Operating and Service Instructions

EXIDE
A Corporation of
INCO ElectroEnergy

NOW POWER

Model NPC -3ø

Exide Now Power Charger

with Electronic Charge Termination

1. WARNING

SAFETY PRECAUTIONS

a. Do not touch uninsulated parts of the output connector or the battery terminals as there is a possibility of electrical shock.

b. 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.

c. Lead-acid batteries contain sulfuric acid which causes burns. Do not get in eyes, on skin or clothing. In case of contact flush immediately with clean water. Obtain medical attention when eyes are affected.

d. Connect or disconnect the battery plug only when the charger output is off to prevent arcing and burning.

e. Only qualified personnel should attempt to service this equipment.

f. 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.

2. RECEIVING

When first received, the charger should be unpacked and carefully examined for any possible damage in transit. If practical, it should be operated normally to insure that all features are functioning properly. Any transit damage should be reported as a claim to the carrier.

3. LOCATION

The charging location should be a clean, cool, well ventilated area. Leave a minimum of four inches of space between the charger and any wall or 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 back and top.

4. INSTALLATION

A.C. Supply

This charger must be electrically grounded to avoid shock hazard. A terminal inside the cabinet is provided for this (refer to wiring diagram).

Be sure that the A.C. supply and the number of cells and capacity of the battery to be used with this charger correspond with the values shown on the charger nameplate. A.C. connections are to be made directly to the connecting lugs at the fuse block. (Refer to wiring diagram). The user, for compliance with local codes and convenience in servicing, should have a suitable disconnect switch, with fuses of the dual element type or circuit breaker of the motor starting type, from the A.C. supply to the charger.

Wire size for the A.C. input can be determined from the nominal A.C. input current shown in section 27.03 or on the charger nameplate.

Chargers are labeled, indicating the A.C. voltage for which they are connected at time of shipment. For each voltage range there are also several voltage taps, these being:

Nominal A.C. Line Voltage	Transformer Taps
— RANGE 1 — 240 V.A.C. nom.	208,240
— RANGE 2 — 480 V.A.C. nom.	416,448,480

Determine the actual voltage of the system during the time the chargers are in use and reconnect, if necessary, to the taps nearest that value. See wiring diagrams and transformer connection tables.

When reconnecting for voltages within the same range, only the taps on the transformer connection block need to be changed. When reconnecting from one range to another, the coil connections of the line starter, the A.C. input primary fuses and the transformer taps will need to be changed. (Refer to wiring diagram.) If charger is equipped with options, check options manual for any additional changes required.

D.C. Connections

The D.C. charging cable is provided with the commonly used battery plug or receptacle. Connect the B+ cable to the positive charger terminal and the B− cable to the negative charger terminal. An improper connection will blow the D.C. fuse and possibly cause other damage.

The D.C. fuse is a special "fast" type to protect the rectifier diodes. It is suggested that spares be kept, as no other type should be used.

5. APPLICATION

The model NPC-3ø charger line is designed to recharge a normally discharged lead-acid type battery, of the number of cells and ampere-hour capacity as shown on the charger nameplate, within an 8-hour period. For example, an NPC 18-3-680 will recharge any 18 cell lead-acid type battery in an 8-hour time period, that has been discharged 680 amp-hours.

The chargers may also be used to recharge batteries of a larger or smaller amp-hour capacity, but having the same number of cells, with a corresponding change being made in the time required for recharge.

The charger comes properly adjusted in every respect for a battery of the number of cells and ampere-hour capacity specified on the nameplate.

Information given herein refers specifically to the standard 240/480 V.A.C., 60 Hz models. For questions on special applications consult your nearest Exide representative.

6. OPERATION

To operate the charger:

a. Be sure the time-switch is at the "OFF" position.

b. Connect battery to the charging plug.

c. For daily charging turn time-switch knob clockwise to the "daily" position. The pilot lamp will light indicating presence of A.C. The line contactor will close, the charge will start and the charging rate will be indicated on the ammeter. If ammeter does not indicate current, check for:
— Blown D.C. fuse.
— Loose or open connections.
— Defective ammeter or ammeter leads.
Charge will continue until battery is fully charged and then stop automatically with the time-switch in the "OFF" position. (If power source should fail, the line contactor will open, but will reclose and charge will resume automatically when power is restored).

d. If it is ever necessary to interrupt the charge before the timer has stopped, turn the time-switch to "OFF" position BEFORE disconnecting the battery.

e. Once per week, turn time-switch knob to the "weekend" position, to give a long "equalizing" charge, which will help prevent heavy sulphation of the negative plates and reduced battery capacity.

7. OPERATING CHARACTERISTICS

When the charge is first started the battery will usually draw a relatively high current, close to the capacity of the charger. Within a few minutes the charger will adapt itself to the state of discharge of the battery, and will either, stay at the start rate current, if the battery is considerably discharged, or a reduced value if the battery is only slightly discharged. The entire control of the charging rate is by means of the solid-state control unit.

The model NPC-3ø uses a constant current, constant voltage, constant current charging method. This unique method is designed to provide the user with a consistently fully charged battery without danger of overcharging and subsequent damage. In operation the charger operates at a fixed "high" initial rate of 16.3 amps per 100 A.H. rated capacity (constant current). As the voltage rises to 2.37 volts per cell it is then held constant (constant voltage) until the charge rate tapers down to approximately 4.5A/100 A.H. This finish rate is held constant (constant current) until the charger shuts off.

The model NPC-3ø also employs electronic charge termination. This function is "built into" the control circuitry and provides a means of protecting the battery from overcharge (or undercharge).

Control Unit — This is properly adjusted at the factory for a battery of the same size as the charger rating, and normally requires no attention. Adjustments are quite critical and should be attempted only by a qualified electrician or Exide representative.

The adjustment potentiometers are as follows:

High Current Adjustment (R_{17}). This adjustment provides for "start" rate current. It is adjusted in the factory for 16.3 amps per 100 A.H. capacity with a "discharged" (below 2.00 V.P.C.) battery. In addition it provides an upper limit to the output current during the first portion of the charge. (Current Limit)

Voltage Control (R_{21}). This control is factory set to determine the point at which the charger will begin to enter its low charge rate (finish rate). It is normally adjusted to provide this function when the battery voltage reaches 2.37 volts per cell (average).

Finish Rate Current. This has no adjustment as it is a function of the start rate setting. If the proper start rate is selected the proper finish rate will be obtained.

This finish rate can range between 4A/100 A.H. to 5A/100 A.H. capacity due to component tolerances but will normally be approximately 4.5A/100 A.H.

8. MAINTENANCE

This charger requires a minimum of maintenance. There are no rotating parts except the timeswitch.

It should, of course, be kept clean and all connections tight. Twice yearly or as often as the cleanliness of the area may dictate, the interior should be thoroughly blown out with DRY air.

In the event of any irregular operation, examine, and tighten if necessary, all internal and external connections and check circuits for continuity (see wiring diagram). If the difficulty cannot be remedied, consult the nearest office of Exide Industrial Battery Division.

9. SAFETY TEST

The insulation systems employed in the power transformer protect the user from the likelihood of high voltage primary A.C. being present in the secondary circuit. The evaluation of the condition of insulation should be of great concern to those who operate and maintain electrical equipment. New equipment may be well designed; it may have received careful and proper treatment in manufacture and passed adequate and recognized acceptance tests, and been placed in service in good condition. Over a period of time, however, due to varying climatic, operating and maintenance conditions, insulation deteriorates and becomes weaker. It is, therefore, of vital concern to successful and safe operation that non-destructive tests be made on the insulation to indicate if appreciable deterioration has, or is about to occur.

The use of a 500-volt insulation resistance tester is recommended for these tests and should be used at regular intervals. The frequency of test should be based on actual service conditions with more frequent test with more severe conditions. Records should be maintained which show the service life, temperature, and insulation resistance. By plotting the aging characteristics of the individual insulation system the trend condition of the system can be established. Any rapid change in trend could indicate incipient troubles from insulation deterioration.

To conduct these tests remove the secondary power wires X1, X2, X3 from their termination points at the rear of the mag amps. Also remove all wires from the control module. Apply the insulation resistance tester from these three windings to their corresponding primary coil points H1, H2, and H3. Also check from primary to ground and secondary to ground. Typical values of 100 megohms can be expected on new equipment.

10. ROUTINE CHECKING

Caution: If necessary to test this charger, do not use a megger of any potential higher than its rated voltage as such may damage the silicon diodes or other parts.

a. There is no need of a detailed check of these chargers if they are functioning properly, this being indicated by:

— Proper current and voltage are obtained with proper "transition" between modes (constant current-voltage-current).
— Proper functioning of time-switch to terminate the charge.
— Proper overall results as shown by battery receiving complete charge without appreciable overcharge.

b. When checking or adjusting these chargers at any time:

— A voltmeter, ammeter and ohmmeter are necessary. Make sure all meters are accurate.
— For convenience, draw a graph of the V-I curve showing total voltage and current of the size being checked. It will save a lot of figuring.
— Before changing the control unit potentiometer, mark its original position for reference.

c. Sometimes it is desirable to make a routine check of a charger or group of them, in which case this procedure is suggested:

— Check A.C. line voltage to insure that it is within 10% of the value for which the transformer taps are set. Change taps if necessary.
— Examine for possible hot or loose connections, particularly at fuse and control unit.
— Operate for 10 to 15 minutes to warm up.
— Connect a fully-charged battery, allow current to stabilize, then measure both "start" and "finish" current and determine that the "voltage" control is operating properly and the electronic charge termination function starts the timer motor.

11. TROUBLESHOOTING PROCEDURE

When a charger is not operating properly, the cause must be determined by checking the various components until the fault is located. At times, the fault may be quite obvious, but when not, the following sequence of procedure is suggested. See later paragraphs covering each item.

a. For any condition:

—Check A.C. voltage to insure that it is within 10% of the value for which the transformer taps are set.
—Examine charger for any evident loose or improper connections, particularly at the control unit.
—Check accuracy of ammeter.

b. No Output — Check:

—Battery connector.
—Battery connection at charger terminals.
—All fuses (D.C. battery fuse first).
—Power Line Contactor.
—Control Unit.
—Follow circuit through transformer, mag-amps and diodes.

c. Heavy Overload (D.C.) — Check:

—Polarity of battery connection.
—Control Unit.
—Diodes.
—Mag-Amps.

d. A.C. Overload only — Check:

—Transformer.
—One or more diodes being open, thus unbalancing the system and overloading one portion.
—Mag-Amps.

e. High or Low Output — Check:

—Control Unit.
—Diodes.
—Mag-Amps.

f. Oscillation — Check:

—Control Unit.

g. Charge Fails to Stop — Check:

—Electronic Charge Termination.
—Time-Switch.

12. COMPONENTS—TESTING OF

a. Line-Contactor

With the time-switch dial in the "ON" position the line-contactor should close and A.C. voltage should be available at the load side with no measurable drop. Check connections of contactor coils and also the heater elements (if used) to insure that they agree with the voltage range in use. If contactor does not close, press re-set button, and check contacts of time-switch by measuring voltage at coil terminals. If proper voltage is at the coils and contactor does not close, check each coil separately with ohmmeter for continuity.

b. Fuses

Make sure all fuses are the **proper size and type** — See Parts List. Check fuses preferably by removing them and testing with an ohmmeter or lamp circuit, etc. Make sure that contact surfaces of fuse and clip or mounting are clean and tight. In an energized circuit, there should be no significant voltage drop across them. **Always keep a stock of spare fuses.** Do not substitute other fuse styles or sizes as the fuses employed in these chargers are dual element, time delay, motor start rated fuses which are sized to fit the characteristics of the transformer type load.

c. Transformers

In checking the transformers, look for visual indications of overheating and measuring the voltage of all primary and secondary windings (assuming they can be energized without blowing fuses, etc.). All primary windings should have full normal A.C. voltage across them. Make sure the taps of all phases are similarly connected and that all 3 secondaries indicate equal voltage. Make this check on open circuit and under load if practical. If any of the above voltages show an appreciable difference, replacement is necessary.

d. Diodes

These should preferably be checked by disconnecting one side of them and measuring their forward and reverse resistance in either of two ways. In using an ohmmeter, use the RXI scale for the forward resistance and this should show around 5 to 10 ohms. The reverse resistance should be up in the thousands of ohms (probably 50,000 or more) measured, of course, with a higher scale of the meter. The diodes may also be checked by connecting them in series with a 6- or 12-volt lamp across a D.C. source of the same voltage. The lamp must be one which requires **at least** one-quarter ampere. The lamp should light with nearly full brilliance with current flowing in the forward direction and not at all in reverse. If it lights in both directions, the diode is shorted — if in neither direction, the diode is "open".

Diodes 1, 2, and 3 are reverse polarity. Thus they have an anode stud rather than the standard cathode stud. **A reverse polarity diode cannot be interchanged with a standard polarity diode.** The polarity is marked by an arrow on the side of the diode.

e. Magnetic Amplifiers

If trouble is suspected in the magnetic amplifiers (and the charger can be operated) measure the voltage across the main or gate windings of each one. These voltages should be essentially the same. If they are not, de-energize the charger and disconnect the leads from the mag-amps to the control unit. Then:

Check for grounds between all windings of the mag-amp and case. If any ground is found, separate the windings successively until the point of grounding is located and remedy if possible. If it cannot be corrected, **all** mag-amps should be replaced as they must be matched.

If there are no grounds, measure the resistance of all windings, being sure, of course, to open the necessary connections to isolate the windings when making these measurements. The resistance of all comparable windings should be within about 2%. For example, all main or gate windings should be within the range of each other. (These gate windings may be difficult to check because of their very low resistance.) The "control" and "bias" windings are all of equal resistance except on 3-phase rectifiers where one coil may be wound on top of the other. This results in the outer coil having a resistance perhaps 10% greater than the inner one, but all the inner ones should be comparable with each other and all the outer ones comparable with each other. If any wide differences in resistance are found, all mag-amps will require replacement.

If there are neither grounds nor appreciable differences in the resistance of the windings, check for possible mis-connection of the windings, i.e., windings connected in reverse. If the above checks indicate no fault, the mag-amps are not the source of trouble.

f. Time-Switch

Check whether the timer is running under the conditions that it should be. Check whether proper A.C. voltage is present at the actual motor terminals. Also turn the timer pointer to a position corresponding to a few minutes before shut-off and wait to learn if it completes the termination properly. If it does not function correctly in every respect it should be replaced.

g. Control Unit

Review the data given in Section 7. If adjustment has no effect, a check of the following voltages and currents will determine if improper operation is being caused by a defective control unit.

Terminals #1 & #8 — With the charger turned **off** and the battery connected, you will typically read 1.35 V.D.C. across these terminals. If not check all the connections between battery and these terminals.

Terminals #9 & #10 — With the charger output at maximum you should see approximately 35 MV. D.C. At any output other than maximum the MV. should be proportionately **lower.** (i.e., at half rated output you should see approximately 17.5 MV. D.C.)

Terminals #2, #3, #4, & #8 — Terminal #8 should be considered "neutral" or "common." Between terminal #8 and terminal #2 **or** #3 **or** #4 you should measure approximately 13.5 volts A.C.

Terminal #6 — This is the Mag.-Amp. bias winding. At maximum output there should be approximately 50 MA D.C. flowing through wire #23. This can be checked by inserting a D.C. milliammeter (0 to 100 MA) in series between wire #23 and terminal #6 (terminal #6 being negative).

Terminal #7 — This is the Mag.-Amp. control winding. At maximum output, in the same manner as for terminal #6 above, there should be approximately 165 MA D.C. flowing through wire #22. This again can be checked in the same manner as outlined above.

Note: The readings for terminals #6 & #7 will change in opposite direction as the charger output decreases. The bias current will rise and the control current will fall; the bias current will reach a maximum of 145 MA and the control current can read as low as zero.

To Check Operation of the Electronic Charge Termination Feature—

1. Connect a A.C. voltmeter across terminals #11 & #12 of the control unit.
2. With the charger running at high rate (voltage below 2.37 V.P.C.) 13 V.A.C. should be present showing the relay has not closed.
3. After the charger gets to finish rate (above 2.37 V.P.C.) there should be zero volts indicating relay has closed. Timer motor should now be running.
4. REFER TO CONTROL UNIT ADJUSTMENT — Install a D.C. variable voltage source as per the procedure outlined.
5. With the D.C. source adjusted for under 2.36 V.D.C. there should be an open circuit indicated on the continuity tester between #11 and #12.
6. With the D.C. source adjusted for over 2.40 V.D.C. there should be continuity between terminals #11 & #12.

To Adjust the Output Characteristic of the Control Unit—

1. Isolate the charger from both A.C. line and battery.
2. Remove wire #24B from top connection on F1.
3. Using a suitable source of regulated variable D.C. voltage connect the negative lead to wire #24B and the positive lead to top connection on the shunt (wire #25 or #25A).
4. Restore A.C. line to the charger.
5. Connect a discharged battery (avg. cell voltage of 2.00 volts/cell) to the charger.
6. Set the regulated variable D.C. voltage supply to 2.00 volts/cell avg. The charger should be in the high rate mode (16.3 amps/100 AH capacity). If output is too high or too low adjust R_{17} for correct setting (starting rate).
7. With the start rate properly adjusted set the regulated variable D.C. voltage supply to 2.37 volts/cell avg. It is at this point that the charger should switch into low rate. Adjust R_{21} for a mid-range current around 8 amps/100 AH capacity.
8. Set the regulated variable D.C. voltage supply to 2.40 volts/cell avg. and confirm that the finish rate current is approximately 4.5 amps/100 AH capacity. There is no finish rate adjustment as this function is a constant of the module and is a function of the start rate setting. If the proper start rate is selected the proper finish rate will be obtained.

Note: Before attempting any of the above adjustments, the I-E-I characteristic should be thoroughly understood. In addition, battery condition, A.C. input, PVT taps, etc., will affect the output. A check of these items should be made before attempting any adjustment of the control unit characteristic. Make any adjustments slowly allowing the control unit time to respond.

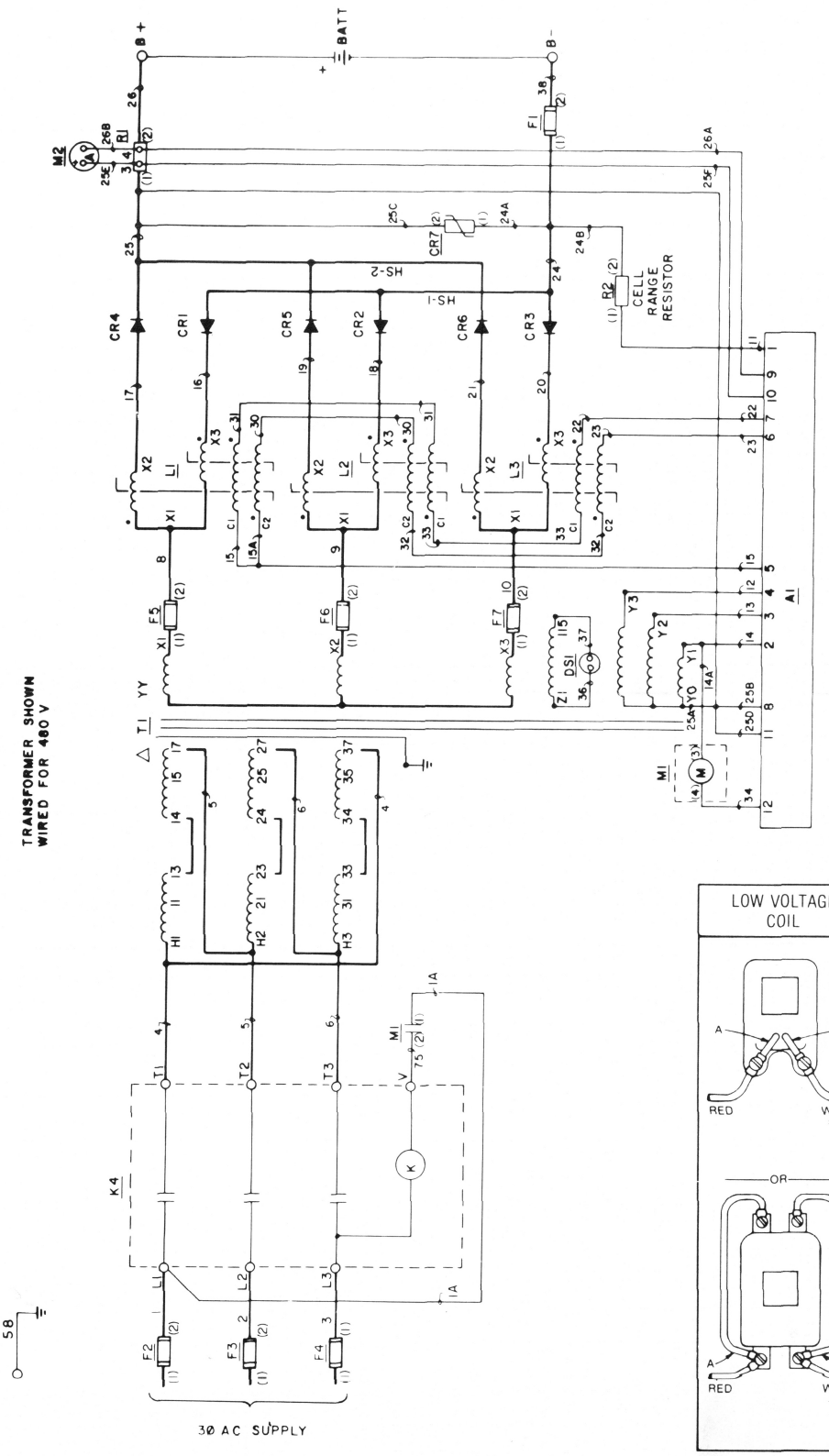
TO CHANGE INPUT VOLTAGE RANGE:

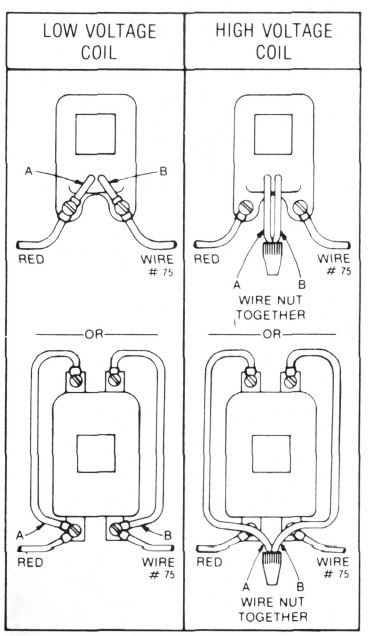
1. Change coil connection.
2. Change Transformer connections.
3. Change primary fuses.

TRANSFORMER CONNECTIONS FOR 240/480 VOLT DUAL RANGE UNIT

Voltage	208	240	416	448	480
Jumper Connections	H1 to 14	H1 to 14	11 to 14	11 to 14	13 to 14
	11 to 15	13 to 17			
	H2 to 24	H2 to 24	21 to 24	21 to 24	23 to 24
	21 to 25	23 to 27			
	H3 to 34	H3 to 34	31 to 34	31 to 34	33 to 34
	31 to 35	33 to 37			
	15 to 24	17 to 24	15 to H2	17 to H2	17 to H2
	25 to 34	27 to 34	25 to H3	27 to H3	27 to H3
	35 to 14	37 to 14	35 to H1	37 to H1	37 to H1

Schematic Diagram





G.E.

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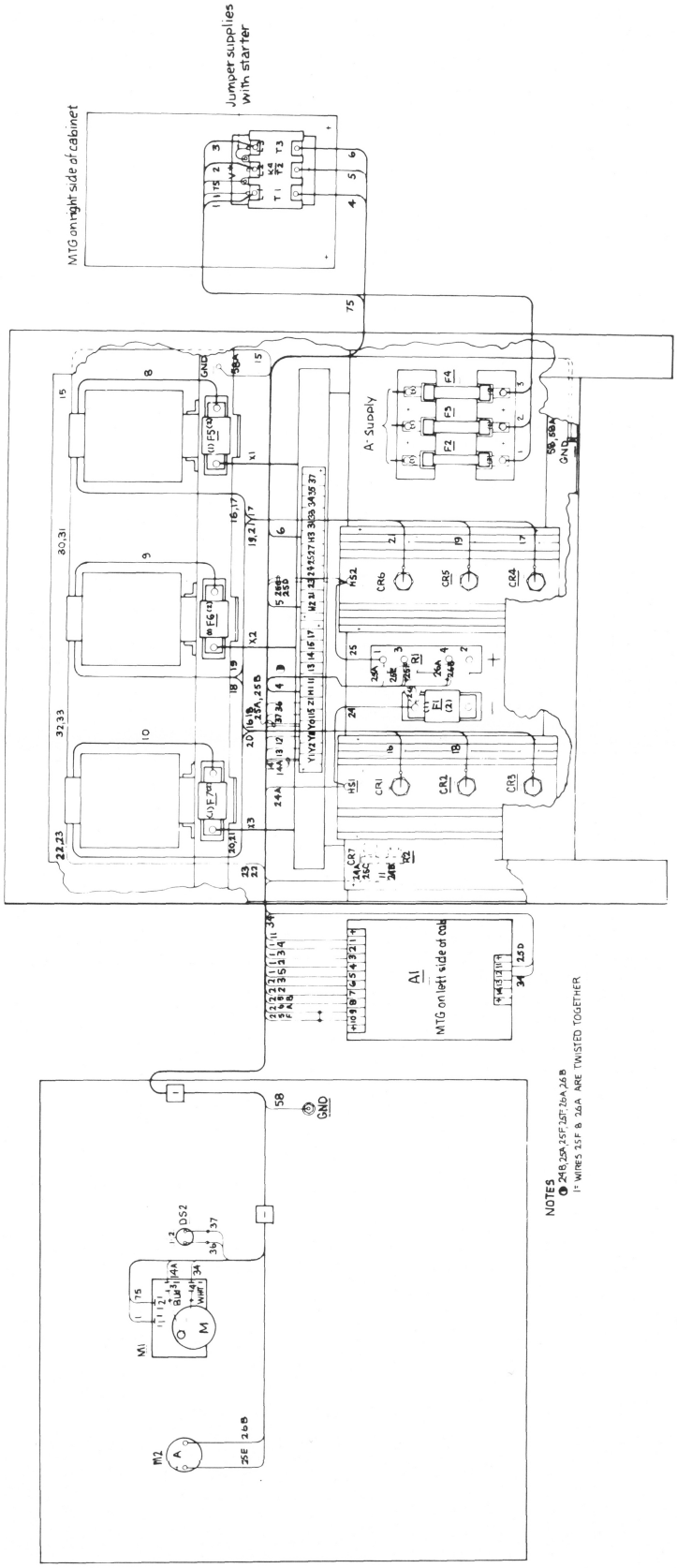
Wiring Diagram



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PARTS LIST FOR NPC 3ø

Model	Primary Fuse F2, 3, 4					Secondary Fuse F5, 6, 7	P.V.T. PWR Transformer T1	Mag. Amps. L1, 2, 3	Power Diode CR1, 2, 3— Rev.	Power Diode CR4, 5, 6— Std.	PWR Line Contactor G.E.	F1 Fuse Battery Line	M2 Ammeter	R1 Shunt	R2 Range Resistor	CR7 Surge Suppressor	Charging Cable
	208VAC	240VAC	416VAC	448VAC	480VAC												
Quantity	3	3	3	3	3	3	1	3	3	3	1	1	1	1	1	1	1
NPC 6-3-550L 101 535 400	9.0A 128 204 028	8.0A 128 204 027	4.5A 128 204 022	4.5A 128 204 022	4.0A 128 204 021	100A 128 302 015	149 154 317	134 152 375	70A 143 117 040	70A 143 117 033	20A 144 101 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	7.87K - 1% 141 653 375	141 923 059	#2 152 501 046
NPC 6-3-680L 101 535 401	12.0A 128 204 030	10.0A 128 204 029	5.6A 128 204 024	5.0A 128 204 023	5.0A 128 204 023	150A 128 302 016	149 154 317	134 152 375	150A 143 118 054	150A 143 118 045	20A 144 101 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	7.87K - 1% 141 653 375	141 923 059	#2 152 501 046
NPC 6-3-850L 101 535 402	15.0A 128 204 031	12.0A 128 204 030	7.0A 128 204 026	7.0A 128 204 026	6.25A 128 204 025	150A 128 302 016	149 154 327	134 152 360	150A 143 118 054	150A 143 118 045	20A 144 101 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	7.87K - 1% 141 653 375	141 923 059	#2 152 501 046
NPC 6-3-1050L 101 535 403	17.5A 128 204 032	15.0A 128 204 031	9.0A 128 204 028	8.0A 128 204 027	8.0A 128 204 027	250A 128 302 018	149 154 319	134 152 355	150A 143 118 054	150A 143 118 045	20A 144 101 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	7.87K - 1% 141 653 375	141 923 059	#1/0 152 501 047
NPC 12-3-550L 101 535 404	17.5A 128 204 032	15.0A 128 204 031	9.0A 128 204 028	8.0A 128 204 027	7.0A 128 204 026	100A 128 302 015	149 154 318	134 152 376	70A 143 117 040	70A 143 117 033	20A 144 101 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	16.9K - 1% 141 653 407	141 923 059	#4 152 501 045
NPC 12-3-680L 101 535 405	20.A 128 204 033	17.5A 128 204 032	10.0A 128 204 029	9.0A 128 204 028	9.0A 128 204 028	150A 128 302 016	149 154 330	134 152 353	150A 143 118 054	150A 143 118 045	20A 144 101 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	16.9K - 1% 141 653 407	141 923 059	#2 152 501 046
NPC 12-3-850L 101 535 406	25.0A 128 204 034	25.0A 128 204 034	12.0A 128 204 030	12.0A 128 204 030	12.0A 128 204 030	150A 128 302 016	149 154 331	134 152 356	150A 143 118 054	150A 143 118 045	20A 144 101 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	16.9K - 1% 141 653 407	141 923 059	#2 152 501 046
NPC 12-3-1050L 101 535 407	30.0A 128 204 035	25.0A 128 204 034	15.0A 128 204 031	15.0A 128 204 031	15.0A 128 204 031	200A 128 302 017	149 154 322	134 152 367	150A 143 118 054	150A 143 118 045	30A 144 102 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	16.9K - 1% 141 653 407	141 923 059	#1/0 152 501 047
NPC 12-3-1200L 101 535 467	35.0A 128 203 036	30.0A 128 204 035	20.0A 128 204 033	17.5A 128 204 032	15.0A 128 204 031	250A 128 302 018	149 154 333	134 152 382	150A 143 118 054	150A 143 118 045	30A 144 102 043	300A 128 302 019	300A 136 402 424	300A 136 403 049	16.9K - 1% 141 653 407	141 923 059	#1/0 152 501 047
NPC 15-3-850L 101 535 408	30.0A 128 204 035	30.0A 128 204 035	15.0A 128 204 031	15.0A 128 204 031	15.0A 128 204 031	150A 128 302 016	149 154 335	134 152 358	150A 143 118 054	150A 143 118 045	30A 144 102 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	21.0K - 1% 141 653 416	141 923 059	#2 152 501 046
NPC 16-3-850L 101 535 409	30.0A 128 204 035	30.0A 128 204 035	15.0A 128 204 031	15.0A 128 204 031	15.0A 128 204 031	150A 128 302 016	149 154 335	134 152 358	150A 143 118 054	150A 143 118 045	30A 144 102 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	22.6K - 1% 141 653 419	141 923 059	#2 152 501 046
NPC 18-3-550L 101 535 410	25.0A 128 204 034	20.0A 128 204 033	12.0A 128 204 030	12.0A 128 204 030	10.0A 128 204 029	100A 128 302 015	149 154 320	134 152 351	70A 143 117 040	70A 143 117 033	20A 144 101 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	25.5K - 1% 141 653 424	141 923 058	#4 152 501 045
NPC 18-3-680L 101 535 411	30.0A 128 204 035	25.0A 128 204 034	15.0A 128 204 031	15.0A 128 204 031	15.0A 128 204 031	150A 128 302 016	149 154 339	134 152 377	150A 143 118 054	150A 143 118 045	30A 144 102 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	25.5K - 1% 141 653 424	141 923 058	#2 152 501 046
NPC 18-3-850L 101 535 412	35.0A 128 203 036	30.0A 128 204 035	17.5A 128 204 032	17.5A 128 204 032	15.0A 128 204 031	150A 128 302 016	149 154 346	134 152 350	150A 143 118 054	150A 143 118 045	30A 144 102 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	25.5K - 1% 141 653 424	141 923 058	#2 152 501 046
NPC 18-3-950L 101 535 413	40.0A 128 203 037	35.0A 128 203 036	20.0A 128 204 033	20.0A 128 204 033	17.5A 128 204 032	200A 128 302 017	149 154 340	134 152 350	150A 143 118 054	150A 143 118 045	40A 144 103 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	25.5K - 1% 141 653 424	141 923 058	#2 152 501 046
NPC 18-3-1050L 101 535 414	45.0A 128 203 038	40.0A 128 203 037	25.0A 128 204 034	20.0A 128 204 033	20.0A 128 204 033	200A 128 302 017	149 154 324	134 152 365	150A 143 118 054	150A 143 118 045	40A 144 103 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	25.5K - 1% 141 653 424	141 923 058	#1/0 152 501 047
NPC 18-3-1200L 101 535 415	60.0A 128 203 040	45.0A 128 203 038	25.0A 128 204 034	25.0A 128 204 034	25.0A 128 204 034	250A 128 302 018	149 154 345	134 152 365	150A 143 118 054	150A 143 118 045	50A 144 104 043	300A 128 302 019	300A 136 402 424	300A 136 403 049	25.5K - 1% 141 653 424	141 923 058	#1/0 152 501 047
NPC 18-3-1400L 101 535 416	60.0A 128 203 040	50.0A 128 203 039	30.0A 128 204 035	30.0A 128 204 035	25.0A 128 204 034	250A 128 302 018	149 154 341	134 152 374	150A 143 118 054	150A 143 118 045	50A 144 104 043	300A 128 302 019	300A 136 402 424	300A 136 403 049	25.5K - 1% 141 653 424	141 923 058	#2/0 152 501 048
NPC 24-3-550L 101 535 417	30.0A 128 204 035	25.0A 128 204 034	15.0A 128 204 031	15.0A 128 204 031	15.0A 128 204 031	100A 128 302 015	149 154 321	134 152 352	70A 143 117 040	70A 143 117 033	30A 144 102 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	34.8K - 1% 141 653 437	141 923 058	#4 152 501 045
NPC 24-3-680L 101 535 418	40.0A 128 203 037	35.0A 128 203 036	20.0A 128 204 033	17.5A 128 204 032	17.5A 128 204 032	150A 128 302 016	149 154 342	134 152 352	150A 143 118 054	150A 143 118 045	40A 144 103 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	34.8K - 1% 141 653 437	141 923 058	#2 152 501 046
NPC 24-3-850L 101 535 419	50.0A 128 203 039	40.0A 128 203 037	25.0A 128 204 034	25.0A 128 204 034	20.0A 128 204 033	150A 128 302 016	149 154 343	134 152 359	150A 143 118 054	150A 143 118 045	40A 144 103 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	34.8K - 1% 141 653 437	141 923 058	#2 152 501 046
NPC 24-3-1050L 101 535 420	60.0A 128 203 040	50.0A 128 203 039	30.0A 128 204 035	30.0A 128 204 035	25.0A 128 204 034	200A 128 302 017	149 154 354	134 152 378	150A 143 118 054	150A 143 118 045	50A 144 104 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	34.8K - 1% 141 653 437	141 923 058	#1/0 152 501 047
NPC 24-3-1400L 101 535 421*	NOT AVAILABLE	NOT AVAILABLE	40.0A 128 204 037	40.0A 128 204 037	35.0A 128 204 036	250A 128 302 018	149 154 356	134 152 379	150A 148 118 054	150A 143 118 045	60A 144 105 043	300A 128 302 019	300A 136 402 424	300A 136 403 049	34.8K - 1% 141 653 437	141 923 058	#2/0 152 501 048
NPC 36-3-450L 101 535 422	40.0A 128 203 037	35.0A 128 203 036	20.0A 128 204 033	17.5A 128 204 032	17.5A 128 204 032	100A 128 302 015	149 154 323	134 152 370	70A 143 117 040	70A 143 117 033	40A 144 103 043	100A 128 302 015	100A 136 402 439	100A 136 403 001	52.3K - 1% 141 653 454	141 923 058	#4 152 501 045
NPC 36-3-550L 101 535 423	45.0A 128 203 038	40.0A 128 203 037	25.0A 128 204 034	25.0A 128 204 034	20.0A 128 204 033	100A 128 302 015	149 154 325	134 152 372	70A 143 117 040	70A 143 117 033	40A 144 103 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	52.3K - 1% 141 653 454	141 923 058	#4 152 501 045
NPC 36-3-680L 101 535 424	60.0A 128 203 040	50.0A 128 203 039	30.0A 128 204 035	25.0A 128 204 034	25.0A 128 204 034	150A 128 302 016	149 154 353	134 152 371	150A 143 118 054	150A 143 118 045	50A 144 104 043	150A 128 302 016	150A 136 402 422	150A 136 403 023	52.3K - 1% 141 653 454	141 923 058	#2 152 501 046
NPC 36-3-850L 101 535 425*	NOT AVAILABLE	NOT AVAILABLE	35.0A 128 204 036	35.0A 128 204 036	35.0A 128 204 036	150A 128 302 016	149 154 355	134 152 380	150A 143 118 054	150A 143 118 045	60A 144 105 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	52.3K - 1% 141 653 454	141 923 058	#2 152 501 046
NPC 36-3-1050L 101 535 426*	NOT AVAILABLE	NOT AVAILABLE	45.0A 128 204 038	40.0A 128 204 037	40.0A 128 204 037	200A 128 302 017	149 154 357	134 152 381	150A 143 118 054	150A 143 118 045	60A 144 105 043	200A 128 302 017	200A 136 402 423	200A 136 403 024	52.3K - 1% 141 653 454	141 923 058	#1/0 152 501 047

PARTS COMMON TO ALL MODELS

ITEM	A1 Control Module		M1 Timer	Timer Knob	Timer Dial Plate	DSI Pilot Light	Door Latch Assembly	AC Fuse Mounting Block	Cabinet
	Standard	Auto Start							
QUANTITY	1	1	1	1	1	1	1	2	1
CATALOG NO.	101-072-108	101-072-105	147-101-052	133-101-004	125-102-002	139-304-001	130-913-121	*128-401-095	158-404-018