Solid State Charger – System 3000

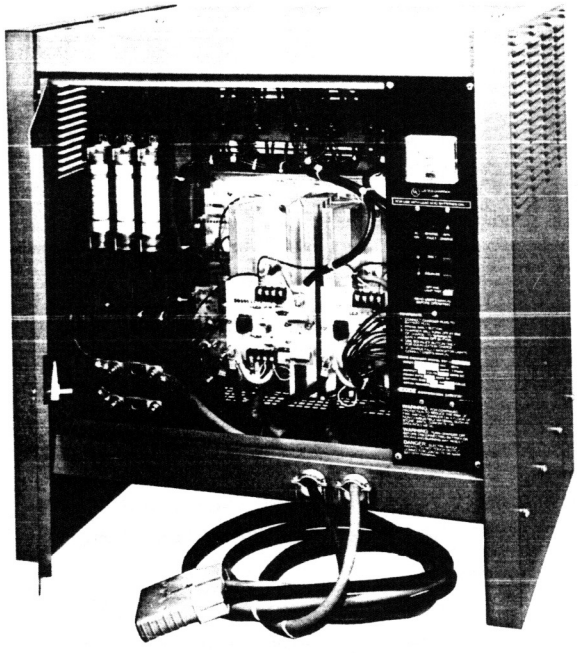
IMPORTANT OPERATING AND SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS

1. This manual contains important safety and operating instructions.
2. Before using battery charger, read all instructions and cautionary markings on (1) battery charger, (2) battery, and (3) product using battery.
3. Do not touch uninsulated parts of the output connector or the battery terminals as there is a possibility of electrical shock.
4. In operation, batteries produce hydrogen gas which can explode if ignited. Never smoke, use an open flame, or create arcs or sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space or when it is being charged.
5. Lead-acid batteries contain sulfuric acid which causes burns. Do not get in eyes, on skin, or clothing. In case of contact with eyes, flush immediately with clean water for fifteen minutes. Obtain medical attention.
6. Connect or disconnect the battery plug only when the charger output is off to prevent arcing or burning.
7. Only qualified personnel should service this equipment.
8. De-energize all AC and DC power connections before servicing this unit. If injury does occur, apply standard treatment for electrical shock and, if necessary, consult with a physician.
9. The charger is not for outdoor use.
10. Do not expose the charger to moisture.
11. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
12. Do not disassemble charger; have it examined by an Exide Field Service Representative, or a local serviceman qualified to service or repair this equipment. Incorrect reassembly may result in a risk of electrical shock or fire.

1. Receiving

When first received, the charger (Figure 1) should be unpacked and carefully examined for any possible damage in transit. Any transit damage should be reported as a claim to the carrier.

FIGURE 1



2. Location

The charger location should be a clean, cool, and well ventilated area.

CAUTION

To maintain proper ventilation, do not store charging cables beneath charger when charger is in operation.

The cabinet is intended for floor mounting and feet are provided with holes for bolting down if necessary or desired.

WARNING

The charger is not to be placed on or near a flammable substance. It is to be positioned on a foundation of non-combustible material. Stone, brick, concrete or grounded metal is recommended.

Leave ample space (four (4) inch minimum) between the charger and any wall or six (6) inches from other equipment to provide accessibility to all parts and to allow the free flow of air for convection cooling. Air enters through the bottom of the cabinet and exhausts through the sides and rear. Both sides of the charger are not to be any closer than four (4) inches to walls or six (6) inches from other equipment.

WARNING

When the maximum ambient temperature of 40° C or minimum space allowance for ventilation cannot be adhered to, use of the forced cooling module is required.

3. Connecting AC

This equipment must be connected to a proper voltage source of 3-phase, 60Hz electric power, as labeled on the AC fuse panel. Connection to any other voltage or frequency may cause equipment damage. The AC input wire size is determined using TABLE 1, AC Input Wire Specifications and/or input current shown on the charger nameplate.

TABLE 1 AC Input Wire Size Specifications

Wire size AWG is based on the temperature rating of 75°C (167°F)

For Fuse Rating	Use Wire Size AWG
5.6	14
10	14
12	14
15	14
20	12
25	10
30	10
35	8
40	8
50	6
60	6

NOTE

Consult local codes for specific site requirements.

Specifications for input power are:
Voltage Tolerance: ± 10%
Phase Balance: ± 5%
Frequency Tolerance: ± 1%

CAUTION

The charger must be electrically grounded to ensure safe operation. A terminal inside the cabinet is provided for grounding (see Figure 2).

AC connection cables can entrance the charger from the front, top or bottom. This unit is intended for use with permanent wiring. In compliance with local codes and for convenient servicing, the user should have a suitable disconnect from the AC supply to the charger. A disconnect switch with fuses of the dual element type or circuit breaker of the motor starting type is recommended.

4. Changing AC Taps

The charger may be wired for other voltages. When reconnecting for different input voltages, jumpers on the terminal blocks (TB1, TB2, TB3) need to be changed as well as the input fuses. (Refer to TABLE 2—Voltage vs Input Fuse Chart, or the fuse rating label in the charger, and TABLE 3—Input Voltage Connections.) If the charger is rewired, mark the label with the new input voltage.

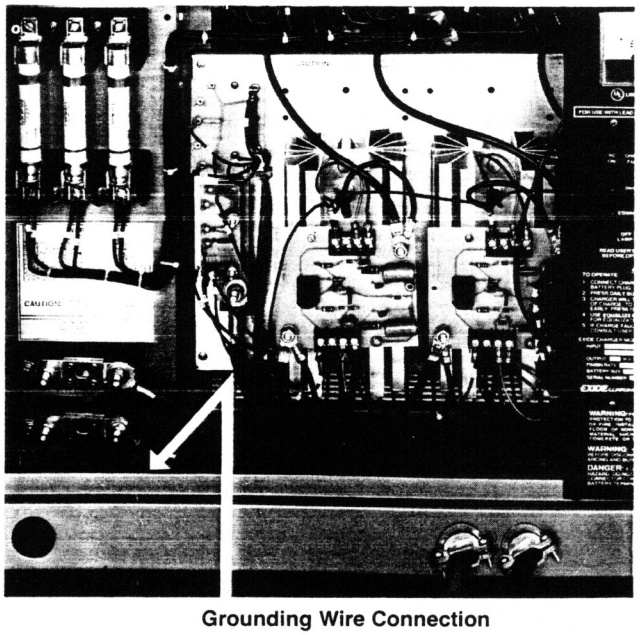
CAUTION

Use only the proper AC fuse rating shown in the fuse rating label or TABLE 2 of this manual. Use of other fuse ratings may cause equipment damage or create an unsafe operating condition.

TABLE 2 Voltage vs Input Fuse Chart

Model ES3-	Output Current (Amps)	Input Voltages and Maximum Input Current									
		208V		240V		416V		448V		480V	
		Fuse Size	Current	Fuse Size	Current	Fuse Size	Current	Fuse Size	Current	Fuse Size	Current
6-550	88	10A	7.4A	10A	6.4A	5.6A	3.8A	5.6A	3.5A	5.6A	3.3A
6-680	109	15A	9.2A	10A	7.9A	5.6A	4.6A	5.6A	4.3A	5.6A	4.0A
6-850	136	15A	11.4A	15A	9.9A	10A	5.7A	10A	5.3A	10A	4.9A
6-1050	168	20A	14.2A	15A	12.2A	10A	7.2A	10A	6.6A	10A	6.1A
9-550	88	15A	11.2A	15A	9.6A	10A	5.6A	10A	5.2A	10A	4.8A
12-550	88	15A	12.5A	15A	10.9A	10A	6.3A	10A	5.8A	10A	5.4A
12-680	109	20A	15.5A	20A	13.4A	10A	7.8A	10A	7.3A	10A	6.7A
12-850	136	25A	19.5A	20A	16.8A	12A	9.7A	12A	9.0A	10A	8.4A
12-1050	168	30A	24.0A	25A	20.8A	15A	12.0A	12A	11.1A	12A	10.3A
12-1200	192	35A	27.4A	30A	23.8A	20A	13.8A	15A	12.8A	15A	11.9A
12-1400	224	40A	32.0A	35A	27.7A	20A	16.0A	20A	14.9A	20A	13.9A
15-850	136	35A	24.3A	30A	21.0A	20A	12.1A	15A	11.2A	15A	10.6A
16-850	136	35A	25.9A	30A	22.4A	20A	13.0A	15A	12.0A	15A	11.2A
18-550	88	25A	18.8A	20A	16.3A	15A	9.5A	15A	8.8A	10A	8.1A
18-680	109	30A	23.3A	25A	20.2A	15A	11.7A	15A	10.8A	15A	10.1A
18-850	136	35A	29.2A	30A	25.2A	20A	14.5A	20A	13.5A	15A	12.7A
18-950	152	40A	32.6A	35A	28.2A	20A	16.3A	20A	15.1A	20A	14.1A
18-1050	168	50A	36.0A	40A	31.1A	25A	18.0A	20A	16.7A	20A	15.6A
18-1200	192	50A	41.1A	50A	35.6A	25A	20.6A	25A	19.1A	25A	17.8A
18-1400	224	60A	48.0A	50A	41.6A	30A	24.0A	30A	22.3A	25A	20.8A
18-1600	256	—	—	60A	47.5A	35A	27.4A	30A	25.4A	30A	23.9A
24-550	88	30A	25.1A	30A	21.8A	15A	12.5A	15A	11.7A	15A	10.9A
24-680	109	40A	31.0A	35A	27.0A	20A	15.5A	20A	14.4A	20A	13.4A
24-850	136	50A	38.8A	40A	33.7A	25A	19.5A	25A	18.0A	20A	16.8A
24-950	152	60A	43.5A	50A	37.6A	30A	21.7A	25A	20.1A	25A	18.8A
24-1050	168	60A	48.0A	50A	41.6A	30A	24.0A	30A	22.3A	25A	20.8A
24-1200	192	—	—	60A	47.5A	35A	27.4A	30A	25.4A	30A	23.8A
24-1400	224	—	—	—	—	40A	32.0A	35A	29.7A	35A	27.7A
24-1600	256	—	—	—	—	50A	36.5A	40A	34.0A	40A	31.7A
36-450	72	40A	30.8A	35A	26.7A	20A	15.4A	20A	14.3A	20A	13.3A
36-550	88	50A	37.7A	40A	32.7A	25A	18.8A	25A	17.5A	20A	16.3A
36-680	109	60A	46.6A	50A	40.4A	30A	23.3A	30A	21.7A	25A	20.2A
36-850	136	—	—	60A	50.5A	35A	29.2A	35A	27.1A	30A	25.2A
36-1050	168	—	—	—	—	50A	36.0A	40A	33.4A	40A	31.1A

FIGURE 2



Grounding Wire Connection

Be sure that the AC supply, the number of cells, and capacity of the battery to be charged correspond with the values shown on the charger nameplate. AC connections are made to fuse block terminals (F1, F2, F3)

Specifications subject to change without notice

NOTE

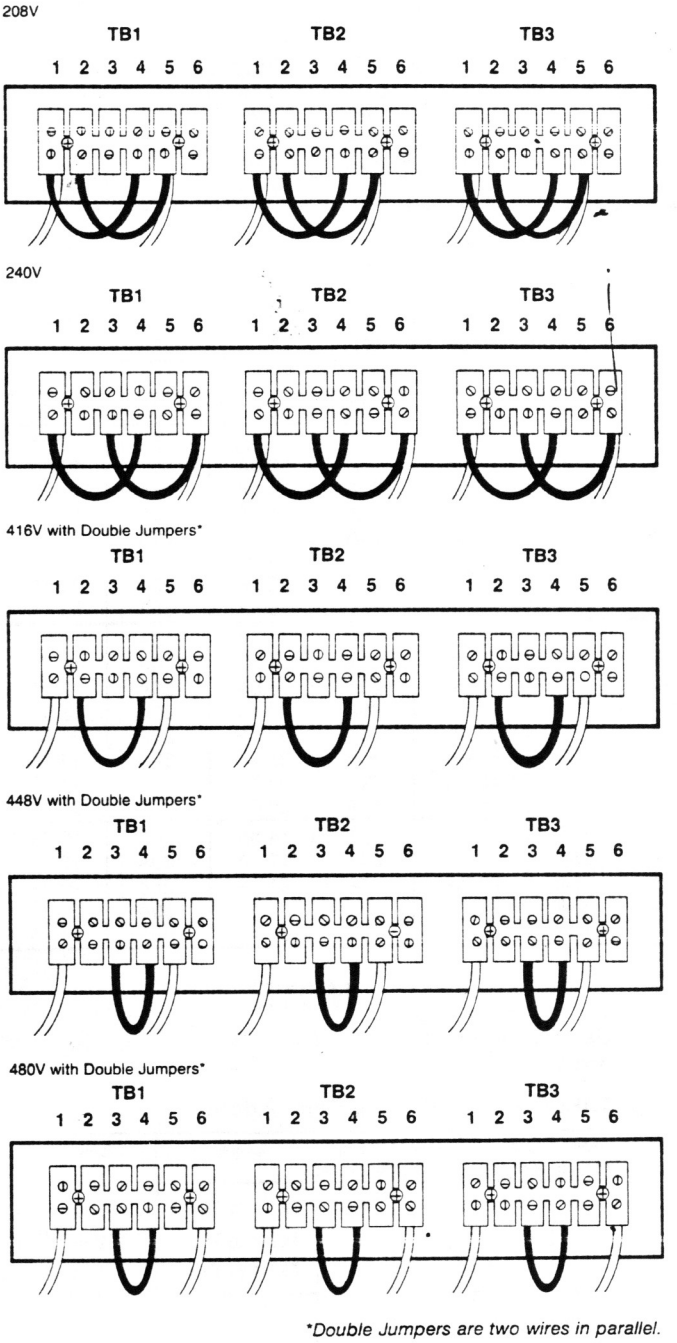
See Figure 3 and the WARNING before changing jumper wires.

TABLE 3 Input Voltage Connections

Input Voltage	Connect Wire #3	Connect Wire #5	Connect Wire #1	Jumper 1	Jumper 2
208V	TB1-5	TB2-5	TB3-5	TB1-1 to TB1-4 TB2-1 to TB2-4 TB3-1 to TB3-4	TB1-2 to TB1-5 TB2-2 to TB2-5 TB3-2 to TB3-5
240V	TB1-6	TB2-6	TB3-6	TB1-1 to TB1-4 TB2-1 to TB2-4 TB3-1 to TB3-4	TB1-3 to TB1-6 TB2-3 to TB2-6 TB3-3 to TB3-6
416V	TB1-5	TB2-5	TB3-5	TB1-2 to TB1-4 TB2-2 to TB2-4 TB3-2 to TB3-4	*Double Jumpers 1 & 2
448V	TB1-5	TB2-5	TB3-5	TB1-3 to TB1-4 TB2-3 to TB2-4 TB3-3 to TB3-4	*Double Jumpers 1 & 2
480V	TB1-6	TB2-6	TB3-6	TB1-3 to TB1-4 TB2-3 to TB2-4 TB3-3 to TB3-4	*Double Jumpers 1 & 2

Double Jumpers are two wires in parallel.

FIGURE 3



*Double Jumpers are two wires in parallel.

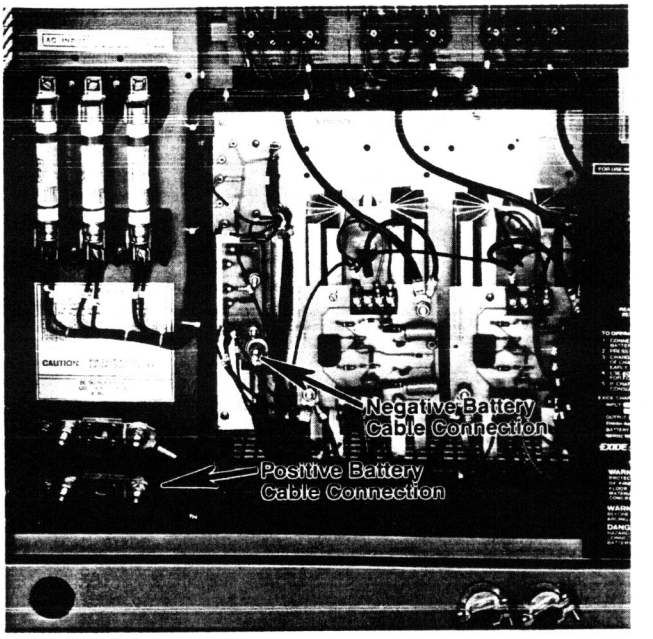
WARNING

When changing jumper wire connections, ensure that all leads are tightened securely onto the terminal block. Loose connections may damage the charger.

5. DC Connections

The DC charging cable is provided with the specified battery plug or receptacle. Connect the red (+) cable to the positive battery terminal as shown in Figure 4 (on the output fuse) and the black (−) cable to the negative battery terminal, next to the heat sink (see Figure 4).

FIGURE 4



6. Fuse List and Rating

The DC fuses are a special "fast" type to protect the silicon controlled rectifiers. Use only identical replacement fuses, obtainable from your Exide distributor.

7. Stacking Multiple Chargers

To conserve space, many models may be stacked up to three (3) units high.

WARNING

The charger is not to be placed on or near a flammable substance.

The following lists the models that can be stacked:

6 Cell	All
9,12 Cell	All
15, 16 Cell	All
18 Cell	550 through 1200 AH
24 Cell	200 through 1050 AH
36 Cell	450 through 680 AH

NOTE

If your model is not in the list above, it *may not be stacked without* the optional forced cooling module. Consult Exide Corporation for details.

To stack chargers proceed as follows:

a. Position the bottom charger no less than four (4) inches from a wall. Allow four (4) inches at both sides and six (6) inches between chargers stacked side-by-side for ventilation.
b. Remove the two lifting eye bolts (if present) from top of cabinet and retain for later use.
c. Position second charger on top of bottom charger, aligning eye bolt holes with holes on bottom of second charger.
d. Fasten both charger cabinets securely, using the eye bolts removed in step b.

e. If a third charger is to be stacked, repeat steps b., c., and d. for the third charger.

WARNING

Do not lean against stacked chargers.

f. Stacked chargers must be fastened to the wall using fastening devices suitable for the wall construction and charger top eye bolts (if provided).

CAUTION

To maintain proper ventilation, do not store charging cables beneath charger when charger is in operation.

8. Application

These chargers may be used only for the number of cells for whcih they are designed. The charger is adjusted for a battery of corresponding ampere-hour capacity; e.g., a 6-550 charger is adjusted for a 550 AH battery for an eight (8) hour charge. Each charger is compatible with a range of battery AH capabilities for daily charge periods up to thirteen (13) hours or equalize charge periods to sixteen (16) hours. Batteries rated from 64% to 200% of the charger nominal rating may be charged. Consult the nearest Exide office for possible use with batteries whose capacities are outside of this range.

NOTE

With the six (6) hour override timer option, a Charge Fault (see TABLE 4) may occur if the AH rating of the battery is greater than the charger rating.

TABLE 4. Front Panel Controls and Indicators

Index No.	Nomenclature	Function
1	D. C. Ammeter	Indicates charging current in amperes
2	AC ON indicator light (Red LED)	Lights red when AC power is applied to the charger
3	CHARGE FAULT indicator light (Red LED)	Lights red if battery on charge did not reach 80% charge (2.38 volts per cell during a six hour charging period) indicates possible defect in battery
4	80% CHARGE indicator (Yellow LED)	Lights yellow when battery has reached 80% state of charge (2.38 volts per cell)
5	DAILY momentary pushbutton and indicator light (Green LED)	When DAILY pushbutton is depressed, associated indicator lights green and the daily charging cycle is initiated
6	EQUALIZE momentary pushbutton and indicator light (Green LED)	When EQUALIZE pushbutton is depressed, the indicator lights green and the equalize charging cycle is initiated
7	OFF and LAMP TEST momentary pushbutton and indicator light (Red LED)	When depressed, associated indicator lights red and the charging cycle will stop. The OFF button, when depressed and held, illuminates all indicators as a lamp test.

9. Operation

A list of operating controls and indicators is given in TABLE 4 and illustrated in Figure 5. The following instructions are provided for daily battery charging and periodic equalize charging.

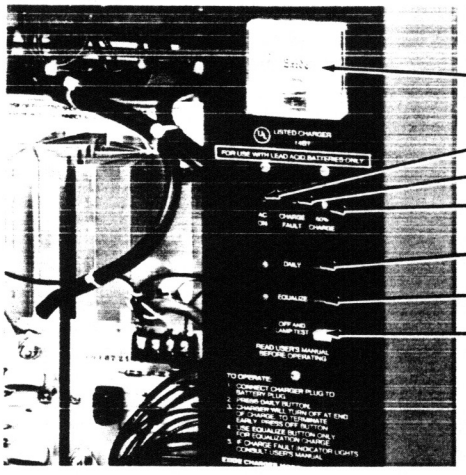


FIGURE 5

A. DAILY BATTERY CHARGING

1. With the utility circuit breaker or fuse box to ON the chargers AC ON indicator (Figure 5, Item 2) will light indicating AC power is present in the charger.
2. Connect the plug at the end of the chargers DC leads to the battery. The charger will automatically start and the DAILY indicator will illuminate, indicating proper battery connection. The 80% CHARGE indicator may also illuminate if the battery being connected is already 80% charged.
3. Should the charge have to be terminated or restarted in a manual mode use the STOP or DAILY buttons shown in Figure 5.
4. Battery charging will continue at a decreasing rate for three hours after the 80% charge is attained, and taper off to approximately 4.5A/100AH.

NOTE

If the battery cannot attain an 80% charge within six (6) hours,* the CHARGE FAULT indicator (Figure 4, Item 3) will illuminate, indicating a defective or mismatched battery and the charger will stop charging.

5. Three (3) hours after lighting of the 80% CHARGE indicator light, the charger will automatically stop charging. At this time, both the 80% CHARGE indicator and the OFF indicator will be illuminated. The DAILY indicator will extinguish. A temporary power failure will not affect the charge cycle. When power is restored, the charge cycle will continue.**

**12 hours with the optional 12-hour override timer.*
***However, disconnecting the battery will cause the charge cycle timer to be reset to zero.*

WARNING

Arcing or burning at the battery connector may result if the connector is disconnected during the charge cycle.

6. The charger can be disconnected from the battery after the charging cycle has ended. The 80% CHARGE and OFF indicators will extinguish but the AC ON indicator will remain illuminated.

B. EQUALIZE BATTERY CHARGING

When the EQUALIZE button (Figure 5, Item 6) is pressed, the charge time, after 80% charge is reached, is automatically increased to six (6) hours. All operating pro-

cedures are the same for daily charging. The EQUALIZE pushbutton is to be used only for periodic equalization charging. Follow the recommendations of the battery or truck manufacturer.

10. Operating Characteristics

In the beginning stages of the charge cycle, a constant current is applied to the battery. When the 80% charge voltage of 2.38 volts per cell is reached (see Figure 6), the 80% CHARGE indicator will illuminate. The charger will then automatically change from the constant-current charge mode to the constant-voltage charge mode. An electronic override timer operates during the initial charge period, to a maximum of twelve hours.* If the 80% charge is not reached during the twelve hour timed cycle, the override timer will time out and shut down the charger. The CHARGE FAULT indicator will light indicating a defective or mismatched battery.

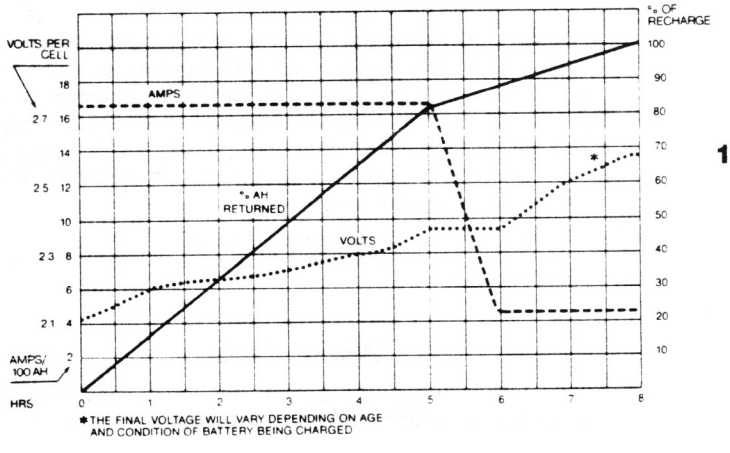
During normal charging conditions, after the 80% CHARGE point is reached, the override timer is reset and timing begins again for either the "DAILY" or "EQUALIZE" charge period. Again, charging continues, as it is timed, and current tapers down to approximately 4.5A per 100A/Hr. At this point the charger returns to the constant current charging mode and the battery voltage is permitted to rise. This function, as described in Figure 6, is the Exide "IEI" characteristic.

Three hours (DAILY mode) or six hours (EQUALIZE mode) after the 80% CHARGE indicator has illuminated, the battery charger will automatically stop. The 80% CHARGE and OFF indicators will illuminate to indicate proper battery charge. When the charged battery is disconnected, all indicator lamps are extinguished except the AC ON indicator (Figure 5, Item 2).

**6 hours optional*

FIGURE 6.

Recharge Characteristic



A functional check can be made by monitoring the battery voltage during the initial constant current mode. The battery voltage should increase gradually but be less than 2.38 volts per cell with charging current of 16% of the nameplate rating (e.g. for a 550 AH charger, start current will be 16% of 550, or 88 amperes). A check can also be made by monitoring the output voltage terminals during the constant voltage mode (after "80% CHARGE" indicator lights). The output battery voltage should be steady at 2.38 volts per cell ±1% with the output current gradually decreasing.

During the finish current mode, the battery voltage can be checked. The battery voltage should measure at least 2.38 volts per cell at a constant current of 4.5% of the nameplate rating. (See Figure 6).

11. Testing Components

a. Transformer—to visually check the transformer, first remove the back panel. Check for signs of overheating or loose connections at transformer terminals. To perform an electrical check, remove the front panel of the charger and measure the secondary voltages from the SCR cathode leads to the DC fuses. Measure primary voltages at TB1, TB2 and TB3 (see TABLE 2). All primary windings should have full normal AC voltage across them. The secondary should show equal voltages between the center tap and either end (SCR cathodes). Make this check on open circuit and under load if practical. If any of the above voltages appear to be abnormal, service may be necessary. In the case of a suspected ground fault, do not use a "megger" or any potential higher than 100V for testing. Failure to observe this precaution may damage the SCR's or other parts.

b. Electronics Module—is properly adjusted at the factory and normally requires no attention. Be sure that any replacement is a factory part with the same part number as the original, or a factory-approved replacement.

12. Maintenance

The charger requires a minimum amount of maintenance. It is to be kept clean and all connections tight. Twice yearly or as often as the cleanliness of the area may dictate, louvres should be vacuumed and the interior is to be thoroughly blown out with DRY air. In the event of any intermittent operation, examine and tighten, if necessary, all internal and external connections and check circuits for continuity (refer to Figure 8. Wiring Diagram). *Be sure that the chassis is reliably grounded.* If any difficulty cannot be resolved, consult the nearest Exide office.

13. Routine Checking

There is no need for a detailed check if the equipment is functioning properly; this being indicated by:

- Approximately normal relation between the current and the voltage during the charge cycle.
- Proper constant output terminal voltage within 1% after changing to voltage control.
- Proper functioning of the timer circuits to terminate the charge.
- Proper overall results as shown by the battery receiving a complete charge without appreciable overcharge.

CAUTION

If it is necessary to test this charger do not use an insulation tester, or any source of voltage higher than 100V. Testing and servicing should be done only by qualified service personnel.

Figure 7. Schematic Diagram

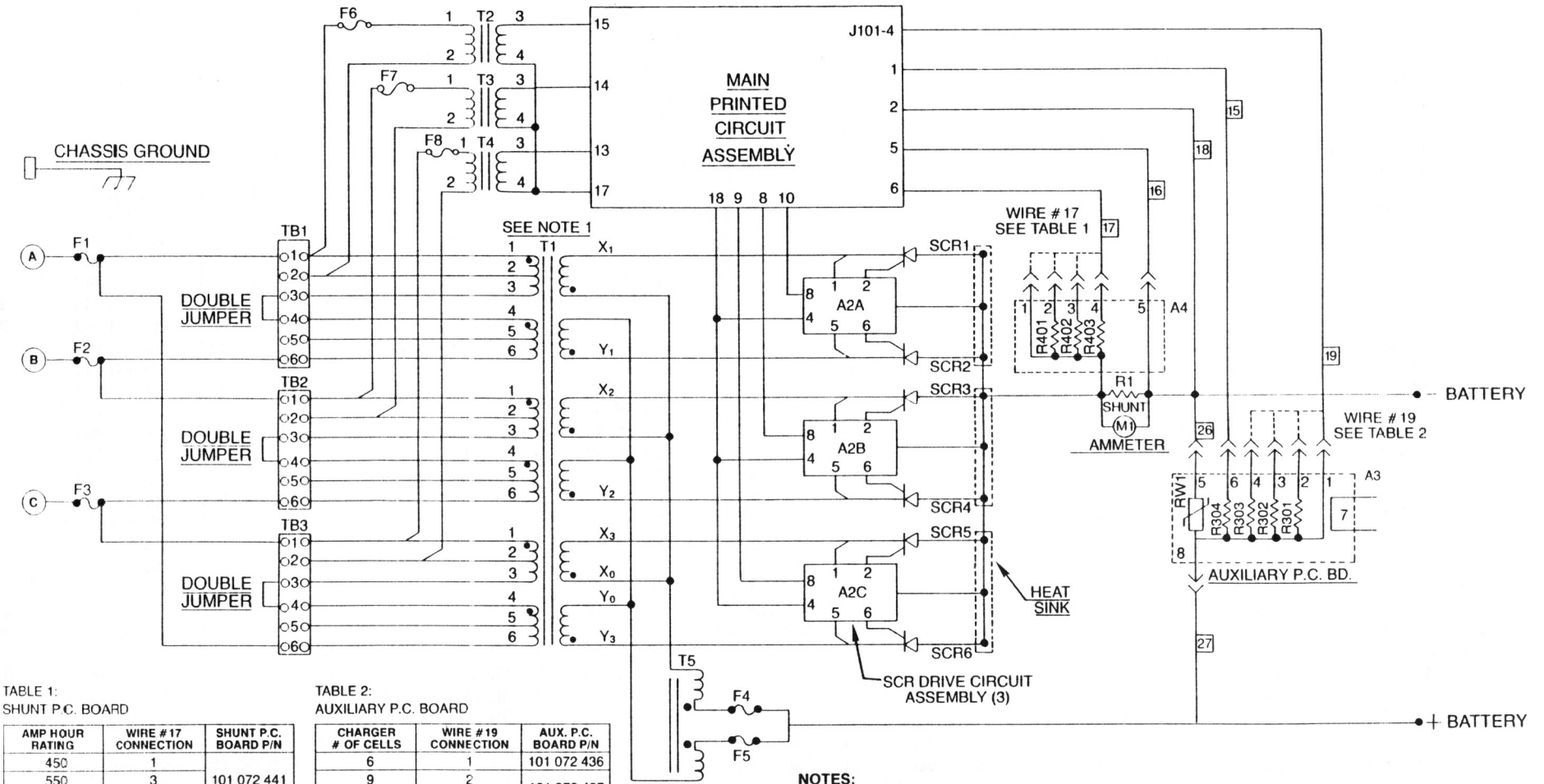


TABLE 1:
SHUNT P.C. BOARD

AMP HOUR RATING	WIRE # 17 CONNECTION	SHUNT P.C. BOARD P/N
450	1	101 072 441
550	3	
680	4	
850	2	101 072 442
950	3	
1050	4	
1200	2	101 072 443
1400	3	
1600	4	

TABLE 2:
AUXILIARY P.C. BOARD

CHARGER # OF CELLS	WIRE # 19 CONNECTION	AUX. P.C. BOARD P/N
6	1	101 072 436
9	2	101 072 437
12	3	
15	2	101 072 438
16	3	
18	4	
24	3	101 072 439
36	4	101 072 440

NOTES:
TRANSFORMER T1 IS SHOWN CONNECTED FOR 480V INPUT.
CONSULT OPERATING INSTRUCTIONS FOR OTHER INPUT VOLTAGES.

Figure 8. Wiring Diagram

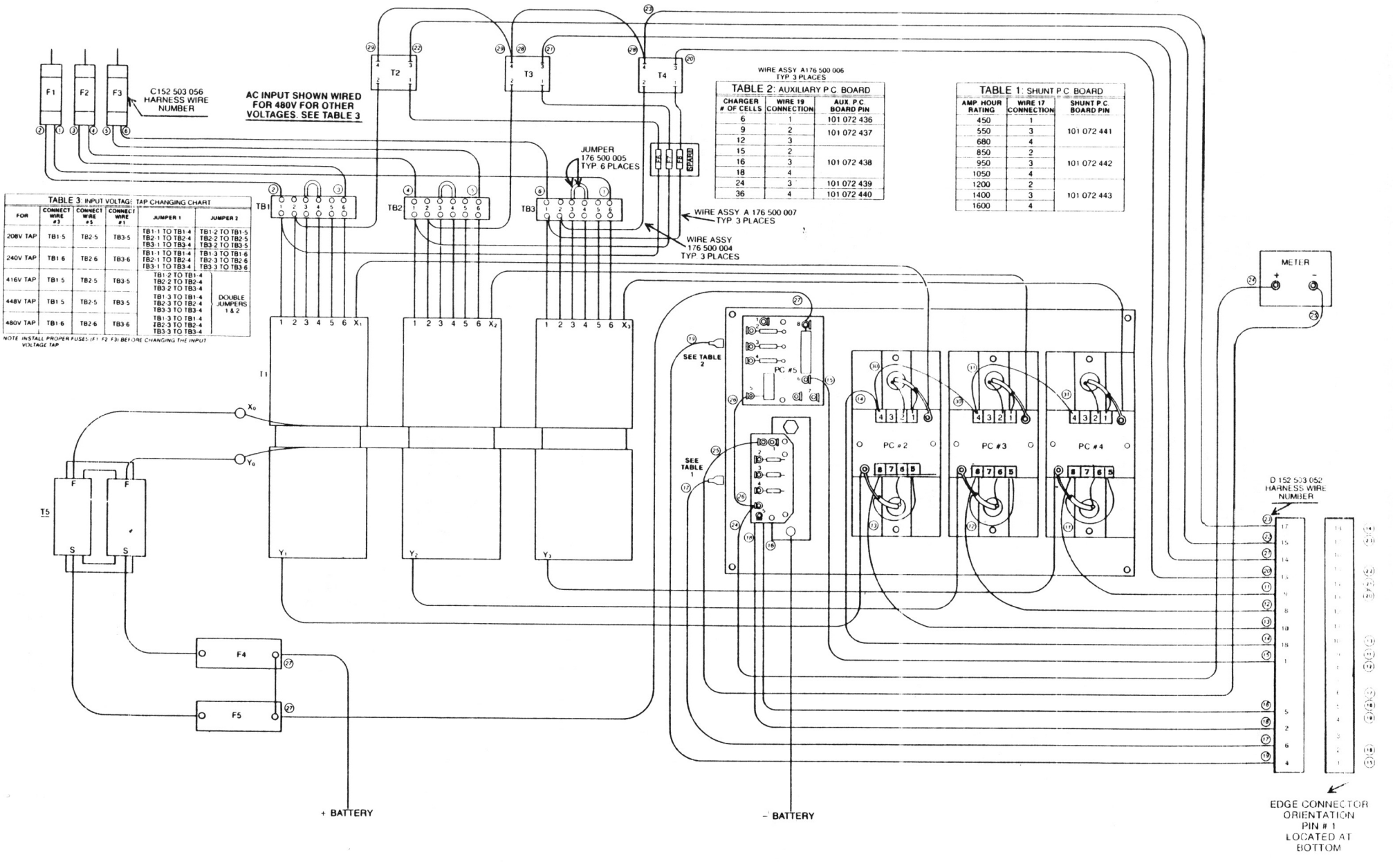


TABLE 3: INPUT VOLTAGE TAP CHANGING CHART

FOR	CONNECT WIRE #3	CONNECT WIRE #5	CONNECT WIRE #1	JUMPER 1	JUMPER 2
208V TAP	TB1-5	TB2-5	TB3-5	TB1-1 TO TB1-4 TB2-1 TO TB2-4 TB3-1 TO TB3-4	TB1-2 TO TB1-5 TB2-2 TO TB2-5 TB3-2 TO TB3-5
240V TAP	TB1-6	TB2-6	TB3-6	TB1-1 TO TB1-4 TB2-1 TO TB2-4 TB3-1 TO TB3-4	TB1-3 TO TB1-6 TB2-3 TO TB2-6 TB3-3 TO TB3-6
416V TAP	TB1-5	TB2-5	TB3-5	TB1-2 TO TB1-4 TB2-2 TO TB2-4 TB3-2 TO TB3-4	DOUBLE JUMPERS 1 & 2
448V TAP	TB1-5	TB2-5	TB3-5	TB1-3 TO TB1-4 TB2-3 TO TB2-4 TB3-3 TO TB3-4	
480V TAP	TB1-6	TB2-6	TB3-6	TB1-3 TO TB1-4 TB2-3 TO TB2-4 TB3-3 TO TB3-4	

NOTE INSTALL PROPER FUSES (F1 F2 F3) BEFORE CHANGING THE INPUT VOLTAGE TAP

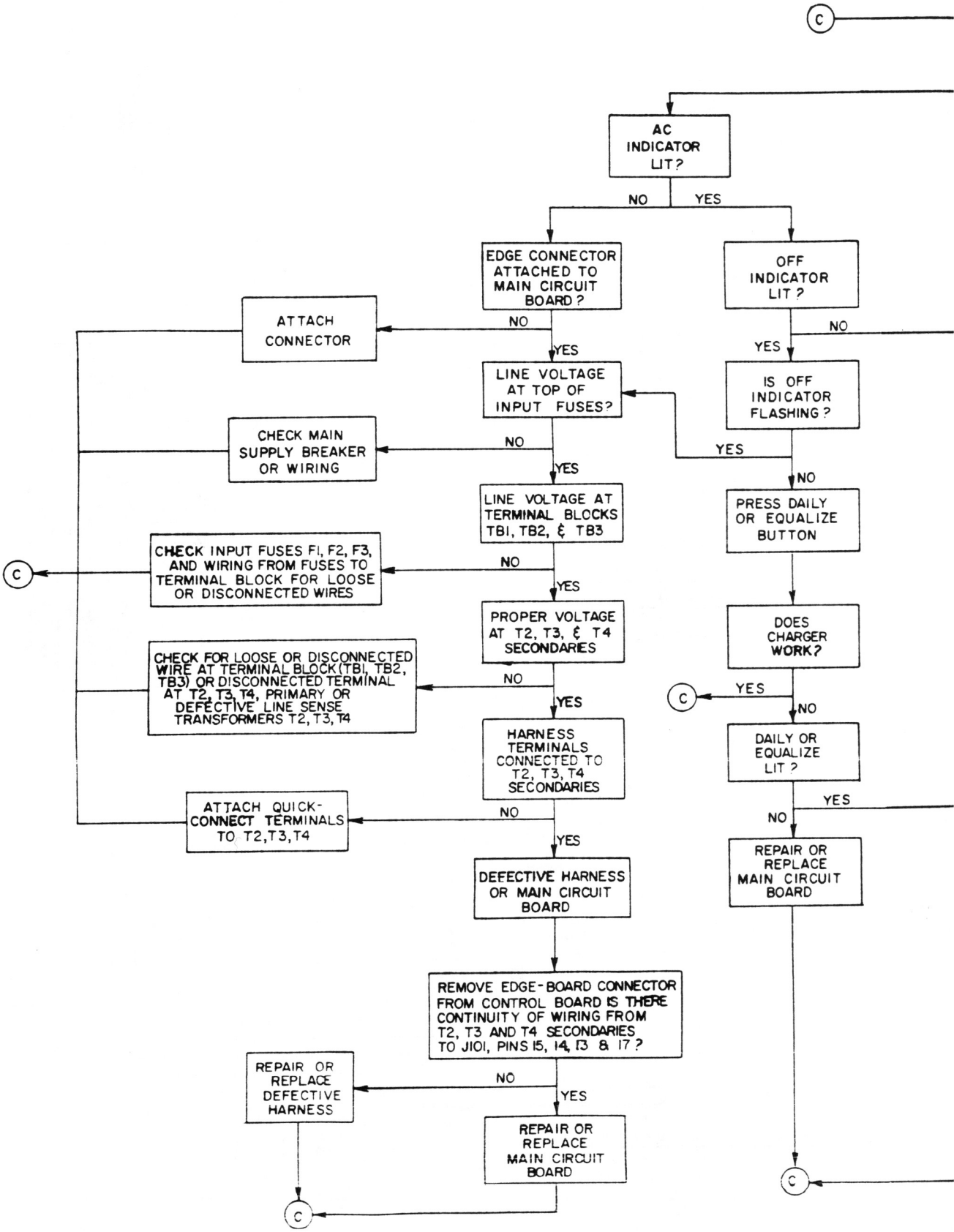
TABLE 2: AUXILIARY P C BOARD

CHARGER # OF CELLS	WIRE 19 CONNECTION	AUX. P.C. BOARD PIN
6	1	101 072 436
9	2	101 072 437
12	3	
15	2	
16	3	101 072 438
18	4	
24	3	101 072 439
36	4	101 072 440

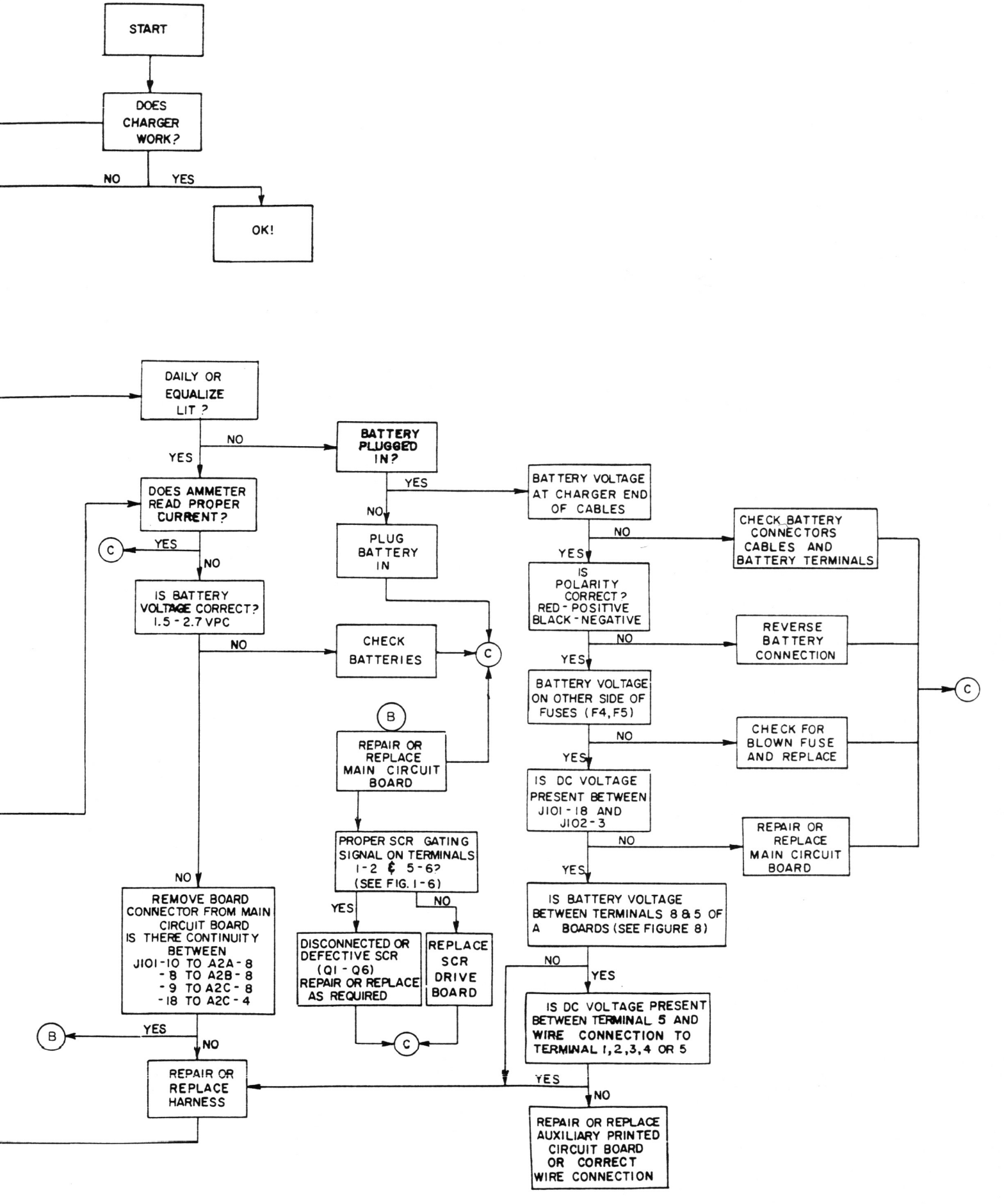
TABLE 1: SHUNT P C BOARD

AMP HOUR RATING	WIRE 17 CONNECTION	SHUNT P.C. BOARD PIN
450	1	
550	3	101 072 441
680	4	
850	2	
950	3	101 072 442
1050	4	
1200	2	
1400	3	101 072 443
1600	4	

Figure 9. Troub



eshooting Chart



System 3000 Replacement Parts List

Model ES3	Main Transformers	Interphase Transformer	Main SCRs	Heat Sink Assembly	Output DC Fuse	AC Fuse Block	Battery Cables	D.C. Ammeter	Auxiliary P.C. Board Assembly	Shunt	Shunt Board Assembly
6-550	149-154-400		143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-436	136-403-023	101-072-441
6-680	149-154-400	149-154-414	143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-436	136-403-023	101-072-441
6-850	149-154-401		143-317-038	131-102-093	128-302-048	128-401-096	152-501-780	136-401-158	101-072-436	136-403-024	101-072-442
6-1050	149-154-401	149-154-415	143-317-038	131-102-093	128-302-048	128-401-096	152-501-780	136-401-158	101-072-436	136-403-024	101-072-442
9-550	149-154-402	149-154-416	143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-437	136-403-023	101-072-441
12-550	149-154-402		143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-437	136-403-023	101-072-441
12-680	149-154-402	149-154-416	143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-437	136-403-023	101-072-441
12-850	149-154-403		143-317-038	131-102-093	128-302-048	128-401-096	152-501-780	136-401-158	101-072-437	136-403-024	101-072-442
12-1050	149-154-403	149-154-417	143-317-038	131-102-093	128-302-048	128-401-096	152-501-780	136-401-158	101-072-437	136-403-024	101-072-442
12-1200	149-154-404	149-154-418	143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-437	136-403-049	101-072-443
12-1400	149-154-404	149-154-418	143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-437	136-403-049	101-072-443
15/16-850	149-154-406	149-154-420	143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-438	136-403-024	101-072-443
18-550	149-154-405		143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-438	136-403-023	101-072-441
18-680	149-154-405	149-154-419	143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-438	136-403-023	101-072-441
18-850	149-154-406		143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-438	136-403-024	101-072-442
18-950	149-154-406	149-154-420	143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-438	136-403-024	101-072-442
18-1050	149-154-406	149-154-420	143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-438	136-403-024	101-072-442
18-1200	149-154-407		143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-438	136-403-049	101-072-443
18-1400	149-154-407	149-154-421	143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-438	136-403-049	101-072-443
18-1600	149-154-407	149-154-421	143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-438	136-403-049	101-072-443
24-550	149-154-408		143-315-040	131-102-085	128-302-047	128-401-096	152-501-779	136-401-157	101-072-439	136-403-023	101-072-441
24-680	149-154-408	149-154-422	143-315-040	131-102-085	128-302-047	128-401-095	152-501-779	136-401-157	101-072-439	136-403-023	101-072-441
24-850	149-154-409		143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-439	136-403-024	101-072-442
24-950	149-154-409	149-154-423	143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-439	136-403-024	101-072-442
24-1050	149-154-409	149-154-423	143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-439	136-403-024	101-072-442
24-1200	149-154-410		143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-439	136-403-049	101-072-443
24-1400	149-154-410	149-154-424	143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-439	136-403-049	101-072-443
24-1600	149-154-410	149-154-424	143-317-038	131-102-101	128-302-044	128-401-095	152-505-036	136-401-159	101-072-439	136-403-049	101-072-443
36-450	149-154-411		143-315-040	131-102-085	128-302-047	128-401-095	152-501-779	136-401-157	101-072-440	136-403-023	101-072-441
36-550	149-154-411		143-315-040	131-102-085	128-302-047	128-401-095	152-501-779	136-401-157	101-072-440	136-403-023	101-072-441
36-680	149-154-411	149-154-425	143-315-040	131-102-085	128-302-047	128-401-095	152-501-779	136-401-157	101-072-440	136-403-023	101-072-441
36-850	149-154-412		143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-440	136-403-024	101-072-442
36-1050	149-154-412	149-154-426	143-317-038	131-102-093	128-302-048	128-401-095	152-501-780	136-401-158	101-072-440	136-403-024	101-072-442

Common Parts

AC Fuse 5.6A	128-204-024	AC Harness	152-505-021	Jumper Wires	176-500-005	Rear Panel	157-308-009
AC Fuse 10A	128-204-029	Bottom Deck Foot	157-401-405	LED, Green	139-310-028	SCR Drive PCB	101-072-444
AC Fuse 12A	128-204-030	DC Cable Size	200-950 AH #2	LED, Red	139-310-027	Shunt (150 mv)	136-403-023
AC Fuse 15A	128-204-031		951-1200 AH 1/0	LED, Spacer	132-208-031	Shunt (200 mv)	136-403-024
AC Fuse 20A	128-204-033		1201-1600 AH 3/0	LED, Yellow	139-310-009	Shunt (300 mv)	136-403-049
AC Fuse 25A	128-204-034	DC Fuse 80A	128-302-047	Line Sense Fuses	128-103-140	Side Panel (2)	157-308-013
AC Fuse 30A	128-204-035	DC Fuse 100A	128-302-048	Line Sense Fuseblock	128-401-102	Signal Harness	152-505-017
AC Fuse 35A	128-204-036	DC Fuse 150A	128-302-044	Line Sense Transformer	149-308-179	Strain Relief, DC Cable	152-201-077
AC Fuse 40A	128-204-037	Door	157-201-767	Main P.C. Board	101-072-435	Suitcase Jumpers	130-918-068
AC Fuse 50A	128-204-039	Door Latch	130-913-168	Momentary Pushbutton Switch	145-301-025	TB1, 2 & 3	146-205-031
AC Fuse 60A	128-204-040	Front Panel	157-308-014	Pushbutton, Green	145-320-001	TB1, 2 & 3 6 pt.	146-106-037