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OWNER'S MANUAL

PHANTOM

INDUSTRIAL BATTERY CHARGER

M17013 REV.A

TABLE OF CONTENTS

GENERAL INFORMATION

SAFETY

Safety First! Please take time to study this manual before installing, operating or troubleshooting. Special attention should be given to WARNING and CAUTION labels on the charger and in this manual.
Battery chargers are safe when properly operated under intended use and by trained operators. Untrained operators and service personnel risk the possibility of serious injury to themselves and others. Improper application of battery chargers can also result in extensive and costly damage to batteries and equipment. Only trained operators and service personnel that are familiar with this manual should install, operate, or trouble shoot the battery chargers.

WARNING: EXPLOSION

Connect or disconnect the battery plug only when the AC line is disconnected or the charger is in the "OFF" position. Failure to follow this instruction may result in arcing and burning of the DC connector contacts. Arcing contacts may ignite a mixture of oxygen and hydrogen, which is produced during battery charging. DO NOT smoke, weld, grind, or use torches around batteries.

DANGER: ELECTRIC SHOCK

Do not touch un-insulated portion of output connector or un-insulated battery terminal. Do not operate charger unless connected to battery.
Before maintenance or troubleshooting, make sure all circuits are de-energized in the following manner:

1. Make sure charger is in "OFF" position
2. Disconnect charger plug from battery.
3. Make sure no AC power can be supplied to the charger from breaker or disconnect switch.
4. Short circuit capacitors with insulated screwdriver.

Avoid operating or trouble shooting in damp or wet locations. Use insulating gloves and shoes in such environments.
Replace defective cord or wires immediately.

GENERAL SAFETY PRECAUTIONS

When servicing battery chargers, the main power supply switches or other switches from which power could enter the circuit should be locked in an open position and tagged e.g.

"Open Circuit for Repairs - DO NOT Tamper".

If it is impractical to open the main power switch USE EXTREME CAUTION WORKING ON ENERGIZED CIRCUITS. Even though power circuits may be off, certain control circuits may still be energized. To take voltage readings on energized components, turn off the charger and attach alligator clips before turning the charger back on. This procedure will avoid sticking both hands with meter probes into a live charger, which is extremely dangerous.
DO NOT WORK ALONE. Have someone capable of rendering first aid. Do not wear loose clothing or jewelry. Do not use bare hands to remove live parts, such as fuses. Think before you act.

RECEIPT AND INSTALLATION

Equipment Identification

Chargers are identified with a model number, which appears on the charger nameplate. Certain information contained in this manual may be superseded by specific operating instructions, and schematic addendums.

Charger Model Designation eg. 12F750TJG22

12	Battery cells
F	1600 Series
750	Amp-hour rating
T	Three Phase
J	208/240/480
G	Case Type
22	2200 Control

For a full range of model designations see the sales literature.

Receiving

Check the charger nameplate against packing lists and purchase orders to verify receipt of proper equipment. If there are any discrepancies notify the shipper immediately. All shipments leaving manufacturing have been carefully inspected. If a shipment arrives with the crating or packing damaged, have the carrier note the condition on the receipt. Check as soon as possible for concealed damage. If damage has occurred, notify and file a claim with the carrier at once. Do not return the unit to the shipper. Failure to follow this procedure may result in refusal by the carrier to honor any claims.

Location

Operating life and performance will be influenced by charger location. Select a dry and well-ventilated

location. Allow 6 inches from walls and other chargers for proper ventilation. Chargers should not be exposed to rain, high temperatures, dust, corrosive fumes, combustible materials, or explosive gases. Dusty environments may require more frequent maintenance to obtain maximum life and optimum performance.

Moving and Transport

Care should be taken when lifting units with forklifts or pallet jacks. Forks should extend completely under charger so as to prevent accidents.

Grounding

Follow applicable local codes or National Electric Code revisions that may supersede the following instructions.

The battery charger must be grounded to prevent lethal injury. Route ground conductor through knock-out side of charger. Connect AC ground wire (green) to ground terminal next to fuses. The case is grounded once this connection is made.

If the AC supply cable does not include a ground conductor see table on pg. 3 for proper sizing of separate ground conductor or consult the National Electrical Code.

AC Line Voltage Changeover

Before making any reconnection, check the charger nameplate to make sure the disconnect switch and supply wiring is of sufficient size to carry the desired input voltage and amps.

Check the fuse label on inside of door to make certain the input fuses are proper for input line voltage. INCORRECT FUSING WILL VOID CHARGER WARRANTY.

Check that jumpers are connected to the proper positions on each terminal block. On 3 phase units, check that all jumpers are positioned the same on each AC terminal block. Check the control transformer for proper AC connection. The control transformer AC voltage setting must match the setting of the AC terminal blocks.

AC Line Connection

Follow applicable local codes or National Electrical Code revisions that may supersede the following instructions:

Make sure main power supply switches or other switches from which power could enter the circuit are locked in an open position.

Check that charger is connected for proper input voltage - arrow on voltage adjust board matches incoming AC line voltage on main panel.

Refer to charger nameplate for input amps at incoming line voltage. See table on pg.3 for recommended disconnect switch, branch fuse size, power and ground cable size. Route appropriate conductor through AC knockout provided on side of charger case. Crimp wire to inside ring terminal barrel located at base of fuses.

DC Cables and Plugs

When changing DC cables use the following table for up to 20 feet.

Max DC Amp	Wire Size A.W.G.
65	#6
75	#4
120	#2
180	1/0
240	2/0
270	3/0

For lengths over 20 feet use one size larger cable. Cable length over 35 feet is not recommended.

Make sure DC plug is connected for proper polarity e.g. positive on plug to positive charging lead, negative on plug to negative charging lead. Improper connections may result in dangerous arcing and blown DC fuses.

When changing or repairing connectors make certain plug contacts are crimped and/or soldered properly. A poor solder joint will overheat and drop output. Make sure the plug contacts are firmly seated in the plug housing.

Charger Fusing

The fuse label (inside door) is marked to show original factory set voltage and AC fuse size. The label is also marked to show proper fuse size for other voltages.

INCORRECT FUSING WILL VOID CHARGER WARRANTY.

OPERATION

See Pg.5 for specific operating instructions and additional information.

Pre-Operation

Make sure the charger has been installed according to the directions in this manual. Failure to do so could result in personal injury and damage to the equipment.

Double check nameplate to verify charger is correct DC voltage for batteries being recharged. Ampere-hour capacity on nameplate should correspond to the battery ampere-hour capacity for normal 8-hour recharge cycle.

General Operating Instructions
WARNING EXPLOSION
Connect or disconnect the battery plug only when the AC supply is disconnected or the charger is in the "OFF" position. Failure to follow this instruction may result in arcing and burning of DC connector contacts. Arcing contacts can ignite a mixture of oxygen and hydrogen, which is produced during battery charging.

Operating Characteristics
The battery charger, when connected to a discharged battery and energized, delivers maximum rated output current. As battery voltage rises, output charge current decreases in proportion to increasing battery voltage. When the battery becomes nearly full, the charger reduces output current to a pre-established finish rate. This ensures proper mixing of electrolyte.

SERVICE

Maintenance
Observe all safety instructions presented in the front of this manual before attempting any maintenance or service.
The charger is designed to provide years of trouble free service. Routine maintenance checks will prevent potential problems and ensure maximum performance.

Cleaning
Keep the charger free from accumulated dirt and dust buildup. Wipe or blow dirt and dust deposits from the charger interior at least twice a year or as the situation demands. Clean components will keep the charger running cooler and more efficiently.

Connections
Make sure all connections are clean and tight. Look for discolored connections and broken or loose wires. All DC connections are especially critical. Loose DC connections create high resistance hot spots that reduce charger output and impair efficiency. Inspect the DC cables to make sure the cable insulation is not damaged. Check charger connector for damage and check to make sure plug contacts are properly seated. See page 6 for trouble shooting information.

REPLACEMENT PARTS
For replacement parts call service with Spec Number, Model Number, Date Code, & Serial Number.

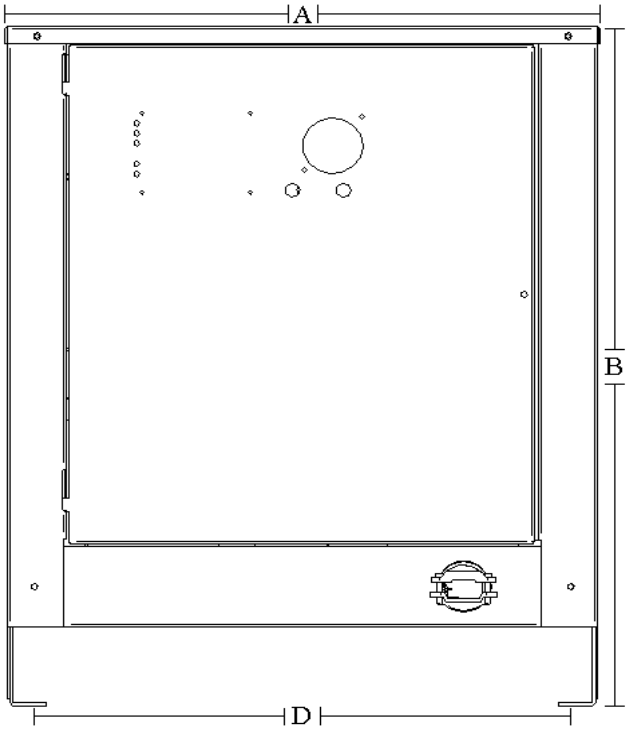
AC SUPPLY WIRING				
MAX Line Amps	Disconnect Switch Amps	Branch Fuse Size (Amps)	Copper Cable Power	Size No. Ground
2.5	30	5	14	14
4.5	30	7	14	14
7.5	30	10	14	14
12.0	30	15	14	14
16.0	30	20	12	12
18.0	30	25	10	12
22.0	30	25	10	10
24.5	60	35	10	10
32.5	60	40	8	8
40.0	60	50	6	8
45.0	60	60	6	8
57.5	100	80	4	8
78.0	100	100	2	8
102.5	200	125	1/0	6
135.0	200	150	3/0	4

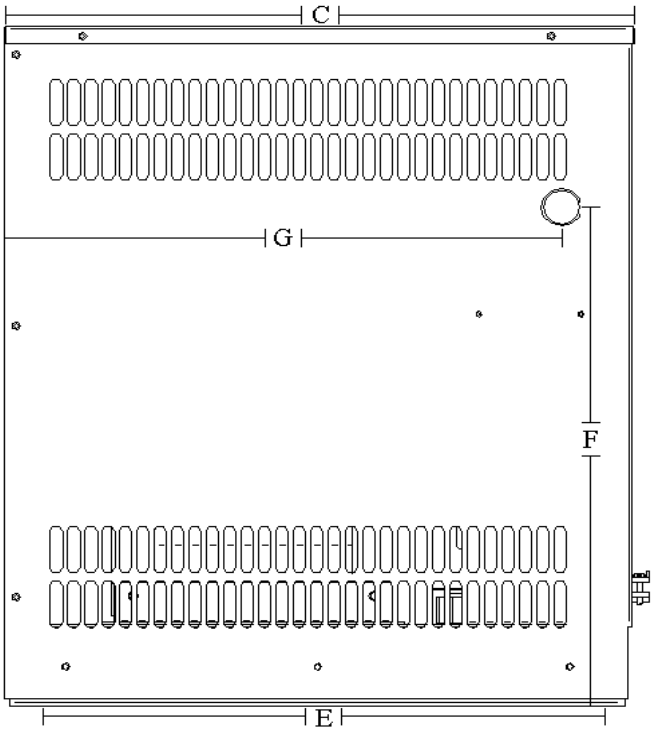
The above table is based on 60 deg. C (140 deg. F) rated conductors and 40 deg. C (104 deg. F) ambient temperatures. Refer to National Electrical Code Tables 310-16 corrected to 40 deg. C (140 deg. F).

DESCRIPTION OF EQUIPMENT

The battery charger is designed to recharge lead acid batteries. The easy access case is constructed to protect internal components, and provide adequate cooling plus component accessibility.

MECHANICAL CONFIGURATIONS





CASE TYPE	"A" DIM	"B" DIM	"C" DIM	"D" DIM	"E" DIM	"F" DIM	"G" DIM
F CASE	14.156	22.563	14.234	12.625	12.000	5.125	13.000
G CASE	20.312	25.063	21.484	18.750	19.105	7.750	19.000
H CASE	27.156	25.062	24.236	25.625	21.790	9.625	20.000

*Note: All dimensions are in inches

OPERATING INSTRUCTIONS

LED Microprocessor Control - 2200

FEATURES

■ This control transforms ordinary chargers into "smart" chargers. A microcomputer monitors the battery, determines when it is fully charged, and terminates the charge cycle.

■ Charge Complete Indicator - Remains lighted after the charge has been terminated by the control circuit to indicate that the battery has received a full charge.

■ 80% Charge Indicator - Lights when the battery reaches 80% of full capacity.

■ Incomplete Indicator - Lights to indicate that charging is required.

■ Charger On - Provides an indication that the charger is supplying power to charge the battery.

■ Abnormal Cycle - A back-up 16 hr. timer on the control turns off the charger and lights this lamp if a normal shutoff does not occur. This would happen if the batteries are too large for the charger.

■ AC interrupt - When AC power is interrupted the circuit switches to standby mode. When power is restored the charger will continue where it left off.

■ DC interrupt - Always STOP the charger before disconnecting the DC plug. If the plug is inadvertently disconnected the charger will shut off. Charger will then be ready for another charge cycle.

CONTROLS

Stop Button - Stops charge cycle. If charger is on, always use this button before disconnecting charging plug from battery.
Equalize Button - Extends charge cycle by 100 minutes.

OPERATING INSTRUCTIONS

Operation is completely automatic. Just connect battery to the charger and the automatic circuit takes control of the charge operation. By analyzing the rate of change in battery voltage, the charge control determines when the batteries are full and terminates the charge cycle. Batteries are completely charged each time - no over charging or under charging. The automatic control is designed to extend battery life and reduce operation costs.
In a typical charge sequence, when the charger is connected to the battery, the control circuit goes through an automatic self-diagnostic check. Indicator lights flash indicating the check is in progress. Following a short delay the charger initiates charge and the yellow Charger On indicator illuminates. Charger On light remains on until batteries are charged, then the green Complete Light will come on and remain on until batteries are disconnected.

GENERAL SERVICE INFORMATION

WARNING: Observe all safety instructions presented in the front of this manual before attempting any service.

DANGER: Electric Shock Hazard - Disconnect AC Power and battery plug before any service is performed. Discharge capacitors with insulated screwdriver.

NOTE: If testing requires energized circuits, observe all safety precautions in the front of this manual. Disconnect all AC power, apply alligator clips so that you do not have to touch any probes or part of the equipment before turning the power back on to take a reading. Follow the sequence of this trouble-shooting manual step by step, as each successful procedure will aid in isolating the causes of problems and point you to necessary steps of corrective actions.

TROUBLE-SHOOTING		
1. Will not turn on. No self-test.	Charge plug not connected to battery.	Connect DC plug.
	AC fuse or wall breaker open	Check fuse size, wire size to wall breaker, and wall breaker size
	DC fuse open	Check 1st for shorted diode and reverse polarity, if OK replace fuse.
TURN WALL CIRCUIT OFF - DISCONNECT BATTERY PLUG		
	Control Circuit fuse blown.	Replace. Check that circuit, battery, and charger are correct voltage.
	Loose DC connection to control circuit.	Clean and tighten. Repair as found.
		Check control circuit lead connections at both ends.
	Loose AC connection in control circuit wires.	Check connections.
2. Will not turn on. Self test OK.	Loose DC connection between battery and control circuit.	Clean and tighten. Repair as found.
	No AC to charger.	Check control circuit lead connections at both ends.
3. Abnormal charge cycle lamp lit.	Battery not fully charged.	Battery and charger not matched. " Battery too big."
		Check battery for shorted or open cell.
		Check all DC connections between circuit board and battery.
4. Early turn off (battery not charged). Less than 1 hour run time.	Loose DC connection.	Check all connections from battery to Control Circuit.
		If battery voltage higher than charger voltage, charger will shut off a few seconds after turn on.

DIODE/CAPACITOR CHECKOUT PROCEDURE

QUICK TIP - a shorted diode can be diagnosed by checking for continuity at positive and negative of plug contacts. If test shows open, DC fuse is probably blown - check for continuity. To bypass open DC fuse check continuity for shorted diode at positive and negative lugs behind DC fuse. Reverse the ohmmeter probes. A shorted diode will show continuity on both tests.

To isolate defective diode, unbolt connection at end of flexible lead to isolate from circuit. Set ohmmeter to RX100 range.

TEST #1 Place one ohmmeter lead on aluminum heatsink and the other probe at end of loose flexible lead.

TEST #2 Reverse the position of the ohmmeter probes.

GOOD DIODE - The ohmmeter needle should deflect on either test #1 or #2 - not both.

SHORT DIODE - The ohmmeter needle will deflect on both tests #1 and #2. Replace diode.

OPEN DIODE - The needle will not deflect in either tests #1 or #2. Replace diode.

CAPACITOR CHECKOUT PROCEDURE

CAUTION: Short out capacitors with insulated screwdriver before performing test.
Disconnect leads. Set ohmmeter to RX100 scale. Connect meter leads to capacitor terminals.

GOOD CAPACITOR - Needle will deflect toward right and then be followed by a deflection in the opposite direction. Reverse ohmmeter probes to validate test accuracy.

SHORTED CAPACITOR - Needle deflects toward right and remains. Replace.

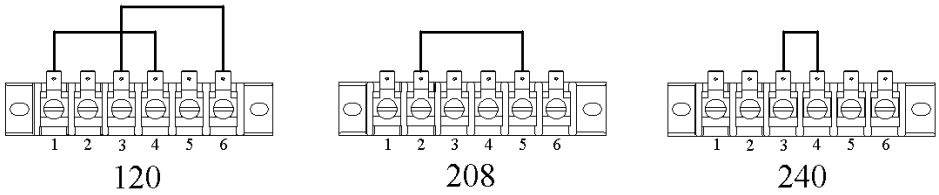
OPEN CAPACITOR - No needle deflection. Replace.

BATTERY VOLTAGE TABLE (INDUSTRY STANDARD)

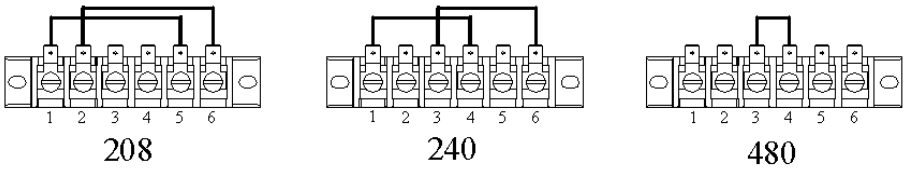
CELLS	DC VOLTS	DEAD @1.9	DISCH W/LOAD @ 1.75	START RATE @ 2.133	FINISH RATE @ 2.55
6	12	11.4	10.5	12.8	15.3
12	24	22.8	21.0	25.6	30.6
18	36	34.2	31.5	38.4	45.9
24	48	45.6	42.0	51.2	61.2
36	72	68.4	63.0	76.8	91.8

AC VOLTAGE CHANGE OVER

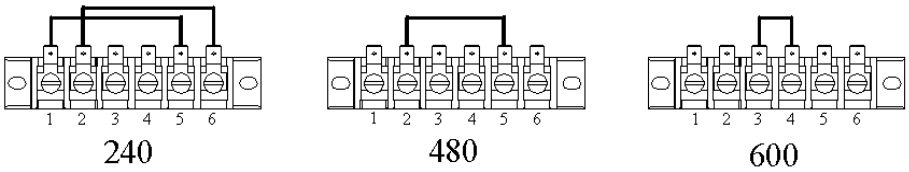
AC VOLTAGE SELECTOR BLOCKS



120/208/240 VOLT UNITS

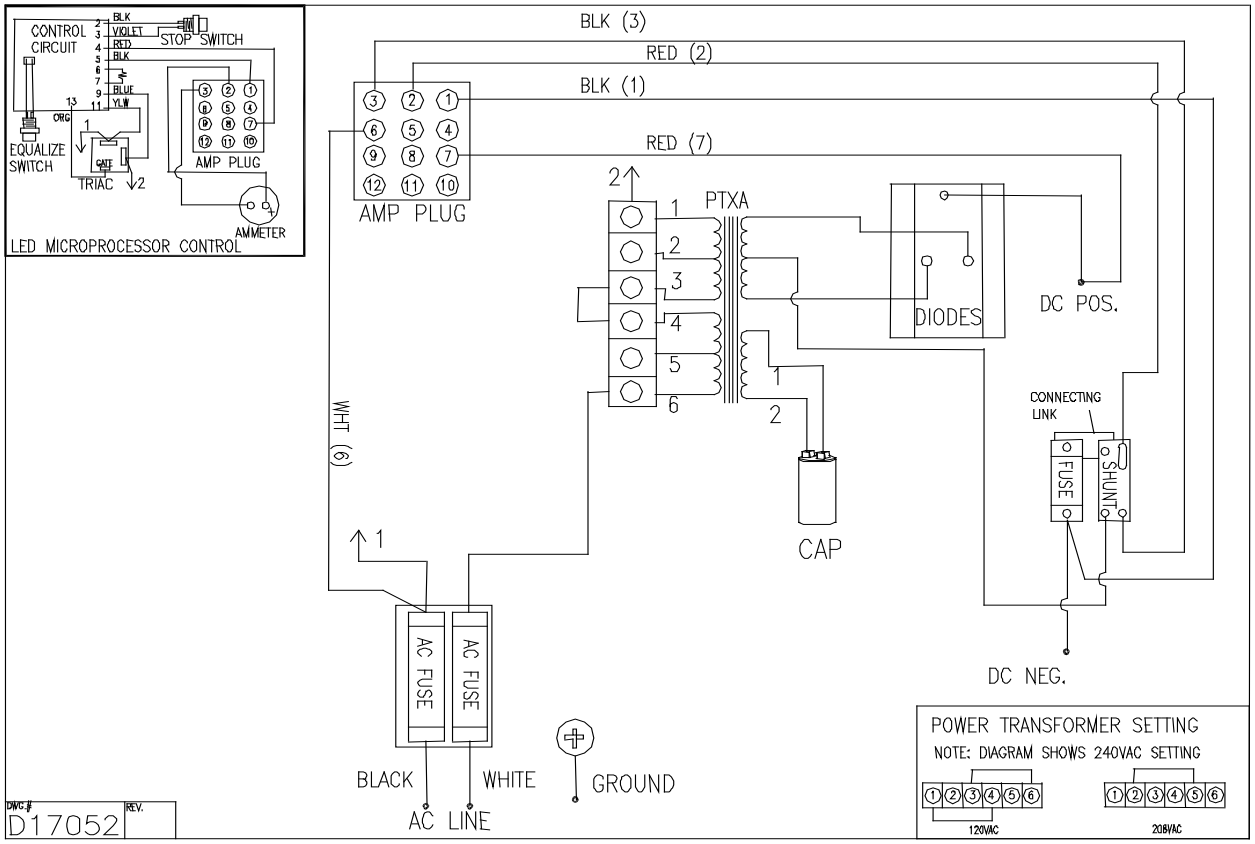


208/240/480 VOLT UNITS

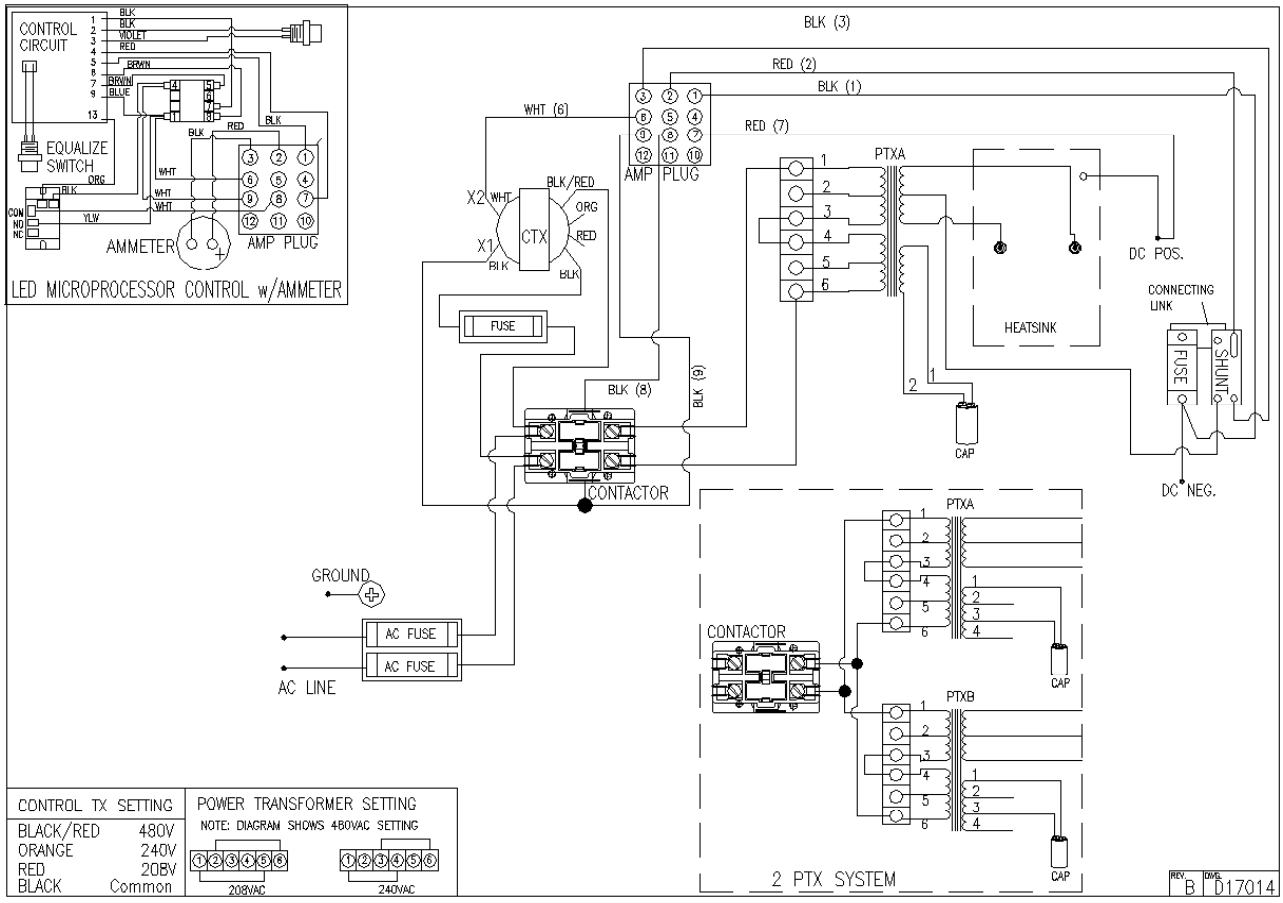


240/480/600 VOLT UNITS

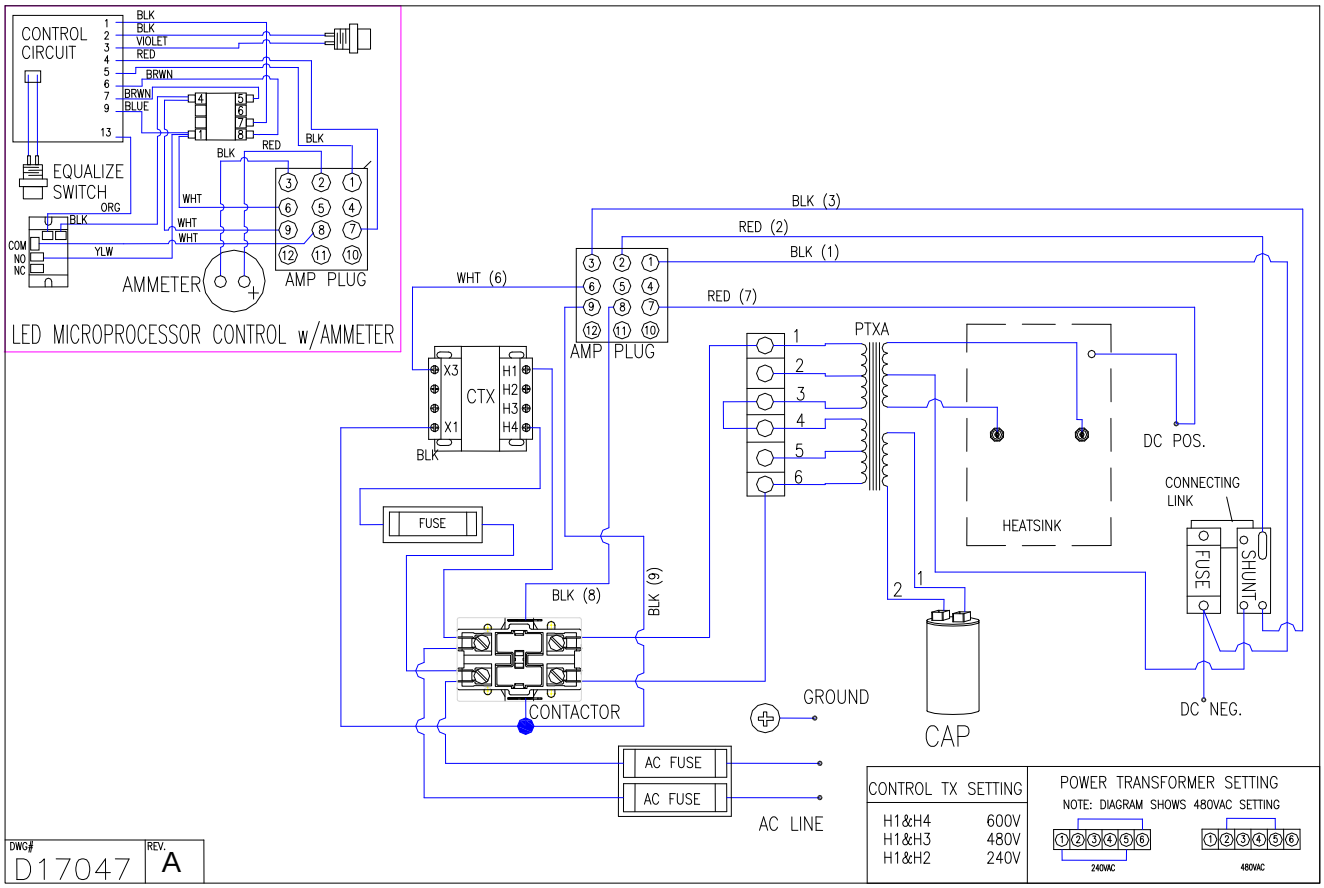
SCHEMATICS/WIRING DIAGRAMS



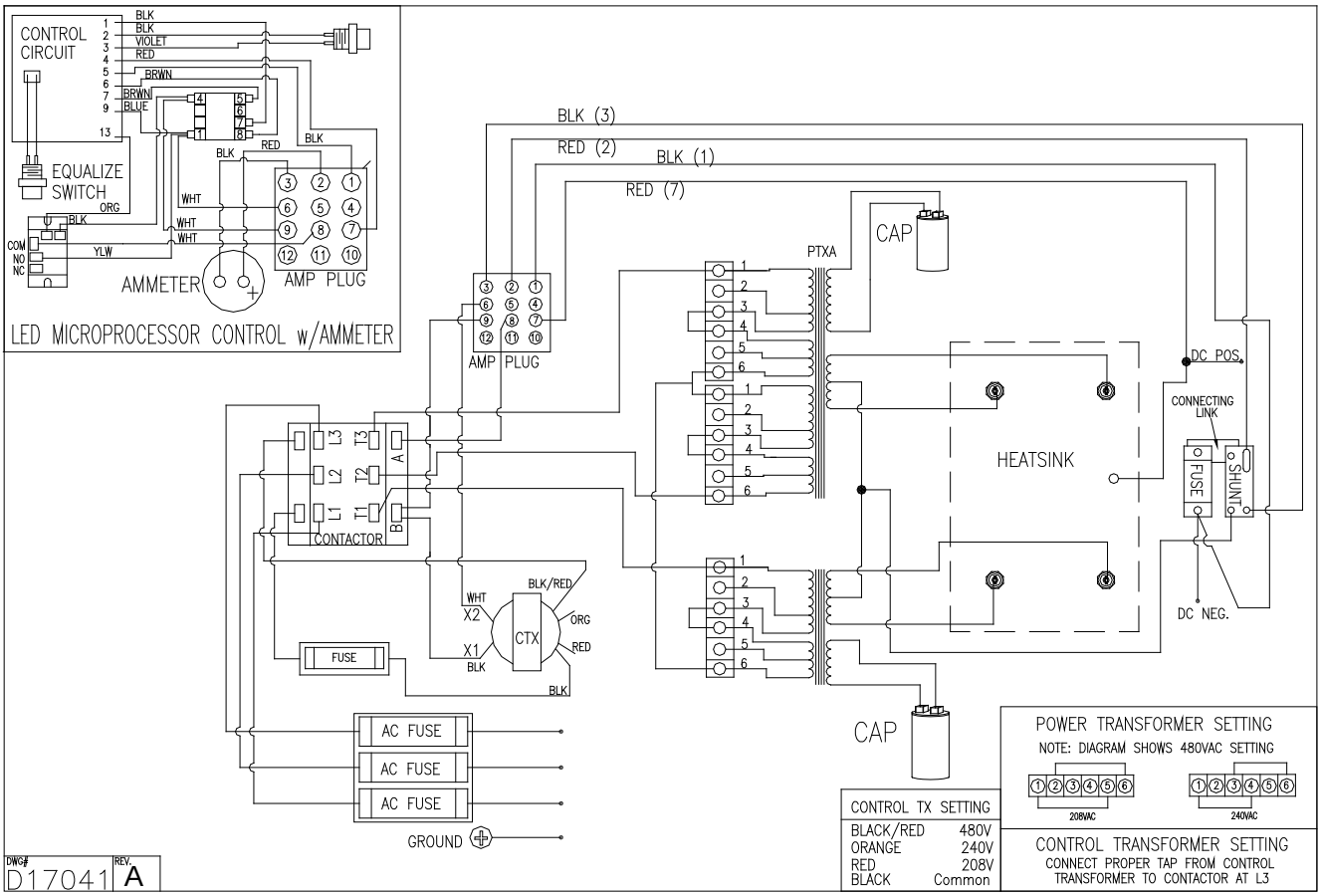
SINGLE PHASE 120/208/240



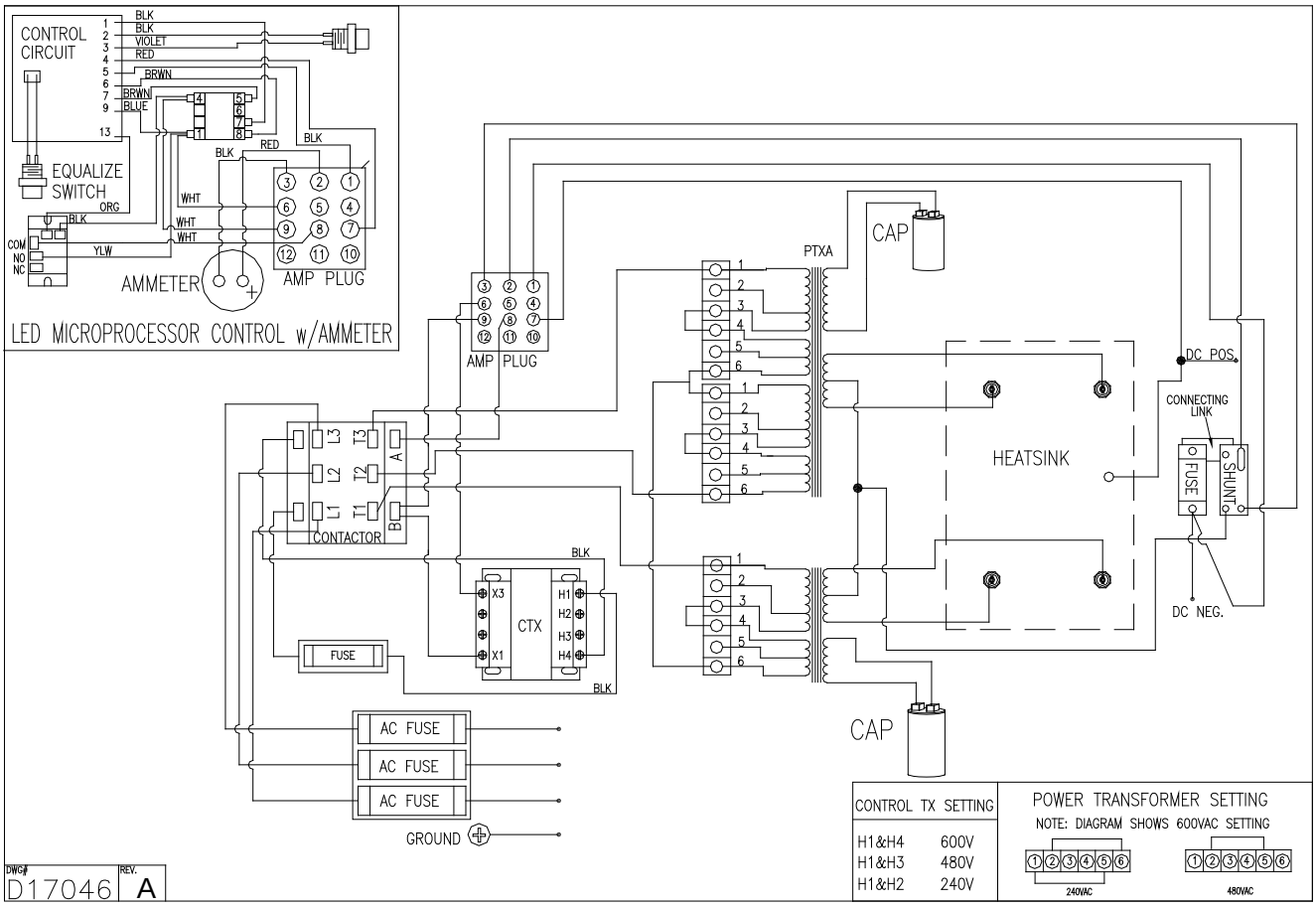
SINGLE PHASE 208/240/480 VAC



SINGLE PHASE 240/480/600



THREE PHASE 208/240/480



THREE PHASE 240/480/600