UPC5000/UPC5010

Portable & Rack-mountable Pneumatic Pressure Calibration Console

Operation & Maintenance Manual

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Contents

About This Manual

The UPC5000 portable pneumatic pressure calibrator and the rack-mounted UPC5010 are rugged, compact instruments manufactured by Condec. They are designed to provide superior accuracy, range of calibration and ease of operation when used for the calibration of a wide variety of pressure sensing and measuring devices.

These instruments utilize a repeatable sensor coupled to microprocessor-based electronic circuitry and a selectable unit display system. This provides an easy-to-read and accurate digital representation of the measured pressure. This all electro-mechanical device combines a 7 cu. ft., 2216 PSI cylinder with our precision ORION-2C vernier. The unit has one test port and front panel gauges that indicate system pressure and remaining pressure in the internal cylinder. A pressure regulator acts as a pressure limiter so that the operator can not over-pressurize a unit under test. Fill and test hoses are supplied for the customer. Standard front panel buttons and switches provide selection of the desired pressure range, push-button zeroing and 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.

Warning *Before attempting to use either style pressure calibrator, the following instructions must be carefully read and understood by personnel using the equipment. This is a high-pressure system. It is strongly recommended that only personnel formally trained in the use of pneumatic pressure equipment be permitted to operate it. Potentially dangerous conditions can be produced through negligent handling or operation of the console due to the high pressure cylinder contained within the unit.*

These units are strictly for use with pneumatic pressures. Erroneous readings and potential damage can 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.

1.0 Introduction

Utilizing microprocessor technology, the UPC5000 and rack-mounted UPC5010 instruments offer a combination of features, performance, versatility, and reliability not previously available in a single, self-contained pressure calibration instrument. Some of the features are listed below:

- Three independent switch-selectable pressure ranges per instrument.
- Accuracy of each range equal to or better than ±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 ensure long-term stability and accuracy.
- Digital Display: Large LED digits provide excellent readability under all lighting conditions (also available with a Liquid Crystal Display).
- Using a manually adjustable regulator, the maximum system input pressure is adjusted to any value higher (typically 20 to 50%) than the full scale range of the device being tested and, the unit under test is fully protected from being inadvertently over-pressurized.
- Portable: These compact, self-contained systems are easily carried and operated by only one person. Total weight is less than 40 pounds.
- System Calibration: The instruments can be completely calibrated without being removed from the external case. A separate plug-in Condec Calibration Module (PN 60109) provides access to the computer when calibration is performed. No manual alignment or potentiometer adjustments are required.

- Calibration Integrity: Once calibrated, the tamper-proof design provides numerous safeguards that guarantee the integrity of pressure readings obtained. The LED provides the operator with status information during both operation and calibration.
- Pressure Source: An internal supply cylinder with a volume of 7.0 std. cu. ft. of N_2 provides up to 2216 PSIG of pressure for calibration and test. A check valve quick disconnect fitting provides re-charging capability.
- Simple Operation: All controls, indicators and pressure ports are accessible from the front panel. Section 2 provides clear, concise instructions for system operation.
- Data Input Capability: A front panel-mounted connector and selector switch permit the 4-20 mA current signal from the gage-under-test or voltage to be displayed. Transducer excitation voltage of 18 VDC can be provided standard, or by special order 28 VDC.
- 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 system contains a high-pressure burst disk and relief valves to protect both the operator and system components from harm in the event of over-pressurization. An all stainless steel version is available by special order.

The heart of this 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.

By combining these sensors with 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-check feature ensures 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 computer is programmed with a series of internal self-diagnostic routines that continually monitor and check every bit of data stored and processed by this system. The system either notes or shuts down operation in the event of an out-of-tolerance reading or outright failure.

The UPC5000 has an internal, rechargeable 12 volt lead acid battery, that provides a minimum of six hours of complete portability when fully charged. An ON/OFF and battery test switch is provided to conserve energy when the instrument is not in use and to provide the operator with battery voltage status during use. It also has a *LO BATT* indicator on display.

The following schematic provides an overview of the UPC5000/UPC5010's function.

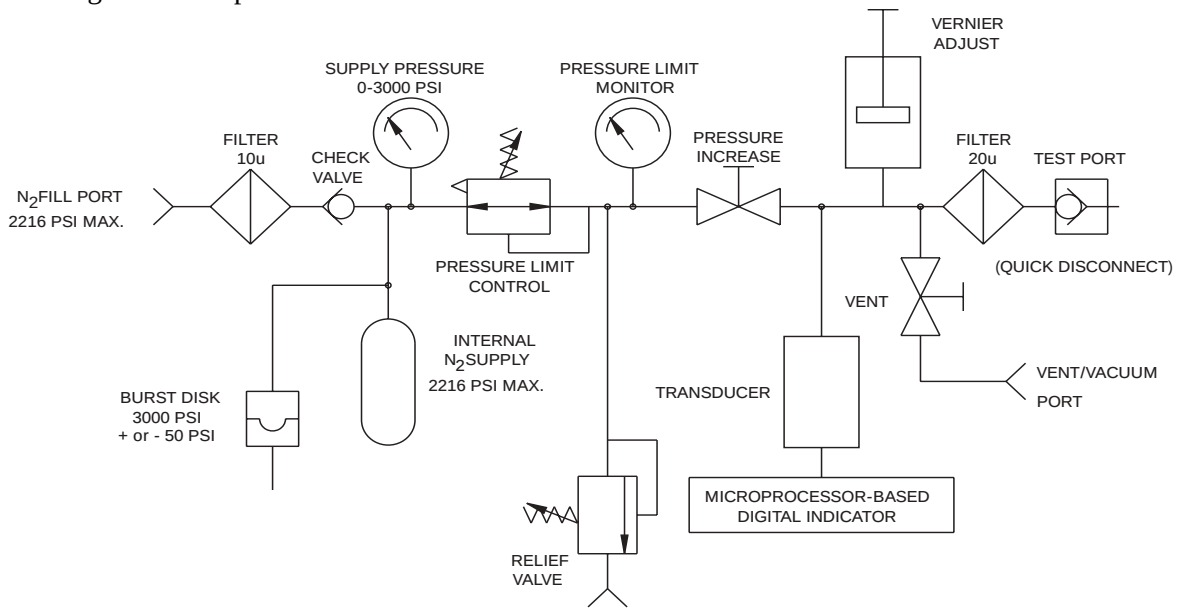


Figure 1-1. UPC5000/UPC5010 Flow Diagram

2.0 Operation

The following sections explains the various procedures for operating the UPC5000/UPC5010.

2.1 Pressure Cylinder Filling Procedure

To initially fill or refill the internal pressure cylinder (2216 PSI max) of the UPC5000/UPC5010, see Figure 2-1 and proceed by following these steps:

1. Rotate the *PRESSURE LIMIT CONTROL* (1) counter-clockwise until it stops. Close the *COARSE ADJUSTMENT* valve (2) by rotating clockwise until it stops.
2. Connect the fill hose (3), to a clean regulated nitrogen source (5).
3. Connect the other end of the fill hose (3) to the male fill port fitting (4).
4. Slowly open the valve on the nitrogen source and allow the gas to flow into the pressure cylinder. The *SUPPLY PRESSURE* gauge (6) indicates the amount of pressure within the internal cylinder.

NOTE: *The Inlet Check Valve (PN 60263) and the Nitrogen Fill Port (Section 4.2.19 on page 25; Figure 4-3 on page 35) can be damaged if pressure is released too fast.*

5. Use the following procedure for filling the cylinder:
   a) Fill cylinder to 1,000 PSI at a rate of charge equal to a minimum of two minutes, then wait five minutes for system to stabilize.
   b) Fill cylinder from 1,000 PSI to 2,216 PSI at a rate of charge equal to a minimum of two minutes.
   c) Wait five minutes for system to stabilize before using.

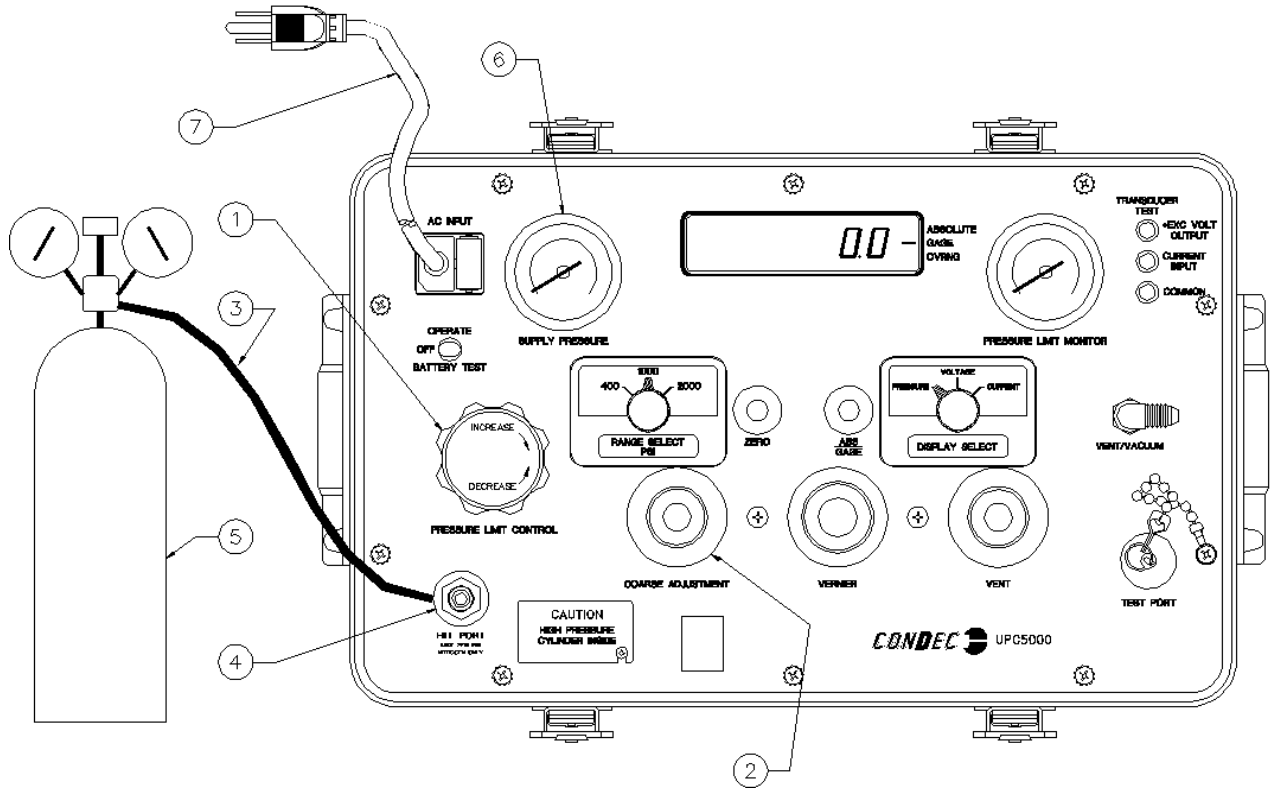


Figure 2-1. Pressure Cylinder Fill Procedure

NOTE: *UPC5000 shown, AC Input (7) and Fill Port (4) are on back of UPC5010 Rack Mountable Calibrator.*

2.2 Initial Setup Procedure

To prepare for actual calibration usage, see Figure 2-2 below and proceed as follows:

1. Check that the *COARSE ADJUSTMENT* valve (2) is closed (rotate clockwise until it stops) and that the *VENT* valve (8) is open (two turns counter-clockwise from its stop).
2. Plug in the power cord (7) and energize the unit by flipping the power switch (18) to OPERATE. The UPC5000/UPC5010 will perform an internal functional self-check. If acceptable, a 100.00 flashes briefly and the display returns to a normal reading. Allow at least ten minutes warm-up time, then zero unit by momentarily depressing the ZERO switch (12) for less than five seconds. The instrument can be zeroed at any time, as long as the VENT valve (8) is open, by momentarily depressing the ZERO switch (12) for less than five seconds.

NOTE: *If ZERO switch is depressed longer than 5 seconds unit will perform an internal functional self-check.*

3. Select the desired full scale pressure range via the three-position RANGE SELECT rotary switch (19). 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 calibration cycle.*

4. Using the *PRESSURE LIMIT CONTROL* regulator (1), adjust the maximum system input pressure (as read by the *PRESSURE LIMIT MONITOR* [9]), to any desired value higher (typically 20–50% higher) than the full-scale range of the device under test. Using this technique, the device under test is fully protected from being accidentally over-pressurized.
5. Set the *DISPLAY SELECT* switch (16) to the *PRESSURE* position.
6. Connect the male end of the test hose to the *TEST PORT* (17) fitting.
7. Connect the swivel fitting end (7/16-20) of the test (output) hose to the device-under-test (use adapters if required). Tighten all connections properly.

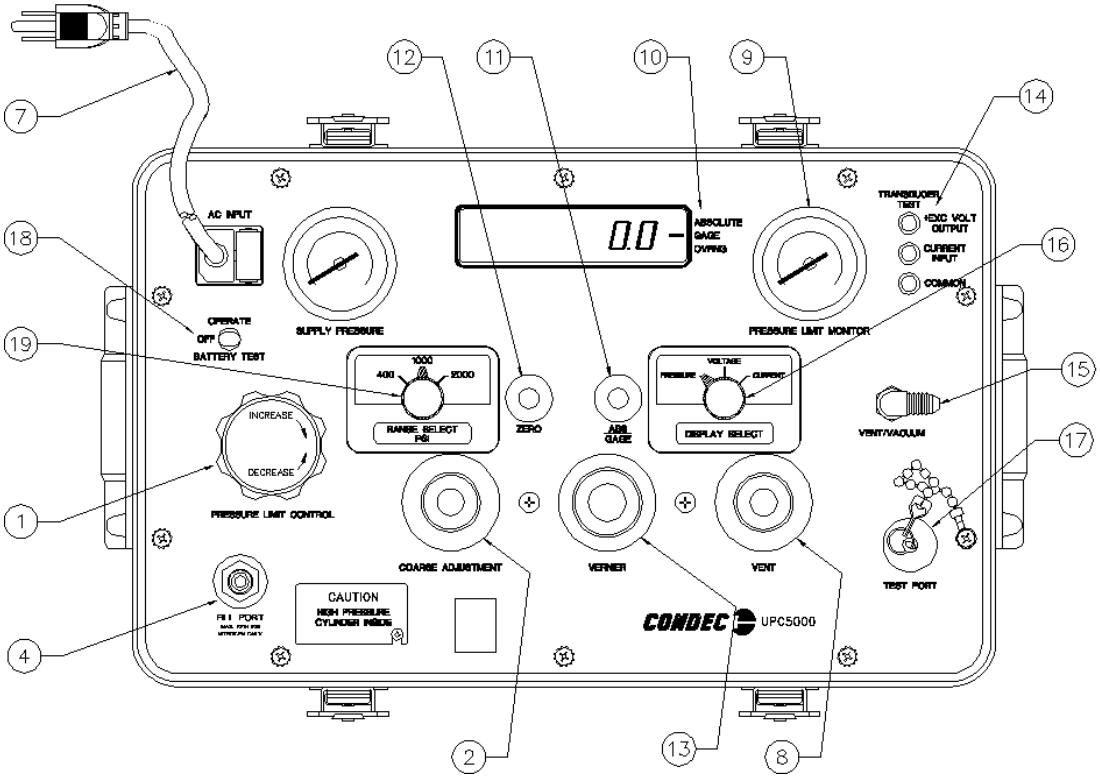


Figure 2-2. Initial Setup Procedure

NOTE*: UPC5000 shown, AC Input (7) and Fill Port (4) are on back side of UPC5010 Rack Mountable Calibrator.*

8. Optional - if the current (4.000 to 20.000 mA) measurement features are used, connect the provided transducer test cable, (PN 55092), to the transducer test jacks (14).

When connected, the transducer test cable provides +32 VDC excitation on non-battery units, or +18 VDC excitation on battery units. The internal impedance (load) is 10 ohms.

NOTE: *+ EXCITATION VOLTAGE will only operate while units power cord is plugged into AC wall outlet. Battery units may be ordered special to obtain +28 VDC excitation.*

The display scaling for these current measurements are as follows:

SWITCH POSITION	DISPLAY READING
Current	0-20.000 mA by 0.005 mA
*Voltage	0-100.00 mV by 0.02 mV

Table 2-1. Display Select Switch (16)

NOTE: *UPC5000/UPC5010 reads a 4-20 mA signal only, but will display as either 4-20 mA or 20-100 mV.*

The test cable connector wiring is as follows:

CONNECTOR PIN DESIGNATION	FUNCTION
A	+ VDC
B	+ SIGNAL
C	NOT USED
D	VOLTAGE & SIGNAL COMMON

Table 2-2. Transducer Test Cable (PN 55092)

NOTE: *Connector pin designations are for reference only, and are no longer a connector on newer units. See Figure 2-2 on page 4 (14).*

2.3 Pressure Measurement Sequence for Absolute/Gage Unit

1. Check that the indicator on the right end of the display indicates desired mode (10). If not, momentarily depress the ABS/GAGE switch (11) to obtain mode.
2. If operating unit in GAGE mode go to Section 2.4. If operating unit in ABSOLUTE mode go to Section 2.5.

2.4 Pressure Measurement Sequence for Gage Only Unit

NOTE: *See Figure 2-3 on page 6 when following these steps.*

1. To apply pressure, close the *VENT* valve (8), approximately two turns, until it stops, then open the *COARSE ADJUSTMENT* valve (2) 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.
2. Use either the *COARSE ADJUSTMENT* (2) or *VENT* valve (8) 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.
3. To obtain exact pressure readings, slowly rotate the *VERNIER* control (13) knob in the direction required (clockwise to increase pressure) as indicated by the electronic numerical display.
4. The transducer current measurement can be displayed at any time by placing the DISPLAY SELECT switch (16) to its *CURRENT* position.

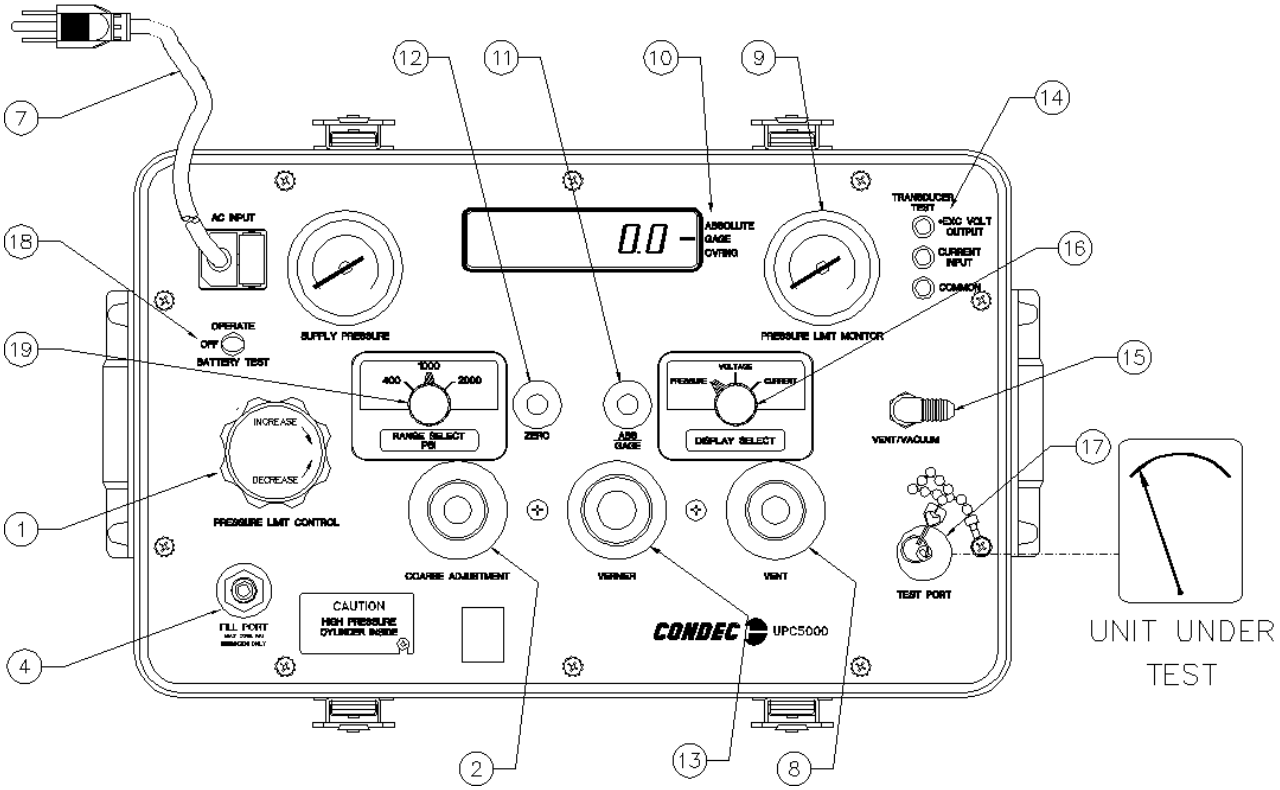


Figure 2-3. Pressure Measurement Sequence (Gage Only)

NOTE*: UPC5000 shown, AC Input (7) and Fill Port (4) are on back side of UPC5010 Rack Mountable Calibrator.*

2.5 Pressure Measurement Sequence for Absolute Only Unit

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 *VENT* valve (8) (approximately two turns to its stop) and open the *COARSE ADJUSTMENT* valve (2) 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.
   1.2. Use either the *COARSE ADJUSTMENT* (2) or *VENT* valve (8) 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.
   1.3. To obtain exact pressure readings, slowly rotate the *VERNIER* control (13) knob in the direction required (clockwise to increase pressure) as indicated by the electronic numerical display.
2. If pressure measurements above and below atmospheric pressure are required, connect a vacuum pump to the *VACUUM/VENT* port (15) as shown in Figure 2-4 on page 7.
3. Open the *VENT* valve (8), close the *COARSE ADJUSTMENT* valve (2) 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 button to establish a zero reference on the display.
4. With the vacuum pump still running, close the *VENT* valve (8) and check for system leaks. If there are none, continue to step 4.1.
   4.1. To apply pressure, close the *VENT* valve (8) (approximately two turns to its stop) and open the *COARSE ADJUSTMENT* valve (2) (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 *COARSE ADJUSTMENT* (2) or *VENT* valve (8) 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.

4.3. To obtain exact pressure readings, slowly rotate the *VERNIER* control (13) knob in the direction required (clockwise to increase pressure) as indicated by the electronic numerical display.

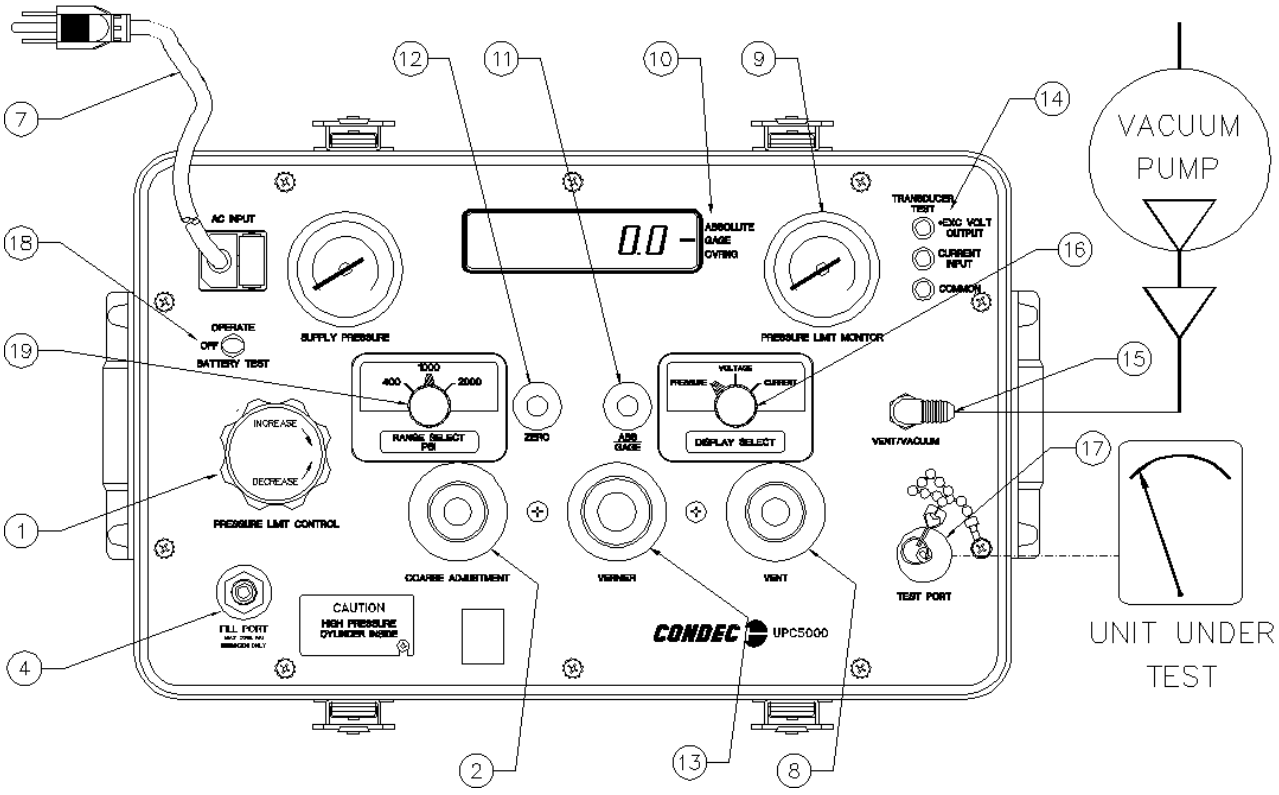


Figure 2-4. Pressure Measurement Sequence (Absolute Only)

2.6 Battery Operation

When supplied with the battery, the UPC5000/UPC5010 has an internal, rechargeable 12 volt, lead acid battery which provides a minimum of six hours of completely portable usage before having to be recharged.

An ON/OFF/BATTERY TEST switch (18) is provided to conserve energy when the instrument is not in use, and to provide the operator with information as to the status of the battery voltage during use.

The UPC5000/UPC5010 can be operated and recharged by 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.

When selected, the momentary action BATTERY TEST switch (18) (Figure 2-4 on page 7) is used to read the actual battery voltage. The battery voltage reading typically is between 11.5 and 13.0 volts. When the battery voltage reads 11.5 volts, there are approximately one to two hours of useful operation left and a *low battery* indicator is illuminated. For LED display units, a red LED in the left center of the display turns on. For LCD display units, five LED segments in the left of the display window illuminate in a "U" shape. The instrument ceases to function when the battery voltage is 11.0 volts or less.

NOTE: *The battery test should only be performed with the UPC5000/UPC5010 operating at zero PSIG (VENT valve open) and at the conclusion of the test, the unit's ZERO button will have to be pushed again to re-zero the instrument.*

3.0 Calibration

Follow the procedure on the following pages for calibrating the UPC5000/UPC5010.

NOTES:

- *When calibrating, the computer within the UPC5000/UPC5010 is actually being re-programmed, therefore it is important that the pressure standard being used is in satisfactory operating condition and that the technician fully understands its operating characteristics and methods of usage. In addition, the UPC5000/UPC5010 itself must be properly warmed up (approximately ten minutes) and electrically stabilized prior to performing a calibration cycle.*
- *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 "UPC5000/UPC5010 Return Material Authorization Form" on page 53).*

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 ±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.

3.2 Instrument Calibration Set-up

The UPC5000/UPC5010 is placed into its calibrate mode by connecting a Condec Calibration Module (PN 60109) via the multi-pin jack. The jack is located behind the small slide plate near the fill port (see Figure 3-1).

The Condec Calibration Module provides access to the calibrator's various program modes via a five-position rotary switch. It also provides a means of entering and storing data via four other momentary action switches.

In the calibrate mode, the UPC5000/UPC5010's numerical display is used to provide operator prompting symbols as well as displaying the various data formats. For example, in Figure 3-2, the data format shown is that obtained as soon as the *ZERO/SPAN* position of the rotary switch is selected.

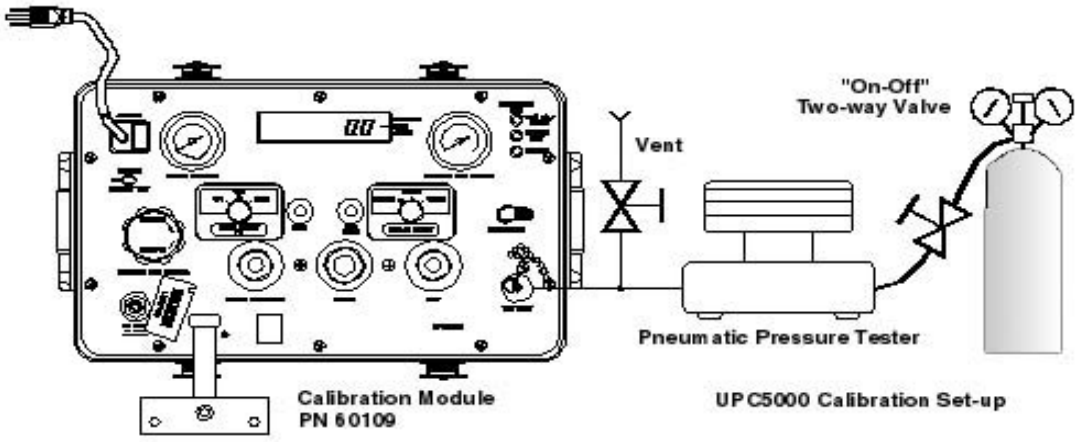


Figure 3-1. Gage Only Unit or Absolute/Gage Unit nstrument Calibration Set-up

NOTE: *UPC5000 shown, AC input and Fill Port are on backside of UPC5010 Rack Mountable Calibrator.*

3.3 Zero/Span Calibration

Selecting the *ZERO/SPAN* position on the Condec Calibration Module (PN 60109) places the instrument into its *ZERO/SPAN* calibration mode. The display is shown in Figure 3-2.

NOTE: *Absolute Only Unit requires vacuum pump with PSIA indicator to obtain readings below local barometric pressure.*

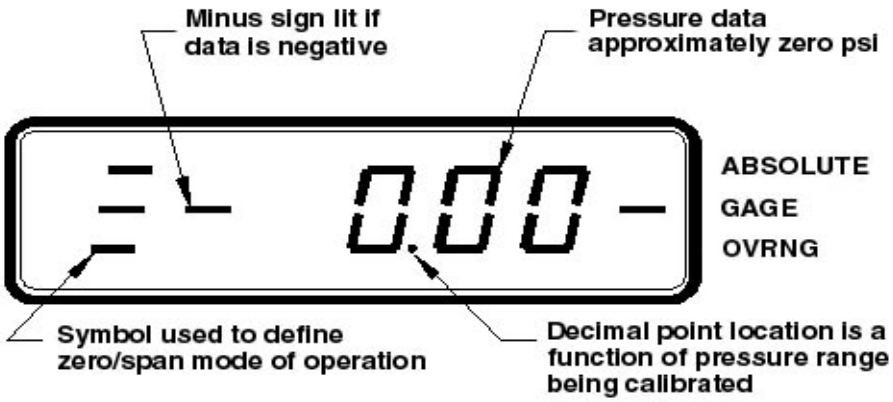


Figure 3-2. Zero/Span calibration for Absolute/GageUnit

Starting with the instrument's lowest pressure range, perform Steps 1 and 2 shown in Table 3-1 for each pressure range.

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

Perform the following for each step:

1. Gage Only or Absolute/Gage Unit: Adjust input pressure to the appropriate (either 0 or 100%) value. Absolute Only Units: Must use a vacuum pump with PSIA display, to reach as close to 0 PSIA as possible.
2. Perform the action indicated in Table 3-1 when pressure input readings are stable.

Step No.	Pressure Input Value	Operator Action Required	Resulting Display Indication	Remarks
1	0% (see Note 3 below)	Press ENTER button	0%	Note 1 below
2	100%	Press ENTER button	100%	Note 2 below

Table 3-1. Zero and Span Calibration Sequence

NOTES:

1. *If readings are not stable or are not within ±20% of zero, the zero correction can't be entered.*
2. *If readings are not stable or are not within ±5% of 100%, the span correction cannot be entered.*
3. *Absolute only unit: Maximum vacuum standard display reading of 0.04 PSIA.*

3.4 Linearity and Hysteresis Calibration

Install the Condec Calibration Module (PN 60109) and select the *LYN/HYS* position of the rotary switch on the module. This places the UPC5000/UPC5010 into its linearization/hysteresis calibration mode. The display is shown in Figure 3-3 below.

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.*

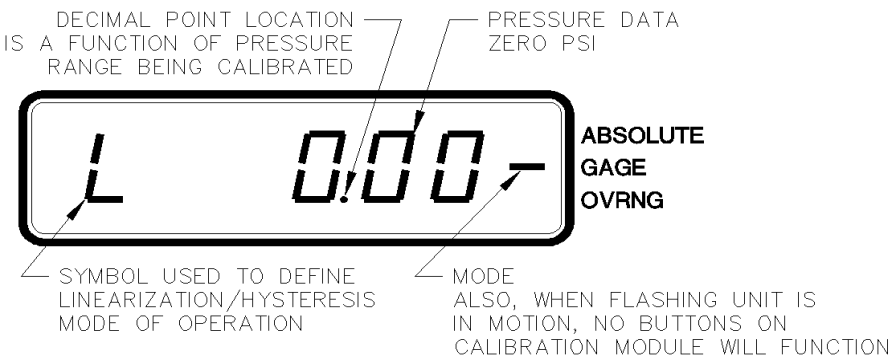


Figure 3-3. Linearity and Hysteresis Calibration

Starting with the instrument's lowest pressure range, sequentially perform the thirteen steps described in Table 3-2, for each pressure range being calibrated. Perform the following for each step:

1. Adjust input pressure to the appropriate value without overshooting the setting. If value is overshot, vent unit and repeat steps.
2. Perform the action as indicated when the readings are stable. On units below 2000 PSI it should not take longer than five minutes. Units above 2000 PSI and all absolute only units should take no longer than fifteen minutes. If it is taking longer, check system for leaks. If no leaks are found, the CPU or transducer may be defective.

Step	Input Pressure % of Range	Operator Action Required	Status Symbol in Left-most Digit	Remarks
1	0 (see note 4 below)	Press ZERO switch	L	Zero on display
2	10	Press ENTER button	L	Notes 1 & 2 below
3	20	Press ENTER button	L	Notes 1 & 2 below
4	30	Press ENTER button	L	Notes 1 & 2 below
5	40	Press ENTER button	L	Notes 1 & 2 below
6	50	Press ENTER button	L	Notes 1 & 2 below
7	60	Press ENTER button	L	Notes 1 & 2 below
8	70	Press ENTER button	L	Notes 1 & 2 below
9	80	Press ENTER button	L	Notes 1 & 2 below
10	90	Press ENTER button	L	Notes 1 & 2 below
11	100	No Action Required	H	Note 3 below
12	50	Press ENTER button	H	Notes 1 & 2 below
13	0 (see note 4 below)	No Action Required	L	

Table 3-2. Linearization and Hysteresis Calibration Sequence

When Step 11 is reached, the display changes so that the left most status symbol is *H*. This remains for Step 12 and down to approximately 0.00 PSI.

NOTES:

1. *If reading is in motion or correction required is not within ±0.8% of full-scale, no entry is made.*
2. *If entry is valid, the display momentarily indicates the correction value (in percent) and the memory location at which it is stored.*
3. *If 100% ±0.05% is not obtained, repeat the zero/span calibration sequence.*
4. *Absolute only unit: Maximum vacuum standard display reading of 0.04 PSIA.*

3.5 Shunt Resistor Calibration

To place the UPC5000/5010 into shunt calibration mode, install the Condec Calibration Module (PN 60109) and select the *SHUNT MODE* position of the rotary switch. The display is shown in Figure 3-4.

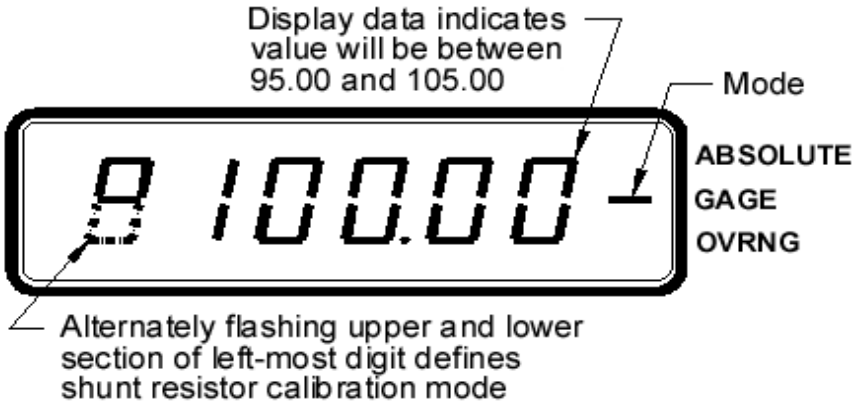


Figure 3-4. Display in Shunt Resistor Calibration Mode.

With the UPC5000/UPC5010's highest pressure range selected, perform the four step sequence described below.

1. Gage Only and Absolute/Gage Units: be sure the input pressure is set at 0 PSIG.

NOTE: *Absolute Only Units: Must use a vacuum pump with PSIA display, to reach as close to 0 PSIA as possible (maximum vacuum standard display reading of 0.04 PSIA).*

2. Press and hold the ZERO button on the module until a stable zero indication is obtained.
3. Release the ZERO button and allow the display to stabilize at its shunt resistor calibration number (100 ± 5.00%).
4. Press the ENTER button on the module. When accepted, the bottom half of all display digits momentarily illuminate.

3.6 Voltage/Current Input Calibration

To calibrate a current generator capable of generating 20 mA, it should be connected to the *COMMON* and *CURRENT INPUT* jacks (Figure 2-2 on page 4 [14]). The DISPLAY SELECT switch (16) should be in the *VOLTAGE* position.

1. Set the Condec Calibration Module (PN 60109) to the *ZERO/SPAN* position (see Figure 3-2 on page 9 for display reading).
2. Press the ENTER button on the module. The display reads *0.00*.
3. Set the current generator for 20 mA output. Press the ENTER button on the module. The display should read *100.000*.
4. Turn the DISPLAY SELECT switch (16) to the *CURRENT* position. Display will read 20.000.
5. Disconnect the current generator.

NOTE: *If the display reading is off, set the Current Generator to 0, and press the ENTER button on the Condec Calibration Module. Set the Current Generator for 20 mA output. The display will read 20.000. If the display reading is off, press the ENTER button on the module. If the display reading is not 20.000, CPU is faulty and requires servicing.*

3.7 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. Select the *DATA RECALL* position of the rotary switch on the Condec Calibration Module (PN 60109).
2. Press the STORE button on the module.
3. When the data is accepted, the four-digit number on the display indicates *1 020* for as long as the STORE button is pressed.

3.8 Required Barometric Offset for Absolute/Gage Unit

Note: *This section can only be completed after Sections 3.3 through 3.7 have been done.*

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.

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: UPC5000/UPC5010 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 4 and Figure 3-1 on page 8):

1. Open the *VENT* valve (8) and close the *COARSE ADJUSTMENT* (2) valve.
2. Using the RANGE SELECT switch (19), select the lowest pressure range on the UPC5000/UPC5010.
3. Select the *ZERO/SPAN* position on the Condec Calibration Module (PN 60109). The UPC5000/UPC5010 displays three dashes on the left side of the display to indicate this mode.
4. Press the ENTER button on the Condec Calibration Module. The UPC5000/UPC5010 display reads zero. Repeat this step for the mid and high ranges.
5. Close the *VENT* valve (8). Select the lowest pressure range of the UPC5000/UPC5010.
6. Turn the *VERNIER* (13) of the UPC5000/UPC5010 clockwise, creating a pressure until the display reads 0.15 PSI.
7. Depress the ENTER button on the Condec Calibration Module. The UPC5000/UPC5010 display reads zero. Repeat this step for the mid and high ranges.
8. Select *DATA RECALL* on the Condec Calibration Module. The display shows *1XXX* (three digits).
9. Press the STORE button on the Condec Calibration Module. The display reads *1 020* or *1 377* when the button is pressed.

Example 2:

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

14.70 PSI: UPC5000/UPC5010 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 4 and Figure 3-1 on page 8):

1. Open the *VENT* valve (8) and close the *COARSE ADJUSTMENT* valve (2).
2. Using the RANGE SELECT switch (19), select the lowest pressure range on the UPC5000/UPC5010.
3. Select the *ZERO/SPAN* position on the Condec Calibration Module (PN 60109). The UPC5000/UPC5010 displays three dashes on the left side of the display to indicate this mode.
4. Depress the ENTER button on the module. The UPC5000/UPC5010 display reads zero. Repeat this step for the mid and high ranges.
5. Close the *VENT* valve (8). Select the lowest pressure range of the UPC5000/UPC5010.
6. Turn the *VERNIER* (13) of the UPC5000/UPC5010 counter-clockwise to create a vacuum until the display reads -0.05 negative offset.
7. Depress the ENTER button on the module. The UPC5000/UPC5010 display reads zero. Repeat this step for the mid and high ranges.
8. Select *DATA RECALL* on the module. The display reads *1XXX* (three digits).
9. Press the STORE button on the module. The display reads *1 020* or *1 377* when the button is pressed.

3.9 Normal Mode Test

After completing the above calibration procedures, you must perform a normal mode test. A current generator capable of generating 20 mA must be connected to the COMMON and CURRENT INPUT jacks, see Figure 2-2 (14). The DISPLAY SELECT switch (16) should be on the CURRENT position.

1. Set the Condec Calibration Module to the *NORMAL MODE* position.
2. DISPLAY SELECT switch should still be in the *CURRENT* position. Display will read *20.000*.
3. Turn the DISPLAY SELECT switch to the *VOLTAGE* position. Display will read *100.00*.
4. The pneumatic portion of the calibration is now complete and the pressure standard and the module can now be disconnected.

3.10 Self-Check Test

Complete the following steps (see Figure 2-2).

1. Remove the CONDEC Calibration Module.
2. Depress the ZERO push-button (12) on the UPC5200/UPC5210 until the unit shows "*CAL*". The display will show "*100*" to verify the unit's accuracy, then it will return to the normal mode automatically.
3. The pneumatic portion of the calibration is now complete and the pressure standard and the CONDEC Calibration Module can now be disconnected.

4.0 Maintenance and Service

This section outlines the mechanical and basic electrical repair procedures for the UPC5000/UPC5010.

4.1 Troubleshooting

Use Table 4-1 below for information on troubleshooting the UPC5000/UPC5010.

Symptom	Problem	Remedy
No lit display	Unit will not energize	Check fuse, check power source, 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 COARSE (Pressure) or VENT 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" and reads a high value at 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	Display will not zero	Perform a ZERO/SPAN calibration
Display shifts	Transducer drifts or possible over pressure	Replace transducer
Gas escapes when external supply pressure is bled	Nitrogen cylinder will not remain charged	Remove inlet check valve; clean or replace

Table 4-1. UPC5000/UPC5010 Troubleshooting

4.2 Maintenance and Service Procedures

The repair procedures cover the major components and sub-assemblies which are critical to the proper functioning of the calibrators and that need periodic maintenance over the life of the unit. Although some mechanical sub-assemblies could be replaced without venting cylinder it is not recommended.

Caution *Only those persons who are formally trained as skilled technicians should attempt to repair these units. All safety precautions should be observed due to the presence of electrical components and high-pressure cylinders. Unit must always be unplugged from power source.*

4.2.1 Panel/Chassis Removal and Installation

UPC5000 Removal

Tools required: Phillips screwdriver

1. Loosen and remove the eight screws (PN 14862) that secure the panel assembly to the enclosure.
2. Lift the panel and chassis by grasping the regulator knob and test port and grasping under the panel edges. Ensure that the wire harnesses do not catch and snag.
3. Gently set the panel/chassis assembly on a bench top. It can be rested on the panel bottom and chassis edge with the panel tilted at an angle from its vertical.

UPC5000 Installation

Tools required: Phillips screwdriver

1. Lift the panel and chassis by first grasping the regulator knob and test port.
2. Gently place panel/chassis assembly into enclosure. Ensure that the wire harnesses do not catch and snag.
3. Align mounting holes and install the eight screws (PN 14862) that secure the panel assembly to the enclosure.

UPC5010 Removal

Tools required: Phillips screwdriver

1. Loosen and remove the fourteen screws (PN 14862) from top, bottom, and sides that secure the panel assembly to the enclosure. Also, loosen and remove the three screws (PN 56444) from the rear of unit that secure the enclosure to the *AC INPUT/FILL PORT* panel.
2. Lift the panel and chassis by grasping the handles located on the front of the rack mountable panel. Ensure that the wire harnesses do not catch and snag.
3. Gently set the panel/chassis assembly on a bench top. It can be rested on the panel bottom and chassis edge with the panel tilted at an angle from its vertical.

UPC5010 Installation

Tools required: Phillips screwdriver

1. Lift the panel and chassis by grasping the handles located on the front of the rack-mountable panel.
2. Gently place panel/chassis assembly into enclosure. Ensure that the wire harnesses do not catch and snag.
3. Align mounting holes and install fourteen screws (PN 14862) from top, bottom, and sides that secure the panel/chassis assembly to the enclosure. Also, align mounting holes and install the three screws (PN 56444) from the rear of unit that secure the enclosure to the *AC INPUT/FILL PORT* panel.

4.2.2 Nitrogen Cylinder Assembly Removal (PN 59531)

NOTE: *Condec strongly recommends that the internal nitrogen supply cylinder be pressure-tested and re-certified every five years from date cylinder was manufactured per U.S. DOT. 3AL Regulation, Title 49 CFR, parts 173 and 178.*

Tools required: 7/16" open end wrench
Phillips screwdriver
1-1/8" open end wrench
3/8" open end wrench

Procedure:

1. Vent any remaining gas from the cylinder to atmosphere. Disconnect the power cord from the power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 and carefully set on a bench top.
3. Using a 7/16" wrench, remove all tubing sections from the cylinder.
4. Remove the four mounting nuts and two clamps from the cylinder.
5. Remove the cylinder assembly.
6. If installing a new cylinder, remove the fitting/tee assembly and Teflon seal and inspect for any damage. If there is no damage, reuse these items on the new cylinder.

4.2.3 Installing New Nitrogen Cylinder Assembly (PN 59531)

Tools required: 7/16" open end wrench
Phillips screwdriver
1-1/8" open end wrench
3/8" open end wrench
A/R 1/4"-wide Teflon tape (PN 60575)
A/R 1/2"-wide Teflon tape (PN 60911)
tube of fluorinated grease (PN 55593)
snoop, bottle of liquid gas leak detector (PN 64781)

1. Install the Teflon O-ring (PN 59217), fitting (PN 59287), and branch tee (PN 59750) on the new cylinder and tighten until snug. Place a small amount of Krytox grease on both sides of Teflon O-ring prior to installation. If installing new parts, Teflon tape is required.
2. If required, wrap two bands of 1" wide rubber friction tape (PN 58838) completely around the perimeter of the cylinder; one at the cylinder bottom and the second at approximately 5.3" from the cylinder bottom.

NOTE: *Prior to wrapping tape, verify and mark on cylinder, center placement of tape, while holding cylinder in mounted position on chassis.*

3. Mount the cylinder in the chassis making sure that the tee fitting is correctly oriented to accept tubing sections.
4. Install the two clamps (PN 58871) and four mounting screws (PN 14862).
5. Install the tubing sections, tightening all fitting nuts 1/4 turn from finger-tight using a 7/16" wrench.
6. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks fill nitrogen supply cylinder to 2200 PSIG. See See Section 2.1 on page 3 for cylinder refilling procedure.
7. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.4 ORION-2C Manifold Removal (PN 55283)

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

NOTE: *See Table 4-7 on page 32 and Figure 4-1 on page 33 for additional parts information.*

1. Vent any remaining gas from the nitrogen cylinder to atmosphere. Disconnect the power cord from the power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 on page 14, and place unit on a bench top.
3. Remove the nitrogen cylinder and its associated tubing as outlined in Section 4.2.2 on page 15.
4. Remove the test port to ORION-2C tubing section using a 7/16" wrench.
5. 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 four transducer wires (red, white, green, black) from the terminal block, TB1, on the CPU board, using the small flat-blade screwdriver.
6. Break the wire ties that hold the transducer wires so that the wires are free.
7. Using the 11/32" thin wrench, loosen and carefully remove the transducer from the ORION-2C manifold.
8. Remove the tubing sections from the *VENT* and *COARSE* (pressure) inlet fittings on the ORION-2C, using a 7/16" wrench
9. Remove the panel knobs from the *COARSE* (pressure), *VERNIER* and *VENT* valves using the .061" hex wrench.
10. Loosen and remove the two panel screws (PN 60837) from the panel front that secure the manifold to the panel.
11. Remove the four retaining nuts that secure the chassis to the panel.
12. Lift the chassis enough to allow the ORION-2C manifold to clear and remove the manifold.

4.2.5 ORION-2C Manifold, Valve Seat Removal

Tools required: A/R solvent (de-natured alcohol)
socket wrench
3/4" socket
needle housing socket (PN 65580)
isolation valve needle housing socket (PN 68509)
hex wrench (.050")
hex wrench (.061")
needle-nose pliers
tube fluorinated Krytox grease (PN 55593)
electric hand drill
No. 43 drill bit
No. 4-40 tap
tap handle
small hammer

NOTE: *See Table 4-7 on page 32 and Figure 4-1 on page 33 for additional parts information.*

1. Use a bench vise to secure the manifold by its center portion, 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. Loosen the 3/4" locknuts (1) on the *COARSE* (pressure) and *VENT* valve threaded needle housings (10).
4. Using the needle housing socket (65580) and socket wrench, loosen and remove the needle/housing assembly (10, 11).
5. To disassemble the isolation valves (two inner valves), first remove the valve needle (18) by turning the gear (6) clockwise.
6. Loosen and remove the valve housings (19) using the isolation valve housing removal socket (68509) and socket wrench.
7. Remove the valve stem seats (8) and valve needle seats (9) using the needle-nose pliers.
8. 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).
9. To remove valve seats (7) from either the *COARSE* (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 10-13).
10. Using the electric hand drill with a 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.
11. Blow out any chips from the seat area using compressed air.
12. While holding the 4-40 tap steady and perpendicular to the seat, slowly turn until the tap starts to engage the seat.
13. When the tap has engaged into the seat, use a small hammer and gently knock upward against the tap handle to extract the seat.
14. After the seat has been removed, blow any remaining chips from the seat area.

4.2.6 ORION-2C Manifold, Vernier Control Disassembly

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 68509)

NOTE: *See Table 4-7 on page 32 and Figure 4-1 on page 33 for additional parts information.*

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 (14) clockwise until the end cap is free to turn.
3. Remove the O-ring (29) 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 (14) and pulling.
6. Remove the O-ring (32) from the piston groove.
7. To disassemble the end cap/shaft assembly, mount the end cap (13) in the vise.
8. Loosen and remove the locknut (20) using the isolation valve housing socket (PN 68509) and socket wrench.
9. Loosen and remove the end bushing (12) using the same socket. Remove the shaft (14). Remove the mylar bearing washers (41 or 42) 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).
11. Wash all parts in solvent and blow dry with compressed air.

4.2.7 ORION-2C Manifold, Vernier Control Reassembly

Tools required:
tube fluorinated Krytox grease (PN 55593)
1-1/4" wrench
screwdriver (flat-blade)
socket wrench
isolation valve needle housing socket (PN 68509)

NOTE: *See Table 4-7 on page 32 and Figure 4-1 on page 33 for additional parts information.*

1. Coat all new O-rings with fluorinated Krytox grease before installing.
2. Install the small O-ring (27) into the end cap (13) inner groove.
3. Add mylar washers (41) or (42) to each side of shaft (14).

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

4. Apply a small amount of fluorinated Krytox grease to the shaft threads and install the shaft (14) into the end cap.
5. Install the end bushing (12) and tighten until snug using the isolation valve needle housing socket (PN 68509) and socket wrench.
6. Feel vertical motion of shaft (14). If motion exists, remove end bushing (12) and add a thicker washer at Step 3, otherwise continue to Step 7.
7. Install the locknut (20) and tighten until snug using the isolation valve needle housing socket (PN 68509) and socket wrench.
8. 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.
9. Install the self-sealing screw (36) and tighten until snug.
10. Apply a thin coat of fluorinated Krytox grease and install the O-ring (29) on the end cap/shaft assembly, install into manifold and tighten until snug.

4.2.8 ORION-2C Manifold, Valve Seat Installation

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)

NOTE: *See Table 4-7 on page 32 and Figure 4-1 on page 33 for additional parts information.*

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 *COARSE* (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 *COARSE* (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 (6) 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.

4.2.9 ORION-2C Manifold, Panel Installation

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 *COARSE* (pressure), *VERNIER*, and *VENT* valves using the .061" hex wrench.
2. With the panel facing down against the bench, lifting up the chassis enough so that the ORION-2C manifold is able to clear.
3. 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.
4. Secure the chassis to the panel with the four nuts and tighten until snug.
5. 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.

NOTE: To install the COARSE (pressure) and VENT valve knobs,and do valve adjustment, follow the procedure in Section 4.2.10 after completing the following steps.

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 four wires to the terminal block, TB1, on the CPU board (see Table 4-2 on page 20):*

Transducer Wires	Terminal Block Wires
+ Excitation	TB1-4 (Green wire)
- Signal	TB1-6 (Red wire)
+ Signal	TB1-5 (White wire)
- Excitation	TB1-7 (Black wire)

Table 4-2. Transducer Wire to Terminal Block Wire Connections

7. Install all tubing sections that attach to the ORION-2C manifold.
8. Install the nitrogen cylinder and its associated tubing.
9. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks, fill nitrogen supply cylinder to 2200 PSIG. See Section 2.1 on page 3 for cylinder refilling procedure.
10. Install panel/chassis assembly in its enclosure as described in Table 4.2.1 on page 14.

4.2.10 ORION-2C Manifold, Valve Adjustment Procedure

Tools required: hex wrench (.050")
hex wrench (.061")

NOTE: *See Table 4-7 on page 32 and Figure 4-1 on page 33 for additional parts information. * denotes reference to Figure 2-2 on page 4.*

1. If not already done, remove the ORION-2C *COARSE* and *VENT* valve knobs (3) using the .061" hex wrench.
2. Energize the unit and let it warm up. Turn the RANGE SELECT switch to its highest range. To adjust the coarse valve, go to step 3.
3. Using a .050" hex wrench, loosen the set screw (34) on the locknut (2) and turn the locknut clockwise to its stop.
4. 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.
5. Close the *COARSE* valve by turning the knob insert (4) clockwise until you feel the valve needle seat on the O-ring (valve is now in the closed position).
6. Rotate gears (6) on both *ISOLATION* valves (two inner valves), counter-clockwise until they stop, then rotate clockwise 1/2 turn (opening isolation valves).
7. Use the *PRESSURE LIMIT CONTROL* (*1), to increase the supply pressure to between 80% and 100% of full scale.
8. Open the *VENT* valve (*8) to atmosphere, zero the indicator (press ZERO switch [*12] less than 5 seconds), then close the *VENT* valve (*8).
9. Slowly open the *COARSE* 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. Tighten the set screw (34) on the locknut with the .050" hex wrench.
13. Install the *COARSE* 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 adjusting valve. The seat can be damaged.*

14. Remove the *COARSE* 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 *COARSE* valve is now adjusted.

16. To adjust the *VENT* valve, follow Steps 3 and 4 above.
17. Close the *COARSE* valve by turning the *COARSE* knob (*2) 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 *COARSE* valve until the indicated pressure stabilizes and then close the *COARSE* 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 until the indicated pressure stops decreasing.
21. Follow steps 10 through 15 replacing the term *COARSE* valve with *VENT* valve. The *VENT* valve is now adjusted.

4.2.11 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 60575)
A/R 1/2" wide Teflon tape, (PN 60911)
1/2" socket
socket wrench
1/4" hex wrench

NOTE: *See Figure 4-2 on page 35 for additional parts information.*

1. Vent any remaining gas from the nitrogen cylinder to atmosphere. Disconnect the power cord from the power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 on page 14, and carefully place on a bench top.
3. Remove regulator knob cap and the 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.

4.2.12 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 60575)
A/R 1/2" wide Teflon tape, (PN 60911)
snoop, liquid leak gas detector (PN 64781)
1/2" socket
socket wrench

NOTE: *See Figure 4-2 on page 35. Call CONDEC for replacement part numbers.*

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.

   NOTE: *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. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks fill nitrogen supply cylinder to 2200 PSIG. See Section 2.1 on page 3 for cylinder refilling procedure.
5. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.13 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 60575)
A/R 1/2" wide Teflon tape, (PN 60911)
1/2" socket
socket wrench
1/4" hex wrench
flat blade screwdriver (small)
channel locks

NOTE: *See Figure 4-2 on page 35 for additional parts information.*

1. Vent any remaining gas from the nitrogen cylinder to atmosphere. Disconnect the power cord from the power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 on page 14, and carefully place on a bench top.
3. Remove regulator knob cap by prying off with a small screwdriver.
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 and remove the panel mounting nut using channel locks.
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.

4.2.14 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 33. Call CONDEC for replacement part numbers*

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. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks, fill nitrogen supply cylinder to 2200 PSIG. See Figure 2-1 on page 3 for cylinder refilling procedure.

7. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.
8. Energize the unit and let warm up. Turn RANGE SELECT switch to highest range.
9. Close the *COARSE* valve by turning the *COARSE* knob clockwise.
10. Turn the regulator knob clockwise until reaching between 5-10% of full scale, but not enough to disturb pressure relief valve.

NOTE: *If pressure can not be attained loosen locknut on shaft, rotate knob a few turns counter-clockwise, re-tighten 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.

4.2.15 Panel Gauge Removal

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

NOTE: *Call CONDEC for replacement part numbers.*

1. Vent any remaining gas from the nitrogen cylinder to atmosphere. Disconnect the power cord from the power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 on page 14, and carefully place on a bench top.
3. Disconnect the tubing section that connects to the gauge fitting.
4. Loosen the two thumb-nuts that hold the gauge mounting U-clamp.
5. While gripping the square portion of the gauge port with the 9/16" wrench, remove the female tube connector (PN 59721) from the gauge.
6. Remove the two thumb-nuts, the mounting U-clamp, and the gauge.

4.2.16 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 numbers.*

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 on to the gauge.
4. Attach the tubing section that connects to the gauge fitting.
5. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks fill nitrogen supply cylinder to 2200 PSIG. See Section 2.1 on page 3 for cylinder refilling procedure.
6. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.17 Test Port Quick-Connect Fitting (PN 55426), Removal and Installation

Every two months, a coating of Krytox grease should be applied to the inner seal of the test port fitting. 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 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. Vent any remaining gas from the nitrogen cylinder to atmosphere. Disconnect the power cord from the power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 on page 14, and carefully set on a bench top.
3. 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.
4. 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.
5. Install the new quick-connect fitting (PN 55426) by turning clockwise.
6. 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 port.
7. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks fill nitrogen supply cylinder to 2200 PSIG. See Section 2.1 on page 3 for cylinder refilling procedure.
8. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.18 Test Port Filter (PN 54188), Removal and Installation

The port filter is a sintered element filter that can be 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. Vent any remaining gas from nitrogen cylinder to atmosphere. Disconnect power cord from power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 on page 14, and carefully place on a bench top.
3. Loosen and remove the tubing end nut from the reducing union (PN 59764).
4. 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.*

5. 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 test port filter removal procedure above.
2. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks fill nitrogen supply cylinder to 2200 PSIG. See Section 2.1 on page 3 for cylinder refilling procedure.
3. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.19 Inlet Check Valve - Nitrogen Fill Port (PN 60263)

Remove the check valve if it does not hold the pressure of the N_2 cylinder. The check valve can be disassembled for cleaning should any debris foul the seat area.

Tools required:
Phillips screwdriver
7/16" open end wrench
9/16" open end wrench
A/R 1/2" Teflon tape, PN 60911
5/32" hex wrench
tube fluorinated Krytox grease (PN 55593)
snoop, liquid leak gas detector (PN 64781)
torque wrench

NOTE: *See Figure 4-3 on page 35.*

Check Valve Removal

1. Vent any remaining gas from nitrogen cylinder to atmosphere. Disconnect power cord from power source.
2. Remove front panel from its enclosure as described in Section 4.2.1 on page 14 and place on a bench top.
3. Loosen and remove the tubing end nuts from the tee fitting (PN 59778).
4. Remove the female tube connector/run tee assembly from the check valve.
5. Remove the check valve from the fill port fitting. Remove any remnants of Teflon tape from the pipe threads. Note direction of flow arrow.

Check Valve Disassembly

1. Remove lock screw from the inlet end (tail of flow arrow) using a 5/32" hex wrench.
2. Remove the insert, O-ring, poppet, and spring and clean in solvent. If any damage to O-ring is noticed, replace O-ring (PN 66654). Blow-dry parts before reassembly.
3. Apply a small amount of fluorinated Krytox grease on both sides of O-ring (PN 66654)
4. Reassemble the check valve per as shown in Figure 4-3 on page 35.
5. Torque insert lock screw to 85 in. lbs.

Check Valve Installation

1. Wrap two turns of Teflon tape on the check valve threads.
2. Install the inlet end (end opposite direction flow arrow is pointing) of check valve into the fill port fitting and tighten until snug.
3. Install the other end of the check valve into the female tube connector/run tee assembly.
4. Install and tighten the tubing end nuts to the tee fitting, (PN 65386).
5. Fill the cylinder to approximately 1000 PSIG and check all fittings for leaks. If there are no leaks fill nitrogen supply cylinder to 2200 PSIG. See Section 2.1 on page 3 for cylinder refilling procedure.
6. Install panel/chassis assembly in its enclosure as described in Table 4.2.1 on page 14.

4.2.20 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 1/4 Amp 250 Volt, 20mm x 5mm diameter (PN 58076).
3. Replace the fuse holder at *AC INPUT*.

4.2.21 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 Table 4.2.1 on page 14, 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.
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

4.2.22 Power Switch (PN 55187), Removal and Installation (Battery Units)

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

Removal:

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Table 4.2.1 on page 14 and carefully set on a bench top.
2. Loosen and remove the nut on the panel front and remove the switch from the panel rear.
3. Remove cable clamp and unplug the switch wire harness connector from location J7 on the CPU board.
4. Unsolder and remove the nine wires from the switch terminals.

Installation:

1. Use shrink sleeving over wires/terminals for protection. Connect and solder the harness wires to the new switch terminals per the following:

Rear of Switch:	1	4	7	BATTERY TEST (Momentary)
	2	5	8	OFF
	3	6	9	OPERATE

Green/white wire to switch terminal 1	Blue/White wire to switch terminal 2
Orange wire to switch terminal 3	Yellow wire to switch terminal 4
Yellow jumper wire between switch terminals 4 & 6	Brown wire to switch terminal 5
Violet wire to switch terminal 8	Black wire to switch terminal 9

2. Install the new switch through the rear of panel. Rotate switch so that the momentary position is toward *BATTERY TEST* and secure it from the front of panel with the mounting nut (discard orientation washer).
3. Plug in the harness connector to its receptacle J7 on the CPU board and install cable clamp.
4. Install panel/chassis assembly in its enclosure as described in Table 4.2.1 on page 14.

4.2.23 Power Switch (PN 58878), Removal and Installation (Non-Battery Units)

Tools required: Phillips screwdriver
11/16" open end wrench
A/R soldering iron
A/R shrink sleeving (PN 64567)
A/R heat gun

Removal:

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Table 4.2.1 on page 14, 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.

Color	Terminal
Black	Normally open
Black	(C) common

Table 4-3. Power Wire Colors/Switch Terminals

2. Pull shrink sleeving over switch and connections. Apply heat. Install the new switch, lock washer and nut through the panel rear as one item. Hand tighten the trim ring from front of panel.
3. Tighten the switch mounting nut and lock washer from the rear of panel.

Caution *If wrench is used, do not over-tighten or damage may occur to switch.*

4. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.24 Range Select and Display Select Switches (PN 55924), Removal and Installation

Tools required: Phillips screwdriver
9/16" open end wrench or nutdriver
A/R soldering iron
061" hex wrench

Removal:

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Table 4.2.1 on page 14, 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. Unsolder and remove the wires from the switch terminals.

Installation:

1. Connect and solder the wires onto their respective switch terminals (Table 4-4).

Range Select:		Display Select:	
Terminal	Color	Terminal	Color
1	Grey	3	Blue
2	Violet	2	Red
(C) common	Brown	(C) common	Green
		(C) common	Green

Table 4-4. Range Select and Display Select Wire Colors/Switch Terminals

2. Install the switch through the panel rear, align with front panel markings, and secure with mounting nut.
3. Install the switch knob using a .061" hex wrench.
4. Replace CPU if necessary.
5. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.25 Absolute and Zero Switches (PN 58886), Removal and Installation

Tools required: Phillips screwdriver
11/16" open end wrench
A/R soldering iron

Removal:

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 14, and carefully set on a bench top.

NOTE: *Sometimes to gain access, the CPU must be removed.*

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.
5. Unsolder and remove the wires from the switch terminals.

Installation:

1. Connect and solder the wires onto their respective switch terminals (see Table 4-5 and Table 4-6 below):

Color	Terminal
Orange	Normally open
Green	(C) common
Green	(C) common

Table 4-5. Wire to switch terminal connections: Absolute

Color	Terminal
Yellow	Normally open
Green	(C) common

Table 4-6. Wire to switch terminal connections: Zero

2. Install the new switch, lock washer and nut through the panel rear. Hand tighten the trim ring from front of panel.
3. Tighten the switch mounting nut and lock washer from the rear of panel. Replace CPU if necessary.

Caution *If wrench is used, do not over tighten, damage may occur to switch.*

4. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

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

Removal of Power Supply Board

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 14, and carefully set on a bench top.
2. Disconnect the three wire connectors (black, white, green) that are 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 (PN 55023) from the power supply board.
4. Remove the two battery cable wires (PN 56367) from the terminal block (TB1) on the power supply board.
5. Loosen and remove the four nuts that hold the power supply board and remove the board.

Installation of Power Supply Board

1. Position the new board over the four standoffs and install four nuts. Tighten the nuts until snug.
2. Install the two battery cable wire ends into the terminal block (TB1) on the power supply board, red wire (+) to TB1-3 and black wire (-) to TB1-1.
3. Plug the CPU (J6) to power supply cable (PN 55023) connector into the power supply board (J1).
4. Connect the three connectors (black, white, green) of the AC filter cable (PN 55540) and the cable from power supply board assembly. Connect like wire colors together.
5. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.2.27 Battery (Replacement Kit PN 55354) Removal, Installation and Adjustments

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

Removal:

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 14, and carefully set on a bench top.
2. Disconnect the two battery cable wires (PN 56367) from the battery terminals, red wire from (+) and black wire from (-).
3. Remove the two nuts and two screws that secure the battery bracket (PN 58386).
4. Remove the bracket and battery.

Installation

1. To install a new battery, reverse steps 2 through 4 of above.
2. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

Adjustment of Charging Circuit

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

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 14, and carefully set on a bench top.
2. Disconnect the two battery cable wires (PN 56367) 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 on the front panel *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 panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

Adjustment of Battery Voltage Display Reading

NOTE: *The BATTERY TEST should only be performed with the UPC5000/UPC5010 operating at Zero PSIG (VENT valve open) and at the conclusion of the test, the unit's ZERO button will have to be re-pushed to re-zero the instrument.*

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

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 14, and carefully set on a bench top.
2. Disconnect the two battery cable wires (PN 56367) from the battery terminals, red wire from (+) and black wire from (-).
3. Connect the leads of a DC voltmeter to the battery wires.
4. Take a reading from the voltmeter.
5. Reconnect the two battery cable wires (PN 56367) to the battery terminals; red wire to (+) and black wire to (-).
6. Push the BATTERY TEST switch on the front panel. If the reading is the same as the voltmeter, go to step 8. If the reading is different, go to next step.
7. While holding toggle switch in the *BATTERY TEST* mode, adjust potentiometer R12 located on power supply board to be the same as previous voltmeter reading.
8. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

Adjustment of Low Battery Display Annunciation

Tools required: Phillips screwdriver
Flat blade screwdriver (small)
11/32" open end wrench or nutdriver
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 14, and carefully set on a bench top.
2. Disconnect the two battery cable wires (PN 56367) 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. For LED display type units a red LED in the left center of the display will turn on. For LCD display type units, 5 LED segments in the left of display window will illuminate in the shape of a "U."
4. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 14.

4.3 Orion 2C Valve Assembly Parts List

The following table lists the component parts of the ORION-2C.

Ref Number	PN	Description	Quantity
1	57482	Nut, Valve Needle Housing 9/16-18	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	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, 2-56NC x 1/8, alloy steel	4
27	55554	O-ring, Buna N (Nitrile) 70 Durometer Color Black	5
28	55536	O-ring, Buna N (Nitrile) 70 Durometer Color Black	4
29	55573	O-ring, Buna N (Nitrile) 70 Durometer Color Black	1
30	60633	Retainer, Packing Backup	4
31	55570	Washer, Backing	4
32	55577	O-ring, Buna N (Nitrile) 70 Durometer Color Black	1
33	59245	Washer, #8 Screw Size	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	1
38	53308	Label	1
41	59878	Spacer .005 thk	2
42	59880	Spacer .007 thk	2

Table 4-7. Orion 2C Valve Assembly Parts List

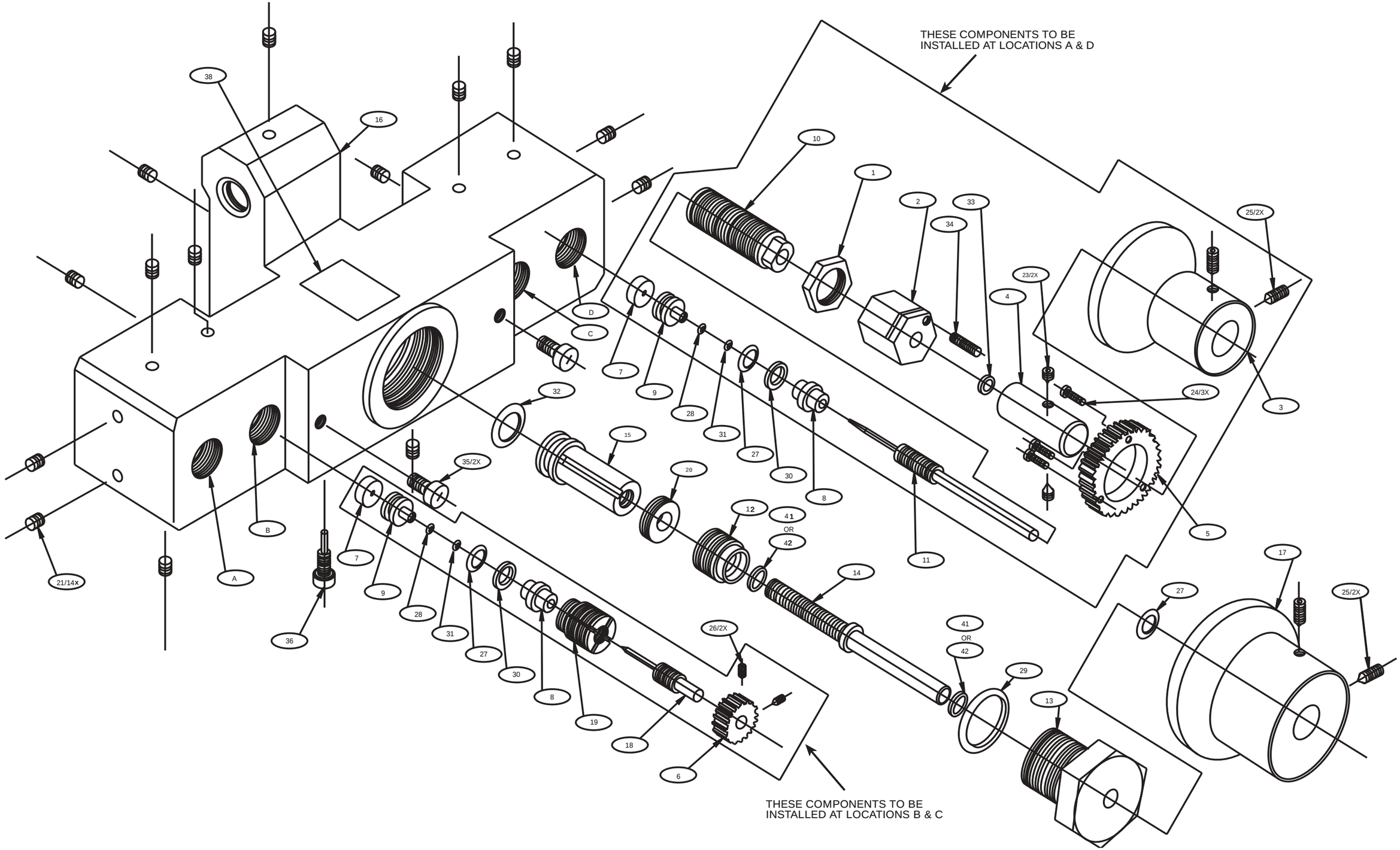


Figure 4-1. ORION-2C, Exploded View

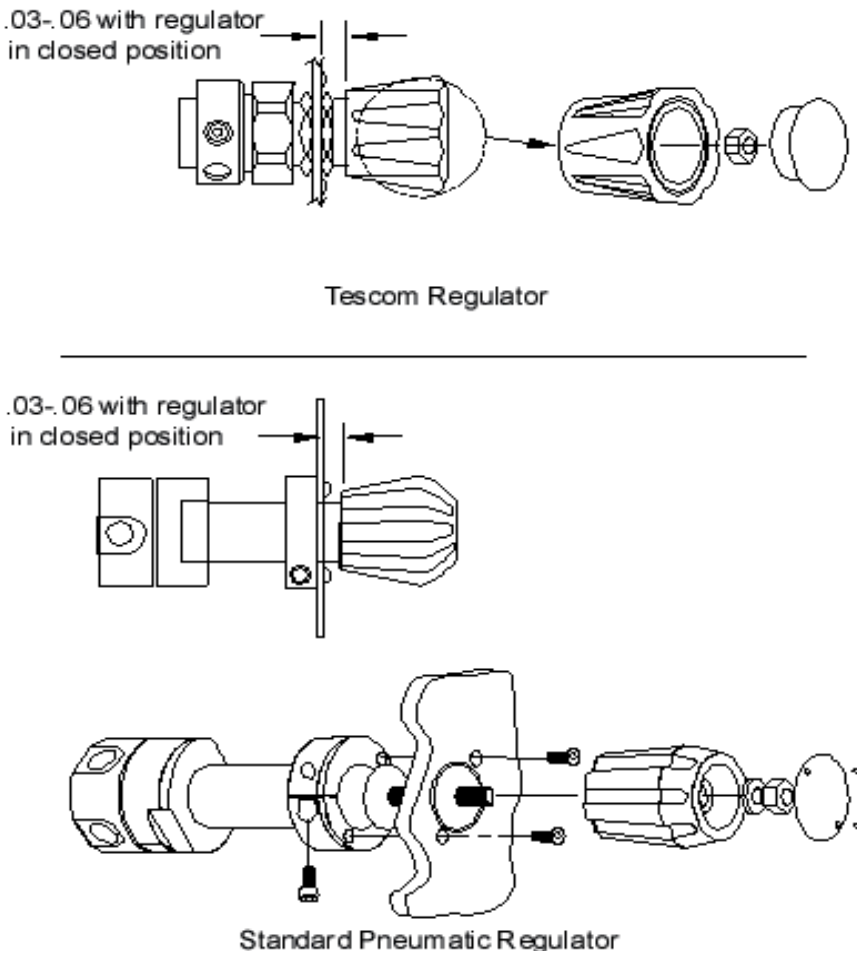


Figure 4-2. Tescom and Standard Pneumatic Regulator Mounting

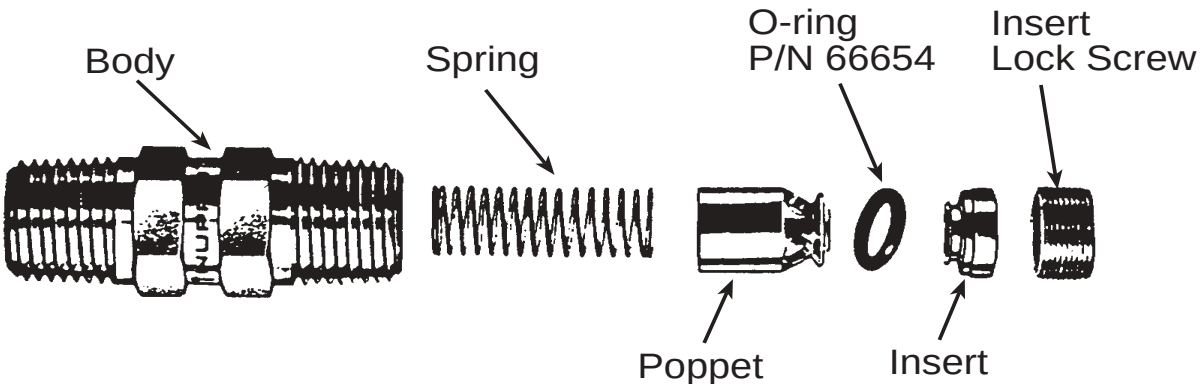


Figure 4-3. N_2 Inlet Check Valve Asssembly (PN 60263)

REVISIONS			
REV	REFERENCE	INIT	DATE
AF	ECO10483: DELETED ITEMS 10 & 11; REDRAWN ON RLW FORMAT	DJS KLL	6/15/00
AG	DELETED ITEM NUMBER 2 .	DJS KLL	10/4/00
AH	ECO11898: ADDED NOTE 27, ADDED INFO TO ITEM NO. 101 ON LIST OF MAT'L, ADDED INFO TO ITEM 31, ADDED NOTE 28 AND 29, REMOVED SPEC. FROM ITEM 61, 62, 65 AND 1 THRU 54	KAL JEW	12/12/01

NOTES:

1- FOR SCHEMATIC SEE DWG. (D)KHP7316.

2- OBSERVE POLARITY OF ICs, CAPACITORS, DIODES, AND TRANSISTORS.

3- TEST PROCEDURE: (A)KUA7317

4- MARK APPLICABLE DASH NUMBER, REVISION LEVEL, AND DATE IN 1/8 INCH HIGH CHARACTERS. USE BLACK EPOXY INK.

5- ITEM 30 REFERENCE DESIGNATIONS: R16, R26, R41, R42, R44, R46, R47, R54, WITH R28 IN KEU8924-1 & KEU8924-3 ONLY.

6- TRANSFORMER SHIELD TO BE INSTALLED AFTER TEST. (REFERENCE PART NUMBER MB80-1)

7- ITEM 3 REFERENCE DESIGNATIONS: U1, U2, U3, U26, WITH U23 IN KEU8924-1 & KEU8924-3 ONLY

8- ITEM 56 REFERENCE DESIGNATIONS: C8, C10-C20, WITH C28 IN KEU8924-1 & KEU8924-3 ONLY

9- ITEM 65 REFERENCE DESIGNATIONS: CR4, CR5, CR7-CR9, AND CR12, WITH CR10 IN KEU8924-1 & KEU8924-3 ONLY

10- TB1 IS MADE UP OF ONE (1) ITEM 82 AND ONE (1) ITEM 91, TB2 IS MADE UP OF ONE (1) ITEM 82.

11- FOR 220VAC: REMOVE JUMPERS ON TRANSFORMER, ITEM 69, BETWEEN PINS 1 & 3 AND 2 & 4.
ADD JUMPER BETWEEN PINS 2 & 3.
RE-MARK PART NUMBER AS APPLICABLE.

12- REFERENCE:

120VAC	220VAC	USED IN
KEU8924-1	KEU8924-4	UPC5000, UPC5200
KEU8924-2	KEU8924-5	UPS3000
KEU8924-3	KEU8924-6	UPC5100

13- ON KEU8924-2, ADD JUMPER TO E11 AND E12.

14- ON KEU8924-1 & -3:
DELETE J2 PINS 6 THRU 10,
DELETE J2 PINS 16 THRU 20, &
CUT CLAD GOING TO PINS 1 & 14
JUMPER PINS J2-1 & J2-2

15- ON KEU8924-3 ONLY, ADD JUMPER BETWEEN E3 AND TP7. CUT CLAD AT CUT MARKS "G" & "E" AND BETWEEN R23A MOUNTING HOLES.

16- USE TWO 8" LENGTHS OF ITEM 109, #22AWG BLK.INS.WIRE, TO CONNECT COMMON CLAD AS SHOWN IN HIDDEN LINES, COMPONENT SIDE VIEW, SHEET 2.

17- ITEM 22 REFERENCE DESIGNATIONS: K5, WITH K4 USED IN KEU8924-1 AND KEU8924-3 ONLY.

18- ITEM 32 REFERENCE DESIGNATIONS: R30 USED IN KEU8924-1 AND KEU8924-3, WITH R23, R23B USED IN KEU8924-3 ONLY.

19- ITEM 33 REFERENCE DESIGNATIONS: R55, WITH R11 IN KEU8924-1 & KEU8924-2 ONLY

20- ITEM 35 REFERENCE DESIGNATIONS: R15, WITH R3 & R4 IN KEU8924-1 & KEU8924-2 ONLY

21- ITEM 37 REFERENCE DESIGNATIONS: R8, R9, R10, R18, WITH R32 IN KEU8924-3 ONLY

22- ITEM 39 REFERENCE DESIGNATIONS: R59, WITH R58 USED IN KEU8924-1 ONLY.

23- ITEM 53 REFERENCE DESIGNATIONS: C3, C29, WITH C9 KEU8924-1 AND KEU8924-3 ONLY.

24- ITEM 64 REFERENCE DESIGNATIONS: CR2, WITH CR1 USED IN KEU8924-1 & KEU8924-2 ONLY

25- ITEM 66 REFERENCE DESIGNATIONS: CR6, WITH CR11 USED IN KEU8924-1 & KEU8924-3 ONLY. EATON P/N KGF327A MAY BE USED AS A SUBSTITUTE.

26- ITEM 83 REFERENCE DESIGNATIONS: XU4, XU6, XU7, XU8, XU13.
ITEM 84 REFERENCE DESIGNATIONS: XS1, XU5, XU14, XU15.

27 CUT ITEM 101 TO REQUIRED LENGTHS. ON CIRCUIT SIDE OF BOARD ASSEMBLY JUMPER U8 PINS 9 AND 10 TO U8-7(GND).

28- KEU8924-1 (54254) & KEU8924-3 (54263) ONLY: ON CIRCUIT SIDE OF BOARD, CUT CLAD BETWEEN CR12 ANODE AND VIA UNDER U10. CUT CLAD BETWEEN CR10 ANODE AND U6-4. ADD 3 1/2" 30 AWG WIRE, ITEM 101, BETWEEN CR10 ANODE AND VIA UNDER U10. SEE PICTORIAL.

29- KEU8924-1 ONLY: INSTALL ITEM 11 AND ITEM 31 IN SERIES AT R33 LOCATION. TWIST, DO NOT SOLDER, LEADS TOGETHER. LEAVE APPROXIMATELY 1/4" LEAD LENGTH ON EACH RESISTER. NOTE TO CONDEC MANUFACTURING:
ITEMS 11 & 31 REQUIRED FOR UPC5200 &UPC5210 UNITS. REMOVE ITEM 11 AND SOLDER ITEM 31 ONLY PRIOR TO INSTALLING INTO UPC5000 OR UPC5010.

-6	-5	-4	-3	-2	-1	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
QTY REQD FOR DASH NO.							LIST OF MATERIALS (CONTINUED)					
1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	116	WIRE, BUS	-	QQW343H18SIT			
1	-	-	-	-	-	115	CPU ASSEMBLY	-	KEU8924-3		NOTE 11	
-	-	-	2	2	2	114	CAPACITOR, ELECTROLYTIC	B	KGE311Q	POLARIZED	C4, C5	6.8uF 20% 35V
-	1	-	-	-	-	113	CPU ASSEMBLY	-	KEU8924-2		NOTE 11	
-	-	1	-	-	-	112	CPU ASSEMBLY	-	KEU8924-1		NOTE 11	
-	-	-	6"	6"	6"	111	WIRE, 22AWG, WHITE	-	M22759/11-22-9			
-	-	-	6"	6"	6"	110	WIRE, 22AWG, GREEN	-	M22759/11-22-5			
-	-	-	27"	27"	27"	109	WIRE, 22AWG, BLACK	-	M22759/11-22-0		NOTE 16	
1"	1"	1"	2"	3"	2"	108	WIRE, BUS	-	QQW343H22SIT		NOTE 11, 13, 14	
-	-	-	1	1	1	107	STRAP, TIE-DOWN	-	MS3367-4-9			
-	-	-	1	1	1	106	NAMEPLATE, INFORMATION	B	KBY7236			"1/4 AMP 250V"
-	-	-	A/R	A/R	A/R	105	SHRINK TUBING	-	M23053/2-209-0			3/4" DIA.
-	-	-	3	3	3	104	INSULATOR	B	KYV297M			TO-220
-	-	-	A/R	A/R	A/R	103	TAPE, ADHESIVE	-	F1011			
-	-	-	1	-	-	102	RESISTOR, METAL FILM	C	KPW310H		R11	1.75K 1% 1/8W
-	-	-	4 1/2"	1"	4 1/2"	101	30 AWG WIRE-WRAP	-	60628		NOTES 27 & 28	
-	-	-	A/R	A/R	A/R	100	COMPOUND, THERMO	-	S1069			
-	-	-	2	2	2	99	SCREW, SEMS	B	KKP83B			#6-32 X 1/4 LG
-	-	-	3	3	3	98	SCREW, NYLON, PAN HD.	-	MS18212-13			#4-40 X 1/4 LG
-	-	-	1	1	1	97	TERMINAL LUG	A	KEG307C			
-	-	-	1	1	1	96	FUSE HOLDER	A	KLL252		XF1	
-	-	-	1	1	1	95	FUSE, SLOW-BLOW	A	KJ350C		F1	1/4 AMP 250V
-	-	-	1	1	1	94	LOCK WASHER, INTERNAL TOOTH	-	MS35333-113			1/2" I.D.
-	-	-	1	1	1	93	BRACKET, POWER SUPPLY	C	KBE7287			
-	-	-	15	15	15	92	TEST POINT	A	KFU307A		TP1-TP15	
-	-	-	1	1	1	91	TERMINAL BLOCK	B	KUH3300C		TB1	4 POS, NOTE 10
-	-	-	1	1	1	90	SOCKET, IC	B	KD251B		XU11	28 PIN DIP
-	-	-	1	1	1	89	SOCKET, IC	B	KD251C		XU9	40 PIN DIP
-	-	-	1	1	1	88	SOCKET, IC	B	KD251A		XU10	24 PIN DIP
-	-	-	1	1	1	87	SOCKET, IC	B	KE251E		XU12	20 PIN DIP
-	-	-	1	1	1	86	SOCKET, IC	B	KE251D		XU22	18 PIN DIP
-	-	-	2	2	2	85	SOCKET, IC	B	KE251C		XS3, XU20	8 PIN DIP
-	-	-	4	4	4	84	SOCKET, IC	B	KE251B		NOTE 26	16 PIN DIP
-	-	-	5	5	5	83	SOCKET, IC	B	KE251A		NOTE 26	14 PIN DIP
-	-	-	2	2	2	82	TERMINAL BLOCK	B	KUH3300A		TB1 & TB2	3 POS, NOTE 10
-	-	-	3	-	3	81	CONNECTOR, CONTACT	B	KRM354A			MATE-N-LOCK
-	-	-	3	-	3	80	CONNECTOR	B	KRH354A			MATE-N-LOCK
-	-	-	1	1	1	79	CONNECTOR	C	KPC354C		J1	4 PIN
-	-	-	1	1	1	78	CONNECTOR	C	KBN7354B		J3	8 PIN
-	-	-	1	1	1	77	CONNECTOR	B	KNM354D		J2 NOTE 14	20 PIN
-	-	-	1	1	1	76	CONNECTOR	B	KNM354B		J4	14 PIN
-	-	-	1	1	1	75	CONNECTOR	B	KNM354C		J5	16 PIN
-	-	-	1	1	1	74	CONNECTOR	B	KNM354A		J6	10 PIN
-	-	-	1	1	1	73	SWITCH, 4 POSITION DIP	B	KTF182G		S3	4 SPST
-	-	-	1	1	1	72	SWITCH, MOMENTARY	B	KAH7182A		S2	PUSH BUTTON
-	-	-	1	1	1	71	SWITCH, 8 POSITION DIP	B	KTF182F		S1	8 SPST
-	-	-	A/R	A/R	A/R	70	BARRIER, DIELECTRIC	-	MB80-1		NOTE 6	3 IN. X 2 3/8 IN.
-	-	-	1	1	1	69	TRANSFORMER	C	KR7301A		T1	
-	-	-	1	1	1	68	CRYSTAL	A	KF357A		Y1	4.9152 MHZ
-	-	-	-	3	-	67	FEMALE DISCONNECT	B	KAF7307A			
-	-	-	2	1	2	66	FULL WAVE BRIDGE	B	KGF327B		NOTE 25	3N249/KB04
-	-	-	7	6	7	65	DIODE, SILICONE	A	KBV327A		NOTE 9	1N4002
-	-	-	1	2	2	64	DIODE	A	KFL327B		NOTE 24	FDH300
						63						
-	-	-	1	-	-	62	RESISTOR, METAL FILM	-	RN55C2491F		R33	2.49K 1% 0.1W
-	-	-	2	-	-	61	RESISTOR, METAL FILM	-	RN55C1502F		R3,R4	15K 1% 0.1W
-	-	-	1	-	1	60	CAPACITOR, ELECTROLYTIC	B	KAU7311B		C27	470uF 20% 50V
-	-	-	2	2	2	59	CAPACITOR, ELECTROLYTIC	B	KAU7311J	POLARIZED	C23,C24	1000uF 20% 35V
-	-	-	3	3	3	58	CAPACITOR, ELECTROLYTIC	B	KAU7311F	POLARIZED	C22,C25,C26	100uF 20% 16V
-	-	-	1	1	1	57	CAPACITOR, ELECTROLYTIC	B	KAU7311K	POLARIZED	C21	4700uF20% 16V
-	-	-	13	12	13	56	CAPACITOR, CERAMIC	A	KHV311A		NOTE 8	.01uF +80% -20% 100V
-	-	-	2	2	2	55	CAPACITOR, MICA	-	CM05ED200J03		C6,C7	20pF 5% 500V

-6	-5	-4	-3	-2	-1	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
QTY REQD FOR DASH NO.							LIST OF MATERIALS					
-	-	-	1	-	-	54	CAPACITOR, POLYCARBONATE	C	KMV311P		C1	.1uF 10% 100V
-	-	-	3	2	3	53	CAPACITOR, METAL POLY	B	KDE7311B		SEE NOTE 23	.5uF 10% 100V
-	-	-	1	1	1	52	CAPACITOR, CERAMIC	A	KKF311B		C2	1uF 20% 50V
-	-	-	-	1	1	51	CAPACITOR, MYLAR	C	KMV311T		C1	.22uF 5% 100V
-	-	-	1	-	-	50	RESISTOR, METAL FILM	-	RN55C2000F		R21	200 Ω 1% 0.1W
-	-	-	-	1	1	49	RESISTOR, METAL FILM	C	KPW310Z		R32	50K 0.1% 0.1W
-	-	-	1	1	1	48	POTENTIOMETER	C	KBY338F		R34	500 Ω 10% 1/2W
-	-	-	1	-	-	47	RESISTOR, METAL FILM	C	KPW310M		R23C	200 Ω 1% 0.1W
-	-	-	1	-	1	46	RESISTOR, COMPOSITION	-	RCR07G241JS		R20	240 Ω 5% 1/4W
-	-	-	1	-	-	45	RESISTOR, METAL FILM	C	KPW310D		R12	1.5K 0.1% 0.1W
-	-	-	1	-	1	44	RESISTOR, METAL FILM	-	RN55C6041F		R7	6.04K 1% 0.1W
-	-	-	3	3	3	43	RESISTOR, SIP	C	KMA310U		R40,R48,R49	10K 2% .3W
-	-	-	1	1	1	42	RESISTOR, COMPOSITION	C	KGE310AU		R50	430 Ω 5% 1/2W
-	-	-	2	2	2	41	RESISTOR, COMPOSITION	-	RCR07G103JS		R51,R52	10K 5% 1/4W
-	-	-	1	1	1	40	RESISTOR, COMPOSITION	-	RCR07G245JS		R43	2.4M 5% 1/4W
-	-	-	1	1	2	39	POTENTIOMETER	B	KBY338B		SEE NOTE 22	20K 10% 1/2W
-	-	-	2	2	2	38	RESISTOR, METAL FILM	C	KPW310G		R56,R57	80K 0.1% 0.1W
-	-	-	5	4	4	37	RESISTOR, METAL FILM	C	KPW310N		SEE NOTE 21	10K 0.1% 0.1W
-	-	-	2	2	2	36	RESISTOR, METAL FILM	C	KPW310		R19,R22	SELECT
-	-	-	1	3	3	35	RESISTOR, METAL FILM	C	KPW310W		SEE NOTE 20	20K 0.1% 0.1W
-	-	-	-	1	1	34	RESISTOR, METAL FILM	C	KPW310AY		R13	13.3K 0.1% 0.1W
-	-	-	1	2	2	33	RESISTOR, METAL FILM	C	KPW310R		SEE NOTE 19	5K 0.1% 0.1W
-	-	-	3	-	1	32	RESISTOR, METAL FILM	C	KPW310E		SEE NOTE 18	1.0K 0.1% 0.1W
-	-	-	-	-	1	31	RESISTOR, METAL FILM	-	RN55C1402F		NOTE 29	14K 0.1% 0.1W
-	-	-	9	8	9	30	RESISTOR, METAL FILM	-	RN55C1001F		SEE NOTE 5	1.0K 1% 0.1W
-	-	-	5	5	5	29	RESISTOR, METAL FILM	-	RN55C8062F		R35-R39	80.6K 1% 0.1W
-	-	-	-	1	1	28	RESISTOR, METAL FILM	-	RN55C4321F		R21	4.32K 1% 0.1W
-	-	-	3	3	3	27	RESISTOR, METAL FILM	-	RN55C1002F		R5,R6,R45	10K 1% 0.1W
-	-	-	1	1	1	26	RESISTOR, METAL FILM	-	RN55C3011F		R25	3.01K 1% 0.1W
-	-	-	2	2	2	25	RESISTOR, METAL FILM	C	KPW310B		R1,R2	100K .1% 0.1W
-	-	-	1	-	1	24	RESISTOR, METAL FILM	-	RN55C10R0F		R29	10 Ω 1% 0.1W
-	-	-	3	3	3	23	RELAY	C	KJU431B		K1,K2,K3	
-	-	-	2	1	2	22	RELAY	C	KJU431A		NOTE 17	
-	-	-	1	1	1	21	RESISTOR, METAL FILM	-	RN55C1741F		R17	1.74K 1% 0.1W
-	-	-	1	-	1	20	POTENTIOMETER	C	KBW338E		R24	2K 10% 1/2W
-	-	-	1	-	1	19	IC, VOLTAGE REGULATOR	C	KGB1918C		U25	LM317T 3 PIN
-	-	-	1	1	1	18	IC, VOLTAGE REGULATOR	C	KHY1918F		U19	79M12 3 PIN
-	-	-	1	1	1	17	IC, VOLTAGE REGULATOR	C	KHY1918B		U18	78M12 3 PIN
-	-	-	1	1	1	16	IC, VOLTAGE REGULATOR	C	KHY1918C		U17	78M15 3 PIN
-	-	-	1	1	1	15	IC, VOLTAGE REGULATOR	B	KBH1918D		U16	7805 3 PIN
-	-	-	1	1	1	14	IC, 4 BIT BINARY COUNTER	C	KBE8918AG		U15	74HCT161 16 PIN
-	-	-	1	1	1	13	IC, NONINVERTED 3 STATE OUT.	C	KBE8918BD		U14	74HCT257 16 PIN
-	-	-	1	1	1	12	IC, OCTAL D TYPE FLIP-FLOP	C	KBE8918BL		U12	74HCT374 20 PIN
-	-	-	-	-	1	11	RESISTER, METAL FILM	-	RN55C50001F		R33 NOTE 29	5K 1% 0.1W
						10						
-	-	-	1	1	1	9	IC, 8 BIT MICROCOMPUTER	C	KBF8918A		U9	80C39 40 PIN
-	-	-	3	3	3	8	IC, 2 INPUT NAND	C	KBE8918A		U8,U13,U7	74HCT00 14 PIN
-	-	-	1	1	1	7	IC, OPERATIONAL AMPLIFIER	B	KDH8918A		U20	AD708NJX 8 PIN
-	-	-	1	1	1	6	IC, HEX BUFFER/DRIVER	C	KAG1918AE		U6	7417 14 PIN
-	-	-	1	1	1	5	IC, QUAD SWITCH	A	KEV1918D		U5	LF13333N 16 PIN
-	-	-	1	1	1	4	IC, QUAD AMPLIFIER	A	KER1918A		U4	HA4741 14 PIN
-	-	-	5	4	5	3	IC, OPERATIONAL AMPLIFIER	C	KBY1918U		NOTE 7	OP-07CJ 8 PIN
-	-	-	1	1	1	1	PRINTED CIRCUIT BOARD	D	KKY7361			

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

MATERIAL: SEE BILL OF MATERIAL
TREATMENT: NONE
DO NOT SCALE DRAWING
DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED
FOR RLWS USE ONLY
SURFACE FINISH ---
TOL. DECIMAL
2 PLC ---
3 PLC ---
ANGLE ---
THIRD ANGLE PROJECTION
MFG.ENG. APPROVED JEW 5/7/87
CKD.
DES.ENG. APPROVED S.V. 5/11/87
DR.BY DJS 6/15/00

TITLE: ASSEMBLY, CPU AND POWER SUPPLY
RICE LAKE WEIGHING SYSTEMS
DWG NO 54254
SCALE N/A
SHEET 1 OF 2
REVISION AH

Figure 4-4. CPU & POWER SUPPLY ASSEMBLY, Sheet 1(For Non-Battery Units Only)

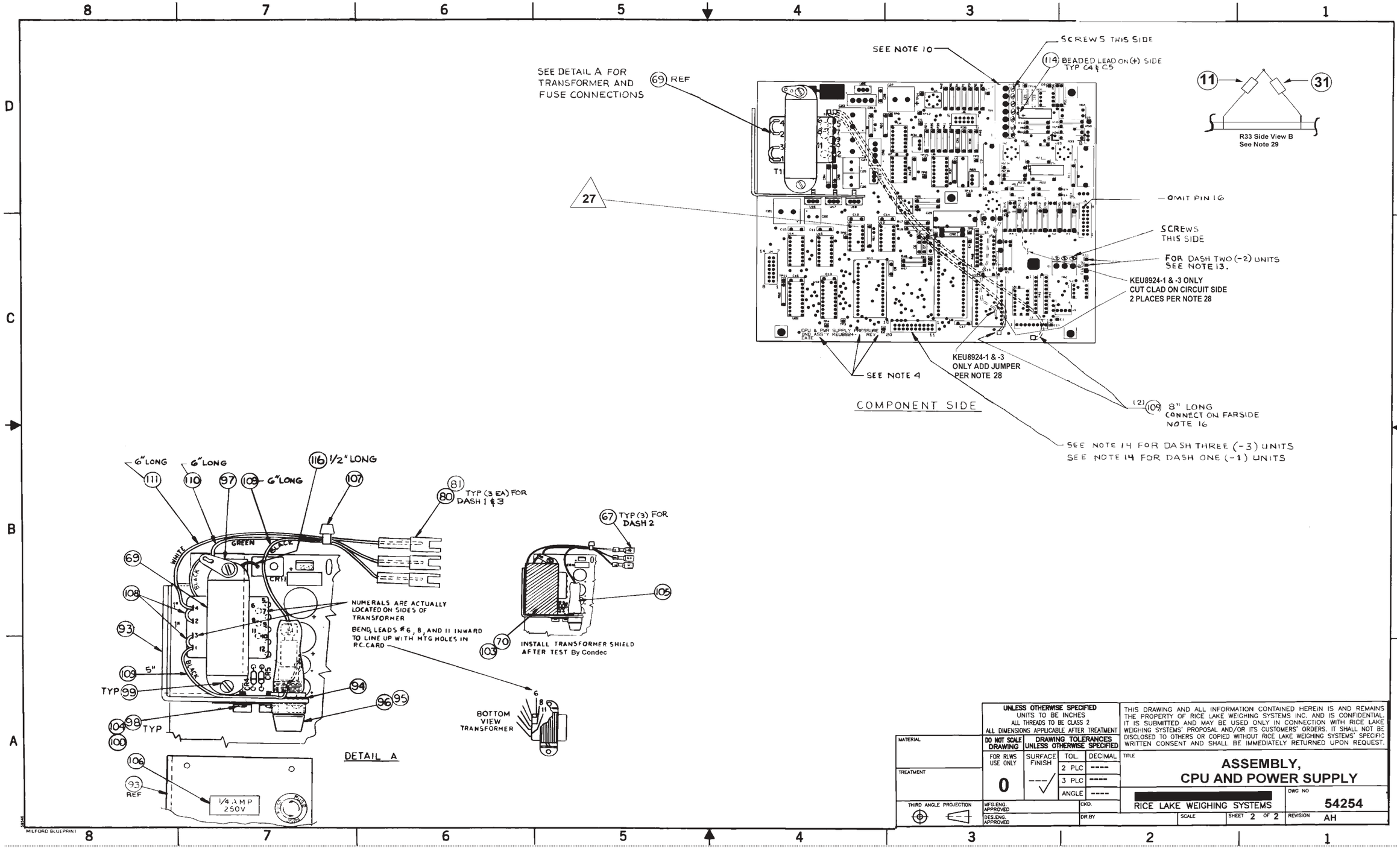
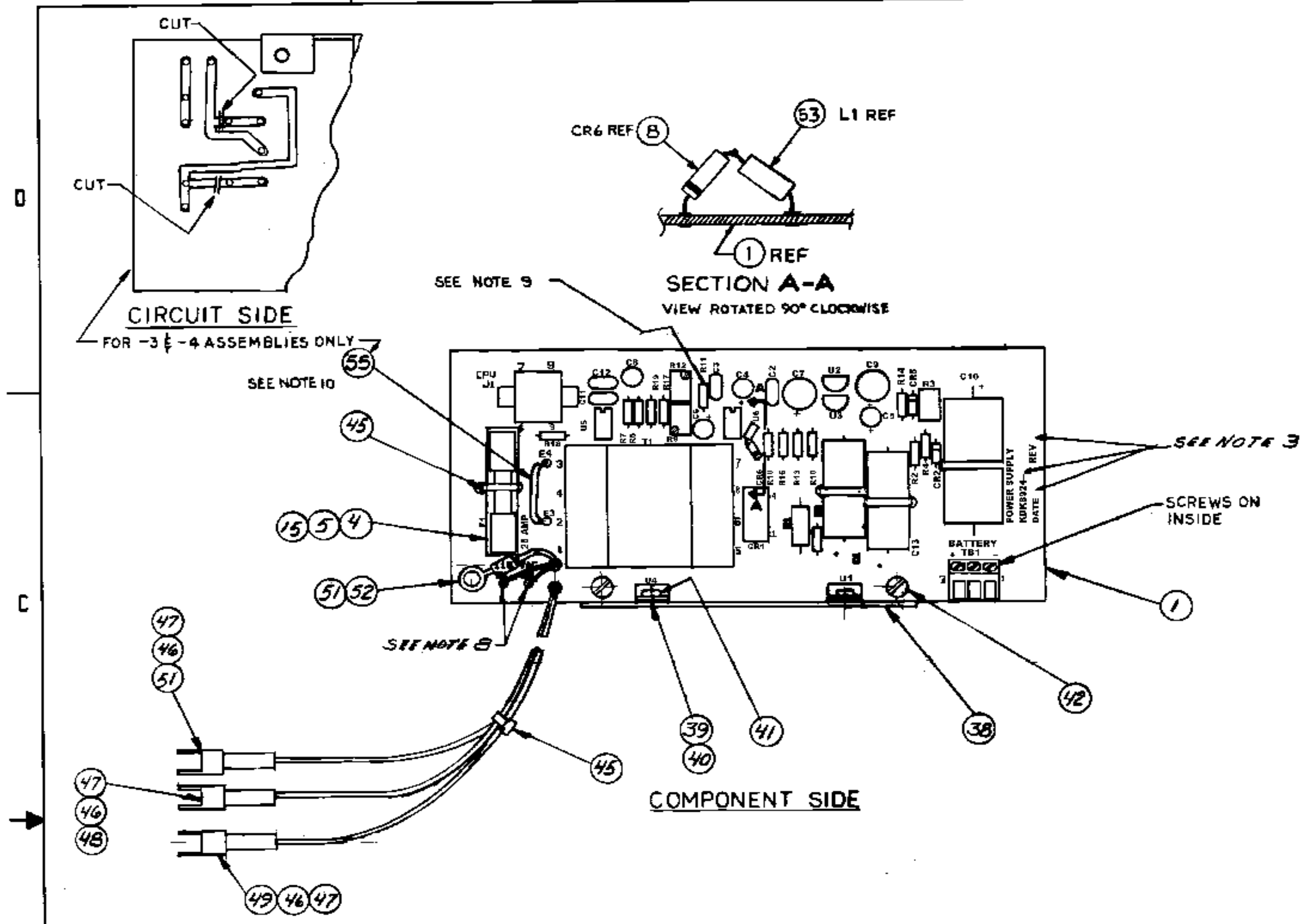


Figure 4-5. CPU & POWER SUPPLY ASSEMBLY, Sheet 2 (For Non-Battery Units Only)

DWG NO. KDK8924 SH 1

REVISIONS				
ZONE	LTR	DESCRIPTIONS	DATE	APPROVED
	-	REL. ON C/ND1337	6/30/86	[illegible]
	B	C/ND1353, DWG SHOULD HAVE BEEN REL ON REV B	7/18/86	[illegible]
	C	C/ND1379 ITEM 35 WAS KML1918A, 7660 & ITEM 45 QTY WAS 5	9/2/86	[illegible]
	D	C/ND1465 ADDED L1 BETWEEN CR6 AND J1-6. ADDED ITEM 53 TO L/M	12/19/86	[illegible]
	E	C/ND2246 ADDED KDK8924-2	8/19/90	[illegible]
	F	C/ND2610, ADDED KDK8924-3, -4 ASSEMBLIES, NOTE 10 & CKT SIDE VIEW	8/5/91	[illegible]
	G	C/ND2828 ADDED LEADER & NOTE TO TB1 AT PICTORIAL	9/18/92	[illegible]
	H	C/ND2934, ADD'D REF TO KDK8924-2 TO NOTE 9	4/30/93	[illegible]
	J	C/N D3614 - ITEM 35 WAS KML1918B	[illegible]	[illegible]



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

-4	-3	-2	-1	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, XU6		8 PIN
1	-	-	-	36	P.S. ASSEMBLY	-	KDK8924-2			
-	-	1	1	35	I.C. REGULATOR	A	KML1918C	U6		ICL7662CPA
-	-	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	KFU310DN	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 ON -1 ONLY)		20K
-	-	2	3	23	RESISTOR	-	RN55C1003F	R8, R18 (R11 ON -1 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	KFU310AL	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	-	RW79U14R0F	R1		14Ω ±2% 3W
-	-	1	1	15	FUSE COVER	B	KF7351A			PVC FLEXIBLE
-	-	1	1	14	CAPACITOR	B	KLN311D	C10		1000µf 35V
-	-	2	2	13	CAPACITOR	B	KLY311C	C7, C9		100µf ±20% 16V
-	-	4	4	12	CAPACITOR	B	KLY311G	C4, 5, 6 & 8		10µf ±20% 50V
-	1	-	-	11	PS ASSEMBLY	-	KDK8924-1			
-	-	4	4	10	CAPACITOR	A	KHV311A	C2, 3, 11 & 12		.01µf, +80% -20% 100V
-	-	2	2	9	CAPACITOR	C	KLN311F	C1, C13		470µf, 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		25AMP
-	-	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			

QTY REQD FOR DASH NO.

LIST OF MATERIAL

RLWS DRAWING NO. 58723
SHEET 1 OF 1
BY: KLL DATE: 12/9/99

NOTES:

1) FOR SCHEMATIC SEE B SIZE KFV7316
2) OBSERVE POLARITY OF DIODES, LED'S, DISPLAYS AND CAPACITORS.
3) STAMP APPLICABLE DASH NUMBERS, REVISION AND DATE AT FINAL ASSEMBLY USING BLACK INDELIBLE INK. CHARACTERS TO BE MIN. .12 HIGH
4) SEAT EACH COMPONENT AS FLAT TO P.C. BOARD AS DEVICE ALLOWS.
5) CAPACITORS WITH VOLTAGE RATINGS GREATER THAN THOSE SHOWN MAY BE USED IF PHYSICAL SIZE AND LEAD SPACING ARE EQUIVALENT.
6) USE ONLY FREON, SUCH AS FREON TMS FOR CLEANING.
7) TEST PROCEDURES: KAB8317
8) 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).
9 ADD JUMPER WIRE ACROSS R11 MOUNTING HOLES FOR KDK8924-2 ONLY.
10 ADD JUMPER WIRE BETWEEN E3 AND E4 ON KDK8924-3 AND KDK8924-4 ONLY, TO CONVERT 110 VAC TO 220 VAC OPERATION

-4	-3	-2	-1	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
-	-	1	-	56	POTENTIOMETER	C	KDU338AH	R12		50K
A/R	A/R	A/R	-	55	WIRE, JUMPER	-	M16878/4BFB0		NOTE 9	22 AWG, BLACK
-	-	1	-	54	RESISTOR	-	RN55C2801F	R10		2.8K ±1% 1/10W
-	-	1	1	53	CHOKE	C	KDP309A	L1		100 µHy ±10%
-	-	1	1	52	TERMINAL, INSULATED	B	KAE307A			
-	-	[illegible]	[illegible]	51	WIRE, GRN #22 AWG	-	MCF66-6			PVC INSUL
-	-	1	1	50	RECTIFIER, SILICON	A	KBV327A	CR2		1N4002
-	-	[illegible]	[illegible]	49	WIRE, WHT #22 AWG	-	MCF66-10			PVC INSUL
-	-	[illegible]	[illegible]	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, F1
				44						
				43						
-	-	2	2	42	SCREW, SEMS	B	KKP83B			#6-32 x 1/4 LG
-	-	2	2	41	SCREW, NYLON	-	MS18212-12			#4-40 x 3/16 LG.
-	-	A/R	A/R	40	COMPOUND, THERMAL	-	S1069			

QTY REQD FOR DASH NO.

	UPS3000
	UPC5000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
.X ±.03 .XX ±.01 .XXX ±.005 ANGLES ±1/2°
FRACTIONS ±
ALL MACH. SURFACES ✓ 125
DRILL HOLES PER AND 10387
BURRS AND SHARP EDGES PER J21215
45° CHAMFER FIRST THREAD
TOLERANCES PER ANSI Y14.5-1973
COML TOL APPLY TO STOCK SIZES

MATERIAL: —
FINISH: —

DRAWN G. Newton 6-26-86
CHECKED J. Welsh 6-30-86
ENGR [illegible] 6-26-86
RELEASED [illegible] 6-30-86

EATON CONSOLIDATED CONTROLS™ BETHEL, CT 06801

POWER SUPPLY ASSEMBLY

SIZE D | FSCM NO. 02750 | DWG NO. KDK8924
SCALE 1:1 | WT CALC ACT. | SHEET 1 OF 1

58723

Figure 4-6. POWER SUPPLY ASSEMBLY (For Battery Units Only)

REV	REFERENCE	INIT	DATE
W THRU AB	SEE C/N'S FOR CHG. DESCRIPTIONS W-C/N D2858, Y-C/N D2900, AA-C/N D2948, AB-C/N D2968.	JEW	SEE CHG #'S
AC	C/N D3121; IT. 95 QTY WAS 11 1/2 IN.	JEW	7/7/94
AD	C/N D3710, ITEM 10 WAS KBF8918B; IT. 24 WAS RN55010ROF; IT. 57 WAS KLY3118; IT. 95 WAS M16878/4BGBO.	JSL	3/17/98
AE	C/N D4003 L/M: ITEM 53 PART# WAS: KJE3118; DESC. WAS CAPACITOR, MYLAR.	JSL	11/8/99
AF	QTY OF ITEM 96 WAS: -1=0; -2=1 1/2"; -3=0; -4=1 1/2" ; ADD'D NOTE 27; UPDT'D SHT. 2.	DJS KLL	8/4/00
AG	DELETED ITEMS 2, 10, AND 11.	DJS KLL	10/5/00
AH	MODIFIED NOTE 27, "CATHODE" REPLACED WITH "ANODE"; REDRAWN ON RLWS FORMAT.	DJS KLL	11/27/00
AJ	ADDED NOTES 28 AND 29.	DFH KLL	12/28/00
AK	ECO11898: ADDED NOTE 30, MODIFIED INFO IN ITEM NO. 96 ON LIST OF MAT'L. REMOVED SPEC. FROM ITEM 65 AND 1 THRU 57.	KAL JEW	12/12/01

REVISIONS

NOTES:

1- FOR SCHEMATIC SEE DWG. (D)KHN7316.

2- OBSERVE POLARITY OF ICs, CAPACITORS, DIODES, AND TRANSISTORS.

3- TEST PROCEDURE: (A)KUA7317

4- MARK APPLICABLE DASH NUMBER, REVISION LEVEL, AND DATE IN 1/8 INCH HIGH CHARACTERS. USE BLACK EPOXY INK.

5- ITEM 30 REFERENCE DESIGNATIONS: R16, R26, R41, R42, R44, R46, R47, R54, WITH R28 IN KET8924-1 & KET8924-3

6-

7- ITEM 3 REFERENCE DESIGNATIONS: U1, U2, U3, U26, WITH U23 IN KET8924-1 & KET8924-3

8- ITEM 56 REFERENCE DESIGNATIONS: C8 AND C10-C26, WITH C28 IN KET8924-1 & KET8924-3

9- ITEM 65 REFERENCE DESIGNATIONS: CR7, CR8, CR9, AND CR12, WITH CR10 IN KET8924-1 & KET8924-3

10- TB1 IS MADE UP OF ONE (1) ITEM 82 AND ONE (1) ITEM 91. TB2 IS MADE UP OF ONE (1) ITEM 82.

11- USE TWO 8" LENGTHS OF ITEM 95, #20AWG BLK.INS.WIRE, TO CONNECT COMMON CLAD, AS SHOWN IN HIDDEN LINES, COMPONENT SIDE VIEW, SHEET 2.

12- REFERENCE:

ASSEMBLY #	USED IN
KET8924-1	UPC5000
KET8924-3	UPC5100
KET8924-4	UPS3000

13- REFERENCE:

ASSEMBLY #	QTY	ITEM #	ADD BETWEEN
KET8924-1	2	66	E9 & E10, E12 & E13
KET8924-2	2	66	E9 & E11, E12 & E15
KET8924-3	3	66	E3 & E16, E9 & E10, E12 & E13
KET8924-4	2	66	E9 & E11, E12 & E15

14- ON KET8924-1 & KET8924-3:
DELETE J2 PINS 6 THRU 10, AND 16 THRU 20.
ON KET8924-2:
DELETE J2 PINS 9,10, & 19,20

15- ON KET8924-3 ONLY:
CUT CLAD AT CUT MARKS "G" & "E"
AND BETWEEN R23A MOUNTING HOLES.

16- ITEM 22 REFERENCE DESIGNATIONS: K5, WITH K4 USED IN KET8924-1 & KET8924-3 ONLY

17- ITEM 32 REFERENCE DESIGNATIONS: R30 USED IN KET8924-1 AND KET8924-3, R23 & R23B USED IN KET8924-3 ONLY.

18- ITEM 33 REFERENCE DESIGNATIONS: R55, WITH R11 USED IN KET8924-1, KET8924-2, & KET8924-4.

19- ITEM 35 REFERENCE DESIGNATIONS: R15, WITH R3 & R4 USED IN KET8924-1, KET8924-2, & KET8924-4.

20- ITEM 37 REFERENCE DESIGNATIONS: R8, R9, R10, & R18 WITH R32 IN KET8924-3 ONLY.

21- ITEM 39 REFERENCE DESIGNATIONS: R59, WITH R58 USED IN KET8924-1 & KET8924-3 ONLY.

22- ITEM 53 REFERENCE DESIGNATIONS: C3, C29, WITH C9 USED IN KET8924-1 & KET8924-3 ONLY.

23- ITEM 64 REFERENCE DESIGNATIONS: CR2, WITH CR1 USED IN KET8924-1, KET8924-2, & KET8924-4.

24- ITEM 75 REFERENCE DESIGNATIONS: J5, WITH J2 USED IN KET8924-2 ONLY.

25- ITEM 83 REFERENCE DESIGNATIONS: XU4, XU6, XU7, XU8, XU13.
ITEM 84 REFERENCE DESIGNATIONS: XS1, XU5, XU14, XU15.

26- ITEM 92 REFERENCE DESIGNATIONS (28 PLACES): TP1-TP6, TP8-TP12, TP14, TP15, E1-E5, E7-E16.

27- KET8924-1 AND KET8924-3:
ON CIRCUIT SIDE OF BOARD, CUT CLAD BETWEEN CR12 ANODE AND VIA UNDER U10. CUT CLAD BETWEEN CR10 ANODE AND U6-4.
ADD 3 1/2" 30AWG WIRE, ITEM 96, BETWEEN CR10 ANODE AND VIA UNDER UI0, SEE PICTORIAL.

28 - CAPACITOR LEADS TO BE WRAPPED WITH NONCONDUCTIVE TUBE TO PREVENT ELECTRICAL ARCING.

29 - CAPACITOR TO BE LAID DOWN FLAT AGAINST BOARD, AND WRAPPED WITH NONCONDUCTIVE SHRINK TUBE TO PREVENT ELECTRICAL ARCING.

30 - CUT ITEM 96 TO REQUIRED LENGTHS. ON CIRCUIT SIDE OF BOARD ASSEMBLY JUMPER U8 PINS 9 AND 10 TO U8-7(GND).

-1 = 59037
-2 = 59040
-3 = 59048
-4 = 59052

-4	-3	-2	-1	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
1/2"	-	1/2"	-	97	WIRE, BUS, 18 AWG	-	QQW343H18SIT			
6"	4 1/2"	6"	4 1/2"	96	WIRE, WIRE WRAP, 30 AWG	-	F985			
19 1/2"	19 1/2"	19 1/2"	19 1/2"	95	WIRE, BLACK, 20 AWG	-	M22759/11-20-0		NOTE 11	
				94						
A/R	A/R	A/R	A/R	93	SEALANT	-	SA13-193		RTV162	
28	28	28	28	92	CONNECTOR PIN	B	KEK7354A		NOTE 26	
1	1	1	1	91	TERMINAL BLOCK	B	KUH3300C		TB1	4 POS, NOTE 10
1	1	1	1	90	SOCKET, IC	B	KD251B		XU11	28 PIN DIP
1	1	1	1	89	SOCKET, IC	B	KD251C		XU9	40 PIN DIP
1	1	1	1	88	SOCKET, IC	B	KD251A		XU10	24 PIN DIP
1	1	1	1	87	SOCKET, IC	B	KE251E		XU12	20 PIN DIP
1	1	1	1	86	SOCKET, IC	B	KE251D		XU22	18 PIN DIP
2	2	2	2	85	SOCKET, IC	B	KE251C		XS3,XU20	8 PIN DIP
4	4	4	4	84	SOCKET, IC	B	KE251B		NOTE 25	16 PIN DIP
5	5	5	5	83	SOCKET, IC	B	KE251A		NOTE 25	14 PIN DIP
2	2	2	2	82	TERMINAL BLOCK	B	KUH3300A		TB1 & TB2	3 POS, NOTE 10
1	1	1	1	81	CONNECTOR, CONTACT	B	KMB354C		J6	12 PIN
1	1	1	1	80	CONNECTOR	B	KMB354A		J7	9 PIN
1	1	1	1	79	CONNECTOR	C	KPC354C		J1	4 PIN
1	1	1	1	78	CONNECTOR	C	KBN7354B		J3	8 PIN
1	-	-	-	77	CONNECTOR	B	KNM354D		J2	20 PIN
1	1	1	1	76	CONNECTOR	B	KNM354B		J4	14 PIN
1	1	2	1	75	CONNECTOR	B	KNM354C		NOTE 24	16 PIN
1	1	1	1	74	CONNECTOR	B	KPC354E		J8	3 PIN
1	1	1	1	73	SWITCH, 4 POSITION DIP	B	KTF182G		S3	4 SPST
1	1	1	1	72	SWITCH, MOMENTARY	B	KAH7182A		S2	PUSH BUTTON
1	1	1	1	71	SWITCH, 8 POSITION DIP	B	KTF182F		S1	8 SPST
-	1	-	1	70	CONNECTOR	B	KNM354A		J2	10 PIN NOTE 14
1	-	1	-	69	TRANSISTOR	C	KEA165A		Q1	2N4401
1	1	1	1	68	CRYSTAL	A	KF357A		Y1	4.9152 MHZ
				67						
2	3	2	2	66	RECEPTACLE, SHORTING	B	KEF7354A		NOTE 13	
4	5	4	5	65	DIODE, SILICONE	A	KBV327A		NOTE 9	1N4002
2	1	2	2	64	DIODE	A	KFL327B		NOTE 23	FDH300
				63						
				62						
				61						
				60						
				59						
2	2	2	2	58	CAPACITOR, ELECTROLYTIC	B	KGE311Q	POLARIZED	C4,C5	6.8uF 20% 35V
-	1	-	1	57	CAPACITOR, ELECTROLYTIC	B	KAU7311J	POLARIZED	C27	1000uF20% 35V

QTY REQD FOR DASH NO.

LIST OF MATERIALS (CONTINUED)

-4	-3	-2	-1	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
18	19	18	19	56	CAPACITOR, CERAMIC	A	KHV311A		NOTE 8	.01uF +80 -20% 100V
2	2	2	2	55	CAPACITOR, MICA	-	CM05ED200J03		C6,C7	20pF 5% 500V
-	1	-	-	54	CAPACITOR, POLYCARBONATE	C	KMV311P		C1	.1uF 10% 100V
2	3	2	3	53	CAPACITOR, METAL POLY	B	KDE7311B		NOTE 22	.5uF 10% 100V
1	1	1	1	52	CAPACITOR, CERAMIC	A	KKF311B		C2	1uF 20% 50V
1	-	1	1	51	CAPACITOR, MYLAR	C	KMV311T		C1	.22uF 5% 100V
1	-	1	-	50	RESISTOR, COMPOSITION	-	RCR07G471J3		R31	470 5% 1/4W
1	-	1	1	49	RESISTOR, METAL FILM	C	KPW310Z		R32	50K 0.1% 0.1W
1	1	1	1	48	POTENTIOMETER	C	KBY338F		R34	500 10% 1/2W
-	1	-	-	47	RESISTOR, METAL FILM	-	RN55C2000F		R21	200 1% 0.1W
-	1	-	1	46	RESISTOR, COMPOSITION	-	RCR07G241J3		R20	240 5% 1/4W
-	1	-	-	45	RESISTOR, METAL FILM	C	KPW310D		R12	1.5K 0.1% 0.1W
-	1	-	1	44	RESISTOR, METAL FILM	-	RN55C3321F		R7	3.32K 1% 0.1W
3	3	3	3	43	RESISTOR, SIP	C	KMA310U		R40,R48,R49	10K 2% .3W
1	-	1	-	42	RESISTOR, COMPOSITION	-	RCR07G102J3		R27	1K 5% 1/4W
2	2	2	2	41	RESISTOR, COMPOSITION	-	RCR07G103J3		R51,R52	10K 5% 1/4W
1	1	1	1	40	RESISTOR, COMPOSITION	-	RCR07G245J3		R43	2.4M 5% 1/4W
1	2	1	2	39	POTENTIOMETER	B	KBY338B		NOTE 21	20K 10% 1/2W
2	2	2	2	38	RESISTOR, METAL FILM	C	KPW310G		R56,R57	80K 0.1% 0.1W
4	5	4	4	37	RESISTOR, METAL FILM	C	KPW310N		NOTE 20	10K 0.1% 0.1W
2	2	2	2	36	RESISTOR, METAL FILM	C	KPW310 [ ]		R19,R22	SELECT
3	1	3	3	35	RESISTOR, METAL FILM	C	KPW310W		NOTE 19	20K 0.1% 0.1W
1	-	1	1	34	RESISTOR, METAL FILM	C	KPW310AY		R13	13.3K 0.1% 0.1W
2	1	2	2	33	RESISTOR, METAL FILM	C	KPW310R		NOTE 18	5K 0.1% 0.1W
-	3	-	1	32	RESISTOR, METAL FILM	C	KPW310E		NOTE 17	1.0K 0.1% 0.1W
1	1	1	1	31	RESISTOR, METAL FILM	-	RN55C6981F		R17	6.98K 1% 0.1W
8	9	8	9	30	RESISTOR, METAL FILM	-	RN55C1001F		SEE NOTE 5	1.0K 1% 0.1W
5	5	5	5	29	RESISTOR, METAL FILM	-	RN55C8062F		R35-R39	80.6K 1% 0.1W
1	-	1	1	28	RESISTOR, METAL FILM	-	RN55C4321F		R21	4.32K 1% 0.1W
3	3	3	3	27	RESISTOR, METAL FILM	-	RN55C1002F		R5,R6,R45	10K 1% 0.1W
1	1	1	1	26	RESISTOR, METAL FILM	-	RN55C1182F		R25	11.8K 1% 0.1W
2	2	2	2	25	RESISTOR, METAL FILM	C	KPW310B		R1,R2	100K 0.1% 0.1W
-	1	-	1	24	RESISTOR, METAL FILM	-	RN55C10R0F		R29	10 1% 0.1W
3	3	3	3	23	RELAY	C	KJU431B		K1,K2,K3	
1	2	1	2	22	RELAY	C	KJU431A		NOTE 16	
-	-	-	1	21	RESISTOR, METAL FILM	-	RN55C1402F		R33	14K 1% 0.1W
-	1	-	1	20	POTENTIOMETER	C	KBW338E		R24	2K 10% 1/2W
-	1	-	-	19	RESISTOR, METAL FILM	C	KPW310H		R11	1.75K 0.1% 0.1W
-	1	-	-	18	RESISTOR, METAL FILM	C	KPW310M		R23C	200 0.1% 0.1W
-	2	-	-	17	RESISTOR, METAL FILM	C	KPW310BA		R3,R4	15K 0.1% 0.1W
-	1	-	-	16	RESISTOR, METAL FILM	-	RN55C2491F		R33	2.49K 1% 0.1W
-	1	-	1	15	IC, VOLTAGE REGULATOR	C	KGB1918C		U25	LM317T 3 PIN
1	1	1	1	14	IC, 4 BIT BINARY COUNTER	C	KBE8918AG		U15	74HCT161 16 PIN
1	1	1	1	13	IC, NONINVERTED 3 STATE OUT.	C	KBE8918BD		U14	74HCT257 16 PIN
1	1	1	1	12	IC, OCTAL D TYPE FLIP-FLOP	C	KBE8918BL		U12	74HCT374 20 PIN
1	1	1	1	9	IC, 8 BIT MICROCOMPUTER	C	KBF8918A		U9	80C39 40 PIN
3	3	3	3	8	IC, 2 INPUT NAND	C	KBE8918A		U8,U13,U7	74HCT00 14 PIN
1	1	1	1	7	IC, OPERATIONAL AMPLIFIER	B	KDH8918A		U20	AD708NJX 8 PIN
1	1	1	1	6	IC, HEX BUFFER/DRIVER	C	KAG1918AE		U6	7417 14 PIN
1	1	1	1	5	IC, QUAD SWITCH	A	KEV1918D		U5	LF13333N 16 PIN
1	1	1	1	4	IC, QUAD AMPLIFIER	A	KER1918A		U4	HA4741 14 PIN
4	5	4	5	3	IC, OPERATIONAL AMPLIFIER	C	KBY1918U		NOTE 7	OP-07CJ 8 PIN
1	1	1	1	1	PRINTED CIRCUIT BOARD	D	KKW7361			

QTY REQD FOR DASH NO.

LIST OF MATERIALS

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

MATERIAL: SEE BILL OF MATERIAL
TREATMENT: NONE
DO NOT SCALE DRAWING
DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED
FOR RLWS USE ONLY
SURFACE FINISH ---
TOL. DECIMAL: 2 PLC ---; 3 PLC ---; ANGLE ---
THIRD ANGLE PROJECTION
TITLE: ASSEMBLY, CPU AND BATTERY POWER
RICE LAKE WEIGHING SYSTEMS
DWG NO 59037
MFG.ENG. APPROVED SV 8/25/87
CKD.
DES.ENG. APPROVED JEW 8/25/87
DR.BY DJS 11/27/00
SCALE N/A
SHEET 1 OF 2
REVISION AK

Figure 4-7. CPU ASSEMBLY, Sheet 1 (For Battery Units Only)

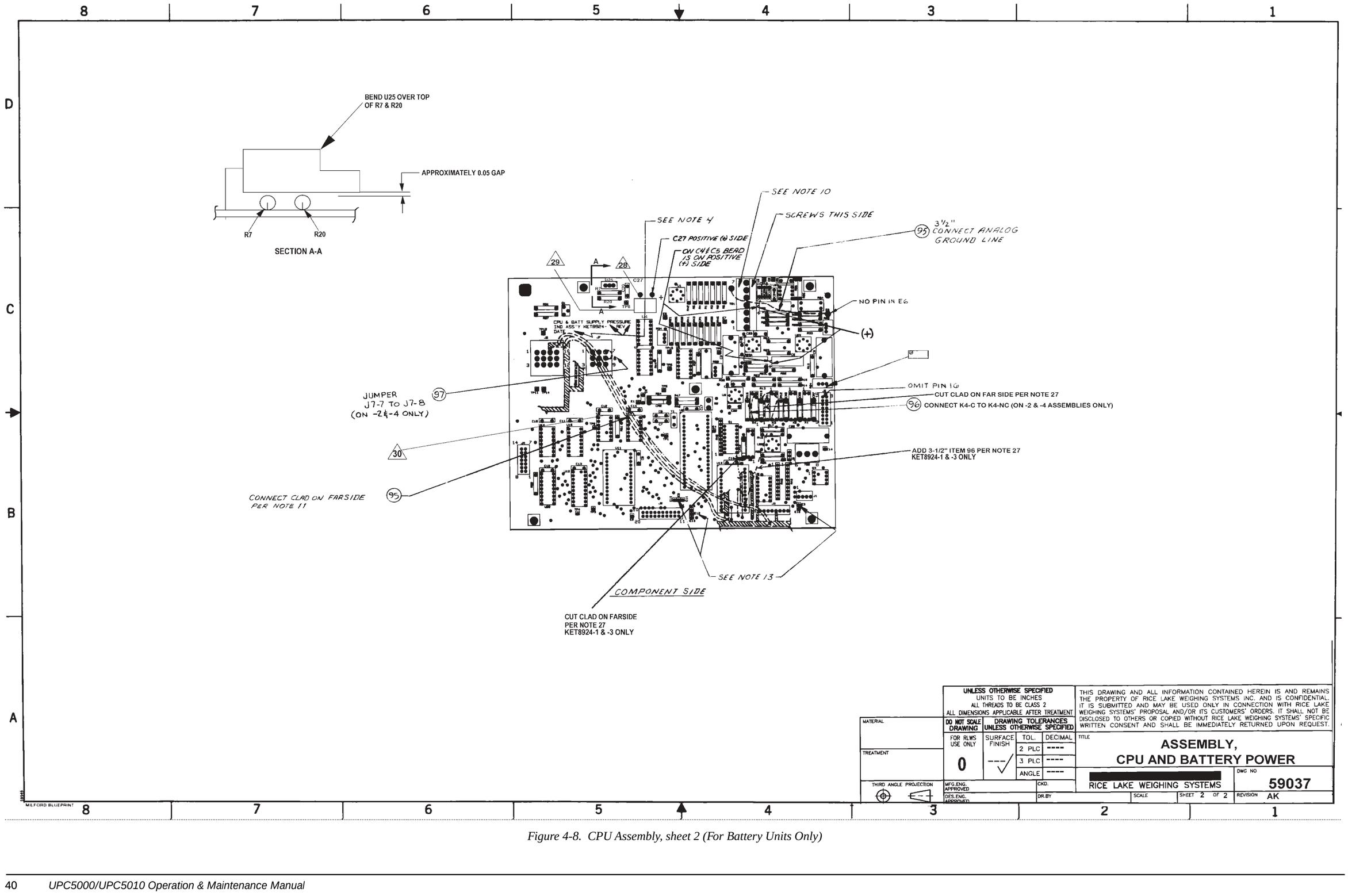


Figure 4-8. CPU Assembly, sheet 2 (For Battery Units Only)

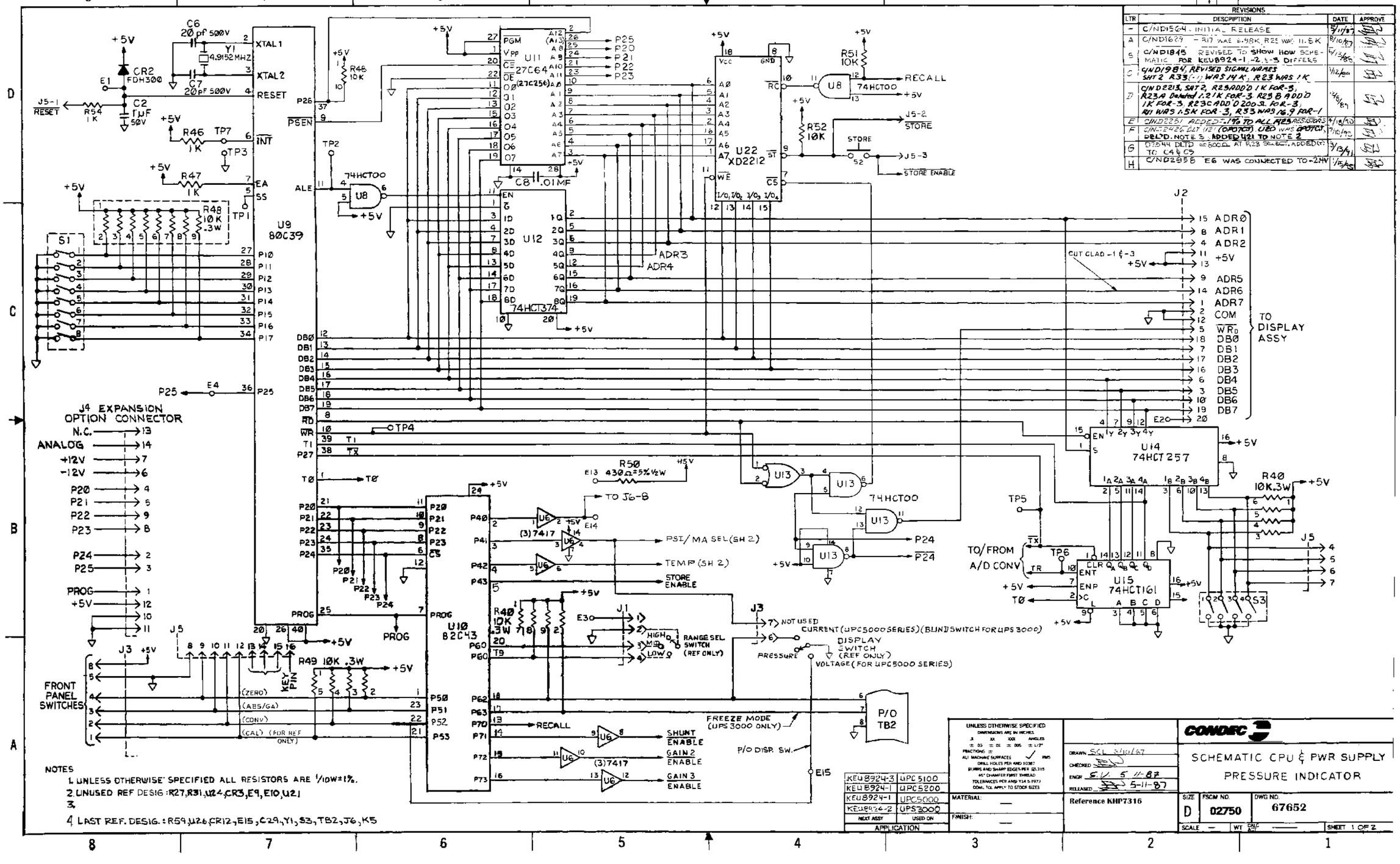


Figure 4-9. CPU & POWER SUPPLY SCHEMATIC, Sheet 1 (For Non-Battery Units Only)

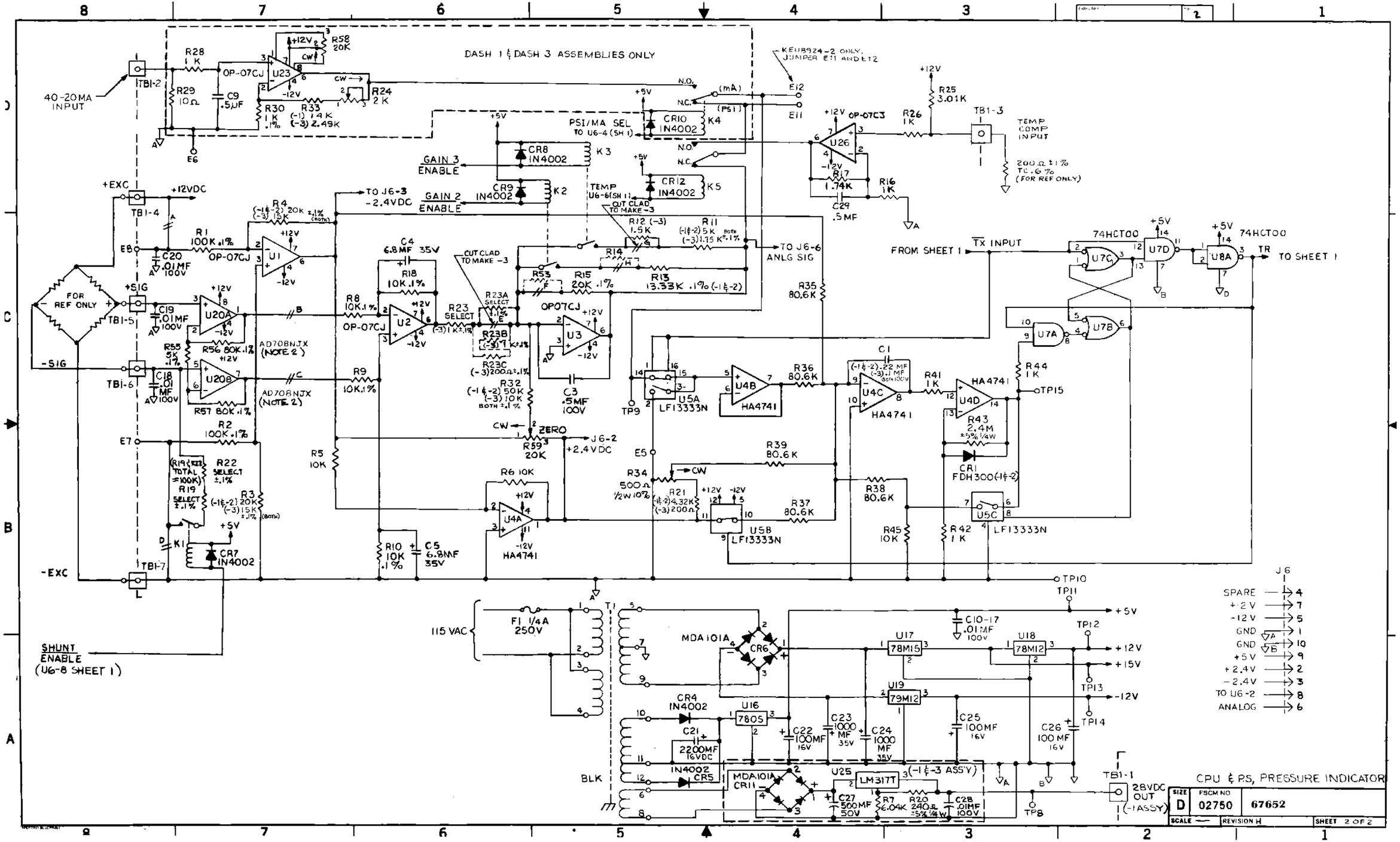


Figure 4-10. CPU & POWER SUPPLY SCHEMATIC, Sheet 2 (For Non-Battery Units Only)

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; JUMPERED
R12—TO BE 50K

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
–	C/ND1124 INITIAL RELEASE	9/11/85	
A	C/ND1262 ADDED R6 & C13. C4-6, CB WERE 50V	3/17/86	
B	C/ND1379 U6 WAS 7660	9/2/86	
C	C/ND1465 ADDED L1 BETWEEN CR6 AND J1-6	12/19/86	
D	C/ND2246 ADDED PROVISION FOR KDK8924-2 PER NOTE 3	2/19/90	

+5V
R8 100K
R18 100K
C11 .01UF 100V
R17 10K ±5% 1/4W
U5 LM311
C12 .01UF 100V
R7 24.9K
R19 80.6K
R9 20K
J1
2 LO BATT
8 PWR OUT
9 PWR IN
1 BATT V
E1 F1 T1 .25A 115 VAC 60 HZ E2
CR1 MDA101A
C1 470 UF 50V
R1 14Ω 1% 3W
LM317T U1
CR2 1N4002
R2 243Ω
TB1 NC
12V BATT 6 CELL (REF)
R4 2.21K
R3 500Ω
R10 20K NOTE 3
R11 100K NOTE 3
R12 20K NOTE 3
C2 .01 UF 100V
LM317LZ U2
R14 1.69K
CR5 FDH300
LM317LZ U3
R16 1.21K
R15 8.25K
C7 100UF 16V
LM78M05 U4
C8 10UF 50V
C9 100UF 16V
4 +9V
C4 100UF 50V
R13 10K
C3 .01 UF 100 V
C5 10 UF 50V
U6 7661
C6 10 UF 50V
CR6 FDH300
L1 100 UH
C10 1000 UF 35V
6 -9V
7 COM
5 +28V
R6 200Ω 5% 1/4W
C13 470UF 50V

KDK8924-2	UPC5000
KDK8924-1	UPC5000
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
X XX XXX ANGLES
± .03 ± .01 ± .005 ± ½°
FRACTIONS ±
ALL MACH SURFACES ✓ RMS
DRILL HOLES PER ANSI 10387
BURRS & SHARP EDGES PER JZL315
45° CHAMFER FIRST THREAD
TOLERANCES PER ANSI Y14.5 1973
COML TOL APPLY TO STOCK SIZES
MATERIAL: —
FINISH: —

DRAWN K W Elmslie
CHECKED 1-23-85
ENGR 9-11-85
RELEASED 9-11-85

Reference KFV7316

CONDEC
SCHEMATIC, POWER SUPPLY
SIZE B | FSCM NO. 02750 | DWG NO. 67654
SCALE — | WT. CALC ACT. — | SHEET 1 OF 1

Milford Blueprint

Figure 4-11. POWER SUPPLY SCHEMATIC, (For Battery Units Only)

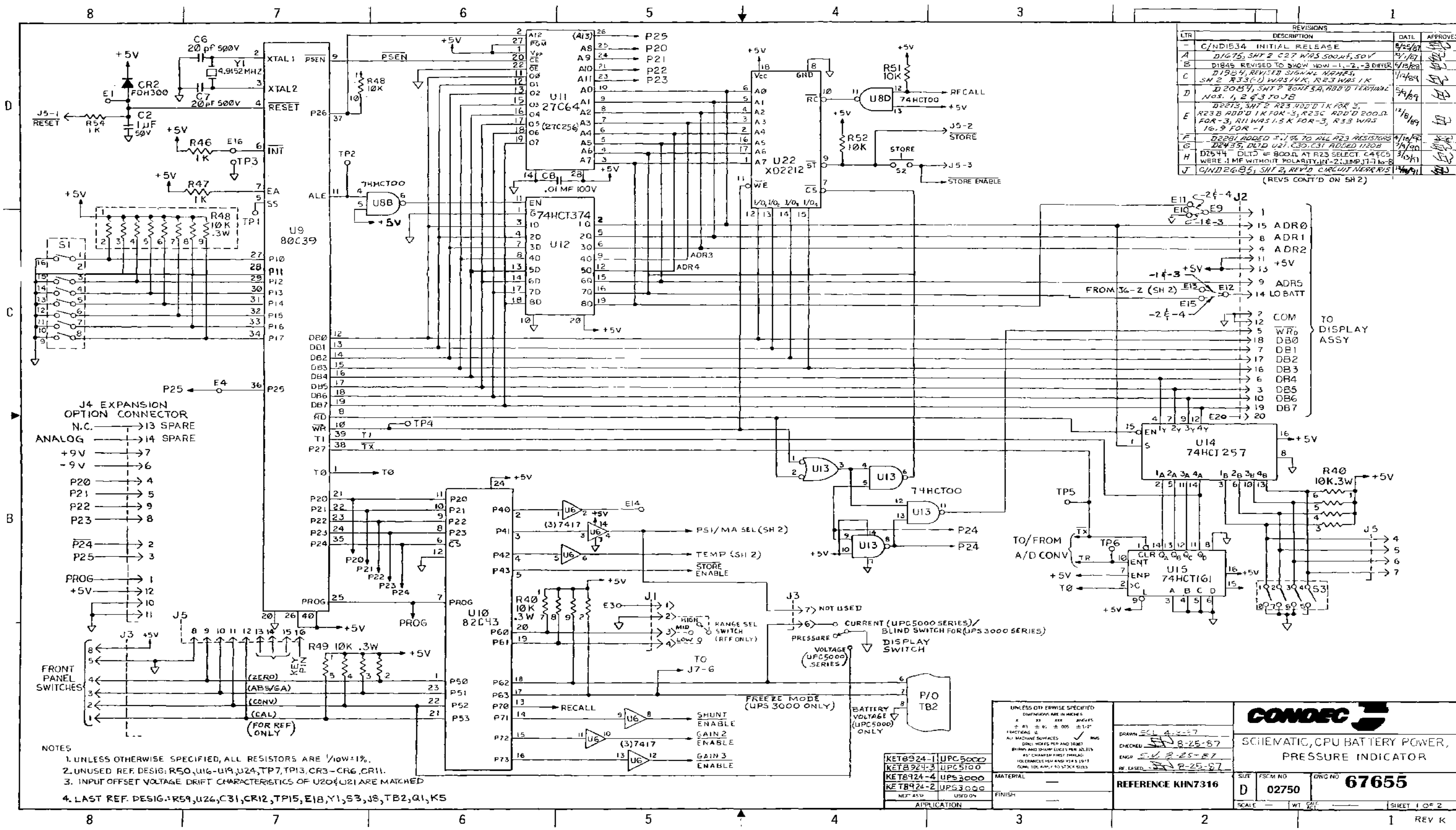


Figure 4-12. CPU SCHEMATIC, Sheet 1 (For Battery Units Only)

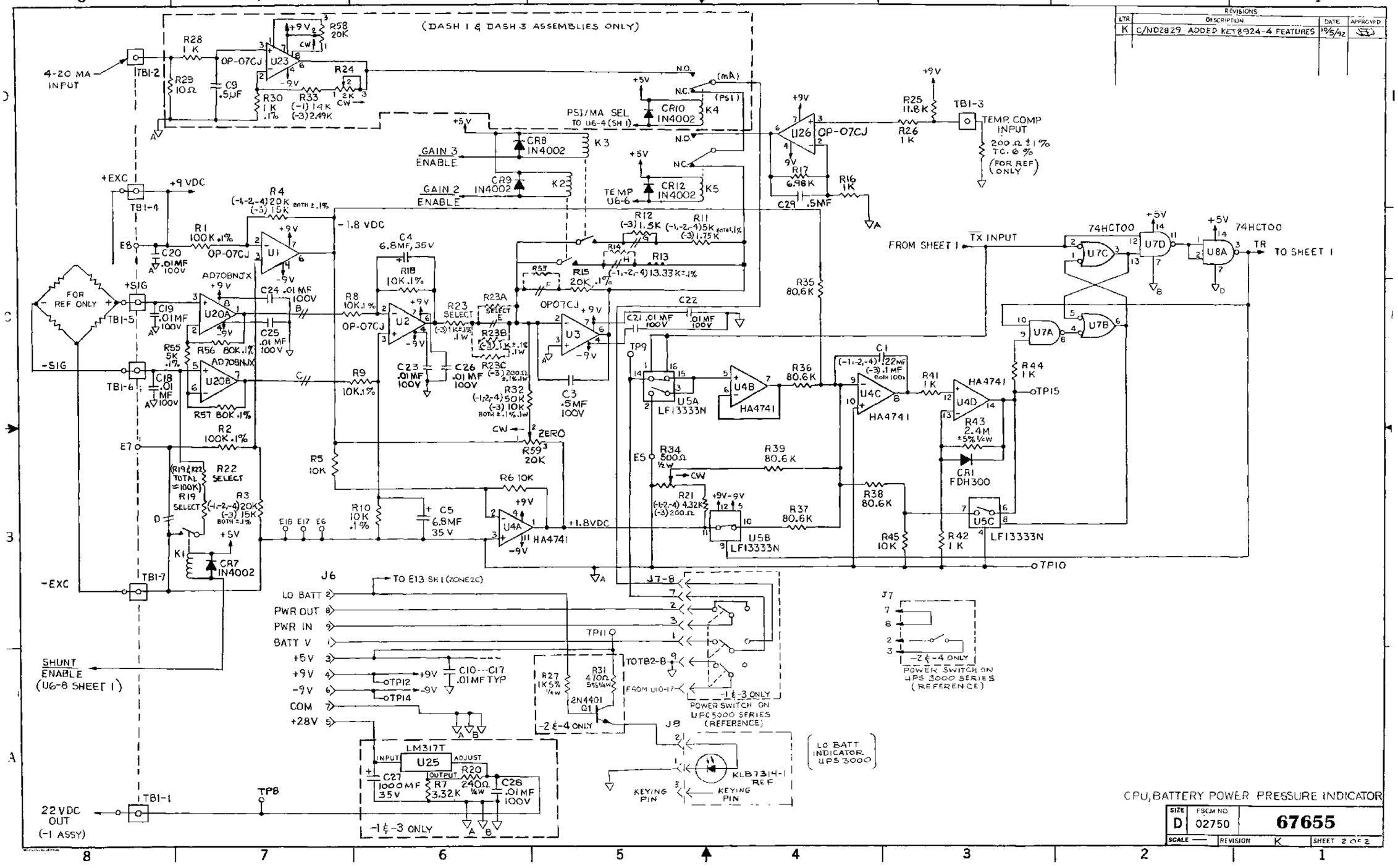


Figure 4-13. CPU SCHEMATIC, Sheet 2 (For Battery Units Only)

5.0 Model Number System

UPC 5000 - ____ ____ ____ ____

UPC 5010 - ____ ____ ____ ____

POWER REQUIREMENTS

A - AC Only (120 VAC)***

B - Battery Operation & 120 VAC

C - AC Only (220 VAC)***

D - Battery Operation & 220 VAC

RANGE - PSI

A - 2000/1000/400

B - 1000/500/200

C - 500/250/100

D - 100/50/20 *

E - 50/25/10 *

F - 15/7.5/3 **

MODE

A - Gage Only

B - Absolute Only

C - Gage or Absolute (Switch-Selectable)

DISPLAY

A – Light Emitting Diode (LED)

B – liquid Crystal (LCD)

*** Available in Gage Only or Absolute Only**

**** Available in Gage Only**

***** UPC5000, Available as a Special**

6.0 Available Ranges, Conversions and Resolutions

NOTE: *All ranges are available in bars only.*

Calibrator Mode:

@ = Gage Only

= Absolute Only

$ = Gage or Absolute

NOTE*: Calibrators have PSI and one conversion as shown in table.*

RANGE (PSI)	A	B	C	D	E	F
2000/1000/400	@,$				@,$	@,$
1000/500/200	@,$	$	@	$		@
500/250/100	$			$		@,$
100/50/25					@	@
50/25/10						@
15/7.5/3						@

Table 6-1. PSI Conversion

A: kPa = PSI x 6.89476

B: mm Hg = PSI x 51.7149

C: Bar = PSI x 0.0689476

D: in Hg (0˚F) = PSI x 2.036

E: Kg/cm^2 = PSI x 0.070308

F: in H_2O (60˚F) = PSI x 27.71

NOTE: Display resolution 0.02% of selected range, unless it is not devisable by 1, 2, or 5.

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
Kg/cm^2	140.62/70.31/28.125	0.02/0.1/0.005
in H_2O	55420/27710/11084	10/5/2

Table 6-2. Resolutions (2000/1000/400 PSI ranges)

CONVERSION	RANGES HI/MED/LO	RESOLUTION HI/MED/LO
PSI	1000.0/500.0/200.00	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
in H_2O	27710/13856/5542	5/2/1

Table 6-3. Resolutions (1000/500/200 PSI ranges)

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
in Hg	1018.0/509.0/203.6	0.2/0.1/0.05
in H_2O	13856/6928/2771.0	2/1/0.5

Table 6-4. Resolutions (500/250/100 PSI ranges)

CONVERSION	RANGES HI/MED/LO	RESOLUTION HI/MED/LO
PSI	100.00/50.00/20.000	0.02/0.01/0.005
Kg/cm^2	7.031/3.5155/1.4062	0.001/0.0005/0.0002
in H_2O	2771.0/1385.6/554.2	0.5/0.2/0.1

Table 6-5. Resolutions (100/50/20 PSI ranges)

CONVERSION	RANGES HI/MED/LO	RESOLUTION HI/MED/LO
PSI	50.00/25.00/10.000	0.02/0.01/0.005
in H_2O	1385.5/692.6/277.1	0.5/0.2/0.1

Table 6-6. Resolutions (50/25/10 PSI ranges)

CONVERSION	RANGES HI/MED/LO	RESOLUTION HI/MED/LO
PSI	15.000/7.500/3.0000	0.002/0.001/0.0005
in H_2O	415.65/207.80/83.13	0.05/0.05/0.01

Table 6-7. Resolutions (15/7.5/3 PSI ranges)

7.0 Options, Replacement Kits

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

ORION-2C O-Ring Replacement Kit (Data Sheet # 65308):

- Nitrile Buna-N (standard) ..... PN 58499
- Ethylene-Propylene ..... PN 58506
- Silicone ..... PN 58509
- Neoprene ..... PN 58515
- Fluorocarbon “Viton” ..... PN 55277

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

- Pressure Trap (Data Sheet # 58609) ..... PN 58483
- Battery Replacement Kit ..... PN 55354
- Test Port (output) Attachment Swivel Fitting ..... PN 55294
- Test Port (output) Quick-Disconnect Male Hose fitting ..... PN 55394
- Fill Port (input) Quick-Disconnect Female Hose fitting ..... PN 57716

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

- 5' Long ..... PN 55279
- 10' Long ..... PN 55300
- 15' Long ..... PN 55304
- 20' Long ..... PN 55310

Fill Port (intput) Hose, with Quick-Disconnect Female fitting:

- 5' Long ..... PN 55282
- 10' Long ..... PN 55313
- 15' Long ..... PN 55319
- 20' Long ..... PN 55322

8.0 Specifications

Pressure Specifications:

Pressure range:	Three independent pressure ranges per instrument. See “Part Number System” on page 36 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:	Dry gaseous nitrogen, standard

Internal Pressure Cylinder:

Capacity:	7.0 ft^3 N_2 @ 2216 PSIG
Volume:	80 in^3
Rating:	2216 PSIG
Test Pressure:	3360 PSIG
Material:	6061 Aluminum

Pressure Supply Gage:

Size:	2-in. diameter
Range:	0–3000 PSIG
Test Pressure:	4500 PSIG

Over-pressure Rupture Disk:

Rating:	3000 PSIG, nominal
Type:	Stainless steel outer case

Pressure Media Filter:

Rating:	20 microns, Test Port
Type:	Field replaceable

Orion-2C Control Valve:

Type:	Micro-metering with replaceable soft seat
Material:	Aluminum body, clear anodized aluminum knobs, black anodized. All other parts 300 series stainless steel

Relief Valve:

Type:	Adjustable, atmospheric bleed
Setting:	Adjustable to 10% above highest calibrated pressure
Material:	300 series stainless steel

Internal Piping:

Tubing:	1/8 in. O.D., 0.030 in. wall thickness seamless Cu
Couplings:	Brass, Swagelok type

Fill Port:

Style:	Quick-disconnect.
Pressure Rating:	3000 PSIG connected, 2000 PSIG disconnected
Material:	300 series stainless steel

Test Port:

Pressure Rating:	5000 PSIG
Material:	300 series stainless steel

Vent Port:

Style:	1/4" 37° AN male
Pressure Rating:	2500 PSIG
Material:	Brass

Pressure Hoses:

Quantity Supplied:	Two; one input, one output
Length:	5 ft. nominal, each hose
Style:	Fill (input) hose - Nylon-lined core tube with synthetic braid, polyurethane cover. Fitted with quick-disconnect (Brass) socket on one end and 1/4" 37° female AN swivel pressure fitting on opposite end Test Port (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

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

Battery:

Type:	Rechargeable, lead-acid gel
Nominal Voltage:	12V
Approx. Weight:	2.86 lbs
Case:	Polystyrene/H.I. ABS

Carrying Case UPC5000 only:

Type:	Aluminum case with latched cover and handle
Material Thickness:	0.090 in., nominal
Finish:	Enamel paint, textured finish
Color:	Gray

Control Panel:

Material:	Aluminum (5052-H32)
Thickness:	0.125 in
Finish:	Gray enamel paint with black silkscreen nomenclature

Physical Specifications:

Weight:	34 lbs. including all hoses and cables
UPC5000 Case Dim’s:	10" wide x 16" long x 11.5" high
UPC5010 Case Dim’s:	19" wide x 8.1" deep x 10.5" high

(Case dimensions excluding front handles)

UPC5000/UPC5010 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. 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.

Warning *Vent all pressure lines and the nitrogen cylinder 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.

UPC5000/UPC5010 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