Model 1054A C

# Conductivity Microprocessor Analyzer


ROSEMOUNT® ANALYTICAL
FISHER-ROSEMOUNT™ Managing The Process Better.™

# ESSENTIAL INSTRUCTIONS
## READ THIS PAGE BEFORE PROCEEDING!

Rosemount Analytical designs, manufactures, and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product. If this Instruction Manual is not the correct manual, telephone 1-800-654-7768 and the requested manual will be provided. Save this Instruction Manual for future reference.
- If you do not understand any of the instructions, contact your Rosemount representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Rosemount. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look alike substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

## WARNING
## ELECTRICAL SHOCK HAZARD

Making cable connections to and servicing this instrument require access to shock hazard level voltages which can cause death or serious injury.

Relay contacts made to separate power sources must be disconnected before servicing.

Electrical installation must be in accordance with the National Electrical Code (ANSI/NFPA-70) and/or any other applicable national or local codes.

Unused cable conduit entries must be securely sealed by non-flammable closures to provide enclosure integrity in compliance with personal safety and environmental protection requirements.

For safety and proper performance this instrument must be connected to a properly grounded three-wire power source.

Proper relay use and configuration is the responsibility of the user.

Do not operate this instrument without front cover secured. Refer installation, operation and servicing to qualified personnel.

SS-MA54
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# MODEL 1054A CONDUCTIVITY MICROPROCESSOR ANALYZER

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# SECTION 1.0
# DESCRIPTION AND SPECIFICATIONS

- *FM AND CSA APPROVED For Class I, Division 2, Gas Groups A, B, C, and D.*
- *SELF DIAGNOSTICS with a user selectable fault alarm.*
- *KEYBOARD SECURITY is user selectable.*
- *NO BATTERY BACK-UP REQUIRED. Non-volatile EEPROM memory.*
- *DUAL ALARMS WITH PROGRAMMABLE LOGIC. A third relay is provided with timer functions.*
- *PROGRAMMABLE OUTPUT AND RELAY DEFAULTS for hold and fault modes.*
- *NEMA 4X (IP65) WEATHERPROOF CORROSION-RESISTANT ENCLOSURE.*

## 1.1 FEATURES AND APPLICATIONS

The Model 1054A Microprocessor Analyzers, with the appropriate sensors, are designed to continuously measure and control pH, ORP, conductivity, percent concentration, dissolved oxygen, or total free chlorine in industrial and municipal processes.

The Model 1054A Conductivity Analyzers are housed in a NEMA 4X (IP65) weatherproof, corrosion-resistant, flame retardant enclosure suitable for panel, pipe or wall mounting. All functions are accessed through the front panel membrane keyboard which features tactile feedback. Measurement data may be read at any time. However, settings may be protected against accidental or unauthorized changes by a user selectable security code. The display indicates the measured value in engineering units as well as temperature, alarm status, hold output and fault conditions.

The 1054A transmits a user selected isolated current output which is continuously expandable over the measurement range for either direct or reverse action and can be displayed in milliamps or percent. Output dampening of 0-255 secs. is user selectable.

The output and relay default settings are user selectable for hold or fault mode operation. The hold output function allows manual control during routine sensor maintenance.

Continuous self diagnostics alert the operator to faults due to analyzer electronics, integral RTD failures, open wiring and process variable range problems. In the event of a fault condition or hold mode diagnosed by the analyzer, the output will be set to a preset or last process value and the relays will be set to their default settings.

Dual alarms are a standard feature on the Model 1054A and are programmable for either high or low operation. Alarm 2 may be programmed as a fault alarm. Both alarms feature independent setpoints, adjustable hysteresis and time delay action. The time delay is convenient when an alarm is used for corrective action, such as shutting down a demineralizer for regeneration. Time delay will ignore a temporary breakthrough and prevent shutting down a de-mineralizer unit prematurely. A dedicated interval timer with relay is also provided.

Automatic or manual temperature compensation is keyboard selectable. The process temperature is accurately measured from an integral RTD in the sensor assembly and is read on the display. For greater accuracy, the temperature indication may be standardized to the process temperature. The temperature may be configured to read in ÞC or ÞF.

Calibration is easily accomplished by simply immersing the sensor in a known solution and entering the value. With a two point calibration, the Model 1054A will automatically calculate the temperature slope of the solution. Upon routine standardization a sensor cell factor value is calculated, and a trend of this value can be used to track sensor coating.

The Model 1054A Microprocessor Analyzer comes standard with an LCD display. An LED display is available as an option. An optional wall or unistrut mount enclosure is available for extra protection of the analyzer in high solids or cold environments.

## 1.2 PHYSICAL SPECIFICATIONS - GENERAL

**Panel Mount Enclosure:** Black, ABS, NEMA 4X, IP65,
CSA Enclosure 4.
144 X 144 X 192mm
(5.7 X 5.7 X 7.6 inches).

**Wall Mount Enclosure:** Weatherproof, Thermoplastic.
300 X 330 X 190mm
(11.75 X 13 X 7.5 inches).

**Front Panel:** Membrane keyboard with tactile feedback and user selectable security. Black and white on grey.

**Digital Display:** LCD, black on grey
Optional, red LED
Character Height: 18mm (0.7 inch)

**Electrical Classification:**

Group I Panel Mount Enclosure:

FM Class I, Div. 2, Group A thru D.
28 VDC relays - 6.0 amps resistive only
150 mA - Groups A & B; 400 mA - Group C;
540 mA - Group D; Ci - 0; Li - 0

CSA Class I, Div. 2, Group A thru D.
28 VDC, 110 VAC & 230 VAC relays
6.0 Amps resistive only

Group II Wall Mount Enclosure: General Purpose

**Power:** 115 VAC, ± 10%, 50/60 Hz ± 6%, 4.0 W
230 VAC, ± 10%, 50/60 Hz ± 6%, 4.0 W

**Current Output:** Isolated, 0-20 mA or 4-20 mA
into 600 ohms maximum load, Direct or Reverse
Output Dampening: 0-255 seconds.

**Ambient Temperature:** -20 to 65ÞC (-4 to 149ÞF)

**Ambient Humidity:** LED max 95% RH
(LCD max 85% RH @ 50°C)

**Alarms:** Dual, field selectable High/Low, High/High, Low/Low
Alarm 2 configurable as a fault alarm
Time Delay 0 to 254 seconds
Dual Setpoints, continuously adjustable
Hysteresis is adjustable up to 25% full scale
for low side/High Alarm and high side/Low Alarm

**Interval Timer:** Interval: 10 min. to 2999 days
On Counts: 1 to 60
On Duration: 1 to 299.9 seconds
Off Duration: 1 to 299.9 seconds
Wait Duration: 1 to 299.9 seconds
Controls dedicated relay

**Relay Contacts:** Epoxy Sealed Form A contacts, SPST, Normally Open.

| | Resistive | Inductive |
|---|---|---|
| 28 VDC | 6.0 Amps | 3.0 Amps |
| 115 VAC | 6.0 Amps | 3.0 Amps |
| 230 VAC | 3.0 Amps | 1.5 Amps |

**Weight/Shipping Weight:** 1.1 kg/1.6 kg (2.5 lbs./3.5 lbs.)

The **Model 1054A Conductivity Analyzer** measures over the range of 0-2 µS/cm to 0-1,000 mS/cm. Temperature slope may be adjusted anywhere between 0 and 5% to provide greater accuracy in chemical concentration control. The temperature slope is factory set at 2% as a representative value, but each conductive solution has its own set of temperature vs. concentration curves. The Model 1054A C will automatically calculate the temperature slope for any given solution, or permit manual adjustment of the temperature slope if already known. On calibration the analyzer will also automatically correct for cell constant variations for better measurement accuracy.

## 1.3 ANALYZER SPECIFICATIONS @ 25ÞC

**Measurement Range:** (See Table 1)

**Output Scale:** Zero suppression: up to 90% full scale.
Span: from 10% to 100% full scale

**Accuracy:** ±0.5% of reading

**Repeatability:** ±0.25% of reading

**Stability:** ±0.25% month, non-cumulative

**Temperature Effect:** 0.02% of reading/ÞC

**Temperature Compensation:** -20 to 200ÞC (-4 to 392ÞF)
(automatic or manual)

**Temperature Slope Adjustment:** 0-5%/ÞC

## 1.4 RECOMMENDED SENSORS:

**Model 112 Insertion Conductivity Sensor**
**Model 140 Retractable Conductivity Sensor**
**Model 141 Insertion Conductivity Sensor**
**Model 142 Insertion Conductivity Sensor**
**Model 150 Insertion/Submersion Conductivity Sensor**
**Model 160 Insertion/Submersion Conductivity Sensor**

**CONDUCTIVITY RANGE – TABLE 1-1**

| Conductivity Sensor Model Number | 142 | 142<br>150 | 140<br>141 | 150 | 140, 141<br>150 | 160 | 160 | 112 |
|---|---|---|---|---|---|---|---|---|
| Cell Constant | 0.01 | 0.1 | 0.2 | 0.5 | 1.0 | 2.0 | 5.0 | 20.0 |
| Min. Range | 1 | 2 | 4 | 10 | 200 | 400 | 1000 | 4000 |
| Max. Range | 200 | 2,000 | 4,000 | 10,000 | 20,000 | 40,000 | 100,000 | 400,000 |
| | FULL SCALE MICROSIEMENS/cm | | | | | | | |

* Uncompensated conductivity

## 1.5 ORDERING INFORMATION

The **Model 1054A Microprocessor Analyze**r is housed in a NEMA 4X weatherproof, corrosion-resistant housing suitable for panel, pipe or wall mounting. The analyzer operates on 115 VAC, 60 Hz unless otherwise specified. Standard features include LCD digital display, isolated current outputs, dual alarms, automatic temperature compensation.

| MODEL 1054A | MICROPROCESSOR ANALYZER |
|---|---|
| CODE | MEASUREMENT (Required Selection) |
| C | Conductivity |

| CODE | GROUP I: PANEL MOUNT ENCLOSURE OPTIONS (Select from either Group I or Group II, not both) |
|---|---|
| 02 | LED Display |
| 05 | 230 VAC, 50/60 Hz Power |

| CODE | GROUP II: WALL MOUNT ENCLOSURE OPTIONS (Select from either Group I or Group II, not both) |
|---|---|
| 20 | LCD Display, 115 VAC, 50/60 Hz |
| 21 | LCD Display, 230 VAC, 50/60 Hz |
| 51 | Enclosure heater for Code 20 |
| 52 | Enclosure heater for Code 21 |

| 1054A | C | 02-21 | EXAMPLE |
|---|---|---|---|

**NOTE: SELECT OPTIONS FROM GROUP I OR GROUP II, NOT BOTH.**

**FORMER OPTIONS**

| | |
|---|---|
| 07 | P/N 23053-00 Wall Mounting Plate with Junction Box |
| 08 | P/N 23054-01 Two-inch Pipe/Wall Mounting Bracket |
| 11 | P/N 2001492 Stainless Steel Tag (specify marking) |

# SECTION 2.0
# INSTALLATION

**2.1 GENERAL.** This analyzer's enclosure is suitable for outdoor use. However, it should be located in an area where temperature extremes, vibrations, electromagnetic and radio frequency interferences are minimized or absent.

**2.2 UNPACKING AND INSPECTION.** Inspect the analyzer for shipping damage. If damaged, notify the carrier immediately. Confirm that all items shown on the packing list are present. Notify Rosemount Analytical if items are missing.

**2.3 MECHANICAL INSTALLATION.** Select an installation site that is at least one foot from any high voltage conduit, has easy access for operating personnel, and is not in direct sunlight. Mount the analyzer as follows:

1. Remove the four screws that secure the rear cover of the enclosure.
2. (Not required for wall mounting configuration). Remove the four screws holding the front panel assembly of the enclosure and carefully pull the front panel and connected printed circuit boards straight out.
3. Follow the procedure for the appropriate mounting configuration: Section 2.3.1 for panel mounting, Section 2.3.2 for wall mounting, Section 2.3.3 for pipe mounting, or Section 2.3.4 for wall mount enclosure mounting.

**2.3.1 Panel Mounting (Standard).** The Model 1054A C is designed to fit into a DIN standard 137.9 mm X 137.9 mm (5.43 inch X 5.43 inch) panel cutout (Refer to Figures 2-1 and 2-2).

1. Prepare the analyzer as described in Section 2.3.
2. Install the mounting latches as described in Figure 2-2 (latches are shown oversize for clarity). If the latches are not installed exactly as shown, they will not work correctly. The screws provided are self-tapping. Tap the screw the full depth of the mounting latch (refer to side view) leaving a gap greater than the thickness of the cutout panel.
3. Align the latches as shown and insert the analyzer enclosure through the front of the panel cutout. Tighten the screws for a firm fit. To avoid damaging the mounting latches, do not use excessive force.
4. Replace the front panel assembly. Circuit boards must align with the slots on the inside of the enclosure. Replace the door and four front panel screws.

**2.3.2 Wall Mounting Plate with Junction Box (P/N 23054-01).** Refer to Figures 2-4 and 2-5.

1. Prepare the analyzer as described in Section 2.3.
2. Mount the junction box and bracket to the analyzer with the hardware provided. All wiring can be brought to the terminal strip prior to mounting the analyzer.
3. Place the metal stiffener on the inside of the analyzer and mount the two 1/2 inch conduit fittings using two each weather seals as shown. Mount NEMA 4X conduit plug (included) into center conduit hole.
4. Mount the analyzer to the junction box using the 1/2 inch conduit fittings.
5. Complete wiring from the analyzer to the junction box (Refer to Figure 2-5).

**NOTE**

Run sensor wiring out of the left opening (From front view) to J-Box. All others out right opening to J-Box.

**2.3.3 Pipe Mounting (P/N 23053-00).** The 2" pipe mounting bracket includes a metal plate with a cutout for the analyzer (Refer to Section 2.3 for mounting the analyzer into the plate). Mounting details are shown in Figure 2-6.

**2.3.4 Wall Mount Enclosure (Options 20/21).** In this configuration, the analyzer is housed in a NEMA 4X heavy duty enclosure. This may be mounted on a wall or handrail (see Figure 2-8 for mounting details). Installation procedures as outlined in Section 2.3 should be followed when installing the wall mounted enclosure. Sufficient clearance should be provided in front of the enclosure to permit opening of the door which is hinged on the left side.

**2.4 ELECTRICAL WIRING.** The Model 1054A has three conduit openings in the bottom rear of the analyzer housing which will accommodate 1/2 inch conduit fittings. From the front view, the conduit opening on the left is for sensor wiring; the center is for signal output and the opening on the right is for timer, alarm, and AC connections. Sensor wiring should always be run in a separate conduit from power wiring.

**2.4.1 Power Input Wiring.** The Model 1054A C has been configured at the factory for either 115 VAC or 230 VAC power. Operating power can be changed by a selector switch located on the power supply board (P/N 23056-02/03). To access this switch, remove the four screws from the front keyboard and pull the electronic assembly straight out (See Figure 2-3).

Connect AC power to TB1-7 and -8, ground to the ground terminal at TB3-8 (refer to Figure 2-7).

**CAUTION**

The sensitivity and stability of the analyzer will be impaired if the input wiring is not grounded. DO NOT apply power to the analyzer until all electrical connections are verified and secure. The following precautions are a guide using UL 508 as a safeguard for personnel and property.

1. AC connections and grounding must be in compliance with UL 508 and/or local electrical codes.
2. The metal stiffener is required to provide support and proper electrical continuity between conduit fittings.
3. This type 4/4X enclosure requires a conduit hub or equivalent that provides watertight connect, REF UL 508-26.10.
4. Watertight fittings/hubs that comply with the requirements of UL 514B are to be used.
5. Conduit hubs are to be connected to the conduit before the hub is connected to the enclosure, REF UL 508-26.10.
6. If the metal support plate is not used, plastic fittings must be used to prevent structural damage to the enclosure. Also, appropriate grounding lug and awg conductor must be used with the plastic fittings.

**2.4.2 Output Wiring.** The signal output and alarm connections are made to terminals 1 through 6 of TB1 and TB3-1 and 2. (Refer to Figure 2-7).

**2.4.3 Wall Mount Enclosure Wiring (Refer to Figure 2-4).** The wall mount enclosure has three 3/4-inch conduit openings, two with 3/4-inch fittings and one with a NEMA 4X conduit plug. From a front view, the conduit opening on the left is for sensor wiring; the center is for signal output and the opening on the right is for timer alarm and AC power supply connections.

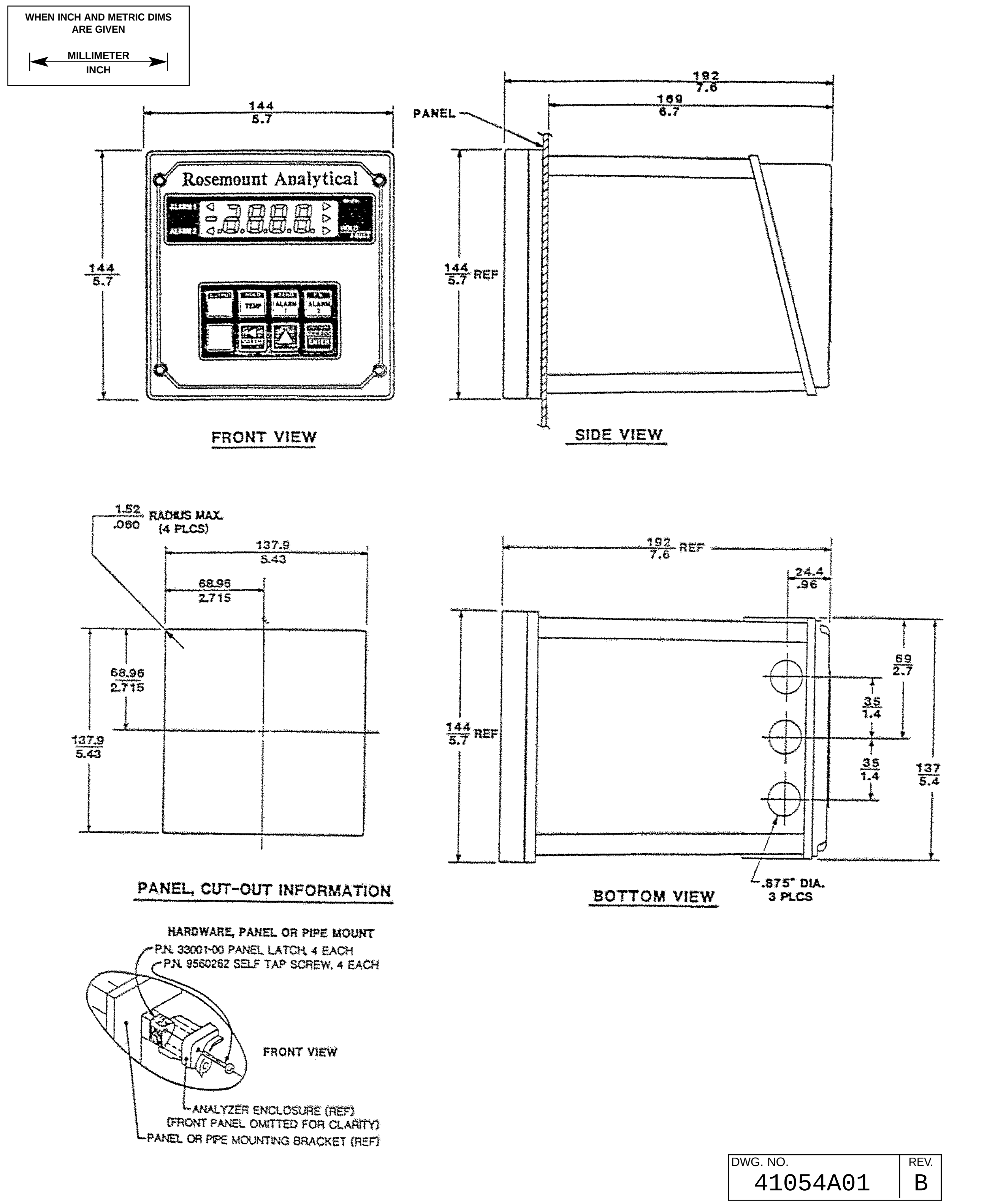



**FIGURE 2-1. Panel Mounting Cutout**

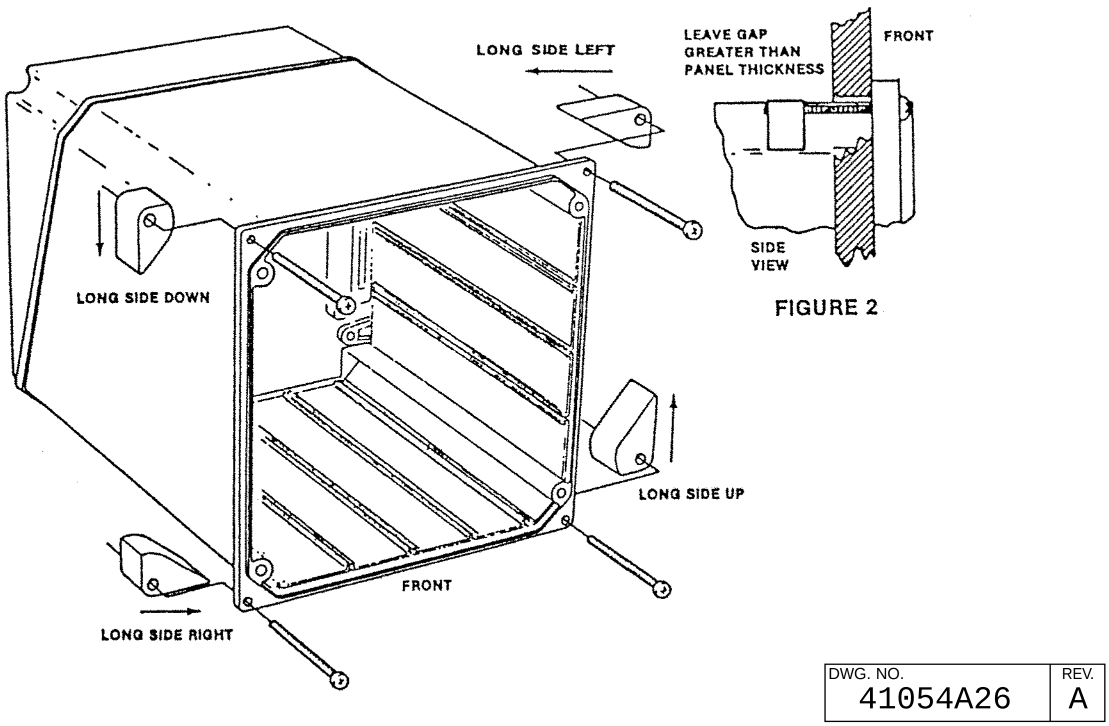



FIGURE 2-2. Panel Mounting Tab Installation

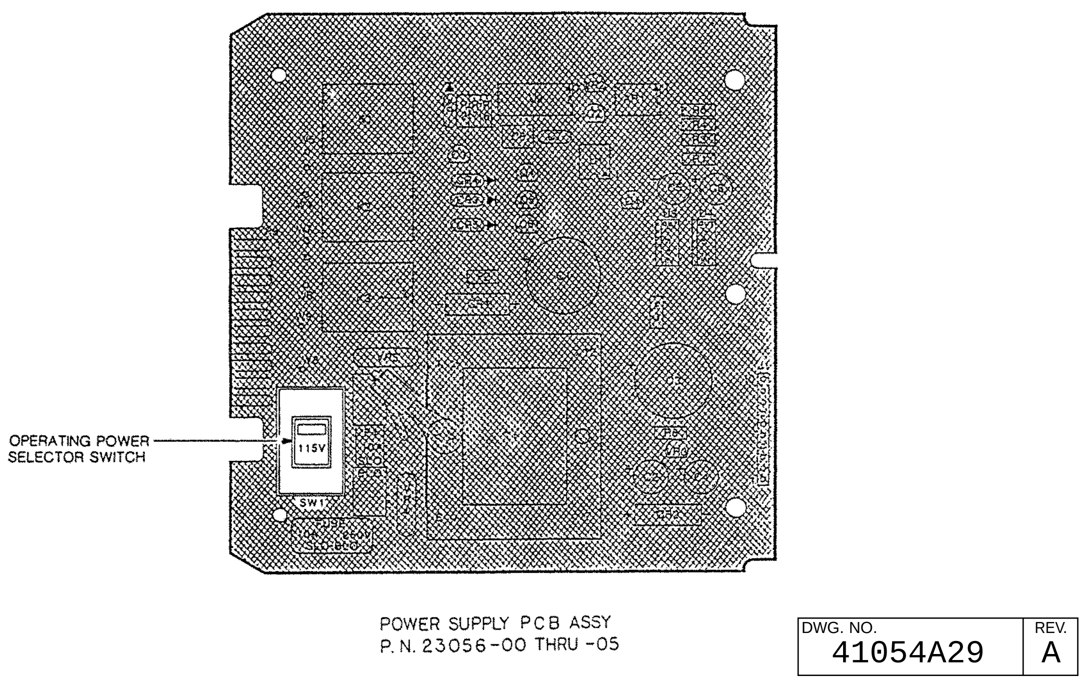
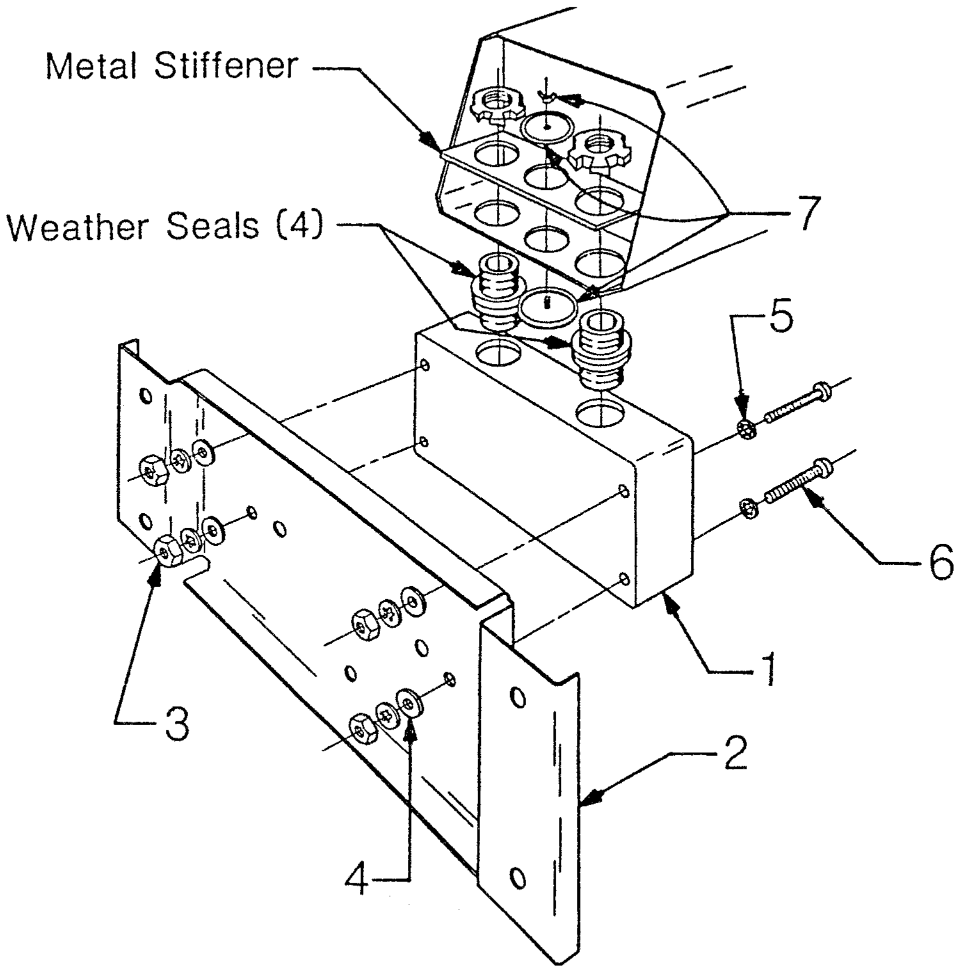


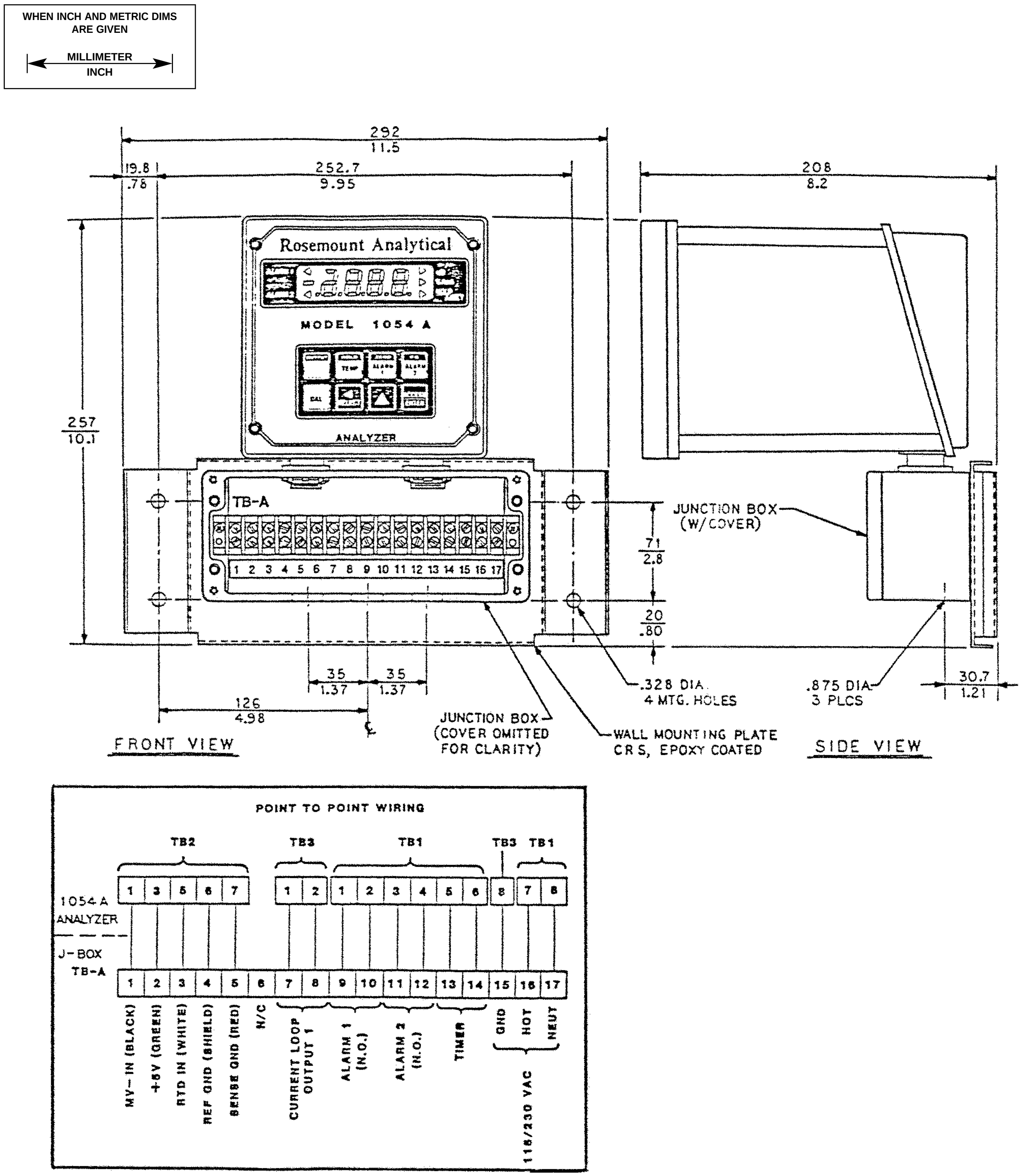

FIGURE 2-3. Input Power Select Switch




| ITEM | PART NUMBER | DESCRIPTION | QTY |
|---|---|---|---|
| 1 | 23058-01 | S Assy, J-Box | 1 |
| 2 | 33030-00 | Bracket, wall mtg | 1 |
| 3 | 9900600 | Nut, 6-32 Hex | 4 |
| 4 | 9910600 | Washer, Flat #6 | 4 |
| 5 | 9910610 | Washer, Lock Int. #6 | 8 |
| 6 | 9600612 | Screw, 6-32 X .75 | 4 |
| 7 | 9510048 | Seal, Weathertight | 1 |

| DWG. NO. | REV. |
|---|---|
| 41054A27 | A |

**FIGURE 2-4. Wall Mounting J-Box Installation**




DWG. NO. 41054A08 REV. B

**FIGURE 2-5. Wall Mounting J-Box Wiring**

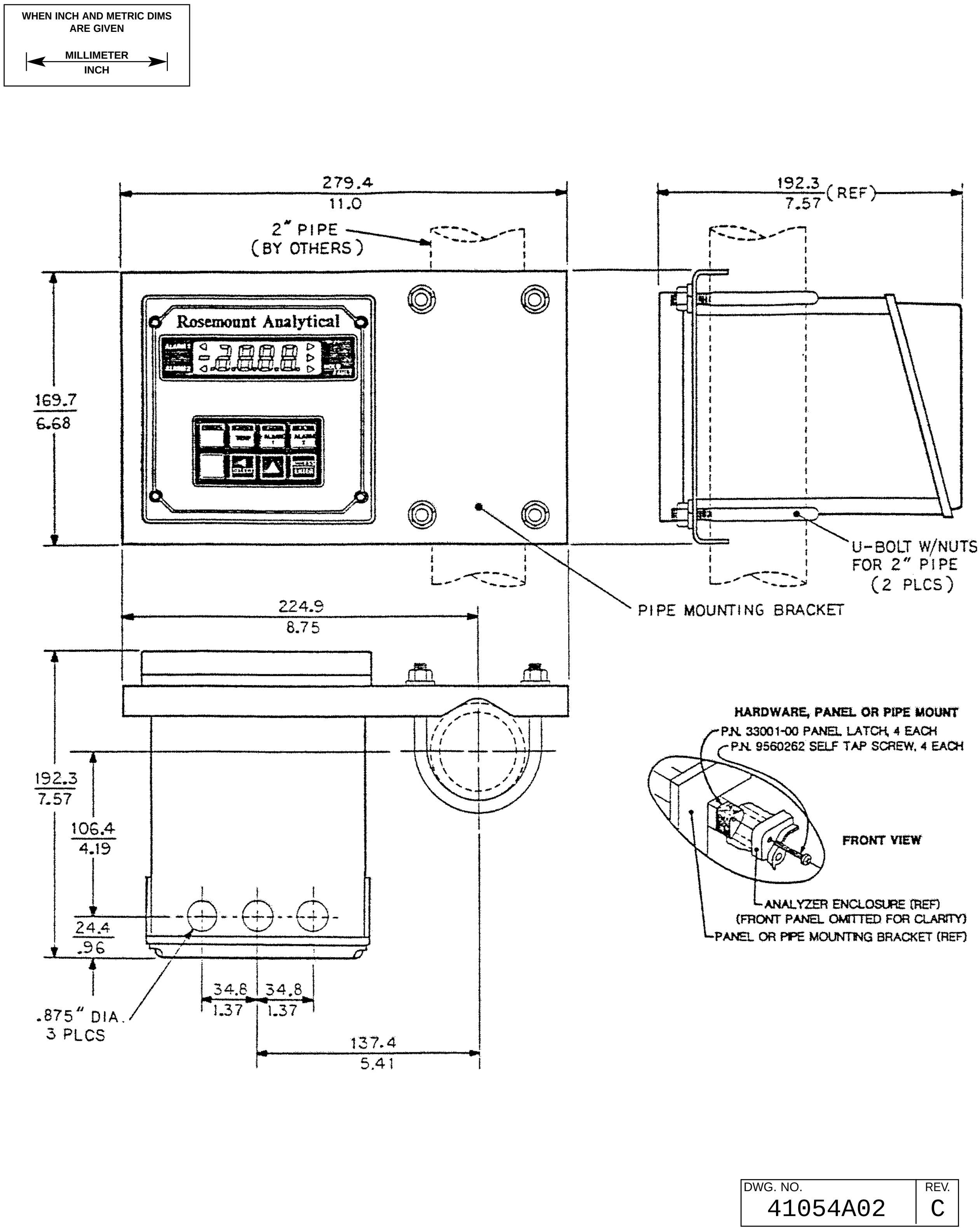
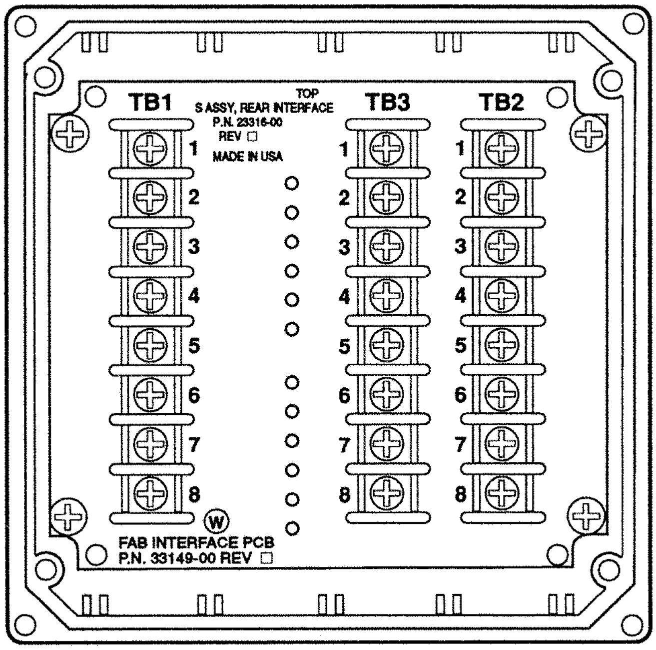
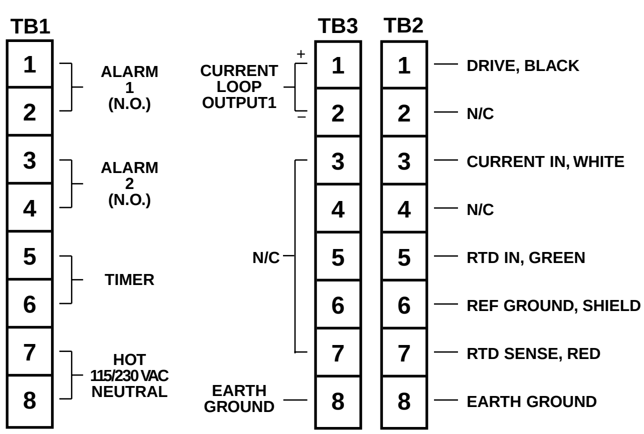



**FIGURE 2-6. Pipe Mounting Installation**




**BACK VIEW / COVER OMMITTED**

**FIELD TERMINAL BOARD CONNECTIONS**




| DWG. NO. | REV. |
|---|---|
| 41054A05 | A |

**FIGURE 2-7. Electrical Wiring**

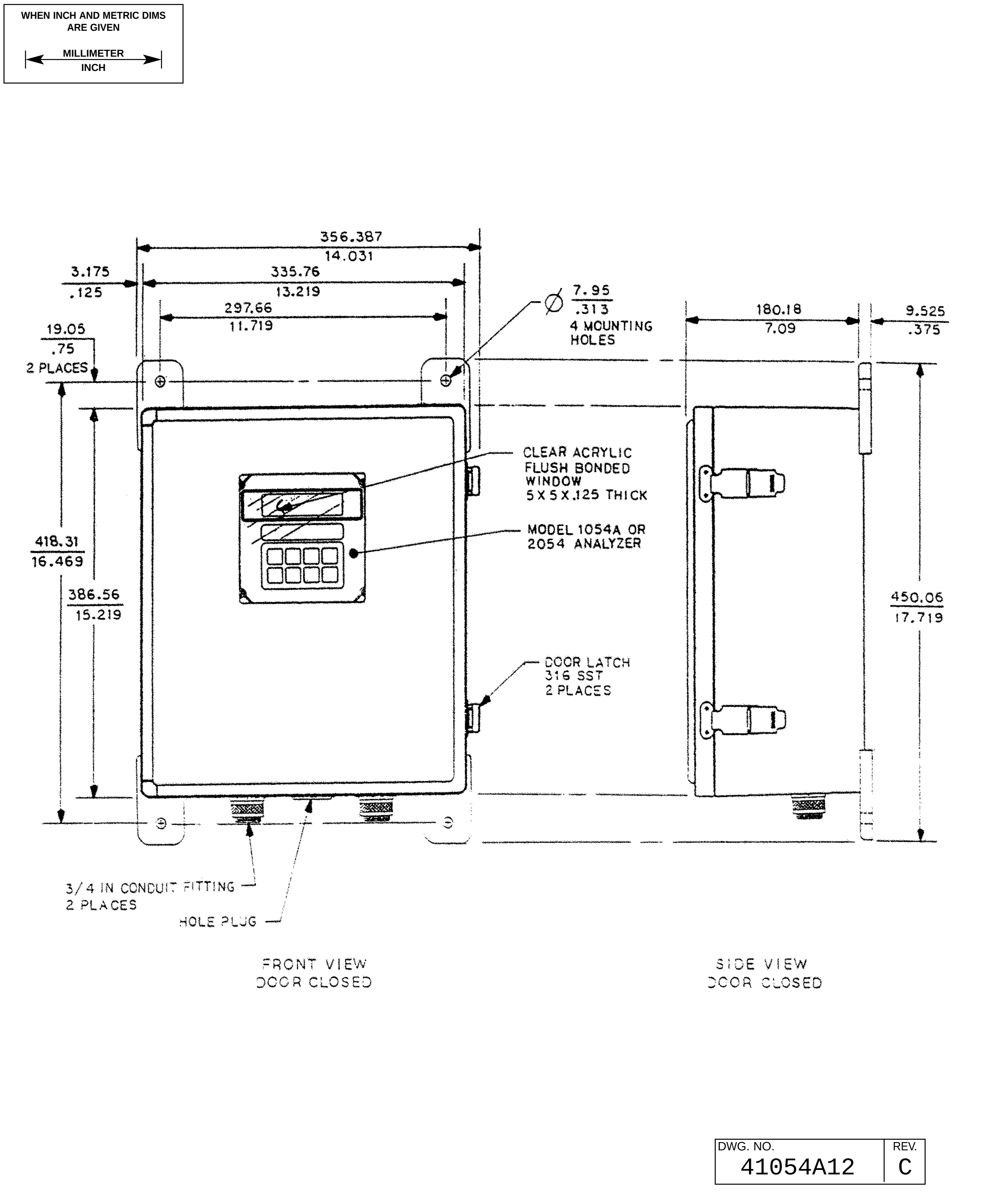



**FIGURE 2-8. Wall Mount Enclosure**

# SECTION 3.0
# DESCRIPTION OF CONTROLS

**3.1 KEYBOARD FUNCTIONS.** All operations of the Model 1054 A C microprocessor Analyzer are controlled by the 8 keypads on the front of the instrument. These keypads are used to :

1. Display parameters other than the primary parameter.
2. Edit setpoints for alarms, set up specific output current value for simulation, calibrate temperature, conductivity, etc.
3. Configure display for temperature units, for automatic temperature compensation, alarm usage, setting timer functions, security, and output range.

To view, and not change parameters, other than the primary parameter requires only a simple keystroke routine. As shown in Figure 3-1, a single keypress accesses the lower function printed on the keypad. Quick, double keypresses access the top function printed on the keypad.

To edit any of these parameters, requires one more operation. After displaying the value associated with the parameter selected, press the SELECT keypad. As seen in Figure 3-2, this will display the numerical value, and the first digit will be flashing to indicate this value may be edited.

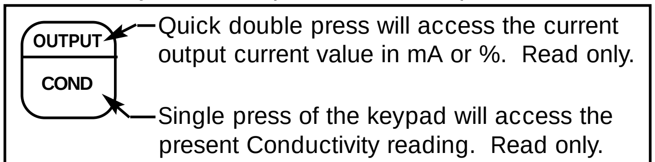



**FIGURE 3-1.** Function Select on Keypad.

All changes to the operating program that set-up the instrument display are made through the set menu program. See Figure 3-5 at the end of this section.

ZERO / ALARM 1

1 .Press Key twice.
2. Lo shows briefly.
3. Zero point is displayed.

◄ SELECT

1. Press Key.
2. Adj shows briefly.
3. Numbers show with digit flashing.

**FIGURE 3-2**. Accessing Editing Function.

Configuration is all accomplished through a series of menus located within the set mode menu. To access these set mode menus the ACCESS keypad is pressed TWICE in RAPID succession.

1. Press twice in rapid succession. — ACCESS / ENTER
2. See SEt on display. Confirms entry into set mode menu. — SEt
3. First menu item is displayed. Analyzer now ready to configure. — Cin
4. Use the SCROLL keypad to rotate through the available menus. — ▲

**FIGURE 3-3**. Accessing Configuration Menus

Once inside the Set mode menu, use the scroll keypad to scroll through the menu list. When the menu desired is displayed, release the scroll keypad.

To enter the submenus press the SELECT keypad. If the submenu allows editing, the item will flash that can be edited. If not, use the scroll keypad to scroll through the next list of submenus . SELECT will enter this submenu and if it is editable, the field will flash.

To exit the menu and SAVE the new value, press the ENTER keypad.

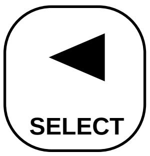
To exit the menu without saving the edited value, press the COND keypad to jump out of the set menu program with out saving value. To change other parameters will require re-entering the set menu program.

Figure 3-4 explains the various fields surrounding the Primary process on the LC display.

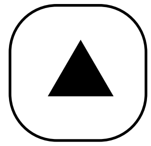
Table 3-1 describes the functions accessible with the 8 keypads, the number of times to press the keypad to access, and its' function when used with the select keypad and set menu.

Table s 3-2 and 3-3 describe the meaning of the various mnemonics used on the display. They are categorized by their use in either menus, or as process information.

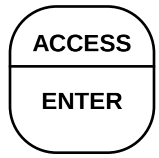
**3.1.1 Item Selection and Value Adjustment Keys.** The three keys located on the lower right side of the keypad are used for menu navigation, value adjustment and entry, and item selection. These keys perform the following functions:




**A. SELECT/Shift (Ô) Key.** This key is used to select the displayed menu, or for shifting to the next digit in the Numeric Display.



**B. SCROLL Key (▲).** This key is used to scroll through menu when selected, or scroll through digits on the active (flashing) Numeric Display, or move the decimal point and µS/mS display. Holding key down auto scrolls display.




**C. ACCESS/ENTER Key.** This key is used to **ACCESS** the Set Mode (Section 4.1.2) and to **ENTER** the displayed value into memory (from Numeric Display).

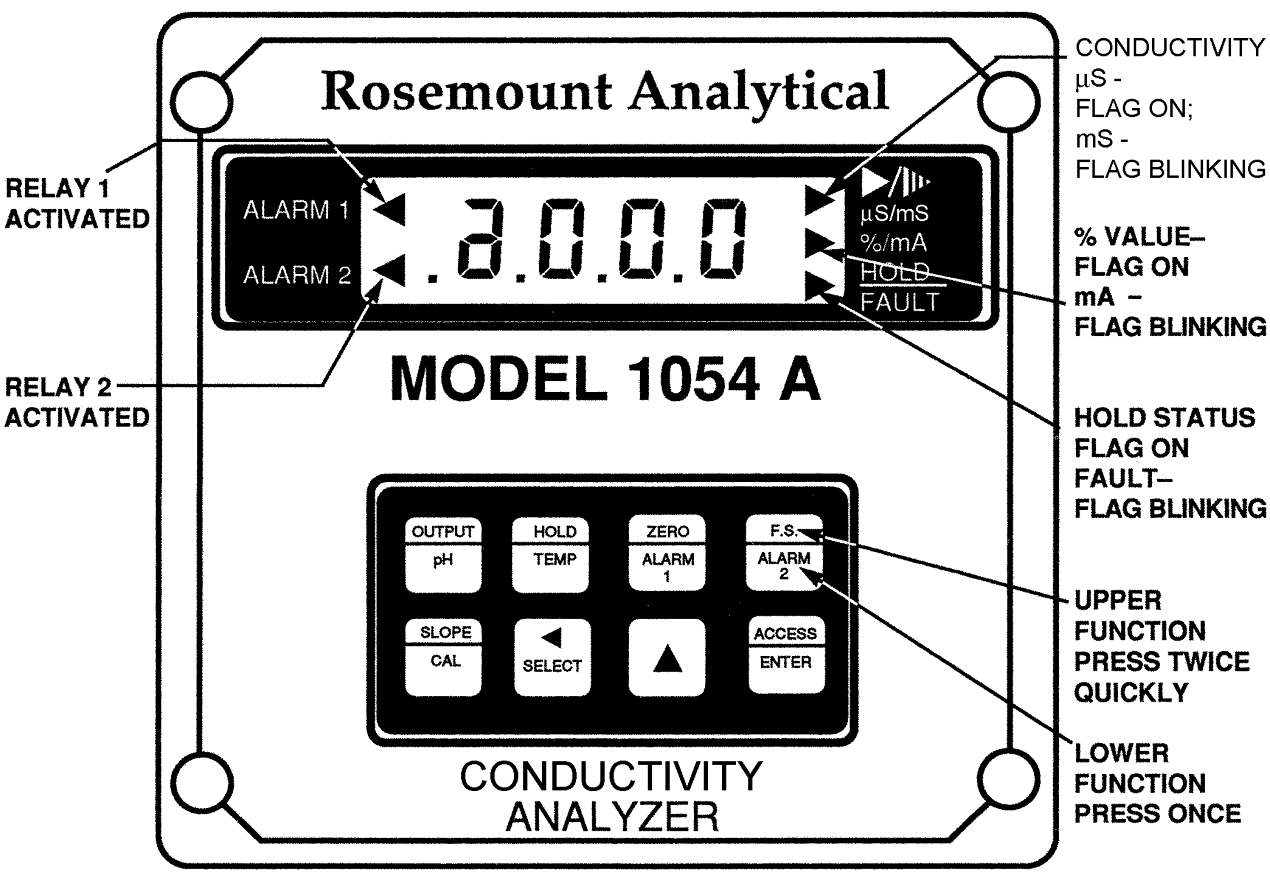



**FIGURE 3-4. LCD Display**

## TABLE 3-1. Key Description

| Key | MAIN FUNCTION (PRESS ONCE) | SECOND FUNCTION (PRESS TWICE QUICKLY) |
|---|---|---|
| OUTPUT / COND | Displays - conductivity.<br><br>Set Function (w/SELECT) - One point standardization of conductivity. | Displays - current output (mA or % full scale).<br><br>Set Function (w/SELECT) - Simulates current output. |
| HOLD / TEMP | Displays - process temperature (ÞC or Þ F).<br><br>Set Function (w/SELECT) - One point standardization of temperature. | Initiates or removes analyzer from hold condition. |
| ZERO / ALARM 1 | Displays - Alarm 1 setpoint.<br><br>Set Function (w/SELECT) - Sets Alarm 1 setpoint. | Displays - low current setpoint.<br><br>Set Function (w/SELECT) - Sets low current point. |
| F.S. / ALARM 2 | Displays - Alarm 2 setpoint.<br><br>Set Function (w/SELECT) - Sets Alarm 2 setpoint. | Displays - full scale output setpoint.<br><br>Set Function (w/SELECT) - Sets full scale output point. |
| SLOPE / CAL | Two Point temperature slope calibration. | Displays - temperature slope in percent.<br><br>Set Function (w/SELECT) - manually sets temperature slope. |

| Key | Function |
|---|---|
| ◀ SELECT | Select sub menu (mnemonic display).<br>Shift to next digit (numeric display). |
| ▲ | Scroll through menu (mnemonic display).<br>Scroll digits (numeric display).<br>Scroll decimal position, µS/mS display.<br>Holding key down auto scrolls the main set menu and each digit in the numeric display. |
| ACCESS / ENTER | Press twice to access set-up menu.<br>Enter displayed value into memory.<br>Enter displayed menu item (flashing) into memory. |

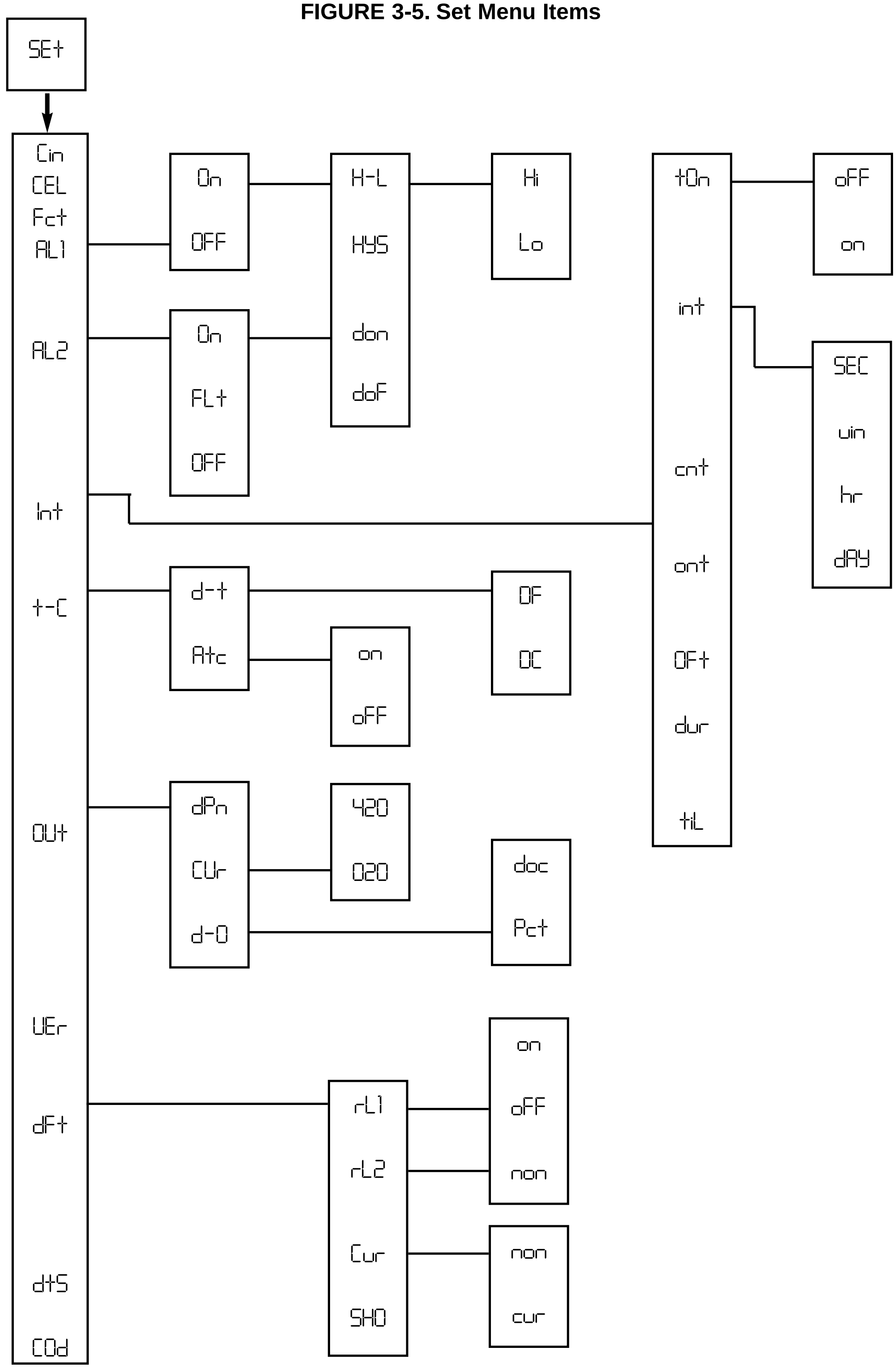
**TABLE 3-2. Information Mnemonics**

| MNEMONIC | DESCRIPTION |
|---|---|
| AdJ | Adjustment to value reading |
| bAd | Incorrect entry |
| Con | Conductivity Display |
| dOC | Displays conductivity output (mA) |
| HLd | Analyzer in Hold Position |
| HI | Displays high range value for current output |
| itr | Interval timer activated |
| LO | Displays low range value for current output |
| LOC | Access locked – enter security code |
| Pct | Displays conductivity output (percent) |
| SEt | Set mode |
| S iP | Simulates current output (percent) |
| S iC | Simulates current output (mA) |
| SLP | Displays temperature slope in percent |
| SP1 | Displays Alarm 1 setpoint |
| SP2 | Displays Alarm 2 setpoint |
| Std | Standardize conductivity |
| tP1 | Calibration Point 1 |
| tP2 | Calibration Point 2 |

**TABLE 3-3. Set Function Mnemonics**

| | | | | | |
|---|---|---|---|---|---|
| AL1 | Alarm 1 setup | don | Delay on time | ont | Timer on time |
| AL2 | Alarm 2 setup | dPn | Dampen output | on | Relay closed on fault |
| Atc | Automatic temp. comp. | dtS | LCD/LED Display test | On | Use alarm as process alarm |
| CEL | Cell Constant | dur | Timer duration | OFt | Timer off time |
| OC | Temperature ÞC | OF | Temperature ÞF | OUt | Current output |
| Cin | Display Sensor input | Fct | Calibration Factor | Pct | Display output in percent |
| COd | Security Code | FLt | Use alarm as fault alarm | rL1 | Relay 1 fault setup |
| cnt | Timer count | Hi | Relay action - high | rL2 | Relay 2 fault setup |
| CUr | Config. current output | H-L | Alarm logic | SEC | Seconds |
| Cur | Config. fault output | Hr | Hours | SHO | Show fault history |
| cur | Default current setpoint | HYS | Hysteresis | t-C | Temperature config. |
| dAY | Days | int | Interval period | tiL | Timer - time remaining |
| dFt | Fault Configuration | Int | Timer setup | tOn | Timer status |
| d-O | Display output | Lo | Relay action - low | UEr | User version |
| d-t | Display temperature | non | No action on fault | uin | Minutes |
| doc | Display output in mA | oFF | Relay open on fault | 420 | 4mA to 20mA output |
| doF | Delay off time | OFF | Alarm not used | 020 | 0mA to 20mA output |

FIGURE 3-5. Set Menu Items



# SECTION 4.0
# CONFIGURATION

**4.1 GENERAL.** This section details all of the items available in the Set Mode to configure the analyzer to a specific application.

**4.1.1. Configuration Worksheet.** The configuration worksheet on page 19 should be filled out before proceeding with the analyzer's configuration. This sheet gives a brief parameter description, the factory setting, and a space for user setting.

**4.1.2 Set Mode Display Mnemonic** "SEt"**.** Most of the analyzer's configuration is done while in the Set Mode. Please refer to Figure 4-1 for the layout of all menu items. All menu variables are written to the analyzer's EEPROM (memory) when selected and remain there until changed. As these variables remain in memory even after the analyzer's power is removed, the analyzer configuration may be performed prior to installing it.

1. Power up the analyzer. Only power input wiring is required for analyzer configuration (Refer to Section 2.4.1). The analyzer's display will begin showing values and/or fault mnemonics. All fault mnemonics will be suppressed while the analyzer is in Set Mode (the fault flag will continue to blink).

2. Enter Set Mode. Pressing the **ACCESS** key twice in rapid succession will place the analyzer in Set Mode. The display will show "SEt" to confirm that it is in Set Mode. It will then display the first item in the set menu "Cin.'' The analyzer is now ready for user configuration.

**NOTE:**
If "LOC" displays, the Keyboard Security Code must be entered to access the Set Mode. (Refer to Section 6.0.)

3. Analyzer variables can be entered in any order. On initial configuration, however, it is recommended that the variables be entered in the order shown on the worksheet. Refer to the configuration worksheet (Table 4-1). This will reduce the chance of accidentally omitting a needed variable.

**TABLE 4-1.**
**CONFIGURATION WORKSHEET**

Use this worksheet to assist in the configuration of the analyzer. Date: ________________

| | RANGE | FACTORY SET | USER SET |
|---|---|---|---|
| **A. Alarm 1 Setup (AL1)** | | | |
| 1. Alarm Configuration (On/OFF) | | On | ________ |
| 2. High or Low (H-L) (Hi/Lo) | | Lo | ________ |
| 3. Hysteresis (HYS) | 0-25 % of setpoint | 0.00% | ________ |
| 4. Delay Time On (don) | 0-255 sec. | 000 Seconds | ________ |
| 5. Delay Time Off (doF) | 0-255 sec. | 000 Seconds | ________ |
| **B. Alarm 2 Setup (AL2)** | | | |
| 1. Alarm Configuration (On/FLt/OFF) | | On | ________ |
| 2. High or Low (H-L) (Hi/Lo) | | Hi | ________ |
| 3. Hysteresis (HYS) | 0-25 % of setpoint | 0.00% | ________ |
| 4. Delay Time On (don) | 0-255 sec | 000 Seconds | ________ |
| 5. Delay Time Off (doF) | 0-255 sec | 000 Seconds | ________ |
| **C. Interval Timer (Int)** | | | |
| 1. Active Status (tOn) (oFF/on) | | oFF | ________ |
| 2. Interval Time (int) | minimum 10 minutes | 1 Day | ________ |
| 3. Count (cnt) | 1 to 60 | 5 | ________ |
| 4. On Time (ont) | 0 to 299.9 sec | 1 Second | ________ |
| 5. Off Time (OFt) | 0 to 299.9 sec | 1 Second | ________ |
| 6. Duration (dur) | 0 to 299.9 sec | 2 Seconds | ________ |
| **D. Temperature Setup (t-C)** | | | |
| 1. Display Temperature (d-t) (OC/OF) | | OC | ________ |
| 2. Automatic Temperature Compensation (Atc) (on/oFF) | | on | ________ |
| a. Manual Temp. Value | -20ÞC to 200ÞC | | ________ |
| **E. Current Output Setup (OUt)** | | | |
| 1. mA Output (CUr) (020/420) | | 420 | ________ |
| 2. Display Current Output (d-O) (Pct/doc) | | doc | ________ |
| 3. Dampen Current Output (dPn) | 0-255 sec. | 0.0 Seconds | ________ |
| **F. Default Setup (dFt)** | | | |
| 1. Relay 1 Default (rL1) (non/oFF/on) | | non | ________ |
| 2. Relay 2 Default (rL2) (non/oFF/on) | | non | ________ |
| 3. Current Output Default (Cur) (non/cur) | | non | ________ |
| **G. Keyboard Security Setup (COd)** | | | |
| 1. Keyboard Security Required | 001-999 | _ | ________ |
| 2. Keyboard Security Not Required | 000 | 000 | ________ |
| **Alarm Set Points** | | | |
| 1. Alarm 1 (SP1) | 0-1999 mS | 0.00 mS | ________ |
| 2. Alarm 2 (SP2) | 0-1999 mS | 1,000 mS | ________ |
| **Current Output** | | | |
| 1. Zero (0 or 4 mA) (Lo) | 0-1,000 mS | 0.00 mS | ________ |
| 2. F.S. (20 mA) (HI) | 0-1,000 mS | 1,000 mS | ________ |

**4.2. ALARM 1 AND 2.** Display Mnemonic "AL1" or "AL2". Used to set alarm relay logic. The alarms may be used to perform on-off process control. See note below.

**A. ON.** Display Mnemonic "On". Select this item if Alarm 1 or 2 is to be used as a process alarm. See Steps D through G for further configuration.

**B. OFF.** Mnemonic "OFF". Select this item if alarm 1 or 2 will not be used or to temporarily disable the alarm. Alarm 1 or 2 setpoint will display "oFF" if this item is selected. Omit Steps D through G.

**C. Fault.** Display Mnemonic "FLt". (Alarm 2 only). Select to make Alarm 2 a fault alarm. Relay 2 will energize when the unit shows a fault condition. See Table 8-1 for a listing of the fault mnemonics and their descriptions. Alarm 2 setpoint will display "At" if this item is selected. Omit Steps D through G.

**D. Alarm Logic.** Mnemonic "H-L". Select this item for high or low alarm logic. High logic activates the alarm when the reading is greater than the set point value. Low logic activates the alarm when the reading is less than the set point value.

**E. Relay Hysteresis.** Display Mnemonic "HYS". Sets the relay hysteresis (dead band) for deactivation after reading has passed the alarm set point. May be set from 0 to 25%. Use hysteresis when a specific conductivity should be reached before alarm deactivation.

**F. Delay Time On.** Display Mnemonic "don". Sets time delay for relay activation after alarm set point is reached. May be set from 0 to 255 seconds.

**G. Delay Time Off.** Display Mnemonic "doF". Sets time delay for relay deactivation after alarm set point is reached. May be set from 0 to 255 seconds. Alarm state restarts time from zero. Use when a fixed time should pass before relay deactivation occurs.

**NOTE**

Alarm logic may be changed from normally open (N.O.) to normally closed (N.C.). by cutting bowties on the power supply PCB and adding a jumper between W4 and W5, and or W6 and W7, and or W8 and W9.

**4.2.1 Alarm Configuration (AL1/AL2).** Refer to Figure 4-1.

1. Enter Set Mode by pressing **ACCESS** key twice.
2. **SCROLL** (▲) until "AL1" or "AL2" appears on the display.
3. **SELECT** to move to the next menu level. "On", "OFF" or (AL2 only) "FLt" will display.
4. **SCROLL** (▲) to display desired item then **SELECT**.
5. If "OFF" is selected, display will show "oFF" to acknowledge. Press **ENTER** key to return to "AL1" or "AL2", concluding routine. Skip to Step 11.

   If "On" is selected, display will show "on" to acknowledge, then display "H-L". Proceed to Step 6.

   If "FLt" is selected, display will show "Flt" to acknowledge. Press **ENTER** key to return to "AL2".
6. **SELECT** "H-L". "Hi" or "Lo" will display (flashing).
7. **SCROLL** (▲) to the desired item and ENTER it into memory. Display will return to "H-L". If changes to relay activation logic are desired, proceed to Step 8, otherwise Step 12.
8. **SCROLL** (▲) to display "HYS", "don" or "doF" then **SELECT** desired item. Numerical display will flash to indicate that a value is required.
9. Use **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value.
10. **ENTER** value into memory. The analyzer will acknowledge and return to display of last item selected. Repeat Step 8 if further changes are desired, otherwise Step 12.
11. Repeat Step 3 for the other Alarm's settings as required.
12. To return to the first level of the Set Mode, Press the **ACCESS** key.

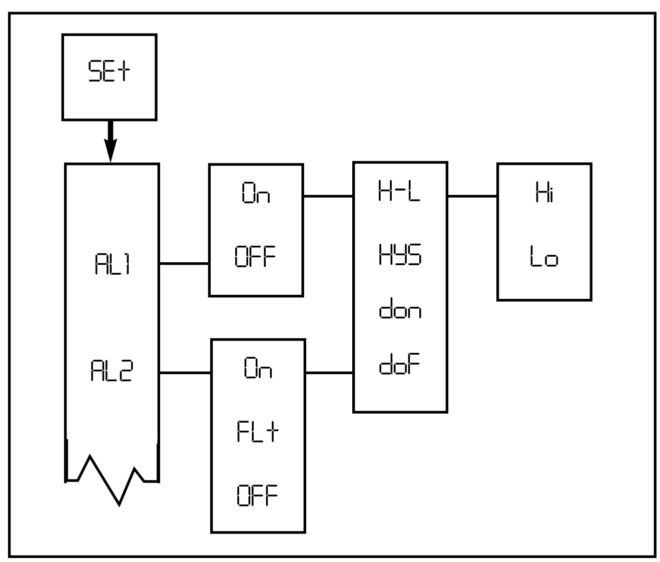



**Figure 4-1.** Alarm 1 and Alarm 2 Configuration

**4.3 INTERVAL TIMER.** Display Mnemonic “Int”. This item is used to set the interval timer's relay logic. The timer can be used for sensor maintenance, such as a wash cycle to clean the sensor in a bypass line. Choices are:

**A. Interval Timer Enable/Disable**. Display Mnemonic “tOn”. Select this item to begin interval cycle “on” or disable interval cycle “oFF”.

**B. Interval Period.** Display Mnemonic “int”. Select this item to set the time period between control cycles. “SEC” for seconds, uin” for minutes, hr for hours, and “dAY” for days. May be set from a minimum of 10 minutes.

**C. “On” Periods Per Cycle.** Display Mnemonic “cnt”. Select this item to enter the number of on periods per cycle. May be set from 1 to 60 on periods.

**D. Duration of “On” Periods.** Display Mnemonic “ont”. Select this item to enter the relay activation time for each on period. May be set from 0.1 to 299.9 seconds.

**E. Duration of “OFF” Periods.** Display Mnemonic “OFt”. Select this item to enter the relay deactivation time between each “on” period during the control cycle. Valid when “cnt” is 2 or greater. May be set from 0 to 299.9 seconds.

**F. Sensor Recovery Time.** Display Mnemonic “dur”. Select this option to enter the duration time after the last “on” period in a cycle. May be set from 0 to 299.0 seconds. The wait duration can be used for electrode recovery after a wash cycle.

**G. Interval Time remaining**. Display Mnemonic “tiL”. Select this item to display the time remaining to the next control cycle. If selected during the control cycle, display will show "---".

**NOTE**

The Model 1054A is placed *on hold* during the control cycle (from first “on” period through the wait duration). The analyzer will simulate a fault condition and briefly show “itr” every eight seconds. The display will continue to show the measured value.

**4.3.1 Interval Timer Configuration (Int).** Refer to Figures 4-2 and 4-2A.

1. Enter Set Mode by pressing **ACCESS** Key twice.
2. **SCROLL** (▲) until “Int” appears on the display.
3. **SELECT** to move to the next menu level. “tOn”. will display.

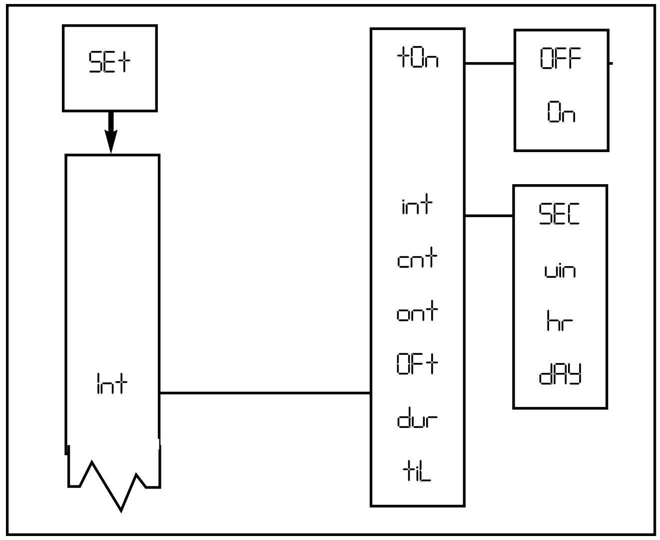



**Figure 4-2.** Interval Timer Configuration

4. **SCROLL** (▲) to display “on” or “oFF” and **ENTER** it into memory. If interval configuration is required, proceed to Step 5, otherwise Step 10.
5. **SCROLL** (▲) to display desired menu item. If “int” is selected, go to Step 6, otherwise Step 10.
6. **SCROLL** (▲) to display desired interval period and **SELECT** it. Numerical Display will flash.
7. **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value and **ENTER** it into memory. Display will return to interval period menu.
8. Repeat Steps 6 and 7 as needed.
9. Press the **ENTER** key to return to the main timer menu.
10. **SELECT** the desired item. The Numerical Display will flash.
11. **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value and **ENTER** it into memory.
12. Repeat Steps 5, 10, and 11 as required.
13. Press the **ENTER** key to return to Set Menu.

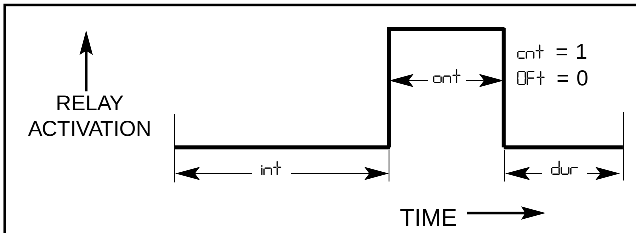



**FIGURE 4-2A.** Timer Diagram for One Cycle

**4.4 TEMPERATURE.** Display Mnemonic “t-C”. Select this item for temperature reading and compensation choices.

**A. Temperature Display.** Display Mnemonic “d-t”. Select this item to toggle between ÞF and ÞC temperature display. The analyzer will show all temperatures in units selected until the selection is changed.

**B. Automatic Temperature Compensation.** Display Mnemonic “Atc”. The analyzer will use the temperature input from the sensor for temperature correction when “on” is selected. When “oFF” is selected, the analyzer will use the value entered by the user for temperature correction. This manual temperature option is useful if the temperature sensor is faulty or not on line. Temperature specific faults will be disabled (refer to Section 1.2).

**4.4.1 Temperature Configuration t-C.** Refer to Figure 4-3.

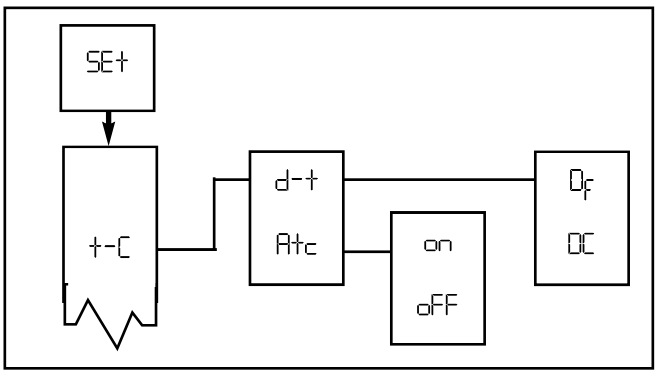



**Figure 4-3.** Temperature Configuration

1. Enter Set Mode by pressing **ACCESS** key twice
2. **SCROLL** (▲) until “t-C” appears on the display.
3. **SELECT** to move to the next menu level. “d-t” will display.
4. **SCROLL** (▲) to display desired item then **SELECT** it.
5. If “d-t” is selected, display will show “OC” or “OF”.

   If “Atc” is selected, display will show “on” or “oFF”.
6. **SCROLL** (▲) then **ENTER** desired item into memory.
7. If “OC”, “OF” or “on” are entered, display will return to the previous level (proceed to Step 9).

   If “oFF” is selected, numerical display will flash indicating that a process temperature value is required (proceed to Step 8).
8. Use **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value. **ENTER** value into memory.
9. Repeat Steps 4-8 as required for other item.
10. Press the **ENTER** key to return to Set Menu.

**4.5 CURRENT OUTPUT.** Display Mnemonic is “OUt”. This item is used to configure the output signal.

**A. Output Dampening.** Display Mnemonic “dPn”. Dampens the response of the signal output. This option is useful to minimize the effect of a noisy reading. The number entered is the sample time (in seconds) for an averaged output. Zero to 255 seconds may be entered.

**B. mA Output Range.** Display Mnemonic “CUr”. Selection of this item will allow choice of 0 to 20 mA or 4 to 20 mA output range.

**C. Display Output.** Display Mnemonic “d-O”. This item is used to select logic of output display. Selecting this item will allow the analyzer to display current output as mA (“doc”) or as a percent of full scale output range (“Pct”).

**4.5.1 Current Output Configuration “OUt.** Refer to Figure 4-4.

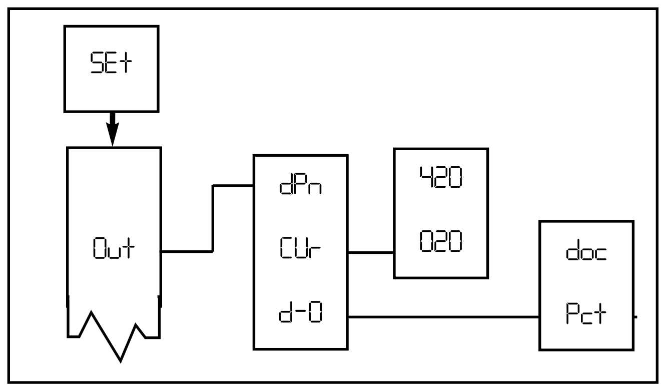



**Figure 4-4.** Current Output Configuration

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. **SCROLL** (▲) until “OUt” appears on the display.
3. **SELECT** to move to the next menu level. “dPn” will display.
4. **SCROLL** (▲) then **SELECT** desired item.
5. If “dPn” is selected, numerical display will flash indicating that a value is required (proceed to Step 6).

   If “CUr” or “d-O” is selected, proceed to Step 7.
6. **SCROLL** (▲) then **SHIFT** (Ô) to display the desired value. **ENTER** into memory
7. **SCROLL** (▲) then **ENTER** desired item.
8. Repeat Steps 4-7 as required.
9. Press the **ENTER** key to return to the Set Menu.

**4.6 DEFAULTS.** Display Mnemonic "dFt". This item is used to set the configuration of relays and output default conditions during fault or hold status. See Table 8-1 for a listing of the possible fault conditions which can be diagnosed by the analyzer. A hold status is initiated by pressing the **HOLD** key twice. (Press twice again to remove the hold.)

**A. Relay 1 and 2.** Display Mnemonic "rL1" and "rL2". The relays can be set to activate "on", deactivate "oFF", or hold present status "non". See Table 4-2.

**B. Current Output.** Display Mnemonic "Cur".The current output is held "non" or goes to a specified value "cur" during a fault condition. "cur" will probably be the most informative selection.

**C. Fault History.** Display Mnemonic "SHO". Selecting this item will display the most recent detected faults. Press the **SCROLL** key once for each previous fault history. Pressing **ACCESS** will clear "SHO" history.

**4.6.1 Default Configuration (dFt).** "dFt" Refer to Figure 4-5.

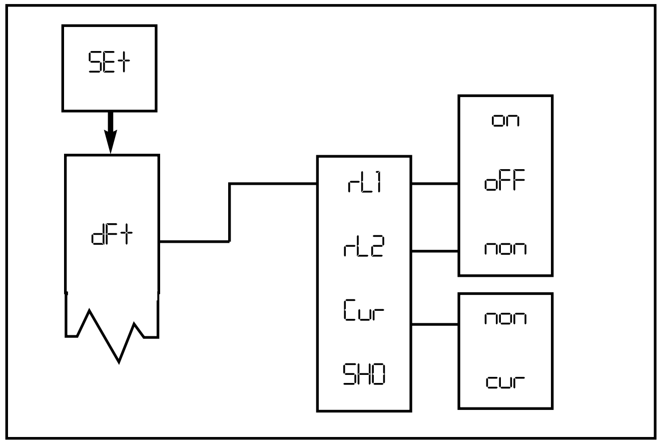



**Figure 4-5.** Default Configuration

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. **SCROLL** (▲) until "dFt" appears on the display.
3. **SELECT** to move to the next menu level. "rL1" will display.
4. **SCROLL** (▲) then **SELECT** desired item.
5. Display will show next item selection. **SCROLL** (▲) and **ENTER** desired item.
6. Repeat Steps 4 and 5 as required for other default settings "rL2" and "Cur". If "cur" is selected for "Cur", press **ENTER** then use the **SCROLL** (▲) and **SHIFT** (Ô) keys to enter the desired current value in mA.
7. Press the **ENTER** key to return to Set Menu.

**TABLE 4-2. Relay States for Various Conditions and Alarm/Default Configurations**

| Set Menu default (dFt) setting rL1/rL2 | ANALYZER CONDITION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | NORMAL | | | HOLD | | | FAULT | | |
| | Set menu AL1/AL2 setting | | | Set menu AL1/AL2 setting | | | Set menu AL1/AL2 setting | | |
| | On | OFF | FLt (Alarm 2 only) | On | OFF | FLt (Alarm 2 only) | On | OFF | FLt (Alarm 2 only) |
| on | Proc. det. | – | – | + | – | – | + | – | + |
| off | Proc. det. | – | – | – | – | – | – | – | + |
| non | Proc. det. | – | – | Proc. det. | – | – | Proc. det. | – | + |

**Proc. det.:** Alarm state is determined by the process value.
**+** **:** Relay will activate.
**–** **:** Relay will not activate.

**Example:** If you want the analyzer to activate relay 1 in hold mode during calibration, set "AL1" to "On" in Section 4.3, and set "rL1" to "on".

**4.7 ALARM SETPOINT.** The alarm setpoints should be adjusted after completing the configuration procedure outlined in Sections 4.1 to 4.6. (Refer to Figure 4-7.)

1. Press the **COND** key to ensure that the analyzer is not in Set Mode.

2. Press the **ALARM 1** or **ALARM 2** key. “SP1” or “SP2” will show briefly, followed by the Alarm 1 or Alarm 2 Setpoint.

**NOTE:**

If the alarm is set to OFF or FAULT (Alarm 2 only), the analyzer will display “oFF” or “At” respectively. (Refer to Section 4.2, Alarm Configuration.)

3. Press **SELECT** to adjust the value. The display will acknowledge briefly with “AdJ” followed by the Numeric Display with digit flashing.

4. **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value.

5. **ENTER** value into memory.

6. Repeat Steps 2 to 5 for the second setpoint.

**NOTE**

Selection of µS/mS and decimal positions is achieved by pressing **SHIFT** (Ô) until the µS/mS flag flashes, then **SCROLL** (▲) until the desired combination of decimal position and mS (quick flashing)/µS (slow flashing) flag are displayed.

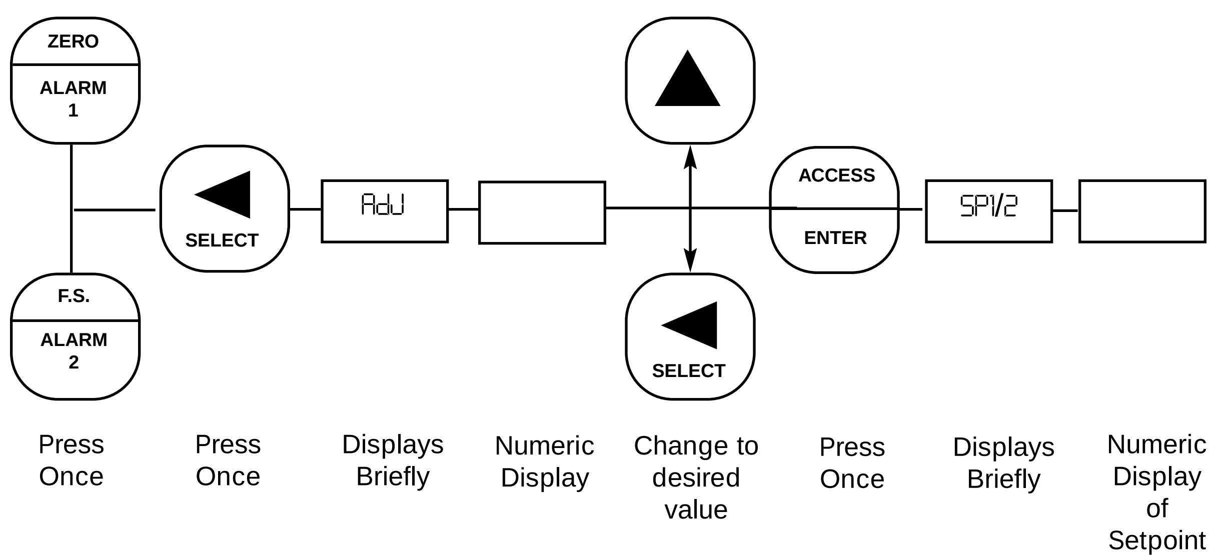



**FIGURE 4-7. Alarm Setpoint**

**4.8 OUTPUT SCALE EXPANSION.** This section should be followed if it is desired to scale the current output range other than the factory setting of 0-20 millisiemen. The output zero and full scale value should be adjusted after completing the configuration procedure as outlined in Sections 4.1 to 4.6. (Refer to Figure 4-8.)

**A. ZERO POINT (0 mA or 4 mA)** "LO"

1. Press the **COND** key to ensure that the unit is not in Set Mode.

2. Press the **ALARM 1** key twice. The display will show "LO" briefly then display the ZERO point.

3. Press **SELECT** to adjust the value. The display will acknowledge briefly with "AdJ" followed by the Numeric Display with digit flashing.

4. **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value.

5. **ENTER** value into memory. The display will show "LO" and display the entered value.

**B. Full Scale (F.S.) Point (20 mA)** "HI"

1. Press the **COND** key to ensure that the analyzer is not in Set Mode.

2. Press the **ALARM 2** key twice. The display will show HI briefly then display the FULL SCALE point.

3. Press **SELECT** to adjust the value. The display will acknowledge briefly with "AdJ" followed by the Numeric Display with digit flashing.

4. **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value.

5. **ENTER** value into memory. The display will show HI and display the entered value.

**NOTE**

For a reverse output, enter the higher value for zero, and the lower value for the Full Scale.

**NOTE**

Selection of µS/mS and decimal positions is achieved by pressing **SHIFT** (Ô) until the µS/mS flag flashes, then **SCROLL** (▲) until the desired combination of decimal position and mS (quick flashing)/µS (slow flashing) flag are displayed.

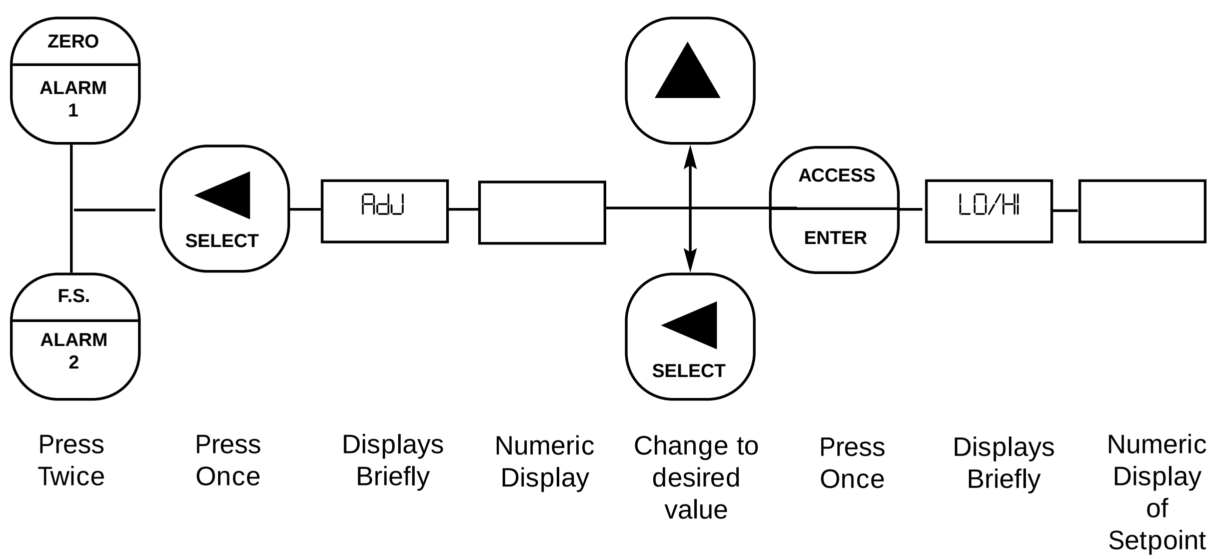



**FIGURE 4-8. Output Scale Expansion**

**4.9 SIMULATE CURRENT OUTPUT.** The output can be simulated to check the operation of devices such as valves, pumps, or recorders. The output can be simulated in either current (mA) or percent of full scale, depending on how the output display "d-O" was configured in Section 4-5. (Refer to Figure 4-9.)

**A. Simulate Output in Percent** "SiP". The output can be simulated in percent if "d-O" in Section 4.5 was configured to display percent "Pct".

1. Press the **COND** key once to insure that the analyzer is not in the Set Mode.
2. Press the **OUTPUT** key twice. The display will show "Pct" briefly, then display the output value in percent of full scale.
3. Press **SELECT** to simulate the output. The display will briefly acknowledge with "SiP" followed by the Numeric Display with digit flashing.
4. **SCROLL** (▲) and **SHIFT** to display the desired value.
5. **ENTER** value into memory. The display will show "Pct" and display the entered value. Also, the display will flash to acknowledge that the analyzer is placed on hold "HLd". In hold mode the relays will be set as determined in Section 4-6.
6. To remove the analyzer from hold, press the **HOLD** key twice. The hold flag on the display will be removed and the display will stop flashing.

**B. Simulate Output in Current** "SiC". The output can be simulated in mA units if "d-O" in Section 4.5 was configured to display current "doc".

1. Press the **COND** key once to insure that the analyzer is not in the Set Mode.
2. Press the **OUTPUT** key twice. The display will show "dOC" briefly, then display the output value in mA.
3. Press **SELECT** to simulate the output. the display will briefly acknowledge with "Sic" followed by the Numeric Display with digit flashing.
4. **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value.
5. **ENTER** value into memory. The display will show "dOC" and display the entered value. Also, the display will flash to acknowledge that the analyzer is placed on hold "HLd". In hold mode the relays will be set as determined in Section 4-6.
6. To remove the analyzer from hold, press the **HOLD** key twice. The hold flag on the display will be removed and the display will stop flashing.

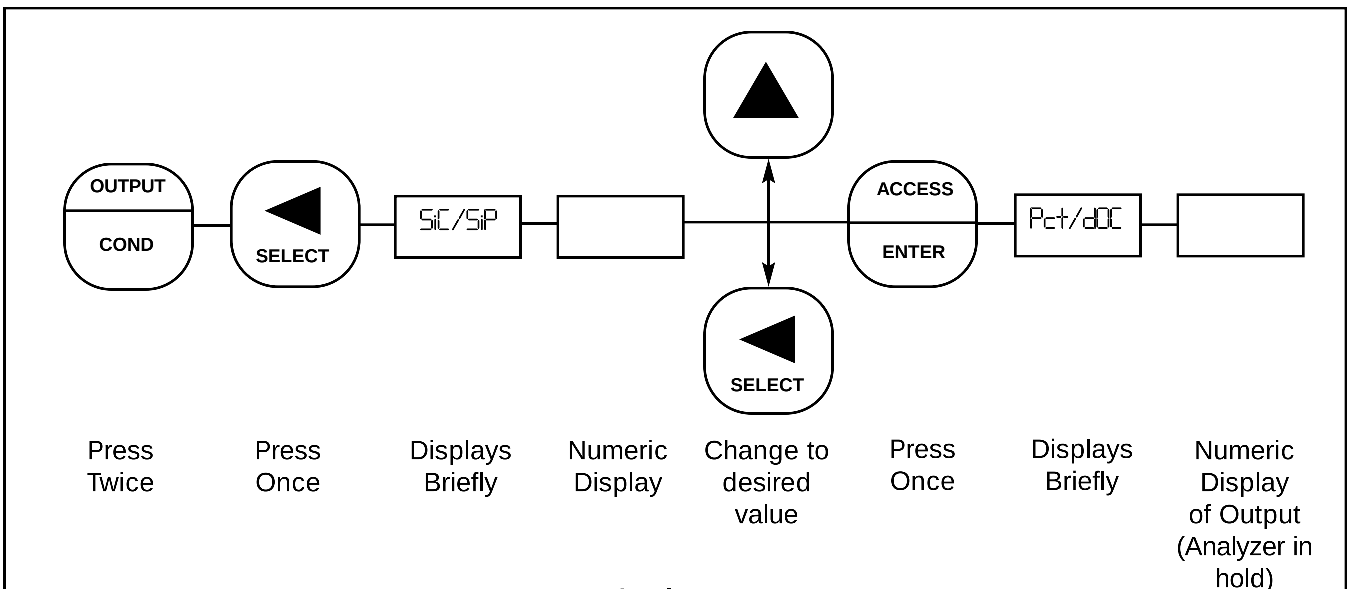



**FIGURE 4-9. Simulate Current Output**

# SECTION 5.0
# START-UP AND CALIBRATION

**5.1 START-UP AND CALIBRATION.** Calibration and operation of the Model 1054A C should begin only after completion of the configuration of the analyzer. The sensor must be wired (including J-box and interconnecting cable) as it will be in operation.

**NOTE**

**READ THE ENTIRE CALIBRATION SECTION TO DETERMINE THE CALIBRATION PLAN MOST SUITABLE FOR YOUR NEEDS.**

**5.1.1 Entering the Cell Constant.** The first time the analyzer is calibrated and any time there is a sensor change, the sensor cell constant must be entered into memory. Entering a cell constant into memory will reset the cell factor “Fct” to 1.0 and will initiate the analyzer (the cell factor gives an indication of sensor scaling. Refer to Section 8.2.6).

1. Enter the Set Mode. Press the **ACCESS** key twice in rapid succession. The analyzer will display “SEt” briefly then display “Cin”.
2. **SCROLL** (Ð) the menu until “CEL” is displayed, then **SELECT** it. The Numerical display will flash to indicate that a value is desired.
3. Use **SCROLL** (Ð) and **SHIFT** (Ô) to display the correct sensor cell constant and **ENTER** it into memory. This value can be found on the cable label, i.e.; Sensor K= 1.00.

**NOTE**

Only adjust the cell constant when the conductivity sensor is replaced or serviced. Then always perform a restandardization. See Section 5.1.4.

**5.1.2 Temperature Calibration.** For accurate temperature correction, the temperature reading may need adjusting. The following steps must be performed with the sensor in the process or in a grab sample. For the most accurate results, standardization should be performed at or near operating temperature.

1. Observe the analyzer temperature reading by pressing the **TEMP** key. Allow the reading to stabilize to insure that the sensor has acclimated to the process temperature.
2. Compare the analyzer reading to a calibrated temperature reading device. If the reading requires adjusting, proceed to Step 3, otherwise, go to Section 5.1.3.
3. Press the **TEMP** key then the **SELECT** key to correct the temperature display. The analyzer will display “AdJ” briefly, then the Numeric Display will show with digit flashing.
4. **SCROLL** (Ð) and **SHIFT** (Ô) to display the correct value and **ENTER** it into memory. Proceed to Section 5.1.3.

**5.1.3 Initial Loop Calibration.** Please read the entire calibration section before proceeding to determine the best plan to follow.

**A. Two Point Calibration -** Standard Method. This is the recommended procedure for the initial calibration if the process's temperature slope is unknown. If any of the steps below are impossible or impractical, refer to the alternate Section 5.1.3 B.

1. Obtain a grab sample of the process to be measured.
2. Determine the sample's conductivity using a calibrated bench or portable analyzer. The analyzer must be able to reference the conductivity to 25ÞC, or the solution must be measured at 25ÞC. **Note** the reading. Insure that the analyzer is in hold. Press the **HOLD** key twice and observe the solid flag.
3. Immerse the analyzer's sensor into the process solution. The sensor body must be held away from the bottom and sides of the sample's container and the sensor cable must not be allowed to contact the solution. Shake the sensor to ensure that no air bubbles are present.
4. Adjust the sample's temperature to either the normal high or normal low temperature of the process. To raise the sample's temperature, a hot plate with stirrer is recommended. To lower the process temperature, place the grab sample's container in an ice bath or let it slowly cool down.

**A. Two Point Calibration. (continued)**

5. Allow the sensor to acclimate to the solution. (The temperature reading should be stable.)
6. Press the **CAL** key. 1St displays briefly (if 2nd displays, press **CAL** again), then the Numeric Adjustment window displays.
7. **SCROLL** (Ð) and **SHIFT** (Ô) to display the grab sample's conductivity value at 25ÞC as noted in Step 2, then **ENTER** into memory.
8. Adjust the sample's temperature to the other normal temperature extreme of the process. To raise the sample's temperature, a hot plate with stirrer is recommended. To lower the process temperature, place the grab sample container in an ice bath.
9. Allow the sensor to acclimate to the solution. (The temperature reading should be stable.)
10. Press the **CAL** key. 1St displays briefly (If "2nd" displays, press **CAL** again), then the Numeric Adjustment window displays.
11. **SCROLL** (Ð) and **SHIFT** (Ô) to display the grab sample's conductivity value 25ÞC as noted in Step 2, then **ENTER** into memory.

The analyzer will then calculate the true cell constant and the temperature slope then return to reading conductivity. The temperature slope of the process can now be read. Press the **SLOPE** key twice. The display will show "SLP" briefly then the calculated slope for the two calibration points. Place the sensor in the process, then remove the analyzer from hold by pressing the **HOLD** key twice again.

The slope may be calculated from the following formula:

$$\text{\% SLOPE/ÞC} = \frac{\left(\dfrac{\text{Conductivity } T^{max}}{\text{Conductivity } T^{min}} - 1\right) \text{X100}}{{}^{3}T}$$

Where: Conductivity $T^{max}$ is the conductivity at the maximum process temperature, Conductivity $T^{min}$ is the conductivity at the lower process temperature, and the ³T is the difference between the maximum and minimum process temperature.

EXAMPLE:

$$\text{\% SLOPE/ÞC} = \frac{\left(\dfrac{45K}{35K} - 1\right) \text{X100}}{60\text{-}50=10} = 2.8\text{\%/ÞC}$$

**B. Single Point Calibration - Slope Known.** This is the recommended procedure for the initial calibration if the temperature slope of the process is known.

If you do not know the exact temperature slope value, but wish to approximate it, refer to the following guide. However, the conductivity reading may have reduced accuracy compared to the value if the procedure in Section A is performed.

Acids: 1.0 to 1.6% per ÞC
Bases: 1.8 to 2.2% per ÞC
Salts: 2.2 to 3.0% per ÞC
Water: 2.0% per ÞC

1. Press the **SLOPE** key twice. The analyzer will display "SLP" briefly, then show the temperature slope in memory.
2. **SELECT** to change the value. The analyzer will display "AdJ" briefly, then show the Numeric Display window.
3. **SCROLL** (Ð) and **SHIFT** (Ô) to display the proper temperature slope for the process to be measured, then **ENTER** into memory.
4. Obtain a grab sample of the process to be measured.
5. Determine the conductivity of the sample using a calibrated bench instrument or portable analyzer. The instrument must be able to reference the conductivity to 25ÞC or the solution must be measured at 25ÞC. Note the reading. Insure that the analyzer is in hold. Press the **HOLD** key twice and observe the solid flag.
6. Press the **COND** key once then press the **SELECT** key once. "Std" will display followed by the Numeric Display with digit flashing.
7. **SCROLL** (Ð) and **SHIFT** (Ô) to display the conductivity value you noted in Step 5, then **ENTER** it into memory.
8. Install the sensor in the process, then remove the analyzer from hold by pressing the **HOLD** key twice.

The analyzer will calculate the true cell constant after the initial calibration.

**5.1.4 Routine Standardization**. The sensor should be standardized routinely if it is suspected that the process might degrade or coat the sensor. When a sensor cell constant is entered CEL is set to this value and the cell factor Fct is set to 1.000. The first standardization recalculates the cell constant CEL. Subsequent standardizations will change the cell factor Fct. Refer to Section 8.2.6 for a description of the cell factor.

To perform a standardization do the following:

1. Take a grab sample which is as close to the sensor as possible. Write down the value the analyzer is reading at this time (C1).
2. Measure the conductivity of the grab sample using a calibrated bench analyzer referenced to 25ÞC/77ÞF or measured at 25ÞC. Write down this value (C2).
3. Before entering the reference value, note the value the analyzer is reading now (C3) and compare it to the value in Step 1. This accounts for the change while the grab sample is being measured.
4. Press the **COND** key once, then press **SELECT**. Std will display briefly followed by the Numeric display with flashing digit.
5. The corrected conductivity reference value may be determined by multiplying the value in Step 2 ($C_2$) by the value noted in Step 3 ($C_3$) and dividing the product by the analyzer value from Step 1 ($C_1$):

   $$\frac{C_2 \text{ x } C_3}{C_1} = C_{RV}$$

   Enter this corrected reference value in the analyzer using the **SCROLL** (Ð) and **SHIFT** (Ô) keys. Then press **ENTER**.
6. Note the cell factor value Fct. Press the **ACCESS** key twice quickly. **SCROLL** (Ð) to Fct press **SELECT** and note this value. Keep track of this value to determine a sensor cleaning schedule.

**5.1.5 Sensor Maintenance**. Before performing maintenance or cleaning of the sensor, the Model 1054A C should be placed in hold. This will place the current output and relays in the states determined in Section 4-6. Before removing the sensor from the process, press the **HOLD** key twice. The **HOLD** flag will show to indicate the hold condition.

Always reenter the cell constant and restandardize (Sections 5.1.1 and 5.1.4) after cleaning or replacement of the sensor.

Replace the sensor back into the process and press the **HOLD** key twice again to remove the analyzer from hold. The hold flag will disappear.

# SECTION 6.0
# KEYBOARD SECURITY

**6.1 KEYBOARD SECURITY.** Display Mnemonic "COd". Select this feature to display the user defined security code. Any three digit number may be used for this code. "000" will disable the security feature. This item is used to prevent accidental changes to the calibration and configuration of the analyzer. When activated, the analyzer will allow all read functions to read normally. If an attempt is made to change a value, "LOC" will display followed by the Numeric Display ready for the code to be entered. A proper code will unlock the analyzer and the analyzer will return to the last function attempted. Any incorrect value will result in "bAd" briefly displaying. The analyzer will then return to numeric display and await the entry of the code. Once unlocked, the analyzer will allow access to all functions until the analyzer is either powered down or no keystrokes are made for a period of 2 minutes. If the code should be forgotten, pressing and holding the **ACCESS** key for 5 seconds will result in display of the code. Releasing the **ACCESS** key, then pressing **ENTER** will unlock the analyzer.

**6.1.2 Keyboard Security ("COd").**

1. Enter Set Mode by pressing **ACCESS** key twice.
2. **SCROLL** (▲) until "COd" appears on the display.
3. Press **SELECT.**
4. **SCROLL** (▲) and **SHIFT** (Ô) to display the desired value, then **ENTER** it into memory.

**NOTE**

Entering "000" disables the keyboard security.

**NOTE**

Security feature will not activate until 2 minutes without keyboard activity or power is removed from the analyzer then restored.

# SECTION 7.0
# THEORY OF OPERATION

**7.1 THEORY OF OPERATION.** This section is a general description of how the analyzer operates. This section is for those users who desire a greater understanding of the analyzer's operation.

A square wave measurement circuit in the Model 1054A C Analyzer replaces the typical bridge circuit used in most conductivity analyzers, resulting in improved linearity, accuracy and a broad measurement range. The analyzer measures the absolute conductivity of the measured process. The analyzer then corrects the conductivity to 25ÞC by accurately measuring the process temperature by means of a PT-100 RTD located in the conductivity sensor. The microprocessor also adjusts the amount of correction required for temperature compensation by means of a temperature slope adjustment.

The slope may be adjusted between 0-5%/ÞC either manually via the keyboard or automatically during bench or process calibration. This slope controls the amount of correction required in the temperature compensation circuit, and is specific to the process, giving you the most accurate conductivity reading possible.

The Model 1054A C analyzer can provide conductivity measurements as low as 1 uS/cm and as high as 1000 mS/cm full scale over a process temperature range of 0 to 200ÞC.

Rosemount Analytical also offers a booklet titled "Conductance Data for Commonly Used Chemicals." This booklet includes measurement theory and conductance information for commonly used chemicals.

# SECTION 8.0
# DIAGNOSTICS AND TROUBLESHOOTING

**8.1 DIAGNOSTICS.** The Model 1054A C analyzer has a diagnostic feature which automatically searches for fault conditions that would cause an error in the measured conductivity value. If such a condition occurs, the current output and relays will act as configured in default and the fault flag and display will flash. A fault code mnemonic will display at frequent intervals. If more than one fault condition exists, the display will sequence the faults at one second intervals. This will continue until the cause of the fault has been corrected. Display of fault mnemonics is suppressed when in Set Mode. Selecting the “SHO” item will display a history of the two most recent fault conditions unless “SHO” was cleared (Refer to Section 4.6).

**NOTE**

If the analyzer is in hold and a fault occurs, the mnemonic “HLd” will display during the fault sequence.

**8.1.1 Fault Mnemonics.** Table 8-1 lists the fault mnemonics and describes the meaning of each.

**TABLE 8-1. Fault Mnemonics**

| Display | Description |
|---|---|
| “EEP” | EEPROM write error (bad EEPROM chip). |
| “CHS” | ROM failure (check sum error) (bad ROM chip). |
| “Orn” | Overrange. |
| “SEn” | Sensor line error or wire length error. |
| “COP” | Computer not operating properly. |
| tcH | High temperature compensation error. |
| tcL | Low temperature compensation error. |
| Ein | Input shorted. |
| rin | Sensor miswired. |
| FAC | Factory calibration required. |

**8.1.2 Temperature Compensation.** Table 8-2 is a ready reference of RTD resistance values at various temperatures. These are used for test and evaluation of the sensor.

**TABLE 8-2. RTD Resistance Values**

| Temperature | Resistance |
|---|---|
| **0ÞC** | **100 ohms** |
| 10ÞC | 103.90 ohms |
| 20ÞC | 107.70 ohms |
| 25ÞC | 109.62 ohms |
| 30ÞC | 111.67 ohms |
| 40ÞC | 115.54 ohms |
| **50ÞC** | **119.40 ohms** |
| 60ÞC | 123.24 ohms |
| 70ÞC | 127.07 ohms |
| 80ÞC | 130.89 ohms |
| 90ÞC | 134.70 ohms |
| **100ÞC** | **138.50 ohms** |
| 110ÞC | 142.29 ohms |
| 120ÞC | 146.06 ohms |
| 130ÞC | 149.82 ohms |
| 140ÞC | 153.58 ohms |
| **150ÞC** | **157.31 ohms** |
| 160ÞC | 161.04 ohms |
| 170ÞC | 164.76 ohms |
| 180ÞC | 168.46 ohms |
| 190ÞC | 172.16 ohms |
| **200ÞC** | **175.84 ohms** |

**NOTE**

Ohmic values are read across the T.C. element and are based on the stated values ($R_O$ ± .12%). Allow enough time for the T.C. element to stabilize to the surrounding temperature. Each 1ÞC change corresponds to a change of 0.385 ohms.

**8.2 TROUBLESHOOTING.** The Model 1054A C analyzer is designed with the state of the art microprocessor circuitry. This design incorporates programmed features that provide constant monitoring for fault conditions, and the reporting of these faults via Mnemonics on the instrument display screen. This aids in determining where to start checking for the cause of failures, and in some instances, the ability to see changes that can be used to predict future degeneration of assemblies before their complete failure.

**8.2.1 Analyzer Installation.** After completion of installation the instrument should be checked for operation. Normally this would consist of Powering up the instrument and checking for:

1. A self diagnostic fault display. Refer to Table 8-1 for brief description of problem indicated by mnemonic. Table 8-3 provides a more comprehensive problem explanation and actions that may help solve the problem.
2. A conductivity reading that is approximately correct. (Depending upon sensor installation in either air or process.) Refer to Section 8.2.2 for sensor checks.
3. Pressing several of the keypads to determine whether programming appears to be operational. Table 8-3 explains problems and actions that may be helpful in solving them.
4. Checking output for 4-20 mA output current.

**8.2.2 After Operation.** Troubleshooting this instrument after previous operation should follow normal troubleshooting procedures. Check display. If power is O.K. the display mnemonic will direct you to the basic area of malfunction (Sensor, Printed Circuit Boards, calibration, or temperature compensation).

Use Tables 8-1 and 8-3 to determine area, possible problem and actions to take to remedy fault.

**Evaluate instrument electronics.** This can be accomplished by simulating a known conductivity input and observation of instrument operation. To simulate sensor operation with known conductivity inputs, use the following procedures.

1. Disconnect the Sensor input leads from TB2-1, 3, 6, and 7.
2. Install decade box or resistor leads to TB2-1 and 3. (If decade box is not available, simulate desired conductivity input by either calculating using the formula given in Figure 8-1, or by using the Conductivity vs. resistance Table in Figure 8-1.)
3. Install a jumper between TB2-6 and 7. Check wiring with Figure 8-1.
4. Power up instrument and enter "SEt" menu.
5. Turn "Atc" to "oFF".
6. Set manual temperature compensation to 25°C (See Section 4.4 and Figure 4-4).
7. Set Cell constant to 1.0 (See Section 5.1.1).
8. Evaluate analyzer response with previous responses.

**Faulty display.** If a faulty display is suspected, enter the **SET** menu and scroll through to the "dtS" option. This option will activate all display segments. See Figure 3-1, Keyboard Overlay).

**Output Circuit Testing.** To check for problems in the output circuit, bypass the sensor input and analyzer calculations by setting a known output current and checking item driven by output current and checking the operation of valves, pumps, recorders, etc. For directions on how to set output current, refer to Section 4.9.

**8.2.2 Sensor Troubleshooting.** In addition to the sensor fault mnemonics, the analyzer can display information pertinent to determining if sensor has become coated, or if there is a conductivity versus temperature problem, or an application problem.

**Sensor Coated.** As the cell becomes coated, or affected by the process, the cell factor will change. Tracking this change in cell factor will prevent use of a sensor that has lost its sensitivity because of contamination or damage.

**CAUTION**

Standardizing the instrument results in the cell factor being returned to 1.0.

This instrument tracks the change in calculated cell factor from the initial cell factor value of 1.0 every time the unit is standardized. The cell factor should be checked and tracked to set up a regular maintenance schedule and can be seen in the following manner:

1. Press **ACCESS** key twice.
2. "SEt" will be displayed briefly followed by "Cin".
3. **SCROLL** (▲) to display "Fct" and press **SELECT**.
4. To return to normal operation, press **COND**.

**Absolute Conductivity.** As an aid in determining whether a problem exists in the conductivity section of the sensor or analyzer, or the temperature compensating circuits, the absolute conductivity (the uncorrected conductivity value, without temperature compensation) of the process can be displayed. To do so:

1. Press **ACCESS** key twice.
2. "SEt" will be displayed briefly followed by "Cin".
3. **SELECT** "Cin" to read the absolute conductivity.
4. To return to normal operation, press **COND**.

**Temperature Sensor accuracy.** If the temperature sensor in the conductivity sensor is suspect, measuring the resistance across the T.C. element and comparing the corresponding temperature reading can be used in the evaluation of the sensor. Allow enough time for the T.C. element to stabilize to the surrounding temperature. Each 1°C change corresponds to a change of 0.385 ohms.

**8.2.3 Subassembly replacement considerations.**

**CPU Board Replacement.** If a problem exists on the CPU board, and replacement is required, specific procedures included with the new board must be followed or the microprocessor will be improperly programmed. Should this occur, it will be necessary to return the analyzer to the factory for reprogramming.

**Power Board Replacement.** If it becomes necessary to replace the power board, the CPU board will need to be recalibrated following the specific procedures that are included with the power board. Failure to follow these procedures exactly will cause the microprocessor to be improperly programmed and require the return of the analyzer to the factory for reprogramming.

**TABLE 8-3. Troubleshooting Guide**

| SYMPTOM | PROBLEM | ACTION |
|---|---|---|
| "Fct" below 0.5 or above 2.0.<br>Actual range determined by user. | 1. Old or coated sensor. | 1. Clean or replace sensor. |
| Analyzer value not the same<br>as grab sample of process. | 1. Grab sample incorrect.<br><br>2. Unclear what is correct.<br>3. Analyzer out of calibration. | 1. Re-evaluate sample technique<br>and equipment.<br>2. Bench test analyzer.<br>3. Recalibrate per Start-up and<br>Calibration Section. |
| Fault code "tcH"/"tcL"/"rin". | 1. Miswire.<br><br>2. Open or shorted RTD. | 1. Check wiring between the<br>sensor and analyzer.<br>2. Replace sensor. |
| Fault code "Orn". | 1. Process conductivity<br>too high for sensor in use.<br>2. Process upset. | 1. Replace sensor with a sensor<br>which has a higher cell constant<br>(see Table 1-1).<br>2. Check for process control<br>problem. |
| Fault code "SEn". | 1. Open wire between sensor<br>and analyzer.<br>2. Cable length has been exceeded.<br>Maximum cable length 250 ft. | 1. Repair wire/check connection.<br><br>2. Locate analyzer within 250 ft.<br>of sensor. |
| Fault code "EEP". | 1. Defective EEPROM. | 1. Replace CPU PCB. |
| Fault code "CHS". | 1. Defective CPU. | 1. Replace CPU PCB. |
| No alarm relay closure. | 1. Defective power card.<br>2. Defective CPU. | 1. Replace power PCB.<br>2. Replace CPU PCB. |
| No output current. | 1. Defective power board.<br>2. Miswired. | 1. Replace power PCB.<br>2. Check for short. |
| Low output current. | 1. Circuit loading with excessive<br>resistance on output. | 1. Consult output loading limits<br>Model 1054A C specifications<br>(600 ohms max load). |
| Zero conductivity reading. | 1. Sensor miswired.<br>2. Solids coating sensor.<br>3. Open wire in sensor. | 1. Repair wire/connection.<br>2. Clean sensor.<br>3. Replace sensor or tube. |
| Fault code "Ein".<br>Very high conductivity reading. | 1. Sensor miswired.<br>2. Shorted sensor. | 1. Repair wire connection.<br>2. Replace sensor or tube. |

## TABLE 8-4. Replacement Parts

| P/N | DESCRIPTION | QUANTITY |
|---|---|---|
| 22966-00 | PCB, LCD Digital Display | |
| 23025-01 | Panel Mounting Kit | 1 |
| 23056-02 | PCB, 115V Power Supply | |
| 23056-03 | PCB, 230V Power Supply | |
| 23124-07 | PCB, CPU, Conductivity | |
| 23245-01 | PCB, LED Digital Display | |
| 23268-01 | Heater Kit, 115V, Wall Mounting Enclosure | |
| 23268-02 | Heater Kit, 230V, Wall Mounting Enclosure | |
| 23316-00 | PCB, Motherboard | |
| 23319-00 | Keyboard Overlay, Conductivity, LCD Version | |
| 23319-01 | Keyboard Overlay, Conductivity, LED Version | |
| 32934-00 | Enclosure | |
| 32936-00 | Enclosure, Rear Cover | |
| 32937-00 | Gasket, Rear Cover | |
| 9100153 | Fuse, 0.125, 2AG, 250V | 2 |
| 9100157 | Fuse, 0.1A, 3AG, 250V, Slo Blo | 2 |

## Accessories

| | |
|---|---|
| 23053-00 | Mounting Bracket, 2-inch Pipe |
| 23054-01 | Mounting Bracket, Wall, with Junction box |
| 2001492 | Stainless Steel Tag (specify marking) |

**8.2.10 Instrument Electronic Check.** This procedure will allow the operation of the analyzer to be evaluated by simulating a known conductivity input.

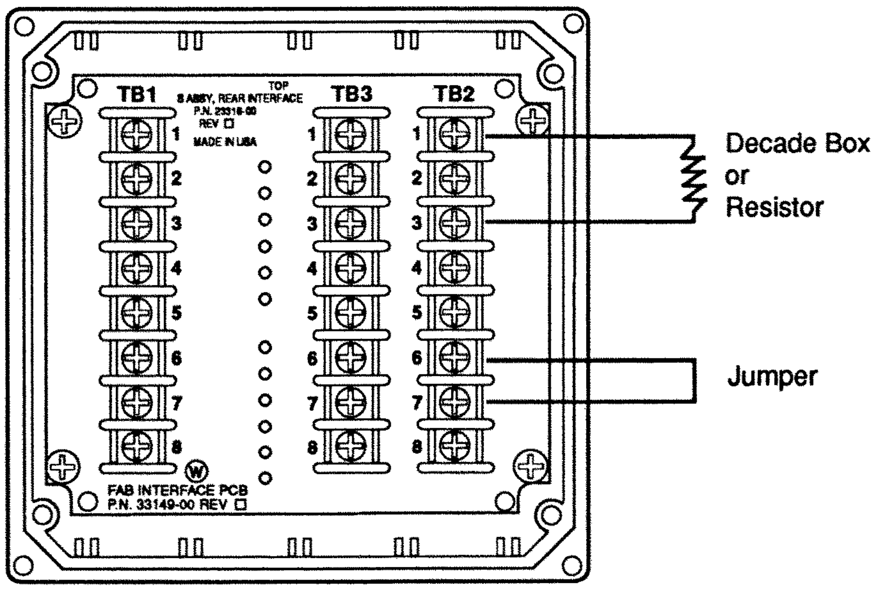
1. Disconnect the conductivity sensor input leads from TB2-1, 3, 6 and 7. Install decade box or resistor leads to TB2-1 and 3 and a jumper to TB2-6 and 7 (see Figure 8-1).

2. With instrument power on, enter the SEt menu and turn Atc to oFF. Set manual temperature compensation to 25°C (see Section 4.4 and Figure 4-4).

3. Set cell constant to 1.0 (see Section 5.1.1).

4. To simulate a desired conductivity input, an appropriate resistance value may be calculated by Formula or selected from the conductivity (µmhos) vs resistance (ohms) table (see Figure 8-1).

5. Simulate conductivity input and evaluate the analyzer response.




**BACK VIEW / COVER OMMITED**

**Formula:**

$$\text{Conductivity} = \frac{1}{\text{Resistance}} \times 1{,}000{,}000$$

**Table:**

| Conductivity (µmhos) | vs | Resistance (ohms) |
|---|---|---|
| 10 | | 100,000 |
| 100 | | 10,000 |
| 1,000 | | 1,000 |
| 10,000 | | 100 |
| 20,000 | | 50 |

**FIGURE 8-1. Simulate Conductivity Input**

# SECTION 9.0
# RETURN OF MATERIAL

**9.1 GENERAL.** To expedite the repair and return of instruments, proper communication between the customer and the factory is important. A return material authorization (RMA) number is required. Call 714 863-1181. The "Return of Materials Request" form is provided for you to copy and use in case the situation arises. The accuracy and completeness of this form will affect the processing time of your materials.

**9.2 WARRANTY REPAIR.** The following is the procedure for returning instruments still under warranty.

1. Contact the factory for authorization.
2. Complete a copy of the “Return of Materials Request” form as completely and accurately as possible.
3. To verify warranty, supply the factory sales order number or the original purchase order number. In the case of individual parts or sub-assemblies, the serial number on the mother unit must be supplied.
4. Carefully package the materials and enclose your “Letter of Transmittal” and the completed copy of the “Return of Materials Request” form. If possible, pack the materials in the same manner as it was received.

**IMPORTANT**

Please see second section of “Return of Materials Request Form”. Compliance to the OSHA requirements is mandatory for the safety of all personnel. MSDS forms and a certification that the instruments have been disinfected or detoxified are required.

5. Send the package prepaid to:

   Rosemount Analytical Inc.
   2400 Barranca Parkway
   Irvine, CA 92714

   Attn: Factory Repair

   Mark the package: Returned for Repair

   RMA# ________________

   Model No. ____________

**9.3 NON WARRANTY REPAIR.**

1. Contact the factory for authorization.
2. Fill out a copy of the “Return of Materials Request” form as completely and accurately as possible.
3. Include a purchase order number and make sure to include the name and telephone number of the right individual to be contacted should additional information be needed.
4. Do Steps 4 and 5 of Section 6.2.

**NOTE**

Consult the factory for additional information regarding service or repair.