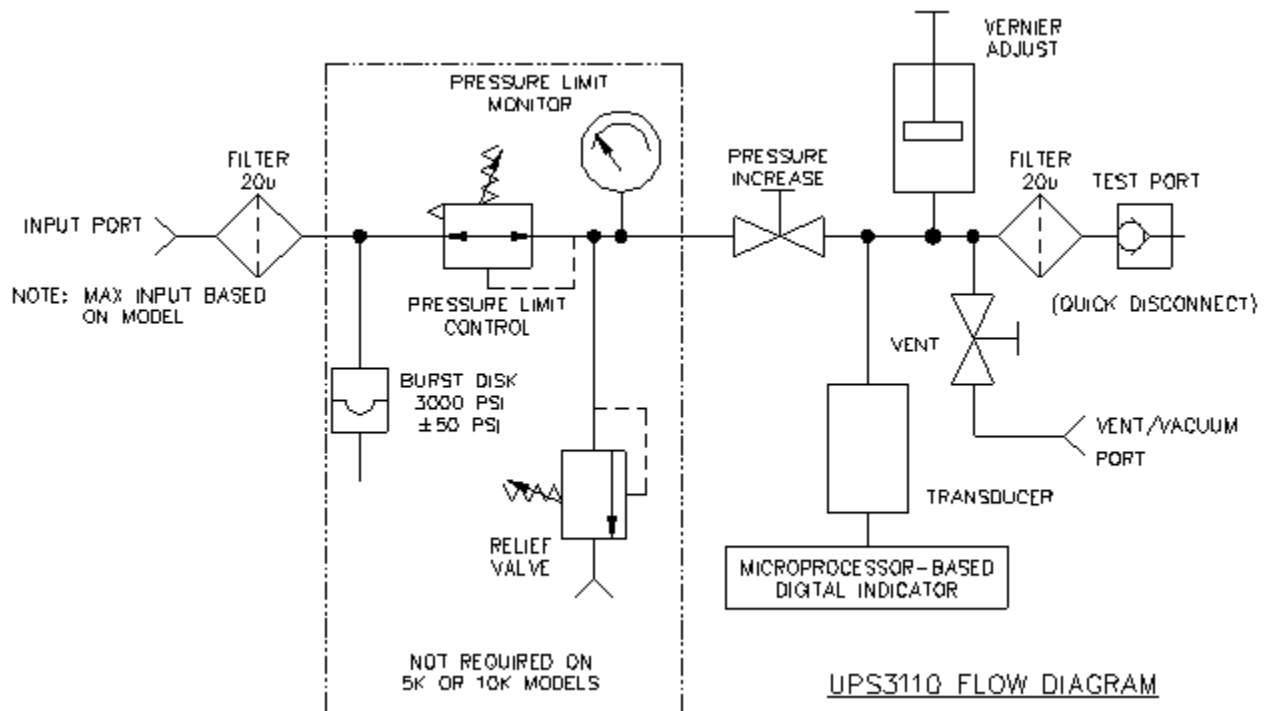


Figure 1-1. UPS3110 Flow Diagram

## 2.0 Operation

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### 2.1 Unpacking and Inspection

When received, carefully remove the instrument from its shipping container. A visual inspection of the instrument's external surfaces should be performed immediately after unpacking. If obvious damage has been incurred during transit, the shipping agency and the distributor should be notified as soon as possible. Instructions as to how to proceed after assessment of the damage will then be determined. If the instrument shows no signs of damage, check to be sure all the required equipment and accessories have been received. See "Options, Replacement Kits" on page 54, for all options.

**NOTE:** *Prior to operating battery models, reinstall (+) cable, red wire, on battery.*

### 2.2 Standard Display/Keyboard Front Panel Functions

UPS3000 See Figure 2-1 on page 5, UPS3110 See Figure 2-2 on page 5, UPS3210 See Figure 2-3 on page 6.

1. Six Digit LED display of the measured pressure. This display also prompts if a problem occurred in performing an operation.
2. Three Annunciators (4). Two of the LEDs are used for indicating whether the instrument is operating as a Gage pressure instrument or as an absolute (ABS) pressure instrument. The third LED indicates the conversion units that the pressure data is currently being displayed in.
3. ZERO function key (1). In GAGE mode and ABS only instruments this key allows the indicator to be zeroed.

**NOTE:** *If attempting to perform a push to ZERO while the pressure data is in motion, the instrument will not go to ZERO.*

**NOTE:** *The four, or five if options have been installed, push button switches located across the lower face of the front panel are individually actuated by momentarily pressing with a light fingertip motion anywhere within the black outlines of the button. When actuated, each switch produces a visual feedback through the digital display.*

4. ABS/GAGE function key (2), toggles instrument to be a Gage pressure instrument or an absolute (ABS) pressure instrument.

**NOTE:** *This key is blank and non-functional if unit is an Absolute (Abs) only pressure unit or a Gage only pressure unit.*

5. CONV conversion key (3), is used to select the conversion units that the pressure data is currently being displayed in.
6. CAL function key (5), activates the internal Self-Check feature. See "GAGE Mode Self-Check" on page 15.

**NOTE:** *CAL key is non-functional in absolute mode.*

7. RANGE SELECT switch (6), used to select the desired pressure range.

**NOTE:** *Do not turn switch between ranges during a cycle.*

8. UPS3110 instrument with maximum range of 2K PSI or less: PRESSURE LIMIT CONTROL (7), for regulating the input pressure to the unit.
9. UPS3110 instrument with maximum range of 2K PSI or less: PRESSURE LIMIT MONITOR (8), indicates input pressure going to the unit.
10. UPS3110 instrument: TEST PORT (9), for connecting to the Device-Under-Test (DUT).
11. UPS3110 instrument: INPUT Valve (10), used for nearing target pressure of the DUT.
12. UPS3110 instrument: VERNIER Valve (11), used for precisely setting target pressure of the DUT.
13. UPS3110 instrument: VENT Valve (12), used for venting pressure of the DUT.



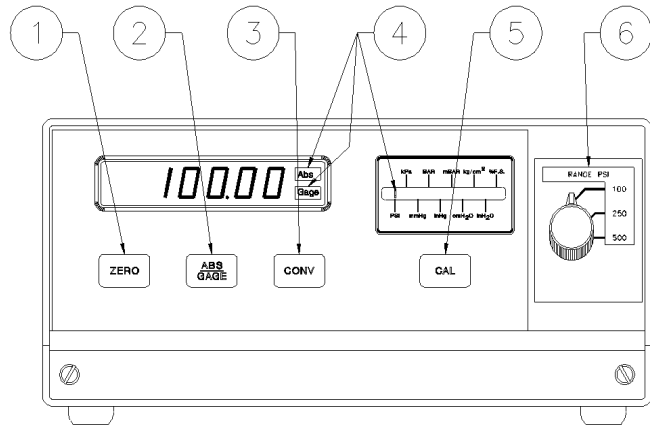


Figure 2-1. UPS3000 Desktop/Panel-mountable Pressure Indicator Display/Keyboard Functions

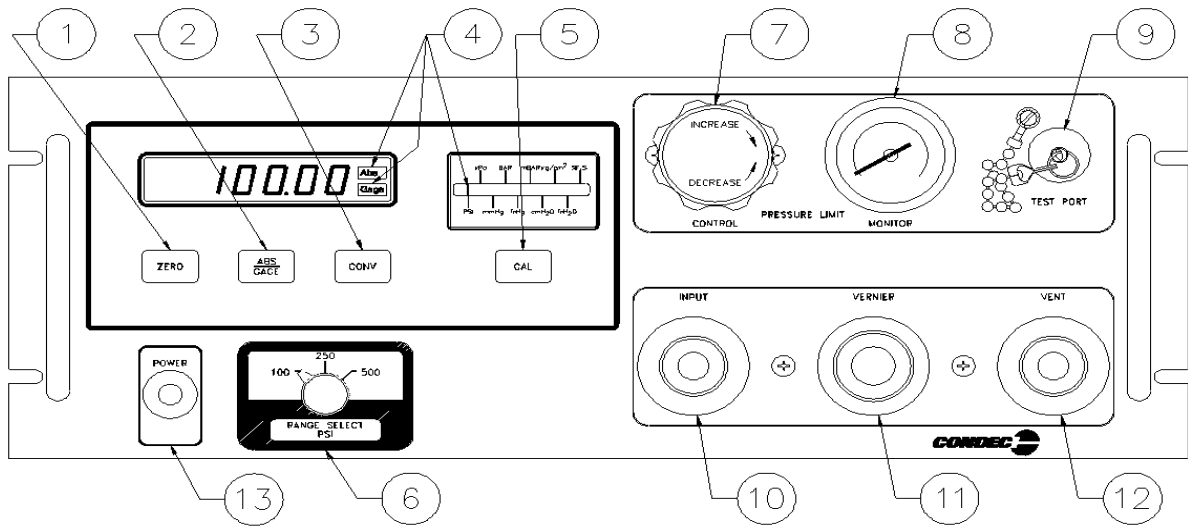


Figure 2-2. UPS3110 Rack-mountable Front Pressure Calibrator Panel Functions

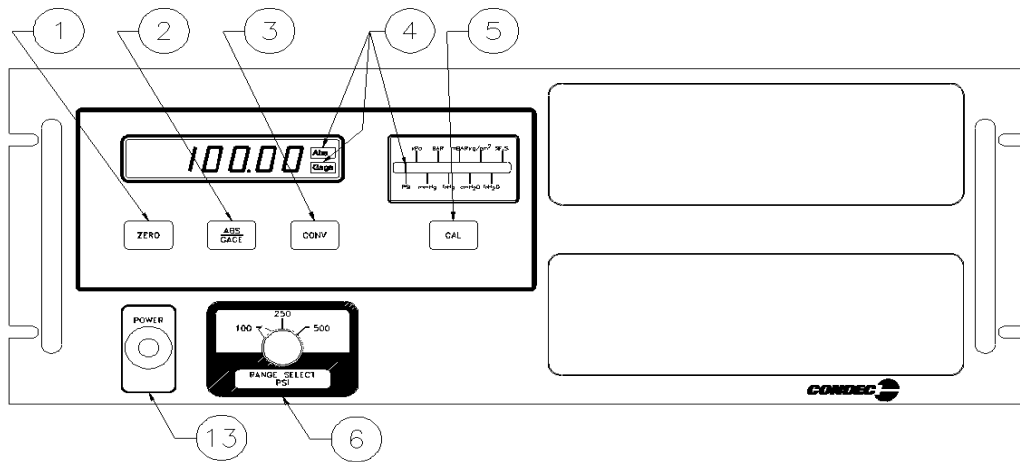


Figure 2-3. UPS3210 Rack-mountable Pressure Indicator Front Panel Functions

## 2.3 Rear Panel Configuration

UPS3000 Series, See Figure 2-4 below, contains the following:

1. AC power cord, and input receptacle (17).
2. INPUT PRESSURE port J1 (16), 7/16-20, 37°-4 AN male fitting.

**Caution** Application of pressures greater than 1.5 times the highest pressure range of the indicator may cause calibration errors or even permanent damage to the pressure transducer.

3. The unit's identification plate (15).
4. Optional if required items:
  - Connector J2 (14), 5 pin round MS style connector, for Serial or Analog Output communication board.
  - Connector J3 (20), 15 pin D connector, for the PCM1000 Controller Interface.
  - Connector (18), 5 pin round connector, for the Freeze Mode Cable.

**NOTE:** For further information, see "Options, Replacement Kits" on page 54.

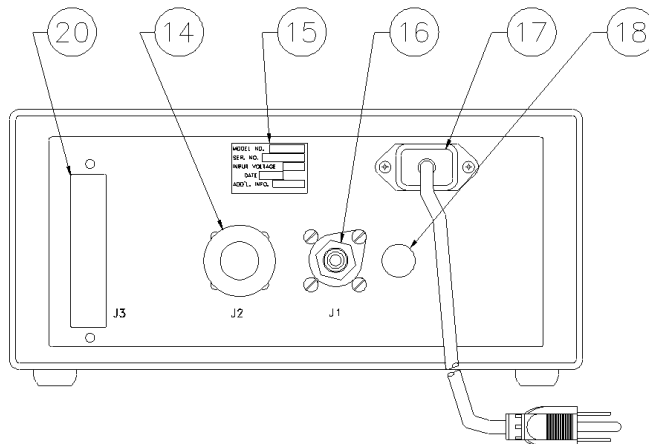


Figure 2-4. UPS3000 Desktop/Panel-mountable Pressure Indicator Rear View

UPS3110 Rack-mountable Series, See Figure 2-5 below, contains the following:

1. AC power cord, fuse holder and input receptacle (17).
2. *INPUT PRESSURE* port (16), 7/16-20, 37°-4 AN male fitting. Location of port for AC only units.

**NOTE:** *The maximum input pressure, supplied by user, is noted below port.*

3. The unit's identification plate (15).
4. *VENT/VACUUM PORT* (19), 7/16-20, 37°-4 AN male fitting.
5. Optional if required items:

Connector J1 (14), 5 pin round MS style connector, for Serial or Analog Output communication board or location of *Input Pressure* port for models with battery.

Connector J2 (18), 5 pin round connector, for the Freeze Mode Cable.

**NOTE:** *For further information, see "Options, Replacement Kits" on page 54.*

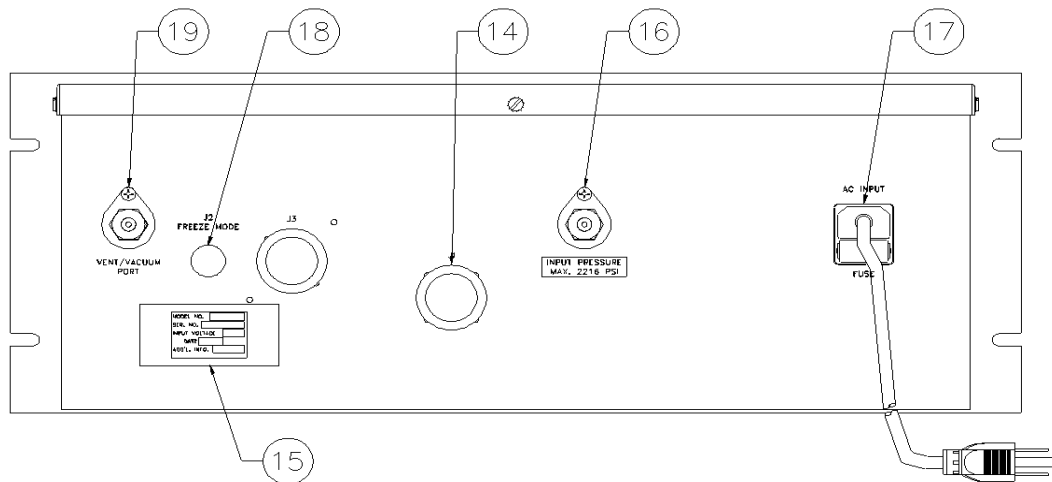


Figure 2-5. UPS3110 Rack-mountable Pressure Calibrator Rear View

UPS3210 Rack-mountable Series, See Figure 2-6 on page 8, contains the following:

1. AC power cord, fuse holder and input receptacle (17).
2. *INPUT PRESSURE* port J3 (16), 7/16-20, 37°-4 AN male fitting.

**NOTE:** *The maximum input pressure, supplied by user, is noted above port.*

3. The unit's identification plate (15).
4. Optional if required items:

Connector J1 (14), 5 pin round MS style connector, for Serial or Analog Output communication board.

Connector J2 (18), 5 pin round connector, for the Freeze Mode Cable.

Connector J4, located below identification plate, required for APC4000/APC4001 interface cable.

**NOTE:** *For further information, see "Options, Replacement Kits" on page 54.*

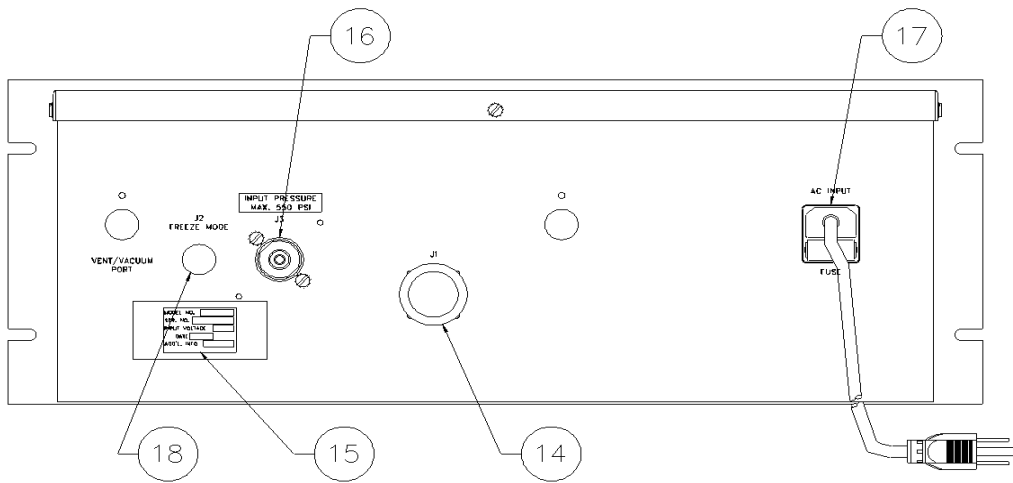


Figure 2-6. UPS3210 Rack-mountable Pressure Indicator Rear View

## 2.4 Configuration Switch Settings

As normally supplied, the UPS3000, UPS3110 and UPS3210 will be fully calibrated and configured to the requirements specified by the customer purchase order. However, there are several functions or operational features that may be selected or altered by the operator during usage. These are controlled by the eight-position DIP switch, S1, located on the CPU board as shown in Figure 2-7.

**NOTE:** To gain access to the CPU board see “Case Removal and Installation” on page 28.

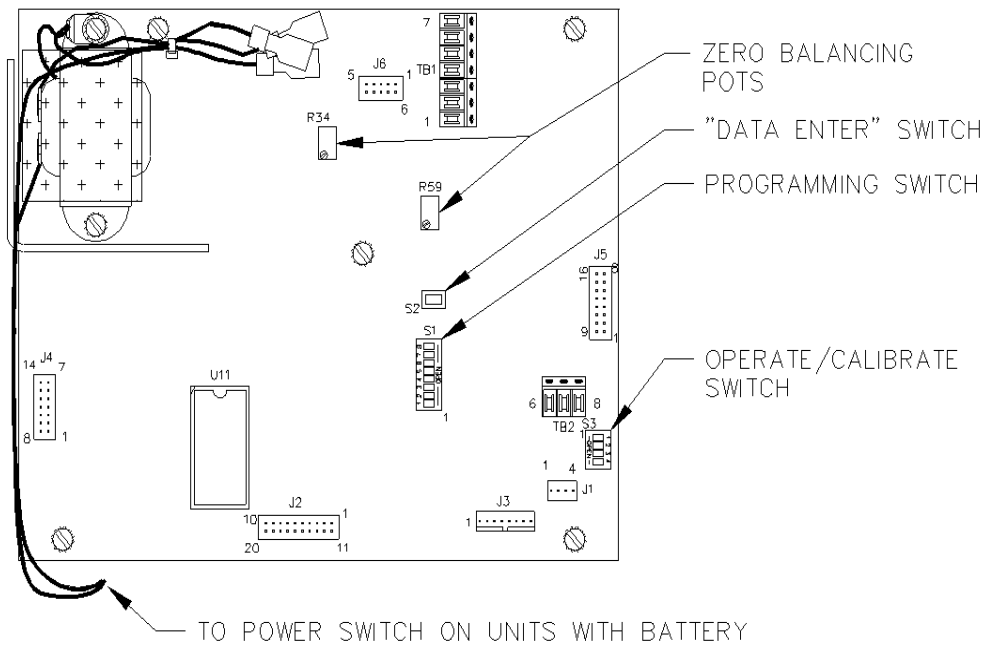


Figure 2-7. CPU Configuration Switch Locations

### 2.4.1 APC4000/APC4001 Interface Option Enable

Switch Settings S1								
Position 1	Position 2	Position 3	Position 4	Position 5	Position 6	Position 7	Position 8	UPS 3000 UPS 3110 UPS 3210
0	0	1	0	0	0	1	1	With Controller
0	0	1	0	0	0	1	0	Without Controller

Table 2-1. APC 4000/APC 4001 Interface Enable Switch Settings

The APC4000 interface enable is activated only for models that are purchased and used with the PCM1000-1 controller or part of an APC4001 controller system. When UPS3000 or UPS3210 is used in conjunction with a controller, Peak Hold, Freeze Mode or MIN/MAX Mode options are not available.

**NOTE:** UPS3110 is not used with a controller.

Approximately 1994 multi conversion software was added to UPS3000 models, therefore UPS3000 and PCM1000 units made prior to this will not work with the ones manufactured after that date. Consult factory for information on upgrading units.

### 2.4.2 Peak Hold or MAX/MIN Option Enable

See “Peak Hold Option” on page 54 or “Min and Max Mode Option” on page 55.

Switch Settings S1		Peak Hold or MAX/MIN Mode	*ABS/GAGE Mode
Position 1	Position 2		
0	0	Disabled	ABS & Gauge (Front Panel Switch Selectable)
0	1	Disabled	Gauge or ABS only
1	0	Enabled	ABS & Gauge (Front Panel Switch Selectable)
1	0	Enabled	Gauge or ABS only

Table 2-2. Peak Hold or MAX/MIN Enable Switch Settings

**NOTE:** \* Absolute or Gage modes of operation are factory set, depending upon the style of transducer supplied and the type of internal memory configuration utilized.

When the Absolute/Gage switching is not utilized; the front panel ABS/GAGE push-button switch will be programmed to inactive and covered with a blank overlay.

When the PEAK HOLD Option or MAX/MIN option is supplied switching from Absolute to Gauge mode via the front panel is possible and the Freeze Mode option, if supplied, is operable.

**NOTE:** When the PEAK HOLD or MAX/MIN option is supplied, the CONV button is no longer active or present on front panel. Therefore, the required conversion must be set thru reconfiguration. See “Engineering Conversion with PEAK HOLD or MAX/MIN Option” on page 12 for applicable method to change to required conversion.

### 2.4.3 Conversion Enable

Switch Setting S1 Position 3	Front Panel Conv Key Mode
0	Disabled
1	Enabled

Table 2-3. Conversion Enable Switch Setting

As standard practice, the instruments are supplied with display indication in PSI (either Absolute, Gage or both) and capable of being converted to a range of nine units via the front panel CONV push-button switch.

**NOTE:** When the PEAK HOLD or MAX/MIN option is supplied with a model having the ABS or GAGE mode, switch selectable from front panel, the “CONV” button will be disabled and will not be present on the front panel. Therefore, the required conversion must be set thru reconfiguration. See “Engineering Conversion with PEAK HOLD or MAX/MIN Option” on page 12 for applicable method to change to required conversion.

### 2.4.4 Digital Averaging

Switch Setting S1		Average Select	Approximate Update Rate
Position 4	Position 5		
0	0	1 (Off)	12/sec.
1	0	2	6/sec.
0	1	4	3/sec.
1	1	Auto	3-12/sec.

Table 2-4. Digital Averaging Switch Setting

Digital Averaging is a technique whereby numerous update cycles are averaged together before the numerical display data is changed. In essence, this feature acts as a variable rate electronic filter to provide a more stable pressure indication reading. The “AUTO” mode of this filter allows the display to update rapidly (12/sec.) when the input pressure is being quickly changed and yet provides extremely stable display operation (3/sec.) when the desired pressure input value has been obtained.

### 2.4.5 AUTO-ZERO Maintenance (AZM) Enable

Switch Setting S1 Position 6	AZM Mode
0	Disabled AZM
1	Enabled AZM

Table 2-5. AZM Enable Switch Setting

The Automatic Zero Maintenance (AZM) feature is used to “hold” the indicator reading to a “zero” value as long as the actual pressure input is maintained at zero. If the input pressure changes by more than one half a least significant display digit between two consecutive display update cycles, the “hold” feature is automatically disabled and the exact magnitude of pressure being exerted will be displayed. In some applications, it may be better to operate the instrument without the AZM circuit enabled. If so, pressing the ZERO push-button switch, with zero pressure applied to the instrument, will guarantee that each new pressure cycle begins at zero.

### 2.4.6 Automatic Span Maintenance (ASM) Enable

Switch Setting S1 Position 7	ASM Mode
0	Disabled ASM
1	Enabled ASM

Table 2-6. ASM Enable Switch Setting

The Automatic Span Maintenance (ASM) circuit operates in conjunction with the front panel CAL push-button to provide a Self-Check feature that insures long-term accuracy by utilizing the computer to generate and control an internal “shunt calibration mode” of operation wherein the indicator reading obtained is compared against, and if necessary, corrected to the digitally-stored value for the same shunt calibration reading obtained at the time of initial pressure calibration.

## 2.5 Freeze Mode Option Wiring

See Figure 2-7 on page 8 for TB location on CPU.

Connections may be made using the Freeze Mode Kit, see “Freeze Mode Option - PN 57778” on page 54. The small five pin connector (pins A & B) which, in turn, are connected to the main CPU board via terminal block TB2-7 (+) (Pin A) and TB2-8 (Gnd Ret) (Pin B). The current through these wires is approximately 0.5 mA as a non-inductive load. The voltage between these two wires is 5 VDC.

**NOTE:** Option may not be used with the APC4000/APC4001 Interface Option.

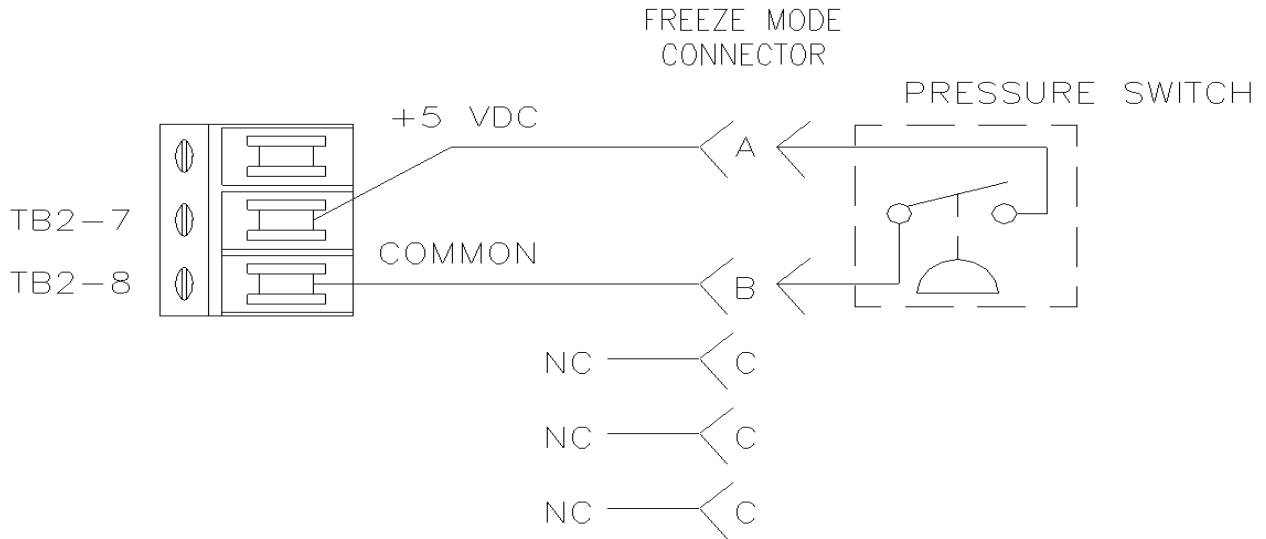


Figure 2-8. Freeze Mode Option Wiring

## 2.6 Engineering Conversion with PEAK HOLD or MAX/MIN Option

See Figure 2-7 on page 8 for location of “Data Enter” and rocker switches.

**NOTE:** When the PEAK HOLD or MAX/MIN option is supplied with a model having the ABS/GAGE mode, switch selectable from front panel, the CONV button will be disabled and will not be present on the front panel.

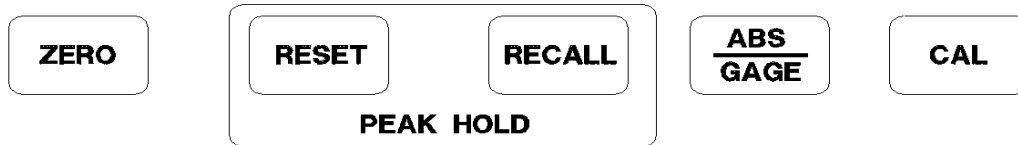


Figure 2-9. Peak Hold Option Front Panel Switches

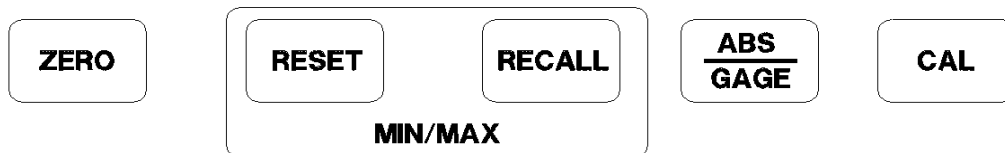


Figure 2-10. MIN/MAX Option Front Panel Switches

In order to step the light bar on conversion display to required conversion the following steps must be taken:

1. Open UPS3000/UPS3110/UPS3210 per Section 4.2.1 on page 28.
2. At this time, record the settings of rocker switches S1 and S3. These settings must be changed in order to program the new conversion configuration.
3. Close the following rocker switches S1 position 3 and S3 positions 1 and 3.
4. Verify Numeric display has “1 XXX”, where X’s are some random number.

**NOTE:** If 1 is not on display open rocker switch S1 position 3 and rocker switch S3 positions 1 and 3, then restart at step 3 above.

5. Push the ABS/GAGE switch located on front panel as needed to move light bar on conversion display to required conversion.
6. Momentarily push the “Data Enter” switch S2 to enter new conversion.
7. Open the following rocker switches S1 position 3 and S3 positions 1 and 3.

**NOTE:** Verify rocker switches S1 and S3 conform to original settings which had been recorded earlier.

8. To verify proper conversion is active remove and restore power to the UPS3000/UPS3110/UPS3210.



## 2.7 UPS3000 or UPS3210 Initial Setup Sequence

For UPS3000, refer to Figure 2-1 on page 5 and Figure 2-4 on page 6.

For UPS3210, refer to Figure 2-3 on page 6 and Figure 2-6 on page 8.

1. Connect the pressure source to the instrument via the *INPUT PRESSURE* port (16), 7/16-20, 37°-4 AN male fitting provided on the rear panel. It is suggested that a Cheat Seal, PN 54854, be used between *INPUT PRESSURE* port and pressure source fitting.

**NOTE:** Valves for venting and pressure input should be installed in line with the pressure source.

2. Apply power to the instrument using AC Cord (17) or, if applicable, by pressing **POWER** switch (13) on front panel and allow it to stabilize for at least 5 to 10 minutes.
3. Select the desired full scale pressure range via the three-position rotary **RANGE SELECT** switch (6). For the best accuracy, the selected range must be greater than, but close as possible to, the full scale range of the Device-Under-Test.

**NOTE:** Do not switch pressure ranges during a pressure cycle.

4. If applicable or required, select the mode of operation by momentarily depressing the **ABS/GAGE** push-button switch (2). The applicable “ABS” or “GAGE” light bar (4) will be lit to provide mode of operation.
5. To select the desired measurement display units, depress **CONV** push-button switch (3).

**NOTE:** When the **PEAK HOLD** or **MAX/MIN** option is supplied with a model having the **ABS** or **GAGE** mode, switch selectable from front panel, the “CONV” button will be disabled and will not be present on the front panel. Refer to Section 2.6 on page 12.

6. If operating the unit in *GAGE* mode go to Section 2.7.1 or if operating the unit in *ABS* mode go to Section 2.7.2.



### Caution

Application of pressures greater than 1.5 times the highest pressure range of the indicator may cause calibration errors or even permanent damage to the pressure transducer.

### 2.7.1 UPS3000 or UPS3210 Display of Pressure Sequence **GAGE** Mode

1. Vent the Input Pressure port (16) to atmosphere.
2. Momentarily depress the **ZERO** push-button switch (1). The display will indicate 0.00.
3. The instrument is now fully configured and ready to display the applied pressure.

### 2.7.2 UPS3000 or UPS3210 Display of Pressure Sequence **Absolute (ABS)** Mode

**NOTE:** If local barometric pressure is not 14.7, *ABS/GAGE* switch selectable units only, may need barometric offset. See “Barometric Offset - Absolute/Gage Switch Selectable Units ONLY” on page 23.

1. If only pressure measurements greater than barometric are required, continue to Step 1.1. If pressure measurements above and below atmospheric pressure are required go to step 2.
  - 1.1. To apply pressure, close the customer supplied vent valve attached in line with the *INPUT PRESSURE* port (16). Unit will display applied pressure.
2. If pressure measurements above and below atmospheric pressure are required, connect a **VACUUM PUMP** in line with the *INPUT PRESSURE* port (16).
3. Close the customer supplied vent and input valve attached in line with the *INPUT PRESSURE* port (16).
4. Apply power to the vacuum pump and allow it to evacuate the system for several minutes or until the digital display reading reaches equilibrium near Zero psia. Momentarily press the **ZERO** push-button switch (1) to establish a zero reference on the display.
5. The instrument is now fully configured and ready to display the applied pressure.

## 2.8 UPS3110 Initial Setup Sequence

Refer to Figure 2-2 on page 5 and Figure 2-5 on page 7.

1. Connect the pressure source to the instrument via the *INPUT PRESSURE* port (16), 7/16-20, 37°-4 AN male fitting provided on the rear panel. It is suggested that a Cheat Seal, PN 54854, be used between *INPUT PRESSURE* port and pressure source fitting.
2. Check that the *INPUT* valve (10) is closed (rotate clockwise until it stops) and that the *VENT* valve (12) is open (two turns counter-clockwise from its stop).
3. Plug in the power cord (17) and energize the unit by pushing the **POWER** switch located on front panel. Allow at least 10 minutes warm-up time.
4. Select the desired full scale pressure range via the three-position rotary **RANGE SELECT** switch (6). For the best accuracy, the selected range must be greater than, but close as possible to, the full scale range of the Device-Under-Test (DUT).

**NOTE:** Do not switch pressure ranges during a calibration cycle.

5. Using the *PRESSURE LIMIT CONTROL* regulator (7), adjust the maximum system input pressure, as read by the *PRESSURE LIMIT MONITOR* (8), to any desired value higher (typically 20–50% higher) than the full-scale range of the DUT. Using this technique, the DUT is fully protected from being accidentally over-pressurized.

**NOTE:** UPS3110 [A] and UPS3110 [G] units do not have *PRESSURE LIMIT CONTROL* or *MONITOR*.

6. Connect the male end of the test hose to the *TEST PORT* (9) fitting.
7. Connect the swivel fitting end (7/16-20) of the Test (output) hose to the DUT using adapters if required. Tighten all connections properly.
8. If applicable or required, select the mode of operation by momentarily depressing the **ABS/GAGE** (2) switch. The applicable “ABS” or “GAGE” light bar (4) will be lit to provide mode of operation.
9. To select the desired measurement display units, depress **CONV** (3) switch.

**NOTE:** When the **PEAK HOLD** or **MAX/MIN** option is supplied with a model having the **ABS** or **GAGE** mode, switch selectable from front panel, the “CONV” button will be disabled and will not be present on the front panel. Refer to Section 2.6 on page 12.

10. If operating the unit in *GAGE* mode go to Section 2.8.1 or if operating the unit in *ABS* mode go to Section 2.8.2.

### 2.8.1 UPS3110 Pressure Measurement Sequence GAGE Mode

1. Press the **ZERO** push-button switch (1), display will return to a normal “Zero” reading. The instrument may be zeroed at anytime, as long as the *VENT* valve (12) is open, by momentarily depressing the **ZERO** push-button switch (1).
2. To apply pressure, close the *VENT* valve (12), approximately two turns, until it stops, then open the *INPUT* valve (10) approximately 1/2 turn counter-clockwise until the numerical display begins to move. The pressure may change rapidly until reaching approximately 90% of the desired final value.
3. Use either the *INPUT* (10) or *VENT* valve (12) to obtain a specific pressure reading. Both provide precise control. As the pressure approaches the desired value, the valve being used for control should be rotated slowly clockwise to its closed position. With a little experience, pressure values very close to the desired final value may be quickly achieved.
4. To obtain exact pressure readings, slowly rotate the *VERNIER* control (11) knob in the direction required (clockwise to increase pressure) as indicated by the electronic numerical display.



**Caution**

Application of pressures greater than 1.5 times the highest pressure range of the indicator may cause calibration errors or even permanent damage to the pressure transducer.

## 2.8.2 UPS3110 Pressure Measurement Sequence Absolute (ABS) Mode

**NOTE:** If local barometric pressure is not 14.7, ABS/GAGE switch selectable units only, may need barometric offset. See "Barometric Offset - Absolute/Gage Switch Selectable Units ONLY" on page 23.

1. If only pressure measurements greater than barometric are required, continue to step 1.1. If pressure measurements above and below atmospheric pressure are required go to step 2.

To apply pressure, close the *VENT* valve (12), approximately two turns, until it stops, then open the *INPUT* valve (10) approximately 1/2 turn counter-clockwise until the numerical display begins to move. The pressure may change rapidly until reaching approximately 90% of the desired final value.

- 1.1. Use either the *INPUT* (10) or *VENT* valve (12) to obtain a specific pressure reading. Both provide precise control. As the pressure approaches the desired value, the valve being used for control should be rotated slowly clockwise to its closed position. With a little experience, pressure values very close to the desired final value may be quickly achieved.
- 1.2. To obtain exact pressure readings, slowly rotate the *VERNIER* control (11) knob in the direction required (clockwise to increase pressure) as indicated by the electronic numerical display



**Caution** Application of pressures greater than 1.5 times the highest pressure range of the indicator may cause calibration errors or even permanent damage to the pressure transducer.

2. If pressure measurements above and below atmospheric pressure are required, connect a *VACUUM PUMP* to the *VACUUM/VENT* port (19).
3. Open the *VENT* valve (12), close the *INPUT* valve (10) and apply power to the vacuum pump and allow it to evacuate the system for several minutes or until the digital display reading reaches equilibrium near Zero psia. Press the **ZERO** push-button switch (1) to establish a zero reference on the display.
4. With the vacuum pump still running, close the *VENT* valve (12) (approximately two turns to its stop) and check for system leaks. If there are none, continue to step 4.1.
  - 4.1. To apply pressure, open the *INPUT* valve (10) (approximately 1/2 turn counter-clockwise until the numerical display begins to move). In general, the pressure may be changed rapidly until reaching approximately 90% of its desired final value.
  - 4.2. Use either the *INPUT* (10) or *VENT* (12) valve to obtain a specific pressure reading. Both provide precise control. As the pressure approaches the desired value, the valve being used for control should be rotated slowly clockwise to its closed position. With a little experience, pressure values very close to the desired final value may be quickly achieved.
  - 4.3. To obtain exact pressure readings, slowly rotate the *VERNIER* control (11) knob in the direction required (clockwise to increase pressure) as indicated by the electronic numerical display.

## 2.9 GAGE Mode Self-Check

For UPS3000, refer to Figure 2-1 on page 5 and Figure 2-4 on page 6.

For UPS3110, refer to Figure 2-2 on page 5 and Figure 2-5 on page 7.

For UPS3210, refer to Figure 2-3 on page 6 and Figure 2-6 on page 8.

**NOTE:** Use of this Self -Check is not required for the proper operation of unit. CAL key is non-functional in absolute mode due to the inability to simulate a perfect vacuum reference.

1. Vent the Input Pressure port (16) to atmosphere.
2. Momentarily depress the **ZERO** push-button switch (1). The display will indicate 0.00.
3. Momentarily depress the **CAL** push-button switch (5). The display will immediately blank except for two "- -" which indicate that the unit is performing the self-check. If the self-check is successful, the display will flash "100.00" and revert to its normal zero indication.

## 2.10 Battery Operation

For replacement, see “Replacement Kits” on page 57.

When supplied with the battery, the UPS3000/UPS3110/UPS3210 has an internal, rechargeable 12 volt, lead acid battery which provides a minimum of 6 hours of completely portable usage before having to be re-charged.

The UPS3000/UPS3110/UPS3210 may be operated and/or recharged by simply connecting to a standard AC outlet via the line cord supplied. The battery re-charge cycle time is approximately 16 to 20 hours with the **ON/OFF** switch in the *OFF* position. The charging circuit is designed to be left on indefinitely without adversely affecting battery life.

The battery voltage reading will typically be between 11.5 and 12.6 volts. When the battery voltage reads 11.5 volts there are approximately 1 to 2 hours of useful operation left and a *LOW BATT* indicator will be illuminated. A red LED in the lower left corner of unit near the **POWER** switch will turn on. The instrument will cease to function when the battery voltage is 11.0 volts or less.

## 2.11 Serial Output: 20 mA Loop

**NOTE:** *This may not be used with the following options in “DEMAND FORMAT”, APC4000 or APC4001 interface, Peak hold, Min/Max or Battery. This may not be used with the following options in “CONTINUOUS FORMAT”, APC 4000 or APC4001 interface or Battery.*

There are two modes of operation, Continuous or Demand.

Continuous Mode: Model is continuously sending data.

Demand Mode: Must be done from the front panel of the UPS3000/UPS3110/UPS3210 using a button. The button is the hidden one between the **CONV** and **CAL** buttons. This is not a two-way mode and cannot be done externally by PC.

### 2.11.1 Hardware Configuration

**NOTE:** See “Case Removal and Installation” on page 28.

UPS3000 Required Parts: PN 60607 Quantity 1, PN 58707 Quantity 1, PN 14839 Quantity 2, PN 58302, Quantity 1.

UPS3110 and UPS3210 Required Parts: Contact factory for requirements.

**NOTE:** *Because of soldering it may be beneficial to have this installed at factory.*

Solder Brown Wire to E13 and Red Wire to E14

The serial output is accessed at J3, a 15-pin D-subminiature female connector at the rear of the unit. Pin designations are as follows:

J3-8 +Tx (Brown wire)

J3-9 -Tx (Red Wire)

### 2.11.2 Serial Output Software Configuration

**NOTES:**

1. See “Case Removal and Installation” on page 28.
2. See Figure 2-7 on page 8 to locate DIP switches S1 and S3, as well as, switch S2 on CPU board.
3. See Figure 3-2 on page 20 for “STEPPER” and “ENTER” switch locations.

1. Open up the unit and power it up.
2. On the main circuit board, close S3-1. The unit will display the following:

6 0 \_ X X X where “X” can be any number

3. Momentarily hit the **STEPPER** push-button switch until the number 64 is on the left side of the display. The unit will display the following:

6 4 \_ X X X where “X” can be any number

4. Refer to the “DATA FORMAT TABLE” in this section to determine the appropriate output format.

5. At this time, record the settings of switch S1. These settings must be changed in order to program the serial output configuration.
6. After the data format and baud rate have been selected, refer to the "SERIAL OUTPUT CONFIGURATION TABLE" in this section for the appropriate values for the M.S.D. "M" and the L.S.D. "L."
7. Set up switch S1 with the data derived from the "Serial Output Configuration Table".
8. After switch S1 has been set, push the **ENTER** button on front panel to enter the data.
9. The selected values for "M" and "L" should now appear at location 64 in the correct order. If this is not the case, go back and perform step "7" and try again.
10. To store this information permanently, close switch S3-2. The unit will display the following:  

\_ 1 \_ X X X where "X" can be any number
11. Push switch **S2** momentarily. As switch S2 is held down, the XXX on the display (see step "10") becomes 377. Release switch S2.
12. Return switch S1 to the original settings which had been recorded earlier in step "5". Open switches on switch S3 to resume normal operation.

### 2.11.3 DATA FORMAT TABLE

Format # 1            3 \_ \_ \_ 0.002 \_ K G / C M 2 \_ G <CR> <LF>

Format # 1 Data String

- A) PRESSURE RANGE + 1 SPACE (IF POSITIVE DATA) OR "-" IF NEGATIVE
- B) DATA\* + 1 SPACE.
- C) CONVERSION + 1 SPACE.
- D) MODE + <CR> + <LF>.

Format # 2            3 \_ 000.002 \_ G <ST> <CR> <LF>

Format # 2 Data String

- A) PRESSURE RANGE + 1 SPACE (IF POSITIVE DATA) OR "-" IF NEGATIVE
- B) DATA\* + 1 SPACE.
- C) MODE + <ST> + <CR> + <LF>

<ST>	Conversion		Pressure Range	Mode
"O" Over Range	PSI	mBar	"1" High Range	"A" Absolute
"U" Under Range	KPa	cm H <sub>2</sub> O	"2" Mid Range	
"M" Motion	mm Hg	Kg/cm <sup>2</sup>	"3" Low Range	
" D" Default	Bar	in H <sub>2</sub> O		
		in Hg	% F. S.	

Table 2-7. Data Format Settings

<CR> CARRIAGE RETURN, <LF> LINE FEED

**NOTE:** \* Data consists of seven characters including the decimal point. In format #1, leading zeros are located only one character to the left of the decimal point. In format # 2, all unused characters will be leading zeros.

### 2.11.4 SERIAL OUTPUT CONFIGURATION TABLE

EEPROM LOCATION 64

64\_\_ML

LSD M	S1 Settings				Serial Output Data Format
	1	2	3	4	
0	0	0	0	0	Format #1 Demand
1	1	0	0	0	Format #2 Demand
2	0	1	0	0	Format #1 Continuous
3	1	1	0	0	Format #2 Continuous

Table 2-8. M Serial Output Configuration

LSD L	S1 Setting				Serial Output Baud Rate
	5	6	7	8	
0	0	0	0	0	300
1	1	0	0	0	600
2	0	1	0	0	1200
3	1	1	0	0	2400
4	0	0	1	0	4800
5	1	0	1	0	9600

Table 2-9. L Serial Output Configuration

0 = OPEN, 1 = CLOSED

MSD = MOST SIGNIFICANT DIGIT, LSD = LEAST SIGNIFICANT DIGIT

All serial characters are ASCII and consist of the following:

1 Start Bit
7 Data Bits
Odd Parity
2 Stop Bits

Table 2-10. Serial Character Settings

## 3.0 Calibration and Adjustment Procedure

The simple step-by-step calibration sequence provided on the following pages will permit a qualified technician to calibrate an entire UPS3000, UPS3110 or UPS3210 instrument in a matter of 45 minutes.

However, it must be strongly emphasized that when performing these tests, the computer within the instrument is actually being re-programmed and as such, it is imperative that the pressure standard being used be in satisfactory operating condition and that the technician fully understands its operating characteristics and methods of usage. In addition, the UPS3000/UPS3110/UPS3210 itself must be properly warmed up (approximately 10 minutes) and electrically stabilized prior to performing a calibration cycle.

**NOTE:** *The CONDEC Repair Lab is equipped to do calibrations on CONDEC calibrators and pressure standards. Calibrations include a certification and are traceable to N.I.S.T (see "UPS3000/UPS3110/UPS3210 Return Material Authorization Form").*

### 3.1 Pneumatic Calibration Set-Up

Figure 3-1 defines a typical gage or absolute/gage calibration set-up using a floating piston type dead weight tester. While doing an ABSOLUTE Only Unit calibration, a vacuum pump with an indicator capable of reading PSIA will be required where the dead weight tester/pressure source is shown in Figure 3-1. This enables going below local barometric pressure.

**NOTE:** *Any type of precision pressure or vacuum standard is acceptable as long as its basic accuracy is  $\pm 0.025\%$  of point or better.*

To permit proper calibration at least an "ON/OFF" and a "VENT" valve, connected as shown in Figure 3-1 must be provided.

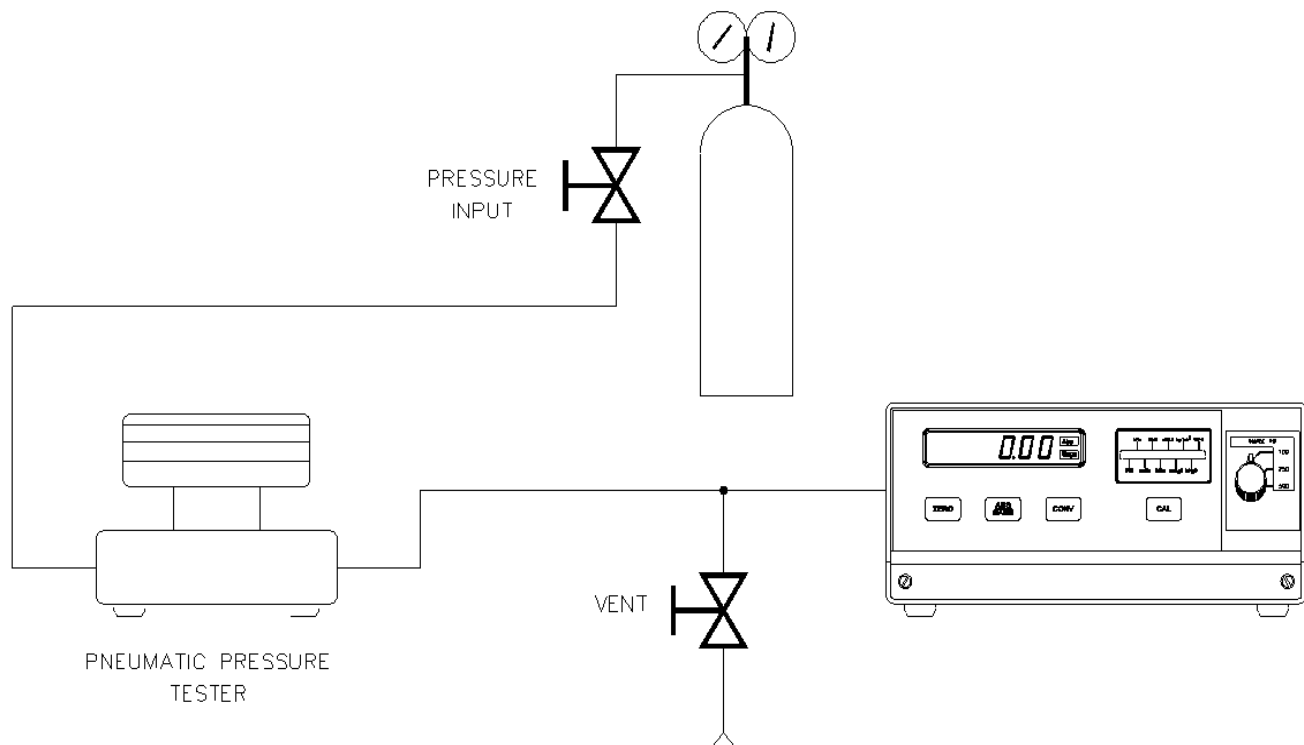


Figure 3-1. Instrument Calibration Set-Up

**NOTE:** *UPS3000 shown, AC Input and Pressure Ports are on back side of all models.*

## 3.2 Instrument Calibration Set-Up

**NOTE:** See “Case Removal and Installation” on page 28 and Figure 2-7 on page 8 to locate DIP switch S3 on CPU board.

UPS3000 is placed into its calibrate mode by momentarily opening instrument drawer and setting the DIP switch, S3 in accordance with Table 3-1. Connect Test Standard to UPS3000 Input Port.

UPS3110, disconnect the input pressure and power lines and remove the unit from its rack. Remove the top cover. Set the DIP switch, S3 in accordance with Table 3-1 and connect Test Standard to UPS3110 Test Port.

UPS3210, disconnect the input pressure and power lines and remove the unit from its rack. Remove the top cover. Set the DIP switch, S3 in accordance with Table 3-1 and connect Test Standard to UPS3210 Input Port.

Switch Settings S3				Program Switch Mode
Position 1	Position 2	Position 3	Position 4	
0	0	0	0	Operate
1	0	1	0	Calibrate

Table 3-1. CALIBRATE/OPERATE Switch Settings

In the CALIBRATE mode the UPS3000/UPS3110/UPS3210’s digital displays are used to provide the operator with prompting symbols, as well as displaying the various data formats employed. The front panel button switch, under the middle of the display, becomes a sequential STEPPER key used to select the various programming functions (Zero/Span, Linearity/Hysteresis, Shunt Resister Calibration) and the push-button (CAL) directly beneath the conversion display is used as the ENTER switch.

All calibration functions will be performed in PSI engineering units, as “Gauge” (atmospheric reference) measurements, unless the instrument being calibrated has been configured as an “Absolute Only” unit. If so, the procedures in this section should be followed, except that an absolute (0 psia) reference must be utilized. A good 2-stage vacuum pump should be employed to attain greater than 100 microns Hg. vacuum.

Figure 3-2 depicts the location of the above described front panel switches as well as showing the display format obtained as soon as the unit has been placed in the CALIBRATE mode.

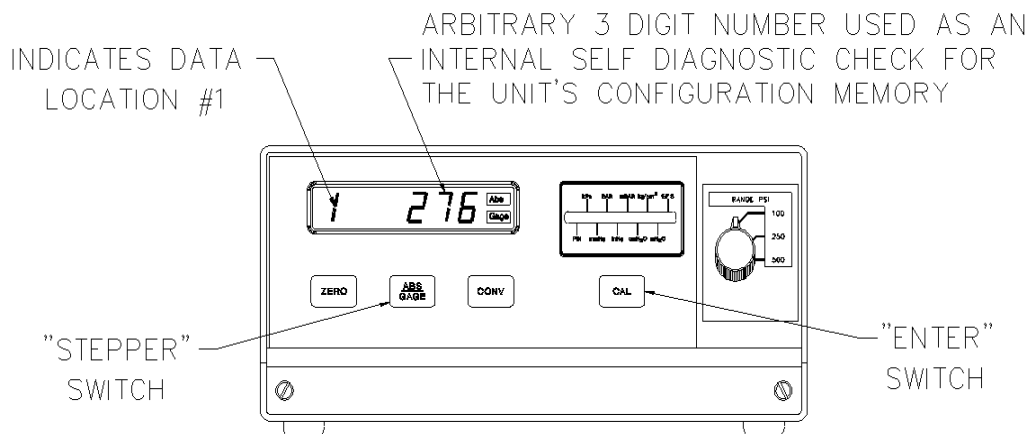


Figure 3-2. Calibration Keys

**NOTE:** UPS3000 shown Input Port located on back of unit.



### 3.3 Zero/Span Calibration

Pressing the STEPPER push-button switch once places the instrument into its ZERO/SPAN calibration mode. The display will be shown in Figure 3-3.

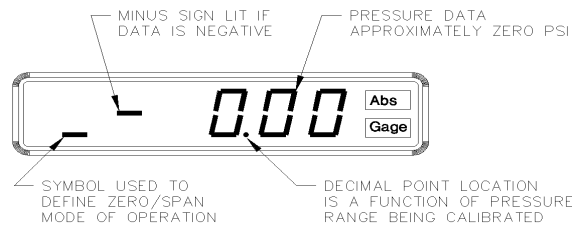


Figure 3-3. Zero/Span Calibration for Gage Only Units (Each Range)

Starting with the instrument's lowest pressure range, sequentially perform steps 1 and 2 shown in Table 3-2 for each pressure range. Perform the following for each step.

**NOTE:** Perform Step 1 in all ranges prior to doing Step 2.

1. Adjust input pressure to the appropriate (either 0 or 100%) value.
2. Perform the action indicated by the table when pressure input readings are stable.

Step Number	Pressure Input Valve	Operator Action Required	Resulting Display Indication	Remarks
1	0%	Press <b>ENTER</b> Switch	0%	Note 1
2	100%	Press <b>ENTER</b> Switch	100%	Note 2

Table 3-2. Zero and Span Calibration Sequence

**NOTES:**

1. If readings are not stable or are not within  $\pm 20\%$  of zero, the zero correction cannot be entered.
2. If readings are not stable or are not within  $\pm 5\%$  of 100%, the span correction cannot be entered.

### 3.4 Linearity and Hysteresis Calibration

The unit can be placed in LINEARIZATION/HYSTERESIS mode by pressing the STEPPER push-button under the middle of the display as shown in Figure 3-2. The display is shown in Figure 3-4.

**NOTE:** The zero/span calibration needs to be performed prior to linearity and hysteresis calibration. For Absolute Only Unit, vacuum pump with PSIA indicator must be used to obtain readings below local barometric pressure.

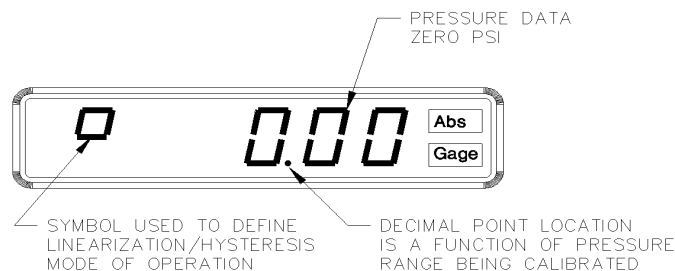


Figure 3-4. Linearity and Hysteresis Calibration

Starting with the instrument's lowest pressure range, sequentially perform the thirteen steps described in Table 3-3 on page 22, for each pressure range being calibrated. Perform the following for each step.

1. Adjust input pressure to the appropriate value without overshooting the setting.

2. Perform the action as indicated when the readings are stable.

STEP NO.	INPUT PRESSURE, % OF RANGE	OPERATOR ACTION REQUIRED	STATUS SYMBOL IN LEFT MOST DIGIT	REMARKS
1	0	Press <b>ZERO</b> Switch	"Upper Circle"	Zero on Display
2	10	Press <b>ENTER</b> Switch		Notes 1 & 2
3	20			Notes 1 & 2
4	30			Notes 1 & 2
5	40			Notes 1 & 2
6	50			Notes 1 & 2
7	60			Notes 1 & 2
8	70			Notes 1 & 2
9	80			Notes 1 & 2
10	90			Notes 1 & 2
11	100	No Action Required	"Lower Circle"	Note 3
12	50	Press <b>ENTER</b> Switch		Notes 1 & 2
13	0	No Action Required	"L"	

Table 3-3. LINEARIZATION & HYSTERESIS CALIBRATION SEQUENCE

When step number 11 is reached, the display will change so that the left most status symbol will be "**H**". This will remain for step 12 and down to approximately 0.00 psi.

**NOTES:**

1. If reading is in motion or correction required is not within  $\pm 0.8\%$  of Full-Scale, no entry will be made.
2. If entry is valid, the display will momentarily indicate the correction value (in percent) and the memory location at which it is stored.
3. If  $100\% \pm 0.05\%$  is not obtained, repeat the Zero/Span calibration sequence.

### 3.5 Shunt Resistor Calibration

Press the **STEPPER** push-button again to select the *SHUNT RESISTOR CALIBRATION* mode. The display will be as shown in Figure 3-5.

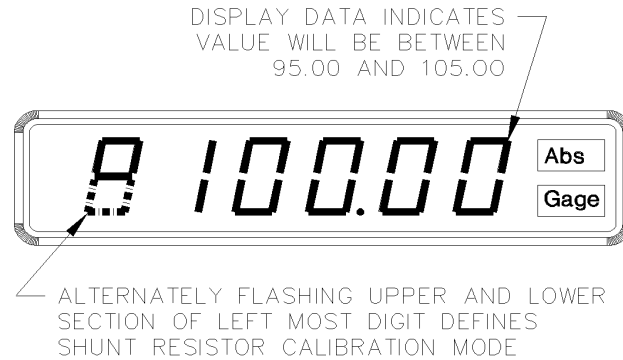


Figure 3-5. Shunt Resistor Calibration

With the UPS3000/UPS3110/UPS3210's highest pressure range selected, perform the four step sequence described below:

1. Be sure the input pressure to the UPS3000/UPS3110/UPS3210 is at zero psig.

**NOTE:** For Absolute Only Unit, vacuum pump with PSIA indicator must be used to obtain zero reading.

2. Press and hold the **ZERO** push-button switch on the front panel until a stable zero indication is obtained.
3. Release the **ZERO** push-button switch and allow the display to stabilize at its shunt resistor calibration number,  $(100 \pm 5.00\%)$ .
4. Press the **ENTER** push-button switch, as shown in Figure 3-2 on page 20, on the front panel. If accepted, the bottom half of all display digits will momentarily illuminate.

### 3.6 Permanent Data Storage

After completing the above calibration procedures, the new data that has been entered into the computer must be permanently stored. The sequence to do this is as follows:

1. Pressing the **STEPPER** push-button again, as shown in Figure 3-2 on page 20, will bring the indicator back to its initial Data Recall display condition as shown in Figure 3-2.
2. Open the instrument and depress the **DATA ENTER** switch, S2, located approximately in the middle of the circuit board.

**NOTE:** See "Case Removal and Installation" on page 28 and for "DATA ENTER" switch location see Figure 2-7 on page 8.

3. If the data is accepted, the three-digit number on the right side of the display will indicate 1 377 for as long as the **DATA ENTER** switch, S2, is depressed.
4. The calibration is now complete and **CALIBRATE/OPERATE** switch, S3, must be returned to its normal operating positions as shown in Table 3-1 on page 20. The pressure standard may now be disconnected.

### 3.7 Barometric Offset - Absolute/Gage Switch Selectable Units ONLY

**NOTES:** This section is only required if barometric conditions are higher or lower than 14.7 PSIA.

See "Case Removal and Installation" on page 28. See Figure 2-7 on page 8 for S3, **CALIBRATE/OPERATE** configuration switch and S2 "DATA ENTER" switch location. See Figure 3-2 on page 20 for **STEPPER** and **ENTER** push-button switch locations.

If required, obtain the current barometric pressure from a pressure standard with an accuracy of .025% or better, to calibrate the absolute zero at the current barometric pressure. Remove top cover and **CALIBRATE/OPERATE** switch, S3, must be changed to its calibrate positions as shown in Table 3-1 on page 20. Using the **STEPPER** push-button place the unit into *ZERO/SPAN* calibration mode as shown in Figure 3-3 on page 21.

### 3.7.1 For UPS3000/UPS3210 Absolute/Gage Switch Selectable Units ONLY

If the current barometric pressure is **below** 14.7 PSIA, the offset is positive, see Example 1. If the current barometric pressure is above 14.7 PSIA, the offset is negative, see Example 2. If the current barometric pressure is 14.7 PSIA, then no offset is needed.

#### Example 1:

If the current barometric pressure is **lower** than 14.70 PSIA, subtract the current barometric pressure from 14.70.

14.70 PSI: UPS3110 reference point

-14.55 PSI: Current barometric pressure

0.15 PSI: Positive Delta Offset

Complete the following steps

**NOTE:** UPS3000 refer to Figure 2-1 on page 5 and Figure 2-4 on page 6. UPS3210 refer to Figure 2-3 on page 6 and Figure 2-6 on page 8.

1. Connect Test Standard to UPS3000/UPS3210 Input Port similar to Figure 3-1 on page 19.
2. Open the vent valve connected between Test Standard and UPS3000/UPS3210.
3. Using the **RANGE SELECT** switch (6), select the lowest pressure range on the UPS3000/UPS3210.
4. Press the **ENTER** push-button, as shown in Figure 3-2 on page 20, on the UPS3000/UPS3210. The display reads zero. Repeat this step for the middle and high ranges.
5. Close the vent valve connected between Test Standard and UPS3000/UPS3210. Select the lowest pressure range of the UPS3000/UPS3210.
6. Input a pressure into the UPS3000/UPS3210 until the display reads the value of the Positive Delta Pressure, 0.15 PSI as in this example.
7. Depress the **ENTER** push-button on the UPS3000/UPS3210. The display reads zero. Without touching the input pressure repeat this step for the middle and high ranges.
8. Using the **STEPPER** push-button, as shown in Figure 3-2 on page 20, place the unit into *SHUNT RESISTOR CALIBRATION* mode. The display will be as shown in Figure 3-5 on page 23.
9. With UPS3000/UPS3210 **RANGE SELECT** switch (6) switched in the high range, depress the **ZERO** push-button on the front panel. Verify that the display reads 0.00. Upon release of the push-button the display will be as shown in Figure 3-5 on page 23.
10. Depress the **ENTER** push-button. The display will respond with “[] [] [] [] [] []” until the button is released.
11. Pressing the **STEPPER** push-button bring the indicator back to its initial Data Recall display condition as shown in Figure 3-2 on page 20. The display shows 1 XXX (three arbitrary digits).
12. Depress the **DATA ENTER** switch, S2, located approximately in the middle of the circuit board. See Figure 2-7 for the switch location.
13. If the data is accepted, the three-digit number on the right side of the display will indicate 377 for as long as the **DATA ENTER** switch, S2, is depressed.
14. The barometric offset is now complete and **CALIBRATE/OPERATE** switch, S3, must be returned to its normal operating positions as shown in Table 3-1 on page 20. The Test Standard may now be disconnected.

**Example 2:**

If the current barometric pressure is **above** 14.70 PSIA, subtract the current barometric pressure from 14.70.  
 14.70 PSI: UPS3110 reference point  
 -14.75 PSI: Current barometric pressure  
 -.05 PSI: Negative Delta Offset

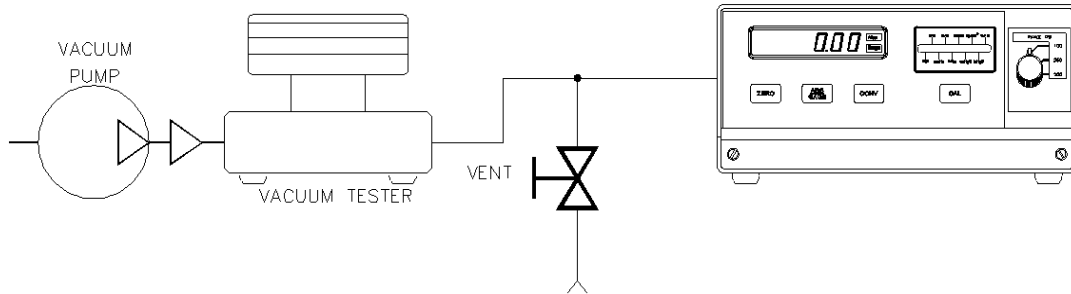


Figure 3-6. Vacuum Pump Setup

Complete the following steps:

**NOTE:** UPS3000 refer to Figure 2-1 on page 5 and Figure 2-4 on page 6. UPS3210 refer to Figure 2-3 on page 6 and Figure 2-6 on page 8.

1. Connect Vacuum Test Standard to UPS3000/UPS3210 Input Port similar to Figure 3-6. A vacuum pump will need to be connected such that the Vacuum Test Standard controls the output coming from the vacuum pump going into the *INPUT PRESSURE* port (16) of the UPS3000/UPS3210.
2. Open the vent valve connected between Test Standard and UPS3000/UPS3210.
3. Using the **RANGE SELECT** switch (6), select the lowest pressure range on the UPS3000/UPS3210.
4. Press the **ENTER** push-button, as shown in Figure 3-2 on page 20, on the UPS3000/UPS3210. The display reads zero. Repeat this step for the middle and high ranges.
5. Close the vent valve connected between Vacuum Test Standard and UPS3000/UPS3210. Select the lowest pressure range of the UPS3000/UPS3210.
6. Turn the vacuum pump on creating a vacuum. Using the Vacuum Test Standard to control the vacuum until the UPS3000/UPS3210 display reads the value of the Negative Delta Pressure, -0.05 PSI as in this example.
7. Depress the **ENTER** push-button on the UPS3110. The display reads zero. Without touching the Vacuum Test Standard settings repeat this step for the middle and high ranges.
8. Using the **STEPPER** push-button, as shown in Figure 3-2 on page 20, place the unit into *SHUNT RESISTOR CALIBRATION* mode. The display will be as shown in Figure 3-5 on page 23.
9. With UPS3000/UPS3210 **RANGE SELECT** switch (6) switched in the high range, depress the **ZERO** push-button on the front panel. Verify that the display reads 0.00. Upon release of the push-button the display will be as shown in Figure 3-5 on page 23.
10. Depress the **ENTER** push-button. The display will respond with “[ ] [ ] [ ] [ ] [ ] [ ]” until the button is released.
11. Pressing the **STEPPER** push-button bring the indicator back to its initial Data Recall display condition as shown in Figure 3-2 on page 20. The display shows 1 XXX (three arbitrary digits).
12. Depress the **DATA ENTER** switch, S2, located approximately in the middle of the circuit board. See Figure 2-7 for the switch location
13. If the data is accepted, the three-digit number on the right side of the display will indicate 377 for as long as the **DATA ENTER** switch, S2, is depressed.
14. The barometric offset is now complete and **CALIBRATE/OPERATE** switch, S3, must be returned to its normal operating positions as shown in Table 3-1 on page 20. The Vacuum Test Standard may now be disconnected.

### 3.7.2 For UPS3110 Absolute/Gage Switch Selectable Units ONLY

If the current barometric pressure is **below** 14.7 PSIA, the offset is positive, see Example 1. If the current barometric pressure is above 14.7 PSIA, the offset is negative, see Example 2. If the current barometric pressure is 14.7 PSIA, then no offset is needed.

#### Example 1:

If the current barometric pressure is **lower** than 14.70 PSIA, subtract the current barometric pressure from 14.70.

14.70 PSI: UPS3110 reference point  
-14.55 PSI: Current barometric pressure  
0.15 PSI: Positive Delta Offset

Complete the following steps (refer to Figure 2-2 on page 5 and Figure 2-5 on page 7):

1. Open the *VENT* valve (12) and close the *INPUT* (10) valve.
2. Using the **RANGE SELECT** switch (6), select the lowest pressure range on the UPS3110.
3. Press the **ENTER** push-button, as shown in Figure 3-2 on page 20, on the UPS3110. The display reads zero. Repeat this step for the middle and high ranges.
4. Close the *VENT* valve (12). Select the lowest pressure range of the UPS3110.
5. Turn the *VERNIER* (11) of the UPS3110 clockwise, creating a pressure until the display reads the value of the Positive Delta Pressure, 0.15 PSI as in this example.
6. Depress the **ENTER** push-button on the UPS3110. The display reads zero. Without touching the *VERNIER* (11) knob repeat this step for the middle and high ranges.
7. Using the **STEPPER** push-button, as shown in Figure 3-2 on page 20, place the unit into *SHUNT RESISTOR CALIBRATION* mode. The display will be as shown in Figure 3-5 on page 23.
8. With UPS3110 **RANGE SELECT** switch (6) switched in the high range, depress the **ZERO** push-button on the front panel. Verify that the display reads 0.00. Upon release of the push-button the display will be as shown in Figure 3-5 on page 23.
9. Depress the **ENTER** push-button. The display will respond with “[] [] [] [] [] []” until the button is released.
10. Pressing the **STEPPER** push-button bring the indicator back to its initial Data Recall display condition as shown in Figure 3-2 on page 20. The display shows 1 XXX (three arbitrary digits).
11. Depress the **DATA ENTER** switch, S2, located approximately in the middle of the circuit board. See Figure 2-7 for the switch location
12. If the data is accepted, the three-digit number on the right side of the display will indicate 377 for as long as the **DATA ENTER** switch, S2, is depressed.
13. The barometric offset is now complete and **CALIBRATE/OPERATE** switch, S3, must be returned to its normal operating positions as shown in Table 3-1 on page 20.

#### Example 2:

If the current barometric pressure is **above** 14.70 PSIA, subtract the current barometric pressure from 14.70.

14.70 PSI: UPS3110 reference point  
-14.75 PSI: Current barometric pressure  
-.05 PSI: Negative Delta Offset

**NOTE:** Normally the negative offset is small enough to prevent the need of a vacuum pump.

Complete the following steps (refer to Figure 2-2 on page 5 and Figure 2-5 on page 7):

1. Open the *VENT* valve (12) and close the *INPUT* (10) valve.
2. Using the **RANGE SELECT** switch (6), select the lowest pressure range on the UPS3110.
3. Press the **ENTER** push-button, as shown in Figure 3-2 on page 20, on the UPS3110. The display reads zero. Repeat this step for the middle and high ranges.
4. Close the *VENT* valve (12). Select the lowest pressure range of the UPS3110.
5. Turn the *VERNIER* (11) of the UPS3110 counter-clockwise, creating a vacuum until the display reads the

value of the Negative Delta Pressure, -0.05 PSI as in this example.

6. Depress the **ENTER** push-button on the UPS3110. The display reads zero. Without touching the *VERNIER* (11) knob repeat this step for the middle and high ranges.
7. Using the **STEPPER** push-button, as shown in Figure 3-2 on page 20, place the unit into *SHUNT RESISTOR CALIBRATION* mode. The display will be as shown in Figure 3-5 on page 23.
8. With UPS3110 **RANGE SELECT** switch (6) switched in the high range, depress the **ZERO** push-button on the front panel. Verify that the display reads 0.00. Upon release of the push-button the display will be as shown in Figure 3-5 on page 23.
9. Depress the **ENTER** push-button. The display will respond with “[ ] [ ] [ ] [ ] [ ] [ ]” until the button is released.
10. Pressing the **STEPPER** push-button bring the indicator back to its initial Data Recall display condition as shown in Figure 3-2 on page 20. The display shows 1 XXX (three arbitrary digits).
11. Depress the **DATA ENTER** switch, S2, located approximately in the middle of the circuit board. See Figure 2-7 for the switch location
12. If the data is accepted, the three-digit number on the right side of the display will indicate 377 for as long as the **DATA ENTER** switch, S2, is depressed.
13. The barometric offset is now complete and **CALIBRATE/OPERATE** switch, S3, must be returned to its normal operating positions as shown in Table 3-1 on page 20.

## 4.0 Maintenance & Service

### 4.1 Troubleshooting

Symptom	Problem	Remedy
Display not lit	Unit will not energize	Check fuse, check power source, if applicable check power switch
Display slowly decreases over time	Leak in system	Check all compression and pipe fittings with snoop, bottle of liquid leak gas detector (PN 64781)
Display does not respond when Vernier knob is turned	No Vernier control	Readjust isolation valves on Orion; replace O-ring on Vernier piston
Display increases or decreases when <i>INPUT</i> (Pressure) or <i>VENT</i> valves are closed	No pressure or vent control	Replace valve seats or O-rings in valves; check valve needles
Unit will not stay in CAL, display shows "O", display reads a high value @ zero PSIG	Transducer over-pressurized	Replace transducer
Low battery indicator on display illuminates when unit is powered	Low or no battery power	Re-charge battery, check power supply charging voltage
No display when in battery mode after charging	Battery will not hold charge	Replace battery
	Display will not zero	Perform a ZERO/SPAN calibration
Display will shift, will not be steady	Transducer drifts or possible over pressure	Replace transducer

Table 4-1. UPS3000/UPS3110/UPS3210 Troubleshooting

### 4.2 Maintenance & Service Procedures

This section outlines the mechanical and BASIC electrical repair procedures for the portable pneumatic pressure calibrator, model UPS3000/UPS3110/UPS3210. The repair procedures cover the major components and sub-assemblies which are critical to the proper functioning of the calibrators and that will likely need periodic maintenance over the life of the unit. Only those persons who are formally trained as skilled technicians should attempt to repair these units. All relevant safety precautions should be observed due to the presence of electrical components and high-pressure.

#### 4.2.1 Case Removal and Installation

##### UPS3000 External Case Removal/Installation

**NOTE:** Verify pressure has been vented from system prior to case removal. Although not recommended the instrument may be fully operated with the case removed without any potentially lethal shock hazard to operating personnel, since accessible internal voltage is nominally 25 VDC.

1. Loosen the two thumbscrews (PN 68916) located at the bottom outermost corners of the front panel. Screws will remain captivated to front panel but will allow chassis to slide away from rear of case.
2. Use screws to slide front panel/chassis away from case.
3. If all power and pressure connections have been removed. Gently slide panel/chassis out until back edge of panel/chassis touches lip on front of case.
4. Tilt front of panel/chassis upward slightly and remove from case. Place assembly on a bench top. Reverse procedure for installation.



## UPS3110/UPS3210 Removal/Installation

### Removal

Tools required: Phillips screwdriver

1. Vent system and remove input pressure source. Disconnect power cord, hoses, connectors, etc. from rear of UPS3110/UPS3210. Remove from rack, if applicable, by grasping the handles located on the front of the unit and gently set the rack-mount assembly on a bench top. It can be rested on the panel bottom and chassis edge.
2. Loosen and remove the three screws (PN 14839) from rear and sides that secure the cover to the chassis.

### Installation

Tools required: Phillips screwdriver

1. Align mounting holes of cover with chassis and install three screws (PN 14839) from rear and sides that secure the cover to the chassis.
2. Lift the panel and chassis by grasping the handles located on the front of the unit and re-install in rack, if applicable. Connect input pressure source, power cord, hoses, connectors, etc. to rear of UPS3110/UPS3210.

### 4.2.2 ORION 2C (PN 55283) or ORION 3A (PN 55287) Manifold Removal

Refer to Figure 2-2 on page 5.

Tools required: Phillips screwdriver  
11/32" Wrench or nutdriver  
.061" Hex wrench  
Adjusting screwdriver (small flat-blade)  
11/32" Open end wrench (thin)  
7/16" Open end wrench

1. Vent any remaining gas from the system to atmosphere.
2. Remove cover from chassis as described in Section 4.2.1 on page 28.
3. Remove the Test Port to Orion tubing section using a 7/16" wrench.
4. If the transducer is wired via a connector, remove the connector by turning counter-clockwise. If the transducer is "hard-wired," loosen and remove the 4 transducer wires (red, white, green, black) from the terminal block, TB1, on the CPU board, using the small flat-blade screwdriver.

**NOTE:** Mark TB positions on end of wires to help when reinstalling transducer.

5. Break the wire ties, if applicable, that hold the transducer wires so that the wires are "free."
6. Using the 11/32" thin wrench, loosen and carefully remove the transducer from the Orion manifold.
7. Remove the tubing sections from the Vent and Pressure inlet fittings on the Orion manifold, using a 7/16" wrench.
8. Remove the panel knobs from the INPUT (10) (pressure), VERNIER (11) and VENT (12) valves using the .061" hex wrench.
9. Loosen and remove the 2 panel screws (PN 60837) from the panel front that secure the manifold to the panel.
10. Remove the manifold from the front panel.

### 4.2.3 ORION Manifold - Valve Seat Removal

ORION 2C: Refer to "ORION 2C Valve Assembly Parts List" on page 45 and Figure 4-1 on the following foldout 11 x 17 sheet.

ORION 3A: Refer to "ORION 3A Valve Assembly Parts List" on page 47 and Figure 4-2 on the second foldout 11 x 17 sheet.

Tools required:

- A/R solvent (de-natured alcohol)
- Torque wrench
- Socket wrench
- Needle-nose pliers
- 3/4" Socket
- Tube fluorinated Krytox® grease (PN 55593)
- Needle housing socket (65580)
- Electric hand drill
- Isolation valve needle housing socket (PN 68509)
- Tap handle
- Hex wrench (.050")
- No. 43 drill bit
- Hex wrench (.061")
- No. 4-40 tap
- Small hammer
- Socket wrench

1. Secure the manifold by its center portion, in a bench vise, with the valve knobs pointing upward.
2. Using the .061" hex wrench, loosen and remove the knob inserts (4) from the pressure and vent valve stems.
3. Using the .050" hex wrench, loosen and remove the setscrew (34) and lock nut (2).
4. Loosen the 3/4" locknuts (1) on the pressure and vent valve threaded needle housings (10).
5. Using the needle housing socket (65580) and torque wrench, loosen and remove the needle/housing assembly (10, 1).
6. To disassemble the isolation valve, first remove the valve needle (18) by turning the gear clockwise.
7. Loosen and remove the valve housings (19) using the isolation valve needle housing removal socket (68509) and socket wrench.
8. Remove the valve stem seats (8) and valve needle seats (9) using the needle-nose pliers.
9. Remove the inner and outer O-rings (28, 27) and back-up rings (31, 30) from the valve stem seats and wash all parts in solvent (de-natured alcohol).
10. To remove valve seats (7) from either the input (pressure), vent or isolation valves, try blowing compressed air through the inlet and outlet fittings. Otherwise, the center holes will have to be drilled and a tap used to extract the seat (Steps 11-14).
11. Using the electric hand drill with the No. 43 bit, carefully drill out the seat hole, ensuring that the drill does not touch the hole in the manifold housing directly beneath the seat.
12. Blow out any chips from the seat area using compressed air.
13. While holding the 4-40 tap steady and perpendicular to the seat, slowly turn until the tap starts to engage the seat.
14. When the tap has engaged into the seat, use a small hammer and gently knock upward against the tap handle to extract the seat.
15. After the seat has been removed, blow any remaining chips from the seat area.

#### 4.2.4 ORION Manifold - Vernier Control Disassembly

ORION 2C: Refer to “ORION 2C Valve Assembly Parts List” on page 45 and Figure 4-1 on the following foldout 11 x 17 sheet.

ORION 3A: Refer to “ORION 3A Valve Assembly Parts List” on page 47 and Figure 4-2 on the second foldout 11 x 17 sheet.

Tools required:     A/R solvent (de-natured alcohol)  
                          1-1/4" open end wrench  
                          Screwdriver (flat-blade)  
                          Socket wrench  
                          Isolation valve needle housing socket (PN 68508)  
                          Isolation valve needle housing socket (PN 68509)

1. With the manifold housing mounted in a vise, turn the vernier shaft (14) clockwise until the piston is bottomed.
2. Loosen and remove the end cap (13) using a 1-1/4" wrench. At certain points during removal the end cap will appear to lock up. If this occurs, rotate the shaft clockwise until the end cap is free to turn.
3. Remove the O-ring (29) from the end cap.  
ORION 3A: Also remove the backup washer (38) from the end cap.
4. Remove the self-sealing screw (36) that acts as the piston key.
5. Extract the piston (15) by partially screwing in the threaded end of the shaft and pulling.
6. Remove the O-ring (32) from the piston groove.
7. To disassemble the end cap/shaft assembly, mount the end cap in the vise.
8. Loosen and remove the locknut (20) using the isolation valve housing socket (PN 68509) and socket wrench.
9. ORION 2C: Loosen and remove the end bushing (12) using the same socket (PN 68509). Remove the shaft (14). Remove the mylar bearing washers (41 or 42) from both sides of the shaft flange.  
ORION 3A: Loosen and remove the end bushing (12) using the isolation valve housing socket (PN 68508) and socket wrench. Remove the shaft (14). Remove the ball bearings (41) from both sides of the shaft flange.
10. Use a small pick or screwdriver to remove the O-ring (27) from the inner groove of the end cap (13).  
ORION-3A: Also remove backup retainer (39) from inner groove of the end cap (13).
11. Wash all parts in solvent and blow dry with compressed air.

#### 4.2.5 ORION Manifold - Vernier Control Reassembly

ORION 2C: Refer to “ORION 2C Valve Assembly Parts List” on page 45 and Figure 4-1 on the following foldout 11 x 17 sheet.

ORION 3A: Refer to “ORION 3A Valve Assembly Parts List” on page 47 and Figure 4-2 on the second foldout 11 x 17 sheet.

Tools required:     Tube fluorinated Krytox grease (PN 55593)  
                          1-1/4" Wrench  
                          Screwdriver (flat-blade)  
                          Socket wrench  
                          Isolation valve needle housing socket (PN 59793)  
                          Female socket (PN 65581)

1. Coat all new O-rings with fluorinated Krytox grease before installing.
2. Install the small O-ring (27) into the end cap inner groove.  
ORION 3A: Also install backup retainer (39) in inner groove of the end cap (13).
3. ORION 2C: Add mylar washers (41 or 42) to each side of shaft (14). Apply a small amount of Krytox grease to the shaft threads and install the shaft (14) into the end cap (13).

**NOTE:** Part number and quantity will vary. Washers are used to adjust vertical play in shaft (14). Try one washer (41) on each side to start.

Install the end bushing (12) and tighten until snug using the isolation valve needle housing socket (PN 68509) and socket wrench.

ORION 3A: Hold shaft (14) vertically with end that goes through end bushing (12) toward ceiling. Place light coating of grease on threads of shaft. Place thick coating of grease on top of shaft bearing surface. Place 16 ball bearings on shaft surface. Allowing grease to hold ball bearings in place. Slide end bushing (12) over top of shaft and down to contact top of ball bearings. Rotate shaft assembly 180°, placing end bushing towards the floor. Be careful not to displace ball bearings. Place thick coating of grease on shaft and bearing surface. Place sixteen chrome ball bearings (41) on greased surface, allowing grease to hold them in place. Install shaft with bearings into end cap. Install the end bushing and tighten until snug using the isolation valve needle housing socket (PN 68508) and socket wrench.

4. ORION 2C: Feel vertical motion of shaft (14). If motion exists, add thicker washer (42) at step 3, otherwise continue to step 5.

ORION 3A: Tighten so that shaft rotates, but should be firm. Verify no up and down movement. If there is up and down movement, retighten end bushing. Install the Locknut (20) and tighten until snug using the Isolation Valve Needle Housing Socket (PN 59793), Female Socket (PN 65581) and Socket Wrench.

5. Install the locknut (20) into end cap (13) and using the isolation valve needle housing socket (PN 68509) and torque wrench. Torque to approximately 325 in. lbs. (may not get to torque on all sub-assemblies).
6. Install the O-ring (32) in the piston groove and install the piston (15) into the vernier cavity. Ensure that the piston keyway is facing the hole into which the self-sealing screw (36) is assembled.
7. Install the self-sealing screw (36) and tighten until snug.
8. Install the O-ring (29) on the end cap/shaft assembly, install into manifold and tighten until snug.

ORION 3A: Also install backup washer (38) on the end cap/shaft assembly.

#### 4.2.6 ORION Manifold - Valve Seat Installation

ORION 2C: Refer to “ORION 2C Valve Assembly Parts List” on page 45 and Figure 4-1 on the following foldout 11 x 17 sheet.

ORION 3A: Refer to “ORION 3A Valve Assembly Parts List” on page 47 and Figure 4-2 on the second foldout 11 x 17 sheet.

Tools required:

- Needle-nose pliers
- Tube fluorinated Krytox grease (PN 55593)
- No. 43 drill
- A/R solvent (de-natured alcohol)
- Hex wrench (.061")
- Torque wrench
- Socket wrench
- 3/4" Socket
- Needle housing socket (PN 65580)
- Isolation valve needle housing socket (PN 68509)

1. Install a new seat (7) by placing it into the seat well with the needle-nose pliers. Ensure that the seat is centered within the cavity and gently tap it with a blunt end of a drill bit to install.
2. Install the valve needle seat (9) with the smaller diameter end facing outward.
3. Install new O-rings (28, 27) inside and outside of the valve stem seat. Coat all O-rings and back-up rings (30, 31) with fluorinated Krytox grease before installation. Make sure that the rings are installed in the proper order.
4. Install the valve stem seat (8) by grasping the small diameter end with the needle-nose pliers and positioning in the valve cavity, then gently pushing with the blunt end of a drill bit.
5. For *INPUT* (pressure) and *VENT* valves (two outer valves), disassemble the valve needle (11) from its housing (10) and check for any burrs or dirt on the threads which might interfere with smooth operation.
6. Clean both the needle (11) and housing (10) in solvent, dry the parts and apply a small amount of fluorinated Krytox grease to the needle threads before reassembly.
7. Assemble the Valve Needle (11) into the Valve Needle Housing (10) and turn it until it stops.
8. Reinstall the needle/housing assembly into the valve cavity until finger tight.
9. Mount the manifold body (16) in a vise. For the *INPUT* (pressure) and *VENT* valves only, torque the needle/housing assembly to 325 in-lb. using the needle housing socket (PN 65580).
10. Install the housing lock nuts (1) onto the housing (10) and tighten until snug with the 3/4" socket.

11. Using the .050" hex wrench, install and tighten the lock nut (2) and set screw (34).
12. Install the Knob Insert (4) over the Valve Needle (11) shaft, align the Set Screws (23) with the indents and tighten with the .061" hex wrench.
13. For the Isolation Valves, (two inner valves), Install the Needle Housing (19) and tighten until snug using the Isolation Valve Housing Installation Socket (PN 68509) and Torque wrench.

**NOTE:** *There is no specified torque, so use care when tightening so as not to break the socket nibs.*

14. Install the Gear (4) over the Isolation Valve Needle (18) shaft, align the Set Screws (26) with the indents and tighten with the .061" hex wrench.
15. Apply a small amount of fluorinated Krytox grease to the threads of the isolation valve needles (18) and install into the valve by turning counter-clockwise. Rotate the gear until the needle just stops at the seat.

#### 4.2.7 ORION - Manifold, Panel Installation

ORION 2C: Refer to "ORION 2C Valve Assembly Parts List" on page 45 and Figure 4-1 on the following foldout 11 x 17 sheet.

ORION 3A: Refer to "ORION 3A Valve Assembly Parts List" on page 47 and Figure 4-2 on the second foldout 11 x 17 sheet.

Tools required:

- 7/16" Open end wrench
- Phillips screwdriver
- Hex wrench (.061")
- Snoop, liquid leak gas detector (PN 64781)
- 11/32" Open end wrench (thin)

1. If not already done, remove the panel knobs from the *INPUT* (pressure), *VERNIER* and *VENT* valves using the .061" hex wrench.
2. Install the manifold with the transducer port side facing the panel bottom. Install the two mounting screws (PN 60837) from the panel front and tighten until snug.
3. Secure the chassis to the panel with the 4 nuts and tighten until snug.
4. Install the Vernier Knob (17) onto the Vernier Valve Shaft (14). Align the set screws (25) with the indentations on the Vernier Valve Shaft and tighten until snug using the .061" hex wrench.
5. To install and adjust the *INPUT* (pressure) and *VENT* Valve Knobs, follow the procedure in Section 4.2.8 for Orion 2C or Section 4.2.9 for Orion 3A.
6. Install the Transducer into the manifold port, tighten with the 11/32" thin wrench and reconnect its wire connector.

**NOTE:** *If transducer is hard-wired, connect the 4 wires to the Terminal block, TB1, on the CPU board per the following:*

Transducer Wires	Terminal Block Wires
+ Excitation	TB1-4 Green wire
- Excitation	TB1-7 Black wire
+ Signal	TB1-5 White wire
- Signal	TB1-6 Red wire
Temp Sense (If applicable)	TB1-3 Blue wire

*Table 4-2. Transducer Wiring Specification*

7. Install all tubing sections that attach to the Orion manifold.
8. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### 4.2.8 ORION 2C Manifold - Valve Adjustment Procedure

For UPS3110 Models with a Maximum Range 2000 PSI and below.

ORION 2C: Refer to "ORION 2C Valve Assembly Parts List" on page 45 and Figure 4-1 on the following foldout 11 x 17 sheet.

Tools required:     Hex wrench (.050")  
                          Hex wrench (.061")  
                          Snoop, leak gas detector (PN 64781)

**NOTE:** \* denotes reference to Figure 2-2 on page 5.

1. If not already done, remove the ORION Input and Vent Valve Knobs (3) using the .061" hex wrench.
2. Energize the unit and let warm up. Turn *RANGE SELECT* (\*6) to highest range. To adjust Input Valve, go to step 3.
3. Check to see that the Knob Insert (4) is securely fastened to the Valve Shaft (11). If it is loose, re-tighten the Set Screws (23) with the .061" hex wrench.
4. Using a .050" hex wrench, loosen the Set Screw (34) on the Locknut (2) and turn the Locknut clockwise to its stop.
5. Close the *INPUT* Valve (\*10) by turning the Knob Insert (4) clockwise until you feel the valve needle seat on the O-ring (valve is now in closed position).
6. Rotate gears (6) on both Isolation valves, counter-clockwise until they stop, then rotate clockwise 1/2 turn (opening isolation valves).
7. Use the *PRESSURE LIMIT CONTROL* (\*7), to increase the supply pressure to between 80% and 100% of Full Scale.
8. *GAGE* Model: Open the *VENT* Valve (\*12) to atmosphere (rotate counter-clockwise), zero the indicator, by momentarily pressing **ZERO** switch (\*1), then close the *VENT* Valve (\*12).  
*ABSOLUTE* Model: Open the *VENT* Valve (\*12) to atmosphere (rotate counter-clockwise), to release line pressure, then close the *VENT* Valve (\*12).
9. Slowly open the Input Valve by turning the Knob Insert (4) counter-clockwise until you notice the displayed pressure increase. Then turn the Knob Insert slightly clockwise until the pressure stops rising.
10. Mark a radial line at the 12 o'clock position on the Knob Insert.
11. Turn the Knob Insert (4) clockwise to move the mark to the 6 o'clock position.
12. Turn the Locknut (2) counter-clockwise until it contacts the bottom of the stop washer (33). Tighten the Set Screw (34) on the Locknut with the .050" hex wrench.
13. Install the *INPUT* Valve Knob (3) on the Knob Insert (4) and engage its Gear (5) with the smaller Isolation Valve Gear (6). Turn the knob clockwise until the Isolation Valve is slightly snug.

**CAUTION: DO NOT USE EXCESSIVE TORQUE WHEN DOING THIS, AS THE SEAT MAY BE DAMAGED**

14. Remove the *INPUT* Valve Knob. Align the Set Screws (25) with the indentations on the Knob Insert. Install the Knob on the Knob Insert while engaging the Knob Gear (5) with the Isolation Valve Gear (6).
15. Tighten the Set Screws (25) with the .061" hex wrench. The *INPUT* Valve is now adjusted.
16. To adjust the *VENT* Valve, follow steps 3 and 4.
17. Close the *INPUT* Valve by turning the Input knob (\*10) clockwise.
18. Close the *VENT* Valve Knob Insert (4) clockwise until slightly snug.
19. With the supply pressure at 100% of Full Scale, open the *INPUT* Valve until the indicated pressure stabilizes and then close the *INPUT* Valve.
20. Slowly turn the *VENT* Valve Knob Insert (4) counter-clockwise until the display starts to decrease, then turn the Knob Insert (4) slightly clockwise until the indicated pressure stops decreasing.
21. Follow steps 10 through 15 replacing the term *INPUT* Valve with *VENT* Valve. The *VENT* Valve is now adjusted.

#### 4.2.9 ORION 3A Manifold - Valve Adjustment Procedure

For UPS3110 5000 PSI and above Models.

ORION 3A: Refer to "ORION 3A Valve Assembly Parts List" on page 47 and Figure 4-2 on the second foldout 11 x 17 sheet.

Tools required:     Hex wrench (.050")  
                          Hex wrench (.061")  
                          Snoop, leak gas detector (PN 64781)

**NOTES:** 1. \* denotes reference to Figure 2-2 on page 5.

2. Customer must supply, as a minimum, input supply pressure with a supply gauge and pressure regulator.

1. Turn the supply pressure regulator off and vent manifold.
2. If not already done, remove the ORION *INPUT* and *VENT* Valve (outer) knobs (3) using the .061" hex wrench.
3. Energize the unit and let warm up. Turn *RANGE SELECT* (\*6) to highest range. To adjust *INPUT* Valve, go to step 4.
4. Check to see that each knob insert (4) is securely fastened to the ORION input and vent valve shaft (11). If it is loose, re-tighten the set screws (23) with the .061" hex wrench.
5. Using a .050" hex wrench, loosen the set screw (34) on each ORION input and vent valve locknut (2) and turn each locknut clockwise to its stop.
6. Close the *INPUT* Valve by turning the Knob Insert (4) clockwise. until you feel the valve needle seat on the O-ring (valve is now in closed position).
7. Rotate gears (6) on both Isolation valves, counter-clockwise until they stop, then rotate clockwise 1/2 turn (opening isolation valves).
8. Turn the supply pressure regulator to increase the supply pressure to between 80% and 100% of Full Scale.
9. GAGE Model: Open the *VENT* Valve (\*12) to atmosphere (rotate counter-clockwise), zero the indicator, by momentarily pressing *ZERO* switch (\*1), then close the *VENT* Valve (\*12).  
ABSOLUTE Model: Open the *VENT* Valve (\*12) to atmosphere (rotate counter-clockwise), to release line pressure, then close the *VENT* Valve (\*12).
10. Slowly open the *INPUT* Valve by turning the Knob Insert (4) counter-clockwise until you notice the displayed pressure increase. Then turn the Knob Insert slightly clockwise until the pressure stops rising.
11. Mark a radial line at the 12 o'clock position on the Knob Insert.
12. Turn the Knob Insert (4) clockwise to move the mark to the 6 o'clock position.
13. Turn the Locknut (2) counter-clockwise until it contacts the bottom of the stop washer (33). Tighten the Set Screw (34) on the Locknut with the .050" hex wrench.
14. Install the *INPUT* Valve Knob (3) on the Knob Insert (4) and engage its Gear (5) with the smaller Isolation Valve Gear (6). Turn the knob clockwise until the Isolation Valve is slightly snug.

**CAUTION: DO NOT USE EXCESSIVE TORQUE WHEN DOING THIS, AS THE SEAT MAY BE DAMAGED**

15. Remove the *INPUT* Valve Knob. Align the Set Screws (25) with the indentations on the Knob Insert. Install the Knob on the Knob Insert while engaging the Knob Gear (5) with the Isolation Valve Gear (6).
16. Tighten the Set Screws (25) with the .061" hex wrench. The *INPUT* Valve is now adjusted.
17. To adjust the *VENT* Valve, follow steps 4 and 5.
18. Close the *INPUT* Valve by turning the Input knob (\*10) clockwise.
19. Close the Vent Valve Knob Insert (4) clockwise until slightly snug.
20. With the supply pressure at 100% of Full Scale, open the *INPUT* Valve until the indicated pressure stabilizes and then close the *INPUT* Valve.
21. Slowly turn the Vent Valve Knob Insert (4) counter-clockwise until the display starts to decrease, then turn the Knob Insert (4) slightly clockwise until the indicated pressure stops decreasing.
22. Follow steps 11 through 15 replacing the term *INPUT* Valve with *VENT* Valve. The *VENT* Valve is now adjusted.

#### 4.2.10 Pressure Limit Control (Standard Pneumatic), Regulator Removal

Tools required: Phillips screwdriver  
7/16" Open end wrench  
9/16" Open end wrench  
A/R 1/4" wide Teflon® tape, (PN's 60575)  
A/R 1/2" wide Teflon tape, (PN's 60911)  
1/2" Socket  
Socket wrench  
1/4" Hex wrench

**NOTE:** See Figure 4-1 on page 49.

1. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully place on a bench top.
2. Remove regulator knob cap.
3. Remove two screws that secure the round plate.
4. Loosen and remove the locknut using a 1/2" socket while holding the knob. Remove the knob by turning counter-clockwise
5. Remove all tubing sections that connect to the regulator inlet and outlet fittings.
6. Loosen the mounting collar in the panel rear using a 1/4" hex wrench.
7. Remove the regulator by sliding out from the panel rear.
8. Mount the regulator in a bench vise by the flats in the base.
9. Note the orientation of the inlet and outlet fittings in the regulator. Remove the fittings and any remnants of teflon tape from the pipe threads.

#### 4.2.11 Pressure Limit Control (Standard Pneumatic), Regulator Installation

Tools required: Phillips screwdriver  
7/16" Open end wrench  
9/16" Open end wrench  
A/R 1/4" wide Teflon tape, (PN's 60575)  
A/R 1/2" wide Teflon tape, (PN's 60911)  
Snoop, liquid leak gas detector (PN 64781)  
1/2" Socket  
Socket wrench

**NOTE:** See Figure 4-1 on page 49. Call CONDEC for replacement Part No.'s.

1. Wrap two layers of Teflon tape on the pipe threads of each fitting and install into the inlet and outlet of the regulator and ensure that each is oriented properly. Use a bench vise when doing this.  
Insert the new regulator into the panel through hole. Pass the adjusting end through the mounting ring. *Do not tighten cap screw until adjusting knob is installed.*
2. Install the tubing sections to the inlet and outlet fittings.
3. Install the adjusting knob on the threaded shaft by turning clockwise Turn adjusting knob on threaded shaft until bottomed and install locking nut and tighten. Turn knob until it bottoms. Position the regulator so that the bottom of the knob is 1/2" from the panel surface, then tighten the cap screw on the mounting collar.
4. Using a pressure source set input pressure to approximately 100% of Full Scale rating of UPS3110 and check all fittings for leaks.
5. Install cover on its enclosure as described in Section 4.2.1 on page 28.



#### 4.2.12 Pressure Limit Control (Tescom), Regulator Removal

Tools required: Phillips screwdriver  
7/16" Open end wrench  
9/16" Open end wrench  
A/R 1/4" wide Teflon tape, (PN's 60575)  
A/R 1/2" wide Teflon tape, (PN's 60911)  
1/2" Socket  
Socket wrench  
1/4" Hex wrench  
Flat blade screwdriver (small)  
Channel locks

**NOTE:** See Figure 4-1 on page 49.

1. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully place on a bench top.
2. Remove regulator knob cap by prying off with small screwdriver.
3. Loosen and remove the locknut using a 1/2" socket while holding the knob. Remove the knob by turning counter-clockwise
4. Remove all tubing sections that connect to the regulator inlet and outlet fittings.
5. Loosen and remove the panel mounting nut using channel locks.
6. Remove the regulator by sliding out from the panel rear.
7. Mount the regulator in a bench vise by the flats in the base.
8. Note the orientation of the inlet and outlet fittings in the regulator. Remove the fittings and any remnants of Teflon tape from the pipe threads.

#### 4.2.13 Pressure Limit Control (Tescom), Regulator Installation

Tools required: Phillips screwdriver  
7/16" Open end wrench  
9/16" Open end wrench  
1/2" Socket  
Socket wrench  
A/R 1/4" wide Teflon tape, (PN's 60575)  
A/R 1/2" wide Teflon tape, (PN's 60911)  
Snoop, liquid leak gas detector (PN 64781)

**NOTE:** See Figure 4-1 on page 49. Call CONDEC for replacement Part No.'s.

1. Wrap two layers of Teflon tape on the pipe threads of each fitting and install into the inlet and outlet of the regulator and ensure that each is oriented properly. Use a bench vise when doing this.
2. Insert the new regulator into the panel through hole. Thread the large mounting nut onto the body from the panel front.
3. Install the tubing sections to the inlet and outlet fittings.
4. Install the regulator knob on the threaded shaft by turning clockwise, until it sits just low enough to allow locknut to be placed on threaded shaft. Hold knob in position and install the locknut.
5. Close Pressure Limit Monitor, by turning regulator knob counter-clockwise.
6. Using a pressure source set input pressure to approximately 100% of Full Scale rating of UPS3110 and check all fittings for leaks.
7. Install cover on its enclosure as described in Section 4.2.1 on page 28.
8. Energize the unit and let warm up. Turn Range Select switch to highest range.
9. Close the Input Valve by turning the *INPUT* knob clockwise.
10. Turn the regulator knob clockwise until reaching between 5% to 10% of Full Scale, but not enough to disturb pressure relief valve.

**NOTE:** *If pressure cannot be attained loosen locknut on shaft, rotate knob a few turns counter-clockwise, retighten locknut. If you hear the pressure relief valve then rotate regulator knob counter-clockwise until relief valve shuts off.*

11. Remove locknut from threaded shaft, and rotate knob counter-clockwise until bottoming out on large locknut. After touching large locknut rotate knob clockwise 1/8 turn. Hold knob in position, install and tighten the locknut with 40 - 50 in-lbs of torque using a 1/2" socket.
12. Open *PRESSURE LIMIT MONITOR* completely, by turning regulator knob clockwise. If you reach between 100-105% of Full Scale and pressure relief valve was not disturbed regulator has been adjusted properly.
13. Replace regulator knob cap.

#### **4.2.14 Panel Gauge Removal**

Tools required:      Phillips screwdriver  
                              7/16" Wrench  
                              9/16" Wrench

**NOTE:** *Call CONDEC for replacement Part No.'s.*

1. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully place on a bench top.
2. Disconnect the tubing section that connects to the gauge fitting.
3. Loosen the two thumb-nuts that hold the gauge mounting U-clamp.
4. While gripping the square portion of the gauge port with the 9/16" wrench, remove the Female Tube Connector (PN 59721) from the Gauge.
5. Remove the two thumb-nuts, the mounting U-clamp, and the gauge.

#### **4.2.15 Panel Gauge Installation**

Tools required:      Phillips screwdriver  
                              7/16" Wrench  
                              9/16" Wrench  
                              A/R 1/4" wide Teflon tape (PN 60575)  
                              Snoop, liquid leak gas detector (PN 64781)

**NOTE:** *Call CONDEC for replacement Part No.'s.*

1. Before installing a new gauge, wrap two layers of new Teflon tape on the port.
2. Install Gauge into panel, secure with U-clamp and tighten the two thumb screws.
3. While gripping the square portion of the gauge port with the 9/16" wrench, tighten the Female Tube Connector (PN 59721) on to the gauge.
4. Attach the tubing section that connects to the gauge fitting.
5. Using a pressure source set input pressure to approximately 100% of Full Scale rating of UPS3110 and check all fittings for leaks.
6. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### 4.2.16 Test Port Quick-Connect Fitting (PN 59762) Removal and Installation - 15, 50 and 100 Full Scale PSI

Models UPS3110[ ]DA, UPS3110[ ]DB, UPS3110[ ]EA, UPS3110[ ]EB and UPS3110[ ]JA only.

If there is leakage out of the port, replace the test port fitting.

Tools required: Phillips screwdriver  
5/8" Two open end wrenches  
9/16" Open end wrench  
Snoop, liquid leak gas detector (PN 64781)

1. Remove cover from its chassis as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Loosen and remove the tubing end nut from the test port fitting.
3. Grasp the hex nut at the panel face with a 5/8" wrench and using a second wrench, turn the nut on inside of panel counter-clockwise.
4. Install the new quick-connect fitting (PN 59762) by reversing steps.
5. Using a pressure source set input pressure to approximately 100% of full scale rating of UPS3110 and check all fittings for leaks.
6. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### 4.2.17 Test Port Quick-Connect Fitting (PN 55426), Removal and Installation - 500, 1000 and 2000 Full Scale PSI

Models UPS3110[ ]B[ ], UPS3110[ ]C[ ] and UPS3110[ ]F[ ] only.

There is relatively little maintenance that has to be done to the port fitting. Every 2 months, a little coating of Krytox grease should be applied to the inner seal. The pressure cap (PN 55434) should be plugged in whenever the unit is not in use.

**NOTE:** For simplest method, apply fluorinated Krytox grease to the outside surface between sealing lip and end of mating quick-disconnect fitting. Vent unit line pressure to atmosphere. Plug quick-connect fitting into applicable test port. Rotate fitting clockwise and counter-clockwise to transfer fluorinated krytox grease to O-ring seal.

If there is leakage out of the port when the pressure cap is in place, replace the port fitting.

Tools required: Phillips screwdriver  
3/4" Two open end wrenches  
9/16" Open end wrench  
A/R 1/4" Wide Teflon tape (PN 60575)  
A/R 1/2" Wide Teflon tape (PN 60911)  
Tube fluorinated Krytox grease (PN 55593)  
Snoop, liquid leak gas detector (PN 64781)

1. Remove front cover from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Grasp the hex Adapter (PN 58062) at the panel face with a 3/4" wrench and using a second wrench, turn the Test Port quick-connect fitting (PN 55426) counter-clockwise. The short Nipple (PN 59112) may or may not be removed at the same time.
3. If the short nipple remains in the panel fitting, a new port can be installed on it. Remove any remnants of sealing tape and wrap two turns of Teflon tape to the threads.

**NOTE:** If the nipple (PN 59112) is removed along with the old fitting, the nipple cannot be reused. Install a new nipple along with the new quick connecting fitting.

4. Install the new quick-connect fitting (PN 55426) by turning clockwise.
5. Using a pressure source set input pressure to approximately 100% of full scale rating of UPS3110 and check all fittings for leaks.
6. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### 4.2.18 Test Port Filter (PN 54188), Removal and Installation - 500, 1000 and 2000 Full Scale PSI

Models UPS3110[B], UPS3110[C] and UPS3110[F] only.

The port filter is a sintered element filter which is easily removed for inspection and cleaning.

Tools required:     Phillips screwdriver  
                          7/16" Open end wrench  
                          9/16" Open end wrench  
                          A/R Solvent (de-natured alcohol)  
                          Snoop, of liquid leak gas detector (PN 64781)

##### Test Port Filter Removal

1. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Loosen and remove the tubing end nut from the reducing union (PN 59764).
3. Loosen and remove the reducing union (PN 59764) from the fractional tube fitting (PN 59780).

**NOTE:** Use PN 54946 for fractional tube fitting field replacement.

4. Clean the filter (PN 54188) in solvent (de-natured alcohol) and blow-dry with compressed air.

##### Test Port Filter Installation

1. To reinstall, reverse the order of steps 2 and 3 of the removal procedure above.
2. Using a pressure source set input pressure to approximately 100% of full scale rating of UPS3110 and check all fittings for leaks.
3. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### 4.2.19 Test Port Filter (PN 54188), Removal and Installation - 15, 50 and 100 Full Scale PSI

Models UPS3110[DA], UPS3110[DB], UPS3110[EA], UPS3110[EB] and UPS3110[JA] only.

The port filter is a sintered element filter which is easily removed for inspection and cleaning.

Tools required:     Phillips screwdriver  
                          7/16" Open end wrench  
                          9/16" Open end wrench  
                          A/R solvent (de-natured alcohol)  
                          Snoop, of liquid leak gas detector (PN 64781)

##### Test Port Filter Removal

1. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Loosen and remove the tubing end nut from the male connector (PN 59733).
3. Loosen and remove the male connector from the fractional tube fitting (PN 59763).

**NOTE:** Use PN 56223 for fractional tube fitting field replacement.

4. Place wrench on nut located behind the test port quick-connect fitting locknut and hold in position. Using other wrench turn fractional tube fitting to loosen and remove.
5. Slide filter (PN 54188) out of fractional tube fitting.
6. Clean the filter (PN 54188) in solvent (denatured alcohol) and blow-dry with compressed air.

##### Test Port Filter Installation

1. To reinstall, reverse the order of steps 2 thru 5 of the removal procedure above.
2. Using a pressure source set input pressure to approximately 100% of full scale rating of UPS3110 and check all fittings for leaks.
3. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### **4.2.20 Test Port Quick-Connect Fitting (PN 59004) and Filter (PN 54188) Removal and Installation - 5000 and 10000 Full Scale PSI**

Models UPS3110[]A[], and UPS3110[]GA only.

Every two months, a coating of fluorinated Krytox grease should be applied to the inner seal of the test port fitting. The pressure cap (PN 58216) should be plugged in whenever the unit is not in use.

**NOTE:** *For simplest method, apply fluorinated Krytox grease to the outside surface between sealing lip and end of mating pressure cap. Do not put grease on flat end of tip, as this may allow grease to enter system. Vent unit line pressure to atmosphere. Plug pressure cap into test port. Rotate pressure cap clockwise and counter-clockwise to transfer fluorinated Krytox grease to O-ring seal.*

If there is leakage out of the port when the pressure cap is in place, replace the port fitting.

Tools required:

- Phillips screwdriver
- 11/16" open end wrench
- Adjustable wrench
- 9/16" Open end wrench
- A/R Solvent (denatured alcohol)
- A/R 1/4" wide Teflon tape (PN 60575)
- A/R 1/2" wide Teflon tape (PN 60911)
- Tube fluorinated grease (PN 55593)
- Snoop, liquid leak gas detector (PN 64781)

1. Remove cover from chassis as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Loosen and remove the tubing end nut from the reducing tube fitting (PN 59830).

**NOTE:** *Use PN 54047 for reducing tube fitting field replacement.*

3. Loosen and remove the reducing tube fitting and filter (PN 54188) from the test port quick-connect fitting.
4. Clean the filter (PN 54188) in solvent (denatured alcohol) and blow-dry with compressed air.
5. Grasp the test port quick-connect fitting on the flats from the rear of panel with a 11/16" wrench and using an adjustable wrench, turn the locknut counter-clockwise. Remove locknut.
6. Remove old and install new test port quick-connect fitting (PN 59004) through front of panel.
7. Thread and tighten locknut by grasping the test port quick-connect fitting on the flats from the rear of panel with a 11/16" wrench and using an adjustable wrench, turn the locknut clockwise.
8. Slide filter (PN 54188) into reducing tube fitting and install into the test port quick-connect fitting.
9. Replace and tighten the tubing end nut on the reducing tube fitting.
10. Using a pressure source set input pressure to approximately 100% of full scale rating of UPS3110 and check all fittings for leaks.
11. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### **4.2.21 AC Fuse (PN 58076), Removal and Installation**

1. Disconnect the power cord from the power source and line filter. Remove the Fuse holder at AC INPUT.
2. Inspect fuse, if blown replace with ¼ Amp 250 Volt, 20mm X 5mm diameter (PN 58076).
3. Replace the Fuse holder at "AC INPUT".

#### 4.2.22 AC Power/EMI Line Filter (PN 58870), Removal and Installation

Tools required:     Phillips screwdriver  
                          1/4" Open end wrench or nutdriver  
                          A/R soldering iron  
                          A/R shrink sleeving (PN 60735)  
                          A/R heat gun

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Remove the three cable connectors from the line filter terminals.

**NOTE:** *Some units may not have connectors and will have to have wire leads unsoldered.*

3. Loosen and remove the line filter retaining nuts on the rear of panel.

**NOTE:** *Some units may have screws on the front panel.*

4. Remove the AC line filter through the panel front.
5. To install a new line filter, reverse the order of steps 1 through 4.

Connect (or solder) wires to the new line filter as follows:

Green wire to terminal (E) Ground  
White wire to terminal (N) Neutral  
Black wire to terminal (P) Line

#### 4.2.23 Power Switch Cable (PN 55351), Removal and Installation (Battery Units)

Models UPS3000B[ ][ ], and UPS3000D[ ][ ] only.

Tools required:     Phillips screwdriver  
                          Flat-blade screwdriver (small)

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Remove connector J1, as well as, red (+) and black (-) battery wires from power supply assembly.
3. While holding power supply assembly mounting bracket, loosen and remove screws from outside of case. Place power supply assembly aside.
4. Loosen and remove the trim ring from the panel front. Slide switch cable out from rear of panel.
5. Remove cable connector from J7.
6. To install a power switch cable, reverse the order of steps 1 through 5.

#### 4.2.24 Power Switch (PN 58878), Removal and Installation

Models UPS3110[ ][ ][ ], and UPS3210[ ][ ][ ] only.

Tools required:     Phillips screwdriver  
                          1 1/16" open end wrench  
                          A/R soldering iron  
                          A/R shrink sleeving (PN 60735)  
                          A/R heat gun

##### **Removal:**

1. Disconnect the power cord from the power source and line filter. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Loosen the switch mounting nut and lock washer from the rear of panel.
3. Loosen and remove the trim ring from the panel front.
4. Remove switch, lock washer and nut from rear of panel as one item.
5. Unsolder and remove the wires from the switch terminals.

**Installation:**

1. Slide shrink sleeving over wires, connect and solder the wires onto their respective switch terminals:

<u>Terminal</u>	<u>Color</u>
Normally open	Black
(C) common	Black

2. Pull shrink sleeving over switch and connections. Apply heat. Install the new switch, lock washer and nut.
3. Tighten the switch mounting nut and lock washer from the rear of panel.

**Caution**

*Do not over tighten if using wrench. Doing so could result in damage to the switch.*

4. Install cover on its enclosure as described in Section 4.2.1 on page 28.

**4.2.25 Range Select Switch Cable (PN 56014), Removal and Installation**

Tools required: Phillips screwdriver  
7/16" Open end wrench  
A/R soldering iron  
.061" Hex wrench

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Remove the switch knob using a .061" hex wrench.
3. Loosen and remove the mounting nut from the panel front.
4. Unplug connector from J1 on CPU board, noting orientation.
5. To install select switch cable, reverse the order of steps 1 through 4.

**4.2.26 Power Supply Assembly, Removal and Installation (Battery Units)**

120 VAC input - PN 58723, 220 VAC input - PN 58729

Tools required: Phillips screwdriver  
Flat blade screwdriver (small)  
11/32" Open end wrench or nutdriver

1. Disconnect the power cord from the power source and line filter. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Disconnect the 3 wire connectors, (black, white, green), that is between the AC filter cable (PN 55540) and the cable attached to the Power Supply board assembly.
3. Unplug the multi-pin connector of the CPU (J6) to Power Supply (J1) cable from the Power Supply board.
4. Remove the 2 battery cable wires, red (+) and black (-), from the terminal block (TB1) on the Power Supply board.
5. Loosen and remove the hardware that hold the Power Supply board and remove the board.
6. To install Power Supply board, reverse the order of steps 1 through 5.

#### **4.2.27 BATTERY (55851), Removal, Installation and Adjustments**

Tools required:     Phillips screwdriver  
                          Flat blade screwdriver (small)  
                          11/32" Open end wrench or nutdriver

1. Disconnect the power cord from the power source and line filter. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Disconnect the 2 battery cable wires from the battery terminals, Red wire from (+) and Black wire from (-).
3. Remove the mounting hardware that secure the battery bracket.
4. Remove the bracket and battery.
5. To install a new battery, reverse steps 1 thru 4 of above.

#### **Adjustment of Charging Circuit:**

Tools required:     Phillips screwdriver  
                          Flat blade screwdriver (small)  
                          DC voltmeter

1. Disconnect the power cord from the power source and line filter. Remove cover from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Disconnect the 2 battery cable wires from the battery terminals, Red wire from (+) and Black wire from (-).
3. Connect the leads of a DC voltmeter to the battery wires.
4. With the unit's power cord connected to a power source, but the power switch OFF, adjust the potentiometer R3 on the power supply board until the voltmeter reads "14.0" volts.
5. Unplug the power cord from the power source.
6. Disconnect the voltmeter and reconnect the battery leads to the battery terminals, Red wire to (+) and Black wire to (-).
7. Install cover on its enclosure as described in Section 4.2.1 on page 28.

#### **Adjustment of Battery Voltage Display Reading:**

Tools required:     Phillips screwdriver  
                          Flat blade screwdriver (small)  
                          11.5 VDC Power Source

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Section 4.2.1 on page 28, and carefully set on a bench top.
2. Disconnect the 2 battery cable wires from the battery terminals, Red wire from (+) and Black wire from (-).
3. Connect the leads of a 11.5 VDC power source to the battery cable wires that are connected to TB1 on the Power Supply Board. Adjust potentiometer R9 located on power supply board to illuminate low battery indicator.
4. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 28.

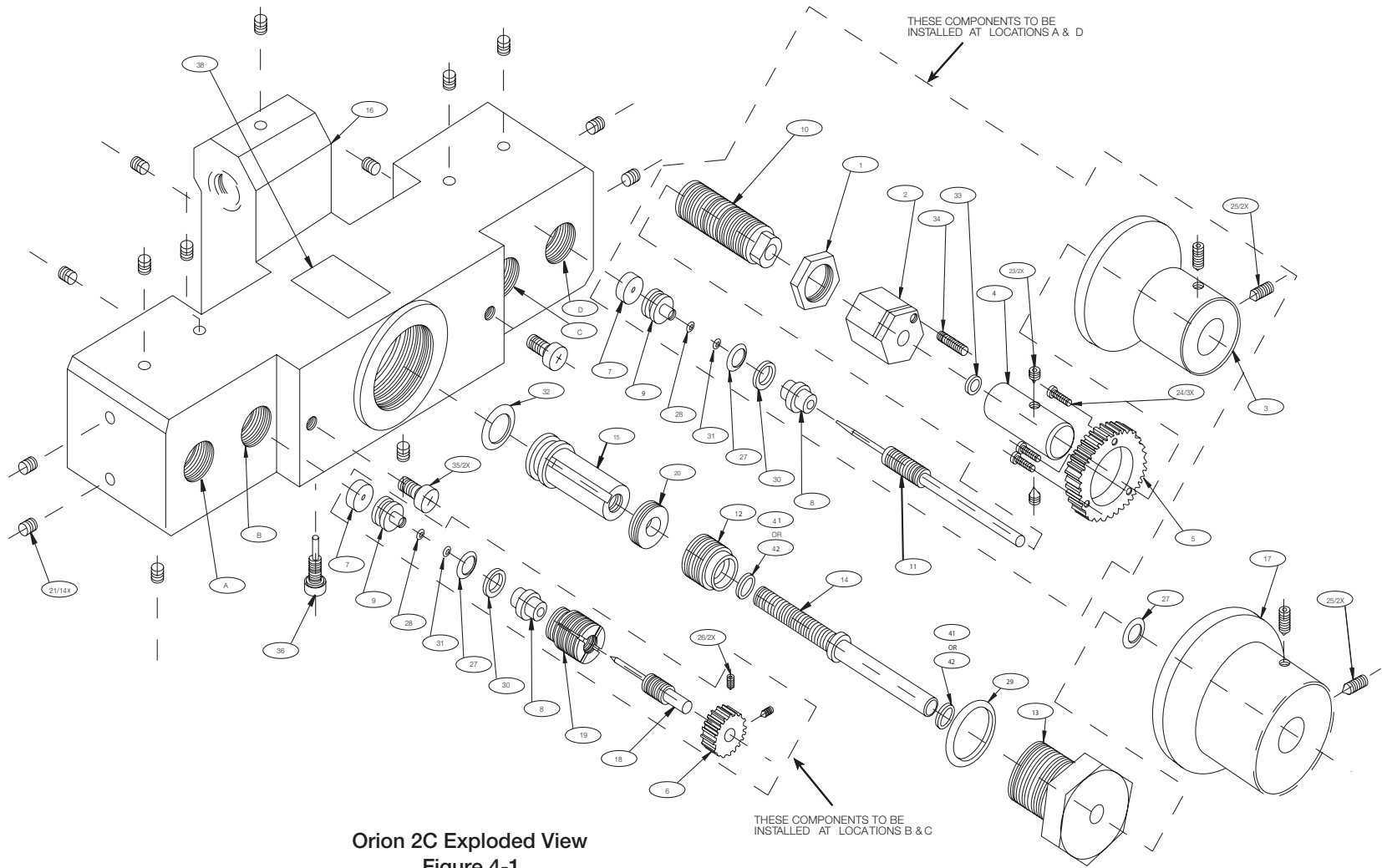


### 4.3 ORION 2C Valve Assembly Parts List

The following table lists the component parts of the Orion 2C and the pullout 11x17 drawing on the next page illustrates the Orion 2C exploded view of those parts.

Ref Number	PN	Description	Quantity
1	57482	Valve Needle Housing Nut	2
2	54401	Locknut	2
3	58079	Knob	2
4	57889	Knob,Insert	2
5	57256	Gear, Spur 40 Teeth	2
6	59233	Gear, Spur 18-tooth	2
7	55896	Valve Seat	4
8	59387	Valve Seat,Stem	4
9	59045	Valve, Needle Seat	4
10	54540	Housing, Valve Needle	2
11	59551	Valve Needle	2
12	57906	Bushing, End	1
13	59378	Cap, End	1
14	59495	Shaft	1
15	59241	Piston	1
16	55714	Body, Dual Valve	1
17	57580	Knob	1
18	55533	Valve Needle	2
19	55159	Housing, Valve Needle	2
20	56784	Locknut, 9/16-18UNF-3A, SST	1
21	59845	Plug, Expansion , .1562 +.0000/-.0012 Hole Diameter	14
23	59383	Setscrew, 6-32NCx1/8 SST	4
24	58342	Screw, Cap Hex Socket Head, #2-56UNC-3A	6
25	59322	Setscrew, 6-32NCx1/4 SST	6
26	59326	Setscrew, 2-56NCx1/8, alloy steel	4
27	55554	O-ring, AS568A Dash No 010, Buna N (Nitrile) 70 Durometer Color Black	5
28	55536	O-ring, AS568A Dash No 002, Buna N (Nitrile) 70 Durometer Color Black	4
29	55573	O-ring, AS568A Dash No 117, Buna N (Nitrile) 70 Durometer Color Black	1
30	60633	Retainer, Packing Backup , Single Turn Tetrafluoroethylene	4
31	55570	Washer, Backing .04 Thick, Tetrafluoroethylene Resin	4
32	55577	O-ring, AS568A Dash No 111, Buna N (Nitrile) 70 Durometer Color Black	1
33	59245	Washer, #8 Screw Size .187, ID x .440 OD x .040 Thick Nylon	2
34	60202	Setscrew, hex	2
35	60837	Screw, MACH Pan Head #10- 32NFx1/2 Phillips Head 300 Series SST	2
36	58976	Screw, Self Sealing,8-32 x 5/8 Modified to Print	1
38	53308	Label Roll, 1.25x1.25, Polytrans 3000 Void 3" Core 8" OD	1
41	59878	Spacer .005 thk Mylar	2
42	59880	Spacer .007 thk Mylar	2





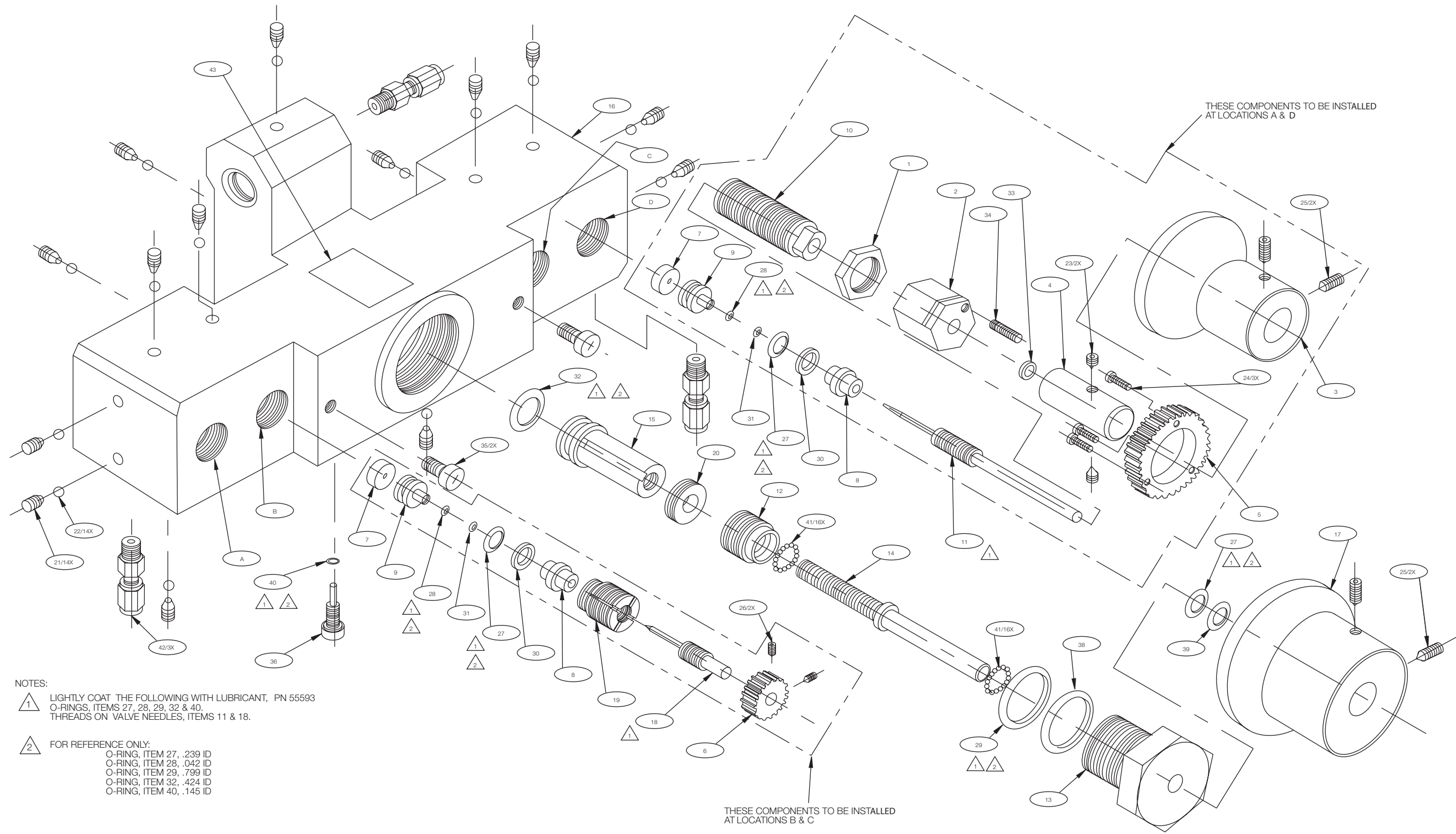
**Orion 2C Exploded View**  
**Figure 4-1**

## 4.4 ORION 3A Valve Assembly Parts List

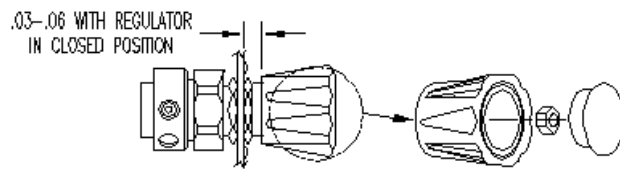
The following table lists the component parts of the Orion 3A and the pullout 11x17 drawing on the next page illustrates the Orion 3A exploded view of those parts.

Ref Number	PN	Description	Quantity
1	57482	Valve Needle Housing Nut	2
2	54401	Locknut	2
3	58079	Knob	2
4	57889	Knob, Insert	2
5	57256	Gear, Spur 40 Teeth	2
6	59233	Gear, Spur 18-tooth	2
7	55896	Valve Seat	4
8	59387	Valve Seat, Stem	4
9	59045	Valve, Needle Seat	4
10	54540	Housing, Valve Needle	2
11	59551	Valve Needle	2
12	57600	Bushing, End	1
13	58554	Cap, End	1
14	58699	Shaft	1
15	58597	Piston	1
16	59309	Body, Dual Valve	1
17	57580	Knob	1
18	55533	Valve Needle	2
19	55159	Housing, Valve Needle	2
20	56784	Locknut, 9/16-18UNF-3A, SST	1
21	58464	Setscrew, 12-24NCx1/4 SST	14
22	58308	Ball, Tungsten Carbide	14
23	59383	Setscrew, 6-32NCx1/8 SST	4
24	58342	Screw, Cap Hex Socket Head, #2-56UNC-3A	6
25	59322	Setscrew, 6-32NCx1/4 SST	6
26	59326	Setscrew, 2-56NCx1/8, alloy steel	4
27	55569	O-ring, Fluorocarbon (Viton) color black w/white dot	5
28	55552	O-ring, Fluorocarbon (Viton) color black w/white dot	4
29	58090	O-ring, Fluorocarbon (Viton) color black w/white dot	1
30	60633	Retainer, Packing Backup	4
31	55570	Washer, Backing	4
32	58045	O-ring, Fluorocarbon (Viton) color black w/white dot	1
33	59245	Washer, Nylon	2
34	60202	Setscrew, hex	2
35	60837	Screw, MACH #10- 32NF SST	2
36	54905	Screw, Self Sealing	1
38	57027	Washer, Backup	1
39	54448	Retainer, Packing backup	1
40	55615	O-ring, Fluorocarbon (Viton) color black w/white dot	1
41	58314	Ball, chrome, steel	32
42	59731	Male connector, 1/8 tube x 1/8 NPT, stainless steel	3

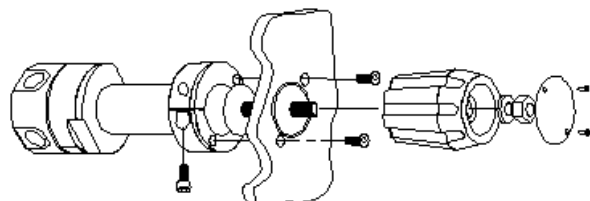
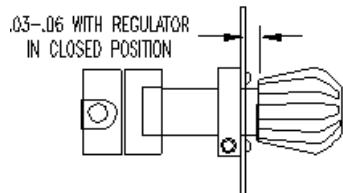




Orion 3A Exploded View  
 Figure 4-2



Tescom Regulator



Standard Pneumatic Regulator

*Figure 4-3. Tescom and Standard Pneumatic Regulator Mounting*

## 4.5 UPS3000 Assembly Drawings

The following table lists assembly drawings included with this manual. They're included at the back of this manual.

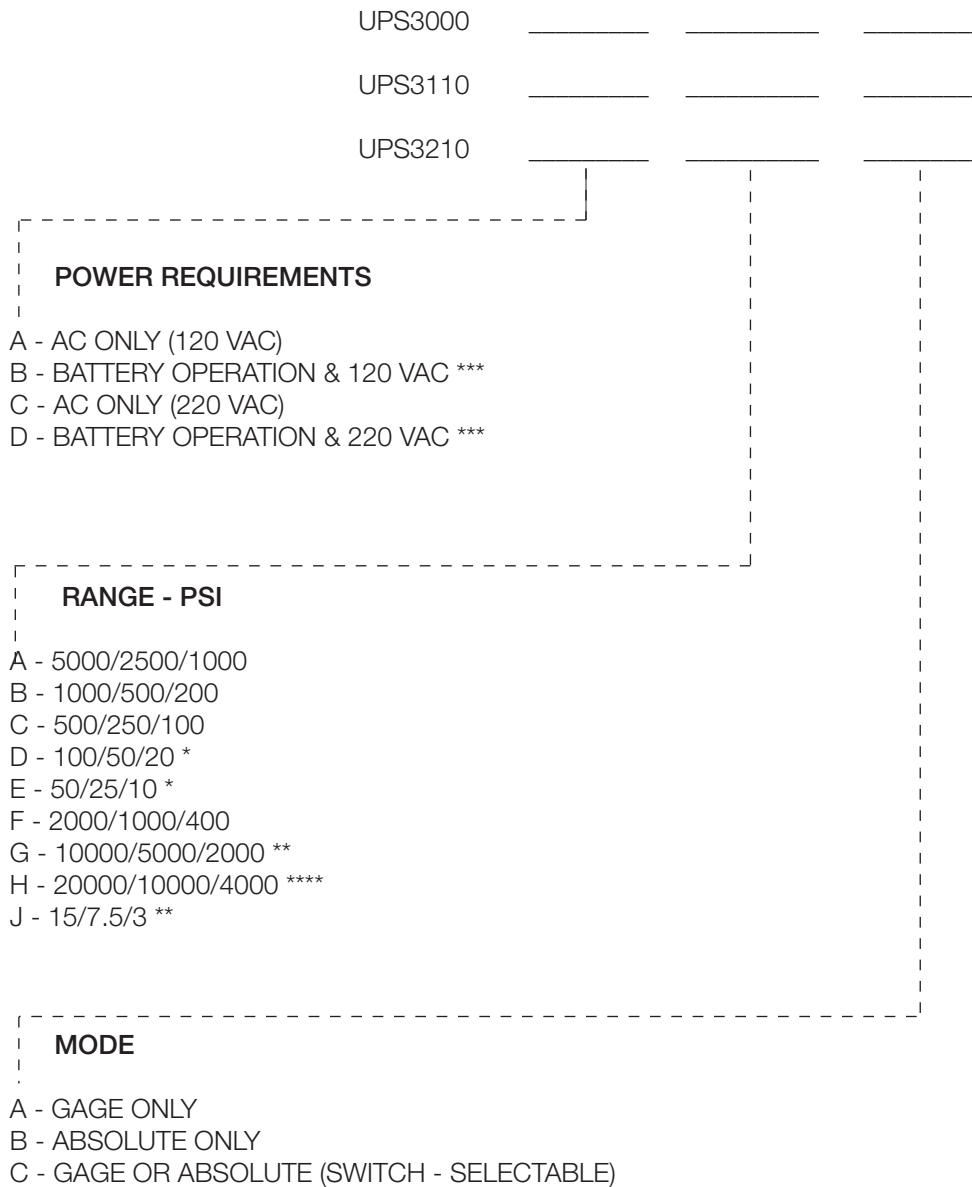
Drawing Number	Description	Pages
56698	Universal Pressure Standard Assembly	3
54850	Rack Mount Universal Pressure Standard Instrument Assembly	7
59627	Rack Mount Universal Pressure Standard Instrument Assembly	2
54254	CPU and Power Supply Assembly	2
67652	CPU and Power Supply Schematic	2
59037	CPU and Battery Power Schematic	2
67655	CPU, Battery Power Pressure Indicator Schematic	2
58723	Power Supply Assembly	1
67654	Power Supply Schematic	1
55952	Display Board Assembly	1
KBT7316	Pressure Indicator Display Board	1
57999	Expander Board Assembly	1
KWH7316	Expander Board Assembly	1

*Table 4-3. UPS3000 Assembly Drawings*

## 5.0 Model Number System

---

The part numbering system is defined as follows:



\* Available in gage only or absolute only

\*\* Available in gage only

\*\*\* UPS3210, available as a special

\*\*\*\* Available in gage only but not in UPS3110 series, not available to be used with PCM1000-1 controller



## 6.0 Available Ranges, Multi-Conversions and Resolutions

Approximately 1994 multi-conversion software was added to UPS3000 models, therefore UPS3000 and PCM1000 units made prior to this will not work with the ones manufactured after that date. Consult factory for information on upgrading units manufactured prior to 1994.

Range (PSI)	A	B	C	D	E	F	G	H	I
20000/10000/4000			%	%			%		%
10000/5000/2000	@		@	@			@		@
5000/2500/1000	@,#,\$		@,#,\$	@,#,\$			@,#,\$		@,#,\$
2000/1000/400	@,#,\$		@,#,\$	@,#,\$			@,#,\$		@,#,\$
1000/500/200	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$
500/250/100	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$	@,#,\$
100/50/20	@, #	@, #	@, #	@, #	@, #	@, #	@, #	@, #	@, #
50/25/10	@, #	@, #	@, #	@, #	@, #	@, #	@, #	@, #	@, #
15/7.5/3	@	@		@	@	@		@	@

Table 6-1. PSI Conversion Table

- A: Kpa = PSI x 6.89476
- B: mm Hg = PSI x 51.7149
- C: Bar = PSI x 0.0689476
- D: in Hg (0°C) = PSI x 2.036
- E: mBar = PSI x 68.9476
- F: cm H<sub>2</sub>O = PSI x 70.308
- G: Kg/cm<sup>2</sup> = PSI x 0.070308
- H: in H<sub>2</sub>O (60°F) = PSI ÷ 27.71
- I: %Full Scale = (PSI x 100) ÷ FullScale

### Calibrator Mode:

- @ = Gage Only
- # = Absolute Only
- \$ = Gage or Absolute, switch selectable
- % = Gage Only but not in UPS3110 series

**NOTE:** Display resolution, 0.02% of selected range, unless it is not divisible by 1, 2, or 5. The following tables illustrate the various display resolutions associated with the various PSI conversion ranges.

Conversion	Ranges, HI/MED/LO	Resolution, HI/MED/LO
PSI	20000.0/10000.0/4000	5/2/1
Bar	1379.0/689.5/275.80	0.2/0.1/0.05
in Hg	40720/20360/8144	10/5/2
Kg/cm <sup>2</sup>	1406.2/703.1/281.25	0.2/0.1/0.05

Conversion	Ranges, HI/MED/LO	Resolution HI/MED/LO
PSI	10000/5000/2000.0	2/1.0/.5
Kpa	68950/34475/13790	10/5/2
Bar	689.5.344.75/137.90	0.1/0.05/0.02
in Hg	20360/10180/4072	5/2/1
Kg/cm <sup>2</sup>	703.1/351.55/140.62	0.1/0.05/0.02

Conversion	Ranges, HI/MED/LO	Resolution, HI/MED/LO
PSI	5000/2500.0/1000.0	1/0.5/0.2
Kpa	34475/17236/6895	5/2/1
Bar	344.75/172.36/68.95	0.05/0.02/0.01
in Hg	10180/5090/2036.0	2/1/0.5
Kg/cm <sup>2</sup>	351.55/175.78/70.31	0.05/0.02/0.01

Conversion	Ranges, HI/MED/LO	Resolution HI/MED/LO
PSI	2000.0/1000.0/400.0	0.5/0.2/0.1
Kpa	13790/6895/2758.0	2/1/0.5
Bar	137.90/68.95/27.580	0.02/0.01/0.005
in Hg	4072/2036.0/814.4	1/0.5/0.2
Kg/cm <sup>2</sup>	140.62/70.31/28.125	0.02/0.01/0.005
in H <sub>2</sub> O	55420/27710/11084	10/5/2

Conversion	Ranges, HI/MED/LO	Resolution HI/MED/LO
PSI	1000.0/500.0/200.0	0.2/0.1/0.05
Kpa	6895/3447.5/1379.0	1/0.5/0.2
mm Hg	51710/25855/10342	10/5/2
Bar	68.95/34.475/13.790	0.01/0.005/0.002
in Hg	2036.0/1018.0/407.2	0.5/0.2/0.1
mBar	68950/34475/13790	10/5/2
cm H <sub>2</sub> O	70310/35.155/14.062	0.01/0.005/0.002
Kg/cm <sup>2</sup>	70.31/35.155/14.062	0.01/0.005/0.002
in H <sub>2</sub> O	27710/13856/5542	5/2/1

Conversion	Ranges, HI/MED/LO	Resolution HI/MED/LO
PSI	500.0/250.00/100.00	0.1/0.05/0.02
Kpa	3447.5/1723.6/689.5	0.5/0.2/0.1
mm Hg	25855/12928/5171	5/2/1
Bar	34.475/17.236/6.895	0.005/0.002/0.001
in Hg	1018.0/509.0/203.6	0.2/0.1/0.05
mBar	34475/17236/6895	5/2/1
cm H <sub>2</sub> O	35155/17576/7031	5/2/1
Kg/cm <sup>2</sup>	35.155/17.576/7.031	0.005/0.002/0.001
in H <sub>2</sub> O	13856/6928/2771.0	2/1/0.5

Conversion	Ranges, HI/MED/LO	Resolution HI/MED/LO
PSI	100.00/50.00/20.000	0.02/0.01/0.005
Kpa	689.5/344.75/137.90	0.1/0.05/0.02
mm Hg	5171/2585.5/1034.2	1/0.5/0.2
Bar	6.895/3.4475/1.3790	0.001/0.0005/0.0002
in Hg	203.60/101.80/40.72	0.05/0.02/0.01
mBar	6895/3447.5/1379.0	1/0.5/0.2
cm H <sub>2</sub> O	7031/3515.5/1406.2	1/0.5/0.2
Kg/cm <sup>2</sup>	7.031/3.5155/1.4062	0.001/0.0005/0.0002
in H <sub>2</sub> O	2771.0/1385.6/554.2	0.5/0.2/0.1

Conversion	Ranges, HI/MED/LO	Resolution, HI/MED/LO
PSI	50.00/25.00/10.000	0.01/0.005/0.002
Kpa	344.7/172.35/68.96	0.05/0.02/0.01
mm Hg	2586/1293.0/517.2	0.5/0.2/0.1
Bar	3.447/1.7235/.6896	0.0005/0.0002/0.0001
in Hg	101.80/50.90/20.36	0.02/0.01/0.005
mBar	3447/1723.5/689.4	0.5/0.2/0.1
cm H <sub>2</sub> O	3515/1757.5/703.0	0.5/0.2/0.1
Kg/cm <sup>2</sup>	3.515/1.7575/.7030	0.0005/0.0002/0.0001
in H <sub>2</sub> O	1385.5/692.6/277.1	0.2/0.1/0.05

Conversion	Ranges, HI/MED/LO	Resolution HI/MED/LO
PSI	15/7.5/3	0.002/0.001/0.0005
Kpa	103.42/51.71/20.685	0.02/0.01/0.005
mm Hg	775.7/387.85/155.14	0.1/0.05/0.02
in Hg	30.540/15.270/6.108	0.005/0.002/0.001
mBar	1034.2/517.1/206.85	0.2/0.1/0.05
cm H <sub>2</sub> O	1054.6/527.3/210.90	0.2/0.1/0.05
in H <sub>2</sub> O	415.65/207.80/83.13	0.05/0.05/0.01

## 7.0 Options, Replacement Kits

There are numerous replacement part numbers mentioned throughout manual that can be ordered.

### 7.1 Freeze Mode Option - PN 57778

**NOTE:** This option may not be used with APC 4000 or APC4001 interface option.

See “Freeze Mode Option Wiring” on page 11 for wiring information.

This mode, often used for testing pressure switches, is an edge triggered input signal that will “freeze” the last display update for approximately five seconds, as soon as, either opening or closing of a switch contact between an active input and RETURN. However, while the display is in the freeze condition it will not respond to another contact transition.

Specifications:

- The Freeze input will “freeze” the display for approximately five seconds on the rise and fall time of the input (edge not level triggered) and is “non-retriggerable”.
- Input pulse > 100 ms required to guarantee detection.
- The freeze will “freeze” the 6 digit numeric and LED bar displays in whatever mode it is in (i.e. Normal, Max or Min mode).
- During the “freeze” the Front Panel Keys are inactive.
- Inputs are a +5 VDC logic level. Sinking current approximately 0.5 mA.

### 7.2 Peak Hold Option

UPS3000[]A, UPS3000[]B, UPS3210[]A, UPS3110[]A, UPS3110[]B, UPS3210[]B use PN 57775

UPS3000[]C, UPS3210[]C, UPS3210[]C use PN 57798

**NOTES:** Recommended factory installed option requires software configuration.

This option may not be used with APC 4000 or APC4001 interface option or MIN/MAX Option.

When model is Absolute or Gage front panel switch selectable, “CONV” button is replaced and therefore, the required conversion must be set through reconfiguration. See “Engineering Conversion with PEAK HOLD or MAX/MIN Option” on page 12 for applicable method to change to required conversion.

This option retains the last highest pressure reading and stores it in memory.

It can then be recalled upon demand at any time provided:

1. The unit has not been powered down (power removed).
2. The reset button has not been pushed.
3. The range select switch has not been changed to another range.

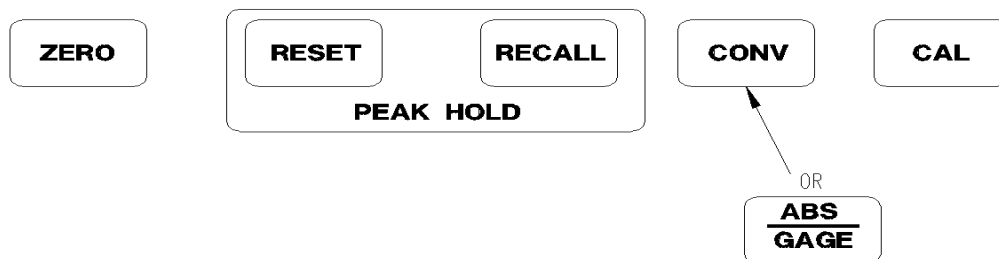


Figure 7-1. Peak Hold Keyboard

To use this option, select the appropriate pressure range using the **Range Select** switch. While the unit is at 0 psi, push the **RESET** button. Now run the pressure test. After the pressure test, push the **RECALL** button to display the “Peak” pressure during this particular test. The **RECALL** button may be pushed as many times as needed. Pushing the **RESET** button will clear the register and another pressure test may begin. Each time the **RESET** or **RECALL** button is pushed a flashing *Dash* will appear in the upper left corner of the digital display.

**NOTE:** For configuration setup See “Peak Hold or MAX/MIN Option Enable” on page 9.

### 7.3 Min and Max Mode Option

UPS3000[]A, UPS3000[]B, UPS3210[]A, UPS3110[]A, UPS3110[]B, UPS3210[]B use PN 57790  
 UPS3000[]C, UPS3210[]C, UPS3210[]C use PN 57796

**NOTES:** Recommended factory installed option requires software configuration.

*This option may not be used with APC 4000 or APC4001 interface option or Peak Hold Option.*

*When model is Absolute or Gage switch selectable, CONV button is replaced and therefore, the required conversion must be set through reconfiguration. See “Engineering Conversion with PEAK HOLD or MAX/MIN Option” on page 12 for applicable method to change to required conversion.*

The Min and Max mode is designed to capture and store the highest and the lowest pressure readings. These values may be recalled at anytime in the normal operating mode. To operate this option, select the pressure range which best fits your needs. Apply pressure to the unit until it is at a point somewhere between the estimated minimum and maximum points. Press the **RESET** button. While pressed, a “-” will flash in the upper left-hand portion of the display and will continue to appear until button is released. The option has now been initialized.

After initialization, the unit will immediately start to record the minimum and maximum readings. To access these readings, momentarily press the **RECALL** button. A “-” will flash in the upper left-hand portion of the display. This reading is the “MAXIMUM” reading. Momentarily press the **RECALL** button again. A “-” will flash in the lower left-hand portion of the display. This reading is the “MINIMUM” reading. Momentarily press the **RECALL** button again and the unit will return to the normal operating mode. This review may be repeated as many times as necessary without the loss of the acquired data.

**NOTE:** Changing ranges may result in a loss of data.

**NOTE:** For configuration setup See “Peak Hold or MAX/MIN Option Enable” on page 9.

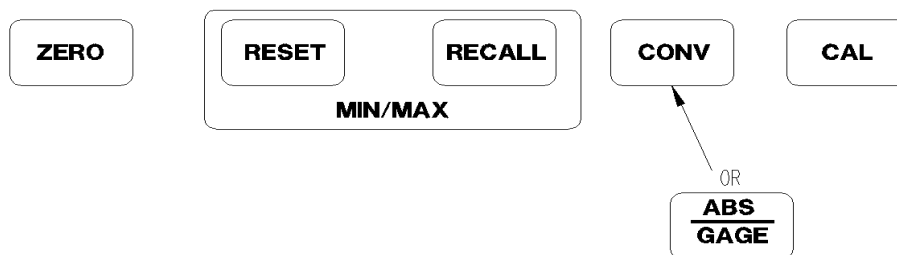


Figure 7-2. Min/Max Keyboard

## 7.4 Analog Output Option (0 VDC to +10 VDC)

**NOTE:** Recommended factory installed option. Also consult factory for battery models with this option.

UPS3000A[[]], UPS3000C[[]], UPS3210A[[]], UPS3110C[[]], UPS3110A[[]], UPS3210C[[]] used in conjunction with +4 to +20 mA DC option use PN 57785

UPS3000A[[]], UPS3000C[[]], UPS3210A[[]], UPS3110C[[]], UPS3110A[[]], UPS3210C[[]] used in conjunction with +4 to +20 mA DC option and RS232 Simplex option use PN 57799

The output voltage at 0 psi is 0 VDC and the output voltage at 100% full scale of any range is + 10 VDC. Output impedance must be greater than 10,000 Ohms. Connections are made via the round military connector for the “Return” (Pin B) and for the “Output Voltage” (Pin C).

Digital circuitry is not used in the generation of the output voltage. Rather, the output voltage is derived directly from the signal conditioner of the transducer. Due to the nature of three pressure ranges and the one pressure transducer, the signal conditioner is set up with three different gains.

On “Gage Only” or “Absolute Only” units, as pressure ranges are selected, there may be slight adjustments necessary to maintain 0 VDC at 0 psi and + 10 VDC at 100% full scale input pressure. On the “Absolute/Gage Switch Selectable” units, the adjustments can be more rigorous.

It is always best to set the “zero” control (R3) first and the “Span” control (R4) last. These controls may be found on the top portion of the circuit board mounted at the rear of the chassis. Select the range which is most appropriate for the measurement application. While the unit is at 0 psi, adjust R3 until the output voltage is 0 VDC. Now apply full-scale pressure for that range and adjust R4 until the output voltage is + 10 VDC.

## 7.5 Analog Output Option (+4 mA DC to +20 mA DC)

**NOTE:** Recommended factory installed option. Also consult factory for battery models with this option.

UPS3000A[[]], UPS3000C[[]], UPS3210A[[]], UPS3110C[[]], UPS3110A[[]], UPS3210C[[]] used in conjunction with 0 to +10 VDC option use PN 57785

UPS3000A[[]], UPS3000C[[]], UPS3210A[[]], UPS3110C[[]], UPS3110A[[]], UPS3210C[[]] used in conjunction with 0 to +10 VDC option and RS232 Simplex option use PN 57799

The output current at 0 psi is +4 ma DC and the output current at 100% Full Scale of any range is +20 ma DC. Output impedance must be less than 500 ohms. Connections are made via the round military connector for the “Output Current” (Pin A) and for the “Return” (Pin B).

Digital circuitry is not used in the generation of the output current. Rather, the output current is derived directly from the signal conditioner of the transducer. Due to the nature of three pressure ranges and the one pressure transducer, the signal conditioner is set up with three different gains.

On “Gage Only” or “Absolute Only” units, as pressure ranges are selected, there may be slight adjustments necessary to maintain +4 ma DC at 0 psi and +20 ma DC at 100% Full Scale input pressure. On the “Absolute/Gage Switch Selectable” units, the adjustments can be more rigorous.

It is always best to set the “Zero” control (R1) first and the “Span” control (R2) last. These controls may be found on the top portion of the circuit board mounted at the rear of the chassis. Select the range which is most appropriate for the measurement application. While the indicator is at 0 psi, adjust R1 until the output current is +4 ma DC. Now apply full scale pressure for that range and adjust R2 until the output current is + 20mADC.

## 7.6 RS232 Simplex Output Option Mode

UPS3000A[[]], UPS3000C[[]], UPS3210A[[]], UPS3110C[[]], UPS3110A[[]], UPS3210C[[]] use PN 57788

**NOTE:** This may not be used with the following options in "DEMAND FORMAT", APC 4000 or APC4001 interface, Peak hold, Min/Max or Battery. This may not be used with the following options in "CONTINUOUS FORMAT", APC 4000 or APC4001 interface or Battery.

There are two modes of operation, Continuous or Demand.

Continuous Mode: Model is continuously sending data.

Demand Mode: Must be done from the front panel of the UPS3000 using a button. The button is the hidden one between the CONV and CAL button's This is not a two-way mode and cannot be done externally by PC.

**NOTE:** For Software configuration See "Serial Output Software Configuration" on page 16.

The serial output is accessed at J2, a round 5-pin male connector located at the rear of the unit. Pin designations: Pin D - Serial Output Data (Xmit), Pin E - Return (Gnd).

## 7.7 Replacement Kits

There are numerous replacement part numbers mentioned throughout manual that can be ordered.

- UPS3000 Panel Mount Kit.....PN 19297

Can be mounted through panels of any thickness up to 1-1/4 inches. Panel cut-out size and overall unit dimensions are as shown below.

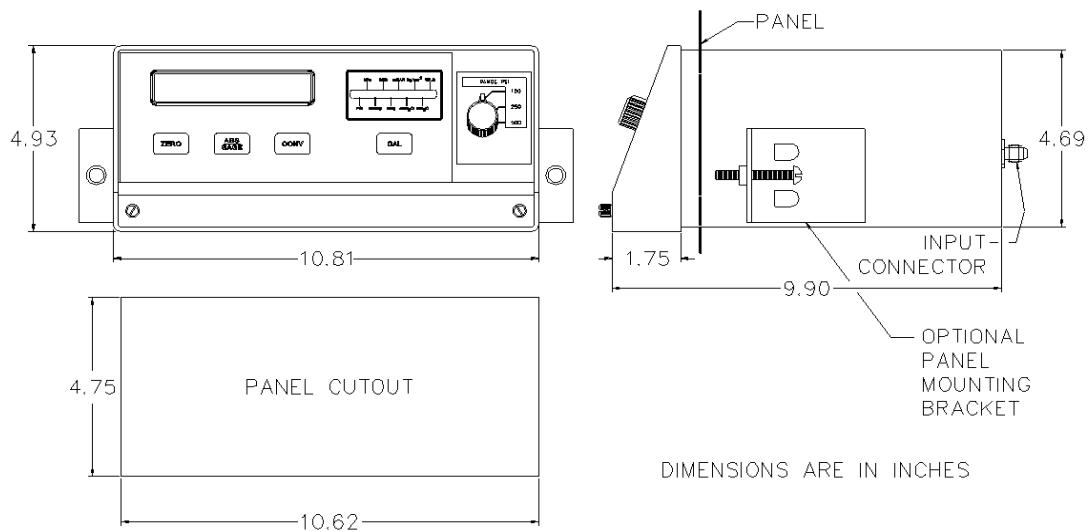


Figure 7-3. Panel Cut-out

- APC4000 Interface Cable Kit.....PN 55576

**NOTE:** Used with model's UPS3000 & UPS3210 only. See "APC4000/APC4001 Interface Option Enable" on page 9 for configuration switch settings.

Approximately 1994 multi conversion software was added to UPS3000 models, therefore UPS3000 and PCM1000 units made prior to this will not work with the ones manufactured after that date.

The APC4000 interface is an option available on UPS3000 units that are purchased in conjunction with CONDEC PCM1000-1, PN 54652, pressure controllers. The output is accessed from the rear of the unit at connector J3, a 15-pin D-sub female connector which supplies a 20 mA loop and communication to the controller input. Cable connects to J2 on PCM1000-1. See APC4000/APC4001 manual, PN 63254, for further information.

- APC4001 Interface Cable Kit.....PN 55590

**NOTE:** *Used with model's APC4001 & UPS3110 only.*

The kit is a replacement cable available for UPS3110 units that were purchased in conjunction with CONDEC APC4001 pressure controllers.

- Battery Replacement Kit.....PN 55844

When fully charged, the 12-volt rechargeable battery will provide up to six hours of portable operation.

**O-Ring Replacement Kit:**

- Fluorocarbon “Viton” (standard ORION-3A Data Sheet #65370).....PN 55277
- Nitrile Buna-N (standard ORION-2C Data Sheet #65308).....PN 58499
- Ethylene-Propylene..... PN 58506
- Silicone..... PN 58509
- Neoprene..... PN 58515

**NOTE:** *A small coating of Fluorinated Krytox grease, (PN 55593), should be applied to both sides of O-ring prior to installation.*

**Pressure Trap for UPS3110:**

- 5000 psi and above (Data Sheet # 58596).....PN 58478
- 500 to 2000 psi max. (Data Sheet # 58609)..... PN 58483
- 15 to 100 psi max. (Data Sheet # 58621)..... PN 58487

**UPS3110 Test Port (output) Hose, with Quick-Disconnect Male fitting:**

- 5000 psi and above, 5' Long.....PN 55280
- 500 to 2000 psi max, 5' Long..... PN 55279
- 500 to 2000 psi max, 10' Long..... PN 55300
- 500 to 2000 psi max, 15' Long..... PN 55304
- 500 to 2000 psi max, 20' Long..... PN 55310
- 15 to 100 psi max., 5' Long..... PN 55281
- 15 to 100 psi max., 10' Long..... PN 55328
- 15 to 100 psi max., 15' Long..... PN 55336
- 15 to 100 psi max., 20' Long..... PN 55341

**UPS3110 Test Port (output) Quick-Disconnect Male Hose fitting:**

- 5000 psi and above.....PN 55542
- 500 to 2000 psi max..... PN 55394
- 15 to 100 psi max..... PN 60195



## 8.0 Specifications

### Pressure Specifications:

Pressure range: Three independent pressure ranges per instrument. See "Model Number System" on page 50 for available ranges.

Available pressure calibrations: Gage only, absolute only, or gage and absolute

Overall accuracy: < ±0.05% Full Scale Max. Accuracy statement includes all effects of linearity, hysteresis, repeatability and ambient temperature

Operating Temperature: +40° to +122°F (+4.4° to +50.0° C)

Storage Temperature: 0° to +185° F (-17.8° to +85°C)

### Pressure Media:

UPS 3000, UPS 3210: Any liquid or gas compatible with 17-4 PH stainless steel.

UPS 3110: Any gas compatible with 17-4PH stainless steel.

### UPS3110 Pressure Limit Control Gage:

Size: 2-in. diameter

Range: Based on Model

### Over-pressure Rupture Disk:

Rating: 3000 psig, nominal

Type: Stainless steel outer case

### UPS3110 Pressure Media Filter:

Rating: 20 microns, Test Port

Type: Field replaceable

### ORION-2C Control Valve:

Pressure Range: 3000 PSI max and vacuum

Type: Micro-metering with replaceable soft seat

Material: Aluminum body, clear anodized  
Aluminum knobs, black anodized.  
All other parts 300 series stainless steel.

O-ring Material: Buna-N (standard)

### ORION-3A Control Valve:

Pressure Range: 0-10000 PSI max and vacuum

Type: Micro-metering with replaceable soft seat

Material: 300 Series Stainless Steel body.  
Aluminum knobs, black anodized.  
All other parts 300 series stainless steel.

O-ring Material: Fluorocarbon "Viton" (standard)

### Relief Valve:

Type: Adjustable, atmospheric bleed

Setting: Adjustable to 10% above highest calibrated pressure.

Material: 300 series Stainless Steel.

### UPS3110 Internal Piping:

Tubing: Based on Model, seamless Cu. or St Stl.

UPS3110 Couplings: Based on Model, Brass or Stainless Steel, Swagelok type

UPS3110 Input Port:

Style: 1/4" 37° AN male

Pressure Rating: Based on Model

Material: Brass or Stainless Steel.

### UPS3110 Test Port:

Pressure Rating: Based on Model.

Material: Stainless Steel.

### UPS3110 Vent Port:

Style: 1/4" 37° AN male

Pressure Rating: Based on Model

Material: Brass or Stainless Steel.

### UPS3110 Pressure Hoses:

Quantity Supplied: one output.

Length: 5 ft. nominal.

Style: Output hose - Nylon-lined core tube with synthetic braid, polyurethane cover. Fitted with quick-disconnect plug (St Stl) on one end and 1/4" 37° female AN swivel tube coupling on the other.

### UPS3110 Pressure Limit Control Regulator:

Type: Single stage, self-venting, non-bleed

Pressure Rating: 3000 psig max. inlet

### Internal Pressure Sensor:

Type: Bonded, metal foil strain gage, sputtered thin-film or equivalent.

Sensitivity: 3 mV/V nominal.

Construction: Completely weld-sealed Stainless Steel outer body and pressure cavity.

Over-pressure Capability: 750% F.S. on low-range  
300% F.S. on mid-range  
150% F.S. on high-range

### Battery:

Type: Rechargeable, lead-acid gel.

Nominal voltage: 12 V.

Approx. Weight: 2.86 lbs.

Case: Polystyrene/H.I. ABS

### Numerical Pressure Display:

Display Type: High Intensity, red LED digits, .043" high.

Active Digits: 5 full digits, standard.

Polarity Indication: "-" sign

### **Pressure to Digital Conversion:**

Conversion rate:	Data updated at the rate of twelve (12) times per second, nominal.
Display Resolution:	Nominally 0.02% of F. S. for each pressure range displayed.
Minimum Display Increments:	To maintain virtually constant resolution, pressure increments of 1, 0.5, 0.2, 0.1, 0.05, 0.02, & 0.01 psi utilized as required.
Accuracy/Resolution Ratio:	A ratio of approx. 3:1 is maintained for all pressure ranges displayed.
Standard Data Output:	Serial output, 20 mA loop, ASCII code format with start, stop & parity bits. 1200 baud rate standard.
Optional Data Output:	RS 232 Simplex

### **Mounting Styles:**

UPS 3000:	Either free-standing bench-top with rubber feet or panel-mounted with adapter kit.
UPS 3110 & UPS 3210:	Rack-mount with 4 screw slots.

### **Case**

Material:	16-gauge, mild steel with textured finish, baked epoxy enamel paint.
Panel:	
Material:	Aluminum (5052-H32)
Thickness:	0.125 in.
Finish:	Tan enamel paint

### **Physical Specifications:**

Weight:	UPS 3000: Approx. 12 lbs. UPS 3110: Approx. 18 lbs. UPS 3210: Approx. 11 lbs.
UPS 3000 Case Dim's:	10.75" wide x 8.9" deep x 4.9" high
UPS 3110 & UPS 3210 Case Dim's:	19" wide x 8.1" deep x 6.9" high

(Case Dimensions excluding front handles).

# UPS3000/UPS3110/UPS3210 Warranty and Return Policy

---

If possible, please save original packing material which is specifically designed for the unit. Should it be necessary to ship the unit back to the factory, a suitable shipping container must be used along with sufficient packing material. If at any time, the instrument must be returned for repair, recalibration or modification, please be sure that a description of the work to be performed is included. Do not put a shipping label on the unit as a shipping container. Some units have been severely damaged this way. This is a delicate, precision instrument. Any damage incurred because of poor packaging procedures will ultimately result in added service charges and longer turn-around times.



*Vent all pressure lines to the atmosphere before shipping.*

When factory service is required, send in only the unit for repair. Retain fittings, manuals, etc. at your facility. However, if there is a problem with a particular part, send in that part with the unit.

If a unit is found to be defective, it may be returned to our repair facility at the following address:

CONDEC  
3 SIMM LANE  
DOOR D, UNIT 2A  
NEWTOWN, CT 06470  
ATTN: PRESSURE PRODUCTS/REPAIR LAB

Each unit's I.D. plate is stamped with a date code (week/year) prior to shipment. Our warranty is twelve (12) months from that date code and includes repair and/or replacement of the unit at our Newtown facilities at no charge. Units subjected to abuse or damaged by external influences, are not covered under warranty.

If the unit is found to be out of warranty, an evaluation charge of not less than fifty (U.S.) dollars (\$50.00) will be charged. Please note on any attached paperwork if a repair estimate is required or if there are any other specific instructions.

Please be explicit as to the nature of the problem and/or its symptoms. Your documentation will save needless time and expense. Also, please include a return shipping address (with a street address) and a contact name with fax and telephone numbers. Contact numbers are necessary to provide a job estimate and in case further questions arise at the factory.

# UPS3000/UPS3110/UPS3210 Return Material Authorization Form

The repair lab is also equipped to do calibrations on our calibrators and pressure standards. Calibrations include a certification and are traceable to N.I.S.T.

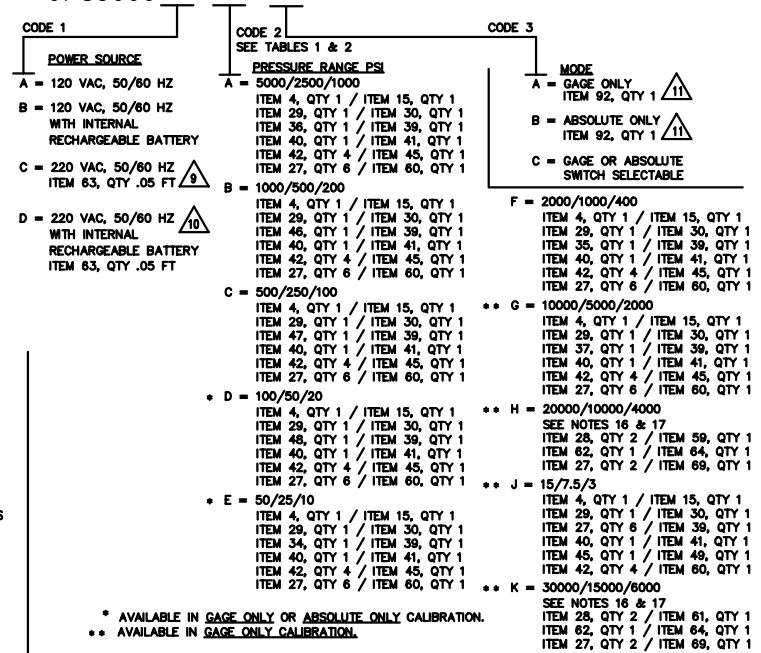
Company Name:	
Street:	
City, State, ZIP:	
Telephone:	
Fax:	
Contact Person:	
MODEL NUMBER:	SERIAL NUMBER:
Problem with Unit (Please Be Specific):	
IS THIS A WARRANTY REPAIR? ( ) YES ( ) NO	
SHIP TO Address:	
Company Name:	
Street:	
City, State, ZIP:	
ATTN:	

CONDEC • 3 SIMM LANE • DOOR D, UNIT 2A • NEWTOWN, CT 06470  
ATTN: PRESSURE PRODUCTS/REPAIR LAB  
TEL: 888-295-8475 • FAX: 203-364-1556 or 715-234-6967  
WEB SITE: [www.4condec.com](http://www.4condec.com)

REVISIONS			
REV	REFERENCE	INIT	DATE
AJ	UPDATED AND REDRAWN ON RLWS FORMAT	JEW	9-12-
AK	ADDED NOTES 18 & 19, ITEMS 93 & 94	JEW	10-3-
AL	REVISED ITEMS 27 & 47	JEW	12-8-
AM	(CONTRACTOR'S REV) 25 PNL / FROM HEAD TO PNL / CHNL	JEW	17/10-

# UPS3000

WIRE CONNECTIONS FROM TRANSDUCER, ITEM 38, TO CPU BOARD, ITEM 6 OR 75 FOR TRANSDUCER P/N'S SEE TABLE 2		
SIGNAL NAME	COLOR	TERMINAL BOARD
+ INPUT	GREEN	TB1-4
+ OUTPUT	WHITE	TB1-5
-OUTPUT	RED	TB1-6
-INPUT	BLACK	TB1-7



- NOTES:
- IF NON-STANDARD INSTRUMENT CONFIGURATIONS ARE SUPPLIED, THE NORMAL LETTER CODING SYSTEM WILL BE MARKED, IN ADDITION TO AN ELS NUMBER USED TO UNIVELY DEFINE THE MODIFIED UNIT.
  - STAMP IDENTIFICATION PLATE, (ITEM 20), WITH MODEL NO., VOLTAGE, AND OTHER APPLICABLE INFORMATION.
  - FOR UPS3000 PRESSURE STANDARD INSTRUMENT AVAILABLE OPTIONS, SEE 5771, C SIZE DRAWING.
  - SHIP SEPARATELY ONE EACH OF THE FOLLOWING: NUT (ITEM 45) AND SLEEVE (ITEM 4) TO REPLACE CAP, (ITEM 15), AT TIME OF INSTALLATION.
  - EPROM, ITEM 13, U11 OF CPU ASSEMBLY TO BE PROGRAMMED PER TABLE 2, OR PER CUSTOMER REQUIREMENTS AS SPECIFIED ON SALES ORDER. MARK EPROM LABEL, (ITEM 43), WITH PROGRAM, VERSION AND DATE. THEN APPLY TO EPROM U11 AND INSTALL WITHIN UNIT.
  - AT INSTALLATION OF POWER SUPPLY ASSEMBLY, ITEM 78, HEATSHNK, P/N 55246, IS TO BE REMOVED AND DISCARDED.
  - INSTALL GAIN RESISTOR, (ITEM 66), ON CPU ASSEMBLY, (ITEM 6 OR 75), AT R23 LOCATION.
  - RESISTOR, (ITEM 67), MUST BE INSTALLED BETWEEN TB1-3 & TB1-7 ON CPU ASSEMBLY, (ITEM 6 OR 75).
  - FOR 220 VAC: REMOVE JUMPERS ON TRANSFORMER, (PART OF CPU ASSEMBLY ITEM 6), BETWEEN PINS 1 & 3 AND 2 & 4. THEN ADD JUMPER BETWEEN PINS 2 & 3. RE-MARK BOARD PART NUMBER: **K0K8924-5**(54276)
  - FOR 220 VAC WITH BATTERY: CUT CLAD ON CIRCUIT SIDE OF POWER SUPPLY ASSEMBLY. (ITEM 78), AS SHOWN ON ASSEMBLY DRAWING, 56723. ADD JUMPER WIRE, (ITEM 63), BETWEEN E3 & E4 ON ITEM 78. RE-MARK BOARD PART NUMBER: **K0K8924-3**(56729)
  - NAMEPLATE (ITEM 92) TO BE USED TO COVER ABS-GAGE ON FRONT PANEL SWITCH WHEN USING CODE 3, MODE A OR B.
  - APPLY SCOTCH ADHESIVE TRANSFER TAPE (ITEM 89) TO PAPER SIDE OF INSULATOR, (ITEM 86), IN ENOUGH QUANTITY TO SECURE TO TOP OF TRANSFORMER.
  - STAMP CALIBRATION LABEL, (ITEM 20), WITH NAME OF TECHNICIAN, DATE CALIBRATED, AND RECALIBRATION DATE, ONE YEAR FROM DATE CALIBRATED.
  - FOR REFERENCE ONLY: WHEN OPTIONAL EXPANDER BOARD ASSEMBLY (ITEM 70) OR (ITEM 71) IS USED, DISCARD HOLE PLUG (ITEM 9), ALSO, ONE EACH OF ITEMS 14, 53, AND 58 WOULD BE REQUIRED FOR INSTALLATION BY THE CUSTOMER.
  - FOR REFERENCE ONLY: WHEN CABLE ASSEMBLY, (ITEM 72) QTY 1, IS USED, DISCARD HOLE PLUG, (ITEM 24), ALSO, ONE OF ITEM 73 WOULD BE REQUIRED FOR INSTALLATION BY THE CUSTOMER.
  - TRANSDUCER, (ITEM 38) TO BE LOCATED IN J1 POSITION FOR NON-BATTERY UNITS AND J2 POSITION FOR BATTERY UNITS.
  - SEE FIGURE 1, ON SHEET 2, FOR REMOVAL OF APPLICABLE J POSITION.
  - INSTALL I/O EXPANDER, (ITEM 83), INTO SOCKET XU10 ON CPU ASSEMBLY, (ITEM 6 OR 75).
  - INSTALL EEPROM, (ITEM 94), INTO SOCKET XU22 ON CPU ASSEMBLY, (ITEM 6 OR 75).

\* AVAILABLE IN GAGE ONLY OR ABSOLUTE ONLY CALIBRATION.  
 \*\* AVAILABLE IN GAGE ONLY CALIBRATION.

PART NO. CODE	TRANSDUCER ITEM 38	EPROM U11 PROGRAM SEE NOTE 5
UPS3000	JA	58842 KAH-10A
UPS3000	AB	58839 KAH-10A
UPS3000	AC	58839 KAH-10A
UPS3000	BA	58788 KAH-10A
UPS3000	BB	58794 KAH-10A
UPS3000	BC	58794 KAH-10A
UPS3000	CA	58845 KAH-10A
UPS3000	CB	58814 KAH-10A
UPS3000	CC	58814 KAH-10A
UPS3000	DA	58772 KAH-10A
UPS3000	DB	58803 KAH-10A
UPS3000	DC	N/A N/A
UPS3000	EA	58764 KAH-10A
UPS3000	EB	58768 KAH-10A
UPS3000	EC	N/A N/A
UPS3000	FA	58835 KAH-10A
UPS3000	FB	58820 KAH-10A
UPS3000	FC	58820 KAH-10A
UPS3000	GA	58797 KAH-10A
UPS3000	GB	N/A N/A
UPS3000	GC	N/A N/A
UPS3000	HA	58753 KAH-10A
UPS3000	HB	N/A N/A
UPS3000	HC	N/A N/A
UPS3000	JA	58746 KAH-10B
UPS3000	KA	57299 KAH-10G

QTY	ITEM NO.	DESCRIPTION	ITEM NO.	QTY	REMARKS
1	50	CABLE ASSEMBLY, RED LED	57072		
1	49	LABEL, RANGE SELECT PSI	64054		3/7.5/15
1	48	LABEL, RANGE SELECT PSI	63898		20/50/100
1	47	LABEL, RANGE SELECT PSI	63653		100/250/500
1	46	LABEL, RANGE SELECT PSI	53617		200/500/1000
1	45	FITTING, NUT 1/4 NPT SST	59787		NOTE 4
1	44	CABLE, FILTER	55561		
1	43	LABEL, EPROM .5 X .8	55698		NOTE 5
1	42	SCREW, SEMS PH	44251		#6-32 X 3/8 LG
1	41	SEAL, CHEAT PAD	54854		
1	40	FITTING, AN ADAPTER	59839		
1	39	FASTENER, BULKHEAD 1/4 NPT	59712		
1	38	TRANSDUCER			SEE TABLES 1 & 2
1	37	LABEL, RANGE SELECT PSI	65915		2000/5000/10000
1	36	LABEL, RANGE SELECT PSI	58164		1000/2500/5000
1	35	LABEL, RANGE SELECT PSI	64984		400/1000/2000
1	34	LABEL, RANGE SELECT PSI	64081		10/25/50
1	33	OVERLAY, ADHESIVE	56453		
1	32	LABEL, 3 POSITION BLANK	56654		
1	31	PLATE, FILLER	58793		
1	30	PLATE, COVER	59299		SEE TABLE 1
1	29	WASHER, BELLVILLE 7/16	58445		
1	28	SCREW, MACH PN HD	14859		#8-32 X 5/16 LG
1	27	NUT, KEPS	14821		#8-32
1	26	LIT, MANUAL	63253		
2	25	FASTENER, CAPTIVE FR PNL	68916		#6-32
1	24	PLUG, HOLE .50 DIA	54714		
4	23	FOOT, SQ ADHESIVE BACK	19433		
A/R	22	COMPOUND, THERMAL	60858		
12	10	21 SCREW, SEMS PH	14839		#6-32 X 1/4 LG
2	2	20 LABEL, ID/CALIBRATION	53308		
1	1	19 LENS, GAGE	56622		
1	1	18 LENS, ABS	56618		
1	1	17 ADAPTER, CONTROL KNOB	59298		1/4 TO 3/16
1	1	16 KNOB, CONTROL 1/4 SHAFT	54634		
1	15	CAP, PROTECTIVE	60870		NOTE 4
REF	REF	14 CONN, MS 5 POSITION FEM	54625		NOTE 14
1	1	13 IC, EPROM BLANK 27C256	16204		
1	1	12 CABLE, PRESSURE RANGE	56014		
1	1	11 LINE FILTER, EMI 3 SPADE	16425		
1	1	10 CORD, POWER	15438		
1	1	9 PLUG, BUTTON	19568		
1	1	8 PLATE, COVER SETPOINT	19568		
1	1	7 DISPLAY BOARD ASSEMBLY	55954		
1	1	6 CPU ASSEMBLY	54256		NOTE 5
1	1	5 PANEL, FRONT SWITCH	56519		
1	1	4 FITTING, SLEEVE	59776		NOTE 4
1	1	3 FRONT PLATE	58181		
1	1	2 CHASSIS ASSEMBLY	19547		
1	1	1 CASE, PROTECTIVE	19580		

LIST OF MATERIALS (CONTINUED ON SHEET 3)

B OR D	A OR C	ITEM NO.	QTY	ITEM NO.	DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS

REFERENCE: UPS3000

UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES

ALL DIMENSIONS APPLICABLE AFTER TREATMENT

FINISH: SURFACE 2 P.L.C. DECIMAL, 3 P.L.C. ANGLE

TOLERANCES: SURFACE 2 P.L.C. DECIMAL, 3 P.L.C. ANGLE

THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PRODUCTS AND/OR ITS CUSTOMER'S ORDER. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.

ASSEMBLY, UNIVERSAL PRESSURE STANDARD

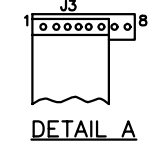
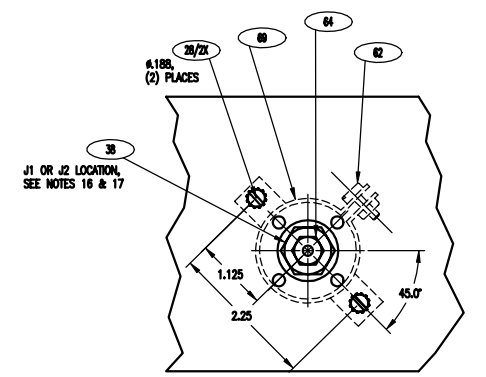
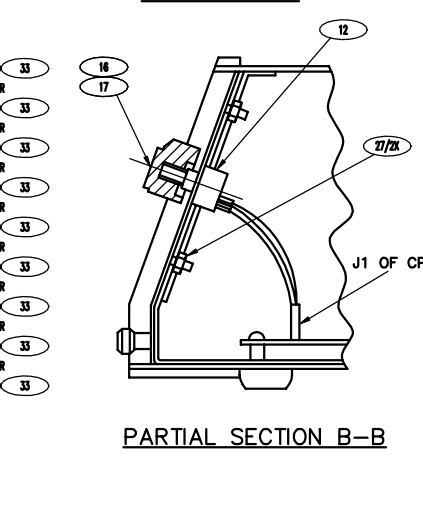
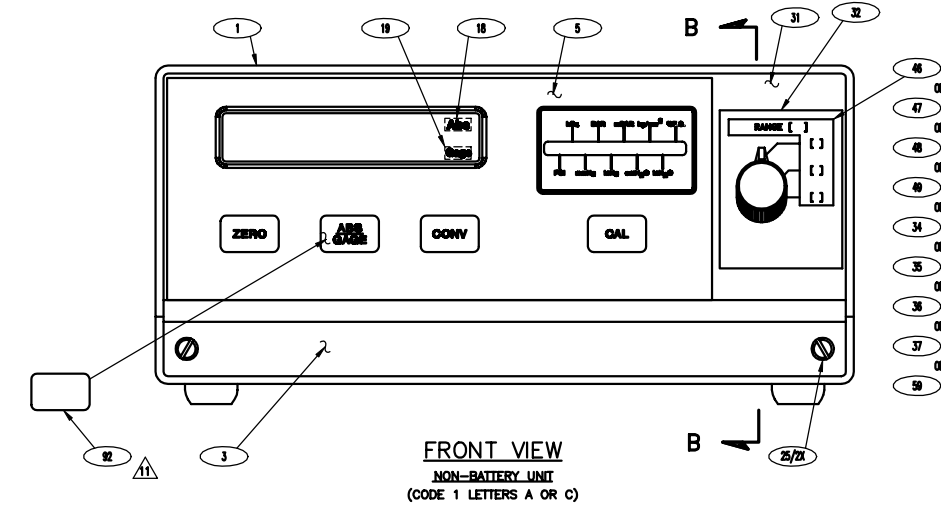
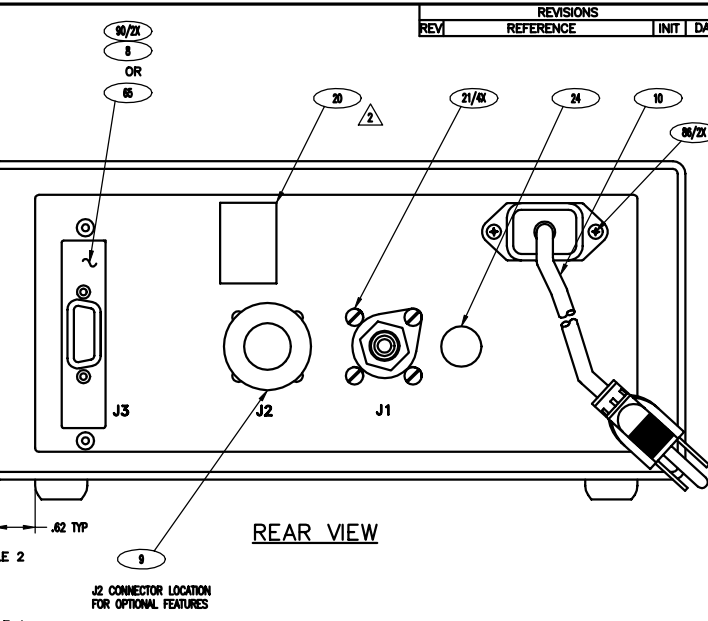
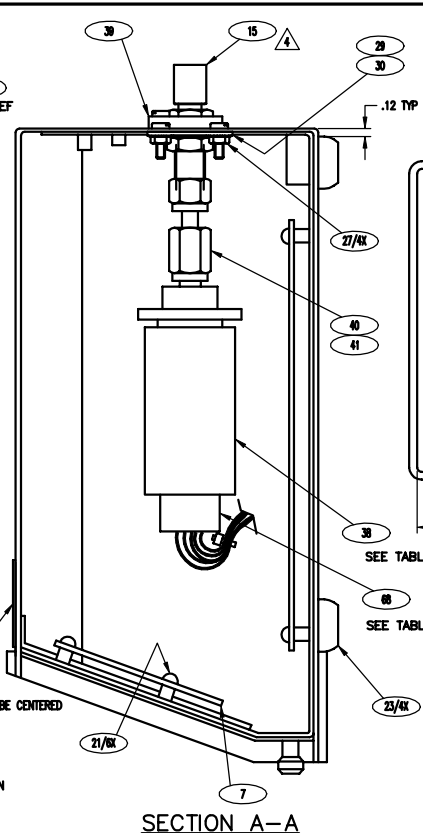
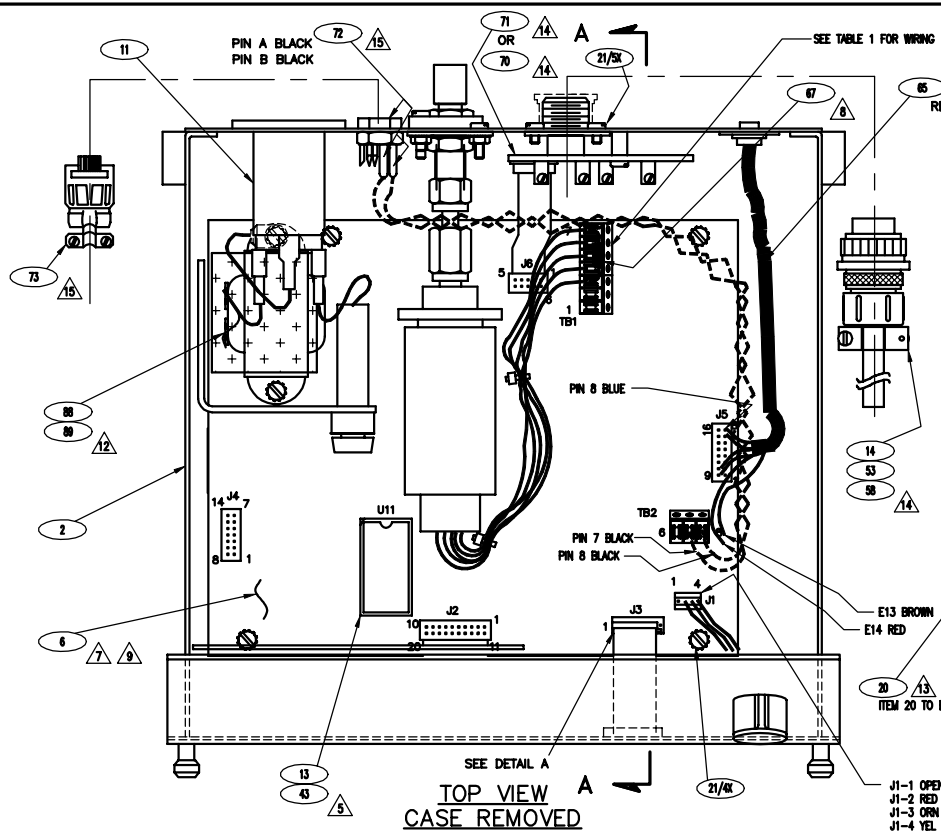
J.WELSH INC. J.WELSH INC. J.WELSH INC. J.WELSH INC.

DATE: 9-8-2004

REV: 3

REVISED: 56698

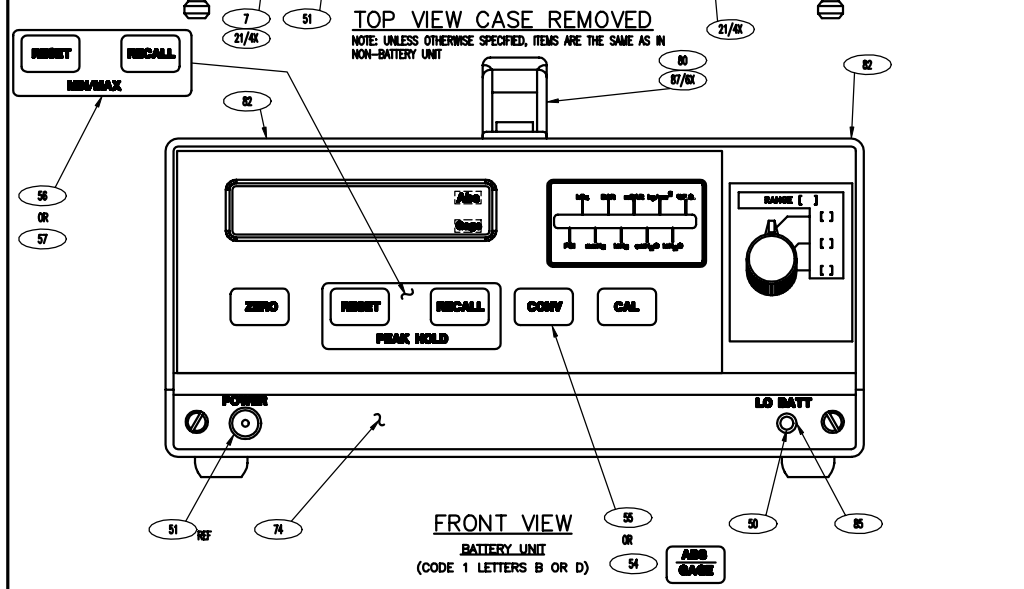
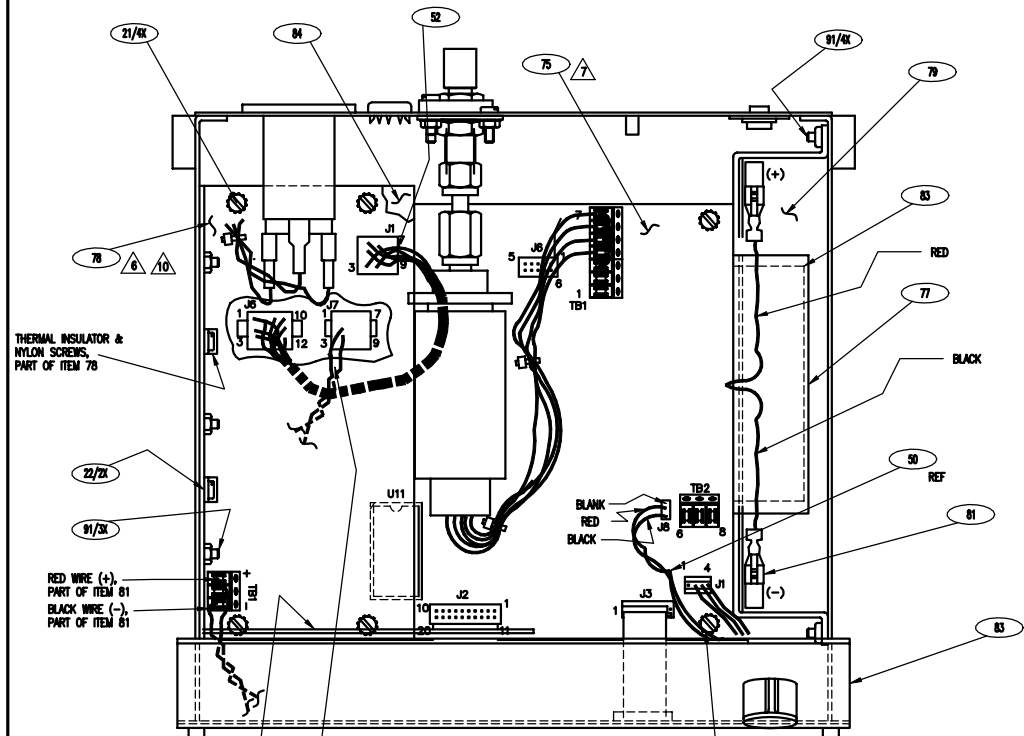
REVISIONS		
REV	REFERENCE	INIT DATE



**PARTIAL REAR VIEW FIGURE 1**  
(UPS3000[HA] & UPS3000[KA])  
SHOWING REQUIRED REWORK  
FOR INSTALLATION OF ITEM 38

REFERENCE UPS3000	UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES ALL DIMENSIONS APPLICABLE AFTER TREATMENT DIMENSIONS IN PARENT PARENTHESES	THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS, INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PRODUCTS AND/OR ITS CUSTOMER'S ORDER. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.
MATERIAL	SURFACE FINISH	<b>ASSEMBLY, UNIVERSAL PRESSURE STANDARD</b>
TREATMENT	TOL. DECIMAL	
DRILLING	PLC	DATE
THIRD ANGLE PROJECTION	ANGLE	REV. NO.
APPROVED	J. WELSH	J. WELSH
DATE	J. WELSH	DATE
	J. WELSH	SCALE
	J. WELSH	SHEET
	J. WELSH	TOTAL
	J. WELSH	REVISED

REVISIONS		
REV	REFERENCE	INIT   DATE



1	1	94	IC, EEPROM	54821	U22	NOTE 19	XD1222
1	1	93	IC, I/O EXPANDER	54179	U10	NOTE 18	82C43
-	-	92	NAMEPLATE, BLANK	54056			
6	-	91	SCREW, FLAT HD	60784			#4-40 X 1/4 LG
2	2	90	RIVET, POP 1/8" X .32 LG	54218	ALUMINUM		
-	.1'	89	TAPE, ADHESIVE TRANSFER	60759		NOTE 12	
-	1	88	INSULATOR, DIELECTRIC	57300		NOTE 12	
6	-	87	RIVET, POP BUTTON HD	64508	SST		
2	2	86	SCREW, FLAT HD	57660			#4-40 X 3/8 LG
1	-	85	HOUSING, LED LAMP	55828	T 1-3/4		
1	-	84	SUPPORT, POWER SUPPLY	54131			
.3'	-	83	GASKET TAPE	57822			
1	-	82	MOD, PROTECTIVE CASE ASSEMBLY	55162			
1	-	81	CABLE ASSEMBLY	56364			
1	-	80	HANDLE	54610		SEE TABLE 1	
1	-	79	BATTERY, 12V, 2.2 AMPHR	55844			
1	-	78	BOARD ASSEMBLY, POWER SUPPLY	58723		SEE NOTES 6 & 10	
1	-	77	BRACKET, BATTERY SUPPORT	56079			
1	1	76	CARTON, 15.04 X 12.08 X 12.08	10066			
1	-	75	BOARD ASSEMBLY CPU & BATTERY	59052		NOTE 10	
1	-	74	FRONT PLATE MOD	59914			
REF	REF	73	CONNECTOR, PLUG MIN HEX	58505		NOTE 15	
REF	REF	72	CABLE ASSEMBLY, MIN HEX CONN	55780		NOTE 15	
REF	REF	71	ASSEMBLY, EXPANDER BOARD	57999		NOTE 14	
REF	REF	70	ASSEMBLY, EXPANDER BOARD	58004		NOTE 14	
-	-	69	BRACKET, TRANSDUCER	58285			
1	1	68	CABLE, TRANSDUCER	65016		TABLE 1	12 IN LONG
1	1	67	RESISTOR, COMPENSATION	55475		NOTE 8	200 OHM, ±1%
1	1	66	RESISTOR, GAIN FIXED FILM	58260		NOTE 7	1K OHM, ±1%
REF	REF	65	KIT, CONTROLLER INTERFACE	55576			
-	-	64	FITTING, HIGH PRESSURE	59802			
-	-	63	WIRE, COPPER SILVER PLATED	16204	#22 AWG	BLACK	
-	-	62	SCREW, MACH PN HD	60804			#8-32 X 1/2 LG
-	-	61	LABEL, RANGE SELECT PSI	59257			6000/15000/30000
-	-	60	FITTING, AN BULKHEAD UNION	59707			
-	-	59	LABEL, RANGE SELECT PSI	63934			4000/10000/20000
REF	REF	58	CONN, BOOT SMALL MS RUBBER	15744		NOTE 14	
REF	REF	57	NAMEPLATE, SWITCH RESET	58000		SEE NOTES 1 & 3	MIN/MAX
REF	REF	56	NAMEPLATE, SWITCH RESET	54234		SEE NOTES 1 & 3	PEAK HOLD
REF	REF	55	NAMEPLATE, CONV	55151		SEE NOTES 1 & 3	CONV
REF	REF	54	NAMEPLATE, ABS/GAGE	55155		SEE NOTES 1 & 3	ABS/GAGE
REF	REF	53	CONN, CABLE CLAMP	57854		NOTE 14	
1	-	52	CABLE ASSEMBLY, POWER SUPPLY	55027			
1	-	51	SWITCH CABLE ASSEMBLY	55351			

LIST OF MATERIALS (CONTINUED FROM SHEET 1)

REFERENCE: UFS300

UNLESS OTHERWISE SPECIFIED  
UNITS TO BE INCHES  
ALL DIMENSIONS APPLICABLE AFTER TREATMENT  
SURFACE FINISH UNLESS OTHERWISE SPECIFIED

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MATERIAL	TREATMENT	TOLERANCE	DECIMAL	ANGLE	TITLE	DWG NO.
---	---	---	---	---	ASSEMBLY, UNIVERSAL PRESSURE STANDARD	56698

TWO HOLE PROJECTION  
OFFICIAL APPROVED  
DATE: 9-8-2004

J.WELSH  
J.WELSH  
J.WELSH

REV. JEW  
REV. WELSH

RICE LAKE WEIGHING SYSTEMS  
9-8-2004

SCALE: N/A  
SHEET: 3 OF 3

REVISION: AM

UPS3110

CODE 1

CODE 2

CODE 3

POWER SOURCE SEE TABLE 1  
A=120 VAC

PRESSURE RANGE (PSI) SEE TABLES 1&3  
A=5000/2500/1000

MODE  
A=GAGE ONLY

SEE NOTE 14  
THE FOLLOWING ITEMS QTY (1)  
80,81,146  
ITEM 149 , QTY 3.35FT  
ITEM 150 , QTY 0.1FT  
ITEM 60, QTY (16)

USE QTY REQD COLUMN B  
SEE NOTE 13  
THE FOLLOWING ITEMS QTY (1)  
105,118  
ITEM 124, QTY 3 FT.

SEE NOTE 9  
ITEM 91,QTY (1)  
B=ABSOLUTE ONLY  
SEE NOTE 9  
ITEM 91,QTY (1)

B=1000/500/200

C=ABSOLUTE OR GAGE

RECHARGEABLE BATTERY  
THE FOLLOWING ITEMS QTY (1)  
71,81,82,84 THRU 90  
120,121,125,144,145  
ITEM 60,QTY (21)  
ITEM 70,QTY (2)  
ITEM 72,QTY (5)  
ITEM 73,QTY (2)  
ITEM 149 , QTY 0.05FT

SEE TABLE 2 SEE NOTE 4  
THE FOLLOWING ITEMS QTY (1)  
99,103,115

C=500/250/100  
SEE TABLE 2 SEE NOTE 4  
THE FOLLOWING ITEMS QTY (1)  
98,102,116

C=220 VAC  
SEE NOTES 6A & 14  
THE FOLLOWING ITEMS QTY (1)  
80,81,146  
ITEM 149 , QTY 3.4FT  
ITEM 150 , QTY 0.1FT  
ITEM 60, QTY (16)

\*D=100/50/20  
SEE TABLE 2 SEE NOTES 4 & 15  
THE FOLLOWING ITEMS QTY (1)  
97,117, 127

D=220 VAC WITH INTERNAL  
RECHARGEABLE BATTERY  
SEE NOTE 6B  
ITEM 60, QTY (21)  
THE FOLLOWING ITEMS QTY (1)  
71,81,82,84 THRU 90  
120,121,125,144,145  
ITEM 70,QTY (2)  
ITEM 72,QTY (5)  
ITEM 73,QTY (2)  
ITEM 149 , QTY 0.05FT

\*E=50/25/10  
SEE TABLE 2 SEE NOTES 4 & 15  
THE FOLLOWING ITEMS QTY (1)  
96,101,117

F=2000/1000/400  
SEE TABLE 2 SEE NOTE 4  
THE FOLLOWING ITEMS QTY (1)  
100,104,114

\*\*G=10000/5000/2000  
USE QTY REQD COLUMN B  
SEE NOTE 13  
THE FOLLOWING ITEMS QTY (1)  
106,119  
ITEM 143, QTY 3 FT

\*\*J=15/7.5/3  
USE QTY REQD COLUMN D  
SEE NOTES 4 & 15  
THE FOLLOWING ITEMS QTY (1)  
126,157,158,159

K=15/30"H g/760 MM g  
OBSOLETE FOR NEW DESIGN

TABLE 2

Table with 25 columns: REGULATOR STYLE, USE CODE 2 QTY REQD COLUMN, USE DWG SHEET CODE 1 LTRS A OR C B OR D, ITEMS AND QUANTITIES REQUIRED IN ADDITION TO CODE 2 QTY REQD (13-164).

TABLE 3: Mapping between PT. NO. CODE, XDUCTOR (ITEM 50) PART NO., and EPROM PROGRAM. Includes entries for AA through JA and KA.

LIST OF MATERIALS CONTINUED LIST SHEET MATERIALS. Table with columns for QTY, REF, ITEM NO., DESCRIPTION, PART OR IDENTIFYING NO., SPEC, MATERIAL OR NOTE, and REMARKS.

REVISIONS table with columns: REV, REFERENCE, INIT, DATE. Lists revision 1 through 11.

TABLE 1: Selection matrix for pressure range and regulator style (e.g., UPS3110AB, ACC, AFD, etc.) mapping to item quantities (ITEM 78, 79).

\*\*\* DRILL TEST PORT TO .890 DIA

Engineering specification block including REF. NO. UPS3110, UNLESS OTHERWISE SPECIFIED, SURFACE FINISH, and a signature block for J. WELSH and YOUNG dated 7/12/90.







REVISIONS		
REV	REFERENCE	INIT / DATE

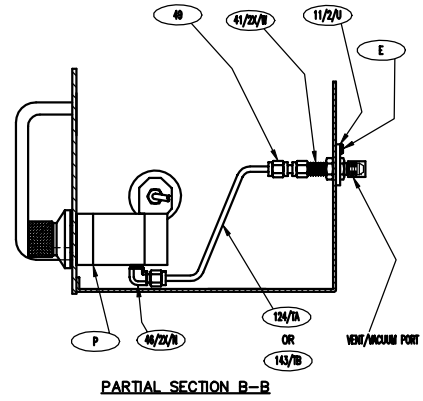
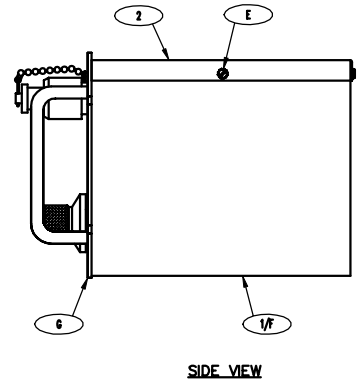
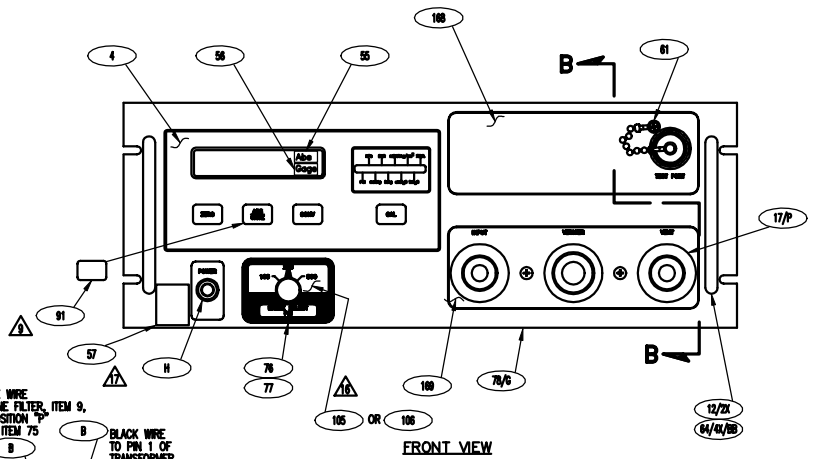
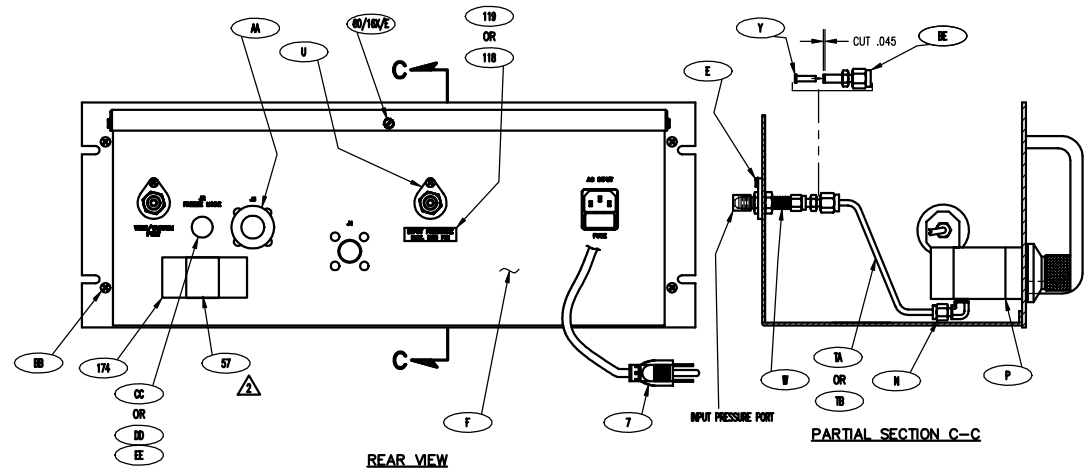
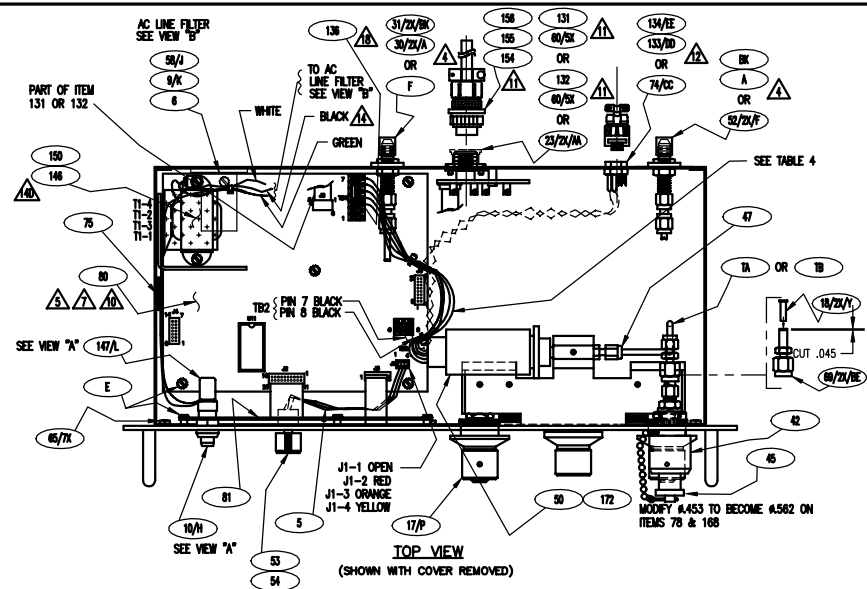


TABLE 4 WIRE CONNECTIONS TRANSDUCER TO TB1

SIGNAL NAME	WIRE COLOR	CPU, ITEM 80 OR 82 TERMINAL BLOCK
+INPUT	GREEN	TB1-4
+OUTPUT	WHITE	TB1-5
-OUTPUT	RED	TB1-6
-INPUT	BLACK	TB1-7
TEMP SENSE IF APPLICABLE	BLUE	TB1-3

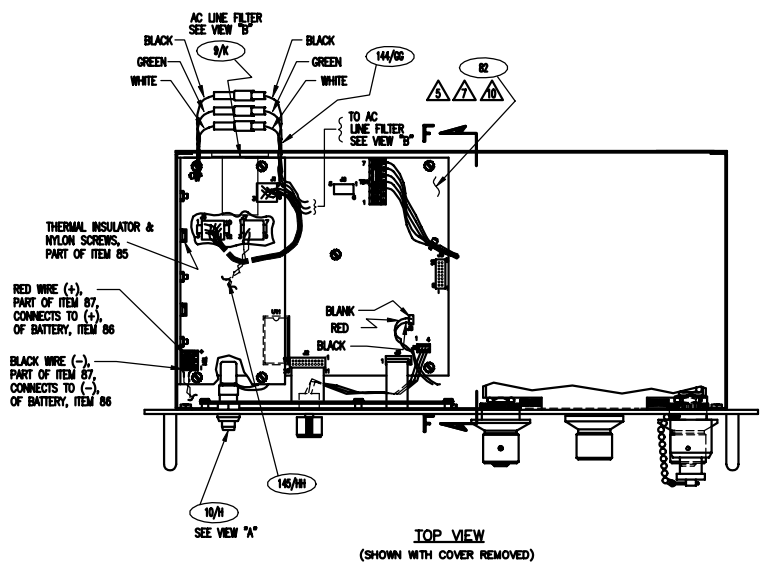
USE THIS SHEET FOR HIGH PRESSURE  
USE QUANTITY REQUIRED COLUMN "B"

UPS310 [A] 5000 PSI  
UPS310 [B] 10000 PSI

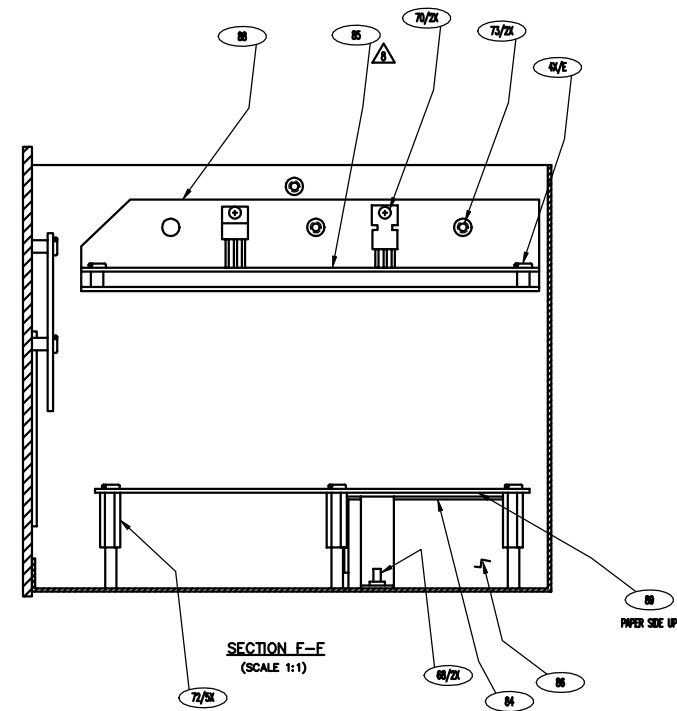
REF. NO. UPS310

MATERIAL	N/A	TOLERANCES UNLESS OTHERWISE SPECIFIED FINISH DECIMAL FRACTIONS ANGLES	TITLE ASSEMBLY, RACK MOUNT UNIVERSAL PRESSURE STANDARD INSTRUMENT	DWG NO 54850
	TREATMENT N/A			
UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES ALL THREADS TO BE CLASS 2 ALL DIMENSIONS APPLICABLE AFTER TREATMENT DO NOT SCALE DRAWING TOLERANCES ROUNDING UNLESS OTHERWISE SPECIFIED		THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PROPOSAL AND/OR ITS CUSTOMER'S ORDER. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.		
DESIGNED BY J. WELSH	CHECKED BY J. WELSH	DATE 7/12/90	SCALE 1:2	REVISED BY 4 9 7
APPROVED BY YOUNG		RICE LAKE WEIGHING SYSTEMS STANDARD INSTRUMENT		

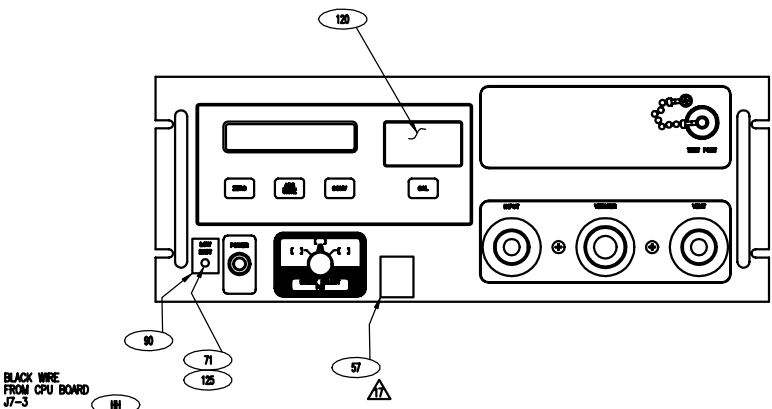
REVISIONS		
REV	REFERENCE	INIT   DATE



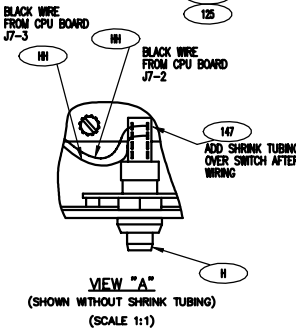
TOP VIEW  
(SHOWN WITH COVER REMOVED)



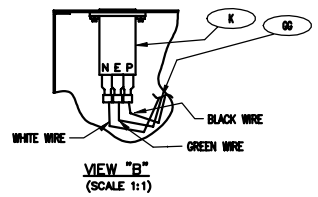
SECTION F-F  
(SCALE 1:1)



FRONT VIEW



VIEW "A"  
(SHOWN WITHOUT SHRINK TUBING)  
(SCALE 1:1)



VIEW "B"  
(SCALE 1:1)

USE THIS SHEET FOR ALL BATTERY UNITS  
NOTE: UNLESS OTHERWISE SPECIFIED, ITEMS ARE THE SAME AS NON-BATTERY UNITS.

REF. NO. UPS3110	UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES: ALL DIMENSIONS APPLICABLE AFTER TREATMENT UNLESS OTHERWISE SPECIFIED		THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PRODUCTS AND/OR ITS CUSTOMERS' ORDERS. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.	
MATERIAL N/A	TOR. FIN. USE ONLY N/A	SURFACE FINISH 2 P.L.C. --- 3 P.L.C. ---	TOL. DECIMAL --- ---	TITLE ASSEMBLY, RACK MOUNT UNIVERSAL PRESSURE STANDARD INSTRUMENT
THIRD ANGLE PROJECTION APPROVED SPECIFIED	J. WELSH YOUNG	DATE SL/GN 7/12/90	SCALE 1:2	DWG. NO. 54850 REVISION R

REVISIONS		
REV	REFERENCE	INIT   DATE

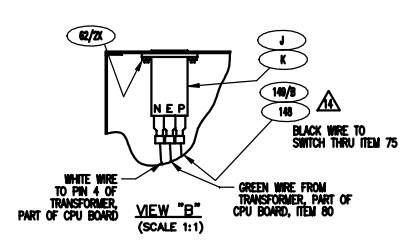
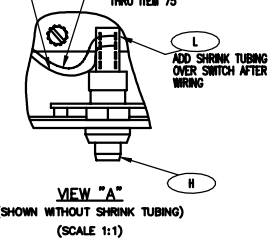
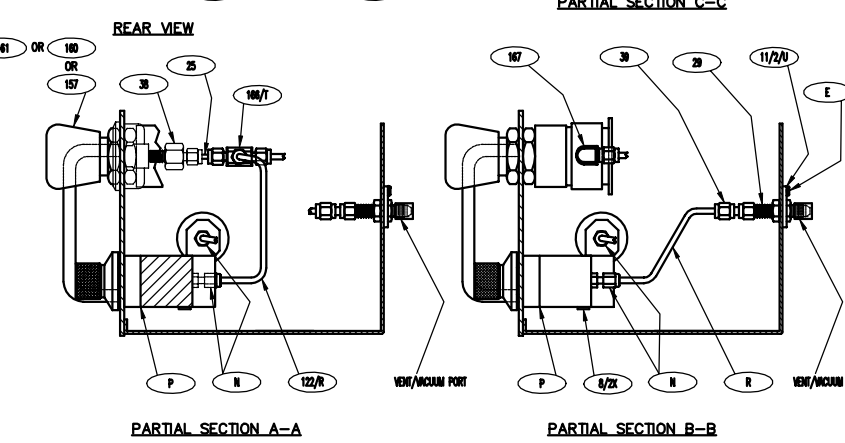
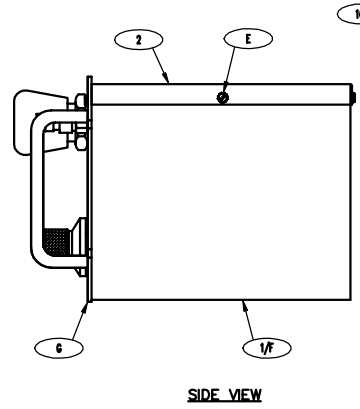
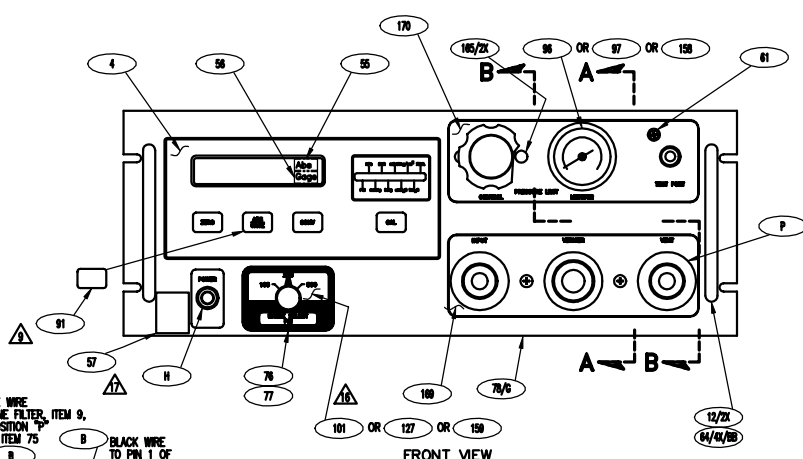
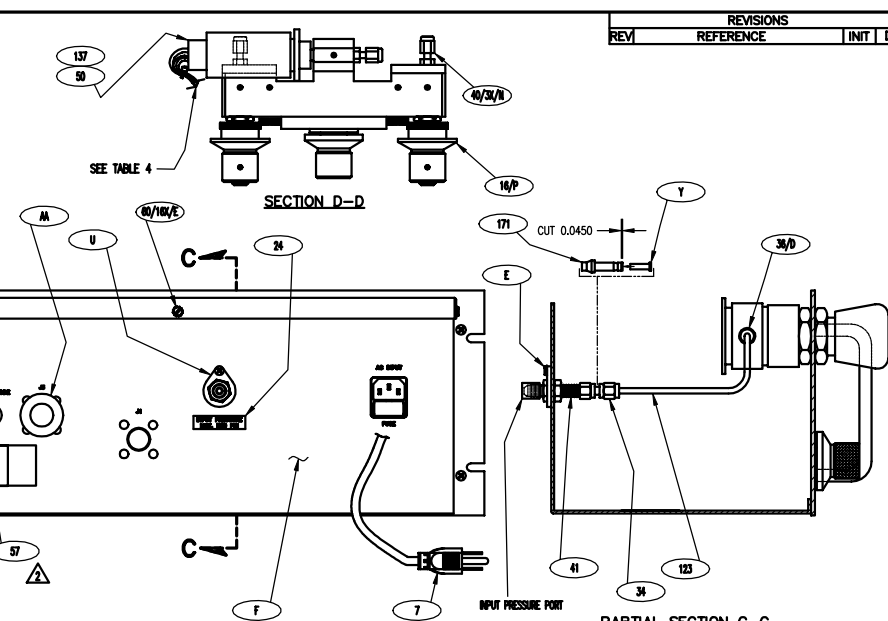
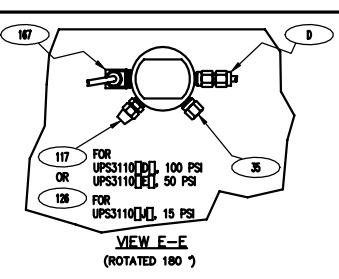
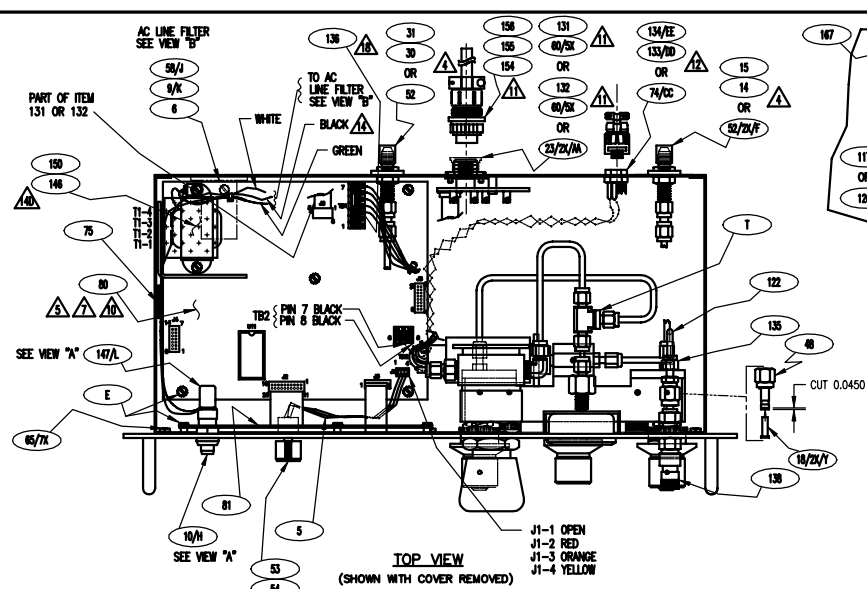


TABLE 4 WIRE CONNECTIONS TRANSDUCER TO TB1

SIGNAL NAME	WIRE COLOR	CPU, ITEM 80 OR B2 TERMINAL BLOCK
+INPUT	GREEN	TB1-4
+OUTPUT	WHITE	TB1-5
-OUTPUT	RED	TB1-6
-INPUT	BLACK	TB1-7
TEMP SENSE IF APPLICABLE	BLUE	TB1-3

USE THIS SHEET FOR LOW PRESSURE  
USE QUANTITY REQUIRED COLUMN "Y"

UPS3110[D], 100 PSI  
UPS3110[E], 50 PSI  
UPS3110[L], 15 PSI

REF. NO. UPS3110

MATERIAL	TREATMENT	FINISH	TOL.	DECIMAL	PLC.	PLC.	ANGLE	DRILL	DRILL	DRILL
N/A	N/A									

UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES  
ALL THREADS TO BE CLASS 2  
ALL DIMENSIONS APPLICABLE AFTER TREATMENT  
DRILL HOLE TOLERANCES UNLESS OTHERWISE SPECIFIED  
SURFACE FINISH 2 PLZ  
SURFACE FINISH 3 PLZ  
ANGLE  
DRILL  
DRILL  
DRILL

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ASSEMBLY, RACK MOUNT UNIVERSAL PRESSURE STANDARD INSTRUMENT

RICE LAKE WEIGHING SYSTEMS  
SCALE 1:2  
DATE 7/12/90  
REV 6  
PAGE 9  
R

DWG NO. 54850



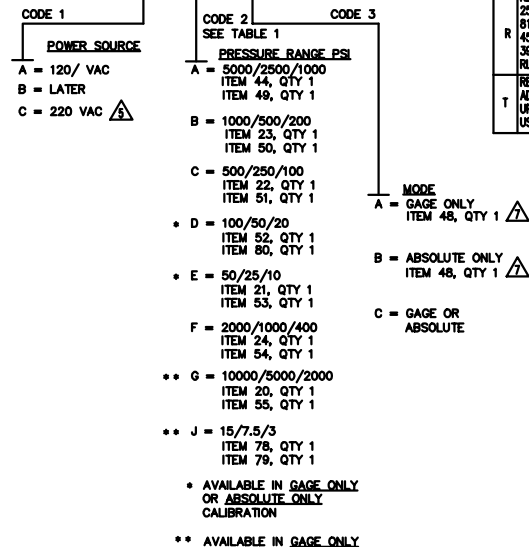
NOTES:

- 1 IF NON-STANDARD INSTRUMENT CONFIGURATIONS ARE SUPPLIED, THE NORMAL LETTER CODING SYSTEM WILL BE REPLACED BY THE MANUFACTURER WITH A TWO-DIGIT NUMBER USED TO UNIQUELY DEFINE THE MODIFIED UNIT. EXAMPLE: UPS3210-11
- △ STAMP IDENTIFICATION PLATE, (ITEM 14), WITH MODEL NO., VOLTAGE, AND OTHER APPLICABLE INFORMATION.
- 3 FOR UPS3210 PRESSURE STANDARD INSTRUMENT AVAILABLE OPTIONS, SEE 57771 DRAWING.
- △ INSTALL EEPROM, ITEM 45, INTO SOCKET XU22 ON CPU ASSEMBLY, ITEM 6.
- △ FOR 220 VAC: REMOVE JUMPERS ON TRANSFORMER, (PART OF CPU ASSEMBLY ITEM 6), BETWEEN PINS 1 & 3 AND 2 & 4. THEN ADD JUMPER BETWEEN PINS 2 & 3. RE-MARK BOARD PART NUMBER: ~~5E18924-5~~.
- △ EPROM, ITEM 9 U11, OF CPU ASSEMBLY TO BE PROGRAMMED PER TABLE 1, OR PER CUSTOMER REQUIREMENTS AS SPECIFIED ON SALES ORDER. MARK EPROM LABEL, (ITEM 81), WITH PROGRAM, VERSION AND DATE. THEN APPLY TO EPROM U11 AND INSTALL WITHIN UNIT.
- △ NAMEPLATE (ITEM 48) TO BE USED TO COVER ABS-GAGE ON FRONT PANEL SWITCH WHEN USING CODE 3, MODE A OR B.
- △ INSTALL I/O EXPANDER, ITEM 36, INTO SOCKET XU10 ON CPU ASSEMBLY, ITEM 6.
- 9 FOR REFERENCE ONLY: WHEN OPTIONAL EXPANDER BOARD ASSEMBLY (ITEM 66) OR (ITEM 67) IS USED, DISCARD HOLE PLUG (ITEM 37). ALSO, ONE EACH OF ITEMS 68, 69, AND 70 WOULD BE REQUIRED FOR INSTALLATION BY THE CUSTOMER.
- 10 FOR REFERENCE ONLY: WHEN CABLE ASSEMBLY, (ITEM 64) QTY 1, IS USED, DISCARD HOLE PLUG, (ITEM 61). ALSO, ONE OF ITEM 65 WOULD BE REQUIRED FOR INSTALLATION BY THE CUSTOMER.
- 11 SHIP SEPARATELY ONE EACH OF THE FOLLOWING: NUT (ITEM 43) AND SLEEVE (ITEM 42) TO REPLACE CAP, (ITEM 71), AT TIME OF INSTALLATION.
- 12A REMOVE BLACK WIRE FROM TRANSFORMER TO FUSE. REMOVE FUSE AND HOLDER (DISCARD). REMOVE BLACK WIRE WITH MATE-N-LOK (DISCARD).
- 12B
- 12C ADD TWO BLACK WIRES (ITEM 56) 20 IN. LONG AS SHOWN ON SHEET 2 IN VIEW "A". ADD LUG (ITEM 56) TO BLACK WIRE GOING TO LINE FILTER.
- 12D APPLY SCOTCH ADHESIVE TRANSFER TAPE (ITEM 63) TO PAPER SIDE OF INSULATOR, (ITEM 62), IN ENOUGH QUANTITY TO SECURE TO TOP OF TRANSFORMER.
- △ LABEL BACKGROUND TO BE DARK TAN.
- △ STAMP CALIBRATION LABEL, (ITEM 14), WITH NAME OF TECHNICIAN, DATE CALIBRATED, AND RECALIBRATION DUE DATE, ONE YEAR FROM DATE CALIBRATED.
- 15 INSTALL GAIN RESISTOR, (ITEM 59), ON CPU ASSEMBLY, (ITEM 6), AT R23 LOCATION.
- △ RESISTOR, (ITEM 60), MUST BE INSTALLED BETWEEN TB1-3 & TB1-7 ON CPU ASSEMBLY, (ITEM 6).

QTY REQD	ITEM NO.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
1	57	CLAMP, FLAT CABLE	56972			
1	56	FEMALE DISCONNECT	31218		NOTE 12C	
REF	55	LABEL, CAPACITY	56437		NOTE 13	10000/5000/2000
REF	54	LABEL, CAPACITY	56446		NOTE 13	2000/1000/400
REF	53	LABEL, CAPACITY	56448		NOTE 13	50/25/10
REF	52	LABEL, CAPACITY	56450		NOTE 13	100/50/20
REF	51	LABEL, CAPACITY	56457		NOTE 13	500/250/100
REF	50	LABEL, CAPACITY	56460		NOTE 13	1000/500/200
REF	49	LABEL, CAPACITY	56435		NOTE 13	5000/2500/1000
REF	48	NAME PLATE	54056		NOTE 7	
	47					
	46					
1	45	I.C. EEPROM	54821	U22	NOTE 4	XD2212
REF	44	LABEL, RANGE SELECT	56526			1000/2500/5000
1	43	NUT	59787		NOTE 11	
1	42	SLEEVE	59776		NOTE 11	
2	41	LABEL, PANEL	53978			
7	40	NUT, KEPS	14626		#8-32	
1	39	DRAWER, FUSE	64571			
2	38	NUT, KEPS	14618		#4-40	
1	37	PLUG, BUTTON	59421		NOTE 9	
1	36	IC,I/O Expander 8243	54179	U10	NOTE 8	82C43
11	35	SEMS, PAN HD SCREW	14839			#6-32 X 1/4 LG
7	34	SEMS, PAN HD SCREW	44251			#6-32 X 3/8 LG
4	33	SCREW, MACH, FL HD (100 )	57151			#10-32 X 1/2 LG
2	32	HANDLE	54032			
1	31	LIT, MANUAL	63253			
1	30	PLATE, MOUNTING	59299		SEE TABLE 1	
4	29	NUT, KEPS	14621		#6-32	
1	28	WASHER, BELLVILLE	58445			
1	27	PLATE, COVER	55089			
1	26	CABLE, TRANSDUCER	65016		SEE TABLE 2	
1	25	TRANSDUCER	[ ]		SEE TABLE 1	
REF	24	LABEL, RANGE SELECT	56522			400/1000/2000
REF	23	LABEL, RANGE SELECT	56516			200/500/1000
REF	22	LABEL, RANGE SELECT	56535			100/250/500
REF	21	LABEL, RANGE SELECT	56532			10/25/50
REF	20	LABEL, RANGE SELECT	56545			2000/5000/10000
1	19	FUSE, MINIATURE	58076			1/4 Amp, 250V
1	18	SWITCH, PUSHBUTTON	58878			
1	17	FILTER, FUSED	58870			
1	16	OVERLAY, ADHESIVE	54815			
1	15	POWER CORD	15438			
2	14	LABEL, ID/CALIBRATION	53308		NOTES 2 & 14	
1	13	LENS	56622		Gage	
1	12	LENS	56618		ABS	
1	11	ADAPTOR, SHAFT	59298			1/4 X 3/16
1	10	KNOB	54634			USED W/ITEM 8
1	9	IC,EPROM Blank 27C64 CMOS	16203	U11	NOTE 6	27C64
1	8	CABLE, PRESSURE RANGE	56014			
1	7	DISPLAY BOARD ASSEMBLY	56014			
1	6	CPU ASSEMBLY	54256		NOTE 5	
1	5	FRONT PLATE SWITCH	56519			
1	4	OVERLAY, UNIVERSAL	54885			
1	3	COVER	59180			
1	2	CHASSIS ASSEMBLY	56339			
1	1	PANEL ASSEMBLY	56040			

LIST OF MATERIALS

UPS3210

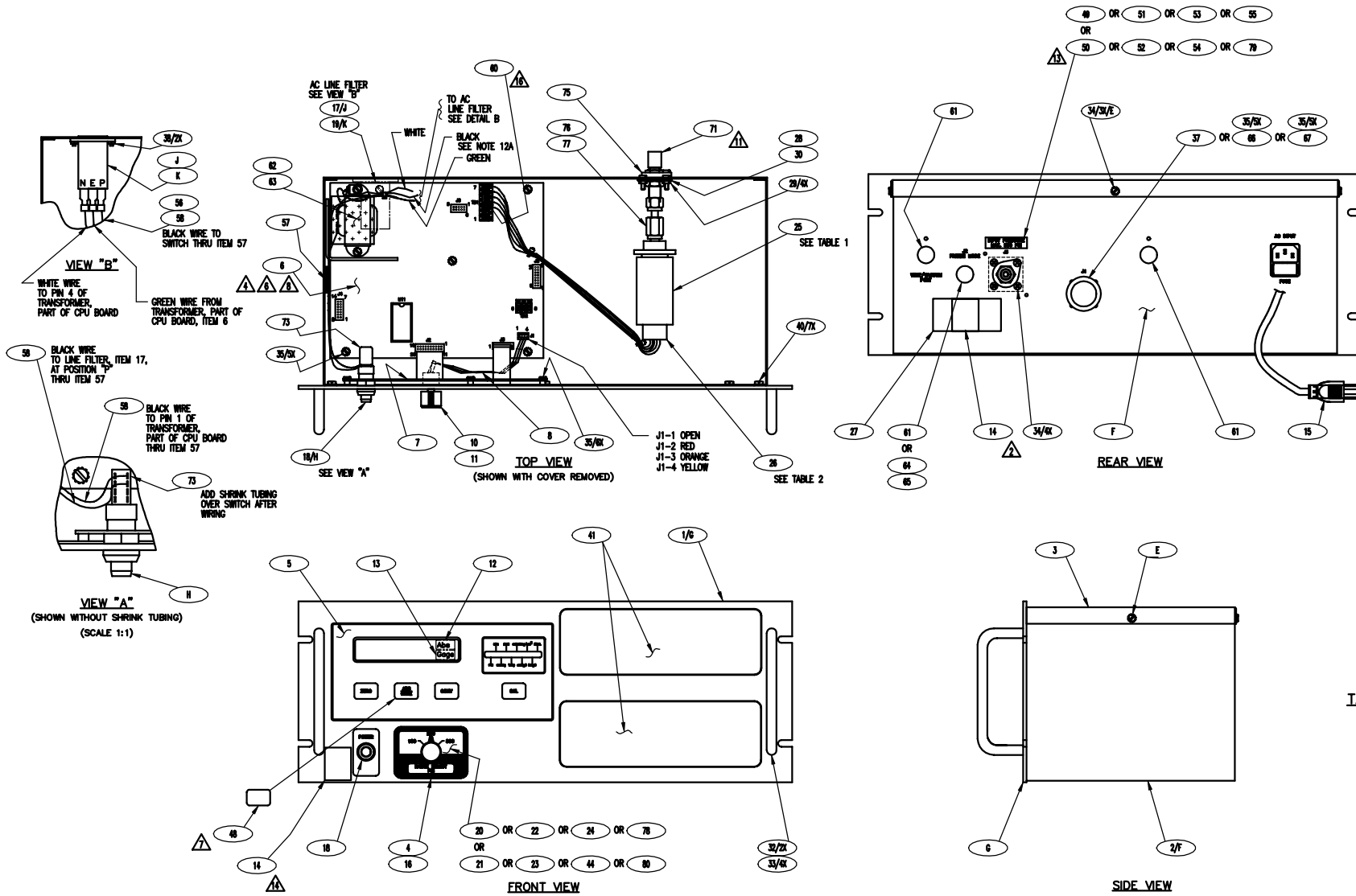


QTY REQD	ITEM NO.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
1	81	LABEL, EPROM	55698			NOTE 6
REF	80	LABEL, RANGE SELECT	56511			100/50/20
REF	79	LABEL, CAPACITY	56442			NOTE 13 15/7.5/3
REF	78	LABEL, RANGE SELECT	56551			15/7.5/3
1	77	SEAL, CHEAT PAD	54854			
1	76	ADAPTER	59839			
1	75	BULKHEAD FASTENER	59712			
1	74	BULKHEAD UNION	58707			
13FT	73	SHRINK TUBING	64567			
	72					
1	71	CAP, PROTECTIVE	60870			NOTE 11
REF	70	BUSHING, CABLE	15744			NOTE 9 NOT SHOWN
REF	69	CLAMP, CABLE	57854			NOTE 9 NOT SHOWN
REF	68	CONNECTOR, 5 PIN	54625			NOTE 9 NOT SHOWN
REF	67	ASSEMBLY, EXPANDER BD	58004			NOTE 9 NOT SHOWN
REF	66	ASSEMBLY, EXPANDER BD	57999			NOTE 9 NOT SHOWN
REF	65	CONNECTOR, MINI HEX	58505			NOTE 10
REF	64	CABLE ASSEMBLY, MINI HEX CONNECTOR	55780			NOTE 10
.1FT	63	ADHESIVE TRANSFER TAPE	60759			NOTE 12D
1	62	INSULATOR	57300			NOTE 12D
3	61	PLUG, HOLE	54714			NOTE 10
1	60	RESISTOR	55475			NOTE 16
1	59	RESISTOR, GAIN	58260			NOTE 15
A/R	58	WIRE, #22 AWG, BLACK	61079			NOTE 12C

REF. NO. UPS3210

MATERIAL	N/A	UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES	THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PRODUCTS AND/OR ITS CUSTOMER'S ORDER. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.
TREATMENT	N/A	ALL THREADS TO BE CLASS 2	ASSEMBLY, RACK MOUNT UNIVERSAL PRESSURE STANDARD INSTRUMENT
FINISH	N/A	ALL DIMENSIONS APPLICABLE AFTER TREATMENT	
QTY	N/A	DRY HOLE FINISH UNLESS OTHERWISE SPECIFIED	DATE NO. 59627
THIRD HOLE PROJECTION	N/A	SURFACE TOL. DECIMAL	DATE 5-12-92
APPROVED	J.WELSH	2 P.L.C. ---	DESIGNER
DATE	YOUNG	3 P.L.C. ---	REVISION
		ANGLE ---	

REVISIONS		
REV	REFERENCE	INIT   DATE



**TABLE 1**

PART NO. CODE	EPROM, U11 PROGRAM (SEE NOTE 6)	TRANSDUCER PART NO. (ITEM NO. 25)
UPS3210 □ AA	KAH-10A	KF7401V
UPS3210 □ AB		KF7401U
UPS3210 □ AC		KF7401V
UPS3210 □ BA		KF7401K
UPS3210 □ BB		KF7401L
UPS3210 □ BC		KF7401M
UPS3210 □ CA		KF7401W
UPS3210 □ CC		KF7401P
UPS3210 □ CB		KF7401P
UPS3210 □ DA		KF7401H
UPS3210 □ DB	KF7401N	
UPS3210 □ EA	KAH-10B	KF7401F
UPS3210 □ EB		KF7401G
UPS3210 □ FA	KAH-10B	KF7401T
UPS3210 □ FB		KF7401R
UPS3210 □ FC		KF7401R
UPS3210 □ GA		KF7401M
UPS3210 □ JA		KF7401A

**TABLE 2 WIRE CONNECTIONS TRANSDUCER TO TB1**

SIGNAL NAME	WIRE COLOR	CPU, ITEM 6 TERMINAL BLOCK
+INPUT	GREEN	TB1-4
+OUTPUT	WHITE	TB1-5
-OUTPUT	RED	TB1-6
-INPUT	BLACK	TB1-7
TEMP SENSE IF APPLICABLE	BLUE	TB1-3

REF. NO. UPS3210

MATERIAL	N/A	UNLESS OTHERWISE SPECIFIED	UNITS TO BE INCHES	THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PRODUCTS AND/OR ITS CUSTOMER'S ORDER. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.
TREATMENT	N/A	ALL DIMENSIONS APPLICABLE AFTER TREATMENT	ALL THREADS TO BE CLASS 2	<b>ASSEMBLY, RACK MOUNT UNIVERSAL PRESSURE STANDARD INSTRUMENT</b> QTY NO. 59627 RICE LAKE WEIGHING SYSTEMS NEWTON 5-12-92 SCALE N/A SHEET 2 OF 2 REVISION T
FINISH	2 PLG 3 PLG	TOL. DECIMAL	DECIMAL	
QUALITY	✓	ANGLE		
THIRD ANGLE PROJECTION	APPROVED	DESIGNED	DATE	
BY	J. WELSH	BY	NEWTON 5-12-92	





D

C

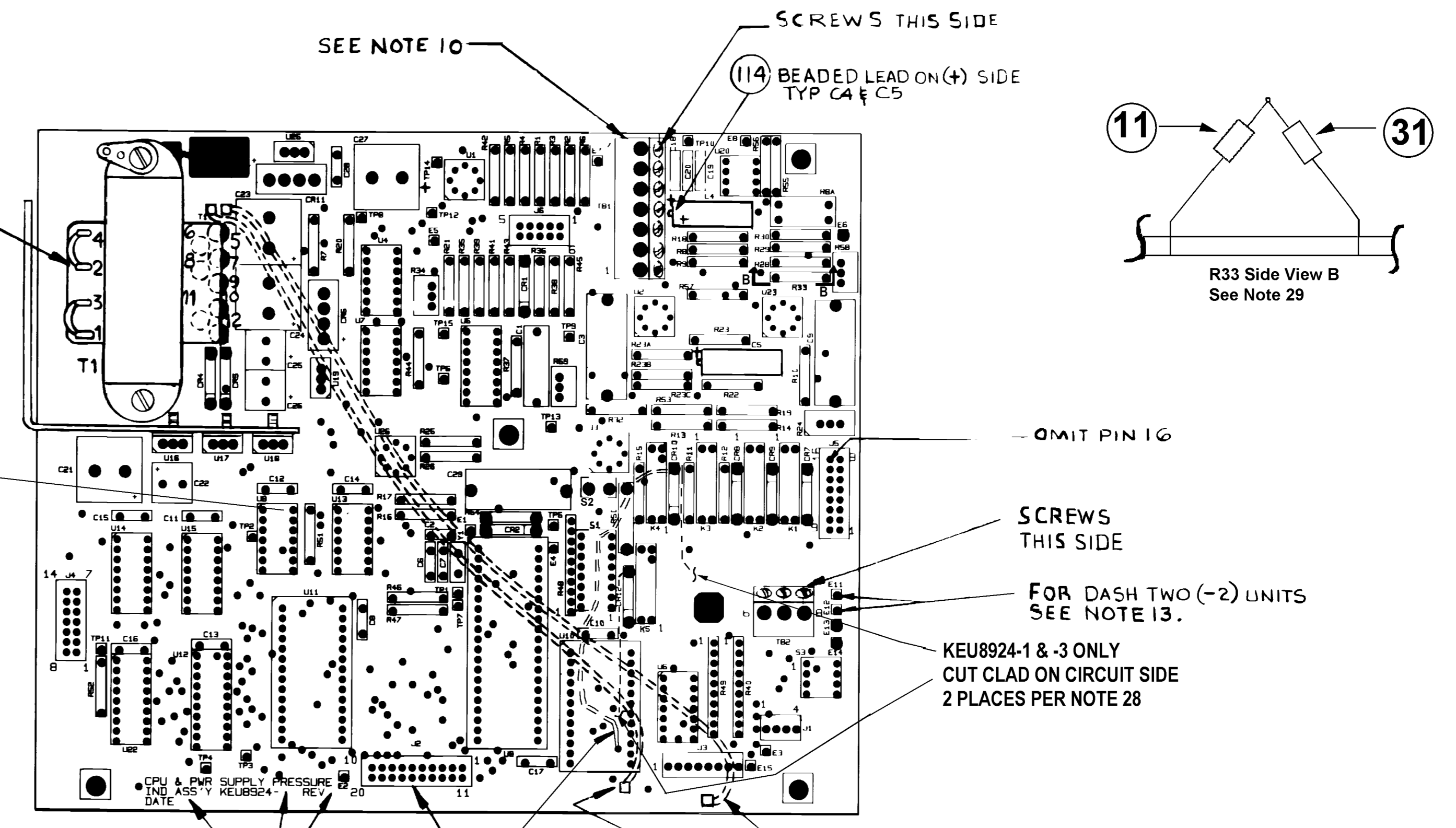
B

A

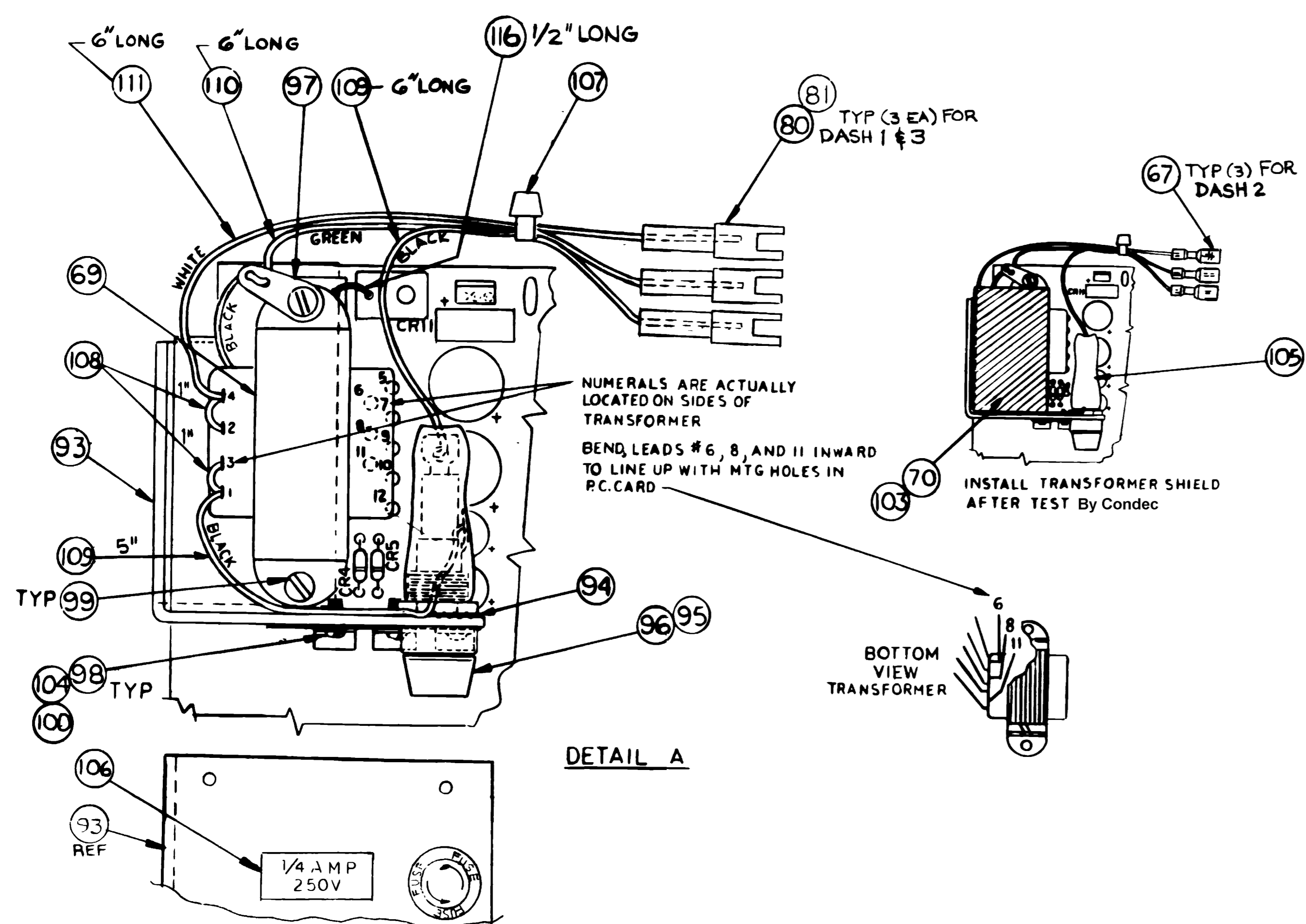
SEE DETAIL A FOR  
TRANSFORMER AND  
FUSE CONNECTIONS

(69) REF

27

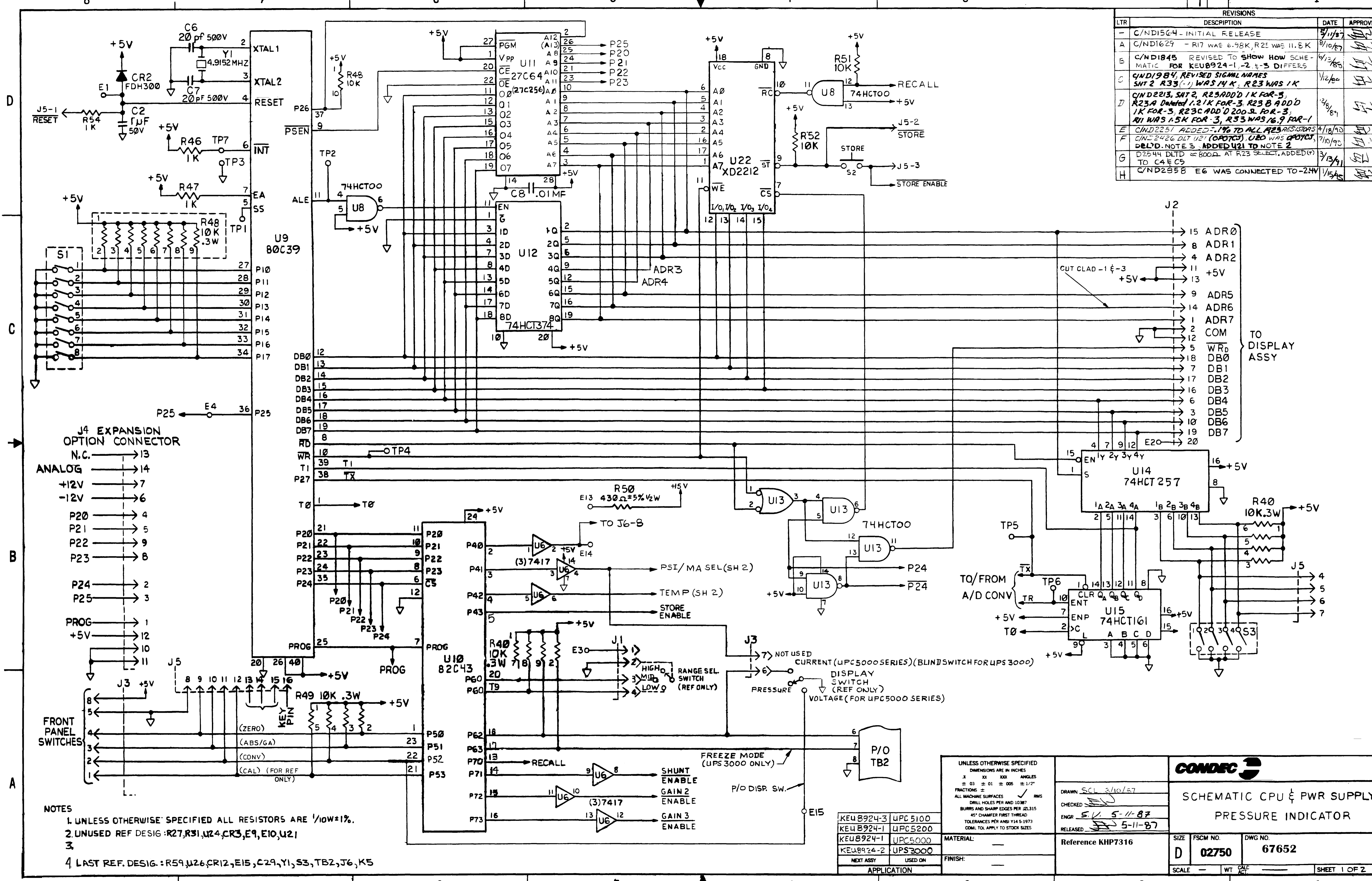


COMPONENT SIDE



DETAIL A

UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES ALL THREADS TO BE CLASS 2 ALL DIMENSIONS APPLICABLE AFTER TREATMENT		THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PROPOSAL AND/OR ITS CUSTOMERS' ORDERS. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.	
MATERIAL	DO NOT SCALE DRAWING	DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED	TITLE
TREATMENT	FOR RLWS USE ONLY	SURFACE FINISH	<b>ASSEMBLY, CPU AND POWER SUPPLY</b>
	0	TOL. 2 PLC 3 PLC ANGLE	DWG NO
THIRD ANGLE PROJECTION	MFG. ENG. APPROVED	CKD.	<b>RICE LAKE WEIGHING SYSTEMS</b>
	DES. ENG. APPROVED	DR. BY	<b>54254</b>
		SCALE	SHEET 2 OF 2
			REVISION <b>AL</b>



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVE
-	C/ND1564 - INITIAL RELEASE	8/10/87	[Signature]
A	C/ND1629 - R17 WAS 6.98K, R22 WAS 11.8K	8/10/87	[Signature]
B	C/ND1845 REVISED TO SHOW HOW SCHEMATIC FOR KEUB924-1, -2, & -3 DIFFERS	6/13/89	[Signature]
C	C/ND1984, REVISED SIGNAL NAMES SMT 2 R33 (-) WAS 14K, R23 WAS 1K	1/12/88	[Signature]
D	C/ND2213, SMT 2, R25 ADD'D 1K FOR -3, R23A DELETED 1.21K FOR -3, R23 B ADD'D 1K FOR -3, R23C ADD'D 200.2 FOR -3, R11 WAS 1.5K FOR -3, R53 WAS 16.9 FOR -1	1/26/87	[Signature]
E	C/ND2251 ADDED -.1% TO ALL R23 RESISTORS	4/18/90	[Signature]
F	C/ND2426 DLT U21 (OPOTCS), U20 WAS OPOTCS, DEL'D. NOTE 3, ADDED U21 TO NOTE 2	7/10/90	[Signature]
G	D2544 DLTD ≈ 800Ω AT R23 SELECT, ADDED (n) TO C4 & C5	3/13/91	[Signature]
H	C/ND2958 E6 WAS CONNECTED TO -2.4V	1/15/85	[Signature]

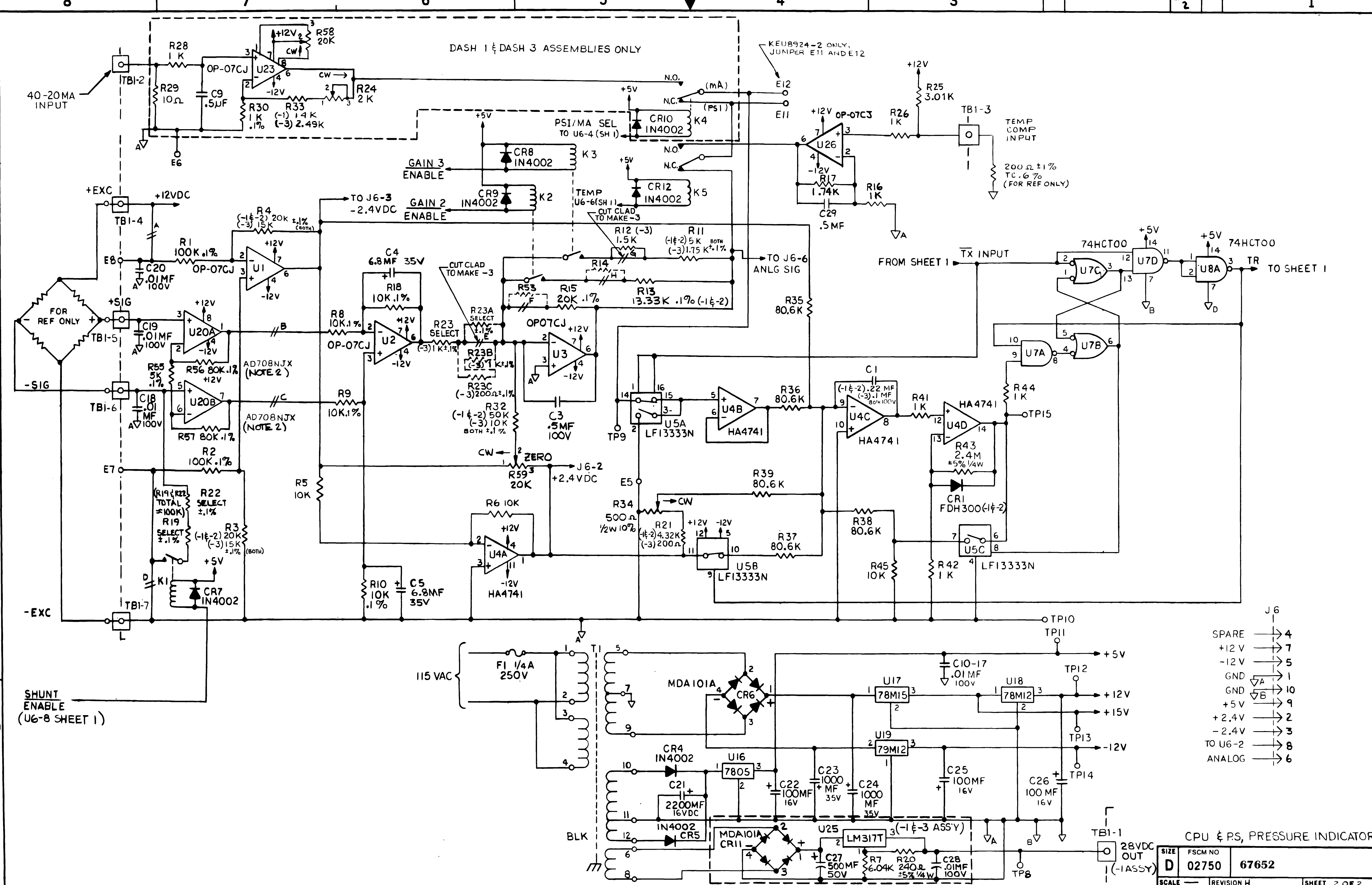
- J4 EXPANSION OPTION CONNECTOR**
- N.C. → 13
  - ANALOG → 14
  - +12V → 7
  - 12V → 6
  - P20 → 4
  - P21 → 5
  - P22 → 9
  - P23 → 8
  - P24 → 2
  - P25 → 3
  - PROG → 1
  - +5V → 12
  - 10
  - 11

- FRONT PANEL SWITCHES**
- 8 →
  - 5 →
  - 4 →
  - 3 →
  - 2 →
  - 1 →
- (ZERO)  
(ABS/GA)  
(CONV)  
(CAL) (FOR REF ONLY)

**NOTES**

- UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/10W±1%.
- UNUSED REF DESIG: R27, R31, U24, CR3, E9, E10, U21
- 
- LAST REF. DESIG.: R59, U26, CR12, E15, C29, Y1, S3, TB2, J6, K5

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES X XX ANGLES ± .03 ± .01 ± .005 ± .1/2" FRACTIONS ± ALL MACHINE SURFACES DRILL HOLES PER AND 10387 BURRS AND SHARP EDGES PER J2L315 45° CHAMFER FIRST THREAD TOLERANCES PER ANSI Y14.5-1973 COML. TOL. APPLY TO STOCK SIZES	DRAWN SCL 3/10/87 CHECKED [Signature] ENGR S.V. 5-11-87 RELEASED [Signature] 5-11-87	<b>CONDEC</b> SCHEMATIC CPU & PWR SUPPLY PRESSURE INDICATOR
KEUB924-3 UPC5100 KEUB924-1 UPC5200 KEUB924-4 UPC5000 KEUB924-2 UPS3000	MATERIAL: — FINISH: —	Reference KHP7316 SIZE D FSCM NO. 02750 DWG NO. 67652
APPLICATION NEXT ASSY USED ON	SCALE — WT — SHEET 1 OF 2	



DASH 1 & DASH 3 ASSEMBLIES ONLY

KEU8924-2 ONLY, JUMPER E11 AND E12

CUT CLAD TO MAKE -3

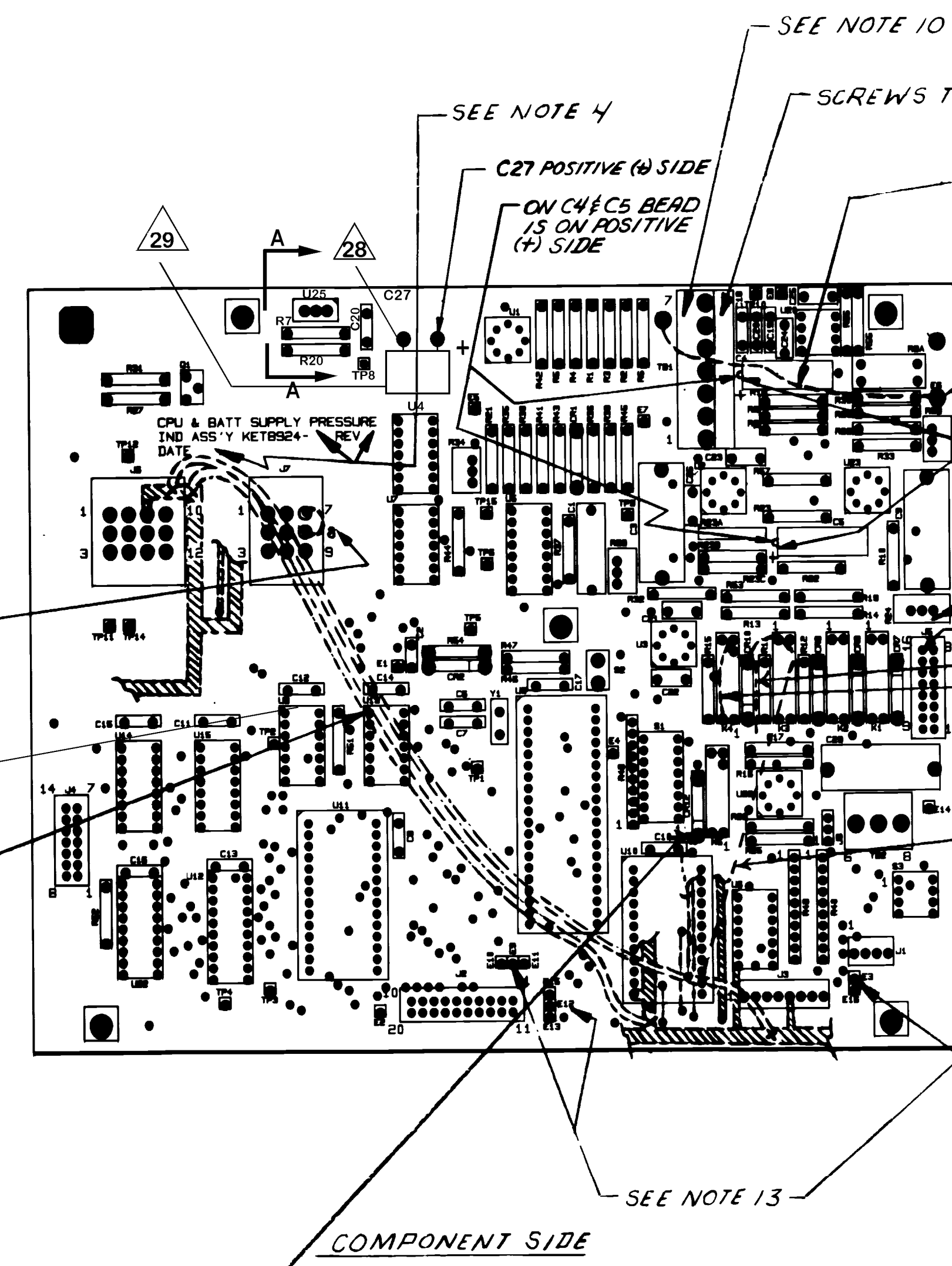
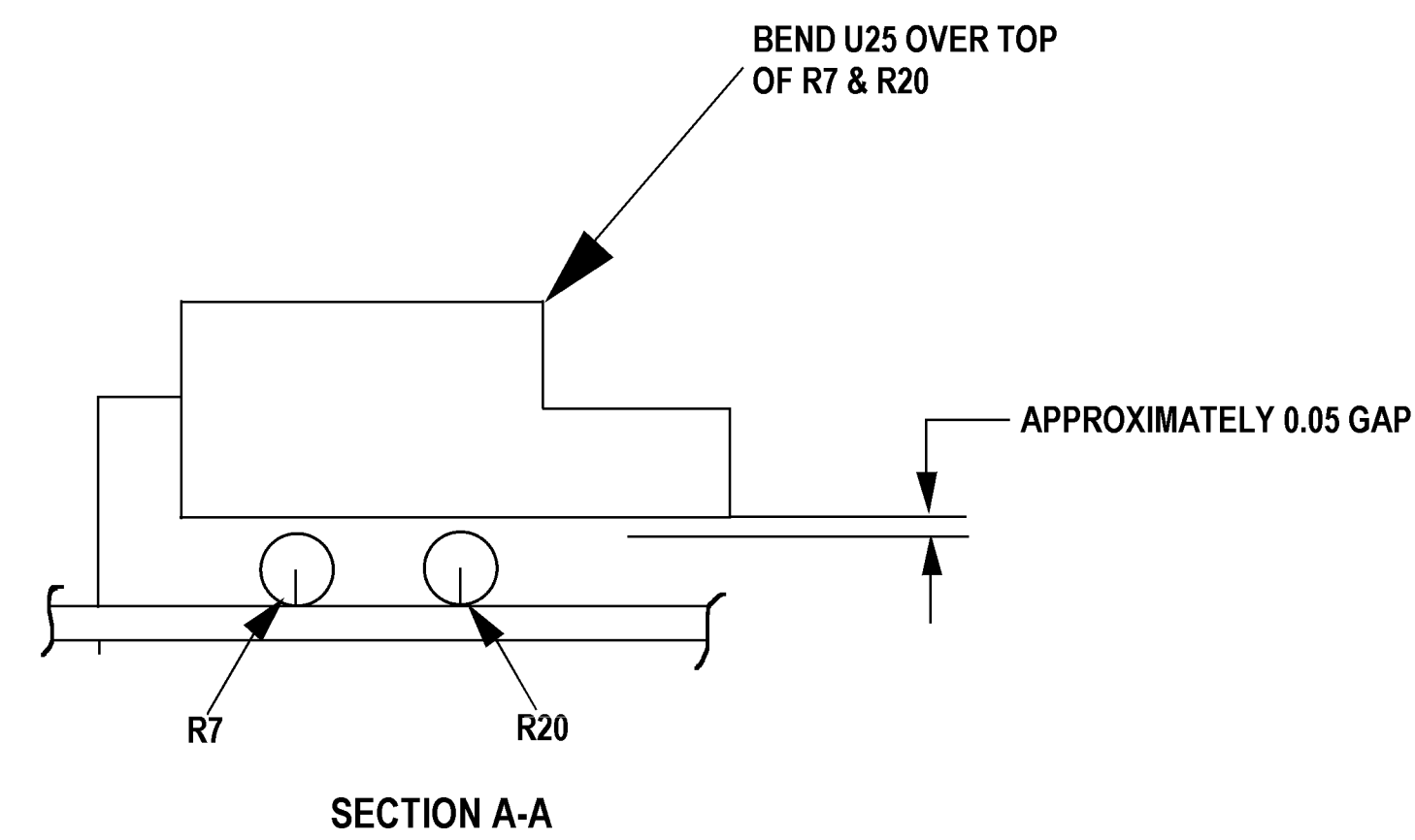
CUT CLAD TO MAKE -3

SHUNT ENABLE (U6-8 SHEET 1)

- J6
- SPARE → 4
- +12V → 7
- 12V → 5
- GND → 1
- GND → 10
- +5V → 9
- +2.4V → 2
- 2.4V → 3
- TO U6-2 → 8
- ANALOG → 6

CPU & PS, PRESSURE INDICATOR	
SIZE	FSCM NO
D	02750
	67652
SCALE	REVISION H
	SHEET 2 OF 2





JUMPER J7-7 TO J7-8 (ON -2 & -4 ONLY)

CONNECT CLAD ON FAR SIDE PER NOTE 11

95 3 1/2" CONNECT ANALOG GROUND LINE

96 CUT CLAD ON FAR SIDE PER NOTE 27 CONNECT K4-C TO K4-NC (ON -2 & -4 ASSEMBLIES ONLY)

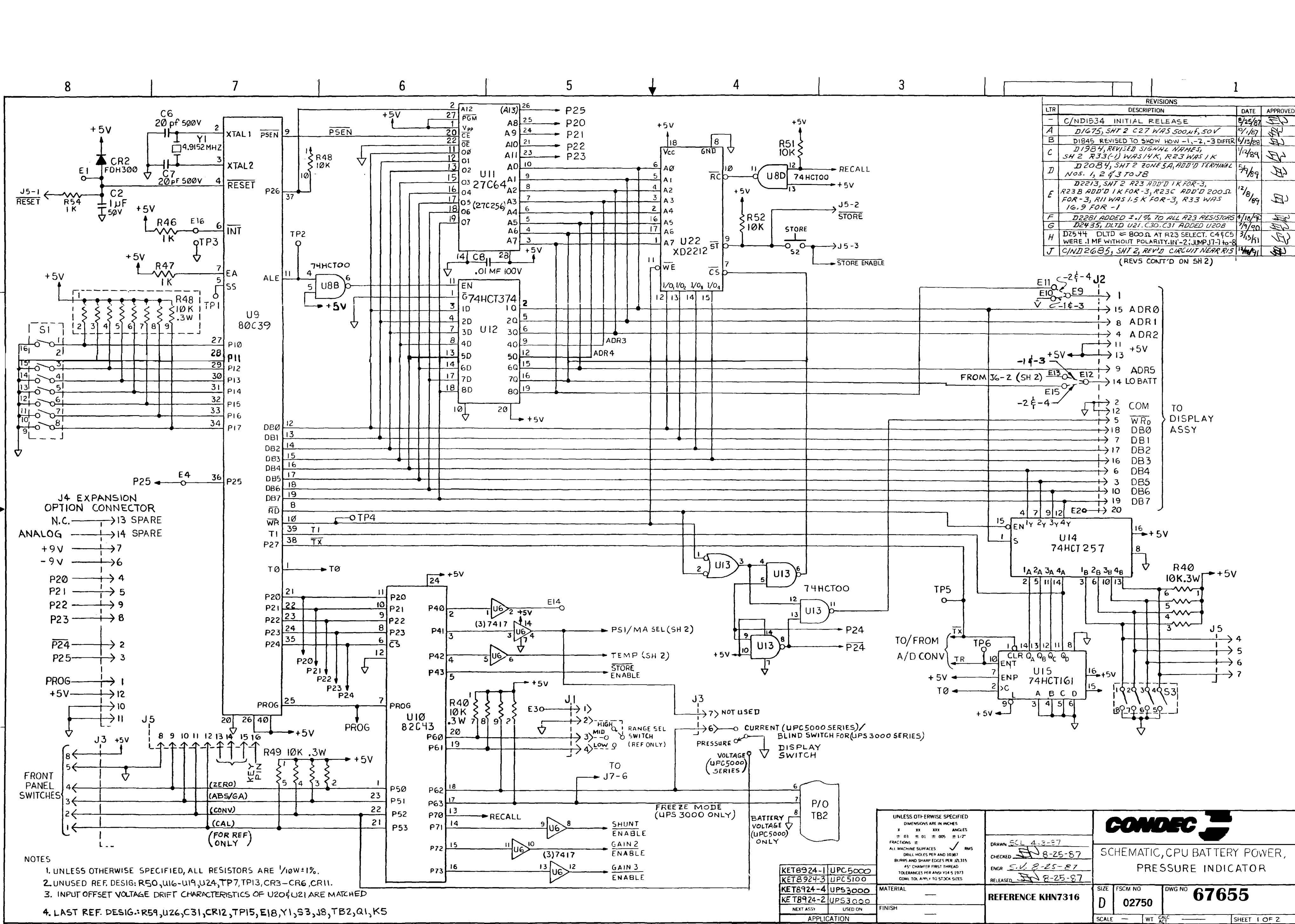
ADD 3-1/2" ITEM 96 PER NOTE 27 KET8924-1 & -3 ONLY

UNLESS OTHERWISE SPECIFIED  
UNITS TO BE INCHES  
ALL THREADS TO BE CLASS 2  
ALL DIMENSIONS APPLICABLE AFTER TREATMENT

DO NOT SCALE DRAWING FOR RLWS USE ONLY	DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED		
	SURFACE FINISH	TOL.	DECIMAL
0	✓	2 PLC	----
	✓	3 PLC	----
	✓	ANGLE	----

THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PROPOSAL AND/OR ITS CUSTOMERS' ORDERS. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.

MATERIAL	MFG. ENG. APPROVED			CKD.		TITLE	
TREATMENT	DES. ENG. APPROVED			DR. BY		ASSEMBLY, CPU AND BATTERY POWER	
THIRD ANGLE PROJECTION	SCALE			SHEET 2 OF 2		RICE LAKE WEIGHING SYSTEMS	
	DWG NO			REVISION		59037	
	AL						



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
-	C/NDI534 INITIAL RELEASE	8/25/87	
A	D1675, SHT 2 C27 WAS 500UF, 50V	10/1/87	
B	D1845, REVISED TO SHOW HOW -1, -2, -3 DIFFER	6/13/88	
C	D1984, REVISED SIGNAL NAMES, SH 2 R33(-) WAS 14K, R23 WAS 1K	1/14/89	
D	D2084, SHT 2 ZONE 5A, ADD'D TERMINAL Nos. 1, 2 & 3 TO J8	5/9/89	
E	D2213, SHT 2 R23 ADD'D 1K FOR -3, R23B ADD'D 1K FOR -3, R23C ADD'D 200Ω FOR -3, R11 WAS 1.5K FOR -3, R33 WAS 16.9 FOR -1	12/1/89	
F	D2281 ADD'D ±.1% TO ALL R23 RESISTORS	4/18/90	
G	D2435, DLT'D U21, C30, C31 ADD'D U20B	1/9/90	
H	D2544 DLT'D 800Ω AT R23 SELECT, C4 & C5 WERE .1 MF WITHOUT POLARITY, IN -2, JUMP J7 to 8	3/13/91	
J	C/NDI 2685, SHT 2, REV'D CIRCUIT NEAR R15 (REVS CONT'D ON SH 2)	11/14/91	

- J4 EXPANSION OPTION CONNECTOR**
- N.C. → 13 SPARE
  - ANALOG → 14 SPARE
  - +9V → 7
  - 9V → 6
  - P20 → 4
  - P21 → 5
  - P22 → 9
  - P23 → 8
  - P24 → 2
  - P25 → 3

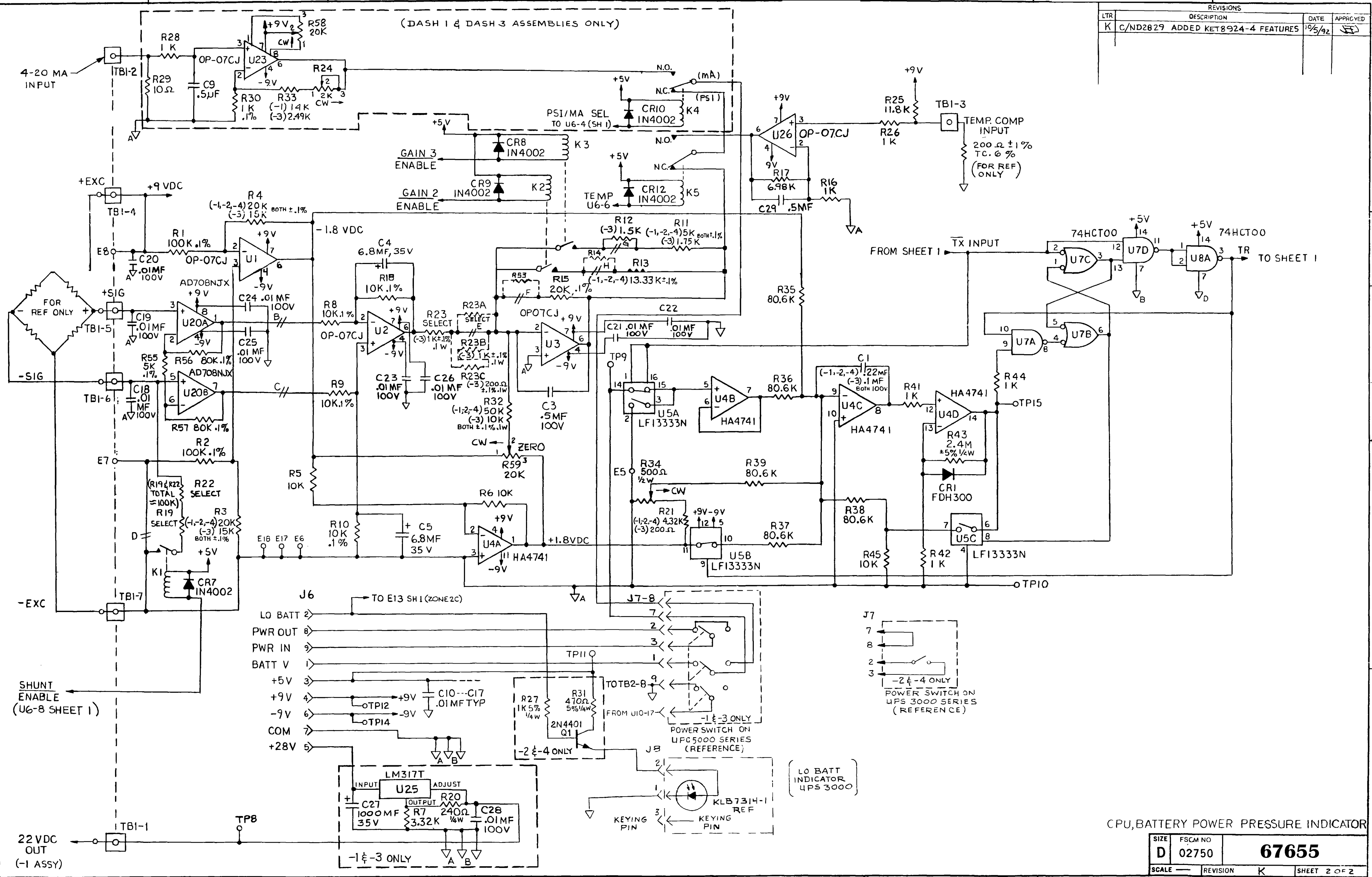
- FRONT PANEL SWITCHES**
- 8 ←
  - 5 ←
  - 4 ←
  - 3 ←
  - 2 ←
  - 1 ←
- (ZERO) (ABS/GA) (CONV) (CAL) (FOR REF) ONLY

**NOTES**

- UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE 1/10W±1%.
- UNUSED REF. DESIG: R50, U16-U19, U24, TP7, TP13, CR3-CR6, CR11.
- INPUT OFFSET VOLTAGE DRIFT CHARACTERISTICS OF U20 & U21 ARE MATCHED
- LAST REF. DESIG: R59, U26, C31, CR12, TP15, E18, Y1, S3, J8, TB2, Q1, K5

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES X XXX ANGLES ±.03 ±.01 ±.005 ±.1/2" FRACTIONS ± ALL MACHINE SURFACES DRILL HOLES PER AND 10/87 BURRS AND SHARP EDGES PER J1.315 .45° CHAMFER FIRST THREAD TOLERANCES PER ANSI Y14.5 1973 COM'L TO APPLY TO STOCK SIZES		DRAWN SCL 4-3-87 CHECKED SCL 8-25-87 ENGR SCL 8-25-87 RELEASED SCL 8-25-87			
KET8924-1 UPC5000 KET8924-3 UPC5100 KET8924-4 UPS3000 KET8924-2 UPS3000		MATERIAL		REFERENCE KHN7316	
NEXT ASSY USED ON		FINISH		SIZE D FSCM NO 02750 DWG NO 67655	
APPLICATION		SCALE		SHEET 1 OF 2	

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
K	C/ND2829 ADDED KET8924-4 FEATURES	10/5/92	[Signature]

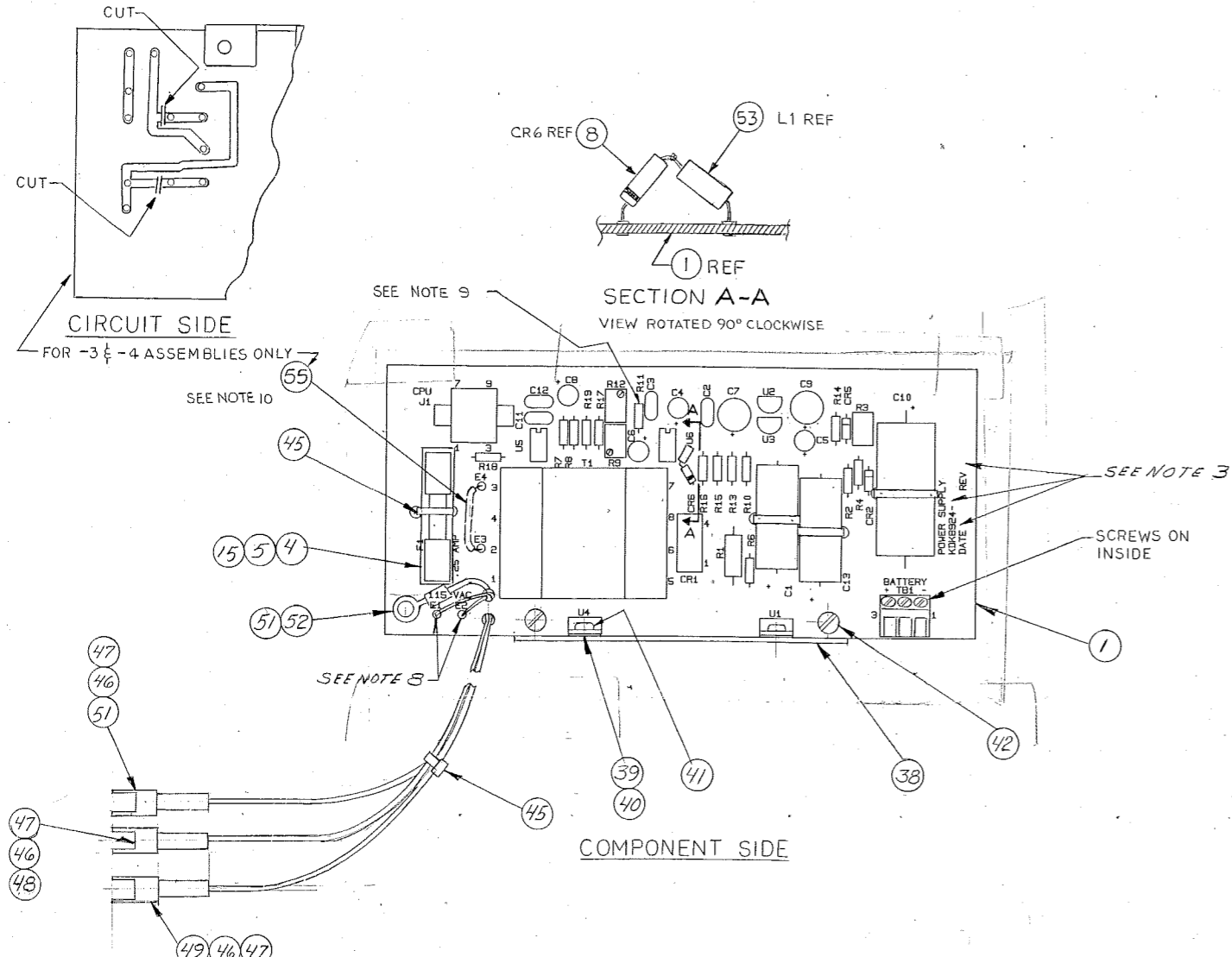


CPU, BATTERY POWER PRESSURE INDICATOR

SIZE	FSCM NO	<b>67655</b>
<b>D</b>	<b>02750</b>	
SCALE	REVISION	K
		SHEET 2 OF 2



DWG NO. KDK8924 SH 1		REVISIONS		
ZONE	LTR	DESCRIPTIONS	DATE	APPROVED
-	-	REL. ON C/ND1337	6/20/86	[Signature]
B	-	C/ND1353, DWG SHOULD HAVE BEEN REL ON REV B	7/18/86	[Signature]
C	-	C/ND1379 ITEM 35 WAS KML1918A, 7660 #1 ITEM 45 QTY WAS 5	9/2/86	[Signature]
D	-	C/ND1465 ADDED L1 BETWEEN CR6 AND J1-6. ADDED ITEM 53 TO LIM	12/19/86	[Signature]
E	-	C/ND2246 ADDED KDK8924-2	2/19/90	[Signature]
F	-	C/ND2610, ADDED KDK8924-3, -4 ASSEMBLIES, NOTE 10 FCCT SIDE VIEW	8/15/91	[Signature]
G	-	C/ND2828 ADDED LEADER & NOTE TO TBI AT PICTORIAL	9/18/92	[Signature]
H	-	C/ND2934, ADD REF TO KDK8924-2 TO NOTE 9	4/20/93	[Signature]
J	-	C/ND3614 - ITEM 35 WAS KML1918B	7/6/97	[Signature]



-1=58723-  
-2=58727-  
-3=58729  
-4=58733

QTY REQ'D FOR DASH NO.	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
-	-	2 2 39 INSULATOR, THERMAL	B	KYV297M			
-	-	1 1 38 HEATSINK	C	KL7365-1			
-	-	2 2 37 SOCKET, I.C.	B	KE251C	XU5, XUG		8 PIN
1	-	-	-	36 P.S. ASSEMBLY	-	KDK8924-2	
-	-	1 1 35 I.C. REGULATOR	A	KML1918C	U6		1CL7662CPA
-	-	1 1 34 I.C. OPERATIONAL AMP	C	KBY1918V	U5		LM311P
-	-	1 1 33 I.C. REGULATOR	C	KGB1918B	U4		LM78M05
-	-	2 2 32 I.C. REGULATOR	C	KGB1918D	U2, U3		LM317LZ
-	-	1 1 31 I.C. REGULATOR	C	KGB1918C	U1		LM317T
-	-	1 1 30 RESISTOR	-	RN55C8062F	R19		80.6K ±1% 1/10W
-	-	1 1 29 RESISTOR	C	KF4310DH	R17		10K ±5% 1/4W
-	-	1 1 28 RESISTOR	-	RN55C1211F	R16		1.21K ±1% 1/10W
-	-	1 1 27 RESISTOR	-	RN55C8251F	R15		8.25K ±1% 1/10W
-	-	1 1 26 RESISTOR	-	RN55C1691F	R14		1.69K ±1% 1/10W
-	-	1 1 25 RESISTOR	-	RN55C1002F	R13		10K ±1% 1/10W
-	-	1 2 24 POTENTIOMETER	B	KBY338B	R9 (R12 ONLY)		20K
-	-	2 3 23 RESISTOR	-	RN55C1003F	R8, R18 (R11 ONLY)		100K ±1% 1/10W
-	-	1 22 RESISTOR	-	RN55C2002F	R10		20K ±1% 1/10W
-	-	1 1 21 RESISTOR	-	RN55C2492F	R7		24.9K ±1% 1/10W
-	-	1 1 20 RESISTOR	C	KF4310AL	R6		200Ω ±5% 1/4W
-	-	1 1 19 RESISTOR	-	RN55C2211F	R4		2.21K ±1% 1/10W
-	-	1 1 18 POTENTIOMETER	B	KBY338F	R3		500Ω ±10% .5W
-	-	1 1 17 RESISTOR	-	RN55C2430F	R2		243Ω ±1% 1/10W
-	-	1 1 16 RESISTOR	-	RW79U4ROF	R1		14Ω ±2% 3W
-	-	1 1 15 FUSE COVER	B	KF7351A			PVC FLEXIBLE
-	-	1 1 14 CAPACITOR	B	KLN311D	C10		1000.0μF 35V
-	-	2 2 13 CAPACITOR	B	KLY311C	C7, C9		100.0μF ±20% 16V
-	-	4 4 12 CAPACITOR	B	KLY311G	C4, 5, 6, 8		10.0μF ±20% 50V
-	-	1 - - 11 P.S. ASSEMBLY	-	KDK8924-1			
-	-	4 4 10 CAPACITOR	A	KHV311A	C2, 3, 11, 12		.01μF ±50% 100V
-	-	2 2 9 CAPACITOR	C	KLN311F	C1, C13		470.0μF 50V
-	-	2 2 8 DIODE	A	KFL327B	CR5, CR6		FDH300
-	-	1 1 7 DIODE	B	KGF327A	CR1		MDA101A
-	-	1 1 6 TRANSFORMER	B	KM7301B	T1		
-	-	1 1 5 FUSE	A	KJ350C	F1		.25 AMP
-	-	2 2 4 FUSE HOLDER	C	KD7351B	XF1		
-	-	1 1 3 TERMINAL BLOCK	B	KUH3300A	TB1		
-	-	1 1 2 CONNECTOR ASSY	B	KMB354A	J1		9 PIN
-	-	1 1 1 PRINTED CIRCUIT BD	C	KHL7361			

ALWS DRAWING NO. 58723  
PART NOS. AND/OR DRAWING NOS. ADDED  
BY: KLL DATE 12/9/99

- NOTES:
- FOR SCHEMATIC SEE BSIZE KFV731G
  - OBSERVE POLARITY OF DIODES, LED'S, DISPLAYS AND CAPACITORS.
  - STAMP APPLICABLE DASH NUMBERS, REVISION, AND DATE AT FINAL ASSEMBLY USING BLACK INDELIBLE INK. CHARACTERS TO BE MIN. .12 HIGH
  - SEAT EACH COMPONENT AS FLAT TO P.C. BOARD AS DEVICE ALLOWS.
  - CAPACITORS WITH VOLTAGE RATINGS GREATER THAN THOSE SHOWN MAY BE USED IF PHYSICAL SIZE AND LEAD SPACING ARE EQUIVALENT.
  - USE ONLY FREON, SUCH AS FREON TMS FOR CLEANING.
  - TEST PROCEDURES: KAB8317
  - FEED WIRES THROUGH OPENINGS IN CARD BEFORE SOLDERING BLACK WIRE (ITEM 48) TO E1 AND WHITE WIRE (ITEM 49) TO E2 ON COMPONENT SIDE OF PCB (ITEM 1).
  - ADD JUMPER WIRE ACROSS R11 MOUNTING HOLES FOR KDK8924-2 ONLY.
  - ADD JUMPER WIRE BETWEEN E3 AND E4 ON KDK8924-3 AND KDK8924-4 ONLY, TO CONVERT 110 VAC TO 220 VAC OPERATION

QTY REQ'D FOR DASH NO.	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
-	-	1 - 56 POTENTIOMETER	C	KDU338AH	R12		50K
-	-	1 - 55 WIRE, JUMPER	-	M16878/4BFEO		NOTE 9	22 AWG, BLACK
-	-	1 - 54 RESISTOR	-	RN55C2801F	R10		2.8K ±1% 1/10W
-	-	1 1 53 CHOKE	C	KDP309A	L1		100.0μH ±10%
-	-	1 1 52 TERMINAL, INSULATED	B	KAE307A			
-	-	9 INCHES 51 WIRE, GRN #22 AWG	-	MCF66-6			PVC INSUL
-	-	9 INCHES 1 1 50 RECTIFIER, SILICON	A	KBY327A	CR2		1N4002
-	-	9 INCHES 49 WIRE, WHT #22 AWG	-	MCF66-10			PVC INSUL
-	-	9 INCHES 48 WIRE, BLK #22 AWG	-	MCF66-1			PVC INSUL
-	-	3 3 47 CONTACT PIN	B	KRM354A			
-	-	3 3 46 CONNECTOR	B	KRH354A			
-	-	5 5 45 STRAP, TIE DOWN	-	MS3367-4-9			FOR C1, C10, C13, R1
-	-	44					
-	-	43					
-	-	2 2 42 SCREW, SEMS	B	KKP83B			#6-32 x 1/4 LG
-	-	2 2 41 SCREW, NYLON	-	MS18212-2			#4-40 x 3/16 LG.
-	-	1 1 40 COMPOUND, THERMAL	-	5106.9			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

X .03 XX .01 XXX .005 ANGLES 1/20G.

FRACTIONS: 1/16, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8

ALL MACH. SURFACES ✓ RMS DRILL HOLES PER AND 103B7 BURRS AND SHARP EDGES PER J1315 45° CHAMFER FIRST THREAD TOLERANCES PER ANSI Y14.5-1973 CDHL TOL APPLY TO STOCK SIZES

**F.T.N** CONSOLIDATED CONTROLS™ BETHEL, CT 06801

POWER SUPPLY ASSEMBLY

DRAWN: G. Newton 6-24-86  
CHECKED: J. Welsh 6-30-86  
ENGR: J.P.R. 6-30-86  
RELEASED: [Signature] 6-30-86

SIZE: 0 FSCM NO. 02750 DWG NO. KDK8924  
SCALE: 1:1 WT ACT. SHEET 1 OF 1

NOTES

1- UNLESS OTHERWISE SPECIFIED ALL RESISTORS 1% 1/10 WATT.

2- LAST REF. DESIG. USED:

C13, CR6, E4, F1, J1, L1, R19, T1, TB1, U6.

NOT USED: CR3, CR4, R5.

3- KDK8924-1 PER SCHEMATIC AS SHOWN

KDK8924-2: R10-TO BE 2.8K

R11-NOT USED; JUMPED

R12-TO BE 50K

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
-	C/ND1124 INITIAL RELEASE	9/11/85	
A	C/ND1262 ADDED R6 EC13.C4-6, CB WERE 50V	3/17/86	
B	C/ND1379 U6 WAS 7660	9/2/86	
C	C/ND1465 ADDED LT BETWEEN CR6 AND JT-6	12/19/86	
D	C/ND2246 ADDED PROVISION FOR KDK8924-2 PER NOTE 3	2/19/90	

RLWS Drawing No \_\_\_\_\_ J1

Rev \_\_\_\_\_ Sheet \_\_\_\_\_ of \_\_\_\_\_ 2 LO BATT

By \_\_\_\_\_ Date \_\_\_\_\_ 8 PWR OUT

9 PWR IN

1 BATT V

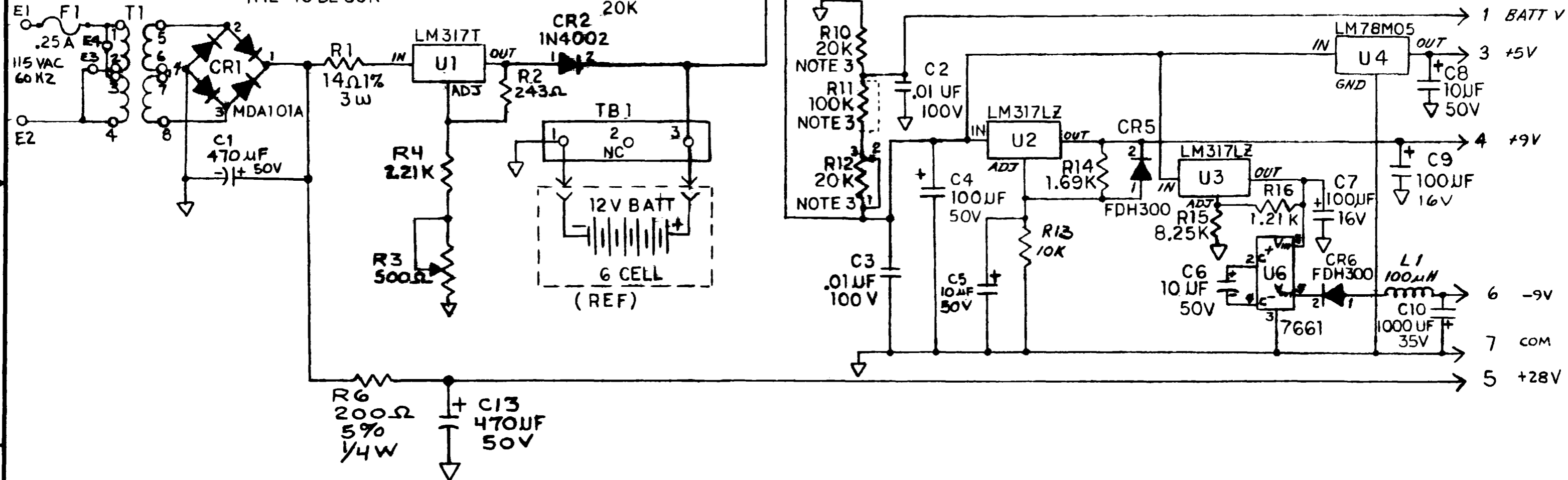
3 +5V

4 +9V

6 -9V

7 COM

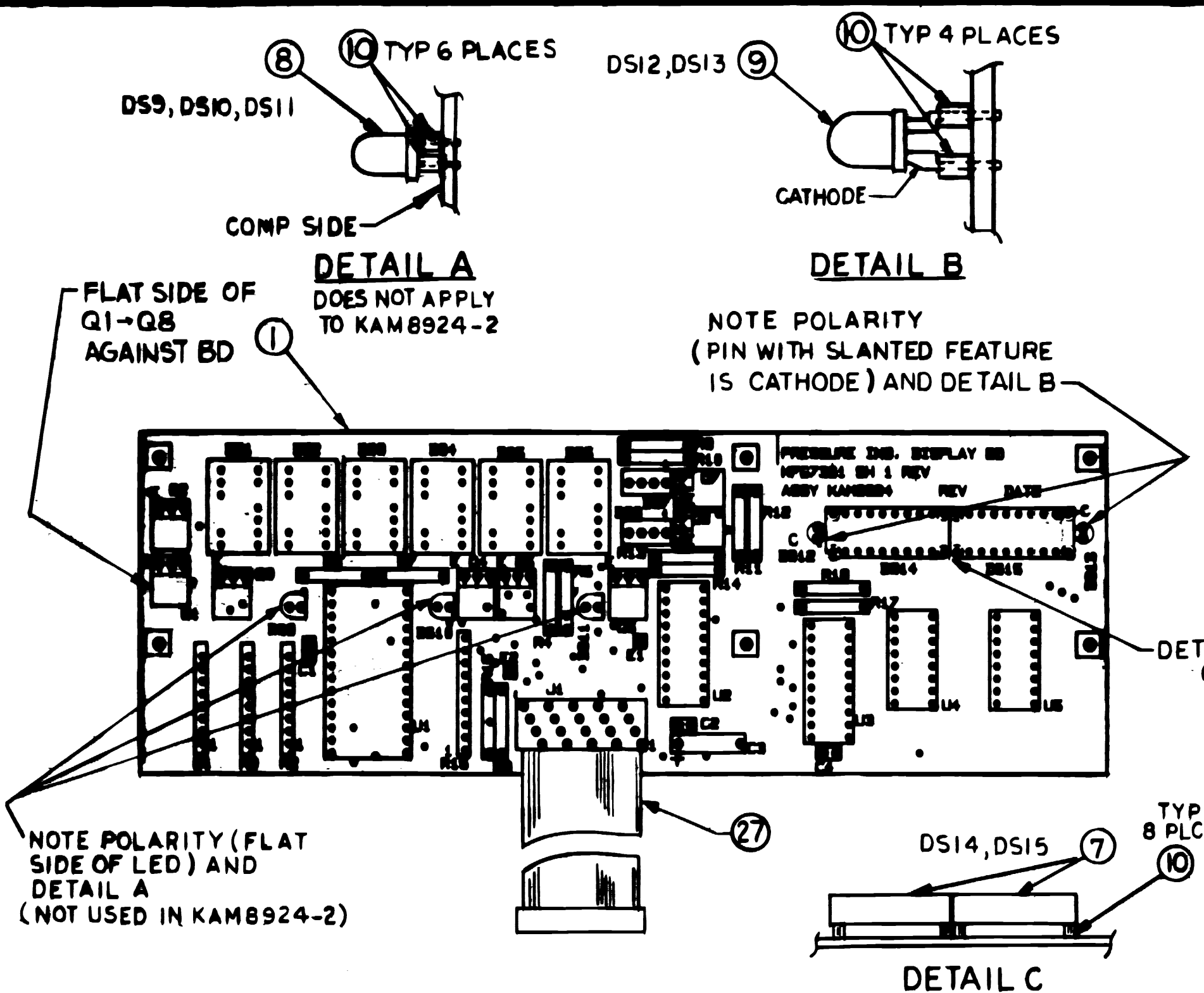
5 +28V



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES X XX XXX ANGLES ± 03 ± 01 ± 005 ± 1/4" FRACTIONS ± ALL MACH SURFACES ✓ RMS DRILL HOLES PER AND 10387 BURRS & SHARP EDGES PER JZL315 45° CHAMFER FIRST THREAD TOLERANCES PER ANSI Y14.5 1973 COML TOL APPLY TO STOCK SIZES		DRAWN <i>R.W. Elnick</i> CHECKED <i>ED</i> 1-23-85 ENGR <i>ED</i> 9-11-85 RELEASED <i>ED</i> 9-11-85	EATON SCHEMATIC, POWER SUPPLY	
KDK8924-2	UPC5000			
KDK8924-1	UPC5000	MATERIAL: <i>XX</i>	WT. CALC <i>XX</i>	SHEET 1 OF 1
NEXT ASSY	USED ON	FINISH: <i>XX</i>	SCALE <i>XX</i>	
APPLICATION				

Milford Blueprint

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
-		REL ON C/N0463	3-27-83	[Signature]
A		C/N0586 ADDED MOS STAMP	6-8-83	[Signature]
B		C/N0846 ITEM 20 WAS 390Ω KFU310AT, ITEM 16 WAS 39Ω, KMA310AF	8/4/84	[Signature]
C		C/N0834 DLYD NOTE 3: TEST PROCEDURE (LATER)	5/13/85	[Signature]
D		REV'D. PER C/ND1342	7/10/86	[Signature]
E		C/ND2881 ADDED KAM8924-2	1/10/88	[Signature]
F		Item 27 was 3.00" Long	6/1/00	ULL
G		Changed HLMP2300 to HLMP2300-EF000 Added Note 8	1/11/02	TLH [Signature]



- NOTES**
- FOR SCHEMATIC SEE KBT 7316
  - OBSERVE POLARITY OF CAPACITORS, LEDS, DISPLAYS, AND SIP RESISTORS.
  - 
  - NO COMPONENT SHALL EXCEED .25 HEIGHT, EXCEPT DS1 → DS15 NOT EXCEED .31 HEIGHT.
  - DS1 → DS8 AND J1 MUST BE SEATED FLAT ON PRINTED CIRCUIT BOARD
  - USE ONLY FREON FOR CLEANING.
  - STAMP APPLICABLE DASH NO, REV, AND DATE. MARKING TO BE 1/8" HIGH. USE EPOXY INK.
  - DS1-DS6 BRIGHTNESS CODES D AND E MAY BE USED, BUT MAY NOT BE MIXED ON INDIVIDUAL BOARDS. MUST USE LEDS FROM SAME MANUFACTURING TUBE.

QTY	ZONE	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
1	1	27	CABLE ASSEMBLY	B	KAG7314-2			3 1/2" LG
		26						
1	1	25	RESISTOR, FIXED	C	KFU310BF		R17	1K ±5% 1/4W
1	1	24	FIXED	C	KFU310DQ		R16	20K ±5% 1/4W
2	2	23	FIXED	C	KFU310BN		R13, R14	2K ±5% 1/4W
2	2	22	FIXED	C	KFU310BZ		R11, R12	51K ±5% 1/4W
2	2	21	FIXED	C	KFU310AP		R9, R10	270Ω ±5% 1/4W
4	4	20	FIXED	C	KFU310AY		R6, R7, R8	560Ω ±5% 1/4W
2	2	19	FIXED	C	KFU310AD		R4, R5	100Ω ±5% 1/4W
1	1	18	SIP	C	KMA310AL		R15	20K 10 PIN
1	1	17	SIP	C	KMA310N		R3	100Ω 8 PIN
2	2	16	RESISTOR, SIP	C	KMA310V		R1, R2	270Ω 8 PIN
		15						
1	1	14	CAPACITOR	B	KBE311E		C3	2.2μF 20V
3	3	13	CAPACITOR	A	KKF311Y		C1, C2, C4	.1μF, ±20%, 50V
		12						
8	8	11	TRANSISTOR	C	KEA165A		Q1 THRU Q8	2N4401
12	18	10	SPACER	A	KLZ224B			
2	2	9	INDICATOR, LED	A	KBR375A		DS2, DS3	HLMP1301
-	3	8	INDICATOR, LED	A	KBD375C		DS9, DS10, DS11	HP5082-4690
2	2	7	LIGHT BAR MODULE	B	KK7375A		DS4, DS5	HDSP4830
2	2	6	LIGHT BAR MODULE	B	KBW375A		DS7, DS8	HLMP-2300-EF000
6	6	5	DISPLAY 7 SEGMENT	B	KBJ375D		DS1-DS6	HDSP-3353
2	2	4	I.C. BCD/DECODER	C	KBJ8918R		U4, U5	74HC42
2	2	3	I.C. OCTAL D TYPE	C	KBE8918BF		U2, U3	74HCT377
1	1	2	I.C. DISPLAY CONTROL	A	KHW1918A		U1	MM74C92N
1	1	1	PRINTED WIRING BOARD	C	KFG7361			

1-555952  
2-555954

UNLESS OTHERWISE SPECIFIED  
UNITS TO BE INCHES  
ALL THREADS TO BE CLASS 2  
ALL DIMENSIONS APPLICABLE AFTER TREATMENT

DO NOT SCALE DRAWING  
FOR RLWS USE ONLY

QUANTITY

THIRD ANGLE PROJECTION

MATERIAL

TREATMENT

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TITLE  
**DISPLAY BOARD ASSEMBLY**

DWG NO  
**55952**

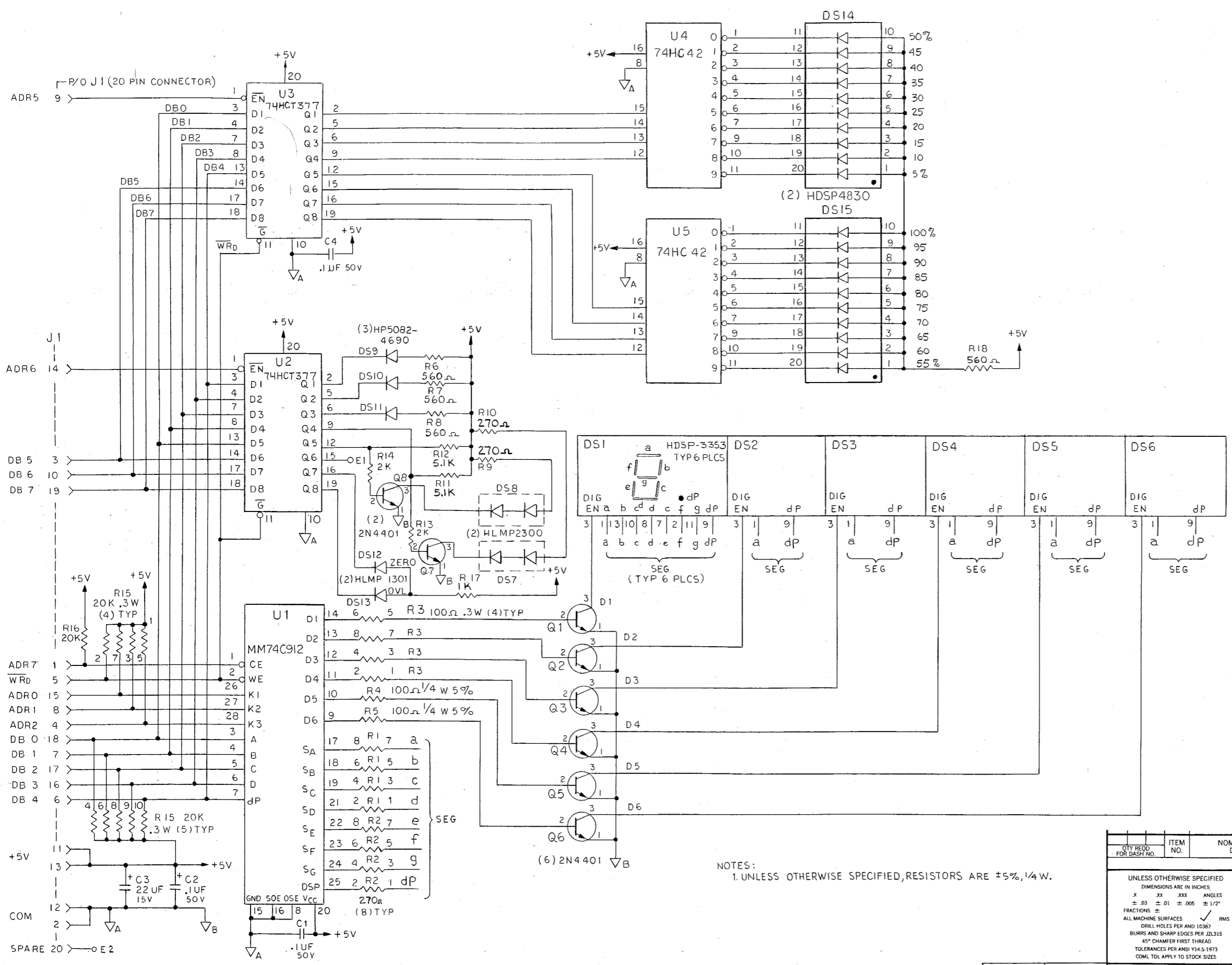
RICE LAKE WEIGHING SYSTEMS

SCALE  
SHEET 1 OF 1

REVISION  
**G**

DATE  
3-27-83

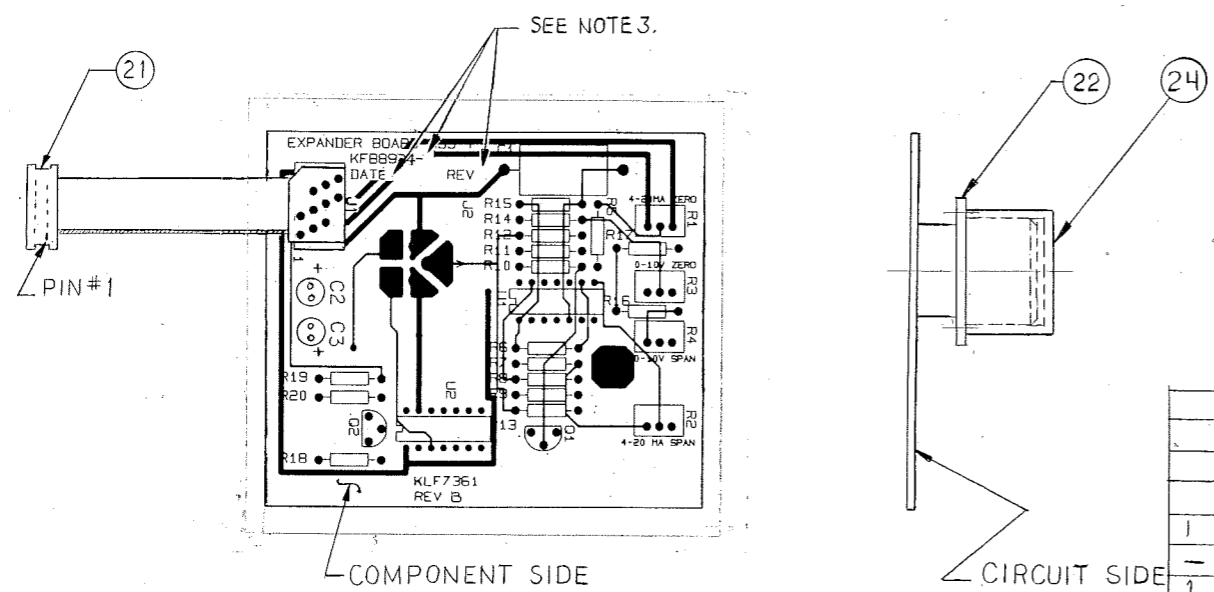
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
-		REL. ON C/N D0846	8/20/84	[Signature]
A		C/N D1342, U2 & U3 WERE 74LS377, U4 & U5 WERE 74LS42, DS1-DS6 WERE 5082-7653, R11 & R12 WERE 1K, R9 & R10 WERE 51Ω, R17 & R18 WERE 270Ω, R1 & R2 WERE 68Ω	7/10/86	[Signature]



NOTES:  
1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE ±5%, 1/4 W.

QTY REQD FOR DASH NO.	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
LIST OF MATERIAL							
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES X XX XXX ANGLES ±.03 ±.01 ±.005 ±1/2" FRACTIONS ± ALL MACHINE SURFACES ✓ RMS DRILL HOLES PER AND 10367 BURRS AND SHARP EDGES PER J2L315 45° CHAMFER FIRST THREAD TOLERANCES PER ANSI Y14.5-1973 OML TOL APPLY TO STOCK SIZES				Consolidated Controls Bethel, CT 06801  DISPLAY BD. PRESSURE INDICATOR			
DRAWN [Signature] 10-29-82		CHECKED [Signature] 11/30/82		ENGR [Signature] 8/30/84		RELEASED [Signature] 8/30/84	
MATERIAL:		FINISH:		SIZE D	FSCM NO. 02750	DWG NO. KBT7316	
NEXT ASSY		USED ON		SCALE	WT. CALC ACT	SHEET 1 OF 1	

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
-		C/ND1538 INITIAL RELEASE	6/9/87	[Signature]
A		C/ND1258, ITEM 22 WAS KBT7354C	6/24/87	[Signature]
B		C/ND1951 ADDED -2.RVSD ITEMS 5,11,14, & 23 TO SPECIFY -1 OR -2	10/27/88	[Signature]
C		C/ND2232, ADD'D ITEM 24 & -25	1/30/90	[Signature]
D		C/ND2272 ADDED ITEM 20: C2 & C3	4/11/90	[Signature]
E		C/ND2574 DLTD ITEM 20, QTY 2, FOR -3	5/5/91	[Signature]
F		C/ND3056, ITEM 21 WAS KLS1314-1	2/28/94	[Signature]
G		chgd item 19 to KDE7311B	6/20/00	KLL



QTY	REQD FOR DASH NO.	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
1	-	25	ASSY EXPANDER BD	-	KFB8924-1			
-	1	24	CAP	A	KK312R			
1	1	23	I.C. SOCKET	B	KE251A	(-1 XU1) -2, -3 XU2		14 PIN
-	1	22	CONNECTOR RECEPTACLE	B	KBT7354	J2		5 PIN
-	1	21	CABLE ASSEMBLY	B	KAU1314-7	J1		10 PIN
-	2	20	CAPACITOR (ELECTROLYTIC)	B	KAU7311G	C2, C3		10µF ±20% 25V
-	-	19	CAPACITOR (MYLAR)	B	KDE7311B	C1		.5µF ±10% 100V
1	1	-	18					
1	1	-	17	RESISTOR FIXED FILM	-	RN55C3921F	R18	3.92K ±1% 1/10 W
-	-	1	16	RESISTOR FIXED FILM	-	1501F	R16	1.50K ±1% 1/10 W
-	-	1	15	RESISTOR FIXED FILM	-	49R9F	R13	49.9Ω ±1% 1/10 W
1	1	4	14	RESISTOR FIXED FILM	-	1001F	(-1 R10, R14, R15, R17) -2, -3 R20	1K ±1% 1/10 W
-	-	4	13	RESISTOR FIXED FILM	-	1003F	R8, R9, R11, R12	100K ±1% 1/10 W
-	-	1	12	RESISTOR FIXED FILM	-	1621F	R7	1.62K ±1% 1/10 W
1	1	2	11	RESISTOR, FIXED FILM	-	RN55C1002F	(-1 R5, R6) -2, -3 R19	10K ±1% 1/10 W
-	-	2	8	POTENTIOMETER	B	KBY338E	R2, R4	1K ±10% 1/2 W
-	-	2	7	POTENTIOMETER	B	KBY338D	R1, R3	20K ±10% 1/2 W
1	1	1	5	TRANSISTOR	C	KEA165A	(-1 Q1) -2, -3 Q2	2N4401
1	1	-	3	I.C. QUAD LINE DRIVER	C	KFT1918A	U2	14 PIN 1488
-	-	1	2	I.C. QUAD OP AMP	A	KER1918A	U1	14 PIN HA-3-4741-5
-	1	1	1	PRINTED CIRCUIT BOARD	C	KLF7361		

- NOTES:
- FOR SCHEMATIC SEE (B SIZE) KHW7316.
  - OBSERVE POLARITY OF DIODES, LED'S, DISPLAYS AND CAPACITORS.
  - STAMP APPLICABLE DASH NUMBERS, REVISION, AND DATE AT FINAL ASSEMBLY USING BLACK INDELIBLE INK. CHARACTERS TO BE MIN. .12 HIGH
  - SEAT EACH COMPONENT AS FLAT TO P.C. BOARD AS DEVICE ALLOWS.
  - CAPACITORS WITH VOLTAGE RATINGS GREATER THAN THOSE SHOWN MAY BE USED IF PHYSICAL SIZE AND LEAD SPACING ARE EQUIVALENT.
  - USE ONLY FREON FOR CLEANING. (SUCH AS FREON TMS).
  - TEST PROCEDURES: KDG8317

-1-57999  
 -2-58001  
 -3-58011

REVISED DRAWING NO. 57999  
 PART NO. A-DORJHA-183N-1010  
 BY CGJ DATE 12-15-99

QTY REQD FOR DASH NO.	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
LIST OF MATERIAL							
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES X XX XXX ANGLES ± .03 ± .01 ± .005 ± .4" FRACTIONS ± ALL MACH SURFACES ✓ RMS DRILL HOLES PER AND 10387 BURRS & SHARP EDGES PER J2L315 45° CHAMFER FIRST THREAD TOLERANCES PER ANSI Y14.5M-1982 COML. TOL. APPLY TO STOCK SIZES				Consolidated Controls Corporation Bethel, CT 06801-0247			
DRAWN: SCL 4/16/87 CHECKED: SA 4-16-87 ENGR: S.V. 6-9-87 RELEASED: SPG-9-87				ASSEMBLY, EXPANDER BOARD			
NEXT ASSY		USED ON		MATERIAL: -/-		FINISH: -/-	
APPLICATION:		SIZE		FSCM NO.		DWG NO.	
		C		02750		KFB8924	
		SCALE: 1/1 REF		WT. CALC ACT		SHEET 1 OF 1	

DWG NO. KFB8924  
 SH 1

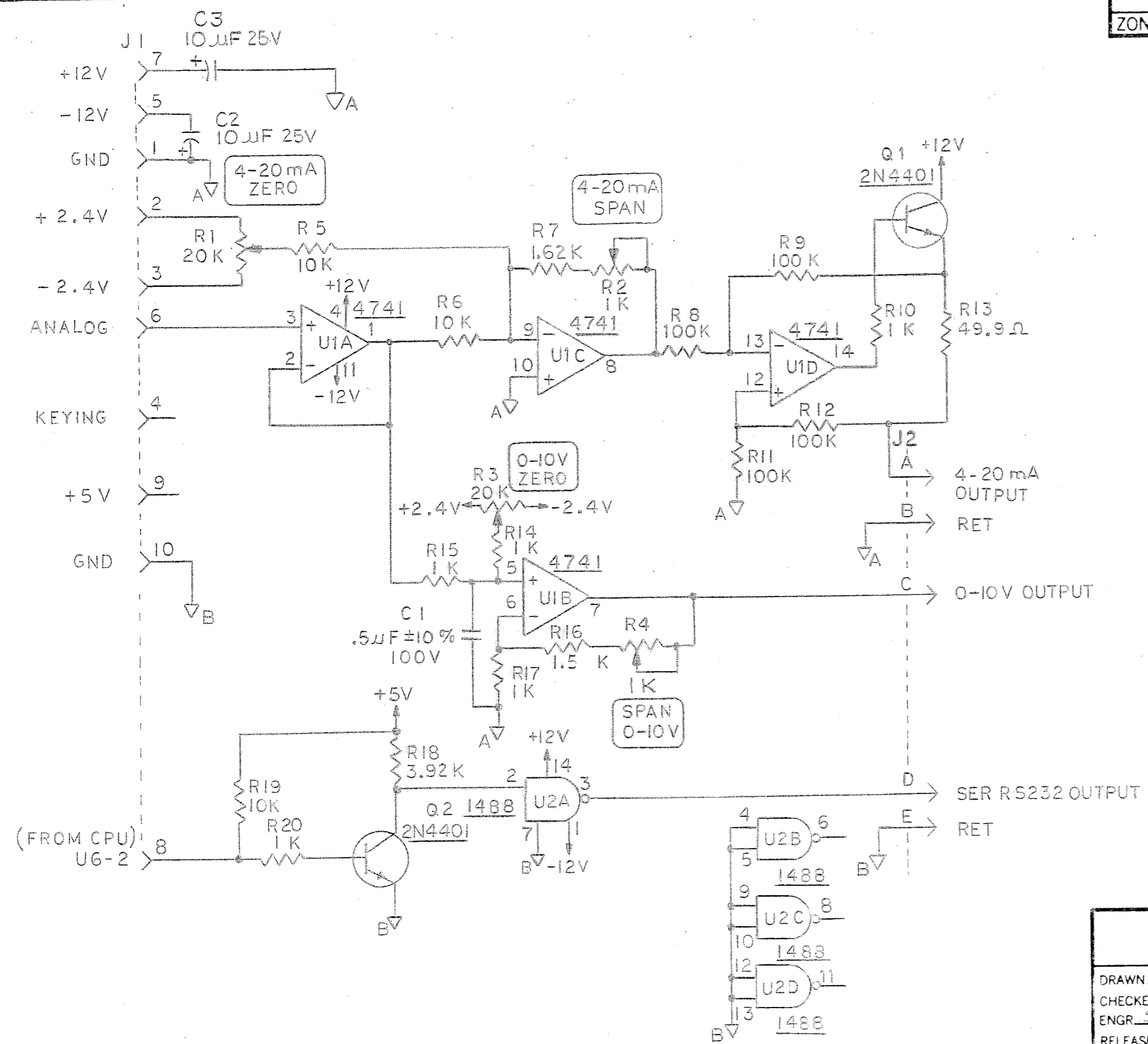
MILFORD BLUEPRINT

124228

57999

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
-		C/ND1538 INITIAL RELEASE	6-9-87	[Signature]
A		C/ND1951 R16 WAS 1.21K	10/27/88	[Signature]
B		C/ND2272 ADDED C2 & C3, 10µF	4/11/90	[Signature]



NOTE:  
 ALL FIXED RESISTORS  $\pm 1\%$   $\frac{1}{10}$  W } UNLESS SPECIFIED OTHERWISE.  
 POTENTIOMETERS  $\pm 10\%$   $\frac{1}{2}$  W }

RLWS Drawing No \_\_\_\_\_  
 Rev \_\_\_\_\_ Sheet \_\_\_\_\_ of \_\_\_\_\_  
 By \_\_\_\_\_ Date \_\_\_\_\_

Consolidated Controls Corporation  
 Bethel, CT 06801-0247

**SCHEMATIC,  
 EXPANDER BOARD**

DRAWN SCL 4-6-87  
 CHECKED [Signature]  
 ENGR S.V. 6-9-87  
 RELEASED [Signature] 6-9-87

SIZE	FSCM NO.	DWG NO.
<b>B</b>	<b>02750</b>	KHW7316
SCALE	WT. CALC	SHEET 1 OF 1

KFB8924	UPS3000	MATERIAL: +
NEXT ASSY	USED ON	FINISH: +
APPLICATION		