Thermo Electron Corporation

Bioscience Technologies

450 Fortune Boulevard
Milford, MA 01757
866.9.THERMO (866.984.3766) • Fax: 508.634.2199

Laboratory Pipetting and Consumables
info.pipettes@thermo.com

Molecular Biology
info.molbio@thermo.com

Microplate Instrumentation
info.microplateinstruments@thermo.com

Sample Preparation
info.sampleprep@thermo.com

Laboratory Automation & Integration
info.labautomation@thermo.com

New Labs
newlabs@thermo.com

Controlled Environment
info.controlenv@thermo.com

Services
services.biosciencetech@thermo.com

Bioscience Technologies

International Sales Office Locations

Belgium
Brussels
+32 2 482 30 30
Fax: +32 2 482 30 31

France
Cergy Pontoise Cedex
+33 1 34 32 51 51
Fax: +33 1 34 32 51 69

Germany
Dreieich
+49 6103 408 0
Fax: +49 6103 408 1222

Netherlands
Breda
+31 76 571 4440
Fax: +31 76 587 9757

Russia
Saint-Petersburg
+7 812 325 8045
Fax: +7 812 186 1194

Moscow
+7 095 755 9045
Fax: +7 095 755 9046

Spain
Barcelona
+34 93 2233154
Fax: +34 93 2230857

Madrid
+34 9165 74930
Fax: +34 9165 74937

Sweden
Stockholm
+46 8 742 03 90
Fax: +46 8 742 09 47

Lund
+46 46 90 96 60
Fax: +46 46 32 87 70

United Kingdom
Basingstoke, Hampshire
+44 870 609 9203
Fax: +44 870 609 9202

China
Beijing
+8610 5850 3588
Fax: +8610 6621 0847

Shanghai
+8621 5465 7588
Fax: +8621 6445 7830

Hong Kong
Wanchai
+852 2885 4613
Fax: +852 2567 4447

India
Navi Mumbai
+91 22 2778 1101
Fax: +91 22 2778 1103

Japan
Yokohama-City
+81 45 453 9122
Fax: +81 45 453 9222

Finland
Vantaa
+358 9 329 100
Fax: +358 9 3291 0414

Thermo
ELECTRON CORPORATION

164-3000-00 Rev. F

Instruction Manual
250-90 Electrophoresis Power Supply

⚠ WARNING ⚠

Please read these instructions carefully before using this power supply.

⚠ AVERTISSEMENT ⚠

Veuillez, avant tout emploi du générateur, lire attentivement ce manuel d´utilisation.

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SAFETY NOTICES
NOTICES DE SÉCURITÉ

⚠ WARNING: This notice alerts you to a potentially dangerous situation.

⚠ AVERTISSEMENT: Cette notice attire votre attention sur des dangers potentiels.

⚠ CAUTION: This notice means serious damage may occur to your power supply or chamber.

⚠ PRECAUTION: Cette notice attire votre attention sur des dangers sérieux pour votre générateur ou votre chambre d´électrophorèse.

NOTE: This notice gives useful advice or suggestions to raise the performance or reliability of your power supply.

⚠ WARNING

This power supply has been designed to be used as a source of DC power for electrophoresis. It is capable of generating lethal currents. Use the same precautions as with any electrical device. Do not operate without the cover in place. Do not connect the output to earth ground. Do not operate in a damp, humid, environment where condensing moisture may short out internal electrical components. Do not operate with connecting cables which have exposed wires. Do not pull the leads out of the 4mm output connectors while the unit is in operation. Follow all appropriate safety measures outlined by the chamber manufacturer.

⚠ AVERTISSEMENT

Ce générateur a été concu pour être utilisé comme source de courant (DC) pour l´électrophorèse, et il est capable de générer un courant mortel. Prenez les mêmes précautions que pour tout autre appareil électrique. N´utilisez pas l´appareil sans que le couvercle de la chambre soit placé. Ne raccordez pas les sorties à la terre. N´utilisez pas l´appareil dans des environnements humides, où la condensation pourrait causer des dommages aux composants électriques internes. Ne mettez pas l´appareil en route avec des câbles ou partie de câble dénudé. Ne retirez pas les câbles des sorties de 4mm pendant que l´appareil est en fonctionnement. Prendre toutes les précautions recommandé par le fabriquant de la chambre d´électrophorèse.

250-90 POWER SUPPLY

NOTES

NOTES

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SPECIFICATIONS

Type Output:	Constant Voltage or Constant Milliamps with automatic crossover
Maximum Voltage:	250 Volts
Maximum Current:	500 Milliamps
Maximum Power:	125 Watts
Regulation:	≤ 1%
Accuracy:	± 1.5 % full scale for each display
Number of Output Terminals:	Four sets of recessed 4mm output connectors
Safety Interlock:	Load sensing shut-down-on disconnect. Key actuation necessary to begin voltage generation. In the event of shutdown due to power interruption, automatic restart is provided.
Timer:	0.00 to 24 hrs 00 min.
Input Power:	110 Volts or 240 Volts AC, 50/60 Hertz, 250 Watts
Ambient Operating Temperature Range:	0°C - 30°C (non-condensing atmosphere)
Dimensions:	7.5" (D) x 8.75" (W) x 5.5" (H) 19cm x 22cm x 14cm
Weight: (net)	11 lbs 5 kg
(shipping)	15 lbs 6.8 kg

WARRANTY

This laboratory equipment was produced by Thermo Electron with the highest practical standards of materials, workmanship, and design. The design and manufacture of parts have been conceived with one purpose — to produce a unit which will give satisfactory service.

Thermo Electron guarantees this unit to be free from defects in materials or workmanship under normal use or service for four years from date of shipment.
If, during this time, this unit proves defective in materials or workmanship, the Company will repair or replace it free of charge if returned to us prepaid. This guarantee does not cover damage in transit, damage caused by carelessness, misuse or neglect, or unsatisfactory performance as a result of conditions beyond our control or consequential losses as a result of our product.

250-90 POWER SUPPLY

SERVICE

WARNING: This notice alerts you to a potentially dangerous situation.

AVERTISSEMENT: Cette notice attire votre attention sur des dangers potentiels.

This power supply is not equipped with any user serviceable parts except for the fuse.

Contact Thermo Electron or your local distributor for technical assistance if problems arise. The telephone number is (508) 482-7000, or (800) 327-2643.

164-3000-00 Rev.F Printed in USA

Appendix D. Utilizing Automatic Crossover

Certain electrophoretic techniques require the careful adjustment of operating limits and the utilization of the automatic crossover feature of this power supply. Automatic crossover involves a transition from one mode of operation (constant current, for example) to another mode of operation such as constant voltage.

Semi-dry electroblotting exemplifies the utility of this feature. Semi-dry transfer chambers contain two closely spaced parallel electrode plates. A "sandwich" consisting of buffer-saturated filter paper sheets on the outside and a gel and a charged transfer membrane on the inside, is assembled and placed between the electrode plates. Typical protocols suggest that the transfer should be carried out at a constant current. As the transfer process progresses, the buffer in the two filter paper layers heats up and begins to break down. This breakdown leads to an increase in the overall resistance between the two plates. In the constant current mode, the increase in resistance leads to a voltage increase. Left unchecked, the increasing voltage can eventually lead to arcing which would damage the electrode plates, the gel and the transfer membrane.

To eliminate the arcing problem, the voltage should be set at an operating limit which is below the threshold needed for the arc. As the voltage increases, it will eventually reach the predetermined operating limit. At this point, the power supply will automatically cross over from the constant current mode to the constant voltage mode of operation. As the transfer is completed, the current will gradually diminish.

FUSE REPLACEMENT

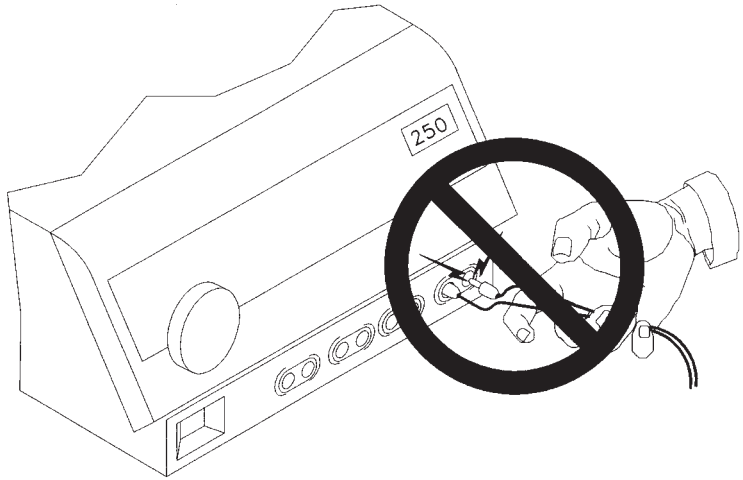
This power supply is equipped with two identical fuses. These can be either 115V, 5A, 20 mm time delay fuses, or 240V, 3.15A, 20 mm time delay fuses. Disconnect the power cord from the power supply before checking or exchanging the fuses. A fuseholder module is located above the power cord receptacle at the rear of the power supply. The cap of the fuseholder has two clips (left and right) that have to be depressed with your fingernails so that the cap with the fuses can be pulled out. If the fuse is burned out, it has to be replaced. Insert the new fuse into the cap and push this assembly back into the fuseholder module.

INTENDED USES AND SET UP

This power supply is intended to be used with electrophoretic devices designed to operate at or below 250 volts and 500 milliamps. Four sets of output connectors operate in parallel to provide a constant voltage (10 - 250V) or constant current (10 - 500mA); the maximum power output is 125 watts.

Make sure that the unit is set up in a location where it is protected from physical damage, moisture, corrosive agents and extreme temperatures. The unit should be readily accessible for safe operation.

Use the power cord to connect the unit to the AC Mains carrying the appropriate specified voltage (V) in accordance with the rating label located at the rear of the unit. Make sure that the mains receptacle has the proper 3-wire (grounded or earthed) connections.



⚠ WARNING

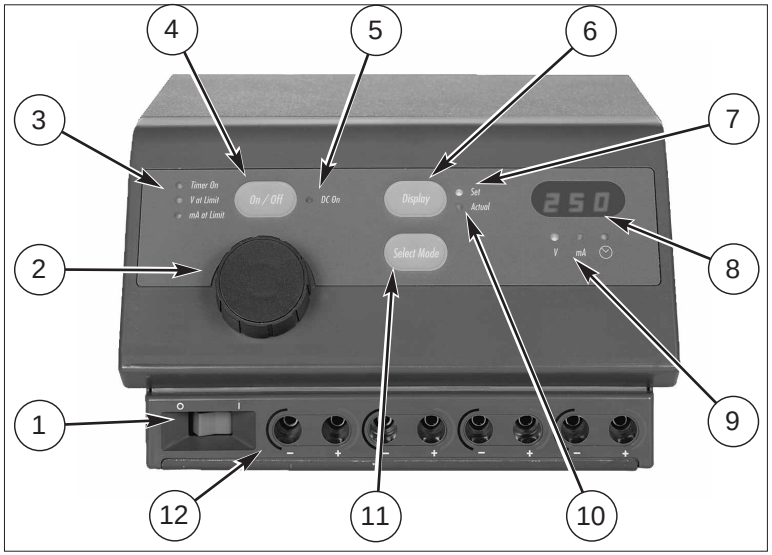
Do not pull the leads out of the 4mm output connectors while the power supply is in operation!

⚠ AVERTISSEMENT

Ne retirez pas les cables des sorties de 4mm pendant que l'appareil est en fonctionement!

OPERATION OF THE POWER SUPPLY

Figure 1. The Front Panel Layout.



1. AC Mains Power Switch
2. Adjustment Knob
3. Timer On, V at Limit and mA at Limit LEDs
4. DC On/Off Key
5. DC On LED
6. Display Key
7. Set Display LED
8. Digital Volts/Milliamps/Time Display
9. V, mA and Timer Mode Selection LEDs
10. Actual Display LED
11. Select Mode Key
12. Four Sets of 4mm Output Connectors

OPERATION OUTLINE

Step 1. Fill the electrophoresis chamber(s) with buffer and insert the leads into the recessed 4mm output connectors (12) on the front of the power supply (bottom right). Make sure that the red leads are connected to the red anodes (+) and the black leads to the black cathodes (-).

Step 2. Switch the AC Mains Power Switch (1) to the On position (1 = On; 0 = Off) At this point the Set Display LED (7) and the V Mode Selection LED (9) will be illuminated. The DC On LED (5) will be off.

Step 3. Use the Select Mode Key (11) to select the first operating limit to be displayed and adjusted. Each time the Select Mode Key is depressed the power supply will advance to the next operating limit. As the display advances, the Mode Selection LED's (9) will change to indicate the limit currently selected.

Appendix C. Running Multiple Chambers

This power supply is equipped with four sets of 4mm output connectors which are connected in parallel. The significance of this fact can be explained by studying the following statements.

1. The voltage is applied equally to all branch paths in a parallel circuit.
2. The current flow in the branch paths of a parallel circuit is determined by the resistance of the individual paths.
3. The sum of the currents entering the branch paths of a parallel circuit is equal to the sum of the currents leaving the branch paths of a parallel circuit.

A practical example of this is described as follows:

The power supply is connected to two identical horizontal submarine electrophoresis chambers (cells A and B). The power supply output is adjusted to 100 volts, at constant voltage, and the current display indicates 60 milliamps. By applying the three rules for parallel circuits we can determine the following information.

1. The voltage applied to both Cell "A" and Cell "B" is 100 volts. (Rule 1)
2. The sum of the currents flowing through Cell "A" and Cell "B" is equal to 60 milliamps. (Rule 3)

Switch off the power supply and momentarily disconnect Cell "B". Switch the power supply back on and note how the output current reading drops to 35 milliamps. From this, the following information can be derived.

1. The current flow through Cell "B" is equal to 60 milliamps minus 35 milliamps i.e. a net value of 25 milliamps. (Rule 3)
2. The reason Cell "A" and Cell "B" have different current readings is due to the difference in resistance between Cells "A" and "B". (Rule 2)

⚠WARNING

Do not pull the leads out of the 4mm output connectors while the power supply is in operation!

⚠ AVERTISSEMENT

Ne retirez pas les cables des sorties de 4mm pendant que l'appareil est en fonctionement!

Always make sure that the DC output is off and that both of the leads are disconnected from the 4mm output connectors on the front of the power supply before you remove the gels from the electrophoresis chambers. This is particularly important when several chambers are connected to the power supply at the same time since the "No Load Detection Safety Feature" of the power supply does not shut the voltage output off when one of the gels is still connected.

Set = 125V, **55**mA
Actual = 125V, **45**mA

In the procedure listed above we first determined the actual milliamps output for operation at 125 volts and then chose operating limits that were at a slightly higher level than those indicated for milliamps. This approach ensures that the maximum output from the power supply will never exceed the normal operating conditions (volts or milliamps) by more than 10%.

NOTE: When the power supply is used in constant current mode, select an operating time for volts which is greater than the actual value by 10% or 25 volts, whichever is greater.

Appendix B. Relationships Between Volts, Milliamps, Watts and Chamber Resistance

There are three fundamental concepts which form the basis for understanding the relationship between volts, milliamps and chamber resistance. When combined with the power formula they also define watts.

1. A movement of free electrons from atom to atom forms an electric current which is measured in milliamps (mA) or amps (A).
2. Electrostatic lines of force between two different charges produce a pressure that can move electrons (measured in volts).
3. All substances oppose the movement of electrons to some extent and are said to have resistance (measured in ohms).

These three factors are always present in any operating electric circuit. It is possible to incorporate them into one inclusive statement:

Ohm's Law

The value of the current that will flow in any circuit will be directly proportional to the value of the voltage applied and inversely proportional to the value of the resistance.

or

amps = volts / resistance

combined with

The power formula:

volts x amps = watts

(where 1 amp = 1000mA)

Together, these two formulas define all aspects of the relationship between volts, milliamps, watts and chamber resistance.

NOTE: The Adjustment Knob (2) can be turned clockwise and counterclockwise past zero. For example, the voltage may be set at at 0 when the power supply is switched on, but the user may want to set it to 245V. If the Adjustment Knob is turned counterclockwise the voltage can be quickly set to 245V.

Step 4. Using the Adjustment Knob (2), adjust the first operating limit to the desired value as shown on the Digital Volts/Milliamps/Time Display (8). Operating limits can range between 10 and 250V, 10 and 500mA and 1 minute (0.01) and 24 hours (24.0); (.00 = Timer Off). Several seconds after the desired setting has been entered, the power supply will automatically revert to the Actual Display Mode and the Actual Display LED (10) will be illuminated.

NOTE: Rotating the Adjustment Knob (2), at any time, will cause the power supply to automatically switch into the Set Display Mode. When this happens the Set Display LED will be illuminated and the operating limits may be changed. Approximately 5 seconds after the Adjustment Knob stops rotating the power supply will revert to the actual mode and the Actual Display LED will be illuminated.

Step 5. Return to Step 3 to select the second operating limit. Once selected, the user may rotate the adjustment knob or depress the Display Key (6) to switch to the Set Mode. Once in the Set Mode, the second operating limit can be set. Use the same procedure to set the last operating limit.

Step 6. Press the DC On/Off Key (4), and make sure that the red DC On LED (5) is illuminated. Note that the Actual Display LED (10) is now illuminated. Verify that the appropriate values for the selected operating limits are displayed on the Digital Volts/Milliamps/Time Display (8).

Step 7. The Timer On LED (3) will tell you whether your count-down Timer has been activated, and the V at Limit and mA at Limit LEDs (3) will indicate whether you are operating at constant voltage (V) or at constant current (mA), respectively. You can also check the limits which have been set and the actual operating conditions, at any time, by pressing the Display (6) and Select Mode (11) keys.

NOTE: Some users prefer to set up the chamber, switch the power supply's output on, and adjust the operating limits before the samples are actually loaded. If you choose to do this follow these five steps.

(i) Confirm that the chamber and the power supply are functioning properly,

(ii) Determine what the safe operating limits are,

(iii) Switch the power supply's output off using the DC On/Off Key,

NOTE CONTINUED ON NEXT PAGE

NOTE CONTINUED:

(iv) Load the samples, and

(v) Switch the power supply on using the DC On/Off Key and readjust the operating limits if necessary.

The power supply will retain its settings in memory only if the DC output has actually been activated. Once in memory, the settings which are being used for the run will be retained until they are changed by the operator.

USING THE TIMER IN THE COUNT-UP OR COUNT-DOWN MODE

This power supply is equipped with a dual function Timer. In the passive, or count-up mode, the Timer will accrue elapsed time when the DC On LED is illuminated. In the active, or count-down mode, the Timer will keep track of the elapsed time, and terminate the high voltage DC output and sound an alarm at the end of the set time interval.

Time is shown in hours and minutes during the first 9 hours and 59 minutes (9.59), and in hours and 10 minute intervals between 10 and 24 hours (10.0 - 24.0).

Count-Up Mode

To utilize the Timer in the passive, count-up mode, the time interval must be set to .00 before the DC output is activated. In the count-up mode, the Timer will be reset to zero (.00) if the DC output is switched off by pressing the DC On/Off Key or by switching the AC Mains Power Switch off; a power failure will also reset the count-up Timer to .00 .

The count-up Timer can accrue time for up to 24 hours. When more than 24 hours have elapsed, the DC On LED and the Digital Volts/Milliamps/Time Display will flash.

Count-Down Mode

To use the Timer in the active, or count-down mode, a time interval must be set before the DC output is activated. Once set, the Timer will count down whenever the DC On LED is illuminated. Note that both the DC On LED and the Timer On LED will be illuminated, indicating the timer is functioning in the count-down mode. In the count-down mode there is a **pause function**. The Timer will **pause** during the run if the DC output is switched off with the DC On/Off Key, or if there is a power failure. The Timer ***resumes*** when the DC On/Off Key is switched on, or when power is restored. When the power supply is switched off with the AC Mains Power Switch, the count-down timer will be reset.

The count-down Timer can only be used for runs with a duration of 24 hours or less. A series of short audible pulses indicates that the run timed by the count-down Timer has ended and that the power supply's DC output is switched off.

MESSAGES

The depression of any key on the front panel will be accompanied by a short audible tone. This message will confirm that the key has actually been depressed.

A series of short audible pulses indicates that a run timed with the count-down Timer has terminated.

The flashing **E01** error message appears when the power supply detects an open connection to the chamber. This message will occur at the beginning of the run if the leads are not properly connected, or during the run if one of the leads is inadvertently disconnected, or if the buffer has leaked and there is a lack of conductivity in the chamber. Depress the DC On/Off Key or switch the power supply off and on with the AC Mains Power switch to clear the **E01** error message. Check the connections and the buffer level before pressing the DC On/Off Key to proceed with the run.

NOTE: Some electrophoretic techniques can store energy in the chamber over a period of time. This energy, which manifests itself as a low voltage, may inhibit the normal function of the load sensing interlock. When a run is restarted, an **E01** error message may appear and the power supply may not start. To overcome this effect, press and hold the DC On/Off Key again until the power supply's voltage begins to rise.

Appendix A. Setting Safe Operating Limits.

Most chambers are made of acrylic plastic which may warp at high temperatures (above 55 °C). For this reason it is especially important to determine the normal operating conditions for each application and to confirm they do not exceed the safe operating limits of the chamber being used.

The following procedure illustrates how normal operating conditions can be determined and how this information can be used to choose safe operating limits for an agarose gel run in a submarine chamber at a constant voltage of 125 volts.

1. Adjust the operating limits to 125V, 500mA, Timer at 0.00.
2. Start the run by pressing the DC On/Off Key, and note the mA value when the voltage has reached 125V and the V at Limit LED is illuminated.
3. Adjust the mA setting so that it exceeds the actual value by 10% or by 10 milliamps, whichever is greater. Thus the Set and Actual values may look like this.

REVISION	DESCRIPTION	DATE	SIGNATURE
-	Initial Release		
A	Per ECN 1338 page 4 changed	9/18/96	
B	PER ECN 1480	9/15/98	
C	PER ECN 1842		

RE TITLE: **POWER SUPPLY 250-00 TEST PROCEDURE**

WRITTEN BY: B. Evans	APPROVED				PROCEDURE NO. 164A4000-00	
SIGNATURE DATE 8/08/98	SIGNATURE 8/08/98 DATE				PAGE 1 OF 2	REVISION C

250-90 POWER SUPPLY TEST PROCEDURE

Equipment Required:

Two, calibrated 3 1/2 digit DMM's configured to measure current and voltage.
Stopwatch
100 Ohm load
2500 Ohm load
470K 0.5W Resistor
Insulated trimming tool
Short Circuit Test Fixture

Please read this test specification and the user manual completely before commencing work.

NOTE 1: The unit must be connected to the AC supply via a GFCI outlet.

NOTE 2: As voltages up to 400VAC are present with in the unit **DO NOT TOUCH ANY PART OF THE CIRCUITRY WITHOUT REMOVING THE POWER FIRST AND WAITING A MINUTE FOR ANY CAPACITORS TO DISCHARGE.**

1. Remove the lid from the unit and visually check the UUT (Unit under test) for correct assembly before applying power, especially note that the position of the transformer connector J14 matches the supply voltage (marked on PCB).

2. Connect the UUT to the appropriate supply voltage (115V /230V).

3. Switch the unit ON.

4. Verify that the following indicators are on and that all the others are off:

   Set amber
   V amber

5. Verify that the display shows 00 (Note the unit will only show 00 at initial switch on. If the unit has been RUN before then it will show the set voltage used previously).

6. Press Select Mode once. Verify that the V indicator is off and the mA indicator (amber) is on.

7. Verify that the display shows 500.

8. Press Select Mode once. Verify that the mA indicator is off and that the time symbol indicator (amber) is on.

9. Verify that the display shows .00.

10. Press Select Mode once. Verify that the time symbol indicator is off and that the V indicator is on.

11. By turning the adjustment knob clockwise and counter clockwise verify that the display goes from 00 to 250 and back again. Set the voltage to 250.

12. Connect the UUT to a 2500 Ohm load. PRESS DC "ON/OFF"

13. Verify that the DC On (red), V at limit (amber) Actual (amber) and V (amber) indicators are on and that all of the others are off.

14. Adjust pot AR2 until the actual output voltage = 250V +/- 1V, as seen on a stand-alone calibrated DMM..

15. Turn the adjustment knob, verify that the Set indicator is on and the Actual indicator is off. Continue turning the adjustment knob until the display shows 100V. Verify that the Set led turns off after approximately 5 sec, that the Display led turns on and the display reads 100V. Check that the output voltage is 100V +/- 2V.

16. Press On/Off (UUT switches off).

17. Connect the UUT to a 100 Ohm load. Press DC On/Off (UUT switches on).

18. Verify that the DC Led is On, mA at limit, Actual and V indicators are on and that all of the others are off.

    Press Select Mode and Display. Verify mA Led is "ON" and that the display shows 500 and can be adjusted from 00 to 500 by turning the adjustment knob clockwise and counter clockwise. Set the display to 500 and press Display.

COLD CALIBRATION TEST:

Adjust pot AR1 until the actual current = 500mA +/-2mA.

21. Turn the adjustment knob, Verify that the Set indicator is on and the Actual indicator is OFF. Continue turning the adjustment know until the display shows 100mA. Verify the Set led turns off after approximately 5 secs, that the ACTUAL led turns "ON" the and the display reads 100mA. Check that the actual output current is 100mA +/-4mA.

22. Press Select Mode verify that the time symbol indicator is "ON". Verify that the time display is incrementing in 1-minute intervals by using the stopwatch.

23. Press On/Off. UUT is "OFF". Verify that the time display is .00.

24. By turning the adjustment knob clockwise and counter clockwise, verify that the display goes from .00 to 24.0 and back again. Set a time of 1 minute.

25. Press On/Off (UUT is "ON") and start the stopwatch. Verify that the Timer On indicator (amber) is ON.

26. Verify that the power supply switches off after 1 min (+/- 1 sec) after giving 3 sets of 4 beeps.

27. Change load to 2.5K ohm.

28. Press On/Off. Verify that the unit restarts and begins delivering power. Disconnect the power to the unit by removing the plug from the wall. Then reconnect power to the unit, the unit should restart and go to the setpoints.

29. Switch the unit OFF/ON using the power switch, Verify that the UUT does not restart but that the setpoints are retained.

30. Change the load to 470K. Verify that the UUT can be turned on by pressing the ON/OFF key.

31. Press ON/OFF. Disconnect all loads.Press ON/OFF. Verify that the error message E01 appears, flashing on the display.

32. Verify that the message can be removed by pressing ON/OFF. Continue to press ON/OFF. Verify that the output voltage starts to increase but that the error message reappears when the ON/OFF button is released.

33. **SHORT CIRCUIT TEST:**
Connect the unit to a 2500ohm load and a set to deliver 250V, 500mA. Switch the unit on, verify that the voltage has stopped increasing and short-circuit the output of the unit using short circuit test fixture. Check that the unit display **E04** and that the actual output voltage dropped to <10V (as measured by the DMM). Remove the short circuit test fixture. Turn the unit ON and verify the the unit starts up again.

34. **HI-POT TEST** the UUT

Per Procedure number 112-4000-00.

35. BURN-IN TEST:

Connect a 2500 Ohm load. Set the timer to 8 hours and put the UUT on the soak test rack and run at 250V for a minimum of 8 hours.

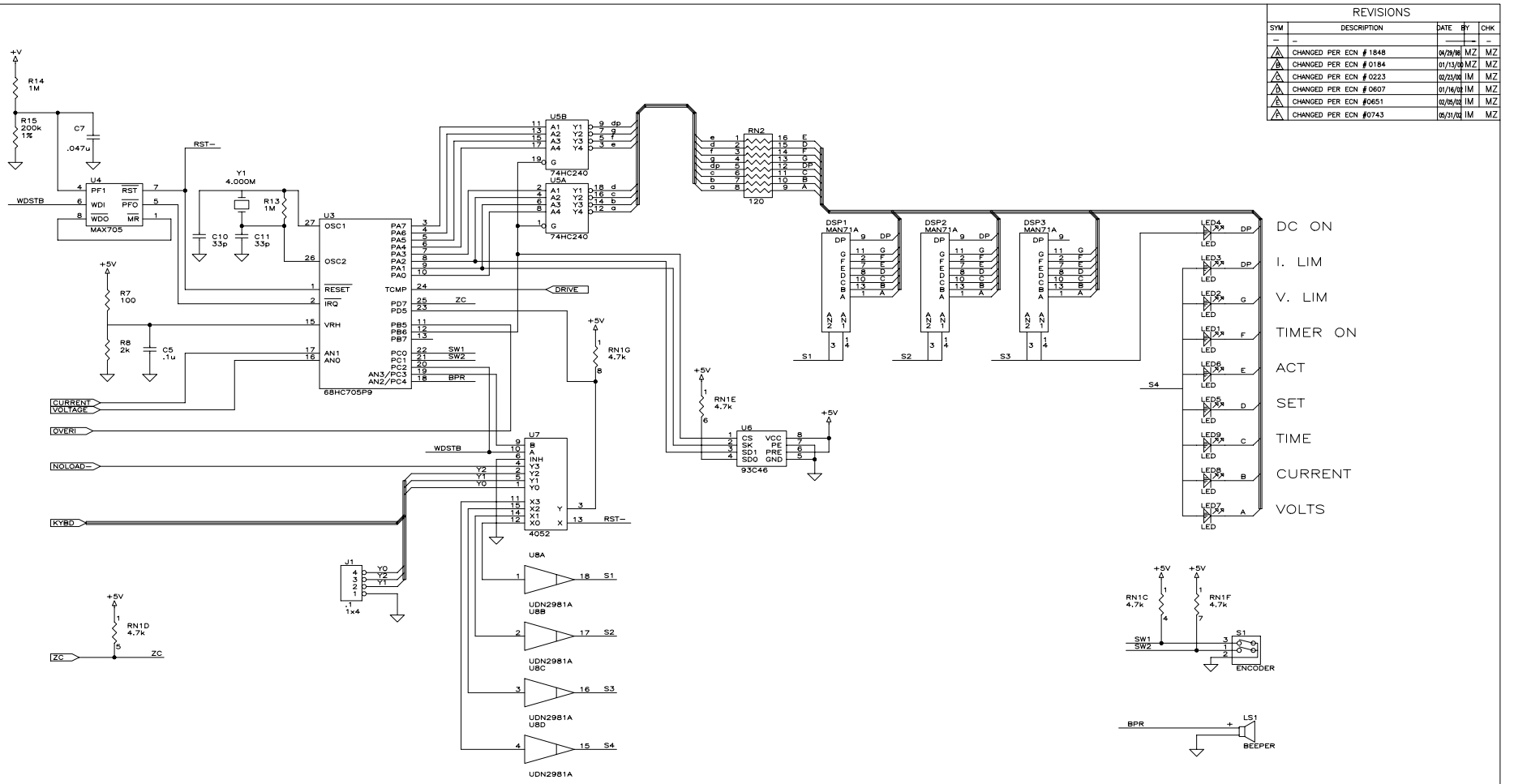
36. HOT CALIBRATION TEST:

Verify the calibration and readjust, if necessary. When performing the hot calibration remove only one unit at a time from the burn-in rack. The unit must be transferred to the test bench and calibration must begin as quickly as possible.

37. Reset the UUT to ON, 500Ma, .00 time.

NOTE: The unit must be turned on to store the values. Test travel ticket to be filled in per procedure SOP #7.

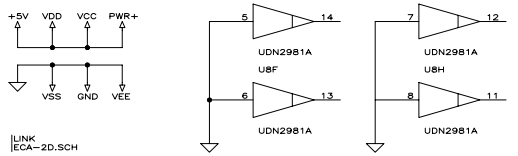
38. Test travel ticket to be filled in per Procedure SOP #7.



REVISIONS

SYM	DESCRIPTION	DATE	BY	CHK
–	–			–
A	CHANGED PER ECN # 1848	04/29/98	MZ	MZ
B	CHANGED PER ECN # 0184	01/13/00	MZ	MZ
C	CHANGED PER ECN # 0223	02/23/00	IM	MZ
D	CHANGED PER ECN # 0607	01/16/01	IM	MZ
E	CHANGED PER ECN #0651	02/05/02	IM	MZ
F	CHANGED PER ECN #0743	05/31/02	IM	MZ

SPARE GATES



POWER & GROUND TABLE

I.C.	REF	+5V	GND	+V	DECOUPLING CAPACITOR
68HC705P9	U3	28	14		C6
MAX705	U4	2	3		C8
74HC240	U5	20	10,1,19		C9
4052	U7	16	8,7		C13
LM324	U2		5,10–12	4	C3
UDN2981A	U8	9	5,6,7 8,10		C20
LM339	U1		5,7,12	3	C1
93C46	U6	6,8	5,7		C12

UNLESS OTHERWISE SPECIFIED DIMS. ARE IN INCHES. TOLS. ARE: (2 DEC PL)±.01 (3 DEC PL)±.005 ANG. ±1/2°

DO NOT SCALE DWG.

BREAK ALL SHARP EDGES

NEXT ASSY DRAWING NO.

DRN. BY M.Z. DATE 05/10/98

CKD. BY M.Z.

ELECT. ENG.

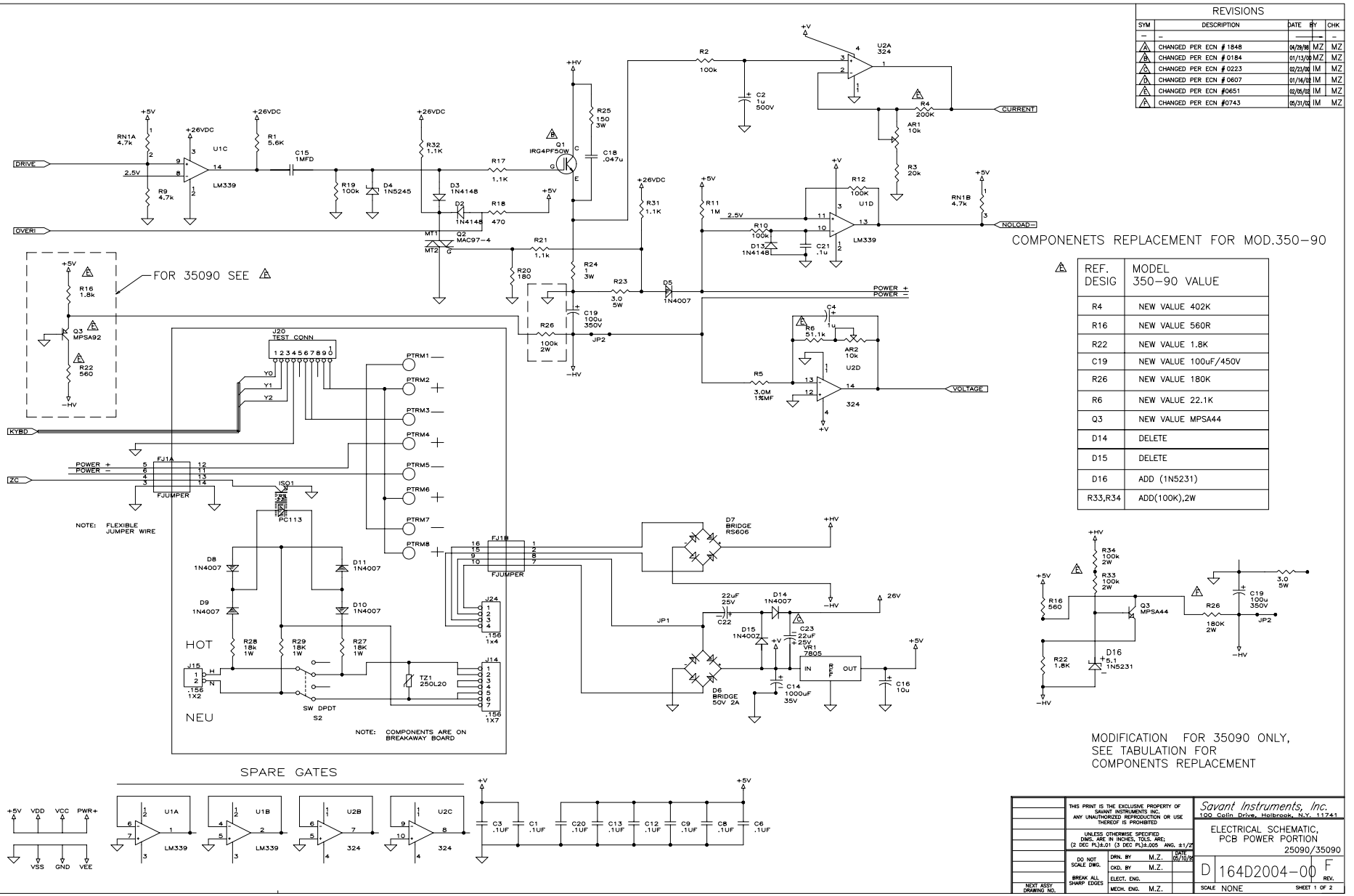
MECH. ENG. M.Z.

Savant Instruments, Inc.
100 Colin Drive, Holbrook, N.Y. 11741

ELECTRICAL SHEMATIC,
PCB MICRO PORTION
PS 250–90

D 164D2004–00 F
REV.

SCALE NONE SHEET 2 OF 2


REVISIONS
SYM DESCRIPTION DATE BY CHK
A CHANGED PER ECN # 1848 04/29/98 MZ MZ
B CHANGED PER ECN # 0184 01/13/00 MZ MZ
C CHANGED PER ECN # 0223 02/23/00 IM MZ
D CHANGED PER ECN # 0607 01/16/01 IM MZ
E CHANGED PER ECN #0651 02/05/02 IM MZ
F CHANGED PER ECN #0743 05/31/02 IM MZ
COMPONENETS REPLACEMENT FOR MOD.350-90
REF. DESIG | MODEL 350-90 VALUE
R4 NEW VALUE 402K
R16 NEW VALUE 560R
R22 NEW VALUE 1.8K
C19 NEW VALUE 100uF/450V
R26 NEW VALUE 180K
R6 NEW VALUE 22.1K
Q3 NEW VALUE MPSA44
D14 DELETE
D15 DELETE
D16 ADD (1N5231)
R33,R34 ADD(100K),2W
FOR 35090 SEE
NOTE: FLEXIBLE JUMPER WIRE
NOTE: COMPONENTS ARE ON BREAKAWAY BOARD
HOT
NEU
SPARE GATES
MODIFICATION FOR 35090 ONLY, SEE TABULATION FOR COMPONENTS REPLACEMENT
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ELECTRICAL SCHEMATIC, PCB POWER PORTION
25090/35090
D 164D2004-00 F
SCALE NONE
SHEET 1 OF 2