

FLEXTEC[®] 350X

For use with machines having Code Numbers:

Standard

12321, 12611, 12575, 12751

Construction

12464, 12610, 12576, 12752

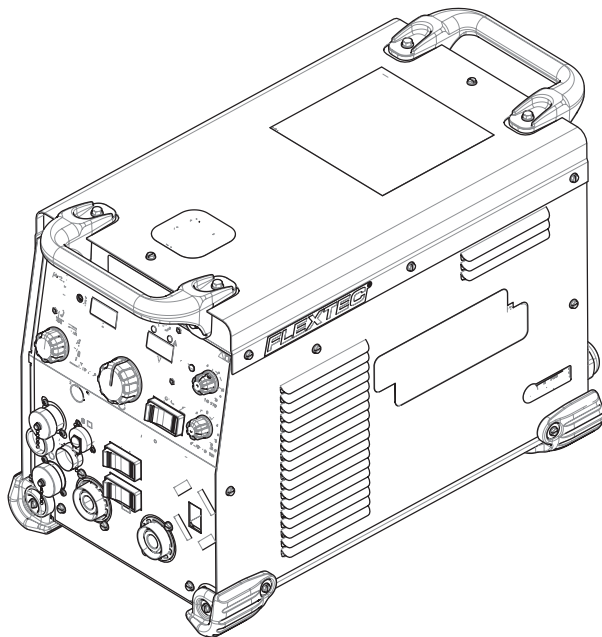
Dinse

12637, 12638, 12754, 12755

Red-D-Arc

12465, 12612, 12577, 12753

SERVICE MANUAL



THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

SAFETY DEPENDS ON YOU

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.



KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.



WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**



SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.



SECTION A: WARNINGS



CALIFORNIA PROPOSITION 65 WARNINGS



WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 *et seq.*)



WARNING: Cancer and Reproductive Harm
www.P65warnings.ca.gov

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 Z87.1 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.



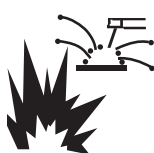
FUMES AND GASES CAN BE DANGEROUS.



- 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 hardfacing (see instructions on container or SDS) 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 unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also 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 Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.
- 5.f. Also see item 1.b.



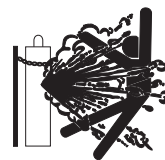
WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



- 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-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.



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.

FLEXTEC® 350X

Service Manual

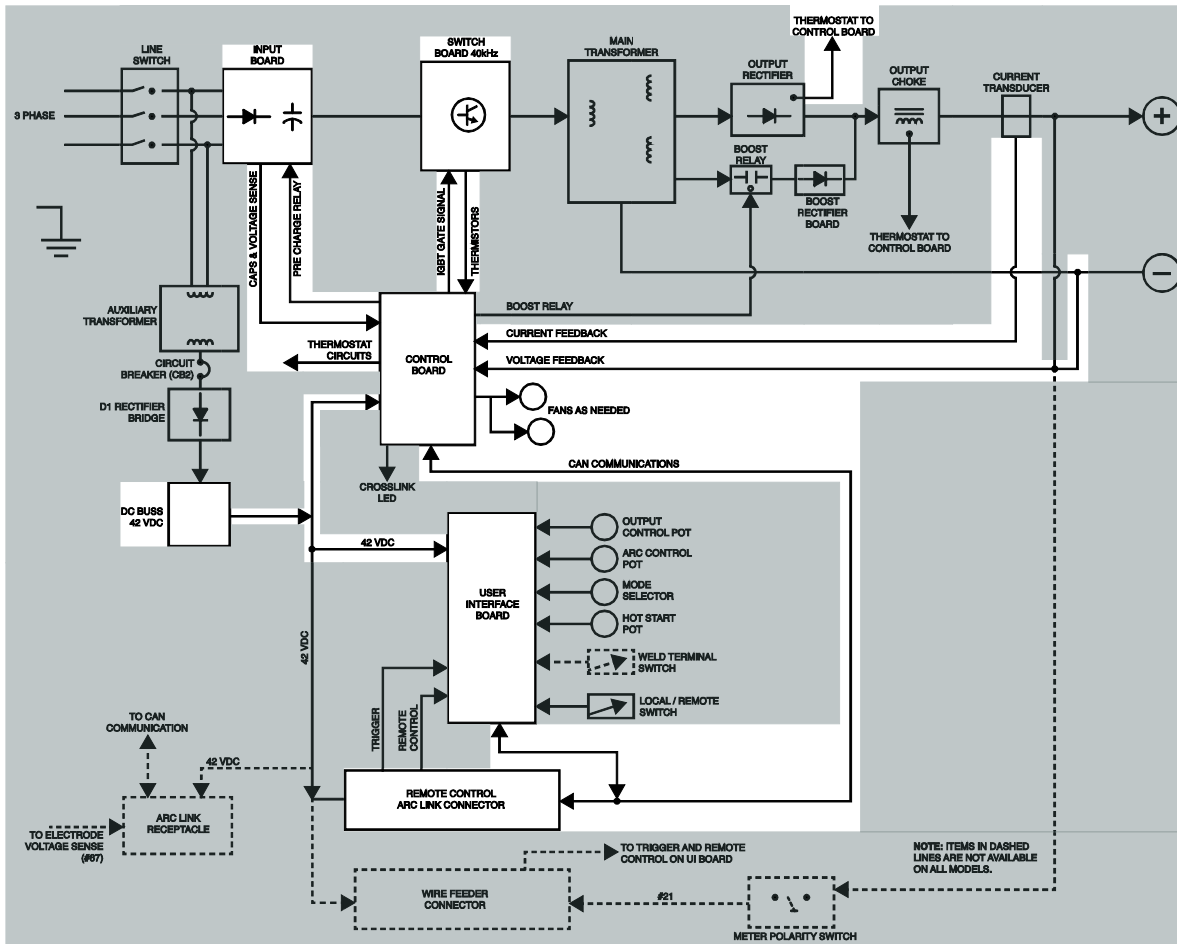
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Theory of Operation

Figure E.1 – Input section



Input Section

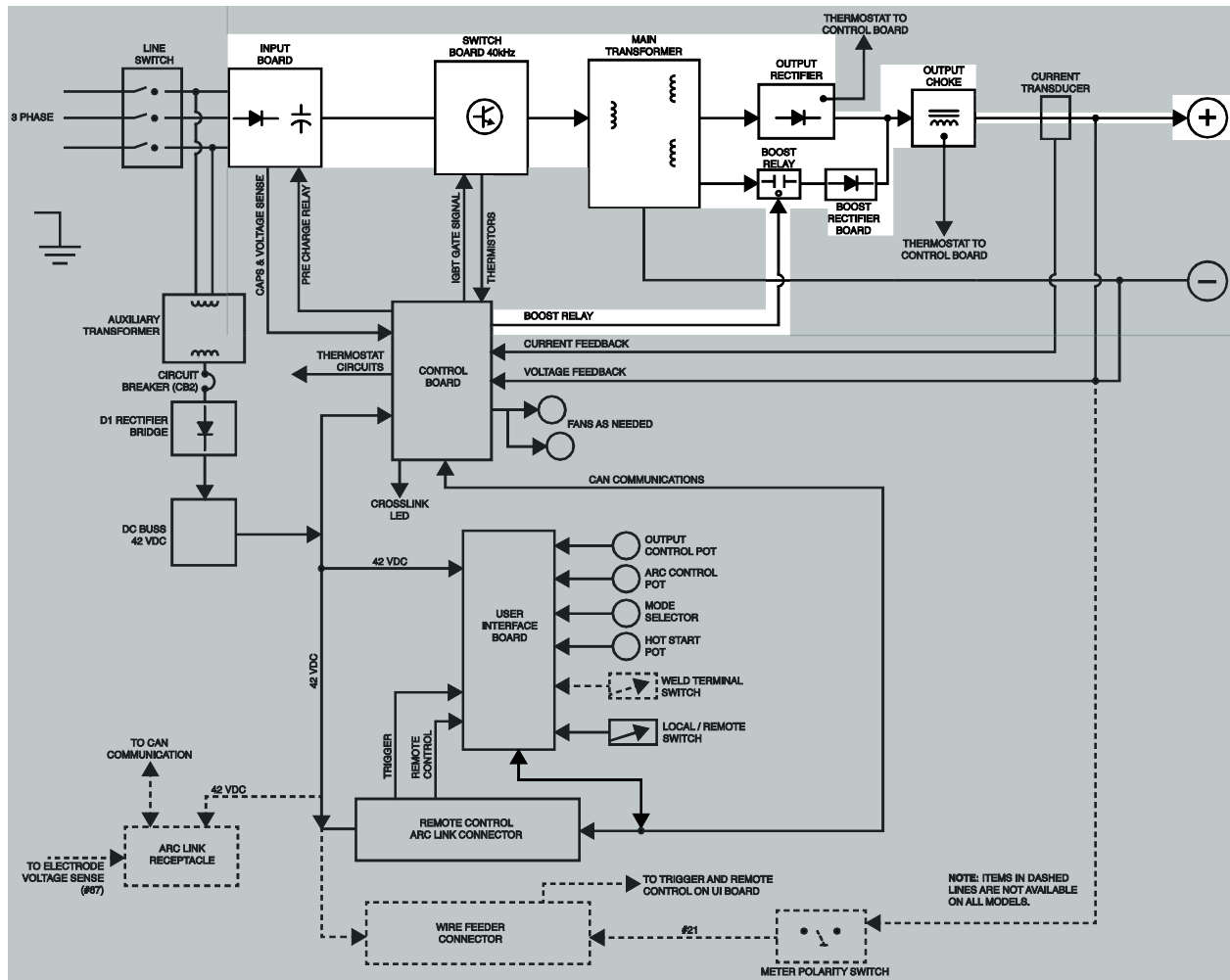
When the correct three-phase input voltage is applied to the Flextec 350X, via the input line switch, two phases of this AC voltage are applied to the auxiliary transformer and all three phases are applied to the input board.

The auxiliary transformer converts the high input voltage (380-575 VAC) to a lower secondary voltage (49-75 VAC) for operating the internal electronics within the Flextec 350X. This secondary voltage is applied to the D1 rectifier bridge through the CB2 20-amp circuit breaker.

The unregulated DC output of the D1 rectifier bridge is applied to the 42V DC bus board. The bus board regulates the output to 42 VDC. This regulated 42 VDC is applied to the control board, the user interface board and the external connectors.

The three-phase input voltage applied to the input board is rectified and applied, through a pre-charge circuit, to the DC link capacitors that are located on the input board and the switchboard. The pre-charge circuit limits the in-rush current to the DC link capacitors for approximately five seconds. The DC link capacitors clamp the voltage and store energy for the welding output. The switchboard receives the rectified and filtered DC voltage from the input board.

Figure E.2 – Switchboard and main transformer

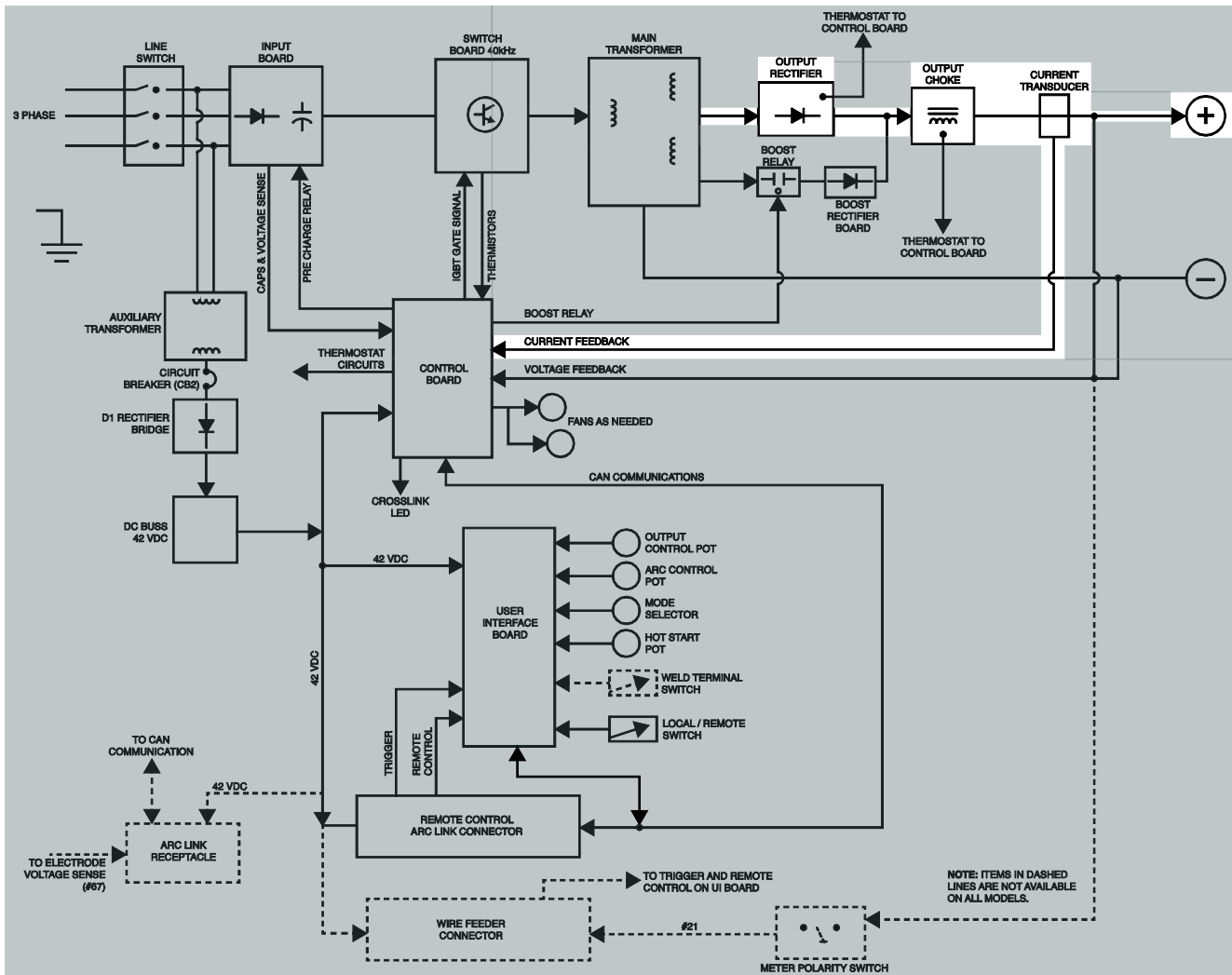


Switchboard and Main Transformer

The main function of the switchboard is to receive and process the rectified and filtered primary power received from the input board. The IGBT circuitry on the switchboard is designed to operate from a rectified three-phase input voltage range from 380 VAC to 575 VAC. There are two quadrants of IGBTs housed on the switchboard that provide pulse width modulated power to the primary windings of the main welding transformer. The operating frequency is 40kHz. See *Pulse Width Modulation* and *Insulated Gate Bipolar Transistor (IGBT) Operation*. The switchboard has five LEDs that indicate the current status of the switchboard. LED 1 indicates the board is receiving primary voltage from the input board. LED 2 thru 5 indicate the switchboard is receiving gate drive signals from the control board. There are also two thermistors that monitor the temperatures of the IGBT quadrants.

The main transformer’s primary windings receive the pulse width modulated power from the switchboard. The 40kHz AC output that is created on the secondary weld windings is applied to the output rectifier. The boost winding of the main transformer provides a higher voltage to the boost rectifier board via the boost relay. The boost relay receives a 15 VDC control signal from the control board when welding current is being drawn. The boost circuit is only active in the SMAW mode. The DC boost voltage is applied thru the output choke to the positive output terminal.

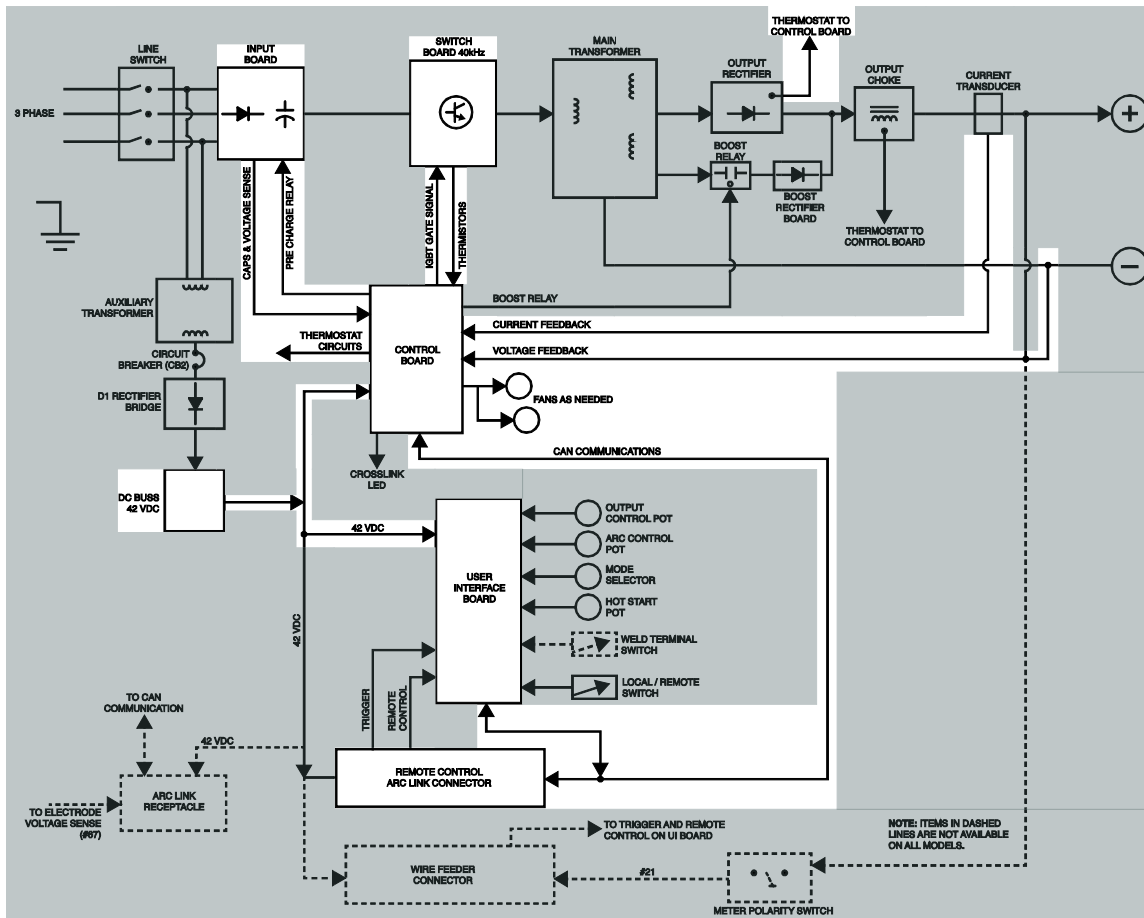
Figure E.3 – Output section



Output Section

The 40KHz. AC output from the main weld winding secondary is applied to the output rectifier bridge. The resultant DC+ power is coupled through an output choke to the positive output terminal. The output choke is an inductor that provides filtering to enhance the arc performance and accurate waveform response. The choke has a normally closed thermostat that is wound into the choke winding. The current transducer converts welding output current to a low voltage that is sent to the control board for digital arc control.

Figure E.4 – Control board



Control Board

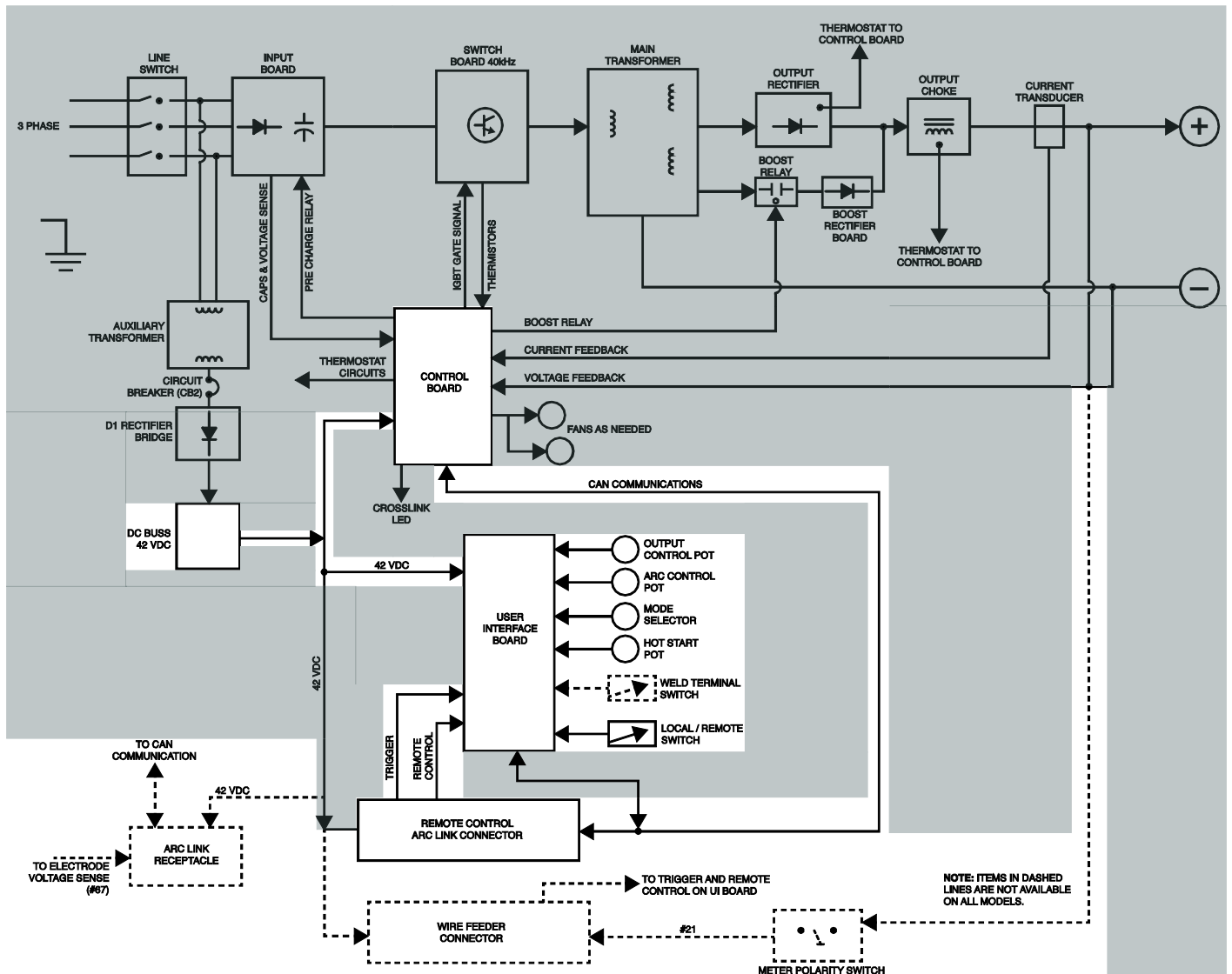
The control board receives input power from the 42V DC bus board. From the 42 VDC the control board creates an internal +15 VCD supply for electronics and a +5 VDC supply for ArcLink. LED 1 indicates the +15 VDC supply is functioning and LED 2 indicates the ArcLink supply is on. LED 1 on the daughter board is the ArcLink status indicator. The control board is the “master” in the ArcLink system and controls the CAN communication network.

The control board receives line input voltage and capacitor voltage information from the input board. After approximately 5 seconds from initial turn on the control board sends a signal to the relay on the input board to by-pass the pre-charge circuit.

The control board receives welding feedback information (voltage and current) and compares this feedback information with the user commands from the user interface (UI) board. These commands are sent from the UI board to the control board via ArcLink communication protocol. The control board then sends the appropriate IGBT gate firing signals to the switchboard so that the welding output is controlled through pulse width modulation. The control board provides actual output voltage and current information to the UI board and also any error codes to display.

The control board also monitors the thermostat and thermistor circuits. This control board controls and monitors the CrossLink™ circuit and turns on the green LED when the Flextec 350X is connected to the LN25X. The two 42 VDC fans are also controlled by the control board.

Figure E.5 – User interface (UI) board



User Interface (UI) Board

The UI board is powered by the 42 VDC received from the 42V DC bus board. LED 5 indicates that the on board power supply is functioning. LED 4 is the ArLink status indicator.

The user controls, switches and connectors allow the operator to communicate to the UI board the desired processes and welding requirements. The UI board then sends the desired parameters to the control board via ArLink CAN communication. The UI board displays to the user the preset settings (voltage or current). During welding the UI board displays actual voltage and output current. The construction model has one 12-pin connector that provides external connections for remote control, triggering, ArLink and 42 VDC. The standard model has two additional connectors. One 14-pin connector is for wire feeders and one 5-pin connector is for ArLink. The standard model also has a meter polarity switch.

There are two VRD indicator lights on the front of the machine. When shipped the VRD function is disabled. VRD is enabled by setting the dipswitch on the UI board. See Operation section of the Operators manual. Several test modes can be accessed using the dipswitches on the UI board.

Thermal Protection

There are two separate thermal protection circuits in the Flextec 350X. Two normally closed thermostats protect the output choke and the output rectifier bridge from over temperature. They are wired in series and are connected to the control board. These protect the machine against reduced airflow or overload. If excessive operating temperatures should occur, the thermostats will open and the fans will turn on, the thermal LED will illuminate, the output will be disabled and error 36 will be logged and displayed.

Two thermistors, located on the top and bottom switchboard heat sinks, protect the IGBT quadrants in the switchboard. The resistance of these thermistors are read by the control board and converted to temperatures. If excessive operating temperatures should occur the fans will turn on, the thermal LED will illuminate, the output will be disabled and error 36 will be logged and displayed.

These devices are self-resetting once the machine cools down sufficiently or any overload is removed. If the thermal shutdown was caused by excessive output or duty cycle and the fans were operating normally, the power switch may be left ON and the reset should occur within a 15-minute timeframe. If the fans are not functioning normally or the air intake louvers are obstructed, then the power must be removed from the machine and the fan problem or air obstruction corrected.

If the machine was being operated in the "Remote" mode when the thermal fault occurred the remote trigger will need to be opened and closed when the thermal fault has cleared to re-established output.

Protective Circuits

Protective circuits are designed into the Flextec 350X to sense trouble and shut down the machine before damage occurs to the machine's internal components.

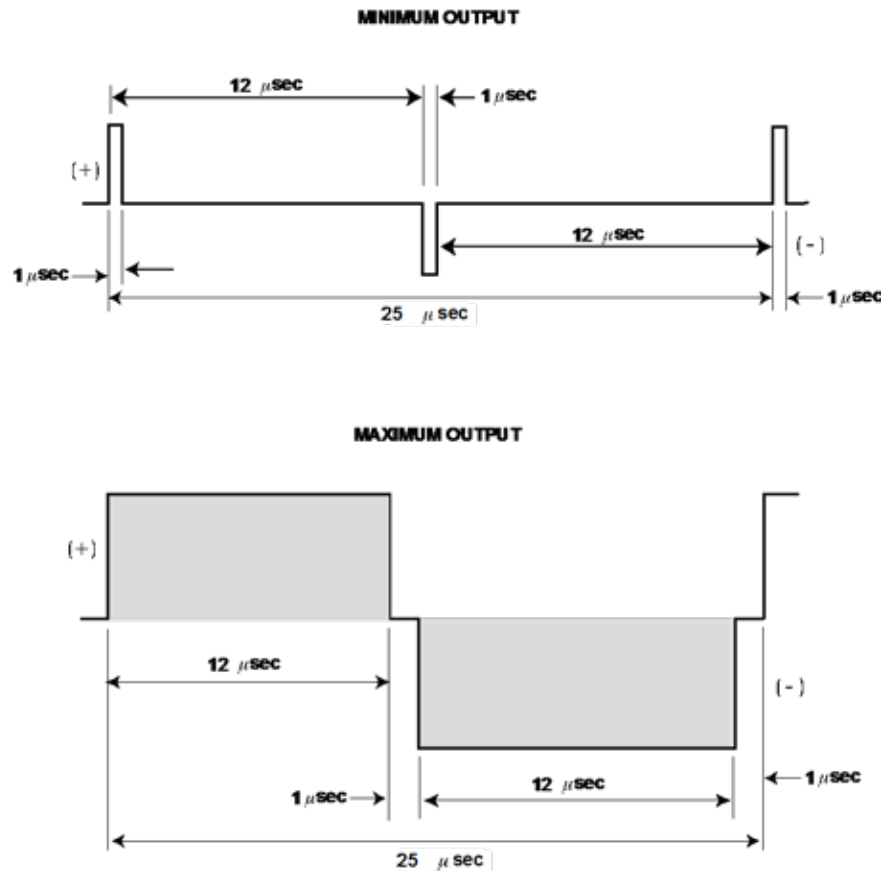
Under/Over Voltage Protection

The machine is protected from both over and under voltage conditions. If the DC voltage being applied to the switchboard is lower than 180 VDC or higher than 1050 VDC the machine's output will be disabled. If the condition persists for more than one second error 711 will be displayed.

CrossLinc™ Capability

The Flextec 350X has the ability to communicate with compatible wire feeders such as the LN25X. The two machines communicate directly over the weld cables by pulsing the OCV voltage and wire feeder current draw. This communication only occurs during an open circuit voltage (OCV) condition. Any changes made at the compatible wire feeder are sent to the power source. This functionality enables the user to adjust the welding voltage at the LN25X wire feeder without the need for a separate control cable.

Figure E.6 – Typical IGBT outputs



Pulse Width Modulation

The term Pulse Width Modulation 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 (PWM) 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 the cycle. The top drawing in Figure E.6 shows the minimum output signal possible over a 25-microsecond time period.

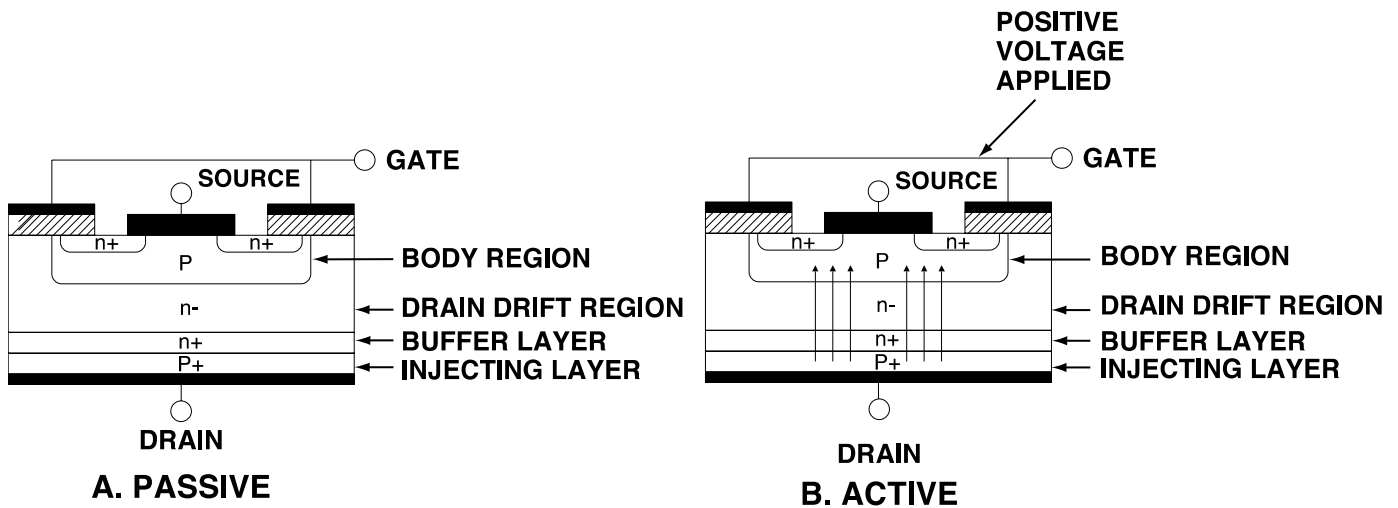
The positive portion of the signal represents one IGBT group¹ conducting for one microsecond. The negative portion is the other IGBT group¹. The dwell time (off time) is 24 microseconds (both IGBT groups off). Since only two microseconds of the 25-microsecond time period are devoted to conducting, the output power is minimized.

Maximum Output

By holding the gate signal on for 12-microseconds each and allowing only two microseconds of dwell time (off time) during the 25-microsecond cycle, the output is maximized. The darkened area under the top curve can be compared to the area under the curve indicates that more power is present.

¹ An IGBT group consists of two IGBT modules feeding one transformer primary winding.

Figure E.7 – Insulated gate bipolar transistor (IGBT) operation



Insulated Gate Bipolar Transistor (IGBT) Operation

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

Example A in Figure E.7 shows an IGBT in 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.

Example B shows the IGBT in an active mode. When the gate signals 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 the 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.

Troubleshooting & Repair

HOW TO USE TROUBLESHOOTING GUIDE

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 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 two main categories: Function 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 cover.

Step 3. PERFORM COMPONENT TESTS. 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 section. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the referred to 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical 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.

• 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.



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

Reusable
 Container
 Do Not
 Destroy

- 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.

Troubleshooting guide

Observe Safety Guidelines detailed in the beginning of this manual.		TROUBLESHOOTING GUIDE
PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
Major physical and electrical damage is evident when the sheet metal cover(s) are removed.	1. Contact your local authorized Lincoln Electric Field Service Facility for technical assistance.	1. Contact the Lincoln Electric Service Department at 1-888-935-3877.
The input fuses repeatedly fail or the input circuit breakers keep tripping.	1. Make sure the input fuses or circuit breakers are properly sized.	1. Perform the <i>Input Board Test Procedure</i> . 2. Perform the <i>Auxiliary Transformer (T1) Test Procedure</i> . 3. Perform the <i>Switchboard Test Procedure</i> . 4. Perform the <i>Main Transformer Test Procedure</i> .
The machine is "dead". No lights, no output, the machine appears to have no input power.	1. Make sure the input power switch is in the ON position. 2. Check the main input fuses or breakers to make sure all three phases of the correct input power are present at the machine. 3. Check CB2 circuit breaker.	1. Check the input switch for proper operation. Also check the associated leads for loose or faulty connections. See Wiring Diagram. 2. Perform the <i>Auxiliary Transformer (T1) Test Procedure</i> . 3. Perform the <i>42V DC Bus Board Test Procedure</i> . 4. Perform the <i>D1 Rectifier Test Procedure</i> .
 CAUTION		
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.		

Observe Safety Guidelines detailed in the beginning of this manual.		TROUBLESHOOTING GUIDE
PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
<p>There is no welding output from the Flextec 350X machine. NOTE: This problem may be accompanied by an error code.</p>	<ol style="list-style-type: none"> 1. Make sure the S5 weld terminals switch is in the "ON" position (standard models only). 2. Make certain the correct three-phase input power is being applied to the machine. The input may be too high or too low. In this case error 713 or 714 will be displayed. 3. There may be a thermal shutdown. Check the thermal LED. 	<ol style="list-style-type: none"> 1. Perform the <i>Auxiliary Transformer (T1) Test Procedure.</i> 2. Perform the <i>Input Board Test Procedure.</i> 3. Perform the <i>Switchboard Test Procedure.</i> 4. Perform the <i>User Interface Board Test Procedure.</i> 5. Perform the <i>Output Rectifier Assembly Test Procedure.</i> 6. Perform the <i>Control Board Test Procedure.</i> 7. Perform the <i>Main Transformer Test Procedure.</i> 8. Perform the <i>Choke Test Procedure.</i>
<p>The thermal LED is "ON". The machine regularly overheats.</p>	<ol style="list-style-type: none"> 1. The welding application may be exceeding the duty cycle and/or limits of the machine. 2. Dirt or dust may have clogged the cooling channels inside the machine. 3. Air intake and exhaust louvers may be blocked due to inadequate clearance. 4. Make sure the fans are functioning correctly. The Flextec 350X is equipped with F.A.N. (fan as needed) circuitry. The fans run whenever the output current is established and will continue running for approximately five minutes after the output current is disabled. 	<ol style="list-style-type: none"> 1. Perform the <i>Thermostat #1 and #2 Circuit Test Procedure.</i> 2. Perform the <i>Thermistor Test Procedure.</i> 3. Perform the <i>Fan and F.A.N. Circuit Test Procedure.</i>
 CAUTION		
<p>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.</p>		

Observe Safety Guidelines detailed in the beginning of this manual.		TROUBLESHOOTING GUIDE
PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The machine turns on but the display is not visible, flickers or has missing digits.	<ol style="list-style-type: none"> 1. Turn the machine off and back on to re-boot. 2. Check for loose or faulty connections at the user interface board. See Wiring Diagram. 	<ol style="list-style-type: none"> 1. Perform the <i>User Interface Board Test Procedure</i>. 2. Perform the <i>Auxiliary Transformer (T1) Test Procedure</i>.
The fan is running at all times.	<ol style="list-style-type: none"> 1. Make sure there is no load on the output terminals. 	<ol style="list-style-type: none"> 1. Perform the <i>Fan And F.A.N. Circuit Test Procedure</i>. 2. Perform the <i>Control Board Test Procedure</i>.
Machine will not respond to the user controls and switches.	<ol style="list-style-type: none"> 1. Make sure the machine is in "Local" control. 	<ol style="list-style-type: none"> 1. Perform the <i>User Interface Board Test Procedure</i>.
The CrossLinc™ function does not work.	<ol style="list-style-type: none"> 1. Make sure a compatible wire feeder (LN-25X) is connected to the Flextec 350X. 2. The weld voltage can only be adjusted from the LN-25X when the Flextec 350X is in an OCV condition, not welding. 3. The green CrossLinc™ LEDs on both machines must be illuminated. 	<ol style="list-style-type: none"> 1. Check the cables between the power source and the feeder. The voltage drop must be less than 10 VDC.
 CAUTION		
<p>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.</p>		

Observe Safety Guidelines detailed in the beginning of this manual.		TROUBLESHOOTING GUIDE
PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
There is a general degradation of the welding performance.	<ol style="list-style-type: none"> 1. Make sure the correct three-phase input power is being applied to the machine. 2. Make sure the machine's controls are set correctly for the welding process being used. 3. Check for poor connections or "loops" in the welding cables. 4. If using a wire feeder check for the correct and consistent wire feed speed at the wire feeder. 	<ol style="list-style-type: none"> 1. Perform the <i>Choke Test Procedure</i>. 2. Perform the <i>Current Transducer (LEM) Test Procedure</i>. 3. Perform the <i>Output Rectifier Assembly Test Procedure</i>.
The machine loses output during a weld.	<ol style="list-style-type: none"> 1. A secondary over-current may have occurred. The welding application may have exceeded the current limitations of the machine. 2. Make sure the correct three-phase input power is being applied to the machine. 	<ol style="list-style-type: none"> 1. Perform the <i>Output Rectifier Assembly Test Procedure</i>. 2. If in SMAW mode, perform the <i>Boost Relay Test Procedure</i>.
Wire feeder won't work. Apparently no power to wire feeder.	<ol style="list-style-type: none"> 1. Check the control cable connectors on the case front of the machine to make sure it is properly connected. 2. Check circuit breaker on the case back of the machine. Reset if necessary. 3. Check the control cable between the power source and the wire feeder for continuity. 	<ol style="list-style-type: none"> 1. Make sure the wire feeder is connected correctly to the power source. See Wiring Diagram and Operators manual.
 CAUTION		
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.		

USING THE STATUS LED TO TROUBLESHOOT SYSTEM PROBLEMS

Errors are displayed on the user interface. In addition, there are status lights on the User Interface PC board and the Switch PC board that contain error sequences.

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 User Interface board, Crossline™, Input board, Control board and the Switchboard are dual-color LED's or green LEDs. Normal operation for each is described on the wiring diagram.

Error conditions are indicated in the following chart.

FAULT CODES			
ERROR CODE#	DESCRIPTION	POSSIBLE CAUSE	CORRECTIVE ACTION
6	Device that controls sequence of the welding operation halted due to an error.	Communication from the Power Source failed before mapping was complete.	Weld Terminals Remote: Re-trigger to recover from error. Weld Terminals Local: Toggle Remote/Local Switch to recover from error.
18	ArcLink Auto-Mapping Failed.	The machine could not properly configure the devices that are attached to it. This configuration problem could be caused by the type of devices that are connected to the machine or a required device that is not connected.	Refer to the Operator's Manual for proper configuration. Verify all devices in the system are properly powered.
21	Device that controls sequence of the welding operation halted due to an error.	A component of the system encountered an error during the welding sequence and caused system to stop. The component with the error could be a wire drive, a user interface or some other part of the system.	Weld Terminals Remote: Re-trigger to recover from error. Weld Terminals Local: Toggle Remote/Local Switch to recover from error.
31	Primary Overcurrent.	Peak current through the transformer primary has exceeded its threshold.	Check the input power (voltage and frequency). Verify that the PC boards and input rectifier are in working condition and proper input power and welding output cable connections. Verify proper connections of main internal power components. Power must be cycled to the machine to reset the error.
36	Thermal Fault.	Machine shut off output due to elevated internal temperatures.	1. Check for material blocking intake or exhaust louvers. • Blow air in the rear louvers to clear dirt

			<p>from the fan. NOTE: The Fan As Needed circuitry automatically shuts off the fan 5 minutes after welding has stopped. 2. Welding output ratings may have been exceeded. Allow the machine to cool down and reset. Measure the thermostats at the Switchboard and replace if defective.</p>
45	Output Voltage Limit Exceeded.	During OCV, the voltage at the studs exceeded the allowable levels.	If VRD is enabled, the stud voltage exceeded 35 volts peak. In standard operation, the stud voltage exceeded 113 volts peak. Verify the voltage feedback leads are properly connected inside the machine. Verify the input voltage is within $\pm 10\%$ of the nominal value.
213	Communication Fault.	CAN communication between the User Interface PC board and the Switch PC Board has been interrupted.	Power must be cycled to the machine to reset the error. Visually inspect the CAN harness to ensure connections and condition. Verify power supply to the User Interface and Switch PC boards. Replace defective assemblies as required.
711	DC Link Capacitor Over/Under Voltage	The voltage on the main DC link capacitors housed on the switchboard has either gone too high or too low.	Verify all three phases of the AC input are connected.
713	Input Power Misconnect – Supply Voltage too High.	Verify the input supply voltage to the machine is within rated specifications.	Machine needs to be turned off and back on to reset.
714	Input Power Misconnect – Supply Voltage too Low.	Verify that the wiring to connector J5 on the control board matches the machine wiring diagram. If condition persists contact an authorized Lincoln Field Service Shop.	Machine needs to be turned off and back on to reset.
719	Switch PC Board Error	The switch PC board experienced an internal error.	Power must be cycled to the machine to reset the error. Replace the switchboard if the error persists.

 **CAUTION**

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 Procedures

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the case sheet metal covers.

MATERIALS NEEDED

5/16" Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Remove the input power to the Flextec 350X machine.
2. Using a 5/16" nutdriver, remove the eight screws (two on top and three on each side) securing the roof to the machine. See *Figures F.1, F.2 and F.3*.
3. Using a 5/16" nutdriver, remove the four screws and washers securing the corner caps to the left and right case sides. See *Figure F.2 and F.3*.
NOTE: It is not necessary to remove the corner caps completely at this time.
4. Using a 5/16" nutdriver, remove the three screws securing the left case side to the machine. See *Figure F.2*.
5. Using a 5/16" nutdriver, remove the three screws securing the right case side to the machine. See *Figure F.3*.
6. The case covers can now be removed.

REPLACEMENT PROCEDURE

1. Carefully position the left case side onto the machine.
2. Using a 5/16" nutdriver, attach the three screws securing the left case side to the machine.
3. Carefully position the right case side onto the machine.
4. Using a 5/16" nutdriver, attach the three screws securing the right case side to the machine.
5. Using a 5/16" nutdriver, attach the four screws and washers securing the corner caps to the left and right case sides.
6. Carefully position the roof onto the machine.
7. Using a 5/16" nutdriver, attach the eight screws (two on top and three on each side) securing the roof to the machine.

Figure F.1 – Roof mounting screw locations

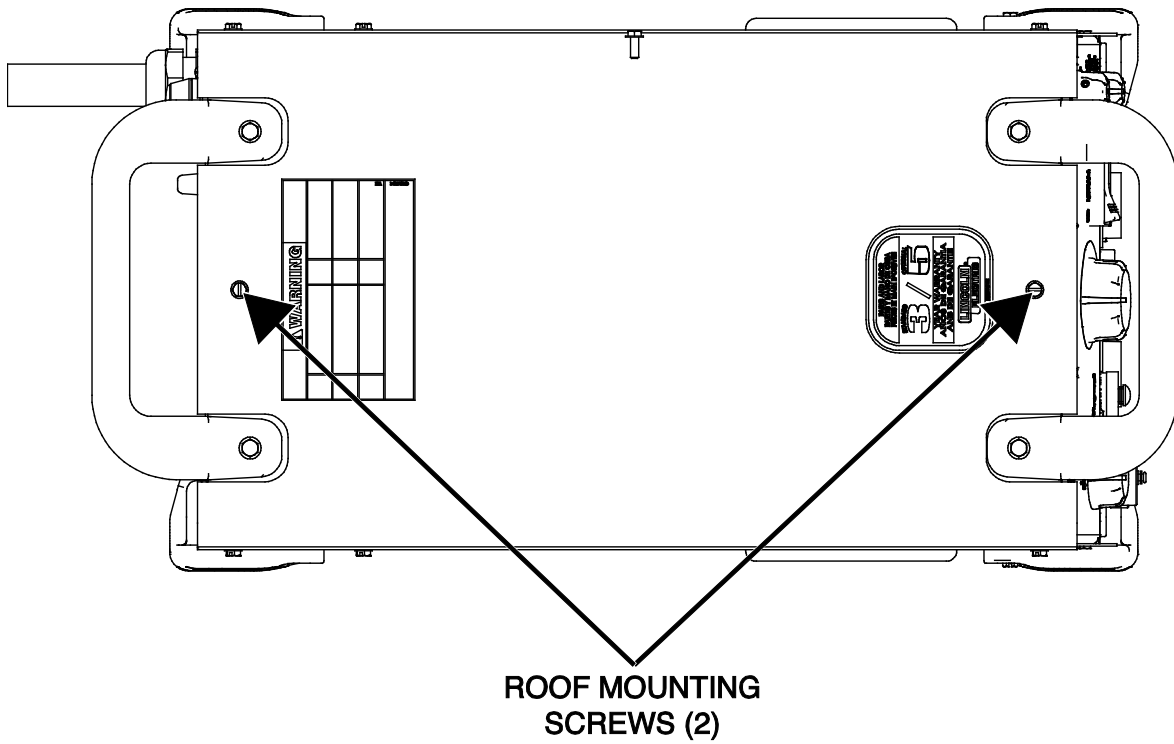


Figure F.2 – Left case side, roof and corner cap mounting screw locations

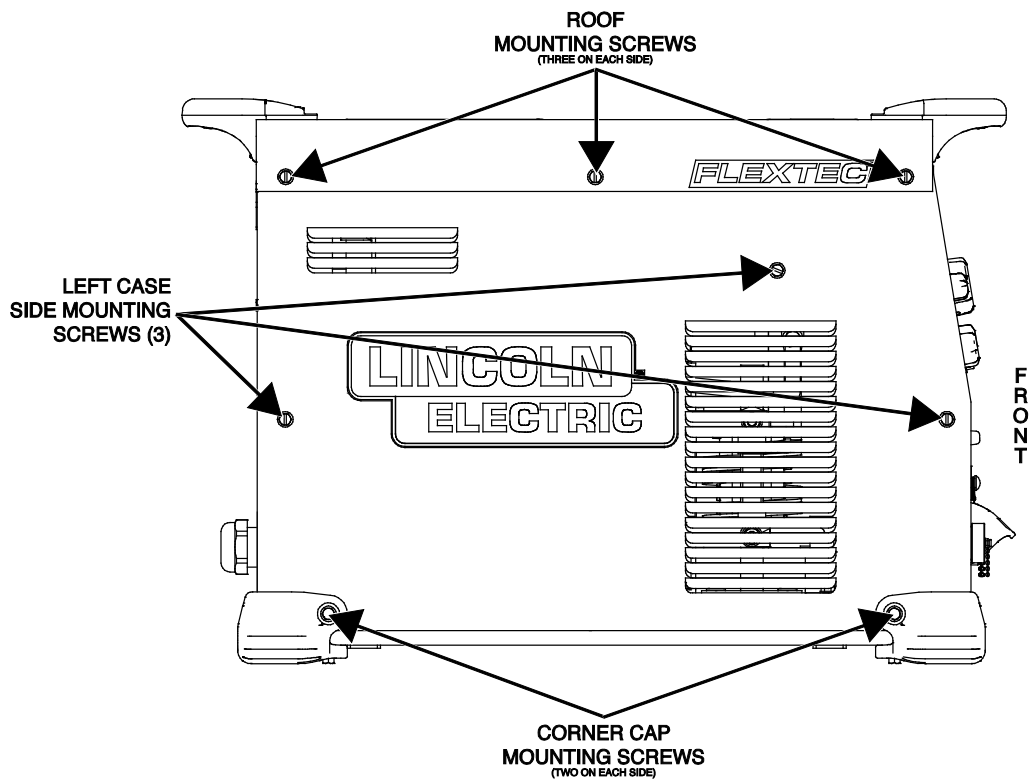
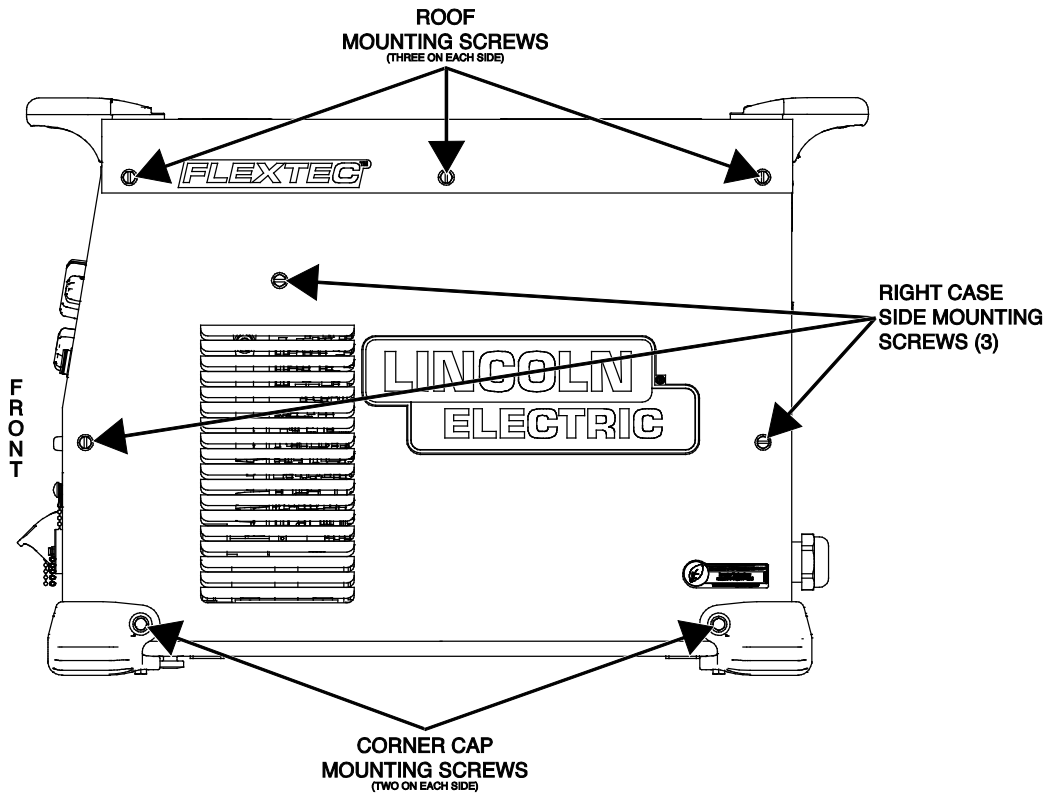


Figure F.3 – Right case side, roof and corner cap mounting screw locations



CAPACITOR DISCHARGE PROCEDURE

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 procedure will help determine if the capacitors are discharged.

MATERIALS NEEDED

Resistor (25 - 1000 ohms and 25 watts minimum)
Electrical Insulating Gloves
Analog Voltmeter or Digital Multimeter
Wiring Diagram

PROCEDURE

1. Remove the input power to the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Locate the input board. See *Figure F.4*. See Wiring Diagram.
4. Locate the two large bolted connections labeled B2 and B1 on the input board. See *Figure F.5*. See Wiring Diagram.
5. Using a 25 watt or more (25 to 1000 ohm) resistor connected to two test leads, carefully discharge the capacitors.
6. Using a digital volt/ohmmeter, ensure the capacitors are discharged by connecting the positive meter probe to B2 and the negative meter probe to B1 on the input board. The voltage should be zero, if not repeat the discharge procedure. See Wiring Diagram.
7. Perform desired test(s) / repair procedure(s).
8. When testing is complete, perform the *Case Cover Replacement Procedure*.

Figure F.4 - Input board location

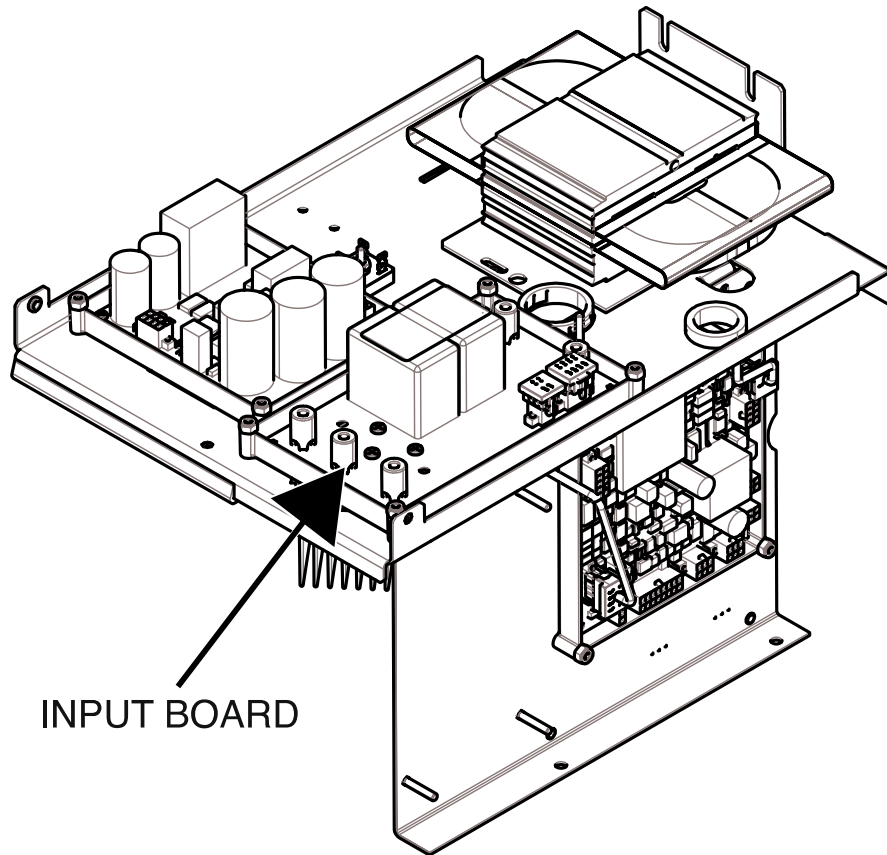
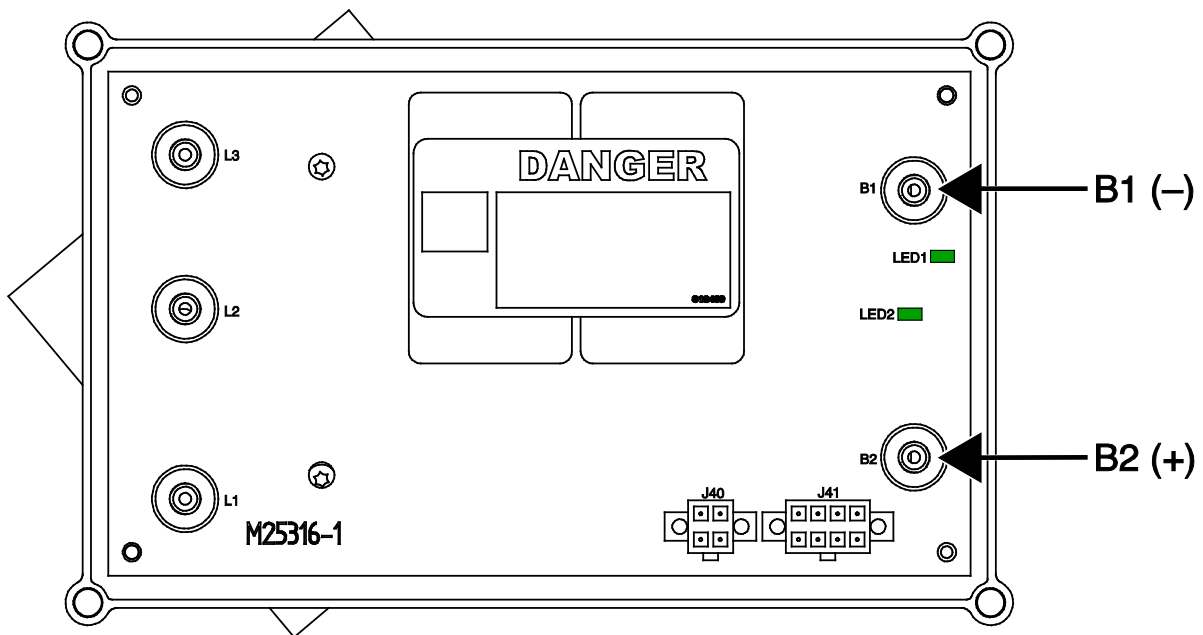


Figure F.5 - Input board connections B2 and B1



42V DC BUS BOARD TEST PROCEDURE

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 help determine if the 42V DC Bus Board is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Carefully apply the correct input power to the Flextec 350X and turn on the machine ON.
5. Locate the 42V DC bus board. See *Figure F.6*.
6. Locate the Green LED on the 42V DC bus board. See *Figure F.7*.
7. If the Green LED is illuminated the 42V DC bus board is receiving input voltage from the DC bus rectifier circuit.
8. If the Green LED is blinking, carefully remove plug J47 from the 42V DC bus board. See *Figure F.7*. If the blinking stops and the Green LED stays illuminated and steady, this is an indication of a heavy load on the 42 VDC output line. See Wiring Diagram.
9. If the Green LED is not illuminated, perform the *Auxiliary Transformer (T1) Test Procedure* and the *D1 Rectifier Test Procedure*. See Wiring Diagram.
10. Using a digital volt/ohmmeter, perform the voltage tests outlined in *Table F.1*. See *Figure F.8*. See Wiring Diagram.
11. If the correct input voltage is being applied to the DC bus board and the correct output voltages are not being generated, the 42V DC bus board may be faulty.
12. If faulty, perform the *42V DC Bus Board Removal And Replacement Procedure*.
13. Perform the *Case Cover Replacement Procedure*.

Table F.1 – 42V DC bus board voltage tests

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
INPUT FROM D1 RECTIFIER	PLUG J46 PIN 1 (+)	PLUG J46 PIN 3 (-)	46 – 74 VDC
42V DC TO CONTROL BOARD	PLUG J47 PIN 3 (+)	PLUG J47 PIN 1 (-)	42 VDC
42V DC TO CONTROL BOARD	PLUG J47 PIN 4 (+)	PLUG J47 PIN 1 (-)	42 VDC
42V DC TO UI BOARD	PLUG J47 PIN 7 (+)	PIN J47 PIN 5 (-)	42 VDC
42V DC TO REMOTE RECEPTACLES	PLUG J47 PIN 8 (+)	PIN J47 PIN 6 (-)	42 VDC

Figure F.6 - 42V DC bus board location

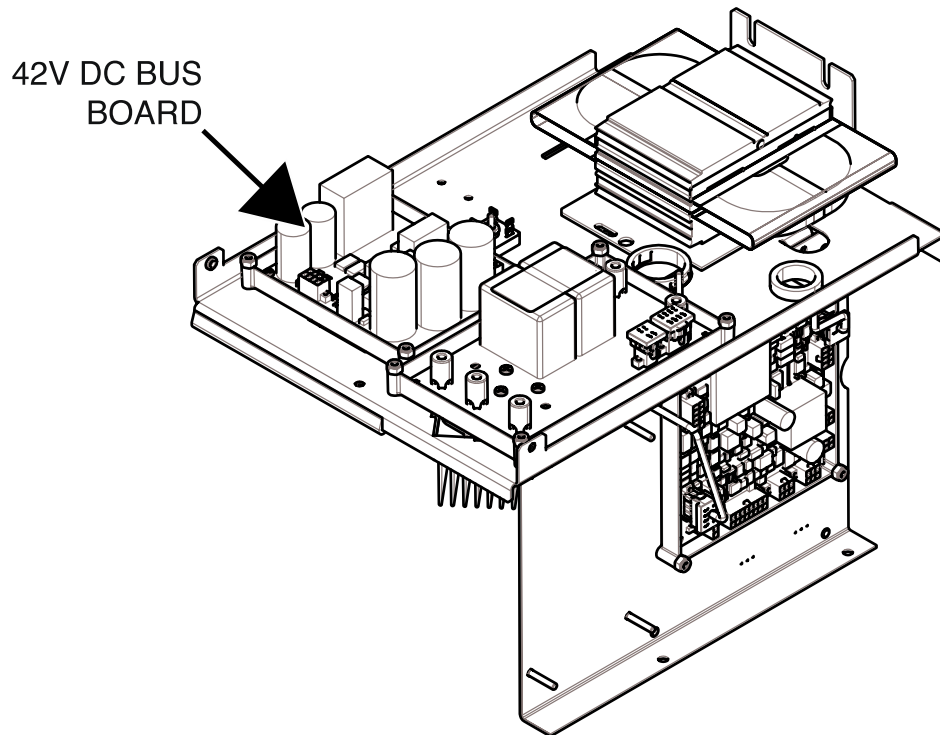


Figure F.7 - 42V DC bus board LED and plug locations

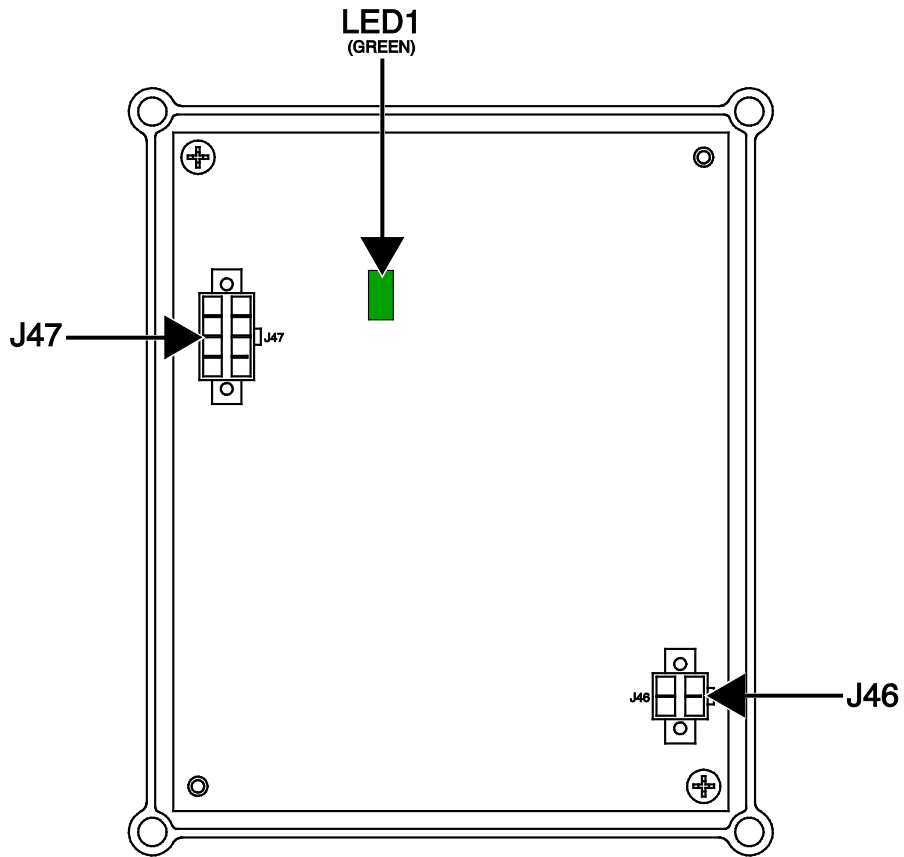
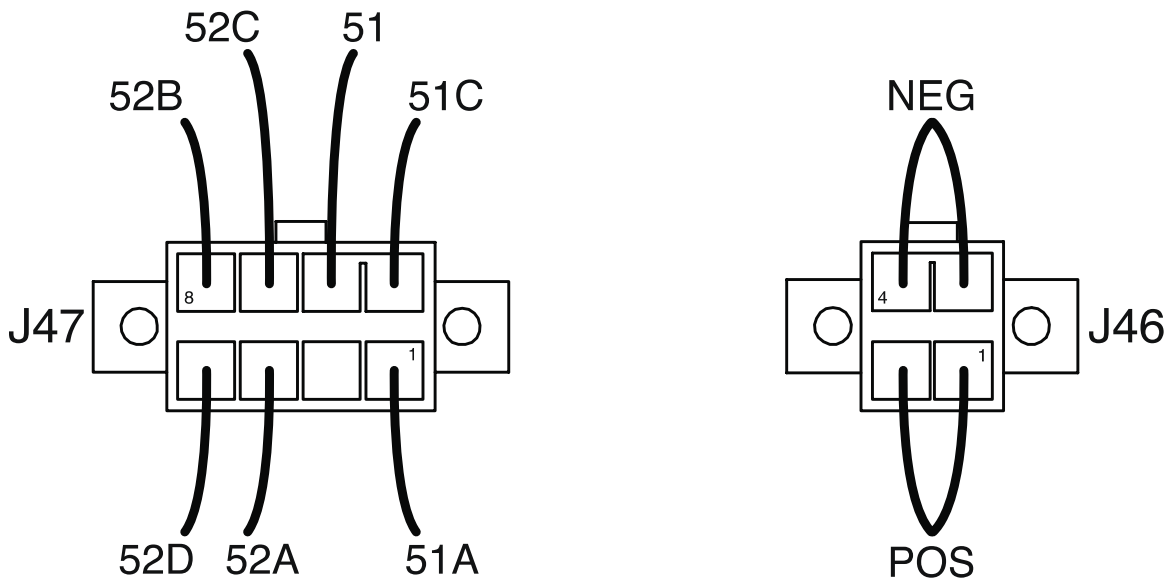


Figure F.8 - 42V DC bus board test points



AUXILIARY TRANSFORMER (T1) TEST PROCEDURE

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 help determine if the Auxiliary Transformer (T1) is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the auxiliary transformer (T1). See *Figure F.9*.
5. Carefully apply the correct input power to the Flextec 350X and turn ON the machine.
6. Using a digital volt/ohmmeter, test for the correct primary voltages at the input board terminal (leads L1 – L3). See *Figure F.10*.
7. If the correct primary voltages are NOT present, check all input power leads, fuse and connections. See Wiring Diagram.
8. If the correct primary voltages are present continue testing.
9. Using a digital volt/ohmmeter, perform the voltage and resistance test in *Tables F.2* and *F.3*. See Wiring Diagram.
10. If faulty, perform the *Auxiliary Transformer (T1) Removal And Replacement Procedure*.
11. Perform the *Case Cover Replacement Procedure*.

Figure F.9 - Auxiliary transformer (T1) location

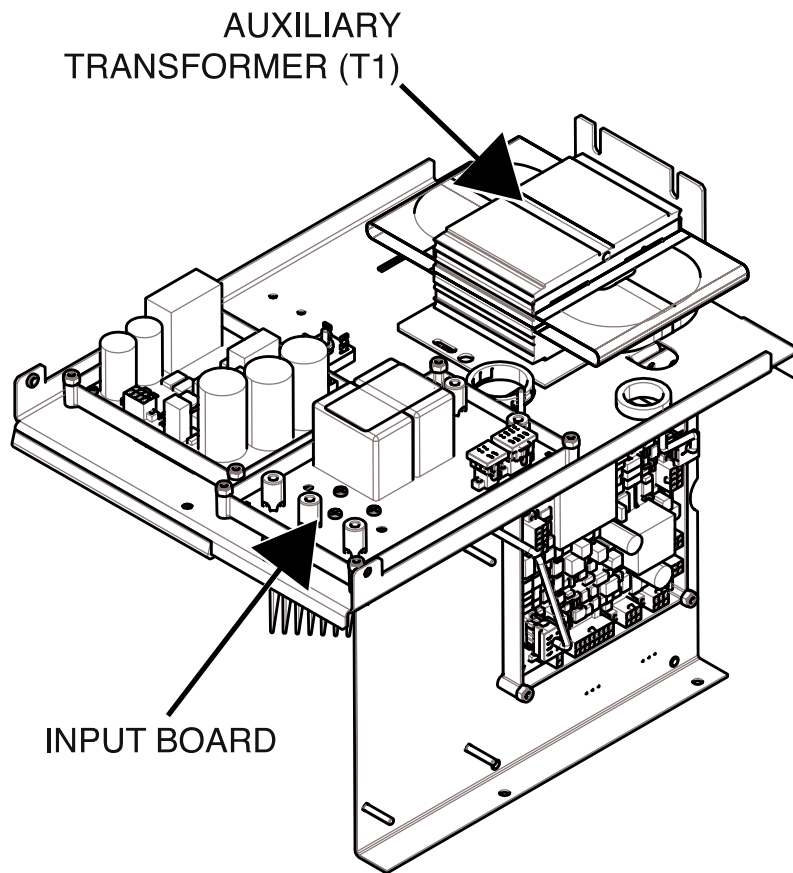


Figure F.10 - Input board terminal locations

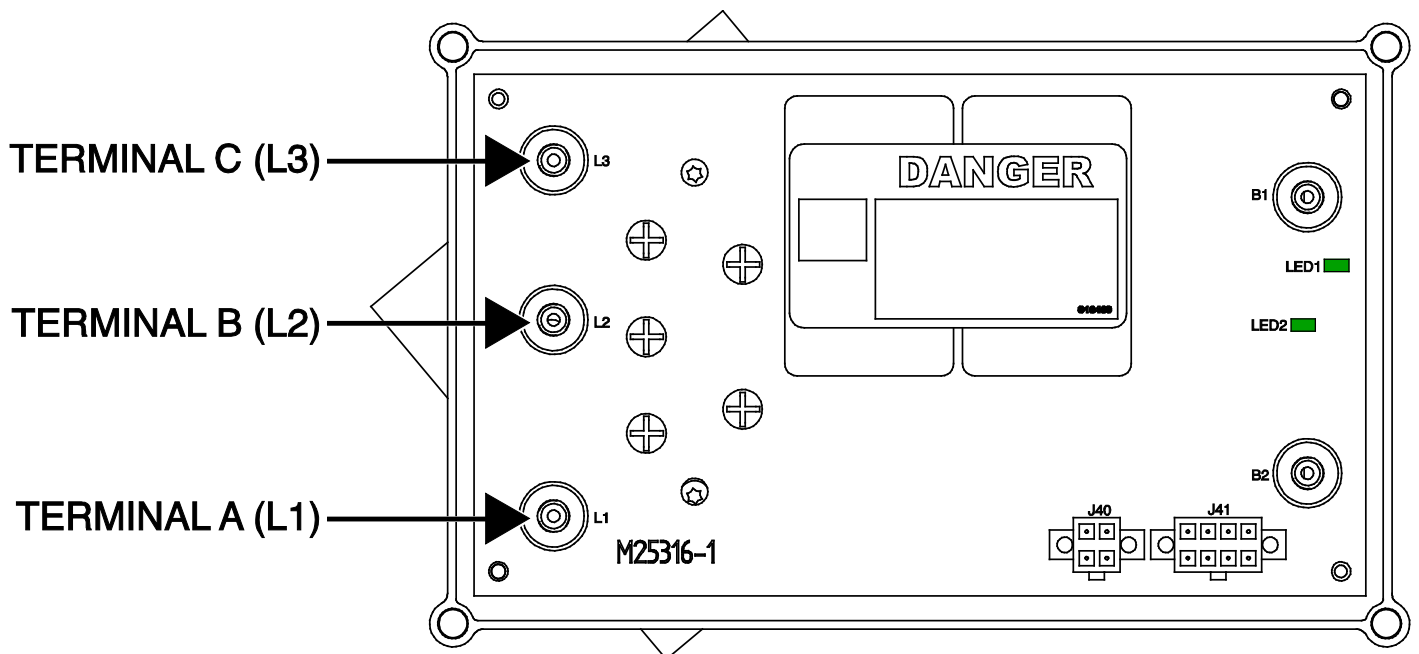


Table F.2 – Auxiliary transformer (T1) voltage tests

DESCRIPTION / PRIMARY VOLTAGE APPLIED TO L1-L3	TEST POINT	TEST POINT	EXPECTED SECONDARY VOLTAGE
380 VAC	X1	X2	49 VAC
440 VAC	X1	X2	57 VAC
460 VAC	X1	X2	59 VAC
575 VAC	X1	X2	74 VAC

Table F.3 – Auxiliary transformer (T1) primary and secondary resistances

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
PRIMARY WINDING	L1	L3	35 OHMS
SECONDARY WINDING	X1	X2	1 OHM
PRIMARY WINDING TO SECONDARY WINDING WITH ALL TRANSFORMER LEADS DISCONNECTED FROM CIRCUIT	X1	L1	500,000 OHMS MINIMUM
PRIMARY WINDING TO CHASSIS GROUND WITH ALL TRANSFORMER LEADS DISCONNECTED FROM CIRCUIT	L1	CHASSIS GROUND	500,000 OHMS MINIMUM
SECONDARY WINDING TO CHASSIS GROUND WITH ALL TRANSFORMER LEADS DISCONNECTED FROM CIRCUIT	X1	CHASSIS GROUND	500,000 OHMS MINIMUM

BOOST RELAY TEST PROCEDURE

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 help determine if the Boost Relay is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
External 15 VDC Power Supply
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the boost relay. The boost relay is attached to the underside of the deck. See *Figure F.11*.
5. Label and disconnect leads #227 and #228 from the boost relay. See *Figure F.12*. See Wiring Diagram.
6. Using a digital volt/ohmmeter, measure the resistance of the boost relay coil. See *Figure F.12*. The resistance should be approximately 83 ohms.
7. Label and disconnect the remaining leads from the boost relay. See *Figure F.12*. See Wiring Diagram.
8. Using a digital volt/ohmmeter, measure the resistance of the contacts (terminals 2 to 4 and terminals 6 to 8). See *Figure F.12*. See Wiring Diagram. The resistance between contacts should be infinite (open).
9. Using an external 15 VDC power supply, apply voltage to the coil terminals. An audible click should be heard as the contacts close. See Wiring Diagram.
10. Using a digital volt/ohmmeter, test the contacts again (terminals 2 to 4 and terminals 6 to 8), resistance should be very low (less than one ohm).
11. If these tests fail, the boost relay may be faulty.
12. If faulty, perform the *Boost Relay Removal And Replacement Procedure*.
13. Connect all previously removed leads.
14. Perform the *Case Cover Replacement Procedure*.

NOTE: The boost relay is only activated when the machine is in SMAW mode and welding current is being drawn.

Figure F.11 - Boost relay location

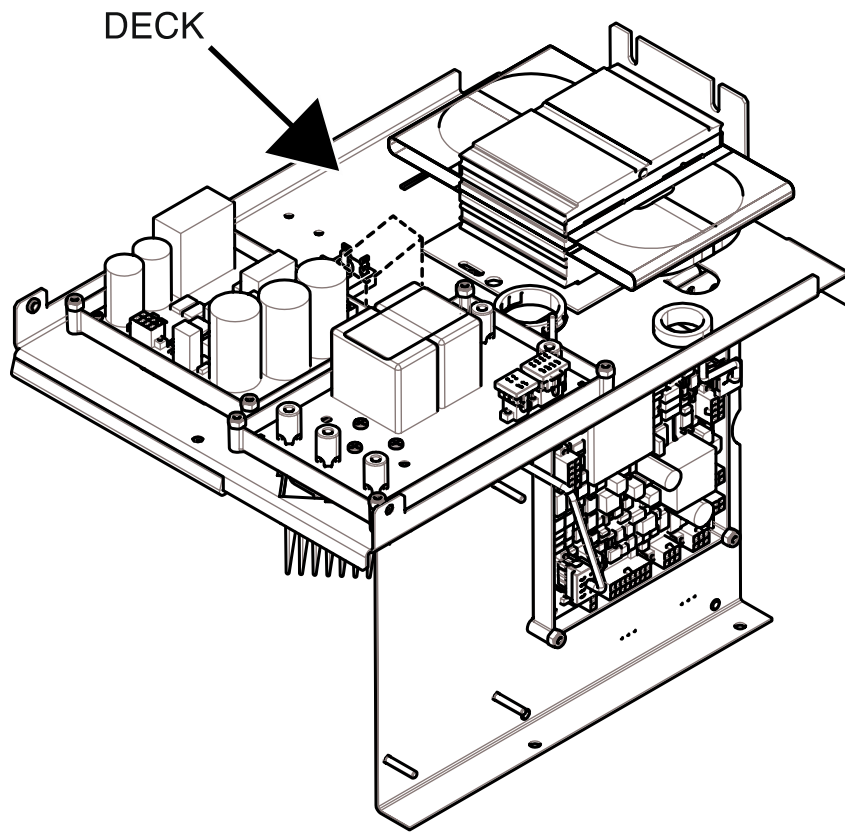
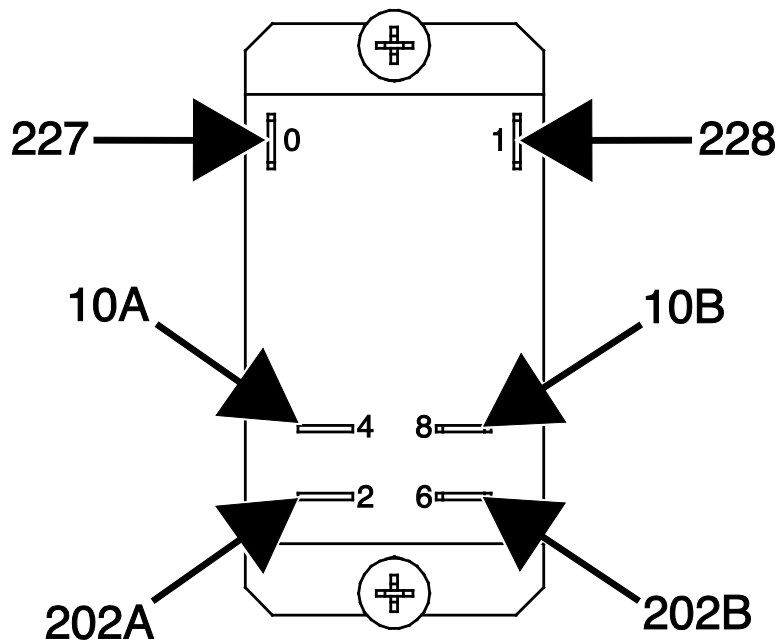


Figure F.12 - Boost relay terminal and lead locations



CHOKE TEST PROCEDURE

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 help determine if the Choke is shorted turn to turn or grounded.

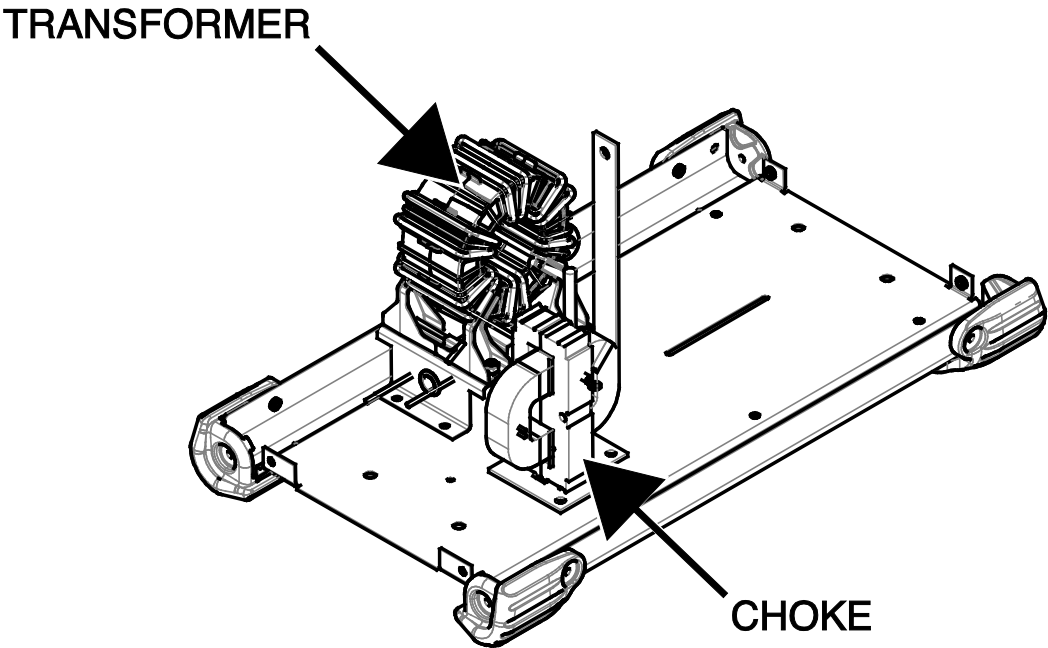
MATERIALS NEEDED

Digital Volt/Ohmmeter
1/2" Nutdriver
1/2" Open End Wrench
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the choke. The choke is attached to the base next to the transformer. See *Figure F.13*.
5. **OPEN:** No weld output. Using a digital volt/ohmmeter, test the resistance from the choke lead connected to the heat sink of the output rectifier to the positive output terminal. See Wiring Diagram. The resistance should be very low (less than one ohm).
6. **Turn To Turn Short:** Reduced inductance, arc instability, excessive heating of the choke. Check for any physical signs of arcing within the choke assembly.
7. **Choke Coil Grounded:** Reduced inductance, alternate weld current path. Electrically isolate the choke coil by disconnecting both choke leads. To electrically isolate the choke coil, using a 7/16" nutdriver and 7/16" open-end wrench, remove the bolt, nut and associated washers securing the top choke lead to the lead from the positive output terminal. Using the 1/2" wrench, remove the other choke flex lead from the output rectifier heat sink. Take note of Positive white lead. Take note of leads 220D and 220A. Using a digital volt/ohmmeter, check the resistance from choke coil to chassis ground. Resistance should be at least 500,000 ohms. See Wiring Diagram.
8. If any of the tests fail, the choke may be faulty.
9. Connect all previously removed leads. See Wiring Diagram.
10. If faulty, perform the *Choke Removal And Replacement Procedure*.
11. Perform the *Case Cover Replacement Procedure*.

Figure F.13 - Choke location



FAN AND F.A.N. CIRCUIT TEST PROCEDURE

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 help determine if the Fan and F.A.N. Circuit are functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

NOTE: The fans should turn on briefly when the machine is turned on. The fans turn on during OCV or when welding current is present. The fans also turn on in the event of an over temperature condition.

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the control board. See *Figure F.14*. See Wiring Diagram.
5. Locate the plugs J13 and J14 on the control board. With the two plugs still connected to the control board carefully insert the meter probes into pin 4 (red wire +) and pin 3 (black wire -) of plug J13 and test per *Table F.4*. See *Figure F.15*. See Wiring Diagram.
6. Carefully apply the correct input power to the Flextec 350X.
7. Repeat the above step for plug J14.
8. If the 42VDC is present at the red and black leads and the fan does not run, the fan may be faulty.
9. If faulty, perform the *Fan(s) Removal And Replacement Procedure*.
10. Perform the *Case Cover Replacement Procedure*.

Figure F.14 - Control board location

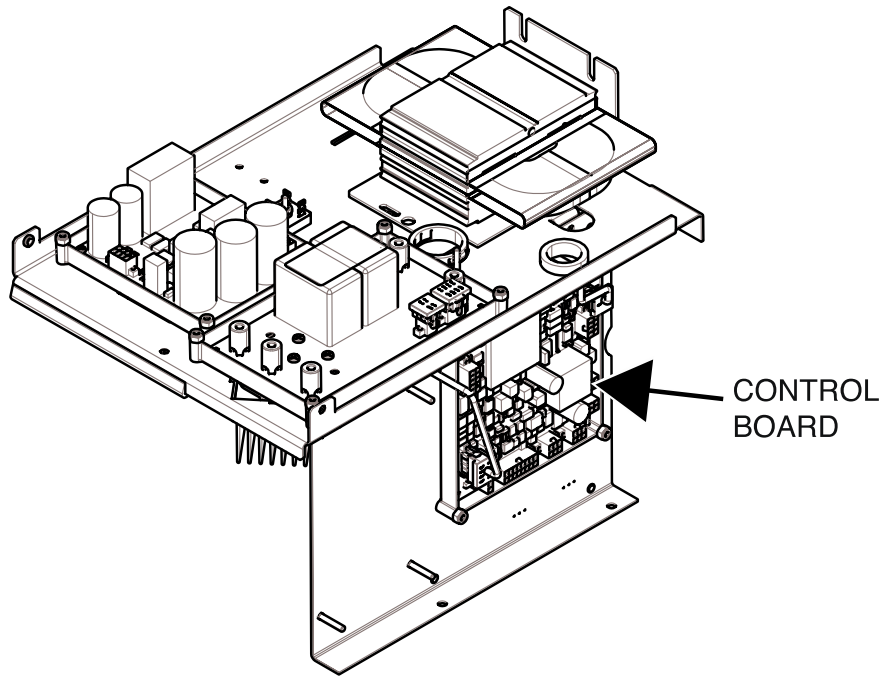


Figure F.15 – Control board Plugs J13 and J14 locations

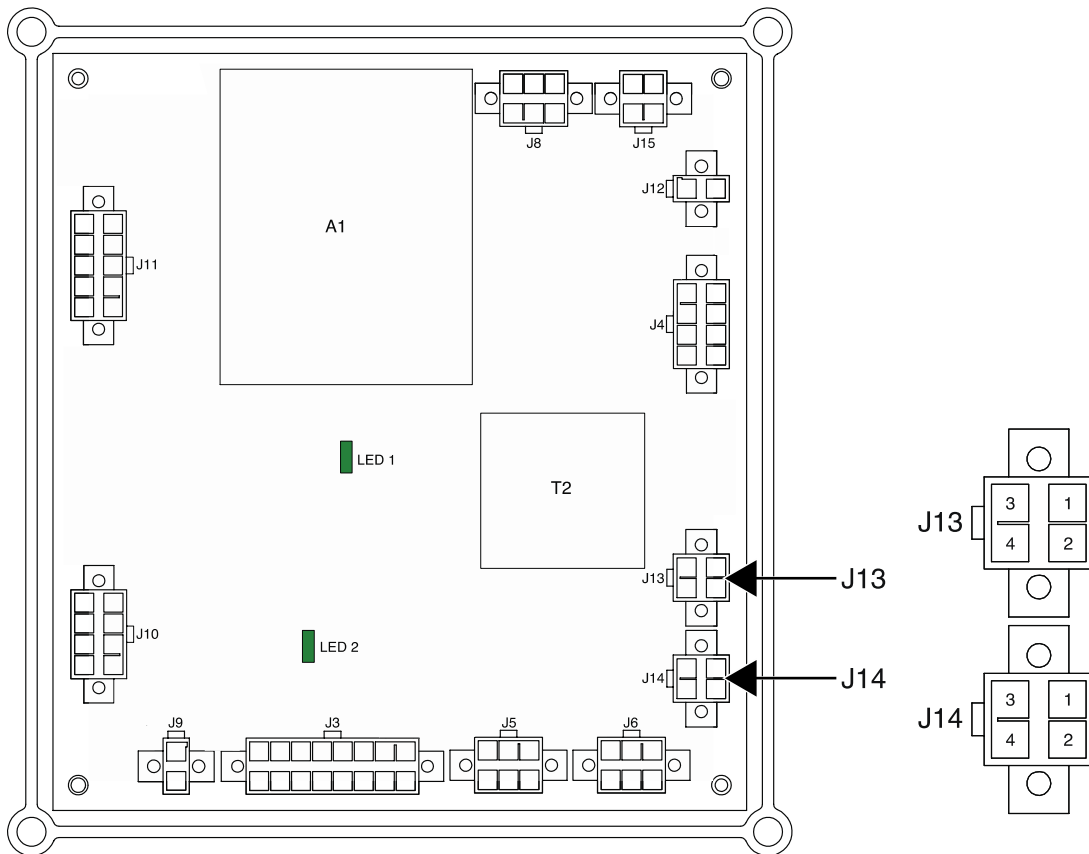


Table F.4 – Fan voltage tests

TEST DESCRIPTION	TEST POINT	TEST POINT	CONDITIONS	EXPECTED READING
BOTTOM FAN	PLUG J13 PIN 4 RED WIRE +	PLUG J13 PIN 3 BLACK WIRE -	FAN NOT RUNNING	0 VDC
TOP FAN	PLUG J14 PIN 4 RED WIRE +	PLUG J14 PIN 3 BLACK WIRE -	FAN NOT RUNNING	0 VDC
BOTTOM FAN	PLUG J13 PIN 4 RED WIRE +	PLUG J13 PIN 3 BLACK WIRE -	FAN RUNNING – FANS SHOULD RUN IF THERMOSTAT CIRCUIT IS OPENED. SEE WIRING DIAGRAM AND FIGURE F.15.	42 VDC
TOP FAN	PLUG J14 PIN 4 RED WIRE +	PLUG J14 PIN 3 BLACK WIRE -	FAN RUNNING – FANS SHOULD RUN IF THERMOSTAT CIRCUIT IS OPENED. SEE WIRING DIAGRAM AND FIGURE F.15.	42 VDC

CURRENT TRANSDUCER (LEM) TEST PROCEDURE

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 help determine if the Current Transducer (LEM) is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Load Bank
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the current transducer. See *Figure F.16*.
5. Locate plug J11 on the control board. See *Figure F.17*. See Wiring Diagram.
6. Carefully apply the correct input power to the Flextec 350X and turn the machine ON.
7. Using a digital volt/ohmmeter, carefully check for the DC supply voltages to the current transducer per *Table F.5*. See *Figure F.17* and *F.18*. See Wiring Diagram.
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.
8. If the correct voltages are NOT present at the control board, perform the *Control Board Test Procedure*.
9. Place the machine into a constant current output mode. Using a load bank, load the machine according to *Table F.6*.
10. Using a digital volt/ohmmeter, test the current transducer feedback versus actual output current. See *Table F.6*. See *Figure F.17* and *F.18*. See Wiring Diagram.
11. If the DC supply voltages are correct but the feedback voltages are incorrect the current transducer may be faulty.
12. If faulty, perform the *Current Transducer Removal And Replacement Procedure*.
13. Perform the *Case Cover Replacement Procedure*.

Figure F.16 - Current transducer location

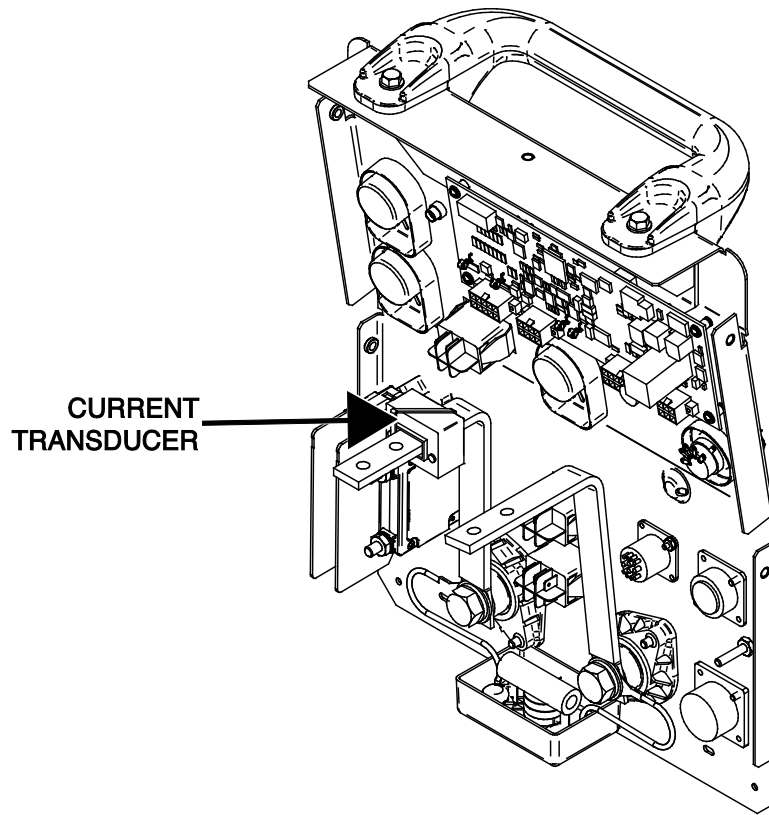


Figure F.17 - Plug J11 location on control board

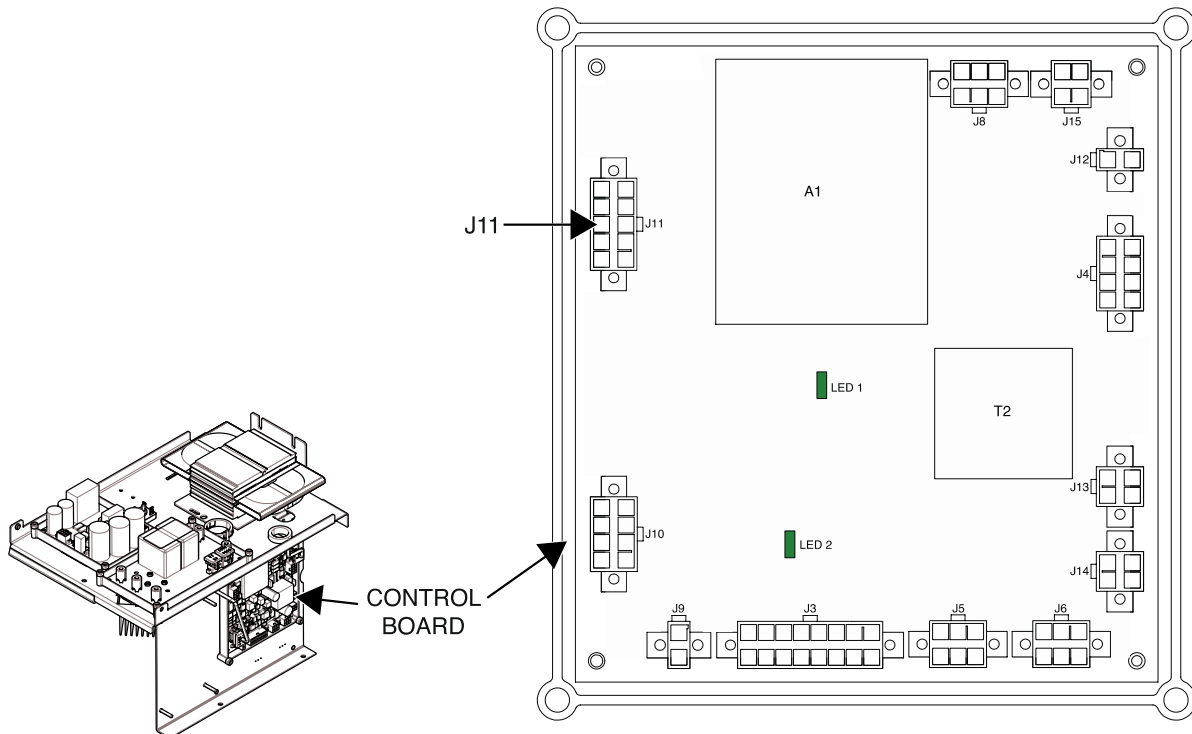


Figure F.18 - Plug J11 lead locations

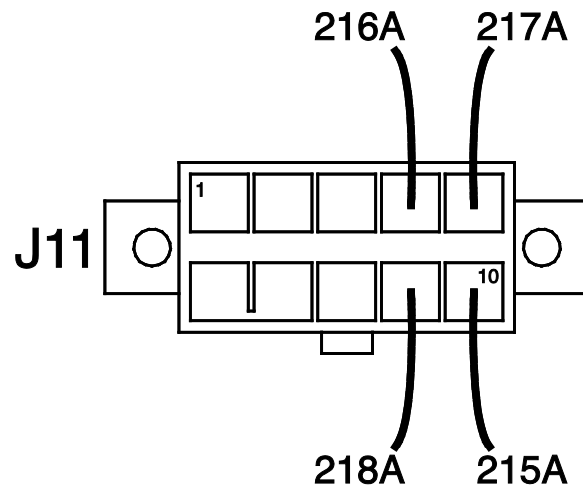


Table F.5 - DC supply voltages from control board

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
POSITIVE VOLTAGE SUPPLY	PLUG J11 PIN 4 (LEAD 216A)	PLUG J11 PIN 9 (LEAD 218A)	+15 VDC
NEGATIVE VOLTAGE SUPPLY	PLUG J11 PIN 5 (LEAD 217A)	PLUG J29 PIN 9 (LEAD 218A)	-15 VDC

Table F.6 - Current transducer feedback versus actual output current

ACTUAL OUTPUT CURRENT (AMPS)	TEST POINT (POS)	TEST POINT (NEG)	CURRENT TRANSDUCER FEEDBACK VOLTAGE
500	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	4.0 VDC
450	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	3.6 VDC
400	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	3.2 VDC
350	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	2.8 VDC
300	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	2.4 VDC
250	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	2.0 VDC
200	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	1.6 VDC
150	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	1.2 VDC
100	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	0.8 VDC
50	PLUG J11 PIN 10 (LEAD 215A)	PLUG J11 PIN 9 (LEAD 218A)	0.4 VDC

D1 RECTIFIER TEST PROCEDURE

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 help determine if the D1 Rectifier is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the D1 rectifier. See *Figure F.19*.
5. Label and disconnect both NEG and POS leads, X1A and X2 leads from the D1 rectifier. See *Figure F.20*. See Wiring Diagram.
6. Using a digital volt/ohmmeter, perform the forward voltage drop tests per *Table F.7*. See *Figure F.20*. See Wiring Diagram.
7. If any of the tests fail, D1 rectifier may be faulty.
8. Connect all previously removed leads.
9. If faulty, perform the *D1 Rectifier Removal And Replacement Procedure*.
10. Perform the *Case Cover Replacement Procedure*.

Figure F.19 - D1 rectifier location

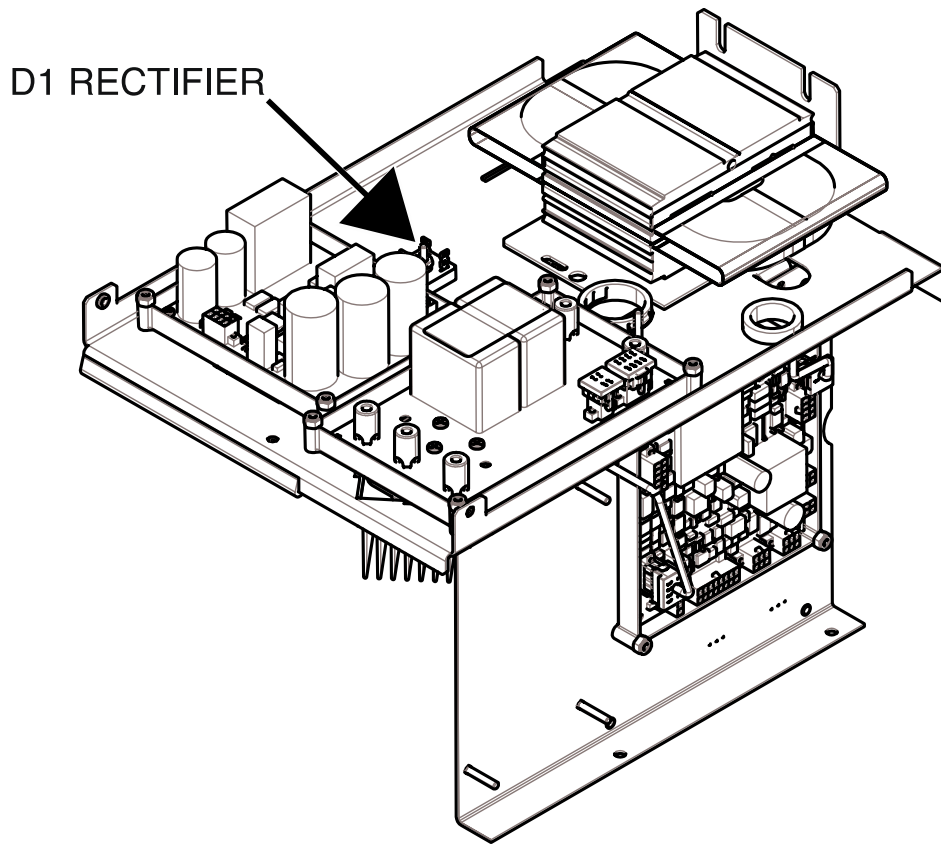


Figure F.20 - D1 rectifier lead locations and test points

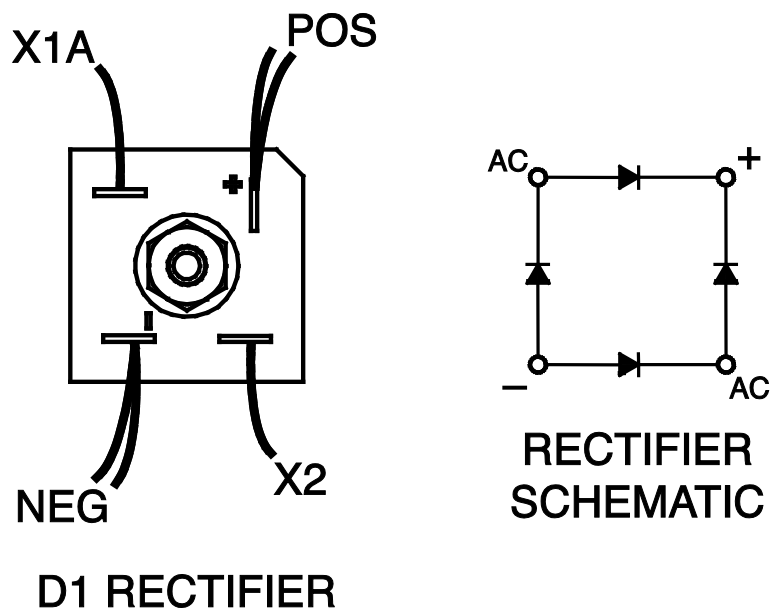


Table F.7 - D1 rectifier forward voltage drop tests

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
TOP AC TERMINAL	POSITIVE TERMINAL	0.2 VDC – 0.7 VDC
BOTTOM AC TERMINAL	POSITIVE TERMINAL	0.2 VDC – 0.7 VDC
NEGATIVE TERMINAL	TOP AC TERMINAL	0.2 VDC – 0.7 VDC
NEGATIVE TERMINAL	BOTTOM AC TERMINAL	0.2 VDC – 0.7 VDC

THERMOSTAT #1 AND #2 CIRCUIT TEST PROCEDURE

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 help determine if the Thermostat Circuit is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate thermostat #1 on the output rectifier heat sink. See *Figure F.21*. See Wiring Diagram.
5. Label and disconnect leads #224 and #225 from thermostat #1. See Wiring Diagram.
6. Using a digital volt/ohmmeter, test the resistance from one thermostat terminal to the other. The resistance should be very low (less than one ohm).
7. If the resistance is greater than one ohm. The thermostat may be faulty.
8. Locate thermostat #2 inside the output choke coil. See *Figure F.22*. See Wiring Diagram.
9. Label and disconnect the two in-line connections attached to leads #226 and #224 on thermostat #2 in the output choke. See Wiring Diagram.
10. Using a digital volt/ohmmeter, check the resistance of thermostat #2 from lead #226 to #224. The resistance should be very low (less than one ohm). See Wiring Diagram.
11. If the resistance is greater than one ohm, thermostat #2 may be faulty. If faulty, perform the *Choke Removal And Replacement Procedure*.
12. Connect all previously removed leads. See Wiring Diagram.
13. To check the thermostat circuit, locate plug J3 on the control board. See *Figure F.23*. See Wiring Diagram.
14. Label and disconnect plug J3 from the control board. See *Figure F.23*. See Wiring Diagram.
15. Using a digital volt/ohmmeter, check the resistance from plug J3 pin 5 (lead #225) to pin 13 (lead #226). See *Figure F.24*. Resistance should be less than one ohm. If the resistance is greater than one ohm, there is an open or high resistance connection in the thermostat circuit. See Wiring Diagram.
16. Connect and previously remove plugs and leads. See Wiring Diagram.
17. Perform the *Case Cover Replacement Procedure*.

Figure F.21 - Thermostat #1 location

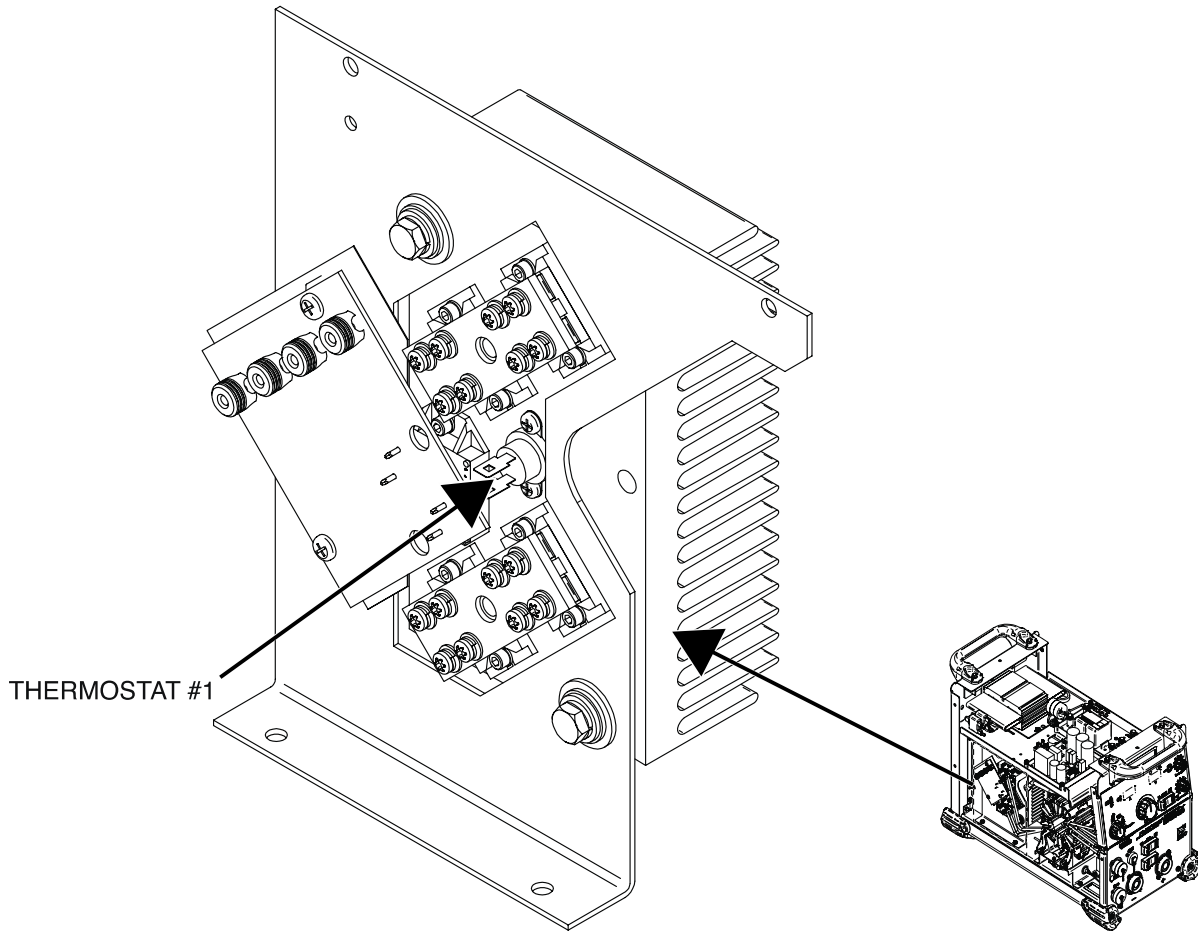


Figure F.22 - Thermostat #2 location

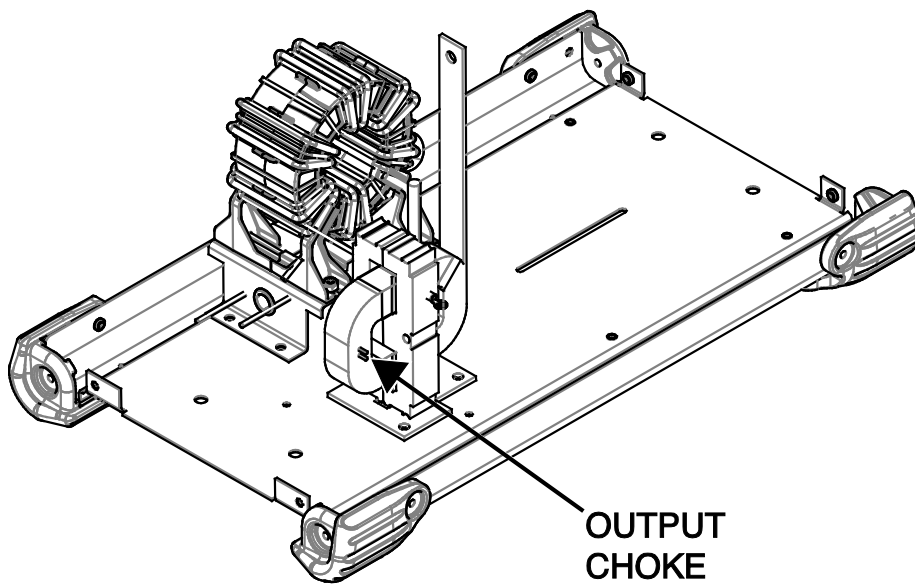


Figure F.23 - Control board plug J3 location

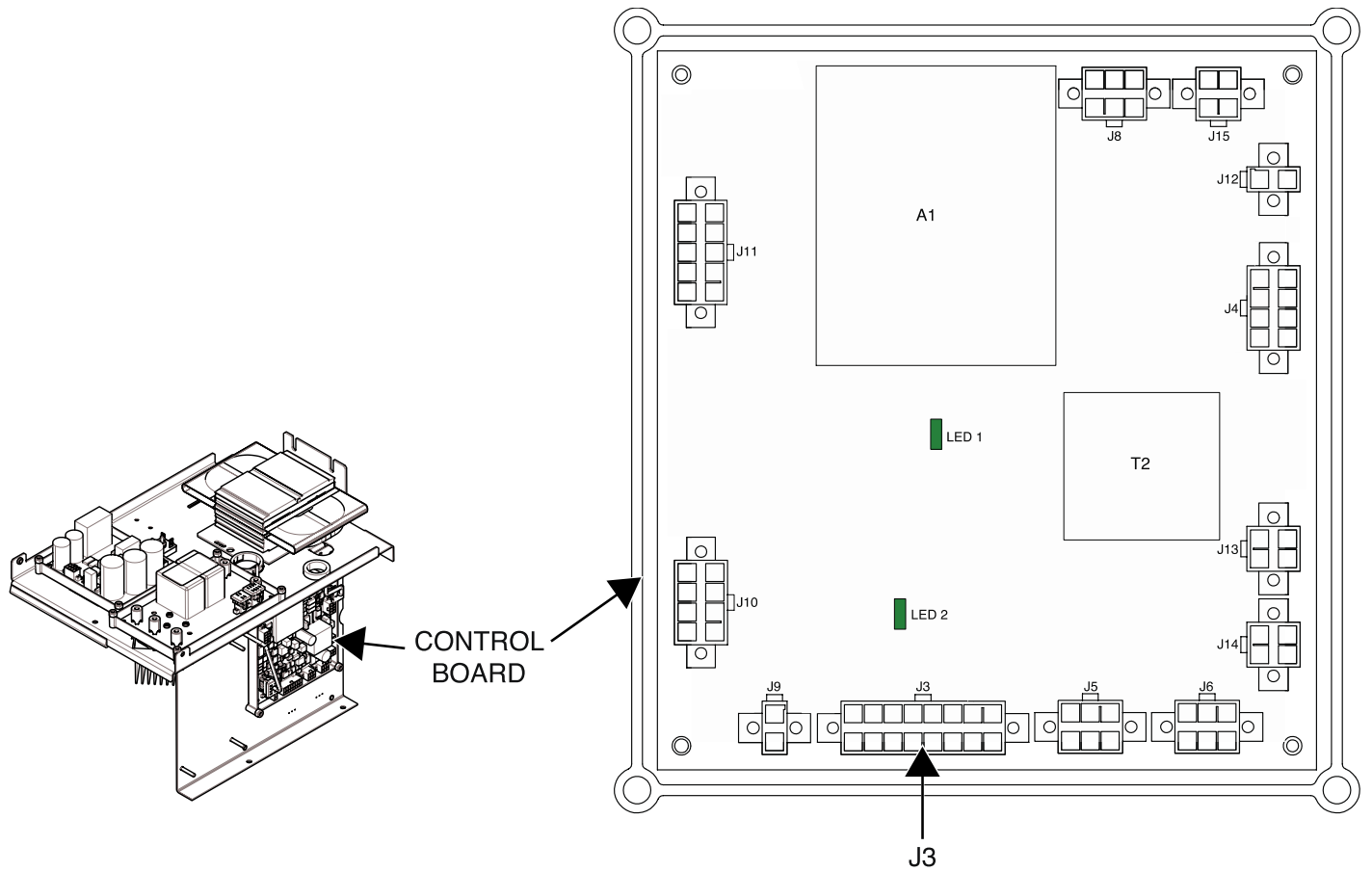
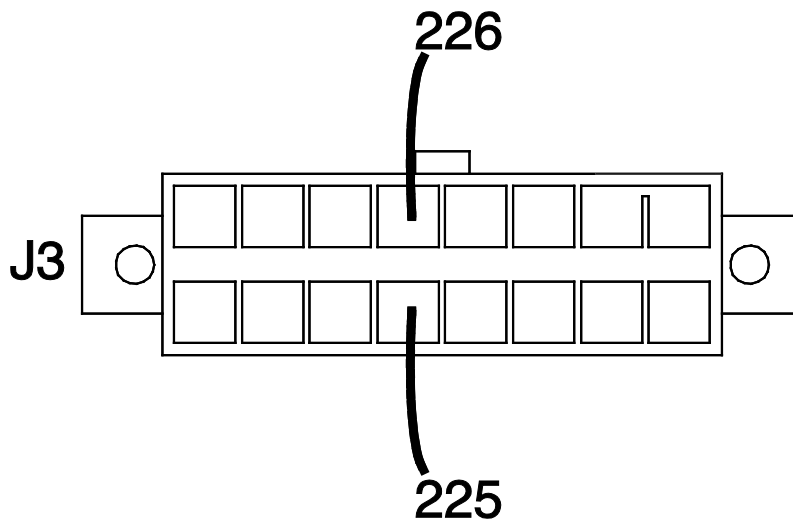


Figure F.24 - Control board plug J3 lead locations



THERMISTOR TEST PROCEDURE

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 help determine if the Thermistors are functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate plug J12 on the control board. See *Figure F.25*. See Wiring Diagram.
5. Label and disconnect plug J12 from the control board. See *Figure F.25*. See Wiring Diagram.
6. Using a digital volt/ohmmeter, check the resistance between pins 1 (lead #431) and pin 2 (lead #433) on plug J12. See *Figure F.26*. See Wiring Diagram. At room temperature the resistance should be approximately 20,000 ohms.
7. Using a digital volt/ohmmeter, check the resistance between pin 1 and/or pin 2 on plug J12 and terminal B2 (+) on the input board. See *Figure F.27*. Normal resistance should be approximately 12,000 ohms.
8. If the resistance checks are not correct, the switchboard may be faulty.
9. Connect plug J12 to the control board. See Wiring Diagram.
10. Perform the *Case Cover Replacement Procedure*.

Figure F.25 - Control board plug J12 location

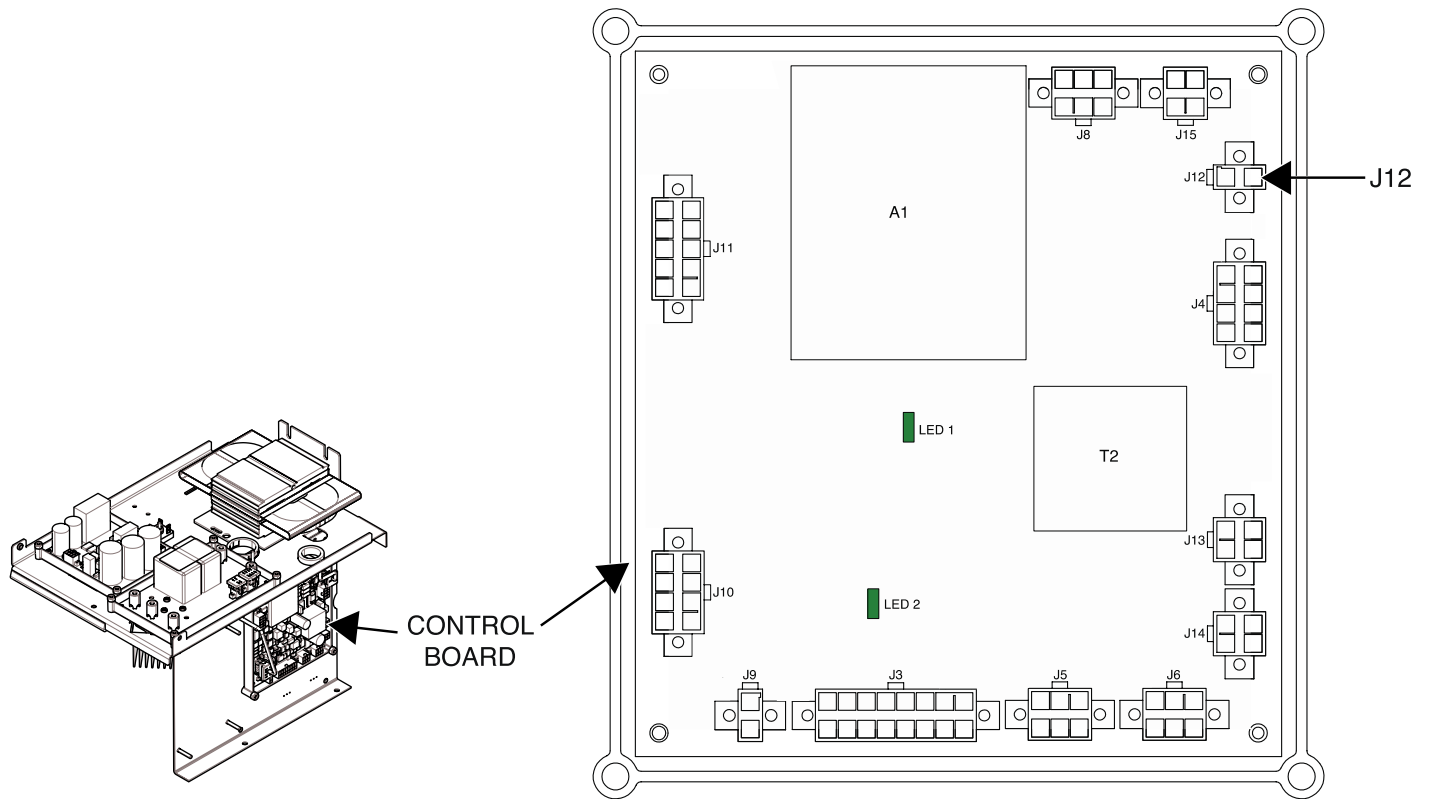


Figure F.26 - Control board plug J12 lead locations

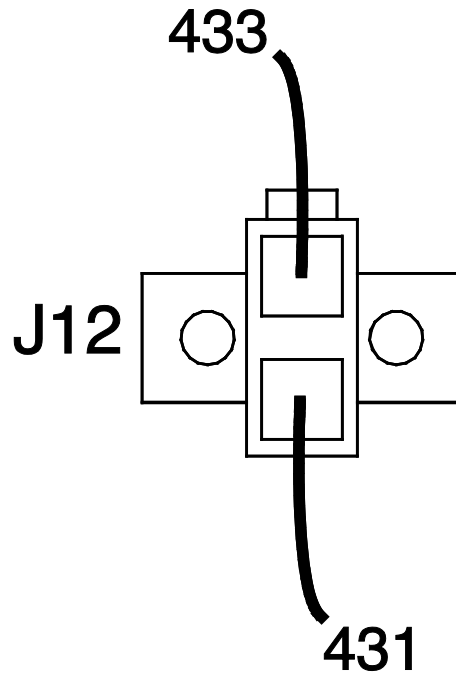
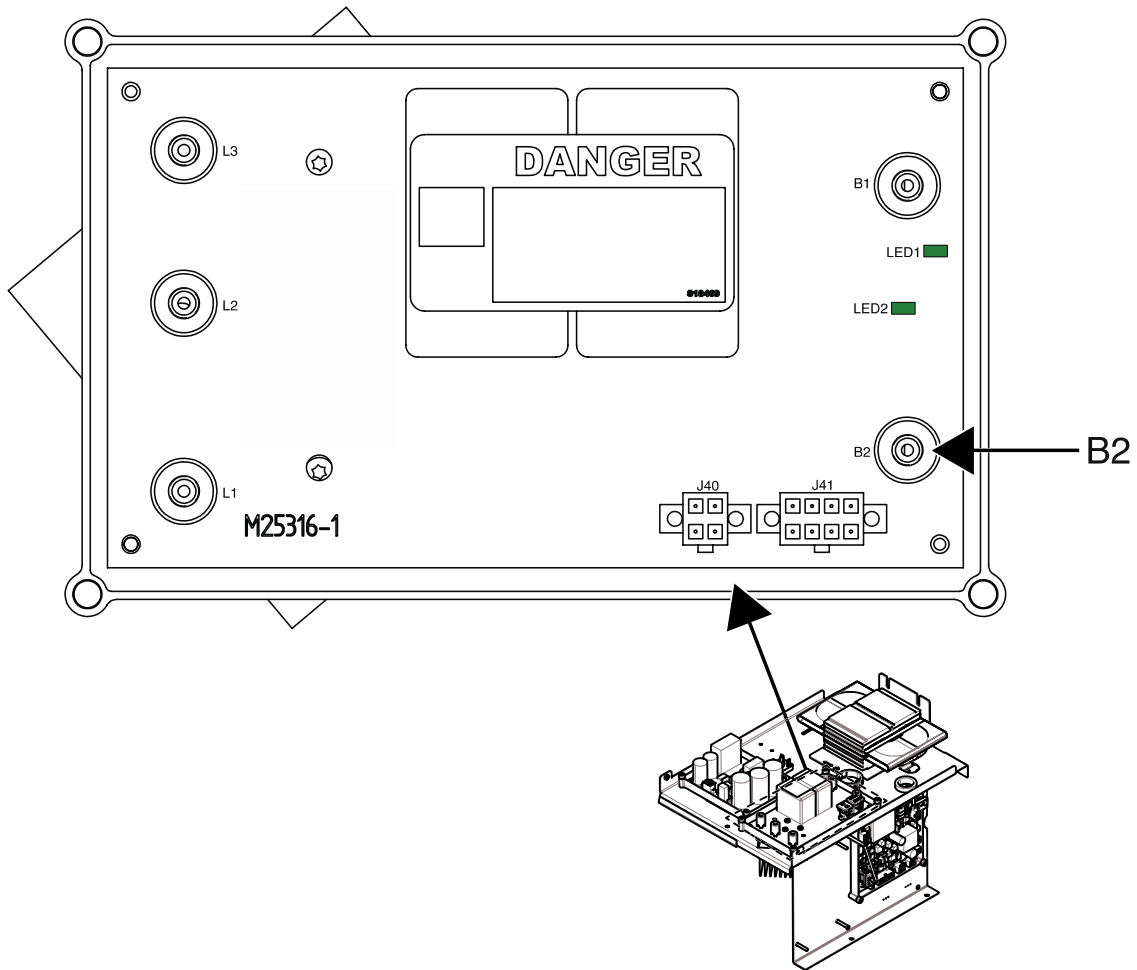


Figure F.27 - Input board terminal B (+) location



OUTPUT RECTIFIER ASSEMBLY TEST PROCEDURE

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 help determine if the Output Rectifier Assembly is functioning properly.

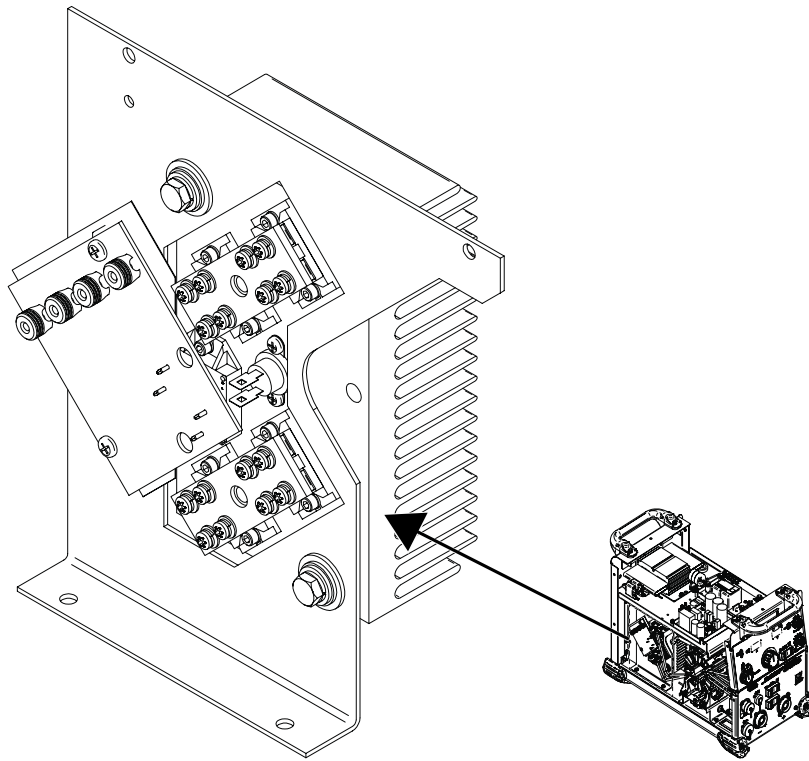
MATERIALS NEEDED

7/16" Nutdriver
Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the output rectifier. See *Figure F.28*. See Wiring Diagram.
5. Using a 7/16" nutdriver, remove the bolt and associated washers securing the transformer leads (X11 and X12) to the output rectifier. Label and disconnect the transformer leads (X11 and X12) from the output rectifier assembly. See *Figure F.29*. See Wiring Diagram.
6. Using a digital volt/ohmmeter (set for diode testing), perform the forward voltage drop test per *Table F.8*. See *Figure F.29* and *F.30*. See Wiring Diagram.
7. If the tests determine that the diodes are shorted or open, the output rectifier assembly may be faulty.
8. When testing is complete connect any previously disconnected leads. See Wiring Diagram.
9. Perform the *Case Cover Replacement Procedure*.

Figure F.28 - Output rectifier assembly location



OUTPUT RECTIFIER
ASSEMBLY

Figure F.29 - Lead X11 and X2 connection point locations

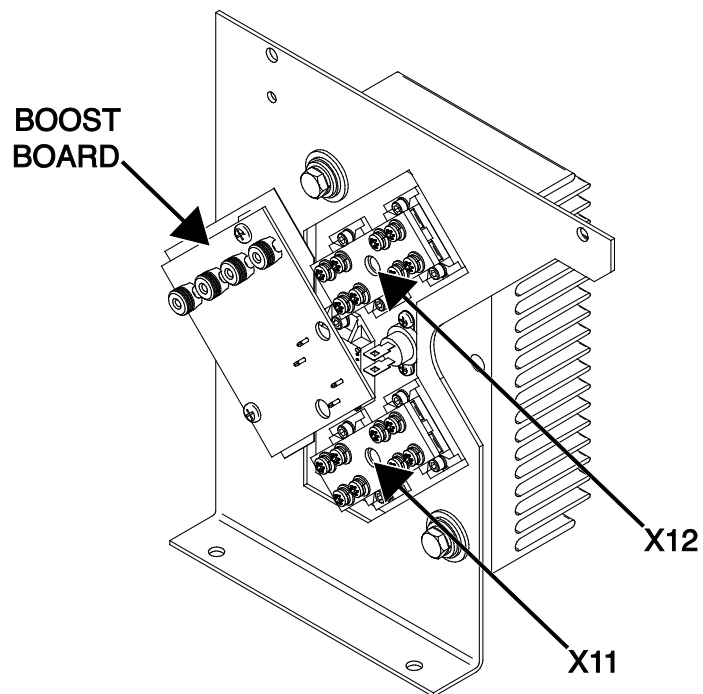


Figure F.30 - Boost board terminal locations

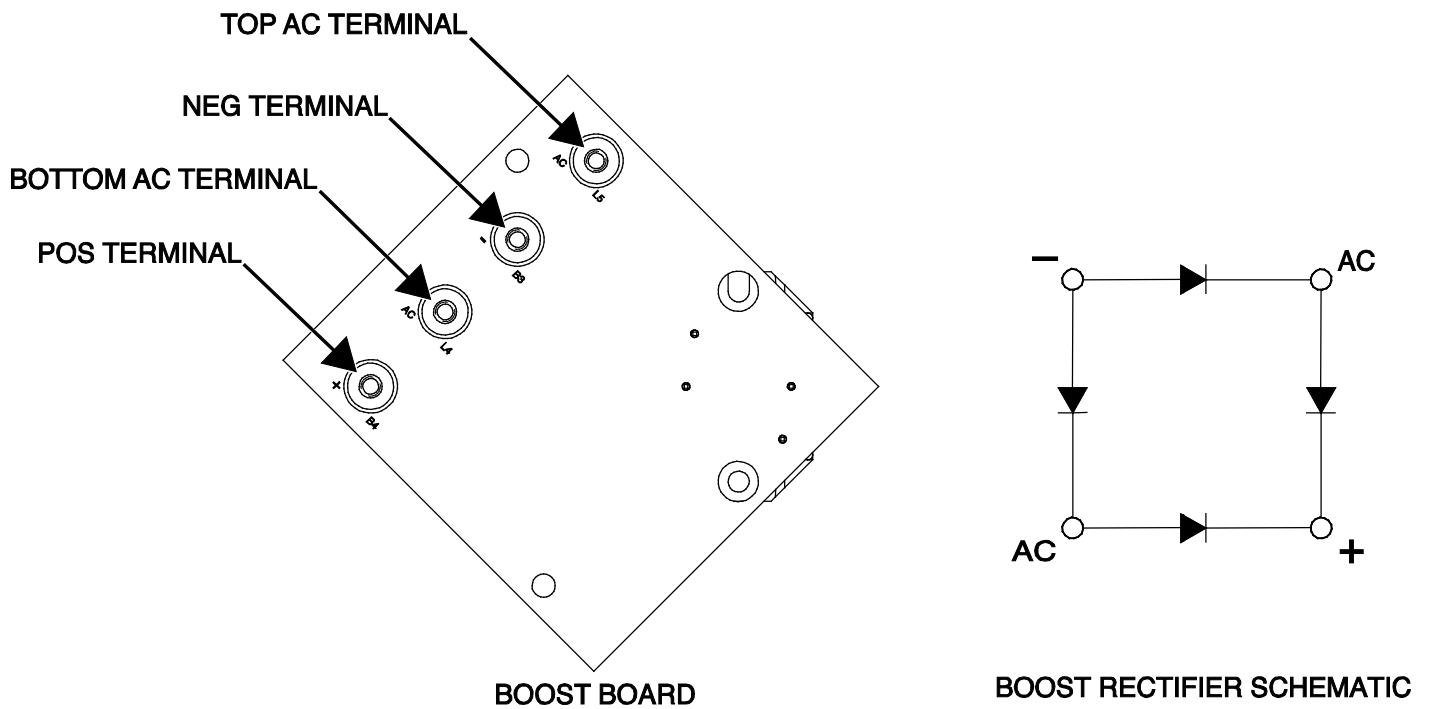


Table F.8 - Output rectifier forward voltage drop tests

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
RECTIFIER TERMINAL X11	OUTPUT RECTIFIER HEATSINK	0.2 VDC – 0.7 VDC
RECTIFIER TERMINAL X12	OUTPUT RECTIFIER HEATSINK	0.2 VDC – 0.7 VDC
BOOST BOARD NEG TERMINAL	BOOST BOARD TOP AC TERMINAL	0.2 VDC – 0.7 VDC
BOOST BOARD NEG TERMINAL	BOOST BOARD BOTTOM AC TERMINAL	0.2 VDC – 0.7 VDC
BOOST BOARD TOP AC TERMINAL	BOOST BOARD POS TERMINAL	0.2 VDC – 0.7 VDC
BOOST BOARD BOTTOM AC TERMINAL	BOOST BOARD POS TERMINAL	0.2 VDC – 0.7 VDC

INPUT BOARD TEST PROCEDURE

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 help determine if the Input Board is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
External 15 VDC Power Supply
Wiring Diagram

PROCEDURE

Locate the two green LEDs on the input board. See *Table F.9* and *Figure F.31*. If the LEDs are not functioning as denoted or the input board functions are in question perform the following procedures.

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the input board. See *Figure F.31*.

Procedure for testing the on-board 3-phase input rectifier bridge

5. Using a digital volt/ohmmeter, perform the forward voltage drop tests in *Table F.10*. See *Figure F.32*.

NOTE: The test probes **MUST** penetrate the potting material.

6. If the test results are questionable, label and disconnect the input leads from terminal L1, L2 and L3 and retest. See Wiring Diagram.
7. If any of the tests fail, the input board may be faulty.
8. If faulty, perform the *Input Board Removal And Replacement Procedure*.
9. Connect all previously disconnected leads. See Wiring Diagram.

Procedure for testing the on-board pre-charge circuitry

1. Using a digital volt/ohmmeter, check the resistance from positive terminal on the 3-phase input rectifier to the B2 positive terminal on the input board. See *Figure F.33*. The resistance should be approximately 50 ohms. This is the pre-charge resistance circuit.

NOTE: The test probes **MUST** penetrate the potting material.

2. Using an external 15 VDC power supply, carefully apply 15 VDC to plug J40 pin 4(+) to J40 pin 1(-). This should activate the onboard pre-charge relay (a small click may be heard). See **Figure F.32** and **F.34**. See Wiring Diagram. The resistance from the positive terminal on the 3-phase rectifier bridge to the B2 positive terminal should drop to less than 1 ohm. If this does happen the input board may be faulty.
3. If faulty, perform the **Input Board Removal And Replacement Procedure**.
4. Perform the **Case Cover Replacement Procedure**.

Table F.9 - Input board LEDs

DESCRIPTION	COLOR	INDICATION
LED 1	GREEN	VOLTAGE BEING APPLIED TO ALL THREE PHASES L1, L2 AND L3.
LED 2	GREEN	INPUT CAPACITORS HAVE BEEN CHARGED.

Figure F.31 - Input board location

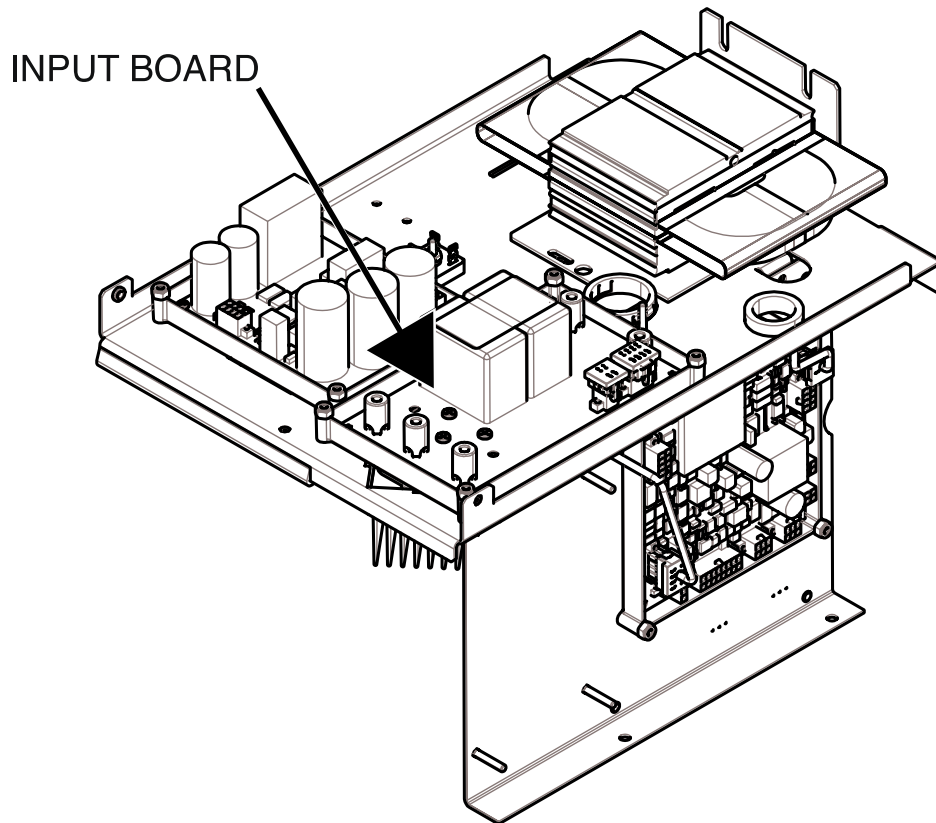


Figure F.32 - Input board terminal, LED and plug locations

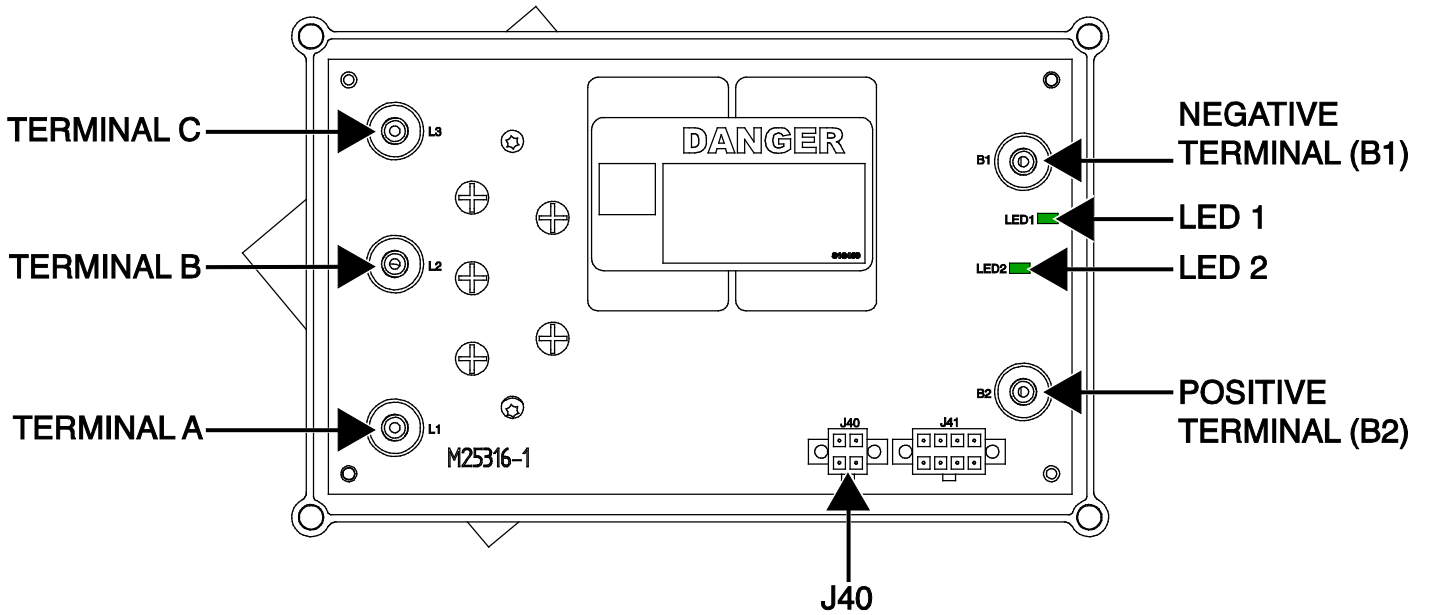


Figure F.33 - Input rectifier positive terminal location

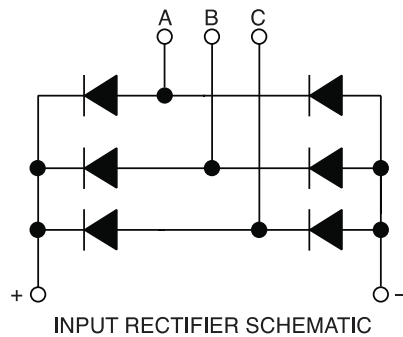
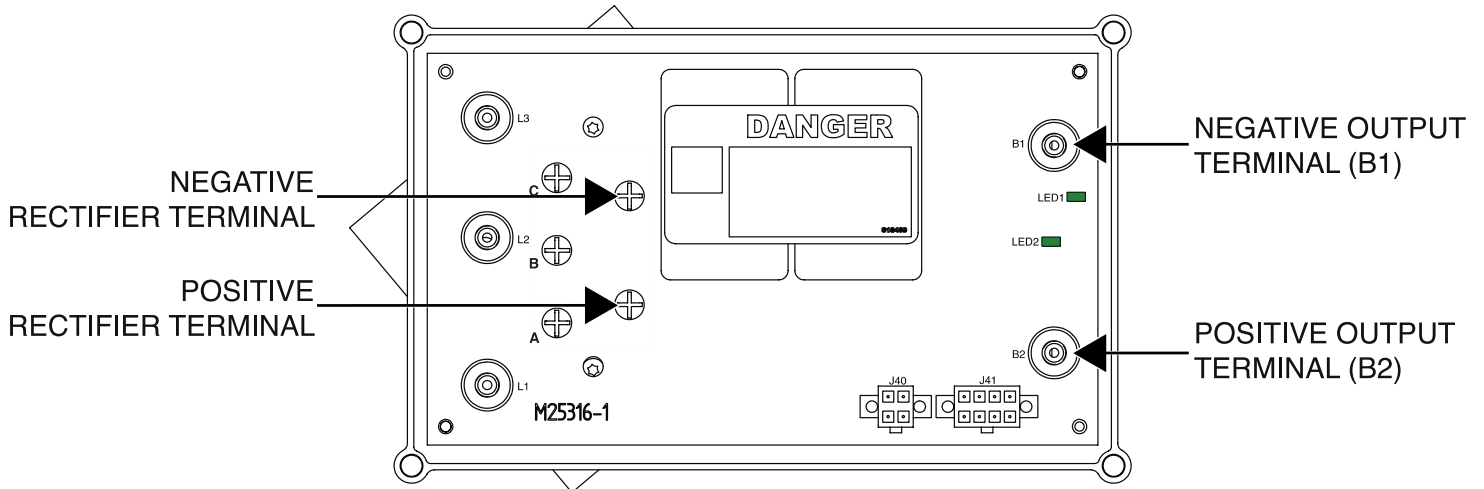


Figure F.34 - Plug J40 pin locations

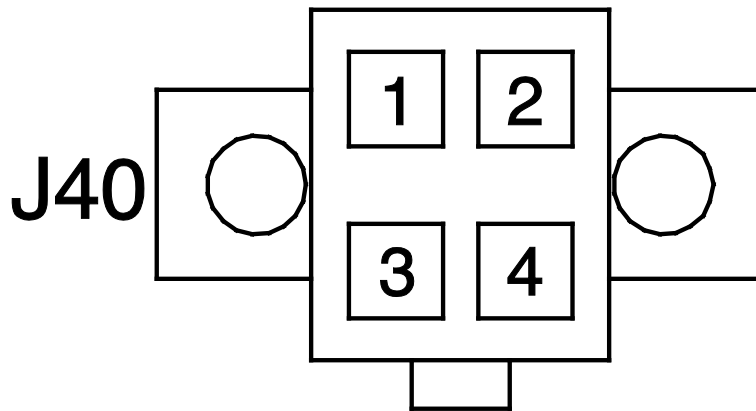


Table F.10 - Input rectifier forward voltage drop tests

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
TERMINAL A	POSITIVE TERMINAL	0.3 VDC – 1.0 VDC
TERMINAL B	POSITIVE TERMINAL	0.3 VDC – 1.0 VDC
TERMINAL C	POSITIVE TERMINAL	0.3 VDC – 1.0 VDC
NEGATIVE TERMINAL	TERMINAL A	0.3 VDC – 1.0 VDC
NEGATIVE TERMINAL	TERMINAL B	0.3 VDC – 1.0 VDC
NEGATIVE TERMINAL	TERMINAL C	0.3 VDC – 1.0 VDC

MAIN TRANSFORMER TEST PROCEDURE

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 help determine if the Main Transformer is functioning properly.

MATERIALS NEEDED

7/16" Nutdriver
3/8" Nutdriver
Digital Volt/Ohmmeter
5/16" Nutdriver
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the main transformer. See *Figure F.35*.
5. Label and disconnect the boost rectifier leads 10A and 10B from the boost relay. See *Figure F.36*. See Wiring Diagram.
6. Using a 7/16" nutdriver, remove the bolt and associated washers securing the main transformer secondary winding leads to terminals X11 and X12 of the output rectifier. See *Figure F.37*. See Wiring Diagram.
7. Using a 5/16" and 3/8" nutdriver, label and disconnect primary leads 201 and 204 from the series capacitors. See *Figure F.38*. See Wiring Diagram.
8. Using a digital volt/ohmmeter, perform the resistance tests in *Table F.11*. See Wiring Diagram.
9. If any of the tests fail, the main transformer may be faulty.
10. If faulty, perform the *Main Transformer Removal And Replacement Procedure*.
11. Connect all previously removed leads.
12. Perform the *Case Cover Replacement Procedure*.

Figure F.35 - Main transformer location

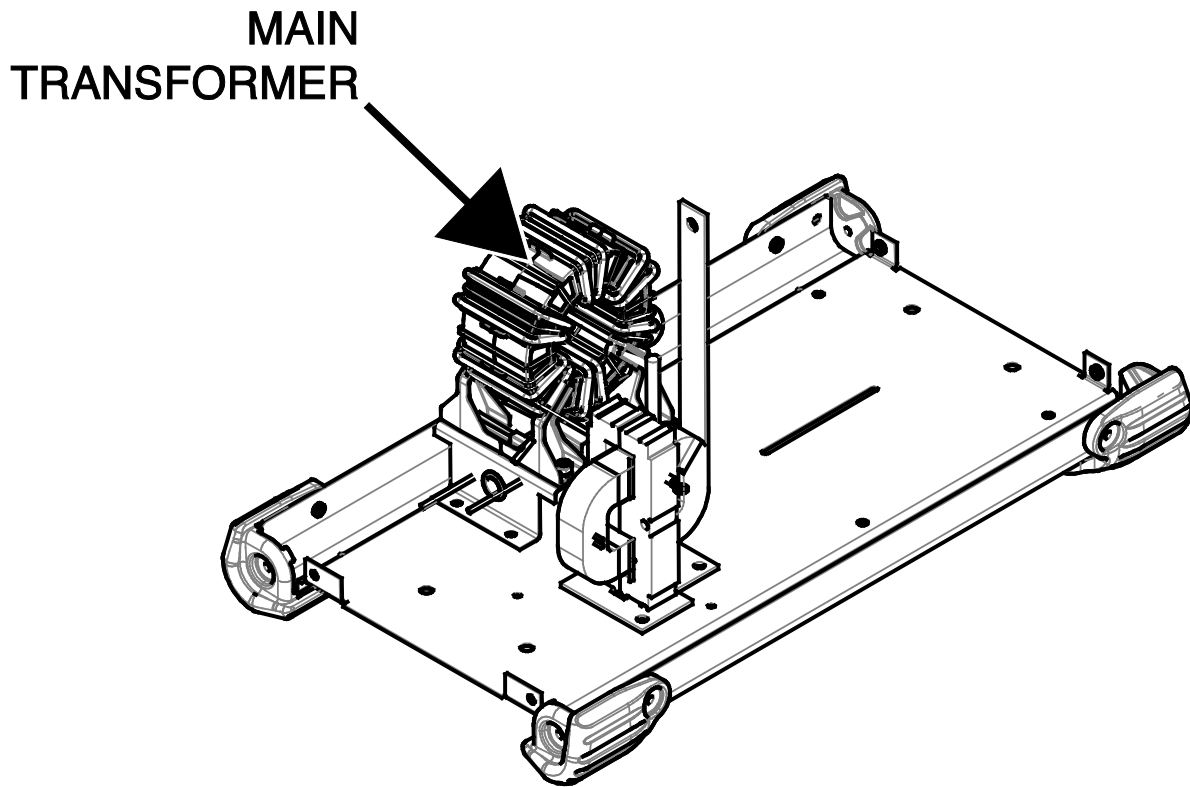


Figure F.36 - Boost relay lead locations

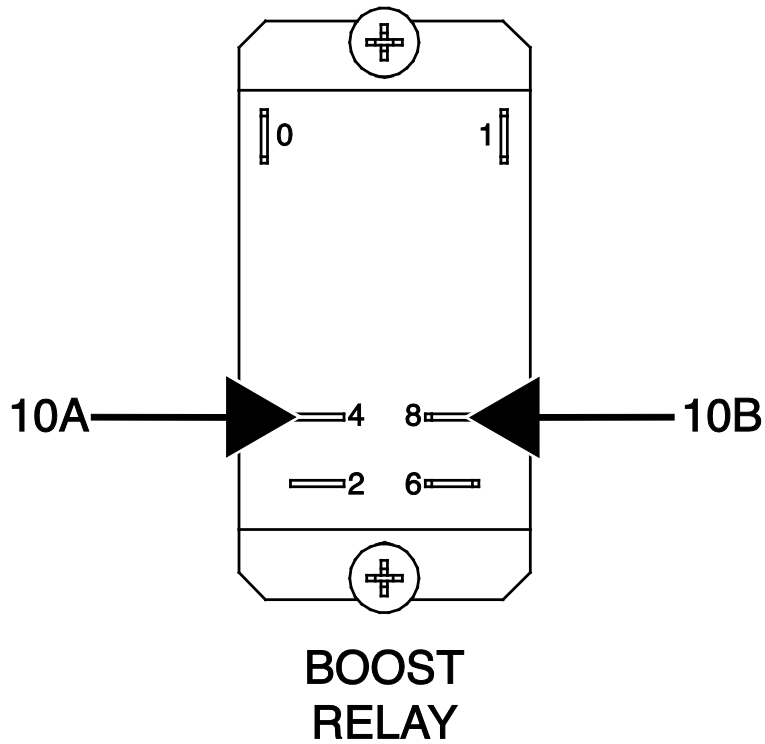


Figure F.37 - Output rectifier terminal X11 and X12 locations

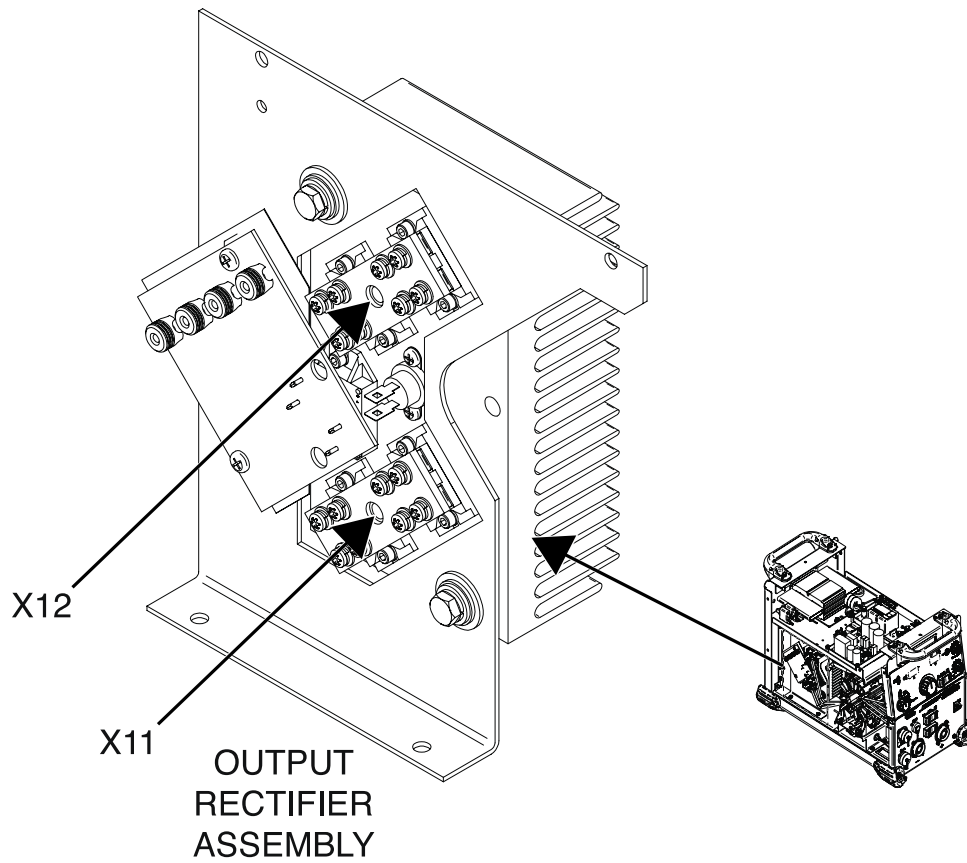


Figure F.38 - Lead #201 and #204 locations

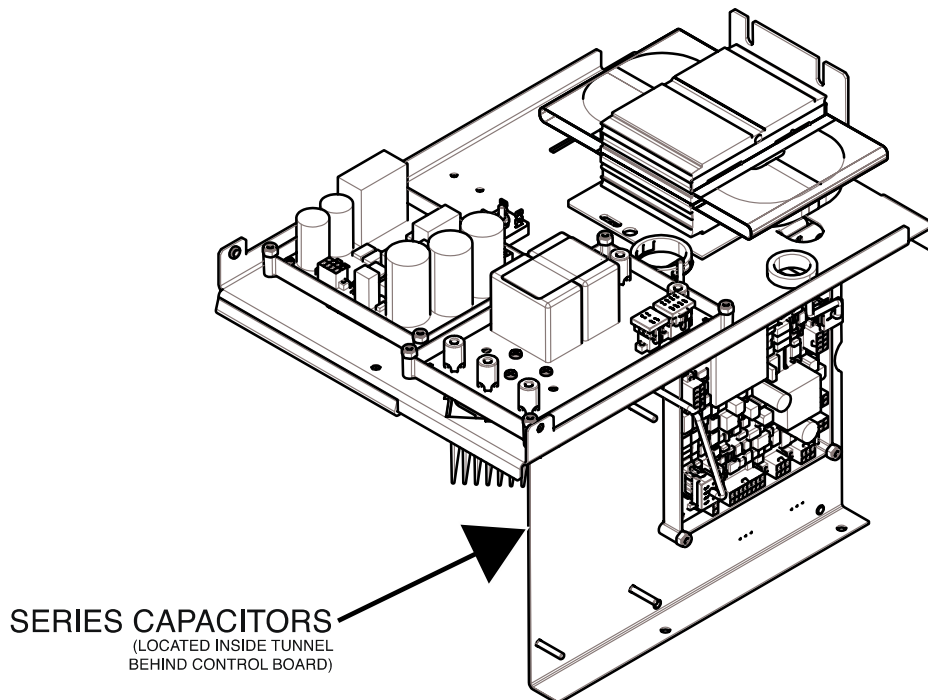


Table F.11 – Main transformer resistance tests

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
BOOST WINDING AND REACTOR	LEAD 10A (DISCONNECTED FROM THE BOOST RELAY)	LEAD #10B (DISCONNECTED FROM THE BOOST RELAY)	VERY LOW RESISTANCE (LESS THAN ONE OHM)
SECONDARY WINDING	SECONDARY WINDING LEAD (DISCONNECTED FROM OUTPUT RECTIFIER TERMINAL X11)	SECONDARY WINDING LEAD (DISCONNECTED FROM OUTPUT RECTIFIER TERMINAL X12)	VERY LOW RESISTANCE (LESS THAN ONE OHM)
PRIMARY WINDING	LEAD #201 (DISCONNECTED FROM THE SERIES CAPACITORS)	LEAD #204 (DISCONNECTED FROM THE SERIES CAPACITORS)	VERY LOW RESISTANCE (LESS THAN ONE OHM)

CONTROL BOARD TEST PROCEDURE

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 help determine if the Control Board is functioning properly. The procedure will not check all of the Control Board's circuitry.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the control board. See *Figure F.39*.
5. Carefully apply the correct input power to the machine and perform the LED and voltage checks in *Table F.12* and *F.13*. See *Figure F.40* and *F.41*. See Wiring Diagram.
6. If any of the tests fail, perform the *Control Board Removal And Replacement Procedure*.
7. Perform the *Case Cover Replacement Procedure*.

Figure F.39 - Control board location

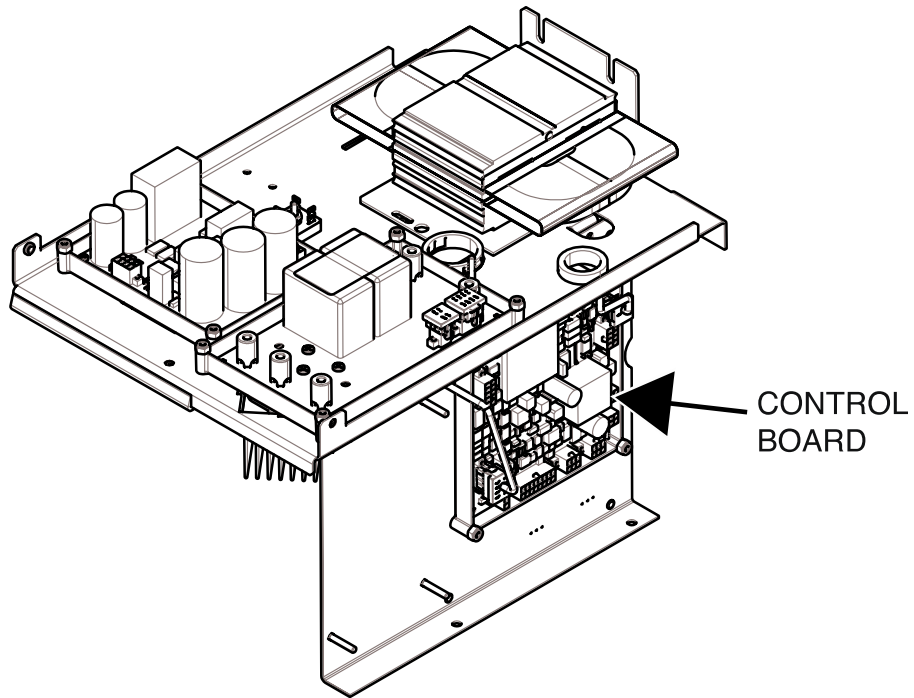


Figure F.40 - Control board test points

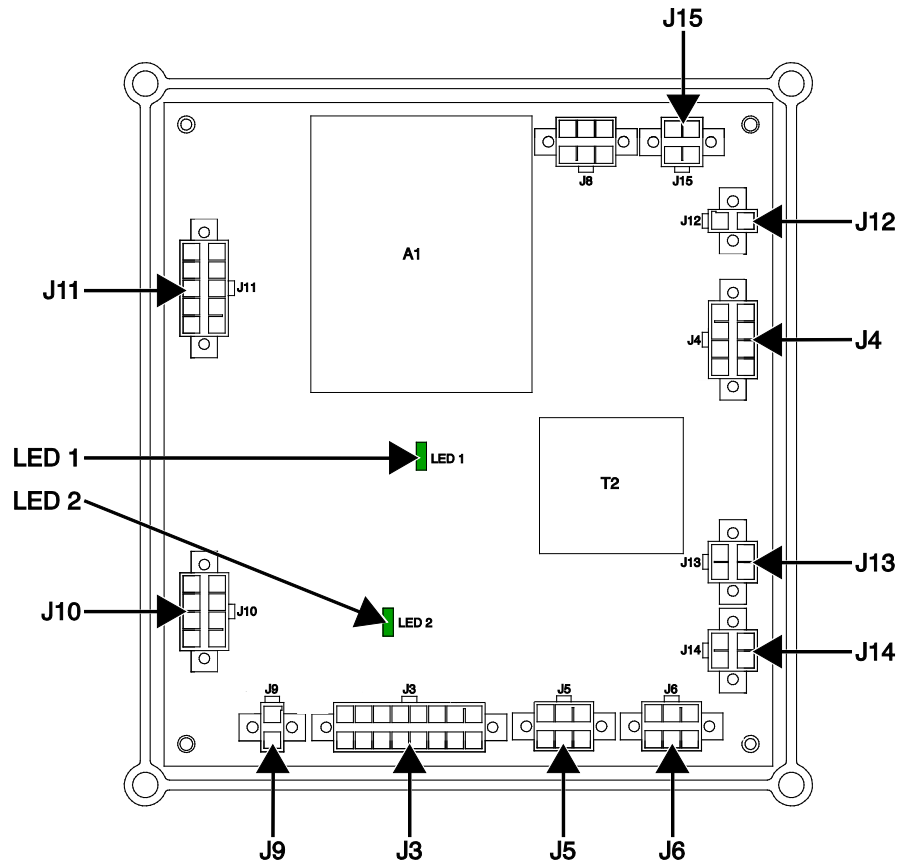


Figure F.41 - Control board lead locations

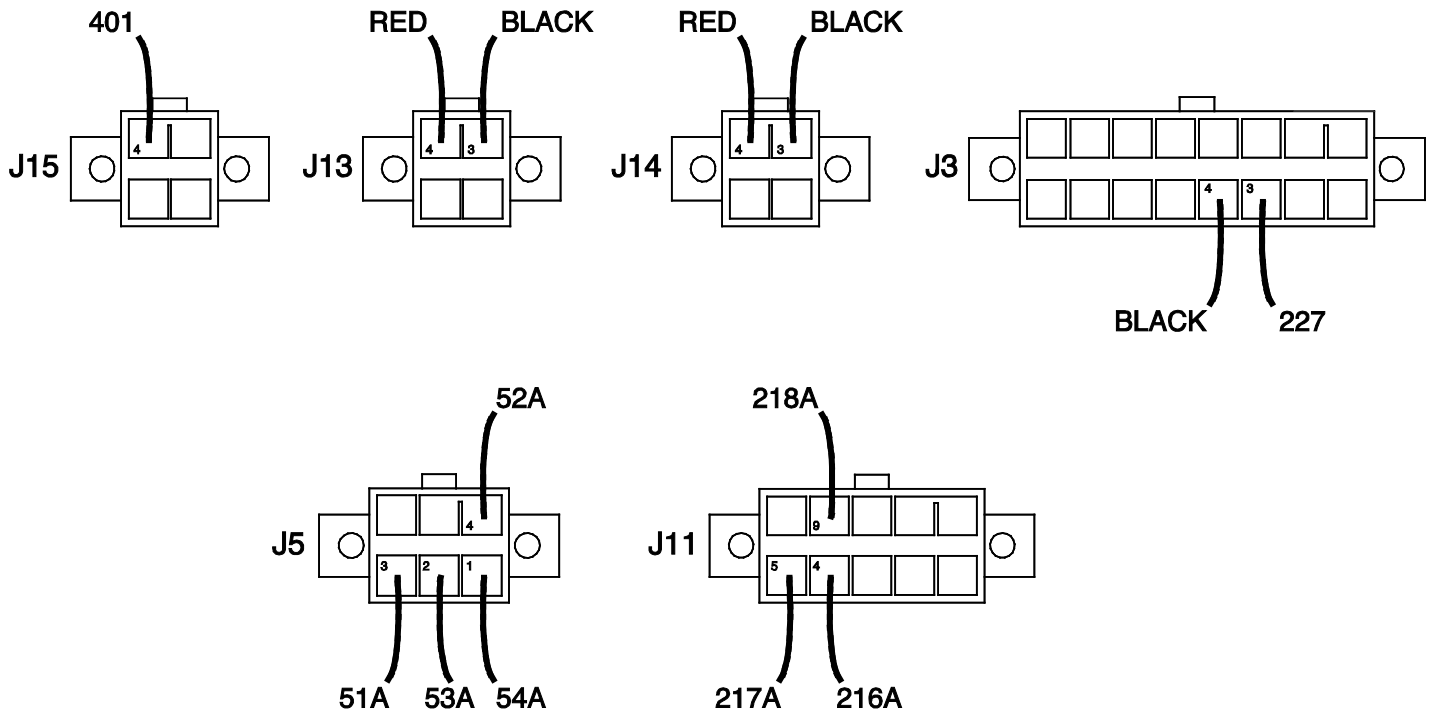


Table F.12 - Control board LED tests

DESCRIPTION	LOCATION	MEANING
LED 1	CONTROL BOARD	+15 VDC SUPPLY ON
LED 2	CONTROL BOARD	ARCLINK SUPPLY ON
LED 1	DAUGHTER BOARD	ARCLINK STATUS INDICATOR STEADY GREEN = SYSTEM OK BLINKING GREEN = OCCURS DURING STARTUP. NORMAL FOR FIRST 1 TO 30 SECONDS AFTER POWER IS APPLIED. ALTERNATING GREEN AND RED = READ THE ERROR CODE BEFORE THE MACHINE IS POWERED OFF.

Table F.13 - Control board voltage tests

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	CONDITIONS
PRE-CHARGE RELAY	PLUG J15 PIN 4 (LEAD #401)	PLUG J11 PIN 9 (LEAD #218A)	15 VDC	MACHINE ON
FAN POWER	PLUG J13 PIN 4 (LEAD RED)	PLUG J13 PIN 3 (LEAD BLACK)	42 VDC	THERMO FAULT MACHINE ON
FAN POWER	PLUG J14 PIN 4 (LEAD RED)	PLUG J14 PIN 3 (LEAD BLACK)	42 VDC	THERMO FAULT MACHINE ON
BOOST RELAY SUPPLY	PLUG J3 PIN 3 (LEAD #227)	PLUG J11 PIN 9 (LEAD #218A)	15 VDC	MACHINE ON
CROSSLINC LED SUPPLY	PLUG J3 PIN 4 (LEAD BLACK)	PLUG J11 PIN 9 (LEAD #218A)	15 VDC	MACHINE ON
CAN COMMUNICATION	PLUG J5 PIN 1 (LEAD #54A)	PLUG J5 PIN 2 (LEAD #53A)	2 VDC	MACHINE ON
INPUT FROM 42V DC BUS BOARD	PLUG J5 PIN 4 (LEAD #52A)	PLUG J5 PIN 3 (LEAD #51A)	42 VDC	MACHINE ON
LEM SUPPLY	PLUG J11 PIN 4 (LEAD #216A)	PLUG J11 PIN 9 (LEAD #218A)	+14 VDC	MACHINE ON
LEM SUPPLY	PLUG J11 PIN 5 (LEAD #217A)	PLUG J11 PIN 9 (LEAD #218A)	-14 VDC	MACHINE ON

SWITCHBOARD TEST PROCEDURE

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 help determine if the Switchboard is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the switchboard and input board. See *Figure F.42*.
5. Using a digital volt/ohmmeter, perform the resistance tests outlined in *Table F.14*. See *Figure F.43* and *F.44*. See Wiring Diagram.
6. If any of the resistance test results are not as expected, label and disconnect the leads attached to the terminals, perform the *Switchboard Removal Procedure* and retest.
7. Carefully apply the correct input power to the Flextec 350X and turn ON the machine.
8. Check the LEDs per *Table F.15*. See *Figure F.44* for LED locations.
9. **If the LEDs are not indicating a properly functioning switchboard**, proceed with the following steps.
10. Make sure the input board is functioning properly, perform the *Input Board Test Procedure*.
11. Make sure the control board is functioning properly, perform the *Control Board Test Procedure*.
12. The switchboard may be faulty.
NOTE: If the switchboard fails, be sure to check the input board.
13. If faulty, perform the *Switchboard Removal And Replacement Procedure*.
14. Perform the *Case Cover Replacement Procedure*.

Figure F.42 - Switchboard and input board locations

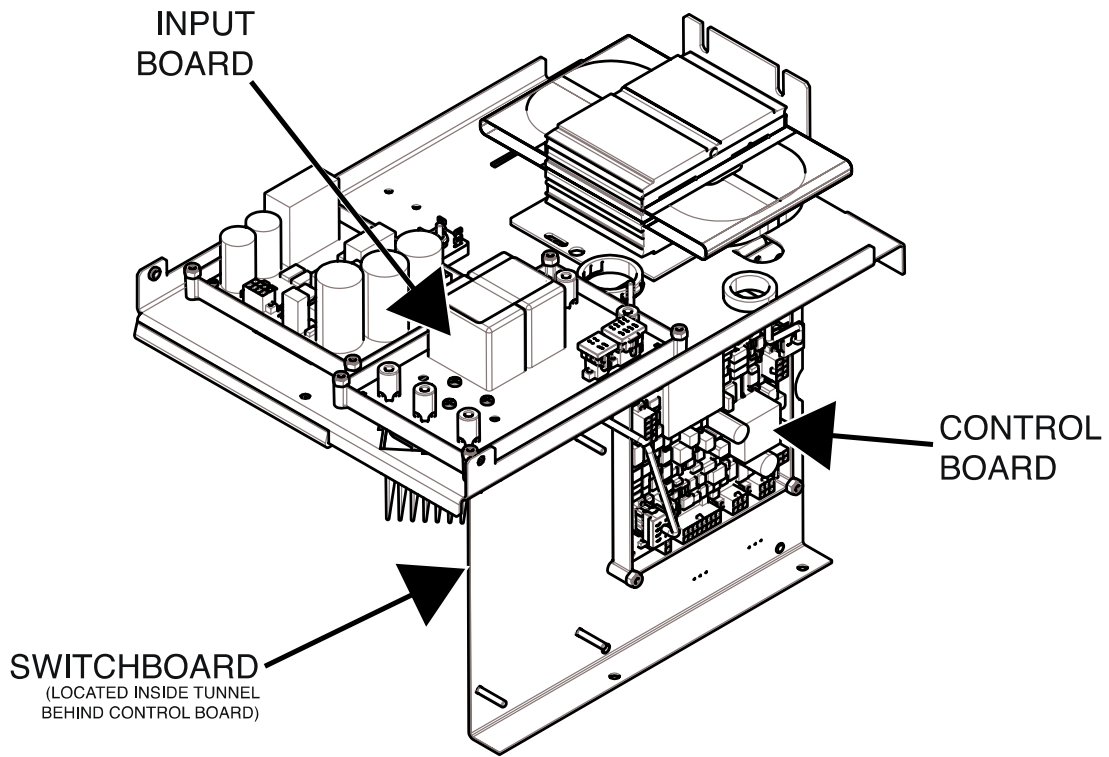


Figure F.43 - Input board terminal locations

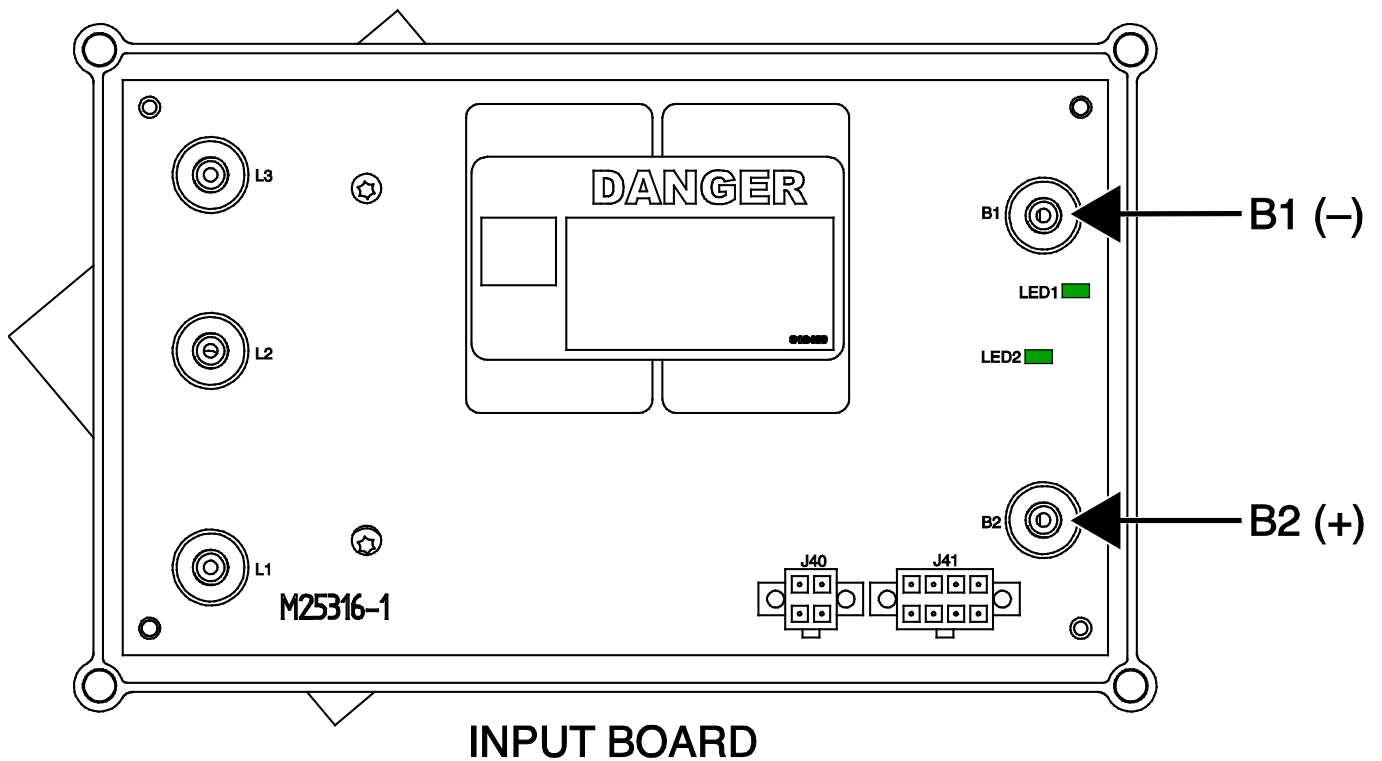
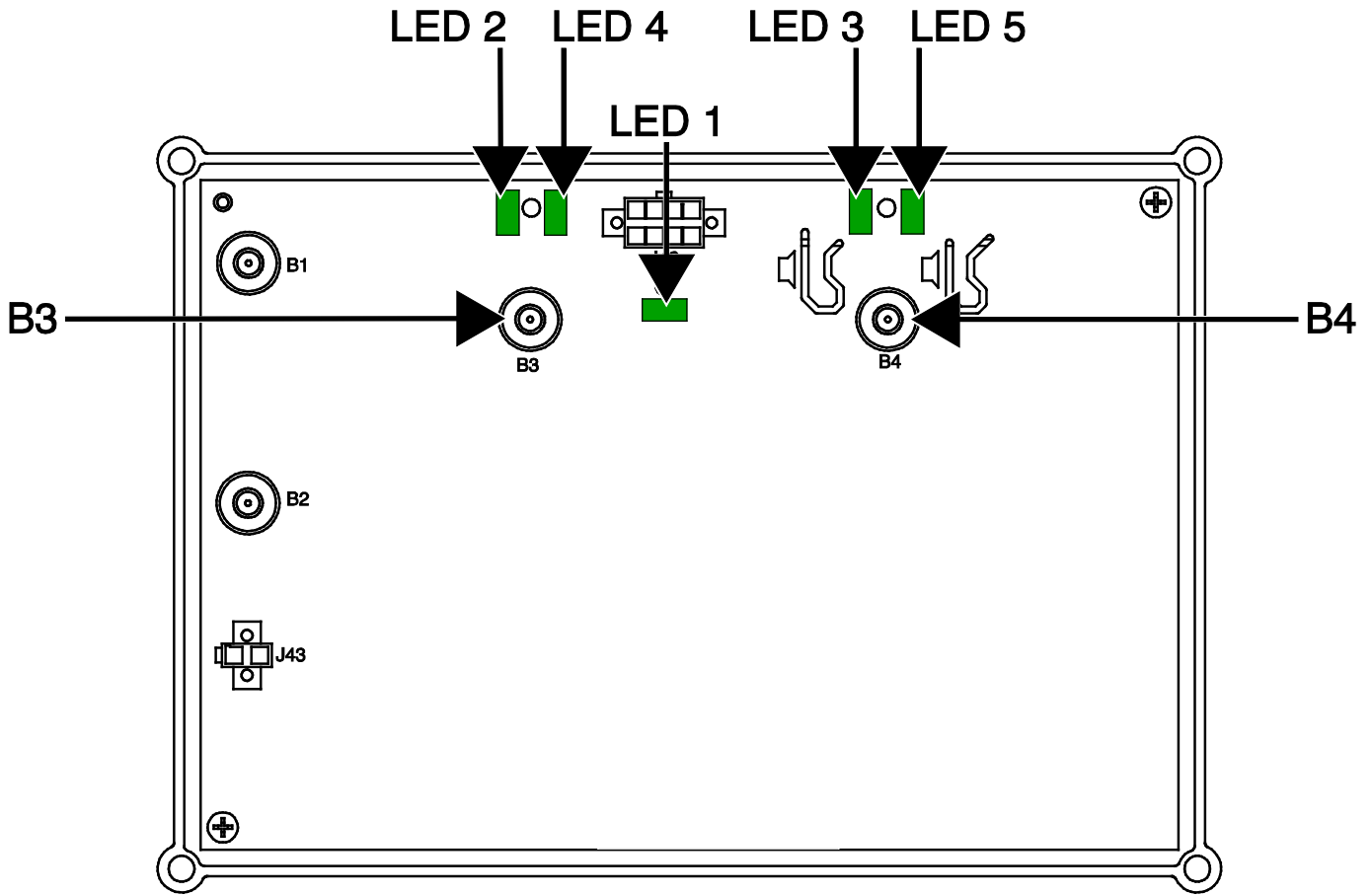


Figure F.44 - Switchboard test point and LED locations



NOTE: LEDS ARE MOUNTED ON BOTTOM OF THE SWITCHBOARD

Table F.14 – Switchboard diode drop tests

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
CHECKING "HIGH-SIDE" IGBTs	B3 CONNECTION TO SERIES CAPACITOR	B2 POSITIVE TERMINAL ON INPUT BOARD	0.3 TO 1.0 VDC
CHECKING "HIGH-SIDE" IGBTs	B4 CONNECTION TO SERIES CAPACITOR	B2 POSITIVE TERMINAL ON INPUT BOARD	0.3 TO 1.0 VDC
CHECKING "HIGH-SIDE" IGBTs	B1 NEGATIVE TERMINAL ON INPUT BOARD	B3 CONNECTION TO SERIES CAPACITOR	0.3 TO 1.0 VDC
CHECKING "HIGH-SIDE" IGBTs	B1 NEGATIVE TERMINAL ON INPUT BOARD	B4 CONNECTION TO SERIES CAPACITOR	0.3 TO 1.0 VDC

Table F.15 - Switchboard LEDs

LED NUMBER	LED COLOR	LED FUNCTION
1	GREEN	INDICATES SWITCHBOARD IS RECEIVING PRIMARY VOLTAGE FROM THE INPUT BOARD.
2	GREEN	INDICATES SWITCHBOARD IS RECEIVING GATE DRIVE SIGNALS FROM THE CONTROL BOARD.
3	GREEN	INDICATES SWITCHBOARD IS RECEIVING GATE DRIVE SIGNALS FROM THE CONTROL BOARD.
4	GREEN	INDICATES SWITCHBOARD IS RECEIVING GATE DRIVE SIGNALS FROM THE CONTROL BOARD.
5	GREEN	INDICATES SWITCHBOARD IS RECEIVING GATE DRIVE SIGNALS FROM THE CONTROL BOARD.

USER INTERFACE BOARD TEST PROCEDURE

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 help determine if the User Interface Board is functioning properly.

MATERIALS NEEDED

Digital Volt/Ohmmeter
Wiring Diagram

PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the user interface board. See *Figure F.45*.
5. Using a digital volt/ohmmeter, perform the resistance tests outlined in *Table F.16* with all plugs connected to the board. See *Figure F.46* and *F.47*. See Wiring Diagram.
6. Carefully apply the correct input power to the Flextec 350X and turn ON the machine.
7. Observe and make sure the status LEDs on the front and rear of the user interface board are indicating a properly functioning user interface board. See *Table F.17* and *Table F.18*. See *Figure F.46*.
8. Using a digital volt/ohmmeter, perform the voltage tests outlined in *Table F.19*. See *Figures F.46* and *F.47*. See Wiring Diagram.
9. If any of the tests fail, the user interface board may be faulty.
10. If faulty, perform the *User Interface Board Removal And Replacement Procedure*.
11. Perform the *Case Cover Replacement Procedure*.

Figure F.45 - User interface board location

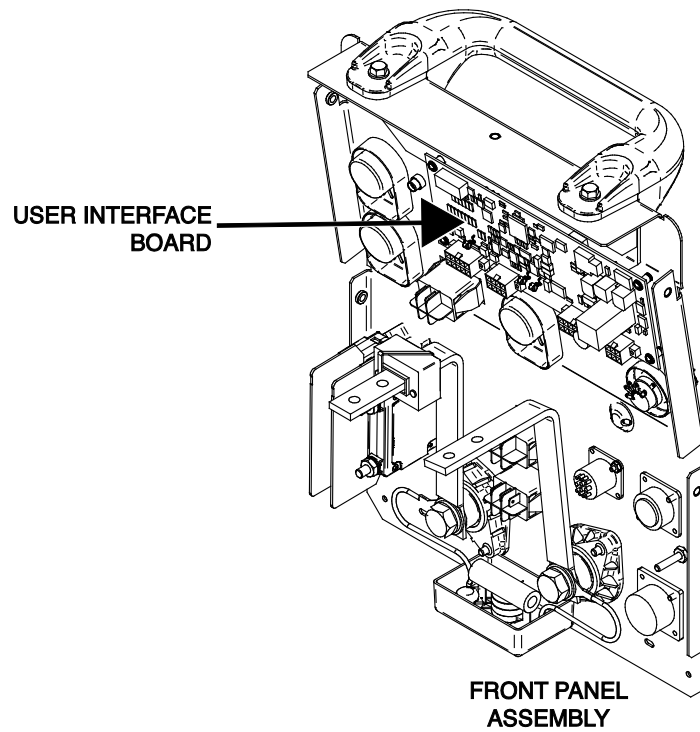


Figure F.46 - User interface board plug and LED locations

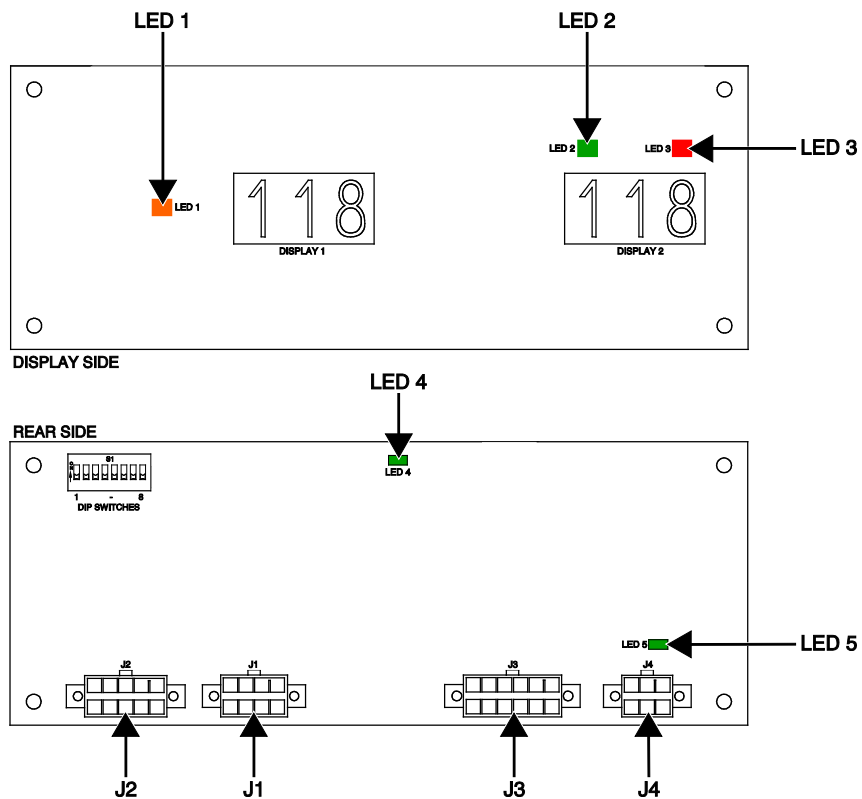


Figure F.47 - User interface board lead locations

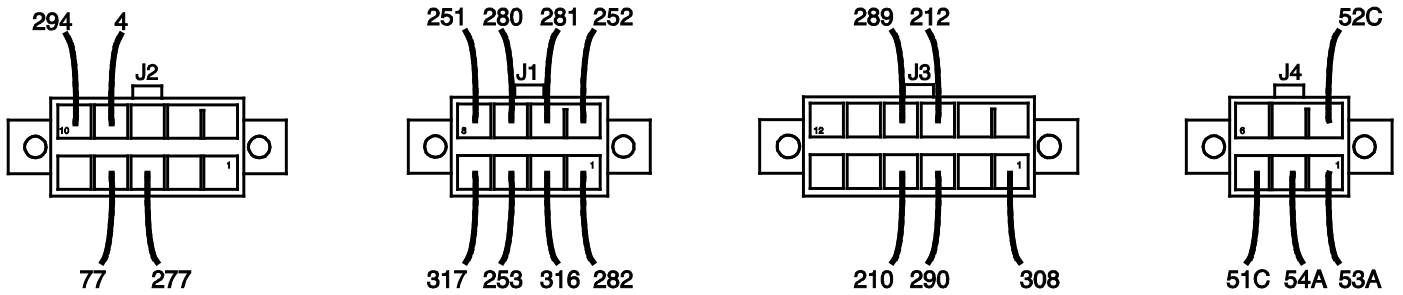


Table F.16 - User interface board resistance tests

TEST POINT	TEST POINT	EXPECTED READING
PLUG J1 PIN 1	PLUG J1 PIN 6	0 – 3.8K OHMS DEPENDENT ON ARC CONTROL POT POSITION.
PLUG J1 PIN 3	PLUG J1 PIN 5	0 – 3.8K OHMS DEPENDENT ON OUTPUT CONTROL KNOB POSITION.
PLUG J1 PIN 4	PLUG J1 PIN 2	0 – 3.8K OHMS DEPENDENT ON HOT START KNOB POSITION.

Table F.17 - User interface LEDs

LED NUMBER	LED COLOR	FUNCTION
1	AMBER	THERMAL LED
2	GREEN	VRD LED VOLTAGE REDUCED
3	RED	VRD LED VOLTAGE NOT REDUCED
4	GREEN	STATUS "OK"
4	RED/GREEN	STATUS "ERROR" (CHECK CODE FOR SPECIFIC ERROR) (BI-COLOR)
5	GREEN	+15 VDC POWER SUPPLY "OK"

Table F.18 - User interface board LED indication

LIGHT CONDITION	MEANING
STEADY GREEN	SYSTEM "OK"
ALTERNATING GREEN AND RED	A SYSTEM FAULT HAS OCCURRED. IF THE USER INTERFACE BOARD STATUS LED IS FLASHING ANY COMBINATION OF RED AND GREEN, ERRORS ARE PRESENT. 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. SEE <i>FAULT CODES</i> .

Table F.19 - User interface board voltage tests

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	CONDITIONS
INPUT FROM 42V DC bus board	PLUG J4 PIN 4 (LEAD #52C)	PLUG J4 PIN 3 (LEAD #51C)	42 VDC	MACHINE ON
CAN COMMUNICATION	PLUG J4 PIN 2 (LEAD #54A)	PLUG J4 PIN 1 (LEAD #53A)	2 VDC	MACHINE ON
+15 VDC SUPPLY	PLUG J3 PIN 3 (LEAD #290)	PLUG J1 PIN 1 (LEAD #282)	15 VDC	MACHINE ON
+10 VDC	PLUG J1 PIN 7 (LEAD #280)	PLUG J1 PIN 1 (LEAD #282)	10 VDC	MACHINE ON
WELD TERMINALS SWITCH	PLUG J3 PIN 9 (LEAD #212)	PLUG J3 PIN 4 (LEAD #210)	0 VDC	WELD TERMINALS SWITCH ON
WELD TERMINALS SWITCH	PLUG J3 PIN 9 (LEAD #212)	PLUG J3 PIN 4 (LEAD #210)	15 VDC	WELD TERMINALS SWITCH OFF
LOCAL/REMOTE SWITCH	PLUG J3 PIN 10 (LEAD #289)	PLUG J3 PIN 3 (LEAD #290)	15 VDC	LOCAL/REMOTE SWITCH IN REMOTE POSITION
LOCAL/REMOTE SWITCH	PLUG J3 PIN 10 (LEAD #289)	PLUG J3 PIN 3 (LEAD #290)	0 VDC	LOCAL/REMOTE SWITCH IN LOCAL POSITION
REMOTE TRIGGER	PLUG J2 PIN 9 (LEAD #4)	PLUG J1 PIN 1 (LEAD #282)	15 VDC	MACHINE ON
ARC CONTROL SUPPLY	PLUG J1 PIN 7 (LEAD #280)	PLUG J1 PIN 1 (LEAD #282)	10 VDC	MACHINE ON
OUTPUT CONTROL SUPPLY	PLUG J1 PIN 8 (LEAD #251)	PLUG J1 PIN 1 (LEAD #282)	10 VDC	MACHINE ON
MODE SWITCH	PLUG J3 PIN 1 (LEAD #308)	PLUG J1 PIN 1 (LEAD #282)	15 VDC	MODE SWITCH IN GTAW POSITION
MODE SWITCH	PLUG J3 PIN 1 (LEAD #308)	PLUG J1 PIN 1 (LEAD #282)	12.5 VDC	MODE SWITCH IN SMAW POSITION
MODE SWITCH	PLUG J3 PIN 1 (LEAD #308)	PLUG J1 PIN 1 (LEAD #282)	10 VDC	MODE SWITCH IN CV-GAS POSITION
MODE SWITCH	PLUG J3 PIN 1 (LEAD #308)	PLUG J1 PIN 1 (LEAD #282)	7.5 VDC	MODE SWITCH IN CV-INNERSHIELD POSITION

SPECIAL TESTING MODES

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

These modes can be used for calibration or to verify correct voltage and current calibration.

MATERIALS NEEDED

Grid Load Bank
Wiring Diagram
Certified Voltmeter And Ammeter

CONSTANT VOLTAGE GRID LOAD TESTING

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the DIP switch on the user interface board. See *Figure F.48*.
5. Place the #4 DIP switch in the ON position. See *Figure F.48*. All other DIP switches should be in the OFF position.
6. Place the weld terminals on/remote switch into the remote position. See *Figure F.49*.
7. Place the weld process selection switch into the GMAW position. See *Figure F.49*.
8. The local / remote switch selects whether the local output control potentiometer or the remote 12-pin connector potentiometer will be used. Place the local / remote switch in the appropriate position for the testing situation. See *Figure F.49*.
9. The output control potentiometer controls voltage set (10.0 to 45.0 volts) when the local / remote switch is in the Local position.
10. Turn the arc control potentiometer fully clockwise (+10). See *Figure F.49*.
11. Turn the hot start knob to the "0" position. See *Figure F.49*.
12. If necessary, disconnect the 14-pin feeder connector. See *Figure F.49*.
13. The 12-pin remote connector controls voltage set (10.0 to 45.0 volts) when Local / Remote switch is in the Remote position.
14. Connect a load bank and the certified meters to the machine.
15. Carefully apply the correct input power to the machine and turn the machine ON. Allow at least

- thirty seconds after power on before running this test to allow for the ArcLink system to be mapped.
16. The left display will read "VOL " and the right display will show the preset voltage.
 17. Adjust the output control knob or the 12-pin remote potentiometer to set the preset voltage desired for testing.
 18. Switch the weld terminal switch to the ON position (with the machine properly loaded by a grid load) and the machine will show the actual voltage and current on the displays.
 19. When the output control potentiometer is changed quickly while operating, the output may "drop out" during a transition to a new voltage. This is normal for the special voltage grid load test mode. The meter reading on the machine must match the readings on the certified meters.
 20. Switch the weld terminals switch to the Remote position and the output will turn off.
 21. Carefully remove the input power from the machine.
 22. Place the #4 DIP switch in the OFF position.
 23. Perform the *Case Cover Replacement Procedure*.

CONSTANT CURRENT GRID LOAD TESTING

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the DIP switch on the user interface board. See *Figure F.48*.
5. Place the #4 DIP switch in the ON position. See *Figure F.48*. All other DIP switches should be in the OFF position.
6. Place the weld terminals on/remote switch into the remote position. See *Figure F.49*.
7. Place the weld process selection switch into the GTAW position. See *Figure F.49*.
8. The local / remote switch selects whether the local output control potentiometer or the remote 12 pin connector potentiometer will be used. Place the local / remote switch in the appropriate position for the testing situation. See *Figure F.49*.
9. The output control potentiometer controls current set (10 to 450 amps) when the local / remote switch is in the Local position.
10. Turn the arc control potentiometer fully counter-clockwise (-10). See *Figure F.49*.
11. Turn the hot start knob to the "0" position. See *Figure F.49*.
12. If necessary, disconnect the 14-pin feeder connector. See *Figure F.49*.
13. The 12 pin remote connector controls current set (10 to 450 amps) when Local / Remote switch is in the Remote position.
14. Connect a load bank and the certified meters to the machine.
15. Carefully apply the correct input power to the machine and turn the machine ON. Allow at least thirty seconds after power on before running this test to allow for the ArcLink system to be mapped.
16. The right display will read "Cur" and the left display will show the preset for the current set.
17. Adjust the output control knob to set the preset current desired for testing.

18. Switch the weld terminal switch to the ON position (with the machine properly loaded by a grid load) and the machine will show the actual voltage and current on the displays. The meter reading on the machine must match the readings on the certified meters.
19. Switch the weld terminals switch to the Remote position and the output will turn off.
20. Carefully remove the input power from the machine.
21. Place the #4 DIP switch in the OFF position.
22. Perform the *Case Cover Replacement Procedure*.

ERROR LOG READING PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Locate the DIP switch on the user interface board. See *Figure F.48*.
5. Place the #8 DIP switch in the ON position. See *Figure F.50*. All other DIP switches should be in the OFF position.
6. Place the weld terminals on/remote switch into the ON position. See *Figure F.49*.
7. Place the process selection switch into the GTAW position. See *Figure F.49*.
8. Place the local / remote switch in the Local position. See *Figure F.49*.
9. Turn the output control potentiometer fully counter-clockwise. See *Figure F.49*.
10. Turn the arc control potentiometer fully counter-clockwise (-10). See *Figure F.49*.
11. Turn the hot start knob to the "0" position. See *Figure F.49*.
12. Carefully apply the correct input power to the machine and turn the machine ON.
13. The displays will show "---" "---".
14. The local / remote switch will be used to step through the test steps and the error log.
15. The left display will show the test step number.
16. Cycle the local / remote switch until the left display shows "20". The right display will show "---".
17. Rotate the output control potentiometer clockwise.
18. The left display will show numbers between 1 and 25.
19. The right display will show the 25 most recent Weld Sequencer errors.
20. Return the output control potentiometer to zero.
21. Cycle the weld terminals switch again. The left display will show "21". The right display will show "--".
22. Rotate the output control potentiometer clockwise.
23. The left display will show numbers between 1 and 25.
24. The right display will show the 25 most recent Weld Controller errors.
25. Return the output control potentiometer to zero.

26. Cycle the weld terminals switch again. The left display will show "22". The right display will show "---".
27. Rotate the output control potentiometer clockwise.
28. The left display will show numbers between 1 and 25.
29. The right display will show the 25 most recent user interface errors.
30. Return the output control potentiometer to zero.
31. Carefully remove the input power from the machine.
32. Place the #8 DIP switch in the OFF position.
33. Perform the ***Case Cover Replacement Procedure***.

SOFTWARE VERSION READING PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Locate the DIP switch on the user interface board. See ***Figure F.48***.
5. Place the #8 DIP switch in the ON position. See ***Figure F.50***. All other DIP switches should be in the OFF position.
6. Place the weld terminals on/remote switch into the ON position. See ***Figure F.49***.
7. Place the process selection switch into the GTAW position. See ***Figure F.49***.
8. Place the local / remote switch in the Local position. See ***Figure F.49***.
9. Turn the output control potentiometer fully counter-clockwise. See ***Figure F.49***.
10. Turn the arc control potentiometer fully counter-clockwise (-10). See ***Figure F.49***.
11. Turn the hot start knob to the "0" position. See ***Figure F.49***.
12. Carefully apply the correct input power to the machine and turn the machine ON.
13. Cycle the local / remote switch until the left display shows " 9". The right display will show the last three digits of the switchboard software number (Example: S30146-07 is software, then the right display shows "607").
14. Cycle the local / remote switch until the left display shows " 10". The right display will show the last three digits of the switchboard boot code version.
15. Cycle the local / remote switch until the left display shows " 11". The right display will show the last three digits of the switchboard main code version.
16. Cycle the local / remote switch until the left display shows " 12". The right display will show the last three digits of the switchboard parameter file version.
17. Cycle the local / remote switch until the left display shows " 13". The right display will show the last three digits of the switchboard weld set.
18. Cycle the local / remote switch until the left display shows " 14". The right display will show the last three digits of the user interface boot code version.
19. Cycle the local / remote switch until the left display shows " 15". The right display will show the last

- three digits of the user interface main code version.
- 20. Cycle the local / remote switch until the left display shows " 16". The right display will show the last three digits of the user interface parameter version.
- 21. At this point, all software has been verified.
- 22. Carefully remove the input power from the machine.
- 23. Place the #8 DIP switch in the OFF position.
- 24. Perform the *Case Cover Replacement Procedure*.

Figure F.48 - User interface board DIP switch location and position

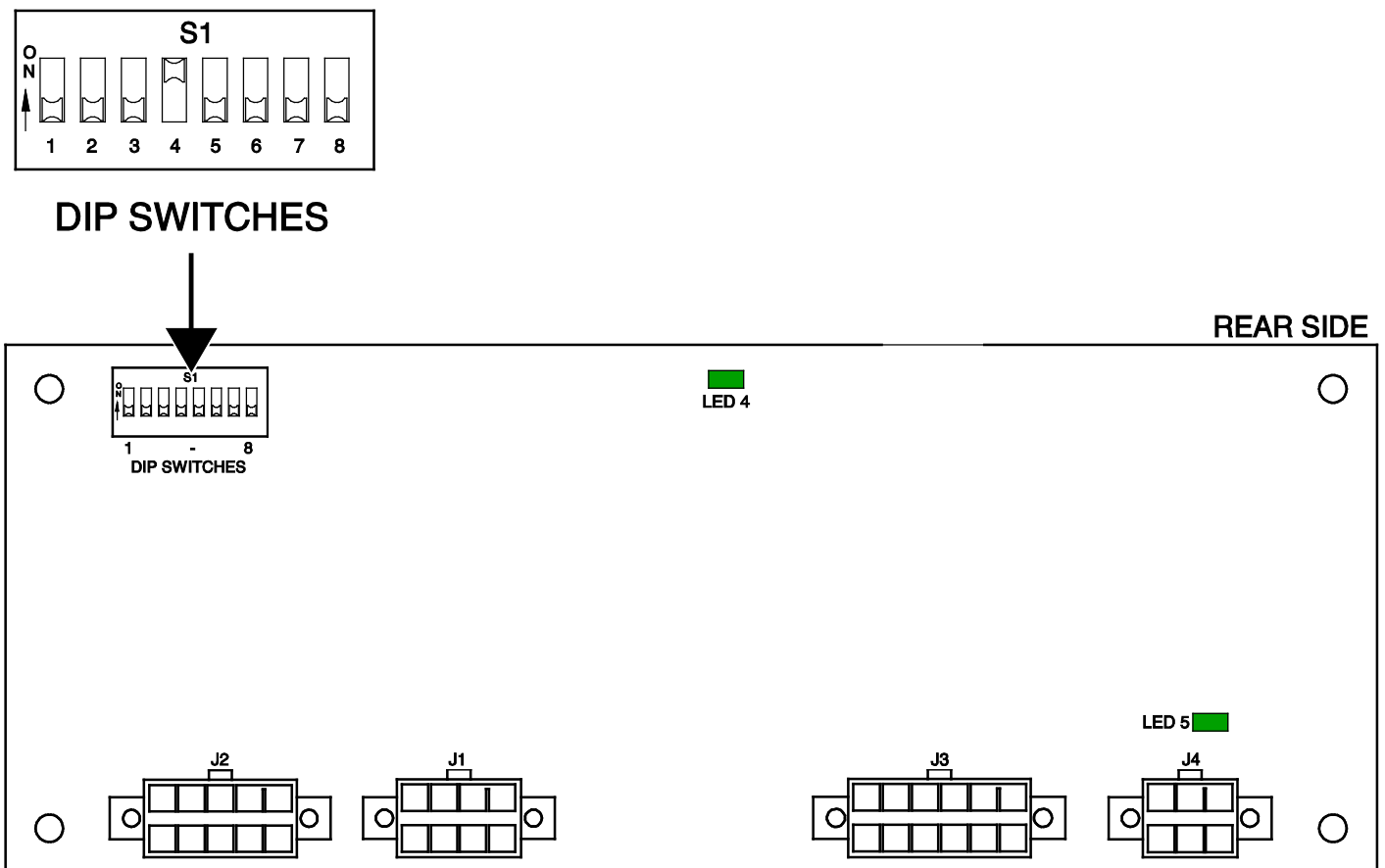


Figure F.49 - User controls locations

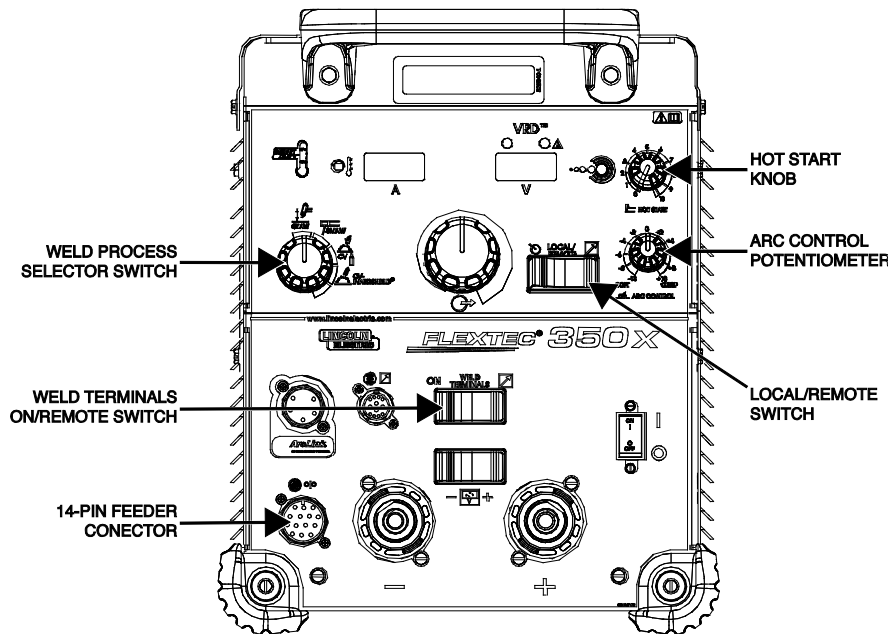
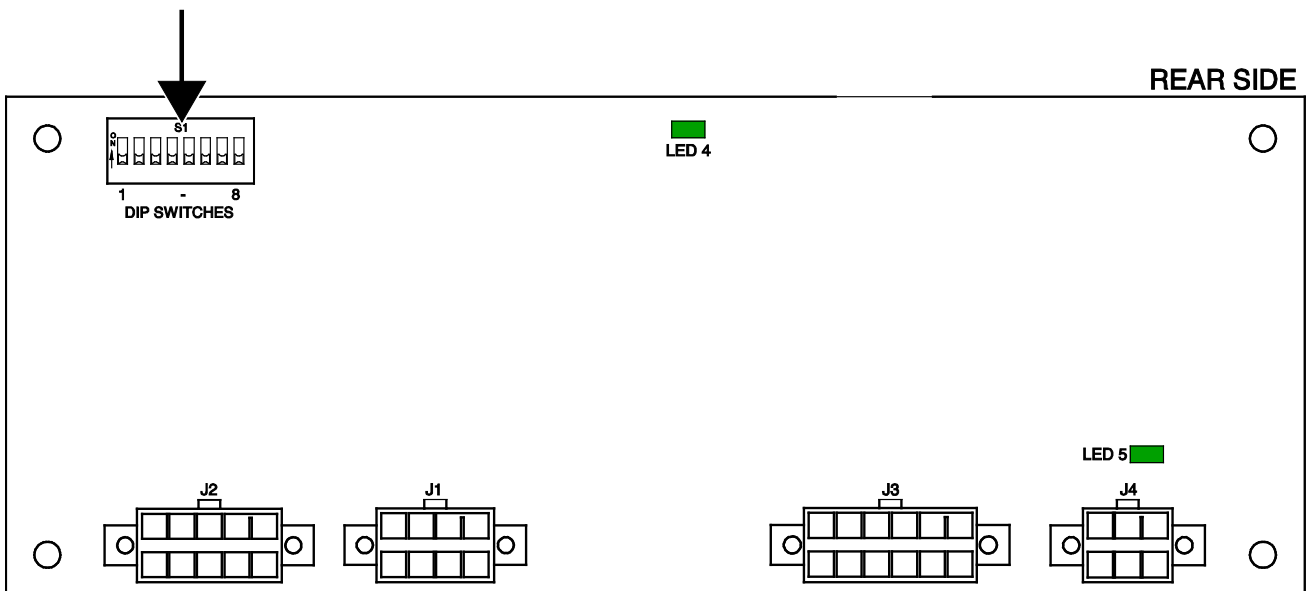


Figure F.50 - User interface board DIP switch location and position



DIP SWITCHES



Removal And Replacement Procedures

42V DC BUS BOARD REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the 42V DC Bus Board.

MATERIALS NEEDED

3/8" Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Label and disconnect plugs J46 and J47 from the 42V DC bus board. See *Figure F.51*. See Wiring Diagram.
5. Using a 3/8" nutdriver, remove the four nuts securing the 42V DC bus board to the mounting studs. See *Figure F.52*.
6. Carefully lift the 42V DC bus board off the mounting posts.
7. The 42V DC bus board can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new 42V DC bus board onto the mounting posts.
2. Using a 3/8" nutdriver, attach the four nuts securing the 42V DC bus board to the machine. Torque nuts to 9-11 in/lbs.
3. Connect plugs J46 and J47 to the 42V DC bus board. See Wiring Diagram.
4. Perform the *Case Cover Replacement Procedure*.
5. Perform the *Retest After Repair Procedure*.

Figure F.51 - 42V DC bus board plug locations

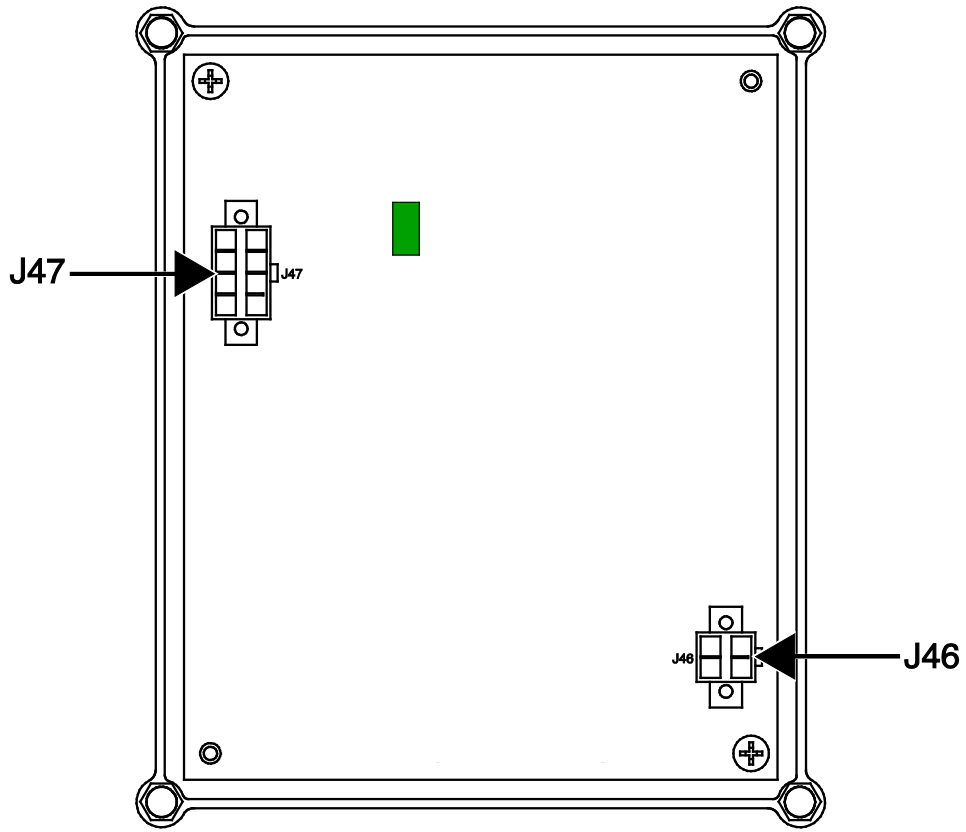
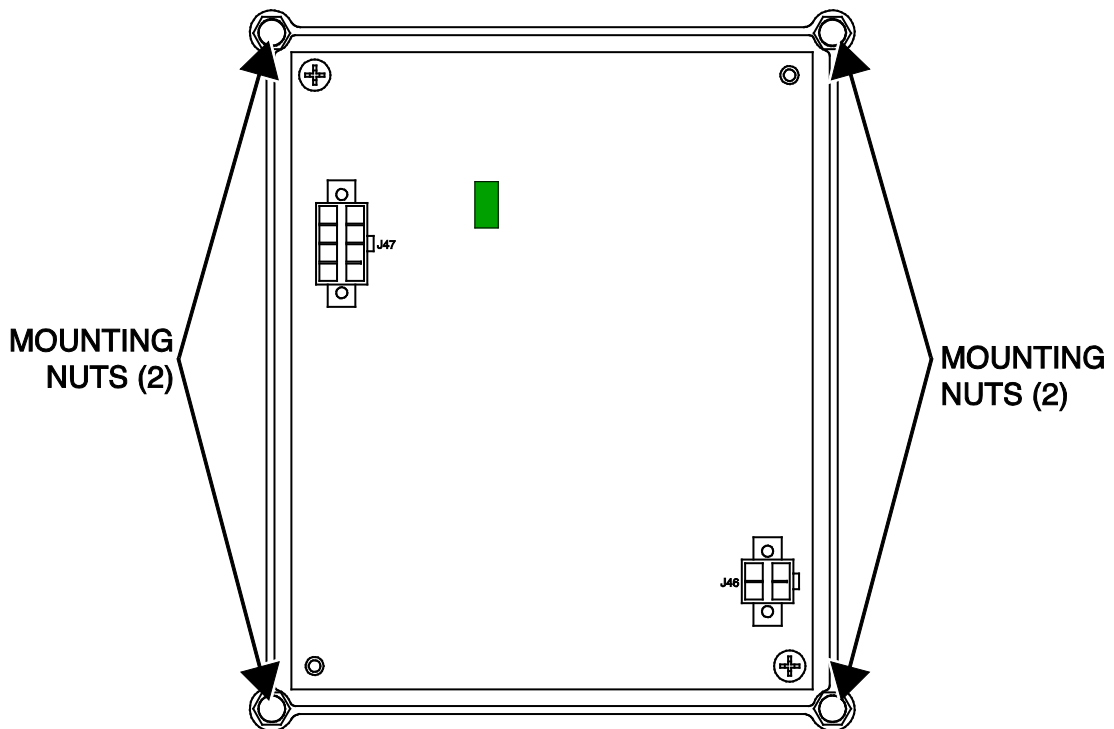


Figure F.52 - 42V DC bus board mounting nut locations



AUXILIARY TRANSFORMER (T1) REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Auxiliary Transformer (T1).

MATERIALS NEEDED

3/8" Nutdriver
5/16" Nutdriver
7/16" Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Using a 7/16" nutdriver, remove the primary leads (L1 and L3) from terminals A and C on the input board. See *Figure F.53*. See Wiring Diagram.
5. Label and disconnect lead X2 from the D1 diode bridge. See *Figure F.53*. See Wiring Diagram.
6. Label and disconnect lead X1 from the CB2 circuit breaker. See Wiring Diagram.
7. Using a 5/16" nutdriver, remove the mounting screw from the base of the auxiliary transformer (T1). See *Figure F.54*.
8. Using a 3/8" nutdriver, remove the two nuts from the horizontal mounting studs securing the auxiliary transformer to the back of the machine. See *Figure F.54*.
9. The auxiliary transformer (T1) can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new auxiliary transformer (T1) into the machine.
2. Using a 3/8" nutdriver, attach the two nuts securing the auxiliary transformer (T1) to the horizontal mounting studs in the back on the machine.
3. Using a 5/16" nutdriver, attach the mounting screw to the base of the auxiliary transformer (T1).
4. Connect lead X1 to the CB2 circuit breaker. See Wiring Diagram.
5. Connect lead X2 to the D1 diode bridge. See Wiring Diagram.
6. Using a 7/16" nutdriver, attach the primary leads (L1 and L3) to terminals A and C on the input board. See Wiring Diagram.

7. Perform the *Case Cover Replacement Procedure*.
8. Perform the *Retest After Repair Procedure*.

Figure F.53 - Primary lead connection points

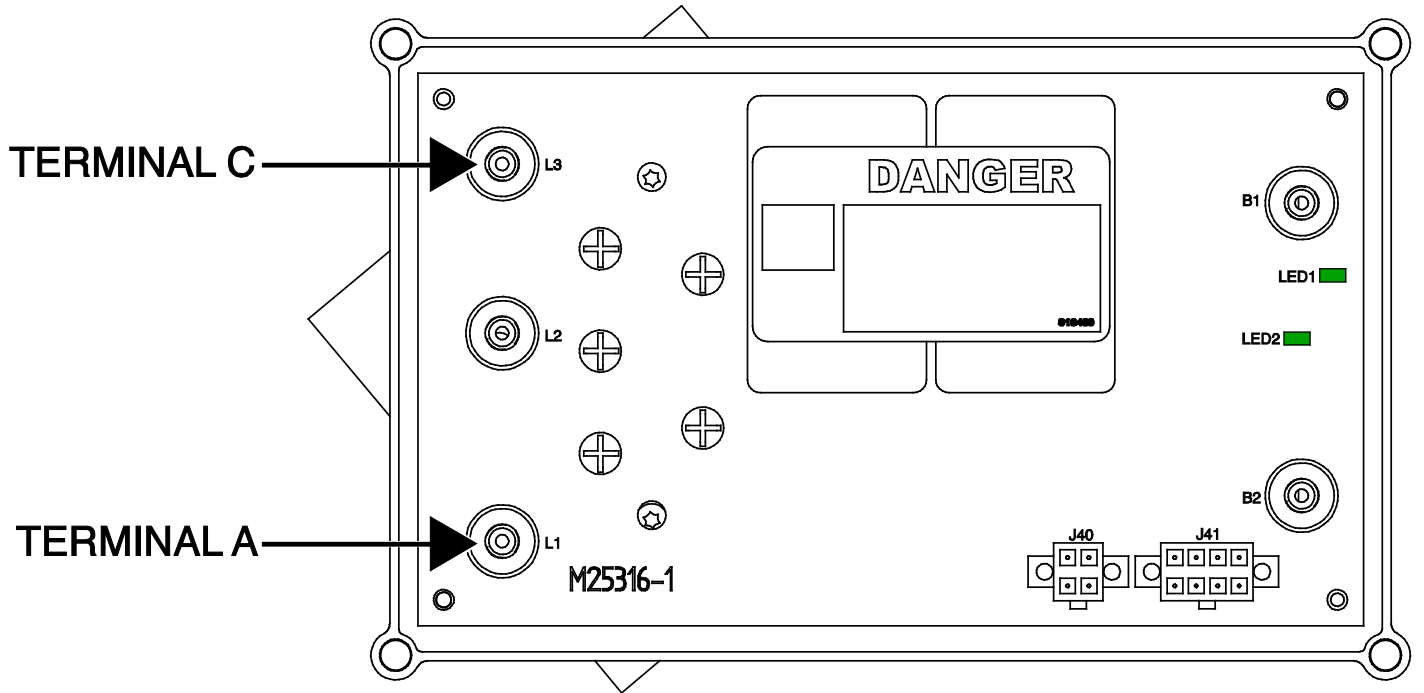


Figure F.54 - Lead X2 location

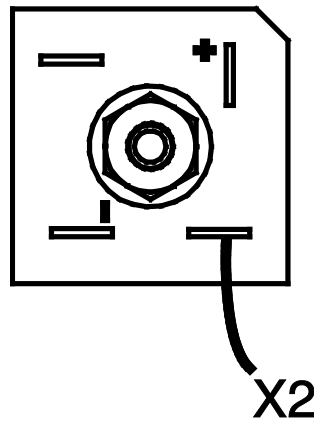
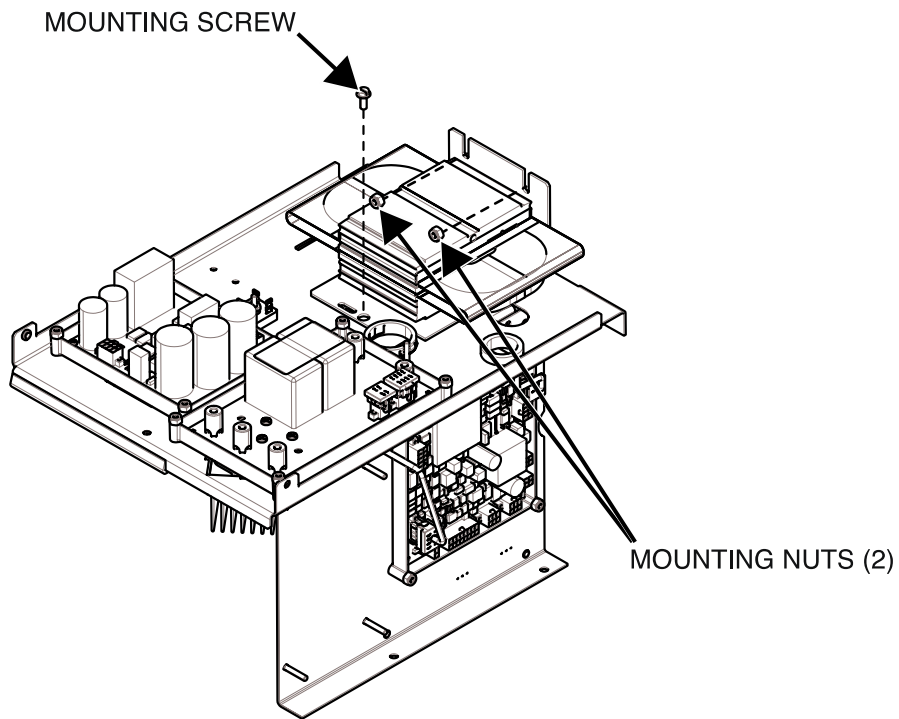


Figure F.55 - Auxiliary transformer (T1) mounting hardware locations



BOOST RELAY REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Boost Relay.

MATERIALS NEEDED

Phillips Screwdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Label and disconnect leads 227, 228, 10A, 10B, 202A and 202B from the boost relay terminals. See *Figure F.56*. See Wiring Diagram.
5. Using a Phillips screwdriver, remove the two screws securing the boost relay to the horizontal mounting deck. See *Figure F.57*.
6. The boost relay can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new boost relay into the machine.
2. Using a Phillips screwdriver, attach the two screws securing the boost relay to the horizontal mounting deck. Torque to 10-12 in/lbs.
3. Connect leads 227, 228, 10A, 10B, 202A and 202B to the boost relay terminals. See Wiring Diagram.
4. Perform the *Case Cover Replacement Procedure*.
5. Perform the *Retest After Repair Procedure*.

Figure F.56 - Boost relay lead locations

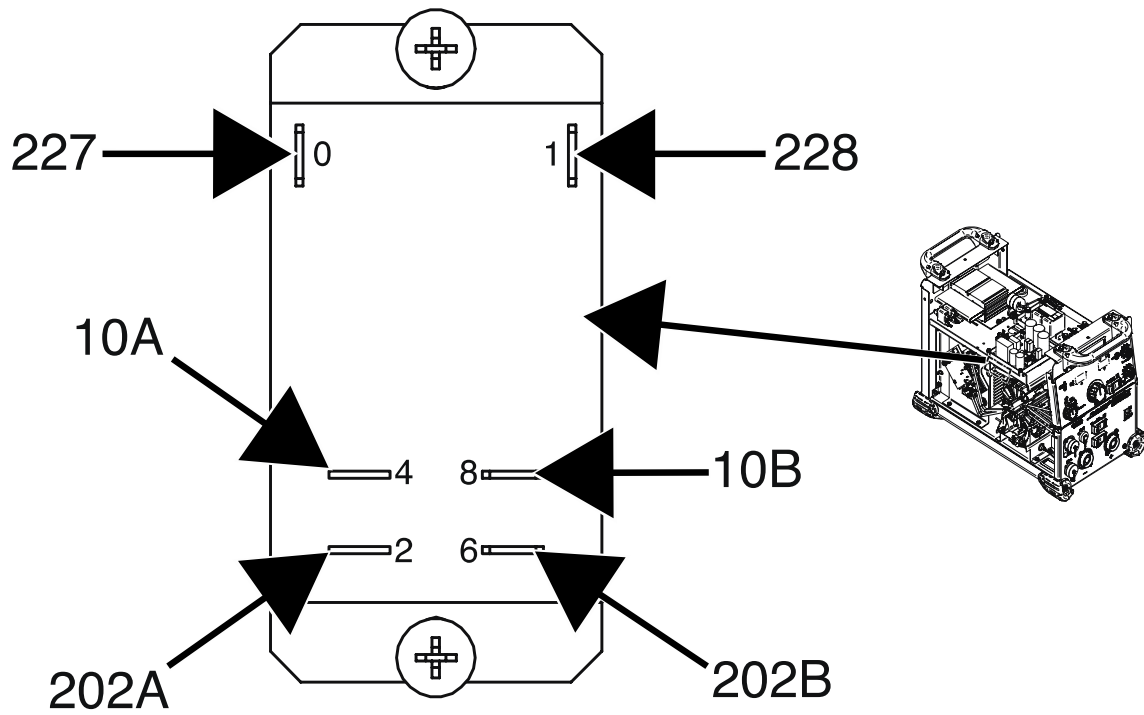
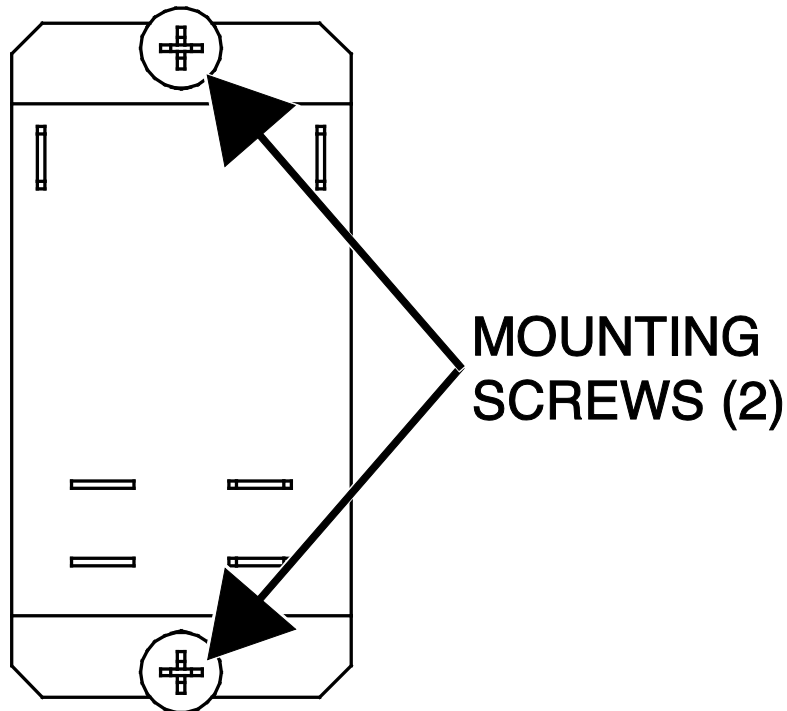


Figure F.57 - Boost relay mounting screw locations



CHOKE REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Choke Assembly.

MATERIALS NEEDED

5/16" Nutdriver
7/16" Nutdriver
1/2" Nutdriver
Penetrox Heat Sink Compound (Lincoln Part #T12837-1)
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Perform the *Main Transformer Removal Procedure*.
5. Using a 1/2" nutdriver, remove the heavy flexible choke lead from the heat sink of the output rectifier assembly. Note the washer placement and positive lead from the boost rectifier board. See *Figure F.58*. See Wiring Diagram.
6. Using a 7/16" nutdriver, remove the outer choke lead from the positive output terminal copper bus bar. Note placement of washers and leads #220. See *Figure F.59*. See Wiring Diagram.
7. Label and disconnect the two thermostat leads (leads #224 and #226) at the in-line connectors. See Wiring Diagram.
8. Using a 5/16" nutdriver, remove the three screws securing the output choke to the base of the machine. See *Figure F.60*.
9. The choke assembly can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new choke assembly into the machine.
2. Using a 5/16" nutdriver, attach the three screws securing the output choke to the base of the machine.
3. Connect the two thermostat leads (leads #224 and #226) at the in-line connectors. See Wiring Diagram.

4. Using a 7/16" nutdriver, connect the outer choke lead and lead #220 to the positive output terminal copper bus bar. Apply a thin coating of Penetrox heat sink compound (Lincoln part #T12837-1) between the connection points. See Wiring Diagram.
5. Using a 1/2" nutdriver, attach the heavy flexible choke lead and positive boost rectifier lead to the heat sink of the output rectifier assembly. Apply a thin coating of Penetrox heat sink compound (Lincoln part #T12837-1) between the connection points. See Wiring Diagram.
6. Perform the *Main Transformer Replacement Procedure*.
7. Perform the *Case Cover Replacement Procedure*.
8. Perform the *Retest After Repair Procedure*.

Figure F.58 - Heavy flexible choke lead connection point

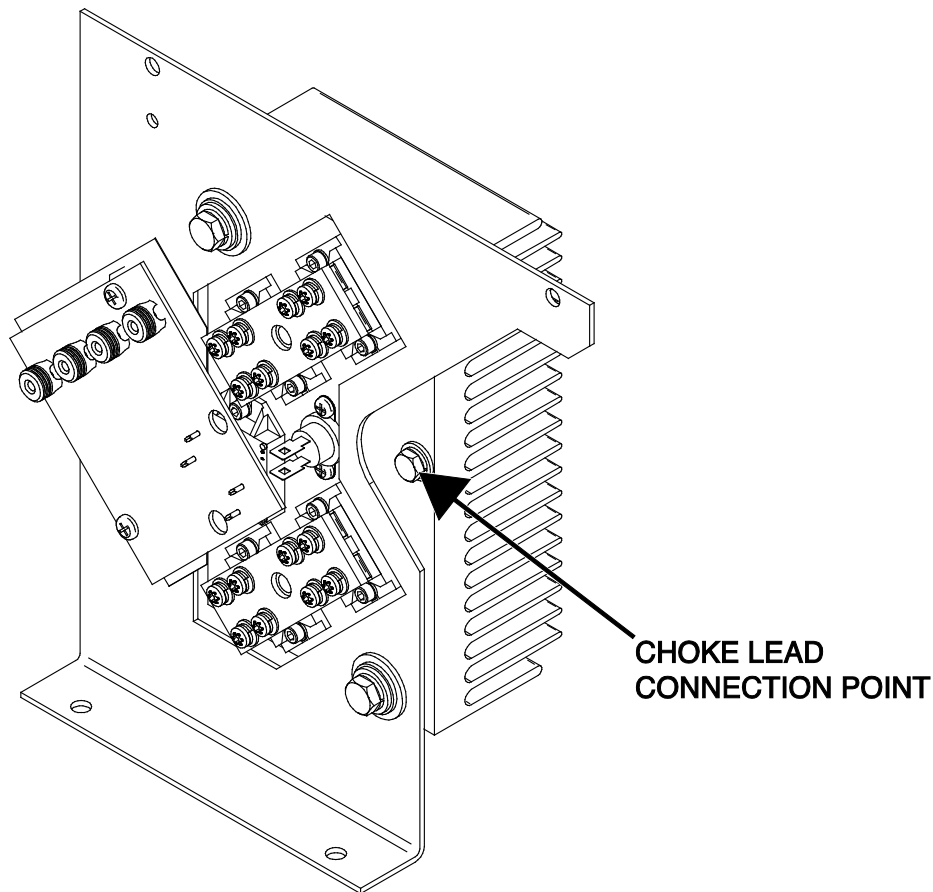


Figure F.59 - Positive output terminal copper bus bar location

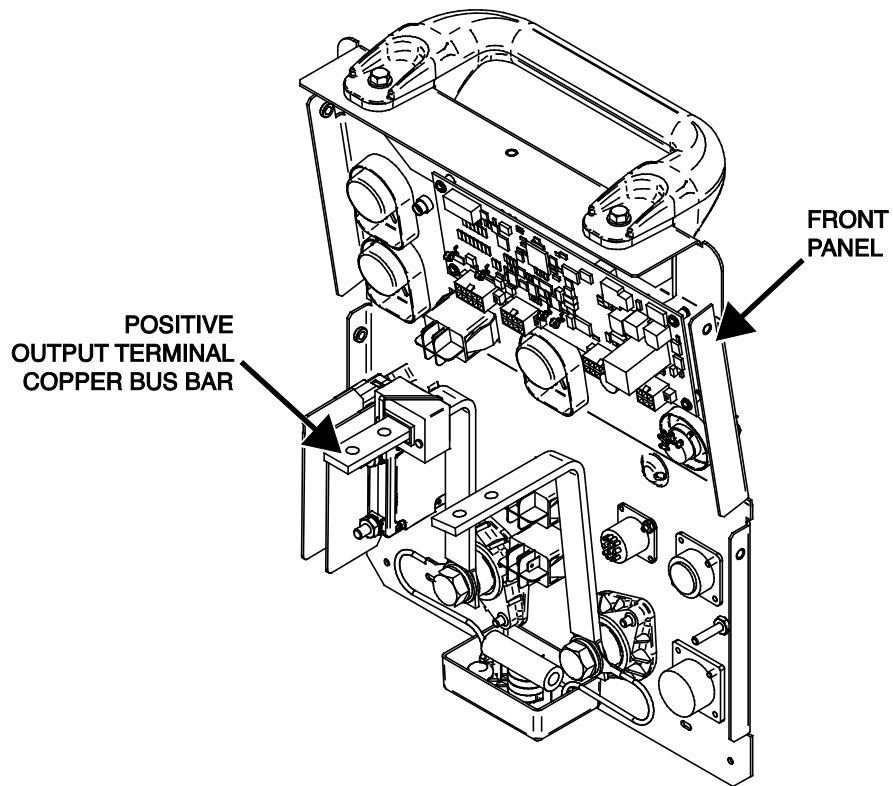
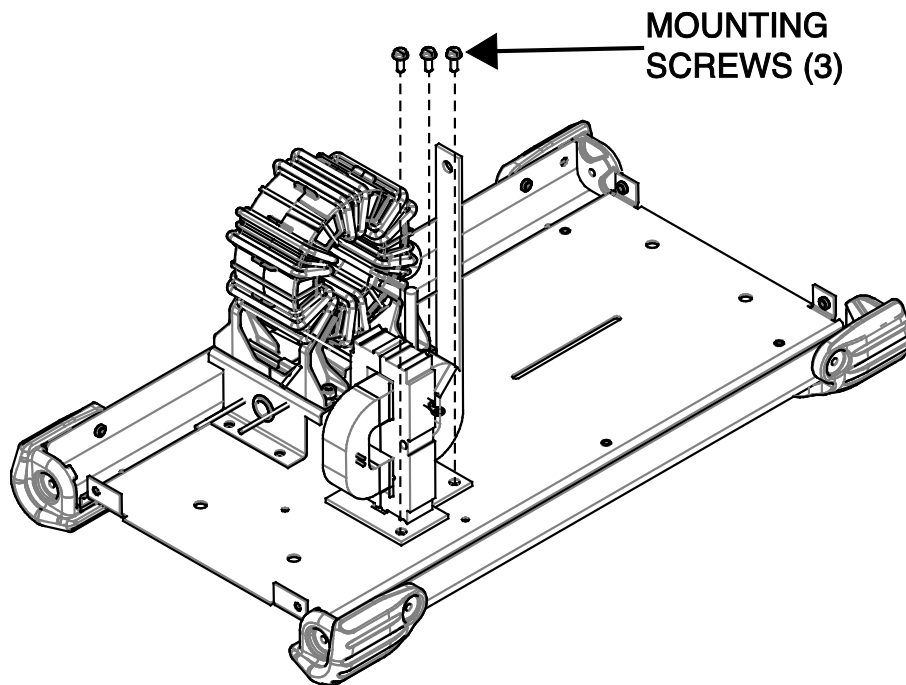


Figure F.60 - Choke mounting screw locations



FAN ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Fan Assembly.

MATERIALS NEEDED

5/16" Nutdriver
Slotted Screwdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Using a 5/16" nutdriver, remove the four screws securing the brickwork fan guard to the rear of the machine. See *Figure F.61*.
5. Using a slotted screwdriver, remove the two screws and washers from the fan assembly to be removed. See *Figure F.62*.
6. Carefully remove either plug J13 or plug J14 from the control board. See *Figure F.63*. See Wiring Diagram.
7. The faulty fan assembly can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new fan assembly into the machine.
2. Connect either plug J13 or J14 to the control board. See Wiring Diagram.
3. Using a slotted screwdriver, attach the two screws and washers to the fan assembly.
4. Using a 5/16" nutdriver, attach the four screws securing the brickwork fan guard to the rear of the machine.
5. Perform the *Case Cover Replacement Procedure*.
6. Perform the *Retest After Repair Procedure*.

Figure F.61 - Brickwork fan guard mounting screw locations

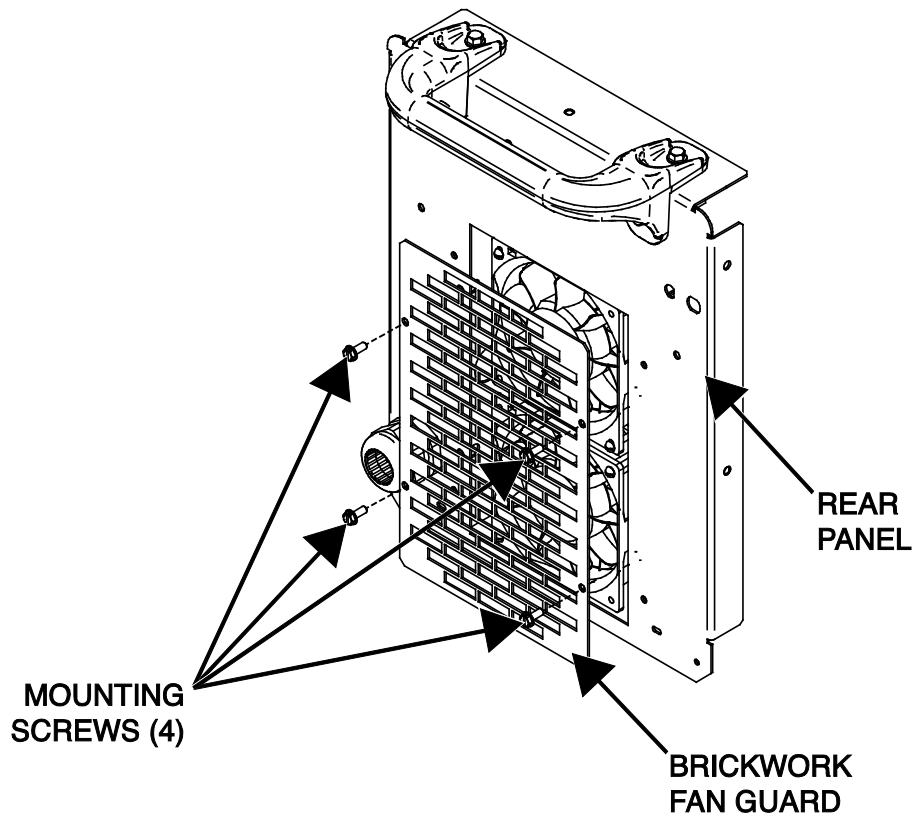


Figure F.62 - Fan assembly mounting screw locations

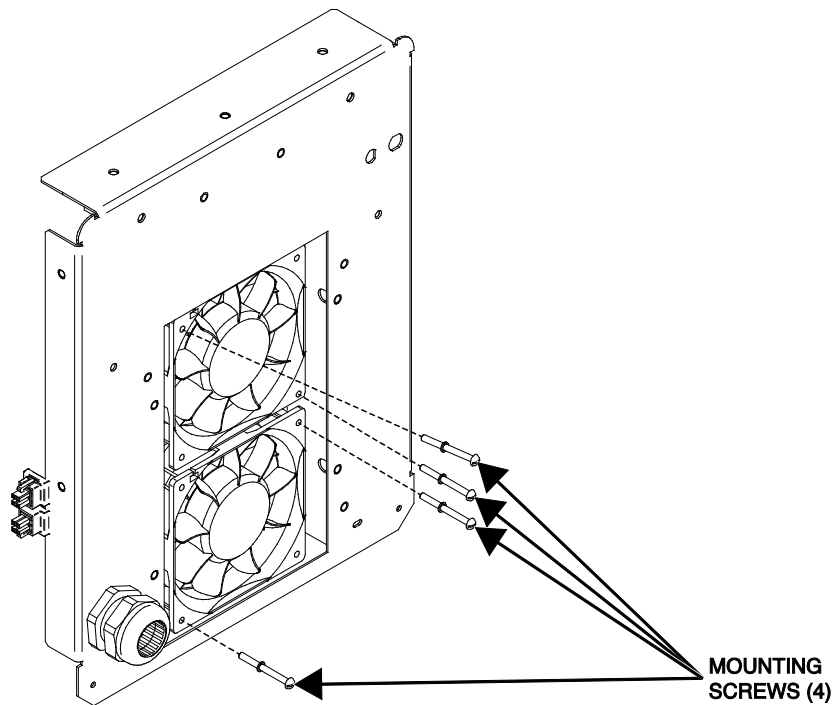
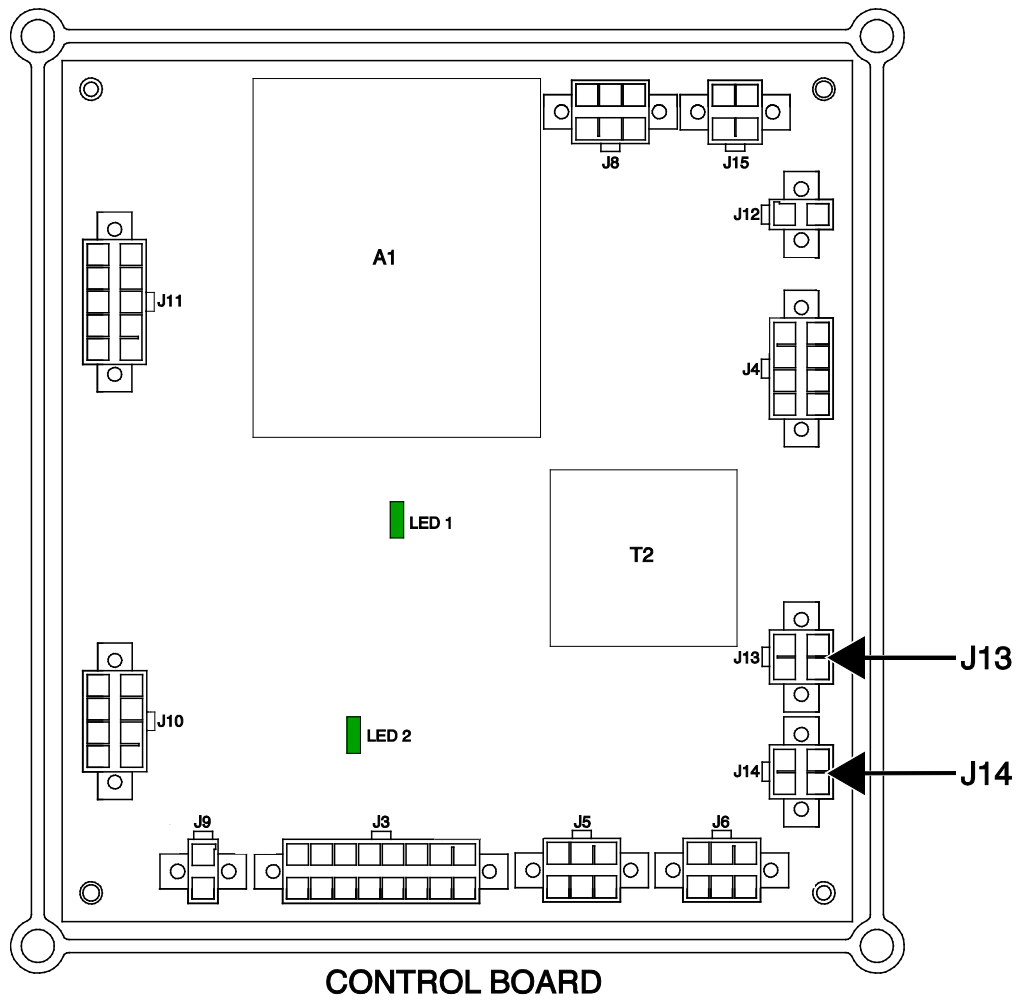


Figure F.63 - Control board plug J13 and J14 locations



CURRENT TRANSDUCER REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Current Transducer.

MATERIALS NEEDED

7/16" Nutdriver
7/16" Open End Wrench
Wiring Diagram

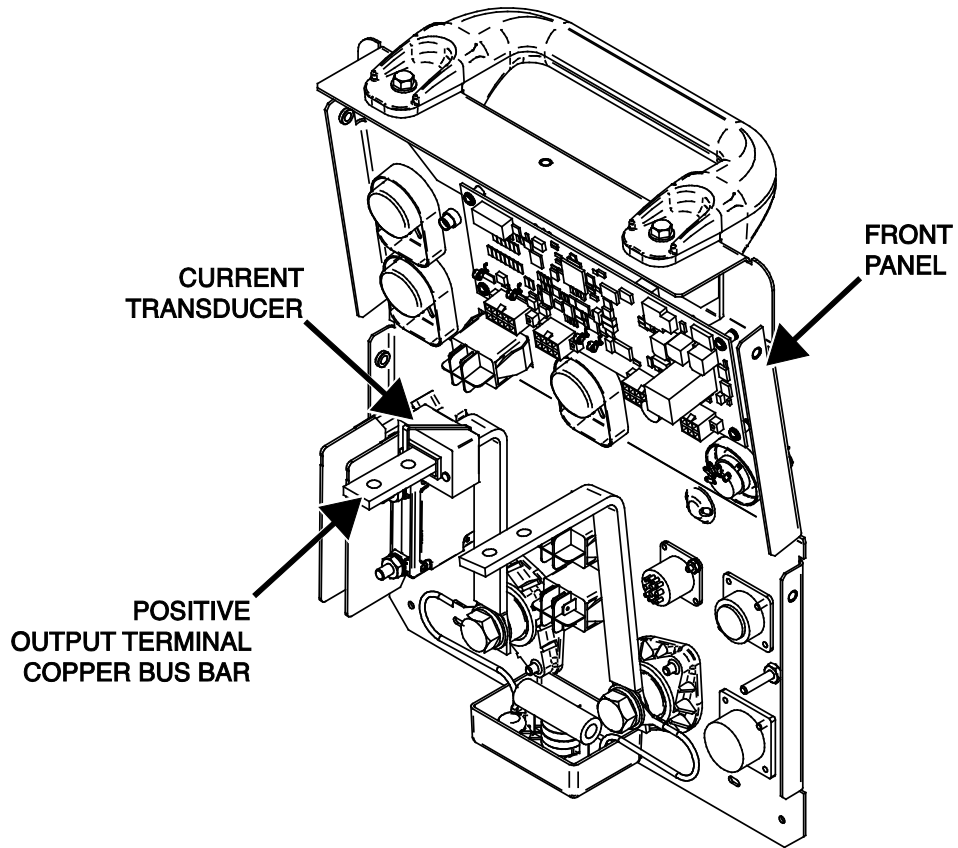
REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Using a 7/16" Nutdriver and a 7/16" open-end wrench, remove the output choke lead from the positive output terminal copper bus bar. Take note of leads #220 and washer placement. See *Figure F.64*. See Wiring Diagram.
5. Label and disconnect the current transducer from plug J16 (in-line connector). See Wiring Diagram.
6. Remove the cable tie securing the current transducer to the copper bus bar.
7. Carefully slide the current transducer off the copper bus bar. See *Figure F.64*. Take note of the direction of the arrow on top of the current transducer for reassembly.

REPLACEMENT PROCEDURE

1. Carefully slide the new current transducer onto the copper bus bar. Make sure the arrow points towards the front of the machine.
2. Using a cable tie, secure the current transducer to the copper bus bar.
3. Connect the current transducer to plug J16 (in-line connector). See Wiring Diagram.
4. Using a 7/16" nutdriver and a 7/16" open-end wrench, attach the output choke lead and lead #220 to the output terminal copper bus bar. See Wiring Diagram.
5. Perform the *Case Cover Replacement Procedure*.
6. Perform the *Retest After Repair Procedure*.

Figure F.64 - Positive output terminal copper bus bar location



D1 RECTIFIER REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the D1 Rectifier.

MATERIALS NEEDED

3/8" Deep Well Nutdriver
Dow Corning 340 Heat Sink Compound (Lincoln Part #T12837)
Wiring Diagram

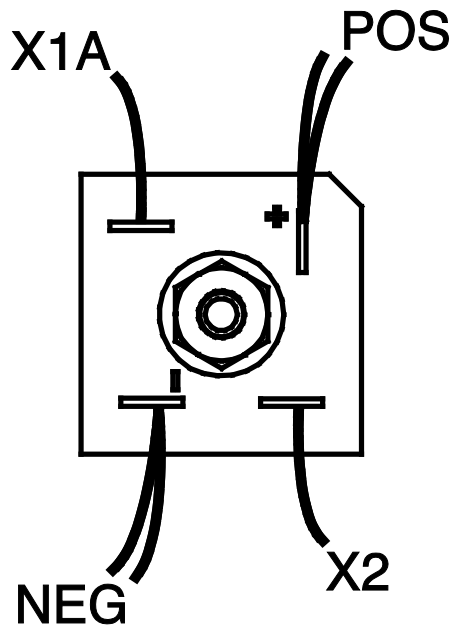
REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Label and disconnect leads X1A, X2, both POS leads and both NEG leads from the D1 rectifier. See *Figure F.65*. See Wiring Diagram.
5. Using a 3/8" deep well nutdriver, remove the nut, lock washer and washer securing the D1 rectifier to the horizontal mounting deck. See *Figure F.66*. See Wiring Diagram.
6. The D1 rectifier can now be removed and replaced.

REPLACEMENT PROCEDURE

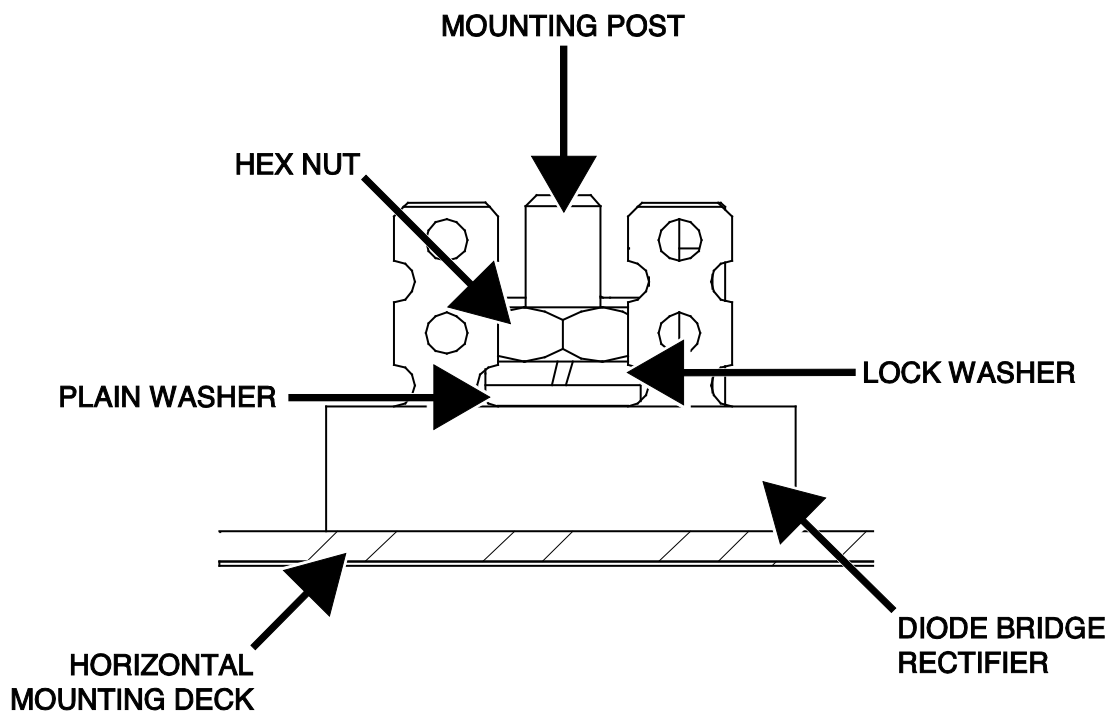
1. Clean the mating surface on the horizontal mounting deck before installing the new D1 rectifier.
2. Apply a coating of Dow Corning 340 heat sink compound (Lincoln part #T12837) to the rear of the new D1 rectifier.
3. Carefully position the new D1 rectifier onto the horizontal mounting deck.
4. Using a 3/8" deep well nutdriver, attach the nut, lock washer and washer securing the D1 rectifier to the horizontal mounting deck.
5. Connect leads X1A, X2, both POS leads and both NEG leads to the D1 rectifier terminals. See Wiring Diagram.
6. Perform the *Case Cover Replacement Procedure*.
7. Perform the *Retest After Repair Procedure*.

Figure F.65 - D1 rectifier lead locations



D1 RECTIFIER

Figure F.66 - D1 rectifier mounting hardware locations



THERMOSTAT #1 REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of Thermostat #1.

MATERIALS NEEDED

Small Phillips Screwdriver
Penetrox Heat Sink Compound (Lincoln Part #T12837-1)
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Label and disconnect lead #224 and #225 from thermostat #1. See *Figure F.67*. See Wiring Diagram.
5. Using a small Phillips screwdriver, remove the two screws securing thermostat #1 from the output rectifier assembly. See *Figure F.68*.
6. Thermostat #1 can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Clean the mating surface of the output rectifier assembly.
2. Apply a coating of Penetrox heat sink compound (Lincoln part #T12837-1) to the rear of thermostat #1.
3. Carefully position the new thermostat #1 onto the output rectifier assembly.
4. Using a small Phillips screwdriver, attach the two screws securing thermostat #1 to the output rectifier assembly.
5. Connect leads #224 and #225 to thermostat #1 terminals. See Wiring Diagram.
6. Perform the *Case Cover Replacement Procedure*.
7. Perform the *Retest After Repair Procedure*.

Figure F.67 - Thermostat #1 lead locations

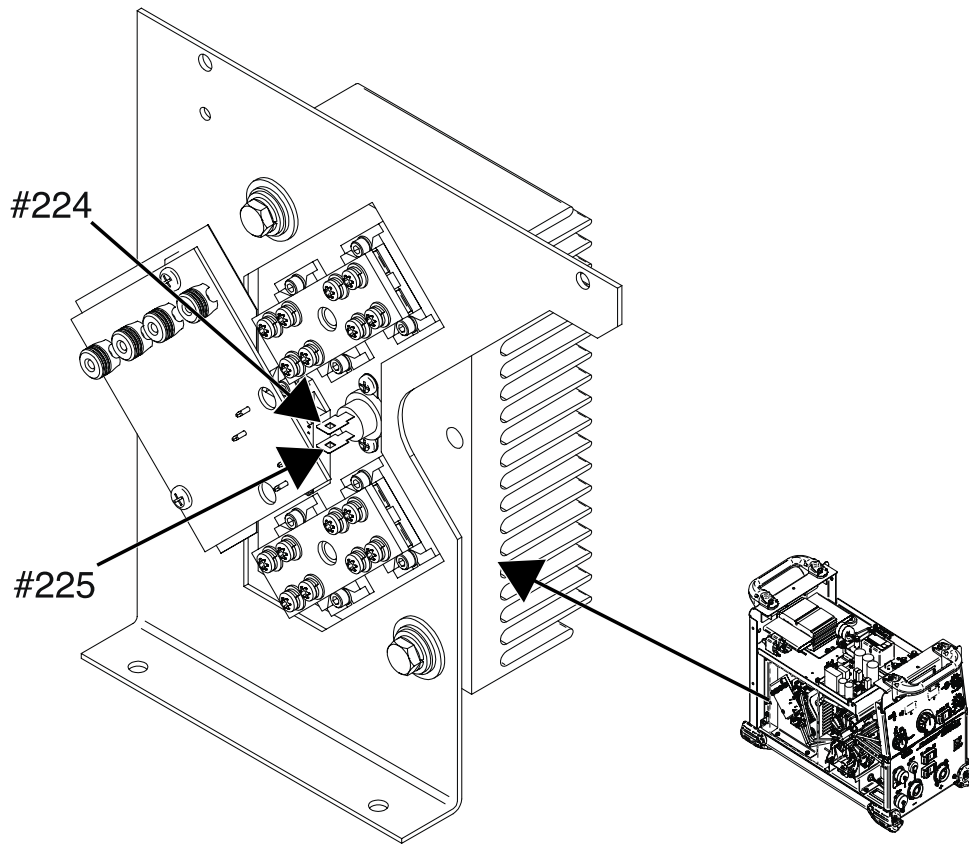
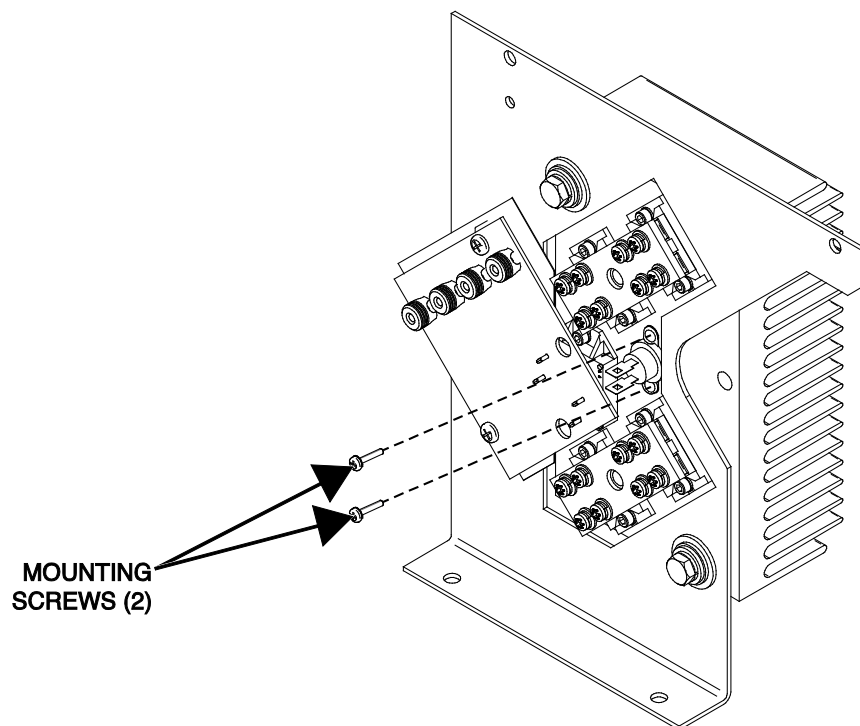


Figure F.68 - Thermostat #1 mounting screw locations



OUTPUT RECTIFIER MODULE REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Output Rectifier Module.

NOTE: The diode modules **MUST** be replaced as matched pairs.

MATERIALS NEEDED

Torx Nutdriver (Size T20)

7/64" Allen Wrench

Penetrox Heat Sink Compound (Lincoln Part #T12837-1)

Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Using a Torx nutdriver (size T20), remove the eight screws and washers securing the bus bars to the diode modules. See *Figure F.69*.
5. Using a 7/64" Allen wrench, remove the four screws and washers securing the two diode modules to the heat sink. See *Figure F.69*.
6. The two diode modules can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Clean all mating surfaces and apply a coating of Penetrox Heat Sink Compound (Lincoln Part #T12837-1).
2. Carefully position the two diode modules onto the heat sink.
3. Using a 7/64" Allen wrench, attach the four screws and washers securing the new matching diode pair to the heat sink. Torque the screws to 11-13 in/lbs.
4. Using a Torx nutdriver (size T20), attach the eight screws and washers securing the bus bars to the diode modules. Hand tighten screws first then torque to 9-11 in/lbs. in the sequence shown in *Figure F.70*.
5. Perform the *Case Cover Replacement Procedure*.
6. Perform the *Retest After Repair Procedure*.

Figure F.69 - Output rectifier mounting hardware locations

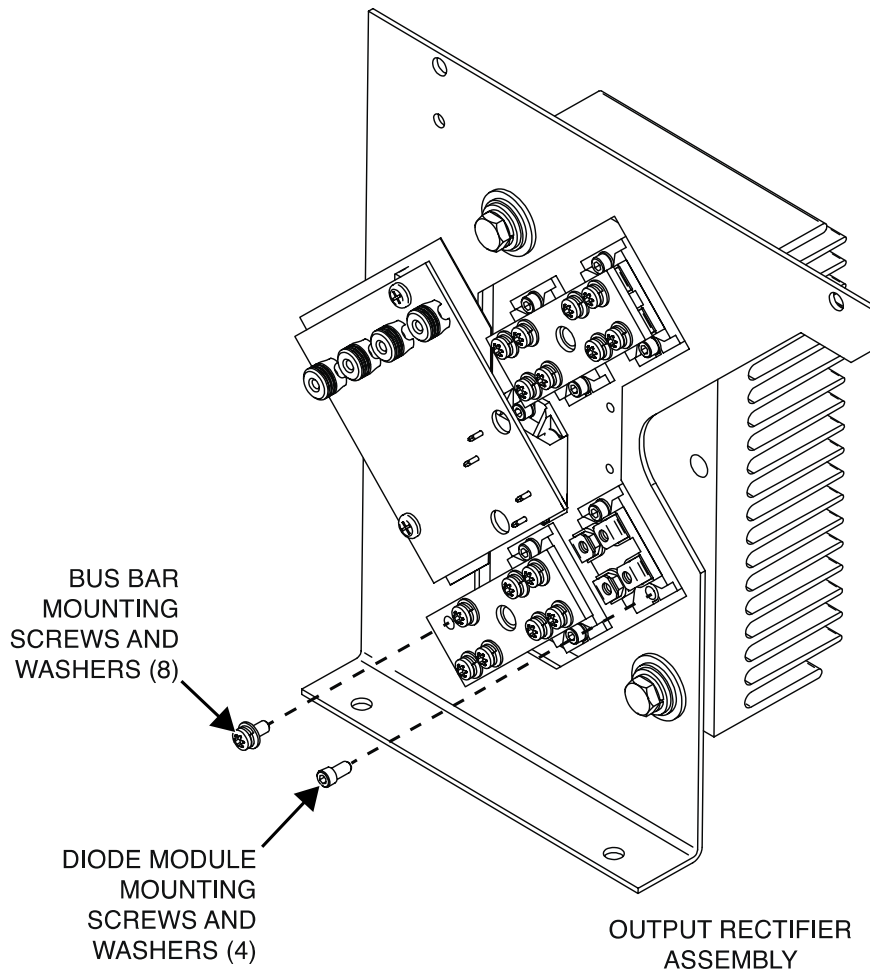
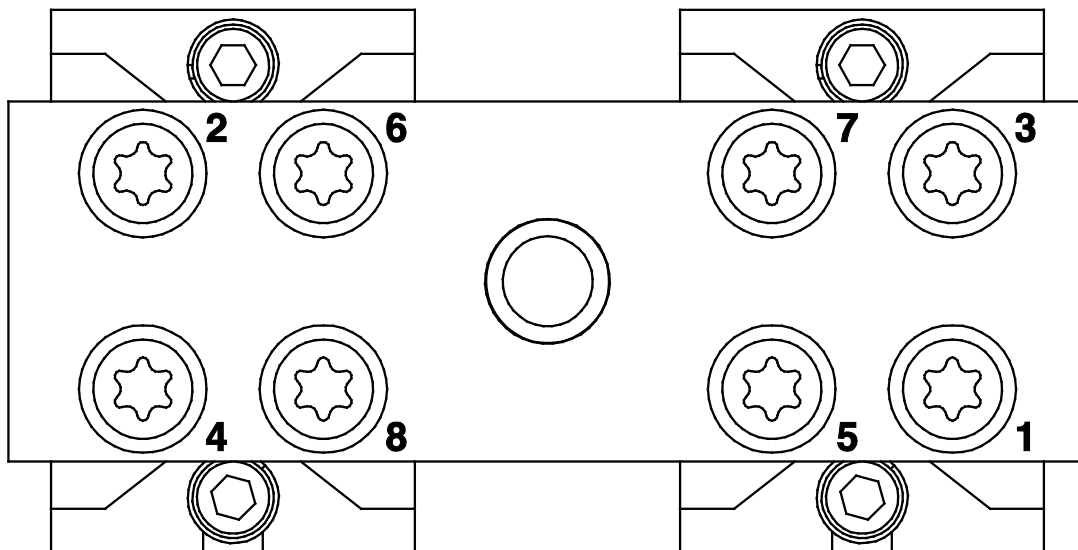


Figure F.70 - Diode module mounting screw tightening sequence



BOOST BOARD REMOVAL AND REPLACEMENT PROCEDURE

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

MATERIALS NEEDED

Torx Nutdriver (Size T20)
Phillips Screwdriver
7/64" Allen Wrench
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Using a Torx nutdriver (size T20), label and disconnect the leads from the terminals marked AC, negative, AC and positive on the boost board. See *Figure F.71*. See Wiring Diagram.
5. Using a Phillips screwdriver, remove the two boost board mounting screws. See *Figure F.72*.
6. Using a 7/64" Allen wrench, remove the two screws and washers securing the boost diode module to the heat sink. See *Figure F.72*.
7. Carefully remove the boost board from the machine, taking note of placement of insulation.

REPLACEMENT PROCEDURE

1. Clean all mating surfaces and apply a coating of Penetrox heat sink compound (Lincoln part #T12837-1).
2. Carefully position the new boost board and insulation into the machine.
3. Using a 7/64" Allen wrench, attach the two screws and washers securing the boost diode module to the heat sink. Torque to 11-13 in/lbs.
4. Using a Phillips screwdriver, attach the two boost board mounting screws. Torque to 9-10 in/lbs.
5. Using a Torx nutdriver (size T20), attach the previously disconnected leads to the terminals marked AC, negative, AC and positive on the boost board. See Wiring Diagram. Torque to 11-13 in/lbs.
6. Perform the *Case Cover Replacement Procedure*.
7. Perform the *Retest After Repair Procedure*.

Figure F.71 - Boost board terminal locations

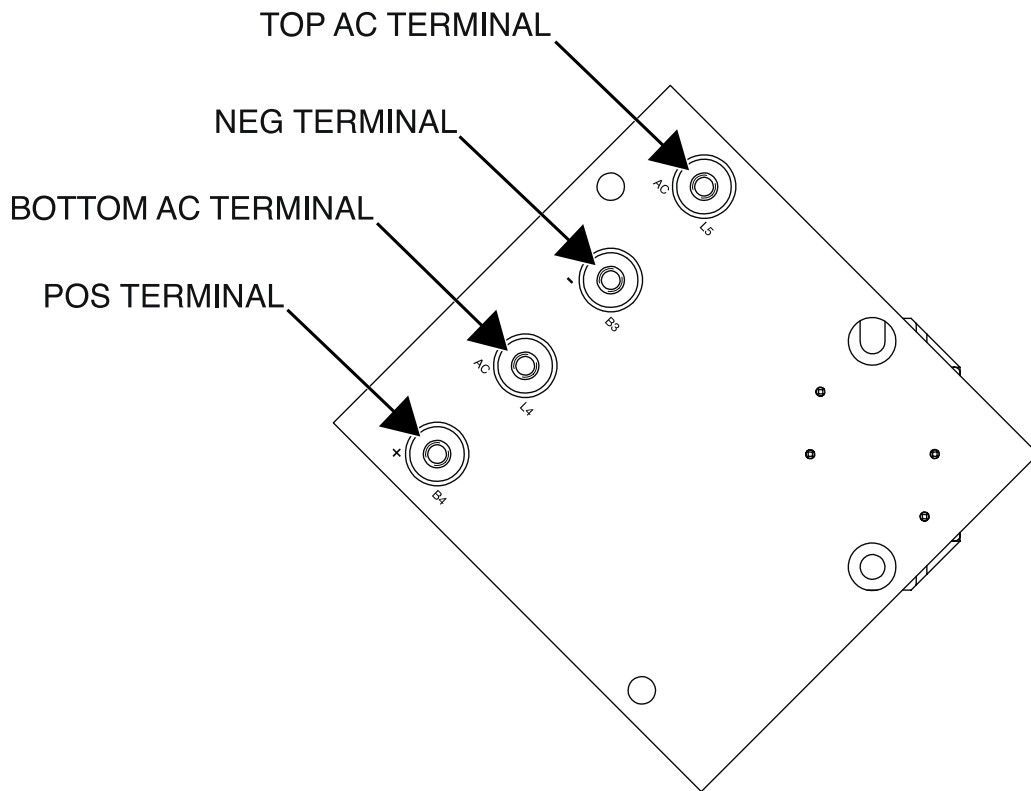
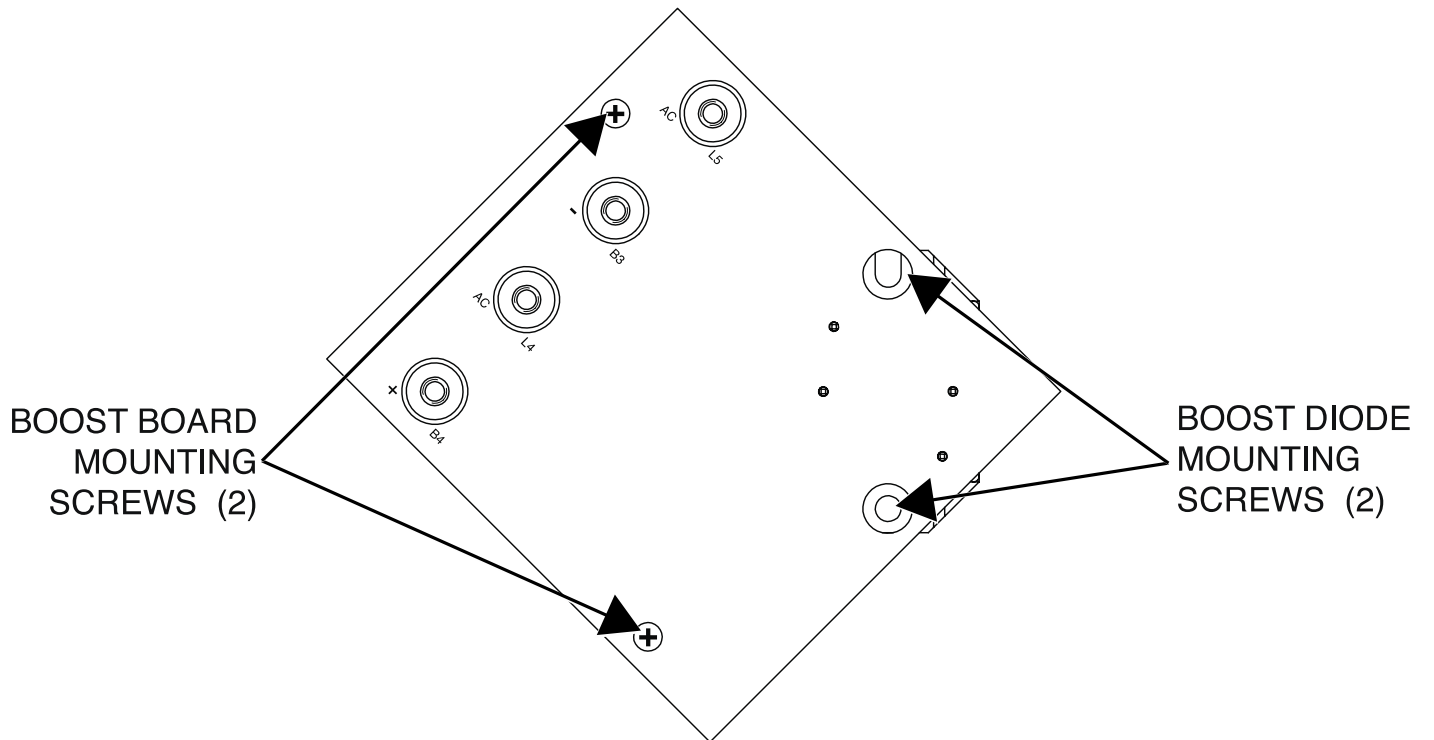


Figure F.72 - Boost board mounting screw locations



INPUT BOARD REMOVAL AND REPLACEMENT PROCEDURE

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

MATERIALS NEEDED

3/8" Nutdriver
7/16" Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Using a 7/16" nutdriver, label and disconnect leads L1A, L2A, L3A, L1 and L3 from terminals A, B and C of the input board. See *Figure F.73*. See Wiring Diagram.
5. Using a 7/16" nutdriver, label and disconnect leads B1 and B2 from terminals B1 and B2 on the input board. See *Figure F.73*. See Wiring Diagram.
6. Label and disconnect plugs J40 and J41 from the input board. See *Figure F.73*. See Wiring Diagram.
7. Using a 3/8" nutdriver, remove the four nuts securing the input board to the mounting studs. See *Figure F.74*.
8. The input board can now be removed and replaced. Note that the heat sink is attached to the bottom of the input board.

REPLACEMENT PROCEDURE

1. Carefully position the new heat sink and new input board into the machine.
2. Using a 3/8" nutdriver, attach the four nuts securing the input board to the mounting studs. Torque to 9-11 in/lbs.
3. Connect plugs J40 and J41 to the input board. See Wiring Diagram.
4. Using a 7/16" nutdriver, connect leads B1 and B2 to terminals B1 and B2 on the input board. See Wiring Diagram.
5. Using a 7/16" nutdriver, connect leads L1A, L2A, L3A, L1 and L3 to terminals A, B and C of the input board. See Wiring Diagram.
6. Perform the *Case Cover Replacement Procedure*.
7. Perform the *Retest After Repair Procedure*.

Figure F.73 - Input board lead locations

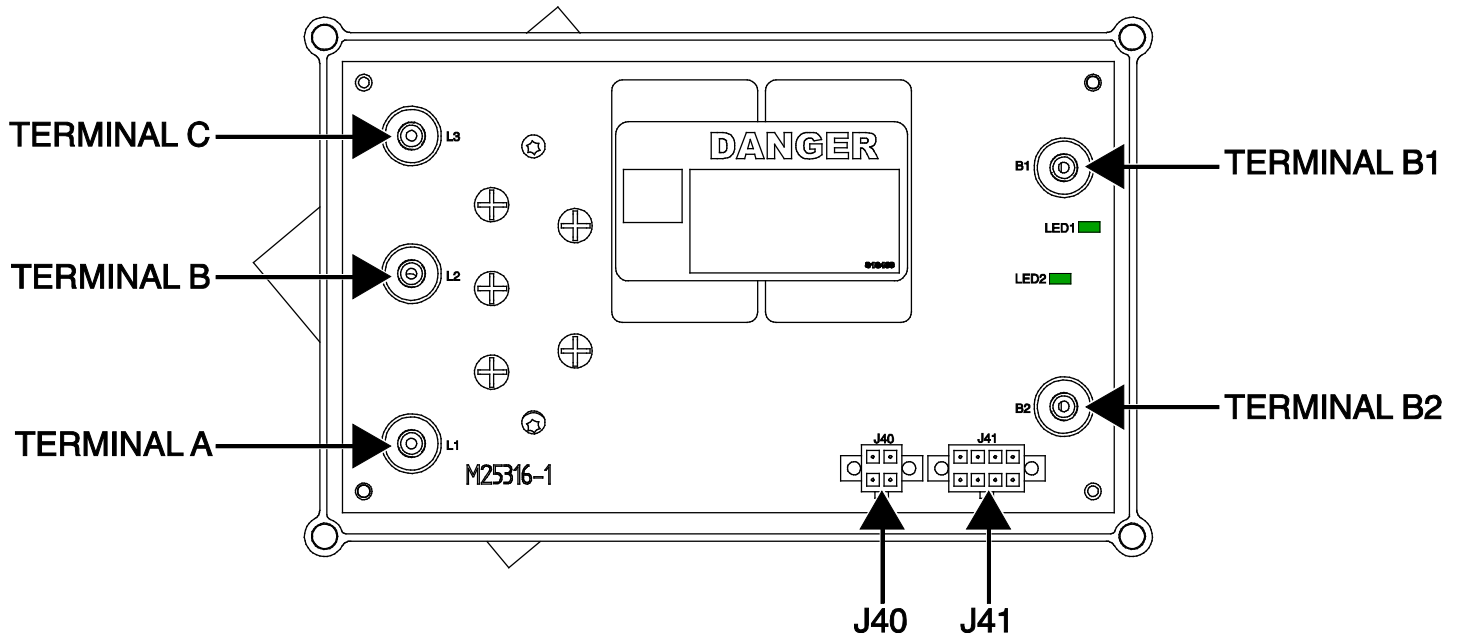
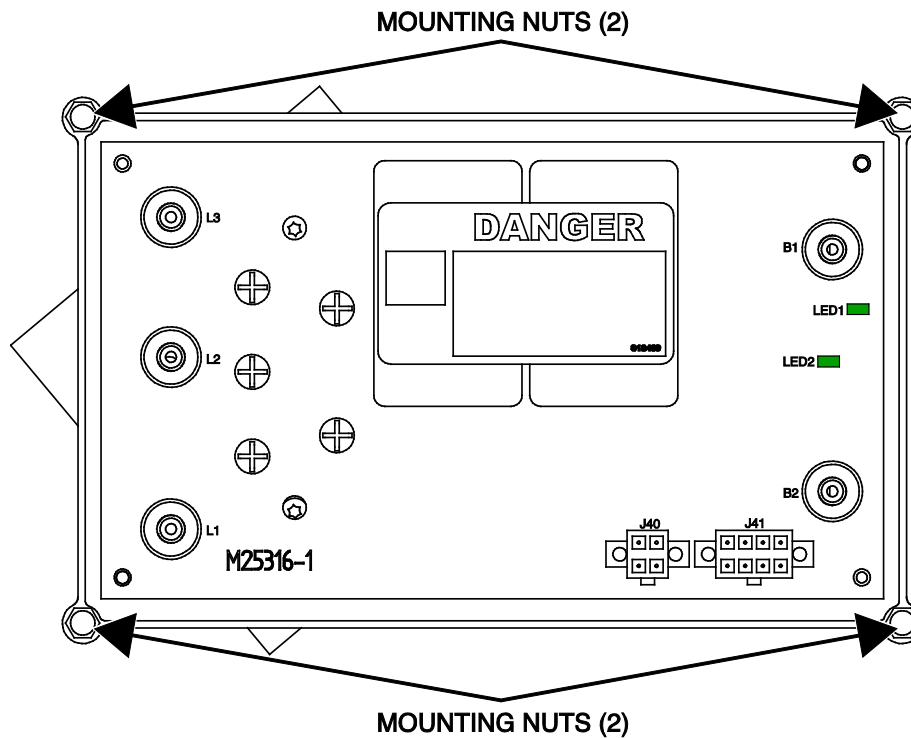


Figure F.74 - Input board mounting screw locations



MAIN TRANSFORMER REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Main Transformer.

MATERIALS NEEDED

3/8" Nutdriver
5/16" Nutdriver
7/16" Nutdriver
Torx Nutdriver (Size T20)
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Using a 7/16" nutdriver, label and disconnect leads X11 and X12 from the output rectifier assembly. Take note of washers and lead placement and the "donut" shaped chokes on the leads (two chokes on each lead). See *Figure F.75*. See Wiring Diagram.
5. Using the 7/16" nutdriver, label and disconnect the four transformer secondary leads attached to the negative output terminal copper bus bar. Take note of the negative boost rectifier lead and the #221 voltage sensing leads. Also take note of the washers and the "donut" shaped chokes on the leads (one choke on each lead). See *Figure F.76*. See Wiring Diagram.
6. Label and disconnect leads 10A and 10B from the boost relay. Cut any necessary cable ties. See *Figure F.77*. See Wiring Diagram.
7. Using a Torx nutdriver (size T20), label and disconnect the boost winding lead from the AC terminal (L5) on the boost board. See *Figure F.78*. See Wiring Diagram.
8. Using a 5/16" nutdriver, remove the four screws securing the main transformer to the machine base. See *Figure F.79*.
9. Clear all leads and carefully move the transformer part way out and towards the rear of the machine. This will give access to the two primary transformer leads connected to the two series capacitors.
10. Using a 3/8" nutdriver, label and disconnect the primary leads from the series capacitors. See Wiring Diagram.
11. The main transformer can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new main transformer into the machine.
2. Using a 3/8" nutdriver, attach the two primary leads to the series capacitors. See Wiring Diagram.
3. Using a 5/16" nutdriver, attach the four screws securing the main transformer to the machine base.
4. Using a Torx nutdriver (size T20), connect the boost winding lead to the AC terminal (L5) on the boost board. See Wiring Diagram.
5. Connect leads 10A and 10B to the boost relay. Replace any previously removed cable ties. See Wiring Diagram.
6. Using the 7/16" nutdriver, connect the four transformer secondary leads, the negative boost rectifier lead and the #221 voltage sensing lead to the negative output terminal copper bus bar. See Wiring Diagram.
7. Using a 7/16" nutdriver, connect leads X11 and X12 to the output rectifier assembly. See Wiring Diagram.
8. Perform the *Case Cover Replacement Procedure*.
9. Perform the *Retest After Repair Procedure*.

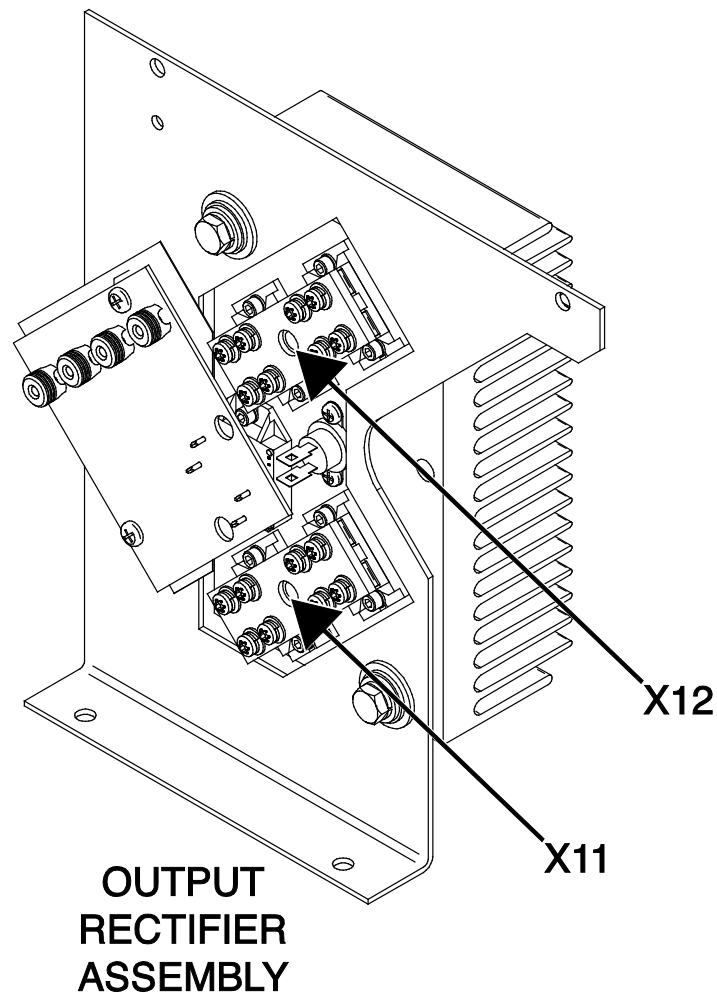
Figure F.75 - Leads X11 and X12 connection points

Figure F.76 - Negative output terminal copper bus bar location

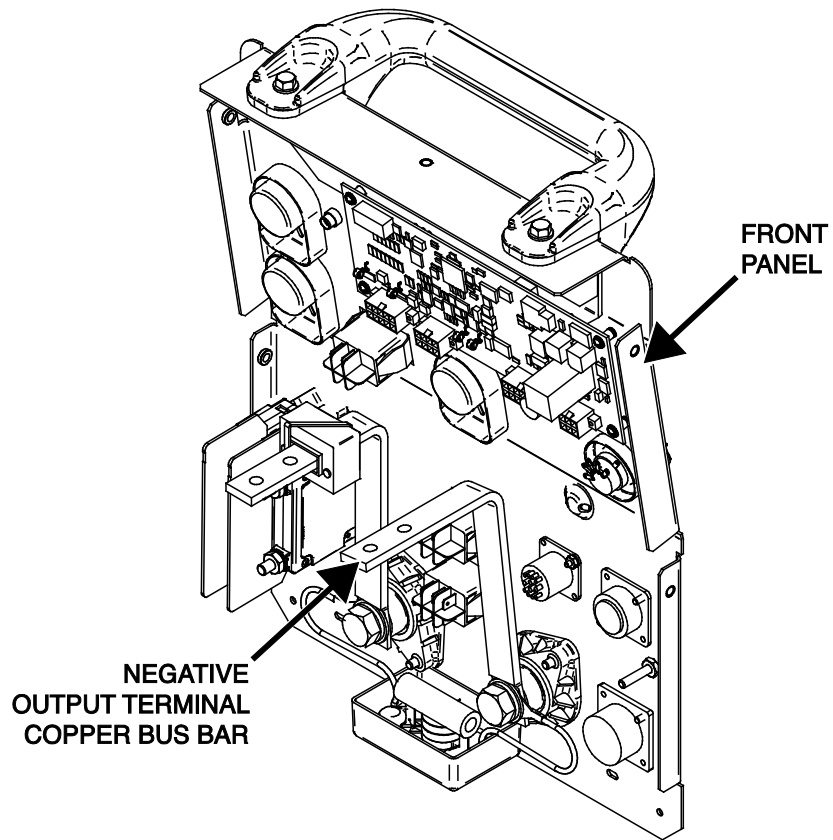


Figure F.77 - Boost relay lead locations

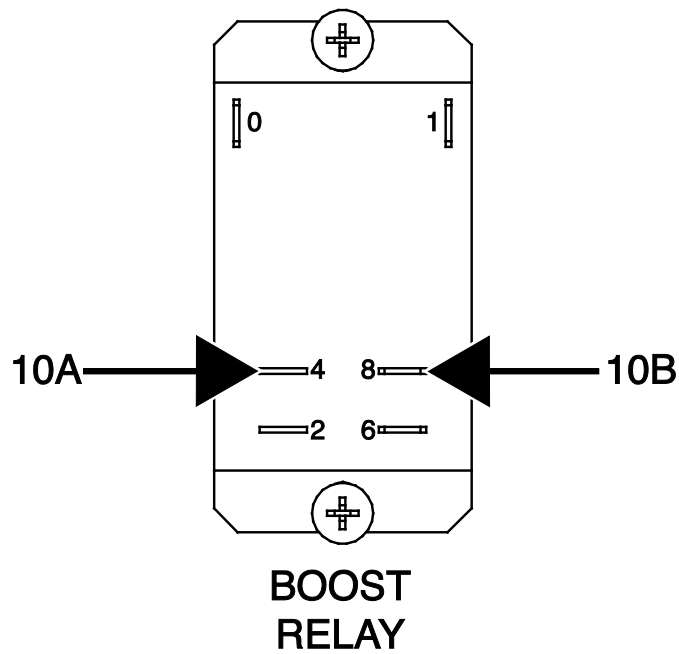


Figure F.78 - Boost board AC terminal location

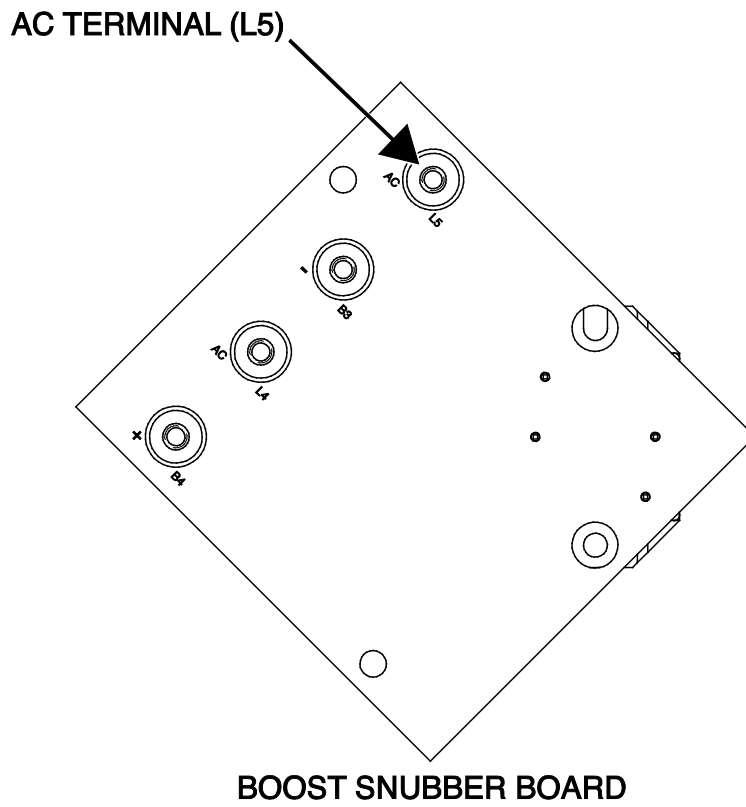
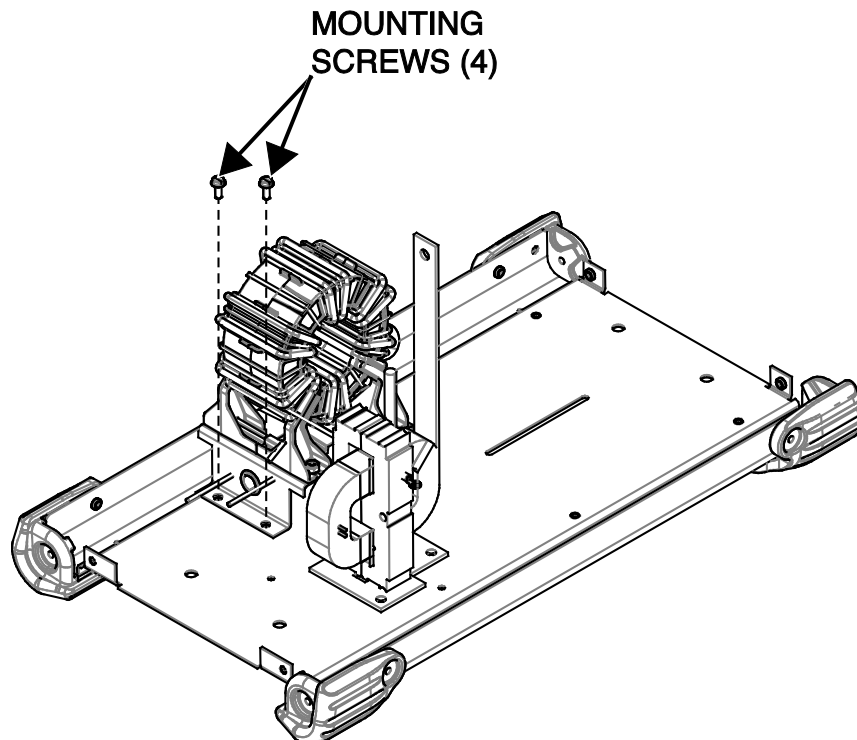


Figure F.79 - Main transformer mounting screw locations



CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

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

MATERIALS NEEDED

3/8" Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Label and disconnect plugs J3, J4, J5, J6, J9, J10, J11, J12, J13, J14 and J15. See *Figure F.80*. See Wiring Diagram.
5. Using a 3/8" nutdriver, remove the four nuts securing the control board to the mounting studs. See *Figure F.81*.
NOTE: Label the green ground lead connected to the lower left mounting stud for reassembly.
6. Clear all plugs and leads to allow for the removal of the control board.
7. The control board (with daughter board) can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new control board assembly onto the four mounting studs.
NOTE: Make sure to attach the green ground lead to the lower left mounting stud.
2. Using a 3/8" nutdriver, attach the four nuts securing the control board to the mounting studs.
3. Connect plugs J3, J4, J5, J6, J9, J10, J11, J12, J13, J14 and J15 to the control board. See Wiring Diagram.
4. Perform the *Case Cover Replacement Procedure*.
5. Perform the *Retest After Repair Procedure*.

Figure F.80 - Control board plug locations

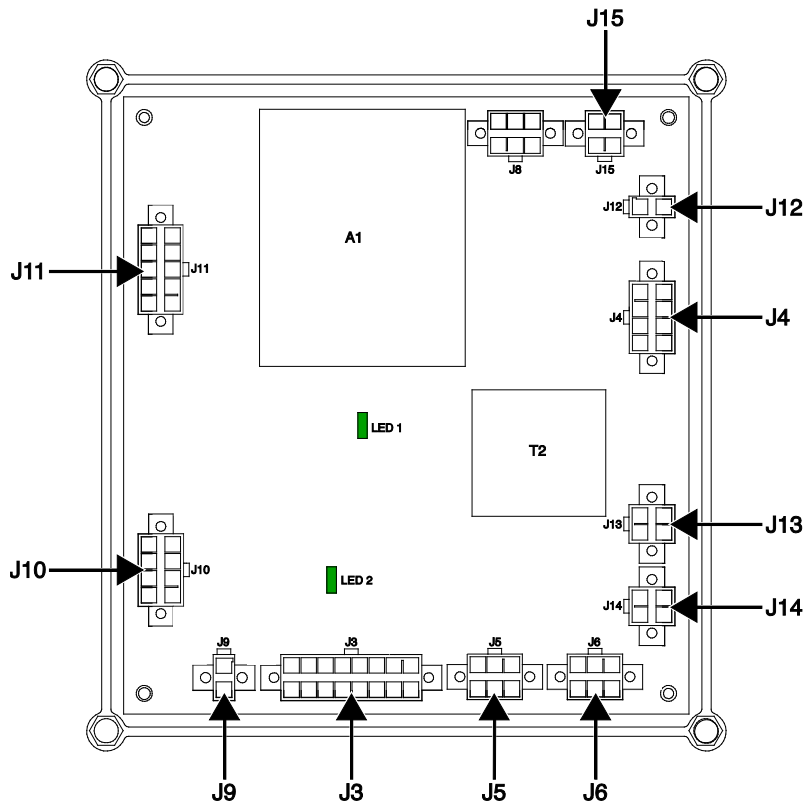
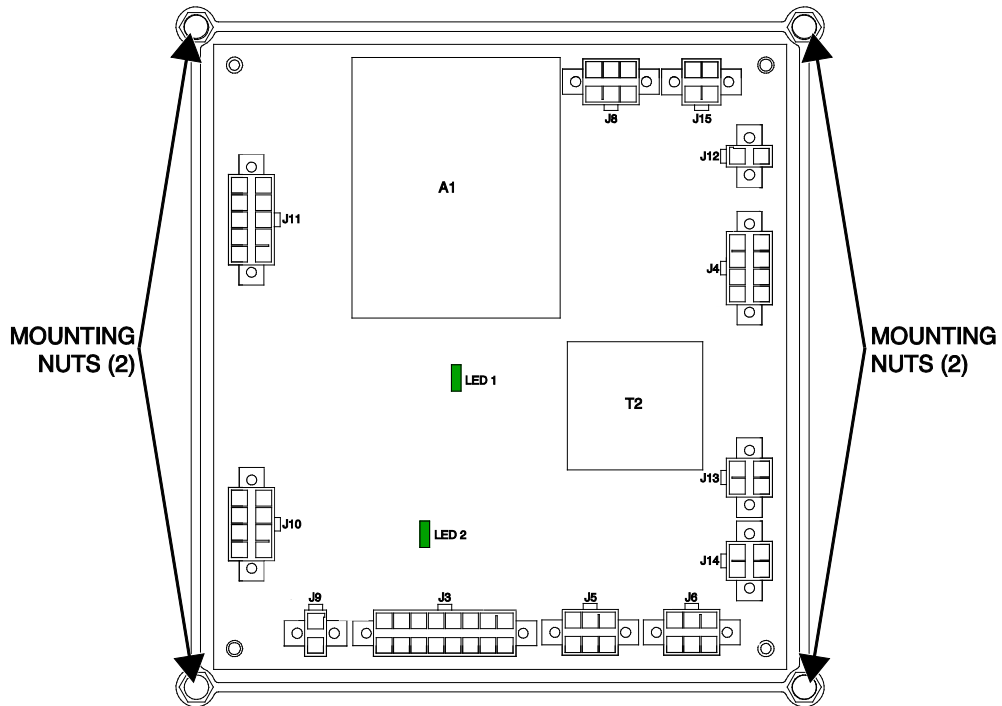


Figure F.81 - Control board mounting nut locations



SWITCHBOARD REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the Switchboard Assembly.

MATERIALS NEEDED

7/16" Nutdriver
5/16" Nutdriver
3/8" Nutdriver
Cable Ties
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Label and disconnect plugs J15, J4, J12, J13, J14 and J11 from the control board. See *Figure F.82*. See Wiring Diagram.
5. Using a 5/16" nutdriver, remove the four screws securing the control board / switchboard assembly to the machine's base and horizontal deck. See *Figure F.83*.
6. Using a 7/16" nutdriver, label and disconnect lead B2 from the input board terminal. See *Figure F.84*. Cut cable ties as necessary.
7. Carefully slide the top of the control board / switchboard assembly away from the horizontal deck to gain access to the switchboard terminal B1 and two series capacitor connections. See Wiring Diagram.
8. Using a 7/16" nutdriver, label and disconnect lead B1 from the switchboard terminal. See *Figure F.85*. See Wiring Diagram.
9. Using a 7/16" nutdriver, label and disconnect lead B2 from the switchboard terminal and set aside for reassembly. See *Figure F.85*. See Wiring Diagram.
10. Using a 3/8" nutdriver, label and disconnect the two main transformer primary leads from the series capacitor terminals. See *Figure F.85*.
11. Label and disconnect plugs J42 and J43 from the switchboard. See *Figure F.85*. See Wiring Diagram.
12. Using a 3/8" and 7/16" nutdrivers, remove the two copper bus jumpers connecting the switchboard to the series capacitors.

13. Using a 3/8" nutdriver, remove the four nuts securing the switchboard to the mounting studs. See **Figure F.86**.
14. The switchboard can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new switchboard onto it's mounting studs.
2. Using a 3/8" nutdriver, attach the four nuts securing the switchboard to the mounting studs.
3. Using a 3/8" and 7/16" nutdrivers, attach the two copper bus jumpers connecting the switchboard to the series capacitors.
4. Connect plugs J42 and J43 to the switchboard. See Wiring Diagram.
5. Connect the two main transformer primary leads to the series capacitor terminals.
6. Using a 7/16" nutdriver, connect the previously removed lead B2 to the switchboard. See Wiring Diagram.
7. Using a 7/16" nutdriver, connect lead B1 to the switchboard terminal. See Wiring Diagram.
8. Carefully slide the control board / switchboard assembly into position.
9. Using a 7/16" nutdriver, connect lead B2 to the input board terminal. See Wiring Diagram. Replace any cable ties as necessary.
10. Using a 5/16" nutdriver, attach the four screws securing the control board / switchboard assembly to the machine's base and horizontal deck.
11. Connect plugs J15, J4, J12, J13, J14 and J11 to the control board. See Wiring Diagram. Replace any cable ties as necessary.
12. Perform the **Case Cover Replacement Procedure**.
13. Perform the **Retest After Repair Procedure**.

Figure F.82 - Control board plug locations

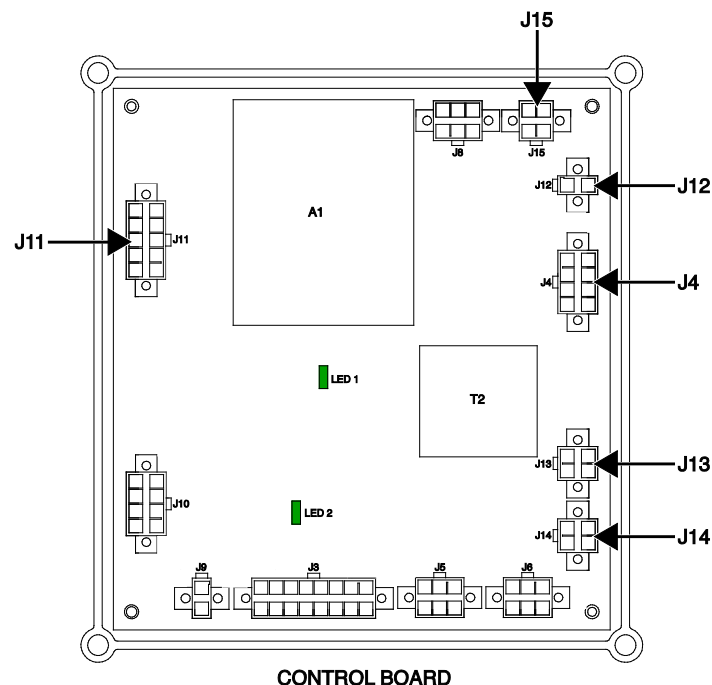


Figure F.83 - Base and deck mounting screw locations

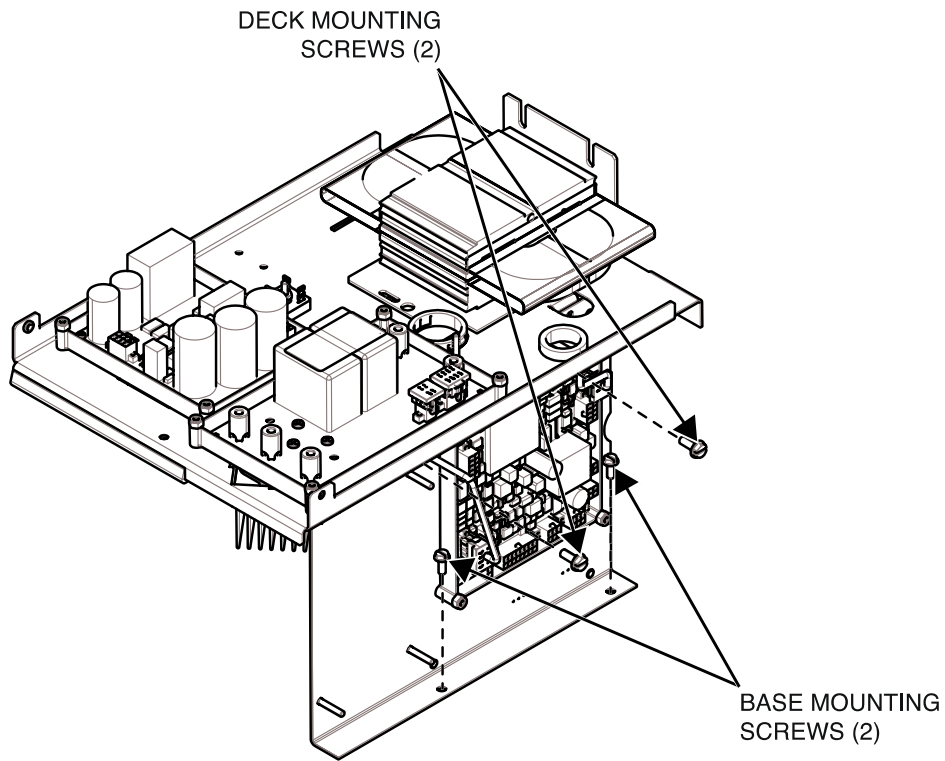


Figure F.84 - Input board terminal B2 location

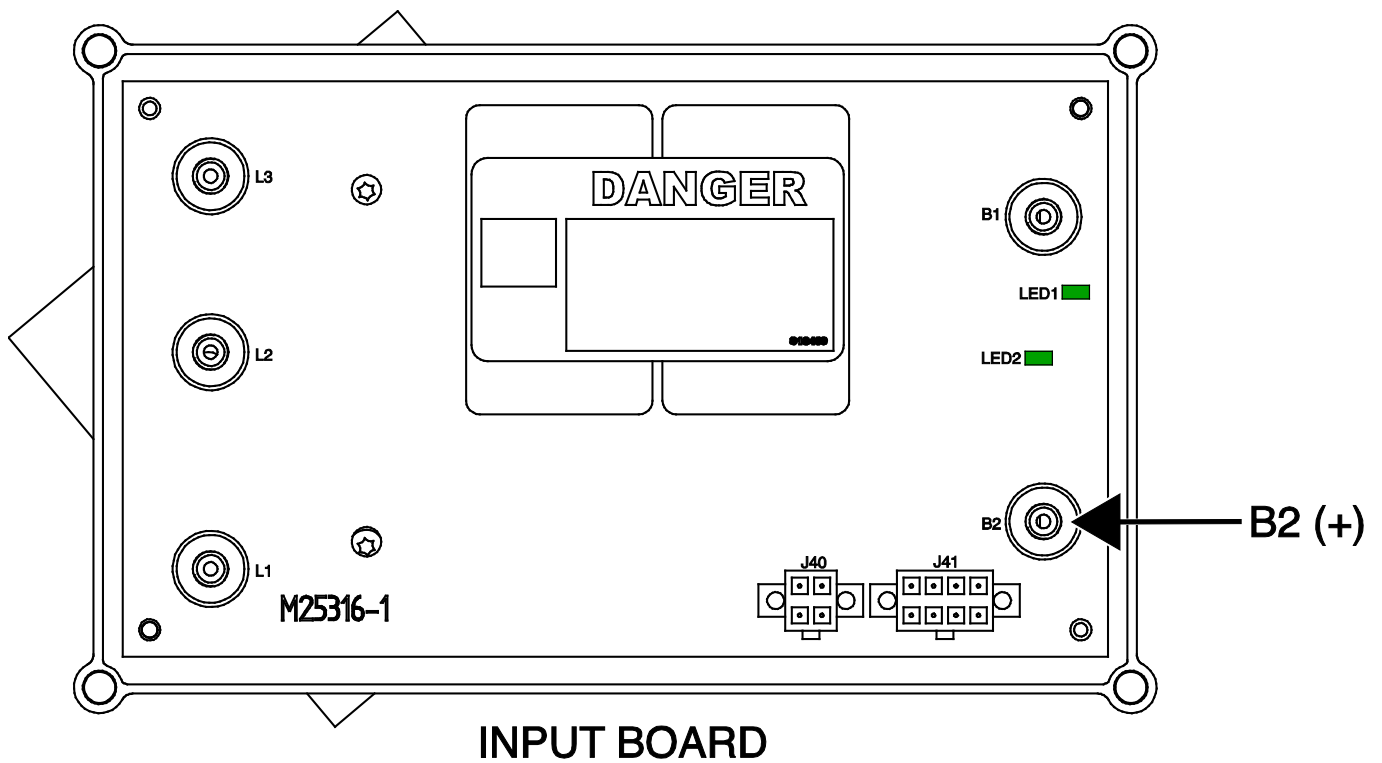


Figure F.85 - Switchboard plug and terminal locations

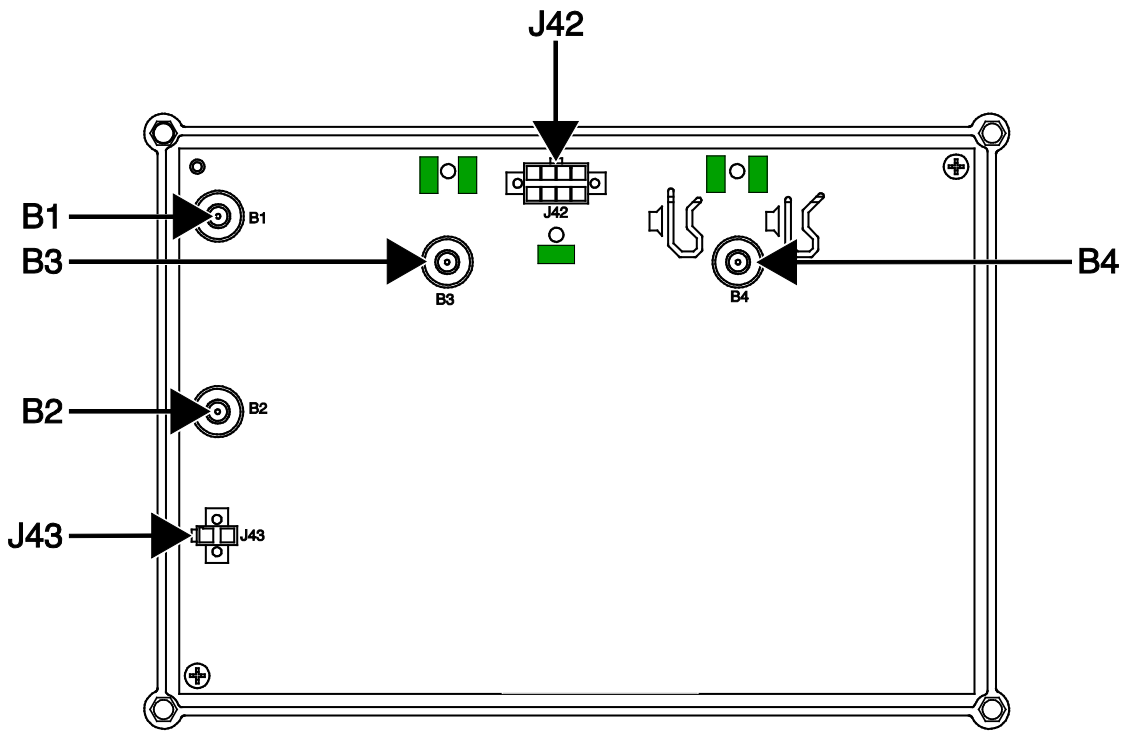
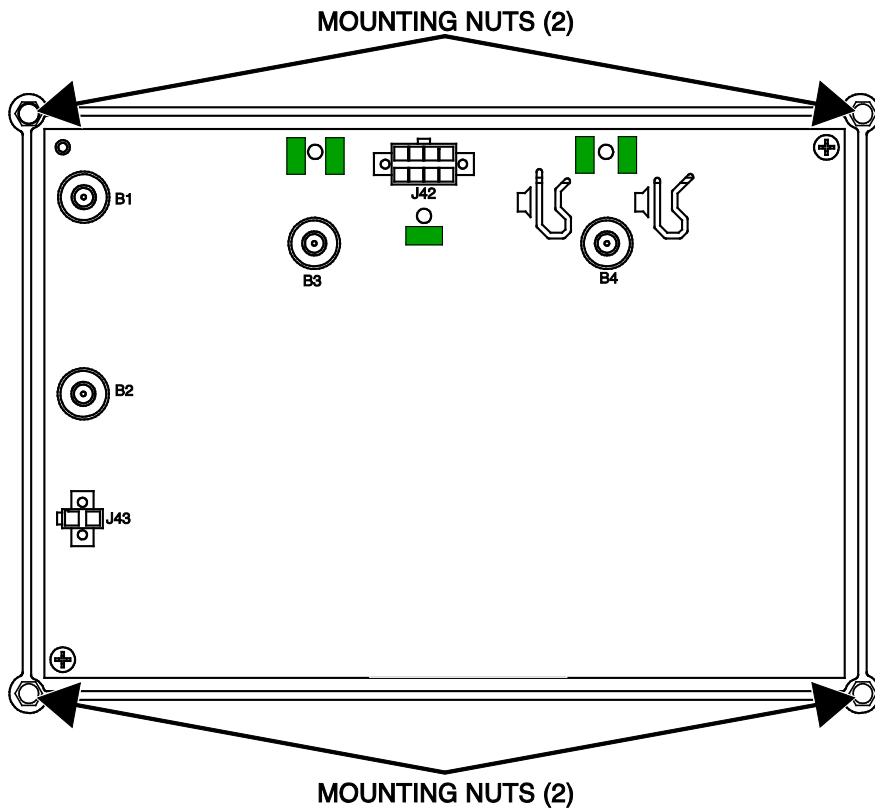


Figure F.86 - Switchboard mounting nut location



USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE

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 procedure will aid the technician in the removal and replacement of the User Interface Board.

MATERIALS NEEDED

Phillips Screwdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the Flextec 350X machine.
2. Perform the *Case Cover Removal Procedure*.
3. Perform the *Capacitor Discharge Procedure*.
4. Label and disconnect plugs J1, J2, J3 and J4 from the rear of the user interface board. See *Figure F.87*. See Wiring Diagram.
5. Using a Phillips screwdriver, remove the four screws securing the user interface board to the front panel. See *Figure F.88*.
6. The user interface board can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new user interface board into the machine.
2. Using a Phillips screwdriver, attach the four screws securing the user interface board to the front panel.
3. Connect plugs J1, J2, J3 and J4 to the rear of the user interface board. See Wiring Diagram.
4. Perform the *Case Cover Replacement Procedure*.
5. Perform the *Retest After Repair Procedure*.

Figure F.87 - User interface board plug locations

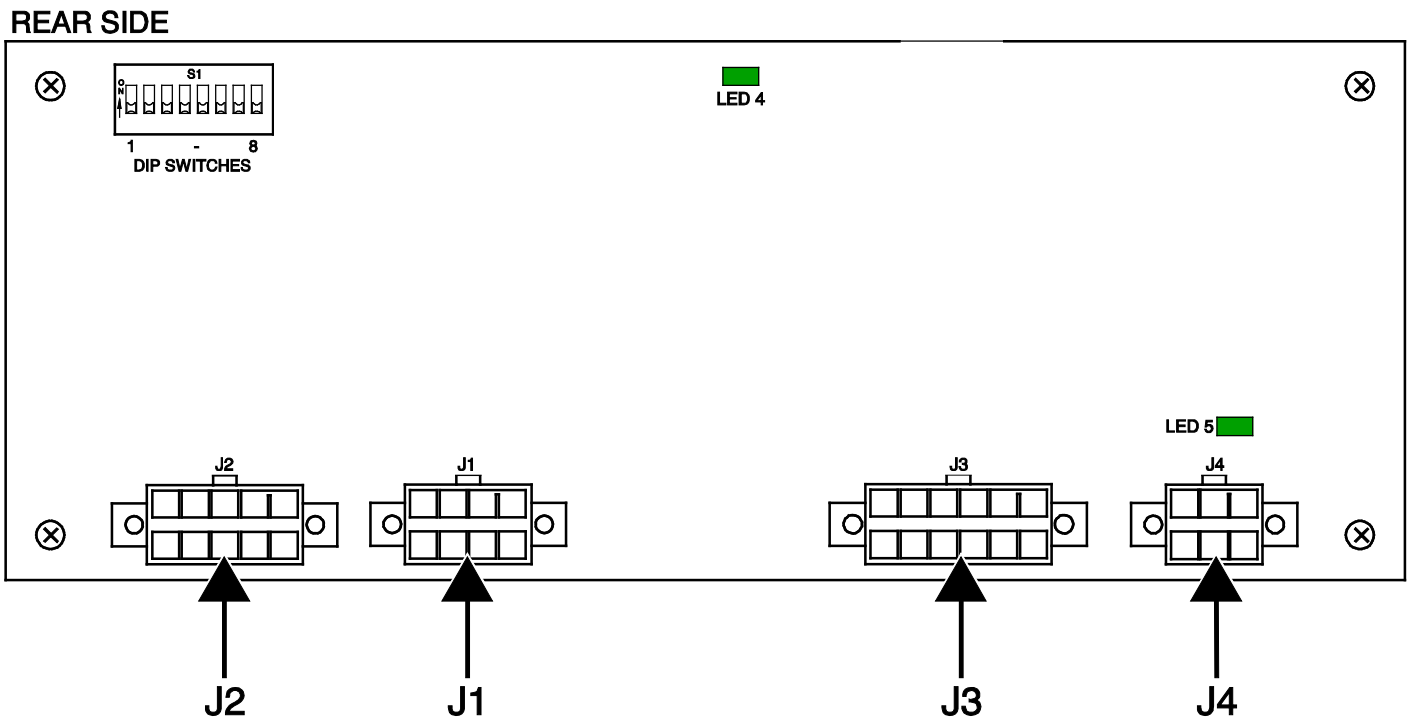
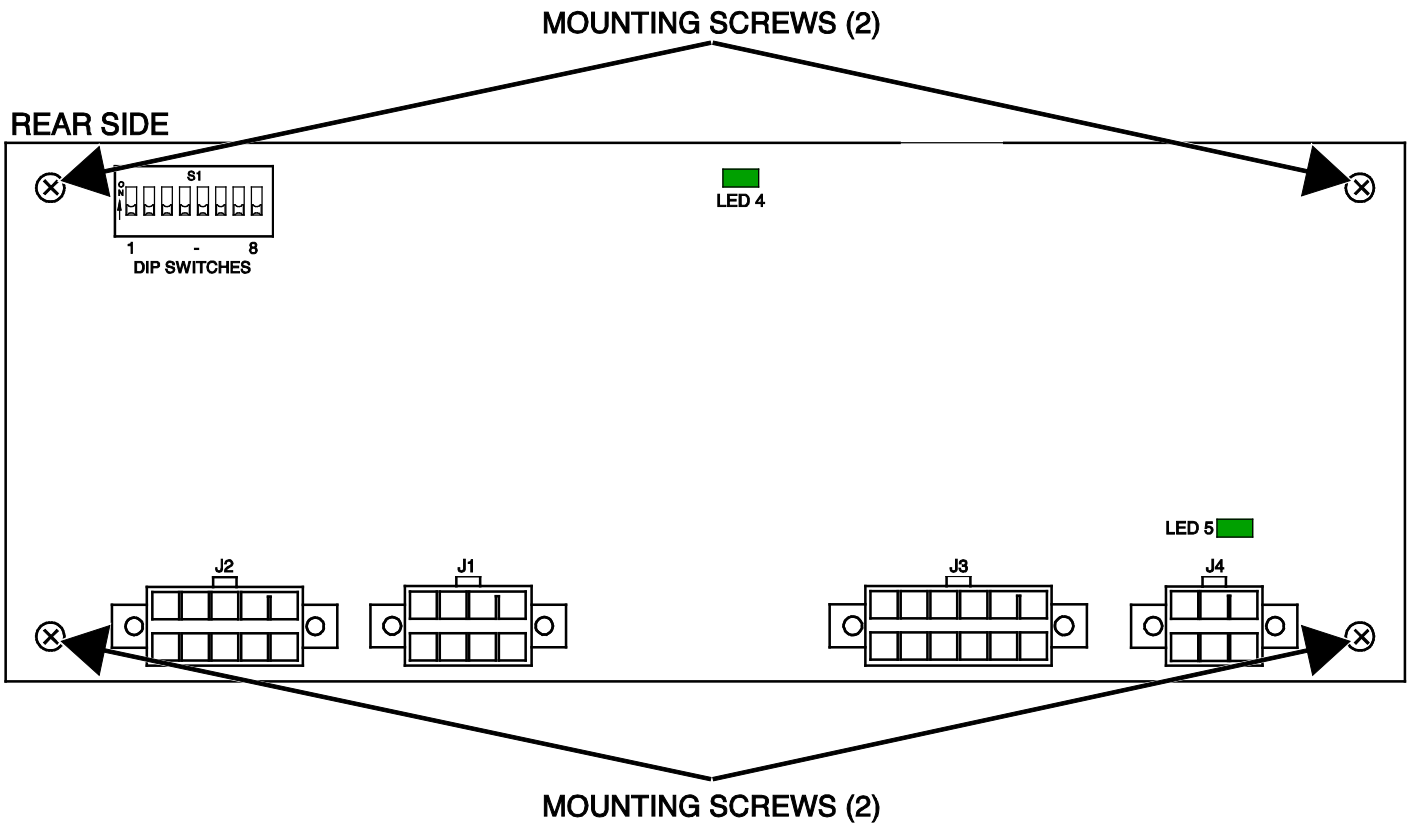


Figure F.88 - User interface board mounting screw location



RETEST AFTER REPAIR

Testing is required after the removal of any component that could affect the machine's electrical characteristics or if any electrical components are repaired or replaced.

VOLTAGES	IDLE WATTS	CONDITIONS
380 / 460 / 575 50 / 60 Hz 3 PHASE	70W	FAN OFF

MINIMUM ACCEPTABLE OUTPUTS		
PROCESS	VOLTS AT RATED AMPS	AMPERAGE
GMAW (CV)	31.5V	350 A
GTAW (CC)	24.0V	350 A
SMAW (CC)	34.0V	350 A
FCAW (CV)	31.5	350 A