

6. MAINTENANCE

6.1 INTRODUCTION

This section provides maintenance information for the DP 100. It includes cleaning instructions, troubleshooting information and procedures for replacing fuses and the battery pack, selecting the ac line power configuration, and calibrating the unit. Service and technical support information is provided at the end of this section.

6.2 CLEANING

To clean your DP 100:

- Use *only* a clean, soft, damp (not wet) cloth.
- *Do not* use aerosol sprays, solvents, or abrasives that might damage the meter's finish.
- Be especially gentle when cleaning the display window to avoid scratching it.

6.3 TROUBLESHOOTING

If you experience trouble while operating your DP 100, follow the recommended action listed in Table 6-1. If you still cannot solve the problem, see Section 6.10, SERVICE AND TECHNICAL SUPPORT.

Table 6-1. Troubleshooting List

<u>Problem</u>	<u>Recommended Action</u>	<u>Section</u>
No ac line operation.	Check the ac input fuse.	6.6
No battery operation, or low battery annunciator is flashing.	Recharge the battery	2.5.2
Display = OL.	Select the next higher range.	3.4
Display = E1 - E5.	Obtain service.	6.10

Problem	Recommended Action	Section
No current measurements.	Check current input fuse.	6.4
UNCAL annunciator is on.	(1) Cycle power switch to Standby and back to On. (2) Perform calibration procedure.	6.8.2, 6.9
Cannot access the CAL function.	Check your password or enter a new one.	6.8.3

6.4 REPLACING THE CURRENT INPUT FUSE

To replace the current input fuse (see Figure 6-1):

- (1) Set On/Standby switch to Standby.
- (2) Insert a screwdriver into the front panel fuse cap slot.
- (3) Push in gently with the screwdriver and turn the fuse cap 1/4 turn counter-clockwise to unlock it.
- (4) Remove the fuse cap and fuse from the front panel.
Remove the blown fuse from the fuse cap and discard it.
- (5) Insert a new fuse into the fuse cap. Replace with a IEC type F (fast blow) 2.5A, 250V, 5mm X 20mm fuse.
- (6) Insert the fuse and fuse cap into the front panel. You may have to rotate the fuse cap slightly so that the fuse slides into the fuse holder all the way.
- (7) Using the screwdriver, push the fuse cap in gently and turn it 1/4 turn clockwise to lock it in place.

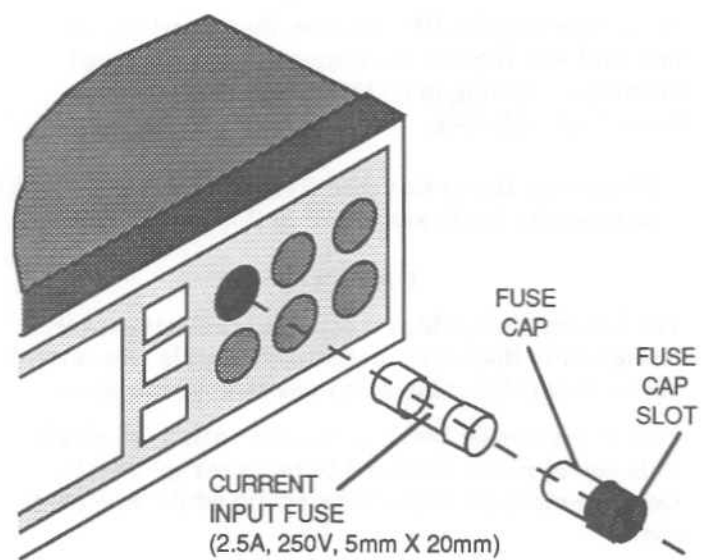


Figure 6-1. Current Input Fuse Replacement

6.5 CHANGING THE AC LINE VOLTAGE CONFIGURATION

Configuring the DP 100 for 100/120 or 220/240 Vac input voltage requires removing the top cover to access the voltage selection jumpers and ac input fuse on the internal circuit board.

WARNING

Before opening the DP 100 case, disconnect the ac line cord and remove the connections to the input terminals. Failing to do this could expose you to hazardous voltages.

- (1) Disconnect the ac line cord from the rear of the unit and remove any leads connected to the input terminals.

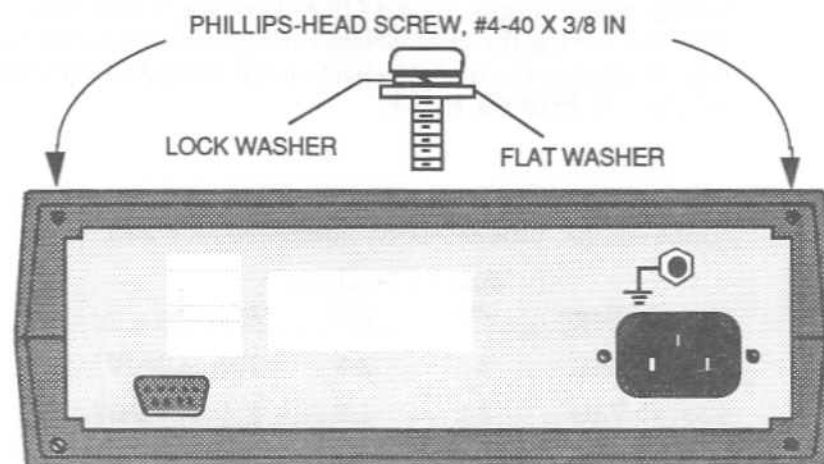
CAUTION

The battery pack, which is attached to the top cover, is connected to the circuit board with a cable. Be careful not to strain this cable when you remove the cover.

Part of the circuit board is covered with a foil shield. This shield is not intended to be user-replaceable. Do not remove or damage the shield while the case is open.

The DP 100 is battery operated. Therefore, voltages are present inside the case even though the ac power cord is disconnected.

- (2) Remove the top cover:
 - a. Remove the two top cover Phillips-head screws, with lock washers and flat washers, from the rear panel (Figure 6-2).
 - b. Lift the cover from the rear and remove it from the unit.
 - c. Carefully turn the top cover upside down and place it beside the unit.

**CAUTION**

The battery cable is connected to the circuit board.

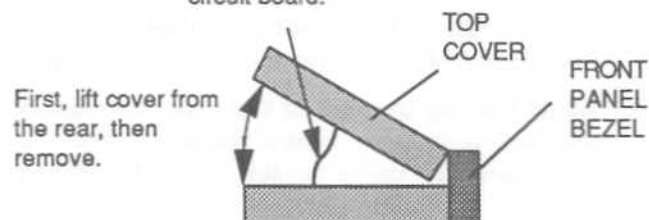


Figure 6-2. DP 100 Top Cover Removal

- (3) Locate the ac line voltage selection jumpers. See Figure 6-3.
- (4) Using Table 6-2, position the voltage selection jumpers for the applicable ac line voltage. If you change the line voltage configuration, be sure to replace the ac line fuse with one having the appropriate rating as shown in Table 6-2. To change the fuse, see Section 6.6 REPLACING THE AC INPUT POWER FUSE.

Table 6-2. AC Line Selection Jumpers and Fuses

Input Voltage	Jumper Positions		AC Fuse
	JP1	JP2	
100/120 VAC	2-3	2-3	100mA 250V
220/240 VAC	1-2	1-2	F 50mA 250V

- (5) Replace the top cover:
 - a. Hold the top cover above the unit and lower the two top cover front corners onto the sides of the bottom half of the case. The sides of the top and bottom halves of the case fit together in a tongue and groove arrangement.
 - b. While holding the rear of the cover up slightly, slide the cover toward the front of the unit so that the front lip of the cover fits under the top edge of the front panel bezel.
 - c. Lower the rear of the cover onto the bottom half of the case.
 - d. On the rear panel, install the two top-cover screws, lock washers and flat washers (see Figure 6-2).

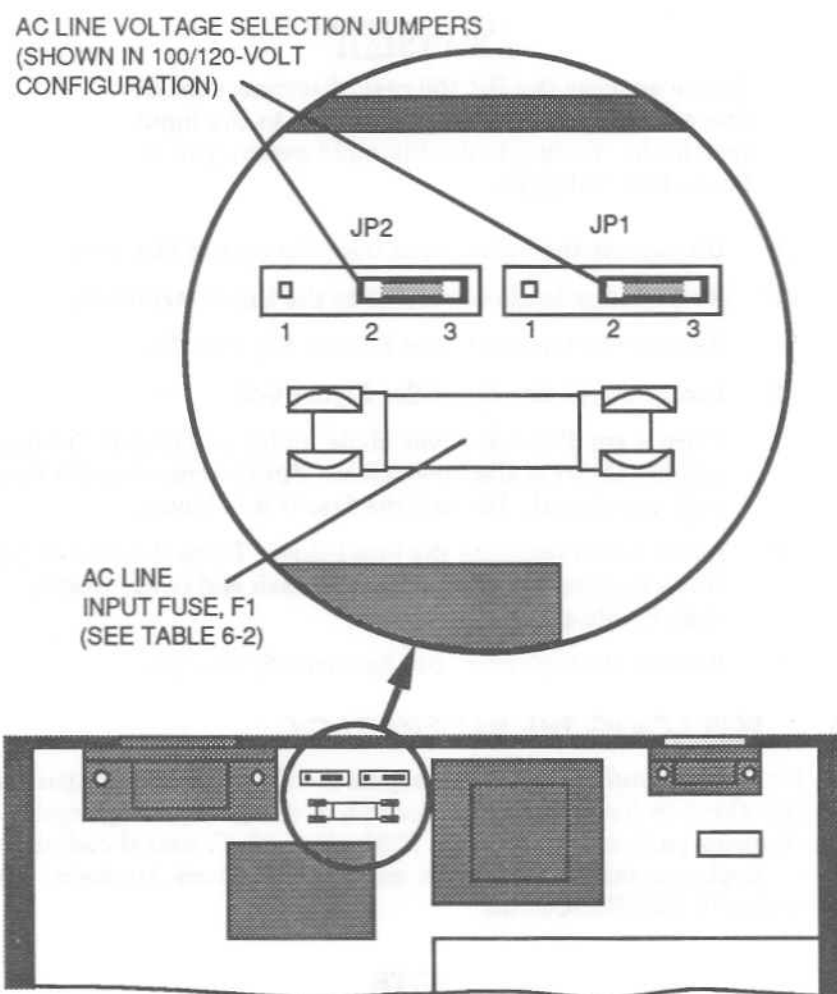


Figure 6-3. AC Line Voltage Selection Jumpers and Fuse

6.6 REPLACING THE AC LINE FUSE

WARNING

Before opening the DP 100 case, disconnect the ac line cord and remove the connections to the input terminals. Failing to do this could expose you to hazardous voltages.

- (1) Disconnect the ac line cord from the rear of the unit.
- (2) Remove any leads connected to the input terminals.
- (3) Remove the top cover. See Section 6.5, step (2).
- (4) Locate the ac line fuse (See Figure 6-3).
- (5) Place a small screwdriver blade under one end of the fuse and pry it out of the fuse holder. Finish removing the fuse with your hand. Discard the fuse if it is blown.
- (6) Insert a new fuse into the fuse holder. Place the fuse on top of the fuse holder. Press down on each end of the fuse to snap it into place.
- (7) Replace the top cover. See Section 6.5, step (5).

6.7 REPLACING THE BATTERY PACK

Under normal conditions you can expect the DP 100's battery pack to last for three to five years or 500 complete charge/discharge cycles. The battery pack consists of five 1500mAh, sub-C, nickel-cadmium cells. Replacement battery packs are available from Analogic. See Appendix B, ACCESSORIES.

NOTE

Although the replacement battery pack was fully charged at the factory, it may have lost its charge while in inventory or transit. Always attempt to recharge a new battery pack before assuming it is defective.

WARNING

Before opening the DP 100 case, disconnect the ac line cord and remove the connections to the input terminals. Failing to do this could expose you to hazardous voltages.

- (1) Remove the top cover. See Section 6.5, step (2).
- (2) Disconnect the battery cable from the internal circuit board (behind the On/Standby switch). Hold in the release tab and pull the connector upward (see Figure 6-4). Pull on the connector body, not the wires.

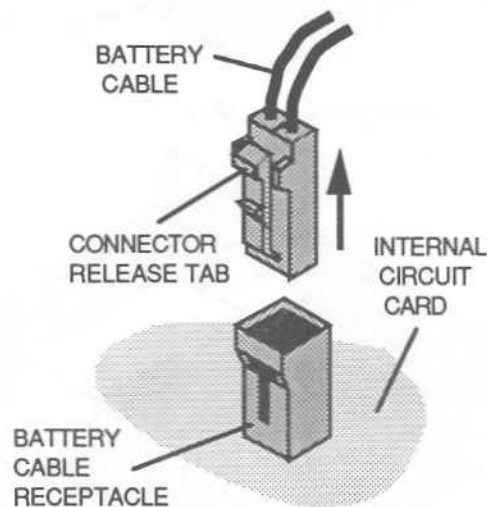


Figure 6-4. Disconnecting the Battery Cable

- (3) Cut the battery holder cable ties and slide the battery pack out of the holder (see Figure 6-5).
- (5) Slide the new battery pack into the holder and secure it with the two new cable ties supplied with the replacement battery pack.

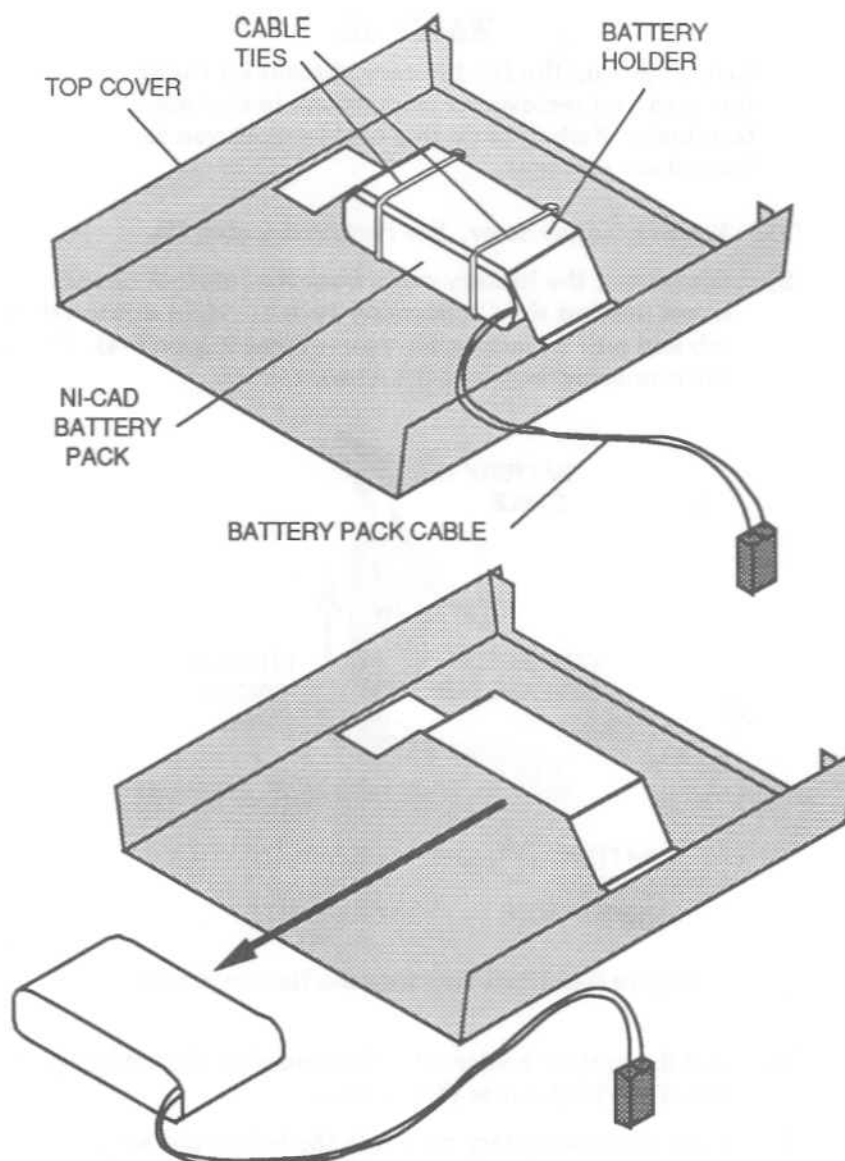


Figure 6-5. Battery Pack Replacement

CAUTION

The battery cable connector is polarized to fit in its receptacle only one way. If the connector refuses to fit in its receptacle, do not attempt to force it. Check for correct orientation.

- (6) Connect the battery cable to the circuit board.
- (7) Reinstall the top cover. See Section 6.5, step (5).
- (8) Verify operation of the DP 100.

6.8 CALIBRATION

The calibration (CAL) auxiliary function is the last selection of the auxiliary function menu. The CAL function provides four individual routines which are identified in Table 6-3.

The primary use of the CAL function is the Normal Calibration routine. This routine allows you to perform a "closed-case" electronic calibration of the DP 100. To calibrate the DP 100 using the RS-232 interface, see Section 6.9, REMOTE CALIBRATION.

The following Sections describe the electronic calibration process and how to activate each of the CAL function routines.

Table 6-3. CAL Routines

Number	Name	Purpose	Section
0	Normal Calibration	Electronic calibration of the DP 100.	6.8.3
1	New Password	Entering a new password.	6.8.4
2	Substitute Calibration Constants	Replacing the actual calibration constants with a substitute set of known values.	6.8.5
3	Display Test	Checking all display annunciators.	6.8.6

6.8.1 The Electronic Calibration Process

The electronic calibration feature of the DP 100 allows you to perform a complete or partial calibration. Before calibrating your DP 100, it is helpful to understand how the calibration constants are electronically stored and retrieved within the multimeter. See Figure 6-6.

At power-on, stored calibration constants are transferred from PERMANENT MEMORY to WORKING MEMORY. The instrument's microprocessor reads these constants from WORKING MEMORY during normal DP 100 operation and uses them to scale the measurements.

During calibration, the DP 100 automatically prompts you to apply calibration-standard input signals to the DP 100 input terminals in a fixed sequence (①). When you calibrate each range of each measurement function, the DP 100 calculates a new calibration constant and stores it in the WORKING MEMORY.

At the end of the fixed sequence, the DP 100 provides the opportunity to enter the next CAL due date. Pressing ENTER at this point stores the calibration due date and the new calibration constants in PERMANENT MEMORY (②). From this point on, the DP 100 uses the updated calibration constants every time it performs a measurement.

6.8.2 Activating the CAL Function

You must enter a three-digit password before you can activate the CAL routines. All DP 100s are shipped with the password set to 001. You may use this password or enter your own using CAL routine #1. See Section 6.8.4, New Password Procedure (CAL Routine #1).

To activate the CAL function:

- (1) Press and HOLD the PRINT/ENTER pushbutton until the PRINT caret is illuminated.
- (2) Press the PRINT/ENTER pushbutton three more times to illuminate the CAL caret and display the CAL due date.

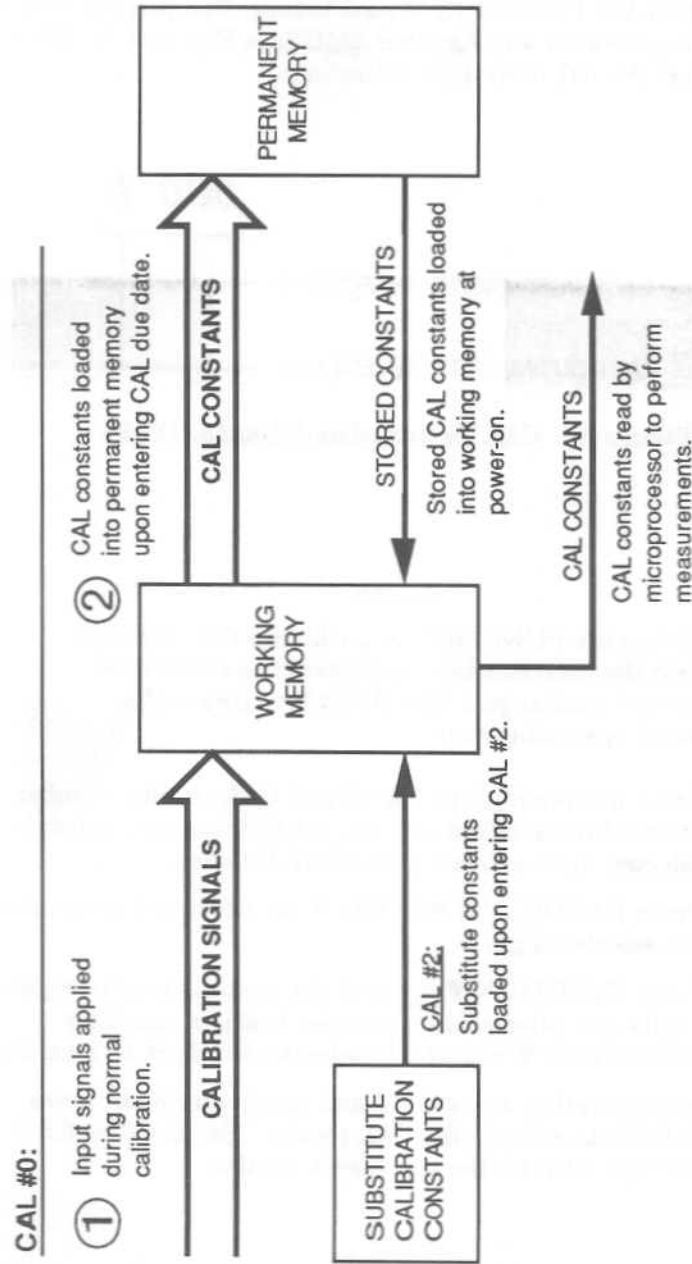


Figure 6-6. Calibration Constants - Storage and Retrieval

- (3) Press the FUNCTION ▼ pushbutton. The display shows the password and function digits (see Figure 6-7). Note that the left-most digit is flashing.

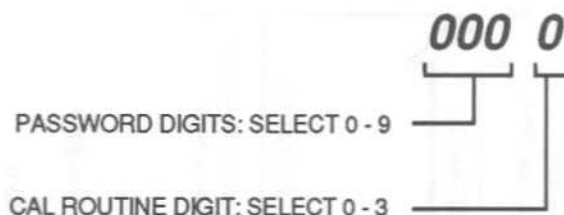


Figure 6-7. CAL Password and Routine Digits

NOTE

Pressing the FUNCTION ▲ pushbutton at any time aborts the CAL function and leaves the calibration constants unchanged. The DP 100 returns to the normal operating mode.

- (4) Enter a three-digit password and CAL routine number. Start with the left-most digit, the flashing one, which is selected upon activating the CAL function.
- (5) Press RANGE ▲ or RANGE ▼ to increment /decrement the selected digit.
- (6) Press FUNCTION ▼ to select the next digit to the right. Digits are selected in a circular fashion; pressing FUNCTION ▼ repeatedly selects each digit in rotation.
- (7) After entering a password and routine number, press ENTER to activate the CAL routine. See Sections 6.8.3 through 6.8.6 for the use of each routine.

6.8.3 Normal Calibration Procedure (CAL Routine #0)

The following procedure tells you how to calibrate the DP 100 using the front panel. To calibrate the DP 100 remotely via the RS-232 interface, see Section 6.9, REMOTE CALIBRATION.

Table 6-4 lists the fixed sequence of prompted input signals which ends with the CAL due date display. This table indicates the measurement function and range that is calibrated using each input signal. Using the following calibration procedures, you can perform a complete or partial calibration. To perform a partial calibration, go to the CAL procedure step(s) indicated in the table for the measurement function you want to calibrate. To perform a complete calibration begin with step (1), dc Volts.

The FUNCTION ▼ pushbutton is used to step through the fixed sequence of input signal prompts. Remember, if you choose to perform a partial calibration, you will need to press FUNCTION ▼ as many times as necessary to step by all the prompts you do not want to use. After each partial or complete calibration, you should verify that the calibration procedure was performed correctly.

When attempting to calibrate a measurement function and range, if the difference between the calibration input signal and the DP 100 prompted signal is too large, the DP 100 ignores the input and displays **FAIL**. When this occurs you can do one of three things:

- Press ENTER to repeat the calibration step,

- Press FUNCTION ▼ to skip the step, or

- Press FUNCTION ▲ to abort the entire calibration procedure.

If you are sure that the applied signal is correct, the DP 100 may be defective. Return it for service. See Section 6.10, SERVICE AND TECHNICAL SUPPORT.

Analogic recommends that you use a quality calibrator such as a *Datron 4708 Autocal Multifunction Standard* or equivalent. If you use the Datron 4708, it must have options 10, 20, 30, and 80 installed. The calibration procedures assume that you are familiar with the proper operation of the equipment you are using.

Table 6-4. Normal Calibration Sequence

Sequence Step #	Prompted Input Signal	Function To Calibrate	CAL Procedure Step #
1	450 V	DC Volts	(1)
2	180 V		
3	18 V		
4	1.8 V		
5	180 mV		
6	18 mV		
7	400 V @ 100 Hz	AC Volts	(2)
8	180 V @ 100 Hz		
9	18 V @ 100 Hz		
10	1.8 V @ 100 Hz		
11	0.25 V @ 100 Hz		
12	180 mV @ 100 Hz		
13	1.8 A	DC Current	(3)
14	180 mA		
15	1.8 A @ 100 Hz	AC Current	(4)
16	180 mA @ 100 Hz		
17	10 M Ω	Resistance	(5)
18	1 M Ω		
19	100 k Ω	4-Terminal Resistance	(6)
20	10 k Ω		
21	1 k Ω		
22	100 Ω		
23	1 MHz @ 1 V rms	Frequency	(7)
24	Enter and store CAL Due Date; Store CAL constants.		(8)

NOTE

The calibrator's DC offset must be adjusted to zero for accurate calibration. Allow a *one-hour warm-up* period before calibrating the DP 100.

To calibrate the DP 100 from the front panel:

- (1) Calibrate dc volts.
 - a. Activate CAL routine #0. See Section 6.8.2, Activating the CAL Function.
 - b. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.

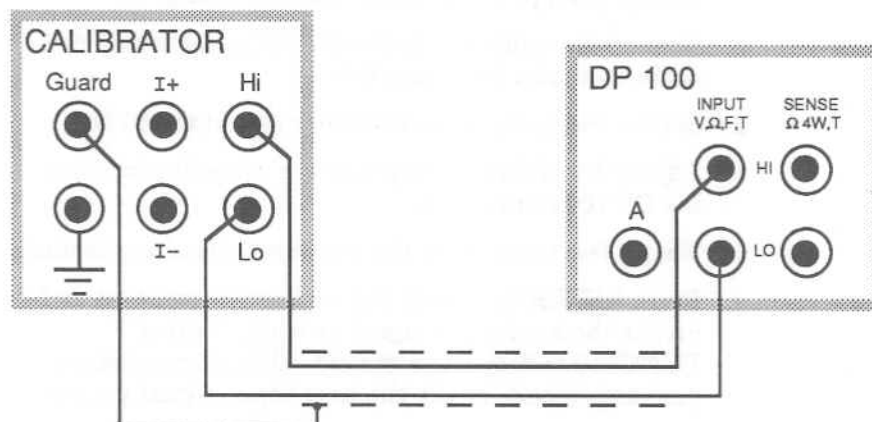
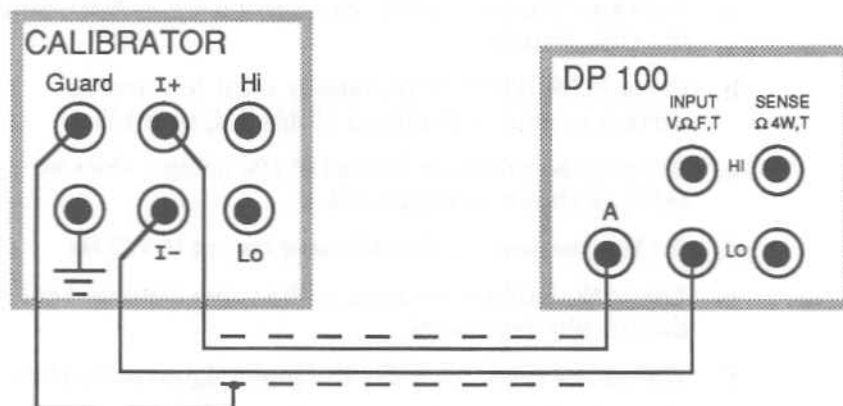


Figure 6-8. Calibrator-to-DP 100 Connections for AC/DC Volts, Resistance (2T), and Frequency

- c. Adjust the calibrator output to the value displayed on the DP 100 front panel.
- d. Wait a few seconds for the the input signal to stabilize.
- e. Press ENTER to update the calibration constant and invoke the next input signal prompt, or press FUNCTION ▼ to leave the old calibration constant unchanged and invoke the next input signal prompt.

- f. Repeat steps *c* and *d* for the subsequent DC voltage input signals (Table 6-4, steps 2 through 6).
 - g. To continue the calibration procedure, go to step (2)*d*. To conclude the calibration procedure at this point, press FUNCTION ▼ repeatedly until the CAL due date is displayed (Table 6-4, step 24) and go to step (8)*c*.
- (2) Calibrate ac volts.
- a. Activate CAL routine #0. See Section 6.8.2, Activating the CAL Function.
 - b. Press FUNCTION ▼ repeatedly until the first ac voltage prompt is displayed (Table 6-4, step 7).
 - c. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.
 - d. Set the frequency of the calibrator output to 100 Hz.
 - e. Adjust the calibrator output to the value displayed on the DP 100 front panel.
 - f. Wait a few seconds for the the input signal to stabilize.
 - g. Press ENTER to update the calibration constant and invoke the next input signal prompt, or press FUNCTION ▼ to leave the old calibration constant unchanged and invoke the next input signal prompt.
 - h. Repeat steps *e*, *f*, and *g* for the subsequent ac voltage input signals (Table 6-4, steps 8 through 12).
 - i. To continue the calibration procedure, go to step (3)*c*. To conclude the calibration procedure at this point, press FUNCTION ▼ repeatedly until the CAL due date is displayed (Table 6-4, step 24) and go to step (8)*c*.
- (3) Calibrate dc current.
- a. Activate CAL routine #0. See Section 6.8.2, Activating the CAL Function.

- b. Press FUNCTION ▼ repeatedly until the first DC current prompt is displayed (Table 6-4, step 13).
- c. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-9.



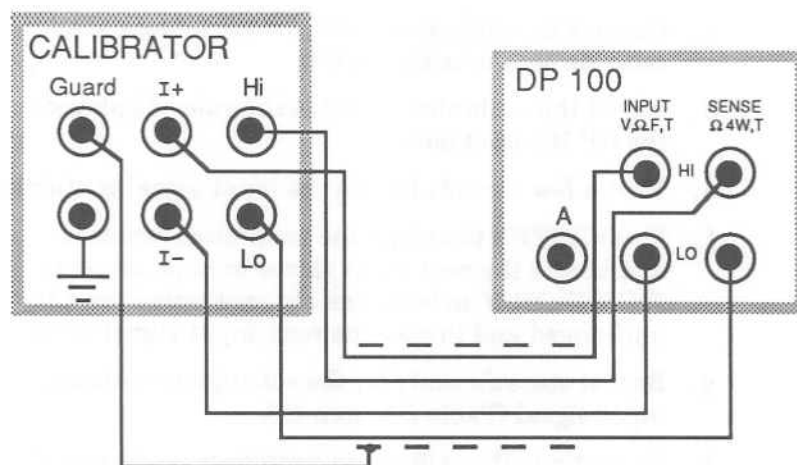
**Figure 6-9. Calibrator-to-DP 100 Connections
for AC/DC Current**

- d. Adjust the calibrator output to the value displayed on the DP 100 front panel.
- e. Wait a few seconds for the the input signal to stabilize.
- f. Press ENTER to update the calibration constant and invoke the next input signal prompt, or press FUNCTION ▼ to leave the old calibration constant unchanged and invoke the next input signal prompt.
- g. Repeat steps *d*, *e* and *f* for the subsequent dc current input signal (Table 6-4, step 14).

- c. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.
- d. Adjust the calibrator output to the value displayed on the DP 100 front panel.
- e. Wait a few seconds for the the input signal to stabilize.
- f. Press ENTER to update the calibration constant and invoke the next input signal prompt, or press FUNCTION ▼ to leave the old calibration constant unchanged and invoke the next input signal prompt.
- g. Repeat steps *d,e* and *f* for the subsequent resistance input signal (Table 6-4, step 18).
- h. To continue the calibration procedure, go to step (6)c. To conclude the calibration procedure at this point, press FUNCTION ▼ repeatedly until the CAL due date is displayed (Table 6-4, step 24) and go to step (8)c.

(6) Calibrate 4-terminal resistance

- a. Activate CAL routine #0. See Section 6.8.2, Activating the CAL Function.
- b. Press FUNCTION ▼ repeatedly until the first four-terminal resistance prompt is displayed (Table 6-4, step 19).
- c. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-10.
- d. Adjust the calibrator output to the value displayed on the DP 100 front panel.
- e. Wait a few seconds for the the input signal to stabilize.
- f. Press ENTER to update the calibration constant and invoke the next input signal prompt, or press FUNCTION ▼ to leave the old calibration constant unchanged and invoke the next input signal prompt.



**Figure 6-10. Calibrator-to-DP 100 Connections
for 4-Terminal Resistance**

- g. Repeat steps *d*, *e* and *f* for the subsequent four-terminal resistance input signals (Table 6-4, steps 20 through 22).
 - h. To continue the calibration procedure, go to step (7)c. To conclude the calibration procedure at this point, press FUNCTION ▼ repeatedly until the CAL due date is displayed (Table 6-4, step 24) and go to step (8)c.
- (7) Calibrate frequency.
- a. Activate CAL routine #0. See Section 6.8.2, Activating the CAL Function.
 - b. Press FUNCTION ▼ repeatedly until the frequency prompt is displayed (Table 6-4, step 23).
 - c. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.
 - d. Adjust the calibrator output to 1.000 MHz, 1 Vac rms.
 - e. Wait a few seconds for the the input signal to stabilize.

- f. Press ENTER to update the calibration constant and invoke the next input signal prompt, or press FUNCTION ▼ to leave the old calibration constant unchanged and invoke the next input signal prompt.
 - g. To conclude the calibration procedure, go to step (8)c.
- (8) Entering a CAL Due Date.
- a. Activate CAL routine #0. See Section 6.8.2, Activating the CAL Function.
 - b. Press FUNCTION ▼ repeatedly until the CAL due date is displayed (Table 6-4, step 24). See Figure 6-11.

1.15.90

MONTH: SELECT 1 - 12

DAY: SELECT 01 - 31

YEAR: SELECT 00 - 99

Figure 6-11. Calibration Due Date Format

NOTE

Storage of the calibration due date is provided only for convenience and has no effect on measurements made by the DP 100.

- c. You now have the opportunity to change the CAL due date. If you do not wish to change the date, go directly to step d. If you wish to change the date, press FUNCTION ▼ to select the month, day, or year. Press RANGE ▲ or RANGE ▼ to increment or decrement the number for the month, day, or year.
- d. Press ENTER to store the new calibration constants if you just performed a calibration and the calibration due date in permanent memory.

- e. This completes the calibration process. The DP 100 returns to the dc voltage measurement mode of operation in AUTO range.
- (9) Verify the DP 100 Calibration. After calibrating your DP 100 it is good practice to check its performance. Using the calibrator again, generate each signal from Table 6-4 and measure it with the DP 100. Check the accuracy of each measurement. This will confirm that the calibration procedure was performed correctly.

6.8.4 New Password Procedure (CAL Routine #1)

This procedure tells you how to change the password used to access the CAL routines.

NOTE

Pressing FUNCTION ▲ at any time aborts the calibration procedure. The DP 100 returns to the dc voltage measurement function in AUTO range.

- (1) Activate CAL routine #1 using your current password. See Section 6.8.2, Activating the CAL Function.
- (2) The display reads: **001**

NOTE

Your DP 100 was shipped with the password set to 001. The number 000 is not a valid password.

- (3) Press FUNCTION ▼ to select each digit. Press RANGE ▲ or RANGE ▼ to set the digits to the desired numbers.
- (4) Press ENTER to replace the old password in memory with the new password. The DP 100 returns to the dc voltage measurement mode of operation in AUTO range.

6.8.5 Substitute Calibration Constants Procedure (CAL Routine #2)

This procedure tells you how to replace the DP 100 calibration constants with a substitute set of constants. See Figure 6-7.

The CAL #2 routine is useful if you doubt that the last calibration procedure was performed correctly. This may be due to a defective calibration source or improper input connections.

Using the substitute constants may allow you to use the unit for limited service until a proper calibration can be performed. The DP 100 should not be used in this mode for precision measurements.

NOTE

Pressing FUNCTION ▲ at any time aborts the calibration procedure. The DP 100 returns to the dc voltage measurement function in AUTO ranging.

- (1) Activate CAL routine #2 using your current password. See Section 6.8.2, Activating the CAL Function.
- (2) Check that the UNCAL annunciator illuminates to indicate that the DP 100 is operating in an uncalibrated condition. The DP 100 returns to the dc voltage measurement function in AUTO range.
- (3) Cycle the power to restore calibration constants from permanent memory.

6.8.6 Display Test Procedure (CAL Routine #3)

This procedure enables you to illuminate all display annunciators. This function is NOT available when using the frequency measurement function.

- (1) Activate CAL routine #3 using your current password. See Section 6.8.2, Activating the CAL Function.
- (2) Observe that all display annunciators are illuminated (see Figure 2-3). Pressing any key aborts this function and returns the DP 100 to its previous measurement mode.

6.9 REMOTE CALIBRATION

The DP 100 calibration commands listed in Table 6-5 allow you to calibrate the instrument remotely via the RS-232 interface. To use these commands, read the guidelines in Section 5.3, USING THE DP 100 COMMANDS.

To connect a terminal or host computer for use with this procedure, see Section 5.2, USING THE RS-232 PORT.

Table 6-5. DP 100 Calibration Commands

Command	Argument	Function
\$CAL	<nnn> (password)	Activates the normal calibration routine (nnn = 001 to 999).
\$GO		Updates the calibration constant stored in working memory.
\$SKIP		Leaves the calibration constant unchanged for the indicated range and skips to the next input signal.
\$CANCEL		Aborts the calibration process.
\$CALSET	<mm/dd/yy>	Updates the CAL due date mm/dd/yy, where mm = month 1 to 12, dd = day 01 to 31, and yy = year 00 to 99. Stores the CAL due date and new calibration constants in permanent memory.
\$CALDUMP		Sends current calibration constants over the RS-232 port.

6.9.1 Remote Calibration Procedure

The following procedure tells you how to calibrate the DP 100 using the DP 100 calibration commands. This procedure uses the same sequence of calibration input signals listed in Table 6-4. See Section 6.8.3, Normal Calibration Procedure, for a description of this table.

After each calibration, you should verify that the calibration procedure was performed correctly. See Section 6.8.3, step (9) to verify the DP 100 calibration.

When attempting to calibrate a measurement function and range, if the difference between the calibration input signal and the DP 100 prompted signal is too large, the DP 100 ignores the input and displays **FAIL**. When this occurs you can do one of three things:

- Send \$GO to repeat the calibration step,

- Send \$SKIP to skip the step, or

- Send \$CANCEL to abort the entire calibration procedure.

If you are sure that the applied signal is correct, the DP 100 may be defective. Return it for service. See Section 6.10, SERVICE AND TECHNICAL SUPPORT.

Analogic recommends that you use a quality calibrator such as a *Datron 4708 Autocal Multifunction Standard* or equivalent. If you use the Datron 4708, it must have options 10, 20, 30, and 80 installed. The calibration procedures assume that you are familiar with the proper operation of the equipment you are using.

NOTE

The calibrator's DC offset must be adjusted to zero for accurate calibration. Allow a *one-hour warm-up* period before calibrating the DP 100.

To calibrate the DP 100 using the RS-232 interface:

- (1) Send \$CAL <nnn> to activate the remote calibration routine, where nnn is a three-digit password from 001 to 999.

The DP 100 responds with a message indicating the signal to be applied to the input terminals followed by three periods and the standard prompt. The first message is:

APPLY +0450.00 VDC ...=>

NOTE

Sending \$CANCEL at any time aborts the calibration process leaving all calibration constants unchanged. The DP 100 returns to the dc voltage measurement function in AUTO range.

- (2) Calibrate dc volts:
 - a. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.
 - b. Adjust the calibrator output to the value indicated in the message.
 - c. Wait a few seconds for the the input signal to stabilize.
 - d. Send \$GO to update the calibration constant and invoke the next message, or send \$SKIP to leave the old calibration constant unchanged and invoke the next message.
 - e. Repeat steps b, c and d for the subsequent dc voltage input signals (Table 6-4, steps 2 through 6). When the DP 100 returns the message,

APPLY +0400.00 VAC ...=>,

Go to step (3).

(3) Calibrate ac volts:

- a. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.
- b. Set the frequency of the calibrator output to 100 Hz.
- c. Adjust the calibrator output to the value indicated in the message.
- d. Wait a few seconds for the the input signal to stabilize.
- e. Send \$GO to update the calibration constant and invoke the next message, or send \$SKIP to leave the old calibration constant unchanged and invoke the next message.
- f. Repeat steps c, d and e for the subsequent ac voltage input signals (Table 6-4, steps 8 through 12). When the DP 100 returns the message,

APPLY +1.80000 ADC ...=>

Go to step (4).

(4) Calibrate dc current:

- a. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-9.
- b. Adjust the calibrator output to the value indicated in the message.
- c. Wait a few seconds for the the input signal to stabilize.
- d. Send \$GO to update the calibration constant and invoke the next message, or send \$SKIP to leave the old calibration constant unchanged and invoke the next message.

- e. Repeat steps *b*, *c* and *d* for the subsequent dc current input signal (Table 6-4, step 14). When the DP 100 returns the message,

APPLY +1.80000 AAC ...=>,

Go to step (5).

(5) Calibrate ac current:

- a. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-9.
- b. Set the frequency of the calibrator output to 100 Hz.
- c. Adjust the calibrator output to the value indicated in the message.
- d. Wait a few seconds for the the input signal to stabilize.
- e. Send \$GO to update the calibration constant and invoke the next message, or send \$SKIP to leave the old calibration constant unchanged and invoke the next message.
- f. Repeat steps *c*, *d* and *e* for the subsequent ac current input signal (Table 6-4, step 16). When the DP 100 returns the message,

APPLY +10.0000 M OHM ...=>,

Go to step (6).

(6) Calibrate resistance:

- a. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.
- b. Adjust the calibrator output to the value indicated in the message.
- c. Wait a few seconds for the the input signal to stabilize.

- d. Send \$GO to update the calibration constant and invoke the next message, or send \$SKIP to leave the old calibration constant unchanged and invoke the next message.
- e. Repeat steps *b*, *c* and *d* for the subsequent resistance input signal (Table 6-4, step 18). When the DP 100 returns the message,

APPLY +100.000 K OHM 4 ...=>,

Go to step (7).

(7) Calibrate 4-terminal resistance:

- a. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-10.
- b. Adjust the calibrator output to the value indicated in the message.
- c. Wait a few seconds for the the input signal to stabilize.
- d. Send \$GO to update the calibration constant and invoke the next message, or send \$SKIP to leave the old calibration constant unchanged and invoke the next message.
- e. Repeat steps *b*, *c* and *d* for the subsequent four-terminal resistance input signals (Table 6-4, steps 20 through 22). When the DP 100 returns the message,

APPLY +1.000 MHZ ...=>,

Go to step (8).

(8) Calibrate frequency:

- a. Connect the calibrator to the DP 100 using a shielded cable as shown in Figure 6-8.
- b. Adjust the calibrator output to 1 MHz, 1 V ac rms.

- c. Wait a few seconds for the the input signal to stabilize.
- d. Send \$GO to update the calibration constant and invoke the next message, or send \$SKIP to leave the old calibration constant unchanged and invoke the next message.
- e. The DP 100 exits the calibration routine and returns to the normal mode of operation. Go to Section 6.9.2, Concluding a Remote Calibration.

6.9.2 Concluding a Remote Calibration

The calibration process is complete when the updated constants are stored in permanent memory (see Section 6.8.1, The Electronic Calibration Process). The \$CALSET command allows you to do this remotely. This command also provides the opportunity to change the CAL due date.

NOTE

Calibration due date storage is provided only for convenience. It has no effect on DP 100 measurements.

To conclude the remote calibration process, do one of the following:

- (1) To conclude a remote calibration *without* changing the CAL due date, send \$CALSET.
- (2) To conclude a remote calibration and update the CAL due date, send \$CALSET <mm/dd/yy>, where mm = month 1 to 12, dd = day 01 to 31, and yy = year 00 to 99.
- (3) Verify the calibration. After calibrating, it is good practice to check the instrument's performance. Using the calibrator again, generate each signal from Table 6-4 and measure it with the DP 100. Check the accuracy of each measurement. This will confirm that the calibration procedure was performed correctly.

6.10 SERVICE AND TECHNICAL SUPPORT

This section contains information on returning defective material, ordering replacement parts and obtaining service or repair. If you need an accessory, such as a replacement battery pack, see Appendix B, ACCESSORIES.

6.10.1 Returning Defective Material

If your DP 100 fails to operate upon arrival, contact your dealer or the Electronic Products Group (EPG) Order Entry service at Analogic's factory in Peabody, MA 01960 to arrange for an exchange. Upon contacting EPG Order Entry, you will be given a Return Material Authorization (RMA) number.

To contact Analogic's EPG Order Entry:

Call toll free: 1-800-343-8333, ask for EPG Order Entry,

or

Dial EPG Order Entry direct: 1-508-977-3000,
X3871 or X3879.

6.10.2 Ordering Replacement Parts

Table 6-6 lists several DP 100 replacement parts. To order replacement parts, contact the Customer Service Office (see Section 6.10.3).

Table 6-6. Replacement Parts List

Part No.	Description
15-500092	Current Input Fuse, 2.5A, 250V, 5mm X 20mm, UL/CSA
15-500094	Current Input Fuse, F 2.5A 250V, 5mm X 20mm, IEC
15-500130	110/120 Vac Input Fuse, 100mA, 250V, 5 x 20 mm
15-500131	220/240 Vac Input Fuse, F 50mA, 250V, 5 x 20 mm
15-820001	Test Leads

6.10.3 Obtaining Service or Repair

If you should need technical support with your particular application, contact Applications Engineering at 1-800-343-8333.

Should your DP 100 require service or repair, contact Analogic's Customer Service Office, according to the instructions given below, and be ready to give them the following information:

- (1) Model and serial number.
- (2) Quantity of each item being returned.
- (3) Detailed description of malfunction.
- (4) Customer's "Bill To" address.
- (5) Customer's "Ship To" address.
- (6) Purchase order number.

When you contact the Customer Service Office, the Service Coordinator will give you a customer service order number (CSO), the warranty status of the units being returned, and the repair charge, if any. The CSO number is your authorization number. Please write this number on your purchase order and shipping label.

Send all authorized returns to:

Analogic Corporation
8 Centennial Drive
Peabody, MA 01960
Attn: Receiving Dock B
CSO# _____

After the material has been returned, you will receive an acknowledgement copy of the CSO which will be marked with the scheduled return date.

To contact the Customer Service Office:

In the continental U.S.A.:

Telephone (outside Mass.)	1-800-237-2200
Telephone (inside Mass.)	(508) 977-3000
Spare parts only	x3617, x3614
Repairs only	x3612, x3613, x3615, x3616
TELEX	681-7288 anal uw
FAX	(508) 532-8913

International:

Analogic GmbH	Telephone 49-6122-70060
Analogic Ltd	Telephone 44-3-44-860111

