Errata

Title & Document Type: **5085A Standby Power Supply Operating and Service Manual**

Manual Part Number: **05085-9009**

Revision Date: **July 1974**

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OPERATING AND SERVICE MANUAL

STANDBY POWER SUPPLY 5085A

HEWLETT hp PACKARD

CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.

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Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

STANDBY POWER SUPPLY

5085A

SERIAL PREFIX: 1320A

This manual applies directly to HP Model 5085A Standby Power Supplies having serial number prefix 1320A.

OLDER INSTRUMENTS

This manual with changes provided in Appendix I applies to older models having serial number prefix 524, 604, 616, 624, 1024A, and 1032A.

5301 STEVENS CREEK BLVD., SANTA CLARA, CALIF. 95050

Printed: JUL 1974

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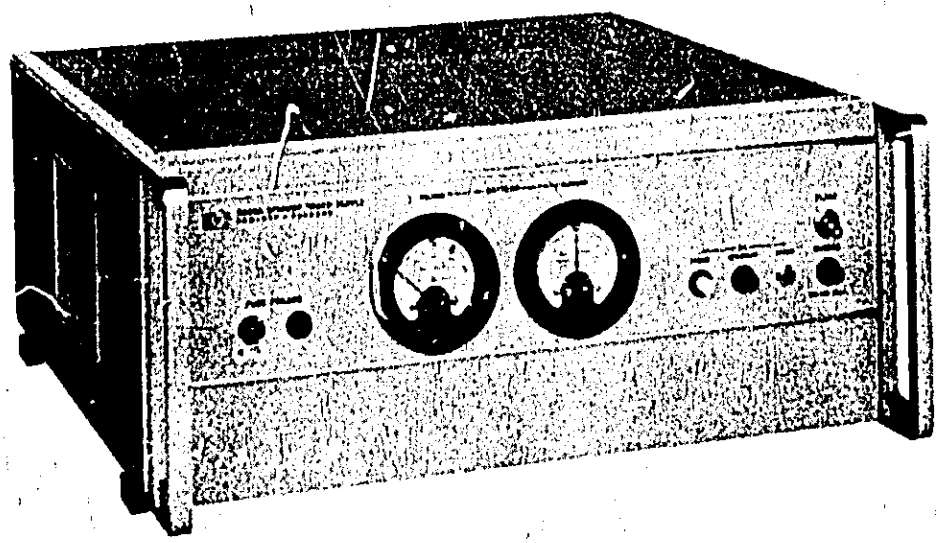
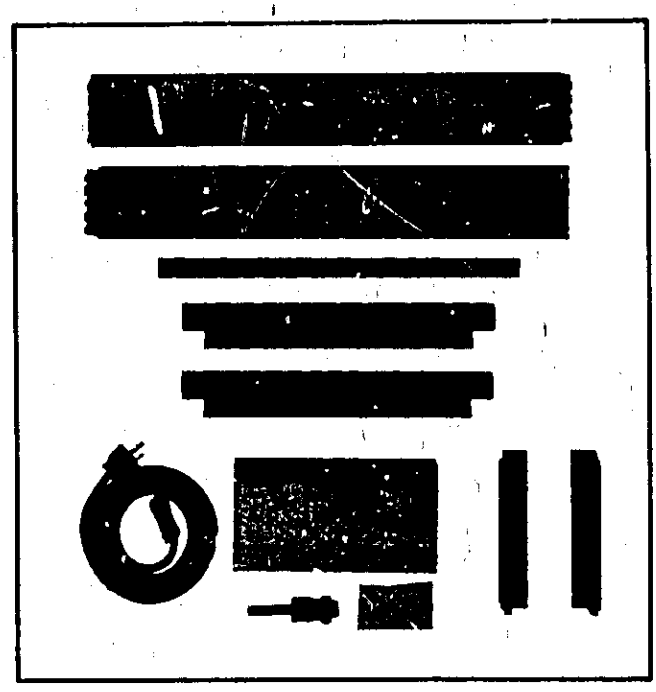
MODEL 5085A



(shown with bench mounting accessories)



RACK-MOUNT INSTALLATION KIT

Figure 1-1. Model 5085A

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION

1-2. DESCRIPTION

1-3. The Hewlett-Packard Model 5085A Standby Power Supply provides uninterrupted regulated 24 volts dc at a 2-ampere rated output. A reserve-charge feature permits charging the batteries to full capacity, providing 18 ampere-hours of standby power. The Model 5085A is designed to be rack-mounted; hardware necessary for rack installation is supplied with the instrument (except screws for attaching to rack).

1-4. The Standby Power Supply consists of: 1) ac-to-dc supply; 2) battery supply regulator; 3) output voltage regulator; 4) standby storage battery; 5) relay and indicator circuits. When operating from ac line voltage, the supply provides regulated 24 volts dc to the load and charging current to the standby storage battery. When ac power is interrupted, the battery immediately supplies power to the load, the relay switches, and the AC INTERRUPT light indicates the interruption of line power. When ac power to the Model 5085A resumes, the circuits automatically return to the original condition of supplying the load and charging the battery, except that the AC INTERRUPT light remains on uhtil manually reset by pressing the RESET button. The CHARGE/FLOAT switch enables charging the battery to full capacity.

1-5. INSTRUMENT IDENTIFICATION

1-6. Hewlett-Packard uses a two section serial number mounted on the rear panel. Earlier instruments use an 8-digit serial number (000-00000). The first three digits are a serial prefix number; the last five digits refer to the specific instrument. Later instruments use a 9-digit serial number (0000A00000). The first four digits are the serial prefix and the last five digits refer to the specific instrument. If the serial prefix of your instrument does not appear on the title page of this manual, there are differences between the manual and your instrument which are described in a change sheet included with the manual. If the change sheet is missing, the information can be supplied by your nearest Hewlett-Packard field office.

1-7. SPECIFICATIONS

1-8. Table 1-3 lists the technical specifications for the Model 5085A Standby Power Supply.

1-9. EQUIPMENT SUPPLIED

1-10. Table 1-1 lists equipment supplied with the Model 5085A Standby Power Supply.

1-11. ACCESSORIES

1-12. Table 1-2 lists accessories for HP Model 5085A Standby Power Supply (not furnished with instrument).

Table 1-1. Equipment Supplied

HP Part No.	Description
05085-6011	Installation Kit, Rack Mtg: Includes instruction and following items.
05061-6091	AC Power Cable (W1)
1490-0718	Slide-Steel, Chassis (pair)
1490-0721	Adapter Kit (pair)
1251-0129	Connector, Male, 5-Pin (for J5)
05085-2011	Mounting Bracket (left)
05085-2012	Mounting Bracket (right)
05085-0011	Battery Shield (two)
5040-6676	Filler Strip
Hardware for installing batteries and mounting strips	
1420-0012	Battery (Sonotone #23957) (two)
5951-0401	Battery Manual
1420-0013	Wrench (for battery caps)
(Batteries and wrench shipped in separate package from instrument)	

Table 1-2. Accessories

HP Part No.	Description
103A-16A	2-conductor cable, male to female, for J5 OSCILLATOR OUTPUT.
113A-16E	2-conductor cable, male to female, for J4 CLOCK OUTPUT only.
1251-0127	4-pin male connector: mates with J3 EXT Battery or J4 CLOCK OUTPUT.
1251-0129	5-pin male connector: mates with J5 OSCILLATOR OUTPUT.
1251-0145	6-pin female connector: mates with J2 EXT. ALARM.
BENCH MOUNTING ACCESSORIES	
5060-0763	Handle Assembly (2 required)
5060-0765	Retainer-Handle Assembly (2 required)
5060-0767	Foot Assembly (5 required)
5000-0052	Trim Strip (2 required)
NOTE: Use of tilt stand with this instrument not recommended.	

1-13. SPECIAL APPLICATIONS

1-14. In installations where standby reliability is of utmost importance, or where many deep discharge-charge cycles are expected, it is advisable to provide a spare battery (HP Part No. 1420-0012) and an auxiliary power supply such as HP Model 6224B.

Table 1-3. Specifications

OUTPUT VOLTAGE: 24 ±2 volts dc at rated current.

MAXIMUM RATED CURRENT (total external load): 2 amperes.*

STANDBY CAPACITY: (At 25°C, **) 18 ampere hours after 48 hours with manually operated CHARGE/FLOAT switch at CHARGE.

ALARM INDICATORS: Panel lamps indicate: (1) FUSE FAILURE, (2) AC POWER, (3) AC INTERRUPT, (4) 48 HR MAX (Charge)

REMOTE ALARM PROVISIONS: SPDT relay contacts provided at rear terminals for operating remote alarm from separate power system. Contacts rated at 3 amps (resistive) at 115 v ac or 28 v dc.

PANEL METERS: Voltmeter and ammeter indicate battery voltage and battery charge/discharge current.

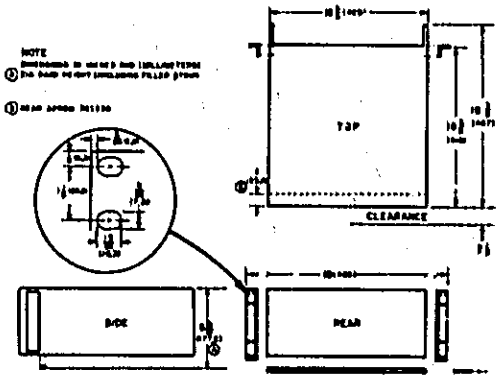
POWER REQUIREMENTS: 115 or 230 ±10% v ac; 50 to 1,000 Hertz (cps) (2.0 amps max. at 115 v line).

OUTPUT CONNECTORS. (Oscillator & Clock):
Mate with 106A/B, 107AR/BR, 115CR, 5060A, 5061A, and 5065A power cables.
Oscillator Power: Cannon #MS3102R14S-5S
Clock Power: Cannon #MS3102R14S-2S.

BATTERY (supplied): Vented nickel-cadmium, 25 ampere-hours rated capacity. Periodic maintenance required.

ADDITIONAL (external) BATTERY PROVISION: MS3102R14S-2S female connector at rear.

DIMENSIONS:



WEIGHT: Net 75 lbs (34, 1 Kg). Shipping 101 lbs (45, 9 Kg) including battery. Option 001 (no batteries) is 50 lbs. (22.8 Kg) less.

EQUIPMENT SUPPLIED
AC Power Cable, 6 feet long (1830 mm).
Instrument Extension Slides for std. 24" (610 mm) deep rack
Oscillator Output Connector

ACCESSORIES AVAILABLE:
HP 103A-16A, 2-conductor cable, male to female, for J5 (Osc. Output)
HP 113A-16E, 2-conductor cable, male to female, for J4 (Clock Output)
HP 1251-0129, 5-pin male Connector (for Oscillator Output)
HP 1251-0127, 4-pin male Connector (for Clock Output)
HP 1251-0145, 6-pin female Connector (External ALARM)

OPTIONS AVAILABLE:
Option 001: supplied less internal batteries.

*2.5 amperes for 30 minutes.
**Derate capacity to 75% at +50°C and 0°C.

INSTALLATION

SECTION II
INSTALLATION

2-1. INTRODUCTION.

2-2. This section includes instructions for unpacking, inspection, storage, shipment, and installation of the Standby Power Supply.

2-3. UNPACKING AND INSPECTION.

2-4. INSTRUMENT. If the shipping carton is damaged, ask that the carrier's agent be present when the instrument is unpacked. Inspect the instrument for damage (scratches, dents, broken parts, etc.). If the instrument is damaged or fails to meet specifications, notify the carrier and the nearest Hewlett-Packard field office immediately. Retain the shipping carton and the padding material for the carrier's inspection. The field office will arrange for the repair or replacement of your instrument without waiting for the claim against the carrier to be settled.

2-5. BATTERIES. Batteries for the Model 5085A are shipped in a cardboard box separate from the instrument. Unpack batteries per Paragraph 2-4. Check to see if any liquid has spilled into the shipping container. This may be a sign of a damaged battery cell. Test screws and nuts on all terminals for tightness -- poor electrical contact may damage the battery. Check vent plugs to be sure they are not obstructed. Check to be sure there is liquid in every cell -- tip battery, if necessary. If no liquid is present, 10 cc of distilled water may be added to cell. Avoid personal contact with electrolyte (refer to Paragraphs 2-30 through 2-37.)

2-6. STORAGE AND SHIPMENT.

2-7. INSTRUMENT. To protect valuable electronic equipment during storage or shipment, always use the best packaging methods available. Your Hewlett-Packard field office can provide packing material such as that used for original factory packaging. Contract packaging companies in many cities can provide dependable custom packaging on short notice. Two recommended packing methods are given below. Remove batteries from instrument before packaging. Fasten battery leads to keep them from flexing during shipment. If batteries are to be shipped, they should be packed separately (see Paragraph 2-9).

a. RUBBERIZED HAIR. Cover painted surfaces of instrument with protective wrapping paper. Pack instrument securely in a strong corrugated container (350 lb/sq in. bursting test) with 2-inch rubberized hair pads placed along all surfaces of the instrument. Insert fillers between pads and container to ensure a good fit. Tape or strap carton securely.

b. EXCELSIOR. Cover painted surfaces of instrument with protective wrapping paper. Pack instrument in a strong container (350 lb/sq in. bursting test) with a layer of excelsior about 6 inches thick packed firmly against all surfaces of the instrument. Tape or strap carton securely.

2-8. Conditions during storage and shipment of the instrument should normally be limited as follows:

a. Minimum temperature: -40°F (-40°C)

b. Maximum temperature: +167°F (+75°C).

2-9. BATTERIES. The batteries used in the Standby Power Supply should be packaged for shipping as follows:

a. Remove from instrument (see Paragraph 2-49).

b. Pack in original shipping container. Take care to protect terminals and caps against breakage.

2-10. PREPARATION FOR USE.

2-11. The batteries (2) should first be installed per Paragraph 2-44. Then the batteries should be fast charged for 48 hours per Paragraph 3-18. When the batteries are charged, the electrolyte level should be checked and if necessary, distilled water should be added; Paragraph 2-68 gives instructions for adding electrolyte and Paragraph 2-28 gives battery precautions that should be observed when dealing with battery electrolyte.

2-12. VENTILATION. The Model 5085A requires a free flow of air about the rear and sides of the instrument to cool the power transistors and remove oxygen and hydrogen which are produced during battery charging (see Paragraph 2-66).

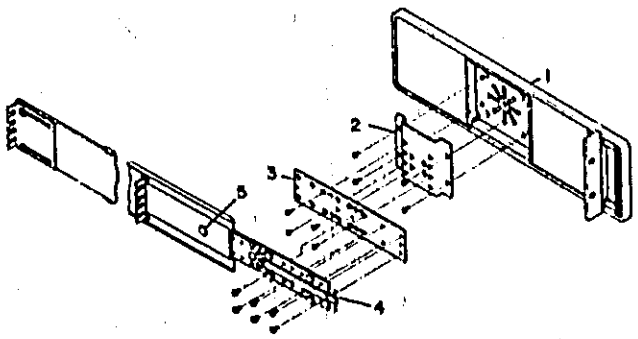
2-13. When operating within the specified 0°C to +50°C range, the standby capability of the Model 5085A is reduced by 1% for each degree Centigrade difference between ambient temperature and +25°C. In FLOAT mode, 100% is 14 ampere-hours. In CHARGE mode, 100% is 21 ampere-hours. Ambient temperatures during operation should be limited as follows:

a. Minimum temperature: +32°F (0°C)

b. Maximum temperature: +122°F (+50°C).

2-14. RACK MOUNTING.

2-15. The Model 5085A is supplied with extension slides as an accessory. These slides permit sliding the instrument out of its rack and tilting for repair or maintenance. Parts necessary to prepare the Standby Power Supply for operation as a slide-mounted rack instrument are supplied as an installation kit with the instrument. When slide-mounting the instrument,



Item No.	
1	Instrument Side Frame (right side)
2	Adapter Bracket (shown inverted)
3	Adapter Plate
4	Slide - Pivot Section
5	Slide - Locks (lock in fully extended position)

Figure 2-1. Rack and Slide Mounting

the batteries should not be installed until slide installation is completed. Figure 2-1 illustrates the correct installation for one side of the instrument.

2-16. RACK. The extension slides supplied with the Model 5085A are designed to be used in a standard 24-inch deep rack. Slots in the rear mounting brackets allow some variation to accomodate other rack depths in this range. Standard EIA-drilled rack flanges are required at front and rear to support the slides.

2-17. ADAPTER BRACKETS. Two identical Adapter Brackets are included in the Adapter Kit. These brackets mount in the recessed portions of the instrument side frames, as shown in Figure 2-1. On each side the part of the bracket that has no holes should be at the top for proper vertical alignment of the instrument in the rack. Four 8-32 binding head screws are used to attach each bracket to instrument side frame.

2-18. ADAPTER PLATES. Attach Adapter Plates to Adapter Brackets. Adapter Plate holes are identified by silkscreened numerals "1" through "7"; for this installation, use four 8-32 flat-head screws through holes identified by "4". Mount plates in upper possible position on brackets; the hole identification numbers must be right-side-up on the right-hand side of the instrument, and upside-down on the left hand side of the instrument.

2-19. SLIDES. Mount each slide in the rack as follows:

a. Lay off the nominal panel height (7 inches) of the Model 5085A in the desired position on the rack flanges. Hold one of the instrument mounting flanges against the top of this position to be sure holes will line up with those in rack. For safety and ease in checking electrolyte level, the Model 5085A should not be more than 4 feet above floor.

b. Mark center of panel height on rack flanges. The centerlines of the slides, when installed, must coincide with these marks.

c. Before fastening slides to rack, adjust rear mounting bracket for rack depth. Both front and rear slide mounting brackets are behind rack flanges, viewed from outside rack.

d. Attach front of slide to rack. If necessary, to avoid interference with instrument mounting brackets, countersink rack flange holes and use flat-head screws.

e. Make any required adjustment of rear mounting bracket, then fasten it to rear rack flange.

f. Be sure slides are parallel in rack.

2-20. INSTRUMENT. The slides supplied with the Model 5085A have three sections, one that attaches to the rack (fixed section), a pivoting section that attaches to the instrument (chassis section), and a movable section between these two (intermediate section). In this part of the installation procedure, the chassis sections of the slides are attached to the Adapter Plates on the instrument, using the following procedure:

a. Remove each chassis section from the rack-mounted slide; pulling it as far out as possible, then pressing the chassis section latching button located near the outside front end of the intermediate section while continuing to pull on the chassis section, which can now be separated from the rest of the slide.

b. Attach chassis sections of slides to adapter plates with pivot lock release handles toward instrument front panel. Use six 10-32 screws through holes in chassis section and holes identified by "2" on each adapter plate. When the chassis sections are correctly installed, a line through the pivot points will pass through the center of gravity of the Model 5085A with batteries installed.

c. Attach filler strip of bottom of instrument front panel.

d. Attach instrument mounting brackets to side frames. Use 8-32 hardware provided. Larger notches on brackets should be toward bottom of instrument.

e. With chassis sections attached to instrument, extend rack mounted slides to their locked position and fit chassis sections into intermediate sections.

f. Depress chassis section latching pushbuttons and push instrument in until the latches engage in holes in the intermediate sections.

g. Rotate instrument to check action of pivots.

2-21. FINAL ADJUSTMENTS. Final slide adjustments are made with instrument slide-mounted in rack.

a. Depress chassis section latching pushbuttons and slide instrument into its normal rack position. Check alignment of front panel. If alignment is not correct, pull instrument out of rack and reposition fronts of slides slightly, as needed, for good fit.

b. Check action of instrument in slides, to be sure it rolls in and out freely.

2-22. USE OF THE EXTENSION SLIDES.

2-23. NORMAL. With the instrument slide-mounted, access may be obtained by removing the instrument mounting bracket retaining screws and sliding the instrument out until the slides lock in their extended position. To return the instrument to its normal operation position, depress chassis section latching pushbuttons, slide instrument into place, and bolt instrument mounting brackets to rack flanges. The Model 5085A at its pivoting chassis sections may be turned to any convenient position for observation or testing. (Do not turn upside-down or into a vertical position while batteries are charging; electrolyte might be forced out through battery vents.) To rotate instrument, pull it out to the slides extended position. Pull forward on the pivot lock release handles (located on the chassis sections just behind the front panel) and rotate instrument to desired position. Return instrument to normal horizontal position before sliding it back into rack.

2-24. REMOVING INSTRUMENT FROM RACK. To remove instrument from rack, remove instrument mounting bracket retaining screws, then slide instrument out to its locked position. Disconnect cables from rear of instrument. Push the chassis section latching pushbuttons and slide instrument outward.

CAUTION

The Model 5085A Standby Power Supply weighs 75 lbs (34, 1 kg) with batteries installed. Disengagement from slides when removing instrument starts after 2 inches (50 mm) of outward movement. Be sure that the instrument is adequately supported beyond this point.

2-25. To return instrument to rack, first extend slides to full locked extended positions. Fit chassis sections into intermediate sections, and slide instrument in until it stops. Depress chassis section latching pushbuttons and push instrument in until the latches engage in holes in the intermediate sections. Depress latching pushbuttons again and continue pushing to slide instrument into its normal rack position. Bolt instrument mounting brackets to rack flanges.

2-26. BENCH MOUNTING.

2-27. Accessories available for converting the Model 5085A for bench operation are listed in Table 1-2. With the instrument not slide-mounted, and the battery not installed, proceed as follows:

a. Install five feet on bottom cover. Put foot into large holes at ends of mounting slots, press foot-release button, slide foot to edge of cover as far as it will go.

b. Attach handles. Handles mount with the ℄ symbol visible and right-side-up on both sides of the instrument. The handle assembly retainers mount with the bottom part (part with largest area) behind bottom of handle and top part covering handle and handle spring. The free ends of the springs should be pointing away from the side castings and toward the bottom of the instrument. Fasten handle assembly retainers with 8-32 x 3/8 Phillips screws.

c. Check operation of handles. If a handle does not work smoothly, remove handle from side casting and smooth points that rub. Reattach handle to side casting.

d. Pull handles about 1 inch out from their normal closed positions; the handle springs should have enough tension to pull them securely back into place. If a spring does not keep its handle snugly against the handle assembly retainer plate, remove handle and rotate end of spring outward to increase tension.

e. Attach trim strips. Remove protective paper from both sides of strips. Mount strips in places on side castings where instrument mounting brackets would be attached if instrument were to be mounted in rack. The strips are slightly shorter than the openings where they are mounted, and should be mounted at the tops of these openings, leaving a space at the bottom on each side.

2-28. BATTERY SAFETY PRECAUTIONS.

2-29. To avoid personal injury and damage to batteries, the WARNING and CAUTION information Paragraphs 2-30 through 2-42 should be read before handling batteries.

2-30. WARNING - GENERAL.

2-31. The electrolyte in the battery is caustic, poisonous, and dangerous to eyes, skin, and clothes. If electrolyte spills or sprays on body or clothing, wash the affected area thoroughly, with cold water only, until all soapy feeling is gone and skin feels clean.

2-32. WARNING - EYES.

2-33. If electrolyte gets into eye, irrigate the eye immediately with cold water. If possible, hold head so water runs from inner corner to outer corner of

eye. Roll eye while irrigating to ensure complete irrigation of eyeball. Do not be afraid of using too much water; extra irrigation does no harm, too little may allow caustic solution to remain. SEEK IMMEDIATE MEDICAL ATTENTION after first aid.

2-34. WARNING - SKIN.

2-35. If electrolyte sprays on body or clothing, remove clothing from affected area to prevent further contact with solution. Wash the affected area thoroughly in cold water until all soapy feeling is gone. Do not apply other chemicals or ointments to burn area. Wrap burn area tightly with sterile dressing to prevent blistering; excluding air reduces pain of burn.

2-36. VENT PLUGS - REMOVING.

2-37. To prevent spraying of electrolyte, vent plugs should be removed as follows:

a. Place special wrench (supplied) on vent plug.

b. Cover wrench and vent plug with a clean cloth as protection against electrolyte that may spray due to gas pressure in cell. (Vent valves open at about 10 psi and close at about 2 psi.)

c. Keep face away from vent plugs when they are being loosened.

d. Turn wrench counterclockwise as far as possible without forcing. (The hiss is the sound of gas escaping from cell.) The vent plug is now loose, and may be removed.

2-38. CAUTION - TOOLS.

2-39. Do not use items or tools that have previously been used with acid batteries. Acid ruins an alkali battery.

2-40. CAUTION - WATER.

2-41. Only distilled or demineralized water should be added to an alkali battery. Do not use water labeled "water for batteries". This is distilled water shipped in carboys which may also have been used for sulfuric acid. As such, it is suitable for lead-acid batteries but will ruin alkali batteries.

2-42. CAUTION - ACID.

2-43. Never add acid to the batteries in the Model 5085A. Acid ruins an alkali battery.

2-44. BATTERY INSTALLATION

2-45. Instrument should be removed from rack before installing or replacing batteries.

2-46. Install batteries as follows:

a. Remove top and side covers.

b. Loosen the 18 screws holding front battery bracket to side castings.

c. Pull front battery bracket as far forward as possible. If necessary, remove instrument mounting brackets or trim strips, loosen 8 screws holding front panel to side castings, and 10 screws holding main deck assembly to side castings.

d. Install batteries. Positive (+) terminals of both batteries should be toward left front of instrument.

e. Push front battery bracket against batteries and tighten 18 screws holding it to side castings.

f. Install two battery shields. Horizontal sections without holes are "up", pointing away from each other. Battery must be disconnected.

g. Tighten all other screws loosened in Paragraph 2-46, b, c.

h. Attach red wire to positive (+) terminal of left battery.

i. Attach yellow wire to negative (unmarked) terminal of right battery.

j. Complete series circuit by connecting the short orange jumper between the batteries. The spark that occurs when making this connection is normal and is caused by C1 and C3 charging before ac power is applied.

k. Install top and side covers, and mounting brackets or trim strips, as necessary.

2-47. Note battery condition on front panel meters. A battery voltage of approximately 26 volts will cause a discharging current of approximately 75 ma. If battery voltage is approximately 10 volts, a discharging current of approximately 20 ma will be indicated.

2-48. If the battery voltage is more than 10 volts, the AC INTERRUPT light will light as soon as the battery is connected. Switching the CHARGE/FLOAT switch to CHARGE will turn on the 48 HR MAX light.

2-49. To remove a battery, reverse procedure of Paragraph 2-46. Lift battery out of instrument by running strong twine or other non-conductor under connecting bars at front and rear of battery and lifting.

2-50. POWER REQUIREMENTS

2-51. The Model 5085A can be operated from either 115- or 230-volt (±10%) 50- to 1000-Hertz (cps) ac power lines. A slide switch on the rear panel permits quick conversion for operation from either voltage. Insert a narrow blade screwdriver in the switch slot and set the switch to expose the correct numbers ("115" or "230") for the line voltage to be used. The line fuses installed are rated at 2 amperes for 115 vac operation, and should be replaced with 1 ampere fuses when the instrument is to be operated from a 230-volt power line (see Table 2-1).

CAUTION

Before connecting ac power to the instrument, be certain slide switch is correctly positioned.

Table 2-1. 115/230-Volt Conversion

Conversion	115 Volts	230 Volts
Slide switch	up ("115")	down ("230")
AC line fuses	2-amp slow-blow (HP 2110-0303)	1-amp slow-blow (HP 2110-0007)

2-52. ELECTRICAL CONNECTIONS

2-53. POWER CABLE.

2-54. The Standby Power Supply is equipped with a detachable three-conductor power cable. Install as follows:

a. Connect the round, three-conductor female plug to the AC LINE jack on the instrument rear panel.

b. Connect male plug (two-blade with round grounding pin) to three-conductor (grounded) outlet. There is no ON/OFF switch; the Model 5085A is "on" as soon as it is plugged into the line. Exposed portions of the instrument are grounded through the round pin for safety; when only two-conductor outlets are available, use connector adapter (HP part number 1251-0048), and connect short wire from adapter to a suitable ground. The capacitors in the line filter can produce a shock hazard; therefore the instrument should always be grounded through the third wire in the power cord when operating from the line.

2-55. OSCILLATOR POWER AND CLOCK POWER.

2-56. Connect instrument to be powered to the appropriate 5- or 4-pin connector on the Model 5085A rear panel. Output voltage is 24 volts dc. Total current output through both connectors must not exceed 2 amperes (2.5 amperes during the first 30 minutes of Model 5060A warmup). With the ac power cord disconnected, the Model 5085A can safely supply 4 amperes without damage. To prevent overheating in the output voltage regulator transistors, maximum current should be limited to two amperes when the ac power cord is connected.

2-57. EXTERNAL ALARM.

2-58. Relay contact closure connects terminals A and B of the rear panel EXT. ALARM 6-pin male connector when ac power fails. The circuit between terminals B and C is opened. Since no power is supplied to terminals A, B, and C, the external alarm circuit must supply its own power. Provision can be made for the Model 5085A to power an external alarm, but this would cause the standby time to be decreased.

2-59. EXTERNAL BATTERY.

2-60. To provide additional standby time, an external battery can be connected to the EXTERNAL BATTERY 3-pin female connector on the rear panel. Use only two 10-cell vented nickel-cadmium (HP stock no. 1420-0012) batteries for extended periods of unattended operation. Use of other batteries as external battery is covered in Paragraphs 2-64 and 2-65.

2-61. Connect external battery as follows:

a. Turn rear panel EXTERNAL BATTERY CURRENT potentiometer fully counter-clockwise to MIN. This resistor limits surge current between the external and internal batteries when a potential difference exists

b. Connect the ungrounded external batteries in series to the rear panel EXTERNAL BATTERY connector with positive (+) terminal to pin B and negative (-) terminal to pin A.

c. Slowly rotate EXTERNAL BATTERY CURRENT potentiometer clockwise, keeping BATTERY CURRENT meter reading on-scale, until reaching MAX current position. Internal and external batteries are now connected in parallel, except that the BATTERY CURRENT meter monitors only the internal battery current.

2-62. No external battery should be connected to the Model 5085A when charging in the CHARGE mode. Differences in battery charging characteristics may cause either the internal or external battery to overcharge, causing gassing problems. (For explanation of gassing, see Paragraph 2-68.)

2-63. Only the external battery described in Paragraph 2-59 should be charged by the Model 5085A and only when the Model 5085A is charging in FLOAT mode. This battery is identical to the internal battery, and the FLOAT mode prevents the Standby Power Supply from overcharging either battery.

2-64. LEAD-ACID BATTERIES. Lead-acid batteries may be used as external batteries for the Model 5085A when vented ni-cad batteries are not available. These batteries should not be charged from the Model 5085A, because their charging characteristics are different from the internal nickel-cadmium batteries. NEVER USE ANY TOOL ON A NICKEL-CADMIUM BATTERY AFTER IT HAS BEEN USED ON A LEAD-ACID BATTERY.

2-65. SEALED NICKEL-CADMIUM BATTERIES. Use of sealed nickel-cadmium batteries with the Model 5085A is not recommended.

2-66. FAST CHARGE.

2-67. When the internal battery is being charged in CHARGE mode, it should be checked twice weekly to replace electrolyte lost due to gassing (see Paragraph 2-68).

2-68. BATTERY GASSING.

2-69. When the batteries are being charged, oxygen and hydrogen are created by the electrolysis of the water in the electrolyte. This reaction causes each battery cell to lose approximately 1 cc of fluid per day for each 100 ma of charging current. The electrolyte in the battery cells should not be permitted to get more than 25 cc low; this is about at the bottom of the windows. In CHARGE mode, each cell will lose about 6 cc of water per day, so electrolyte levels

should be checked twice weekly. The Normal Charge mode causes each cell to lose about 1 cc of water per day, so electrolyte level should be checked every three weeks. Add only distilled water to bring electrolyte to proper level.

2-70. MATING CONNECTORS

2-71. Table 2-2 lists the instrument connectors and the mating connectors required on the external cables. Refer to Table 1-2 for cables.

Table 2-2. Mating Connectors

Instrument Connector		Mating Connector	
Description	℗ Part No.	℗ Part No.	Description
J1 AC LINE 3-pin male MS3102A18-22PW	1251-2458*	1251-2457	3-pin female, Cannon MS3106A18-22SW
J2 EXTERNAL ALARM 6-pin male MS3102R14S-6P	1251-0144	1251-0145	6-pin female, Cannon MS3106E14S-6S (series ME)
J3 EXTERNAL BATTERY 4-pin female MS3102R14S-2S	1251-0128	1251-0127	4-pin male, Cannon MS3106E14S-2P (series ME)
J4 CLOCK OUTPUT 4-pin female MS3102R14S-2S	1251-0128	1251-0127	4-pin male, Cannon MS3106E14S-2P (series ME)
J5 OSCILLATOR OUTPUT 5-pin female MS3102R14S-5S	1251-0130	1251-0129	5-pin male, Cannon MS3106E14S-5P (series ME)

*Instruments with Serial Prefix 624- and below use MS3102R10SL-3P (HP Part No. 1251-0146) connector for J1 and require MS3106B10SL-3S mating (HP Part No. 1251-0257) female connector.

OPERATION

SECTION III
OPERATION

3-1. INTRODUCTION.

3-2. The Model 5085A needs a minimum of attention during operation. In normal operation, with the AC POWER indicator lit and battery on FLOAT mode, the Standby Power Supply requires only a daily meter check and a periodic check of battery electrolyte level. (When charging the battery in the CHARGE mode, electrolyte level should be checked every three days.)

3-3. Observe front panel meters and indicator lights daily to be sure instrument is operating properly, and that ac line power has not been interrupted. A daily log of instrument condition and meter readings is helpful for maintenance and repair purposes.

3-4. FRONT PANEL CONTROLS AND INDICATORS

3-5. Figure 3-1 illustrates the instrument front panel controls and indicators.

3-6. METERS. The condition of the instrument internal batteries is monitored by the front panel BATTERY VOLTAGE and BATTERY CURRENT meters. Battery output voltage is indicated by the left meter. The battery charging or discharging current is indicated by the right meter. These meters do not indicate the output voltage or current of the Standby Power Supply.

3-7. INDICATOR LIGHTS AND RESET BUTTON. Each FUSE FAILURE light is connected in parallel with one of the ac line fuses. When a FUSE FAILURE light is on, a fuse has blown and the power supply circuits should be checked.

3-8. There is no ON/OFF switch in the Model 5085A, thus the AC POWER light is normally on when the instrument is plugged into the ac line (see Paragraph 3-14). Should the AC INTERRUPT light also be on, it is an indication that the ac line voltage has been interrupted and some of the battery's standby time used. The AC INTERRUPT light is turned off by pressing the RESET button. When the AC INTERRUPT light is on while the AC POWER light is off, line voltage is not being supplied to the instrument and it is operating from its standby batteries.

3-9. The 48 HR MAX light is on when the instrument switch is set to CHARGE. This mode of operation charges the battery to full capacity and increases the standby capability to 18 ampere-hours. (Refer to Paragraph 2-66.)

3-10. REAR PANEL CONNECTORS & INDICATORS, FUSES, & SWITCH.

3-11. All connections for input and output power are made at the rear-panel connectors (see Figure 3-2). Two ac line fuses are installed in holders in the upper right corner of the rear panel. The 115/230-volt switch provides for operation from either 115- or 230-volt, 50- to 1000-Hertz (cps) power lines. Set this switch to expose the correct marking ("115" or "230") for the line voltage used. The ac line voltage is applied through the 3-pin male AC LINE jack.

3-12. The OSCILLATOR POWER and CLOCK POWER output connectors provide the dc output voltage to power loads with appropriate mating connectors. An external battery can be connected to the EXTERNAL BATTERY jack to increase standby time (refer to Paragraphs 2-59 through 2-65). The EXT. ALARM jack provides connections to complete an external, self-powered alarm circuit when ac line power fails (see Paragraph 2-57).

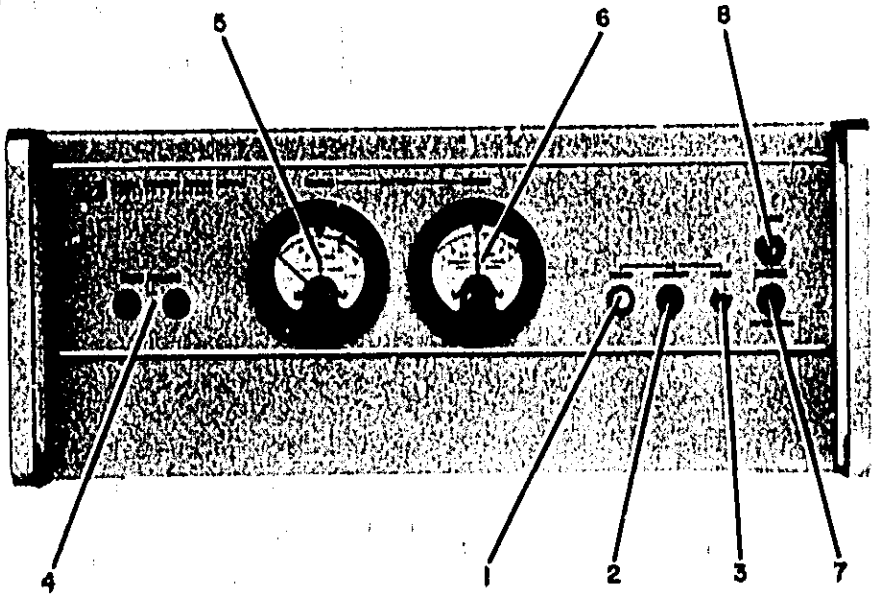
3-13. Table 3-1 lists current requirements at turn-on and ambient temperatures of 0°, +25°, and +50°C for several ⊕ instruments which may be operated by a Model 5085A Standby Power Supply.

Table 3-1. Current Requirements (typical values)

⊕ Instrument	Warm-up	Temperature		
		0°C*	+25°C	+50°C*
106A/B Quartz Oscillators	460 ma (8 hrs)	400 ma	275 ma	200 ma (40°C max)
107AR/BR Quartz Oscillators	600 ma (4 hrs)	540 ma	420 ma	300 ma
5065A Rubidium Vapor Freq. Std.	2.1 amp	1.7 amp	1.6 amp	1.34 amp
115A/B/C Freq. Divider & Clock	----	115 ma	115 ma	115 ma
115 W/encoders	----	350 ma	350 ma	350 ma
5061A Cesium Freq. Standard	1.8 amp	1.69 amp	1.63 amp	1.52 amp
5085A (in addition to load)	----	50 ma	50 ma	50 ma

*Derate 5085A standby capacity to 75%.

FRONT PANEL



1. AC POWER light. Indicates Standby Power Supply is operating from ac line power.

2. AC INTERRUPT light. Lights when ac power to instrument has been interrupted and internal batteries have supplied standby power to load.

3. RESET button. Must be pressed to turn off AC INTERRUPT light.

4. FUSE FAILURE lights. Light to indicate when instrument is not operating from ac line power due to a fuse failure.

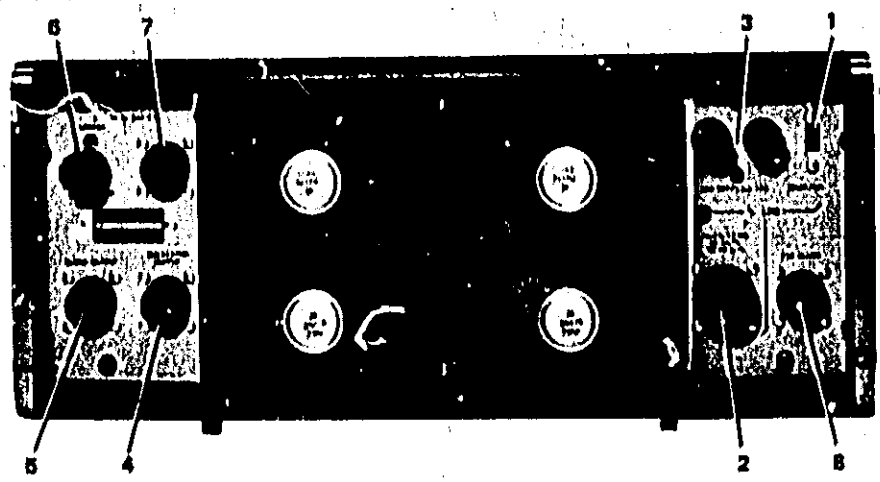
5. BATTERY VOLTAGE meter. Indicates voltage of internal standby batteries. The normal operating voltage is between 28 and 30 volts, indicated by the red area on the meter face. This meter does not show the output voltage of the Standby Power Supply.

6. BATTERY CURRENT meter. Indicates the charging or discharging current through the internal standby batteries.

7. 48 HR MAX light. Lights when CHARGE/FLOAT switch is set to CHARGE. In this mode the standby batteries are charged to full capacity. When operating in CHARGE mode, check level of battery electrolyte twice weekly.

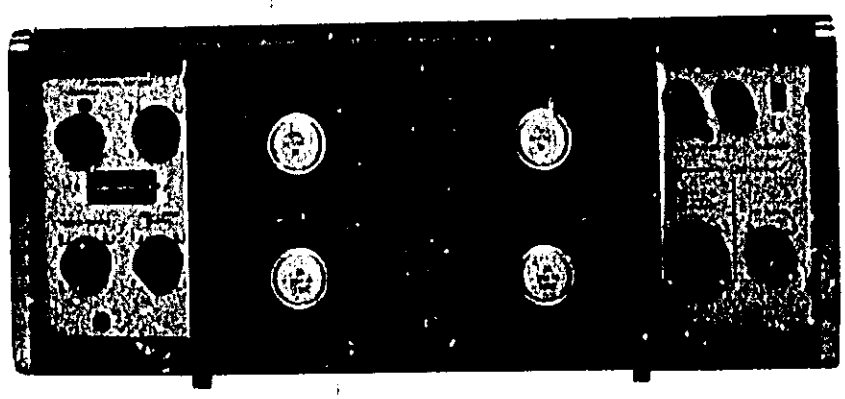
8. CHARGE/FLOAT switch. CHARGE position provides maximum charge in; 1) 24 hours from 60% charge or, 2) 48 hours with a fully discharged battery. When operating in this mode, check level of battery electrolyte twice weekly. When finished charging, place at FLOAT position for a continuous trickle charge.

Figure 3-1. Front Panel Controls and Indicators



REAR PANEL SERIAL PREFIX 1024A AND ABOVE

1. 115/230-VOLT switch. Allow selection of either 115- or 230-volt line. Slide up for 115 volts, down for 230 volts. Be sure switch in correct position before connecting ac power.
2. AC LINE jack. Accepts round female connector on power cable supplied.
3. AC LINE fuses. Use 2-ampere slow-blow for 115-volt operation; 1-ampere slow-blow for 230-volt operation.
4. OSCILLATOR OUTPUT connector. 5-pin female connector. Provides 24 volts dc between terminals A (+) and C (-). Total current output through 4 and 5 connectos should not exceed 2 amperes.
5. CLOCK OUTPUT connector. Four-pin female connector. Provides 24 volts dc between terminals D (+) and C (-). Total current output through 4 and 5 connectors should not exceed 2 amperes.
6. EXTERNAL BATTERY CURRENT potentiometer. Controls sure currents when external batteries are connected. Turn counterclockwise to MIN before connecting external batteries. After batteries are connected, slowly turn to MAX, keeping BATTERY CURRENT meter mreading on-scale.
7. EXTERNAL BATTERY jack. Four-pin female connector. When extended standby time is desired, two external batteries identical with the internal batteries may be connected in series between terminals B (+) and A (-). (Read BATTERY PRECAUTIONS, Paragraphs 2-43 through 2-47 before doing this.)
8. EXT. ALARM jack. Six-pin male connector. Provides switching circuit for external self-powered, ac power failure alarm, Terminals A, B normally open, terminals B, C normally connected. Power failure causes internal relay to switch, connecting terminals A, B and opening terminals B, C.



REAR PANEL SERIAL PREFIX 624- AND BELOW

Figure 3-2. Rear Panel Controls and Indicators

3-14. NORMAL OPERATION.

3-15. Table 3-2 lists normal indications for the Model 5085A lights and meters. Normal operation occurs when the instrument is plugged into an operating ac line, the CHARGE/FLOAT switch is set to FLOAT, and the load is warmed-up and operating normally. (Some of these indications may not occur when instrument is first turned on; refer to Paragraph 3-16 for explanation.)

Table 3-2. Normal Indications

AC POWER light	on
AC INTERRUPT light	off
48 HR MAX light	off
FUSE FAILURE lights	off
BATTERY VOLTAGE meter	24 to 26 volts
BATTERY CURRENT meter	1.0 amp (approximate)

3-16. If the battery in the Model 5085A is discharged to a point where the BATTERY VOLTAGE meter indicates 10 volts or less, either at turn-on or after having supplied standby power, some of the normal indications will not occur immediately when the instrument is plugged into the ac power line. The AC POWER, AC INTERRUPT, and 48 HR MAX light will not light with normal brilliance until the battery voltage is approximately 15 volts. If the battery has been completely discharged, it may take as long as 5 minutes for these lights to come on after the instrument has been plugged into the power line. It may take as long as 20 minutes for the BATTERY VOLTAGE meter to come to a reading of about 24 volts.

3-17. BATTERY CHARGING.

3-18. When the Model 5085A is first turned on, or when the AC INTERRUPT light indicates power has been interrupted, charge the batteries for 48 hours with the CHARGE/FLOAT switch set to CHARGE. If this switch is left at FLOAT, the standby capacity will be less than 60% of full capacity.

3-19. During this charging period, check the battery electrolyte level every three days (See Paragraph 2-66). After 48 hours, place the CHARGE/FLOAT switch to FLOAT; in this mode, the battery will be float-charged, maintaining the initial charge. The standby capability will be 18 ampere-hours.

3-20. EXTENDING STANDBY TIME.

3-21. Standby time can be increased in three ways:

a. The internal battery of the Standby Power Supply can be brought to full charge using the Normal Charge/Reserve Charge switch (see Paragraph 2-66).

b. An external battery can be connected to the Model 5085A (see Paragraphs 2-59 through 2-65).

c. More than one Model 5085A may be connected in parallel. When this is done the total current still should not exceed 2 amperes because one Standby Power Supply may be supplying all the current.

3-22. GROUND.

3-23. GENERAL.

3-24. The output of the Model 5085A is isolated from chassis ground and may be used to power instruments operating up to ±100 volts dc away from ground potential.

3-25. CONNECTING TWO INSTRUMENTS.

3-26. Two instruments may be powered at the same time by one Model 5085A Standby Power Supply, provided their grounds have the same polarity and their combined current requirement does not exceed 2 amperes. Two methods for checking the compatability of two instruments that are to be powered by the Model 5085A are given below.

3-27. FIRST METHOD. This method may be used when momentary loss of power to an instrument connected to the Model 5085A is not important. (A short circuit across the output of the Standby Power Supply would interrupt power to an instrument connected to it.)

a. Disconnect the Standby Power Supply from ac power. (With ac power removed, the reading of the BATTERY CURRENT meter is nearly identical with the output current of the Model 5085A.)

b. Connect one of the instruments to the Model 5085A output and note the amount of current it draws.

c. Determine the amount of current the second instrument should draw, either by connecting it separately to the Model 5085A or by referring to its specifications. (Table 3-1 lists current requirements for several HP instruments which may be powered by the Model 5085A.)

d. Plug the two instruments into their proper connectors, while watching the BATTERY CURRENT meter. The instrument should show the sum of the currents required to operate each instrument separately. (Maximum current should not exceed 2.75 amperes.) If current is appreciably greater than this, immediately disconnect instruments from 5085A and check for short circuits and different polarity ground connections.

e. If instruments are compatible for operation with the Model 5085A, plug the Standby Power Supply into the ac line.

3-28. SECOND METHOD. This method should be used where one instrument is already plugged into the Model 5085A, and must not lose power. (A short across the output of the Standby Power Supply would interrupt power to an instrument connected to it.)

a. Disconnect Standby Power Supply from ac power line.

b. Turn EXTERNAL BATTERY CURRENT potentiometer to MIN.

c. Connect positive power input of second instrument to pin B of EXTERNAL BATTERY jack and negative power input to pin A of jack. (Voltage across these terminals is about 30 volts; be sure instrument connected here will not be damaged by this voltage.)

d. Slowly rotate EXTERNAL BATTERY CURRENT potentiometer toward MAX, keeping BATTERY CURRENT meter on-scale. Maximum current should be 2.75 amperes (discharging); if more current is drawn, the instruments are incompatible, and must be modified or connected to separate Standby Power Supplies.

e. Disconnect instrument from EXTERNAL BATTERY jack. If instruments are compatible with each other, plug this instrument into the appropriate connector on the rear panel of the Model 5085A.

f. Plug the Standby Power Supply into ac line.

THEORY

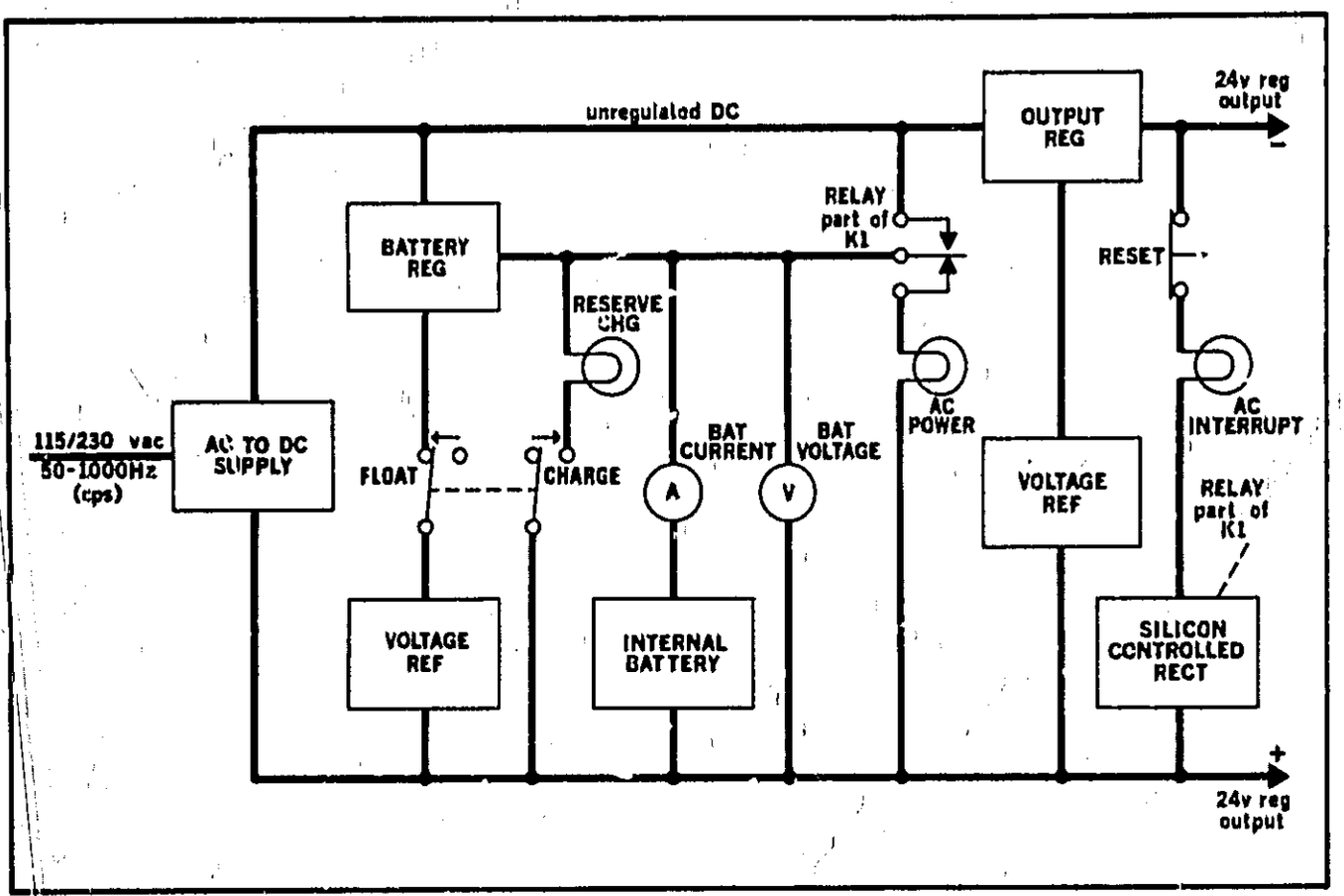


Figure 4-1. Block Diagram

SECTION IV
THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section describes how the Model 5085A operates. As illustrated in the block diagram (Figure 4-1), the Standby Power Supply consists of the following functional sections: 1) ac-to-dc supply, 2) output voltage regulator, 3) battery supply regulator, 4) internal battery, and 5) relay and indicator circuits. Line power is converted to unregulated dc by the ac-to-dc power supply. The regulators, operating from the unregulated dc power, provide the 24-volt output and current to charge the battery and drive the indicator lamps. The relay, connected across the ac line, controls the AC POWER and AC INTERRUPT lights and drive current for the output regulator in addition to providing switching contacts for an external alarm circuit.

4-3. AC-TO-DC SUPPLY.

4-4. Switch S1 connects the primary windings of the transformer in parallel for 115-volt line operation or in series for 230-volt operation. Line voltage is stepped down by the transformer to about 32 volts, rectified by the full-wave bridge rectifier circuit CR1, 2, 3, 4, and filtered by C1. Output of the ac-to-dc supply is unregulated 33 to 45 volts, dependi ɣ on output load current and input line voltage.

4-5. REGULATORS.

4-6. GENERAL.

4-7. The battery supply regulator and output voltage regulators are both basically simple transistor series voltage regulators with current limiting, as shown in Figure 4-2. In this circuit, transistor Q1 is connected as an emitter follower, with the output load, R_L, as the emitter resistor. Breakdown diode CR1 provides the reference voltage at the transistor base. Resistor R1 provides a path for drive current to the breakdown diode and transistor base. Because the resistance of a forward-biased base-emitter junction is low, changes in output current have little effect on the output (emitter) voltage, which must remain nearly the same as the reference (base) voltage. Changes in the unregulated input voltage are not seen by the transistor base, and have no effect on the output voltage.

4-8. Diode CR2 and resistor R2 in the simple series regulator (Figure 4-2) provide current limiting. The diode is, in effect, connected between the input and output terminals of the regulator. The value of R2 is chosen so that excessive current will produce enough voltage drop across the regulator to cause the diode to conduct. When the diode conducts, its current through R1 reduces the current available for Q1 base, thus preventing further increase in Q1 conduction.

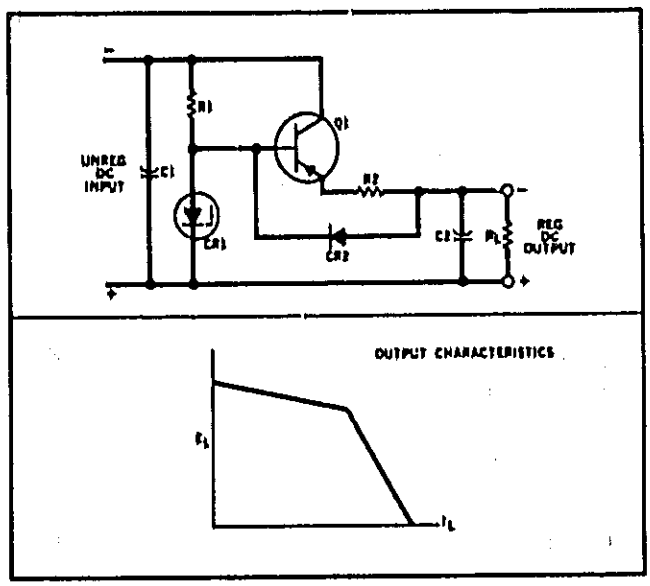


Figure 4-2. Series Regulator with Current Limiting

4-9. OUTPUT VOLTAGE REGULATOR.

4-10. The output voltage regulator consists of four series voltage regulators connected in parallel and driven by Q4 for more current gain. Transistor Q4 operates at a reference level determined by CR12, 13, and obtains its drive current from the battery circuit through R11, 12. This transistor supplies drive current to the bases of regulating transistors Q5, 6, 7, 8, at the voltage level determined by CR12, 13. Resistors R13, 14, 15, 16 equalize output currents among the transistors and, with CR14, provide current limiting for the output regulator.

4-11. Resistor R17 provides a path for the collector-base currents (I_{CO}) that occur in the regulator transistors when the Standby Power Supply is operating with little or no load at the output. If this resistor were removed (or open) these currents would cause the voltage at Q4 emitter to increase, turning off that transistor and allowing the output voltage to rise toward the unregulated supply voltage.

4-12. The output voltage regulator must normally develop a voltage drop of 12 to 15 volts when operating from the ac line versus a maximum voltage drop of 4 to 6 volts when operating from battery power. This is accomplished by having relay K1 short R11 during battery operation, increasing drive current to Q4 base and reducing the voltage drop across the output voltage regulator. Output voltage of the Model 5085A depends on the voltage at Q4 base. When the battery has discharged to about 25 volts, CR12, 13 cease conduction and the voltage drop between the battery and regulator is equal to Q4 base current times

the resistance of R12. Shorting R11 for battery operation reduces the resistance between the battery and the output voltage regulator, keeping the output voltage up for a longer time near the end of battery life.

4-13. BATTERY SUPPLY REGULATOR.

4-14. GENERAL. The battery supply regulator consists of transistors Q1, 2, 3, and associated components. This regulator supplies charging current for the battery, drive current for the output voltage regulator, current for the AC POWER light, and current for the 48 HR MAX light when in the CHARGE mode of operation. The CHARGE/FLOAT switch changes the characteristics of the battery supply regulator to provide for charging the battery to full capacity or float charging to about 60% of full capacity.

4-15. Figure 4-3 shows the relationship between current available through the battery supply regulator and the battery voltage. The line representing non-battery current requirements (current required by R11,12,DS4, and DS3) is not drawn with its true slope to make its relation to the total available current more apparent. Current available for battery charging is equal to the current available through the regulator at a given battery voltage minus the non-battery current requirements. At higher battery voltages the non-battery currents are increased, while the current available from the regulator decreases, reducing the current available for battery charging.

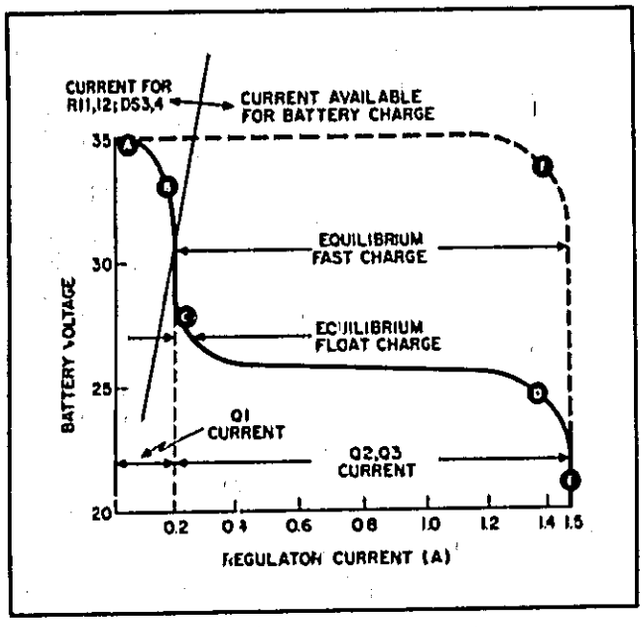


Figure 4-3. Battery Supply Regulator Characteristics

4-16. As the battery is charged in either charging mode, its voltage rises and charging current decreases until equilibrium is reached, and voltage and current remain constant. The charged battery normally reaches equilibrium in FLOAT mode with a charging current of 100 ma. and voltage of 28 volts. At equilibrium in the CHARGE mode, current continues at a rate nearly equal to the initial charging current, about 1 amp at 31 to 32 volts. The charging current at the equilibrium point of the FLOAT curve is enough to allow the battery to retain whatever level of charge it had attained in the CHARGE mode. Note that the initial charging rates for both FLOAT and CHARGE modes are identical.

4-17. Transistor Q1 is responsible for the portion of the characteristic curve through ABC (Figure 4-3). CR8 across Q1 base-emitter circuit limits the voltage across R5 to approximately 0.6 volt, thus the current through R5 and Q1 is limited to about 230 ma.

4-18. Transistors Q2,3 connected in parallel are responsible for the CDE portion of the FLOAT charge characteristic curve, and the BFE portion of the fast CHARGE characteristic curve. Diodes CR9A/B limit the voltage across the Q2,3 regulator circuit to about 1.2 volts, and the current through this transistor pair to about 0.5 ampere.

4-19. FLOAT Mode. In FLOAT mode operation the bases of Q2, 3 are operated at a reference voltage established by the voltage division of selected resistors, R1 and R18. Initially the battery is charged by the maximum current through all three transistors (E on graph, Figure 4-3). As the battery voltage increases toward the level of the reference voltage on the bases of Q2, 3 (D on graph), the curve knee is reached where a small increase in voltage is accompanied by a large decrease in charging current as Q2, 3 reduce conduction. When the battery voltage is greater than the reference voltage for Q2, 3, these transistors cease conduction and the battery continues to be charged by current through Q1 only.

4-20. CHARGE SETTING. Setting the CHARGE/FLOAT switch to CHARGE disconnects the reference voltage from the bases of Q2, 3, and these transistors operate in parallel with Q1, charging the batteries toward the voltage of the unregulated dc supply (dotted line, Figure 4-3). In this mode an equilibrium is reached wherein the batteries gas due to electrolysis of the water in the electrolyte by the charging current (see Paragraph 2-68).

4-21. AC INTERRUPT LIGHT CIRCUIT.

4-22. The AC INTERRUPT light circuit is connected across the output of the Model 5085A. Current for the light is controlled by silicon controlled rectifier CR10. An SCR is similar to a thyratron in that once triggered into conduction, the control element loses control and conduction continues until the anode current is interrupted. In the Model 5085A, the conduction signal is supplied when relay K1 switches, connecting R4 to the positive battery terminal, causing the SCR gate electrode to go about 1.5 volts more positive than the cathode. Conduction continues after ac power is resumed until the anode circuit is interrupted by pressing the RESET button. Capacitor C2 provides filtering to prevent the SCR being triggered by noise.

MAINTENANCE

SECTION V
MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides maintenance and service information for the Model 5085A. An in-cabinet performance check and a performance check record card are included to verify proper operation of the Standby Power Supply. Component location views and the schematic diagram are Figures 5-1 through 5-4 at the end of this section. Table 5-5 is included as troubleshooting aid.

5-3. SAFETY.

5-4. Paragraphs 5-5 through 5-11 contain the basic WARNING and CAUTION information required to prevent personal injury or damage to the instrument while performing maintenance and servicing operations. (Read Paragraphs 2-28 through 2-43 for details.)

5-5. WARNING.

5-6. The electrolyte in the battery is caustic, poisonous, and dangerous to eyes, skin, and clothing. If electrolyte sprays or spills on body or clothes, remove clothing from the affected area to prevent continuing contact with the solution and wash the area thoroughly with cold water until the soapy feeling is gone. If electrolyte gets into eye, wash eye immediately and completely in cold water, then seek medical attention. Seek proper First Aid and/or medical attention for any alkali burn.

5-7. Do not tilt instrument more than 45° while batteries are charging. Gas pressure may force electrolyte through vent plugs.

5-8. Do not turn batteries upside down. Electrolyte may seep through or around vent caps.

5-9. To protect against spraying electrolyte when removing vent caps, the following procedure should be used:

a. Place special wrench (supplied) on vent plug.

b. Cover wrench and vent plug with a clean cloth to protect against electrolyte that may be sprayed.

c. Keep face away from vent plugs when they are being loosened.

d. Turn wrench counterclockwise as far as possible without forcing. The vent plug is now loose, and may be removed.

5-10. CAUTION.

5-11. Do not use items or tools that have previously been used with acid batteries. Only pure distilled or demineralized water should be added to alkali batteries (do not use water labeled "water for batteries," which may have been shipped in carboys formerly used for sulfuric acid). Keep acid away from alkali batteries--acid ruins an alkali battery.

5-12. INSTRUMENT COVER REMOVAL.

5-13. To remove top cover, turn special fasteners about 1/4 turn counterclockwise, unlocking them. Slide cover toward rear of instrument, lifting front end of cover so fasteners will clear mating parts mounted on side castings. To replace cover, reverse procedure; check mating of flange at front edge of cover with front panel of instrument.

5-14. To remove bottom cover, unscrew and remove four countersunk phillips-head screws securing cover to instrument. Slide cover toward rear of instrument. To replace cover, reverse procedure.

WARNING

115/230 vac and battery connections are exposed with either top or bottom cover removed. Use appropriate caution when working on instrument with either cover off. Be careful when working around battery; a short circuit may cause current in excess of 100 amperes.

5-15. COMPONENT LOCATION.

5-16. Figures 5-1 and 5-2 show the location of components in the Standby Power Supply.

5-17. GENERAL INSTRUMENT MAINTENANCE.

5-18. The Standby Power Supply functions automatically, and normally needs a minimum amount of attention. General instrument maintenance is as follows:

a. Check front panel meters and indicator lights daily to be sure instrument is operating properly. Keeping a daily log of light indications and meter readings is a good way to ensure this check being made. The instrument log should include information on when electrolyte is checked, and how much is added to bring it up to the required level. Table 5-1 is a suggested heading arrangement for such a log.

Table 5-1. Typical Daily Log

AC POWER light	AC INTER light (off/on)	48 HR MAX light (off/on)	BATTERY		ELECTRO-LYTE CHECKED (amt. added) (comments)	By	Date
			CUR.	VOLT			

b. Keep electrolyte at correct level. When battery is fully charged, electrolyte should be 1/16 to 1/8 inch above top of plates in each cell. Do not allow electrolyte to go below bottom of window in side of battery. Check electrolyte level every three days in CHARGE mode; every three weeks in FLOAT mode.

c. Clean instrument and battery by using a clean dry brush to remove dust and potassium carbonate (white powder-deposits) from panel, battery, and chassis. This should be done before removing vent plugs each time electrolyte is added.

d. The Model 5085A may be thoroughly washed by hosing it with water. To do so, disconnect the instrument, remove it from the rack (see Paragraph 2-24) and remove top and bottom covers (see Paragraph 5-12). All components, including meters, transformer, and line filter, are hermetically sealed and will not be damaged by water. After washing, tip the instrument on its side and use compressed air to dry it and the batteries completely before returning to rack.

c. Clean battery at least once a year (see Paragraphs 5-20 to 5-22).

5-19. BATTERY MAINTENANCE

5-20. CLEANING BATTERY.

5-21. Harmless potassium carbonate (a white powdery substance) will accumulate on the battery and vent plugs. Remove such deposits with a brush or a warm-water-dampened rag or sponge. Wipe battery dry with a clean dry cloth. At least once a year, remove complete vent plug assemblies and wash in warm water; dry them and replace on battery. For further instructions, refer to battery manual.

5-22. The batteries may be washed in warm water. Remove the batteries from the Standby Power Supply per Paragraph 2-49. Wash by running warm tap water over the tops of the batteries, with vent plugs in place. Tip batteries on side and use compressed air to dry them completely before replacing in instrument.

WARNING

Avoid personal contact with electrolyte. (See Paragraph 5-6.)

5-23. CHECKING ELECTROLYTE LEVEL.

5-24. Prevent spilling of, or contact with, electrolyte when checking level in battery. Protect eyes against spraying electrolyte when removing vent plugs (Paragraph 5-9).

5-25. In a discharged Sonotone battery, electrolyte level may not be above the plates. When batteries are installed in Standby Power Supply, electrolyte should be visible above bottom of windows in batteries before charging begins; add water as necessary to bring electrolyte level into view. If the level of the electrolyte is below the top of the plates after the battery voltage reaches 28 to 30 volts, add distilled or demineralized water until electrolyte level is 1/16 to 1/8 inch above the plates.

WARNING: Avoid personal contact with electrolyte (see Paragraph 5-5).

CAUTION: Do not contaminate electrolyte with acid (see Paragraph 5-10).

5-26. TEST EQUIPMENT.

5-27. Table 5-2 lists test equipment and loads recommended for in-cabinet performance checks and other

Table 5-2. Recommended Test Equipment and Loads

Instrument Type	Critical Requirements	Recommended Instrument
Variable voltage line source with meter	Variable from 103 to 127 vac (207 to 253 vac). Current capability of 2 amperes (1 ampere)	
DC voltmeter	Voltage range 0 to 50 volts. Accuracy ± 1% of full scale.	℔ Model 412A
AC voltmeter	Voltage range 0 to 5 mv. Accuracy ± 3% of full scale.	℔ Models 403A/B
DC ammeter	Current capability 0 to 10 amperes. Accuracy ± 3% of full scale.	℔ Model 428B Clip-on DC milliammeter
Adjustable DC power supply	Current capability of 7 amperes at 35 volts.	Harrison Model 510A
LOAD: 300 ma		Resistor, fixed: 100 ohms, 15 watts minimum.
LOAD: 0.5 ampere		Resistor, fixed: 48 ohms, 15 watts minimum.
LOAD: 2.0 ampere	50 watts actual dissipation.	Resistor, fixed: 12.5 ohms, 50 watts minimum

servicing of the Model 5085A. Test instruments other than those recommended may be used, provided they meet the critical requirements listed.

5-28. VARIABLE LINE VOLTAGE.

5-29. When operating from ac power for performance checks and servicing, the Model 5085A should be connected to line power through a variable voltage device so input operating voltage may be varied ±10% from nominal line to assure proper operation under various supply conditions. Table 5-3 lists nominal, high, and low line voltages for 115- and 230-volt operation.

Table 5-3. Line Voltage

Nominal Voltage	115	230
High line	127	253
Low line	103	207

5-30. IN-CABINET PERFORMANCE CHECKS.

5-31. The in-cabinet performance checks (Table 5-4) and the PERFORMANCE CHECK TEST RECORD should be used to verify specifications and provide a permanent record of the performance of the instrument. The in-cabinet performance checks also verify proper operation of the Model 5085A and should be used:

a. As a check of instrument performance before connecting load instruments.

b. Periodically, to assure continuing performance within specifications.

c. As part of troubleshooting procedure to locate malfunctioning circuits.

d. After any repairs or adjustments, before returning instrument to regular service.

Table 5-4. In-Cabinet Performance Checks*

*Before making any of the in-cabinet performance checks, charge the batteries at the CHARGE rate for 48 hours. Switch CHARGE/FLOAT switch to FLOAT before beginning any of these checks.

1. OUTPUT VOLTAGE: 24 volts ±2 volts dc at rated current.

Disconnect load instruments. Connect 2.0 ampere load (Table 5-2) to terminals A (+) and C (-) Oscillator Power output connector.

a. Connect Standby Power Supply to ac power line through variable-voltage device (Table 5-2). Measure voltage across load at high, nominal, and low line voltages (Table 5-3). Voltage must be between 22 and 26 volts. Record value at nominal line on Performance Check Test Record. Measure voltage between terminal D (+) and C (-) of Clock Power output jack at nominal line. Must be same as voltage at Oscillator Power output.

b. Disconnect instrument from ac line. Measure voltage across load. Must between 22 and 26 volts. Record value on Performance Check Test Record.

2. MAXIMUM RATED CURRENT: 2 amperes (2.5 amperes for 30 minutes).

Disconnect load instruments. Connect 2.0 ampere load between terminals A (+) and C (-) of Oscillator Power jack. Connect 0.5 ampere load between terminals D (+) and C (-) of Clock Power jack. Connect instrument to ac line through variable-voltage device. Operate at nominal line voltage (115- or 230-volts). After 30 minutes, measure output voltage and disconnect loads. (Output voltage must be 22 to 26 volts.)

3. STANDBY CAPACITY: 18 ampere-hours after 48 hours charging in CHARGE mode.

Ambient temperature during test must be between +20°C and +30°C. Model 5085A output voltage should be observed carefully, particularly near end of test. Make test only when it is certain that someone is available to monitor battery and ac power system, especially during final stages of test. Perform test as follows:

a. Charge battery for 48 hours in CHARGE mode, being sure to replace electrolyte lost due to gassing.

b. Disconnect Model 5085A from ac line power.

c. Using system as load, record hourly indications of BATTERY CURRENT and BATTERY VOLTAGE meters.

Table 5-4. In-Cabinet Performance Checks (cont'd)

3. STANDBY CAPACITY (cont'd)
d. As BATTERY VOLTAGE meter reading decreases toward 22.5 volts, check voltage more frequently and accurately record time of drop to 22.5 volts. e. Reconnect Model 5085A to line power. f. To determine the available ampere hour capacity of the Model 5085A, multiply current flow from the battery by the discharge time to 22.5 volts. If this figure is not more than rated capacity (18 ampere-hours), attempt to restore battery capacity by using the procedure of Paragraph 5-36.
4. ALARM INDICATORS
a. FUSE FAILURE. Plug Standby Power Supply into ac power line. Remove one ac line fuse. One FUSE FAILURE light lights. Replace fuse. Remove second ac line fuse. Second FUSE FAILURE light lights. Replace fuse. b. AC POWER. Connect Standby Power Supply to ac power line. AC POWER light lights. Disconnect from ac power line. AC POWER light goes out. c. AC INTERRUPT. Connect Standby Power Supply to ac power line. Press RESET button. AC INTERRUPT light is off. Remove ac power from instrument. AC INTERRUPT light lights. Apply ac power to instrument. AC INTERRUPT light remains on. Press RESET button. AC INTERRUPT goes off and remains off. d. 48 HR MAX. Remove instrument top cover. (Paragraph 5-12.) Switch CHARGE/FLOAT switch to CHARGE. 48 HR MAX light lights. Switch CHARGE/FLOAT to FLOAT. 48 HR MAX light does not light. Replace top cover.
5. REMOTE ALARM
Connect Model 5085A to ac line. EXTERNAL ALARM pins A, B open; pins B, C shorted. Disconnect power: A, B shorted; B, C open.
6. PANEL METERS
a. BATTERY VOLTAGE meter. Remove top cover. Connect dc voltmeter (range 0 to 50 volts minimum, accuracy ±1%) in parallel with the BATTERY VOLTAGE meter. Compare the readings of the two meters. The BATTERY VOLTAGE meter reading should be within 2.6 volts of reading on test voltmeter. b. BATTERY CURRENT meter. Disconnect Standby Power Supply from ac line. Disconnect load instruments. Remove top cover. Connect ammeter (range 0 to 3.0 ampere minimum, accuracy ±3%) across orange jumper between batteries. Disconnect orange jumper. (When using a clip-on milliammeter, clip probe around orange jumper and leave jumper connected between batteries.) Connect 2.0 ampere load (Table 5-2) between terminals A and C of Oscillator Power jack. Note current readings of both meters. BATTERY CURRENT meter should be within 0.2 ampere of reading on test ammeter.

5-32. TROUBLESHOOTING AND REPAIR.

5-33. If the Model 5085A seems to be operating improperly, refer to Table 5-5 (Troubleshooting Aids), for possible causes.

5-34. DETERMINING AMPERE-HOUR CAPACITY OF BATTERY.

5-35. The ampere-hour capacity of a battery will gradually decrease with age and with the number and depth of discharge-charge cycles. If the Model 5085A is used in standby service only, the loss of capacity will be very small; but if frequent and deep discharge cycles are encountered, the loss of capacity may be serious and may occur early. To determine the ampere-hour capacity of the batteries in the Model 5085A, perform a controlled discharge test as described in Section 3 of In-Cabinet Performance Checks (Table 5-4).

5-36. To restore a battery that has lost ampere-hour capacity due to aging or repeated deep discharge-charge cycling:

a. Connect adjustable dc power supply to terminals B (+) and C (-) of rear panel EXTERNAL BATTERY jack (refer to Table 2-2 for mating connector). Adjust power supply to deliver 7 amperes charging current to battery for 6 hours. Battery voltage will rise to about 32 volts. Model 5085A must be plugged into ac line.

PERFORMANCE CHECK TEST CARD

Hewlett-Packard Model 5085A
Standby Power Supply
Serial No. ___ - _____

Tests performed by _____
Date _____

CHECK	INDICATION
1. OUTPUT VOLTAGE a. 115/230-volt line b. Battery operation	22.0 v. ☐ 26.0 v. 22.0 v. ☐ 26.0 v.
2. MAXIMUM RATED CURRENT	☐
3. STANDBY CAPACITY CHARGE Mode (Charge for 48 hours before test)	18 amp-hrs. ☐ amp-hrs.
4. ALARM INDICATORS a. FUSE FAILURE b. AC POWER c. AC INTERRUPT d. 48 HR MAX	☐ ☐ ☐ ☐
5. REMOTE ALARM	☐
6. PANEL METERS a. BATTERY VOLTAGE b. BATTERY CURRENT	☐ ☐

b. Check battery electrolyte level during charging. Add water to replace electrolyte lost due to gassing.

c. Repeat discharge procedure of Table 5-4, Item 3.

d. If battery capacity remains less than 21 ampere-hours, the procedure of Paragraphs 5-36,e through 5-36,l below may be used to attempt to restore the lost capacity.

e. Disconnect Model 5085A from ac line. Operate system from Model 5085A internal battery until battery voltage drops to 22.5 volts.

f. Connect an external battery per Paragraph 2-41.

g. Disconnect Model 5085A internal battery and remove from instrument (see Paragraph 2-49).

h. Refer to Sonotone Battery Manual, Part III-B-1, "APPARENT LOSS OF CAPACITY", for instructions.

i. Replace batteries in Model 5085A. Reconnect batteries. (See Paragraphs 2-46 through 2-48.) Disconnect external batteries and repeat battery life test, Table 5-4, Item 3.

j. If battery capacity is not 18 ampere-hours or greater, repeat procedure of Paragraphs 5-36e through 5-36i.

k. If battery capacity is 18 ampere-hours or greater after second restoration attempt, leave in Model 5085A and disconnect external battery.

l. If battery capacity is less than 18 ampere-hours, the battery must be returned to the Sonotone Corporation for overhaul. Contact the Sonotone Corporation, Elmsford, New York, for instructions.

5-37. DAMAGED BATTERY/BAD ELECTROLYTE.

5-38. If the battery is damaged in use, or electrolyte has wrong specific gravity or has been contaminated by foreign material (especially acid), the battery (or individual cells) should be returned directly to Sonotone Corporation, Battery Service Department. Sonotone Corporation specifically recommends that the battery user not attempt to readjust the specific gravity of the battery unless it is impractical to remove it from service long enough to have this done at the factory. Refer to Sonotone battery manual, Parts III-A-5 ("ELECTROLYTE SPECIFIC GRAVITY"), III-A-6 ("REPAIR AND REPLACEMENT"), and III-B ("Troubleshooting").

5-39. SELECTION OF DIODE CR12.

5-40. The resistor board assembly is manufactured with bare wire in place of CR12. During production testing at the factory, the voltage at TP1 is measured and the diodes are padded, as necessary, to produce the proper reference voltages at Q2, 3 bases and Q4 base.

5-41. If CR12 or 13 is bad or suspected to be bad, or if the resistor board assembly is replaced, the following procedure should be used to obtain the proper reference voltage. Instrument should be operating in ambient temperature of +25°C, at normal line voltage.

a. Disconnect the Model 5085A from ac line power.

b. Remove any load instruments from output.

c. Remove top cover.

d. Connect 300 ma load (refer to Table 5-2) in place of battery. (Disconnect orange jumper between batteries. Connect 300 ma load across yellow and red battery leads.)

e. Connect 2.0-ampere load (see Table 5-2) to Oscillator Power jack (terminals A and C).

f. Set CHARGE/FLOAT switch to CHARGE.

g. Plug instrument into ac line, operating at nominal voltage (115 or 230 volts).

h. Measure voltage at TP1 (see Figure 5-4). Voltage at TP1 should be 24.8 to 25.8 volts. If this voltage is outside its allowable range, measure the voltage at TP1, and refer to Table 5-6 to determine amount of padding required.

i. When installing padding diodes, disconnect instrument from line power.

j. Connect to ac power and measure voltage at TP1 and/or TP2 after installing padding diode(s).

k. When installation and tests are complete, disconnect from ac line power. Disconnect all loads. Connect orange jumper between batteries (the spark is normal). Replace top cover.

5-42. PARTS REPLACEMENT

5-43. GENERAL. In most cases, replacement of parts in the Model 5085A is a straightforward procedure. Except for parts on the front board of the resistor board assembly, power transistors mounted on the heat sinks, and FUSE FAILURE lights, it is necessary only to remove the top (or top and bottom) cover(s) to be able to change any part in the instrument. Parts identification numbers or names are silk-screened on the main deck, panels, and resistor board assembly; parts location information is also provided in Figures 5-1 and 5-2.

5-44. LIGHTS AND METERS. The AC POWER, AC INTERRUPT, and 48 HR MAX lights are replaced by unscrewing the lens and removing the bulb. The instrument need not be removed from its rack location to do this. The neon lamps in the FUSE FAILURE indicators are integral parts of the indicator assemblies; if a FUSE FAILURE lamp is bad, the

whole assembly must be replaced. The batteries may have to be removed to provide access to replace the FUSE FAILURE lamps.

5-45. The meters mount from the front of the instrument. Remove the top cover to allow access to nuts on meter mounting screws.

CAUTION

Be careful not to short battery when working in Standby Power Supply. It is possible to draw currents in excess of 100 amperes, resulting in damage to battery.

5-46. TRANSISTORS AND DIODES. To replace one of the power transistors (Q5-8) mounted on heat sinks at the rear of the instrument, the heat sink must be removed to provide access for soldering iron and wrench. Silkscreened identification for transistors Q5-8 is located on rear panel between fins of heat sinks. Use nylon bushings (HP Part No. 1200-0081) to insulate mounting screws for power transistors Q1-4 from main deck.

5-47. Silicone grease (HP Part No. 8500-0059) is used on all anodized aluminum insulating washers and heat sinks to increase heat transfer from semiconductor components mounted on them. Silicone grease is also used on heat sink flanges that attach to the rear panel of the Model 5085A. When replacing any of the power transistors Q1-8, or diodes CR1 - 4, 13, be sure to renew the silicone compound on the insulating washers and heat sinks as required to ensure good heat transfer between the transistor or diode and the mounting surface.

Table 5-5. Troubleshooting Aids

Trouble	Possible Cause
1. AC POWER light doesn't come on when instrument is plugged into operating line.	a. Battery voltage less than 15 volts. b. Lamp burned out. c. Relay K1 faulty. d. 115-230 v switch in 230 v.
2. AC INTERRUPT light doesn't come on when instrument is not operating from ac.	a. Battery voltage less than 15 volts. b. Lamp burned out. c. CR10 faulty. d. R4 or K1 faulty.
3. Battery charging current higher than normal. (48 HR MAX light off.)	a. Diode CR8 or 9 open. b. 48 HR MAX light burned out. (Check position of S2.) c. Excessive battery temperature. d. Damaged cell (s).
4. Battery charging current less than normal.	a. R5, 6, 7 open. b. CR8, or 9A/B shorted. c. Battery electrolyte weak. d. Battery electrolyte level too low. e. Low AC line voltage and/or low ambient temperature.
5. Battery supply voltage (BATTERY VOLTAGE meter reading) too high.	a. Open circuit in battery (check orange jumper and battery connecting bars). b. CR8 or 9A/B open. c. Excessive charging current. d. Low ambient temperature.
6. Battery supply voltage (BATTERY VOLTAGE meter reading) too low.	a. R1, 3, 5, 6, 7 open. b. Q1, 2, 3 open. c. Reference voltage at Q2, 3 bases too low. d. R13, 14, 15, 16 open. e. Q5, 6, 7, 8 open. f. AC power off.

Table 5-5. Troubleshooting Aids (cont'd)

Trouble	Possible Cause
7. Output voltage too low.	a. Output load draws too much current. b. Reference voltage at Q4 base low. c. Insufficient drive current to Q4 base or Q5-8 bases. d. R13, 14, 15, 16 open. e. Q5, 6, 7, 8 open. f. Ac power off.
8. Output voltage too high.	a. Reference voltage at Q4 base too high. b. Too much drive current to Q4 base or to Q5-8 bases. c. R17 open (light or no load on output). d. High battery voltage.
9. Output current too high.	a. Load draws too much current. b. CR14 open or has high resistance. c. R11, 12, or K1 faulty.
10. AC INTERRUPT light remains on while AC POWER light is on after RESET button is pressed.	a. CR10 shorted. b. K1 faulty. c. RESET switch faulty.
11. Output current low.	a. CR14 shorted. b. Insufficient drive current to Q4 base or Q5-8 bases. (Check R11, 12, K1, R17) c. R13, 14, 15, 16 open. d. R17 shorted. e. Q5, 6, 7, 8 open.
12. High ripple content in output DC.	a. Load draws too much current. b. Q5, 6, 7, 8 open. c. R13, 14, 15, 16 open. d. C1 or C3 open. e. Battery not connected. f. Ground loops.

Table 5-6. Selection of CR12

TP1 Voltage	CR12 Selection
24.8 to 25.8 volts (normal	No padding required. Use bare wire in place of CR12.
24.6 to 24.8 volts	Install CR12, ⊛ Part No. 1901-0016
24.0 to 24.6 volts	Install CR12, ⊛ Part No. 1901-0022

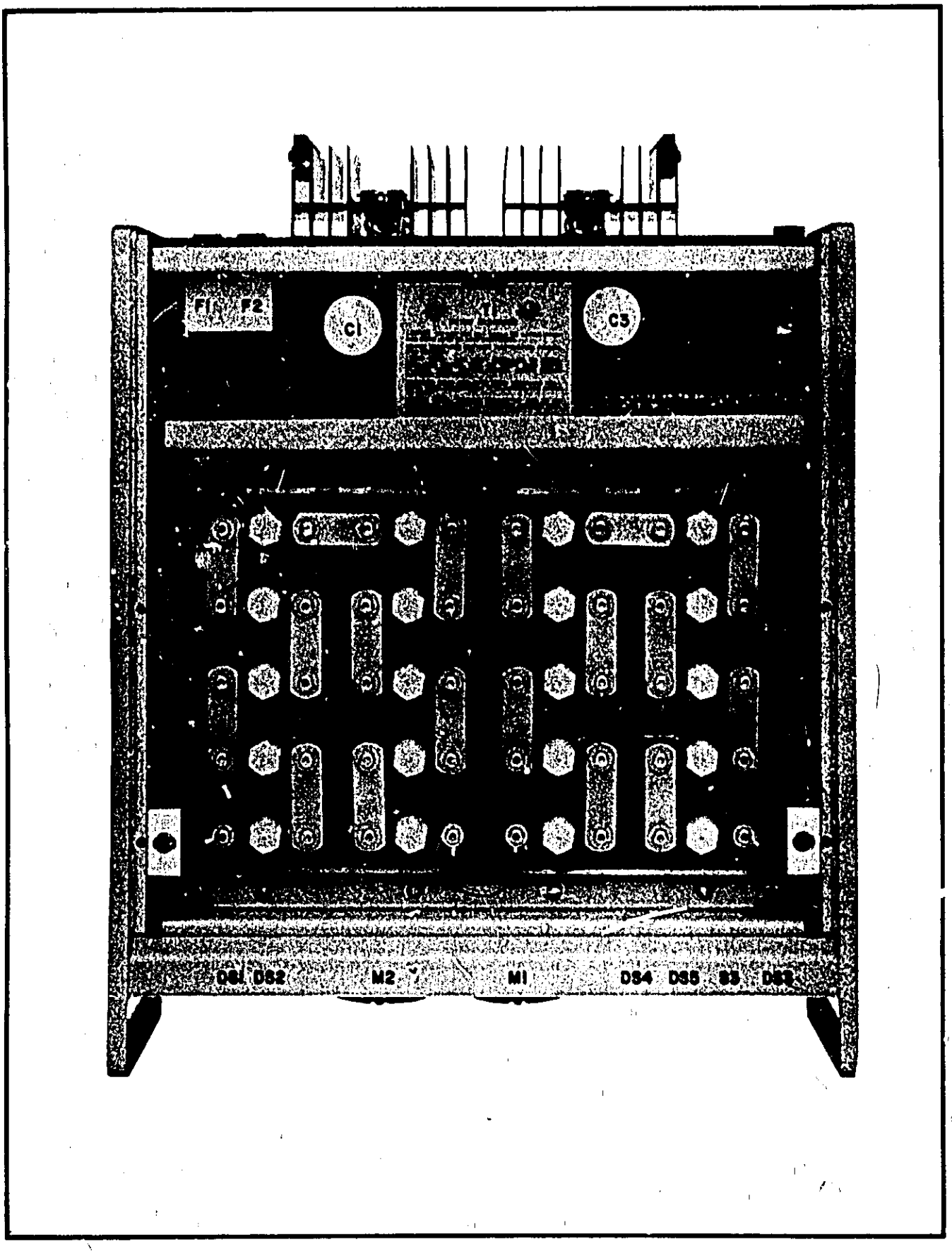


Figure 5-1. Model 5085A, Top View

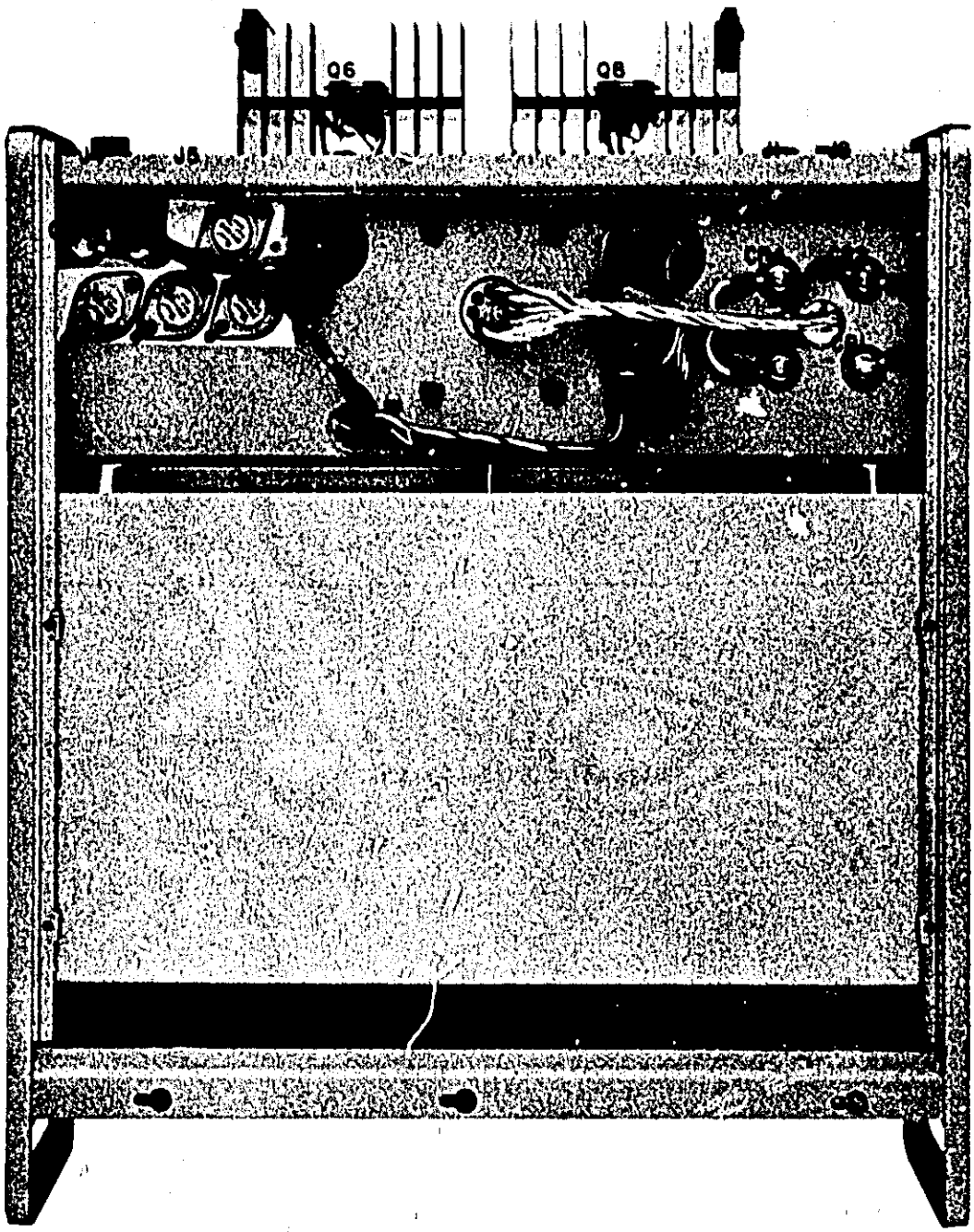


Figure 5-2. Model 5085A, Bottom View

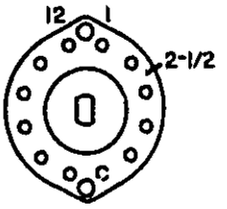
SYMBOLS

- FRONT PANEL
- REAR PANEL
- KNOB CONTROL
- SCREWDRIVER ADJUST
- MAIN SIGNAL PATH
- FEEDBACK PATH
- CONDUCTING ELEMENT
- WIPER MOVES TOWARD "CW" WHEN CONTROL IS ROTATED CLOCKWISE
- POWER LINE GROUND
- CIRCUIT COMMON GROUND
- TEST POINT
- "AND" GATE
- INHIBIT GATE
- "OR" GATE

WAVEFORMS SHOWN ARE TYPICAL

SWITCH DESIGNATIONS

A3S1BR(2-1/2)



A3S1	SWITCH S1 WITHIN ASSEMBLY A3
B	2ND WAFER FROM FRONT (A=1ST, ETC)
R	REAR OF WAFER (F=FRONT)
(2-1/2)	TERMINAL LOCATION (2½) (VIEWED FROM FRONT)

REFERENCE DESIGNATIONS

REFERENCE DESIGNATIONS WITHIN ASSEMBLIES ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.

ASSEMBLY	ABBREVIATION	COMPLETE DESCRIPTION
A25	C1	A25C1
A25A1	CR1	A25A1CR1
NO PREFIX	J3	J3

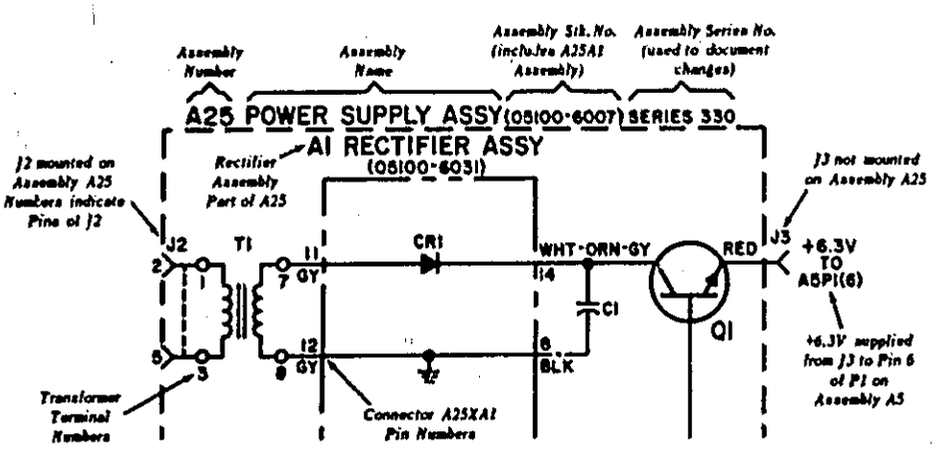
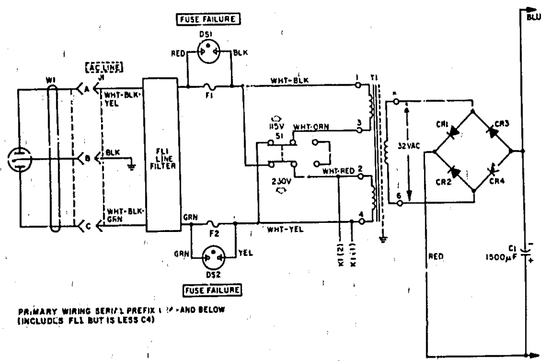
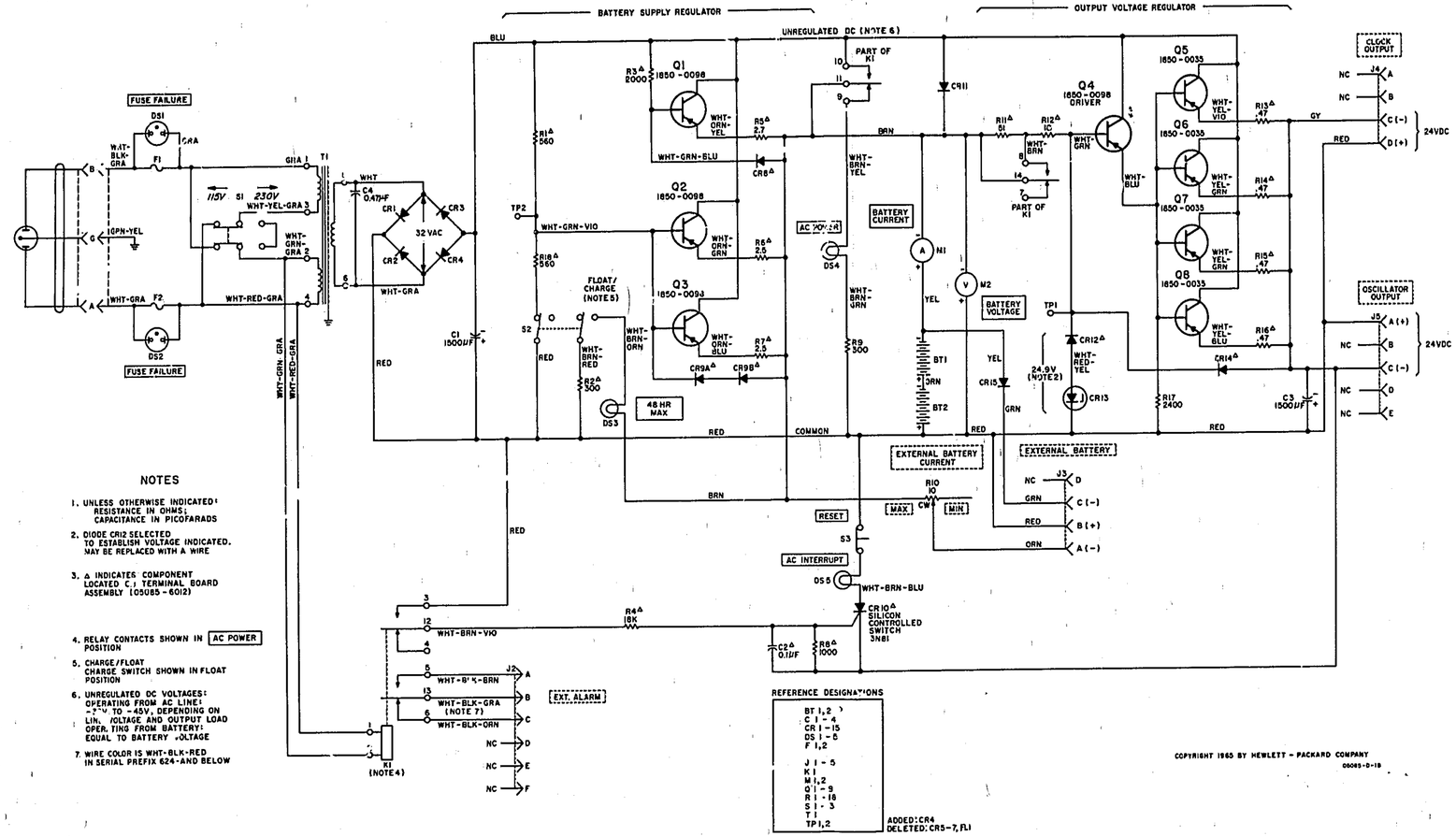


Figure 5-3. Schematic Diagram Notes

	JUMPER COLOR				JUMPER COLOR		
A	BRN			L	WHT	GRN	GRN
B	RED			M	WHT	GRN	BLU
C	BLU			N	WHT	YEL	GRN
D	GY			O	WHT	YEL	BLU
E	WHT	BRN		P	WHT	YEL	VIO
F	WHT	BRN	RED	R	WHT	YEL	GY
G	WHT	BRN	GRN	S	WHT	GRN	
H	WHT	BRN	BLU	T	WHT	GRN	BLU
I	WHT	BRN	VIO	U	WHT	GRN	VIO
J	WHT	RED		V	WHT	GRN	GY
K	WHT	GRN	YEL	W	WHT	BLU	



PRIMARY WIRING SERIAL PREFIX 1 [illegible] AND BELOW (INCLUDES FL1 BUT IS LESS C4)



NOTES

1. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN PICOFARADS
2. DIODE CR12 SELECTED TO ESTABLISH VOLTAGE INDICATED. MAY BE REPLACED WITH A WIRE
3. Δ INDICATES COMPONENT LOCATED ON TERMINAL BOARD ASSEMBLY (05085-6012)
4. RELAY CONTACTS SHOWN IN AC POWER POSITION
5. CHARGE/FLOAT CHARGE SWITCH SHOWN IN FLOAT POSITION
6. UNREGULATED DC VOLTAGES: OPERATING FROM AC LINE: -27V TO -45V, DEPENDING ON LIN. VOLTAGE AND OUTPUT LOAD OPER. TING FROM BATTERY: EQUAL TO BATTERY VOLTAGE
7. WIRE COLOR IS WHT-BLK-RED IN SERIAL PREFIX 624-AND BELOW

Figure 5-4. Schematic Diagram and Component Location

PARTS LIST

SECTION VI

REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This section contains information for ordering replacement parts. Table 6-1 lists parts in alpha-numerical order of their reference designators. Table 6-1 includes:

a. Description of the part (see list of abbreviations below).

b. Typical manufacturer of the part in a five-digit code; see list of manufacturers in Table 6-2.

c. Manufacturer's part number.

d. Total quantity used in the instrument (TQ column).

6-3. Miscellaneous parts are listed at the end of Table 6-1.

6-4. ORDERING INFORMATION

6-5. To obtain replacement parts, address order or inquiry to your local Hewlett-Packard Field Office (see lists at rear of this manual for addresses). Identify parts by their Hewlett-Packard stock numbers.

6-6. To obtain a part that is not listed, include:

a. Instrument model number.

b. Instrument serial number.

c. Description of the part.

d. Function and location of the part.

REFERENCE DESIGNATIONS

A	= assembly	E	= miscellaneous electrical part	P	= electrical connector (movable portion); plug	U	= integrated circuit; microcircuit
AT	= attenuator; isolator; termination	F	= fuse	Q	= transistor; SCR; triode thyristor	V	= electron tube
B	= fan; motor	FL	= filter	R	= resistor	VR	= voltage regulator; breakdown diode
BT	= battery	H	= hardware	RT	= thermistor	W	= cable; transmission path; wire
C	= capacitor	HY	= circulator	S	= switch	X	= socket
CP	= coupler	J	= electrical connector (stationary portion); jack	T	= transformer	Y	= crystal unit-piezoelectric
CR	= diode; diode thyristor; varactor	K	= relay	TB	= terminal board	Z	= tuned cavity; tuned circuit
DC	= directional coupler	L	= coil; inductor	TC	= thermocouple		
DL	= delay line	M	= meter	TP	= test point		
DS	= annunciator; signaling device (audible or visual); lamp; LED	MP	= miscellaneous mechanical part				

ABBREVIATIONS

A	= ampere	avg	= average	CHAN	= channel	dc	= direct current
ac	= alternating current	AWG	= American wire gauge	cm	= centimeter	deg	= degree (temperature interval or difference)
ACCESS	= accessory	BAL	= balance	CMO	= cabinet mount only	°	= degree (plane angle)
ADJ	= adjustment	BCD	= binary coded decimal	COAX	= coaxial	°C	= degree Celsius (centigrade)
A/D	= analog-to-digital	BD	= board	COEF	= coefficient	°F	= degree Fahrenheit
AF	= audio frequency	BE CU	= beryllium copper	COM	= common	°K	= degree Kelvin
AFC	= automatic frequency control	BFO	= beat frequency oscillator	COMP	= composition	DEPC	= deposited carbon
AGC	= automatic gain control	BH	= binder head	COMPL	= complete	DET	= detector
AL	= aluminum	BKDN	= breakdown	CONN	= connector	diam	= diameter
ALC	= automatic level control	BP	= bandpass	CP	= cadmium plate	DIA	= diameter (used in parts list)
AM	= amplitude modulation	BPF	= bandpass filter	CRT	= cathode-ray tube	DIFF	
AMPL	= amplifier	BRS	= brass	CTL	= complementary transistor logic	AMPL	= differential amplifier
APC	= automatic phase control	BWO	= backward-wave oscillator	CW	= continuous wave	div	= division
ASSY	= assembly	CAL	= calibrate	cw	= clockwise	DPDT	= double pole, double throw
AUX	= auxiliary	ccw	= counterclockwise	cm	= centimeter	DR	= drive
		CER	= ceramic	D/A	= digital-to-analog		
				dB	= decibel		
				dBm	= decibel referred to 1 mW		

ABBREVIATIONS

DSB	= double sideband
DTL	= diode transistor logic
DVM	= digital voltmeter
ECL	= emitter coupled logic
EMF	= electromotive force
EDP	= electronic data processing
ELECT	= electrolytic
ENCAP	= encapsulated
EXT	= external
F	= farad
FET	= field-effect transistor
F/F	= flip-flop
FH	= flat head
FIL.H	= fillister head
FM	= frequency modulation
FP	= front panel
FREQ	= frequency
FXD	= fixed
g	= gram
GE	= germanium
GHz	= gigahertz
GL	= glass
GND	= ground(ed)
H	= henry
h	= hour
HET	= heterodyne
HEX	= hexagonal
HD	= head
HDW	= hardware
HF	= high frequency
HG	= mercury
HI	= high
HP	= Hewlett-Packard
HPF	= high pass filter
HR	= hour (used in parts list)
HV	= high voltage
Hz	= Hertz
IC	= integrated circuit
ID	= inside diameter
IF	= intermediate frequency
IMPG	= impregnated
in	= inch
INCD	= incandescent
INCL	= include(s)
INP	= input
INS	= insulation
INT	= internal
kg	= kilogram
kHz	= kilohertz
kΩ	= kilohm
kV	= kilovolt
lb	= pound
LC	= inductance-capacitance
LED	= light-emitting diode
LF	= low frequency
LG	= long
LH	= left hand
LIM	= limit
LIN	= linear taper (used in parts list)
lin	= linear
LK	
WASH	= lock washer
LO	= low; local oscillator
LOG	= logarithmic taper (used in parts list)
log	= logarithm(ic)
LPF	= low pass filter
LV	= low voltage
m	= meter (distance)
mA	= milliampere
MAX	= maximum
MΩ	= megohm
MEG	= meg (10^6) (used in parts list)
MET FLM	= metal film
MET OX	= metal oxide
MF	= medium frequency; microfarad (used in parts list)
MFR	= manufacturer
mg	= milligram
MHz	= megahertz
mH	= millihenry
mho	= mho
MIN	= minimum
min	= minute (time)
′	= minute (plane angle)
MINAT	= miniature
mm	= millimeter
MOD	= modulator
MOM	= momentary
MOS	= metal-oxide semiconductor
ms	= millisecond
MTG	= mounting
MTR	= meter (indicating device)
mV	= millivolt
mVac	= millivolt, ac
mVdc	= millivolt, dc
mVpk	= millivolt, peak
mV p-p	= millivolt, peak-to-peak
mVrms	= millivolt, rms
mW	= milliwatt
MUX	= multiplex
MY	= mylar
μA	= microampere
μF	= microfarad
μH	= microhenry
μmho	= micromho
μs	= microsecond
μV	= microvolt
μVac	= microvolt, ac
μVdc	= microvolt, dc
μVpk	= microvolt, peak
μVp-p	= microvolt, peak-to-peak
μVrms	= microvolt, rms
μW	= microwatt
nA	= nanoampere
NC	= no connection
N/C	= normally closed
NE	= neon
NEG	= negative
nF	= nanofarad
NI PL	= nickel plate
N/O	= normally open
NOM	= nominal
NORM	= normal
NPN	= negative-positive-negative
NPO	= negative-positive zero (zero temperature coefficient)
NRFR	= not recommended for field replacement
NSR	= not separately replaceable
ns	= nanosecond
nW	= nanowatt
ORD	= order by description
OD	= outside diameter
OH	= oval head
OP AMPL	= operational amplifier
OPT	= option
OSC	= oscillator
OX	= oxide
oz	= ounce
Ω	= ohm
P	= peak (used in parts list)
PAM	= pulse-amplitude modulation
PC	= printed circuit
PCM	= pulse-code modulation; pulse-count modulation
PDM	= pulse-duration modulation
pF	= picofarad
PH BRZ	= phosphor bronze
PHIL	= Phillips
PIN	= positive-intrinsic-negative
PIV	= peak inverse voltage
pk	= peak
PL	= phase lock
PLO	= phase lock oscillator
PM	= phase modulation
PNP	= positive-negative-positive
P/O	= part of
POLY	= polystyrene
PORC	= porcelain
POS	= positive; position(s) (used in parts list)
POSN	= position
POT	= potentiometer
p-p	= peak-to-peak
PP	= peak-to-peak (used in parts list)
PPM	= pulse-position modulation
PREAMPL	= preamplifier
PRF	= pulse-repetition frequency
PRR	= pulse repetition rate
ps	= picosecond
PT	= point
PTM	= pulse-time modulation
PWM	= pulse-width modulation
PWV	= peak working voltage
RC	= resistance-capacitance
RECT	= rectifier
REF	= reference
REG	= regulated
REPL	= replaceable
RF	= radio frequency
RFI	= radio frequency interference
RH	= round head; right hand
RLC	= resistance-inductance-capacitance
RMO	= rack mount only
rms	= root-mean-square
RND	= round
ROM	= read-only memory
R&P	= rack and panel
RWV	= reverse working voltage
S	= scattering parameter
s	= second (time)
″	= second (plane angle)
S-B	= slow-blow (fuse) (used in parts list)
SCR	= silicon controlled rectifier; screw
SE	= selenium
SECT	= sections
SEMICON	= semiconductor
SHF	= superhigh frequency
SI	= silicon
SIL	= silver
SL	= slide
S/N	= signal-to-noise ratio
SP,ST	= single-pole, double-throw
SPG	= spring
SR	= split ring
SPST	= single-pole, single-throw
SSB	= single sideband
SST	= stainless steel
STL	= steel
SQ	= square
SWR	= standing-wave ratio
SYNC	= synchronize
T	= timed (slow-blow fuse)
TA	= tantalum
TC	= temperature compensating
TD	= time delay
TERM	= terminal
TFT	= thin-film transistor
TGL	= toggle
THD	= thread
THRU	= through
TI	= titanium
TOL	= tolerance
TRIM	= trimmer
TSTR	= transistor
TTL	= transistor-transistor logic
TV	= television
TVI	= television interference
TWT	= traveling wave tube
U	= micro (10^{-6}) (used in parts list)
UF	= microfarad (used in parts list)
UHF	= ultrahigh frequency
UNREG	= unregulated
V	= volt
VA	= voltampere
Vac	= volts, ac
VAR	= variable
VCO	= voltage-controlled oscillator
Vdc	= volts, dc
VDCW	= volts, dc, working (used in parts list)
V(F)	= volts, filtered
VFO	= variable-frequency oscillator
VHF	= very-high frequency
Vpk	= volts, peak
Vp-p	= volts, peak-to-peak
Vrms	= volts, rms
VSWR	= voltage standing wave ratio
VTO	= voltage-tuned oscillator
VTVM	= vacuum-tube voltmeter
V(X)	= volts, switched
W	= watt
W/	= with
WIV	= working inverse voltage
WW	= wirewound
W/O	= without
YIG	= yttrium-iron-garnet
Zo	= characteristic impedance

NOTE

All abbreviations in the parts list will be in upper case.

MULTIPLIERS

Abbreviation	Prefix	Multiple
T	tera	10^{12}
G	giga	10^{9}
M	mega	10^{6}
k	kilo	10^{3}
da	deka	10
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
μ	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}
f	femto	10^{-15}
a	atto	10^{-18}

Table 6-1. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
	05085-6012 Δ	1	ASSY, RESISTOR BOARD	28480	05085-6012
	05085-2016 Δ		BOARD, BLANK RESISTOR	28480	05085-2016
	05085-2002 Δ		BOARD, BLANK RESISTOR	28480	05085-2002
	5020-0241 Δ	1	SUPPORT, RESISTOR BOARD	28480	5020-0241
BT1	1420-0012	2	BATTERY; NICKEL CADMIUM; 12V 25A-HR	28480	1420-0012
BT2	1420-0012		BATTERY; NICKEL CADMIUM; 12V 25A-HR	28480	1420-0012
C1	0180-0040	2	CAPACITOR-FXD; 1500UF+100-10% 50VDC AL	28480	0180-0040
C2	0170-0055 Δ	1	CAPACITOR-FXD .1UF+-20% 200WVDC	56289	292P10402
C3	0180-0040		CAPACITOR-FXD; 1500UF+100-10% 50VDC AL	28480	0180-0040
C4	0170-0078	1	CAPACITOR-FXD .47UF+-5% 150WVDC	84411	663UW474J15
CR1	1901-0032	5	DIODE-PWR RECT IN3209 100V 15A	04713	1N3209
	1200-0088	8	INSULATOR; DIO; DO- 5; .25 ID; .02 THK	28480	1200-0088
CR2	1901-0032		DIODE-PWR RECT IN3209 100V 15A	04713	1N3209
	1200-0088		INSULATOR; DIO; DO- 5; .25 ID; .02 THK	28480	1200-0088
CR3	1901-0032		DIODE-PWR RECT IN3209 100V 15A	04713	1N3209
	1200-0088		INSULATOR; DIO; DO- 5; .25 ID; .02 [illegible]	28480	1200-0088
CR4	1901-0032		DIODE-PWR RECT IN3209 100V 15A	04713	1N3209
	1200-0088		INSULATOR; DIO; DO- 5; .25 ID; .02 THK	28480	1200-0088
CR5-CR7		1	NOT ASSIGNED		
CR8	1901-0022 Δ	2	DIODE-STABISTOR 10V 250MA	28480	1901-0022
CR9	05085-6003 Δ	1	ASSY, DIODE (INCLUDES CR9A, CR9B)	28480	05085-6003
CR10	1884-0070 Δ	1	THYRISTOR, SCS, JEDEC 3N81	03508	3N81
CR11	1901-0409 Δ	1	DIODE-PWR RECT 1N4719 50V 1A	04713	1N4719
CR12*	1910-0016 Δ	1	DIODE-SWITCHING 1US 60V 60MA FACTORY SELECTED PART (SEE TABLE 5-6)	28480	1910-0016
CR13	1902-0186	1	DIODE-ZNR 1N2986B 24.9V 2% DO-4 PD=10W	12954	1N2986B
CR14	1901-0022 Δ		DIODE-STABISTOR 10V 250MA	28480	1901-0022
CR15	1901-0032		DIODE-PWR RECT IN3209 100V 15A	04713	1N3209
	1200-0080	6	INSULATOR; XSTR; TRANSISTOR; .19 ID;	28480	1200-0080
DS1	1450-0031	2	LIGHT; IND; NEON; CLR TP LENS	03797	ER-03-WCB-N117
DS2	1450-0031		LIGHT; IND; NEON; CLR TP LENS	03797	ER-03-WCB-N117
DS3	2140-0025	3	LAMP, INCAND, BULB T-1-3/4, 28V	08806	327
	1450-0127	2	LIGHT; IND; LAMPHOLDER; RED TP LENS	07137	RDL-A1-F2-000
	1450-0118	2	LIGHT; IND; LENS CAP; AMB TP LENS	07137	221710-3
DS4	2140-0025		LAMP, INCAND, BULB T-1-3/4, 28V	08806	327
	1450-0041	1	LIGHT; IND; LAMPHOLDER; WHT TL LENS	72765	5154-036-804 WHITE
DS5	2140-0025		LAMP, INCAND, BULB T-1-3/4, 28V	08806	327
	1450-0127		LIGHT; IND; LAMPHOLDER; RED TP LENS	07137	RDL-A1-F2-000
	1450-0118		LIGHT; IND; LENS CAP; AMB TP LENS	07137	221710-3
F1	2110-0303	2	FUSE 2A 250V SLO-BLO (FOR 115V OPERATION)	71400	MDX-2A
F1	2110-0007	2	FUSE 1A 250V SLO-BLO (FOR 230V OPERATION)	71400	MDL-1
F2	2110-0303		FUSE 2A 250V SLO-BLO (FOR 115V OPERATION)	71400	MDX-2A
F2	2110-0007		FUSE 1A 250V SLO-BLO (FOR 230 OPERATION)	71400	MDL-1
J1	1251-2458	1	CONNECTOR, 3-CONT, MALE, CIRC STANDARD (AC LINE)	71468	MS3102A-18-22PW
J2	1251-0144	1	CONNECTOR, 6-CONT, MALE, CIRC STANDARD (EXT. ALARM)	71468	MS3102R145-6P
J3	1251-0128	2	CONNECTOR, 4-CONT, FEM, CIRC STANDARD (EXT. BATTERY)	71468	MS3102R145-2S
J4	1251-0128		CONNECTOR, 4-CONT, FEM, CIRC STANDARD (CLOCK OUT)	71468	MS3102R145-2S
J5	1251-0100	1	CONNECTOR, 5-CONT, FEM, CIRC STANDARD (OSC. OUT)	71468	MS3102R145-5S
K1	0490-0033	1	RELAY, 115VAC, CONT 5A 115VAC FORM 4C	83851	SMU04-115A
M1	1120-0400	1		28480	1120-0400
M2	1120-0117	1		28480	1120-0117
Q1	1850-0098	4	TRANSISTOR PNP GE CHIP TO-3 PD=90W	28480	1850-0098
	1200-0081	8	INSULATOR, BSHG,FLG, .115 ID	26365	974-307
	1200-0040	4		28480	1200-0040
Q2	1850-0098		TRANSISTOR PNP GE CHIP TO-3 PD=90W	28480	1850-0098
	1200-0081		INSULATOR, BSHG,FLG, .115 ID	26365	974-307
	1200-0040			28480	1200-0040
Q3	1850-0098		TRANSISTOR PNP GE CHIP TO-3 PD=90W	28480	1850-0098
	1200-0081		INSULATOR, BSHG,FLG, .115 ID	26365	974-307
	1200-0040			28480	1200-0040
Q4	1850-0098		TRANSISTOR PNP GE CHIP TO-3 PD=90W	28480	1850-0098
	1200-0081		INSULATOR, BSHG,FLG, .115 ID	26365	974-307
	1200-0040			28480	1200-0040

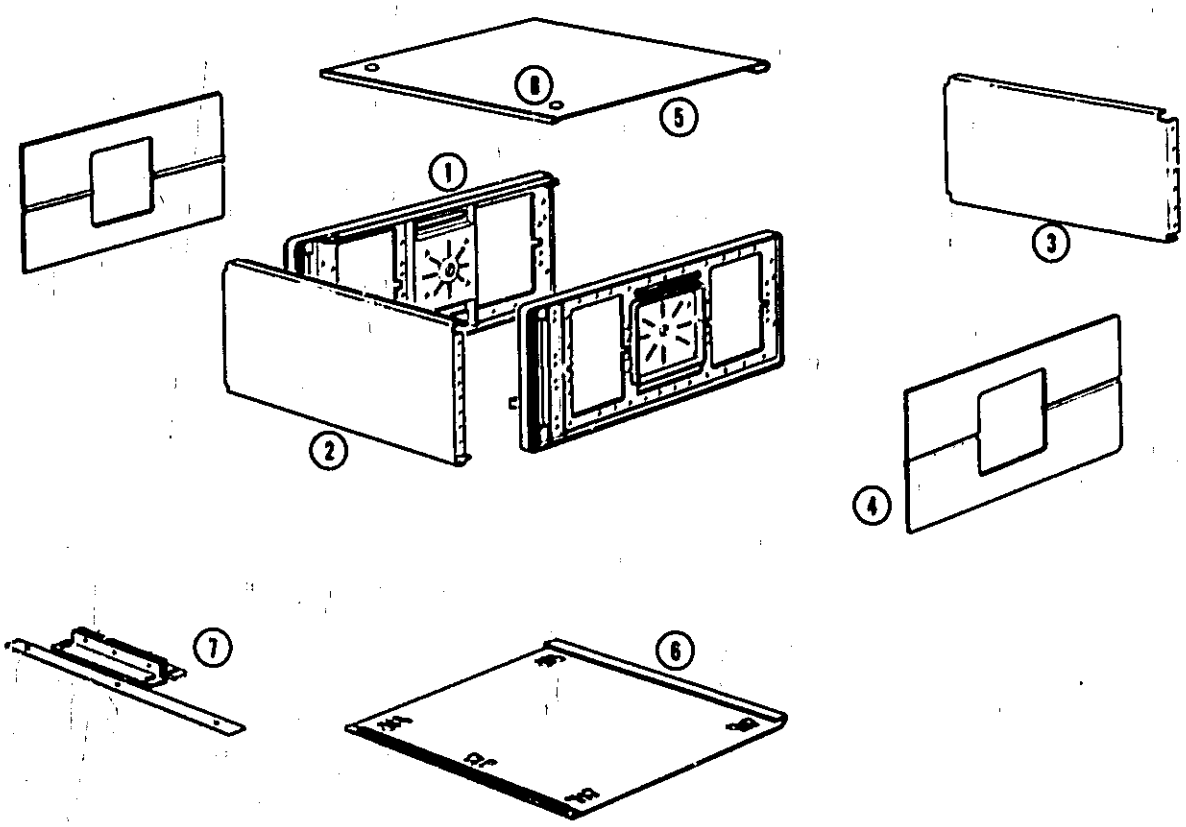
ΔIndicates part is on Resistor Board 05085-6012

FORM 9320-1747

Table 6-1. Replaceable Parts (Continued)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
Q5	1 30-0035	4	TSTR:GE	04713	2N174
	1200-0080		INSULATOR; XSTR; TRANSISTOR; .19 ID;	28480	1200-0080
	1200-0079	4	INSULATOR:TRANSISTOR	71785	294665
Q6	1850-0035		TSTR:GE	04713	2N174
	1200-0080		INSULATOR; XSTR; TRANSISTOR; .19 ID;	28480	1200-0080
	1200-0079		INSULATOR:TRANSISTOR	71785	294665
Q7	1850-0035		TSTR:GE	04713	2N174
	1200-0080		INSULATOR; XSTR; TRANSISTOR; .19 ID;	28480	1200-0080
	1200-0079		INSULATOR:TRANSISTOR	71785	294665
Q8	1850-0035		TSTR:GE	04713	2N174
	1200-0080		INSULATOR; XSTR; TRANSISTOR; .19 ID;	28480	1200-0080
	1200-0079		INSULATOR:TRANSISTOR	71785	294665
R1	0767-0002 Δ	2	RESISTOR 560 OHM 5% 3W MO TUBULAR	24546	FP32-3-250-561-J
R2	0758-0016 Δ	2	RESISTOR 300 OHM 5% .25W F TUBULAR	24546	C5-1/4-T0-301-J
R3	0766-0033 Δ	1	RESISTOR 2K 2% 3W MO TUBULAR	24546	FP32-3-250-2001-G
R4	0758-0019 Δ	1	RESISTOR 18K 5% .25W F TUBULAR	24546	C5-1/4-T0-1802-J
R5	0699-0001 Δ	1	RESISTOR 2.7 OHM 10% .5W CC TUBULAR	01121	EB27G1
R6	0811-0982 Δ	2	RESISTOR 2.5 OHM 1% 3W PW TUBULAR	00213	12005-3-2R5-F
R7	0811-0982 Δ		RESISTOR 2.5 OHM 1% 3W PW TUBULAR	00213	12005-3-2R5-F
R8	0758-0003 Δ	1	RESISTOR 1K 5% .25W F TUBULAR	24546	C5-1/4-T0-1001-J
R9	0758-0016 Δ		RESISTOR 300 OHM 5% .25W F TUBULAR	24546	C5-1/4-T0-301-J
R10	2100-0252 Δ	1	RESISTOR; VAR; CONT; 10 OHM 10% WW	28480	2100-0252
R11	0760-0012 Δ	1	RESISTOR 51 OHM 2% 1W MO TUBULAR	FR003	C52
R12	0812-0012 Δ	1	RESISTOR 10 OHM 5% 3W PW TUBULAR	91637	CW2B-1,
R13	0812-0021 Δ	4	RESISTOR .47 OHM 5% 3W PW TUBULAR	91637	CW2B1-3-T2-47/100-J
R14	0812-0021 Δ		RESISTOR .47 OHM 5% 3W PW TUBULAR	91637	CW2B1-3-T2-47/100-J
R15	0812-0021		RESISTOR .47 OHM 5% 3W PW TUBULAR	91637	CW2B1-3-T2-47/100-J
R16	0812-0021 Δ		RESISTOR .47 OHM 5% 3W PW TUBULAR	91637	CW2B1-3-T2-47/100-J
R17	0758-0034 Δ	1	RESISTOR 2.4K 5% .25W F TUBULAR	24546	C5-1/4-T0-2401-J
R18	0767-0002		RESISTOR 560 OHM 5% 3W MO TUBULAR	24546	FP32-3-250-561-J
S1	3101-1234	1	SWITCH; SL; DPDT MSI 6A 250VAC (115V/230V)	82389	11A-1242A
S2	3101-0038	1	SWITCH; TGL; DPDT 1A/250VAC/DC ON (NORMAL/RESERVE CHARGE)	28480	3101-0038
S3	3101-0097	1	SWITCH; PB 1-STA CYL SPST (RESET)	81073	30-2
T1	9100-0360	1		28480	9100-0360
W1	5061-6091	1	CABLE ASSY, AC POWER (P/O INSTALLATION KIT)	28480	5061-6091
XF1	1400-0084	2	FUSEHOLDER; EXTR POST; BAY CAP; 15A	28480	1400-0084
XF2	1400-0084		FUSEHOLDER; EXTR POST; BAY CAP; 15A	28480	1400-0084
			MISCELLANEOUS PARTS		
	7248-16C	1	WIRE ASSY, BATTERY JUMPER/LUGS	28480	7248-16C
	05085-2006	1	BAR, BOTTOM RETAINING,1/8"X3/8"X13-1/2"	28480	05085-2006
	05085-2014	1	BAR,FRONT RETAINING,1/8"X3/8"X2-1/2"	28480	05085-2014
	05085-2004	1	BAR,REAR RETAINING,1/8"X3/8"X4-1/2"	28480	05085-2004
	05085-2009	1	BAR, STIFFENING,3/8"X1"X15-27/32"	28480	05085-2009
	05085-2013	1	BAR, VERTICAL RETAINING,1/4"X1/2"X3-9/16	28480	05085-2013
	05085-0002	1	BRACKET, FRONT BATTERY	28480	05085-0002
	05085-0006	1	BRACKET, TRANSFORMER	28480	05085-0006
	05085-6005	1	CABLE, AC INTERNAL WIRING	28480	05085-6005
	05085-6009	1	WIRE ASSY, BATTERY, NEGATIVE, YELLOW	28480	05085-6009
	05085-6008	1	WIRE ASSY, BATTERY, POSITIVE, RED	28480	05085-6008
	05085-6007	1	CABLE, FUSE WIRING	28480	05085-6007
	05085-6013	1	CABLE, MAIN	28480	05085-6013
	05085-2015	1	GUARD, HEAT SINK	28480	05085-2015
	05085-6011	1	INSTALLATION KIT, SEE TABLE 1-1 FOR CONT	28480	05085-6011
	1205-0051	4	HEAT-DISSIPATOR; DUAL; TO-48 PKG (FOR Q5 THRU Q8)	28480	1205-0051
	0370-0026	1	KNOB;BLK W/ARROW 3/4" OD 1/8" SHAFT	28480	0370-0026
	05085-0008	1	SHIELD, AC	28480	05085-0008
	05085-0009	1	SUPPORT, FASTENER, TOP COVER	28480	05085-0009
	5951-0401	1	MANUAL, BATTERY INSTRUCTION	28480	5951-0401
			CABINET PARTS		
1	05085-6008	2	FRAME, PAINTED	28480	05085-6001
2	05085-0001	1	FRONT PANEL	28480	05085-0001
3	05085-0004	1	REAR PANEL	28480	05085-0004
4	5000-8719	2	SIDE COVER	28480	5000-8719
5	05085-0012	1	TOP COVER	28480	05085-0012
6	5040-8718	1	BOTTOM COVER	28480	5040-8718
7			RACK MOUNTING		
	05085-2011	1	LEFT BRACKET	28480	05085-2011
	05085-2012	1	RIGHT BRACKET	28480	05085-2012
	5040-6676	1	FILLER STRIP	28480	5040-6676
8	0510-0647	2	FASTENER, PANEL, QUARTER TURN, STUD	71286	2700-4

ΔIndicates part is on Resistor Board 05085-6012



Item	Description	Qty	HP Part No. Give Serial Prefix Number when Ordering any of these parts
1	Frame, painted	2	05085-6001
2	Front Panel	1	05085-0001
3	Rear Panel	1	05085-0004
4	Side Cover	2	5000-8719
5	Top Cover	1	05085-0012
6	Bottom Cover	1	5060-8713
7	Rack Mounting*		
	Left Bracket	1	05085-2011
	Right Bracket	1	05085-2012
	Filler Strip	1	5040-6676
8	Fastener	2	0510-0147

*Part of 05085-6011 Rack Mounting Installation Kit.

Figure 6-1. Modular Cabinet Parts

Table 6-2. Manufacturers Code List

MFR NO.	MANUFACTURER NAME	ADDRESS	CODE
FR003	SOVCOR ELECTRONIQUE	LE VESINET FRANCE	
00213	SACE ELECTRONICS CORP	ROCHESTER NY	14610
01121	ALLEN BRADLEY CO	MILWAUKEE WI	53212
03508	GE CO SEMICONDUCTOR PROD DEPT	SYRACUSE NY	13201
03797	ELDEMA DIV GENISCO TECHNOLOGY CORP	COMPTON CA	90221
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
07137	TEC INC	EDEN PRAIRIE MN	55343
08806	GE CO MINIATURE LAMP PROD DEPT	CLEVELAND OH	44112
12954	DICKSON ELECTRONICS CORP	SCOTTSDALE AZ	85252
24546	CORNING GLASS WORKS	BRADFORD PA	16701
26365	GRIES REPRODUCER CORP	NEW ROCHELLE NY	10802
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
71285	RED CHAINBELT INC CAMLOC DIV	PARAMUS NJ	07652
71400	ELSSMAN MFG DIV OF MCGRAW-EDISON CO	ST LOUIS MO	63017
71450	ITT CANNON ELECTRIC CO	SANTA ANA CA	92702
71785	ITT ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	60007
72765	DRAKE MFG CO	HARWOOD HEIGHTS IL	60656
81073	GRAYHILL INC	LA GRANGE IL	60525
82389	SWITCHCRAFT INC	CHICAGO IL	60630
83501	KLEINMAN INSTRUMENTS CORP	SYOSSET NY	11791
84411	ITT CAPACITOR DIV	OGALLALA NE	69153
91637	DALE ELECTRONICS INC	COLUMBUS NE	68601

BACK DATING MANUAL CHANGES

APPENDIX I - MANUAL CHANGES

This manual applies directly to HP Model 5085A Standby Power Supplies having serial number prefix 1320A. With the apprcpriate changes listed below, this manual applies to older instruments with manual backdating changes listed for serial number prefixes as shown with higher number change taking procedence.

MANUAL CHANGES

Serial No. Prefix	Backdating Change
524	1, 2, 3, 4, 5, 6
604	1, 2, 4, 5, 6
616	1, 4, 5, 6
624	4, 5, 6
1024A	5, 6
1032A	6

CHANGE 1

SPECIAL NOTE: Starting at serial prefix 624, switch S2 nomenclature was changed and this switch was relocated from inside the unit to the front panel. To backdate models before prefix 624, change all references to the 48 HR MAX light (DS3) and the FLOAT and CHARGE positions of switch S2 as follows:

IS (624 and above)	WAS (616 and below)
FLOAT	NORMAL CHARGE
CHARGE	RESERVE CHARGE
FLOAT/CHARGE switch	NORMAL CHARGE/RESERVE CHARGE switch
48 HR MAX light	RESERVE CHARGE light

Page 1-1, Par. 1-3: Following the first sentence, add: With the internal batteries at normal (60%) charge, the Model 5085A has a standby capability of 14 ampere hours at 250°C.

Page 1-1, Par. 1-3: Change 3rd sentence;
-----providing 21 ampere hours of-----

Page 1-1, Par. 1-4: Preceeding the last sentence; insert;
Normally, the internal battery is charged to 60% of its ampere hour capacity.

Page 1-2, Table 1-3: Reword STANDBY CAPACITY specification;
(at 25 degrees C**) 14 ampere hours after 10 days normal operation. 21 ampere hours after 4 days in reserve charge mode.

Page 1-2, Table 1-3: Under EQUIPMENT SUPPLIED; delete oscillator output connector and add Instrument Mounting Bracket.

Page 3-1, Par. 3-9: Reword last sentence; ---the standby capability from 14 ampere hours to 21 ampere hours.

Page 3-2, Fig. 3-1: Delete Step 5.

Page 3-2, Fig. 3-1: In Photo, delete CHARGE/FLOAT switch.

CHANGE 1 (Cont'd)

Page 3-2, Fig. 3-1: Change second sentence of Item 5; The normal operating voltage is between 26.5 and 28.5 volts.

Page 3-4, Table 3-2: Change BATTERY VOLTAGE meter to 26.5 to 28.5 volts.

Page 3-4, Table 3-2: Change BATTERY CURRENT meter to; 0.05 to 0.75 ampere*, reword asterik comment to read; *Current will initially be 0.75 ampere, ---

Page 3-4, Par. 3-18: Replace Paragraphs 3-18 and 3-19 with following:

"When the Model 5085A is first turned on, or when the AC INTERRUPT light indicates power has been interrupted, charge the batteries for 96 hours with the Normal Charge/ Reserve Charge switch set to Reserve Charge. If this switch is left in Normal Charge, the standby capacity will be less than 60% of full capacity. During this charging period check the battery electrolyte level every three days (see Paragraph 2-66). After 96 hours place the internal switch to Normal Charge; in this mode, the battery will float-charged, maintaining the initial charge. The standby capability will be 21 ampere-hours.

Page 4-2, Fig. 4-3: Delete this figure and disregard references to it.

Page 4-2, Par. 4-16: Change second sentence; ---and voltage of 28.7 to 29.5 volts.

Page 4-2, Par. 4-16: In middle of paragraph change: ---1 amp--- to ---550 ma. ---

Page 5-2, Par. 5-25: Change last sentence: ---reaches 26.5 to 28.5 volts.

Page 5-3, Table 5-4: Following "3. STANDBY CAPACITY" add; 14 ampere hours after 10 days Normal Charge. Change ---18 ampere-hours after 48 hours--- to ---21 ampere-hours after 4 days---

Page 5-4, Table 5-4: Under 3. STANDBY CAPACITY, change; 18 ampere hours to 21 ampere hours.

Page 5-4a: PERFORMANCE CHECK TEST CARD:

Add; Normal Charge (Charge for 10 days before test ---14 amp-hrs [ ] amp-hrs

Reword; Reserve Charge (Charge for 4 days before test) ---21 amp-hrs [ ] amp-hrs

Page 5-5, Par. 5-36: In step j, change; ---is not 18 ampere hours--- to --- is not 21 ampere hours ---

In step k, change; ---is 18 ampere hours--- to ---is 21 ampere hours---

In step l, change; ---less than 18 ampere hours--- to ---less than 21 ampere hours---

CHANGE 1 (Cont'd)

Page 5-5, Par. 5-39: Reword as follows; SELECTION OF DIODES CR6 AND CR12

Page 5-5, Par. 5-40: Reword first sentence as follows; The resistor board is manufactured with bare wire in place of CR6 and CR12

Page 5-5, Par. 5-40: Reword second sentence; ---voltage across each breakdown diode (CR7, 13) is measured---

Page 5-5, Par. 5-41: Reword first sentence as follows; If CR6, 7, 12, or 13 is bad or ---

Page 5-5, Par. 5-41h: Reword last sentence as follows; If either of these voltages is outside its allowable range, measure the voltage at junction of CR12, 13, or CR6, 7 and refer to---

Page 5-6, Table 5-5: Add to possible causes for step 3; ---Diode CR5, CR6, or CR7 open---

Page 5-6, Par. 5-47: Reword last sentence; or diodes CR1, 4, 7, 13, be sure to ---

Page 5-7, Table 5-6: Replace with the following table:

Table 5-6. Selection of CR12 and CR6

CR12, 13 Junction Volt.	CR5, 9 Junction Volt.	For CR12 (CR6)
Greater than 25.8	Greater than 27.4	Replace breakdown diode (CR13, 7)
24.8 to 25.8	27.0 to 27.4	No padding required. Use wire in place of CR12 (CR6)
24.6 to 24.8	26.7 to 27.0	Install germanium diode (0.3 volt) ℔ Part No. 1910-0016
24.0 to 24.6	26.3 to 26.7	Install silicon diode (0.7 volt) ℔ Part No. 1901-0022
----	26.0 to 26.3	Add CR5 and repeat above
Less than 24.0	Less than 26.0	Replace breakdown diode (CR13, 7)

Page 5-8, Fig. 5-1: Delete S2 from top view photo

Page 5-9, Fig. 5-2: Show CR7 mounted just to the right of CR13.

Page 5-11, 5-12, Fig. 5-4: (Upper circuit board photograph) Delete R18. Show CR5 in its place and show CR6 mounted two pins to the right.

Page 5-11, 5-12, Fig. 5-4: Delete R18, change DS3 and S2 nomenclature. Add CR5, CR6, CR7, and relocate TP2 as shown on Figure IA-1. Change 05085-6012 in NOTE 3 to 05085-6001.

Page 5-11, 5-12: Upper Circuit Board Photo:

a. At top end of R18, delete (V).
b. Change R18 to CR5.
c. Label pin next to J as (V).

Table 6-1: Change cable main assembly no. to 05085-6004

Change ℔ Part No. 05085-6013 to 05085-6004

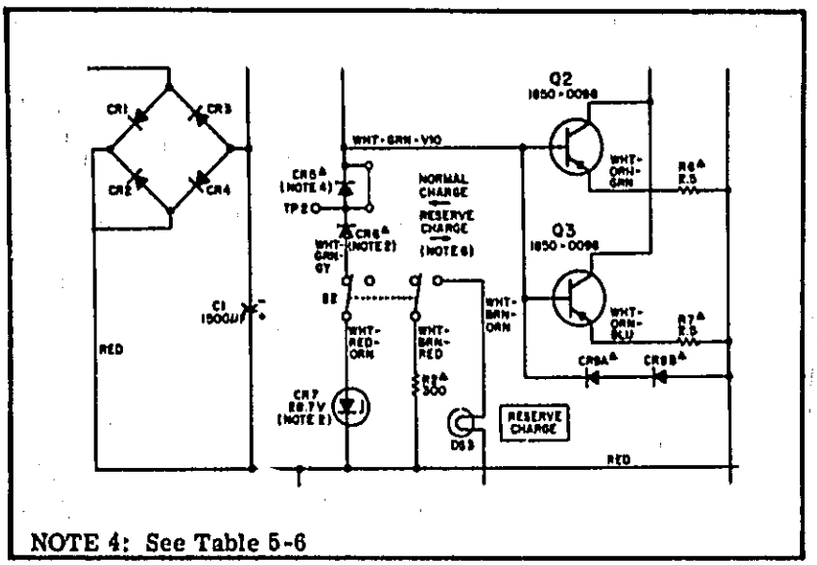


Figure IA-1. Partial Schematic

CHANGE 1 (Cont'd)	Table 6-1:	Delete R18 Add CR5, 1901-0022, DIODE, SILICON 0.56V at 1 MA Add CR6, no part no., DIODE FACTORY SELECTED PART Add CR7, 1902-1208, DIODE, BREAKDOWN 26.7V
	Table 6-1:	Change 0767-0002 quantity to 2 Change 1901-0022 quantity to 3 Add; 1902-1208, DIODE BREAKDOWN 26.7V, Mfg 28480
	Table 6-1:	Change assembly resistor board no. to 05085-6001
	Table 6-1:	Change ⓟ Part No. 05085-6012 to 05085-6001
	Table 6-1:	Change board, blank resistor no. to 05085-2001
	Table 6-1:	Change ⓟ Part No. 05085-2016 to 05085-2001
	Table 6-1:	Add 05085-0007, Bracket Switch
	Table 6-1:	Add 05085-0007, Bracket Switch, Mfg 28480
CHANGE 2	Page 3-2, Fig. 3-1:	Change second sentence of Item 5; The normal operating voltage is between 28 and 30 volts.
	Page 3-4, Table 3-2:	Change BATTERY VOLTAGE meter to: 28 to 30 volts.
	Page 3-4, Par. 3-18:	Replace Paragraphs 3-18 and 3-19 with the following:
		3-18. In normal operation the internal battery is charged to approximately 60% to 70% of its capacity, providing 14 ampere-hours of standby power capability. This is

CHANGE 2 (Cont'd)

Page 3-4, Par. 3-18: (Cont'd)

sufficient to power the ⊛ Model 5060A Cesium Beam Frequency Standard for 9 hours at 25°C ambient temperature.

3-19. When standby power is expected to be required for an extended period, the Normal Charge/Reserve Charge switch can be set to Reserve Charge for 48 hours (96 hours for completely discharged battery), allowing the internal battery to be charged to full capacity. When fully charged, the battery provides 21 ampere-hours of standby power (14 hours of standby power for the ⊛ Model 5060A). After charging for 96 hours at the Reserve Charge rate, return the instrument to Normal Charge mode; batteries will be float-charged at whatever level of charge was attained in Reserve Charge mode. (Check electrolyte level, see Paragraph 2-66.)

Page 4-2, Par. 4-16: Reword; ---charging current of 50 to 125 ma and voltage of 28.7 to 29.5 volts.

Page 5-2, Par. 5-25: Reword last sentence; ---after the battery voltage reaches 28 to 30 volts.---

Page 5-5, Par. 5-41h: Reword first sentence; ---voltage at TP2 should be 28.7 to 29.6 volts.

Page 5-7, Table 5-6: Replace with following table:

Table 5-6. Selection of CR12 and CR6

CR12, 13 Junction Voltage	CR6, 7 Junction Voltage	For CR12 (CR6)
Greater than 25.8	Greater than 29.6	Replace breakdown diode (CR13, 7)
24.8 to 25.8	28.7 to 29.6	No padding required. Use wire in place of CR12 (CR6)
24.6 to 24.8	28.4 to 28.7	Install germanium diode (0.3 volt) ⊛ Part No. 1910-0016
24.0 to 24.6	27.7 to 28.4	Install silicon diode (0.7 volt) ⊛ Part No. 1901-0022
Less than 24.0	Less than 27.7	Replace breakdown diode (CR13, 7)

Page 5-11, 5-12, Fig. 5-4: Change voltage at CR7 to 28.7 to 29.6 volts.

Page 6-2, Table 6-1: Change CR7 part no. and description to; CR7 1902-1188 diode, breakdown, 28.7 volts

Page 6-6, Table 6-2: Delete 1902-1208 and add; 1902-1188 DIODE BREAKDOWN, 28.7V, Mfg 28480

CHANGE 3	Page 1-1, Table 1-1:	Change 1490-0721 to 0403-0052 and 1490-0718 to 0403-0051
	Table 6-1:	Delete: Slide Steel, Chassis 1490-0715 Delete: Adapter Slide, Recessed 1490-0721 Delete: Service Note P1490-0721 Add: Extension Slides 0403-0051 Add: Adapter 0403-0052
	Table 6-1:	Delete: Items 1490-0718, 1490-0721, and P1490-0721 Add: Extension Slides HP Part No. 0403-0051, Mfg 28480 Add: Adapter HP Part No. 0403-0052, Mfg 28480
	Table 6-1:	Change part no. of support; resistor board from 5020-0241 to 5020-0242
	Table 6-1:	Change 5020-0241 to 5020-0242 with same description
CHANGE 4	Page 1-1, Table 1-1:	Change 05061-6091 to 114B-16A
	Page 2-6, Table 2-2:	Change J1 part 1251-2458 to 1251-0146 as explained by Table 2-2 footnote
	Page 5-11, Figure 5-4:	Change REFERENCE DESIGNATIONS table to make C1-4 read C1-3 and add FL1.
	Table 6-1:	Delete C4: part 0170-0078 Add: FL1 9110-0014 FILTER AC LINE Change: J1 1251-2458 to 1251-0146 and MS3102A18-22 PW in "Description" to MS3106R10SL-3P Change: W1 part 05061-6091 to 114B-16A Delete: part 1450-0118 for DS3 and DS5.
	Table 6-1:	Delete: part 0170-0078 C:FXD MY 0.47 UF 5% 150VDCW Add: 9110-0014 FILTER:AC LINE, "Mfr" 28480, "Mfr Part No." 9110-0014, and "TQ" 1. Change: 1251-2458 to 1251-0146 and "Mfr Part No." MS3102A18-22PW to MS3102R10SL-3P Change: W1 part in "HP Stock No." and "Mfr Part No" columns from 05061-6091 to 114B-16A. Delete: 1450-0118 LENS CAP:AMBER

CHANGE 5

Serial Prefix 624- and below have type 3N58 silicon controlled switch (HP Part No. 1884-0003) for CR10. This switch is no longer available.

The HP Part No. 1884-0070 (Type 3N81) PNPN silicon controlled switch (used in Serial Prefix 1032A and above) can be used as a direct replacement for the discontinued 3N58.

CHANGE 6 Figure 6-1: MODULAR CABINET PARTS

Change: 5000-8719 to 5000-0743
Change: 5060-8713 to 5060-0752
Change: 5040-6676 to 5040-0164

Instruments with Serial Prefix 1032A and below have a light grey panel with matching blue-gray trim colors.

MANUAL CHANGES

MANUAL CHANGES

CHANGE DATE: July 14, 1982
(This change supersedes all earlier dated changes.)

*** Make all corrections listed under ERRATA before making other changes.

*** Check following table for your instrument's serial prefix or series number and make listed change(s) to manual.

MANUAL DESCRIPTION

INSTRUMENT: 5085A
Standby Power Supply

SERIAL PREFIX: 1320A

DATE PRINTED: JULY 1974
HP PART NO: 05085-9009
MICROFICHE NO: 05085-9010

# INDICATES NEW OR REVISED ITEM

> INDICATES ACTION TO BE TAKEN

SERIAL PREFIX OR SERIES NUMBER	MANUAL CHANGE(S)
1420A	1
1816A	1,2
1920A	1,2,3
1944A	1,2,3,4
#1944A	1,2,3,4,5

Information for any optional circuit boards described in this manual agrees with the series numbers on the circuit board(s) for the option, which may not be the same as the Serial Prefix Number on the rear of the instrument.

(C5085AS) 8243/8874/9642/5=11236

HEWLETT PACKARD

ERRATA

#Between front cover and Page i:
>Insert the following SAFETY CONSIDERATIONS:

Model 5085A

SAFETY CONSIDERATIONS

The 5085A Standby Power Supply is a Safety Class I instrument (provided with a protective earth terminal), designed and tested according to international safety standards. To ensure safe operation and to keep the instrument in safe condition, the user must follow the information, cautions, and warnings provided below and in the Operating and Service Manual.

```
****************
*              *
*   WARNING    *
*              *
****************
```

Before switching on this instrument, the protective earth terminal of the instrument must be connected to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding).

Whenever it is likely that the protection has been impaired, the instrument must be made inoperative an be secured against any unintended operation.

All protective earth terminals, extension cords, autotransformers, and devices connected to this instrument should be connected to a protective earth grounded socket outlet. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in personal injury.

For continued protection against fire hazard, replace the line fuse only with a 250V fuse of the same current rating and type. Do not use repaired fuses or short circuited fuseholders.

Before switching on this instrument, make sure that it is adapted to the voltage of the ac power source.

Any maintenance or service requiring removal of protective covers should be performed by service-trained personnel who are aware of the hazard involved (for example, fire and electrical shock).

Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

ERRATA

Page 3-3, Figure 3-2:

>Replace part of Figure 3-2 identified as "REAR PANEL SERIAL PREFIX 624- AND BELOW" with Figure 1 of this change sheet.

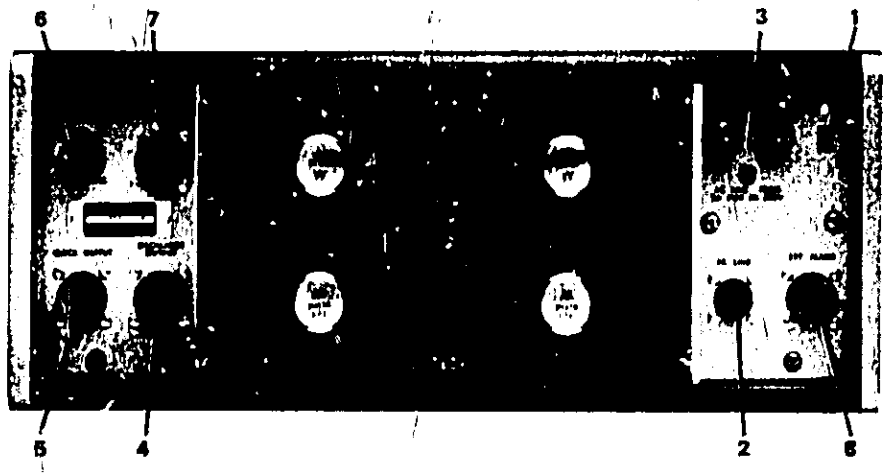


Figure 1.

Page 6-4, Table 6-1, Replaceable Parts:

>Change R3 to 0811-1806; RESISTOR 2K 5% 3W WW TC+-20 (28480)

CHANGE 1

Page 6-3/6-4, Table 6-1, Replaceable Parts:

>Change 05085-6012 Resistor Board Assembly to 05085-6017.

>Delete 05085-2016 and 05085-2002 board blanks. Delete delta " " symbol next to the part numbers for these boards.

>Change R1 and R18 to 0811-1207, R:FXD 560 ohm, 5% 3W,Mfr Part Number 0811-1207

>Change 05085-6001, in delta marked note at bottom of pages, to 05085-6017.

Page 5-11/5-12, Component Locator for Figure 5-4.

>Delete component locator and table of jumper colors and replace with Figure 2 of this change sheet.

>Change Q7 emitter wire, WHT-YEL-GRN to WHT-YEL-GRA.

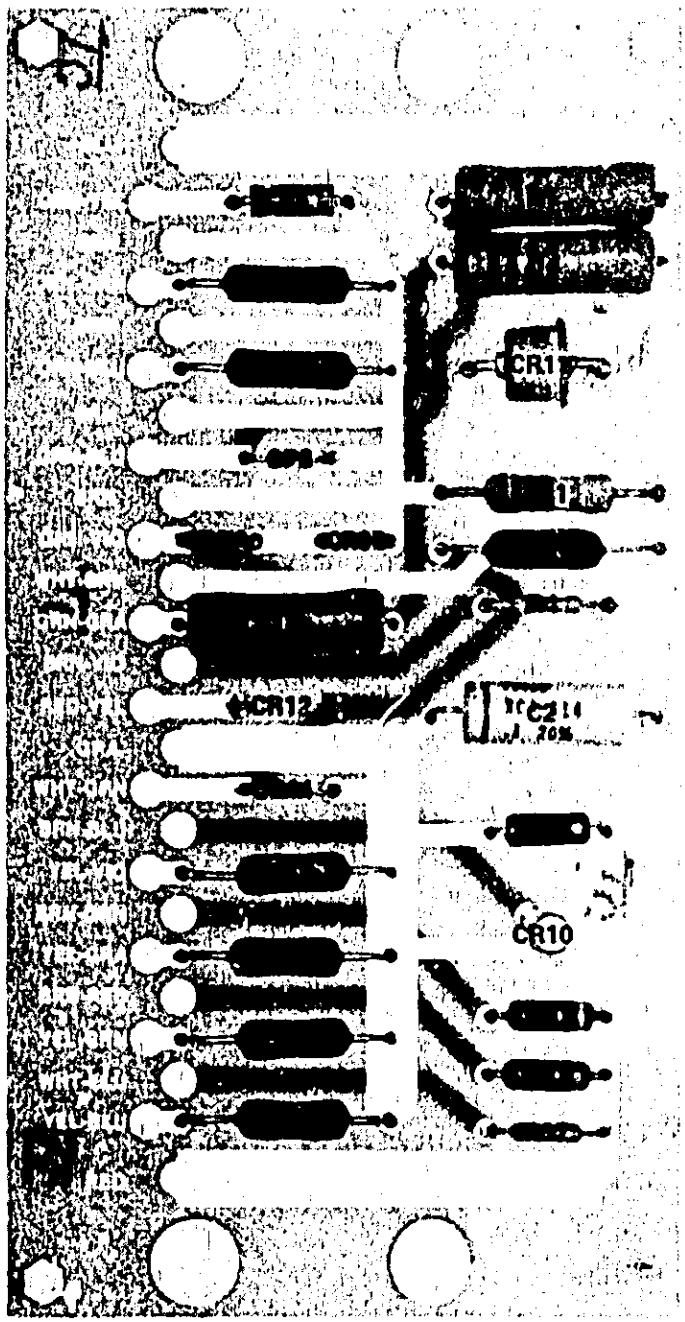


Figure 2.

CHANGE 2
Page 3-1, Paragraph 3-7:
>Delete all references to FUSE FAILURE lights.

Page 3-2, Figure 3-1, Front Panel View:
>Delete paragraph 4 pertaining to FUSE FAILURE lights.

Page 5-4, Table 5-4, In-Cabinet Performance Checks:
>Delete paragreph 4a., "FUSE FAILURE".

Page 5-4a, Performance Check Test Card:
>Delete check 4a., "FUSE FAILURE".

Page 5-11/5-12, Figure 5-4, Schematic Diagram:
>Delete FUSE FAILURE lamps DS1 and DS2 shown in parallel with F1 and F2.
>Add "SERIES 1816" to caption for Figure 5-4.

Page 6-3/6-4, Table 6-1, Replaceable Parts:
>Delete neon lamps DS1 and DS2 (HP Part No. 1450-0031).
>Change XF1 and XF2 from 1400-0084 to the following:

2110-0564	FUSEHOLDER BODY
2110-0565	FUSEHOLDER CAP
2110-0569	NUT, PLASTIC FUSEHOLDER MTG (2 REQUIRED)

>Change 05085-0001 panel under CABINET PARTS to the following:

05085-0016	FRONT PANEL
05085-2018	EXTRUDED PANEL TRIM
05085-0015	PANEL INSERT WITH LOGO

Page 6-5, Figure 6-1, Modular Cabinet Parts:
>Change item 2 to 05085-0015, 05085-0016, and 05085-2018; as described above.

CHANGE 3
Page 6-4, Table 6-1, Replaceable Parts:
>Change R2 and R9 from 07588-0016 (300 ohm 1/4W) to 0686-3015; RESISTOR 300 5% .5W CC; 01121; EB3015.

CHANGE 4
>Change "SERIES 1816" in Figure 5-4 caption to "SERIES 1944". (See Change 2)

Page 5-11/5-12, Figure 5-4, Schematic Diagram:
>Delete line fuse F2 and replace with a direct connection from the input power connector to S1 and F1 to S1 and T1.

Page 6-3/6-4, Table 6-1, Replaceable Parts:
>Delete both "F2" fuses.
>Delete XF2 fuseholder.

#CHANGE 5
Page 1-1, Table 1-1; Equipment Supplied:
>Delete reference to "Sonotone".
>Change Part Number of Battery Manual to 05085-9011.

NOTE: In this manual, delete all references to "Sonotone".