UPC5200 & UPC5210

Portable & Rack-mountable Pneumatic
High Pressure Calibration Console

Operation and Maintenance Manual

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Contents

About This Manual 1

1.0 Introduction 1

2.0 Operation 4

2.1 Pressure Cylinder (PN 59533) Filling Procedure 4
2.2 Initial Setup Procedure 4
2.3 Pressure Measurement Sequence (Gage Only) 5
2.4 Pressure Measurement Sequence (Absolute Only) 6

3.0 Calibration 9

3.1 Pneumatic Calibration Set-Up 9
3.2 Instrument Calibration Set-Up 9
3.3 Zero/Span Calibration 10
3.4 Linearity and Hysteresis Calibration 10
3.5 Shunt Resistor Calibration 12
3.6 Current Input Calibration 12
3.7 Permanent Data Storage 12
3.8 Normal Mode Test 13
3.9 Self-Check Test 13

4.0 Maintenance & Service 14

4.1 Troubleshooting 14
4.2 Maintenance & Service Procedures 14
4.2.1 Panel/Chassis Removal and Installation 16
4.2.2 Accumulator, Intensifier & ORION-3A (PN 55287) Removal 16
4.2.3 ORION-3A Manifold, Valve Seat Removal 17
4.2.4 ORION-3A Manifold, Vernier Control Disassembly 18
4.2.5 ORION-3A Manifold, Vernier Control Reassembly 18
4.2.6 ORION-3A Manifold, Valve Seat Installation 19
4.2.7 Accumulator, Intensifier and ORION-3A Manifold, Panel Installation 20
4.2.8 ORION-3A Manifold, Valve Adjustment Procedure 20
4.2.9 Accumulator Assembly, O-ring (PN 58051) Replacement, Filter (PN 56993) Cleaning 21
4.2.10 Intensifier Assembly, O-rings/Seals Replacement 22
4.2.11 Regulator (Standard Pneumatic) and Solenoid Removal 25
4.2.12 Regulator (Standard Pneumatic) and Solenoid Installation 25
4.2.13 Regulator (Tescom) and Solenoid Removal 26
4.2.14 Regulator (Tescom) and Solenoid Installation 26
4.2.15 Panel Gauge Removal and Installation 27
4.2.16 Test Port Quick-Connect Fitting (PN 59004) and Filter (PN 54188), Removal and Installation 28
4.2.17 Test Port (output) Hose Quick-Connect Fitting and Filter (PN 56991), Removal and Installation 28
4.2.18 Input Port Filter (PN 54188), Removal and Installation 29
4.2.19 Input Port Hose Quick-Disconnect Female Fitting, Removal and Installation 29
4.2.20 AC Fuse (PN 57472), Removal and Installation 30
4.2.21 Panel Mounted AC Power/EMI Line Filter (PN 58870), Removal and Installation 30
4.2.22 Chassis Mounted EMI Line Filter (PN 59015), Removal and Installation 30
4.2.23 Pump Control Switch (PN 60307), Removal and Installation 31
4.2.24 Power Switch (PN 58878), Removal and Installation 31
4.2.25 Range Select Switch (PN 55924) and Display Select Switch (PN 55933), Removal and Installation 32
4.2.26 Zero Switch (PN 58886), Removal and Installation 32
4.2.27 CPU Assembly, Removal and Installation 33
4.2.28 Pump Control Board Assembly, Removal and Installation 33
4.3 ORION-3A Valve Assembly (55287) Parts List 34
4.4 Intensifier Assembly Parts List 36

February 2002

5.0 Model Number System 44
6.0 Ranges and Resolutions 45
7.0 Options, Replacement Kits 46
8.0 Specifications 47
UPC5200/UPC5210 Warranty and Return Policy 49
UPC5200/UPC5210 Return Material Authorization Form 50

About This Manual

This manual is intended for use by service technicians responsible for installing and servicing UPC5200/UPC5210 pressure calibrators.

The UPC5200 portable pneumatic pressure calibrator and the rack-mounted UPC5210 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.

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

The UPC5200/UPC5210 pressure calibrators utilize an extremely repeatable sensor coupled to microprocessor-based electronic circuitry and a selectable units display system. This provides easily readable and accurate digital representation of the measured pressure. This all electro-mechanical device utilizes our precision Orion-3A vernier, which has one test port. Front panel gages tell the operator accumulator pressure, as well as regulated input pressure. The pressure regulator acts as a pressure limiter so that the operator can adjust input system pressure to 1/10 of the target value. 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 the unique internal self-check feature. For field use, the UPC5200 has a separate 83.3 cubic foot, 2,216 psi cylinder to provide many hours of use.

Utilizing microprocessor technology, the UPC5200 and rack-mounted UPC5210 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 calibration models are available.
- Automatic self-check: Computer-controlled internal circuitry provides automatic maintenance of both zero and span calibration data to insure long-term stability and accuracy.
- Digital Display: Eliminates parallax, interpolation and operator judgement errors. Large, bright, red LED. digits provide excellent readability under all lighting conditions (also available with an LCD).
- Using a manually adjustable regulator, the maximum system input pressure is adjusted to any desired value higher (typically 20 to 50%) than the full scale range of the device being tested. By virtue of this technique, the unit under test is fully protected from being inadvertently over-pressurized.
- Portable: These compact, self-contained systems are easily carried and operated by only one person. Total weight is approximately 50 lbs.
- System Calibration: The instruments may be completely calibrated without being removed from the external case. A separate plug-in calibration console (PN 60109) provides access to the computer when calibration is to be performed. No manual alignment or potentiometer adjustments are required.

- Calibration Integrity: Tamper-proof design. Once calibrated, numerous safeguards guarantee the integrity of pressure readings obtained. Display prompting provides the operator with functional status information during both operation and calibration.
- Pressure Source (UPC5200 only): An external supply cylinder with a volume of 83.3 std. cu. ft. of N_2 provides up to 2,216 psig of pressure for calibration and test. This pressure source drives a pneumatically operated 10 to 1 intensifier contained within the UPC5200. Therefore, a 1,000 PSI input is amplified to 10,000 PSI.
- Simple Operation: All controls, indicators and pressure ports are accessible from the front panel. Accompanying operator's manual 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 gauge-under-test or voltage to be displayed. Transducer excitation voltage of 28 VDC is provided standard.
- Safe, Clean Operation: All pressure components are made of stainless steel and proof-tested to at least 150% of maximum operating pressure. In addition, the system contains a high-pressure burst disk to protect both the operator and system components from harm in the event of inadvertent over-pressurization.

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 the sensors with sophisticated microprocessor-based circuitry, an even higher degree of operational accuracy and precision has been accomplished. For example, computer-generated correction curves for both the non-linearity and the hysteresis of the sensors improve these characteristics by an order of magnitude or more. In addition, a self-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.

In addition to the features, the UPC5200/UPC5210 pressure calibrator is easy to use. Two micro-metering valves and vernier are provided to control the internally intensified nitrogen while the digital display indicates precisely the magnitude of the applied test pressure. Also, a simple push-button switch provides zeroing of the pressure display. The *Range* selection, as well as, *Pressure* and *Current* display selections are accomplished via a pair of clearly marked rotary switches. Over-pressure protection is provided through a fully-adjustable pressure regulator, which is manually set for each new device being tested.

With respect to calibration, the instruments have been designed and programmed to provide the operator with various prompting symbols and legends during each phase of the calibration sequence. Also, to prevent unauthorized tampering or calibrations, programming or calibration can only be achieved with the aid of a separate, plug-in calibration console (PN 60109). Also, the electronic circuitry has been designed without any potentiometers or adjustments, eliminating the possibility of unwanted changes. Finally, the computer has been programmed with a series of internal self-diagnostic routines which continually monitor and check every bit of data stored and processed by this system. The computer immediately notes or shuts down operation in the event of an out-of-tolerance reading or any outright failures.

Figure 1-1 provides an overview of the UPC5200/UPC5210's function.

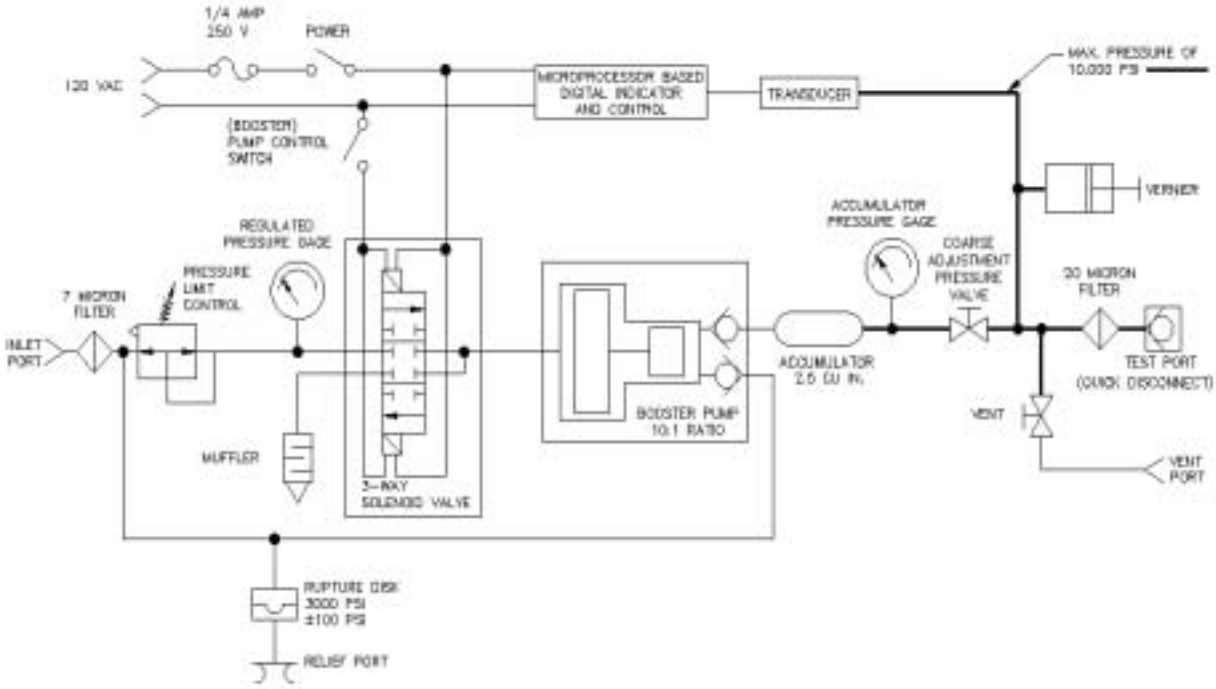


Figure 1-1. UPC5200/UPC5210 Flow Diagram

2.0 Operation

2.1 Pressure Cylinder (PN 59533) Filling Procedure

NOTE: Condec strongly recommends that the external 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.

To initially fill or refill the external pressure cylinder (2,216 PSI max.), proceed as described below.

1. Close the *CYLINDER* valve by rotating clockwise until it stops.
2. Connect the customer supplied fill hose, to a clean regulated nitrogen source, with an output pressure gauge and vent valve.
3. Connect the other end of the customer supplied fill hose to the female CGA-580 brass *CYLINDER* valve fitting.
4. Open the *CYLINDER* valve by rotating counter-clockwise until it stops.
5. Slowly open the valve on the nitrogen source and allow the gas to flow into the pressure cylinder. The customer supplied output pressure gauge indicates the amount of pressure within the internal cylinder.

   NOTE: Cylinder is equipped with a rupture disk.
6. Use the following procedure to fill 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 cylinder to stabilize before using.
7. Close the *CYLINDER* valve by rotating clockwise until it stops.Vent nitrogen source and remove fill hose.

2.2 Initial Setup Procedure

To prepare for actual calibration usage, see Figure 2-1 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). Verify that the REGULATOR (1) is closed (rotate counter-clockwise until it stops).
2. Plug in the power cord (7) and energize the unit by depressing the POWER switch (18). The UPC5200/UPC5210 performs an internal functional self-check. Allow at least 10 minutes warm-up time.
3. Select the desired full scale pressure range via the three-position 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. Set the DISPLAY SELECT switch (16) to the PRESSURE position.
5. Connect the male end of the test hose to the TEST PORT (17) fitting.
6. Connect the swivel fitting end (7/16-20) of the test (output) hose to the device-under-test using adapters if required. Tighten all connections properly.
7. UPC5200: Connect the male end of the input hose (3) to the female CGA-580 brass *CYLINDER* (5) valve fitting.

   UPC5210: Connect the male end of the input hose (3) to the female CGA-580, customer supplied, pressure source.
8. Connect the swivel fitting end (7/16-20) of the input hose (3) to the INPUT PORT (4) fitting. Tighten all connections properly.

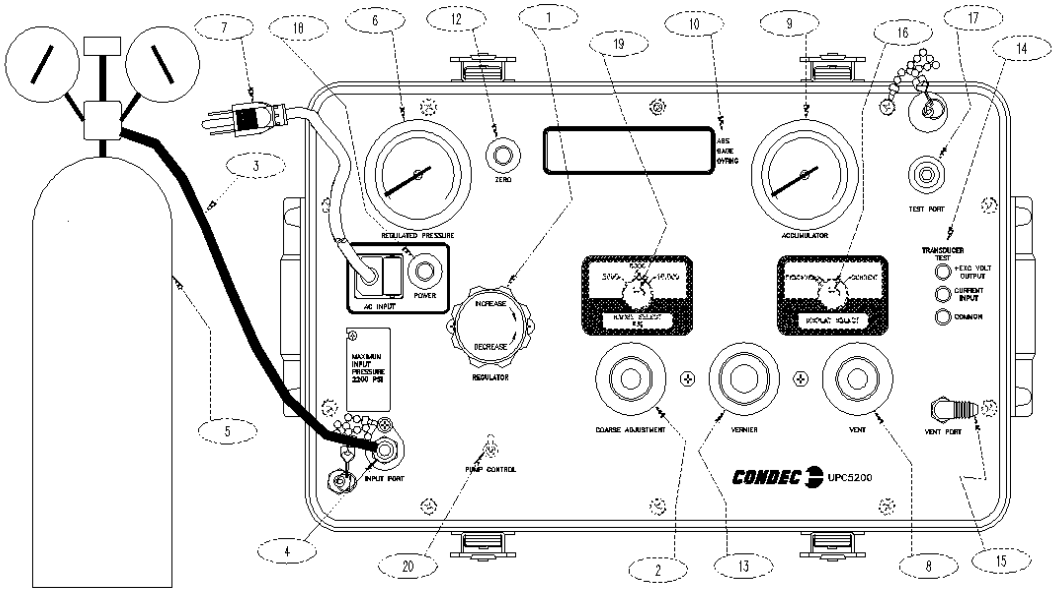


Figure 2-1. Initial Setup Procedure

NOTE: UPC5200 shown, AC Input (7) and Input Port (4) are on back side of UPC5210 Rack Mountable Calibrator.

9. Optional - if the current (4.000 to 20.000 mA) measurement features are to be used, connect the provided Transducer Test Cable (PN 55092) to the Transducer Test Jacks (14).

When connected, this cable provides +28 VDC excitation. The internal impedance (load) is 10 ohms. The display scaling for these current measurements are as follows:

SWITCH POSITION	DISPLAY READING
Current	0-20.000 mA by 0.005 mA

Table 2-1. Display Select Switch (16)

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 2-1 on page 5 (14).

2.3 Pressure Measurement Sequence (Gage Only)

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

1. Note that the indicator on the right end of the display indicates GAGE mode (10).
2. Zero unit by 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 depressing the ZERO switch (12).

   NOTE: If ZERO switch is depressed longer than 5 seconds unit will perform an internal, functional self-check.
3. UPC5200: Open the cylinder valve (5) by rotating counter-clockwise slowly until it stops. UPC5210: Open the, customer supplied, pressure source valve.

4. Using the REGULATOR (1), adjust the maximum intensifier pump input pressure, as read by the REGULATED PRESSURE gauge (6), to 1/10 of the full-scale range of the device-under-test. The unit utilizes an internal intensifier with a 10:1 ratio. As an example, setting regulated pressure to 300 PSI would generate an output pressure of 3,000 PSI. Using this technique, the device under test is fully protected from being accidentally over-pressurized.
5. To generate pressure, enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9). Turn the PUMP CONTROL switch (20) off when 10% more than the target pressure has been achieved.

   NOTE: The intensifier PUMP CONTROL switch (20) can be operated in two modes. The up position is continuous and the down position is momentary/jog.
6. To apply pressure, the *VENT* valve (8) must remain closed. 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 the desired final value.
7. 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. With a little experience, pressure values very close to the desired final value may be quickly achieved.

   NOTE: Use the intensifier PUMP CONTROL switch if the ACCUMULATOR gauge (9) reading falls below required target pressure value.
8. 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.
9. Transducer Current Measurement - the current signal from the transducer may be displayed at any time simply by placing the DISPLAY SELECT switch (16) to its CURRENT position.

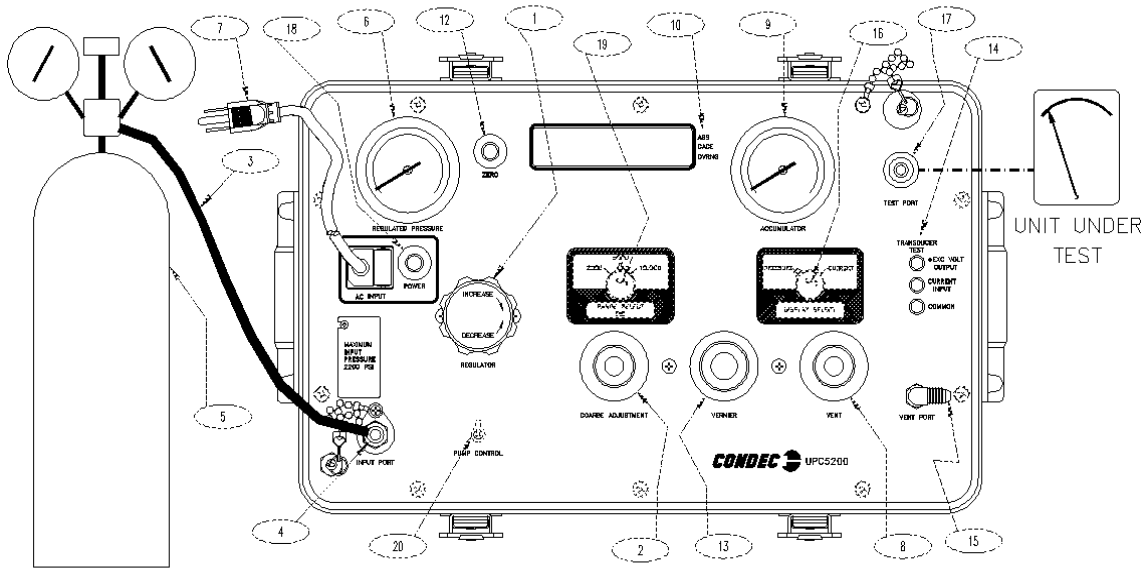


Figure 2-2. Pressure Measurement Sequence (Gage Only)

NOTE: UPC5200 shown, AC Input (7) and Input Port (4) are on back side of UPC5210 Rack Mountable Calibrator.

2.4 Pressure Measurement Sequence (Absolute Only)

NOTE: See Figure 2-3 on page 8, when following these steps.

1. Note that the indicator on the right end of the display indicates ABSOLUTE mode (10).
2. If only pressure measurements greater than barometric are required, continue to step 2.1. If pressure measurements below atmospheric pressure are required go to step 3.

   2.1. UPC5200: Open the cylinder valve (5) by rotating counter-clockwise slowly until it stops. UPC5210: Open the pressure source valve (customer supplied).

2.2. Using the REGULATOR (1), adjust the maximum intensifier pump input pressure, as read by the REGULATED PRESSURE gauge (6), to 1/10 of the full-scale range of the device-under-test. The unit utilizes an internal intensifier with a 10:1 ratio. As an example, setting regulated pressure to 300 PSI would generate an output pressure of 3,000 PSI. Using this technique, the device under test is fully protected from being accidentally over-pressurized.

2.3. To generate pressure, enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9). Turn the PUMP CONTROL switch (20) off when 10% more than the target pressure has been achieved.

2.4. 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 it desired final value.

2.5. 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. With a little experience, pressure values very close to the desired final value may be quickly achieved.

NOTE: Use the intensifier PUMP CONTROL switch if the ACCUMULATOR gauge (9) reading falls below required target pressure value.

2.6. 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.

3. If pressure measurements below atmospheric pressure are required, connect a vacuum pump to the VENT/VACUUM port (15) as shown in Figure 2-3 on page 8.

3.1. Open the VENT valve (8), but the COARSE ADJUSTMENT valve (2) must remain closed. 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 0 PSIA. Press the ZERO button to establish a zero reference on the display.

3.2. With the vacuum pump still running, close the VENT valve (8) and check for system leaks. If there are none, continue to step 3.3.

3.3. Remove the vacuum pump.

3.4. To apply vacuum, COARSE ADJUSTMENT (2) valve must remain closed. Open the VENT valve (8) counter-clockwise slowly until the numerical display begins to move.

3.5. As the pressure approaches the desired value, the VENT valve (8) should be rotated slowly clockwise to its closed position. With a little experience, pressure values very close to the desired final value may be quickly achieved.

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

4. Transducer Current Measurement - the current signal from the transducer may be displayed at any time simply by placing the DISPLAY SELECT switch (16) to its CURRENT position.

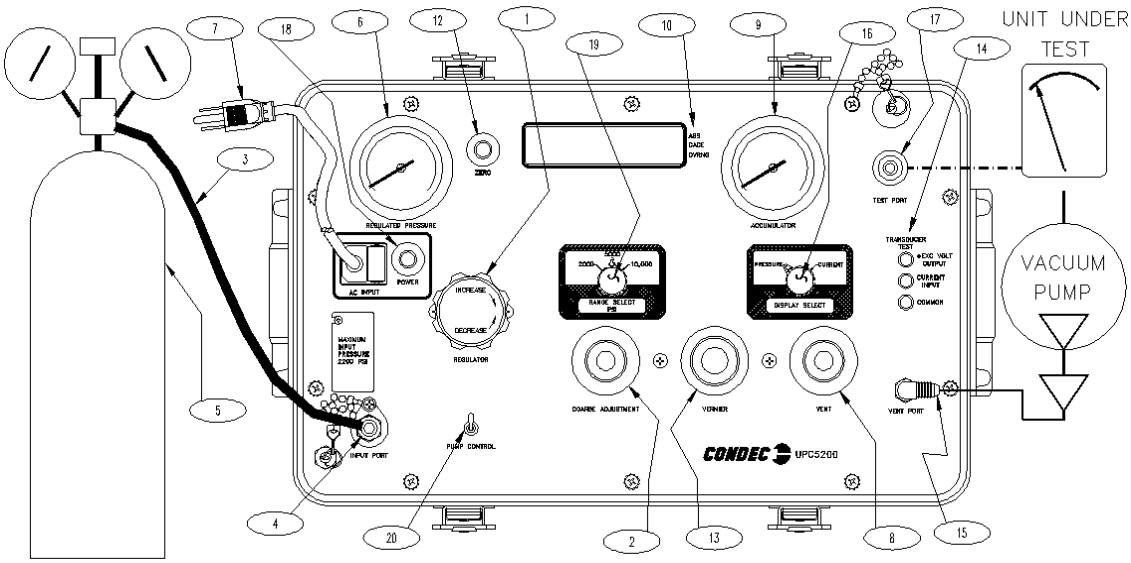


Figure 2-3. Pressure Measurement Sequence (Absolute Only)

NOTE: UPC5200 shown, AC Input (7) and Input Port (4) are on back side of UPC5210 Rack Mountable Calibrator.

3.0 Calibration

Follow the procedure on the following pages for calibrating the UPC5200/UPC5210.

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 10 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 "UPC5200/UPC5210 Return Material Authorization Form" on page 50).*

3.1 Pneumatic Calibration Set-Up

A typical GAGE calibration set-up using a floating piston type dead weight tester is shown in Figure 3-1. While doing an ABSOLUTE only unit calibration, a vacuum pump with a PSIA test standard is 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 UPC5200/UPC5210 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 lower left corner of the panel (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 UPC5200/UPC5210's numerical display is used to provide operator prompting symbols as well as displaying the various data formats employed. For example, in Figure 3-2, the data format shown is obtained as soon as the ZERO/SPAN position of the rotary switch has been selected.

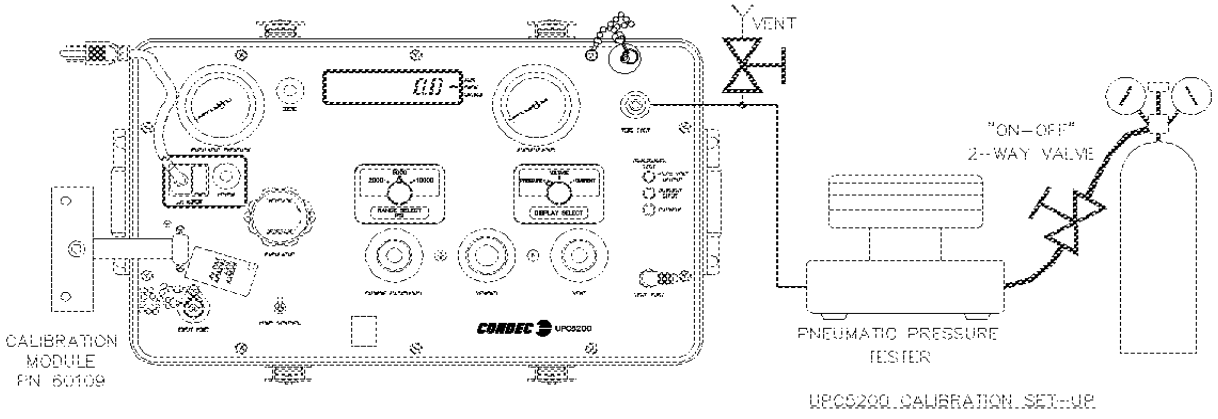


Figure 3-1. Instrument Calibration Set-Up

NOTE: UPC5200 shown, Power (AC Input) and Input Port are on back side of UPC5210 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 test standard to obtain readings below local barometric pressure.

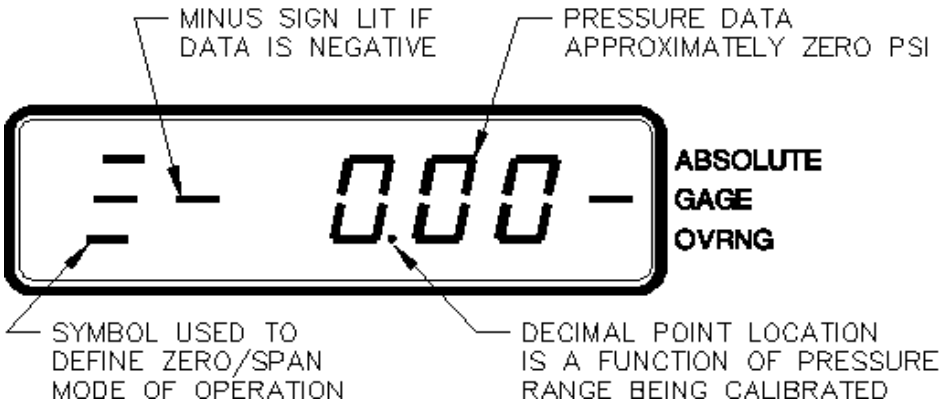


Figure 3-2. Zero/Span Calibration for Gage Only Units

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 Units: Adjust input pressure to the appropriate (either 0 or 100%) value.
   Absolute Only Units: Must use a vacuum pump with PSIA test standard, to reach as close to 0 PSIA as possible (maximum .05 PSIA).
2. Perform the action indicated by Table 3-1 when pressure input readings are stable.

STEP NO.	PRESSURE INPUT VALUE	OPERATOR ACTION REQUIRED	RESULTING DISPLAY INDICATION	REMARKS
1	0% (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 cannot 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 PSIA test standard display reading of 0.05 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 UPC5200/UPC5210 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 test standard must be used to obtain readings below local barometric pressure.

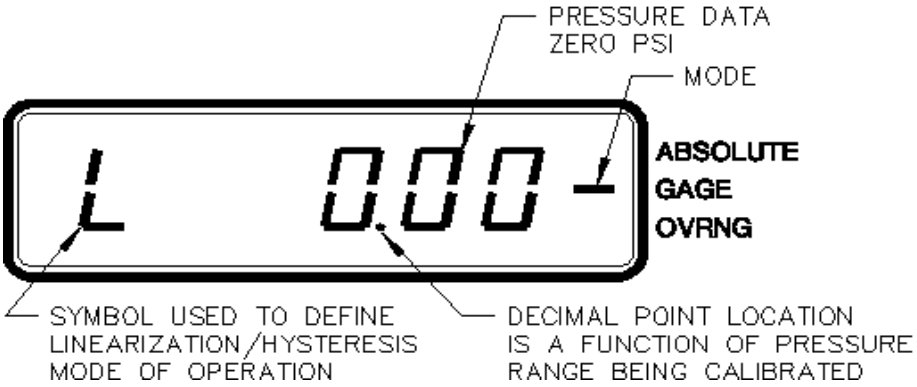


Figure 3-3. Linearity and Hysteresis Calibration

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 by more than 1%, vent unit and repeat steps.
2. Perform the action as indicated when the readings are stable. Should not take longer than 15 minutes. If it takes longer, check system for leaks. If no leaks are found, the CPU or transducer may be defective.

STEP NO.	INPUT PRESSURE % OF RANGE	OPERATOR ACTION REQUIRED	STATUS SYMBOL IN LEFT MOST DIGIT	REMARKS
1	0 (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 (Note 4 below)	No Action Required	L	

Table 3-2. Linearization and Hysteresis Calibration Sequence

When step no. 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 PSIA test standard display reading of 0.05 PSIA.

3.5 Shunt Resistor Calibration

Install the Condec Calibration Module (PN 60109) and select the SHUNT position of the rotary switch on the module. This places the UPC5200/UPC5210 into its SHUNT RESISTOR calibration mode. The display is shown in Figure 3-4.

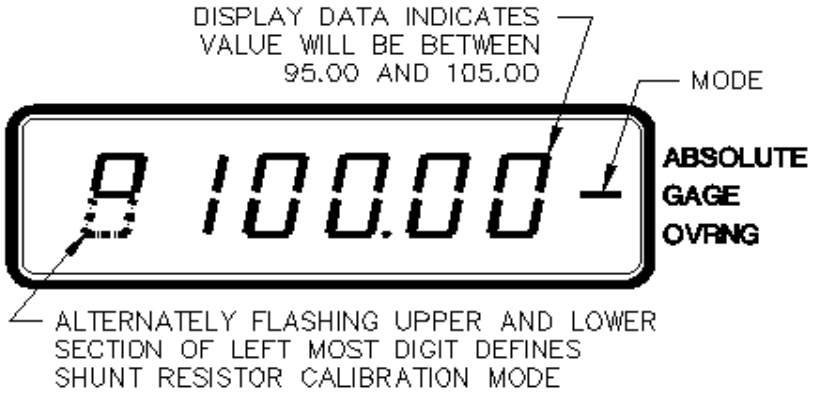


Figure 3-4. Shunt Resistor Calibration

With the UPC5200/UPC5210's highest pressure range selected, perform the four step sequence described below:

1. Gage Only Units: Be sure the input pressure to the UPC5200/UPC5210 is at 0 PSIG.

   NOTE: Absolute Only Units: Must use a vacuum pump with PSIA test standard, to reach as close to 0 PSIA as possible (maximum PSIA test standard display reading of 0.05 PSIA).
2. Press and hold the ZERO button on the Condec Calibration 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 Condec Calibration Module. When accepted, the bottom half of all display digits are momentarily illuminated.

3.6 Current Input Calibration

To calibrate the current input, a current generator capable of generating 20 mA must be connected to the COMMON and CURRENT INPUT jacks, see Figure 2.2 on page 4 (14). The DISPLAY SELECT switch (16) should be on the CURRENT position.

1. Set the Condec Calibration Module (PN 60109) to the ZERO/SPAN position. The display is similar to Figure 3-2 on page 10.
2. Press the ZERO 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 *20.00*.

   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 reads 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.
4. Disconnect the current generator.

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 pushbutton on the module.
3. If the data is accepted, the four-digit number on the right side of the display indicates *1 020* for as long as the STORE button is pressed.

3.8 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 on page 4 (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 be in the CURRENT position. The display reads *20.000*.

3.9 Self-Check Test

1. Remove the Condec Calibration Module.
2. Press the ZERO pushbutton (12) on the UPC5200/UPC5210 until the unit shows *CAL*. The display shows *100* to verify the unit's accuracy, then it returns to the normal mode automatically.
3. The pneumatic portion of the calibration is now complete. The pressure standard and the Condec Calibration Module can now be disconnected.

4.0 Maintenance & Service

This section outlines the mechanical and basic electrical repair procedures for the UPC5200/UPC5210.

4.1 Troubleshooting

Use Table 4-1 below for information on troubleshooting the UPC5200/UPC5210.

Symptom	Problem	Remedy
Display does not light up.	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 does not stay in CAL, display shows "o", display reads a high value @ zero PSIG.	Transducer over-pressurized.	Replace transducer.
Display does not show zero.	Display will not zero.	Perform a ZERO/SPAN calibration.
Display shifts, will not be steady.	Transducer drifts or Possible over pressure.	Replace transducer.
Unit does not cycle when Pump Control switch is on.	Fuse blown on Pump Control Board. No power.	Replace fuse. Check that power is on.
Unit cycles, but does not pressurize.	Debris in check valve seat in intensifier, deformity in seat. No supply pressure.	Remove seats in intensifier and clean and/or replace. Check to see if there is sufficient supply pressure.

Table 4-1. UPC5200/UPC5210 Troubleshooting

4.2 Maintenance & 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.

Caution *Only those persons who are formally trained as skilled technicians should attempt to repair these units. Although some mechanical sub-assemblies could be replaced without venting cylinder it is not recommended. All safety precautions should be observed due to the presence of electrical and high-pressure components. Unit must always be unplugged from power source.*

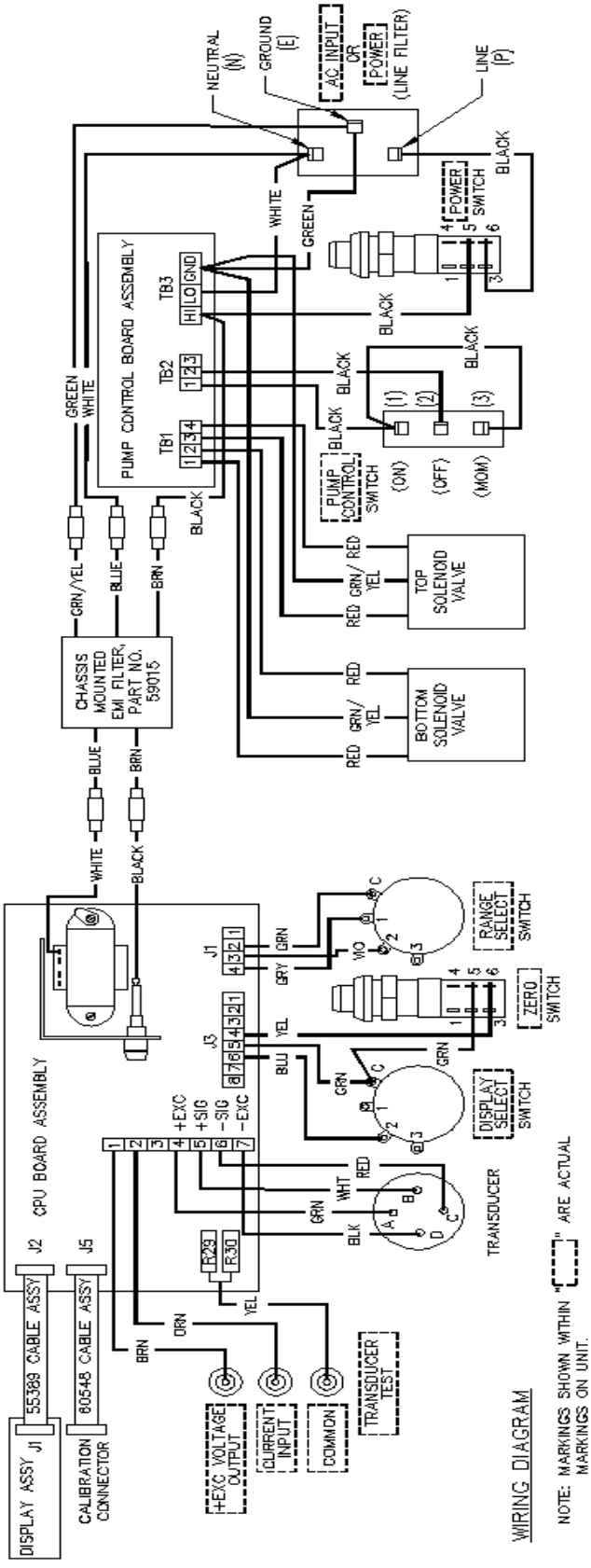


Figure 4-1. UPC5200/UPC5210 Wiring Diagram

4.2.1 Panel/Chassis Removal and Installation

UPC5200 Removal

Tools required: Phillips screwdriver

1. Loosen and remove the 10 screws (PN 14862) that secure the panel assembly to the enclosure.
2. Lift the panel and chassis by first grasping the regulator knob and test port and second, grasping under the panel edges. Tilt the panel at an angle by lifting the right side before the left side as you face the 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 with the accumulator supported by a screwdriver handle.

UPC5200 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. Tilt the panel at an angle by lifting the right side before the left side as you face the panel. Ensure that the wire harnesses do not catch and snag.
3. Align mounting holes and install the 10 screws (PN 14862) that secure the panel assembly to the enclosure.

UPC5210 Removal

Tools required: Phillips screwdriver

1. Loosen and remove the 14 screws (PN 14861) from top, bottom, and sides that secure the panel assembly to the enclosure. Also, loosen and remove the three screws (P/N 14861) from the rear of unit that secure the enclosure to the AC INPUT/INPUT 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 with the accumulator supported by a screwdriver handle.

UPC5210 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 14 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 (P/N 14862) from the rear of unit that will secure the enclosure to the AC INPUT/INPUT PORT panel.

4.2.2 Accumulator, Intensifier & ORION-3A (PN 55287) Removal

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 4-2 on page 34 and Figure 4-2 on page 35 for additional ORION-3A parts information.*

1. Vent the system to atmosphere before attempting to work on the unit. 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 the following tubing sections:

- Accumulator to supply pressure gauge (1/8" dia.)
- Accumulator to pressure inlet on ORION-3A manifold (1/8" dia.)
- Accumulator to intensifier outlet (1/4" dia.)

4. Loosen and remove the six screws that secure the two clamps that hold the intensifier and accumulator.
5. Remove the accumulator by sliding out.
6. Loosen the fitting nut at the intensifier end of the long 1/4" diameter tubing section that connects the solenoid valve to the intensifier. There is no need to remove the tubing.
7. Remove the two clamps and the intensifier.
8. Using a 7/16" wrench, remove the following tubing sections:

- Vent port to ORION-3A manifold vent outlet (1/8" dia.)

9. 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.
10. Break the wire ties that hold the transducer wires so that the wires are free.
11. Using the 11/32" thin wrench, loosen and carefully remove the transducer from the ORION-3A manifold.
12. Remove the panel knobs from the Coarse (pressure), Vernier and Vent valves using the .061" hex wrench.
13. Loosen and remove the two panel screws (PN 60837) from the panel front that secure the manifold to the panel.
14. Remove the five retaining nuts and lock washers that secure the chassis to the panel.
15. Lift the chassis enough to allow the ORION-3A manifold to clear and remove the manifold.
16. Reposition the chassis over the mounting studs and secure with at least two nuts.

4.2.3 ORION-3A Manifold, Valve Seat Removal

Tools required:
A/R solvent (de-natured alcohol)
socket wrench
3/4" socket
needle housing socket (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 4-2 on page 34 and Figure 4-2 on page 35 for additional parts information.

1. Secure the manifold by its center portion, in a bench vise, with the valve knobs pointing upward.
2. Using the .061" hex wrench, loosen and remove the knob inserts (4) from the pressure and vent valve stems.
3. Loosen the 3/4" locknuts (1) on the pressure and vent valve threaded needle housings (10).
4. Using the needle housing socket (65580) and torque wrench, loosen and remove the needle/housing assembly (10, 1).
5. To disassemble the isolation valves (two inner valves), first remove the valve needle (18) by turning the gear clockwise.
6. Loosen and remove the valve housings (19) using the isolation valve housing removal socket (59793) female socket (65581) and torque 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 have to be drilled and a tap used to extract the seat (Steps 10-13).
10. Using the electric hand drill with the No. 43 bit, carefully drill out the seat hole, ensuring that the drill does not touch the hole in the manifold housing directly beneath the seat.

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.

4.2.4 ORION-3A 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 68508)
isolation valve needle housing socket (PN 68509)

NOTE: See Table 4-2 on page 34 and Figure 4-2 on page 35 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 might appear to lock up. If this occurs, rotate the shaft clockwise until the end cap is free to turn.
3. Remove the O-ring (29) from the end cap.
4. Remove the self-sealing screw (36) that acts as the piston key.
5. Extract the piston (15) by partially screwing in the threaded end of the shaft and pulling.
6. Remove the O-ring (32) from the piston groove.
7. To disassemble the end cap/shaft assembly, mount the end cap in the vise.
8. Loosen and remove the locknut (20) using the isolation valve needle housing socket (PN 68509), and socket wrench.
9. Loosen and remove the end bushing (12) using the isolation valve housing socket (PN 68508) and socket wrench. Remove the shaft (14). Remove the ball bearings (41) from both sides of the shaft flange.
10. Use a small pick or screwdriver to remove the O-ring (27) from the inner groove of the end cap (13). Also, remove backup retainer (39) from inner groove of the end cap (13).
11. Wash all parts in solvent and blow dry with compressed air.

4.2.5 ORION-3A 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 68508)
isolation valve needle housing socket (PN 68509)
torque wrench

NOTE: See Table 4-2 on page 34 and Figure 4-2 on page 35 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 inner groove. Also, install backup retainer (39) in inner groove of the end cap (13).
3. Hold shaft (14) vertically with end that goes through end bushing (12) toward ceiling. Place light coating of grease on threads of shaft. Place thick coating of grease on top of shaft bearing surface.
4. Allowing grease to hold ball bearings in place, slide end bushing (12) over top of shaft and down to contact top of ball bearings.
5. Rotate shaft assembly 180˚, placing end bushing towards the floor. Be careful not to displace ball bearings. Place thick coating of grease on shaft and bearing surface. Place sixteen chrome ball bearings (41) on greased surface, allowing grease to hold them in place.
6. Install shaft (14) with bearings (41) into end cap.

7. Install the end bushing (12) and tighten until snug using the isolation valve needle housing socket (PN 68508) and socket wrench.
8. Tighten so that shaft rotates, but should be firm. Feel vertical motion of shaft (14). If motion exists, retighten end bushing.
9. Install the locknut (20) into end cap (13) and using the isolation valve needle housing socket (PN 68509) and torque wrench. Torque to approximately 325 in/lbs. (may not get to torque on all sub-assemblies).
10. 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.
11. Install the self-sealing screw (36) and tighten until snug.
12. Apply a thin coat of fluorinated Krytox grease and install the O-ring (29) and backup washer (38) on the end cap/shaft assembly, install into manifold and tighten until snug.

4.2.6 ORION-3A 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 (.050")
hex wrench (.061")
torque wrench
socket wrench
3/4" socket
needle housing socket (PN 65580)
isolation valve needle housing socket (PN 68509)
female socket (PN 65581)

NOTE: See Table 4-2 on page 34 and Figure 4-2 on page 35 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) and torque wrench.
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 needle 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.

4.2.7 Accumulator, Intensifier and ORION-3A Manifold, Panel Installation

NOTE: See Figure 2-1 on page 5, for the items listed in parenthesis.

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, if not already done, remove the five retaining nuts and lock washers that secure the chassis to the panel. Lift up the chassis enough so that the ORION-3A 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 five nuts and lock washers (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 perform a valve adjustment, follow the procedure in Section 4.2.8 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 per the following:

(+ Excitation)	*TB1-4*	*Green wire*	*(- Signal)*	*TB1-6*	*Red wire*
(+ Signal)	*TB1-5*	*White wire*	*(- Excitation)*	*TB1-7*	*Black wire*
7. Using a 7/16" wrench, install the following tubing section that goes from vent port to ORION-3A manifold vent outlet (1/8" dia.)
8. Replace the intensifier and the two clamps.
9. Realign and tighten the fitting nut at the intensifier end of the long 1/4" diameter tubing section that connects the solenoid valve to the intensifier.
10. Replace the accumulator by sliding in thru the clamps.
11. Thread and tighten the six screws that secure the two clamps that hold the intensifier and accumulator.
12. Using a 7/16" wrench, realign and tighten the following tubing sections:

- accumulator to intensifier outlet (1/4" dia.)
- accumulator to pressure inlet on ORION-3A manifold (1/8" dia.)
- accumulator to supply pressure gauge (1/8" dia.)

13. Using a pressure source connected to the input port (4) set input pressure to 100 PSI. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9). Turn the PUMP CONTROL switch (20) off when 1,000 PSI has been achieved. Check all fittings for leaks. If there are no leaks vent system and remove pressure source.

    NOTE: See Section 2.2 on page 4 for pressure source connection procedure.
14. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.8 ORION-3A Manifold, Valve Adjustment Procedure

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

NOTE: See Table 4-2 on page 34 and Figure 4-2 on page 35 for additional parts information (denotes reference to Figure 2-1 on page 5).*

1. If not already done, remove the ORION-3A COARSE and VENT valve knobs (3) using the .061" hex wrench.

2. Energize the unit and let warm up. Turn RANGE SELECT switch to 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 closed position).
6. Rotate gears on both ISOLATION valves (two inner valves), counter-clockwise until they stop, then rotate clockwise 1/2 turn (opening isolation valves).
7. With a pressure source connected to the INPUT PORT (*4). Use the REGULATOR (*1), to increase the regulated pressure (monitor REGULATED PRESSURE gauge) to 1/10 of Full Scale. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (*9). Turn the PUMP CONTROL switch (20) off when 80% to 100% of Full Scale has been achieved.
8. Open the VENT valve (*8) to atmosphere, 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 tightening coarse valve knob. Doing so may damage seat.
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.
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 a pressure source connected to the INPUT PORT (*4). Use the REGULATOR (*1), to increase the regulated pressure to 1/10 of full scale. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (*9). Turn the PUMP CONTROL switch (20) off when 80% to 100% of Full Scale has been achieved. 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.

4.2.9 Accumulator Assembly, O-ring (PN 58051) Replacement, Filter (PN 56993) Cleaning

Tools required:
Phillips screwdriver
5/8" open end wrench
adjustable wrench
A/R 1/4" wide teflon tape, (PN's 60575)
tube fluorinated Krytox grease (PN 55593)
A/R solvent (de-natured alcohol)

Disassembly:

1. Remove accumulator assembly from UPC5200/UPC5210 per Section 4.2.2 on page 16.
2. Place accumulator body in vise, using flats.
3. Remove plug adapter fitting (PN 57134) using adjustable wrench.

4. Remove O-ring (PN 58051) and back-up ring (PN 59735).
5. Remove accumulator body from vise and place adapter fitting in vise, using flats, threads facing upwards.
6. Remove filter retainer fitting (PN 57811) using wrench.
7. Remove plug adapter fitting from vise, turn up side down, and remove filter.
8. Clean the filter (PN 56993) in solvent (de-natured alcohol) and blow-dry with compressed air.

Assembly:

1. Place filter (PN 56993) into filter retainer fitting (PN 57811).
2. Finger tighten filter retainer fitting into plug adapter fitting (PN 57134).
3. Place plug adapter fitting (PN 57134) in a vise and tighten filter retainer fitting.
4. Grease O-ring/back-up ring groove on plug adapter fitting.
5. Grease both sides of O-ring (PN 58051) and back-up ring (PN 59735). Then install backup ring onto plug adapter fitting, followed by O-ring.

   NOTE: *Use pointed bent pick when installing O-ring to Prevent damage. Verify Backup ring split is properly aligned.*

6. Place accumulator body in vise using flats. Grease accumulator body in O-ring seat area, then slowly thread plug adapter fitting using an adjustable wrench into accumulator body.

   NOTE: *To help seat back-up ring hand tighten plug adapter fitting close to bottoming, then wrap an 8" piece of 22 AWG, solid buss wire around the edge of back-up ring within gap between accumulator body and plug adapter fitting. Pull buss wire ends to squeeze back-up ring into proper position within accumulator body. Verify backup ring split is properly aligned.*

7. Tighten plug adapter fitting.
8. Install accumulator assembly into UPC5200/UPC5210 per Section 4.2.7 on page 20.

4.2.10 Intensifier Assembly, O-rings/Seals Replacement

NOTE: *See Table 4-2 on page 34 and Figure 4-2 on page 35 for additional parts information.*

Tools required:
Phillips screwdriver
5/8" open end wrench
1/4” hex key
3/16” hex key
3/8” hex key
adjustable wrench
check valve seat tool (PN 70711)
fitting holder tool (PN 70710)
tapered packing retainer tool (PN 70712)
check valve fitting tool (PN 70709)
A/R 1/4" wide teflon tape, (PN's 60575)
tube fluorinated Krytox grease (PN 55593)
Oil lubricant, (PN 60944)
A/R solvent (de-natured alcohol)

Disassembly Rings and Seals:

1. Remove intensifier assembly from UPC5200/UPC5210 per Section 4.2.2 on page 16.
2. Remove the 10 cap screws (1) and washers (2) from the end cap which has the single elbow fitting (23).
3. Remove the end cap (3) and O-ring (4).
4. Remove the piston (18).
5. Remove the small piston retainer (24) and 3 piston rings (22).
6. Remove the large piston O-ring (21) and 2 packings (20).

Disassembly of Check Valves:

1. Remove inlet check valve fitting (12) and outlet (16) ports.
2. For the outlet valve, remove, in order, the spring housing (8), spring (9), poppet (10) and seat (11).
3. For the inlet valve remove, in order, the seat (15), poppet (10) and spring (9).

Reassembly of Check Valves:

NOTES:

- *Clean all parts with solvent and use shop air hose to remove any dust particles from all mechanical parts, except screws and washers. Wipe the bores of the intensifier housing with a clean cloth before installing the piston. Replace all damaged parts with new ones.*
- *For ease of assembly and to prevent damage to parts it is recommended to use the following tools during assembly:*
    - *check valve seat tool (PN 70711)*
    - *fitting holder tool (PN 70710)*
    - *tapered packing retainer tool (PN 70712),*
    - *check valve fitting tool (PN 70709)*

For the outlet valve:

1. Assemble spring (9) and check valve (10) into spring housing (8).
    1.1. Press check valve seat (11) into spring housing (8), using large diameter end of check valve seat tool (PN 70711). Be sure check valve seat (11) is seated. Coat grease in bottom groove marks, in hole of end cap (19) where fitting item (16) goes.

    NOTE: The larger of the 2 seats belongs to the outlet check valve. Very important not to get grease in counter-sunk hole located at center of groove marks.

    1.2. Place grease on bottom of items (11/8) sub-assembly.

    NOTE: Very important not to get grease on item 10.

    1.3. Slide (11/8) sub-assembly into end cap (19), until properly seated on bottom. Thread high pressure tube fitting (16) into end cap (19) and tighten using a 5/8" wrench.
2. For the inlet valve, perform the following steps:
    2.1. Thread AN side of inlet check valve fitting (12) into fitting holder tool (PN 70710).
    2.2. Place a small amount of grease (PN 55593) on inlet check valve fitting (12) between groove area and top of fitting to enable ease of installation of packing retainer (13).
    2.3. Place tapered Packing Retainer Tool (PN 70712), stepped part, into hole in packing retainer (13). Place Grease on sides of tool.
    2.4. Slide packing retainer (13) onto packing retainer tool (PN 70712) and down into groove of inlet check valve fitting (12).
    2.5. Remove packing retainer tool (PN 70712) and wipe the grease from tool.
    2.6. Grease both sides of O-ring (14) and install into groove on inlet check valve fitting (12).
    2.7. Use stepped part of packing retainer tool (PN 70712) on check valve seat (15) to install into recessed end of inlet check valve fitting (12). Check valve seat (15) must seat flat. If needed, tap tool very lightly to seat, but make sure no damage occurs to inlet check valve fitting (12).
    2.8. Tap round dowel (25) into hole on threaded shaft of piston ring retainer (24). Leave extra material protruding from both sides of shaft. Trim round dowel (25), using cutters, to top of threads on both sides. Thread piston ring retainer (24) into piston (18), two or three turns, to form threads on round dowel (25). Remove piston ring retainer (24) from piston (18).
    2.9. Grease inside wall of end cap (19) where inlet check valve fitting (12), sub-assembly, O-ring & backup ring will touch.
    2.10. Place spring (9) and check valve (10) into end cap (19).
    2.11. Thread "AN" side of inlet check valve fitting (12), sub-assembly into Fitting Holder Tool (PN 70710). Now place sub-assembly into Check Valve Fitting Tool (PN 70709), such that, flat side of item (15) goes through beveled side of tool.
    2.12. Slide item (12) back and forth in tool a few time to align O-ring and backup ring. Remove sub-assembly from check valve fitting tool (PN 70709) and unthread from fitting holder tool (PN 70710). Thread item (12) sub-assembly into end cap (19), where spring (9) and check valve (10) were previously installed. Tighten using a 5/8" wrench.

Reassembly of Rings and Seals:

NOTE: Clean all parts with solvent and use shop air hose to remove any dust particles from all mechanical parts, except screws and washers. Wipe the bores of the intensifier housing with a clean cloth before installing the piston. Replace all damaged parts with new ones.

1. Smear a medium amount of grease in O-ring cavity on piston (18). Grease both sides of the two backup rings (20) and O-ring (21). Install into groove on piston (18).

   NOTE: Split of each backup ring, item 84, must be 180^{o} from each other and ends overlapping properly.

2. Lightly coat edges of backup rings (20) and O-ring (21) with oil lubricant (PN 60944).
3. Lightly coat both inside diameters of housing (17).
4. Place grease on piston ring retainer (24) where piston rings (22) seat.
5. Place grease on both sides of the three piston rings (22) and install the three piston rings (beveled sides aligned) onto piston ring retainer (24).
6. Slide piston (18) into housing (17), being careful not to damage wall areas. Slide until smaller diameter of piston (18) is exposed from side of housing (17).
7. Thread item (24), with the three piston rings (22) into piston (18) approximately four turns.
8. Stand housing (17) on end, with piston ring retainer (24) facing upward. Push piston ring retainer (24) to verify it will go into housing (17) fully. Top of piston ring retainer (24) must be slightly below surface of housing (17).
9. Place housing (17) on its side. Place 3/16" hex key in item (24) and 1/4" hex key in piston (18). Rotate 1/4" hex key to tighten.
10. Remove the 3/16" hex key and verify piston (18) will rotate. If piston rotates remove 1/4" hex key. If it doesn’t rotate, loosen piston slightly.
11. Grease both sides of O-ring (4), and end cap (3) O-ring groove. Then install O-ring (4) into groove of end cap (3).
12. Place housing (17) sub-assembly with large I.D. upward and install end cap (3) into housing (17).
13. Place cap screw (1) through washer (2) and thread finger tight into end cap (3). Repeat for the other nine cap screws.
14. Use torque wrench and 1/4" hex key socket to torque each bolt to 325 in/lbs.

    NOTE: Torque cap screws in a side to side pattern, (do not use a circular pattern), and in small increments to insure end cap, item 67 is seated flat to Housing surface.

15. If previously removed, place 1/4" Teflon tape, two turns, on 90^{o} NPT elbow (23). Thread and tighten 90^{o} NPT elbow (23) into end cap (3). Align so that 90^{o} NPT elbow (23) is parallel with the small hole located on the side of housing (17).
16. Grease both sides of O-ring (7) and O-ring seat area on end cap (19). Install O-ring (7) onto end cap (19) and in turn place onto housing (17). Orient such that the small hole located on housing side is on your left at the "9 o’clock" position. The inlet check valve fitting (12) placement hole located on end cap (19) must be at the 6 o’clock position.
17. Place Cap Screw (5), thru Washer (6), end cap (19) and thread finger tight into housing (17). Repeat for the other nine cap screws. Use torque wrench and 3/8” hex key socket to torque each bolt to 325 in/lbs.

    NOTE: Torque cap screws in a side to side pattern (do not use a circular pattern) and in small increments to ensure end cap (item 83) is seated flat to housing surface.

18. Install intensifier assembly into UPC5200/UPC5210 per Section 4.2.7 on page 20.

4.2.11 Regulator (Standard Pneumatic) and Solenoid Removal

Solenoid 120 VAC input - PN 56851, Solenoid 220 VAC input - PN 54366

Tools required: Phillips screwdriver
7/16" open end wrench
9/16" open end wrench
A/R 1/4" wide teflon tape, (PN's 60575)
A/R 1/2" wide teflon tape, (PN's 60911)
1/2" socket
socket wrench
1/4" hex wrench

NOTE: See Figure 4-4 on page 37.

1. Vent any remaining gas from the system 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 16, and carefully place on a bench top.
3. Remove regulator knob cap and 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. **(UPC5210 Only)** Loosen tube nut on INPUT PORT fitting. Remove the two screws and POWER/INPUT PORT panel.
6. Remove all tubing sections that connect to the regulator/solenoid assembly.
7. Loosen the mounting collar in the panel rear using a 1/4" hex wrench.
8. Remove the regulator/solenoid assembly by sliding out from the panel rear.
9. Mount the regulator in a bench vise by the flats in the base.
10. Note the orientation of the solenoids, as well as the inlet and outlet fittings in the regulator. Remove the fittings and any remnants of teflon tape from the pipe threads.

4.2.12 Regulator (Standard Pneumatic) and Solenoid Installation

Solenoid 120 VAC input - PN 56851, Solenoid 220 VAC input - PN 54366

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

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, as well as, solenoids are oriented properly. Use a bench vise when doing this.
2. Insert the new regulator/solenoid assembly into the panel through hole. Pass the adjusting end through the mounting ring. Do not tighten cap screw until adjusting knob is installed.
3. Install the tubing sections to the inlet and outlet fittings.

   (UPC5210 only) Replace the POWER/INPUT PORT panel and 2 mounting screws. Thread and tighten tube nut on INPUT PORT fitting.
4. 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.
5. Using a pressure source connected to the input port (4) set regulated pressure to 100 PSI. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9). Turn the PUMP CONTROL switch (20) off when 1,000 PSI has been achieved. Check all fittings for leaks. If there are no leaks vent system and remove pressure source.
6. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.13 Regulator (Tescom) and Solenoid Removal

Solenoid 120 VAC input - PN 56851, Solenoid 220 VAC input - PN 54366

Tools required:
- Phillips screwdriver
- 7/16" open end wrench
- 9/16" open end wrench
- A/R 1/4" wide teflon tape, (PN's 60575)
- A/R 1/2" wide teflon tape, (PN's 60911)
- 1/2" socket
- socket wrench
- 1/4" hex wrench
- flat blade screwdriver (small)
- channel locks

NOTE: See Figure 4-4 on page 37.

1. Vent any remaining gas from the system 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 16, and carefully place on a bench top.
3. Remove regulator knob cap by prying off with small screwdriver.
4. Loosen and remove the locknut using a 1/2" socket while holding the knob. Remove the knob by turning counter-clockwise.

   (UPC5210 only) Loosen tube nut on INPUT PORT fitting. Remove the 2 screws and POWER/INPUT PORT panel.
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/solenoid assembly 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 solenoids, as well as the inlet and outlet fittings in the regulator. Remove the fittings and any remnants of teflon tape from the pipe threads.

4.2.14 Regulator (Tescom) and Solenoid Installation

Solenoid 120 VAC input - PN 56851, Solenoid 220 VAC input - PN 54366

Tools required:
- Phillips screwdriver
- 7/16" open end wrench
- 9/16" open end wrench
- 1/2" socket
- socket wrench
- torque 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 Table 4-4 on page 37. 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/solenoid assembly 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.

   (UPC5210 only) Replace the POWER/INPUT PORT panel and two mounting screws. Thread and tighten tube nut on INPUT PORT fitting.
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 REGULATOR, by turning regulator knob counter-clockwise.
6. Using a pressure source connected to the INPUT PORT (4) set regulated pressure to 100 PSI. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9).

Turn the PUMP CONTROL switch (20) off when 1,000 PSI has been achieved. Check all fittings for leaks. If there are no leaks vent system and remove pressure source.

7. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.
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. Using a pressure source connected to the INPUT PORT (4), turn the REGULATOR knob clockwise until reaching between .5% to 1% of full scale, but not enough to disturb pressure relief valve.

    NOTE: If pressure cannot be attained loosen locknut on shaft, rotate knob a few turns counter-clockwise, and retighten locknut. If you hear the pressure relief valve open, 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 REGULATOR completely, by turning REGULATOR knob clockwise. If you reach between 10-11% 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 and Installation

- Regulated pressure gauge (PN 59745), 0–600 PSIG
- Regulated pressure gauge (PN 59751), 0–1,500 PSIG
- Accumulator gauge (PN 59749), 0–6,000 PSIG
- Accumulator gauge (PN 59696), 0–15,000 PSIG

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)

Panel Gauge Removal

1. Vent any remaining gas from the system 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 16, 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 tube connector fitting from the gauge.
6. Remove the two thumb-nuts, the mounting U-clamp, and the gauge.

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)

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 onto the gauge.
4. Attach the tubing section that connects to the gauge fitting.
5. Using a pressure source connected to the INPUT PORT (4) set regulated pressure to 100 PSI. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9). Turn the PUMP CONTROL switch (20) off when 1,000 PSI has been achieved. Check all fittings for leaks. If there are no leaks vent system and remove pressure source.
6. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.16 Test Port Quick-Connect Fitting (PN 59004) and Filter (PN 54188), Removal and Installation

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

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

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

Tools required:
Phillips screwdriver
11/16" open end wrench
adjustable wrench
9/16" open end wrench
A/R solvent (de-natured alcohol)
A/R 1/4" wide Teflon tape (PN 60575)
A/R 1/2" wide Teflon tape (PN 60911)
tube fluorinated grease (PN 55593)
snoop, liquid leak gas detector (PN 64781)

1. Vent any remaining gas from the system 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 16, and carefully set on a bench top.
3. Loosen and remove the tubing end nut from the reducing tube fitting (PN 59830).

   NOTE: Use PN 54047 for reducing tube fitting field replacement.
4. Loosen and remove the reducing tube fitting and filter (PN 54188) from the test port quick-connect fitting.
5. Clean the filter (PN 54188) in solvent (de-natured alcohol) and blow-dry with compressed air.
6. Grasp the test port quick-connect fitting on the flats from the rear of panel with a 11/16" wrench and using an adjustable wrench, turn the locknut counter-clockwise. Remove locknut.
7. Remove old and install new test port quick-connect fitting (PN 59004) through front of panel.
8. Thread and tighten locknut by grasping the test port quick-connect fitting on the flats from the rear of panel with a 11/16" wrench and using an adjustable wrench, turn the locknut clockwise.
9. Slide filter (PN 59764) into reducing tube fitting and install into the test port quick-connect fitting.
10. Replace and tighten the tubing end nut on the reducing tube fitting.
11. Using a pressure source connected to the INPUT PORT (4) set regulated pressure to 100 PSI. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9). Turn the PUMP CONTROL switch (20) off when 1000 PSI has been achieved. Check all fittings for leaks. If there are no leaks vent system and remove pressure source.
12. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.17 Test Port (output) Hose Quick-Connect Fitting and Filter (PN 56991), Removal and Installation

Tools required:
5/8" open end wrench
3/4" open end wrench
13/16" open end wrench
A/R solvent (de-natured alcohol)
tube fluorinated grease (PN 55593)

Removal:

1. Loosen and unthread quick-connect fitting assembly from test port hose using 3/4" and 5/8" wrenches.
2. Remove cheat seal pad (PN 54854) from AN thread side of adapter fitting (PN 60803)
3. Place quick-connect fitting assembly in a vise using filter fitting (PN 59588) as clamping area.
4. Loosen and unthread quick-connect fitting (PN 59034) using 13/16" wrench.
5. Remove filter fitting (PN 59588) from vise.
6. While holding filter fitting (PN 59588) vertically, remove filter (PN 56991) and then O-ring (PN 55608) from filter fitting.
7. Inspect and clean parts in solvent (de-natured alcohol) and blow-dry with compressed air. Replace worn or damaged parts with new ones.

Installation:

1. Grease inside cavity on bottom flat (none allowed in hole) of quick-connect fitting (PN 59034).
2. Grease O-ring seat groove area in filter fitting (PN 59588).
3. Grease both sides of O-ring (PN 55608). While holding filter fitting (PN 59588) vertically, place O-ring (PN 55608) and then filter (PN 56991) into filter fitting (PN 59588).
4. Thread quick-connect fitting (PN 59034) onto filter fitting (PN 59588).
5. Place filter fitting (PN 59588) in a vise and tighten quick-connect fitting (PN 59034) using 13/16" wrench.
6. Remove from vise.
7. Place a cheat seal pad, cheat seal pad (PN 54854) on AN part of assembly and thread into test port (output) hose. Tighten assembly using 5/8" and 3/4" wrenches.

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

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

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

Input Port Filter Removal

1. Vent any remaining gas from the system 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 16, and carefully place on a bench top.
3. Loosen and remove the tubing end nut from the tube union (PN 59886).
4. Loosen and remove the tubing end nut from the input port bulkhead AN fitting (PN 59707).
5. Remove the the tube union (PN 59886), port connector (PN 59746) and filter from the bulkhead AN fitting (PN 59707).

   NOTE: Use PN 55705 for port connector field replacement.
6. Clean the filter (PN 54188) in solvent (de-natured alcohol) and blow-dry with compressed air.

Input Port Filter Installation

1. To reinstall, reverse the order of steps 3, 4 and 5 of the "Input Port Filter Removal" procedure above.
2. Using a pressure source connected to the INPUT PORT (4) set regulated pressure to 100 PSI. Enable the PUMP CONTROL switch (20) and monitor the pressure as it builds in the ACCUMULATOR gauge (9). Turn the PUMP CONTROL switch (20) off when 1,000 PSI has been achieved. Check all fittings for leaks. If there are no leaks vent system and remove pressure source.
3. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.19 Input Port Hose Quick-Disconnect Female Fitting, Removal and Installation

Tools required: 3/4" open end wrench
9/16" open end wrench
A/R solvent (de-natured alcohol)
A/R 1/2" wide Teflon tape (PN 60911)

Removal:

1. Loosen and unthread quick-disconnect fitting from input hose using 3/4" and 9/16” wrenches.
2. Remove cheat seal pad (PN 54854) from “AN” thread side of adapter fitting (PN 60803) and place CGA-580 nipple (PN 57150) pressure fitting in vise, holding by flats located on nipple.
3. Loosen and unthread adapter fitting (PN 60803) from CGA-580 nipple (PN 57150) pressure fitting using a 3/4" wrench.
4. Remove CGA-580 nut (PN 57154) by sliding over threads of CGA-580 nipple (PN 57150) pressure fitting.
5. Remove remnants of teflon tape from fittings.

6. Inspect and clean parts in solvent (de-natured alcohol) and blow-dry with compressed air. Replace worn or damaged parts with new ones.

Installation:

1. Wrap two turns of 1/2" Teflon Tape around threads of CGA-580 Nipple (PN 57150) pressure fitting.
2. Hold CGA-580 nipple (PN 57150) pressure fitting in vise by flats located on nipple.
3. Slide CGA-580 nut (PN 57154) over threads of CGA-580 nipple (PN 57150) pressure fitting.
4. Thread and tighten adapter fitting (PN 60803) onto CGA-580 nipple (PN 57150) pressure fitting using a 3/4" wrench.
5. Remove assembly from vise and install a cheat seal pad (PN 54854) on AN thread side of adapter fitting (PN 60803).
6. Thread into input hose and tighten using 3/4" and 9/16" wrenches.

4.2.20 AC Fuse (PN 57472), Removal and Installation

1. Disconnect the power cord from the power source and line filter. Remove the Fuse holder at POWER.
2. Inspect fuse, if blown replace with 1/2 Amp 250 Volt, 20mm x 5mm diameter (PN 57472).
3. Replace the Fuse holder at POWER location.

4.2.21 Panel Mounted AC Power/EMI Line Filter (PN 58870), Removal and Installation

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

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Section 4.2.1 on page 16, and carefully set on a bench top.
2. Remove the 3 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 Chassis Mounted EMI Line Filter (PN 59015), Removal and Installation

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

1. Disconnect the power cord from the power source and line filter. Remove front panel from its enclosure as described in Section 4.2.1 on page 16, and carefully set on a bench top.
2. Remove the five cable connectors from the line filter terminals.
3. Loosen and remove the line filter retaining nuts on the side of chassis.
4. Remove the line filter.
5. To install a new line filter, reverse the order of steps 1 through 4.

   Connect wires to the two wire side of new line filter as follows:

   Blue wire to CPU White wire
   Brown wire to CPU Black wire

Connect wires to the three wire side of new line filter as follows:

Green/Yellow wire to AC INPUT Green wire from terminal (E) Ground
Blue wire to AC INPUT White wire from terminal (N) Neutral
Brown wire to pump control board, black wire from TB3 terminal HI

NOTE: *Some units may have POWER marking in place of AC INPUT on panel.*

4.2.23 Pump Control Switch (PN 60307), Removal and Installation

Tools required:
Phillips screwdriver
Flat 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 Section 4.2.1 on page 16, and carefully set on a bench top.
2. Remove the two black wires from pump control board TB2 terminals 1 and 2.
3. Loosen and remove the nut on the panel front and remove the switch from the panel rear..
4. Unsolder and remove the three 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:

	Terminal	Function
Rear of Switch	1	On
	2	Off
	3	Momentary

Black wire to switch terminal 1
Black wire to switch terminal 2
Black jumper wire between switch terminals 1 & 3

2. Install the new switch through the rear of panel. Rotate switch so that the momentary position is toward bottom of panel and secure it from the front of panel with the mounting nut.
3. Replace the two black wires to the pump control board TB2. Connect terminal 1 of switch to terminal 1 of TB2, and terminal 2 of switch to terminal 2 of TB2.
4. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.24 Power Switch (PN 58878), Removal and Installation

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 Section 4.2.1 on page 16, 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:

Terminal	Color
Normally open	Black
(C) common	Black

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, damage may occur to switch.
4. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.25 Range Select Switch (PN 55924) and Display Select Switch (PN 55933), 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 Section 4.2.1 on page 16, 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.

   NOTE: Intensifier and Accumulator will need to be removed prior to switch removal.
4. Unsolder and remove the wires from the switch terminals.

Installation:

1. Connect and solder the wires onto their respective switch terminals:

Range Select:	Terminal	Color
	1	Grey
	2	Violet
	(C) common	Green

Display Select:	Terminal	Color
	2	Blue
	(C) common	Green
	(C) common	Green

2. Install the switch through the panel rear, align with front panel markings, and secure with its mounting nut.
3. Install the switch knob using a .061" hex wrench.
4. Replace tubing and components as necessary.
5. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.26 Zero Switch (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 16, 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.
5. Unsolder and remove the wires from the switch terminals.

Installation:

1. Connect and solder the wires onto their respective switch terminals:

Zero:	Terminal	Color
	Normally open	Yellow
	(C) common	Green

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 16.

4.2.27 CPU Assembly, Removal and Installation

120 VAC input - PN 54254, 220 VAC input - PN 54268

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

Removal of CPU 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 16, and carefully set on a bench top.
2. Disconnect and/or unsolder the wire connections attached to the CPU board assembly.
   NOTE: It may be helpful to mark ends of wire with location. Also refer to the wiring diagram Figure 4-1 on page 15.
3. Loosen and remove the five screws and two cable clamps (PN 59480) that hold the CPU board assembly and remove the board.

Installation of Power Supply Board:

1. Position the new board over the five standoffs and install five screws and two cable clamps. Tighten the screws until snug.
2. Connect and/or solder the wire connections attached to the CPU board assembly.
   NOTE: Refer to the wiring diagram Figure 4-1 on page 15.
3. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.2.28 Pump Control Board Assembly, Removal and Installation

120 VAC input - PN 56679, 220 VAC input - PN 56682

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

Removal of Pump Control 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 16, and carefully set on a bench top.
2. Disconnect the wires from the terminal blocks located on the pump control board assembly.
   NOTE: It may be helpful to mark ends of wire with location. Also refer to the wiring diagram Figure 4-1 on page 15.
3. Loosen and remove the four nuts that hold the pump control 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. Connect the wires to the terminal blocks located on the pump control board assembly (see Figure 4-1 on page 15.
3. Install panel/chassis assembly in its enclosure as described in Section 4.2.1 on page 16.

4.3 ORION-3A Valve Assembly (55287) Parts List

The following table lists the component parts of the ORION-3A.

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

Table 4-2. ORION-3A Valve Assembly Parts List

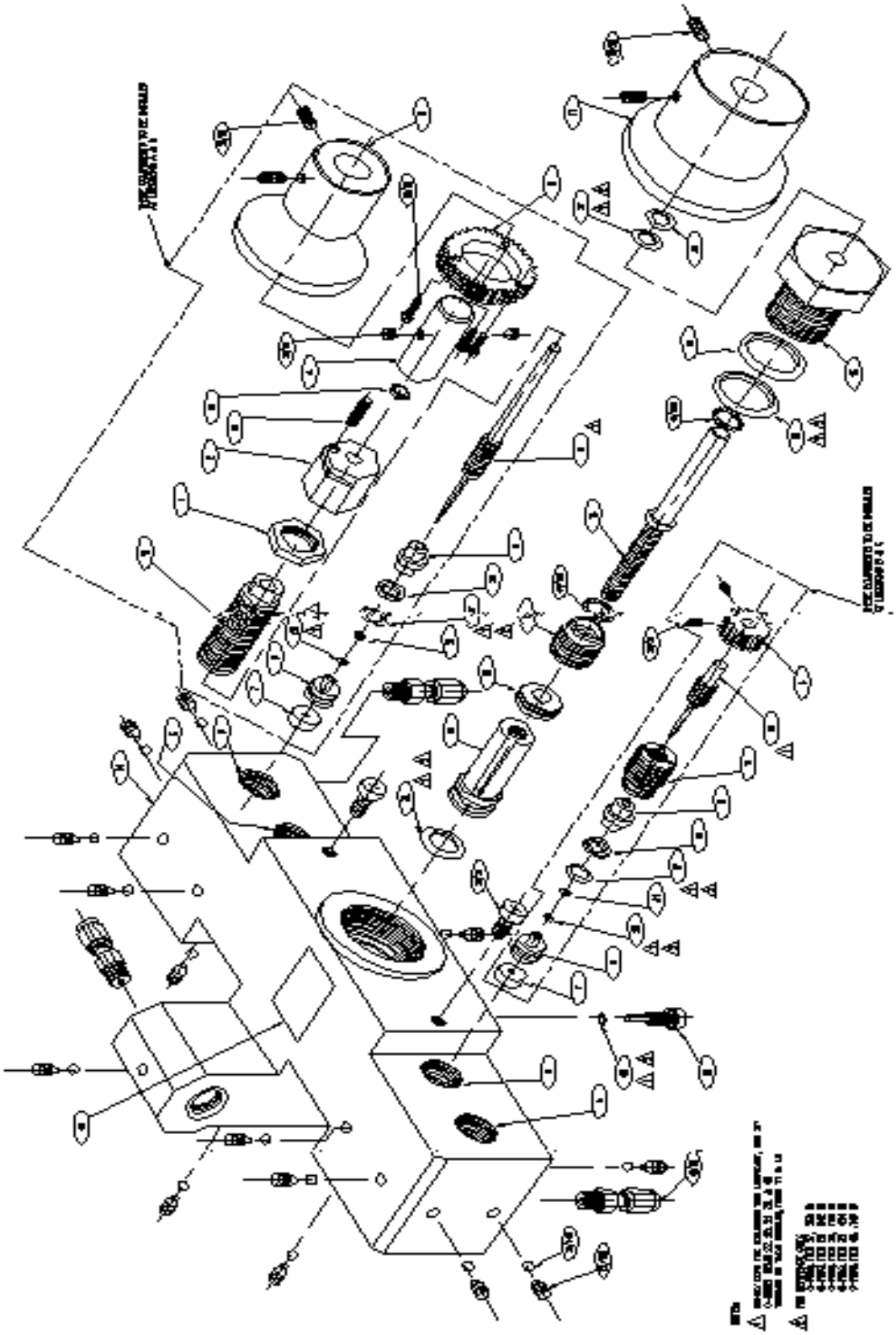


Figure 4-2. ORION-3A Part No. 55287 Exploded View

4.4 Intensifier Assembly Parts List

Ref Number	PN	Description	Quantity
1	59328	Screw, cap, socket	10
2	60704	Washer, flat	10
3	59548	Cap, end	1
4	55589	O-ring, Buna-N (Nitrile) 70 Durometer color black	1
5	59333	Screw, cap, socket head	10
6	59508	Washer, flat	10
7	55579	O-ring, Flourocarbon (Viton) 90 Durometer color black w/white dot	1
8	60133	Housing, spring	1
9	60343	Spring	2
10	57410	Check valve	2
11	56714	Seat, check valve	1
12	57236	Fitting, check valve inlet	1
13	54456	Retainer, packing backup	1
14	55596	O-ring, Flourocarbon (Viton) 90 Durometer color black w/white dot	1
15	57114	Seat, check valve	1
16	59785	Adapter, High Pressure 1/4 NPT Male to Swagelok	1
17	60333	Housing, piston	1
18	59070	Piston	1
19	58786	Cap, end	1
20	60579	Retainer, packing	2
21	55600	O-ring, Buna-N (Nitrile) 70 Durometer color black	1
22	54614	Ring, piston	3
23	59794	Elbow, 90 Tube to Male NPT	1
24	58752	Retainer, piston ring	1
25	69435	Dowel, round	1

Table 4-3. Intensifier Parts List

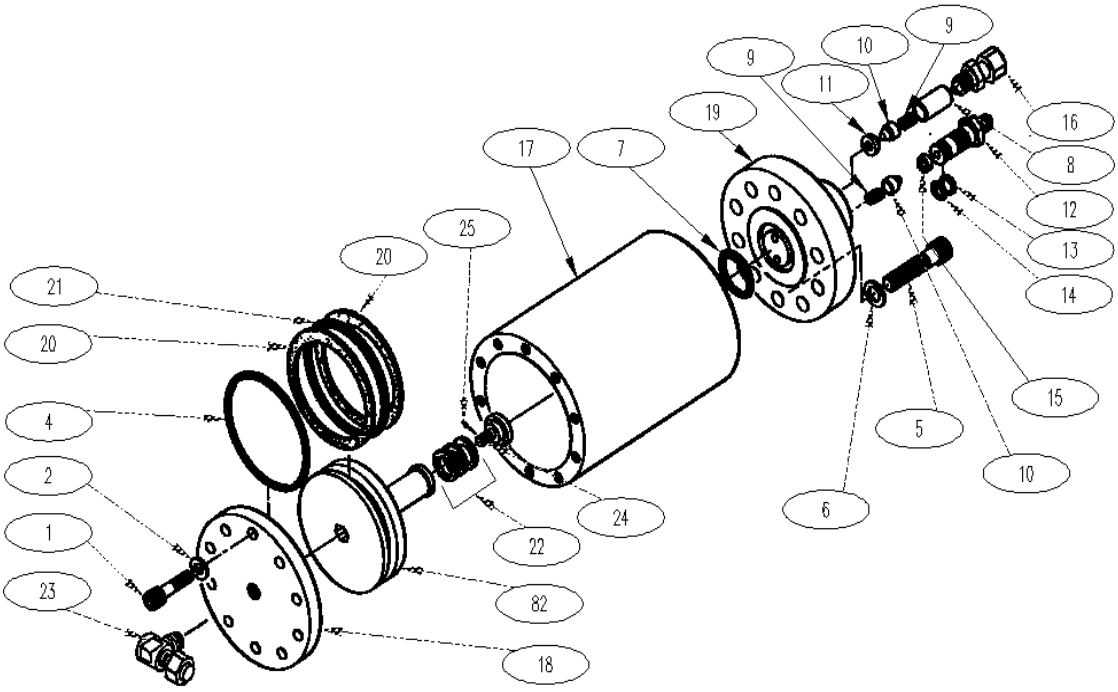


Figure 4-3. Intensifier Exploded View

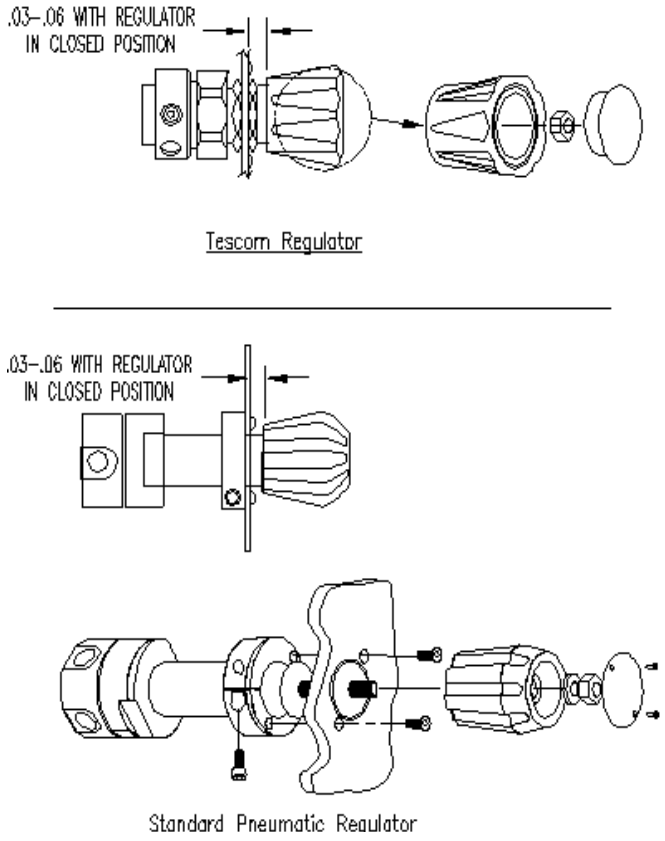


Figure 4-4. Tescom and Standard Pneumatic Regulator Mounting

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 MATL, ADDED INFO TO ITEM 31, ADDED NOTE 29 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.

QTY REQD FOR DASH NO.						ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
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 (CONTINUED)					

QTY REQD FOR DASH NO.						ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
-	-	-	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 .0% 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 .0% 1/2W
-	-	-	1	-	-	47	RESISTOR, METAL FILM	C	KPW310M		R23C	200 .0% 0.1W
-	-	-	1	-	1	46	RESISTOR, COMPOSITION	-	RCR07G241JS		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	-	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 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 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 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			
-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					

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
DES.ENG. APPROVED: S.V. 5/11/87
CKD.
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 4-5. CPU and Power Supply Assembly, Sheet 1(For Non-Battery Units Only)

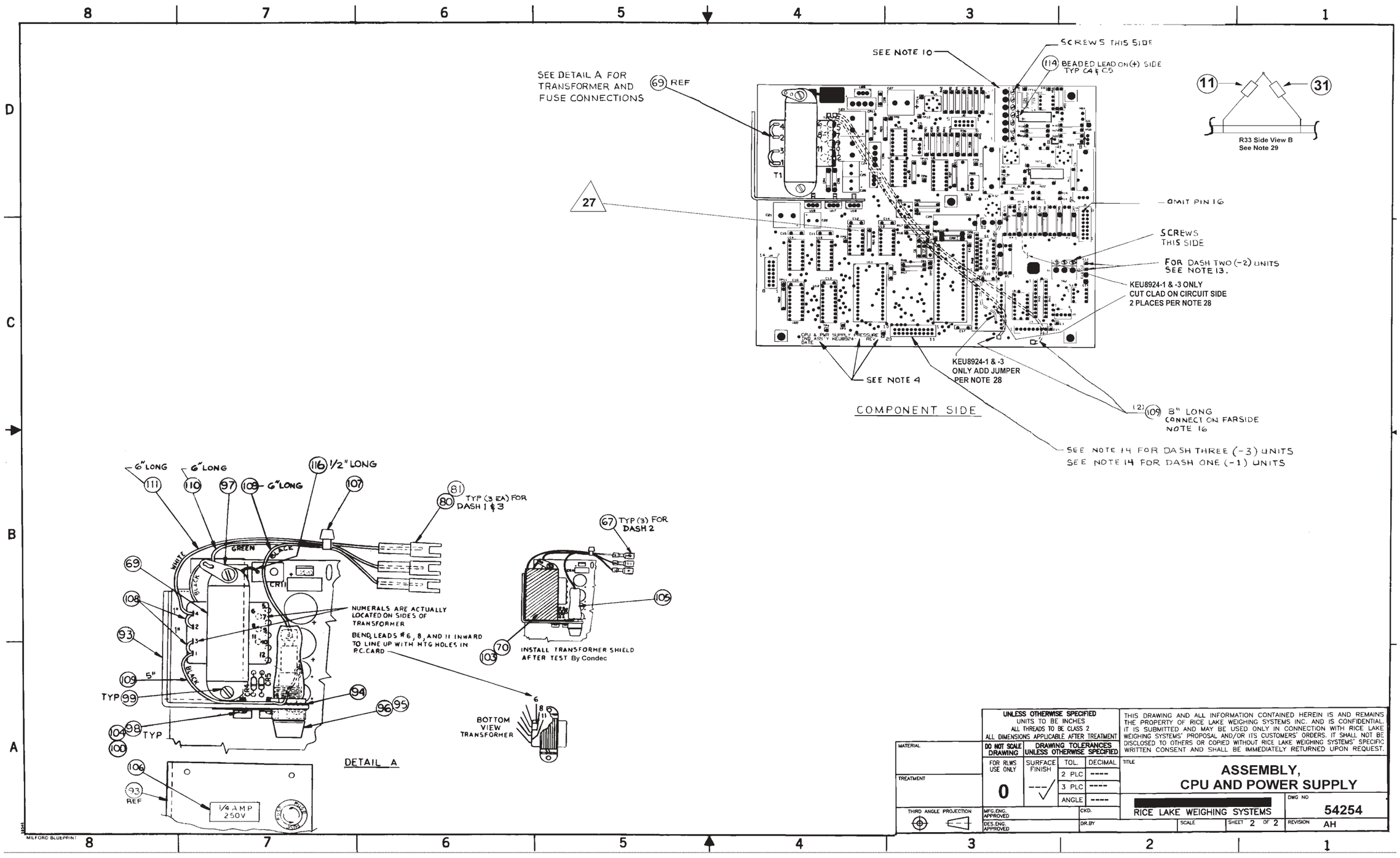


Figure 4-6. CPU and Power Supply Assembly, Sheet 1 (For Non-Battery Units Only)

Figure 4-7. Power Supply Assembly (For Battery Units Only)

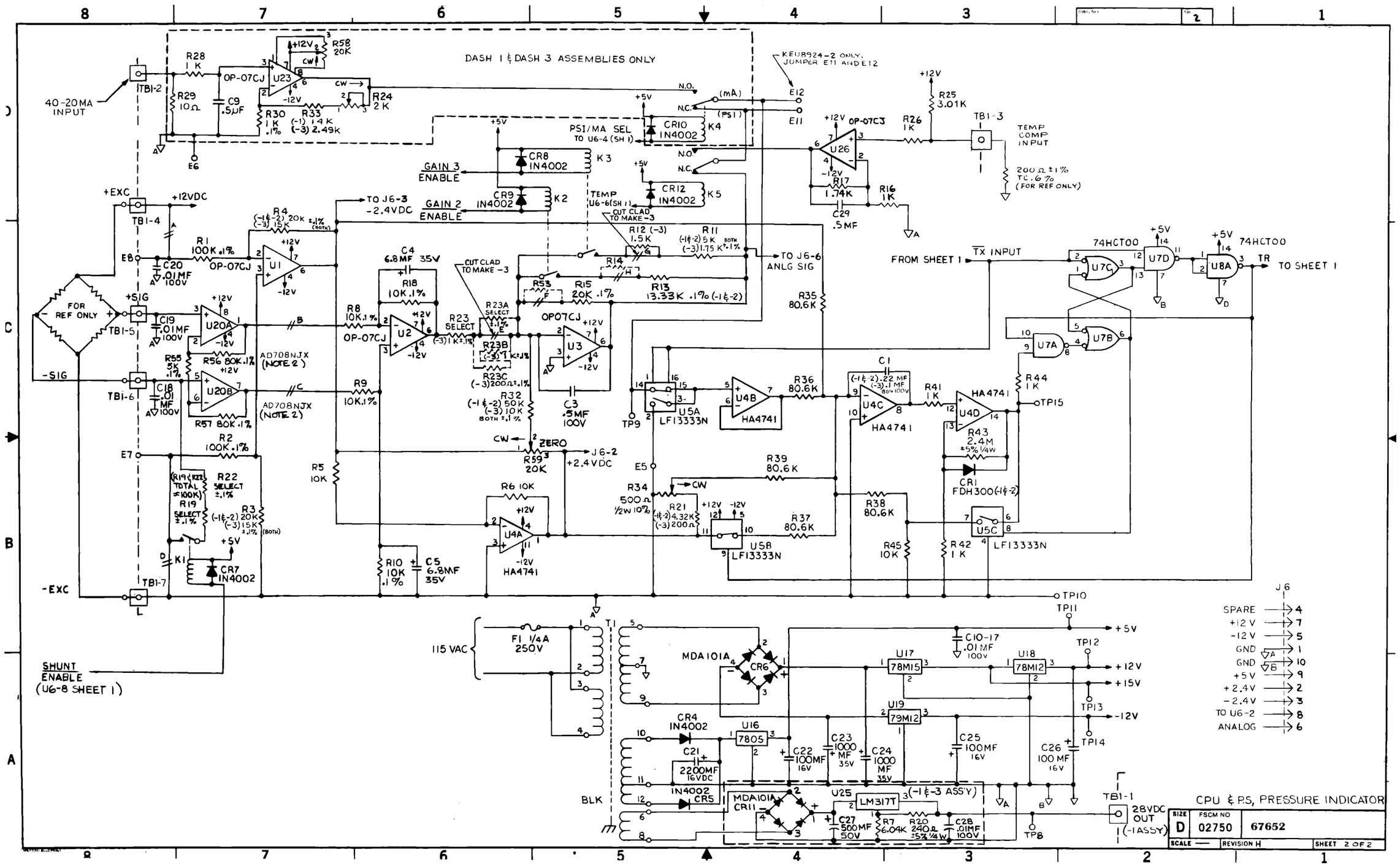
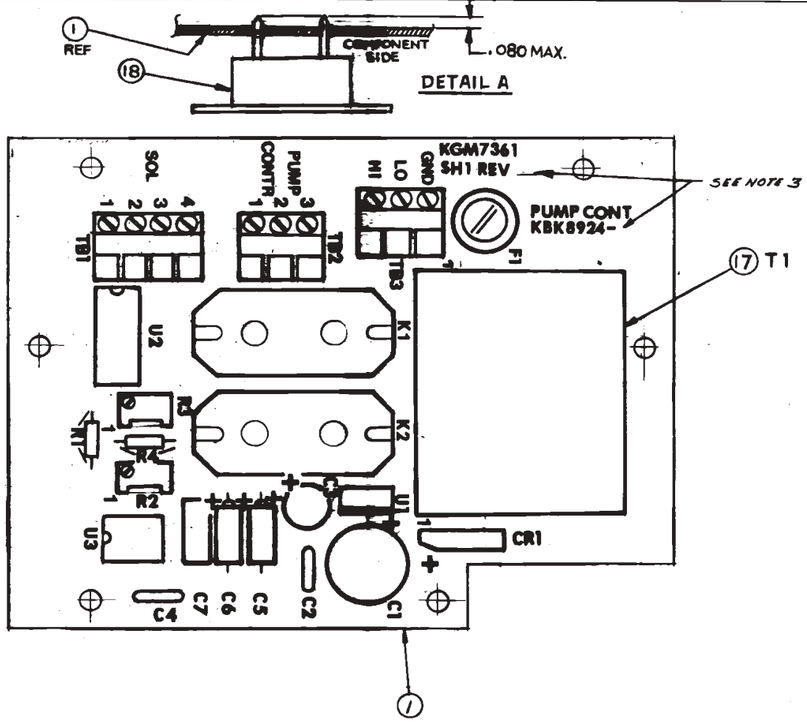


Figure 4-8. CPU Schematic, Sheet 2 (For Battery Units Only)



COMPONENT SIDE

NOTES:

1) FOR SCHEMATIC SEE C SIZE KDW7316

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, EXCEPT K1 & K2 PER DETAIL A

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 PROCEDURE(S): KAD8317.

8) FOR 220VAC:
CUT JUMPER WIRE INTO 2, 1" LONG PIECES
CUT CLAD AND ADD JUMPER WIRES PER FIGURE 1,
REMARK ASSEMBLY "KBK8924-2."

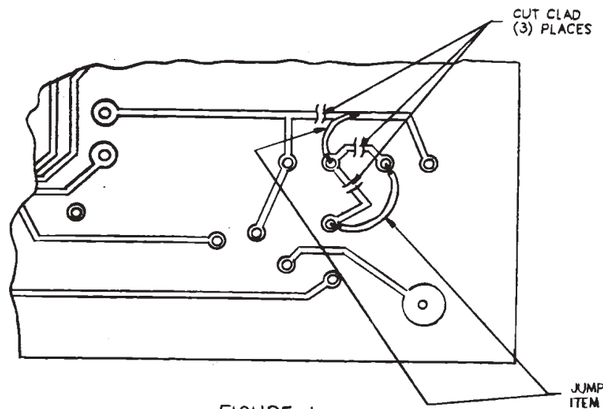


FIGURE 1
CIRCUIT SIDE OF PRINTED WIRING BOARD KGM7361, PART OF PUMP CONTROL ASSEMBLY KBK8924-1 (NO SCALE)

DWG NO. KBK8924 SH 1

REVISIONS

ZONE	LTR	DESCRIPTIONS	DATE	APPROVED
	-	REL. ON C/N D1347	7/10/86	
	B	C/N D1353 - REV. PER C/N	7/24/86	
	C	C/N D1627, REV. OUTLINE CONF.	7/23/87	
	D	C/N D1750 COMPONENT DETAILS AND T1 CALL-OUT ADDED TO PICTURE	2/4/88	
	E	C/N D1781 ADDED DETAIL A	9/15/88	
	F	C/N D3729, ITEM 19 WAS KP350	4-26	AB2
	G	C/N D3753 - SEE C/N FOR DETAILS	8-10-90	AB

RLWS DRAWING NO. 56679

PART NOS. AND/OR DRAWING NOS. ADDED

BY: RLL DATE 12/9/99

-1 = 56679
-2 = 56682

	-	1	25	SOCKET	B	KE251C		XU3	8 PIN
	-	1	24	SOCKET	B	KE251A		XU2	14 PIN
	-	2	23	TERMINAL BLOCK	B	KUH3300A		TB2, TB3	3 TERMINAL
	-	1	22	TERMINAL BLOCK	B	KUH3300C		TB1	4 TERMINAL
			21						
	-	1	20	FUSE HOLDER, VERT	A	KS351B		XF1	
	-	1	19	FUSE, CARTRIDGE	A	KP350K		F1	.2 AMP
	-	2	18	RELAY, DC/AC	B	KHK431C		K1, K2	NOTE 4
	-	1	17	TRANSFORMER	B	KM7301A		T1	
	-	1	16	DIODE, FULL WAVE BRIDGE	B	KGF327A		CR1	MDA101A
			15						
	-	2	14	CAPACITOR, ELECTROLYTIC	B	KGE311R		C5, C6	22μf ±10% 15V
	-	1	13	CAPACITOR, ELECTROLYTIC	B	KLY311C		C3	100μf ±20% 16V
	-	2	12	CAPACITOR, CERAMIC	A	KHV311A		C2, C4	.01μf +80% -20% 100V
	-	1	11	CAPACITOR, ELECTROLYTIC	B	KLY311A		C1	1000μf ±20% 16V
	2*	-	10	WIRE, 22 AWG	-	m22759/11-22-0		NOTE 8	
	-	1	9	POTENTIOMETER	C	KDU338AH		R3	50K
	-	1	8	POTENTIOMETER	C	KDU338AF		R2	10K
	-	1	7	RESISTOR, FIXED	C	KFU3102H		R4	10K ±5% ¼W
	-	1	6	RESISTOR, FIXED	C	KFU3102N		R1	2K ±5% ¼W
	1	-	5	ASSY PUMP CONTROL	-	KBK8924-1		NOTE 8	
	-	1	4	I.C. TIMER	B	KBT1918A		U3	NE555V
	-	1	3	I.C. HEX INV/BFR	C	KAG1918AC		U2	7416
	-	1	2	I.C. REGULATOR	C	KHV1918A		U1	78M05
	-	1	1	PRINTED WIRING BD.	C	KGM7361			
	-2	-1	ITEM NO.	NOMENCLATURE OR DESCRIPTION	DWG SIZE	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTE	REMARKS
	QTY REQU FOR DASH NO.			LIST OF MATERIAL					

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
X ±.03 XX ±.01 XXX ±.005 ANGLES ±1/2°.
FRACTIONS ±
ALL MACH. SURFACES ✓ RMS
DRILL HOLES PER ANSI 10307
BURRS AND SHARP EDGES PER JZL315
45° CHAMFER FIRST THREAD
TOLERANCES PER ANSI Y14.5-1973
COML TOL APPLY TO STOCK SIZES

DRAWN G. Newton 7-9-86
CHECKED
ENGR S.V. 7-10-86
RELEASED 7-10-86

EATON CONSOLIDATED CONTROLS BETHEL, CT 06801

PUMP CONTROL ASSEMBLY

KGL7237-1	UPC5200
NEXT ASSY	USED ON
APPLICATION	

MATERIAL
FINISH

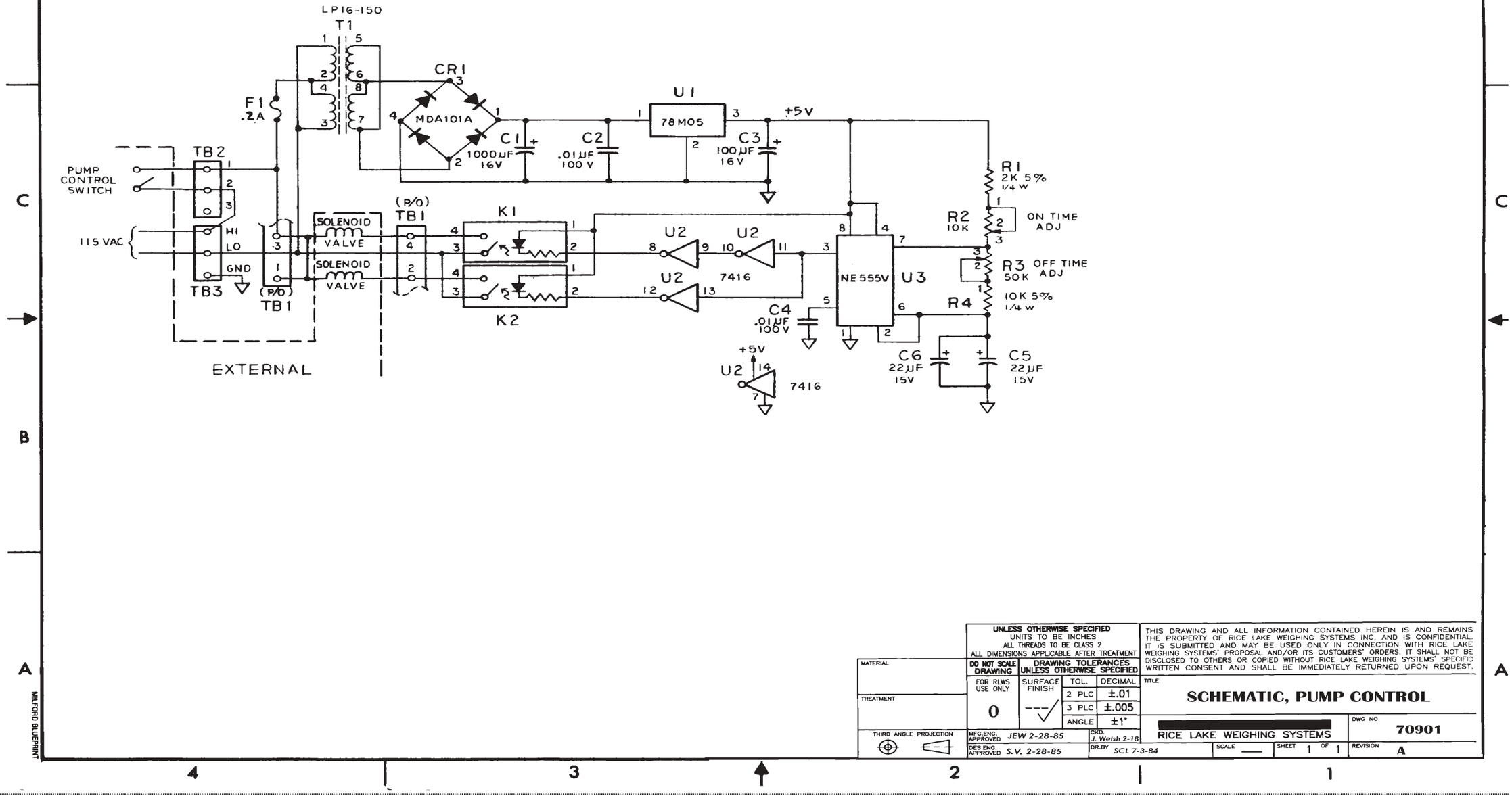
SIZE D | FSCM NO. 02750 | DWG NO. KBK8924 | REV

SCALE 2:1 | WT | SHEET 1 OF 1

56679

Figure 4-9. Pump Control Board Assembly

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	REL ON C/ND0817	2/28/05	
	A	ENGINEERING RELEASE	1/16/02	TLH JEW



UNLESS OTHERWISE SPECIFIED: UNITS TO BE INCHES; ALL THREADS TO BE CLASS 2; ALL DIMENSIONS APPLICABLE AFTER TREATMENT			THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. AND IS CONFIDENTIAL. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PROPOSAL AND/OR ITS CUSTOMERS' ORDERS. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.
MATERIAL	DO NOT SCALE DRAWING	DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED	TITLE: SCHEMATIC, PUMP CONTROL
TREATMENT	FOR RLWS USE ONLY: 0	SURFACE FINISH: ---√	TOL. / DECIMAL: 2 PLC ±.01; 3 PLC ±.005; ANGLE ±1°
THIRD ANGLE PROJECTION	MFG.ENG. APPROVED: JEW 2-28-85	CKD.: J. Welsh 2-18	RICE LAKE WEIGHING SYSTEMS
	DES.ENG. APPROVED: S.V. 2-28-85	DR.BY: SCL 7-3-84	SCALE: — SHEET 1 OF 1 DWG NO 70901 REVISION A

MILFORD BLUEPRINT

Figure 4-10. Pump Control Board Schematic

5.0 Model Number System

UPC5200- ____ ____ ____

UPC5210- ____ ____ ____

POWER and RANGE REQUIREMENTS

A - 10000/5000/2000 120 VAC *

B - 5000/2500/1000 120 VAC

C - 10000/5000/2000 220 VAC *

D - 5000/2500/1000 220 VAC

MODE

A - Gage Only

B - Absolute Only

DISPLAY

A - Light Emitting Diode (LED)

B - liquid Crystal (LCD)

*** Available in Gage Only**

6.0 Ranges and Resolutions

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

RANGE (PSI) HI/MED/LO	Calibrator Mode	RESOLUTION HI/MED/LO
10000/5000.0/2000.0	Gage Only	2/1/0.5
5000.0/2500.0/1000.0	Gage Only or Absolute Only	1/0.5/0.2

Table 6-1. Ranges and Resolutions

7.0 Options, Replacement Kits

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

ORION-3A O-Ring Replacement Kit (Data Sheet # 65370):

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

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

- Pressure Trap (Data Sheet # 58596).....PN 58478
- Test Port (output) Quick-Disconnect Male Hose fitting.....PN 55542
- Input Port Hose Nitrogen Bottle Mating fitting (one each of the following)

  Cheat Seal Pad.....PN 54854

  Hose Adapter fitting .....PN 60803

  CGA-580 Nipple .....PN 57150

  CGA-580 Nut .....PN 57154

Note: For Input Port Quick-Disconnect Female Hose fitting assembly instructions see Section 4.2.19 on page 29.

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

- 5' Long.....PN 55280

Input Port Hose, with Nitrogen Bottle Mating fitting:

- 4' Long.....PN 55360
- 10' Long.....PN 55366
- 15' Long.....PN 55369
- 20' Long.....PN 55375

8.0 Specifications

Pressure Specifications:

Pressure range:	Three independent pressure ranges per instrument. See Section 5.0 on page 44 for available ranges.
Available pressure calibrations:	Gage only or absolute only,
Overall accuracy:	< ±0.05% Full Scale Max. Accuracy statement includes all effects of linearity, hysteresis, repeatability and ambient temperature
Operating Temp:	+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

External Pressure Cylinder, UPC5200 only:

Capacity:	83.3 ft^3 N_2 @ 2,216 PSIG
Volume:	960 in^3
Rating:	2,216 psig
Test Pressure:	3,694 psig
Material:	Aluminum

Regulated Pressure Gage:

Size:	2-1/2 in. diameter
Range:	5K model 0–600 PSIG, 10K model 0–3,000 PSIG
Test Pressure:	5K model 900 PSIG, 10K model 4,500 PSIG

Accumulator Gage:

Size:	2-1/2 in. diameter
Range:	5K model 0–6,000 PSIG, 10K model 0–15,000 PSIG
Test Pressure:	5K model 9,000 PSIG, 10K model 22,500 PSIG

Over-pressure Rupture Disk:

Rating:	3,000 PSIG, nominal
Type:	Stainless steel outer case

Pressure Media Filter:

Rating:	20 microns, Test Port and Input Port 40 microns, Test Port Hose
Type:	Field replaceable

ORION-3A Control Valve:

Type:	Micro-metering with replaceable soft seat
Material:	Aluminum knobs, black anodized All other parts 300 series stainless steel
Relief Valve:	
Type:	Adjustable, atmospheric bleed
Setting:	Adjustable, set between 525-550 PSIG
Material:	300 series Stainless Steel.

Internal Piping:

Tubing:	1/8 in. O.D., 0.035 in. wall thickness, seamless Cu. 1/4 in. O.D., 0.035 and 0.065 in. wall thickness, seamless 304 Stainless Steel

Couplings: Stainless Steel, Swagelok type

Input Port:

Style:	1/4" 37° AN flare male
Pressure Rating:	2216 PSIG connected
Material:	300 series Stainless Steel

Test Port:

Pressure Rating:	10,000 PSIG.
Material:	300 series Stainless Steel

Vent Port:

Style:	1/4" 37° AN male
Pressure Rating:	10,000 PSIG
Material:	300 series Stainless Steel

Pressure Hoses:

Quantity Supplied:	Two; one input, one output
Length:	4 ft. nominal, input hose 5 ft. nominal, output hose
Style:	Input hose - Nylon-lined core tube with synthetic fiber braid and polyester cover. Fitted with CGA-580 (Brass) nipple fitting on one end and 1/4" 37° female AN swivel pressure fitting on opposite end. Output hose - Nylon-lined core tube with synthetic fiber braid and polyurethane cover. Fitted with quick-disconnect plug (St Stl) on one end and 1/4" 37° female AN swivel tube coupling on the other.

Regulator:

Type:	Single stage, self-venting, non-bleed
Pressure Rating:	3,000 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.

Carrying Case UPC5200 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.
UPC5200 Finish:	Gray enamel paint with black silkscreen nomeclature
UPC5210 Finish:	Dark Tan enamel paint with black silkscreen nomenclature

Physical Specifications:

Weight:	52 lbs. including all hoses and cables.
UPC5200 Case Dim's:	11" wide x 18" long x 11.5" high
UPC5210 Case Dim's:	19" wide x 8.1" deep x 10.5" high

(Case Dimensions excluding front handles).

UPC5200/UPC5210 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 "suitable shipping container." Some units have been severely damaged this way. This is a delicate, precision instrument. Any damage incurred because of poor packaging procedures will ultimately result in added service charges and longer turn-around times.

Vent all pressure lines 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.

UPC5200/UPC5210 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