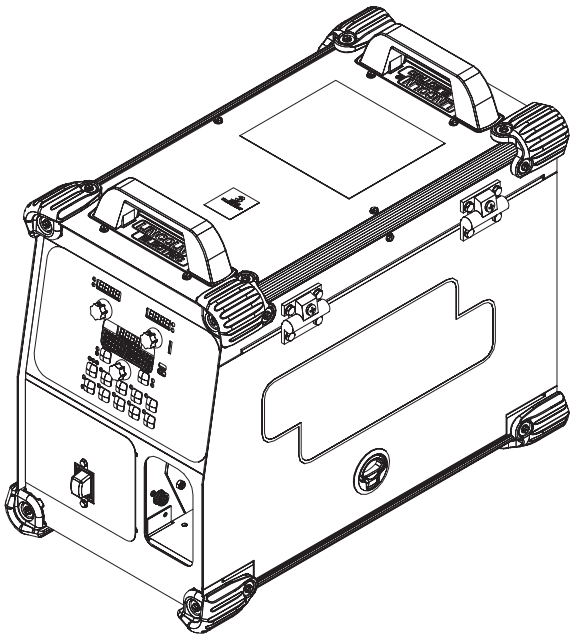
LINCOLN ELECTRIC

GENUINE LINCOLN PARTS™

POWER WAVE® C300

For use with machines having Code Numbers:
11479, 11624, 11672, 11958, 12392

SERVICE MANUAL



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⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

The Above For Diesel Engines

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

The Above For Gasoline Engines

ARC WELDING can be hazardous. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE powered equipment.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS may be dangerous

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK can kill.

3.a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS can burn.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

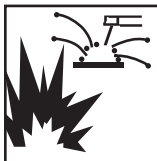
5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.



WELDING and CUTTING SPARKS can cause fire or explosion.

6.a. Remove fire hazards from the welding area.If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to “Safety in Welding and Cutting” (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”, AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

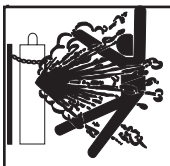
6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B “ Standard for Fire Prevention During Welding, Cutting and Other Hot Work”, available from NFPA, 1 Batterymarch Park,PO box 9101, Quincy, Ma 022690-9101.

6.j. Do not use a welding power source for pipe thawing.



CYLINDER may explode if damaged.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer’s recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer’s recommendations.

Refer to **http://www.lincolnelectric.com/safety** for additional safety information.

PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté specifiques qui parraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   d.Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

PRÉCAUTIONS DE SÛRETÉ POUR LES MACHINES À SOUDER À TRANSFORMATEUR ET À REDRESSEUR

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.

3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Electromagnetic Compatibility (EMC)

Conformance
Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

Introduction
All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

Installation and Use
The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

Assessment of Area
Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;

b) radio and television transmitters and receivers;

c) computer and other control equipment;

d) safety critical equipment, e.g., guarding of industrial equipment;

e) the health of the people around, e.g., the use of pacemakers and hearing aids;

f) equipment used for calibration or measurement

g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;

h) the time of day that welding or other activities are to be carried out.

Electromagnetic Compatibility (EMC)

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Methods of Reducing Emissions

Mains Supply
Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

Maintenance of the Welding Equipment
The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturers instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Welding Cables
The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

Equipotential Bonding
Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

Earthing of the Workpiece
Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding
Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications. [1]

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[1] Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

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TABLE OF CONTENTS-THEORY OF OPERATION SECTION

FIGURE E.1 BLOCK LOGIC DIAGRAM

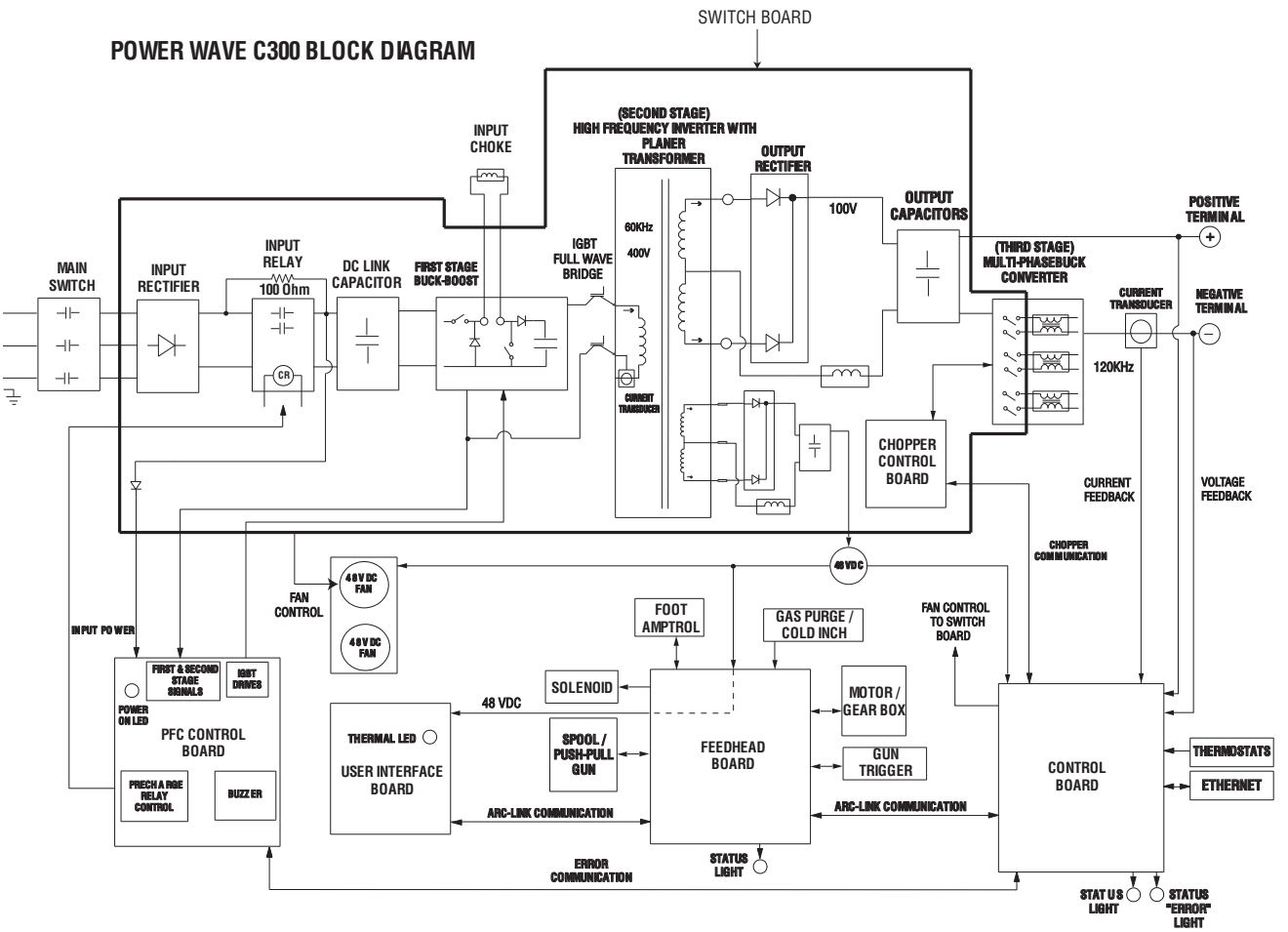
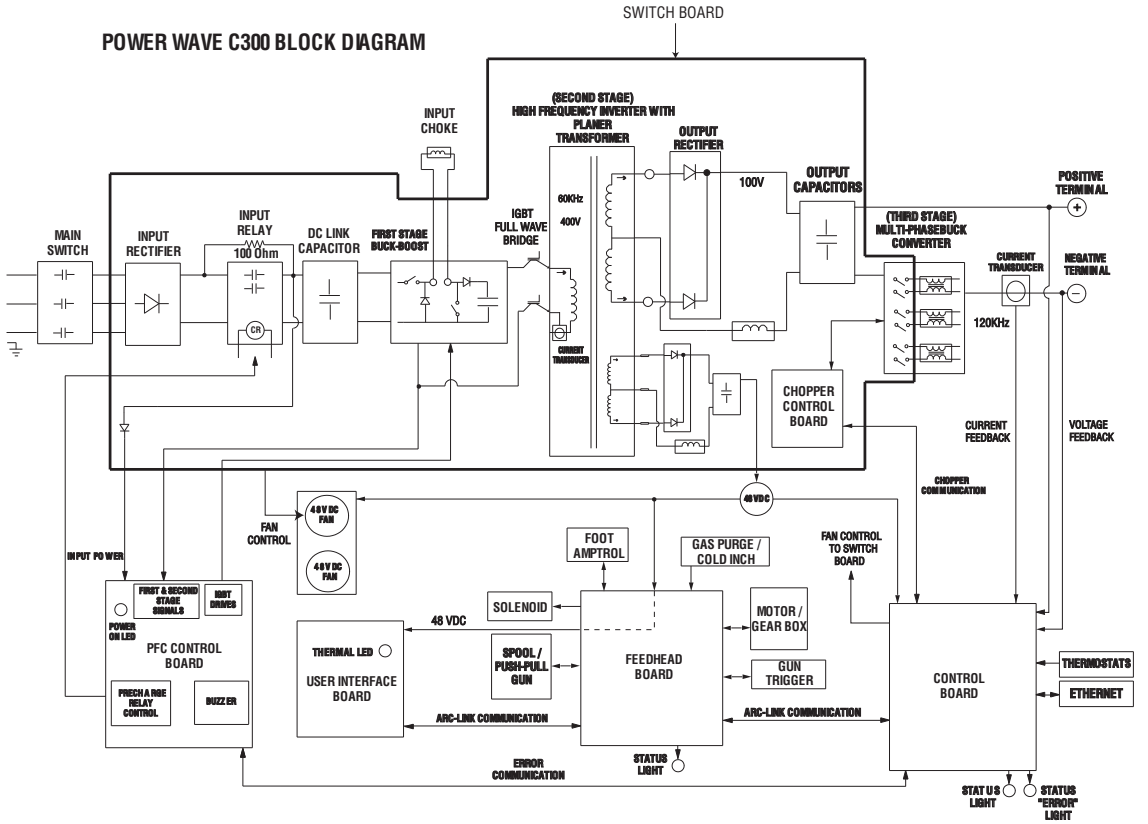


FIGURE E.2 - GENERAL DESCRIPTION



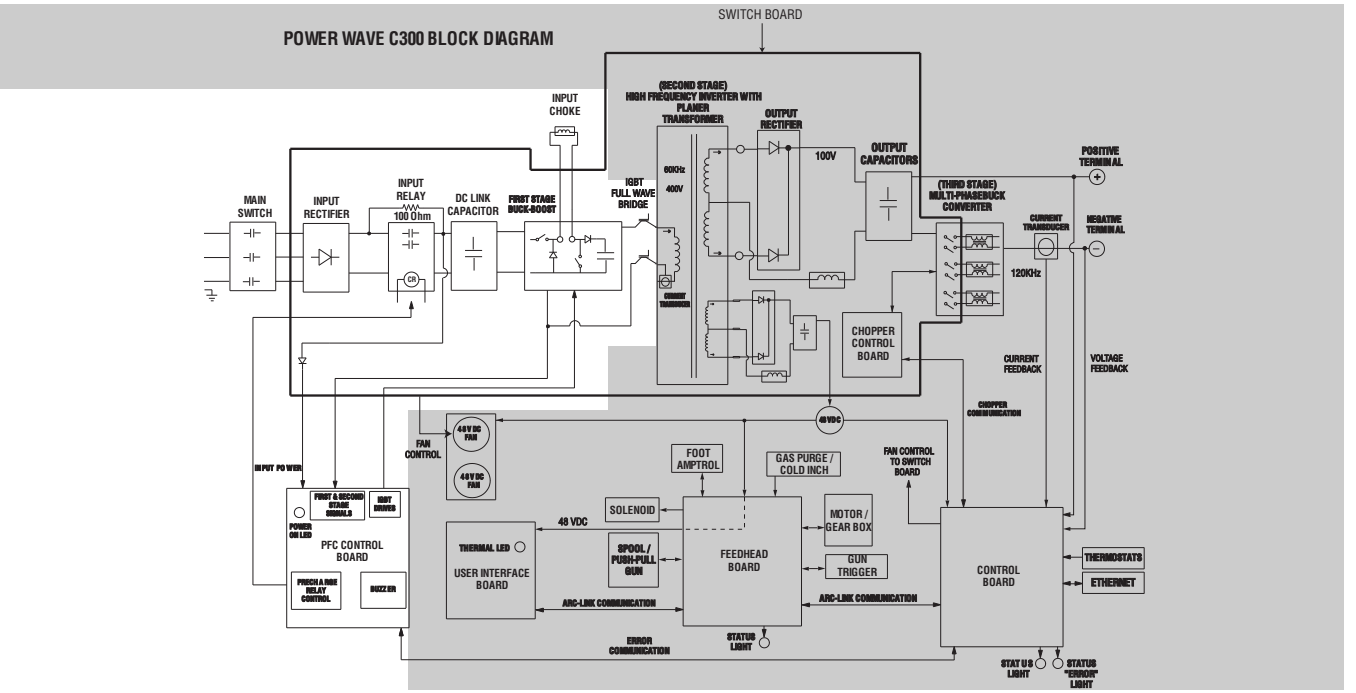
GENERAL DESCRIPTION

The POWER WAVE® C300 is a Wire Feeder/Welder featuring an inverter type power source with Tribrid Converter Technology, Automatic PowerConnect Technology and an Integrated Wire Drive System. The POWER WAVE® C300 machine is a high performance multi-process machine with GMAW, FCAW, MMA, DC TIG and pulse capability. The PW C 300 is capable of regulating the current, voltage and power of the welding arc. It offers premier welding performance solutions for specific areas such as aluminum, stainless and nickel especially where machine size and weight are considerations.

The POWER WAVE® C300 is capable of producing a welding output from 5 to 300 amperes and also capable of producing 515 ampere pulses. It will operate on single and or three phase input power from 208VAC to 575VAC. It is environmentally hardened to an IP23 rating for operating in difficult environments. It also will accept standard Mig guns, Spool guns and Push-pull guns.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

FIGURE E.3 - MAIN INPUT SWITCH, INPUT RECTIFIER, SOFT START/INPUT RELAY, ETC.



MAIN INPUT SWITCH, INPUT RECTIFIER, SOFT START/INPUT RELAY, DC LINK CAPACITOR, BUCK-BOOST AND POWER FACTOR CORRECTION BOARD

The POWER WAVE® C300 can be connected to a variety of both three-phase or single phase input voltages. The POWER WAVE® C300 automatically adjusts to operate with different AC input voltages. No reconnect switch settings are required. The initial input power is applied through a line switch located on the lower front panel of the machine. This AC input voltage is applied to an input rectifier where it is rectified to a DC voltage. The DC voltage is then applied to a soft-start circuit consisting of a 100 ohm resistor and a DC relay. The rectified input power is also connected, through a blocking diode, to the Power Factor Correction (P.F.C.) Board.

Initially the DC relay is not activated and the incoming DC voltage is applied to the DC Link Capacitor via the 100 ohm resistor. This resistor functions as a current limiting device allowing the DC Link Capacitor to charge slowly. The P.F.C. board uses the incoming DC voltage to create three separate 15VDC supplies. These auxiliary voltages are used to power the circuitry for the control circuits as well as the +15 volts for the Buck-Boost IGBTs and the soft start relay.

Under normal operating conditions the P.F.C. board activates the soft start relay 50ms after input power is applied to the machine. The 100 ohm resistor will be “shorted out” by the relay’s contacts and the full input potential will be applied to the DC Link Capacitor. The DC Link Capacitor also functions as a voltage clamp for the Buck-Boost circuit.

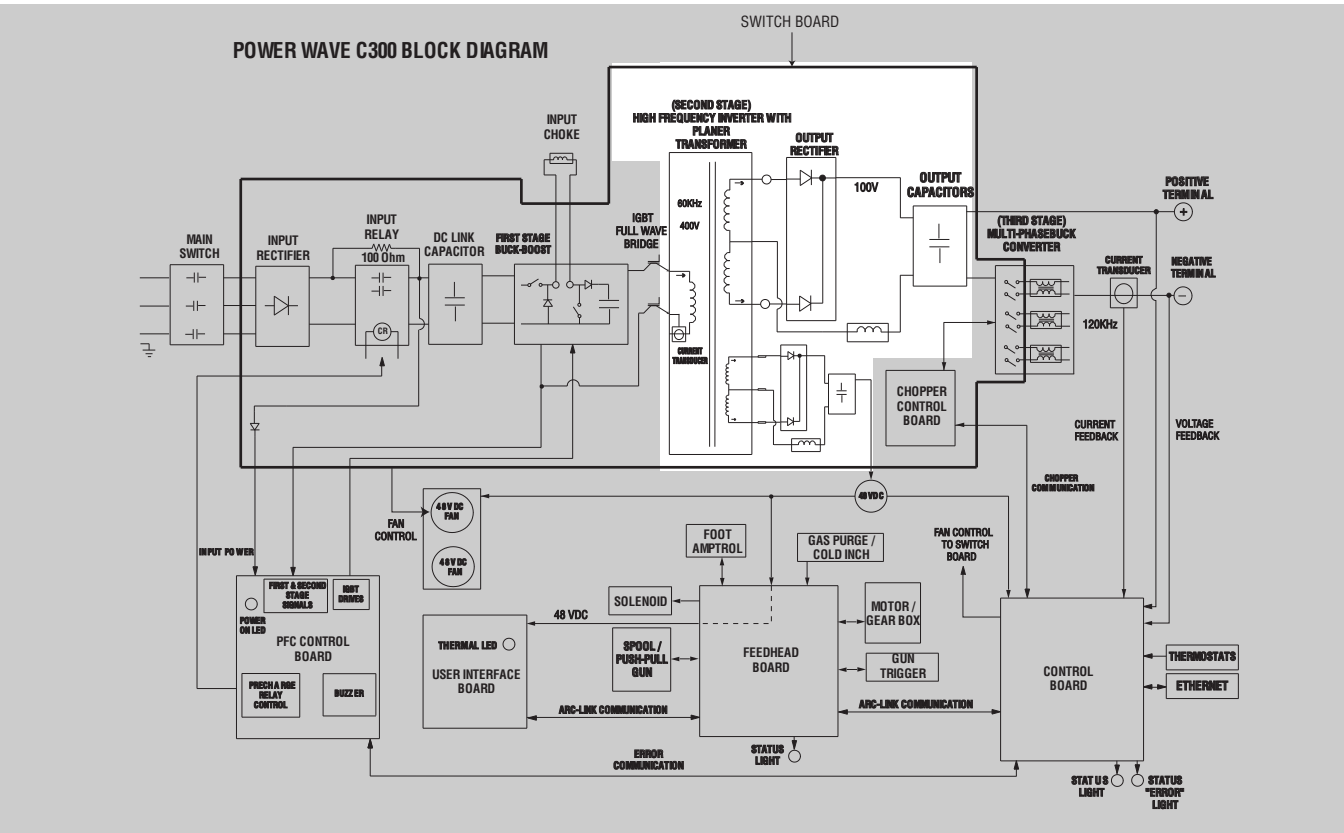
The Buck-Boost circuit, located on the switch board, consists of a buck converter followed by a boost converter. The boost switch is active when the input voltage is at 230VAC input or less. Under this condition the Buck switch is held on the entire time. The Buck switch is active when the input voltage is at 325VAC or more. Under this condition the Boost switch is not active for most of the time. The Buck-Boost circuit operates at 25kHz. The Buck-Boost circuit’s output is a 400 volt regulated bus.

The output of the Buck Boost circuit is filtered and applied to an IGBT controlled full wave bridge inverter that is located on the switch board. The resultant 400 volt output is coupled to the primary winding of a Planar Transformer that is also located on the switch board. The full wave bridge operates at 60kHz. switching frequency with a 99% on time.

The P.F.C. board controls the “firing” of the Buck Boost circuit and the IGBT full wave bridge circuit. This permits the P.F.C. board to monitor and control the wave shape of the applied input current to provide a optimal power factor correction for the POWER WAVE® C300.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

FIGURE E.4 - PLANAR TRANSFORMER, OUTPUT RECTIFICATION AND FILTERING



PLANAR TRANSFORMER, OUTPUT RECTIFICATION AND FILTERING

The Planar Transformer has two secondary windings. The 100 volt weld winding is center tapped and rectified. The 48 volt auxiliary winding is also center tapped and rectified. The term “Planar” refers to the design and construction of the transformer. The windings are created on printed circuit boards and stacked up to create a transformer.

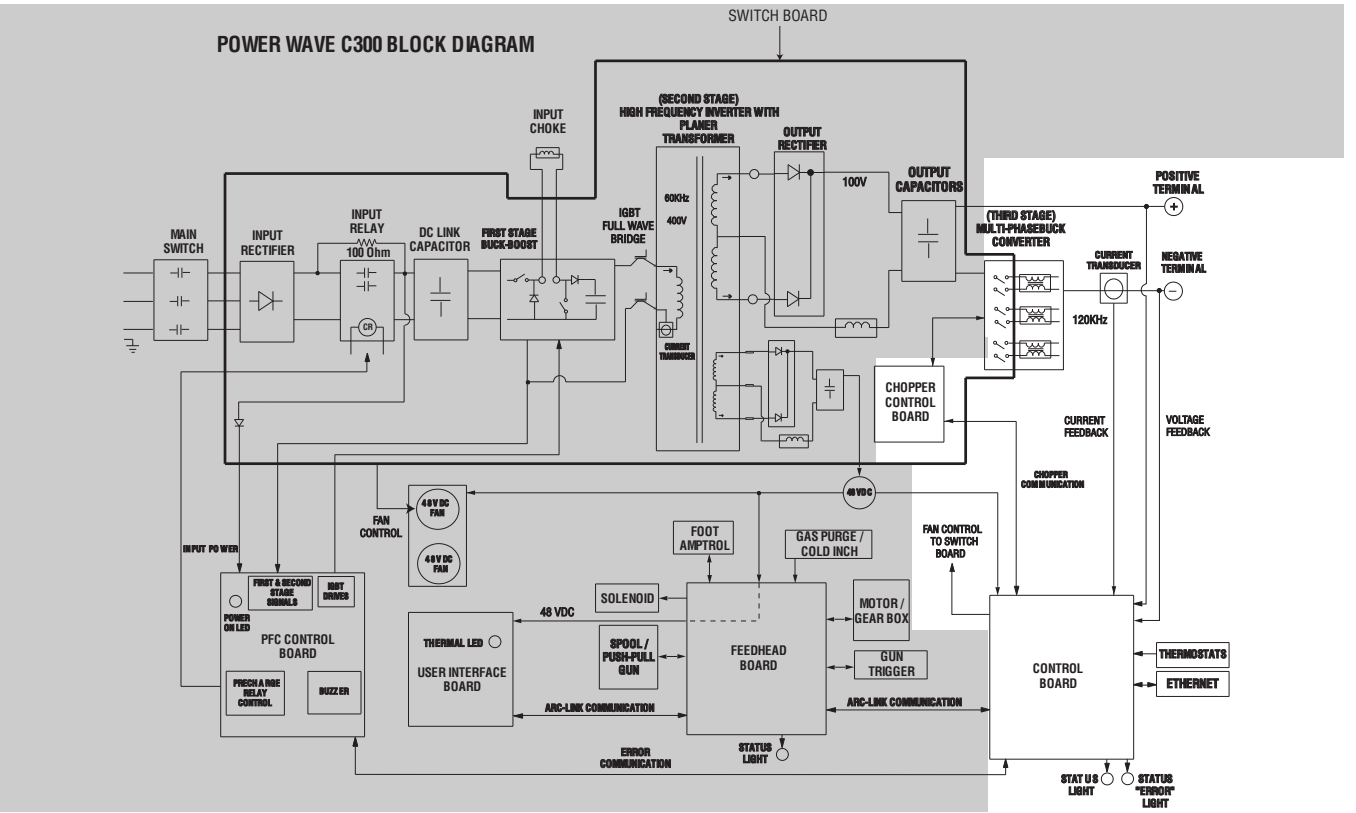
The primary and secondary connections are oriented at opposite ends of the transformer. This type of assembly provides for tighter magnetic coupling between the primary and secondary windings resulting in lower leakage inductance, higher efficiency, cooler operation and reduced size.

The 100 volt output of the weld winding is rectified and filtered by three capacitors and an inductor. This filtered DC voltage is applied to the multi-phase output chopper circuit.

The 48 volt output from the Planar Transformer’s auxiliary winding is also rectified and filtered and is used to provide power for the Fans, the Control Board, the FeedHead Board and the User Interface Board.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

FIGURE E.5 - CHOPPER, CURRENT TRANSDUCER AND CONTROL BOARDS



MULTI-PHASE CHOPPER, CHOPPER CONTROL BOARD, CURRENT TRANSDUCER AND CONTROL BOARD

The Multi-Phase Chopper is used to control the welding voltage and current output. It receives the 100 volt DC from the Planar transformer and produces a regulated output for welding purposes. It contains six chopper phases in parallel that turn on 60 degrees out of phase. Two complimentary phases each conduct 180 degrees out of phase through the same output choke assembly.

The Chopper Control Board, located on the Switch Board, receives welding output commands from the Control Board. The Chopper Control Board then determines the on-time of the six chopper IGBTs to meet the requirements set forth from the Control Board.

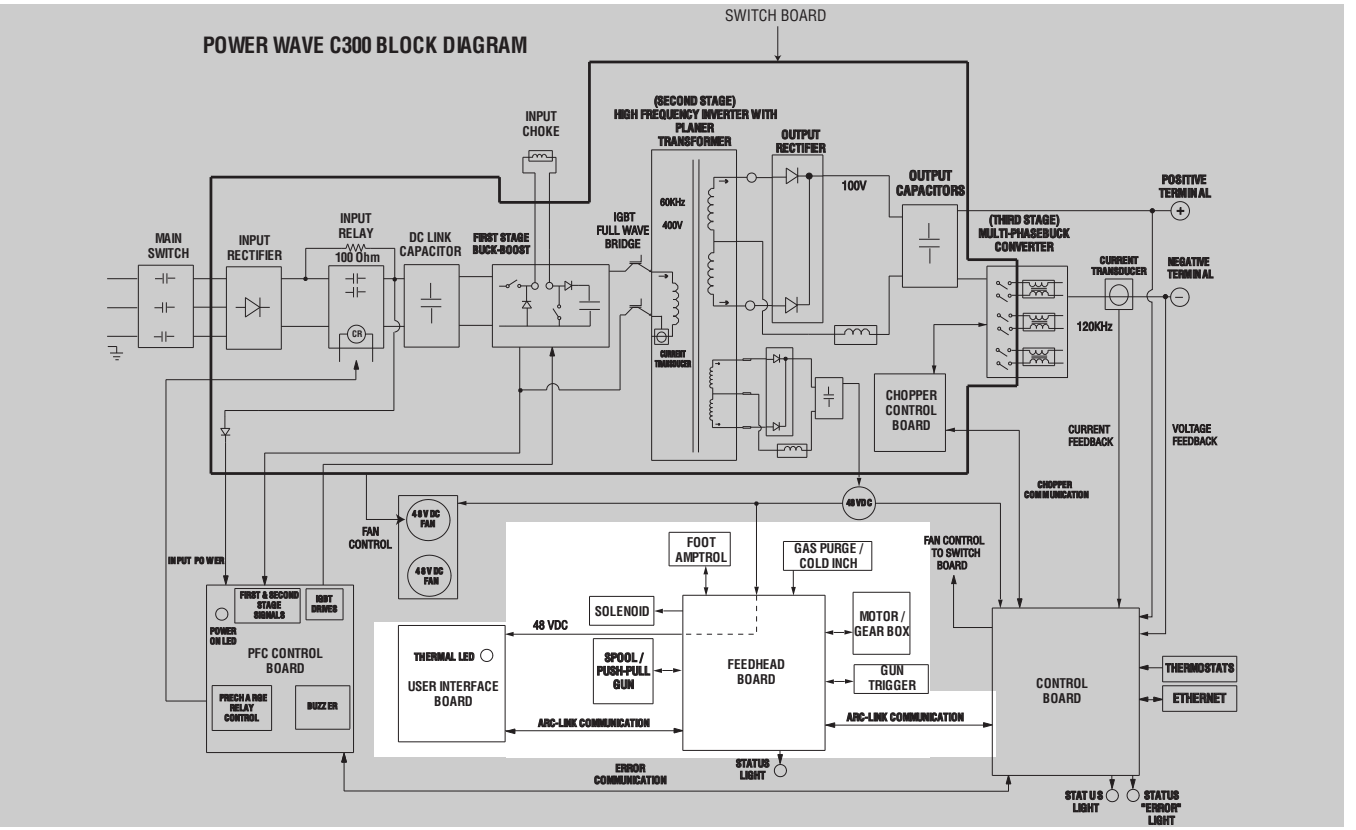
The Control Board receives commands and feedback information from the User Interface Board, the FeedHead Board, and the Chopper Control Board. It also receives output current and voltage information from the Current Transducer and via leads 202 and 206 from the output terminals.

The Current Transducer monitors the output current and converts that information into a low voltage signal that is sent to the Control Board. (500 Amps = 4.0VDC). The Control Board uses this current feedback information along with the output voltage feedback to monitor and control the output of the machine. The control board also houses the software welding tables.

In addition, the Control Board monitors the thermostat circuitry, the shutdown circuitry from the P.F.C. Board and controls the two speed fans.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

FIGURE E.6 - FEEDHEAD BOARD & USER INTERFACE BOARD



FEEDHEAD BOARD AND USER INTERFACE BOARD

The FeedHead Board receives command signals from the User Interface Board and the Control Board. In turn the FeedHead Board supplies power and control information to the wire drive motor, the tachometer circuit, the gas solenoid and the Spool Gun Daughter Board. The FeedHead Board also receives command signals from the gun trigger, the gas purge/cold inch switch and the optional foot amptrol.

The User Interface Board receives the operator commands, and via Arc Link communications, sends the appropriate signals to the FeedHead Board and the Control Board.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Machine Protection

THERMAL PROTECTION

Three normally closed (NC) thermostats protect the machine from excessive operating temperatures. Two thermostats are wired in series and connected to the control board. One of the thermostats is located in the output choke assembly and the other is located on top of the secondary heat sink. The third thermostat is located and integrated into the switch board and is monitored by the Power Factor Correction Board. Excessive temperatures may be caused by a lack of cooling air or by operating the machine beyond its duty cycle or output rating. If excessive operating temperatures should occur, the thermostats will prevent output from the machine. The yellow thermal light, located on the front of the machine, will be illuminated. The thermostats are self-resetting once the machine cools sufficiently. If the thermostat shutdown was caused by excessive output or duty cycle and the fans are operating normally, the power switch may be left on and the reset should occur within a 15-minute period. If the fans are not turning or the intake air louvers are obstructed, the power must be removed from the machine and the fan condition or air obstruction corrected.

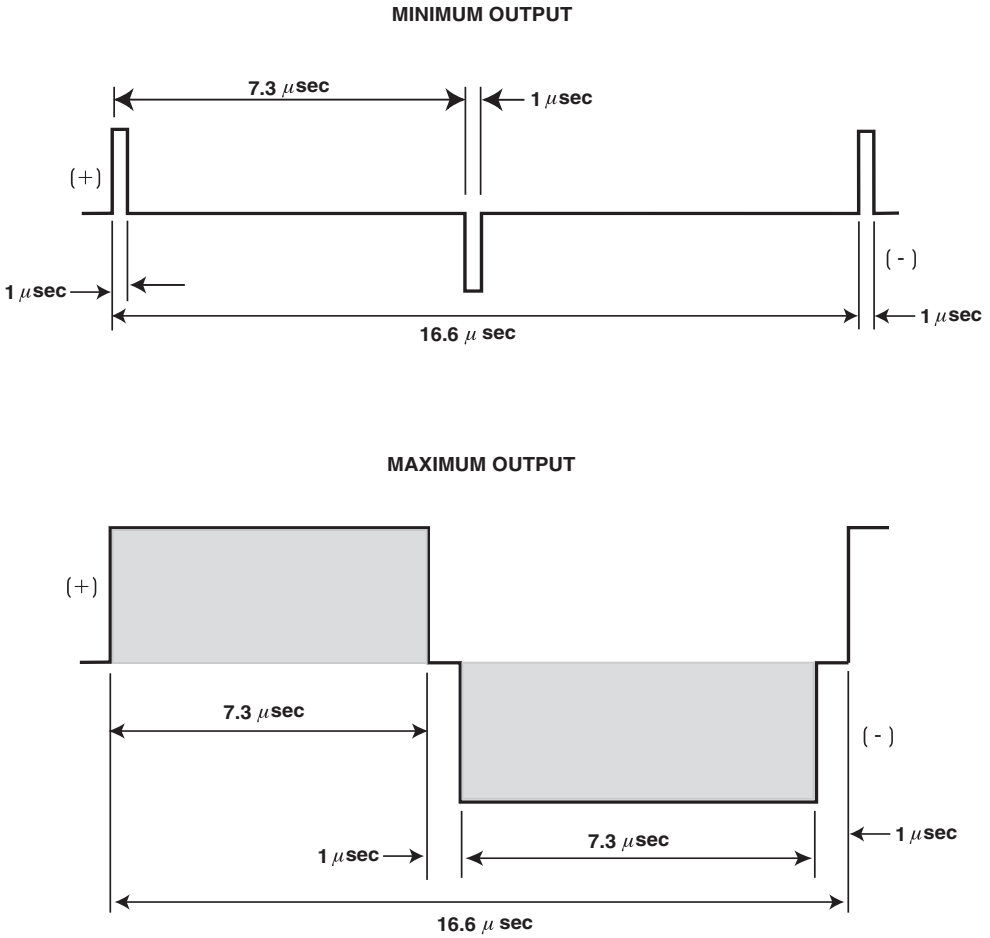
PROTECTIVE CIRCUITS

Protective circuits are designed into the POWER WAVE® C300 to sense trouble and shut down the machine before damage occurs to the machine's internal components. Error Codes will be flashed out by the light on the Control Board and/or the P.F.C. Board to help identify the reason for the shutdown. Fault codes can also be seen by using the Diagnostic Software. The LED associated with the FeedHead Board provides indications of the wire drive status. Various status lights can be viewed in the wire drive compartment and also through the louvers on the left case side. They should all be steady green. See the Troubleshooting Section for more information regarding Error Codes.

OVER CURRENT PROTECTION

If the average weld current exceeds 325 amps the machine's output will be disabled.

FIGURE E.7 - IGBT OPERATION



PULSE WIDTH MODULATION

The term PULSE WIDTH MODULATION (PWM) is used to describe how much time is devoted to conduction in the positive and negative portions of the cycle. Changing the pulse width is known as MODULATION. Pulse Width Modulation is the varying of the pulse width over the allowed range of a cycle to affect the output of the machine.

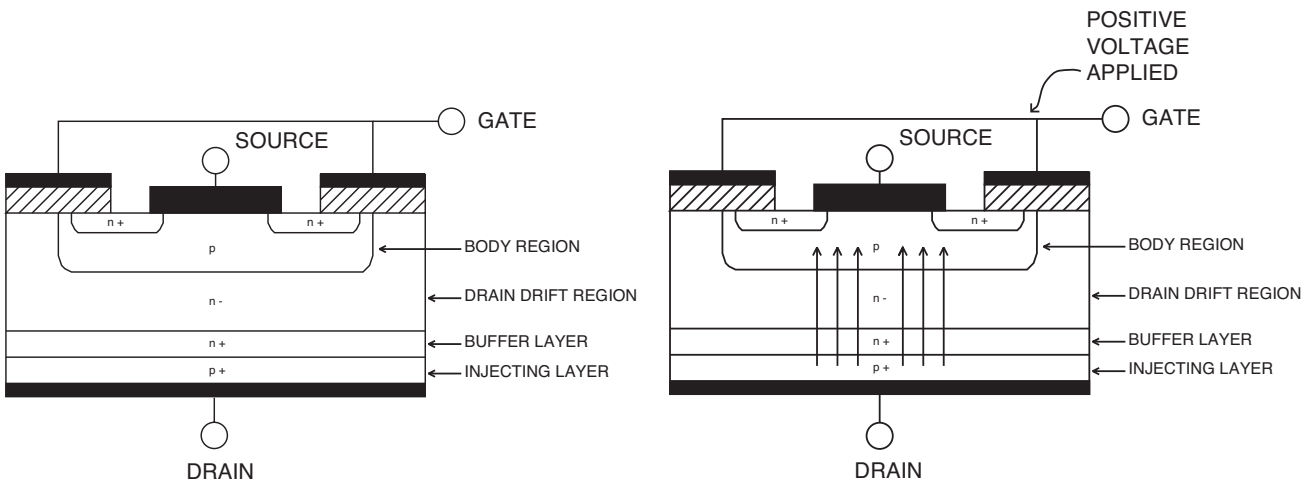
MINIMUM OUTPUT

By controlling the duration of the gate signal, the IGBT is turned on and off for different durations during a cycle. The top drawing shows the minimum output signal possible over a 16.6-microsecond time period. The shaded portion of the signal represents one IGBT group1, conducting for 1 microsecond. The negative portion is the other IGBT group. The dwell time (off time) is 14.6 microseconds (both IGBT groups off). Since only 2 microseconds of the 16.6-microsecond time period are devoted to conducting, the output power is minimized.

MAXIMUM OUTPUT

By holding the gate signals on for 7.3 microseconds each and allowing only 2 microseconds of dwell or off time (one microsecond during each half cycle) during the 16.6 microsecond cycle, the output is maximized. The darkened area under the minimum output curve can be compared to the area under the maximum output curve. The more darkened area, the more power is present.

FIGURE E.8 - IGBT OPERATION



INSULATED GATE BIPOLAR TRANSISTOR (IGBT) OPERATION

An IGBT is a type of transistor. IGBTs are semiconductors well suited for high frequency switching and high current applications.

Drawing A shows an IGBT in a passive mode. There is no gate signal, (zero volts relative to the source), and therefore, no current flow. The drain terminal of the IGBT may be connected to a voltage supply; but since there is no conduction, the circuit will not supply current to components connected to the source. The circuit is turned off like a light switch in the OFF position.

Drawing B shows the IGBT in an active mode. When the gate signal, a positive DC voltage relative to the source, is applied to the gate terminal of the IGBT, it is capable of conducting current. A voltage supply connected to the drain terminal will allow the IGBT to conduct and supply current to circuit components coupled to the source. Current will flow through the conducting IGBT to downstream components as long as the positive gate signal is present. This is similar to turning ON a light switch.

NOTES

TABLE OF CONTENTS - TROUBLESHOOTING AND REPAIR

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into the following categories: output problems, function problems, wire feeding problems, and welding problems.

Step 2. PERFORM EXTERNAL TESTS.
The second column labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)" lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

Step 3. RECOMMENDED COURSE OF ACTION
The last column labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

All of the referenced test procedures referred to in the Troubleshooting Guide are described in detail at the end of this chapter. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the specified test points, components, terminal strips, etc. can be found on the referenced electrical wiring diagrams and schematics. Refer to the Electrical Diagrams Section Table of Contents to locate the appropriate diagram.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

- Have an electrician install and service this equipment. Turn the input power OFF at the fuse box before working on equipment. Do not touch electrically hot parts.

⚠ CAUTION

Sometimes machine failures appear to be due to PC board failures. These problems can sometimes be traced to poor electrical connections. To avoid problems when troubleshooting and replacing PC boards, please use the following procedure:

1. Determine to the best of your technical ability that the PC board is the most likely component causing the failure symptom.
2. Check for loose connections at the PC board to assure that the PC board is properly connected.
3. If the problem persists, replace the suspect PC board using standard practices to avoid static electrical damage and electrical shock. Read the warning inside the static resistant bag and perform the following procedures:

PC board can be damaged by static electricity.

ATTENTION Static-Sensitive Devices Handle only at Static-Safe Workstations

- Remove your body's static charge before opening the static-shielding bag. Wear an anti-static wrist strap. For safety, use a 1 Meg ohm resistive cord connected to a grounded part of the equipment frame.

- If you don't have a wrist strap, touch an un-painted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.

- Tools which come in contact with the PC board must be either conductive, anti-static or static-dissipative.

- Remove the PC board from the static-shielding bag and place it directly into the equipment. Don't set the PC board on or near paper, plastic or cloth which could have a static charge. If the PC board can't be installed immediately, put it back in the static-shielding bag.

- If the PC board uses protective shorting jumpers, don't remove them until installation is complete.

- If you return a PC board to The Lincoln Electric Company for credit, it must be in the static-shielding bag. This will prevent further damage and allow proper failure analysis.

4. Test the machine to determine if the failure symptom has been corrected by the replacement PC board.

NOTE: It is desirable to have a spare (known good) PC board available for PC board troubleshooting.

NOTE: Allow the machine to heat up so that all electrical components can reach their operating temperature.

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.
   a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.
   b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.
6. Always indicate that this procedure was followed when warranty reports are to be submitted.

NOTE: Following this procedure and writing on the warranty report, "INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM," will help avoid denial of legitimate PC board warranty claims.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT AND FUNCTION PROBLEMS		
Major physical or electrical damage is evident when the C300 case is removed.	Contact your local authorized Lincoln Electric Service Facility.	Contact the Lincoln Electric Service Department at 1-888-935-3877.
The input fuses repeatedly fail or the input circuit breakers keep tripping.	Make certain the fuses or breakers are properly sized. The welding procedure may be drawing too much input current or the duty cycle may be too high. Reduce the welding current and/or reduce the duty cycle. Check for error codes. See ***Status LED Troubleshooting*** in this section.	Perform the ***Input Rectifier Test***. Perform the ***Switch Board Test***. Perform the ***P.F.C. Control Board Test***.
The machine will not power up. –no lights or displays-. The machine appears to be off.	Make sure the proper input voltage is being applied to the machine.(check fuses or breakers) Make sure the input supply disconnect has been turned ON. Make certain the input power switch (SW1) is in the ON position. Check for error codes. See ***Status LED Troubleshooting*** in this section.	Check the input switch SW1 for proper operation. Also check the associated leads for loose or faulty connections. See the Wiring Diagram. Check to make sure that 48VDC is being applied to the User Interface Board at leads 359B(+) to lead 357B(-). See the wiring diagram. Perform the ***Input Rectifier Test***. Perform the ***P.F.C. Control Board Test***.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT AND FUNCTION PROBLEMS		
The power wave® C300 does not have welding output.	If the symptom is accompanied by an error code see the Status LED Troubleshooting section. There may be an external "short" in the external output circuitry. Remove all loads from the output terminals and restart the machine. Make sure the gun trigger circuit is functioning properly. When the gun trigger is activated the fans should go to high speed. If the thermal LED is lit the unit may be overheated. Adjust the welding load and /or duty cycle to coincide with the output limits of the PW C300. Also see the symptom "The Thermal LED is ON" in this section.	Perform the ***Input Rectifier Test.*** Perform the ***Switch Board Test.*** Perform the ***Planar Transformer Resistance Test.*** Perform the ***Control Board Test.*** Perform the ***User Interface Board Test.*** Perform the ***Output Rectifier Test.***
The Thermal LED is ON. The machine regularly overheats. There is no welding output.	The welding application may be exceeding the recommended duty cycle and/or current limits of the machine. Dirt and dust may have clogged the cooling channels inside the machine. Refer to the ***Maintenance Section*** of this manual. The air intake and exhaust louvers may be blocked due to inadequate clearance around the machine. Make sure the fans are functioning correctly. The fans should run in a low speed setting when the machine is at idle and in a high speed when welding output is activated. The fans should also run if a thermostat has tripped.	Check the thermostats and associated wiring for loose or faulty connections. See the wiring diagram. Check the DC voltages being applied to the fans at lead 351 (-) to lead 353 (+). At the low speed setting the voltage should be 24VDC. At the high speed setting the voltage should be 48VDC.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT AND FUNCTION PROBLEMS		
The “Real Time Clock” no longer functions.	The Control Board Battery may be faulty. Replace if necessary. (Type BR2032)	The Control Board may be faulty.
The C300 will not produce full output.	The input voltage may be too low. See the Check for error codes. See ***Status LED Troubleshooting*** in this section. Make certain the input voltage is correct for the machine.	Perform the ***Current Transducer Test.*** Perform the ***Current and Voltage Calibration Procedure.*** The Control Board may be faulty. Perform the ***Control Board Test.***
The Gas purge is not functioning. No gas flow.	Make sure there is gas available at the input of the gas solenoid. Make certain that the gas line is not obstructed. Make sure mode selection is correct. Check ***Set-Up menu ”P.8”***	The gas solenoid may be faulty. Perform the ***Gas Solenoid Test.*** The Wire Drive Board (FeedHead Board) may be faulty. Perform the ***FeedHead Board Test.***

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
General degradation of the welding performance.	Check for proper wire feeding. Make certain that the actual speed is the same as the preset. Verify that the correct wire drive and gear ratio have been selected. Check the welding cables for loose or faulty connections. Check for adequate gas shielding. Make sure the welding process is correct for the wire feed and voltage settings.	Perform the ***Current and Voltage Calibration Procedure.***
The wire burns back to the tip at the end of the weld.	Reduce the burnback time. Reduce the workpoint.	N/A
During a weld the machine shuts down.	The secondary current limit has been exceeded and the machine shuts down to protect itself. Adjust the procedure to reduce the load and lower the output current draw.	A non-recoverable internal fault will interrupt the welding output. This condition will also result in a status light blinking. Check for error codes. See ***Status LED Troubleshooting*** in this section.
The arc is excessively long and erratic.	Make certain the correct wire drive and gear ratio have been selected for the welding process being used. Make sure the shielding gas is correct for the welding process being used. Also make sure the flow rate is correct.	Perform the ***Current and Voltage Calibration Procedure.***

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The welding starting is poor.	Make sure the driver roll tension on the wire feeder is adjusted correctly. Also the welding wire should travel freely through wire feeding path. Check the welding tip for blockage. Make sure the shielding gas flow is correct. Adjust Run-In Speed.	Perform the ***Wire Drive Motor Test.***
The end of the weld is not acceptable.	Make sure all of the settings for Burnback and Crater states are set correctly for the welding process being used. Verify that the Burnback has a value other than 0. Make sure the shielding gas flow is adequate.	N/A

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WIRE FEEDING PROBLEMS		
When the gun trigger is activated the wire will not feed. The welding open circuit voltage is present.	Check for obstructions in the wire feeding path. The gun tip may be faulty. The wire feed will not function if the machine is in the FCAW (stick) or TIG mode.	Perform the ***FeedHead Board Test***. Perform the ***Wire Drive Motor Test***.
The wire drive speed is high and uncontrollable.	Make sure the wire feed setting is correct for the process being used.	Perform the ***FeedHead Board and Tachometer Feedback Test***.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
ETHERNET PROBLEMS		
The system will not connect.	Make sure that the correct patch cable or cross over cable is being used. Make sure the software is not blocking the connection. See the on line documentation. Verify that the cables are fully inserted into the bulk head connector. Verify that the network device connected to the POWER WAVE® is either a 10-baseT device or a 10/100-baseT device. The LED located under the PC board Ethernet connector will be lit when the machine is connected to another network device.	Use Power Wave Manager software available at ***www.powerwavesoftware.com*** to verify the correct IP address information has been entered. Verify that no duplicate IP addresses exist on the network.
The Ethernet connection drops out while welding.	Make sure all of the connections are tight and secure.	Make certain that the network cable is not located next to any heavy current carrying conductors. This would include input power cables and welding output cables.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

USING THE STATUS LED TO TROUBLESHOOT SYSTEM PROBLEMS

Not all of the **POWER WAVE® C300** errors will be displayed on the user interface. There are three status lights that contain error sequences that may not show up on the user interface. If a problem occurs it is important to note the condition of the status lights. Therefore, prior to cycling power to the system, check the power source status light for error sequences as noted below.

There are two externally mounted status lights located above the wire drive in the wire feeder compartment. One of the status lights is for the main control board (labeled “status”, and one for the wire drive module. The third status light is internal and is located on the input control board and can be seen by looking through the left case side louvers.

There is an audible beeper associated with this input control board’s status light. So the error codes on the input board can be detected through either the status light or the status beeper.

Included in this section is information about the Status Lights and some basic troubleshooting charts for both machine and weld performance.

The status lights on the main control board and the wire drive module are dual-color LED’s. Normal operation for each is steady green. The status light on the input control board is one color. Normal operation is for the status light to be off (and the buzzer to be off).

Error conditions are indicated in the following Table F.1.

TABLE F.1

Light Condition	Meaning	
	Main control board status light and Wiredrive Status Light	**Input control board**
Steady Green	System OK. Power source is operational, and is communicating normally with all healthy peripheral equipment connected to its ArcLink network.	Not applicable.
Blinking Green	Occurs during power up or a system reset, and indicates the POWER WAVE® C300 is mapping (identifying) each component in the system. Normal for first 1-10 seconds after power is turned on, or if the system configuration is changed during operation.	Not applicable.
Fast Blinking Green	Indicates Auto-mapping has failed	Not applicable.
Alternating Green and Red	Non-recoverable system fault. If the Status lights are flashing any combination of red and green, errors are present. **Read the error code(s) before the machine is turned off.**	Not applicable.
	Error Code interpretation through the Status light is detailed in the Service Manual. Individual code digits are flashed in red with a long pause between digits. If more than one code is present, the codes will be separated by a green light. Only active error conditions will be accessible through the Status Light.	
	Error codes can also be retrieved with the **Diagnostics Utility** (link included on the **Service Navigator** DVD or available at **www.powerwavesoftware.com**. This is the preferred method, since it can access historical information contained in the error logs.	
	To clear the active error(s), turn power source off, and back on to reset.	
Steady Red	Not applicable.	Not applicable.
Blinking Red	Not applicable.	**Error Code interpretation** Individual code digits are flashed in red with a long pause between digits. These error codes are three digit codes that all start with a number three.
Status LED off	Not applicable.	System OK

ERROR CODES FOR THE POWER WAVE® C300

MAIN CONTROL BOARD ("STATUS" LIGHT)	
Error Code #	**Indication**
36 Thermal error	Indicates over temperature. Usually accompanied by Thermal LED. Check fan operation. Be sure process does not exceed duty cycle limit of the machine
54 Secondary (Output) over current error	The long term average secondary (weld) current limit has been exceeded. **NOTE:** The long term average secondary current limit is 325 amps.
56 Chopper communication error	Indicates communication link between main control board and chopper has errors. If cycling the input power on the machine does not clear the error, contact the Service Department.
58 Primary Current Fault error	Review error code from input board status light or status beeper. Most likely caused by an over power condition which caused an under voltage on the primary bus. If cycling the input power on the machine does not clear the error, contact the Service Department.
Other	Error codes that contain four digits are defined as fatal errors. These codes generally indicate internal errors on the Power Source Control Board. If cycling the input power on the machine does not clear the error, contact the Service Department.
WIRE DRIVE MODULE	
81 Motor Overload	Long term average motor current limit has been exceeded. Typically indicates mechanical overload of system. If problem continues consider higher torque gear ratio (lower speed range).
82 Motor Overcurrent	Absolute maximum motor current level has been exceeded. This is a short term average to protect drive circuitry.

INPUT CONTROL BOARD

Error Code #	Indication
331 Peak input current limit	Input current limit has been exceeded. Typically indicates short term power overload. If problem persists contact Service Department.
333 Under-voltage lockout	+15 VDC supply on Input control board too low. Verify input voltage is within the acceptable range. If problem persists contact service department.
336 Thermal Fault	Thermostat on primary module tripped. Typically caused by the fan not working. Thermostat may be faulty. See Wiring Diagram.
337 Pre-charge timeout	Problem with start-up sequence. If problem persists contact Service Department.
346 Transformer primary over current	Transformer current too high. Typically indicates short term power overload. If problem persists contact service department.
Other	Contact the Service Department @ 1-888-935-3877.

NOTES

CASE COVER REMOVAL AND DC LINK CAPACITOR DISCHARGE PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

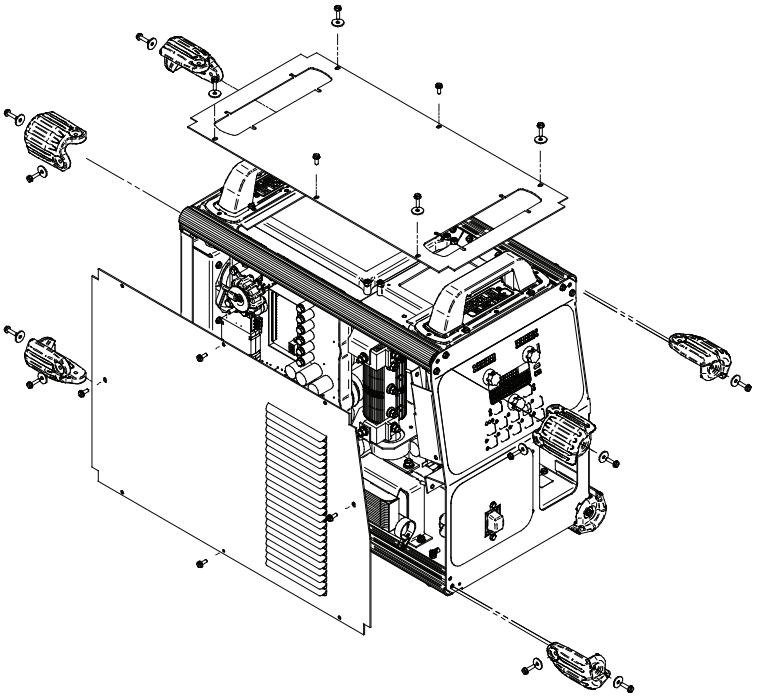
This procedure will aid the technician in the removal and replacement of the case sheet metal cover and discharging the DC link capacitor making it safe for the technician to work on the machine.

MATERIALS NEEDED

5/16 Inch Nut Driver
25-1000 Ohm resistor (25 Watts minimum)

CASE COVER REMOVAL AND DC LINK CAPACITOR DISCHARGE PROCEDURE (continued)

FIGURE F.1 – CASE COVER SCREW LOCATION



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. Using the 5/16 inch nut driver remove six of the eight corner end caps as shown in Figure F.1. Keep the screws and flat washers for reassembly.

3. To gain access to the left side internal components use the 5/16 inch nut driver to remove the four remaining screws from the left side. See Figure F.1.

4. Locate the DC Link Capacitor and carefully check the voltage across it. ***See Figure F.2.*** If any voltage is present discharge the capacitor using the high wattage resistor (25-1000 ohms @ 25 watts minimum), electrically insulated gloves and pliers. Hold on the resistor terminals on the capacitor terminals for 10 seconds.

5. Recheck the voltage across the capacitor terminals. The voltage should be zero. If any voltage remains repeat the procedure. Note. Any voltage present after discharge has been performed is an abnormal condition.

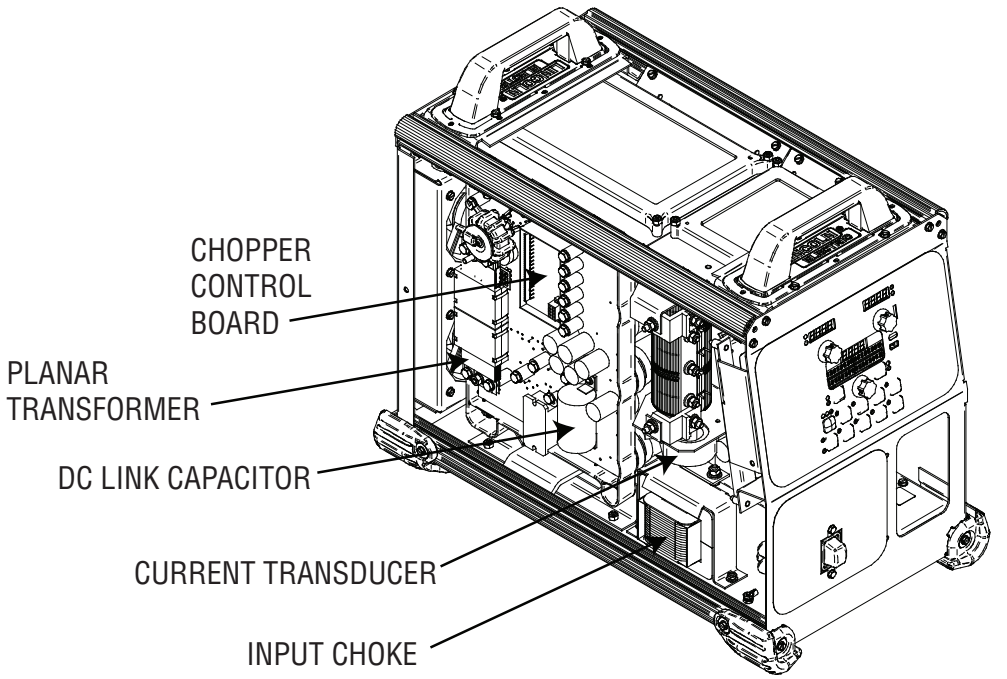
6. To gain access to the top portion of the unit remove the ten remaining screws from the top cover.

7. When replacing the case side and/or top be sure to secure all screws.

8. When replacing the corner end caps be certain to replace the flat washers previously removed.

CASE COVER REMOVAL AND DC LINK CAPACITOR DISCHARGE PROCEDURE (continued)

FIGURE F.2 – CAPACITOR LOCATION



CAPACITOR DISCHARGE PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. Be careful not to make contact with capacitor terminals located on the left side of chassis as shown in Figure F.2.

3. Carefully check for DC voltage at the capacitor terminals. ***See Figure F.3.***

4. If the capacitor voltage is present discharge the capacitor as follows.

5. Using a high wattage resistor (25-1000 ohms @ 25 watts (minimum), electrically insulated gloves and pliers hold the resistor terminals across the capacitor terminals for 10 seconds

⚠ WARNING

ELECTRIC SHOCK can kill.

High voltage is present when input power is applied to the machine.

DO NOT TOUCH THE CAPACITOR TERMINALS WITH YOUR BARE HANDS.

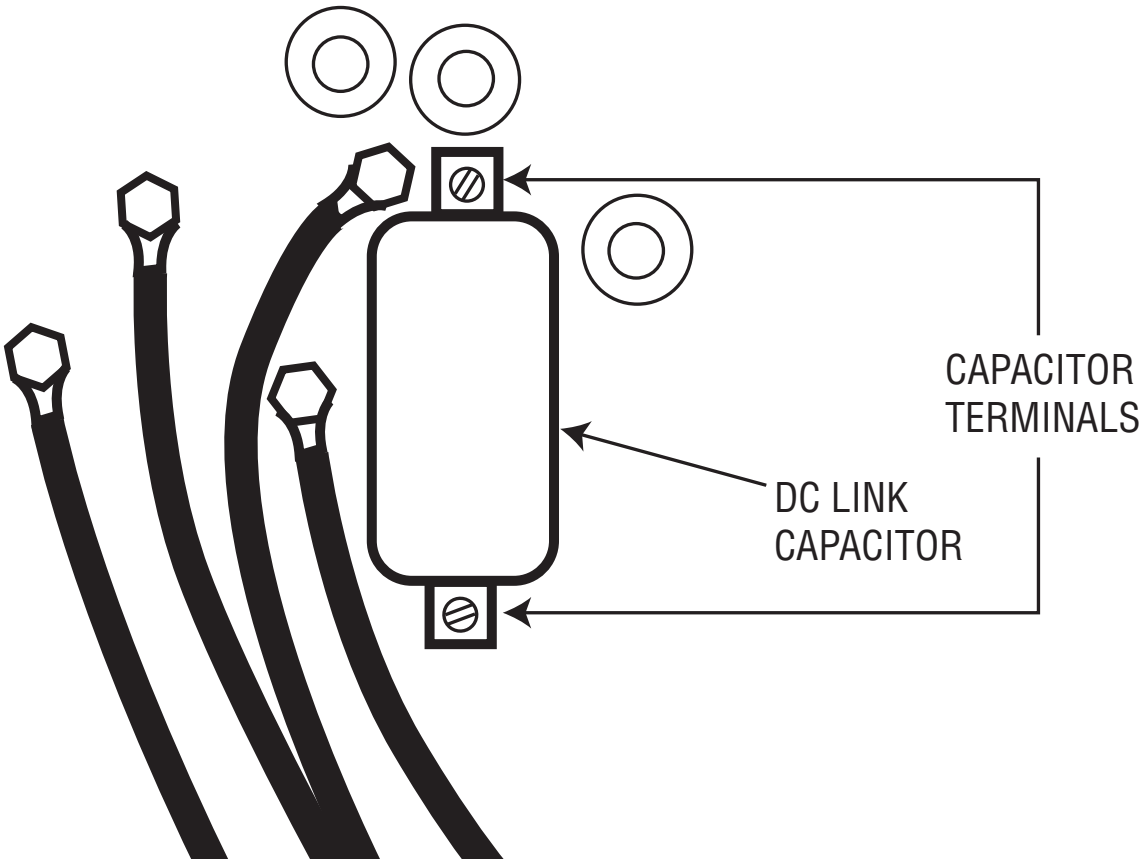
NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.

ALSO CAREFULLY CHECK FOR A DC VOLTAGE AT B48 - B49. *SEE FIGURE F.9.* IF A VOLTAGE IS PRESENT WAIT FOR IT TO DECAY BEFORE PROCEEDING.

6. Recheck the voltage across the capacitor terminals. The voltage should be zero. If any voltage remains, repeat the procedure. NOTE: Any voltage present after discharge has been performed is an abnormal condition and may indicate a switch board problem.

CASE COVER REMOVAL AND DC LINK CAPACITOR DISCHARGE PROCEDURE (continued)

FIGURE F.3 – CAPACITOR TERMINALS AND ASSOCIATED LEADS



CONTROL BOARD TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

Voltmeter/Ohmmeter (Multimeter)

MATERIALS NEEDED

This test will help determine if the Control Board is receiving the correct supply voltages and creating the correct output voltages to various circuits. Also the LED's status chart will provide information as to the Control Board's functionality.

CONTROL BOARD TEST PROCEDURE (continued)

PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.
2. Perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***
3. To gain access to the control board test points and LEDs see the ***Control Board Removal and Replacement Procedure.***
4. Carefully apply the correct input voltage to the POWER WAVE® C300 machine.
5. ***See Figure F.4*** for LEDs status and functions. If Led #9 is green then the proper input voltage is being applied to the control board. If LED #1 is green then no errors are detected on the control board.
6. If further testing is required proceed to Step #7.
7. Using the Voltmeter carefully check the voltages per Table F2. ***See Figure F.5*** for test point locations and ***Figure F.6*** for lead locations.
8. Using the Ohmmeter check the resistances per ***Table F.3. See Figure F.3*** for test point locations and ***Figure F.6*** for lead locations.
9. If the control board is OK carefully replace it onto the mounting studs and replace the case covers and top.

TABLE F.2 – CONTROL BOARD VOLTAGE TESTS

Description	Test Points	Leads Numbers	Expected Reading	Conditions
Input Supply to Board	J4 pin 2 To J4 pin 1	Lead 356(-) To Lead 358(+)	48 VDC	Input power applied to machine
Power from control board to chopper board	J12 pin 12 To J12 pin 3	Lead 342(-) To Lead 341(+)	5VDC	Input power applied to machine
Secondary voltage from PFC board	J6 pin 10 To J7 pin 14	Lead 404(-) To Lead 406(+)	15VDC	Input power applied to machine
Fan control signal	J7 pin 16 To J7 pin 6	Lead 350(-) To Lead 355(+)	0VDC (Low Speed) 10VDC (High Speed)	Input power applied. Output enabled for high fan speed signal.
Power supply to Current Transducer	J8 pin 6 To J8 pin 2	Lead 214(-) To Lead 212(+)	+15VDC	Input power applied to machine
Power supply to Current Transducer	J8 pin 6 To J8 pin 3	Lead 214(+) To Lead 213(-)	-15VDC	Input power applied to machine

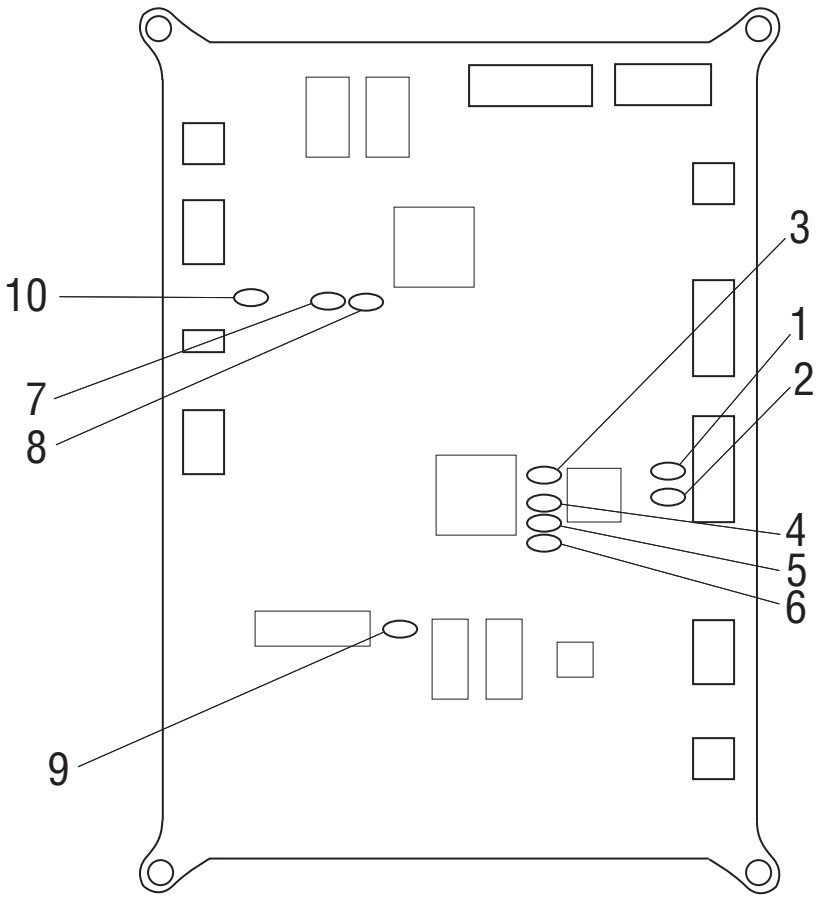
CONTROL BOARD TEST PROCEDURE (continued)

TABLE F.3 - CONTROL BOARD ASSOCIATED RESISTANCE

Description	Test Points	Lead Numbers	Expected Readings	Conditions
Connection to Output Terminals	J9 pin 3 To Negative Output Terminal	Lead 202 To Negative Output Terminal	Zero Ohms	No Input power applied to machine
	J9 pin 1 To Positive Output Terminal	Lead 206 To Positive Output Terminal	Zero Ohms	
Connections to Normally Closed Thermostats	J5 pin 2 To J5 pin 3	Lead 410 To Lead 409	Zero Ohms	No Input power applied to machine

CONTROL BOARD TEST PROCEDURE (continued)

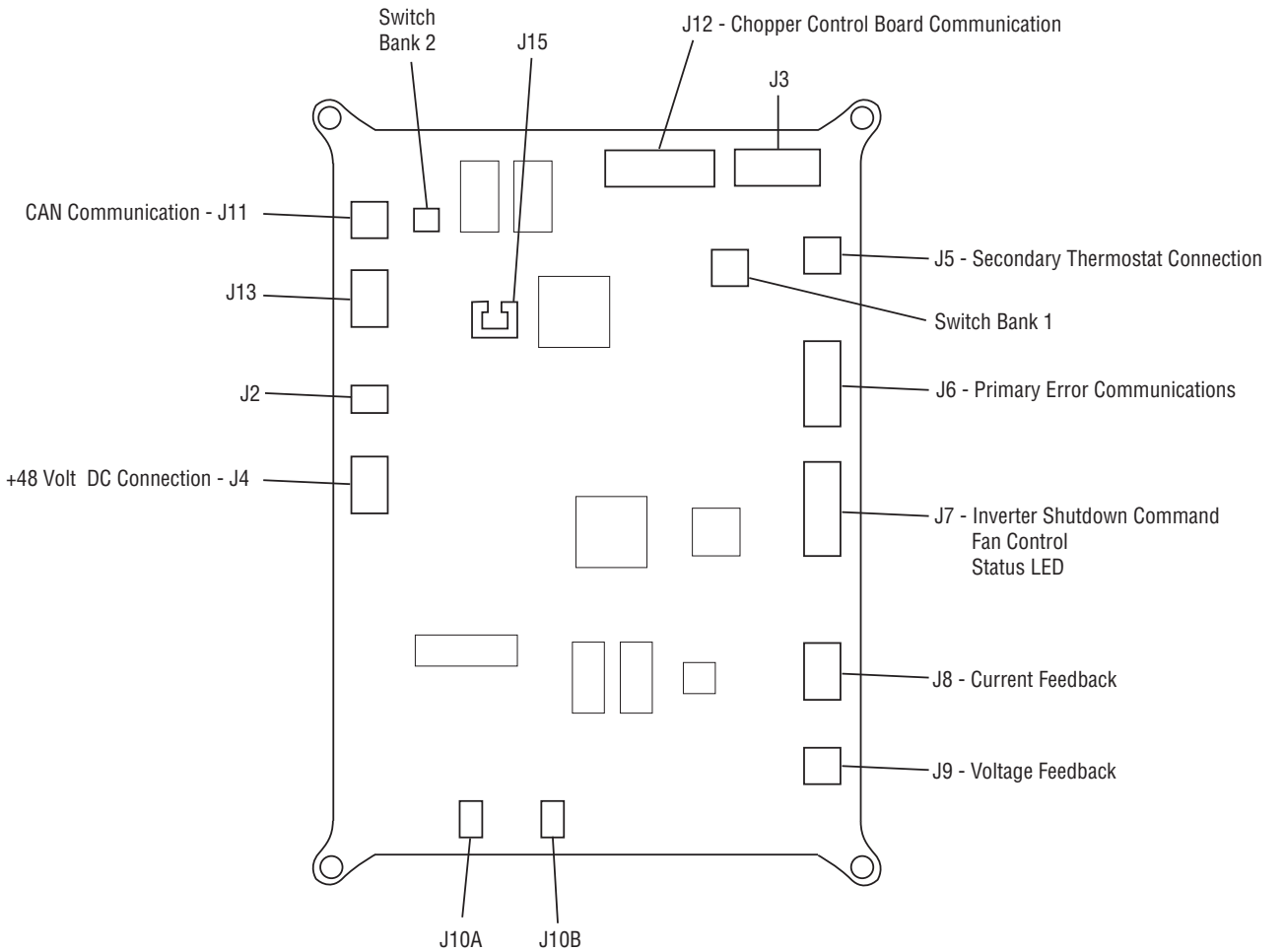
FIGURE F.4 – LED LOCATIONS



G4800 CONTROL P.C. BOARD		
LED #	COLOR	FUNCTION
1	GREEN	STATUS "OK"
2	RED	STATUS "ERROR" (CHECK CODE FOR SPECIFIC ERROR)
3	GREEN	OUTPUT ENABLE
4	GREEN	SINGLE PHASE DETECT
5	GREEN	67 SENSE
6	GREEN	21 SENSE
7	GREEN	ETHERNET STATUS
8	GREEN	ETHERNET STATUS
9	GREEN	INPUT SUPPLY 30 VDC TO 55 VDC
10	GREEN	DEVICENET

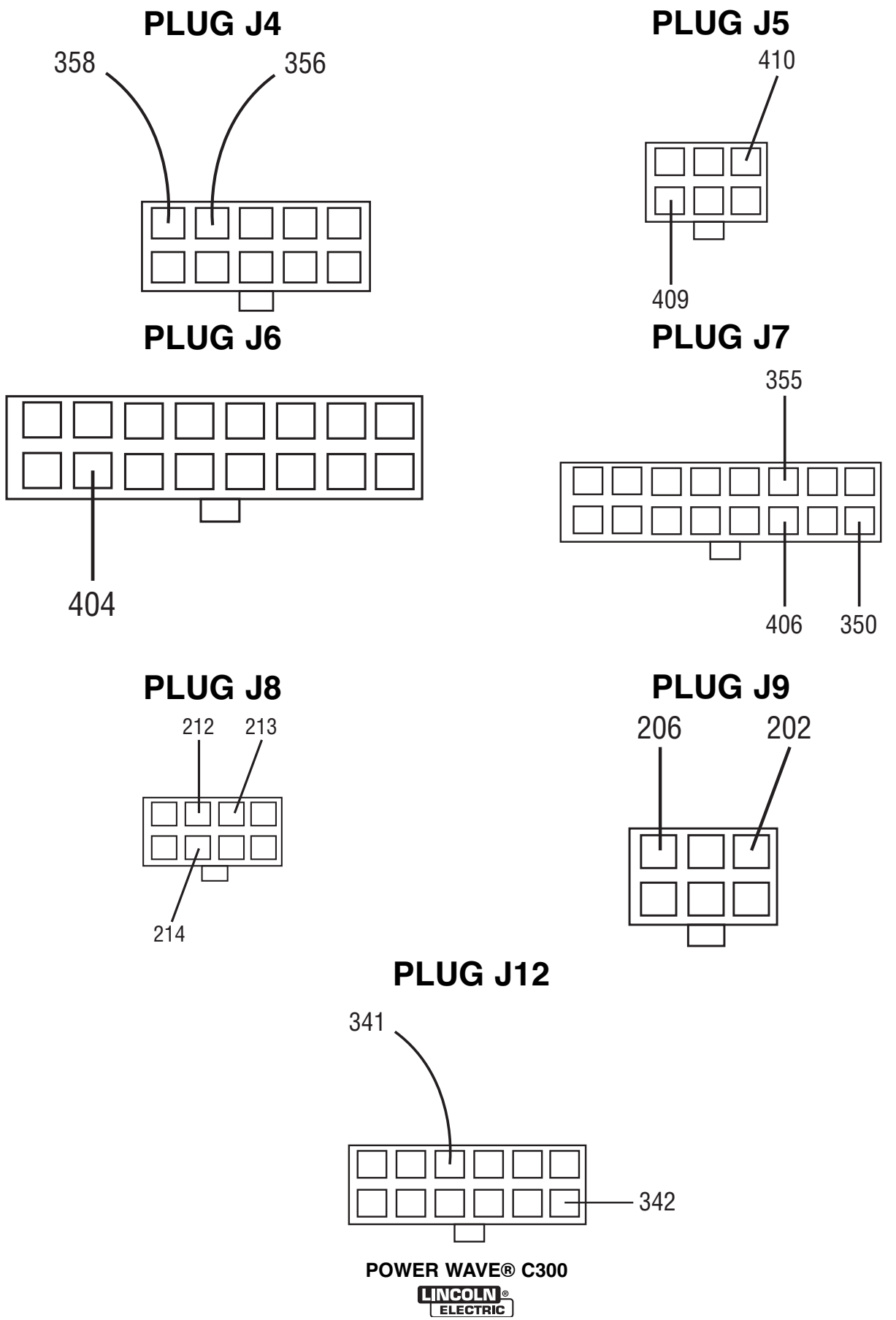
CONTROL BOARD TEST PROCEDURE (continued)

FIGURE F.5 – TEST POINT LOCATIONS



CONTROL BOARD TEST PROCEDURE (continued)

FIGURE F.6 – PLUGS & LEAD LOCATIONS



SWITCH BOARD TEST PROCEDURE

⚠ WARNING

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If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will help determine if the Switch Board is receiving the correct voltages and also if the Switch Board is functioning properly. The Switch Board has many functions and components. Testing of the Planar Transformer, the Input Rectifier and the Output Diodes are addressed with individual testing procedures. See the ***"F"Section Table of Contents.***

MATERIALS NEEDED

Voltmeter/Ohmmeter (Multimeter)
7/16 Inch Wrench

SWITCH BOARD TEST PROCEDURE (continued)

TABLE F.4 - SWITCH BOARD LED's

Description	Indicates	Light	Conditions
LED 1	+48VDC Supply	ON	Power applied to PW C300
LED 4	+15VDC Supply	ON	Power applied to PW C300
LED 3	Boost Circuit Active	ON*	*When high input voltage is applied (460 and higher) LED3 may be very dim or off
LED11	Buck Circuit Active	ON**	** Brilliance may vary with load
LEDs 5 thru 10	Chopper IGBTs activated	ON***	*** Brilliance will vary with load and output.

PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. Perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

⚠ WARNING

High voltages are present on and around the switch board. Take the appropriated safety precautions when performing the following procedures.

3. Locate the switch board on the left side of the machine. ***See Figure F.7***.

4. Carefully apply the correct input power to the POWER WAVE® C300. Check the LEDs per Table F.4. ***See Figure F.8*** for LED locations.

5. If the LEDs are not indicating a properly functioning switch board (per TABLE F.4.) proceed with the following steps.

6. Check the voltages per ***Table F.5***. ***See Figure F.9*** for test point locations.

7. Check the switch board resistances per ***Table F.6. See Figure F.9*** for test point locations.

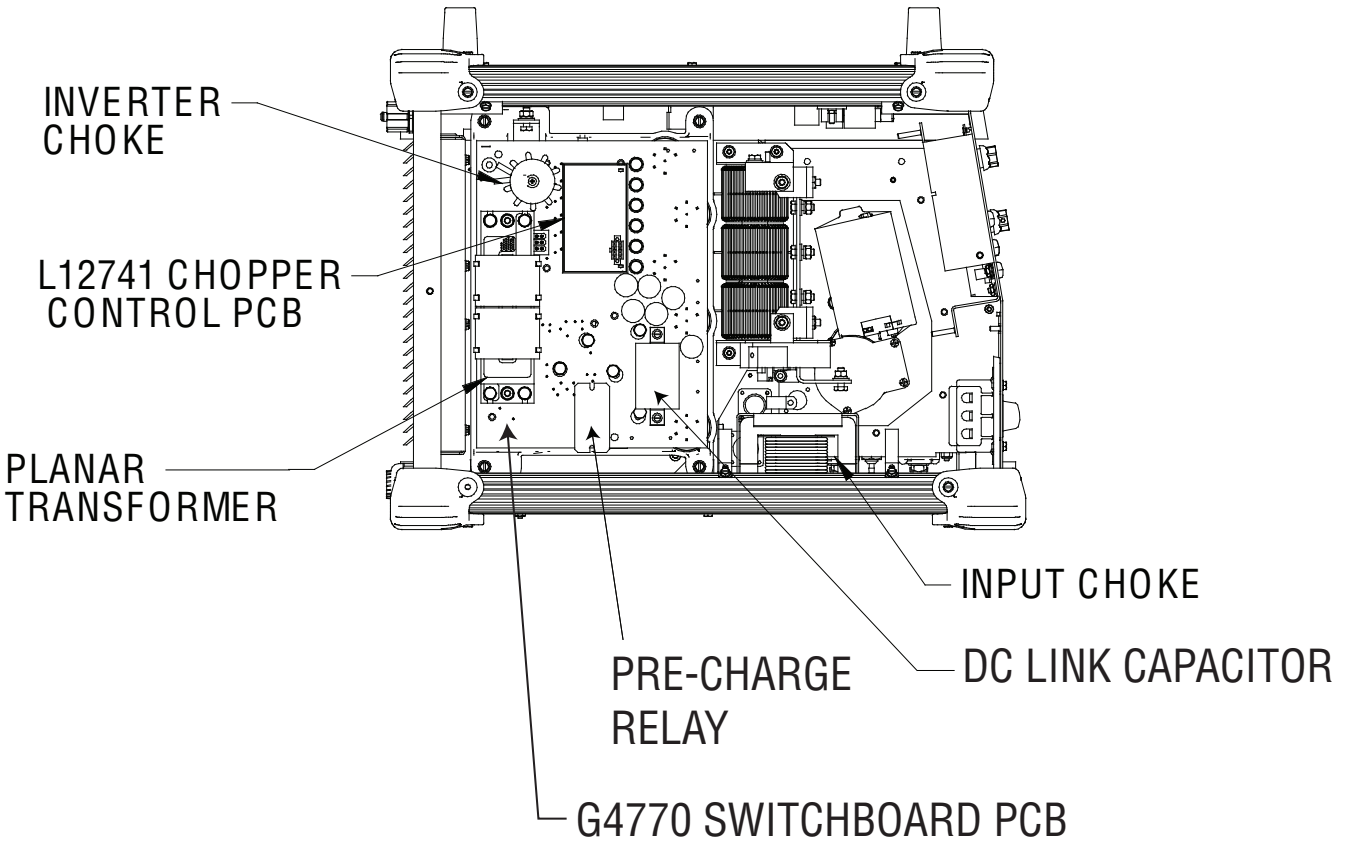
8. If any of the above tests are not correct the Switch may need to be replaced.

9. Replace all plugs and leads that were previously disconnected.

10. Replace the case covers.

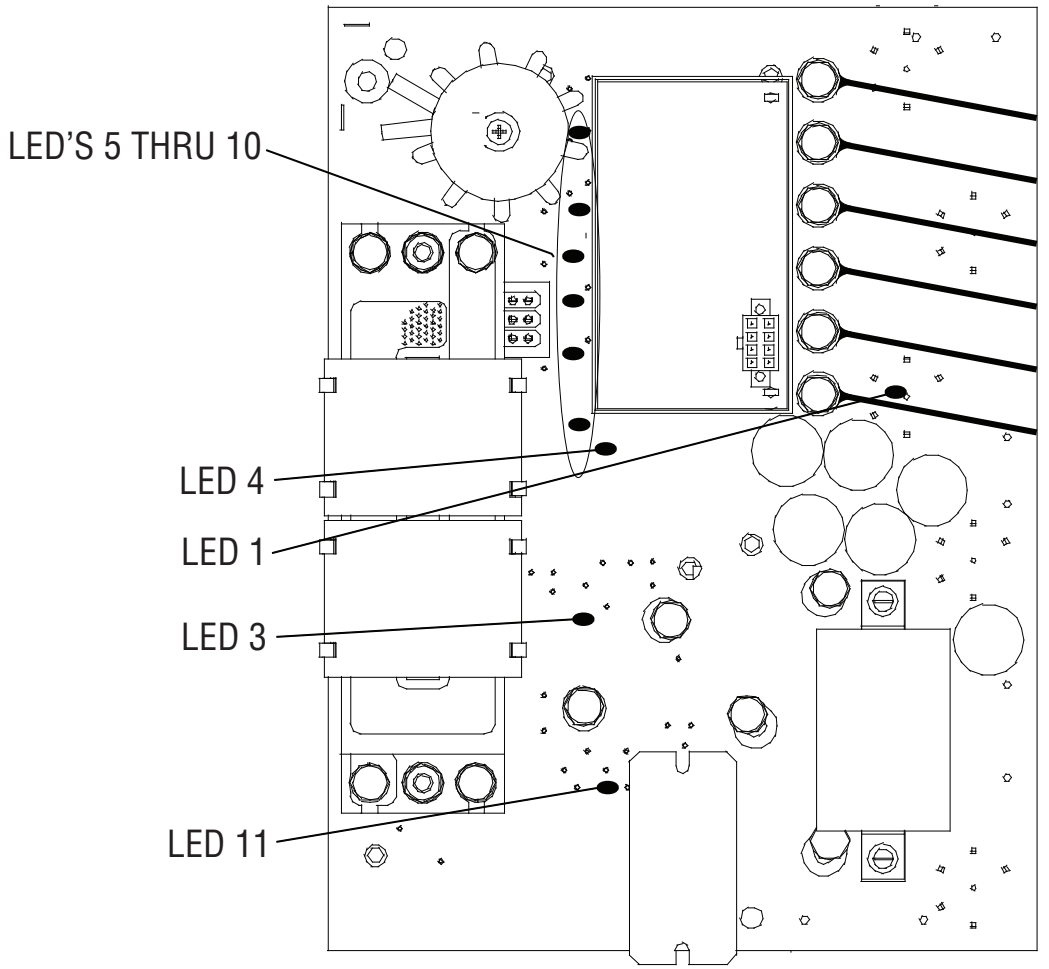
SWITCH BOARD TEST PROCEDURE (continued)

FIGURE F.7 - SWITCH BOARD LOCATION



SWITCH BOARD TEST PROCEDURE (continued)

FiGURE F.8 – SWITCH BOARD LED's



LED'S 5 Thru 10
These six LED's are used to indicate a turn-on of a chopper phase. Intensity of each LED is related to the on-time of each of the IGBT's

LED 4
+15 Volt DC power supply for secondary control circuits.

LED 1
+48 Volt DC auxiliary power supply indicator

LED 3
Boost IGBT drive.

LED 11
Buck IGBT drive.

SWITCH BOARD TEST PROCEDURE (continued)

TABLE F.5 – SWITCH BOARD VOLTAGE MEASUREMENTS

Description	Test Points	Expected Reading	Conditions
Pre-Charge Relay Coil Voltage	Plug J41 Pin 6(-) To Plug J41 Pin 5(+)	15VDC	Correct input power applied to machine and pre-charge completed. If not correct Perform the ***Power Factor Control Board Test.*** See the wiring diagram.
400VDC from Buck/Boost and DC Link Capacitor	B48(+) To B49(-)	400VDC	Correct input power applied to machine and pre-charge completed. If not correct Perform the ***Input Rectifier Test***
48VAC from the Planar Transformer Winding	B7 To B9 Also B7 to B8	50VAC	Correct input power applied to machine and pre-charge completed. If not correct perform the ***Planar Transformer Test.***
100VAC from Planar Transformer Winding	B38 To B40	100VAC	Correct input power applied to machine and pre-charge completed. If not correct perform the ***Planar Transformer Test.***
100VDC from Output Rectifier	B52(-) To B51(+)	100VDC	Correct input power applied to machine and pre-charge completed. If not correct perform the ***Output Rectifier Test***

SWITCH BOARD TEST PROCEDURE (continued)

TABLE F.6 – SWITCH BOARD RESISTANCE MEASUREMENTS

Description	Meter Test Points and Polarity	Expected Readings	Conditions
100 Ohm Pre-Charge Resistor	B10(+) To B12(-)	100 Ohms	Machine "off" no input power applied
Pre-Charge Relay Coil Resistance	J41 Pin 5 (+) Receptacle on Switch Board To J41 Pin 6(-) Receptacle on Switch Board	15,000 to 30,000 ohms dependent on meter being used. Two diodes are in the circuit path to the relay coil.	Machine "off" no input power applied. Plug J41 removed from the Switch Board.
"Buck" Converter IGBTs	B12(+) To B28(-)	High Resistance Greater than 100,000 ohms Typical failure is a "short"	Machine "off" no input power applied. The input choke disconnected from the Switch Board at B28.
"Buck" Converter Diode	B28(+) To B49(-)	High Resistanc e Greater than 100,000 ohms Typical failure is a "short"	Machine "off" no input power applied. The input choke disconnected from the Switch Board at B28
"Boost" Converter IGBTs	B49(+) To B29(-)	High Resistance Greater than 100,000 ohms Typical failure is a "short"	Machine "off" no input power applied. The input choke disconnected from the Switch Board at B28
"Boost" Converter Diode	B48(+) To B29(-)	High Resistance Greater than 10,000 ohms Typical failure is a "short"	Machine "off" no input power applied. The input choke disconnected from the Switch Board at B28
Full Bridge HighSide IGBTs	B48(+) To B37(-) Also B48(+) To B41(-)	High Resistance Greater than 10,000 ohms Typical failure is a "short	Machine "off" no input power applied. The Planar Transformer electrically isolated from the switch board at test points B37 and B41.

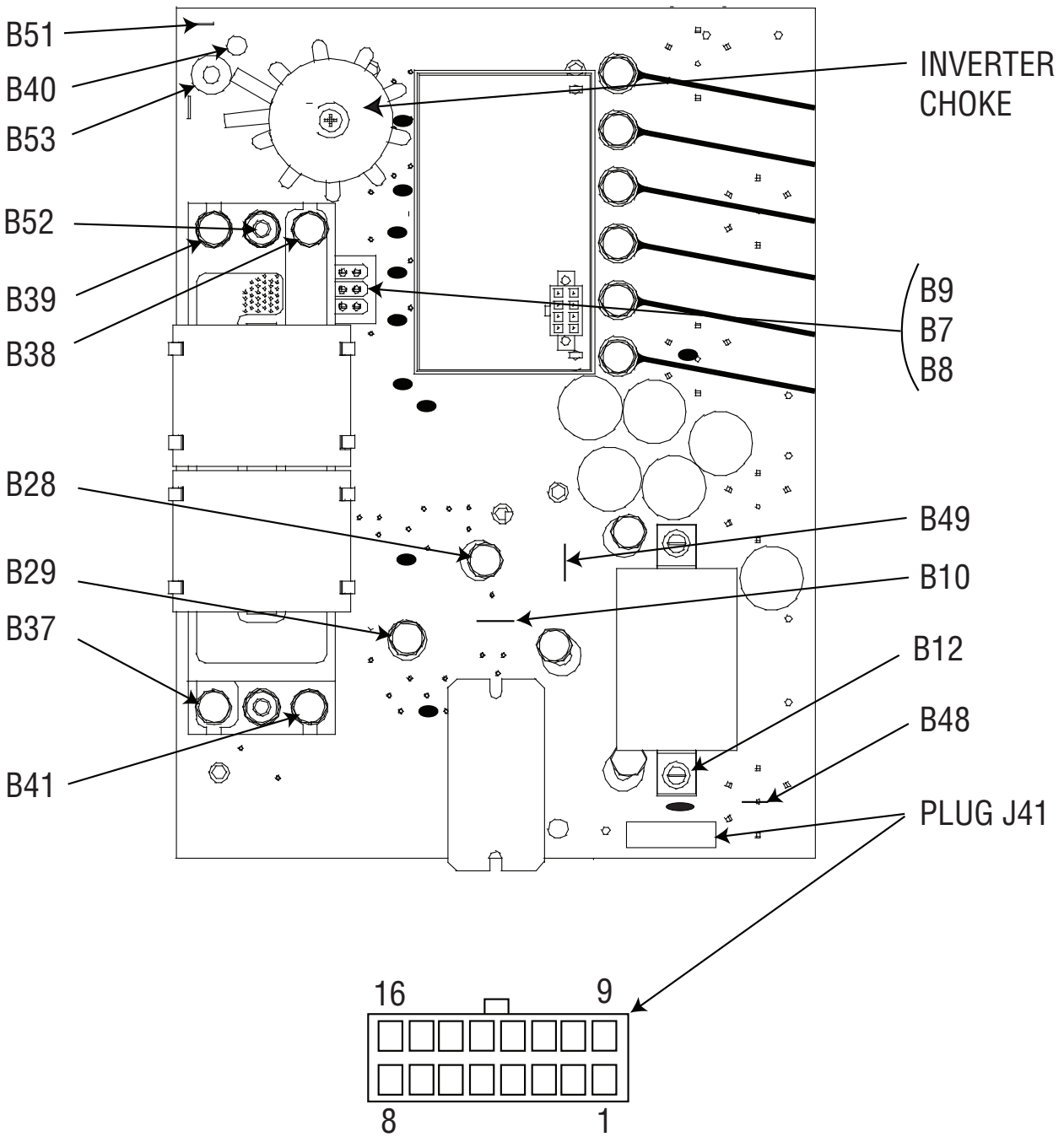
SWITCH BOARD TEST PROCEDURE (continued)

TABLE F.6 – SWITCH BOARD RESISTANCE MEASUREMENTS (continued)

Full Bridge Low Side IGBTs	B37(+) To B49(-) Also B41(+) To B49(-)	High Resistance Greater than 10,000 ohms Typical failure is a "short	Machine "off" no input power applied. The Planar Transformer electrically isolated from the switch board at test points B37 and B41

SWITCH BOARD TEST PROCEDURE (continued)

FIGURE F.9 – SWITCH BOARD TEST POINTS



POWER FACTOR CONTROL BOARD TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will help determine if the Power Factor Correction Control Board is functioning correctly. There are very high voltages present on the P.F.C. Control Board. This test will be limited to LED and audio error codes and also resistance checks with the input power removed from the machine.

MATERIALS NEEDED

Voltmeter/Ohmmeter (Multimeter)

POWER FACTOR CONTROL BOARD TEST PROCEDURE (continued)

PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. Perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

3. Locate the P.F.C. Control Board. ***See Figure F.10***.

4. Apply the correct input power to the POWER WAVE® C300 machine.

5. Locate LED 2 on the P.F.C. Control Board. ***See Figure F.11.***

6. LED 2 should be on and green during proper operation of the P.F.C. Control Board.

7. Locate LED 1 and the audio buzzer on the P.F.C. Control Board. ***See Figure F.11.***

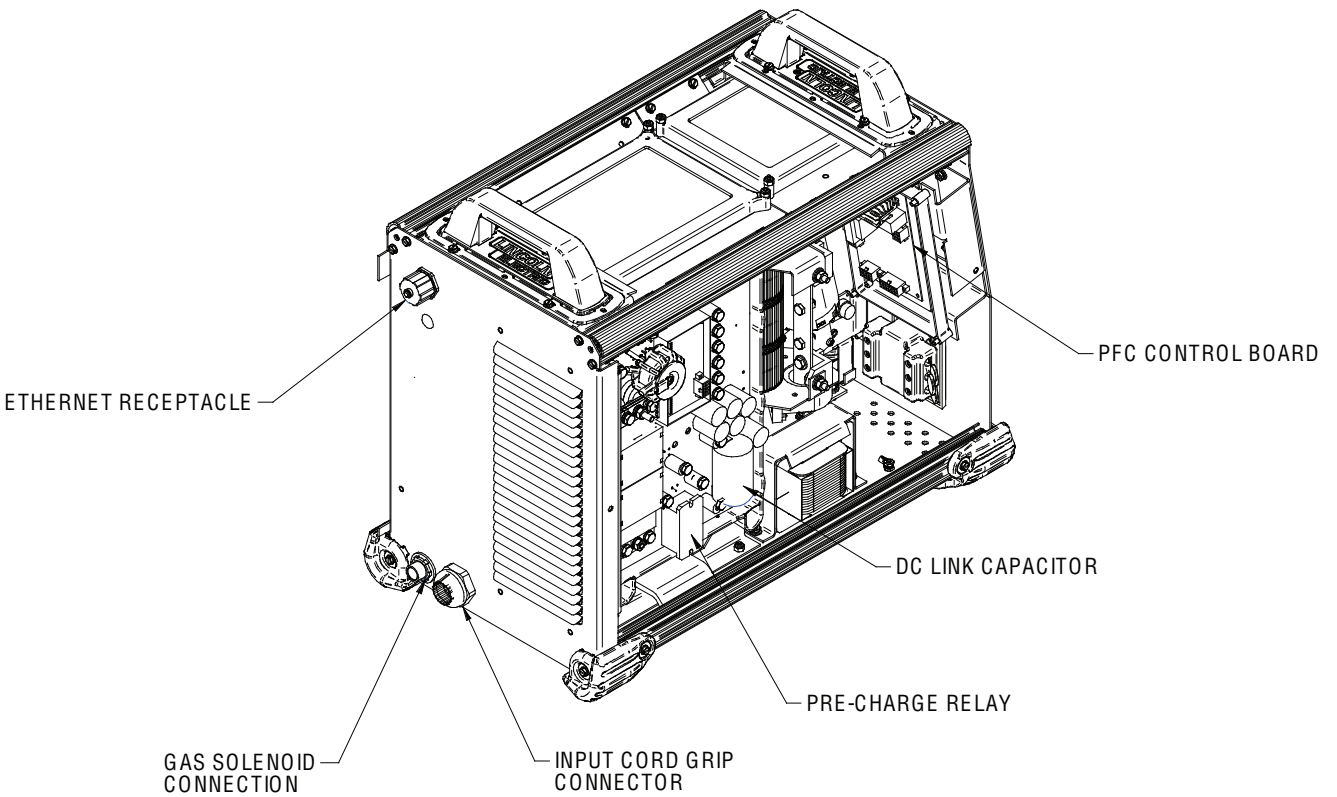
8. If there is a problem with the P.F.C. Control Board LED 1 and the buzzer will provide an error code. ***See Figure F.11*** for error codes. LED 2 will also be OFF or blinking.

9. If further testing is required remove the input power to the machine and perform the resistance checks in ***Table F.8. See Figure F.12*** and ***Figure F.13*** for test point locations. To access some of the test points the P.F.C. Control Board may have to be removed from its mounting studs. See the Power Factor Correction ***Control Board Removal and Replacement Procedure.***

10. When testing is complete replace all plugs previously removed. Replace the P.F.C. Board and the case covers.

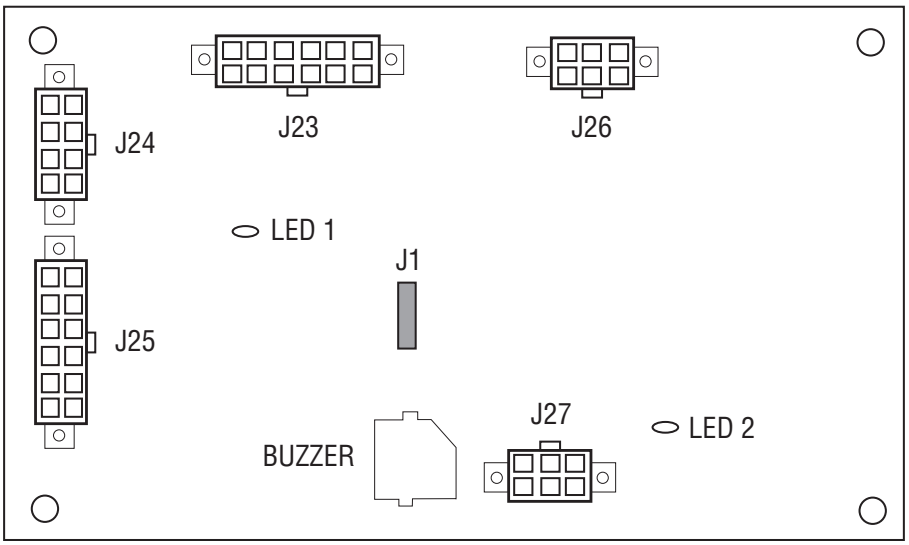
POWER FACTOR CONTROL BOARD TEST PROCEDURE (continued)

FIGURE F.10 – P.F.C. CONTROL BOARD LOCATION



POWER FACTOR CONTROL BOARD TEST PROCEDURE (continued)

FIGURE F.11 – P.F.C. CONTROL BOARD PLUGS



G5915 P.F.C. CONTROL BOARD P.C. BOARD		
LED #	**COLOR**	**FUNCTION**
2	GREEN	15 VDC POWER SUPPLY FUNCTION PROPERLY WHEN ON
1	RED	ERROR CODE (LED WILL FLASH ERROR AND BUZZER WILL SOUND) SEE TABLE BELOW FOR DETAILS

- Pause before repeating the code: 3.5 seconds
- Pause between digits of the code: 1.5 seconds
- Pause between sounds/flashes indicating a specific digit: 0.5 seconds

ERROR CODE	
ERROR	**EXPLANATION**
331	PEAK INPUT CURRENT LIMIT
334	START UP CURRENT CHECK FAILURE
335	START UP VOLTAGE CHECK FAILURE
336	THERMAL FAULT (NO FIRST STAGE FAN)
337	PRECHARGE TIMEOUT
346	TRANSFORMER PRIMARY OVERCURRENT

POWER FACTOR CONTROL BOARD TEST PROCEDURE (continued)

TABLE F.8 - POWER FACTOR CORRECTION CONTROL BOARD RESISTANCE CHECKS

Description	Meter Test Points and Polarity	Expected Readings	Conditions
Auxiliary Power Input Circuit	Receptacle J27 Pin 3 (-) To Receptacle J27 Pin 4 (+)	Very High resistance. Greater than 50,000 ohms	Input power removed. Remove Plug J27 from the PFC Board. Typical failure is a short.
Auxiliary Power Diode Circuit on Switch Board	B48 (-) To Plug J27 Pin 4 (+)	Very high resistance. Greater than 50,000 ohms	Input power removed. Typical failure is short. If shorted replace the Switch Board.
Auxiliary Power Diode Circuit on Switch Board	B12 (-) To Plug J27 Pin 4 (+)	Very high resistance. Greater than 50,000 ohms	Input power removed. Typical failure is short. If shorted replace the Switch Board.
Pre-Charge Relay Drive Circuit	Plug J23 Pin 3 (-) To Plug J23 Pin 4 (+)	High resistance. Greater than 30,000 ohms	Input power removed. Remove Plug J41 from the Switch Board. Typical failure is a short
Full Bridge Gate Drive Circuit	Plug J23 Pin 6 (+) To Plug J23 Pin 5 (-)	Resistance should be greater than 1000 ohms	Input power removed. Remove Plug J41 from the Switch Board. Typical failure is a short.
Main Buck Gate Drive	Plug J23 Pin 11 (-) To Plug J23 Pin 12 (+)	Resistance should be greater than 500 ohms	Input power removed. Remove Plug J41 from the Switch Board. Typical failure is a short.
Auxiliary Buck Gate Drive	Plug J23 Pin 2 (-) To Plug J23 Pin 1 (+)	Resistance should be greater than 500 ohms	Input power removed. Remove Plug J41 from the Switch Board. Typical failure is a short

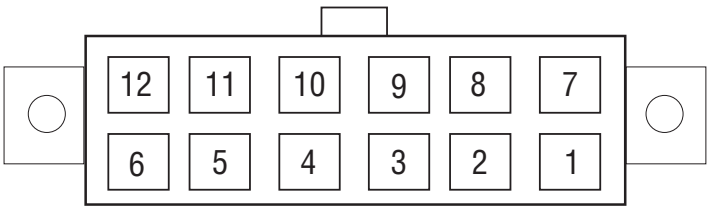
POWER FACTOR CONTROL BOARD TEST PROCEDURE (continued)

TABLE F8 - POWER FACTOR CORRECTION CONTROL BOARD RESISTANCE CHECKS (continued)

Main Boost Gate Drive	Plug J23 Pin 8 (-) To Plug J23 Pin 7 (+)	Resistance should be greater than 500 ohms	Input power removed. Remove Plug J43 from the Switch Board. Typical failure is a short
Auxiliary Boost Gate Drive	Plug J23 Pin 9 (-) To Plug J23 Pin 10 (+)	Resistance should be greater than 500 ohms	Input power removed. Remove Plug J43 from the Switch Board. Typical failure is a short

POWER FACTOR CONTROL BOARD TEST PROCEDURE (continued)

FIGURE F.12 – PLUG J23



PLUG J27

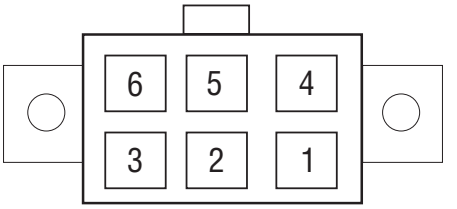
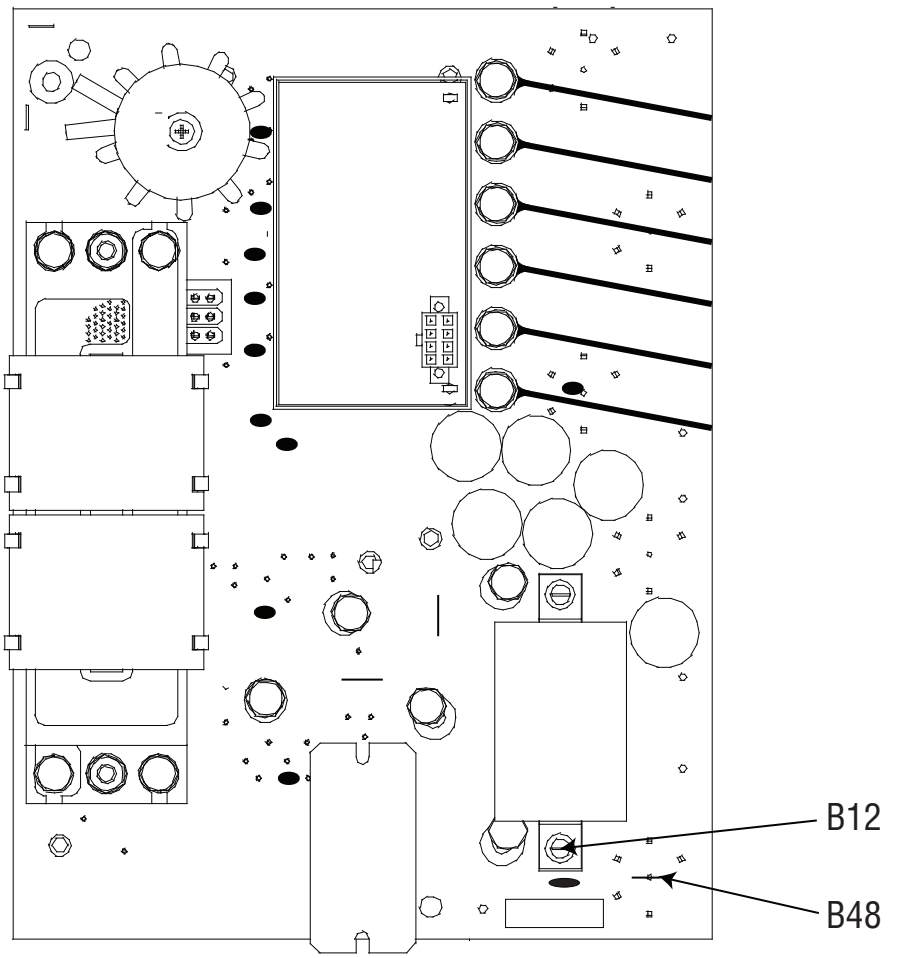


FIGURE F.13 – SWITCH BOARD TEST POINTS



NOTES

CURRENT AND VOLTAGE CALIBRATION PROCEDURE

⚠ WARNING

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DESCRIPTION

This procedure will aid the technician in checking and, if necessary, adjusting the calibration of the POWER WAVE C300.

Calibration should be checked as part of the ***Test After Repair***.

MATERIALS NEEDED

Power Wave Manager Software (www.powerwavesoftware.com)
Laptop or other Suitable Computer
Ethernet Cross Connect Cable (LECO #M19969-7)
Resistive Load Bank
Two (2) Welding Cables - 20ft. -4/0
Calibrated Ammeter and Voltmeter *

* Calibration inaccuracies due to external metering can and will effect weld performance. Use good quality digital meters that are **calibrated and traceable to National Standards.**

CURRENT AND VOLTAGE CALIBRATION PROCEDURE (continued)

CALIBRATION SET-UP:

1. Load the Power Wave Manager Software into the computer.
2. Use the Ethernet cable to connect the computer to the POWER WAVE® C300.
3. Connect a resistive load bank to the output studs.
4. Energize the POWER WAVE® C300.
5. Launch the Power Wave Manager Utility and establish communication with the POWER WAVE® C300 (Refer to the software documentation to determine proper connection)
6. Click on the "Calibration" Icon in the menu. A screen similar to ***Figure F.14*** should appear and you are ready to begin the calibration check.

NOTE: The Calibration Screen may look slightly different depending on the Software version.

Calibration can only be done under "Static Load" conditions. Do not attempt to calibrate while welding.

NOTE: Incorrect calibration can and will affect welding performance. It is strongly recommended to record and save a "Snapshot" of the existing settings before making any calibration adjustments. This will allow returning to original settings if necessary. (Refer to the software documentation for instructions on using the Snapshot feature).

CALIBRATION PROCEDURE:

1. Once in the "Calibration" screen, make sure that the machine output is OFF (light is BLACK) and connect a resistive load bank to the output studs.
2. Set the load bank for 200 Amps.
3. On the Calibration screen, select the 200 Amps Current Set Point.

NOTE: If the meters on the load bank are not certified, connect calibrated and traceable

⚠ WARNING

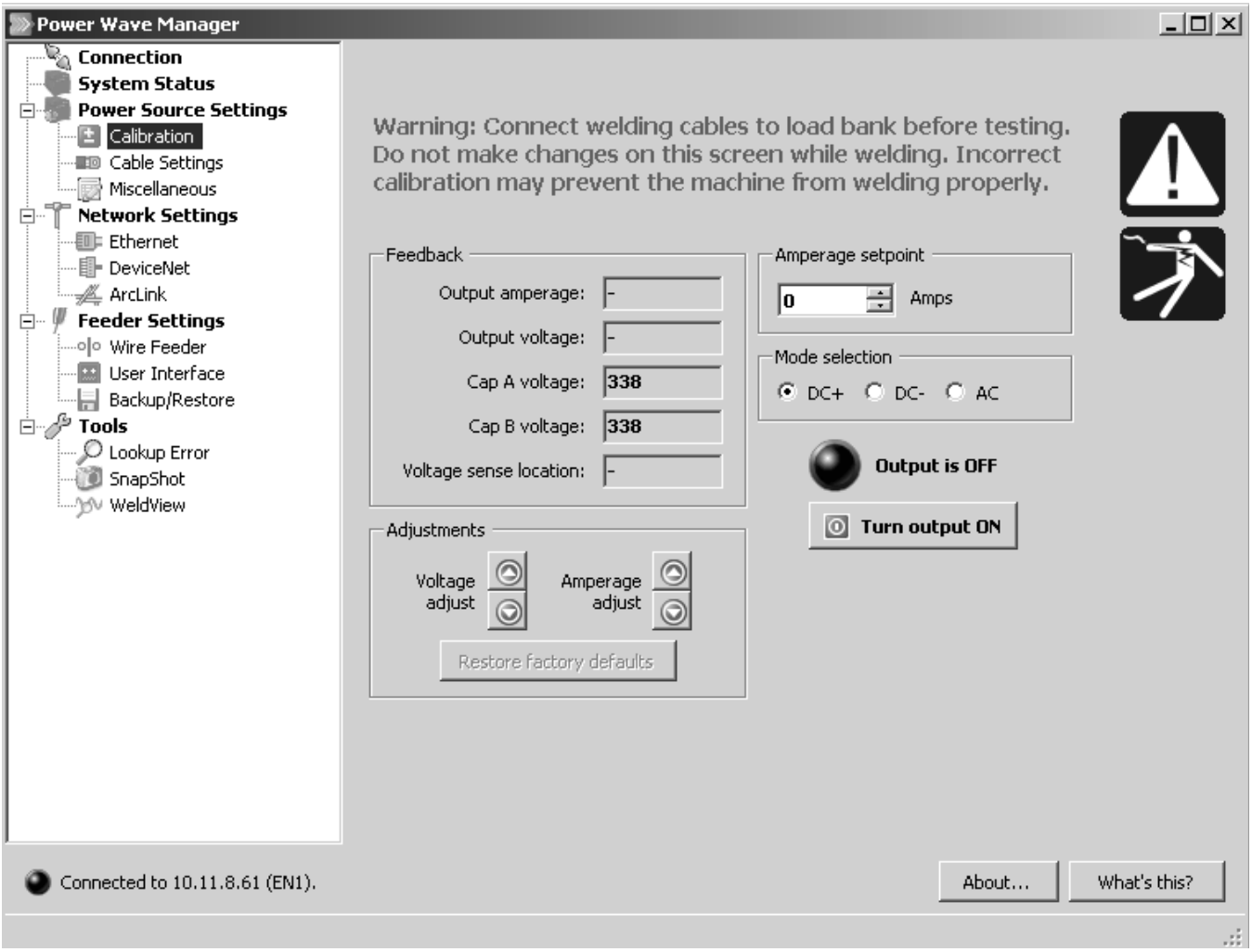
meters to the machine output. (See Materials Needed at the beginning of this Section).

The Output Studs of the Machine will be Electrically "HOT" during Steps 4 through 7

4. Click on the "Turn Output ON" button. The BLACK light on the screen will flash RED indicating that the weld output is turned ON. ***See Figure F.14.***
5. Adjust the load bank to 200 Amps at approximately 24 Volts as read on the external calibrated meters.
6. Using the "Calibration Adjustment" buttons: Adjust the current so that the external ammeter reads 200 Amps +/-2A. Adjust the voltage so that the "Output Voltage" display window reads the same as the external voltmeter +/-.25volts.

CURRENT AND VOLTAGE CALIBRATION PROCEDURE (continued)

FIGURE F.14 – CALIBRATION SCREEN



NOTES

USER INTERFACE BOARD TEST PROCEDURE

⚠ WARNING

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If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the User Interface Board is functional.

MATERIALS NEEDED

Voltmeter/Ohmmeter (Multimeter)

USER INTERFACE BOARD TEST PROCEDURE (continued)

PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the User Interface Board test points first perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

3. Carefully apply the correct input power to the POWER WAVE® C300 machine.

4. If the displays light on the front of the machine the User Interface is receiving the correct input voltage. (48VDC)

5. ***See Table F.10***. and ***Figure F.15***. for the description of the LED functions on the User Interface Board.

6. If the displays do not light carefully check to make sure the User Interface Board is receiving the correct input supply voltage. ***See Figure F.16***. and the wiring diagram.

7. Remove the input power to the POWER WAVE® C300 machine and discharge the DC Link Capacitor. Check the continuity of the supply leads (357B and 359B) between Plug J5 on the User Interface Board and Plug J81 on the FeedHead Board. Also check the continuity of the CAN communication leads (541B and 542B) between Plug J5 and Plug J81. See the wiring diagram.

8. Replace the case covers previously removed.

USER INTERFACE BOARD TEST PROCEDURE (continued)

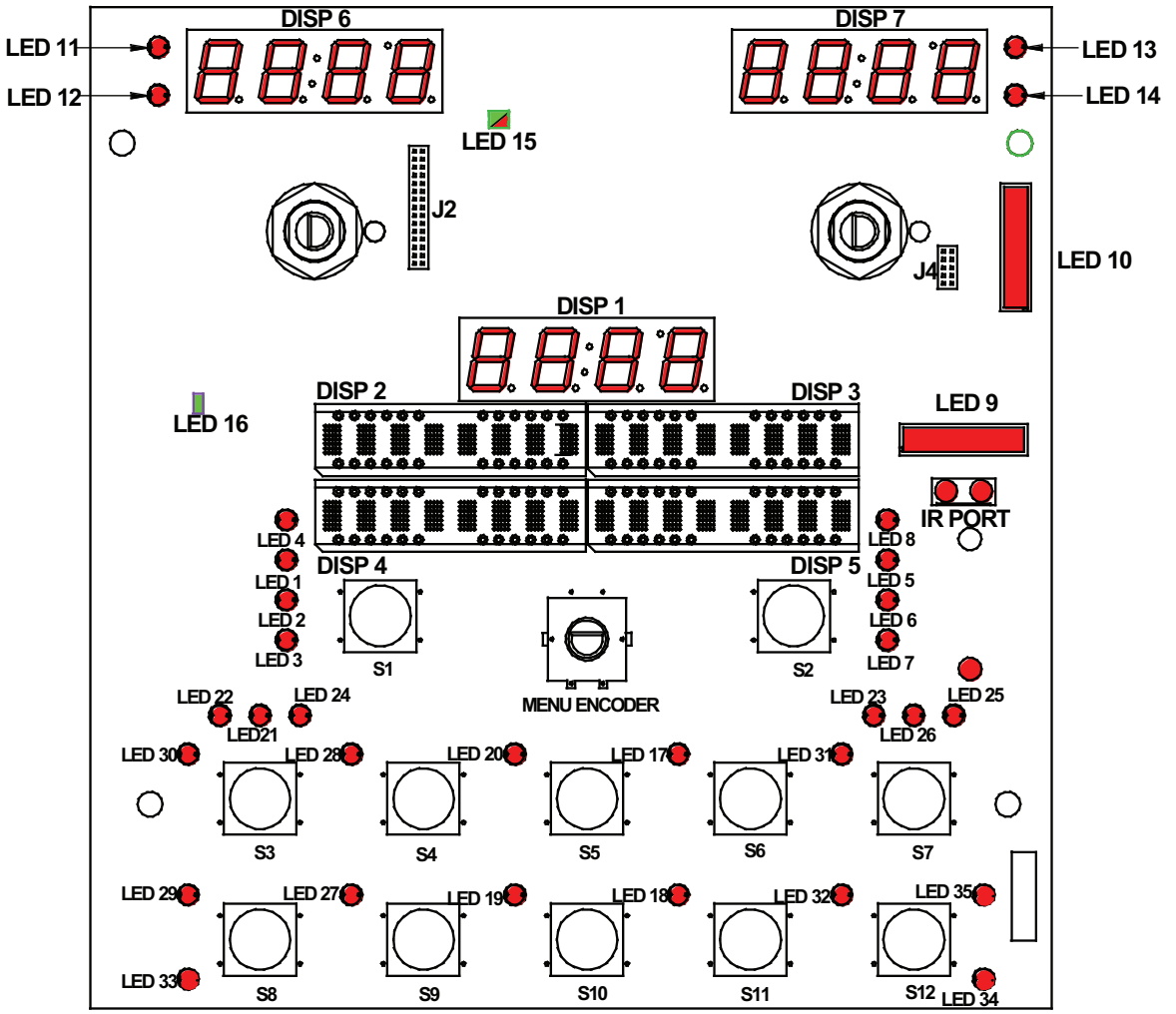
Table F.10 - Description of LED Functions

User Interface Board (G4760 Series)

			G4759 F.R.E.D P.C. BOARD					
LED #	COLOR	FUNCTION	LED #	COLOR	FUNCTION	LED #	COLOR	FUNCTION
1	RED	N/A	13	RED	VOLTS SELECT	24	RED	PROCEDURE B SELECT
2	RED	WAVE CONTROL SELECT	14	RED	TRIM SELECT	25	RED	N/A
3	RED		15	GREEN	STATUS "OK"	26	RED	N/A
4	RED	N/A		RED	STATUS "ERROR" (CHECK CODE FOR SPECIFIC ERROR)	27	RED	MEMORY SELECT SWITCH 5
5	RED	N/A	16	GREEN	POWER SUPPLY FUNCTION "OK"	28	RED	MEMORY SELECT SWITCH 4
6	RED	PRE-WELD CONTROL SELECT	17	RED	MEMORY SELECT SWITCH 6	29	RED	2 STEP TRIGGER MODE
7	RED	POST-WELD CONTROL SELECT	18	RED	MEMORY SELECT SWITCH 11	30	RED	N/A
8	RED	N/A	19	RED	MEMORY SELECT SWITCH 10	31	RED	MEMORY SELECT SWITCH 7
9	RED	SETUP MENU ENABLED	20	RED	MEMORY SELECT SWITCH 5	32	RED	MEMORY SELECT SWITCH
10	RED	THERMAL FAULT MEASURED	21	RED	TORCH DUAL PROCEDURE SELECT	33	RED	4 STEP TRIGGER MODE
11	RED	WIRE FEED SPEED SELECT	22	RED	PROCEDURE A SELECT	34	RED	N/A

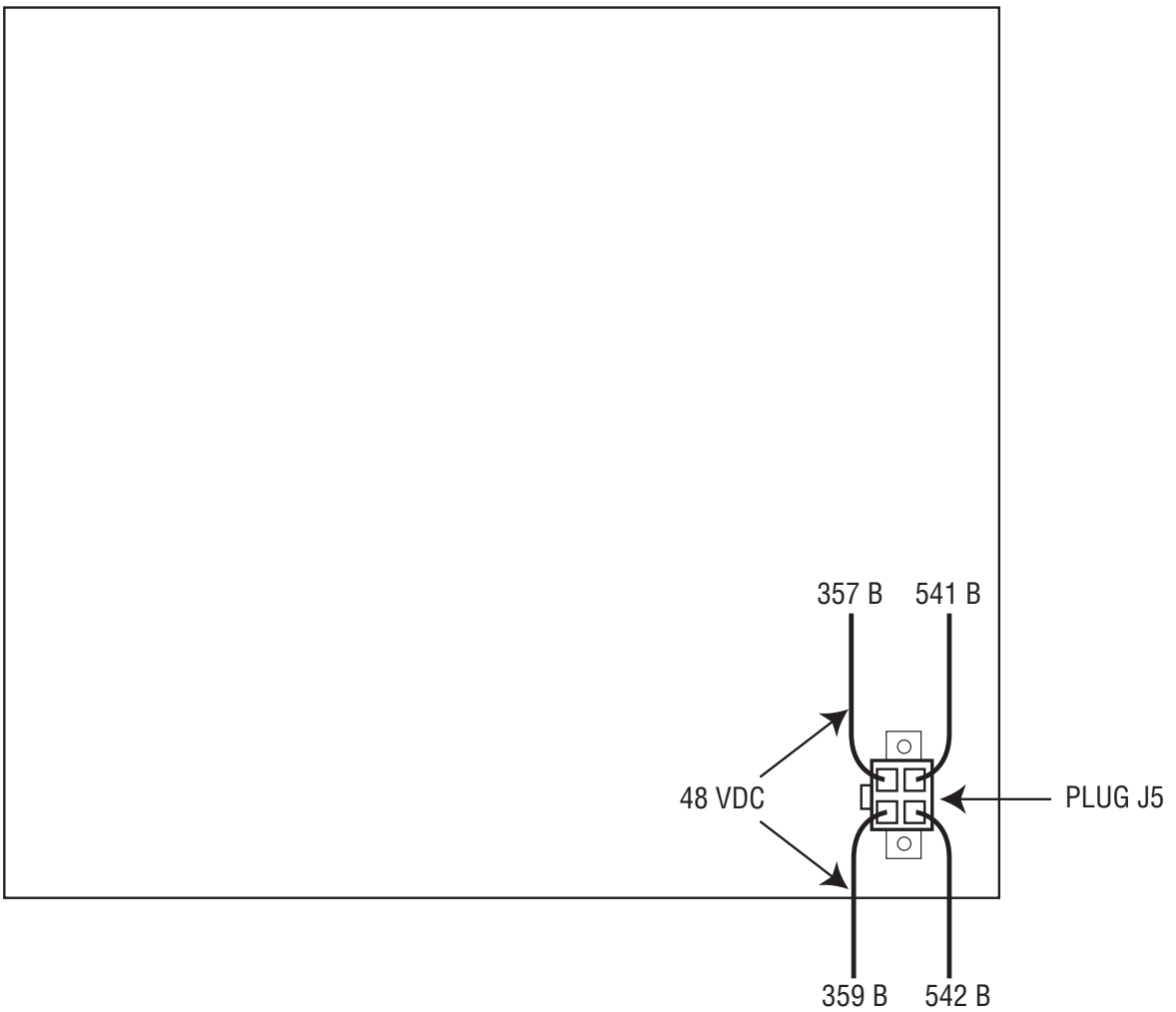
USER INTERFACE BOARD TEST PROCEDURE (continued)

FIGURE F.15 – U.I. FRONT VIEW (G4760 Series)



USER INTERFACE BOARD TEST PROCEDURE (continued)

FIGURE F.16 – PLUG J5 LOCATION ON USER INTERFACE BOARD (rear view)



NOTE: Leads connect to Plug J81 on the Feed head Board

NOTES

INPUT RECTIFIER TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

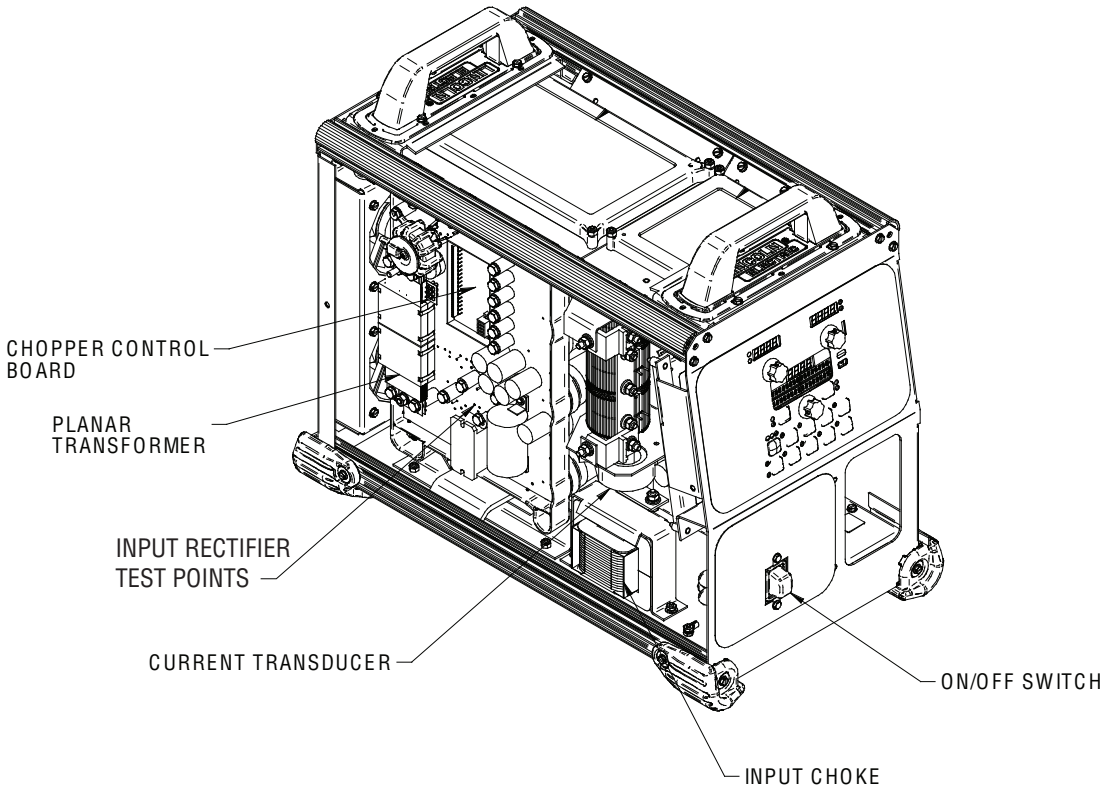
This test will help determine if the input rectifier has “shorted” or “open” diodes.

MATERIALS NEEDED

Digital Volt-Ohmmeter (DVM)
Misc. Hand Tools
Wiring Diagram

INPUT RECTIFIER TEST PROCEDURE (continued)

FIGURE F.17 – INPUT RECTIFIER LOCATION



PROCEDURE

1. Remove the input power to the machine.

2. Perform the ***Chassis Removal and DC Link Capacitor Discharge Procedure.***

3. Locate the Input Rectifier and associated leads. See Figure F.17 and ***Figure F.18.***

4. Use the digital voltmeter (DVM) set to the diode test mode to perform the tests detailed in ***Table F.11.***

5. If the Input Rectifier does not meet the expected readings replace the Switch Board.

INPUT RECTIFIER TEST PROCEDURE (continued)

FIGURE F.18 – INPUT RECTIFIER LEAD LOCATIONS

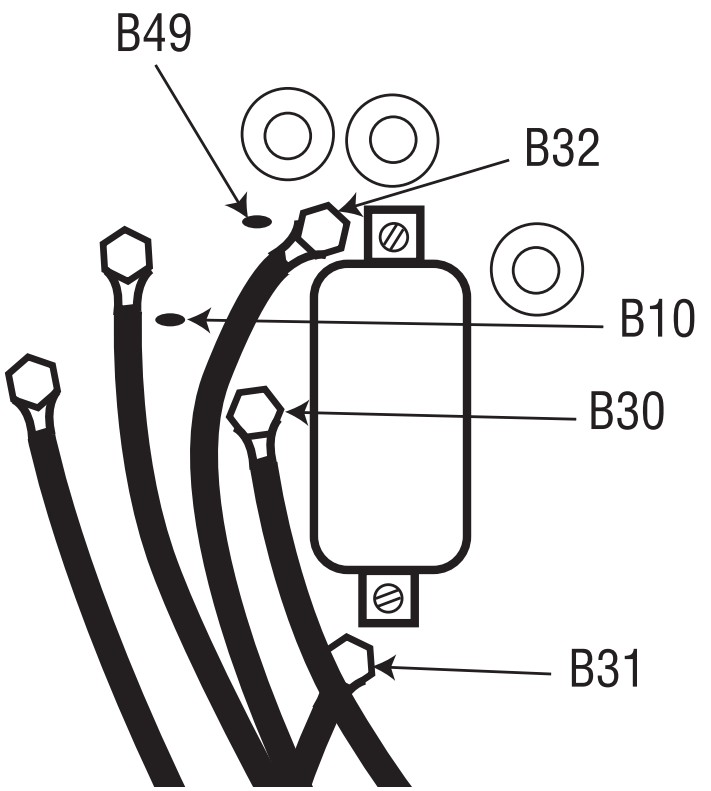


TABLE F.11 – PROBE READINGS

+Probe (RED)	-Probe (BLACK)	RESULT
Terminal B32	Terminal B10	0.3V - 1.0V
Terminal B31	Terminal B10	0.3V - 1.0V
Terminal B30	Terminal B10	0.3V - 1.0V
Terminal B49	Terminal B32	0.3V - 1.0V
Terminal B49	Terminal B31	0.3V - 1.0V
Terminal B49	Terminal B30	0.3V - 1.0V

NOTES

GAS SOLENOID TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will help determine if the gas solenoid is receiving the correct voltage and also if the gas solenoid is functional.

MATERIALS NEEDED

5/8 Inch Wrench
Voltmeter/Ohmmeter (Multimeter)

GAS SOLENOID TEST PROCEDURE (continued)

PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. Open and secure the right case side door gaining access to the wire drive compartment. ***See Figure F.19.***

3. Locate the hinged cover at the bottom rear of the machine.

4. Using the 5/8 inch wrench remove the two bolts holding hinged cover in place.

⚠ WARNING

The input supply lines are connected in this compartment. Be careful not to come in contact with them while performing this test on the gas solenoid.

---

5. Locate the gas solenoid and leads 552 and 553. ***See Figure F.19.***

6. Apply the input power and activate the gas solenoid by using the gas purge switch or the gun trigger. Make sure the machine is in a CV mode.

7. Carefully check for approximately 7.5 VDC on the solenoid terminals. Lead 552 (+) to lead 553(-).

8. If the correct DC voltage is present and the solenoid does not operate proceed to Step 9. If the correct DC voltage is not present proceed to Step 10.

9. Remove the input power to the machine. Remove the leads (552 and 553) from the solenoid terminals and check the solenoid coil resistance. If should be approximately 20 ohms. If the resistance is very high or very low replace the solenoid.

10. If the correct solenoid voltage is not present at the solenoid terminals check for the correct voltage at plug J83 pins 3 and 4 on the FeedHead PC Board. ***See Figure F.20*** for pin locations. To gain access to the FeedHead PC Board see the ***FeedHead Board Removal and Replacement Procedure.***

11. If the correct voltage (approximately 7.5VDC) is not present at plug J83 pins 3 and 4 (leads 552 and 553) when the gas purge switch is activated the FeedHead Board may be faulty.

12. If the correct voltage is present at plug J83 pins 3 and 4 but not present at the solenoid terminals check the continuity of leads 552 and 553. See the Wiring Diagram.

13. Remove the input power and using the 5/8 inch wrench replace the hinged cover.

GAS SOLENOID TEST PROCEDURE (continued)

FIGURE F.19 – GROUNDING LUG

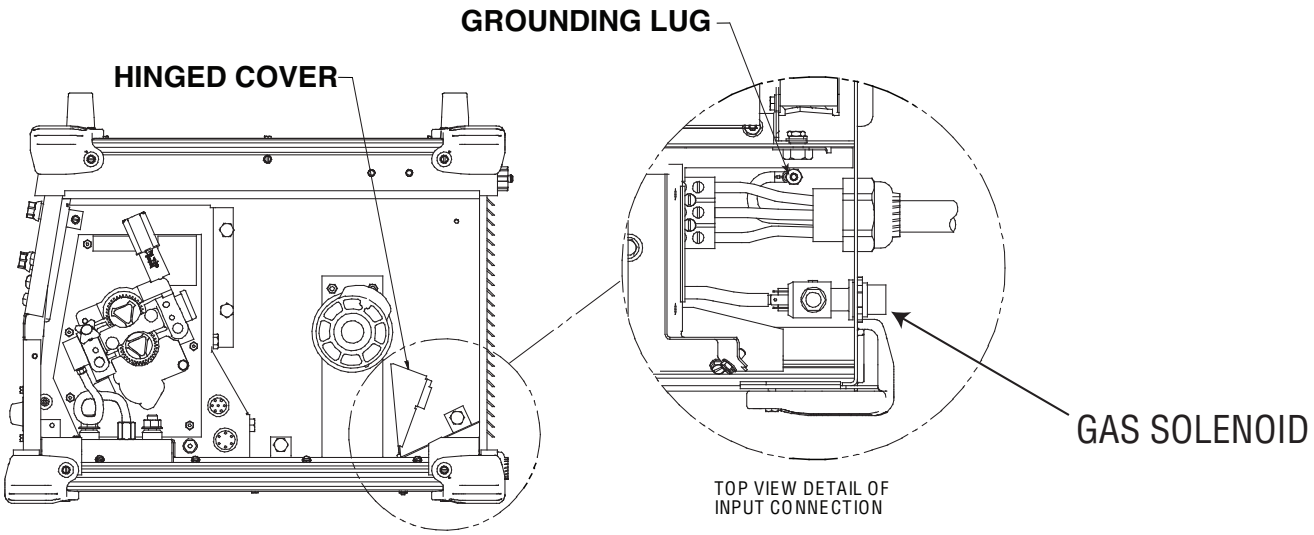
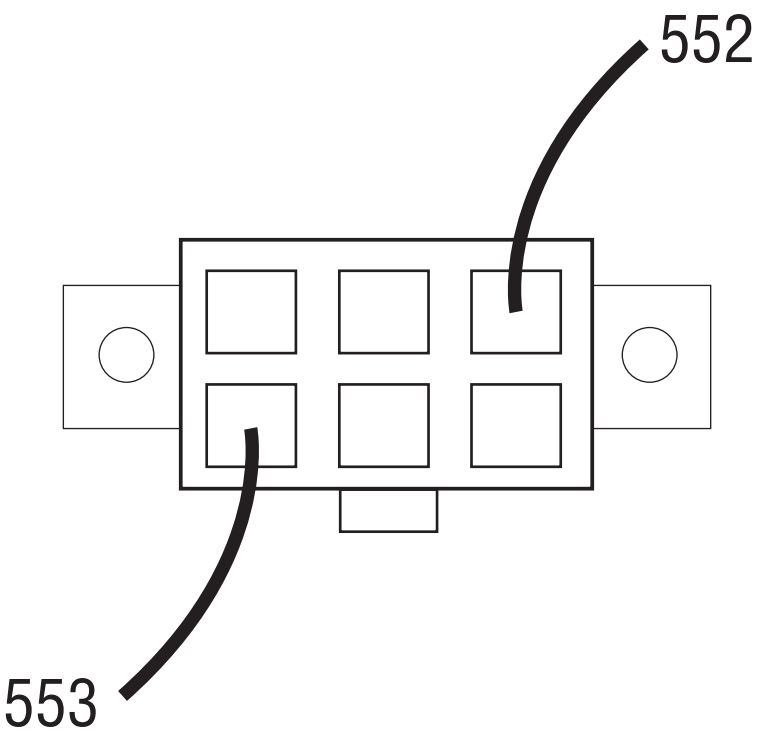


FIGURE F.20 – PLUG J83



NOTES

PLANAR TRANSFORMER RESISTANCE TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

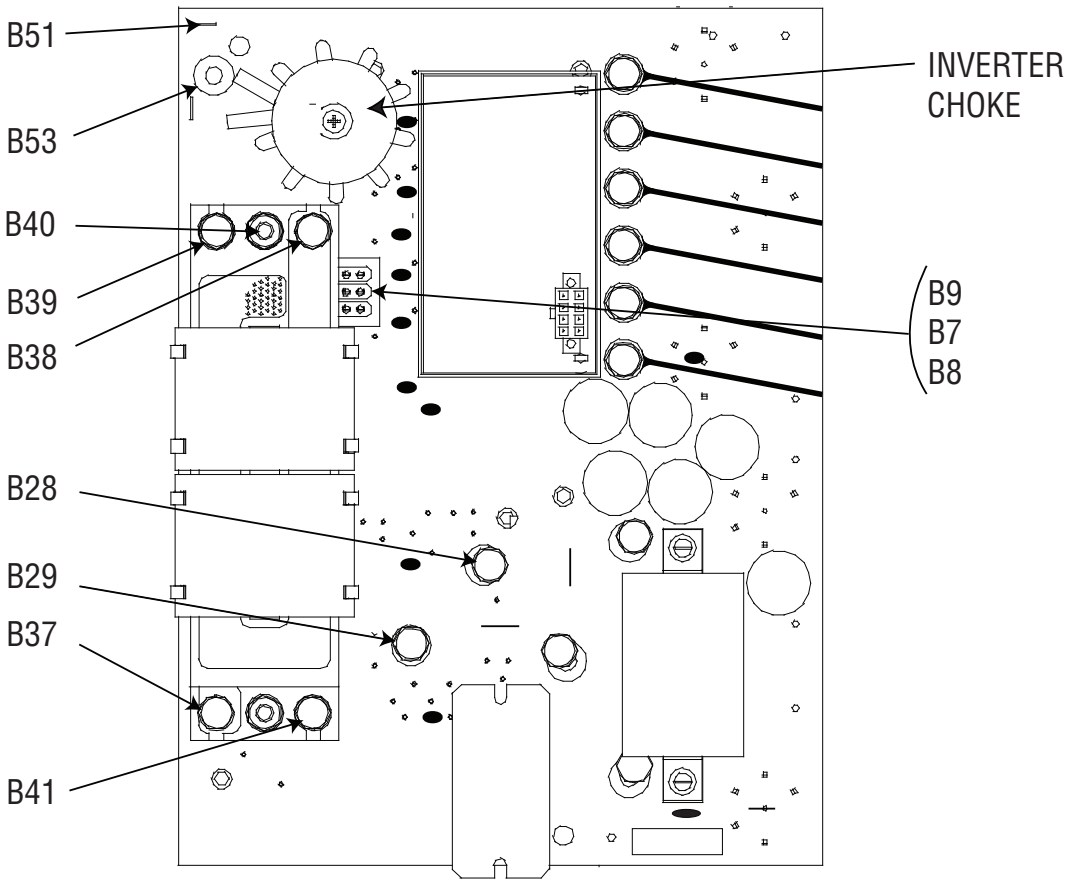
This test will help determine if the Planar Transformer windings are good and not shorted to each other or to ground.

MATERIALS NEEDED

Voltmeter/Ohmmeter (Multimeter)

PLANAR TRANSFORMER RESISTANCE TEST PROCEDURE (continued)

FIGURE F.21 - TEST POINTS



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the Planar Transformer test points first perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

3. See Figure F.21 for test point locations.

4. Using the Ohmmeter check the resistances per ***Table F.12.***

5. If the resistances are correct per ***Table F.12*** then the Planar Transformer is OK.

6. Replace the Case Cover.

PLANAR TRANSFORMER RESISTANCE TEST PROCEDURE (continued)

TABLE F.12 – RESISTANCE CHECKS

Test Points	Expected Resistance Reading	Comments
B37 to B41	Zero ohms	Continuity of Primary Winding
B39 to B40	Zero ohms	Continuity of 1/2 of Secondary Winding
B40 to B38	Zero ohms	Continuity of 1/2 of Secondary Winding
B8 to B7	Zero ohms	Continuity of 1/2 of 48V Winding
B7 to B9	Zero ohms	Continuity of 1/2 of 48V Winding
B37 to B40	Infinity	Isolation between Primary and Secondary Windings
B37 to B7	Infinity	Isolation between Primary and 48V Windings
B40 to B7	Infinity	Isolation between Secondary and 48V Windings
All Test Points to Chassis Ground	Infinity	Isolation from all windings to chassis ground

NOTES

FeedHead BOARD AND TACHOMETER FEEDBACK TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will help determine if the FeedHead Board and Tachometer circuits are functioning properly.

MATERIALS NEEDED

3/8 Inch Nutdriver
5/16 Inch Nutdriver
Voltmeter/Ohmmeter (Multimeter)
Frequency Counter

FeedHead BOARD AND TACHOMETER FEEDBACK TEST PROCEDURE (continued)

TABLE F.13 – FeedHead BOARD TEST POINTS

Description	Test Points	Lead Numbers	Expected Readings	Conditions
Power Supply to Board	Plug J82 Pin 3 To Plug 82 Pin4	Lead 357(-) To Lead 359(+)	48VDC	Input power applied to machine
Armature Voltage to Wire Drive Motor	Plug J83 Pin 1 To Plug J83 Pin 2	Lead 550(+) To Lead 551(-)	2.6VDC@50IPM To 27.4VD@700 IPM	Input power applied and gun trigger activated
Tachometer Supply	Plug J84 Pin 1 To Plug J84 Pin 4	Lead 531(+) To Lead 534(-)	5VDC	Input power applied to machine
Tachometer Feedback	Plug J84 Pin 7 To Plug J84 Pin 4	Lead 537(+) To Lead 534(-)	70Hz.@ 50IPM To 1KHz.@700IPM	Input power applied and gun trigger activated. Motor running
48VDC feed-thru supply to Interface Board	Plug J81 Pin 3 To Plug J81 Pin 4	Lead 357B(-) To Lead 359B(+)	48VDC	Input power applied to machine

PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the FeedHead Board first perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

3. To gain access to the test points on the FeedHead Board see the ***FeedHead Board Removal and Replacement Procedure.***

4. Apply the correct input power to the POWER WAVE® C300 and carefully check for the expected readings in Table F.13. Also see ***Figure F.22*** for lead and pin locations on the FeedHead Board.

5. If any of the readings are incorrect check the continuity of the associated leads. See Wiring Diagram.

6. If the 48VDC supply is present but the motor armature voltage and/or tachometer supply voltage is not correct the FeedHead Board may be faulty.

7. If the motor armature voltage is not correct at the FeedHead Board check the diode bridge connected to the board via Plug J83 Pin 5 (Lead 554) Plug J83 Pin 6 (Lead 640). See ***Figure F.22.*** This diode bridge is not on the FeedHead Board and is located underneath the FeedHead Board mounting rail.

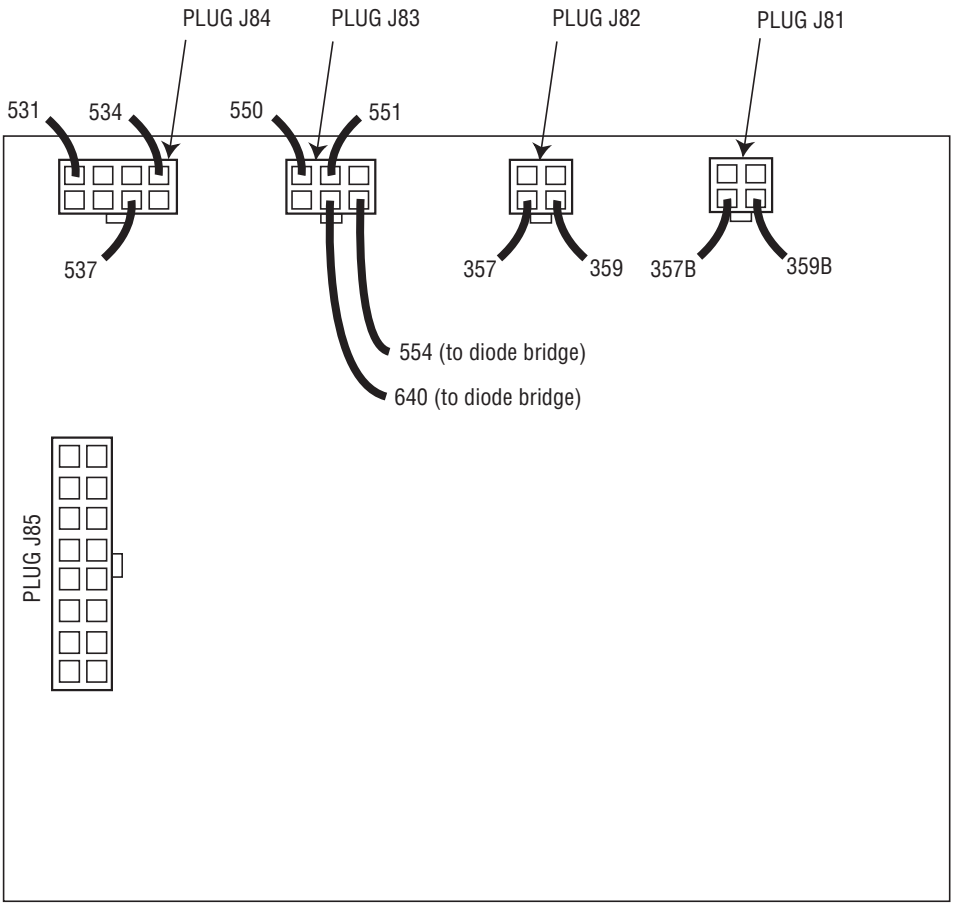
8. If the tachometer supply voltage is present but tachometer feedback is missing or not correct the tachometer may be faulty.

9. Remove the input power to the machine before reassembly.

10. Replace the FeedHead Board and case covers.

FeedHead BOARD AND TACHOMETER FEEDBACK TEST PROCEDURE (continued)

FIGURE F.22 – FEEDHEAD BOARD PLUG LOCATION



NOTES

WIRE DRIVE MOTOR TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

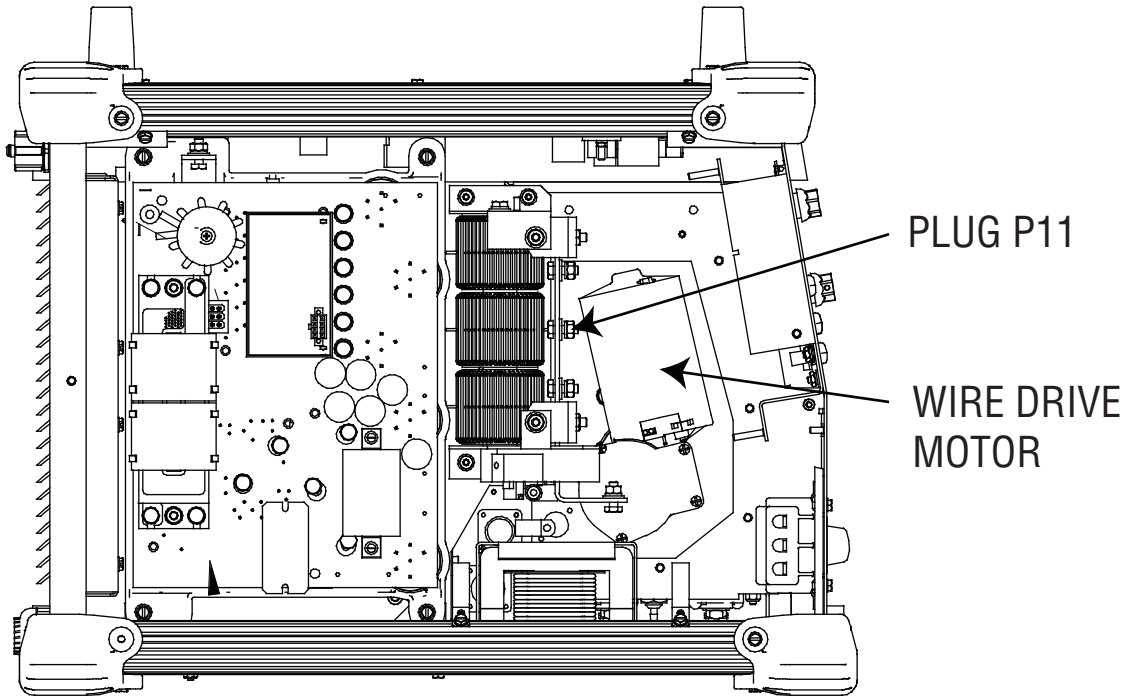
This test will determine if the Wire Drive Motor is functional.

MATERIALS NEEDED

Variable DC Power Supply
Voltmeter/Ohmmeter (Multimeter)

WIRE DRIVE MOTOR TEST PROCEDURE (continued)

FIGURE F.23 – WIRE DRIVE MOTOR LOCATION



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the Wire Drive Motor test points first perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

3. Locate the Wire Drive Motor and Plug P11. See Figure F.23.

4. Disconnect Plug P11. Some wire ties may have to be removed to gain access to Plug P11.

5. Using the Ohmmeter check the armature resistance from the black lead to the white lead on the motor. The normal resistance is approximately 1.5 ohms. Also check the armature resistance to the case of the motor.

   This resistance should be very high. In the millions of ohms. If either of these resistance measurements is not correct the motor may be defective.

6. If the resistance measurements are correct in Step 5 then using the variable DC Power Supply apply a low voltage DC (8-10 volts) to the motor armature leads. White Lead (+) and Black Lead (-). The motor should run. As the armature voltage is increased the motor should increase in speed. If the motor does not function correctly the wire drive motor may be defective. Make certain there are no physical restrictions preventing the motor from running.

7. Reconnect Plug P11 and replace any wire ties previously removed.

8. Replace the case covers.

OUTPUT RECTIFIER TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

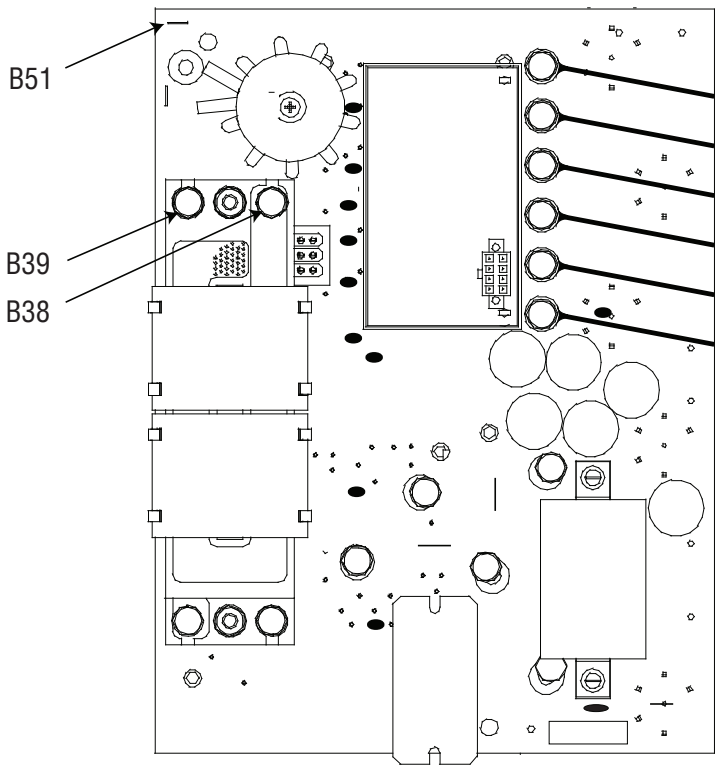
This test will determine if the Output Rectifier is “open” or “shorted”.

MATERIALS NEEDED

Voltmeter/Ohmmeter (Multimeter)

OUTPUT RECTIFIER TEST PROCEDURE (continued)

FIGURE F.24 – TEST POINTS



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the Output Rectifier test points first perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

3. Locate test points B51, B38 and B39. See Figure F24.

4. Using the ohmmeter check the resistances from B51 to B38/ B39. Polarity of the ohmmeter is important. With the positive meter probe on B51 and the negative meter probe on B38/B39 the resistance reading should be very high. With the positive meter probe on B38/B39 and the negative probe on B51 the resistance reading should be very low. Thus a forward diode drop. If the meter readings indicate a very low resistance is both directions the output rectifier may be shorted. If the meter readings indicate a very high resistance in both directions the output rectifier may be open.

5. If the Output Rectifier is faulty the entire Switch Board must be replaced.

6. Replace the case covers.

CURRENT TRANSDUCER TEST PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will help determine if the Current Transducer and associated wiring is functioning correctly.

MATERIALS NEEDED

Misc. Hand Tools
Lap-top computer
Power Wave Manager Software
Ethernet Cross Connect Cable (LE Co.#M19969-7)
Resistive Load Bank (Optional 50 ft. 4/0 weld cable)
Calibrated Ammeter
Volt-Ohmmeter

Note: The Power Wave Manager Software can be down-loaded from the “web” at Powerwavesoftware.com

CURRENT TRANSDUCER TEST PROCEDURE (continued)

PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the Current Transducer first perform the ***Case Cover and DC Link Capacitor Discharge Procedure.***

3. Locate plug J8 on the Control Board. ***See Figure F.25.*** To gain access to the Control Board see the ***Control Board Removal and Replacement Procedure.***

4. Locate the Current Transducer. ***See Figure F.26.***

5. Carefully apply the correct input power to the POWER WAVE® C300.

6. Check for the correct DC supply voltage to the current transducer. ***See Figure F.25*** for Plug J8.

   A. Pin 2 (lead 212+) to Pin 6 (lead 214-) should read +15VDC.

   B. Pin 3 (lead 213-) to pin 6 (lead 214+) should read -15VDC.

Note: Do not attempt to check the voltages at the current transducer connector. The terminals are small and delicate and may be damaged if probed with meter leads.

If the DC supply voltages are not present the Control Board may be faulty. If the supply voltages are correct, proceed to Step 7.

For Steps 7 through 13 refer to the information in the Power Wave Manager software found at Powerwavesoftware.com

7. Using the Ethernet Cross Connect cable, connect a laptop computer to the POWER WAVE® C300 via the Ethernet port located at the top rear of the machine. ***See Figure F.27.***

8. Connect a load bank (or 50 Ft. weld cable) to the Positive and Negative output terminals on the POWER WAVE® C 300.

9. Using the Power Wave Manager software:

   a. Establish Communication with the PW C300

   b. Select the “Calibrate” tab

   c. Select the “50 amp” current set point

   d. Select “Turn Output On”

   e. Use an external calibrated ammeter that is not affected by inverter noise to read the actual current.

10. Check the current transducer’s feedback voltage at the Control Board plug J8 per ***Table F.14.*** Pin 1 (lead 211+) to pin 6 (lead 214-). ***See Figure F.25.*** for pin locations.

11. Repeat the test at several other current levels. If the transducer feedback voltage is correct for the actual current, the current transducer is functioning properly. If there is no feedback voltage, check the wiring from the control board to the current transducer. See the wiring diagram.

CAUTION: If using a weld cable across the output terminals instead of a load bank, do not exceed the current rating of the cable.

12. If the supply voltages are correct but the current transducer feedback voltages are incorrect the current transducer or wiring from the current transducer to the control board may be defective. See the wiring diagram.

13. Click on “Turn Output Off”

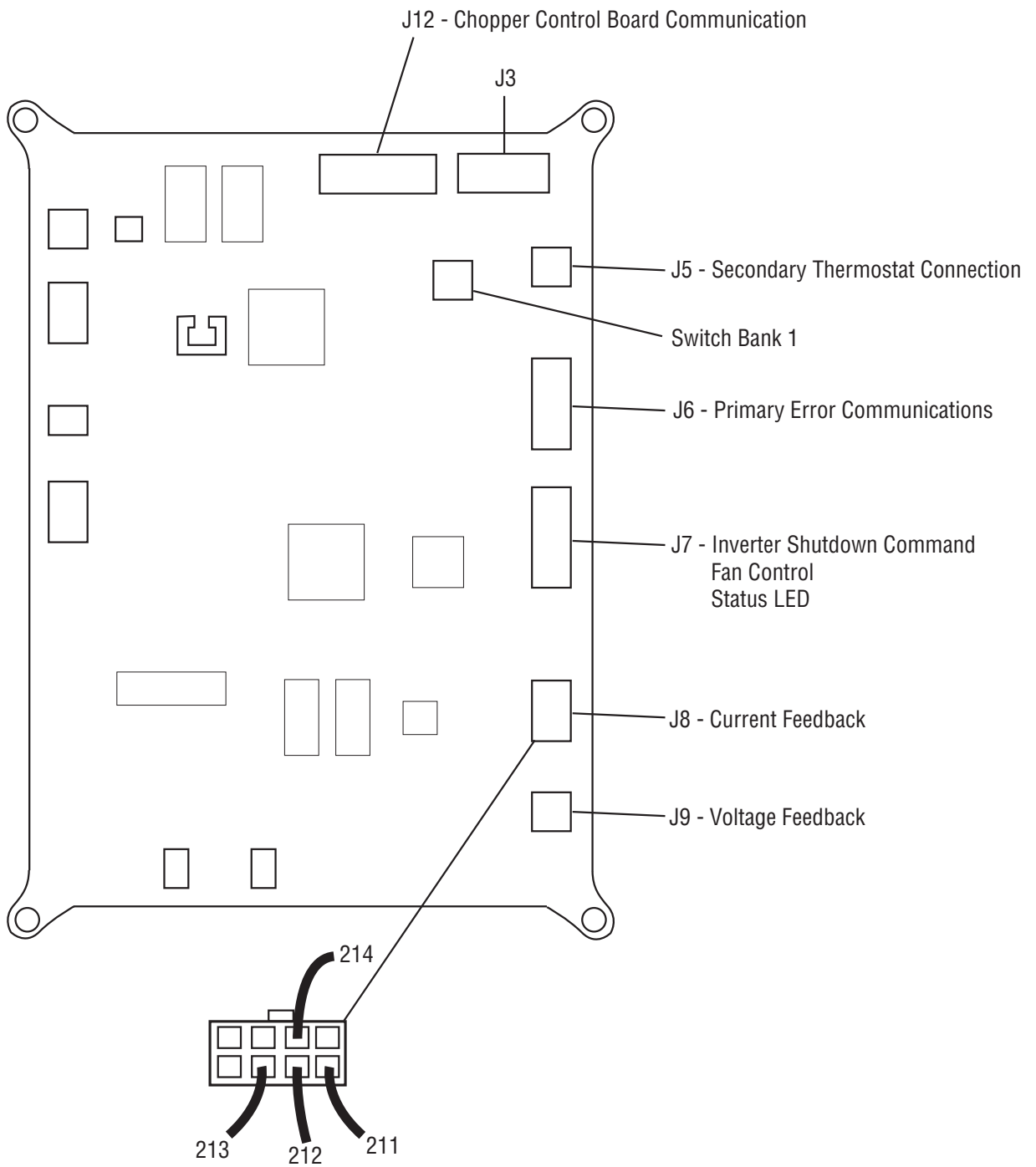
14. Disconnect the laptop computer.

15. Remove the input power to the PW C300 machine.

16. Replace the Control Board and the case covers.

CURRENT TRANSDUCER TEST PROCEDURE (continued)

FIGURE F.25 – PLUG LOCATIONS ON CONTROL BOARD



CURRENT TRANSDUCER TEST PROCEDURE (continued)

FIGURE F.26 – CURRENT TRANSDUCER LOCATION

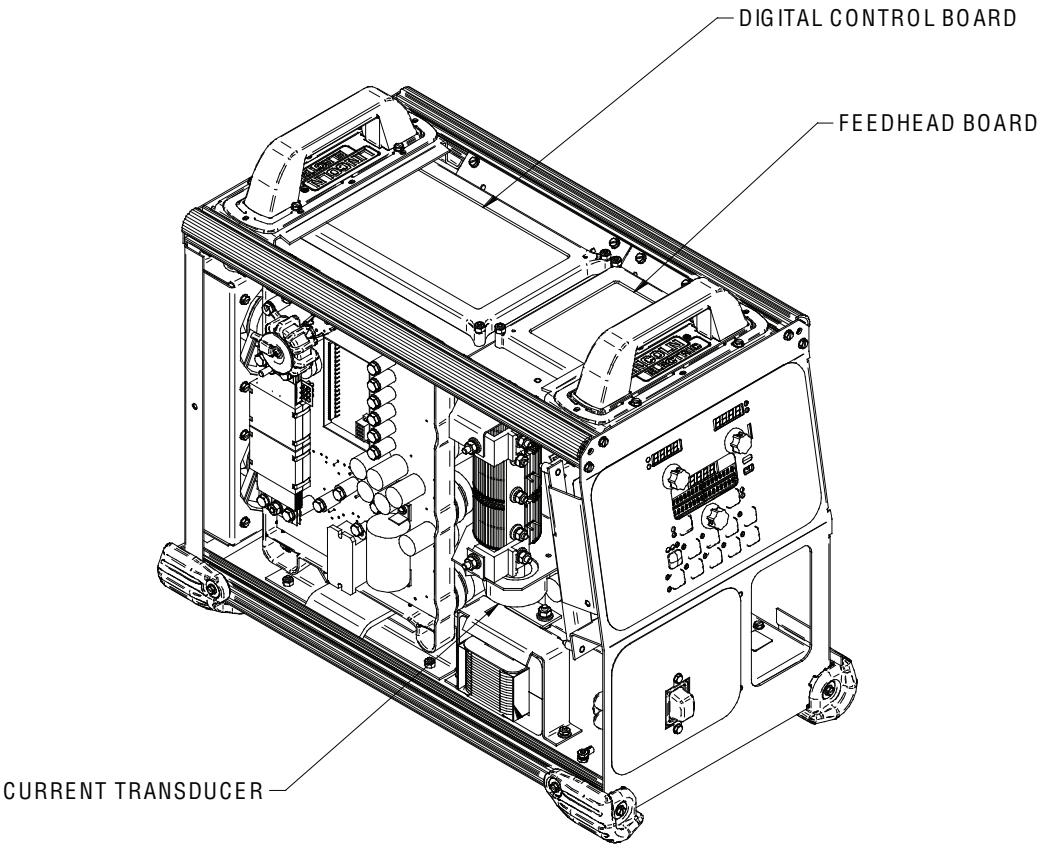
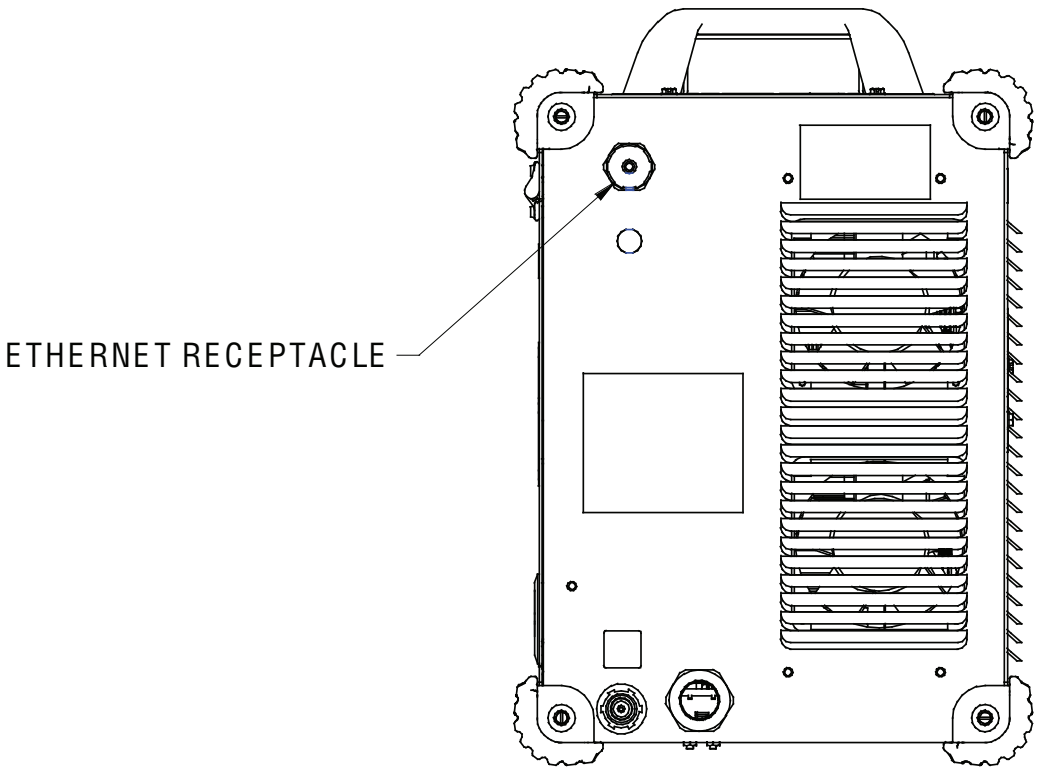


TABLE F.14

Output Current (Actual)	Transducer Feedback Voltage
500	4.0
450	3.6
400	3.2
350	2.8
300	2.4
250	2.0
200	1.6
150	1.2
100	0.8
50	0.4

CURRENT TRANSDUCER TEST PROCEDURE (continued)

FIGURE F.27 – ETHERNET RECEPTACLE



NOTES

POWER FACTOR CORRECTION CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

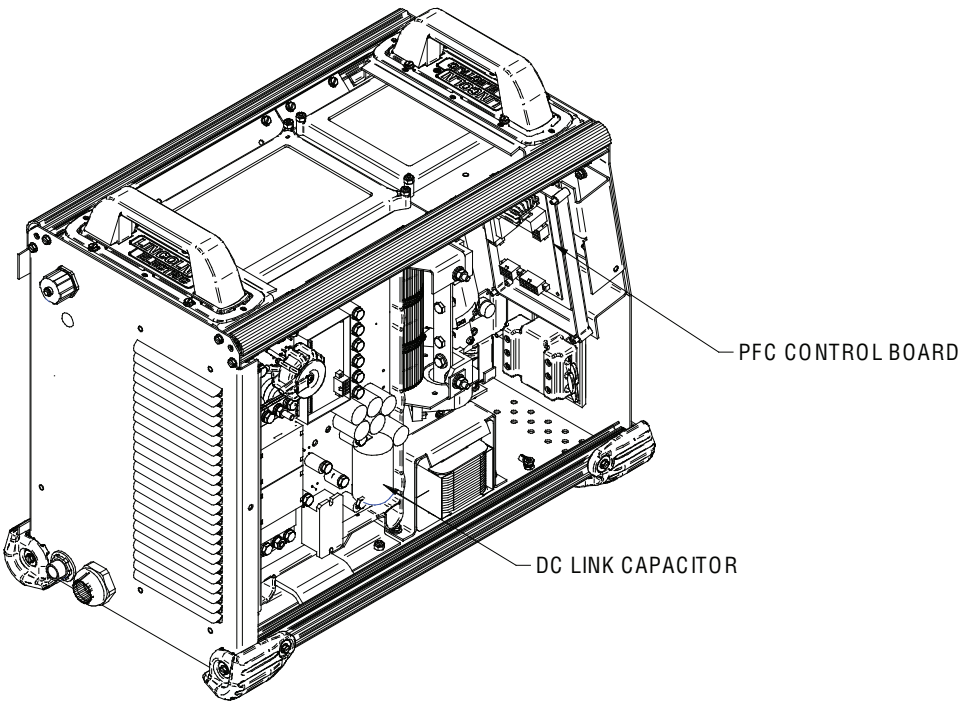
This procedure will aid in the removal and replacement of the Power Factor Correction Control Board.

MATERIALS NEEDED

3/8" Nutdriver

POWER FACTOR CORRECTION CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.28 – CAPACITOR & P.F.C. CONTROL BOARD LOCATION



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.
2. To gain access to the P.F.C. Control Board see the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***
3. Locate the P.F.C. Control Board and using the 3/8 inch nutdriver remove the three nuts securing the P.F.C. Control Board. See Figure F.28.
4. Carefully slide the P.F.C. Control Board from the mounting studs.
5. Remove the five molex type plugs from the board. Label locations for reassembly.
6. Install the new board and replace the molex type plugs previously removed.
7. Replace the three nuts previously removed.
8. Replace the left case side. See the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***

CURRENT TRANSDUCER (LEM) REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

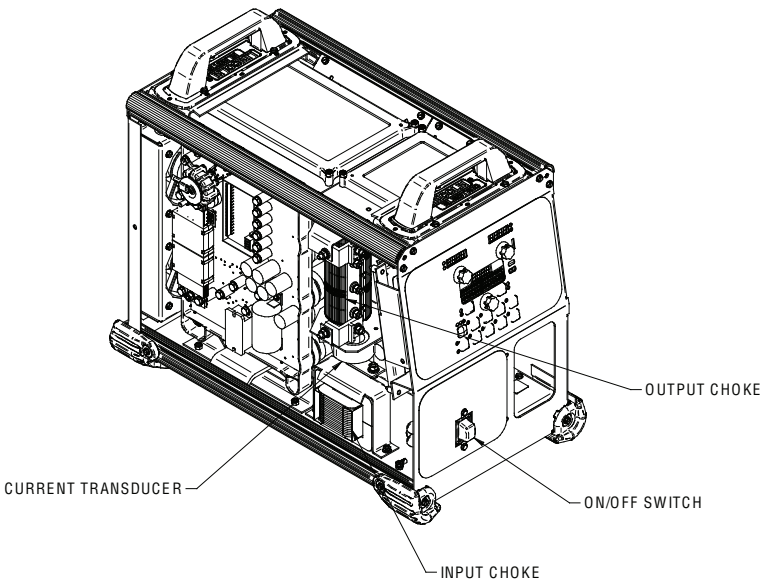
This procedure will aid in the removal and replacement of the Current Transducer (LEM) Module.

MATERIALS NEEDED

11/32 Inch Wrench
7/16 Inch Wrench
Flat Head Screwdriver

CURRENT TRANSDUCER (LEM)
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.29 – CURRENT TRANSDUCER LOCATION



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the Current Transducer see the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***

3. Locate the Current Transducer Module on the left side of the machine. See Figure F.29.

4. Locate and carefully unplug the four pin molex type plug from the Current Transducer. It is located on the underneath side of the module.

5. Using the flat head screwdriver and the 11/32 inch wrench remove the two machine screws, flat washers, lock washers and nuts mounting the Current Transducer Module to the output choke bracket.

6. Using the 7/16 inch wrench remove the negative output flex cable from the output choke aluminum strap.

7. Take note of the arrow direction on Current Transducer Module. The new Module must be installed with the arrow pointing in the same direction.

8. Carefully remove the Current Transducer Module from the aluminum strap. This may require some gentle twisting.

9. Carefully place the new Current Transducer Module into the proper position taking note of the arrow direction discussed in Step 7.

10. Mount the new Current Transducer Module to the output choke bracket using the machine screws, washers and nuts previously remove.

11. Attach the negative output flex cable to the output choke aluminum strap.

12. Replace the four pin molex type plug into the new Current Transducer Module.

13. Replace the left case side. See the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***

CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

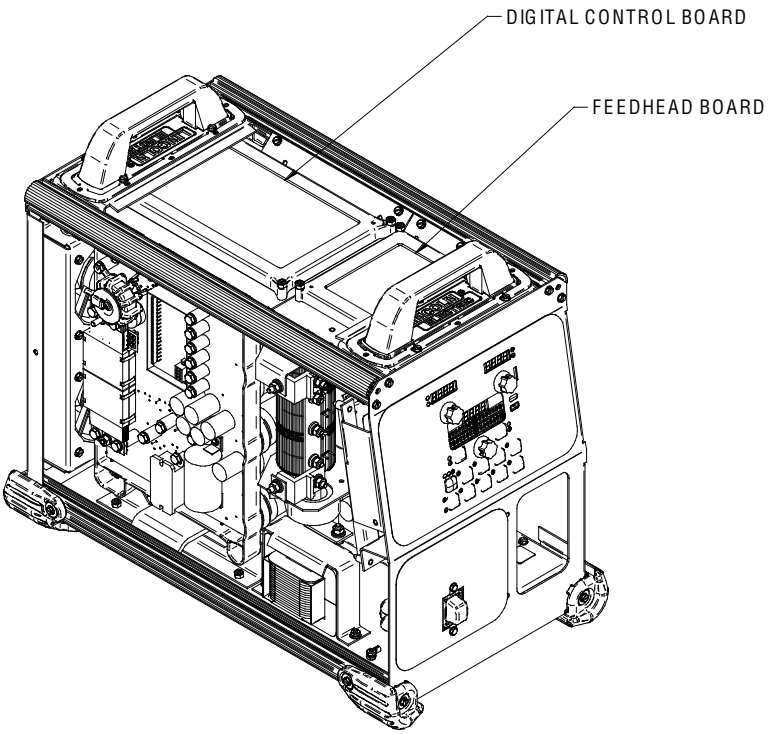
This procedure will aid in the removal and replacement of the Control Board.

MATERIALS NEEDED

3/8 Inch Nutdriver

CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.30 – CONTROL BOARD LOCATION



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the Control Board see the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.*** Remove the top case cover.

3. Locate the Control Board and using the 3/8 inch nutdriver remove the two nuts securing the Control Board. See Figure F.30.

4. Carefully slide the Control Board up and out over the mounting studs.

5. Carefully turn the Control Board over to the component side of the board.

6. Remove the eight molex type plugs and the Ethernet cable from the board. Label locations for reassembly. **See Figure F.31.**

7. Install the new board and replace the molex type plugs and Ethernet cable previously removed.

8. Check the settings of the dip switch making sure they are the same as the old board

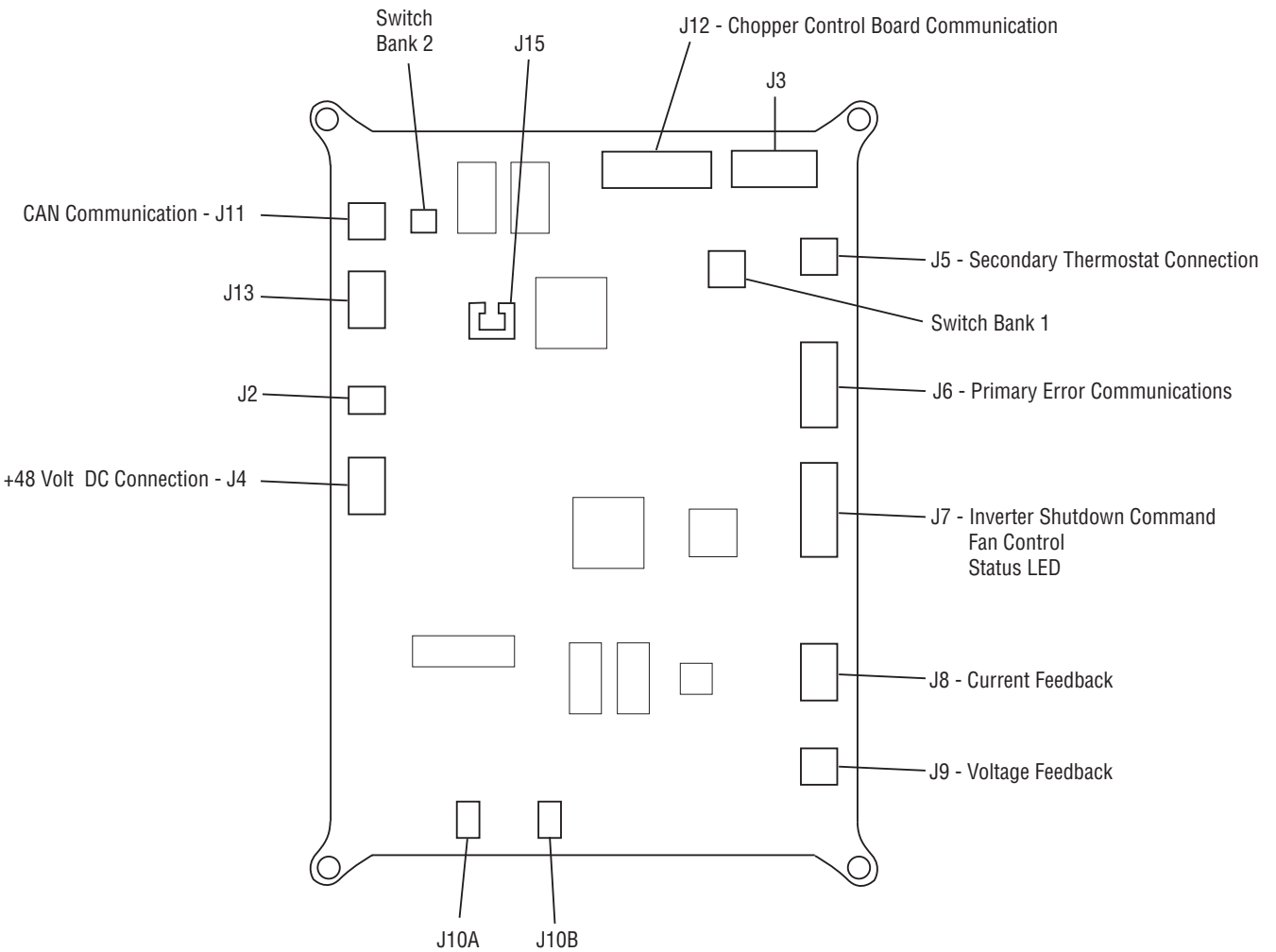
9. Carefully slide the new Control Board into place being careful not to damage any components or plugs.

10. Replace the two nuts previously removed.

11. Replace case top. See the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***

CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.31 – BOARD PLUG REMOVAL



NOTES

FeedHead BOARD REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

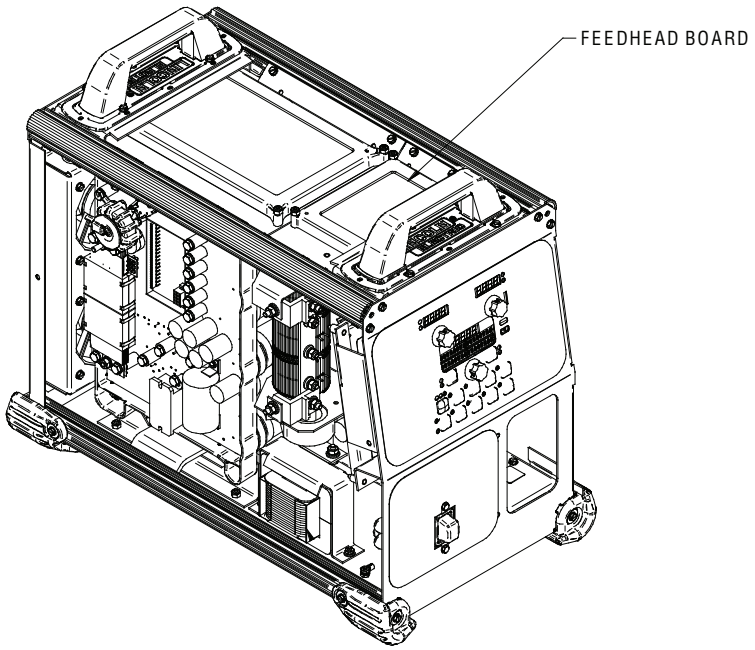
This procedure will aid in the removal and replacement of the FeedHead Board.

MATERIALS NEEDED

3/8 Inch Nutdriver

FeedHead BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.32 – FeedHead BOARD LOCATION



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.
2. To gain access to the FeedHead Board see the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.*** Remove the top case cover.
3. Locate the FeedHead Board and using the 3/8 inch nutdriver remove the two nuts securing the FeedHead Board. See Figure F.32.
4. Carefully slide the FeedHead Board up and out over the mounting studs.
5. Carefully turn the FeedHead Board over to the component side of the board.
6. Remove the molex type plugs from the board. Label locations for reassembly.
7. If a spool gun board is plugged into the FeedHead Board carefully remove it.
8. Install the new board and replace the molex type plugs previously removed.
9. Check the settings of the dip switch making sure they are the same as the old board.
10. Install the spool gun board and associated plugs.
11. Carefully slide the new FeedHead Board into place being careful not to damage any components or plugs.
12. Replace the two nuts previously removed.
13. Replace case top. See the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***

SWITCH BOARD ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

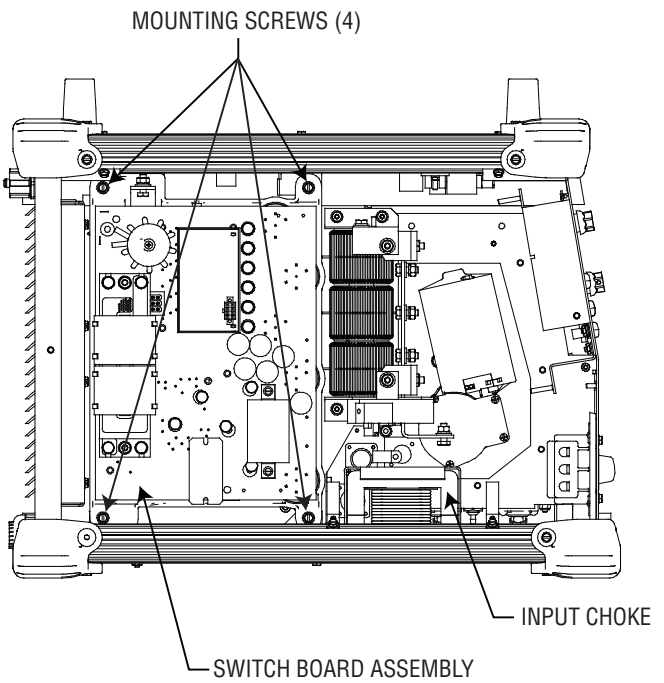
This procedure will aid the technician in the removal and replacement of the Switch Board.

MATERIALS NEEDED

5/16” Nutdriver
7/16” Wrench

SWITCH BOARD ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.33 – SWITCH BOARD LOCATION & MOUNTING SCREWS



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.

2. To gain access to the Switch Board Assembly see the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***

3. Locate the Switch Board. See Figure F.33.

4. Locate, label and remove the five molex plugs from the switch board. J41, J42, J43, J45 and J28. ***See Figure F.34.***

5. Using the 7/16” wrench, remove the six output choke leads from the terminals labeled BL1 thru BL6. Be sure to label the leads for reassembly. ***See Figure F.34.***

6. Using the 7/16” wrench, remove the positive output cable from the switch board. See ***Figure F.34.*** Note washer and lead placement for reassembly.

7. Using the 7/16” wrench, remove the two input choke leads from terminals B28 and B29. See ***Figure F.34.***

8. Using the 7/16” wrench, remove the three input power leads from terminals B30 Lead 2A, B31 Lead 1A and B32 Lead 3A. ***See Figure F.34.***

9. Remove the two thermostat leads (410 and 409) from the heat sink thermostat.

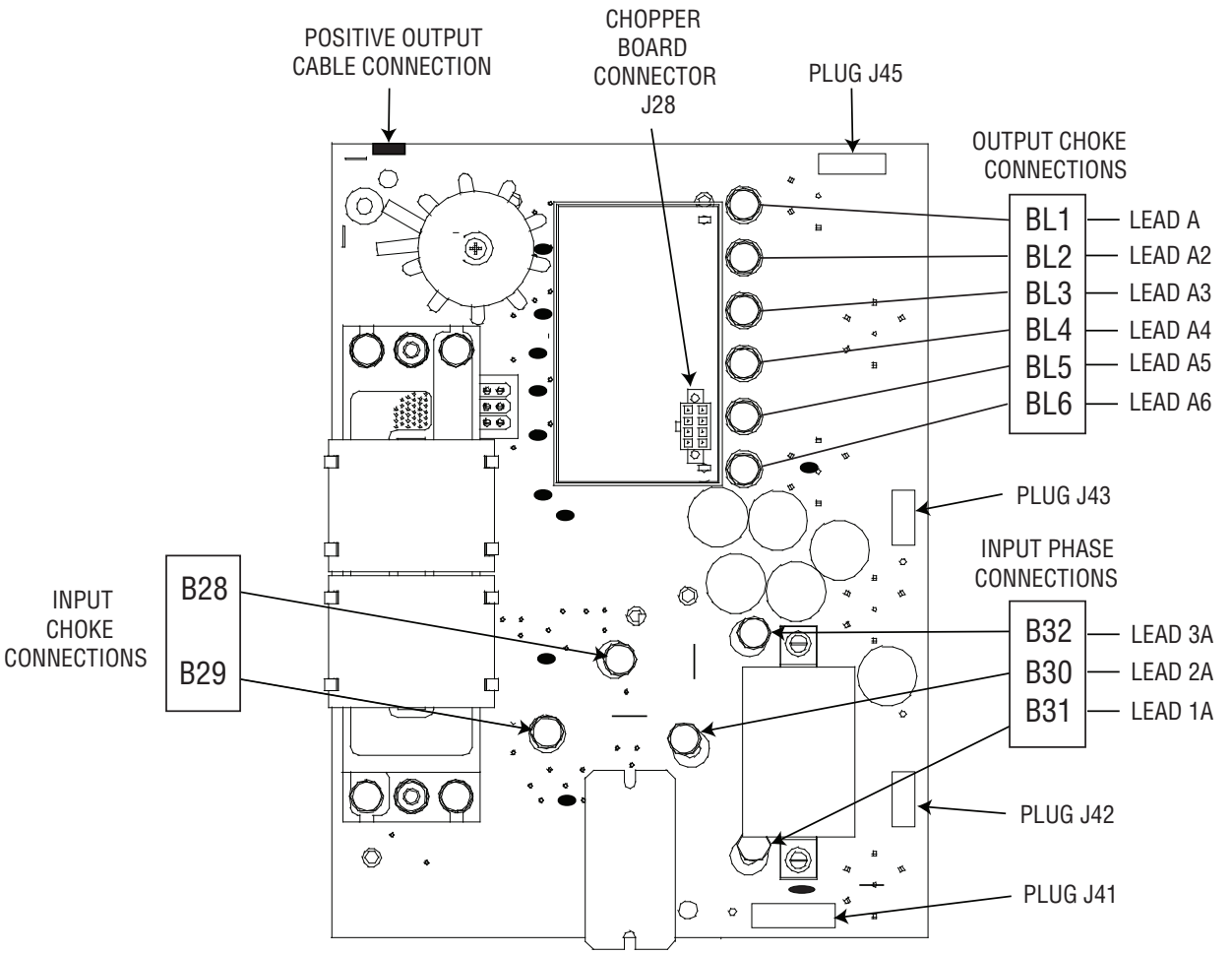
10. Using the 5/16” nutdriver, remove the four screws and washers securing the switch board assembly to the chassis frame. See Figure F.33.

11. Using the 5/16” nutdriver, remove the cable clamp from the top aluminum extrusion. Clear all leads for Switch Board Assembly removal.

12. Carefully remove the Switch Board Assembly.

SWITCH BOARD ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.34 – SWITCH BOARD LEADS



13. Carefully place the new Switch Board Assembly into position in the chassis.

14. Secure the Switch Board Assembly to the chassis with the four screws and washers previously removed.

15. Connect leads 410 and 409 to the heat sink thermostat.

16. Connect the cable clamp to the top aluminum extrusion.

17. Reconnect the positive output cable.

18. Reconnect all of the leads previously removed. See Figure F.34.

19. Replace the five molex plugs previously removed. See Figure F.34.

20. Clear and position all leads.

21. Replace the case cover. See the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***

22. Perform the ***Retest After Repair Procedure.***

NOTES

WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

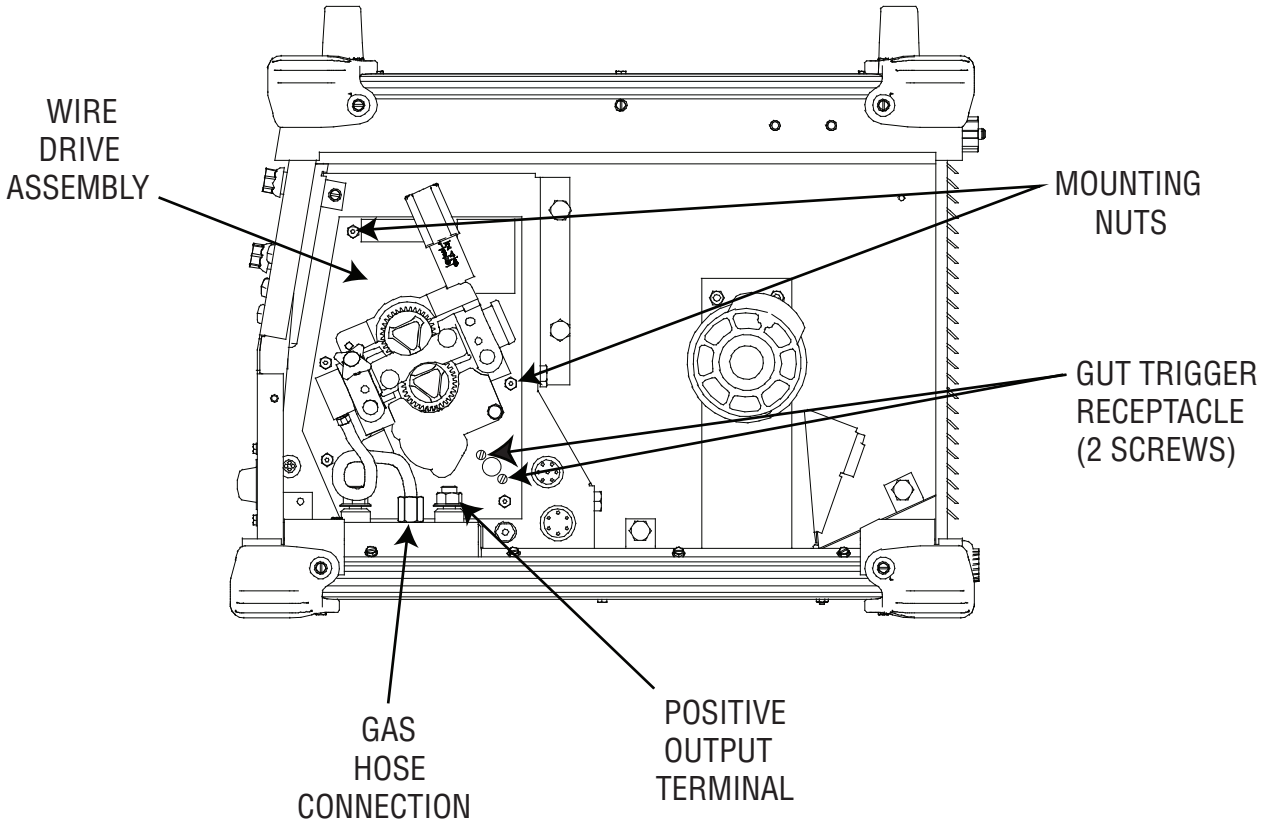
This procedure will aid in the removal and replacement of the Wire Drive Assembly from the machine.

MATERIALS NEEDED

3/4 Inch Wrench
11/16 Inch Wrench
Small Phillips Head Screwdriver
3/8 Inch Nutdriver

WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.35 – WIRE DRIVE ASSEMBLY LOCATION



PROCEDURE

1. Disconnect the input power to the POWER WAVE® C300 machine.
2. Locate the Wire Drive Assembly. See Figure F.35.
3. Using the Phillips Head screwdriver remove the two screws securing the gun trigger receptacle to the Wire Drive Assembly. See Figure F.35.
4. Using the ¾ inch wrench remove the output cable from the positive output terminal. See Figure F.35.
5. Using the 11/16 inch wrench remove the gas hose connection. See Figure F.35.
6. Using the 3/8 inch nutdriver remove the six nuts securing the Wire Drive Assembly to the center support of the machine. See Figure F.35.
7. Carefully remove the Wire Drive Assembly from the machine. When the Wire Drive Assembly is part way out disconnect Plug J83 from the wiring harness.

WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE (continued)

8. Carefully place the new Wire Drive Assembly into position and connect Plug J83 into the wiring harness.

9. Mount the gun trigger receptacle into the Wire Drive Assembly.

10. Secure the Wire Drive Assembly to the center support studs with the six nuts previously removed

11. Attach the output cable to the positive output terminal.

12. Attach the gas hose.

13. Perform the ***Retest After Repair Procedure.***

NOTES

USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid in the removal and replacement of the User Interface Board from the front panel.

MATERIALS NEEDED

5/16 Inch Wrench
3/8 Inch Wrench
Small Slot Head Screwdriver

USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

PROCEDURE

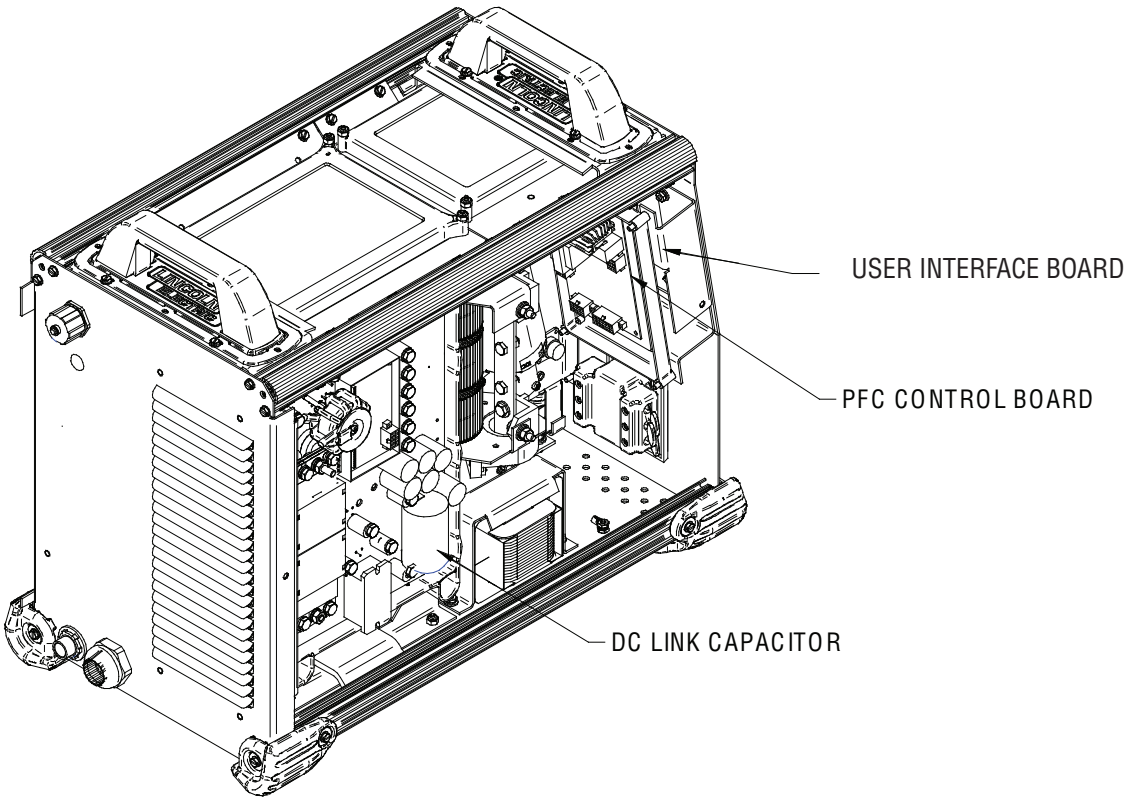
1. Disconnect the input power to the POWER WAVE® C300 machine.
2. To gain access to the User Interface Board see the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***
3. Locate the User Interface Board. See ***Figure F.36.***
4. Using the small screwdriver remove the three knobs and felt washers from the case front. ***See Figure F.37.***
5. Using the 5/16 inch wrench remove the four screws from the top of the case front assembly. See ***Figure F.37.***
6. Using the 5/16 inch wrench remove the two screws from the User Interface Board cover plate. ***See Figure F.38.***
7. Using the 3/8 inch wrench remove the two nuts, lock washers and washers from the interface cover plate. ***See Figure F.38.***
8. Remove the cover plate and locate the two slot head screws securing the User Interface Board to the case front assembly.
9. Using the slot head screwdriver remove the two mounting screws from the User Interface Board.
10. Remove the Power Factor Correction Control Board. See the ***Power Factor Correction Control Board Removal and Replacement Procedure.***
11. Remove Plug J5 from the User Interface Board.
12. Remove the bypass grounding assembly from the User Interface Board.
13. Locate and remove the other two slot head mounting screws on the left hand side of the User Interface Board.
14. Carefully remove the User Interface Board from the case front panel assembly.

REPLACEMENT PROCEDURE

15. Carefully place the new User Interface Board into position in the case front assembly.
16. Secure the User Interface Board to the case front with the four slot head screws previously removed.
17. Connect the bypass grounding assembly.
18. Connect plug J5.
19. Install the Power Factor Correction Control Board that was previously removed.
20. Replace the User Interface Board cover plate.
21. Replace the three knobs and felt washers.
22. Replace the four screws that were removed from the top of the front cover assembly.
23. Replace the case cover. See the ***Case Cover Removal and DC Link Capacitor Discharge Procedure.***
24. Perform the ***Retest After Repair Procedure.***

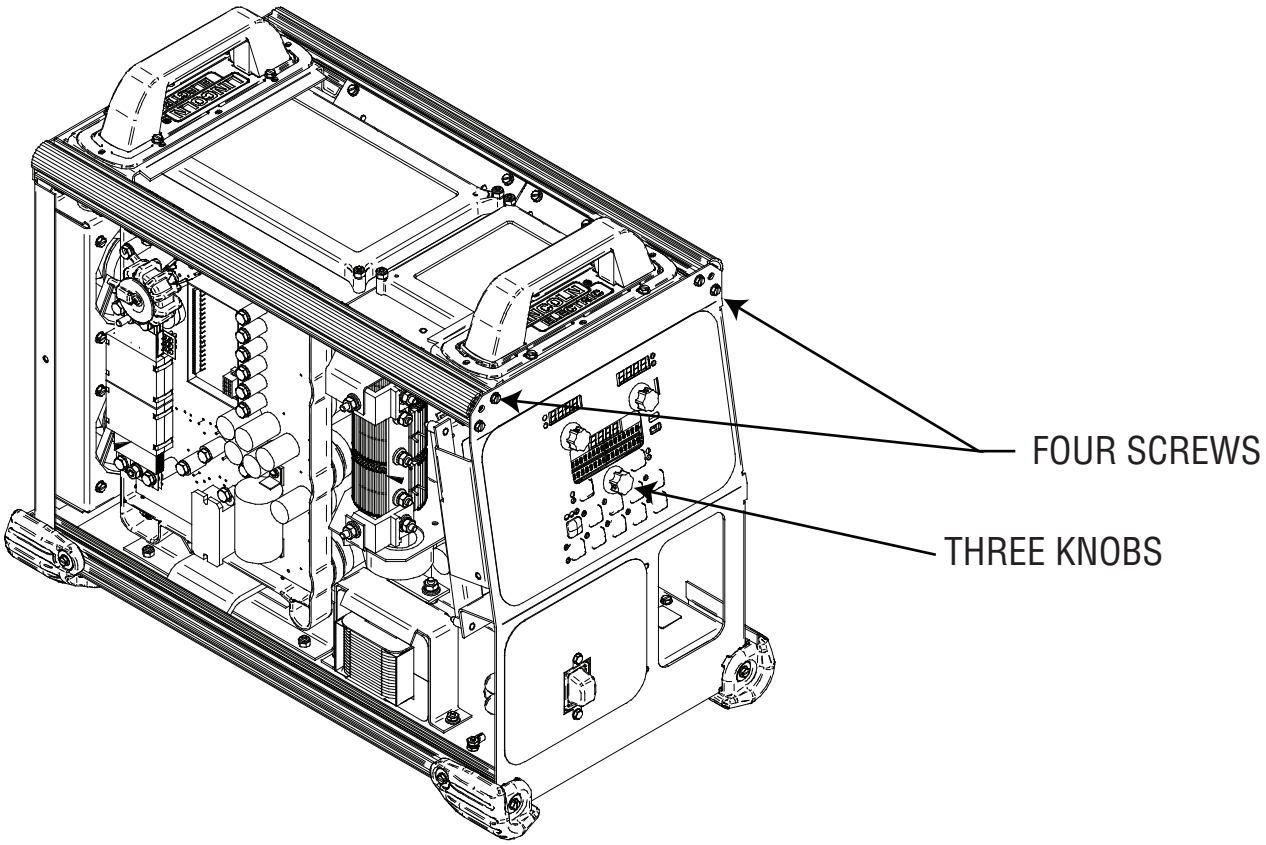
USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.36 – USER INTERFACE BOARD LOCATION



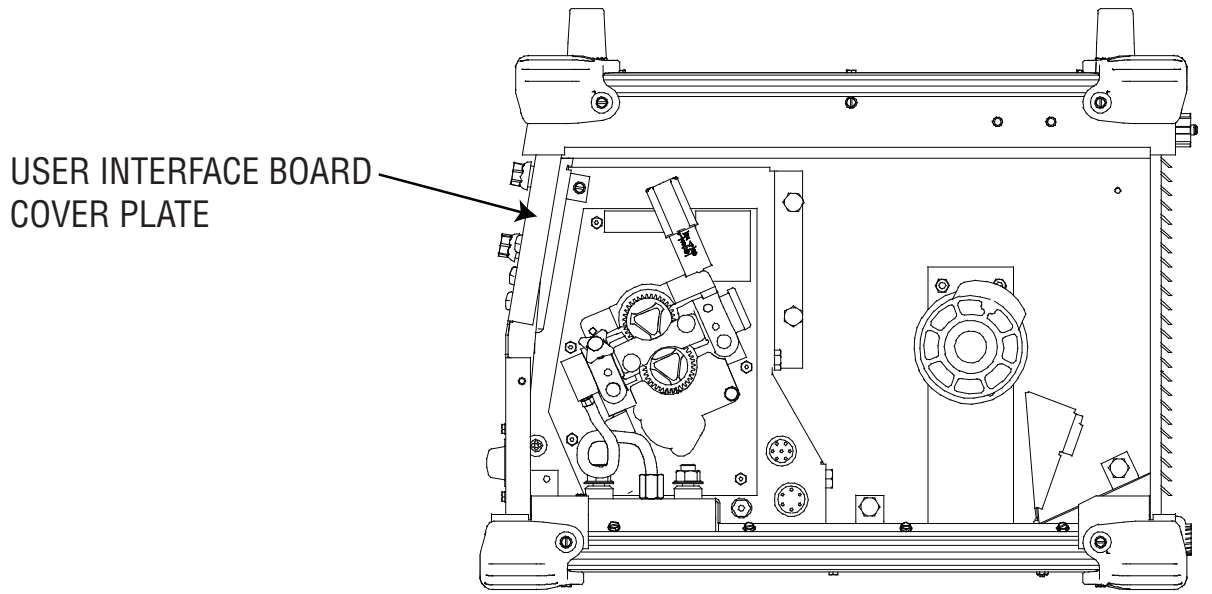
USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.37 – KNOBS



USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.38 – USER INTERFACE BOARD COVER PLATE



NOTES

RETEST AFTER REPAIR

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid the technician in testing the Power Wave C300 output after the repair or replacement of a part or PC board.

MATERIALS NEEDED

Power Wave Manager Software
Laptop or other Suitable Computer
Ethernet Cross Connect Cable (LE Co. #M19969-7)
Resistive Load Bank
Two (2) Welding Cables - 20ft. -4/0
Calibrated Ammeter and Voltmeter

TEST PROCEDURE

1. Be certain that the machine is properly connected for the input voltage being applied.

2. Turn the Power Switch ON and see that it goes through the Start-up routine and the Status Light is steady Green.

3. Turn the Power Switch OFF and connect a resistive load across the Output Studs and a computer to the Ethernet. ***Perform the Calibration Procedure*** to be sure that the machine will produce proper weld output.

4. Activate the gun trigger and make sure the wire drive motor runs in the correct direction and the speed is adjustable (50-700 IPM).

5. Make certain the Gas Purge and Cold Inch function properly.

NOTES

CHOPPER MODULE OUTPUT TEST

⚠ WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

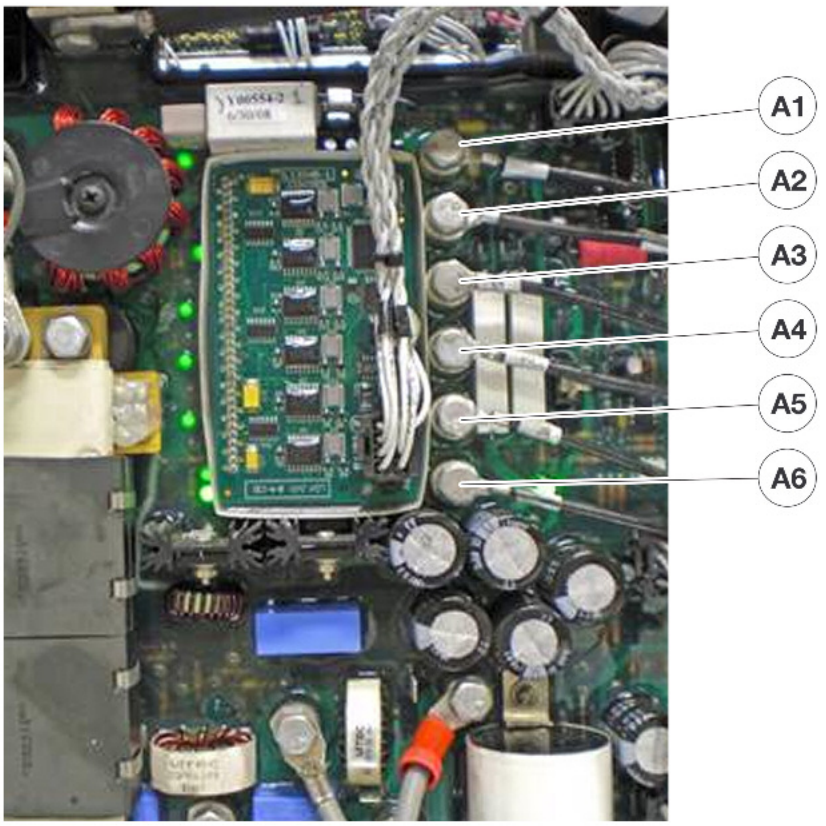
This test will determine if the Chopper Module is working properly.

MATERIALS NEEDED

Load Bank
Clamp on Ammeter
Power Feeder, U/I kit, or Computer with Ethernet and Power Wave Manager

CHOPPER MODULE OUTPUT TEST (continued)

FIGURE F.39 – CHOPPER MODULE OUTPUT TEST



PROCEDURE

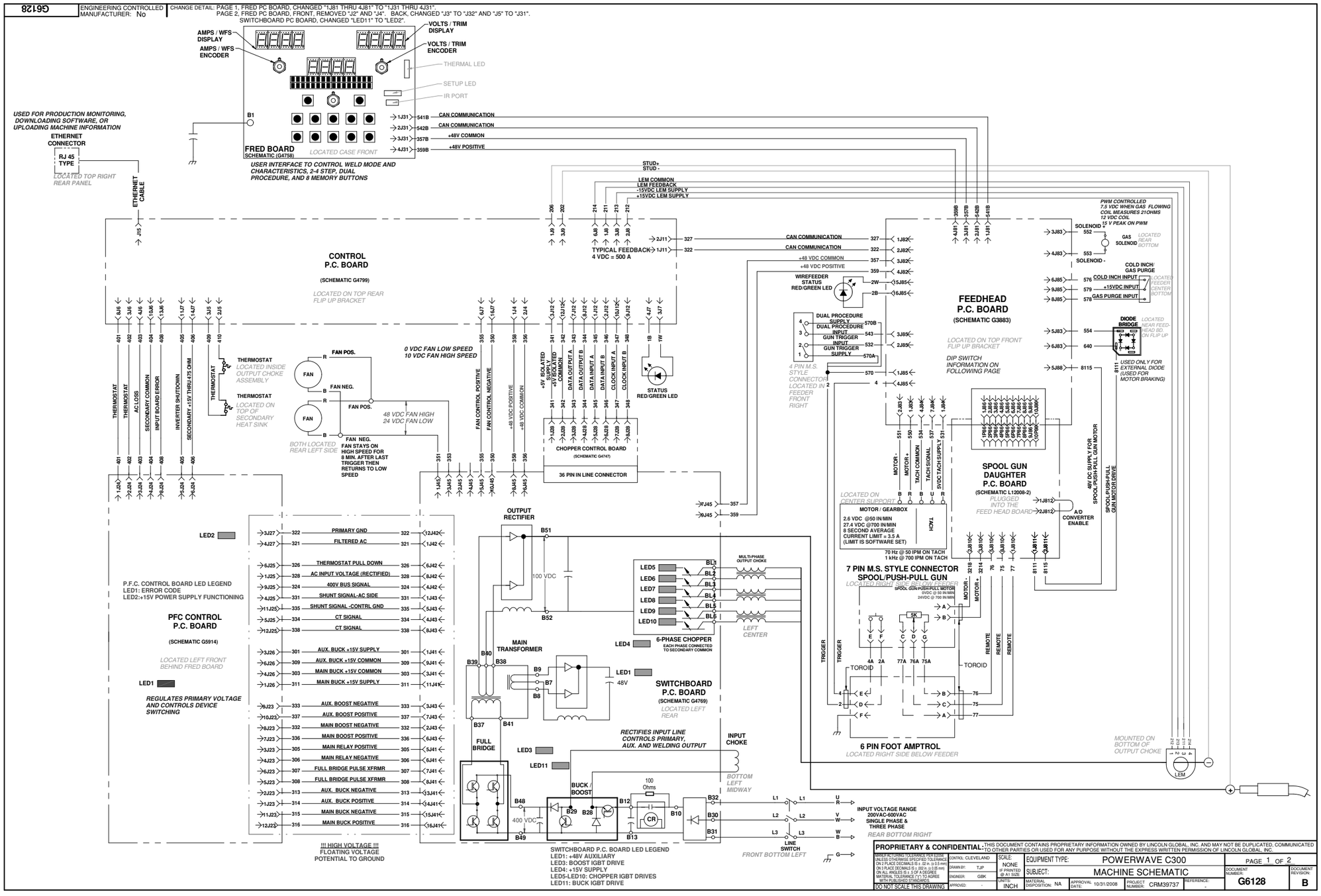
1. Perform the Case Cover Removal Procedure
2. Connect the output terminals to a load bank
3. Set the load bank to 450A
4. Using a Power Feed, U/I, or Power Wave Manager, put the machine in mode 200 (CC Test Mode)
5. Set the output to 300A and use the clamp on ammeter to check using the table below

Test Point	Lead	Acceptable Value	Component Tested
1.	Positive Output Lead	300A	Machine Output
2.	A	45-55A	Chopper Output
3.	A2	45-55A	Chopper Output
4.	A3	45-55A	Chopper Output
5.	A4	45-55A	Chopper Output
6.	A5	45-55A	Chopper Output
7.	A6	45-55A	Chopper Output

TABLE OF CONTENTS - DIAGRAM SECTION

*** NOTE:** Many PC Board Assemblies are now totally encapsulated, surface mounted and or multi-layered and are therefore considered to be unserviceable. Assembly drawings of these boards are no longer provided.

WIRING DIAGRAM - (G6128) (PG. 1 0F 2)

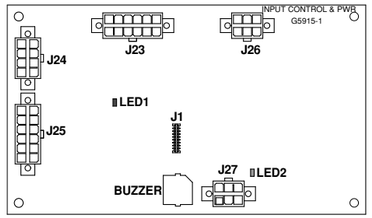


NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

WIRING DIAGRAM - (G6128) (PG. 2 0F 2)

G6128 | ENGINEERING CONTROLLED MANUFACTURER: No | CHANGE DETAIL: PAGE 1, FRED PC BOARD, CHANGED "1J81 THRU 4J81" TO "1J31 THRU 4J31". PAGE 2, FRED PC BOARD, FRONT, REMOVED "J2" AND "J4". BACK, CHANGED "J3" TO "J32" AND "J5" TO "J31". SWITCHBOARD PC BOARD, CHANGED "LED11" TO "LED2".

PFC CONTROL P.C. BOARD



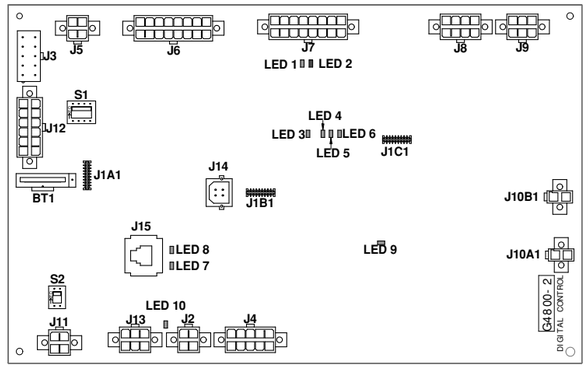
Description of LED functions on Power Wave C300

For reference only

G5915 PFC CONTROL P.C. BOARD		
LED #	COLOR	FUNCTION
2	GREEN	15 VDC POWER SUPPLY FUNCTIONING PROPERLY WHEN ON
1	RED	ERROR CODE (LED WILL FLASH ERROR AND BUZZER WILL SOUND) SEE TABLE BELOW FOR DETAILS

ERROR CODE	
ERROR	EXPLANATION
331	PEAK INPUT CURRENT LIMIT
334	START UP CURRENT CHECK FAILURE
335	START UP VOLTAGE CHECK FAILURE
336	THERMAL FAULT (NO FIRST STAGE FAN)
337	PRECHARGE TIMEOUT
346	TRANSFORMER PRIMARY OVERCURRENT

CONTROL P.C. BOARD



Description of LED functions on Power Wave C300

For reference only

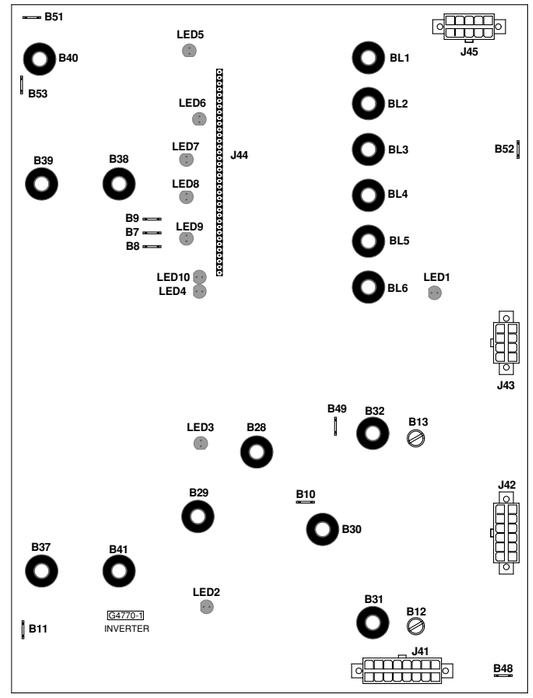
G4800 CONTROL P.C. BOARD		
LED #	COLOR	FUNCTION
1	GREEN	STATUS "OK"
2	RED	STATUS "ERROR" (CHECK CODE FOR SPECIFIC ERROR)
3	GREEN	OUTPUT ENABLE
4	GREEN	SINGLE PHASE DETECT
5	GREEN	67 SENSE
6	GREEN	21 SENSE
7	GREEN	ETHERNET STATUS
8	GREEN	ETHERNET STATUS
9	GREEN	INPUT SUPPLY 30 VDC TO 55 VDC
10	GREEN	DEVICENET

SWITCHBOARD P.C. BOARD

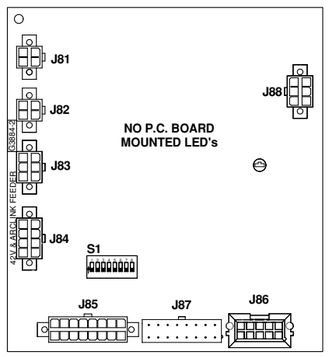
Description of LED functions on Power Wave C300

For reference only

G4770 SWITCHBOARD P.C. BOARD		
LED #	COLOR	FUNCTION
1	GREEN	48 VDC AUXILIARY POWER FUNCTIONING WHEN ON
3	GREEN	BOOST IGBT DRIVE FUNCTIONING WHEN ON
4	GREEN	15 VDC POWER FUNCTIONING PROPERLY WHEN ON
5	GREEN	CHOPPER IGBT 1 DRIVE FUNCTIONING WHEN ON
6	GREEN	CHOPPER IGBT 2 DRIVE FUNCTIONING WHEN ON
7	GREEN	CHOPPER IGBT 3 DRIVE FUNCTIONING WHEN ON
8	GREEN	CHOPPER IGBT 4 DRIVE FUNCTIONING WHEN ON
9	GREEN	CHOPPER IGBT 5 DRIVE FUNCTIONING WHEN ON
10	GREEN	CHOPPER IGBT 6 DRIVE FUNCTIONING WHEN ON
11	GREEN	BUCK IGBT DRIVE FUNCTIONING WHEN ON

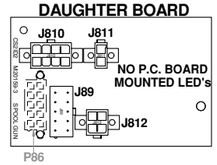


FEEDHEAD P.C. BOARD



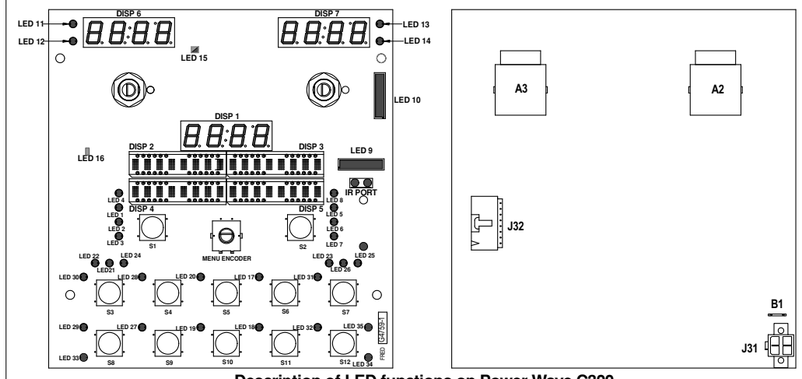
G3884 FEEDHEAD P.C. BOARD		
SWITCH	POSITION	DESCRIPTION
1-6	OFF	UNUSED SWITCHES
7	OFF	FOR "POSITIVE" ELECTRODE POLARITY
	ON	FOR "NEGATIVE" ELECTRODE POLARITY
8	OFF	FOR "LOW" FEED SPEED GEAR
	ON	FOR "HIGH" FEED SPEED GEAR

SPOOL GUN DAUGHTER BOARD



F.R.E.D. P.C. BOARD

FRONT *BACK*



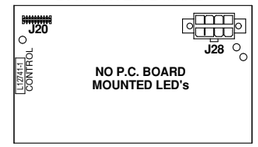
Description of LED functions on Power Wave C300

For reference only

G4759 F.R.E.D P.C. BOARD								
LED #	COLOR	FUNCTION	LED #	COLOR	FUNCTION	LED #	COLOR	FUNCTION
1	RED	N/A	13	RED	VOLTS SELECT	24	RED	PROCEDURE B SELECT
2	RED	WAVE CONTROL SELECT	14	RED	TRIM SELECT	25	RED	N/A
3	RED		15	GREEN	STATUS "OK"	26	RED	N/A
4	RED	N/A		RED	STATUS "ERROR" (CHECK CODE FOR SPECIFIC ERROR)	27	RED	MEMORY SELECT SWITCH 5
5	RED	N/A	16	GREEN	POWER SUPPLY FUNCTION "OK"	28	RED	MEMORY SELECT SWITCH 4
6	RED	PRE-WELD CONTROL SELECT	17	RED	MEMORY SELECT SWITCH 6	29	RED	2 STEP TRIGGER MODE
7	RED	POST-WELD CONTROL SELECT	18	RED	MEMORY SELECT SWITCH 11	30	RED	N/A
8	RED	N/A	19	RED	MEMORY SELECT SWITCH 10	31	RED	MEMORY SELECT SWITCH 7
9	RED	SETUP MENU ENABLED	20	RED	MEMORY SELECT SWITCH 5	32	RED	MEMORY SELECTSWITCH
10	RED	THERMAL FAULT MEASURED	21	RED	TORCH DUAL PROCEDURE SELECT	33	RED	4 STEP TRIGGER MODE
11	RED	WIRE FEED SPEED SELECT	22	RED	PROCEDURE A SELECT	34	RED	N/A

NOTE: P.C. BOARD GRAPHICS ARE FOR REFERENCE ONLY. SEE P.C. BOARD DRAWINGS FOR UP TO DATE INFORMATION.

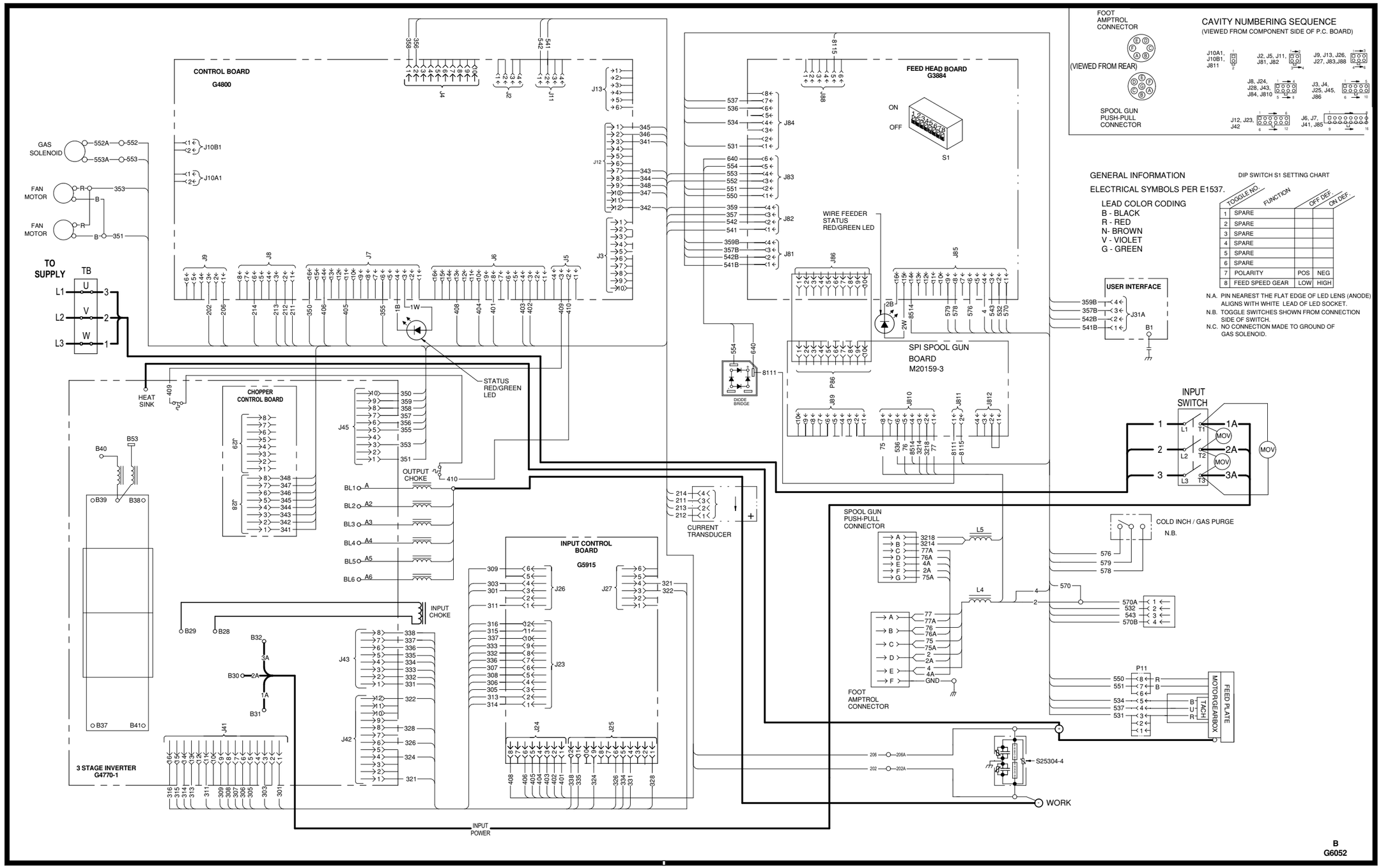
CHOPPER CONTROL DAUGHTER BOARD



MANUFACTURING TOLERANCE PER ES999 UNLESS OTHERWISE SPECIFIED TOLERANCE ON 1 PLACE DECIMALS IS ± .030 in (0.8 mm) ON 2 PLACE DECIMALS IS ± .010 in (0.25 mm) ON ALL ANGLES IS ± .5 OF A DEGREE MATERIAL TOLERANCE ("t") TO AGREE WITH PUBLISHED STANDARDS	CONTROL: CLEVELAND	SCALE: NONE IF PRINTED @ A1 SIZE	EQUIPMENT TYPE: POWERWAVE C300		PAGE 2 OF 2
	DRAWN BY: TJP		SUBJECT: MACHINE SCHEMATIC		DOCUMENT NUMBER: G6128 / DOCUMENT REVISION: B
	ENGINEER: GBK	UNITS: INCH	MATERIAL DISPOSITION: NA	APPROVAL DATE: 10/31/2008	PROJECT NUMBER: CRM39737 / REFERENCE: -
DO NOT SCALE THIS DRAWING	APPROVED: -				

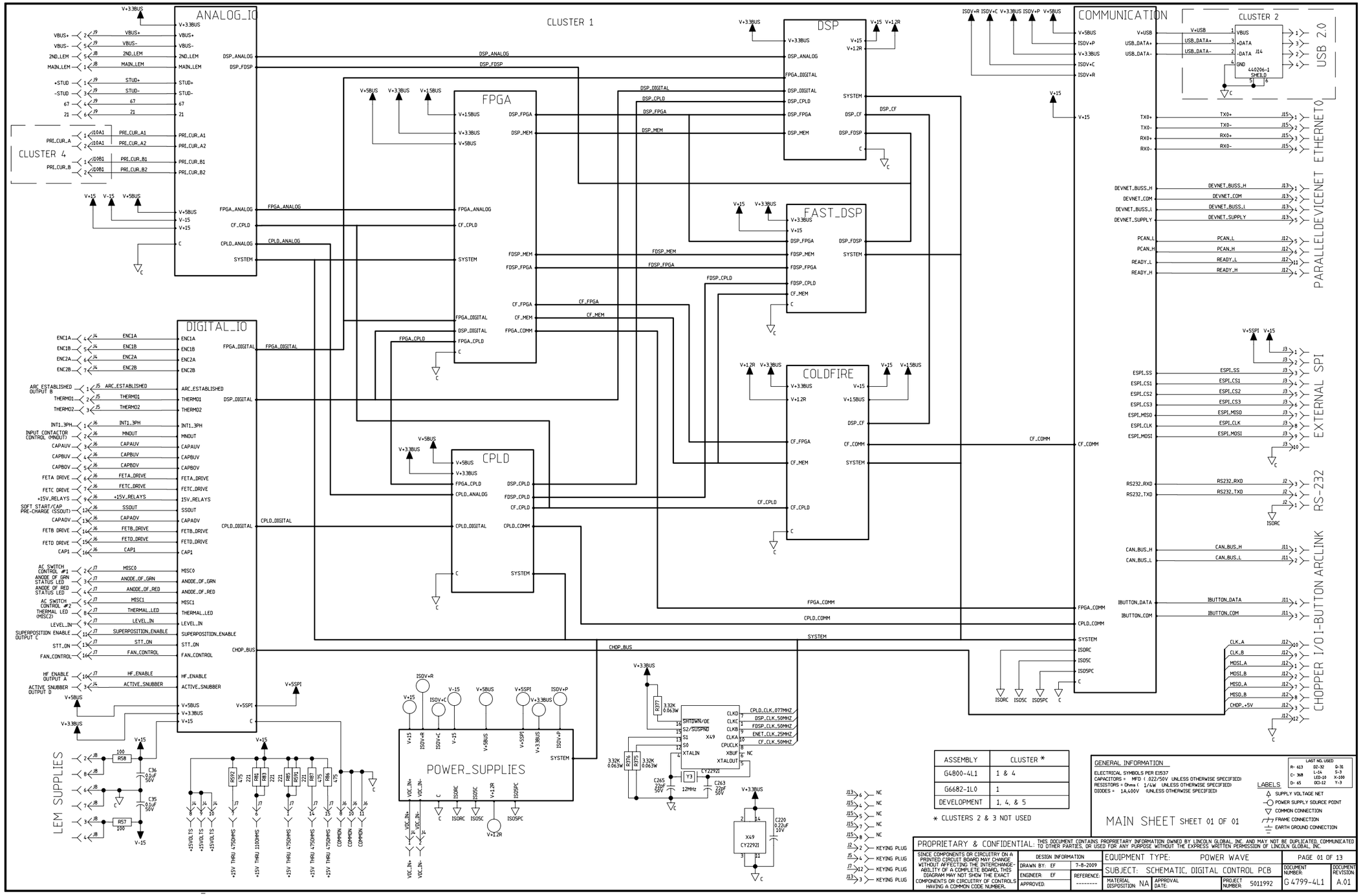
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

SCHEMATIC - COMPLETE MACHINE (G6052)



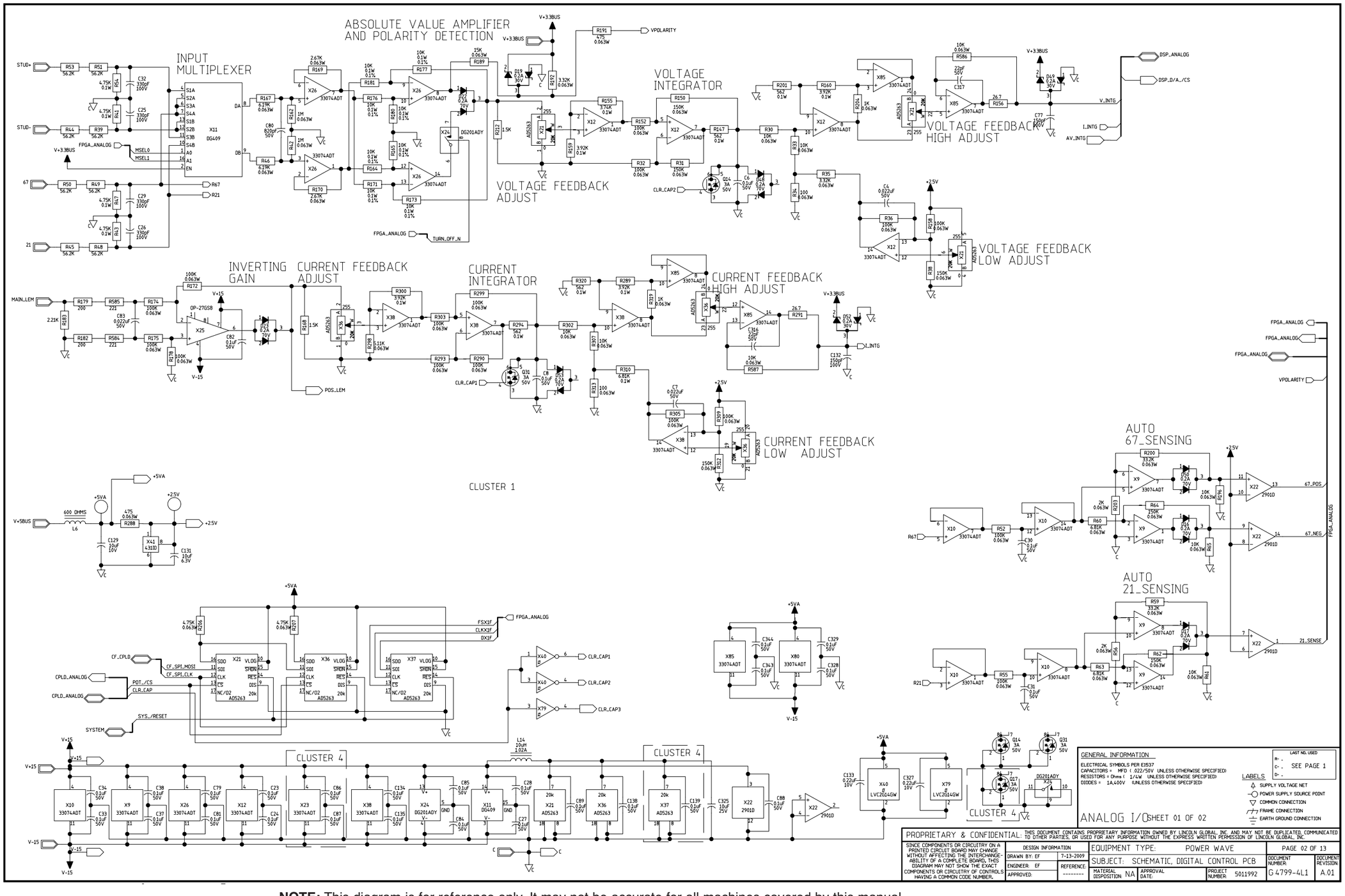
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 1 OF 13)



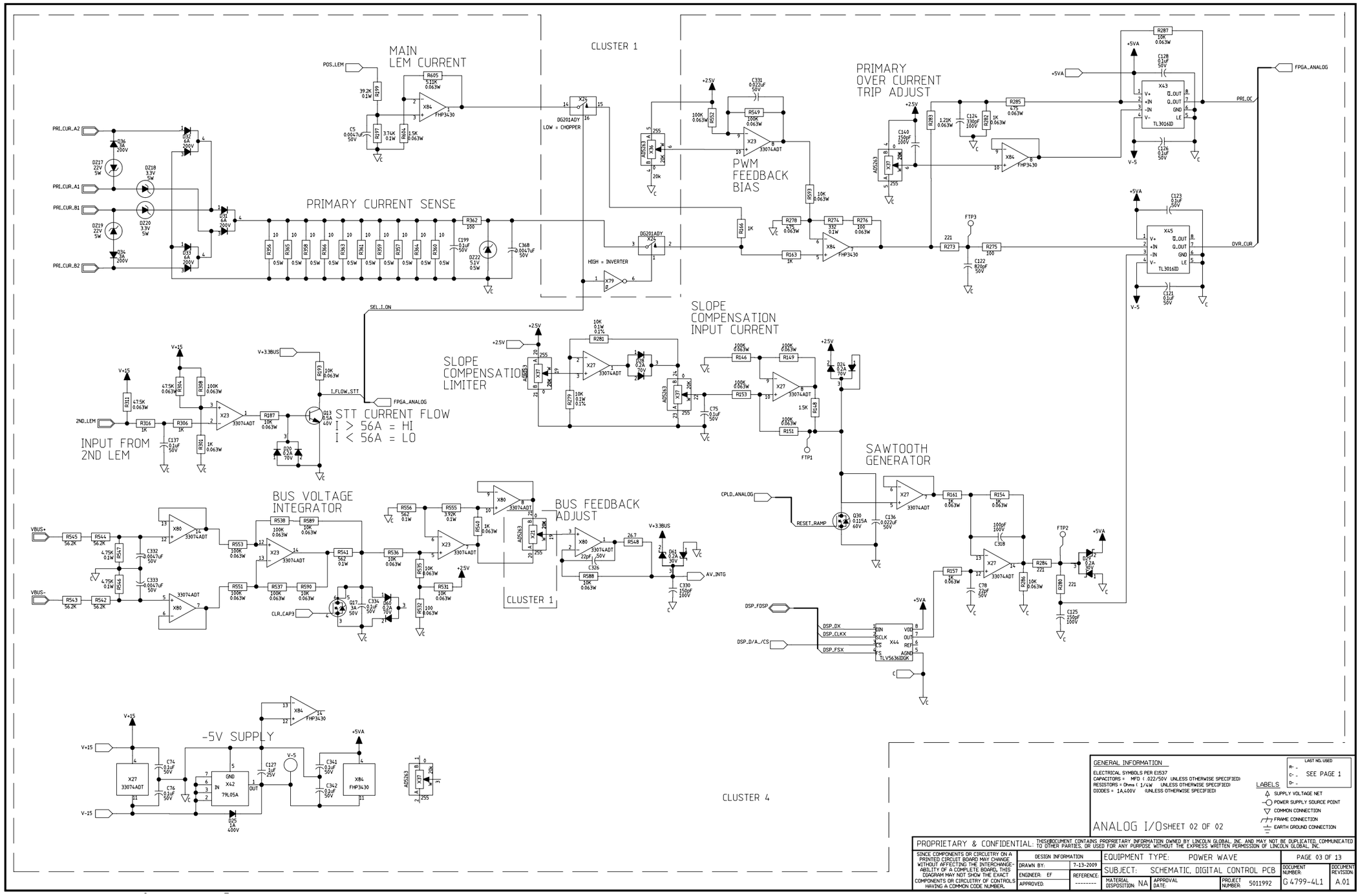
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 2 OF 13)



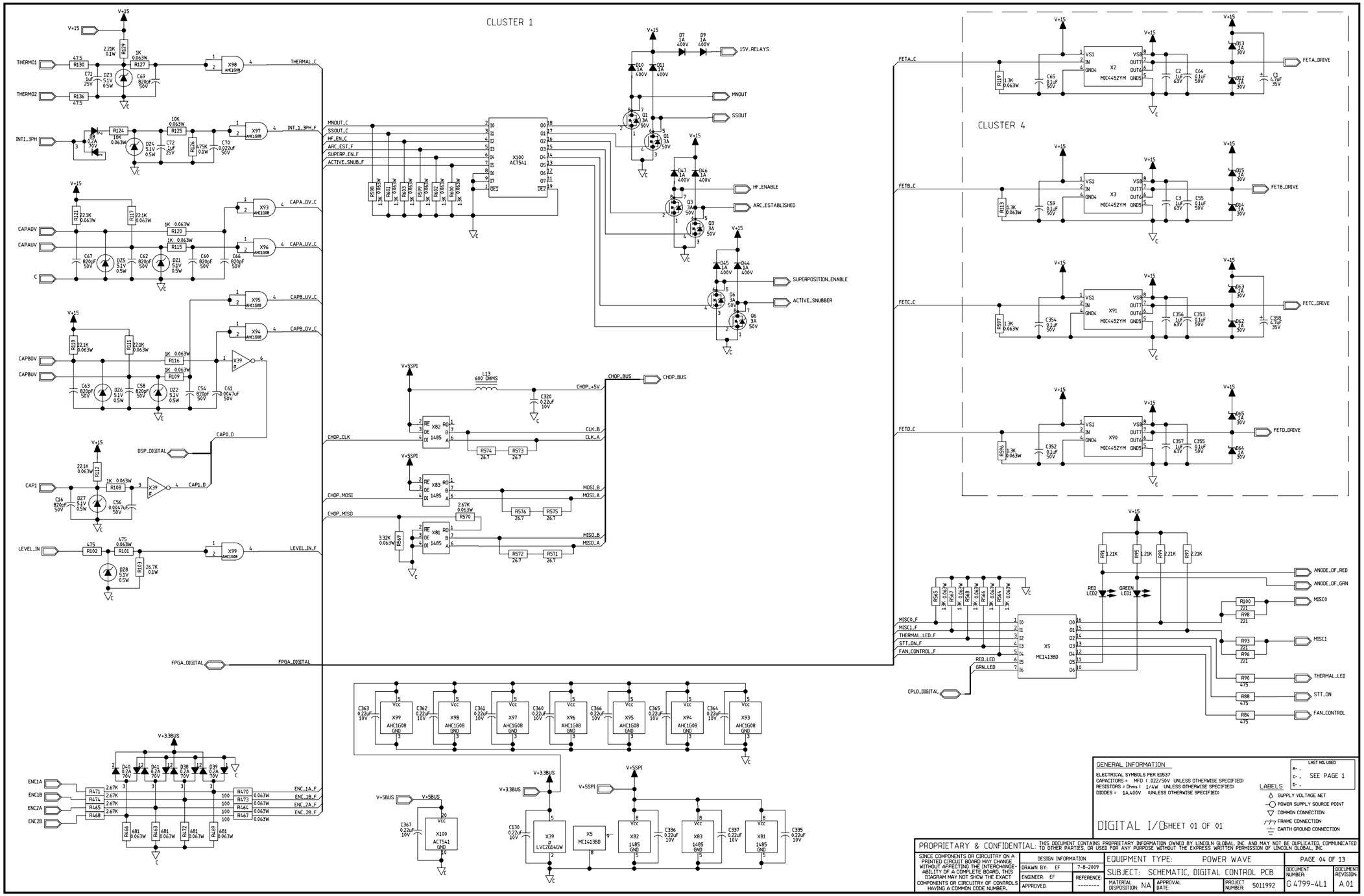
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 3 OF 13)



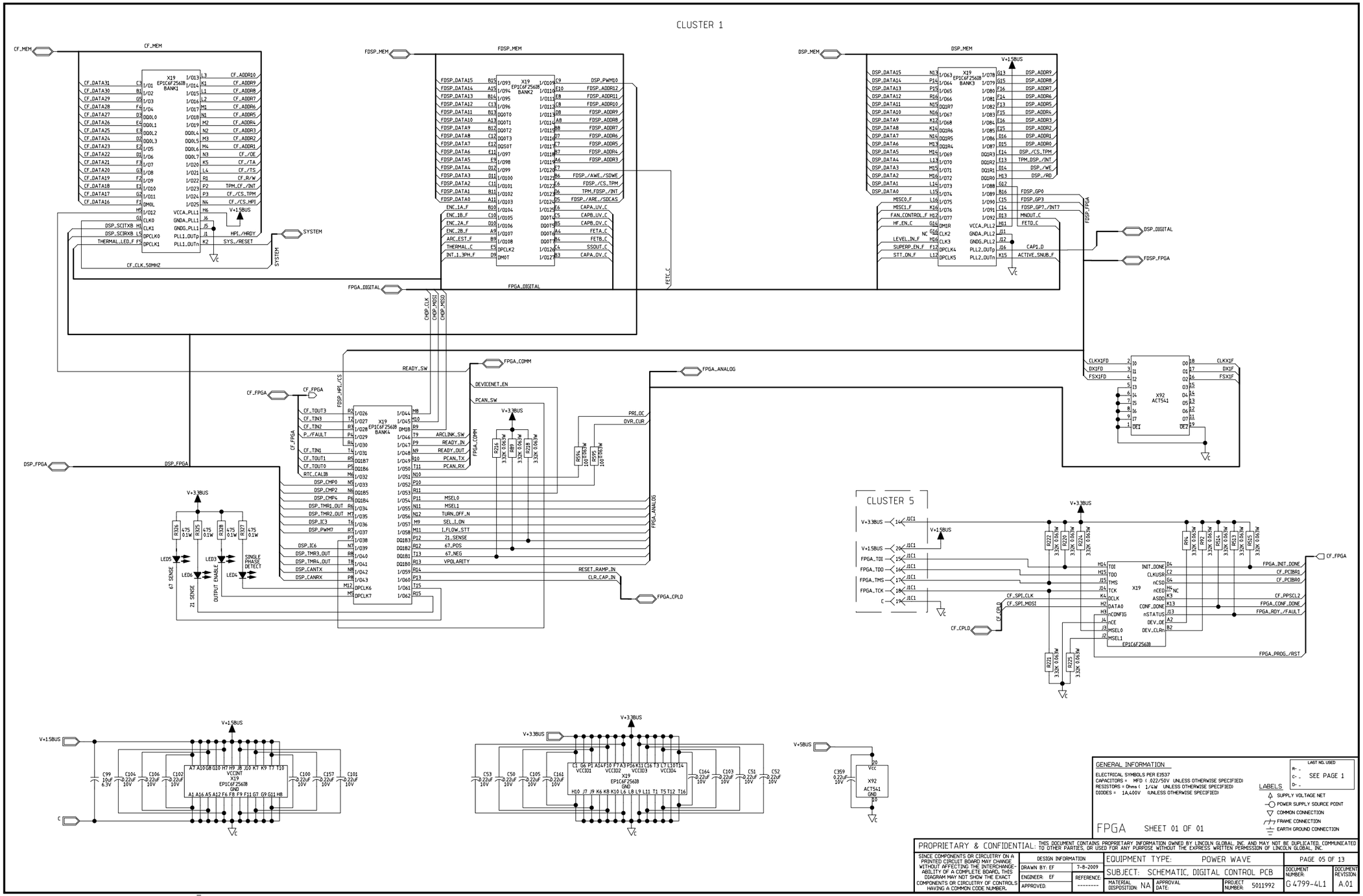
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 4 OF 13)



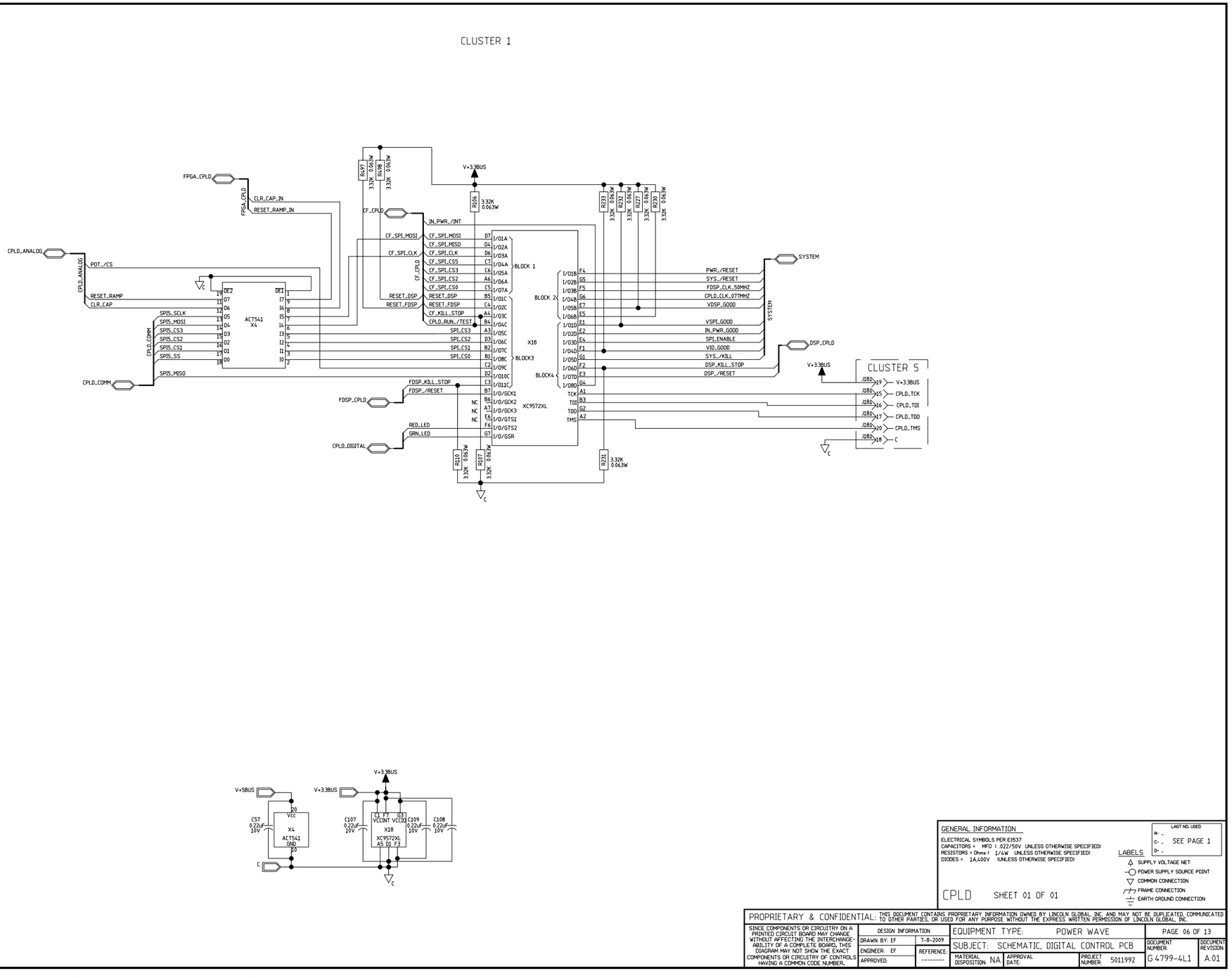
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 5 OF 13)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 6 OF 13)



GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537
CAPACITORS = MFD (.022/50V UNLESS OTHERWISE SPECIFIED)
RESISTORS = Ohms (1/4W UNLESS OTHERWISE SPECIFIED)
DIODES = 1A,400V (UNLESS OTHERWISE SPECIFIED)

LAST NO. USED
A- -
C- - SEE PAGE 1
D- -

LABELS
- SUPPLY VOLTAGE NET
- POWER SUPPLY SOURCE POINT
- COMMON CONNECTION
- FRAME CONNECTION
- EARTH GROUND CONNECTION

CPLD SHEET 01 OF 01

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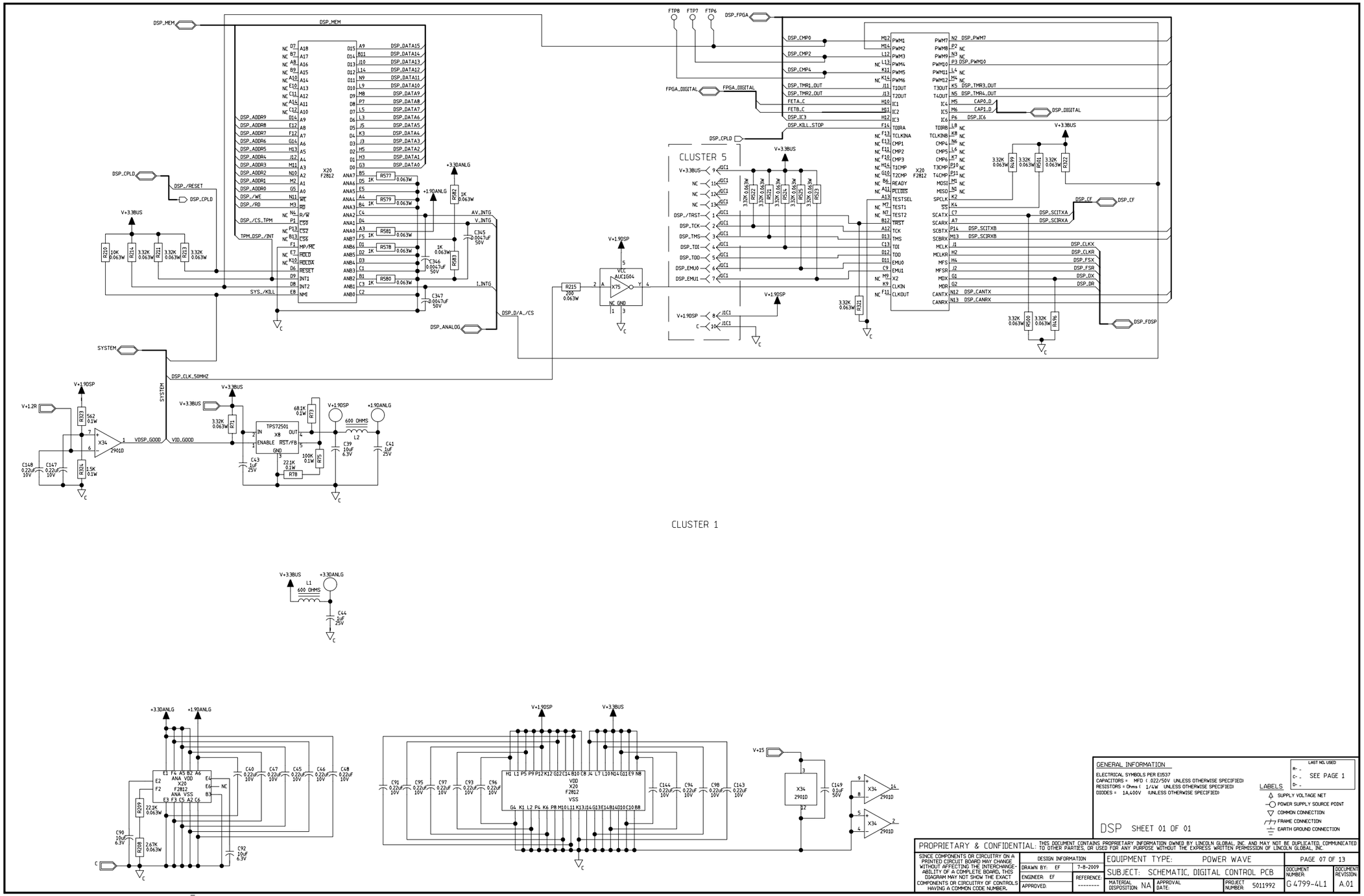
DESIGN INFORMATION		EQUIPMENT TYPE: POWER WAVE	PAGE 06 OF 13	
DRAWN BY: EF	7-8-2009	SUBJECT: SCHEMATIC, DIGITAL CONTROL PCB	DOCUMENT NUMBER	DOCUMENT REVISION
ENGINEER: EF	REFERENCE --------	MATERIAL DISPOSITION: NA / APPROVAL DATE: / PROJECT NUMBER: 5011992	G4799-4L1	A.01
APPROVED:				

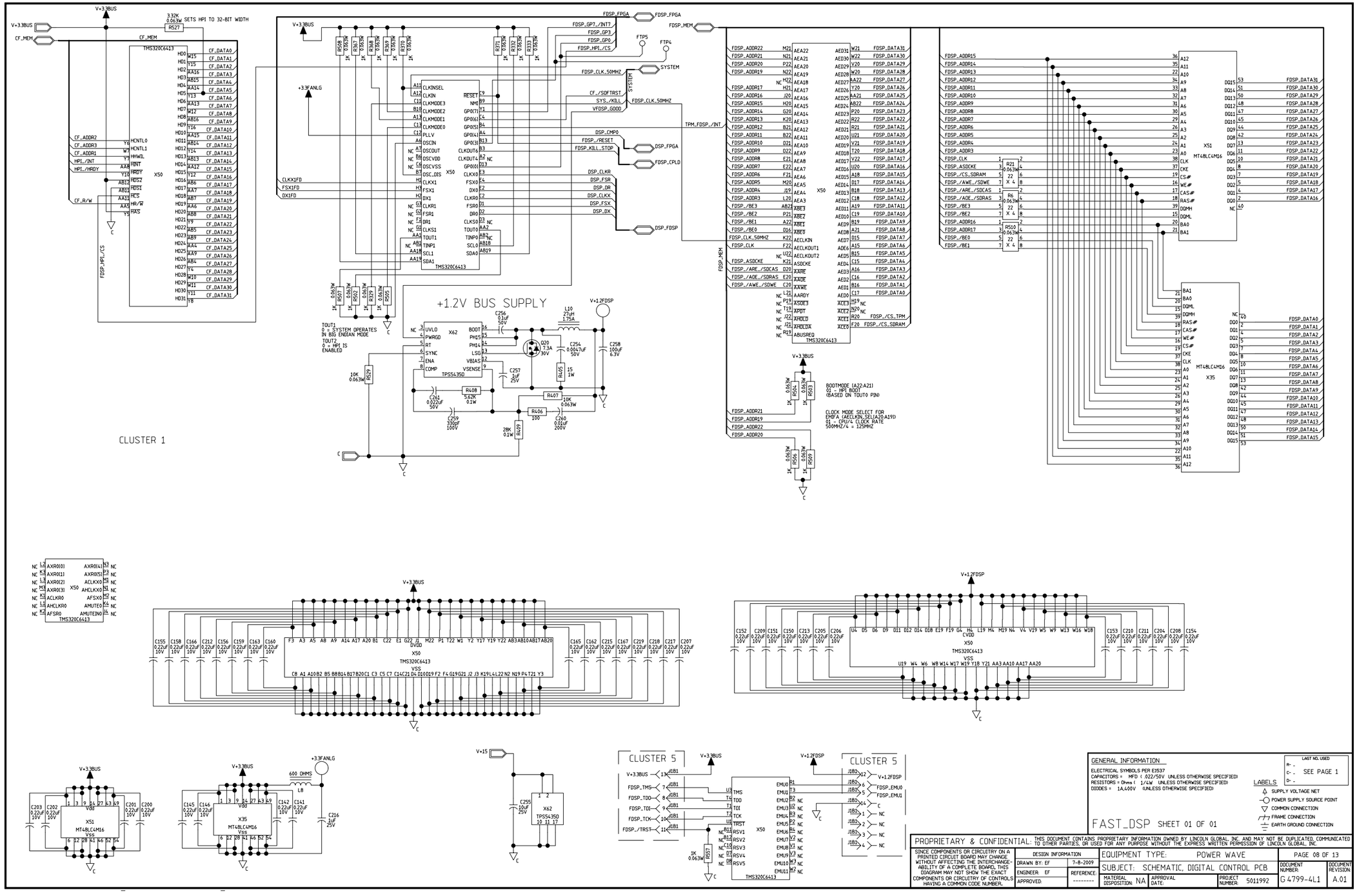
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 7 OF 13)



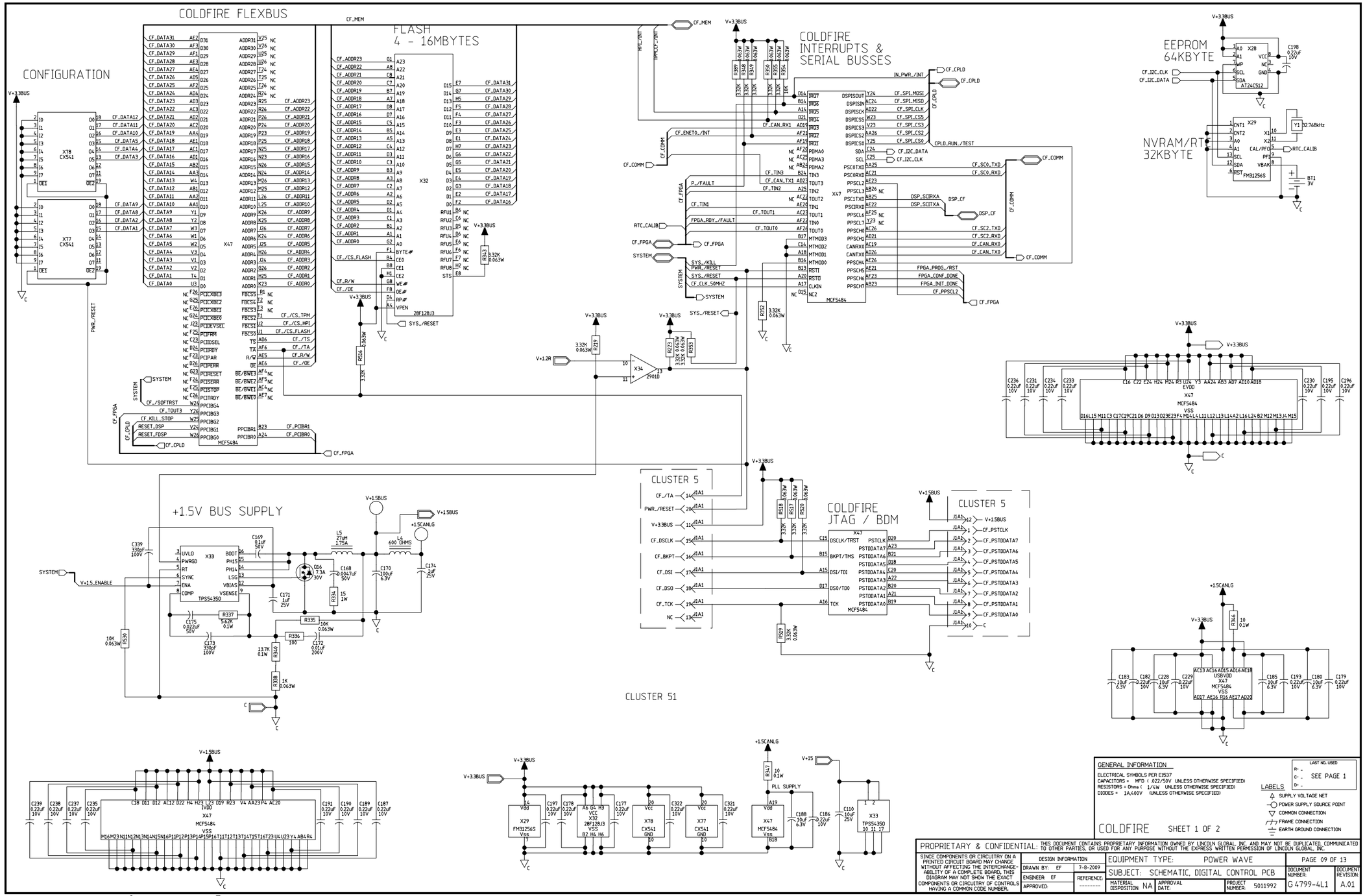
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 8 OF 13)



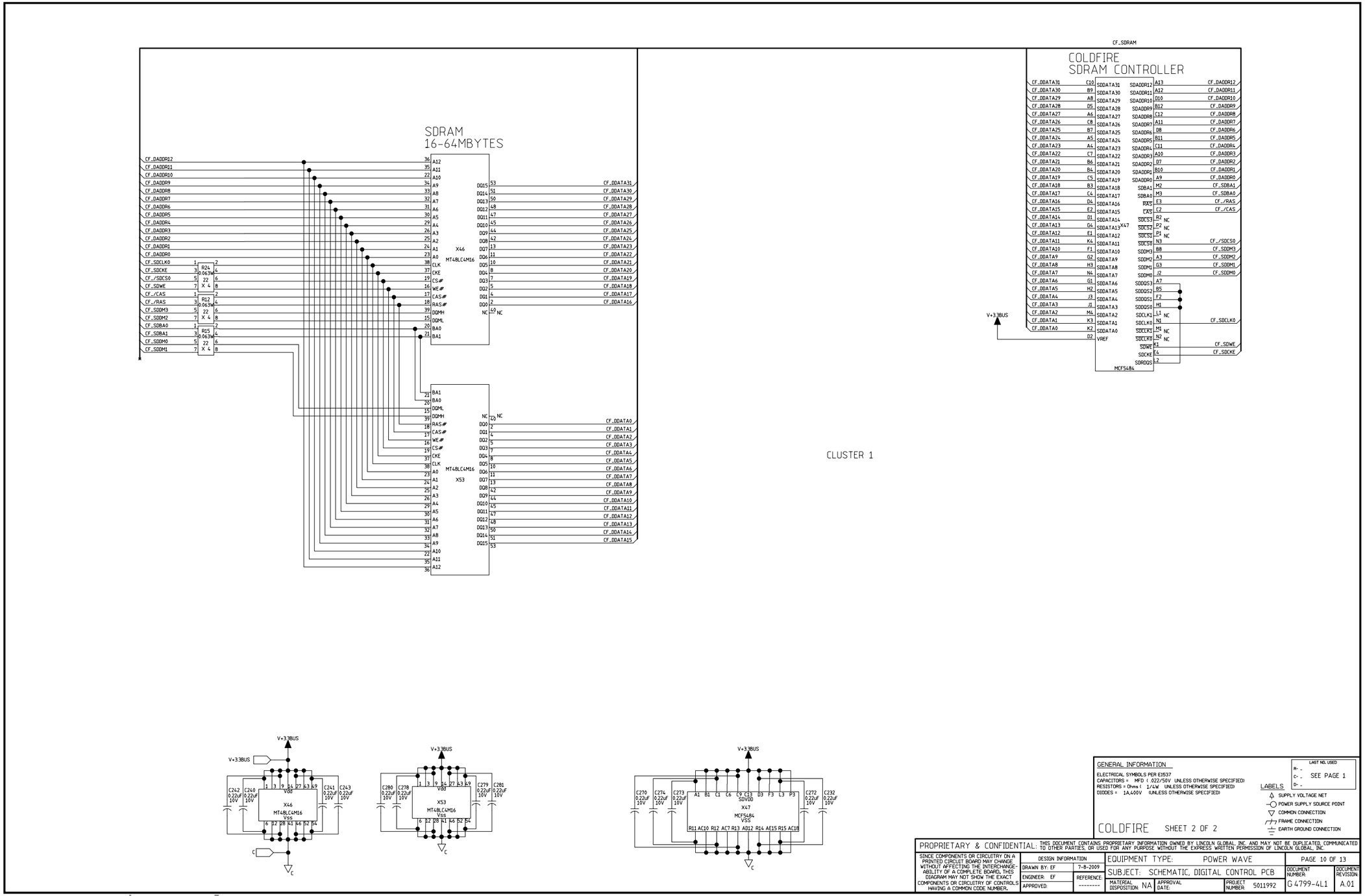
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 9 OF 13)



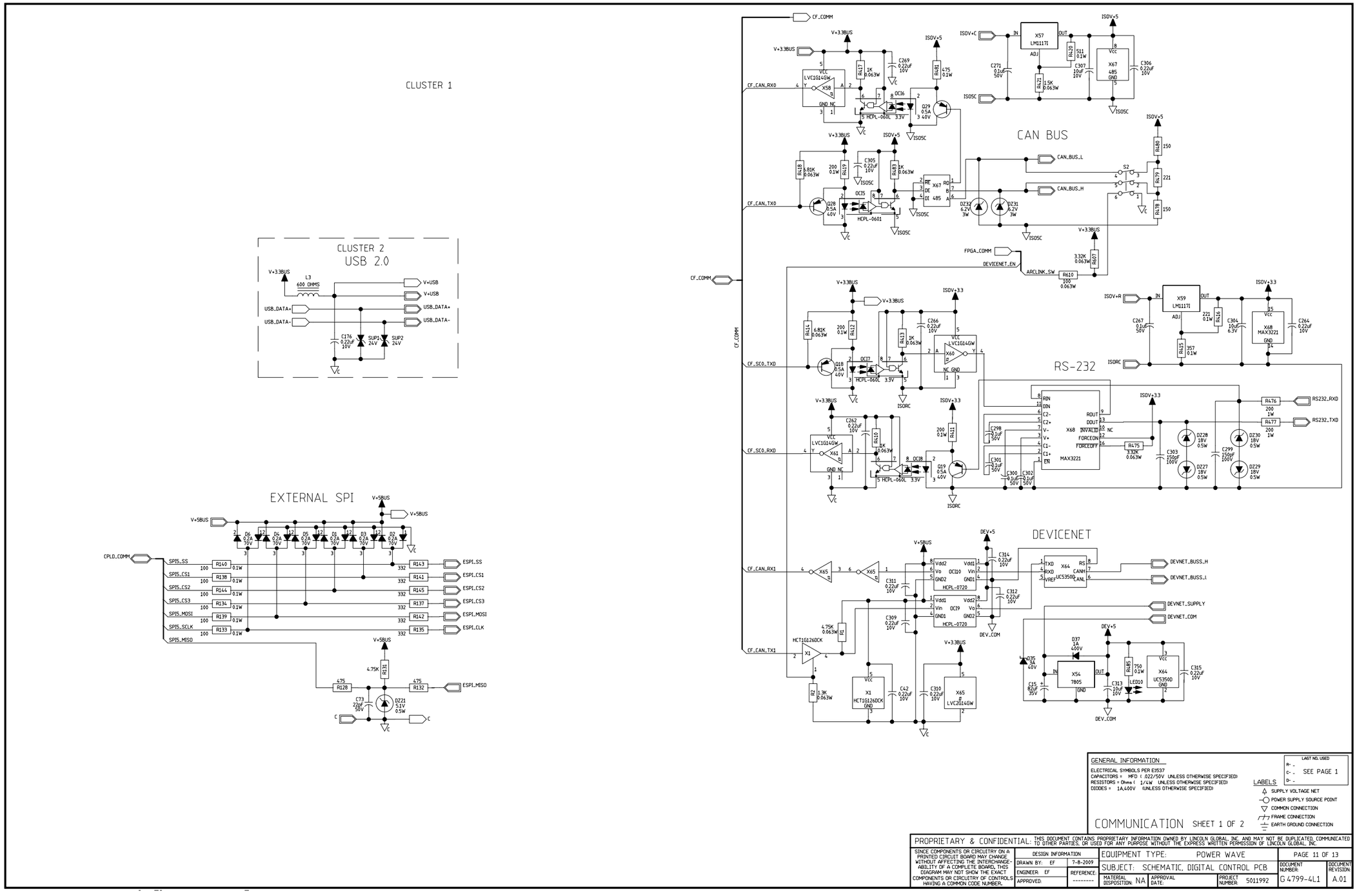
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 10 OF 13)



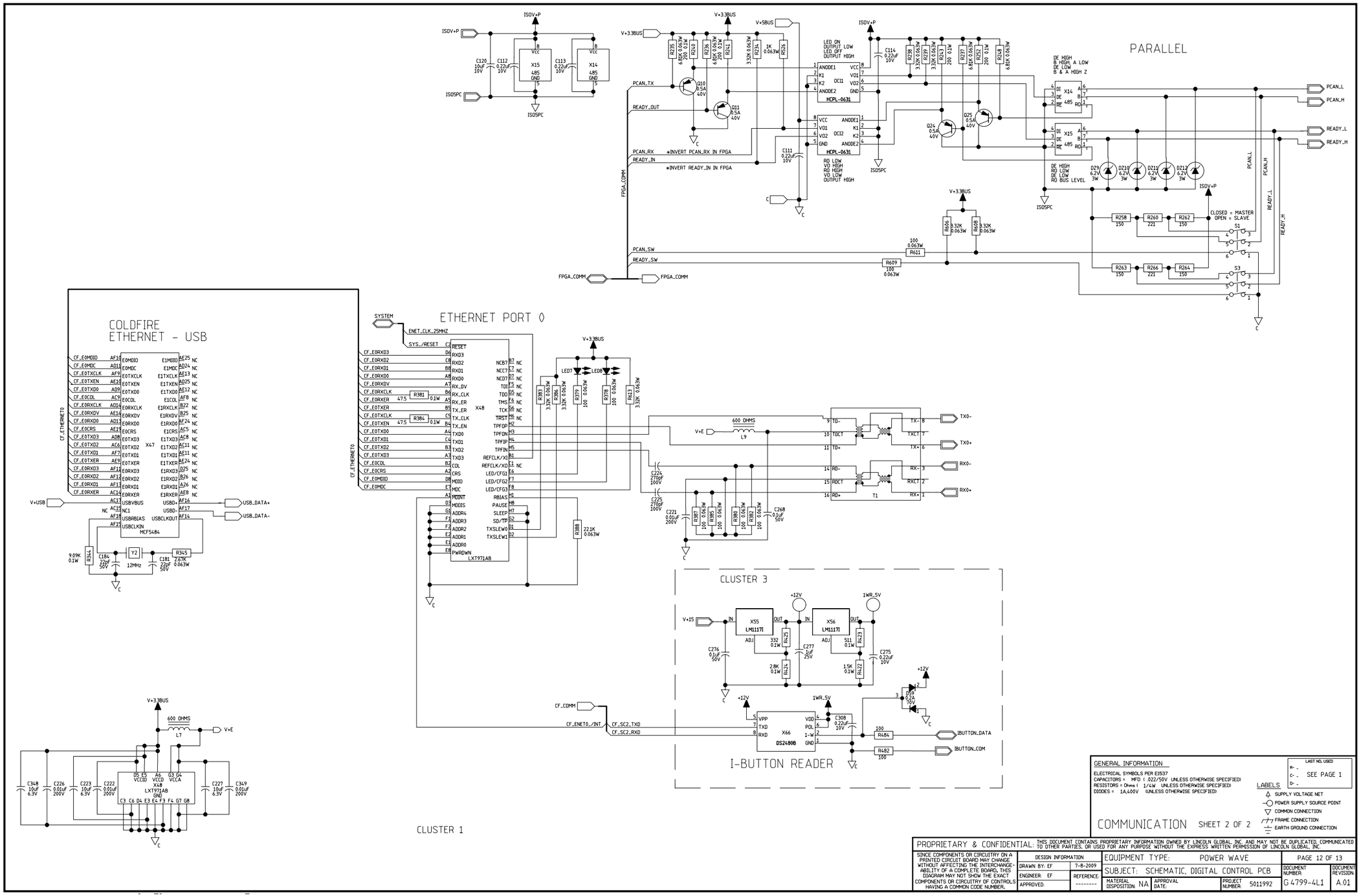
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 11 OF 13)



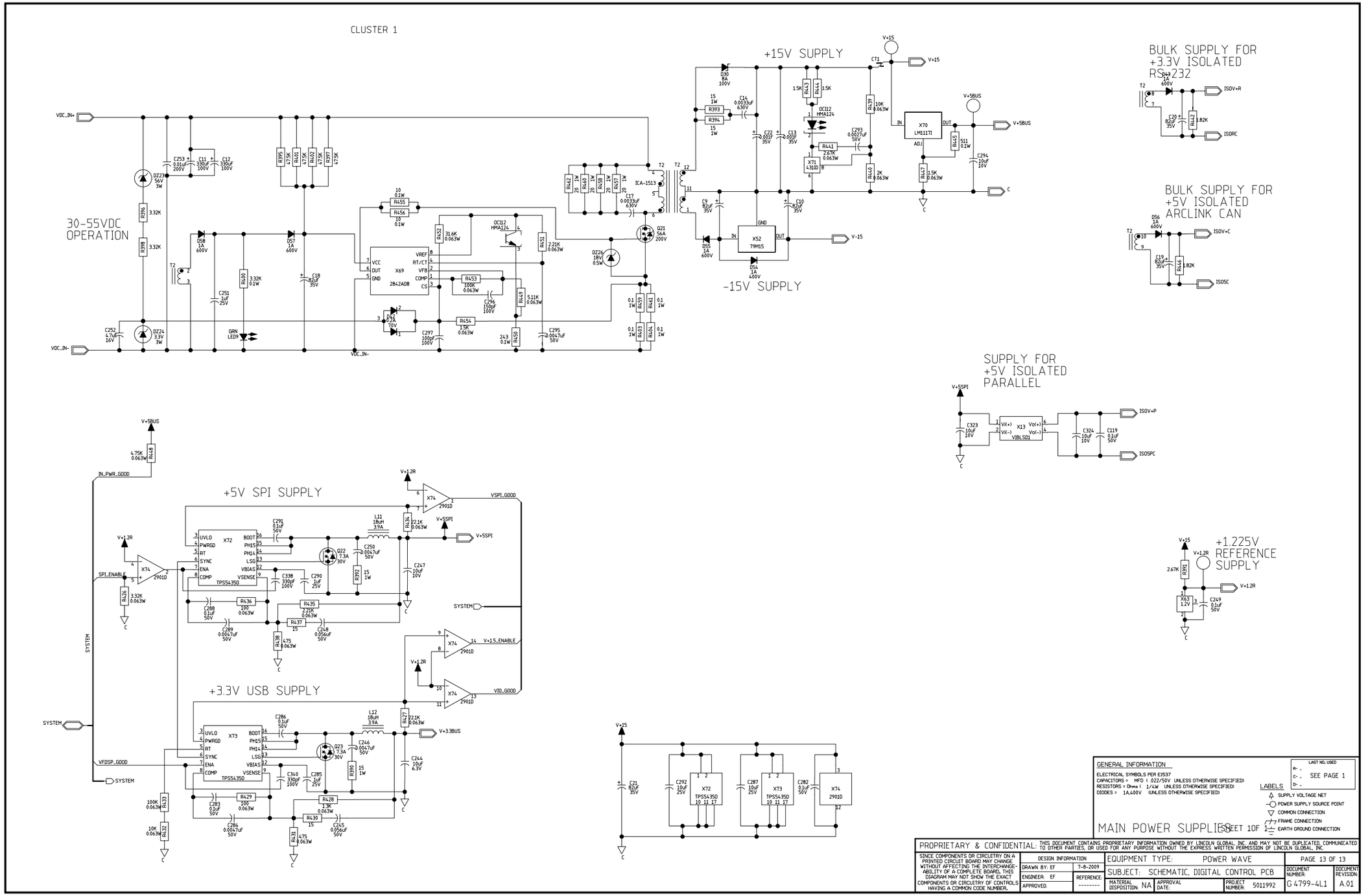
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 12 OF 13)



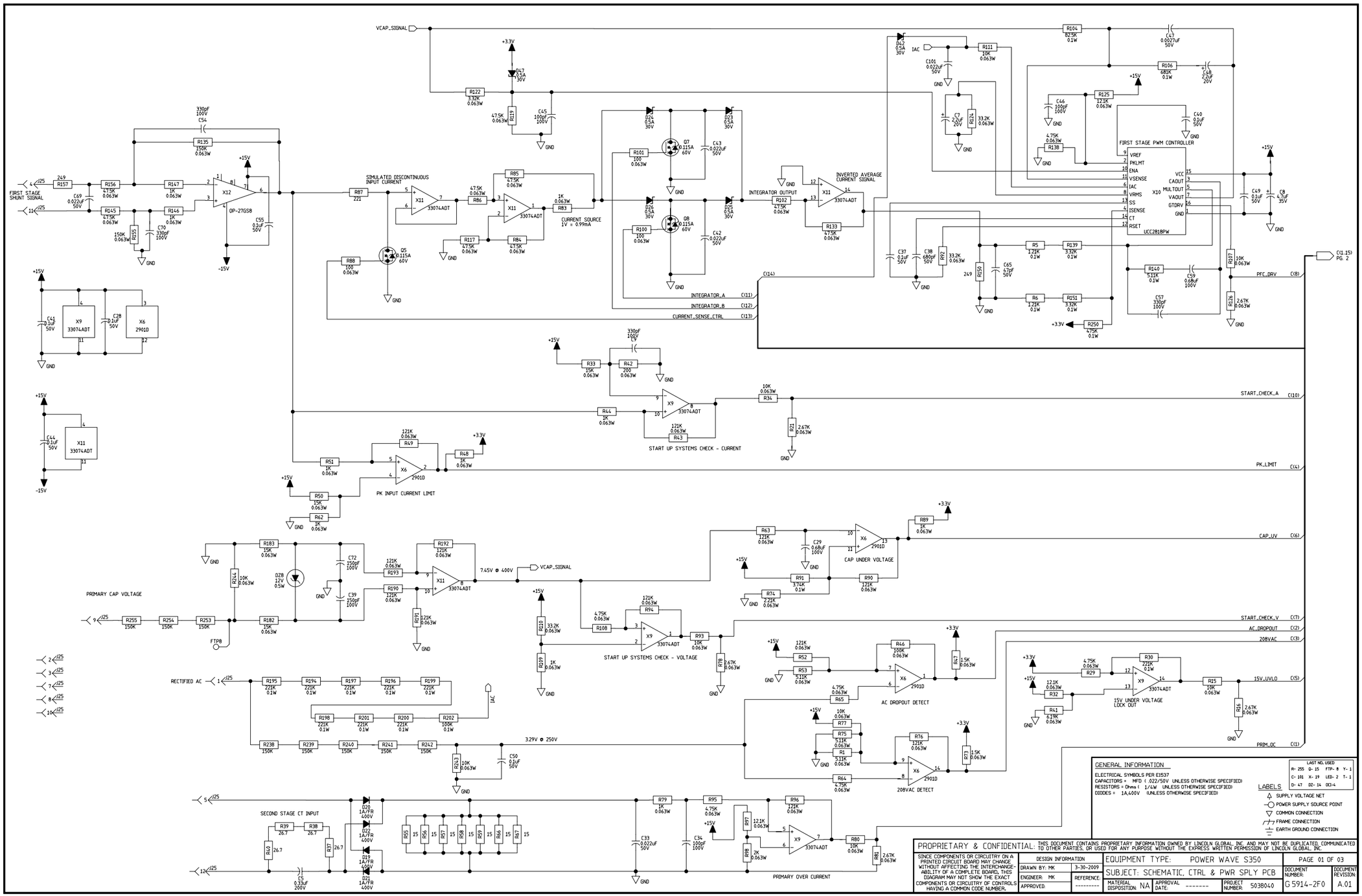
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - CONTROL PC BOARD (G4799) (PG. 13 OF 13)



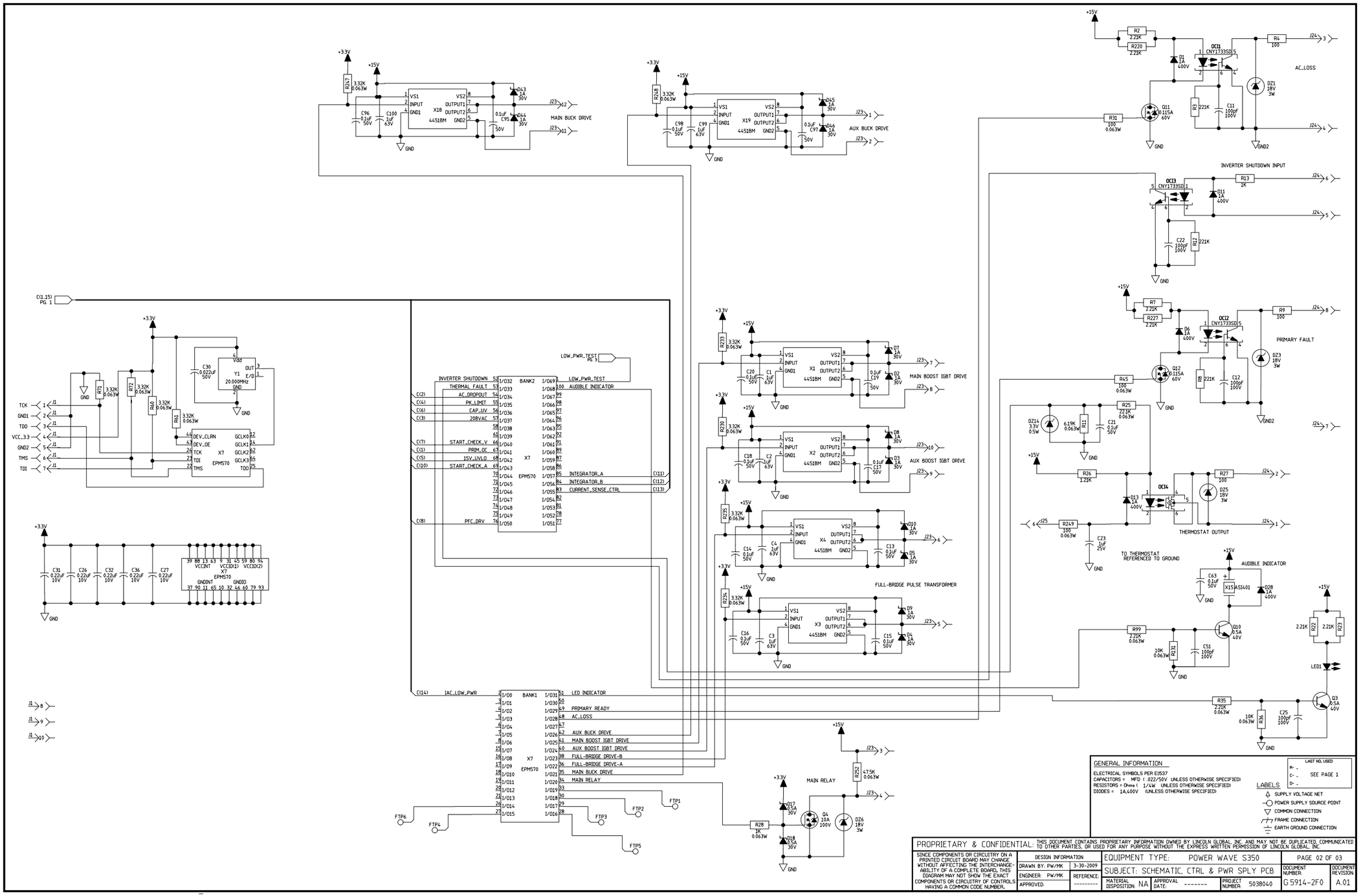
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - INPUT CONTROL PC BOARD (G5914) (PG. 1 OF 3)



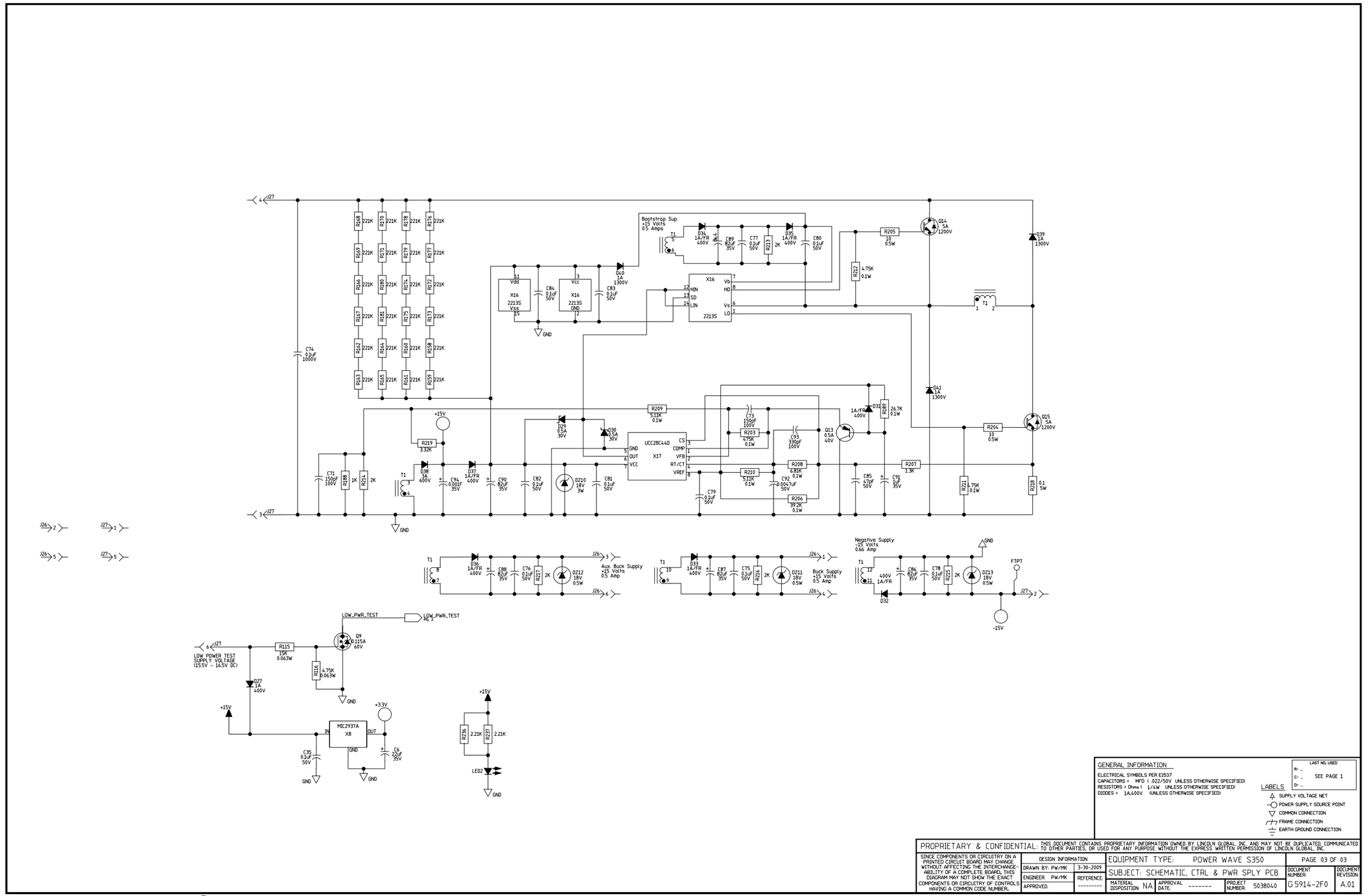
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - INPUT CONTROL PC BOARD (G5914) (PG. 2 OF 3)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - INPUT CONTROL PC BOARD (G5914) (PG. 3 OF 3)



GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537
CAPACITORS = MFD (.022/50V UNLESS OTHERWISE SPECIFIED)
RESISTORS = Ohms (1/4W UNLESS OTHERWISE SPECIFIED)
DIODES = 1A,400V (UNLESS OTHERWISE SPECIFIED)

LAST NO. USED
A- -
C- - SEE PAGE 1
D- -

LABELS
- SUPPLY VOLTAGE NET
- POWER SUPPLY SOURCE POINT
- COMMON CONNECTION
- FRAME CONNECTION
- EARTH GROUND CONNECTION

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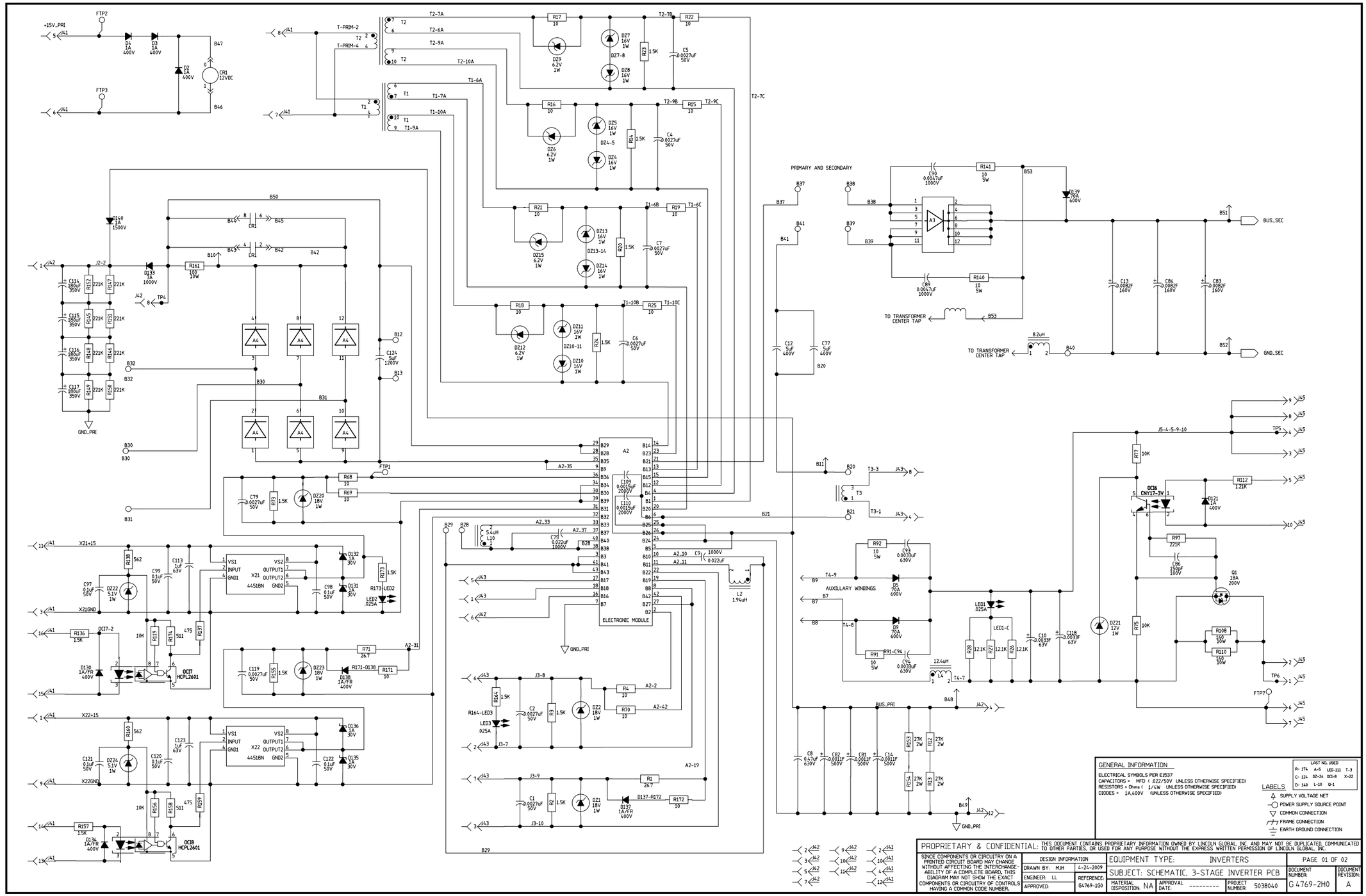
DESIGN INFORMATION		EQUIPMENT TYPE: POWER WAVE S350	PAGE 03 OF 03
DRAWN BY: PW/MK	3-30-2009	SUBJECT: SCHEMATIC, CTRL & PWR SPLY PCB	DOCUMENT NUMBER: G5914-2F0 / DOCUMENT REVISION: A.01
ENGINEER: PW/MK	REFERENCE: --------		
APPROVED:	MATERIAL DISPOSITION: NA	APPROVAL DATE: -------	PROJECT NUMBER: 5038040

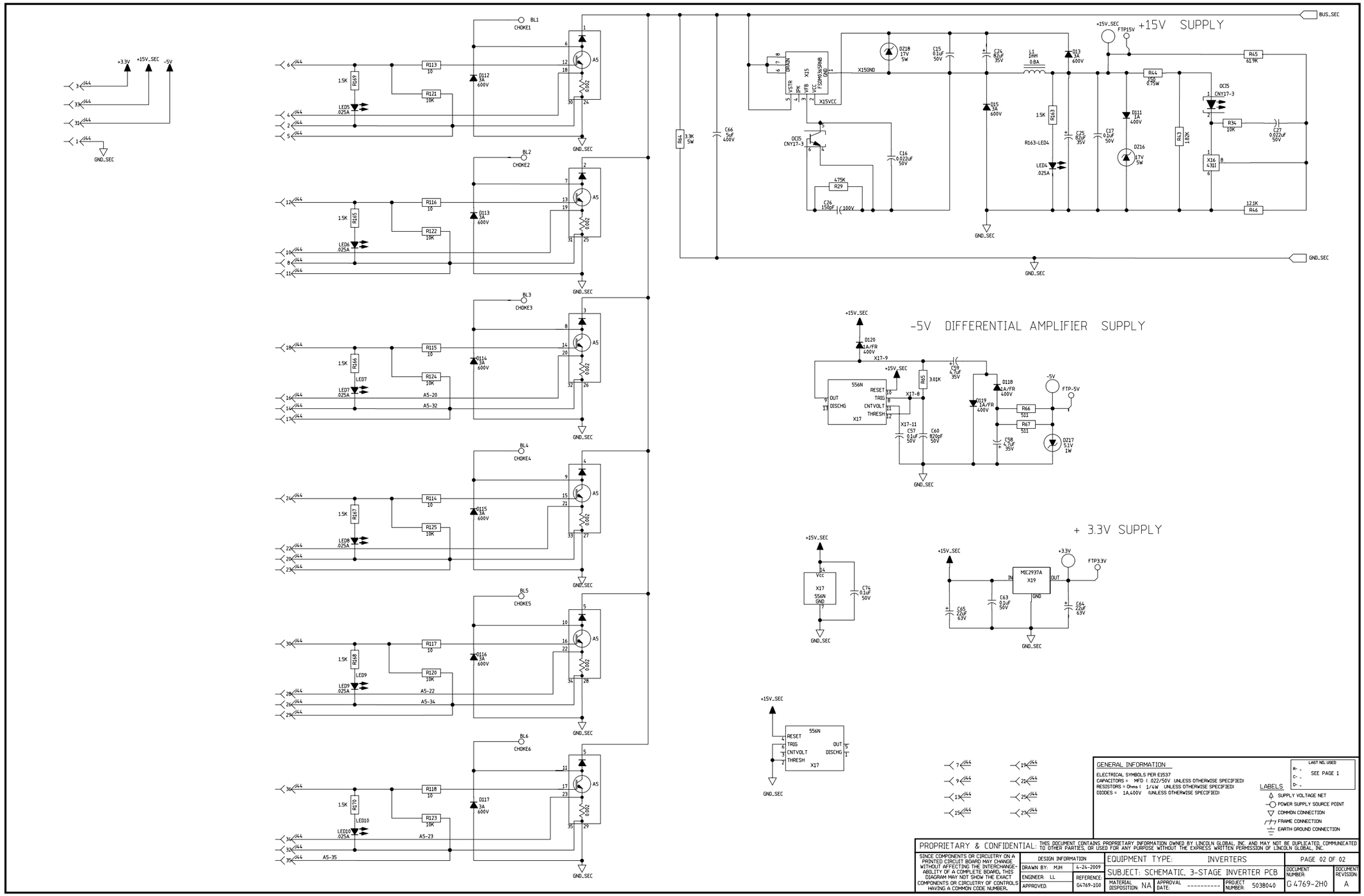
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - 3 STAGE INVERTER PC BOARD (G4769) (PG. 1 OF 2)



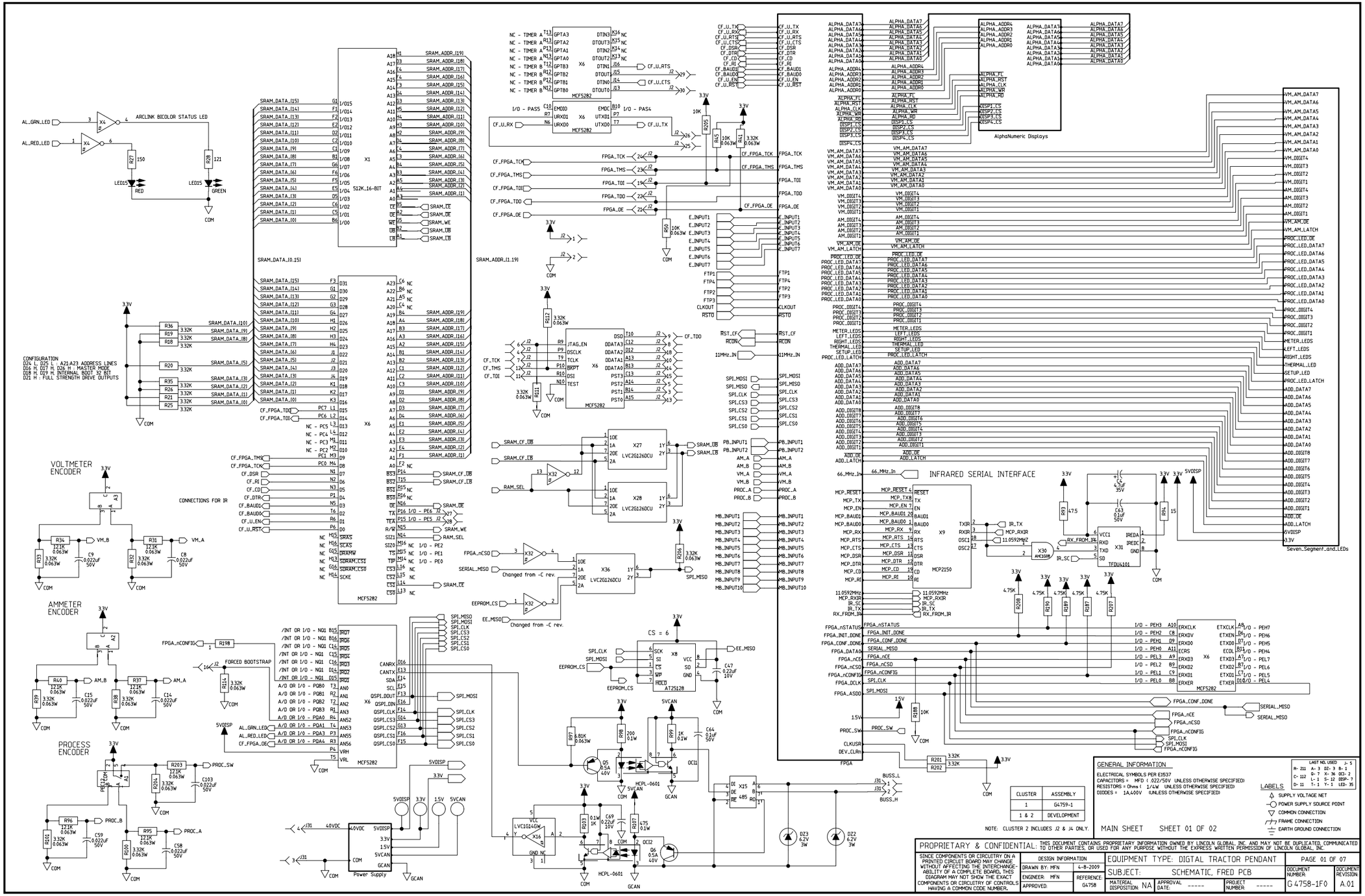
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - 3 STAGE INVERTER PC BOARD (G4769) (PG. 2 OF 2)



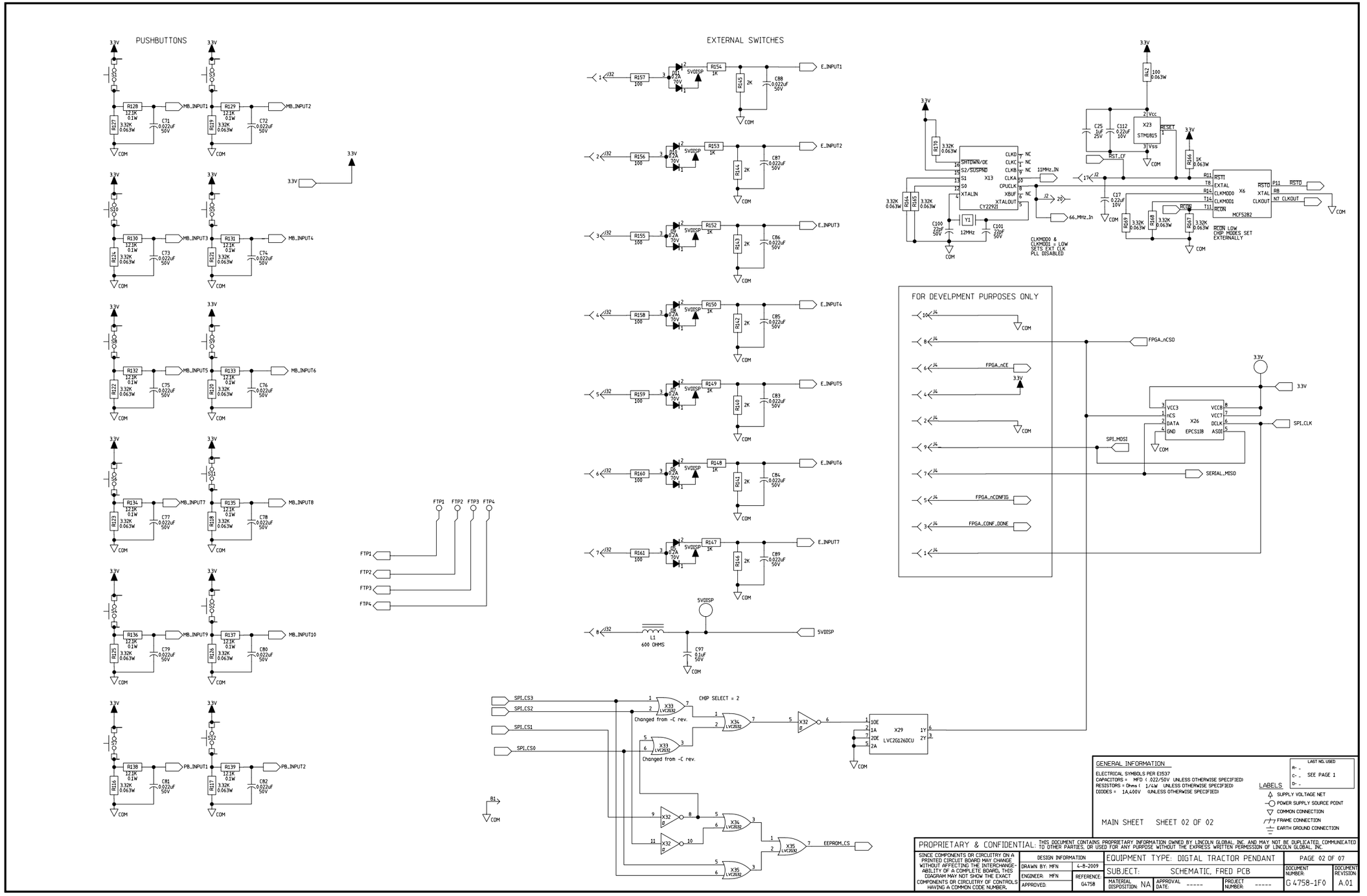
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - F.R.E.D. PC BOARD (G4758) (PG. 1 OF 7)



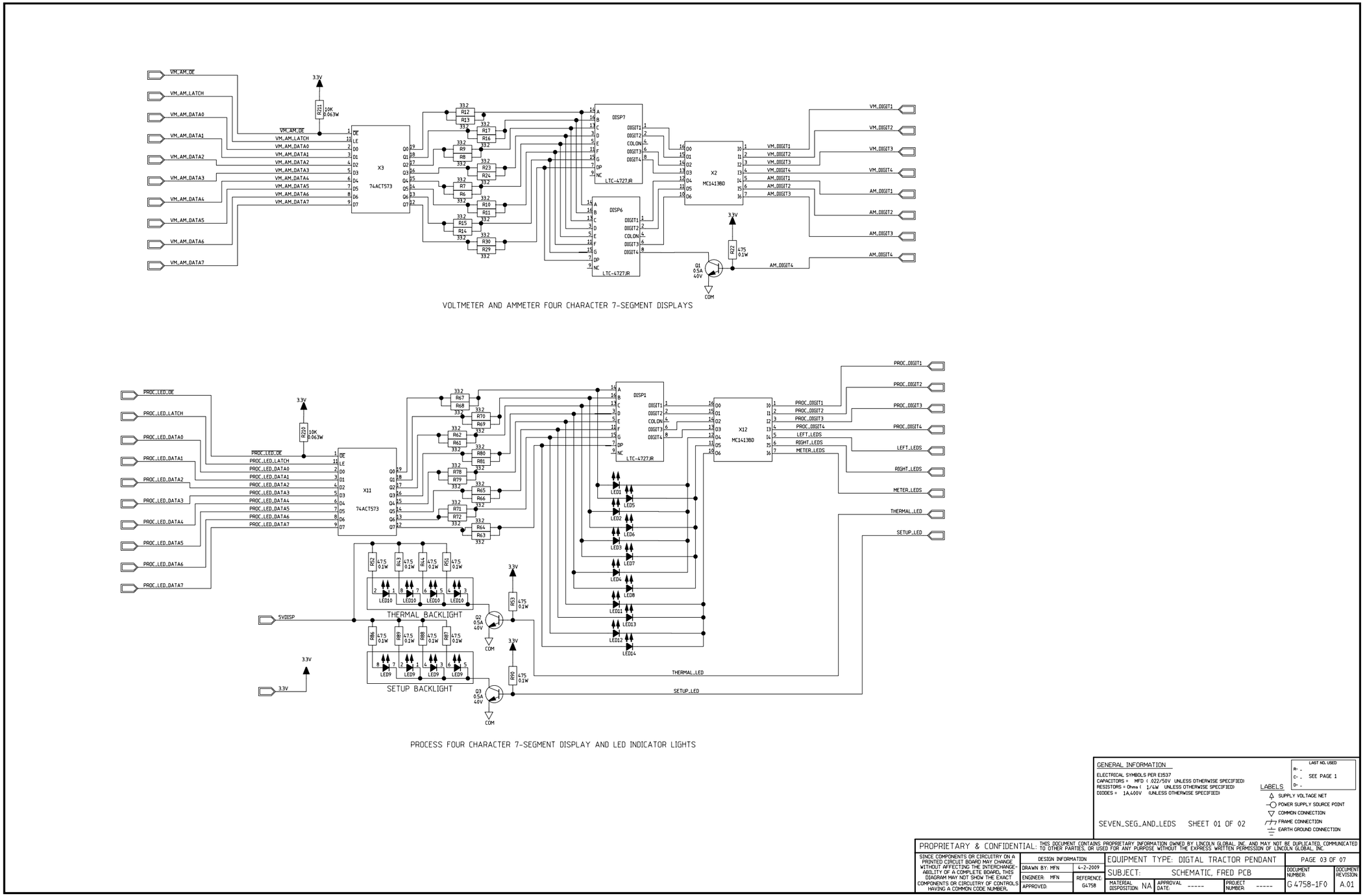
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - F.R.E.D. PC BOARD (G4758) (PG. 2 OF 7)



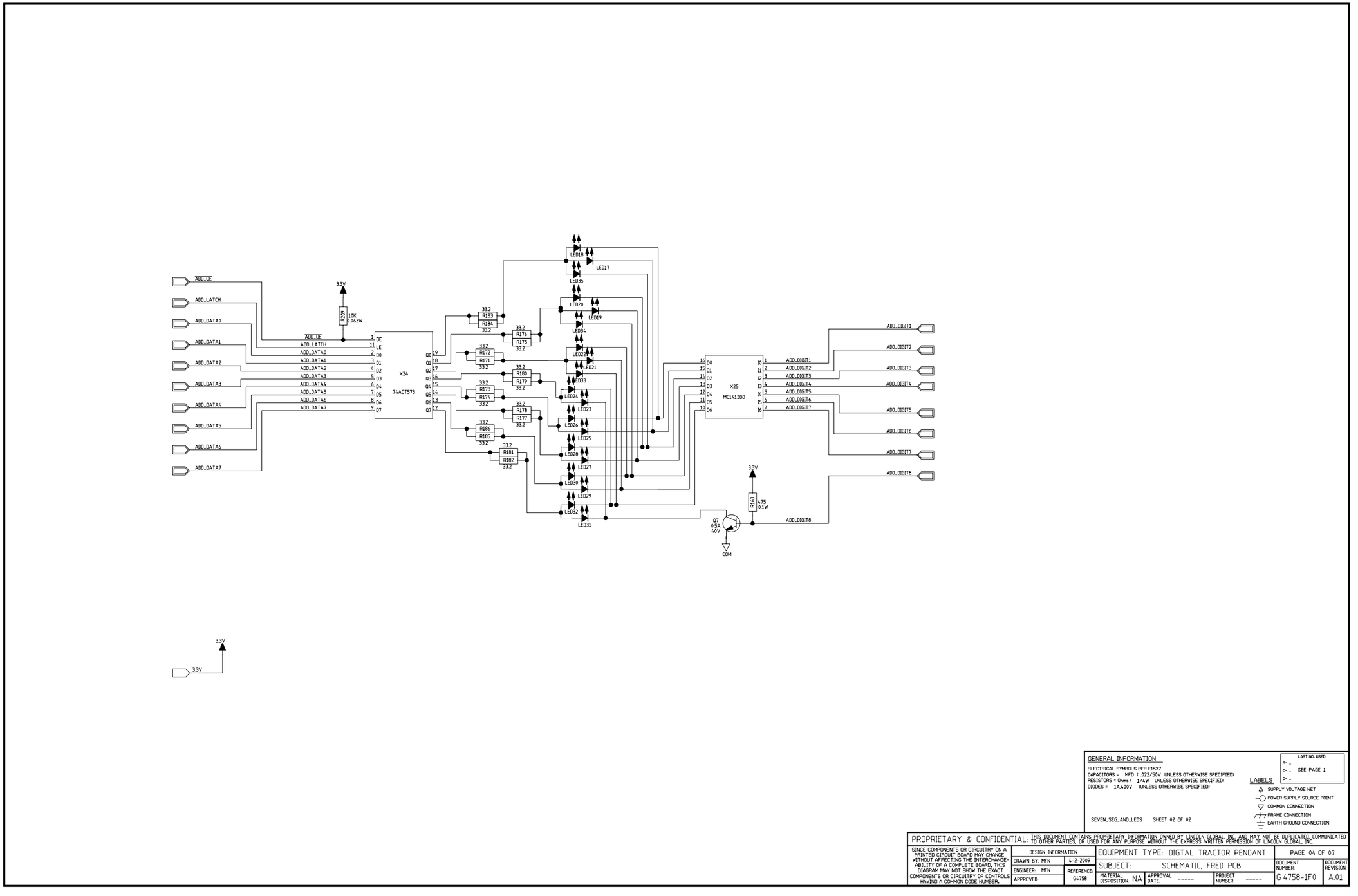
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - F.R.E.D. PC BOARD (G4758) (PG. 3 OF 7)



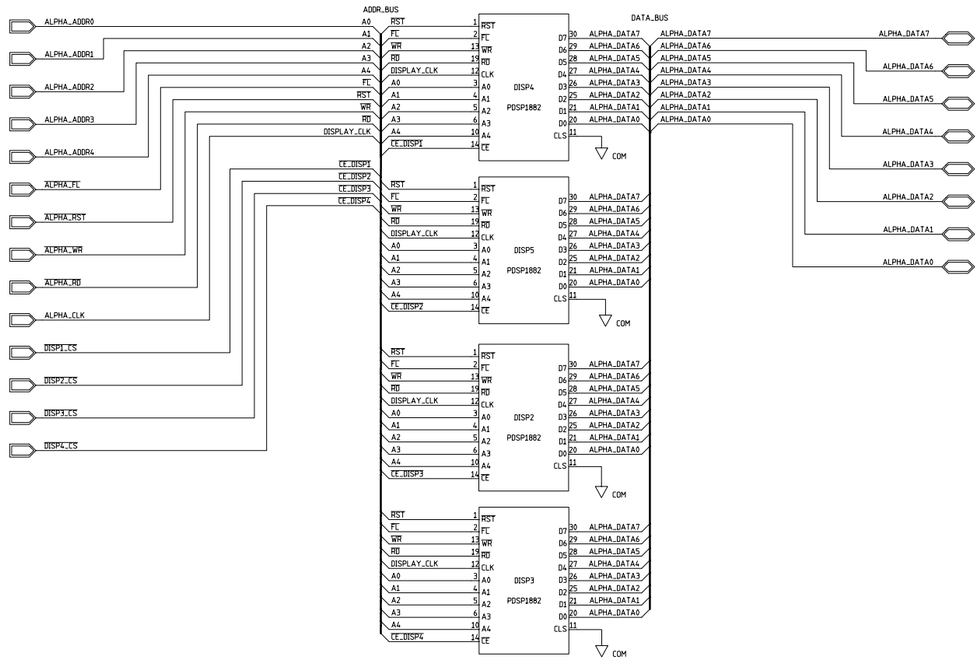
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - F.R.E.D. PC BOARD (G4758) (PG. 4 OF 7)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - F.R.E.D. PC BOARD (G4758) (PG. 5 OF 7)



INTELLIGENT ALPHANUMERIC LED DISPLAYS

GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537
CAPACITORS = MFD (022/50V UNLESS OTHERWISE SPECIFIED)
RESISTORS = Ohms (1/4W UNLESS OTHERWISE SPECIFIED)
DIODES = 1A,400V (UNLESS OTHERWISE SPECIFIED)

LAST NO. USED
R- -
C- - SEE PAGE 1
D- -

LABELS
- SUPPLY VOLTAGE NET
- POWER SUPPLY SOURCE POINT
- COMMON CONNECTION
- FRAME CONNECTION
- EARTH GROUND CONNECTION

ALPHANUMERIC DISPLAYS SHEET 01 OF 01

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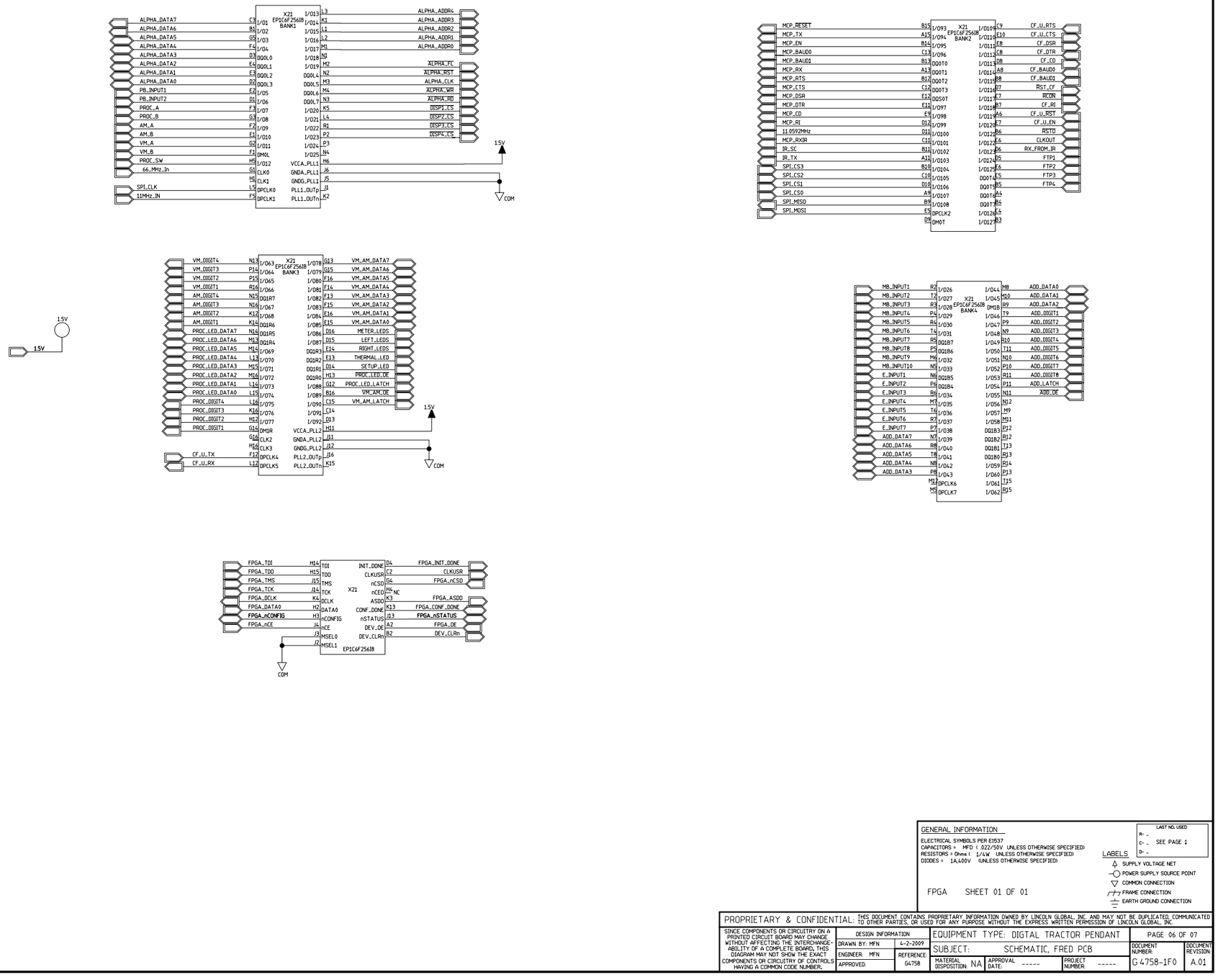
DESIGN INFORMATION		EQUIPMENT TYPE: DIGTAL TRACTOR PENDANT	PAGE 05 OF 07
DRAWN BY: MFN	4-2-2009	SUBJECT: SCHEMATIC, FRED PCB	DOCUMENT NUMBER: G4758-1F0 / DOCUMENT REVISION: A.01
ENGINEER: MFN	REFERENCE: G4758		
APPROVED:		MATERIAL DISPOSITION: NA / APPROVAL DATE: ----- / PROJECT NUMBER: -----	

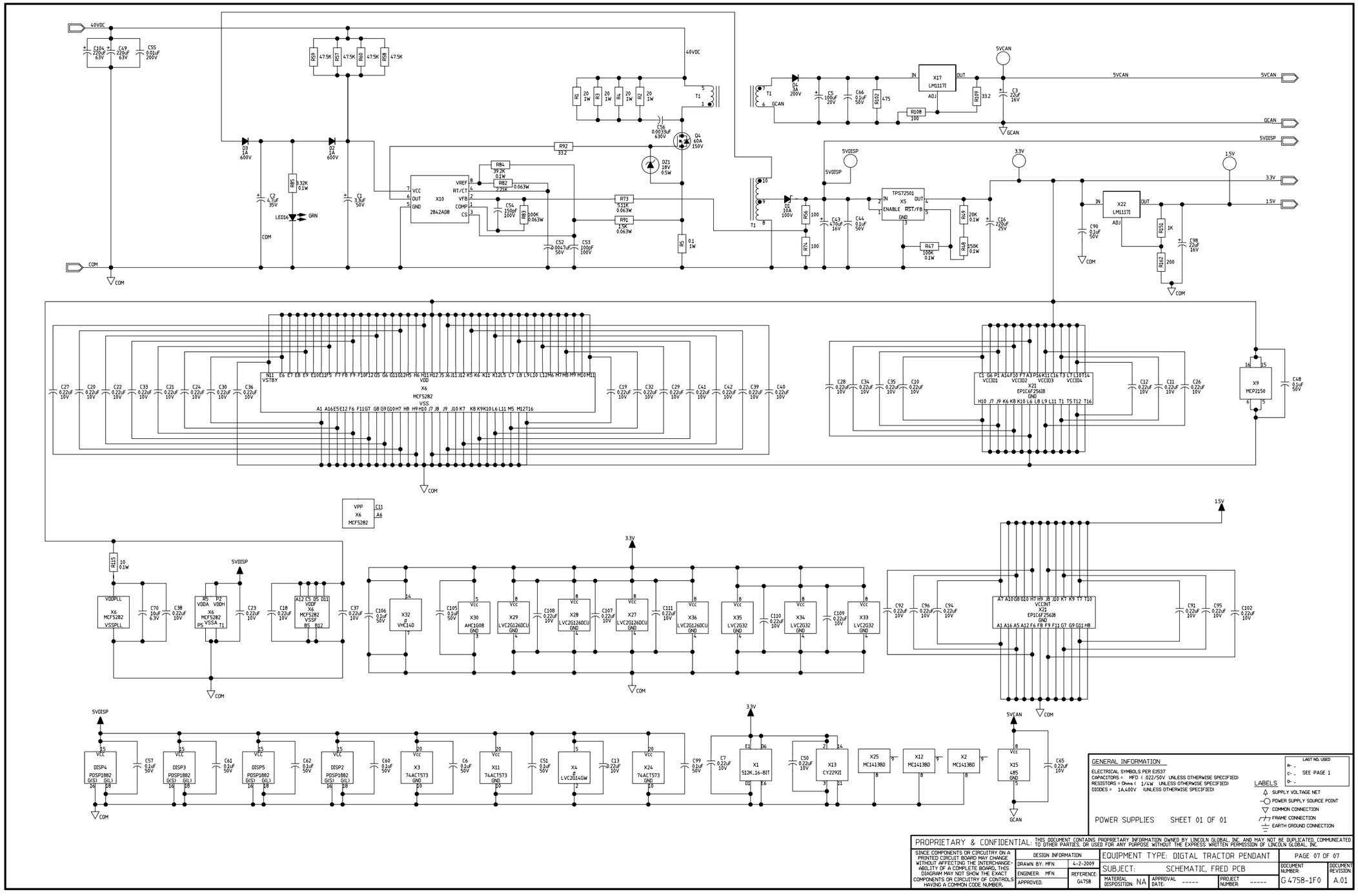
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - F.R.E.D. PC BOARD (G4758) (PG. 6 OF 7)



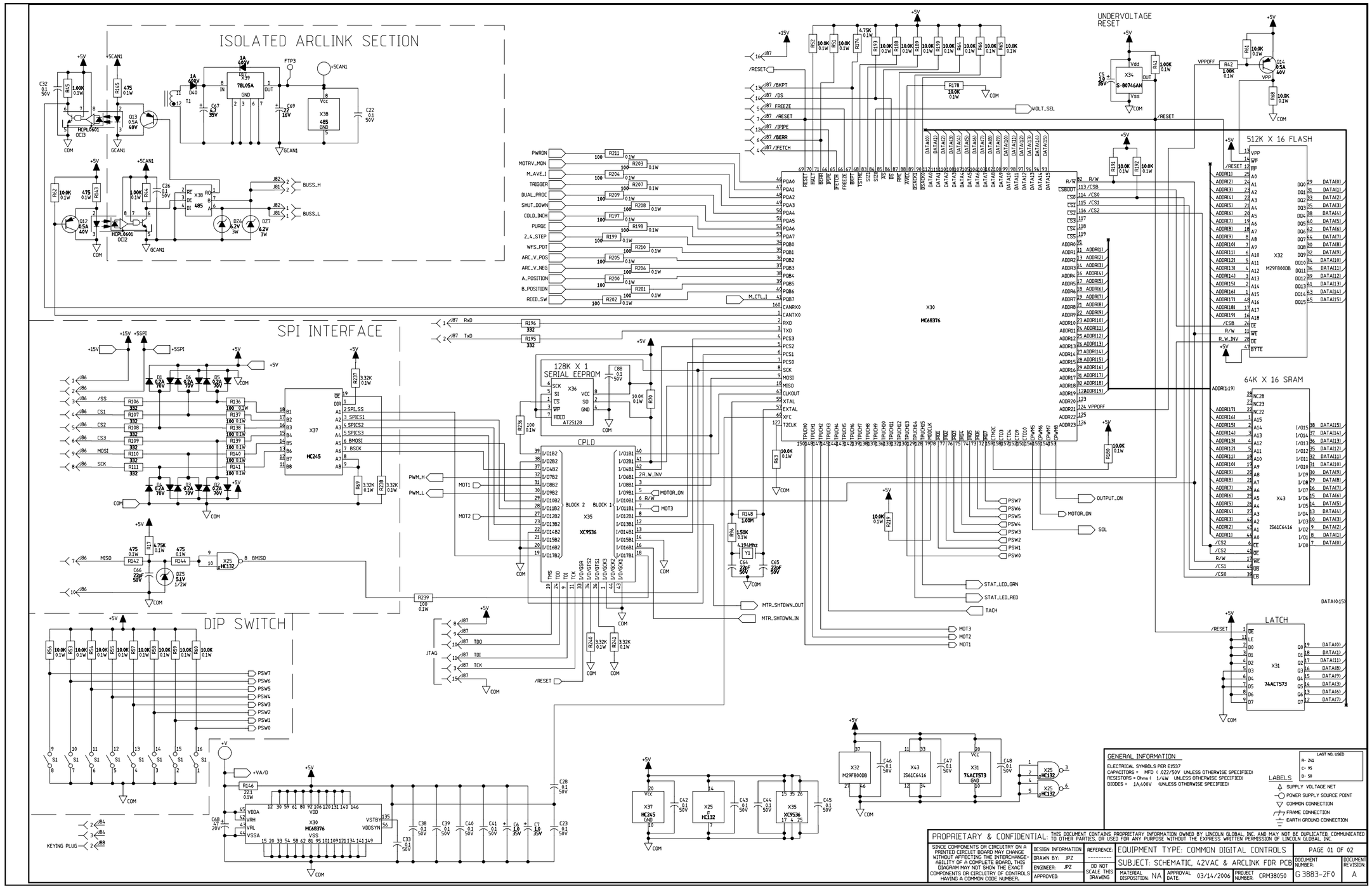
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - F.R.E.D. PC BOARD (G4758) (PG. 7 OF 7)



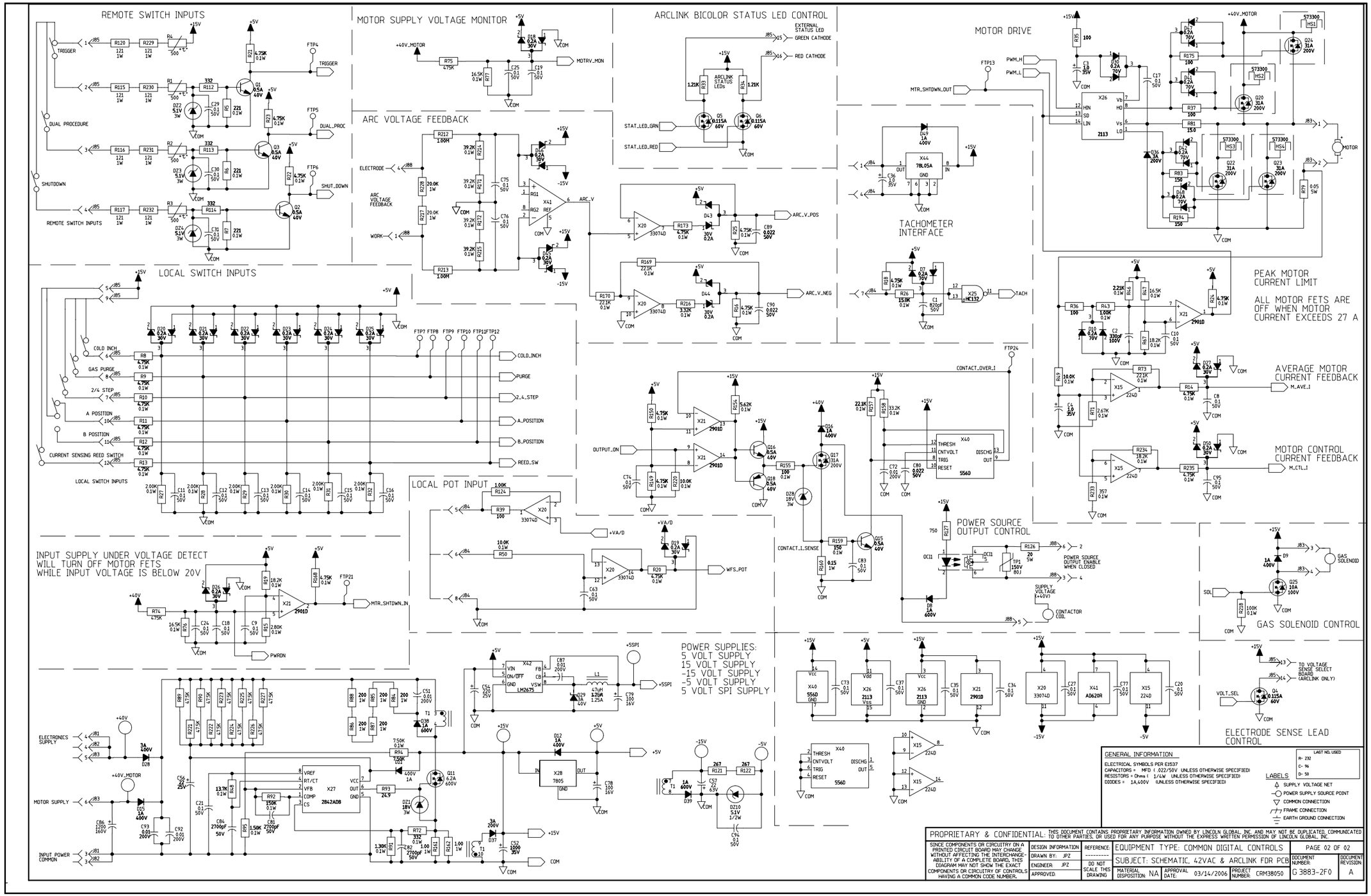
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - 42 VOLT & ARCLINK FEEDER PC BOARD (G3883) (PG. 1 OF 2)



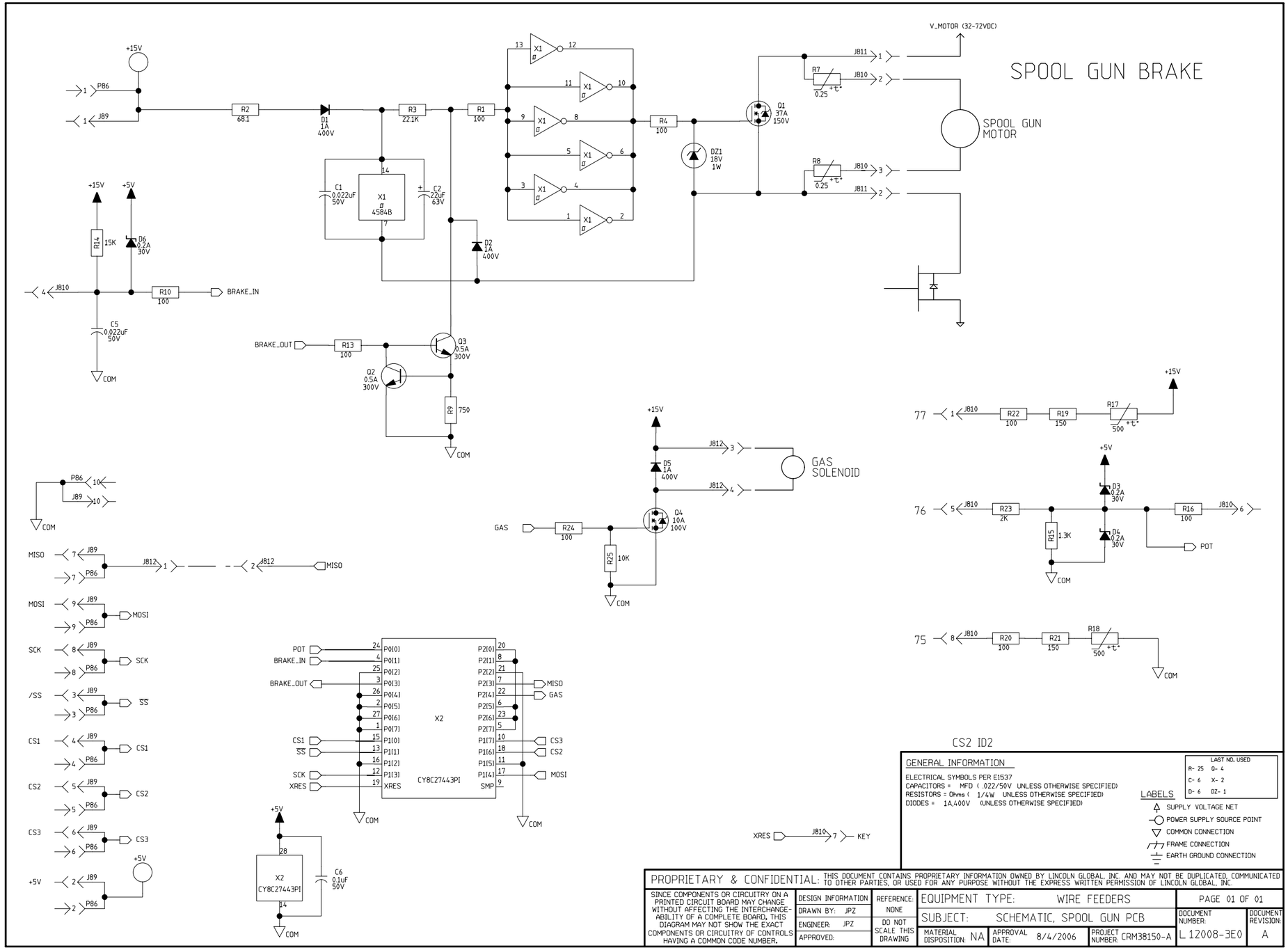
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - 42 VOLT & ARCLINK FEEDER PC BOARD (G3883) (PG. 2 OF 2)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - SPOOL GUN PC BOARD (L12008)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.