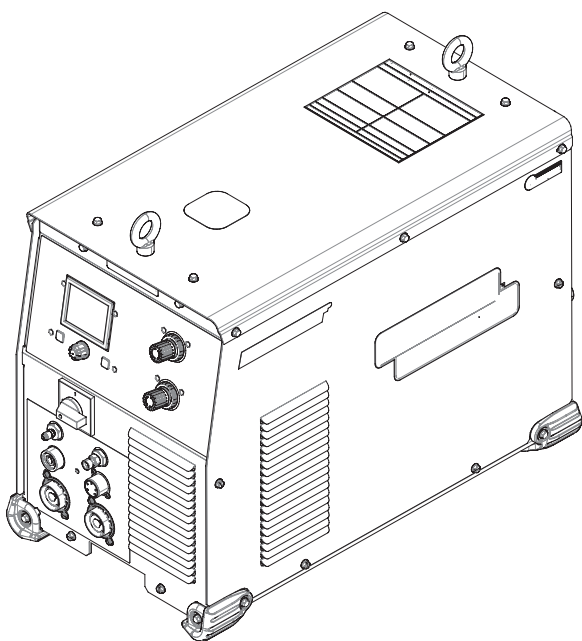


## ***FlexCut<sup>®</sup> 200***

For use with machines having Code Numbers:

**FlexCut<sup>®</sup> 200: 12731**

# ***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.

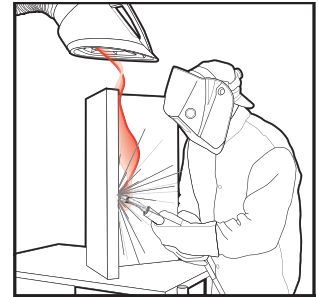
**READ** and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

**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

#### Diesel Engines

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

#### Gasoline Engines

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

**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.



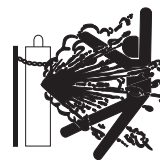
## WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



- 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 02269-9101.
- 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.**

# FlexCut® 200

## Service Manual

Last update: 2018/08/01

**FLEXCUT® 200..... 1**

**Service Manual..... 1**

**Block Diagram..... 3**

**Troubleshooting & Repair ..... 5**

**HOW TO USE TROUBLESHOOTING GUIDE ..... 5**

**PC BOARD TROUBLESHOOTING PROCEDURES ..... 6**

**Troubleshooting guide ..... 7**

**Error Codes ..... 10**

**Test Procedures ..... 15**

**CASE COVER REMOVAL AND REPLACEMENT PROCEDURE ..... 15**

**CAPACITOR DISCHARGE PROCEDURE ..... 17**

**INPUT RECTIFIER (D1) TEST PROCEDURE ..... 20**

**AUXILIARY TRANSFORMER (T2) TEST PROCEDURE ..... 22**

**FAN AND F.A.N. CIRCUIT TEST PROCEDURE..... 25**

**CHOKE TEST PROCEDURE..... 27**

**THERMOSTAT TEST PROCEDURE ..... 30**

**AUXILIARY RECTIFIER (D4) TEST PROCEDURE ..... 32**

**USER INTERFACE BOARD TEST PROCEDURE..... 34**

**SWITCH BOARD TEST PROCEDURE ..... 37**

**INPUT SWITCH TEST PROCEDURE..... 44**

**SOLENOID 1, 2 AND 3 TEST PROCEDURE..... 47**

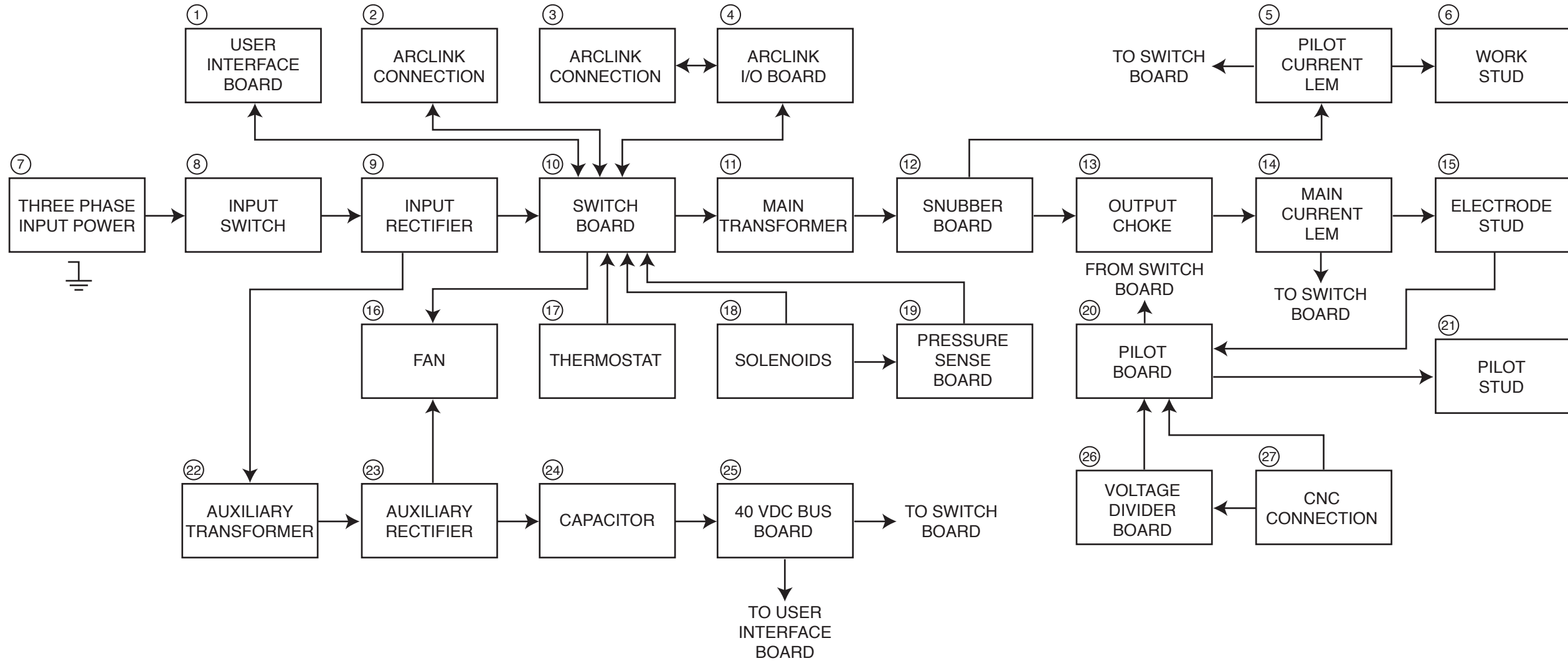
**POWER TRANSFORMER (T1) TEST PROCEDURE ..... 50**

**VOLTAGE DIVIDER BOARD TEST PROCEDURE ..... 53**

**SNUBBER BOARD TEST PROCEDURE..... 56**

<b>PILOT BOARD TEST PROCEDURE .....</b>	<b>59</b>
<b>MAIN CURRENT LEM TEST PROCEDURE.....</b>	<b>63</b>
<b>PILOT CURRENT LEM TEST PROCEDURE.....</b>	<b>66</b>
<b>ARCLINK I/O BOARD TEST PROCEDURE .....</b>	<b>69</b>
<b>PRESSURE SENSE BOARD TEST PROCEDURE .....</b>	<b>73</b>
<b>40 VDC BUS BOARD TEST PROCEDURE .....</b>	<b>76</b>
 <b>Removal And Replacement Procedures .....</b>	 <b>79</b>
 <b>INPUT RECTIFIER (D1) REMOVAL AND REPLACEMENT PROCEDURE .....</b>	 <b>79</b>
<b>AUXILIARY TRANSFORMER (T2) REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>81</b>
<b>FAN REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>85</b>
<b>CHOKE REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>88</b>
<b>THERMOSTAT REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>91</b>
<b>AUXILIARY RECTIFIER (D4) REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>93</b>
<b>USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>95</b>
<b>SWITCH BOARD REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>97</b>
<b>INPUT SWITCH REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>100</b>
<b>SOLENOID 1, 2 AND 3 REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>102</b>
<b>POWER TRANSFORMER (T1) REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>105</b>
<b>VOLTAGE DIVIDER BOARD REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>108</b>
<b>SNUBBER BOARD REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>110</b>
<b>PILOT BOARD REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>114</b>
<b>MAIN CURRENT LEM REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>116</b>
<b>PILOT CURRENT LEM REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>118</b>
<b>ARCLINK I/O BOARD REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>120</b>
<b>PRESSURE SENSE BOARD REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>122</b>
<b>40 VDC BUS BOARD REMOVAL AND REPLACEMENT PROCEDURE .....</b>	<b>124</b>
<b>ISOTOP IGBT REMOVAL AND REPLACEMENT PROCEDURE.....</b>	<b>126</b>
<b>RETEST AFTER REPAIR.....</b>	<b>128</b>

# FlexCut 200





1. **USER INTERFACE BOARD**  
Allows the user to select modes, adjust work point and display pressure via a digital display. Communicates directly to the switch board via CAN. Displays machine status and error codes to the user.
2. **ARCLINK CONNECTION**  
40 VDC Arclink communication to switch board.
3. **ARCLINK CONNECTION**  
Arclink communication for Arclink I/O board.
4. **ARCLINK I/O BOARD**  
Enables machine to communicate via ArcLink XT to Torchmate 5100 table.
5. **PILOT CURRENT LEM**  
Current transducer in work lead provides level detect for arc transfer.
6. **WORK STUD**  
Connects to material for cutting (positive polarity).
7. **THREE PHASE INPUT POWER**  
Current transducer.
8. **INPUT SWITCH**  
Applies line power to the machine.
9. **INPUT RECTIFIER**  
Converts 3 phase 50/60 Hz ac to full wave rectified DC.
10. **SWITCH BOARD**  
Converts rectified 50/60 Hz input to high frequency output of 20 kHz. Drives solenoids, fan and pilot board. Reads all external sensors such as pressure, current feedbacks, voltage feedbacks, thermostats and cap fault, etc.
11. **MAIN TRANSFORMER**  
Provides isolation from primary to secondary.
12. **SNUBBER BOARD**  
Converts 20 kHz AC transformer output to DC for cutting. Provides RC snubber for rectifier diodes.
13. **OUTPUT CHOKE**  
Provides arc stability (never saturates). Inductance reduces output ripple.
14. **MAIN CURRENT LEM**  
Current transducer in electrode lead provides feedback for power source regulation.
15. **ELECTRODE STUD**  
Connects to torch (negative polarity).
16. **FAN**  
Provides airflow through the machine. Airflow direction is front to back.
17. **THERMOSTAT**  
Normally closed thermal circuit. Contacts open at 185° F. Contacts close at 158° F.
18. **SOLENOIDS**  
There are three solenoids, one to energize the cutting gas, one to energize the shielding gas and a third to switch between cutting and marking pressure for the shielding gas.
19. **PRESSURE SENSE BOARD**  
Reads in the pressure value exiting the machine for plasma and shield pressures. Converts pressure to a voltage signal.
20. **PILOT BOARD**  
Initiates pilot. Provides isolated I/O for external interface.
21. **PILOT STUD**  
Connects to torch for pilot arc.
22. **AUXILIARY TRANSFORMER**  
Supplies isolated power to auxiliary circuits. 52 VAC and 115 VAC secondary output.
23. **AUXILIARY RECTIFIER**  
Rectifies AC voltage from the auxiliary transformer.
24. **CAPACITOR**  
Filters the rectified voltage from the auxiliary rectifier.
25. **40 VDC BUS BOARD**  
Provides a regulated 40 VDC supply for internal and external use. Provides power to switch board and user interface board.
26. **VOLTAGE DIVIDER BOARD**  
Provides non-isolated feedback of voltage potential between the torch and work connections to the CNC interface. Alternately provides a divided voltage at a lower level that can be accepted by external devices.
27. **CNC CONNECTION**  
Provides non-isolated plasma voltage for height control, can be raw or divided. Provides signal for motion to initialize. Provides input for trigger and procedure change.

# 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 Output 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.		<b>TROUBLESHOOTING GUIDE</b>
<b>PROBLEMS (SYMPTOMS)</b>	<b>POSSIBLE AREAS OF MISADJUSTMENT(S)</b>	<b>RECOMMENDED COURSE OF ACTION</b>
<b>FUNCTION PROBLEMS</b>		
Major physical or electrical damage is evident when the sheet metal covers are removed.	1. Contact your local authorized Lincoln Electric Service Facility.	1. Contact the Lincoln Electric Service Department at 1-888-935-3877.
The main circuit breaker trips when power is applied to the machine.	1. Verify that the input circuit breakers are correct for the input voltage being applied.	1. Perform the <b><i>Input Rectifier (D1) Test Procedure.</i></b> 2. Perform the <b><i>Input Switch Test Procedure.</i></b> 3. Perform the <b><i>Switch Board Test Procedure.</i></b>
No display after the power switch is turned on.	1. Check to make sure the correct three phase input is being applied to the machine. 2. Check to make sure the machine's reconnect panel is configured correctly for the input voltage being applied. 3. Check the 7.5 amp fuse located in the reconnect panel. 4. Check the CB1 circuit breaker.	1. Perform the <b><i>Input Switch Test Procedure.</i></b> 2. Perform the <b><i>Auxiliary Transformer (T2) Test Procedure.</i></b> 3. Perform the <b><i>User Interface Board Test Procedure.</i></b> 4. Perform the <b><i>Auxiliary Rectifier (D4) Test Procedure.</i></b> 5. Perform the <b><i>40 VDC Bus Board Test Procedure.</i></b>
No communication between the Flexcut 200 and cooler.	1. Possible bad connection cable. 2. Possible bad Arclink I/O Board.	1. Check the connection cable and replace if necessary. 2. Perform the <b><i>ArcLink I/O Board Test Procedure.</i></b>
<div style="text-align: center;">  <b>CAUTION</b> </div> <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.		<b>TROUBLESHOOTING GUIDE</b>
<b>PROBLEMS (SYMPTOMS)</b>	<b>POSSIBLE AREAS OF MISADJUSTMENT(S)</b>	<b>RECOMMENDED COURSE OF ACTION</b>
<b>OUTPUT PROBLEMS</b>		
Thermal error 0036 is displayed.	<ol style="list-style-type: none"> <li>1. Check that the rear brickwork is not blocked.</li> <li>2. Make sure the fan rotates freely.</li> <li>3. Make sure the heat sink fins on the snubber board are not blocked.</li> <li>4. Make sure the cutting process is not exceeding the current limitations and duty cycle of the machine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the <b><i>Fan And F.A.N. Circuit Test Procedure.</i></b></li> <li>2. Perform the <b><i>Thermostat Test Procedure.</i></b></li> </ol>
The machine powers up properly but there is no response (air flow or pilot arc) when the output is triggered.	<ol style="list-style-type: none"> <li>1. Make sure the air pressure is set correctly.</li> <li>2. Check the torch consumables and look for kinks in the lines.</li> <li>3. Check for proper CNC trigger operation if applicable.</li> <li>4. The torch may be faulty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Press the purge button on the front of the machine. If air does not flow, perform the <b><i>Solenoid 1, 2 And 3 Test Procedure.</i></b></li> <li>2. Perform the <b><i>Snubber Board Test Procedure.</i></b></li> <li>3. Perform the <b><i>Switch Board Test Procedure.</i></b></li> <li>4. Perform the <b><i>Pilot Board Test Procedure.</i></b></li> <li>5. Perform the <b><i>Pressure Sense Board Test Procedure.</i></b></li> </ol>
When the output trigger is activated air begins to flow but there is a very brief pilot arc. The sequence is repeated with subsequent trigger pulls.	<ol style="list-style-type: none"> <li>1. Make sure the input voltage is correct.</li> <li>2. Make sure the air pressure is correct.</li> <li>3. Check the torch consumables.</li> <li>4. Make sure there are no kinks or restrictions in the torch cable.</li> <li>5. Make sure the work clamp is connected tightly to the work piece.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the <b><i>Snubber Board Test Procedure.</i></b></li> <li>2. Perform the <b><i>Switch Board Test Procedure.</i></b></li> <li>3. Perform the <b><i>User Interface Board Test Procedure.</i></b></li> <li>4. Perform the <b><i>Pilot Board Test Procedure.</i></b></li> <li>5. Perform the <b><i>Pilot Current LEM Test Procedure.</i></b></li> </ol>
<div style="text-align: center;"> <b>CAUTION</b></div> <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.		<b>TROUBLESHOOTING GUIDE</b>
<b>PROBLEMS (SYMPTOMS)</b>	<b>POSSIBLE AREAS OF MISADJUSTMENT(S)</b>	<b>RECOMMENDED COURSE OF ACTION</b>
<b>OUTPUT PROBLEMS</b>		
The cutting arc starts but sputters badly.	<ol style="list-style-type: none"> <li>1. Check the torch consumables.</li> <li>2. Make sure the work clamp is connected tightly to the work piece.</li> <li>3. Make sure the air pressure is correct.</li> <li>4. The torch may be faulty.</li> <li>5. Verify the correct input voltage is being applied to the machine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the <b><i>Choke Test Procedure.</i></b></li> <li>2. Perform the <b><i>Snubber Board Test Procedure.</i></b></li> <li>3. Perform the <b><i>Main Current LEM Test Procedure.</i></b></li> </ol>
The pilot arc starts but the arc will not transfer to the work piece to establish a cutting arc.	<ol style="list-style-type: none"> <li>1. Make sure the work clamp is connected tightly to the work piece.</li> <li>2. The work piece must be electrically conductive material.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the <b><i>Snubber Board Test Procedure.</i></b></li> <li>2. Perform the <b><i>Switch Board Test Procedure.</i></b></li> <li>3. Perform the <b><i>Choke Test Procedure.</i></b></li> <li>5. Perform the <b><i>Power Transformer (T1) Test Procedure.</i></b></li> <li>6. Perform the <b><i>Pilot Board Test Procedure.</i></b></li> </ol>
<div style="text-align: center;">  <b>CAUTION</b> </div> <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>		






## Error Codes


Observe Safety Guidelines detailed in the beginning of this manual.		ERROR CODES
ERROR CODE	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
 <b>0006</b>  <b>DESCRIPTION:</b> <i>Control Board Offline</i>	Communication error between power board and control board.	Cycle power to the machine to see if error clears. Otherwise a qualified technician must check communication between the power and control boards.
 <b>0021</b>  <b>DESCRIPTION:</b> Work Transfer Failed	Work Transfer failed.	In cut, mark, and grid modes, the pilot arc will only run for 5 seconds to prevent unnecessary consumable wear. Verify the correct torch to workpiece height and that the work lead is connected and making a good electrical connection.
 <b>0021</b>  <b>DESCRIPTION:</b> Pilot Transfer Failed	Pilot timer error.	In cut, mark and grid modes, the pilot arc will only run for five seconds to prevent unnecessary consumable wear. Verify the correct torch to workpiece height and that the work lead is connected and making a good electrical connection. If error occurs immediately after triggering, verify correct three phase input.
 <b>0021</b>  <b>DESCRIPTION:</b> Open Pilot - Check Consumables	No pilot arc could be established.	Check that all leads are properly connected between the power source, FlexCut and torch. Verify that the consumables are correctly installed.

 <b>0031</b>  <b>DESCRIPTION:</b> Primary Overcurrent	Peak current through the transformer primary has exceeded threshold (140 amps).	Verify connections to the switch board, transformer and output rectifier assemblies are made correctly and there are no damaged components in the machine. Replace shorted output rectifier diode. Replace defective power transformer (T1). Replace defective switch board assembly.
 <b>0036</b>  <b>DESCRIPTION:</b> Thermal Trip	Machine has overheated and must be allowed to cool before continuing.	Check that the fan is spinning freely and that the rear brickwork and side/front louvers are not obstructed. If thermal faults continue, blow dust out from the rear of the machine.
 <b>0213</b>  <b>DESCRIPTION:</b> Switch Board Is Offline	Switch board failed to turn on.	Mapping error. Cycle power to attempt to clear error. Switch board has a fatal error. Read error code at on-board status LED and decode error. Replace defective switch board assembly.
 <b>0298</b>  <b>DESCRIPTION:</b> Low Gas Pressure	Plasma gas is not connected to the rear of the machine or the plasma pressure regulator is turned down too far.	Check that the plasma gas supply is connected to the rear of the power source. Increase the plasma pressure on the front of the machine to match the cut charts for material and cutting current.
 <b>0299</b>  <b>DESCRIPTION:</b> Low Shield Gas Pressure	Shield gas is not connected to the rear of the machine or the shield pressure regulator is turned down too far.	Check that the shield gas supply is connected to the rear of the power source. Increase the shield pressure on the front of the machine to match the cut charts for material and cutting current.



 <b>0446</b>  <b>DESCRIPTION:</b> Cooler Fault	The water cooler object was not found and is required in the system.	Connect a water cooler that has a control board (FlexCool 35). If not using a water cooler, reset the 'Fault if No Cooler' attribute using Power Wave Manager Misc tab. If using a Water Cooler, verify the board is properly connected in the system.
 <b>0447</b>  <b>DESCRIPTION:</b> Flexstart Fault	The Flexstart object was not found and is required in the system.	Connect a Flexstart.
 <b>0713</b>  <b>DESCRIPTION:</b> Misconnection Primary Supply Voltage Too High	Switch board auxiliary supply voltage is too high at machine power-up.	Improper input voltage configuration. Verify primary reconnect position, measure input voltage level and check three phase operation. Damaged auxiliary transformer (T2) or intermittent "A" lead connection. Replace defective user interface board.
 <b>0714</b>  <b>DESCRIPTION:</b> Misconnection Primary Supply Voltage Too Low	Switch board auxiliary supply voltage is too low at machine power-up.	Improper input voltage configuration. Verify primary reconnect position, measure input voltage level and check three phase operation. Damaged auxiliary transformer (T2) or intermittent "A" lead connection. Replace defective user interface board assembly.

 <b>0729</b>  <b>DESCRIPTION:</b> Release Trigger	Trigger locked.	Release the trigger before continuing. The trigger must be disabled at machine startup or when changing modes.
 <b>0811</b>  <b>DESCRIPTION:</b> FlexStart door open	The door to the Flexstart console is open.	Close the Flexstart door and latch it tightly. Check door switch if problem persists.
 <b>0814</b>  <b>DESCRIPTION:</b> Cooler Flow Fault	Coolant hoses not connected, leaking or blocked.	Check coolant hoses and replace if necessary.
 <b>0815</b>  <b>DESCRIPTION:</b> Cooler Level Fault	Not enough coolant in cooler reservoir.	Add more coolant to reservoir of cooler. Check for leaks or disconnected hoses.
 <b>0817</b>  <b>DESCRIPTION:</b> Coolant Temperature Too High	Torch coolant has exceeded temperature limit.	Allow coolant to fully cool before continuing. Verify that the cooler fans are working properly and radiator is not blocked. Verifying cutting current and voltage do not exceed rating plate limits.

 <b>0824</b> <b>DESCRIPTION:</b> Thermistor Missing	Thermistor missing.	NTC thermistor is not plugged in, ambient temperature is too low or thermistor is damaged.
--	---------------------	--

# 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 Covers.

### MATERIALS NEEDED

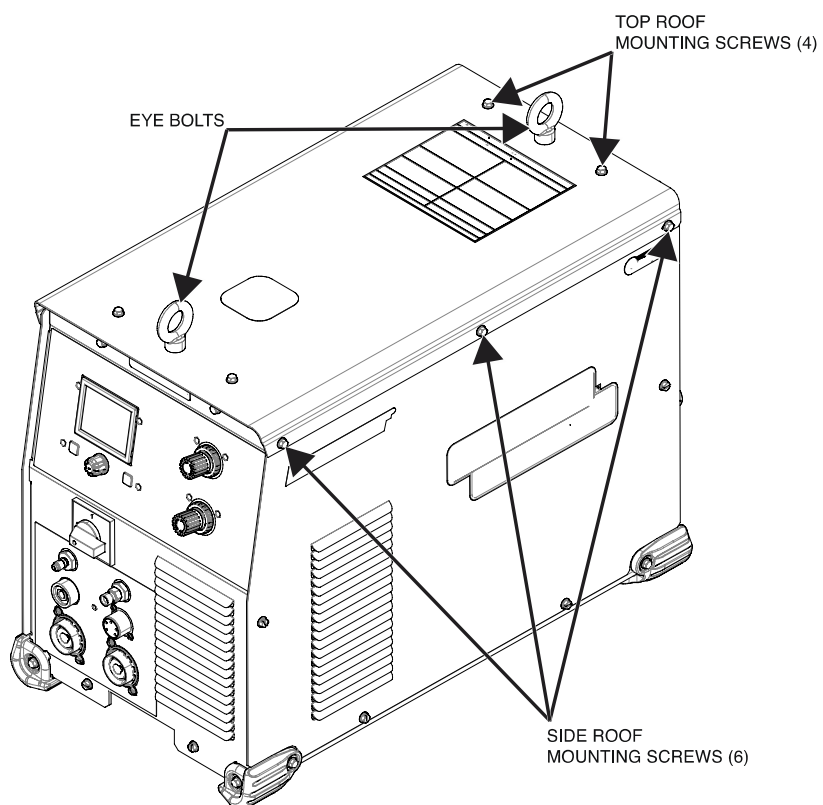
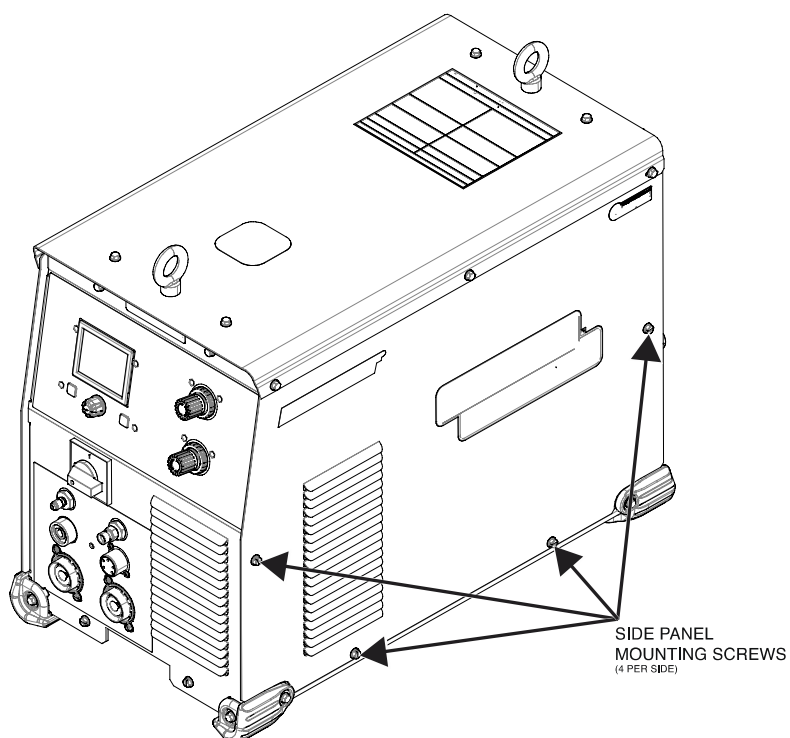
5/16" Nutdriver

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Carefully unscrew the two eyebolts from the top of the machine. See **Figure F.1**.
3. Using a 5/16" nutdriver, remove the four screws from the top of the roof. See **Figure F.1**.
4. Using a 5/16" nutdriver, remove the six longer screws from the sides of the roof. See **Figure F.1**.
5. Carefully remove the roof panel.
6. Using a 5/16" nutdriver, remove the four screws securing the right case side panel. See **Figure F.2**.
7. Carefully remove the right case side panel.
8. Using a 5/16" nutdriver, remove the four screws securing the left case side panel. See **Figure F.2**.
9. Carefully remove the left case side panel.
10. Perform any tests / replacement procedure.

### REPLACEMENT PROCEDURE

1. Position the left case side panel onto the machine.
2. Using a 5/16" nutdriver, attach the four screws securing the left case side panel.
3. Position the right case side panel onto the machine.
4. Using a 5/16" nutdriver, attach the four screws securing the right case side panel.
5. Position the roof panel onto the machine.
6. Using a 5/16" nutdriver, attach the six longer screws to the sides of the roof.
7. Using a 5/16" nutdriver, attach the four screws to the top of the roof.
8. Carefully screw the two eyebolts into the top of the machine.

**Figure F.1 – Eye bolt and roof mounting screw locations****Figure F.2 – Side panel 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

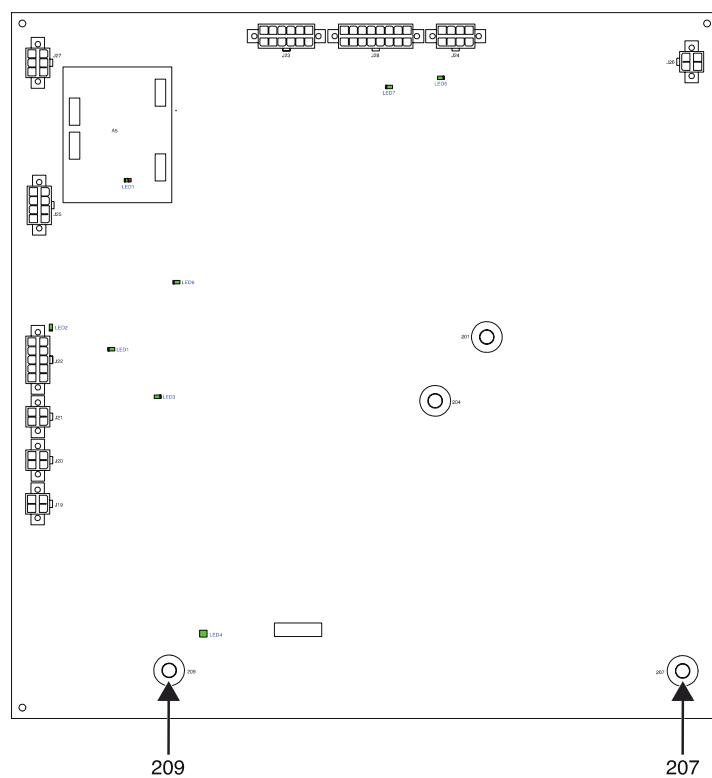
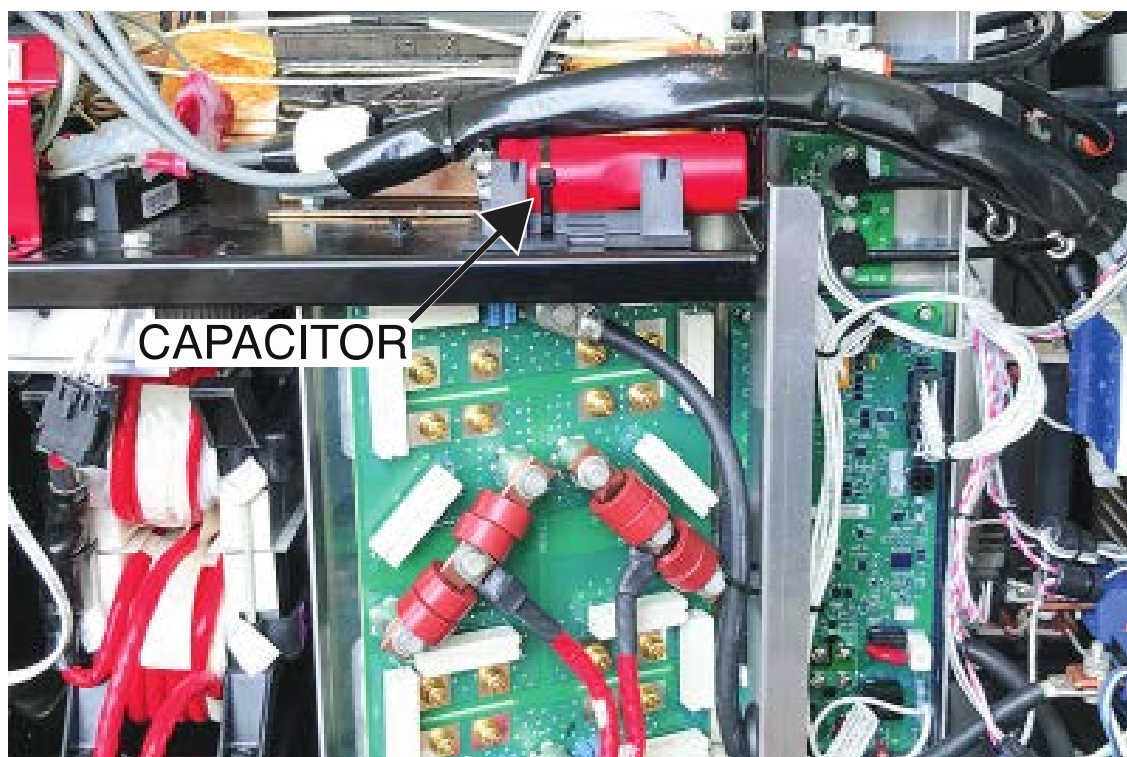
This procedure will ensure that the Capacitors on the Switch Board and capacitor (C1) have been discharged.

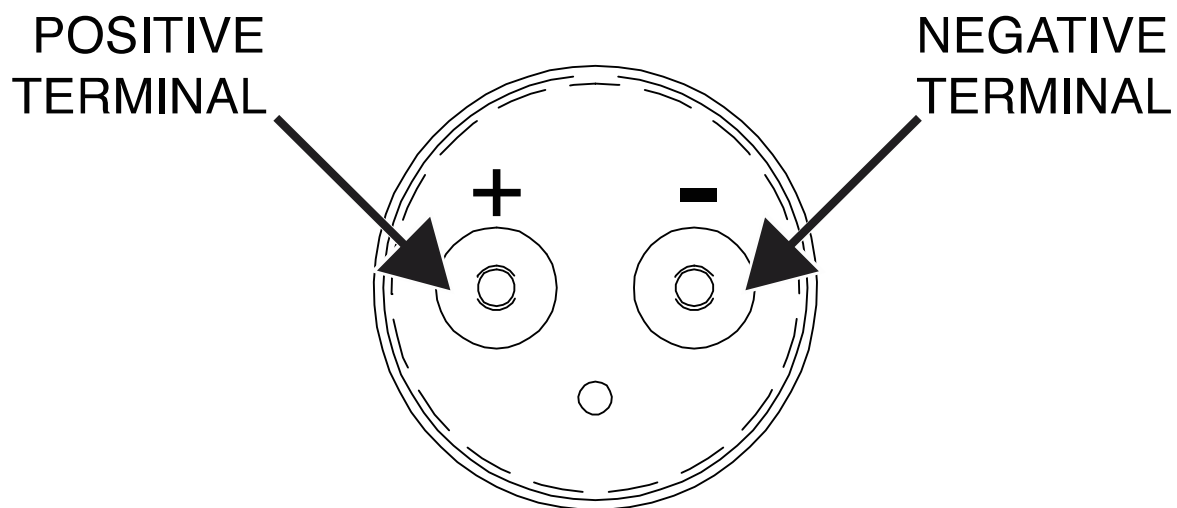
### MATERIALS NEEDED

Volt/Ohmmeter  
Resistor (25-1000 ohms and 25 watts minimum)  
Electrically Insulated Gloves  
Electrically Insulated Pliers  
Jumper Leads  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Locate terminals 207 and 209 on the switch board. See **Figure F.3**. See Wiring Diagram.
4. Using a 25 watt or more resistor (25 to 1000 ohm) connected to two test leads, carefully discharge the capacitors.
5. Using a volt/ohmmeter, ensure the capacitors are discharged by connecting the positive meter probe to terminal 209 and the negative meter probe to terminal 207 on the switch board. The voltage should be zero, if not repeat the discharge procedure. See Wiring Diagram.
6. Locate the positive and negative terminals of capacitor (C1). See **Figures F.4** and **F.5**. See Wiring Diagram.
7. Using a 25 watt or more resistor (25 to 1000 ohm) connected to two test leads, carefully discharge the capacitor (C1).
8. Using a volt/ohmmeter, ensure that capacitor (C1) is discharged by connecting the positive meter probe to the positive terminal and the negative meter probe to the negative terminal on capacitor (C1). The voltage should be zero, if not repeat the discharge procedure. See Wiring Diagram.

**Figure F.3 – Switch board terminal 207 and 209 locations****Figure F.4 – Capacitor (C1) location**

**Figure F.5 – Capacitor terminal locations**



## INPUT RECTIFIER (D1) 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 determine if the Input Rectifier (D1) is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter  
Phillips Screwdriver  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the input rectifier (D1). See **Figure F.6**. See Wiring Diagram.
5. Using a volt/ohmmeter, perform the forward diode drop tests in **Table F.1**. See **Figures F.6** and **F.7**. See Wiring Diagram.
6. If the test results are questionable, using a Phillips screwdriver, label and disconnect all leads and MOVs from the input rectifier (D1) and retest. See Wiring Diagram.
7. If any portion of the test fails, the input rectifier (D1) may be faulty.
8. If faulty, perform the **Input Rectifier (D1) Removal And Replacement Procedure**.
9. Connect any previously disconnected leads to the input rectifier (D1).
10. Perform the **Case Cover Replacement Procedure**.

**Table F.1 – Forward diode drop tests**

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
TERMINAL A	POSITIVE TERMINAL	0.3 VDC – 0.7 VDC
TERMINAL B	POSITIVE TERMINAL	0.3 VDC – 0.7 VDC
TERMINAL C	POSITIVE TERMINAL	0.3 VDC – 0.7 VDC
NEGATIVE TERMINAL	TERMINAL A	0.3 VDC – 0.7 VDC
NEGATIVE TERMINAL	TERMINAL B	0.3 VDC – 0.7 VDC
NEGATIVE TERMINAL	TERMINAL C	0.3 VDC – 0.7 VDC

Figure F.6 – Input rectifier (D1) location

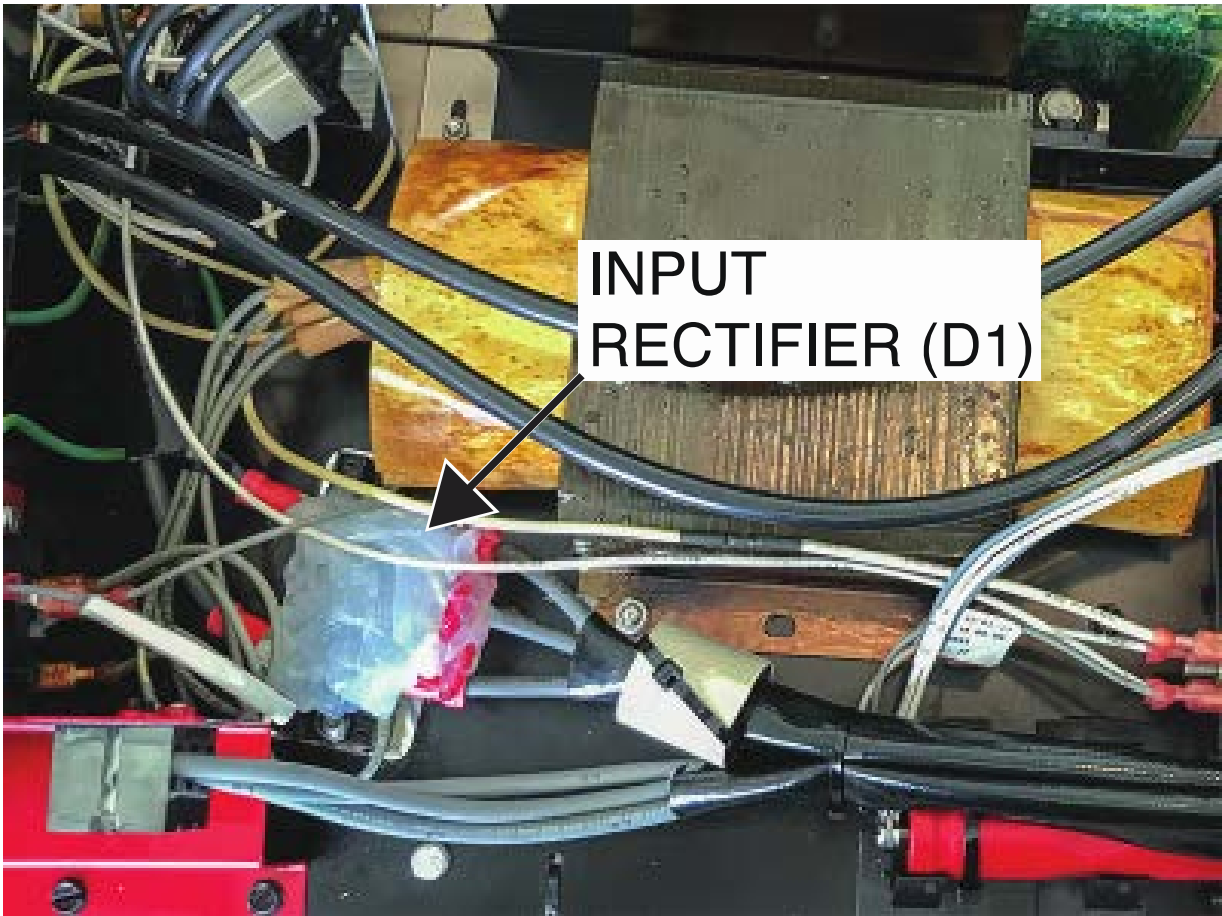
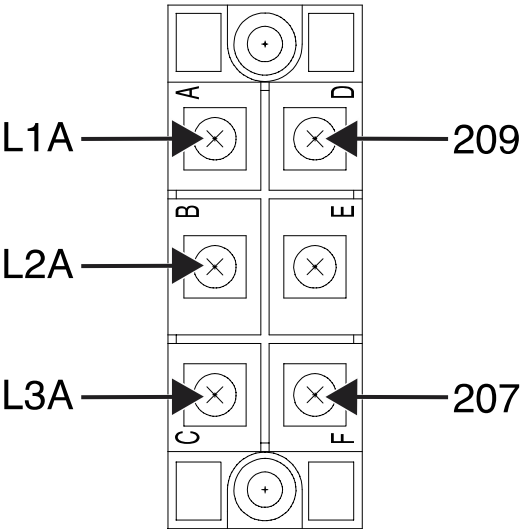
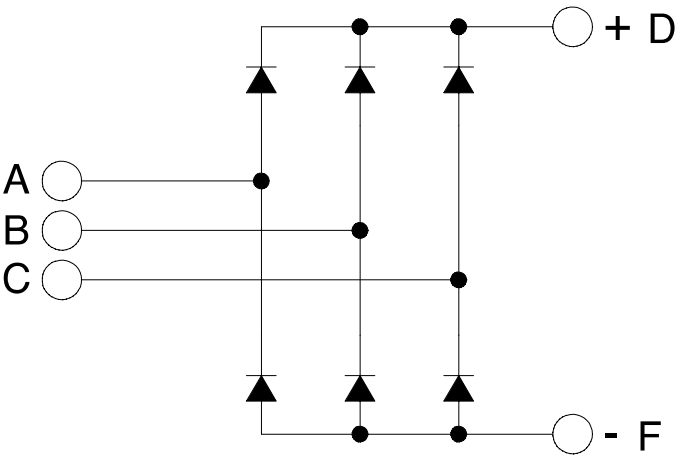


Figure F.7 – Input rectifier (D1) detail



INPUT RECTIFIER



TERMINAL SCHEMATIC

## AUXILIARY TRANSFORMER (T2) 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 determine if the Auxiliary Transformer (T2) is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter

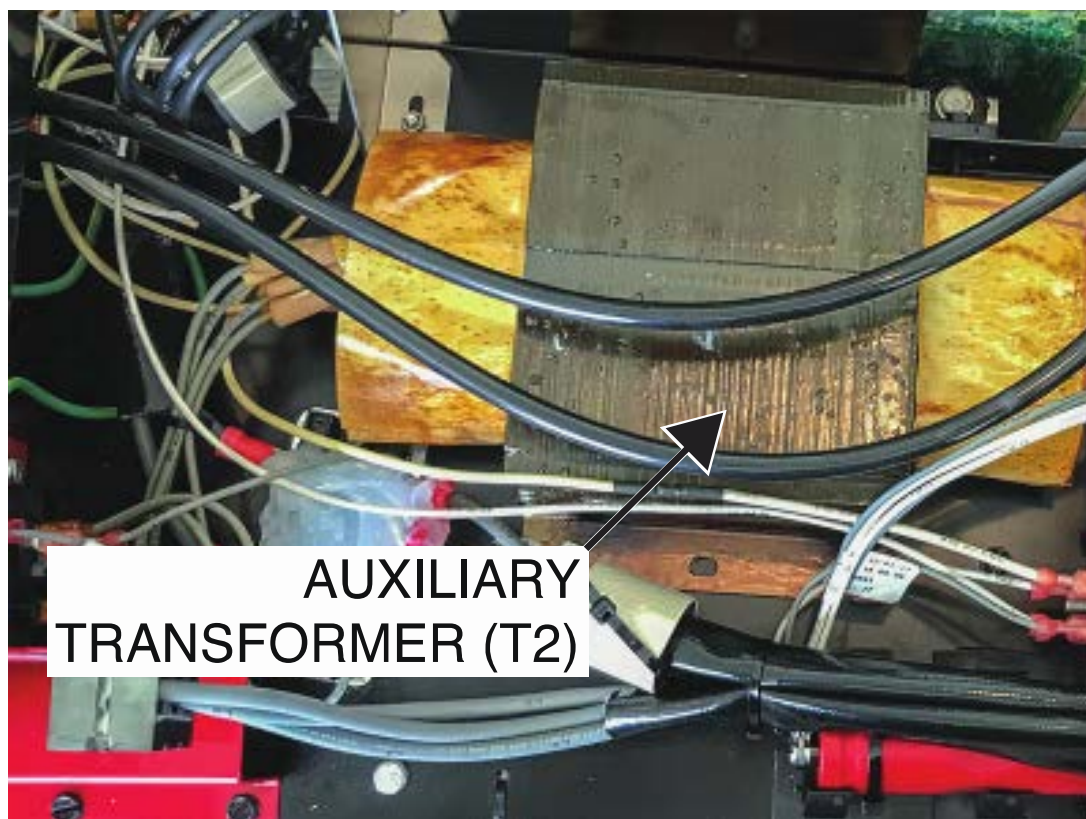
Wiring Diagram

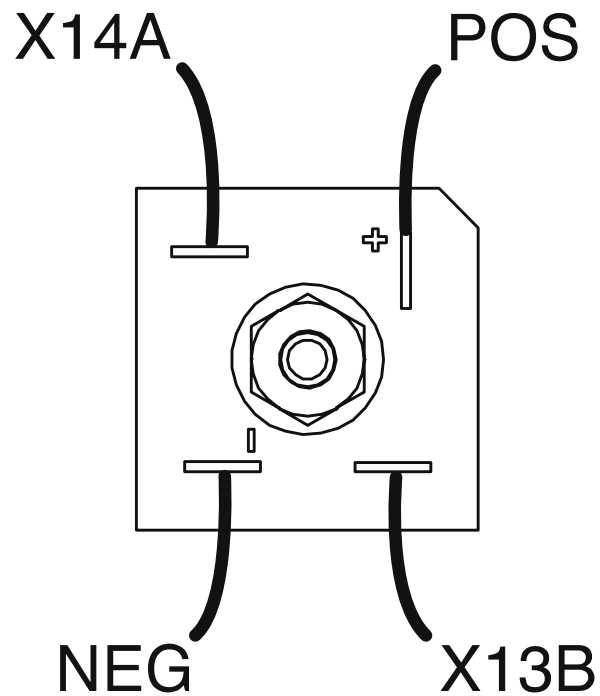
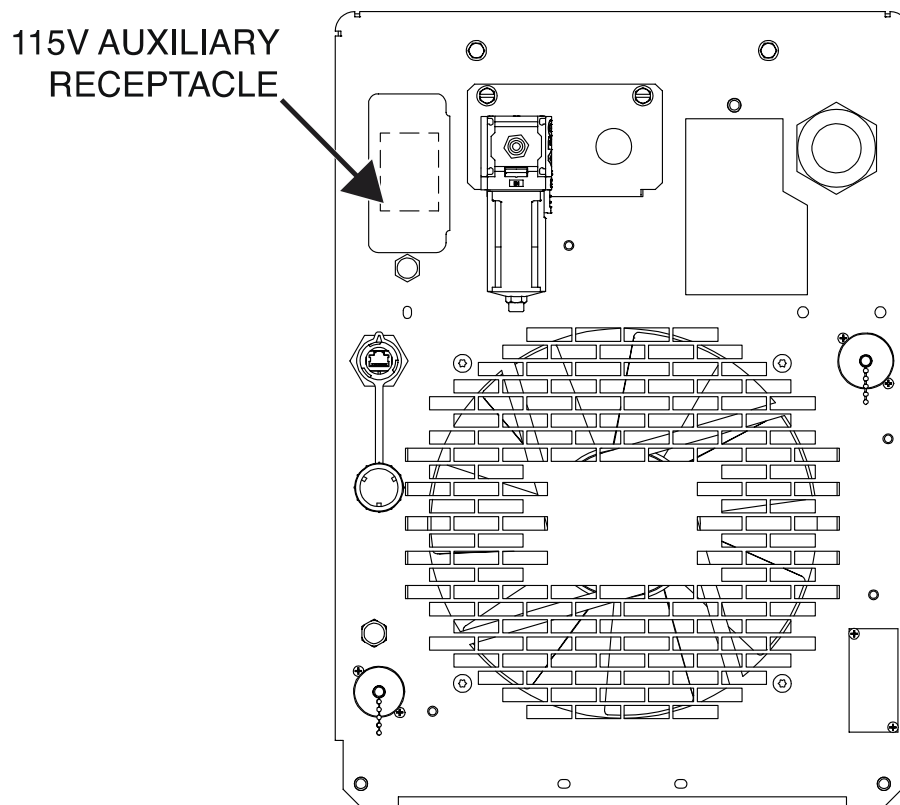
### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the auxiliary transformer (T2). See **Figure F.8**. See Wiring Diagram.
5. Carefully apply the correct input power to the machine and turn ON the machine.
6. Using a volt/ohmmeter, test for the correct primary voltages at the reconnect panel. See **Table F.2**. See **Figure F.8**. See Wiring Diagram.  
**NOTE:** The reconnect jumper must be in the correct position for the supply voltage being used.
7. If the correct primary voltages are NOT present, check all input power leads, reconnect jumper, fuse and connections. See Wiring Diagram.
8. If the correct primary voltages are present continue testing.
9. Using a volt/ohmmeter, test for the correct secondary voltages at the auxiliary rectifier (D4) and at the 115V receptacle. See **Table F.2**. See **Figures F.9** and **F.10**. See Wiring Diagram.
10. If the primary voltages are correct and the secondary voltages are low or not present, label and disconnect the AC leads (X13B and X14A) from the auxiliary rectifier (D4) and retest. If the AC secondary voltages are still low or not present the auxiliary transformer (T2) may be faulty.
11. If the primary voltages are correct and no voltage is measured at the 115V receptacle, check circuit breaker (CB2) and all leads and connections between the auxiliary transformer (T2) and the 115V receptacle. If all leads and connections are correct, the auxiliary transformer (T2) may be faulty.
12. If faulty, perform the **Auxiliary Transformer (T2) Removal And Replacement Procedure**.
13. When testing is complete, reconnect any previously disconnected leads. See Wiring Diagram.
14. Perform the **Case Cover Replacement Procedure**.

**Table F.2 – Primary and secondary voltage tests**

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
PRIMARY VOLTAGE (460 VAC H1 to H3)	H1	H2	380 VAC
PRIMARY VOLTAGE (460 VAC H1 to H3)	H1	H3	460 VAC
PRIMARY VOLTAGE (460 VAC H1 to H3)	H1	H4	575 VAC
SECONDARY VOLTAGE	X11	X12	115 VAC
SECONDARY VOLTAGE	X13	X14	52 VAC

**Figure F.8 – Auxiliary transformer (T2) location**

**Figure F.9 – Auxiliary rectifier (D4) lead locations****Figure F.10 – 115V receptacle 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 determine if the Fan and F.A.N. Circuit is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter

Wiring Diagram

### TEST PROCEDURE

**NOTE:** The fan should turn ON briefly when the machine is turned on. The fan turns on during cutting and remains on for five minutes after output is disabled. The fan also turns on during a thermal fault.

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect plug J26 from the switch board and insert a jumper wire into the end of the connector to short leads 31B and 31A together. See **Figure F.11**. See Wiring Diagram.
5. Carefully apply the correct input power to the machine.
6. When the machine is turned on, the fan should start and run as long as the power is on. If this test results in the fan operating properly, all components of the fan circuit are OK with the possible exception of the switch board.
7. If the test fails to start the fan, check the 115 volt secondary of the auxiliary transformer (T2) and the fan itself. Perform the **Auxiliary Transformer (T2) Test Procedure**. If the transformer produces the required 115 volts and the plug J26 leads are jumped, the fan and/or fan capacitor are suspect. See Wiring Diagram.
8. Carefully remove input power from the FlexCut 200 machine.
9. If the test results in a running fan, remove the jumper wire from between leads 31B and 31A. Connect plug J26 to the switch board. Label and disconnect one lead from the thermostat. See **Figure F.12**. See Wiring Diagram.
10. If removing the lead from the thermostat causes the switch board to flash error 36 and the thermo LED (on the user interface) turns on but the fan still does not start, the switch board may be faulty. Perform the **Switch Board Test Procedure**.

11. If no error 36 flashes and the thermo LED does not turn on, the user interface board may be faulty.  
Perform the **User Interface Board Test Procedure**.
12. If any component tests faulty, replace the suspect component.
13. Connect any previously removed leads and plugs.
14. Perform the **Case Cover Replacement Procedure**.

Figure F.11 – Switch board plug J26 location

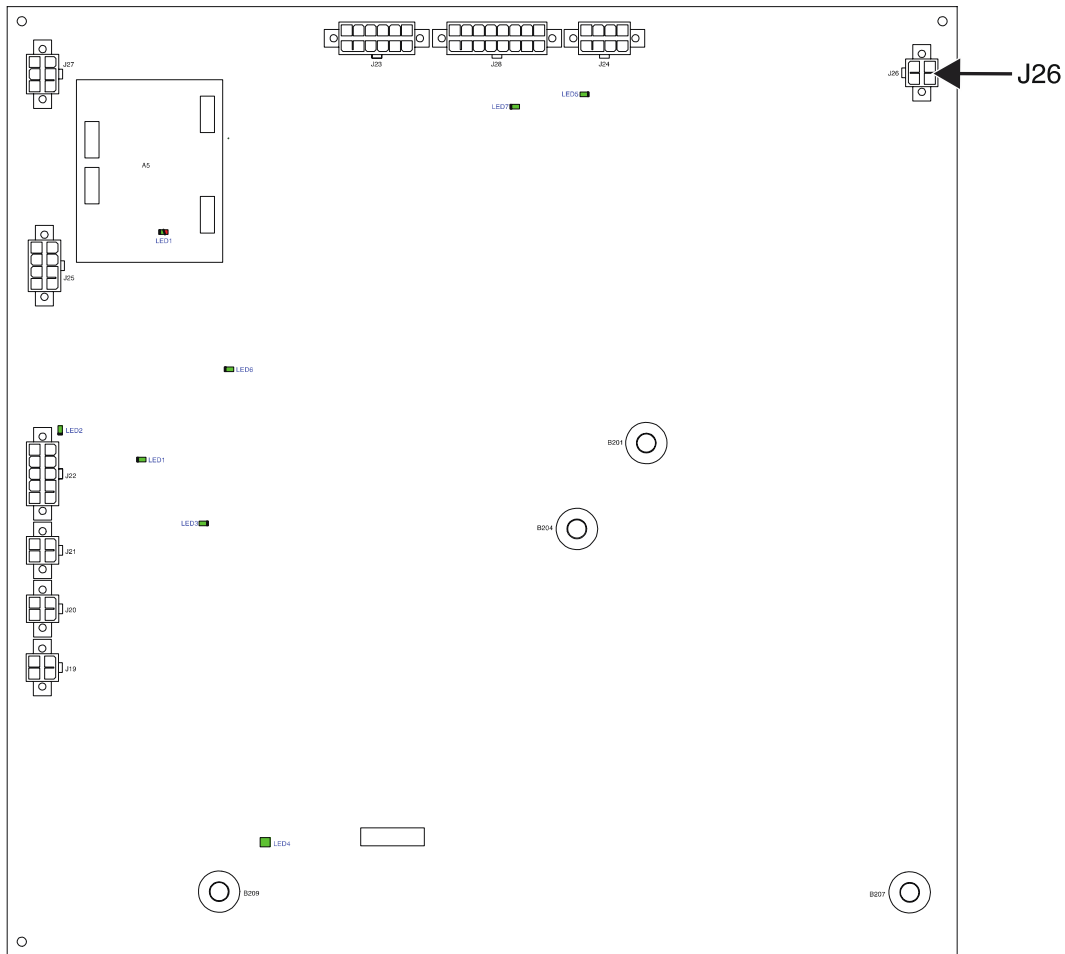
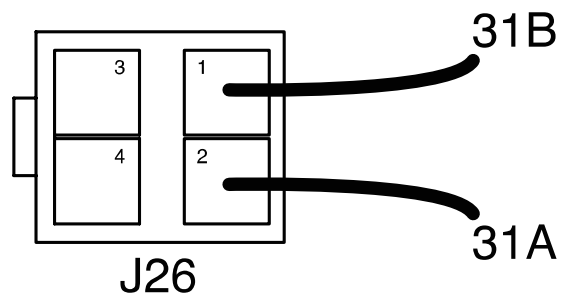


Figure F.12 – Switch board plug J26 lead locations



## 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 determine if the Choke is open or grounded.

### MATERIALS NEEDED

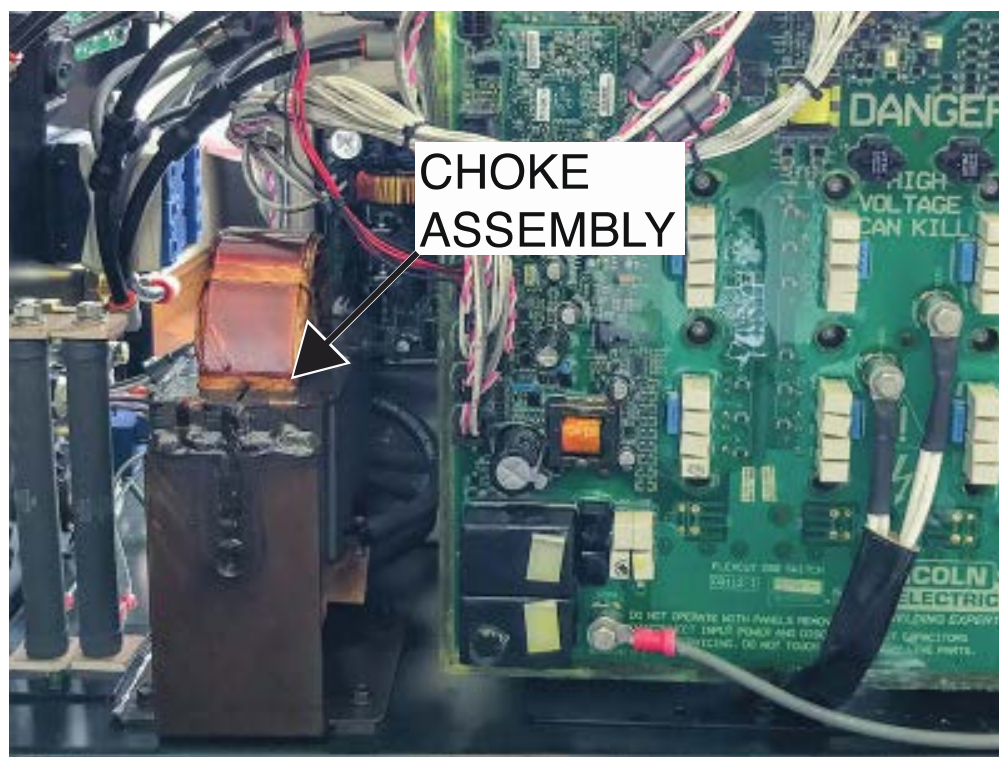
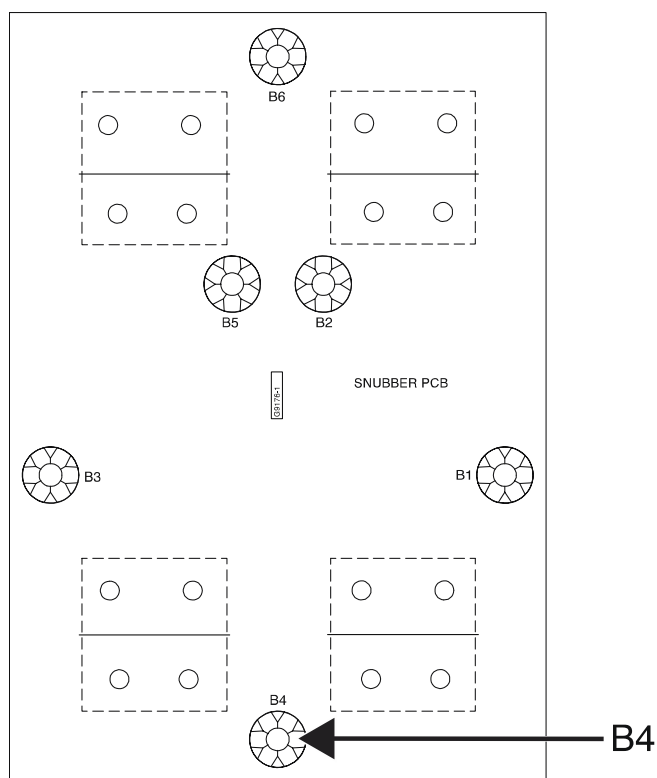
Volt/Ohmmeter

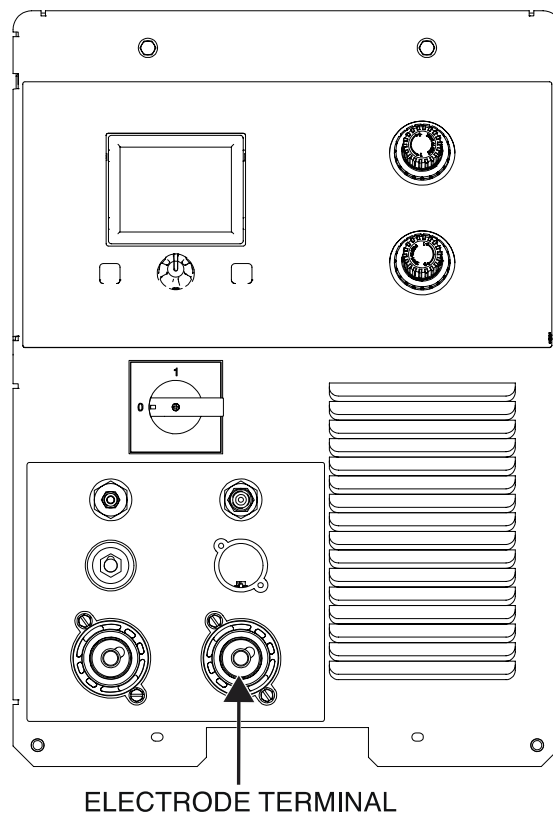
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the choke assembly. See **Figure F.13**. See Wiring Diagram.
5. **Open:** No cutting output. Using a volt/ohmmeter, test the resistance from the snubber board terminal B4 to the rear of the electrode stud. See **Figures F.14** and **F.15**. See Wiring Diagram. Typical resistance is less than one ohm.
6. Check for any physical signs of arcing within the choke assembly. See Wiring Diagram.
7. **Choke Coil Grounded:** Reduced inductance, alternate cutting current path. Electrically isolate the choke coil by disconnecting the choke lead from snubber board terminal B4 and the choke lead from the rear of the electrode stud. Using a volt/ohmmeter, check the resistance from choke coil to chassis ground. Resistance should be at least 500,000 ohms. See **Figure F.14**. See Wiring Diagram.
8. If any of the tests fail, the choke may be faulty.
9. If faulty, perform the **Choke Removal And Replacement Procedure**.
10. Connect any previously disconnected leads. See Wiring Diagram.
11. Perform the **Case Cover Replacement Procedure**.



**Figure F.13 – Choke location****Figure F.14 – Snubber board terminal B4 location**

**Figure F.15 – Electrode terminal location**

## THERMOSTAT 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

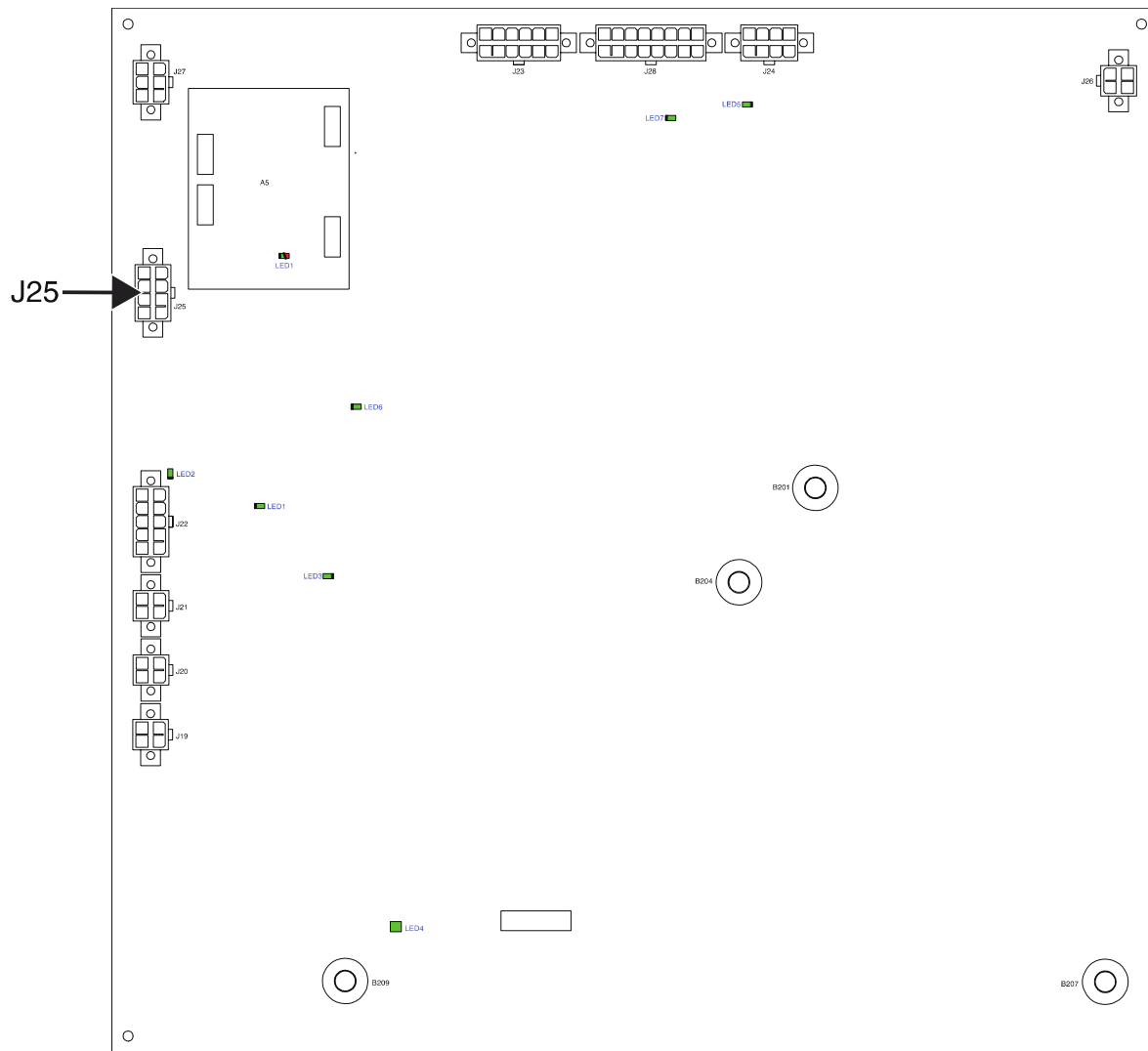
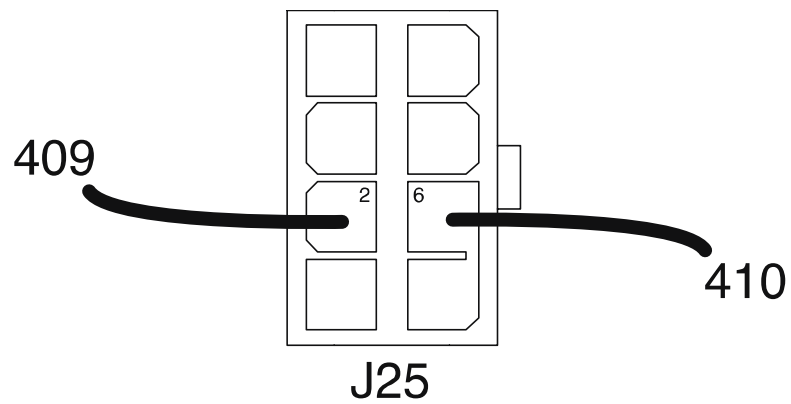
This test will determine if the Thermostat is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the thermostat, on the switch board heat sink. See Wiring Diagram.
5. Locate plug J25 on the switch board. Label and disconnect plug J25 from the switch board. See **Figure F.16**. See Wiring Diagram.
6. Using a digital volt/ohmmeter, check the resistance between plug J25 pin 2 (lead #409) and plug J25 pin 6 (lead #410). See **Figure F.17**. See Wiring Diagram. The resistance should be very low (less than one ohm).
7. If the test fails, the thermostat may be faulty.
8. If faulty, perform the **Thermostat Removal And Replacement Procedure**.
9. Connect plug J20 to the switch board. See Wiring Diagram.
10. Perform the **Case Cover Replacement Procedure**.

**Figure F.16 – Switch board plug J25 location****Figure F.17 – Switch board plug J25 lead locations**

## AUXILIARY RECTIFIER (D4) 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 determine if the Auxiliary Rectifier (D4) is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the auxiliary rectifier (D4), on the top shelf at the vertical flange of the horizontal divider. See **Figure F.18**. See Wiring Diagram.
5. Label and disconnect leads POS, NEG, X13B and X14A from the auxiliary rectifier (D4). See **Figure F.19**. See Wiring Diagram.
6. Using a digital volt/ohmmeter, perform the diode drop tests outlined in **Table F.3**. See **Figure F.19**. See Wiring Diagram.
7. If any of the tests fail, the auxiliary rectifier (D4) may be faulty.
8. If faulty, perform the **Auxiliary Rectifier (D4) Removal And Replacement Procedure**.
9. Connect leads POS, NEG, X13B and X14A to the auxiliary rectifier (D4). See Wiring Diagram.
10. Perform the **Case Cover Replacement Procedure**.

**Table F.3 – Auxiliary rectifier (D4) diode drop tests**

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
TOP AC TERMINAL	POSITIVE TERMINAL	0.3 VDC – 0.7 VDC
BOTTOM AC TERMINAL	POSITIVE TERMINAL	0.3 VDC – 0.7 VDC
NEGATIVE TERMINAL	TOP AC TERMINAL	0.3 VDC – 0.7 VDC
NEGATIVE TERMINAL	BOTTOM AC TERMINAL	0.3 VDC – 0.7 VDC

Figure F.18 – Auxiliary rectifier (D4) location

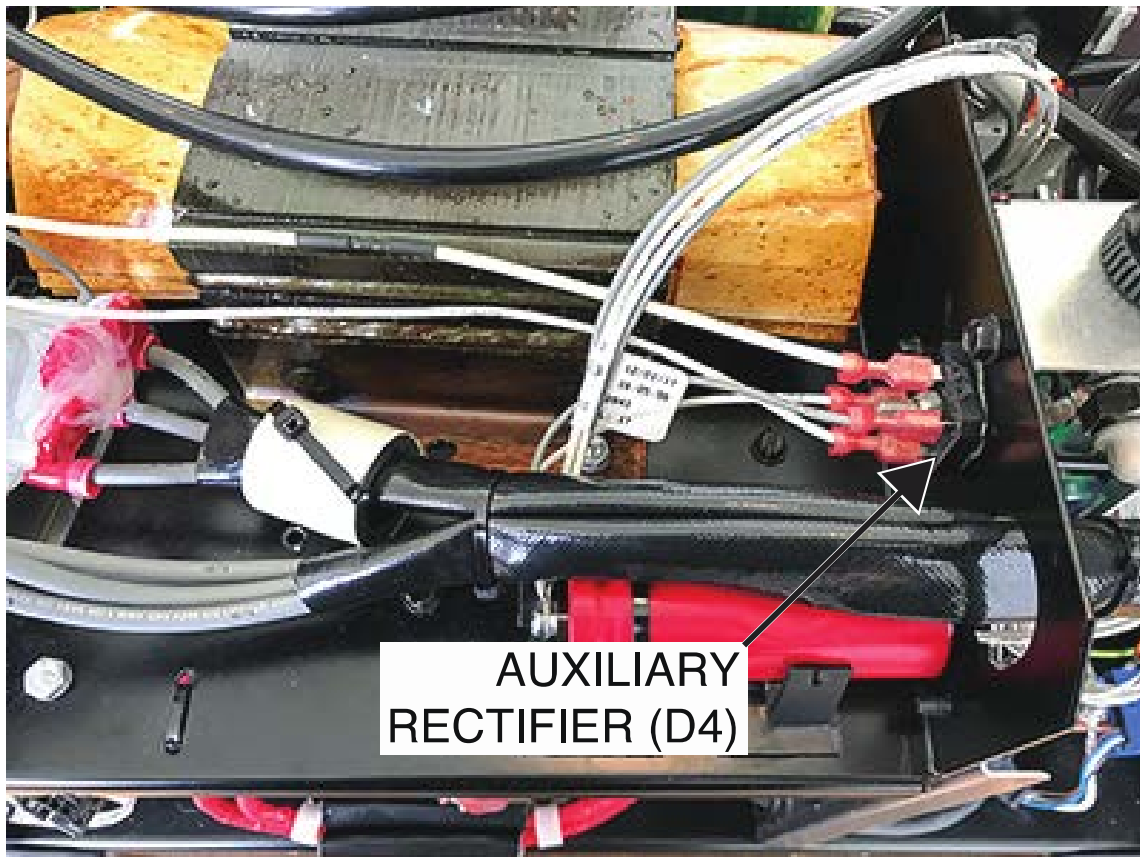
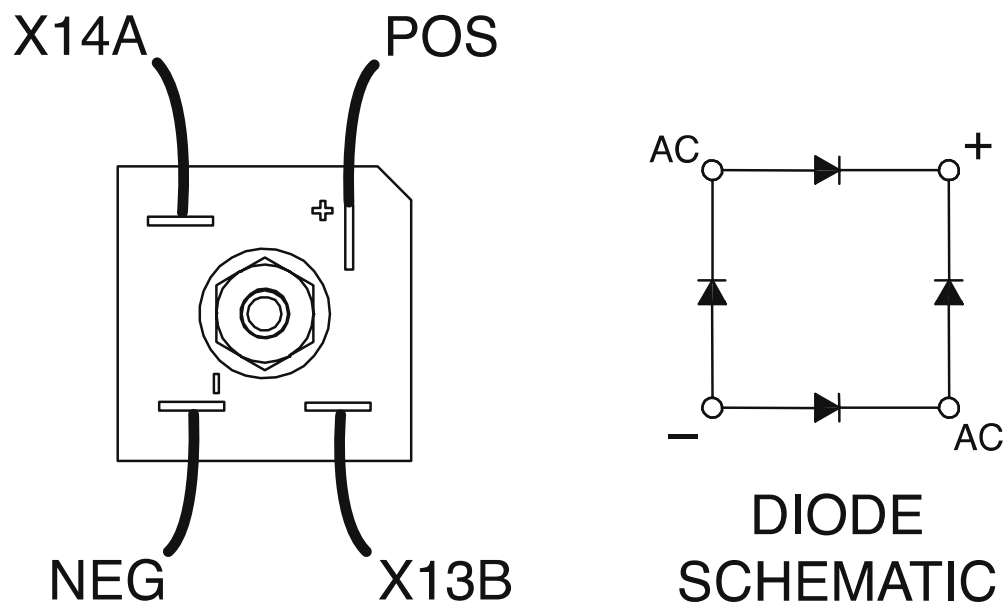


Figure F.19 – Auxiliary rectifier (D4) test point and lead locations



## 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 determine if the User Interface Board is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

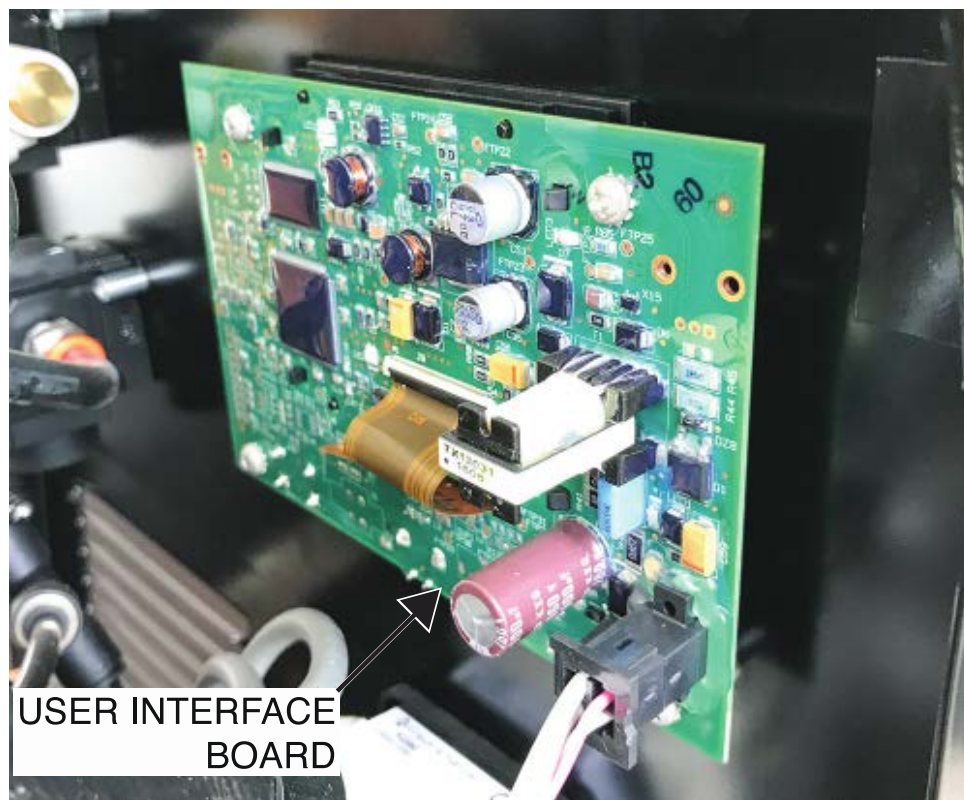
1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the user interface board, on the rear of the front panel. See **Figure F.20**. See Wiring Diagram.
5. Carefully apply the correct input power to the machine and turn ON the machine.
6. Using a volt/ohmmeter, check for the presence of 40 VDC at plug J1 pins 3 and 4. See **Figures F.21** and **F.22**. See Wiring Diagram.
7. If the 40 VDC is not present, perform the **40 VDC Bus Board Test Procedure**.
8. If the 40 VDC is present, continue with this test.
9. Using a volt/ohmmeter, check for the presence of 2 VDC at plug J1 pins 1 and 2. See **Figures F.21** and **F.22**. See Wiring Diagram.
10. Perform the LED inspections outlined in **Tables F.4** and **F.5**. See **Figure F.21**. See Wiring Diagram.
11. Carefully remove input power from the FlexCut 200 machine.
12. If any of the tests fail, the user interface board may be faulty.
13. If faulty, perform the **User Interface Board Removal And Replacement Procedure**.
14. Perform the **Case Cover Replacement Procedure**.

**Table F.4 – User interface board LED functions**

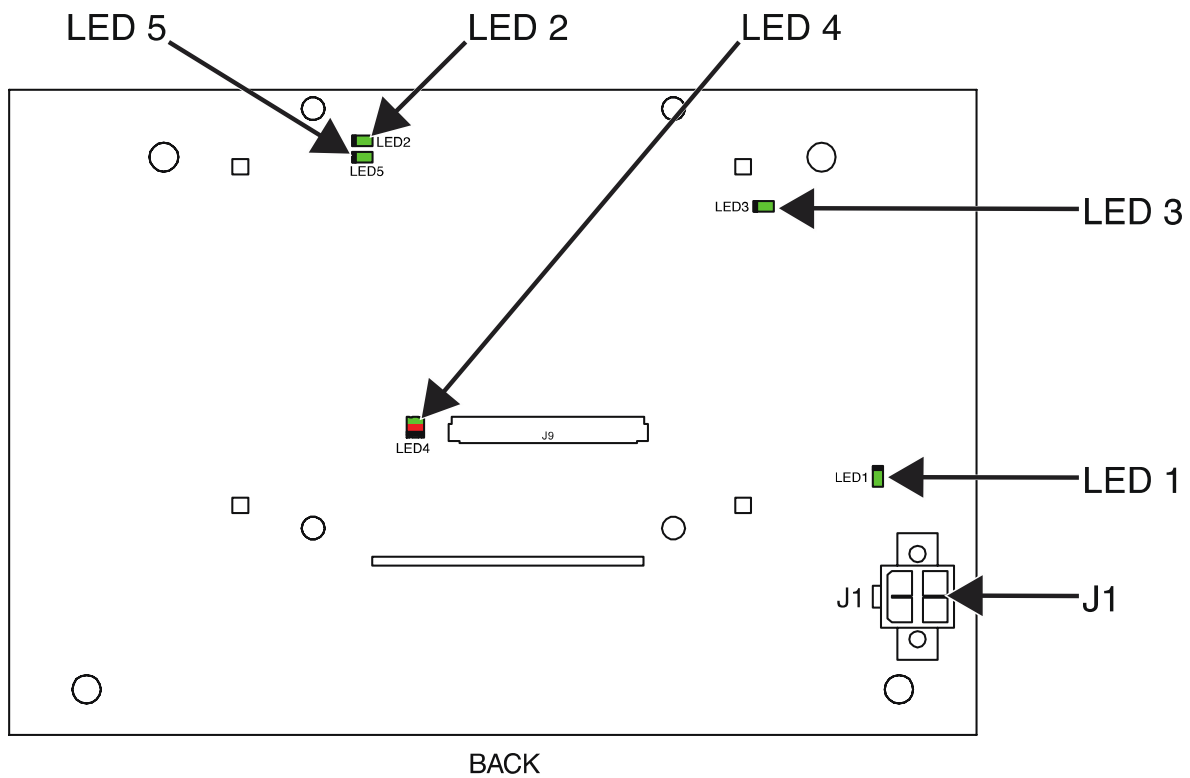
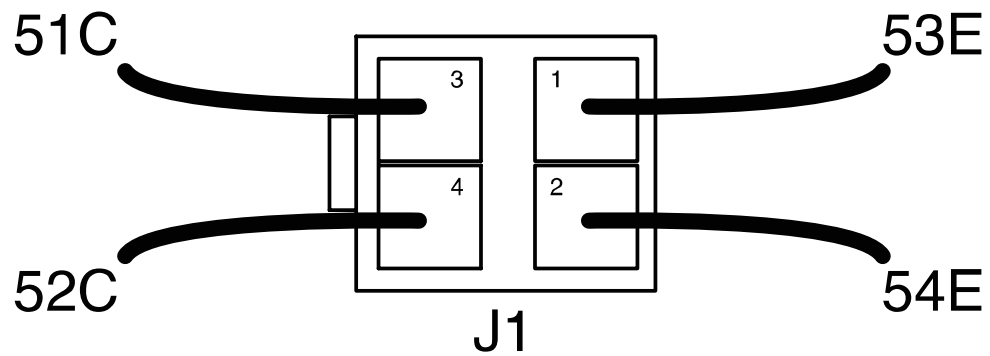
LED #	COLOR	FUNCTION
1	GREEN	INPUT POWER CONNECTED
2	RED	+3.3V POWER SUPPLY "OK"
3	GREEN	+5V CAN POWER SUPPLY "OK"
4	GREEN	STATUS "OK"
	RED	STATUS "ERROR" (CHECK CODE FOR SPECIFIC ERROR)
5	GREEN	+5V USB POWER "OK" (NOT USED)

**Table F.5 – User interface board LED light conditions**

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 <b>ERROR CODES</b> IN TROUBLESHOOTING GUIDE.

**Figure F.20 – User interface board location**



**Figure F.21 – User interface board plug J1 and LED locations****Figure F.22 – User interface board plug J1 lead locations**

## SWITCH 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 determine if the Switch Board is functioning properly. This test will not test all functions of the Switch Board.

### MATERIALS NEEDED

Volt/Ohmmeter With Diode Test Functionality  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the switch board. See **Figure F.23**. See Wiring Diagram.
5. Using a volt/ohmmeter, perform the resistance tests outlined in **Table F.6**. See **Figures F.24, F.25, F.26** and **F.27**. See Wiring Diagram.
6. If any of the resistance tests results are not as expected, using a 7/16" nutdriver, label and disconnect the leads attached to the terminals and retest. See Wiring Diagram.
7. Connect leads when resistance testing is complete.
8. Carefully apply the correct input power and turn ON the machine.
9. Check the LEDs per **Tables F.7** and **F.8**. See **Figure F.24**, for LED locations. See Wiring Diagram.
10. Using a volt/ohmmeter, perform the voltage tests outlined in **Table F.9**. See **Figure F.24** and **F.27**. See Wiring Diagram.
11. If any of the tests fail, the switch board may be faulty.
12. If faulty, perform the **Switch Board Removal And Replacement Procedure**.
13. Perform the **Case Cover Replacement Procedure**.

**Table F.6 – Switch board diode drop and resistance tests**

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	CONDITION
DIODE DROP TEST	B209 (+)	B204 (–)	OL	MACHINE “OFF” NO INPUT POWER APPLIED
DIODE DROP TEST	B204 (+)	B209 (–)	.390 VDC	MACHINE “OFF” NO INPUT POWER APPLIED
DIODE DROP TEST	B209 (+)	B201 (–)	OL	MACHINE “OFF” NO INPUT POWER APPLIED
DIODE DROP TEST	B201 (+)	B209 (–)	.390 VDC	MACHINE “OFF” NO INPUT POWER APPLIED
DIODE DROP TEST	B207 (+)	B204 (–)	.325 VDC	MACHINE “OFF” NO INPUT POWER APPLIED
DIODE DROP TEST	B204 (+)	B207 (–)	OL	MACHINE “OFF” NO INPUT POWER APPLIED
DIODE DROP TEST	B207 (+)	B201 (–)	.390 VDC	MACHINE “OFF” NO INPUT POWER APPLIED
DIODE DROP TEST	B201 (+)	B207 (–)	OL	MACHINE “OFF” NO INPUT POWER APPLIED
NEGATIVE VOLTAGE FEEDBACK	PLUG J23 PIN 11 (LEAD 802)	ELECTRODE STUD	VERY LOW RESISTANCE (LESS THAN ONE OHM)	MACHINE “OFF” NO INPUT POWER APPLIED
POSITIVE VOLTAGE FEEDBACK	PLUG J23 PIN 5 (LEAD 806)	TERMINAL B3 ON THE PILOT BOARD	VERY LOW RESISTANCE (LESS THAN ONE OHM)	MACHINE “OFF” NO INPUT POWER APPLIED

**Table F.7 – Switch board LED functions**

LED #	COLOR	FUNCTION
1, A5	GREEN/RED	SYSTEM STATUS LED
1	GREEN	+15V DC POWER SUPPLY “OK”
2	GREEN	+5V CAN POWER SUPPLY “OK”
3	GREEN	MICRO STATUS “OK”
4	GREEN	INPUT CAP VOLTAGE BLEEDER
	GREEN	HIGH VOLTAGE PRESENT WHEN ILLUMINATED
5	GREEN	FAN HAS BEEN ENABLED
6	GREEN	FPGA STATUS LED
7	GREEN	COOLANT ENABLE SIGNAL

**Table F.8 – Switch board LED functions**

<b>LIGHT CONDITION</b>	<b>MEANING</b>
STEADY GREEN	SYSTEM OK.
BLINKING GREEN	OCCURS DURING STARTUP OR RESET AND INDICATES THAT THE SWITCH BOARD STATUS IS WAITING FOR COMMUNICATION FROM THE USER INTERFACE BOARD. NORMAL FOR THE FIRST 1-10 SECONDS AFTER POWER IS TURNED ON.
ALTERNATING GREEN AND RED	A SYSTEM FAULT HAS OCCURRED. IF THE SWITCH 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 <b><i>ERROR CODES</i></b> IN TROUBLESHOOTING GUIDE.

Table F.9 – Switch board voltage tests

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	CONDITION
INPUT POWER TO SWITCH BOARD	PLUG J19 PIN 3 (LEAD 51B)	PLUG J19 PIN 4 (LEAD 52B)	40 VDC	MACHINE ON.
CAN COMMUNICATION	PLUG J21 PIN 1 (LEAD 54A)	PLUG J21 PIN 2 (LEAD 53A)	2 VDC	MACHINE ON.
CAN COMMUNICATION	PLUG J19 PIN 1 (LEAD 54E)	PLUG J19 PIN 2 (LEAD 53E)	2 VDC	MACHINE ON.
CAN COMMUNICATION	PLUG J20 PIN 1 (LEAD 54D)	PLUG J20 PIN 2 (LEAD 53D)	2 VDC	MACHINE ON.
FAN SUPPLY VOLTAGE FROM AUXILIARY TRANSFORMER (T2)	PLUG J26 PIN 1 (LEAD 31B)	PLUG J26 PIN 2 (LEAD 31A)	115 VAC	FAN NOT ACTIVATED. IF 115VAC IS NOT PRESENT, PERFORM THE <b>AUXILIARY TRANSFORMER (T2) TEST PROCEDURE.</b>
FAN SUPPLY VOLTAGE FROM AUXILIARY TRANSFORMER (T2)	PLUG J26 PIN 1 (LEAD 31B)	PLUG J26 PIN 2 (LEAD 31A)	0 VAC	FAN ACTIVATED
RECTIFIED AND FILTERED INPUT VOLTAGE	B209 (+)	B207 (–)	535 VDC TO 815 VDC DEPENDING UPON THE INPUT VOLTAGE (380 VAC TO 575 VAC)	CORRECT INPUT POWER TO MACHINE AND PRE-CHARGE COMPLETED. IF NOT CORRECT, PERFORM THE <b>INPUT RECTIFIER (D1) TEST PROCEDURE.</b>
POWER SUPPLY TO PILOT BOARD	PLUG J28 PIN 16 (LEAD 296)	PLUG J28 PIN 8 (LEAD 288)	15 VDC	MACHINE ON.
POWER SUPPLY TO PRESSURE SENSE BOARD	PLUG J22 PIN 2 (LEAD 222)	PLUG J22 PIN 7 (LEAD 227)	5 VDC	MACHINE ON.
POWER SUPPLY TO ARCLINK I/O BOARD	PLUG J20 PIN 4 (LEAD 52D)	PLUG J20 PIN 3 (LEAD 51D)	40 VDC	MACHINE ON.

Figure F.23 – Switch board location

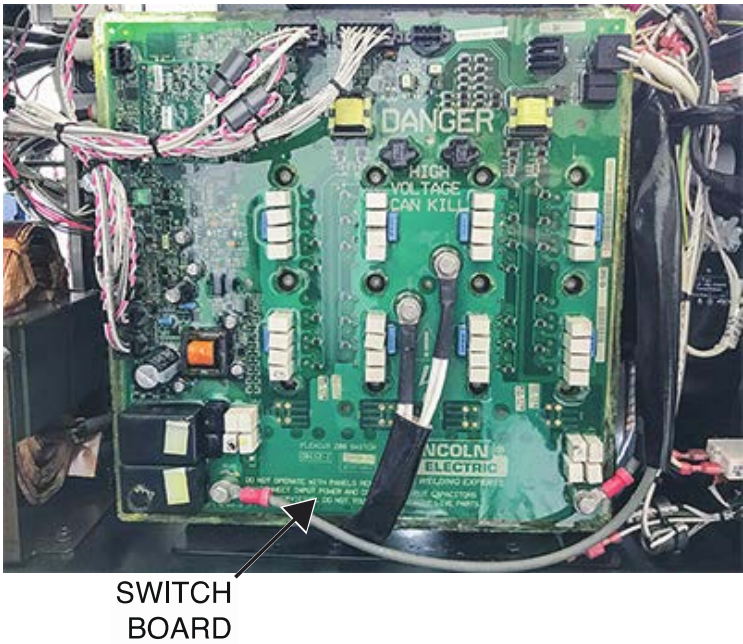
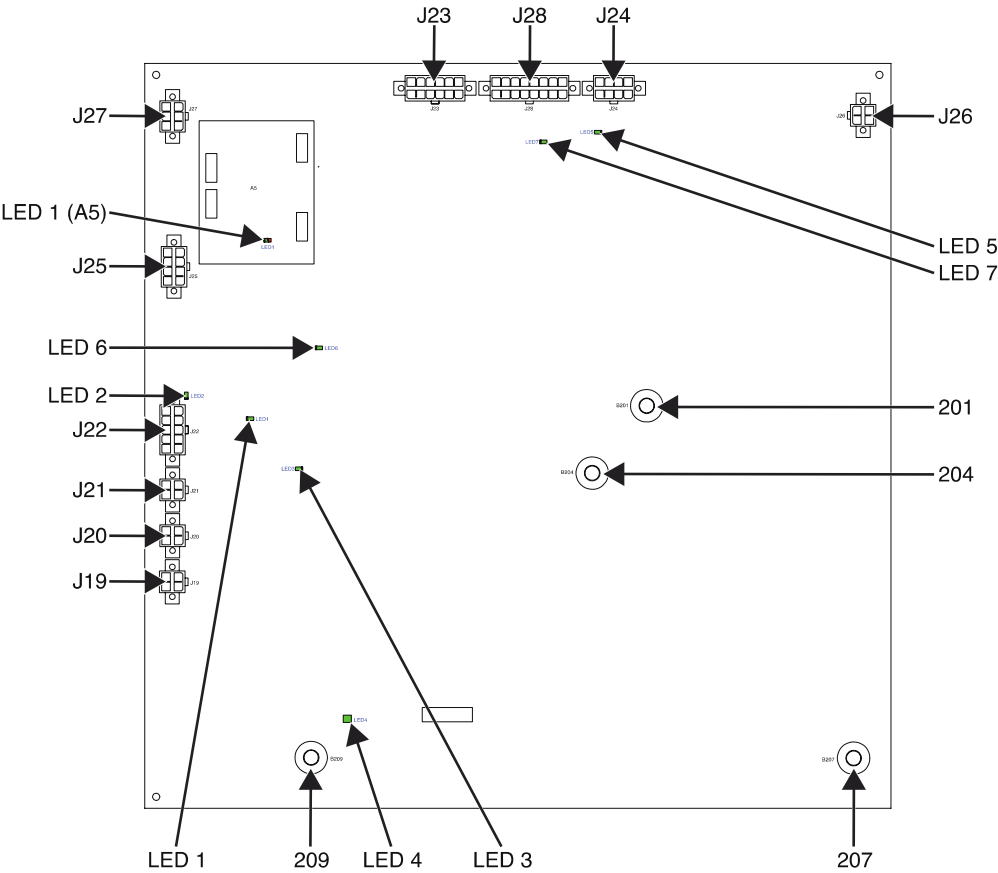


Figure F.24 – Switch board plug and LED locations



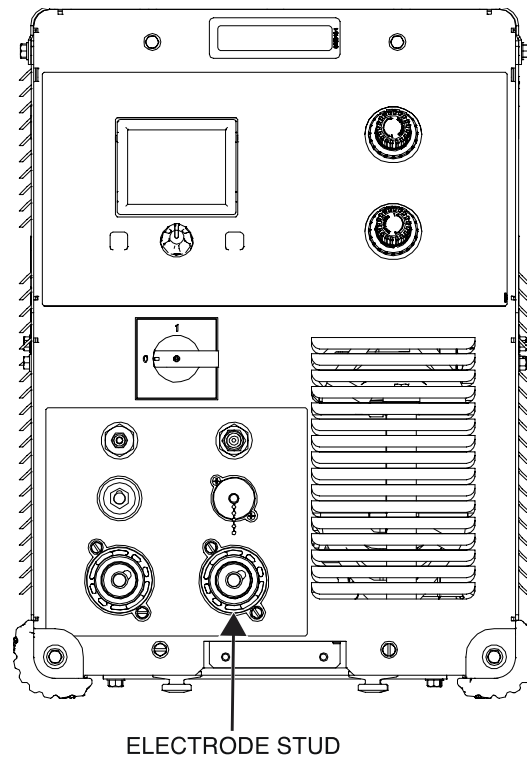
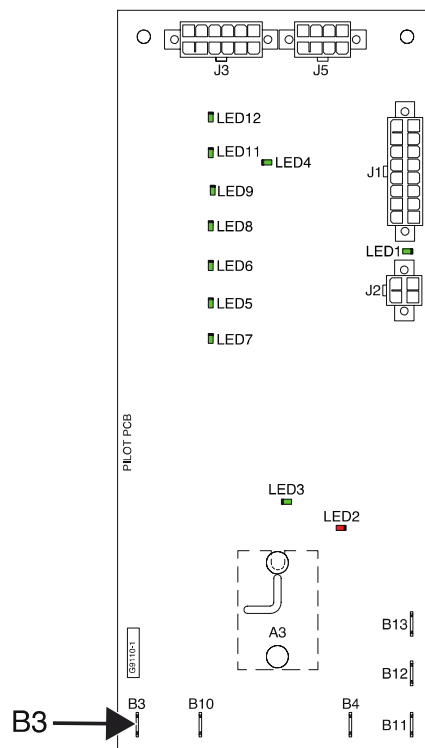
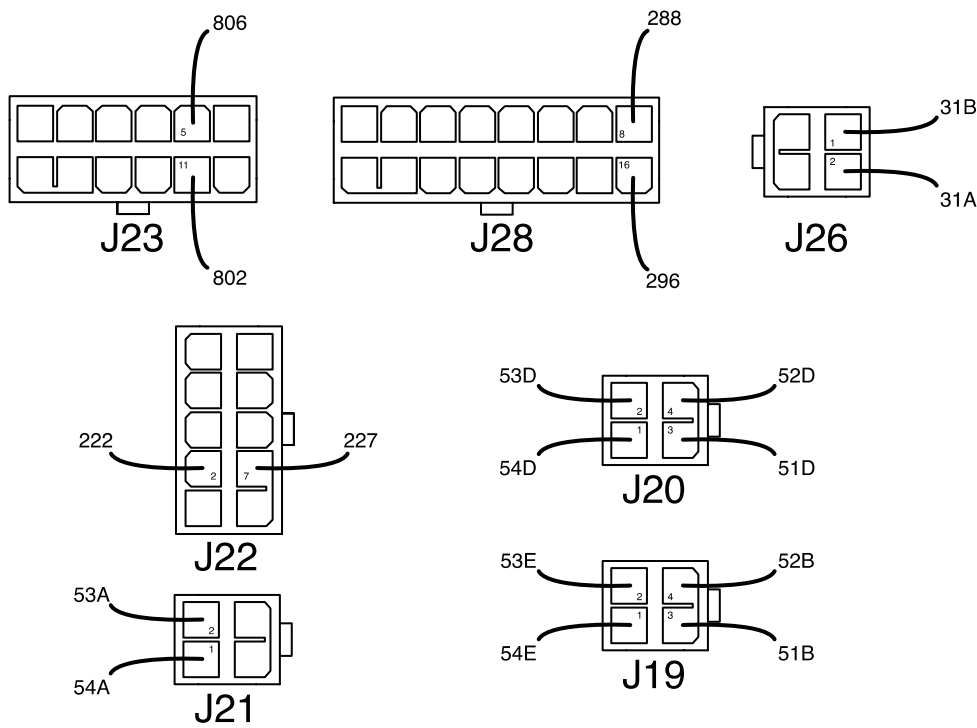
**Figure F.25 – Electrode and work stud locations****Figure F.26 – Pilot board terminal B3 location**

Figure F.27 – Switch board lead locations





## INPUT SWITCH 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 determine if the Input Switch is functioning properly.

### MATERIALS NEEDED

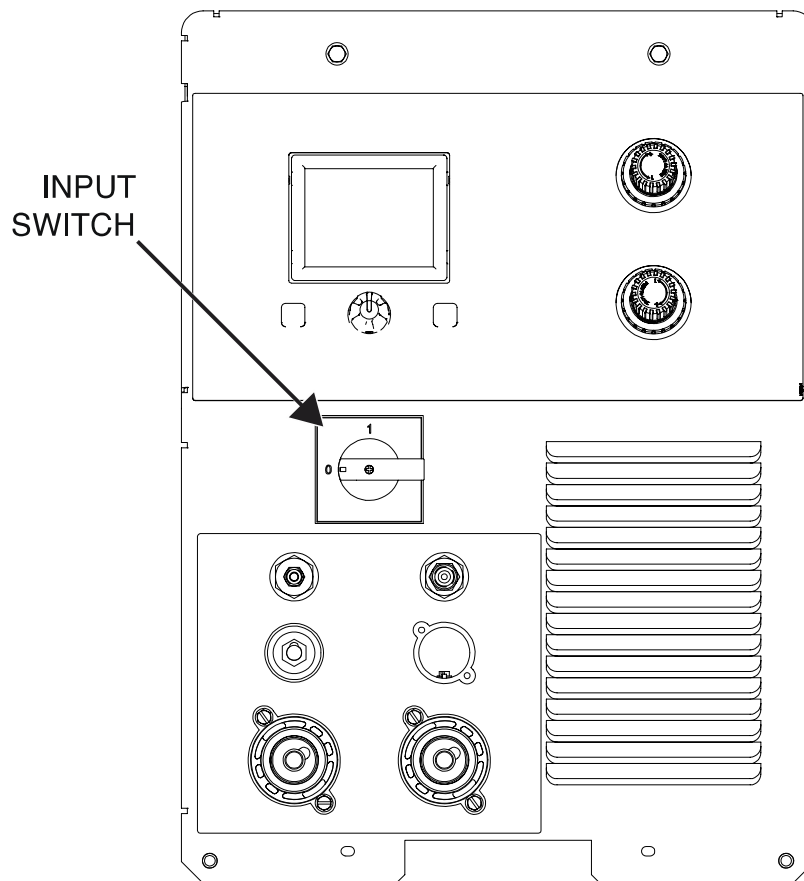
Offset Phillips Screwdriver  
Volt/Ohmmeter  
Wiring Diagram

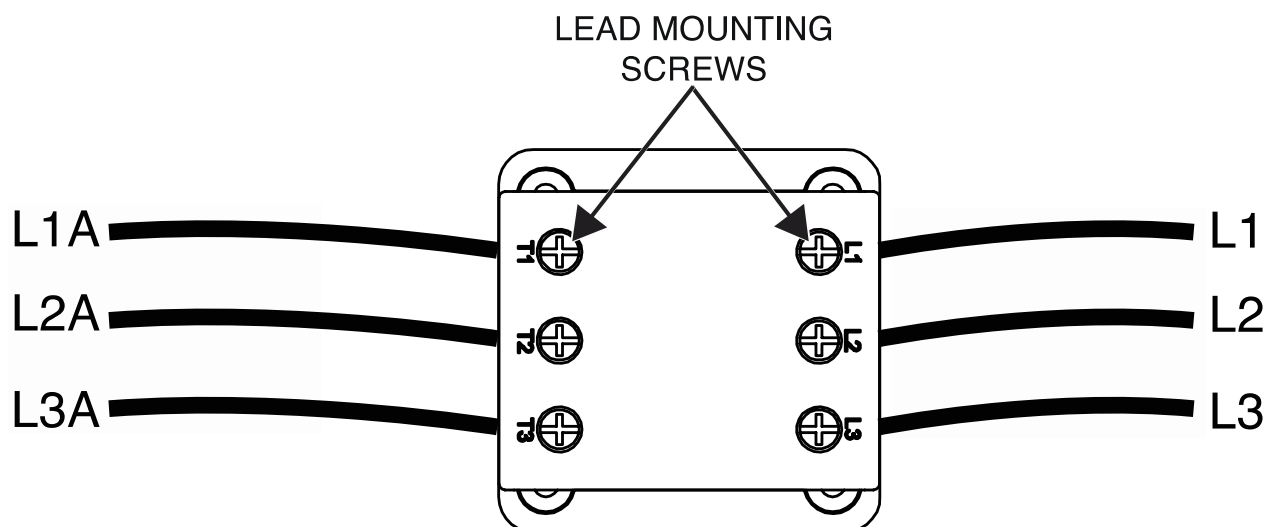
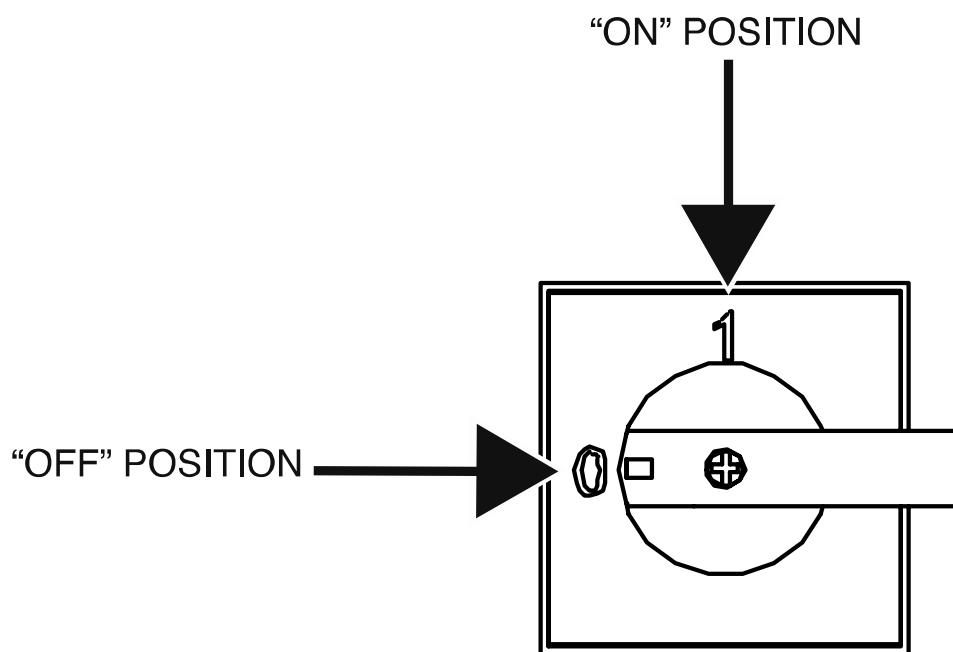
### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the input switch. See **Figure F.28**. See Wiring Diagram.
5. Using an offset Phillips screwdriver, remove the six screws securing the leads L1, L2, L3, L1A, L2A and L3A to the input switch. See **Figure F.29**. See Wiring Diagram. Label and disconnect leads from the input switch.
6. Using a volt/ohmmeter, perform the resistance test outlined in **Table F.10**. See **Figures F.29** and **F.30**. See Wiring Diagram.
7. If any of the tests fail, the input switch may be faulty.
8. If faulty, perform the **Input Switch Removal And Replacement Procedure**.
9. Using an offset Phillips screwdriver, attach the six screws securing the leads L1, L2, L3, L1A, L2A and L3A to the input switch. See Wiring Diagram.
10. Perform the **Case Cover Replacement Procedure**.

**Table F.10 – Input switch resistance tests**

TEST POINT	TEST POINT	EXPECTED READING	SWITCH POSITION
L1	L1A	VERY LOW RESISTANCE (LESS THAN ONE OHM)	“ON” POSITION
L2	L2A	VERY LOW RESISTANCE (LESS THAN ONE OHM)	“ON” POSITION
L3	L3A	VERY LOW RESISTANCE (LESS THAN ONE OHM)	“ON” POSITION
L1	L1A	HIGH RESISTANCE (GREATER THAN 500K OHMS)	“OFF” POSITION
L2	L2A	HIGH RESISTANCE (GREATER THAN 500K OHMS)	“OFF” POSITION
L3	L3A	HIGH RESISTANCE (GREATER THAN 500K OHMS)	“OFF” POSITION

**Figure F.28 – Input switch location**

**Figure F.29 – Input switch terminal and lead locations****Figure F.30 – Input switch positions**

## SOLENOID 1, 2 AND 3 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 determine if the Solenoid 1 (Cutting/Mark), Solenoid 2 (Plasma Gas) and Solenoid 3 (Shielding Gas) are functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate solenoids 1, 2 and 3 on the vertical flange of the upper shelf. See **Figure F.31**. See Wiring Diagram. Solenoid 1 is to the right side of the machine (viewed from the front); solenoid 2 is between solenoid 1 and solenoid 3.
5. Locate plug J22 on the switch board. See **Figure F.31**. See Wiring Diagram.
6. Label and disconnect plug J22 from the switch board. See **Figure F.31**. See Wiring Diagram.
7. Using a volt/ohmmeter, perform the diode drop tests outlined in **Table F.11**. See **Figure F.32**. See Wiring Diagram.
8. If any of the tests fail, the solenoid may be faulty.
9. If faulty, perform the **Solenoid 1, 2 & 3 Removal And Replacement Procedure**.
10. Connect plug J22 to the switch board.
11. Perform the **Case Cover Replacement Procedure**.

**Table F.11 – Solenoid 1, 2 and 3 diode drop tests**

TEST POINTS (POS)	TEST POINTS (NEG)	EXPECTED READING
PLUG J22 PIN 3 (LEAD R1)	PLUG J22 PIN 8 (LEAD B1)	.80 VDC
PLUG J22 PIN 4 (LEAD R2)	PLUG J22 PIN 9 (LEAD B2)	.80 VDC
PLUG J22 PIN 5 (LEAD R3)	PLUG J22 PIN 10 (LEAD B3)	.80 VDC

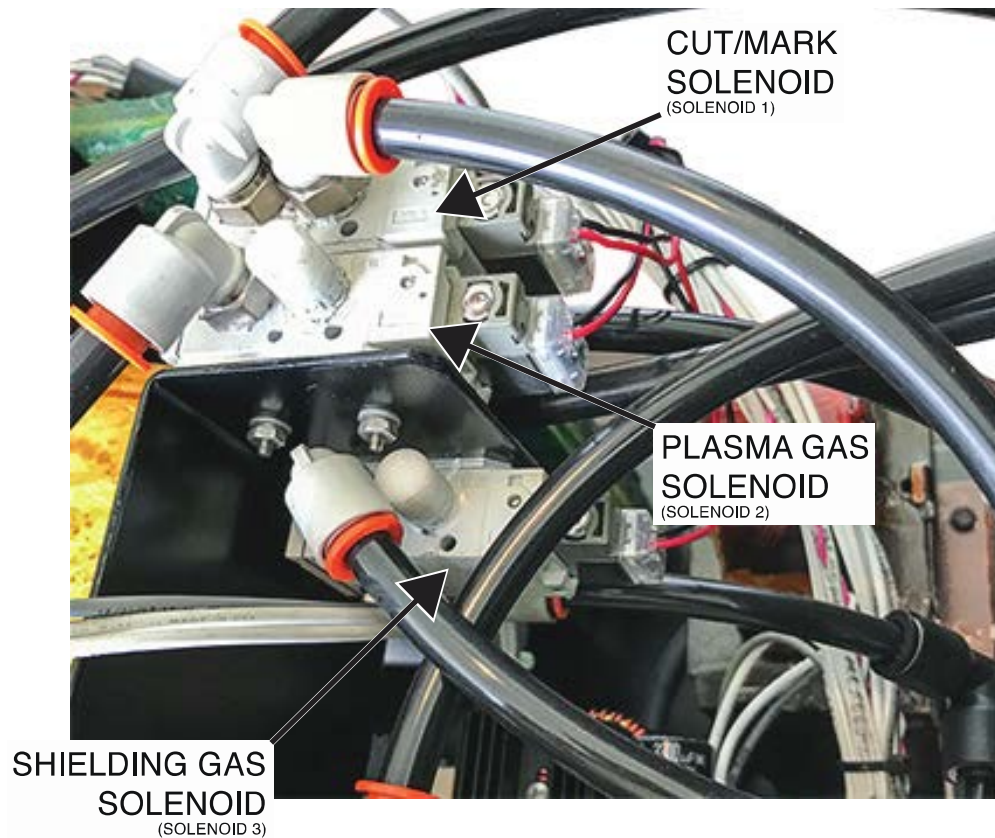
**Figure F.31 – Solenoids 1, 2 and 3 locations**

Figure F.32 – Switch board plug J22 location

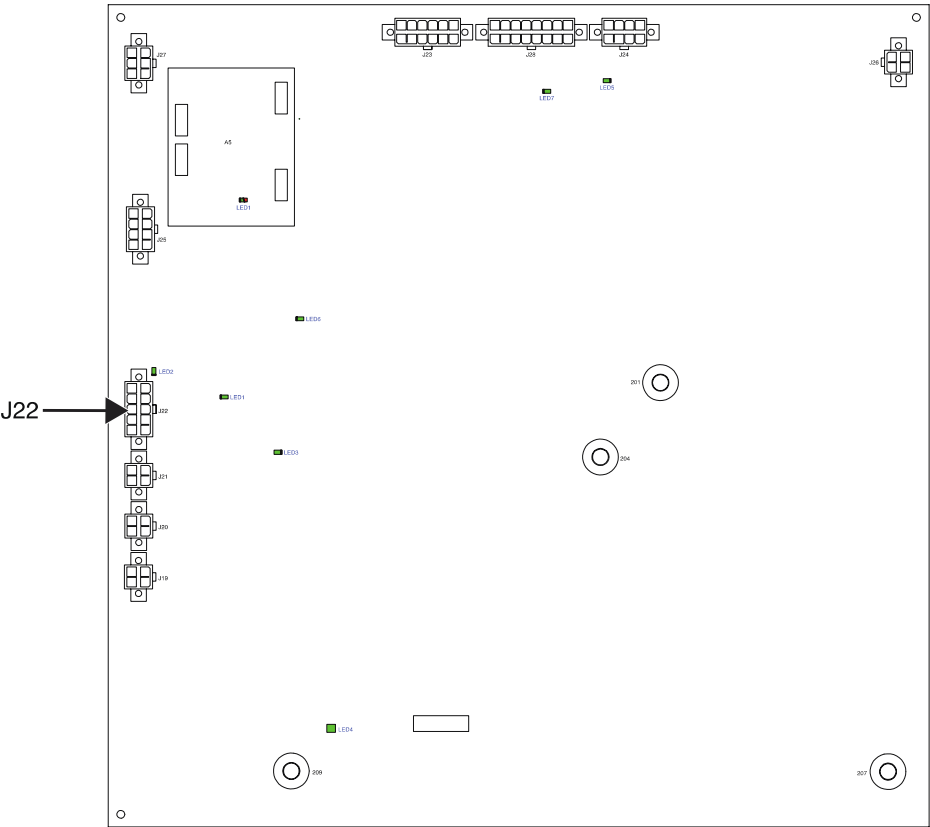
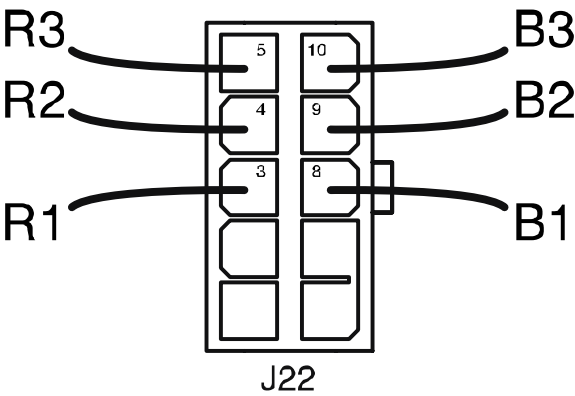


Figure F.33 – Switch board plug J22 lead locations



## POWER 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 determine if the Power Transformer (T1) is functioning properly.

### MATERIALS NEEDED

7/16" Nutdriver  
Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the power transformer (T1). See **Figure F.34**. See Wiring Diagram.
5. Using a 7/16" nutdriver, remove the two bolts, lock washers and flat washers securing the secondary transformer leads (X2 and X4) to the snubber board. See **Figure F.34**. See Wiring Diagram. Label and disconnect leads X2 and X4.
6. Using a 7/16" nutdriver, remove the two bolts, lock washers and flat washers securing the primary transformer leads (201 and 204) to the switch board. See **Figure F.35**. See Wiring Diagram. Label and disconnect leads 201 and 204.
7. Using a digital volt/ohmmeter, perform the resistance tests outlined in **Table F.12**. See Wiring Diagram.
8. If any of the tests fail, the power transformer (T1) may be faulty.
9. If faulty, perform the **Power Transformer (T1) Removal And Replacement Procedure**.
10. Using a 7/16" nutdriver, attach the two bolts, lock washers and flat washers securing the primary transformer leads (201 and 204) to the switch board. See Wiring Diagram.
11. Using a 7/16" nutdriver, attach the two bolts, lock washers and flat washers securing the secondary transformer leads (X11 and X13) to the snubber board. See Wiring Diagram.
12. Perform the **Case Cover Replacement Procedure**.

**Table F.12 – Power transformer (T1) resistance tests**

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
SECONDARY WINDING	SECONDARY WINDING LEAD X2 (DISCONNECTED FROM THE SNUBBER BOARD)	SECONDARY WINDING LEAD X4 (DISCONNECTED FROM THE SNUBBER BOARD)	VERY LOW RESISTANCE (LESS THAN ONE OHM)
PRIMARY WINDING	LEAD #201 (DISCONNECTED FROM THE SWITCH BOARD)	LEAD #204 (DISCONNECTED FROM THE SWITCH BOARD)	VERY LOW RESISTANCE (LESS THAN ONE OHM)
PRIMARY TO SECONDARY ISOLATION	LEAD #201 (DISCONNECTED FROM THE SWITCH BOARD)	SECONDARY WINDING LEAD X4 (DISCONNECTED FROM THE SNUBBER BOARD)	VERY HIGH RESISTANCE (GREATER THAN 500,000 OHMS)

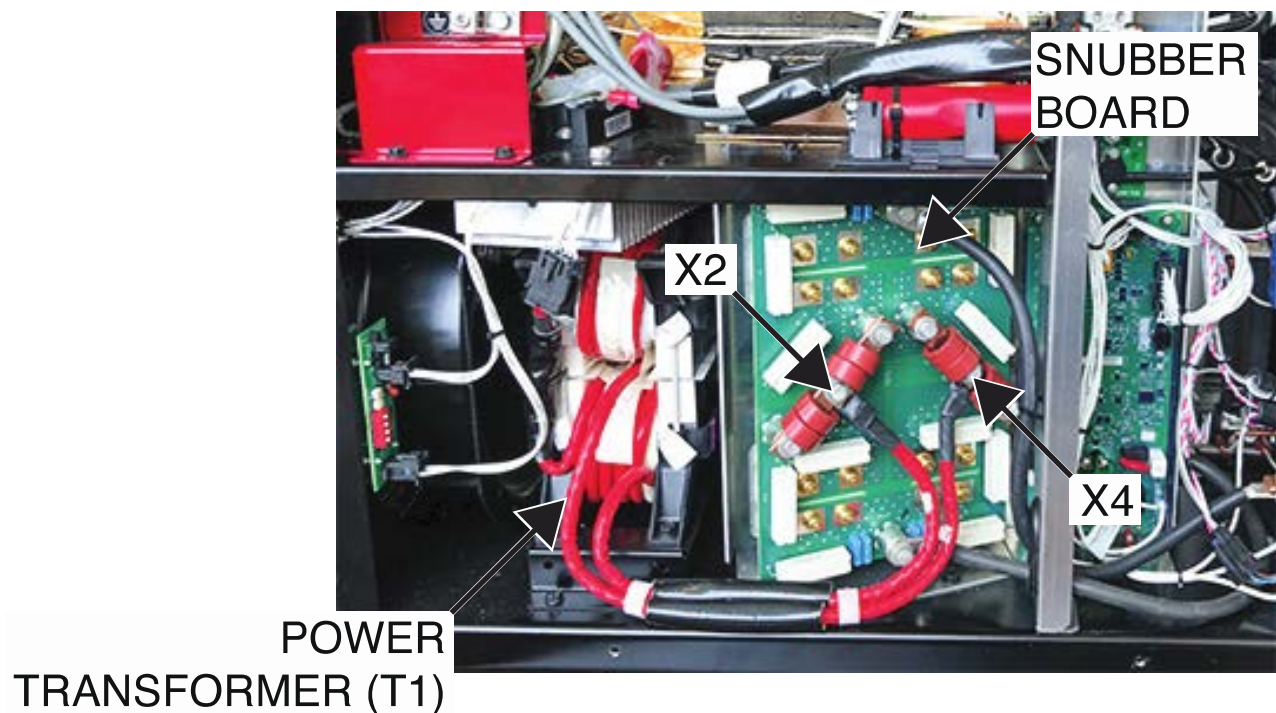
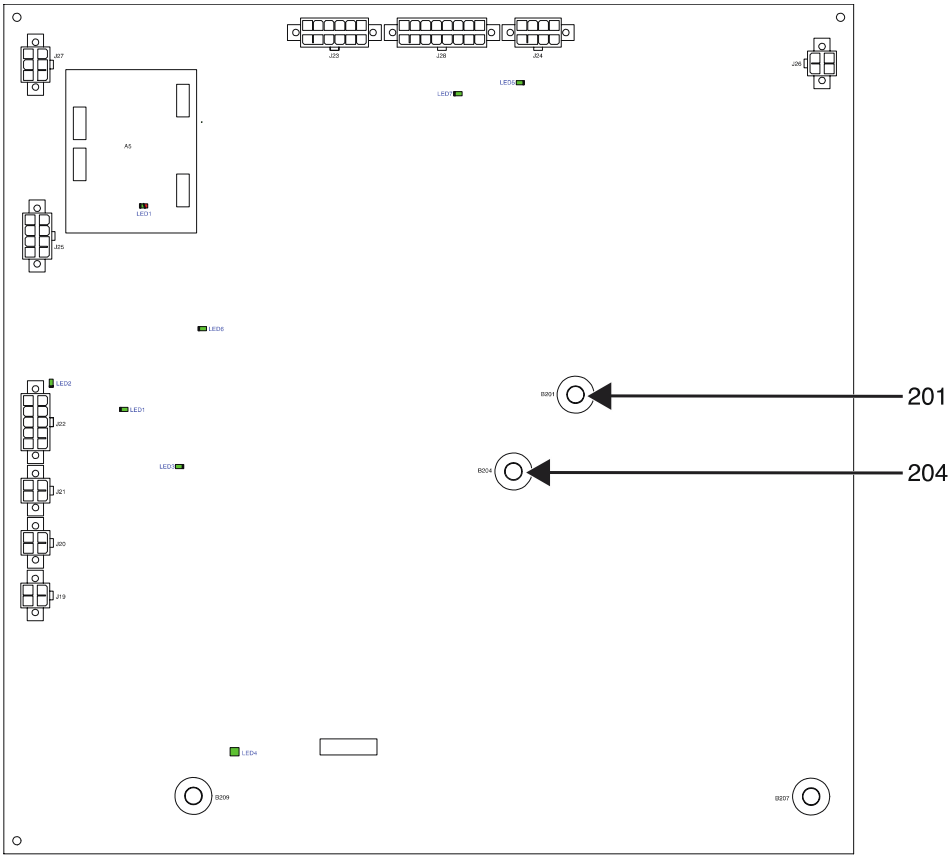
**Figure F.34 – Power transformer (T1) and snubber board lead locations**



Figure F.35 – Switch board terminals 201 and 204 locations



## VOLTAGE DIVIDER 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 determine if the Voltage Divider Board is functioning properly.

### MATERIALS NEEDED

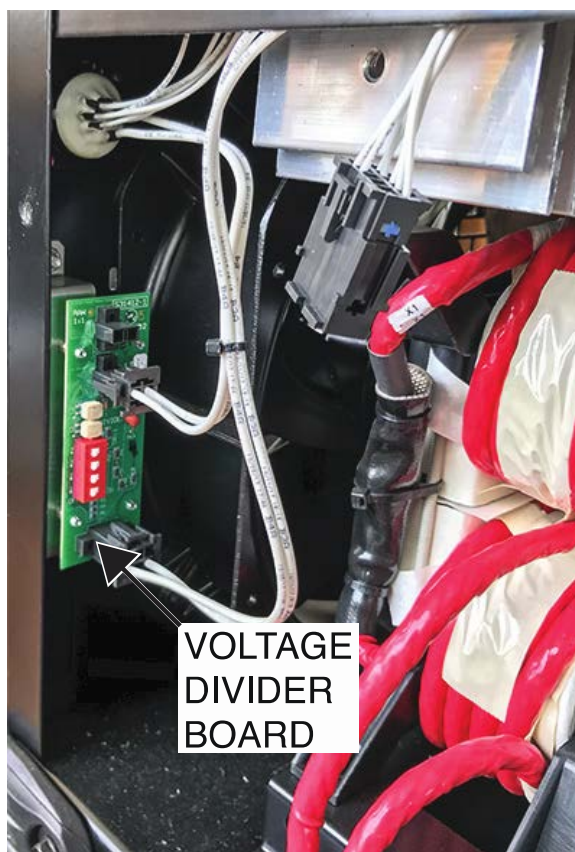
Load Bank  
Test Torch  
Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

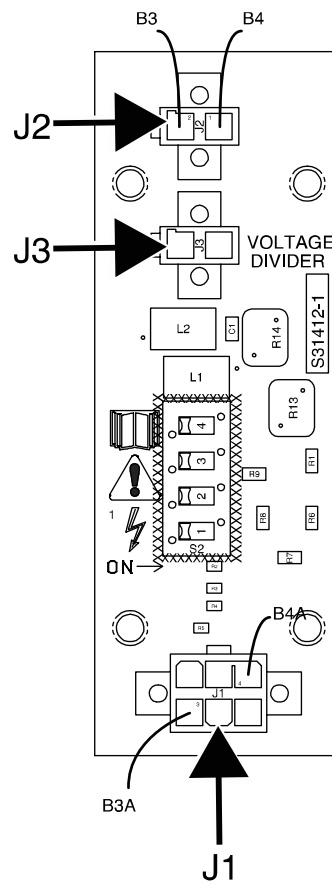
1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the voltage divider board. See **Figure F.36**. See Wiring Diagram.
5. Carefully apply the correct input power to the machine.
6. Place the line switch into the ON position.
7. Connect the load bank to the machine.
8. Turn ON the load bank.
9. Set the machine's output to 100A.
10. Set load bank to 250A.
11. Activate "Trigger" switch.
12. Activate "Master Load On" switch. Failure to complete this step within 5 seconds will activate a "Work Transfer Failed" fault.
13. Using a volt/ohmmeter, perform the voltage tests outlined in **Table F.13**. See **Figures F.36** and **F.37**. See Wiring Diagram.
14. Turn off and disconnect the load bank.
15. Carefully remove input power from the machine.
16. If any of the tests fail, the voltage divider board may be faulty.
17. If faulty, perform the **Voltage Divider Board Removal And Replacement Procedure**.
18. Perform the **Case Cover Replacement Procedure**.

**Table F.13 – Voltage divider board voltage tests**

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	COMPONENT TESTED
PLUG J1 PIN 3 (LEAD B3A)	PLUG J1 PIN 4 (LEAD B4A)	22 VDC	ARC VOLTAGE INPUT
PLUG J2 PIN 2 (LEAD B3)	PLUG J2 PIN 1 (LEAD B4)	22 VDC	ARC VOLTAGE OUTPUT
PLUG J3 PIN 2	PLUG J3 PIN 1	VARIOUS VOLTAGES	DIVIDED VOLTAGE DEPENDENT ON DIPSWITCH SETTINGS

**Figure F.36 – Voltage divider board location**

**Figure F.37 – Voltage divider board plug and lead locations**



## SNUBBER 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 determine if the Snubber Board is functioning properly.

### MATERIALS NEEDED

7/16" Nutdriver  
Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the snubber board. See **Figure F.38**. See Wiring Diagram.
5. Using a 7/16" nutdriver, remove the screw, lock washer and flat washer securing leads to terminals B4 and B6 on the snubber board. See **Figure F.39**. See Wiring Diagram.
6. Using a 7/16" nutdriver, remove the two screws, lock washers and flat washers securing bus bars to terminals B5 to B3 and terminals B1 to B2 on the snubber board. See **Figure F.39**. See Wiring Diagram. Note torroid placement for reassembly.
7. Using a volt/ohmmeter, perform the diode tests outlined in **Table F.14**. See **Figure F.39**. See Wiring Diagram.
8. If any of the tests fail, the snubber board may be faulty.
9. If faulty, perform the **Snubber Board Removal And Replacement Procedure**.
10. Using a 7/16" nutdriver, attach the two screws, lock washers and flat washers securing bus bars to terminals B5 to B3 and terminals B1 to B2 on the snubber board. See Wiring Diagram.
11. Using a 7/16" nutdriver, attach the screw, lock washer and flat washer securing leads to terminals B4 and B6 on the snubber board. See Wiring Diagram.
12. Perform the **Case Cover Replacement Procedure**.

**Table F.14 – Snubber board diode drop tests**

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	DIODE TESTED
B2	B6	.25V TO .70V	A1 (DIODE)
B5	B6	.25V TO .70V	A2 (DIODE)
B6	B2	OL	A2 (DIODE)
B6	B5	OL	A1 (DIODE)
B4	B1	.25V TO .70V	A4 (DIODE)
B4	B3	.25V TO .70V	A3 (DIODE)
B1	B4	OL	A4 (DIODE)
B3	B4	OL	A3 (DIODE)

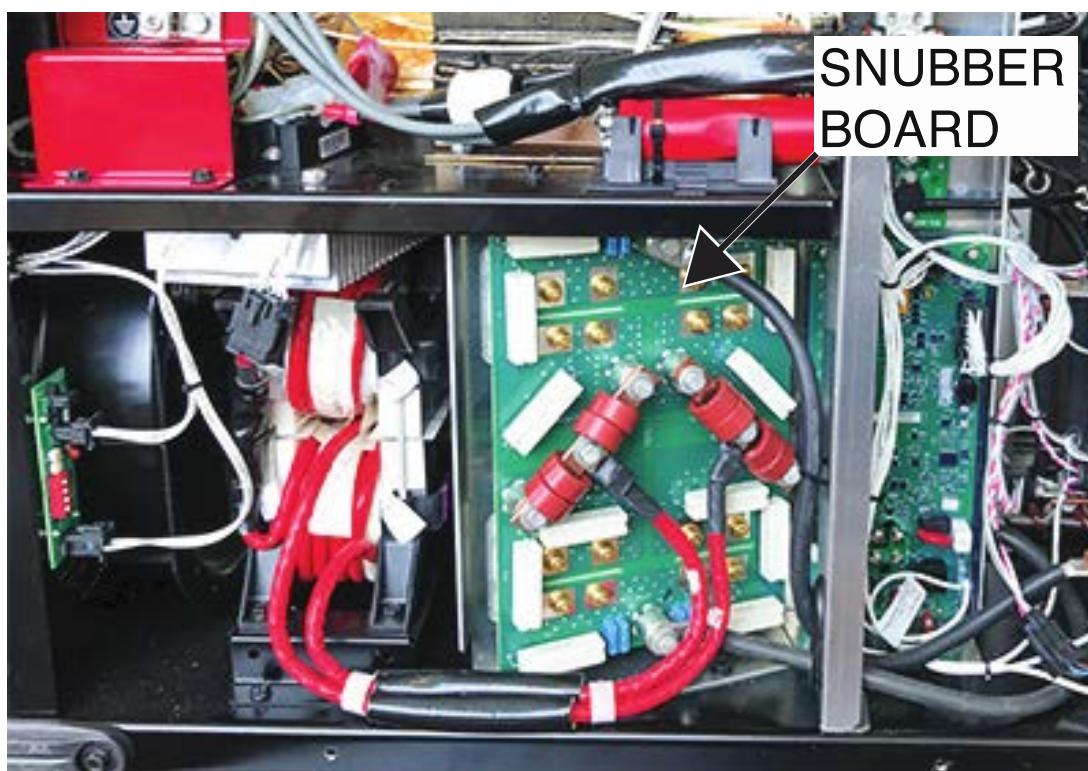
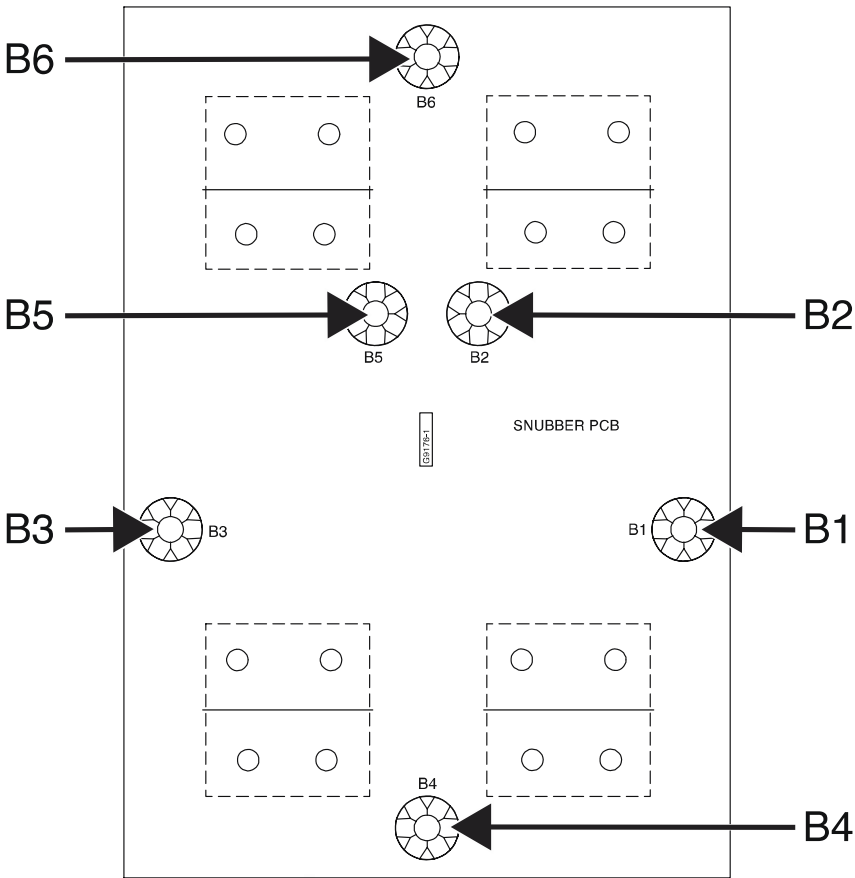
**Figure F.38 – Snubber board location**

Figure F.39 – Snubber board terminal locations



## PILOT 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 determine if the Pilot Board is functioning properly. This test will not test all sections of the pilot board.

### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the pilot board. See **Figure F.40**. See Wiring Diagram.
5. Using a volt/ohmmeter, perform the diode tests outlined in **Table F.15**. See **Figure F.41**. See Wiring Diagram.
6. If the diode tests fail, the isotop IGBT may be faulty.
7. If faulty, perform the **Isotop IGBT Removal And Replacement Procedure**.
8. Carefully apply the correct input power to the machine and turn ON the machine.
9. Perform the voltage tests outlined in **Table F.16**. See **Figures F.41** and **F.42**. See Wiring Diagram.
10. Perform the LED inspections outlined in **Table F.17**. See **Figure F.41**. See Wiring Diagram.
11. If any of the tests fail, the pilot board may be faulty.
12. If faulty, perform the **Pilot Board Removal And Replacement Procedure**.
13. Connect any previously disconnected leads.
14. Perform the **Case Cover Replacement Procedure**.

**Table F.15 – Pilot board diode drop tests**

TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	IGBT TESTED
B11	B10	.25V TO .70V	A3 (IGBT)
B10	B11	OL	A3 (IGBT)



**Table F.16 – Pilot board voltage tests**

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING	CONDITION
INPUT POWER SUPPLY FROM THE SWITCH BOARD	PLUG J1 PIN 16 (LEAD 296)	PLUG J1 PIN 8 (LEAD 288)	15 VDC	MACHINE ON.
	PLUG J5 PIN 2 (LEAD 77)	PLUG J5 PIN 4 (LEAD 75)	10 VDC	MACHINE IDLE / NO OUTPUT
	PLUG J3 PIN 9 (LEAD HOLD2)	PLUG J3 PIN 3 (LEAD HOLD1)	15 VDC	MACHINE IDLE / NO OUTPUT
	PLUG J3 PIN 10 (LEAD CCR2)	PLUG J3 PIN 4 (LEAD CCR1)	15 VDC	MACHINE IDLE / NO OUTPUT
	PLUG J3 PIN 7 (LEAD TRIG 2)	PLUG J3 PIN 1 (LEAD TRIG 1)	15 VDC	MACHINE IDLE / NO OUTPUT
	PLUG J3 PIN 8 (LEAD PROC B)	PLUG J3 PIN 2 (LEAD PROC A)	15 VDC	MACHINE IDLE / NO OUTPUT

**Table F.17 – Pilot board LED descriptions**

LED #	COLOR	FUNCTION
1	GREEN	15V POWER "OK"
2	RED	ILLUMINATES WHEN PILOT IGBT IS CLOSED (PILOT ON)
3	GREEN	+15V PILOT SUPPLY "OK"
	OFF	PILOT IS LIKELY SHORTED
4	GREEN	ILLUMINATES WHEN ARC ESTABLISHED IS ENABLED
5	GREEN	ILLUMINATES WHEN TRIGGER IS ENABLED
6	GREEN	ILLUMINATES WHEN PROCEDURE SELECT SWITCH IS ENABLED
7	GREEN	ILLUMINATES WHEN PARTS IN PLACE IS CLOSED
8	GREEN	ILLUMINATES WHEN HOLD SIGNAL IS ENABLED
9	GREEN	ILLUMINATES WHEN CORNER CURRENT REDUCTION SIGNAL IS ENABLED
11	GREEN	ILLUMINATES WHEN MISC1 SIGNAL IS ENABLED
12	GREEN	ILLUMINATES WHEN MISC2 SIGNAL IS ENABLED

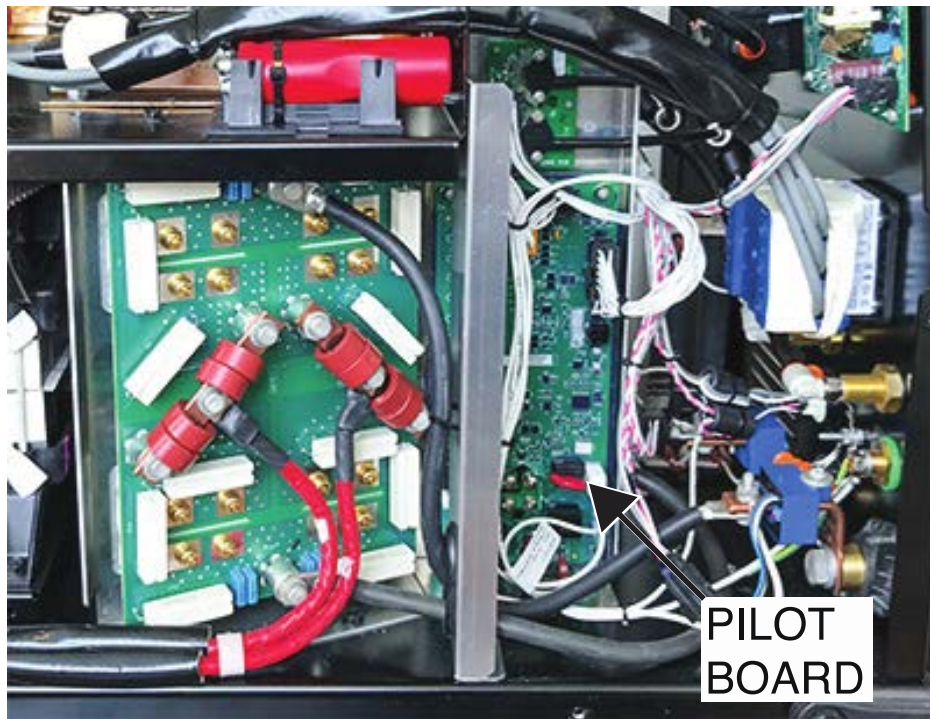
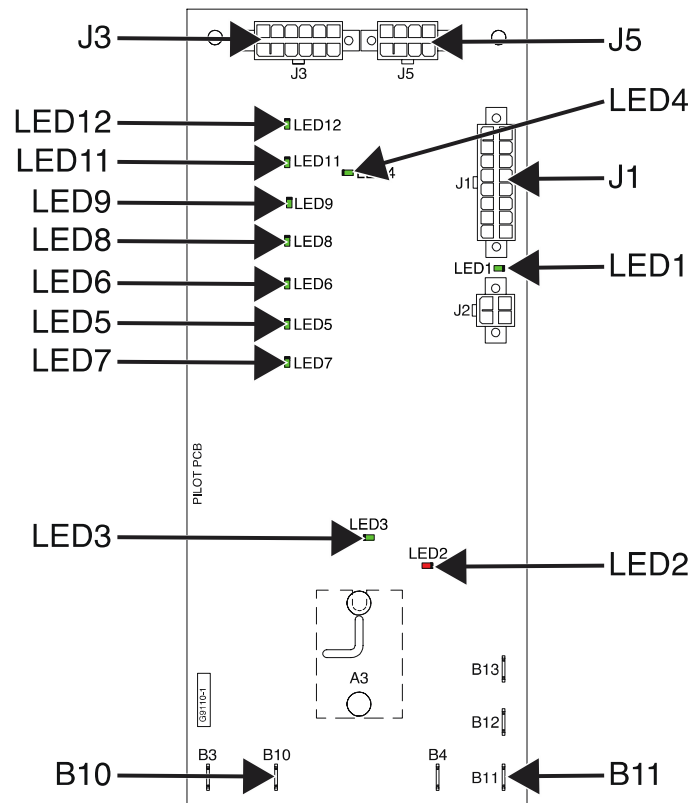
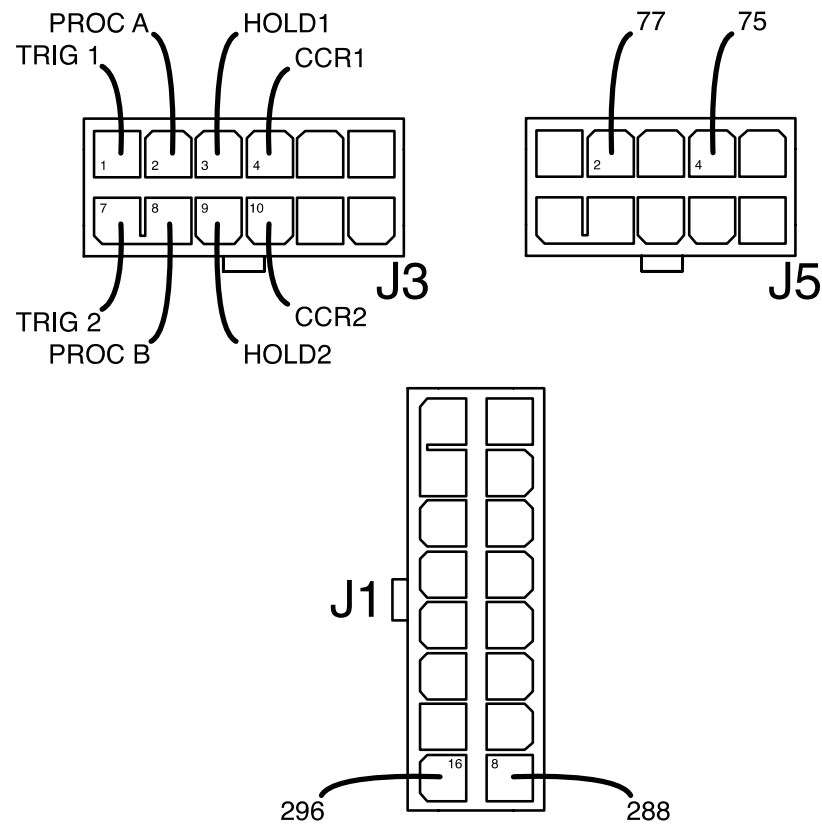
**Figure F.40 – Pilot board location****Figure F.41 – Pilot board LED and plug locations**

Figure F.42 – Pilot board lead locations



## MAIN CURRENT 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 determine if the Main Current LEM is functioning properly.

### MATERIALS NEEDED

Load Bank  
Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the main current LEM. See **Figure F.43**.
5. Locate plug J23 on the switch board. See **Figure F.44**. See Wiring Diagram.
6. Carefully apply the correct input power to the FlexCut 200 and turn the machine ON.
7. Using a volt/ohmmeter, carefully check for the DC supply voltages to the main current LEM per **Table F.18**. See **Figure F.44**. See Wiring Diagram.  
**NOTE:** Do not attempt to check the voltages at the main current LEM 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 switch board, perform the **Switch Board Test Procedure**.
9. Using a load bank, load the machine according to **Table F.19**. See Wiring Diagram.
10. Using a volt/ohmmeter, test the main current LEM feedback versus actual output current. See **Table F.19**. See **Figure F.44**. See Wiring Diagram.
11. If the DC supply voltages are correct but the feedback voltages are incorrect the main current LEM may be faulty.
12. If faulty, perform the **Main Current LEM Removal And Replacement Procedure**.
13. Perform the **Case Cover Replacement Procedure**.

**Table F.18 – Main current LEM voltage tests**

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
POSITIVE VOLTAGE SUPPLY	PLUG J23 PIN 1 (LEAD 231)	PLUG J23 PIN 7 (LEAD 237)	+15 VDC
NEGATIVE VOLTAGE SUPPLY	PLUG J23 PIN 2 (LEAD 232)	PLUG J23 PIN 7 (LEAD 237)	-15 VDC

**Table F.19 – Main current LEM feedback versus actual output current**

ACTUAL OUTPUT CURRENT (AMPS)	TEST POINT (POS)	TEST POINT (NEG)	CURRENT LEM FEEDBACK VOLTAGE
500	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	4.0 VDC
450	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	3.6 VDC
400	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	3.2 VDC
350	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	2.8 VDC
300	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	2.4 VDC
250	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	2.0 VDC
200	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	1.6 VDC
150	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	1.2 VDC
100	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	0.8 VDC
50	PLUG J23 PIN 8 (LEAD 238)	PLUG J23 PIN 7 (LEAD 237)	0.4 VDC

Figure F.43 – Main current LEM location

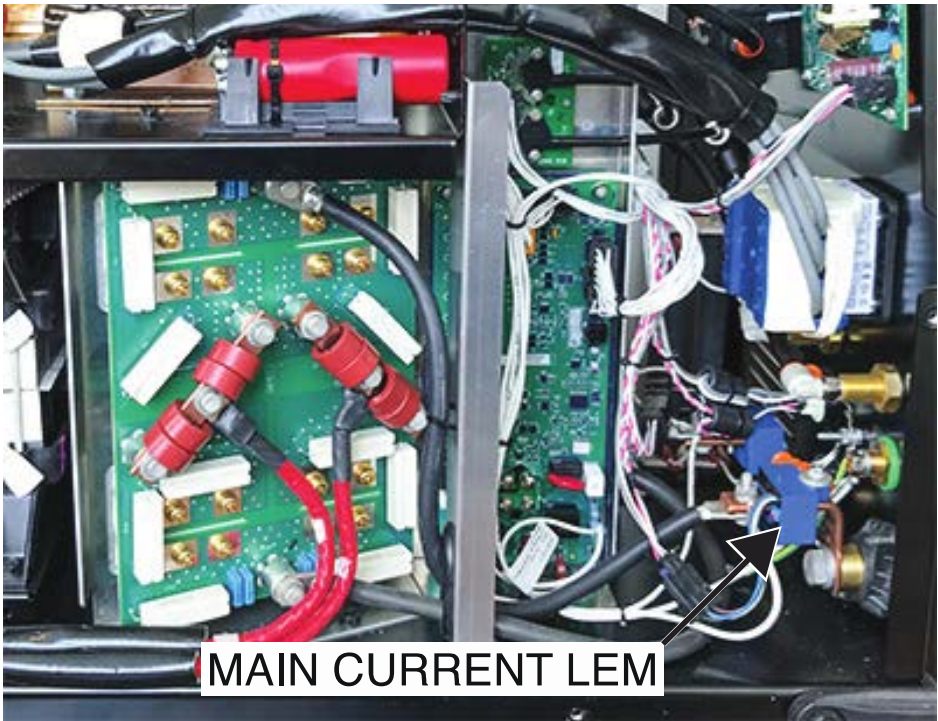
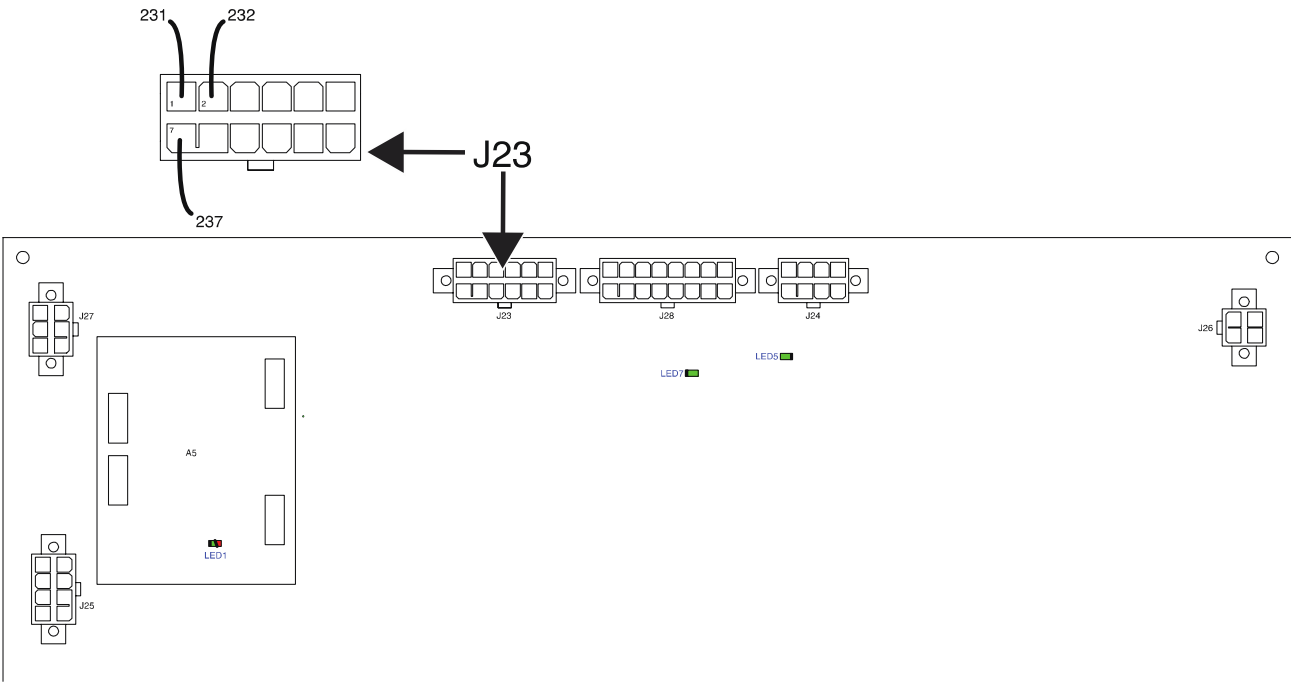


Figure F.44 – Switch board plug J23 pin and lead locations



## PILOT CURRENT 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 determine if the Pilot Current LEM is functioning properly.

### MATERIALS NEEDED

Load Bank  
Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Locate the pilot current LEM. See **Figure F.45**.
5. Locate plug J23 on the switch board. See **Figure F.46**. See Wiring Diagram.
6. Carefully apply the correct input power to the FlexCut 200 and turn the machine ON.
7. Using a volt/ohmmeter, carefully check for the DC supply voltages to the pilot current LEM per **Table F.20**. See **Figure F.46**. See Wiring Diagram.  
**NOTE:** Do not attempt to check the voltages at the pilot current LEM 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 switch board, perform the **Switch Board Test Procedure**.
9. Using a load bank, load the machine according to **Table F.21**. See Wiring Diagram.
10. Using a volt/ohmmeter, test the pilot current feedback versus actual output current. See **Table F.21**. See **Figure F.46**. See Wiring Diagram.
11. If the DC supply voltages are correct but the feedback voltages are incorrect the pilot current LEM may be faulty.
12. If faulty, perform the **Pilot Current LEM Removal And Replacement Procedure**.
13. Perform the **Case Cover Replacement Procedure**.

**Table F.20 – Pilot current LEM voltage tests**

DESCRIPTION	TEST POINT (POS)	TEST POINT (NEG)	EXPECTED READING
POSITIVE VOLTAGE SUPPLY	PLUG J23 PIN 3 (LEAD 233)	PLUG J23 PIN 9 (LEAD 239)	+15 VDC
NEGATIVE VOLTAGE SUPPLY	PLUG J23 PIN 4 (LEAD 234)	PLUG J23 PIN 9 (LEAD 239)	-15 VDC

**Table F.21 – Pilot current LEM feedback versus actual output current**

ACTUAL OUTPUT CURRENT (AMPS)	TEST POINT (POS)	TEST POINT (NEG)	CURRENT LEM FEEDBACK VOLTAGE
500	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	4.0 VDC
450	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	3.6 VDC
400	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	3.2 VDC
350	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	2.8 VDC
300	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	2.4 VDC
250	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	2.0 VDC
200	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	1.6 VDC
150	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	1.2 VDC
100	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	0.8 VDC
50	PLUG J23 PIN 10 (LEAD 240)	PLUG J23 PIN 9 (LEAD 239)	0.4 VDC



Figure F.45 – Pilot current LEM location

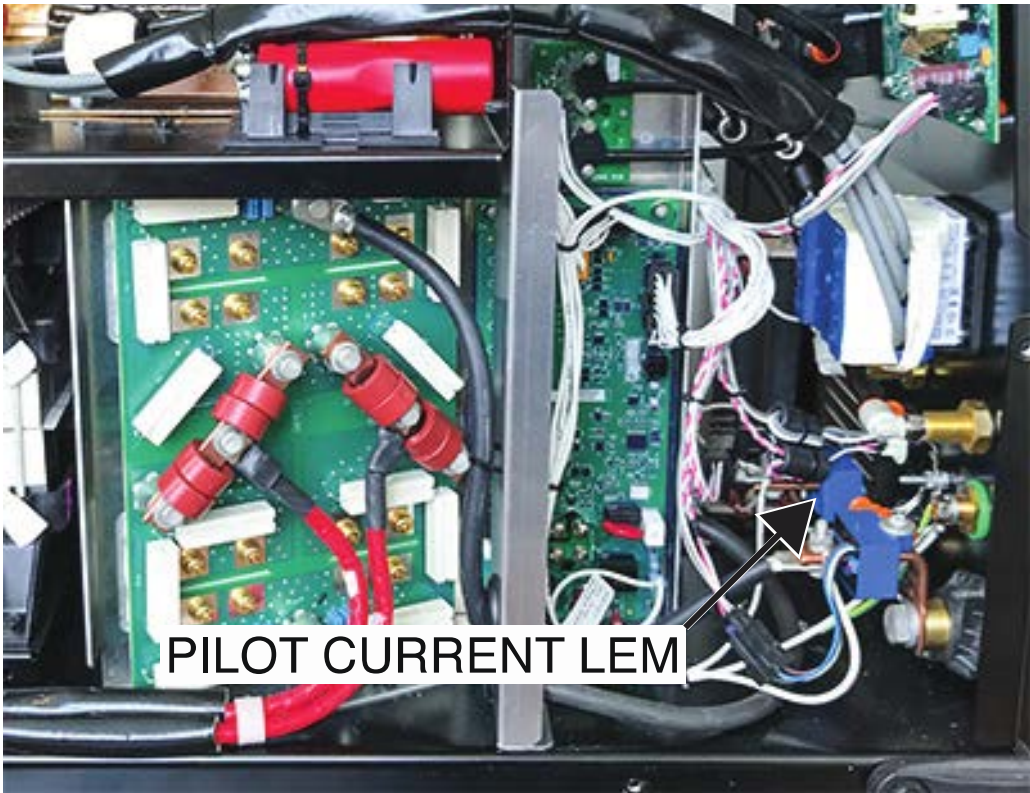
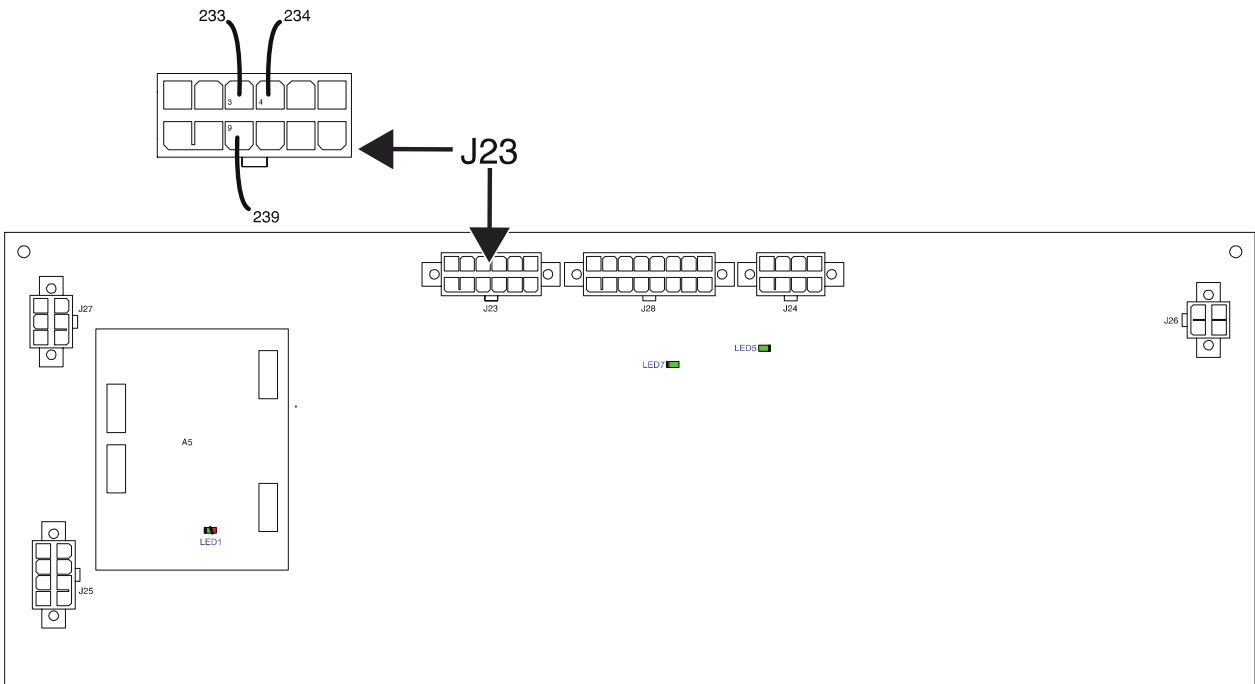


Figure F.46 – Switch board plug J23 pin and lead locations



## ARCLINK I/O 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 determine if the ArcLink I/O Board is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Locate the arclink I/O board. See ***Figure F.47***. See Wiring Diagram.
5. Carefully apply the correct input power to the machine and turn ON the machine.
6. Perform the voltage tests outlined in ***Table F.22***. See ***Figures F.48*** and ***F.49***. See Wiring Diagram.
7. Perform the LED inspections outlined in ***Tables F.23*** and ***F.24***. See ***Figure F.48***. See Wiring Diagram.
8. If any of the tests fail, the arclink I/O board may be faulty.
9. If faulty, perform the ***ArcLink I/O Board Removal And Replacement Procedure***.
10. Connect any previously disconnected leads.
11. Perform the ***Case Cover Replacement Procedure***.

**Table F.22 – Arclink I/O board voltage tests**

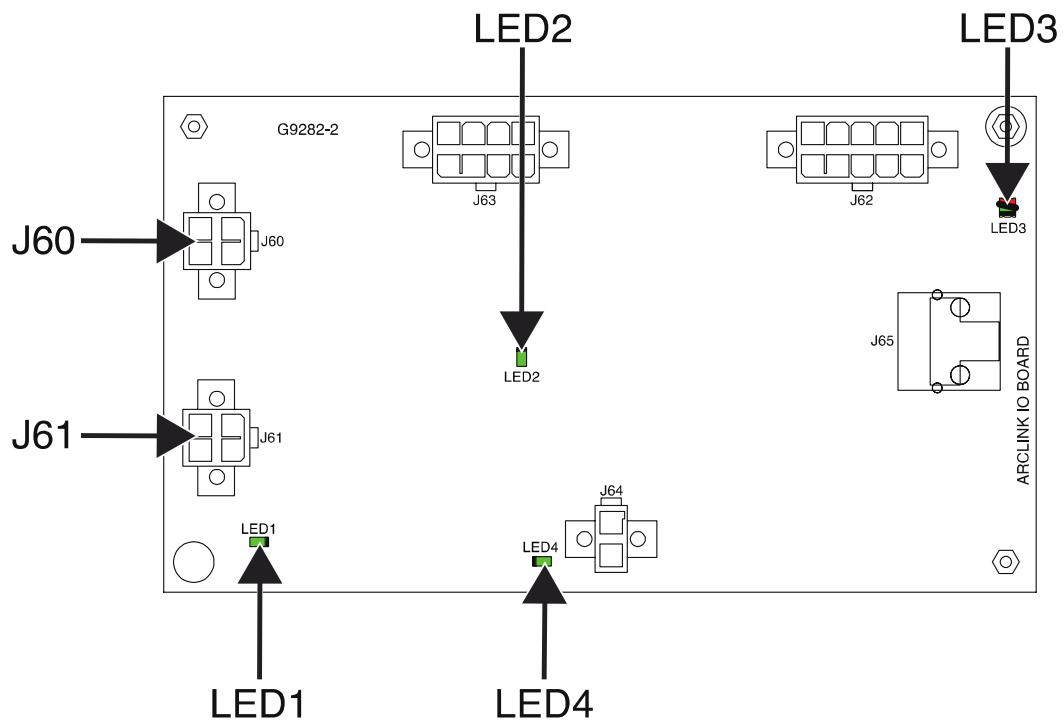
DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
INPUT VOLTAGE FROM SWITCH BOARD	PLUG J60 PIN 4 (LEAD 52D)	PLUG J60 PIN 3 (LEAD 51D)	40 VDC
CAN SIGNAL	PLUG J60 PIN 1 (LEAD 53D)	PLUG J60 PIN 2 (LEAD 54D)	2 VDC
OUTPUT VOLTAGE TO ARCLINK CONNECTOR	PLUG J61 PIN 4 (LEAD 52)	PLUG J61 PIN 3 (LEAD 51)	40 VDC
CAN SIGNAL	PLUG J61 PIN 1 (LEAD 53)	PLUG J61 PIN 2 (LEAD 54)	2 VDC

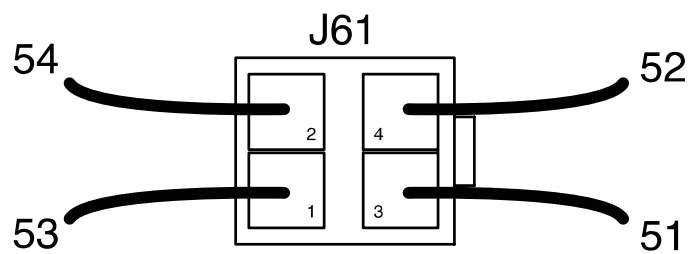
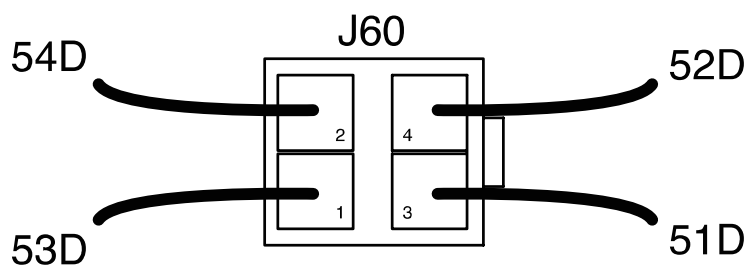
**Table F.23 – Arclink I/O board LED descriptions**

LED #	COLOR	FUNCTION
1	GREEN	+5V CAN COMMUNICATION POWER "OK"
2	GREEN	+12V CAN COMMUNICATION POWER "OK"
3	GREEN/ RED	SYSTEM STATUS LED
4	GREEN	+5V NTC SENSOR POWER "OK"

**Table F.24 – Arclink I/O board LED conditions**

LIGHT CONDITION	MEANING
STEADY GREEN	SYSTEM OK.
ALTERNATING GREEN AND RED	A SYSTEM FAULT HAS OCCURRED. IF THE ARCLINK I/O 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 <b>ERROR CODES</b> IN TROUBLESHOOTING GUIDE.

**Figure F.47 – Arclink I/O board location****Figure F.48 – Arclink I/O board plug and LED locations**

**Figure F.49 – Arclink I/O board lead locations**

## PRESSURE SENSE 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

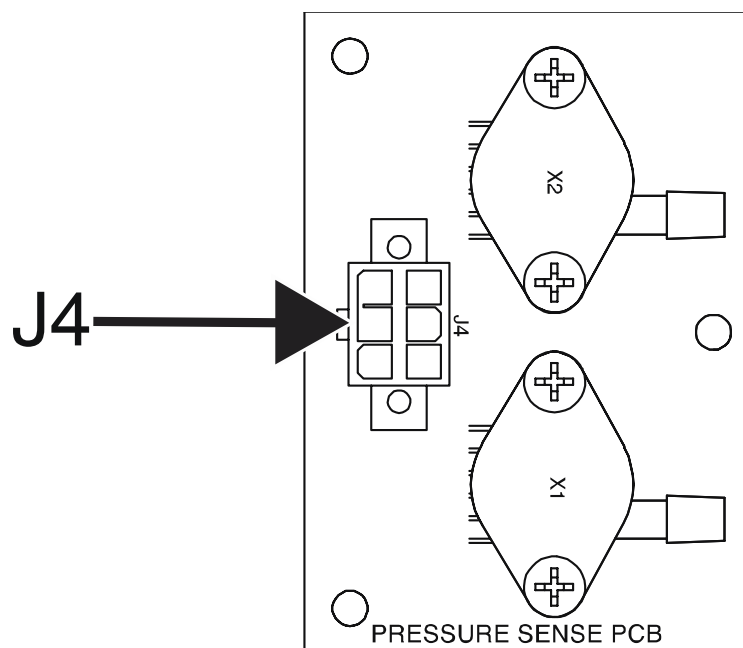
This test will determine if the Pressure Sense Board is functioning properly.

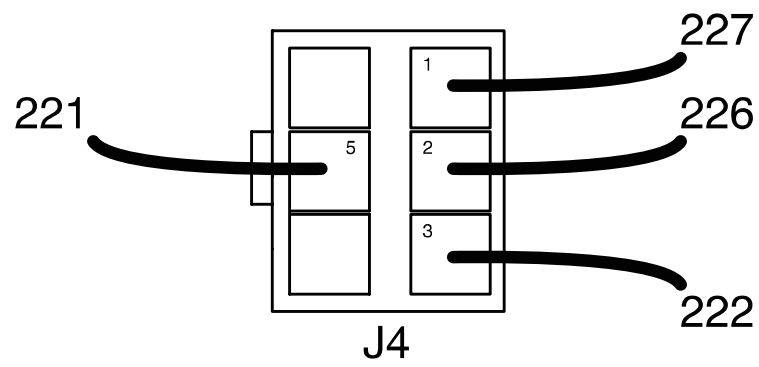
### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Locate the pressure sense board. See ***Figure F.50***. See Wiring Diagram.
5. Carefully apply the correct input power to the machine.
6. Using a volt/ohmmeter, measure the voltage from plug J4 pin 3 (lead 222) to plug J4 pin 1 (lead 227). Voltage should read 5 VDC. See ***Figures F.51*** and ***F.52***. See Wiring Diagram.
7. Using a volt/ohmmeter, measure the voltage from plug J4 pin 2 (lead 226) to plug J4 pin 1 (lead 227). Voltage should read 2 VDC @ 0 p.s.i. plasma gas pressure.  $PSI = (V_{out} - 0.2) * 153.846$ . See ***Figures F.51*** and ***F.52***. See Wiring Diagram.
8. Using a volt/ohmmeter, measure the voltage from plug J4 pin 5 (lead 221) to plug J4 pin 1 (lead 227). Voltage should read 2 VDC @ 0 p.s.i. shielding gas pressure.  $PSI = (V_{out} - 0.2) * 153.846$ . See ***Figures F.51*** and ***F.52***. See Wiring Diagram.
9. If any of the tests fail, the pressure sense board may be faulty.
10. If faulty, perform the ***Pressure Sense Board Removal And Replacement Procedure***.
11. Perform the ***Case Cover Replacement Procedure***.

**Figure F.50 – Pressure sense board location****Figure F.51 – Pressure sense board plug J4 location**

**Figure F.52 – Pressure sense board lead locations**



## 40 VDC 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 determine if the 40 VDC Bus Board is functioning properly.

### MATERIALS NEEDED

Volt/Ohmmeter  
Wiring Diagram

### TEST PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Carefully apply the correct input power to the FlexCut 200 machine and turn on the machine ON.
5. Locate the 40 VDC bus board. See **Figure F.53**.
6. Locate the Red LED on the 40 VDC bus board. See **Figure F.54**.
7. If the Red LED is illuminated the 40 VDC bus board is receiving rectified and filtered input voltage from the auxiliary transformer (T2).
8. If the Red LED is not illuminated, perform the **Auxiliary Transformer (T2) Test Procedure** and the **Auxiliary Rectifier (D4) Test Procedure**. See Wiring Diagram.
9. If the input voltage is significantly less than 70 VDC, the capacitor (C1) may be faulty.
10. Using a volt/ohmmeter, perform the voltage tests outlined in **Table F.25**. See **Figure F.55**. See Wiring Diagram.
11. If the correct input voltage is being applied to the 40 VDC bus board and the correct output voltages are not being generated, the 40 VDC bus board may be faulty.
12. If faulty, perform the **40 VDC Bus Board Removal And Replacement Procedure**.
13. Perform the **Case Cover Replacement Procedure**.

**Table F.25 – 40 VDC bus board voltage tests**

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
INPUT POWER FROM AUXILIARY RECTIFIER (D4)	PLUG J1 PIN 1 (LEAD POS)	PLUG J1 PIN 3 (LEAD NEG)	APPROX. 70 VDC
INPUT POWER FROM AUXILIARY RECTIFIER (D4)	PLUG J1 PIN 2 (LEAD POS)	PLUG J1 PIN 4 (LEAD NEG)	APPROX. 70 VDC
INPUT POWER TO SWITCH BOARD	PLUG J2 PIN 5 (LEAD 51B)	PLUG J2 PIN 7 (LEAD 52B)	40 VDC
INPUT POWER TO USER INTERFACE BOARD	PLUG J2 PIN 2 (LEAD 51C)	PLUG J2 PIN 4 (LEAD 52C)	40 VDC

**Figure F.53 – 40 VDC bus board location**

Figure F.54 – 40 VDC bus board LED and plug locations

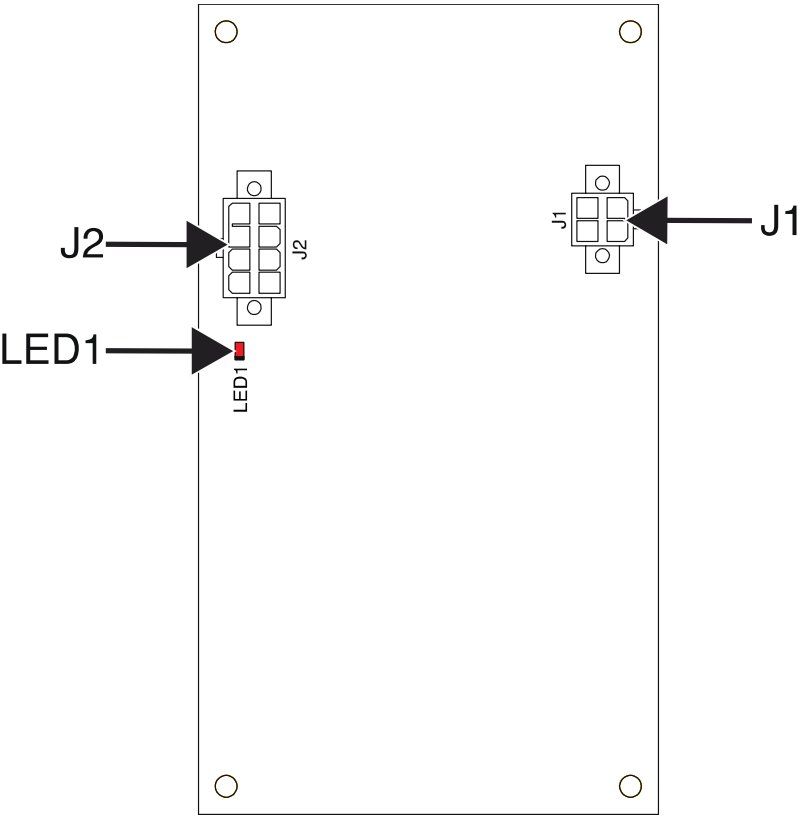
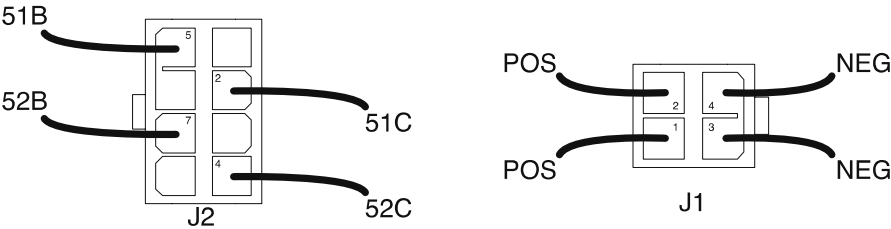


Figure F.55 – 40 VDC bus board lead locations



# Removal And Replacement Procedures

## INPUT RECTIFIER (D1) 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 Rectifier (D1).

### MATERIALS NEEDED

5/16" Nutdriver  
Torx Nutdriver (Size T25)  
Silicone Sealant  
Dow Corning 340 Heat Sink Compound (Lincoln Part #T12837)  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Using a 5/16" nutdriver, remove the five screws, lock washers and flat washers securing the leads to the input rectifier (D1). See ***Figure F.56***. See Wiring Diagram.
5. Label and disconnect leads 207, 209, L1A, L1B, L2A, L3A and H1 from the input rectifier (D1). See ***Figure F.57***. See Wiring Diagram.
6. Using a Torx Nutdriver (size T25), remove the two screws, lock washers and flat washers securing the input rectifier (D1) to the heat sink. See ***Figure F.57***.
7. The input rectifier (D1) can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Apply a thin coating of Dow Corning 340 heat sink compound to the mating surfaces of the input rectifier (D1) and the heat sink.
2. Carefully position the new input rectifier (D1) onto the heat sink.
3. Using a Torx Nutdriver (size T25), attach the two screws, lock washers and flat washers securing the input rectifier (D1) to the heat sink.

4. Connect leads 207, 209, L1A, L1B, L2A, L3A and H1 to the input rectifier (D1). See Wiring Diagram.
5. Using a 5/16" nutdriver, attach the five screws, lock washers and flat washers securing the leads to the input rectifier (D1). See Wiring Diagram.
6. Apply a heavy coating of silicone sealant to protect the lead connection points.
7. Perform the **Case Cover Replacement Procedure**.
8. Perform the **Retest After Repair Procedure**.

Figure F.56 – Input rectifier (D1) lead locations

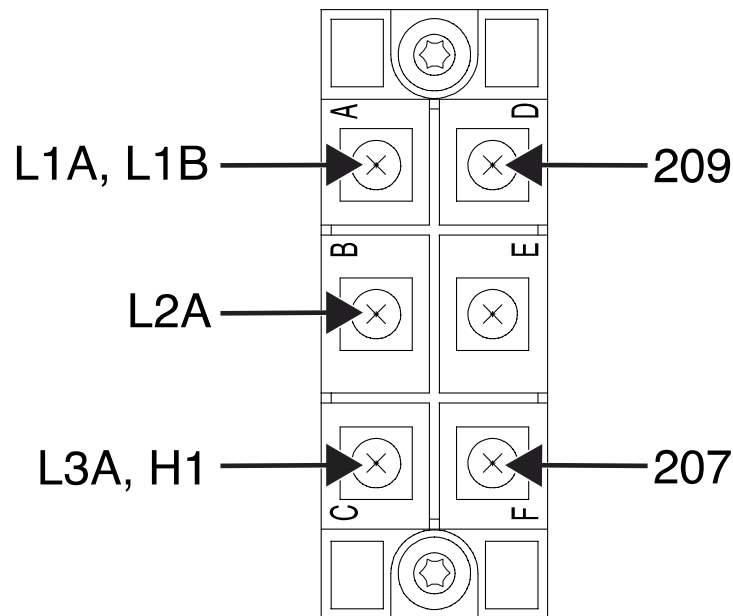
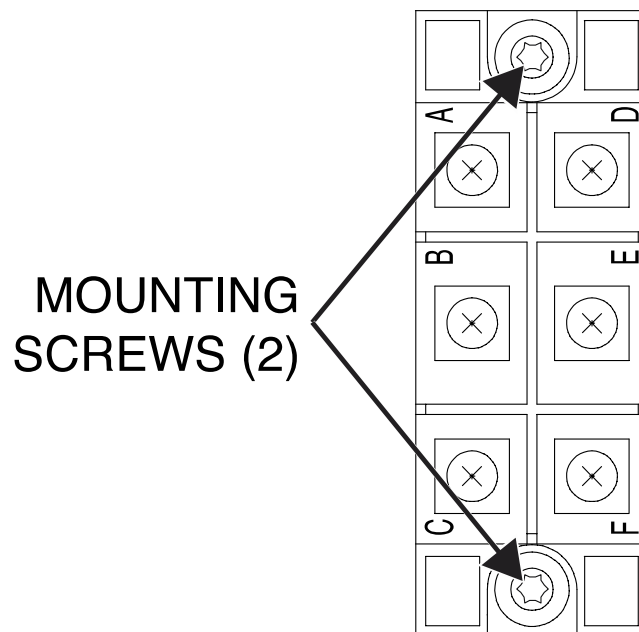


Figure F.57 – Input rectifier (D1) mounting hardware locations



## AUXILIARY TRANSFORMER (T2) 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 (T2).

### MATERIALS NEEDED

Phillips Screwdriver  
7/16" Nutdriver  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect lead X13A from circuit breaker CB1 and route lead thru the upper shelf. See **Figure F.58**. See Wiring Diagram.
5. Label and disconnect lead X12 from circuit breaker CB2. See **Figure F.58**. See Wiring Diagram.
6. Label and disconnect lead X14A from the auxiliary rectifier (D4). See **Figure F.59**. See Wiring Diagram.
7. Label and disconnect lead X11 from it's quick connect terminal. See Wiring Diagram.
8. Label and disconnect leads H4, H5 and H6 from the reconnect panel. See **Figure F.60**. See Wiring Diagram.
9. Cut cable ties as necessary to allow for the removal of the auxiliary transformer (T2).
10. Using a Phillips screwdriver, remove the screw, lock washer and flat washer securing lead H1 to the input rectifier (D1). See **Figure F.61**. See Wiring Diagram.
11. Using a 7/16" nutdriver, remove the three nuts and lock washers securing the auxiliary transformer (T2) to the upper shelf. See **Figure F.62**.
12. The auxiliary transformer (T2) can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully position the new auxiliary transformer (T2) onto the upper shelf.
2. Using a 7/16" nutdriver, attach the three nuts and lock washers securing the auxiliary transformer (T2) to the upper shelf.

3. Using a Phillips screwdriver, attach the screw, lock washer and flat washer securing lead H1 to the input rectifier (D1). See Wiring Diagram.
4. Connect leads H4, H5 and H6 to the reconnect panel. See Wiring Diagram.
5. Connect lead X11 to it's quick connect terminal. See Wiring Diagram.
6. Connect lead X14A to the auxiliary rectifier (D4). See Wiring Diagram.
7. Connect lead X12 to circuit breaker CB2. See Wiring Diagram.
8. Connect lead X13A to circuit breaker CB1 and route lead thru the upper shelf. See Wiring Diagram.
9. Replace any previously removed cable ties as necessary.
10. Perform the **Case Cover Replacement Procedure**.
11. Perform the **Retest After Repair Procedure**.

**Figure F.58 – Circuit breaker CB1 and CB2 locations**

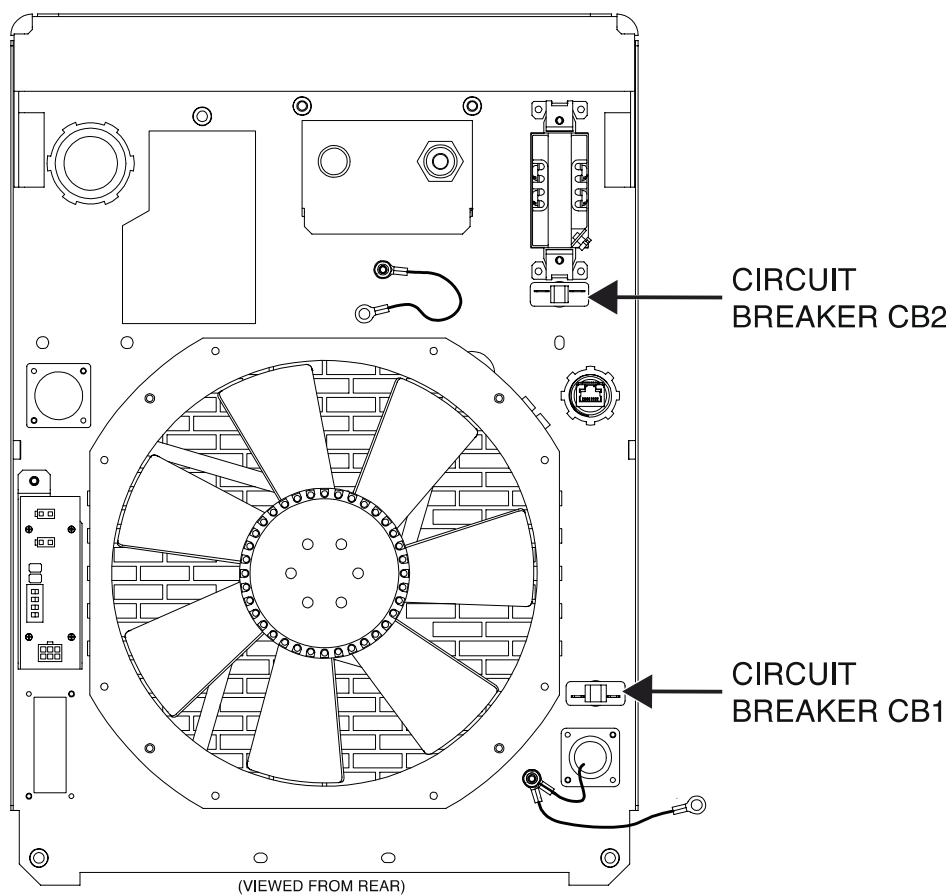


Figure F.59 – Auxiliary rectifier (D4) lead location

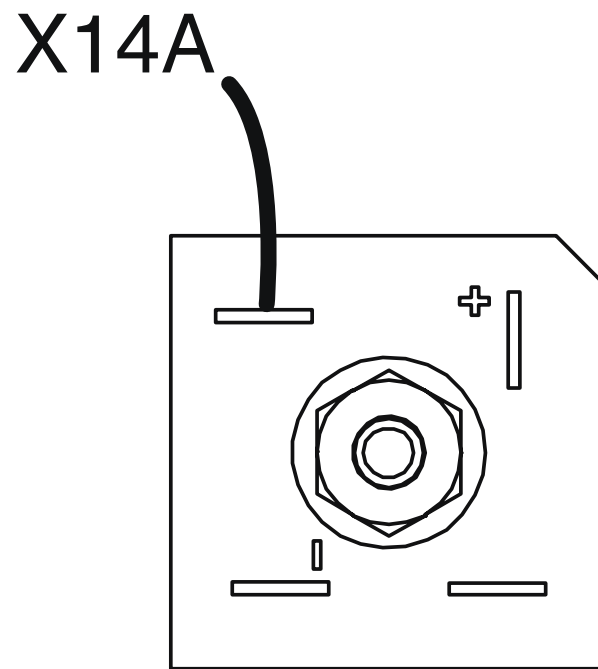


Figure F.60 – Reconnect panel location

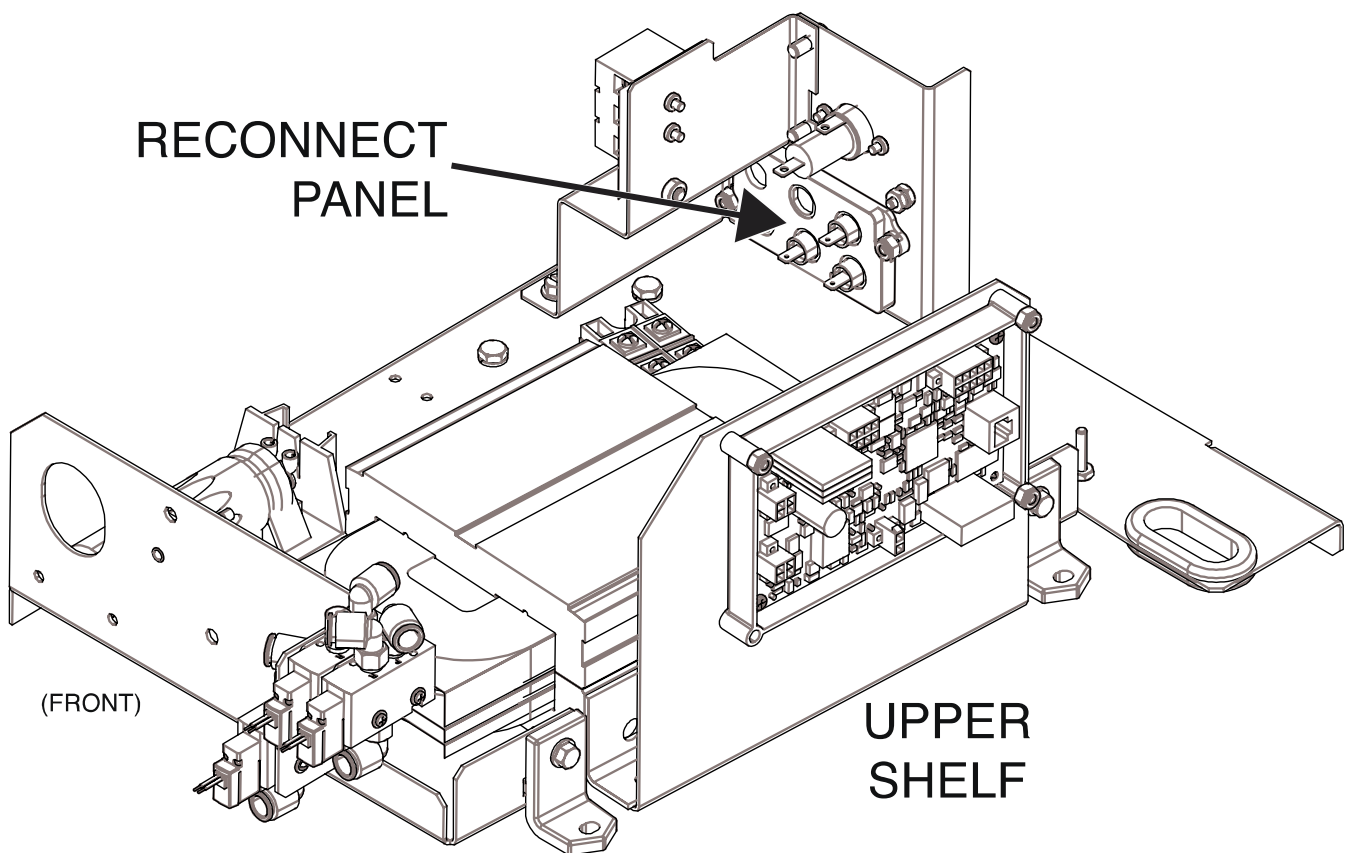




Figure F.61 – Input rectifier (D1) lead H1 location

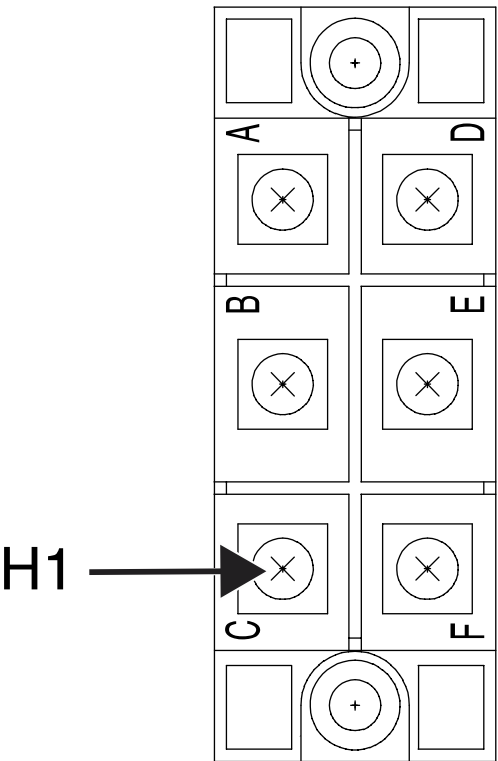
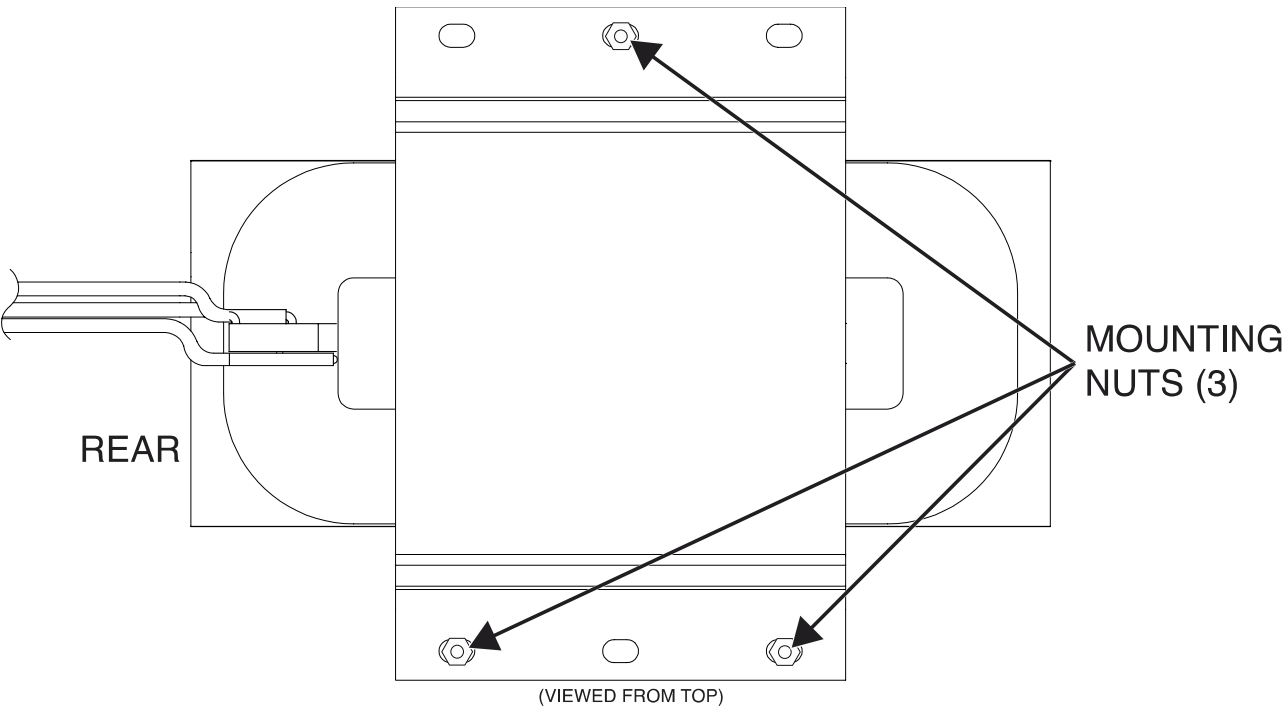


Figure F.62 – Auxiliary transformer (T2) mounting hardware locations



## FAN 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

3/8" Nutdriver  
7/16" Nutdriver  
Small Slotted Screwdriver  
Wiring Diagram

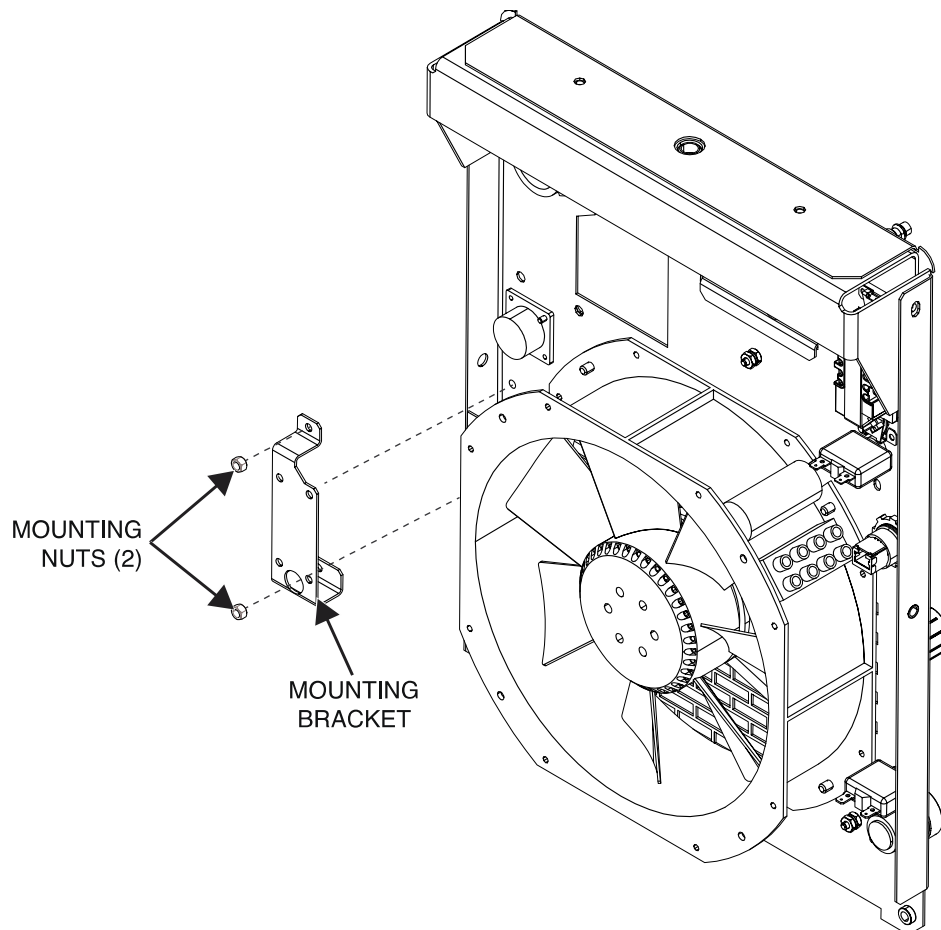
### REMOVAL PROCEDURE

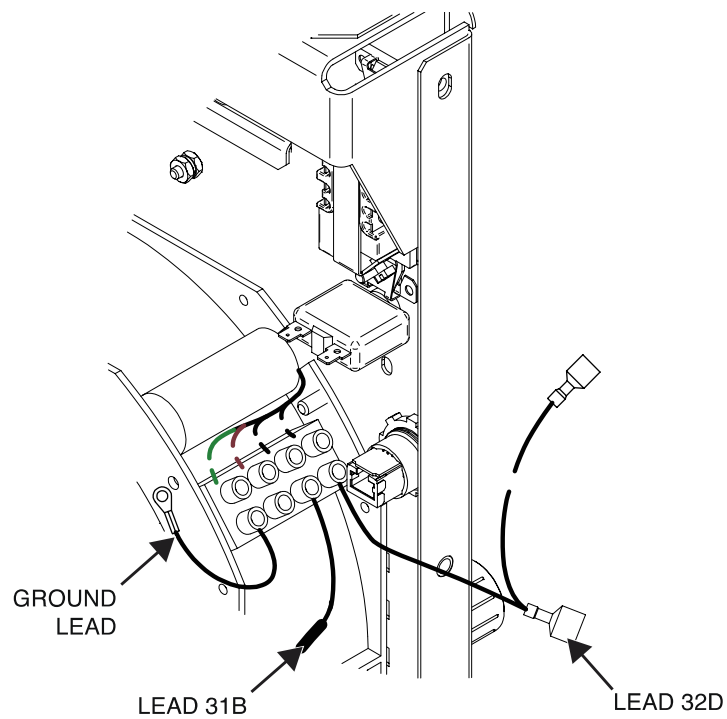
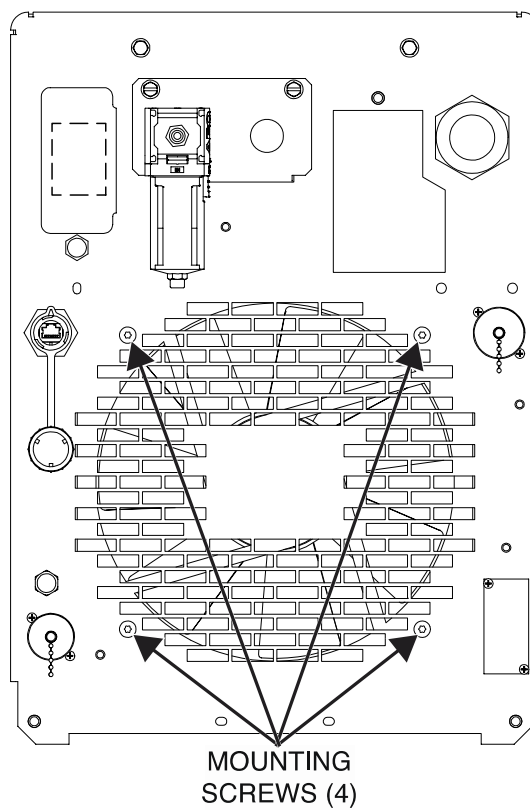
1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Perform the ***Voltage Divider Board Removal Procedure***.
5. Perform the ***Power Transformer (T1) Removal Procedure***.
6. Perform the ***Input Rectifier (D1) Removal Procedure***.
7. Using a 3/8" Nutdriver, remove the two nuts securing the voltage divider board mounting bracket to the rear panel of the machine. See ***Figure F.63***.
8. Using a 7/16" nutdriver, remove the two screws and lock washers securing the input rectifier (D1) heat sink to the upper shelf. Carefully remove the heat sink.
9. Using a small slotted screwdriver, loosen screws securing the ground lead and lead 31B to the fan terminals. See ***Figure F.64***. See Wiring Diagram. Cut cable ties as necessary.
10. Label and disconnect lead 32D from it's quick connect terminal. See ***Figure F.64***. See Wiring Diagram.
11. Carefully route leads to allow for removal. Cut cable ties as necessary.
12. Using a Torx nutdriver, remove the four screws securing the fan assembly to the rear of the machine. See ***Figure F.65***.
13. The fan assembly can now be removed and replaced. Note orientation for reassembly. Direction of airflow is back to front.

## REPLACEMENT PROCEDURE

1. Carefully position the new fan assembly into the machine. Note orientation and airflow. Direction of airflow is back to front.
2. Using a Torx nutdriver, attach the four screws securing the fan assembly to the rear of the machine.
3. Connect lead 32D to it's quick connect terminal. See Wiring Diagram.
4. Using a small slotted screwdriver, tighten the screws securing the ground lead and lead 31B to the fan terminals. See Wiring Diagram.
5. Carefully position the heat sink into the machine.
6. Using a 7/16" nutdriver, attach the two screws and lock washers securing the input rectifier (D1) heat sink to the upper shelf.
7. Using a 3/8" Nutdriver, attach the two nuts securing the voltage divider board mounting bracket to the rear panel of the machine.
8. Perform the ***Input Rectifier (D1) Replacement Procedure***.
9. Perform the ***Power Transformer (T1) Replacement Procedure***.
10. Perform the ***Voltage Divider Board Replacement Procedure***.
11. Perform the ***Case Cover Replacement Procedure***.
12. Perform the ***Retest After Repair Procedure***.

**Figure F.63 – Voltage divider board mounting bracket mounting hardware location**



**Figure F.64 – Fan terminal connections****Figure F.65 – Fan 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.

### MATERIALS NEEDED

7/16" Nutdriver  
Two 7/16" Open-End Wrenches  
3/8" Nutdriver  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Using a 7/16" nutdriver, remove the screw, lock washer and flat washer securing the choke lead to terminal B4 of the snubber board. See **Figure F.66**. See Wiring Diagram.
5. Using two 7/16" open-end wrenches, remove the bolt, flat washer, lock washer and nut securing the choke lead to the rear of the electrode terminal. See **Figure F.67**. See Wiring Diagram.
6. Using a 3/8" nutdriver, remove the four screws securing the choke to the machine. See **Figure F.68**.
7. Carefully route the choke leads thru the machine to allow for the removal of the choke.
8. The choke can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully route the choke leads thru the machine to allow for the placement of the choke.
2. Carefully position the new choke into the machine.
3. Using a 3/8" nutdriver, attach the to the four screws securing the choke to the machine.
4. Using two 7/16" open-end wrenches, attach the bolt, flat washer, lock washer and nut securing the choke lead to the rear of the electrode terminal. See Wiring Diagram.
5. Using a 7/16" nutdriver, attach the screw, lock washer and flat washer securing the choke leads to terminal B4 of the snubber board. See Wiring Diagram.
6. Perform the **Case Cover Replacement Procedure**.
7. Perform the **Retest After Repair Procedure**.

Figure F.66 – Snubber board terminal B4 location

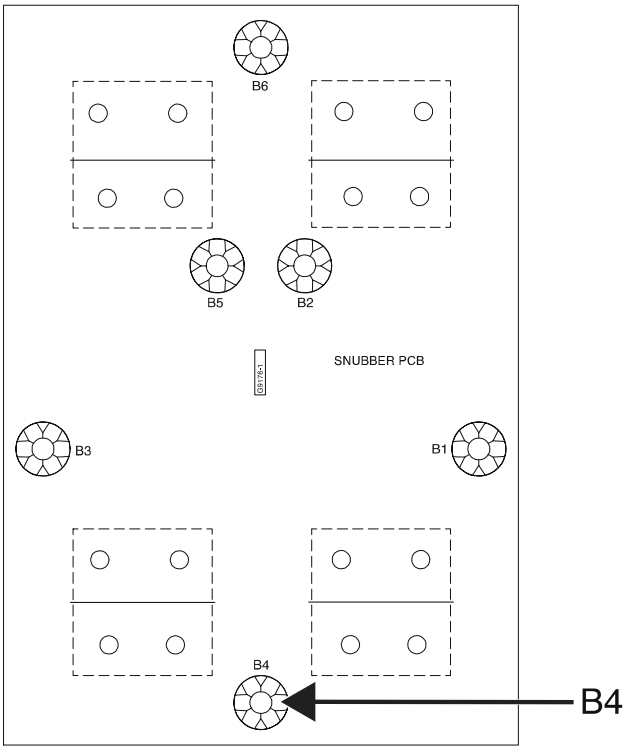
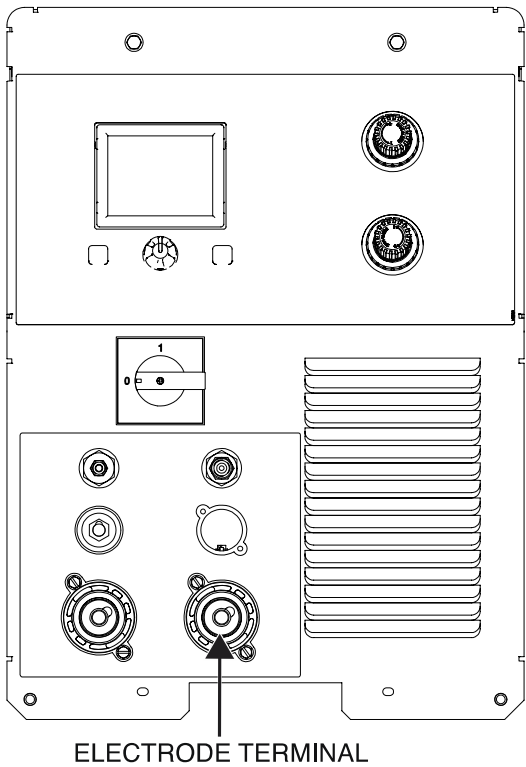
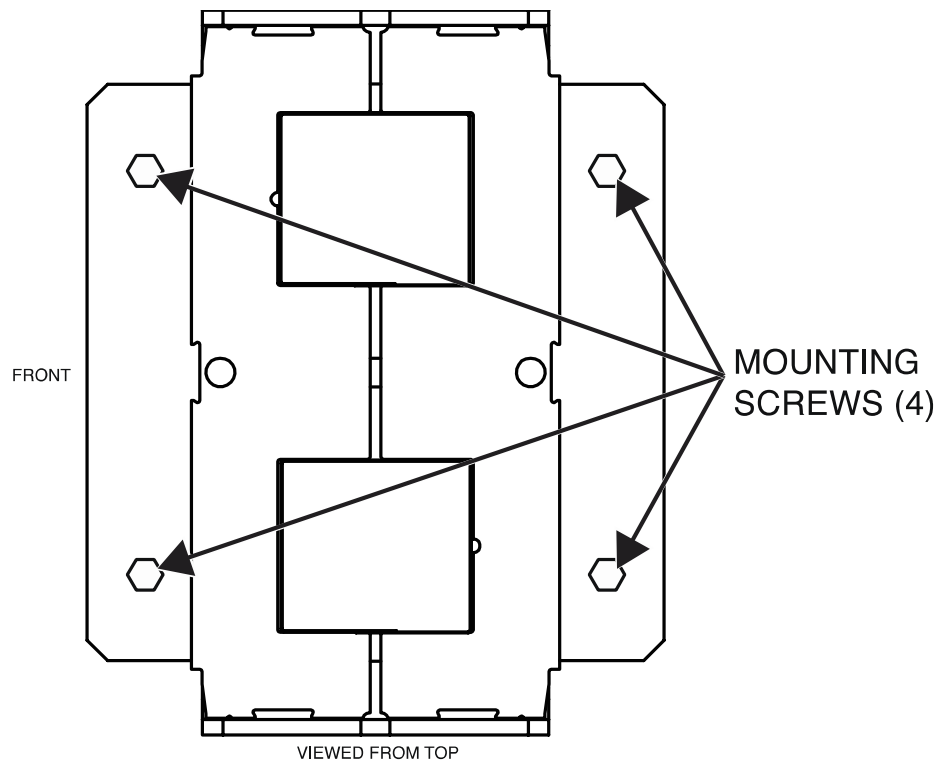


Figure F.67 – Electrode terminal location



**Figure F.68 – Choke mounting screws location**

## THERMOSTAT 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 Thermostat.

### MATERIALS NEEDED

Phillips Screwdriver  
Wiring Diagram

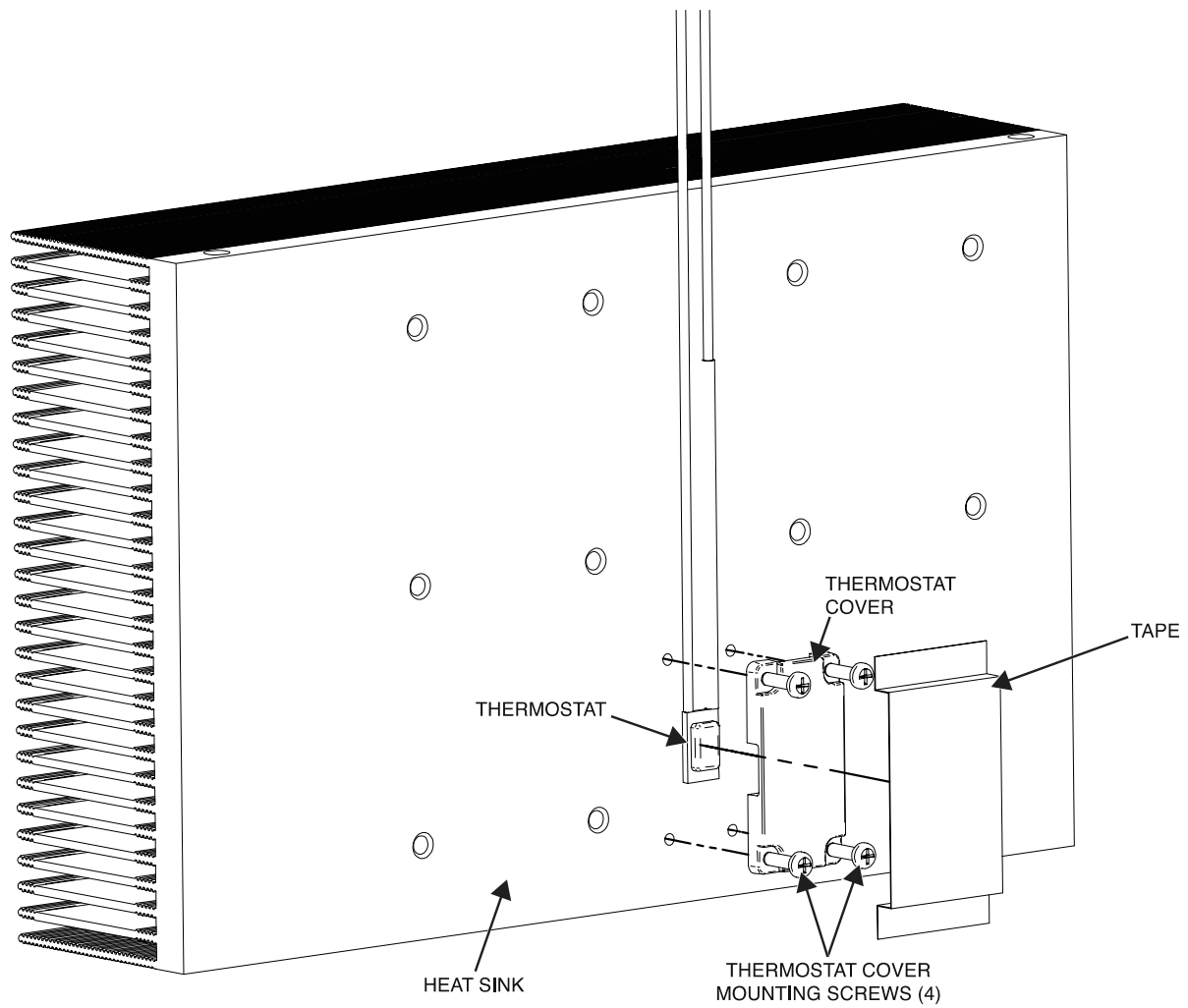
### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Perform the ***Switch Board Removal Procedure***.
5. Cut any cable ties securing plug J25. See Wiring Diagram.
6. Carefully remove the tape covering the thermostat cover. See ***Figure F.69***.
7. Using a Phillips screwdriver, remove the four screws securing the thermostat cover to the heat sink. See ***Figure F.69***.
8. The thermostat assembly can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully position the new thermostat assembly onto the heat sink.
2. Using a Phillips screwdriver, attach the four screws securing the thermostat cover to the heat sink.
3. Cover the thermostat cover with tape.
4. Replace cable ties as necessary.
5. Perform the ***Switch Board Replacement Procedure***.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Retest After Repair Procedure***.



**Figure F.69 – Thermostat removal**

## AUXILIARY RECTIFIER (D4) 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 Rectifier (D4).

### MATERIALS NEEDED

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

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect leads X14A, POS, X13B and NEG from the auxiliary rectifier (D4). See **Figure F.70**. See Wiring Diagram.
5. Using a 3/8" nutdriver, remove the nut securing the auxiliary rectifier (D4) to the mounting post. See **Figure F.71**.
6. The auxiliary rectifier (D4) can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Apply a thin coating of Dow Corning 340 heat sink compound to the rear of the auxiliary rectifier (D4).
2. Carefully position the new auxiliary rectifier (D4) onto the mounting post.
3. Using a 3/8" nutdriver, attach the nut securing the auxiliary rectifier (D4) to the vertical divider panel. See Wiring Diagram.
4. Connect leads X14A, POS, X13B and NEG to the auxiliary rectifier (D4). See Wiring Diagram.
5. Perform the **Case Cover Replacement Procedure**.
6. Perform the **Retest After Repair Procedure**.

Figure F.70 – Auxiliary rectifier (D4) lead locations

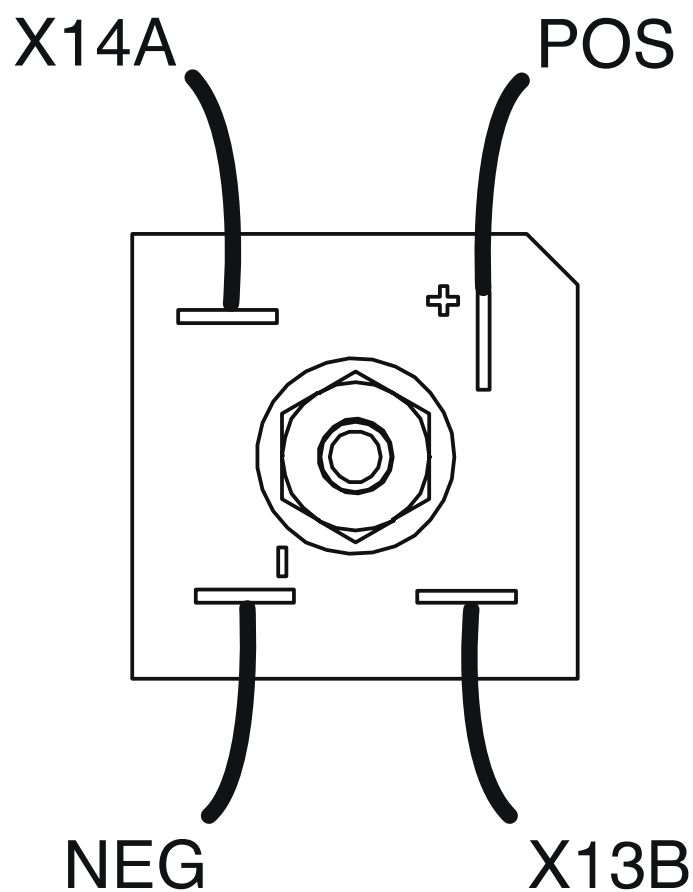
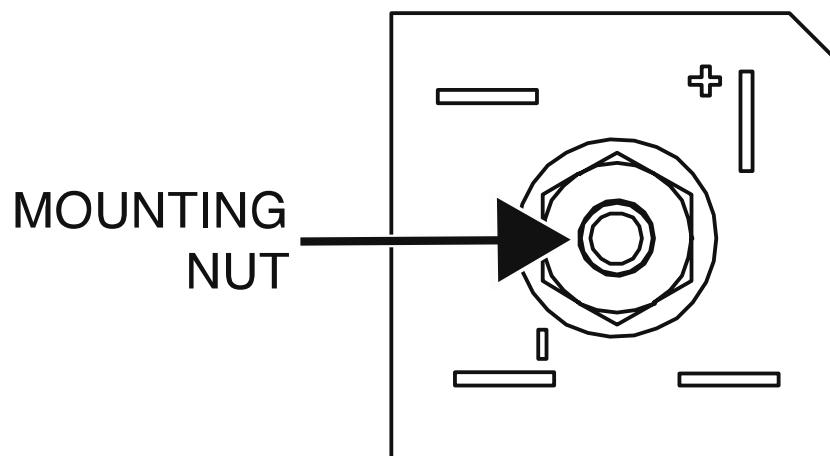


Figure F.71 – Auxiliary rectifier (D4) mounting nut location



## 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

5/64" Allen Wrench  
1/2" Nutdriver  
Phillips Screwdriver  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect plug J1 from the user interface board. See **Figure F.72**. See Wiring Diagram.
5. Using a 5/64" Allen wrench, loosen the set screw securing the control knob to the shaft. See **Figure F.73**.
6. Using a 1/2" nutdriver, remove the nut securing the board to the front panel. See **Figure F.73**.
7. Using a Phillips screwdriver, remove the four screws and washers securing the user interface board to the front panel. See **Figure F.73**.
8. 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 and washers securing the user interface board to the front panel.
3. Using a 1/2" nutdriver, attach the nut securing the board to the front panel.
4. Using a 5/64" Allen wrench, tighten the set screw securing the control knob to the shaft.
5. Connect plug J1 to the user interface board. See Wiring Diagram.
6. Perform the **Case Cover Replacement Procedure**.
7. Perform the **Retest After Repair Procedure**.

Figure F.72 – User interface board plug J1 location

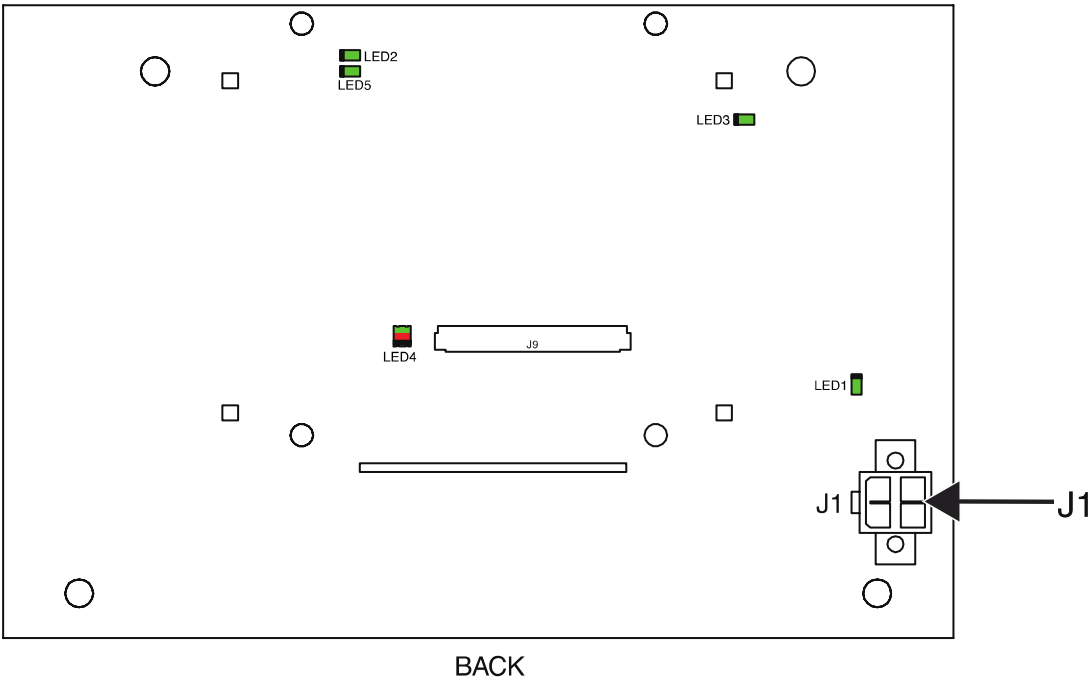
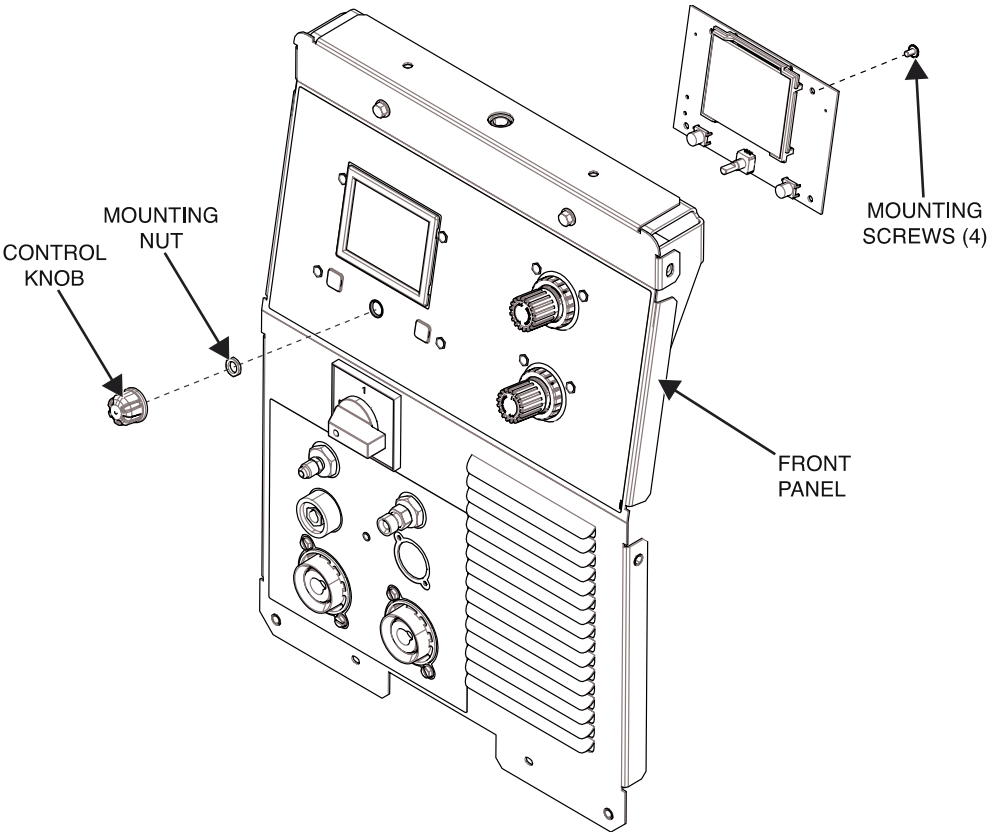


Figure F.73 – User interface board mounting hardware locations



## SWITCH 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 Switch Board.

### MATERIALS NEEDED

7/16" Nutdriver  
Torx Nutdriver (Size T25)  
Dow Corning 340 Heat Sink Compound (Lincoln Part #T12837)  
Penetrox Heat Sink Compound (Lincoln Part #T12837-1)  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect plugs J19, J20, J21, J22, J23, J25, J26 and J28 from the switch board. See **Figure F.74**. See Wiring Diagram.
5. Using a 7/16" nutdriver, remove the four screws, lock washers and flat washers securing leads to terminals 201, 204, 207 and 209 of the switch board. See **Figure F.74**. See Wiring Diagram.
6. Using a Torx nutdriver (size T25), remove the twelve screws and lock washers securing the switch board to the machine. See **Figure F.75**.
7. The switch board can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully apply a coating of Dow Corning 340 heat sink compound to the mating surface of the heat sink and the switch board.
2. Carefully position the new switch board onto the heat sink. See Wiring Diagram.
3. Using a Torx nutdriver (size T25), attach the twelve screws and lock washers securing the switch board to the machine.
4. Using a 7/16" nutdriver, attach the four screws, lock washers and flat washers securing leads to terminals 201, 204, 207 and 209 of the switch board. See Wiring Diagram. Apply a coating of Penetrox heat sink compound to the connections.

5. Connect plugs J19, J20, J21, J22, J23, J25, J26 and J28 to the switch board. See Wiring Diagram.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Retest After Repair Procedure***.

**Figure F.74 – Switch board plug and lead locations**

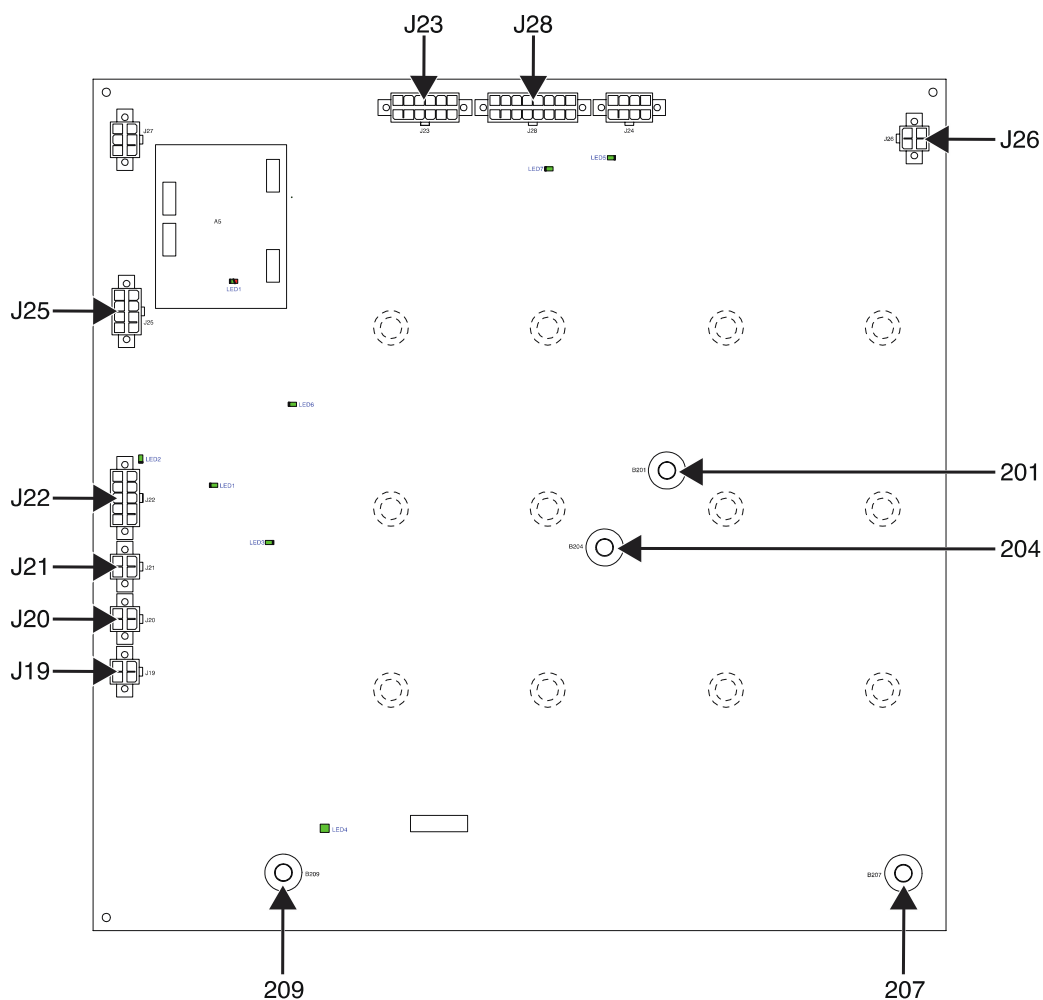
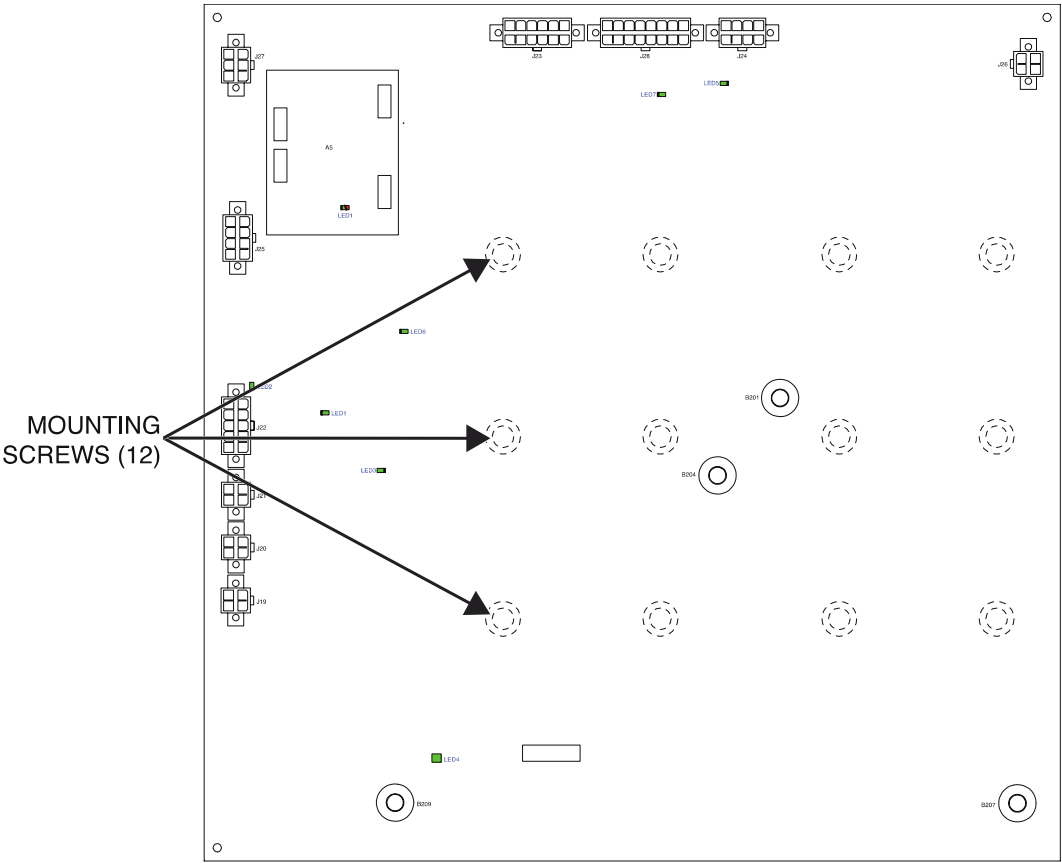


Figure F.75 – Switch board mounting hardware locations





## INPUT SWITCH 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 Switch.

### MATERIALS NEEDED

Offset Phillips Screwdriver  
Small Phillips Screwdriver  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Using an offset Phillips screwdriver, loosen the six screws securing the leads L1, L2, L3, L1A, L2A and L3A from the input switch. See ***Figure F.76***. See Wiring Diagram.
5. Using a small Phillips screwdriver, remove the screw securing the knob to the machine. See ***Figure F.77***.
6. Remove the plastic spacer from the shaft of the input switch. See ***Figure F.77***.
7. Remove the switch cover plate. See ***Figure F.77***.
8. Using a Phillips screwdriver, remove the four screws securing the switch to the machine. See ***Figure F.77***.
9. The input switch can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully position new input switch into the machine.
2. Using a Phillips screwdriver, attach the four screws securing the switch to the machine.
3. Attach the cover plate to the switch.
4. Attach the plastic spacer to the shaft of the input switch.
5. Using a small Phillips screwdriver, attach the screw securing the knob to the machine.
6. Using an offset Phillips screwdriver, tighten the six screws securing the leads L1, L2, L3 L1A, L2A and L3A to the input switch. See Wiring Diagram.
7. Perform the ***Case Cover Replacement Procedure***.
8. Perform the ***Retest After Repair Procedure***.

Figure F.76 – Input switch lead locations

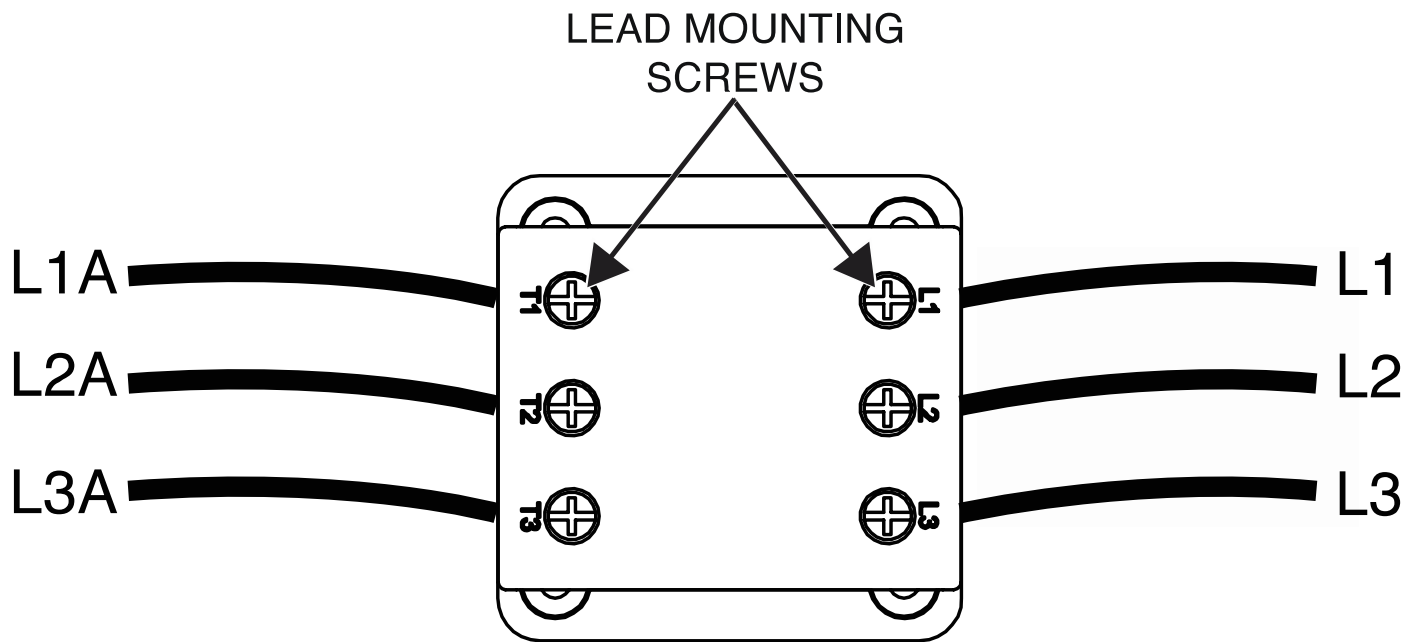
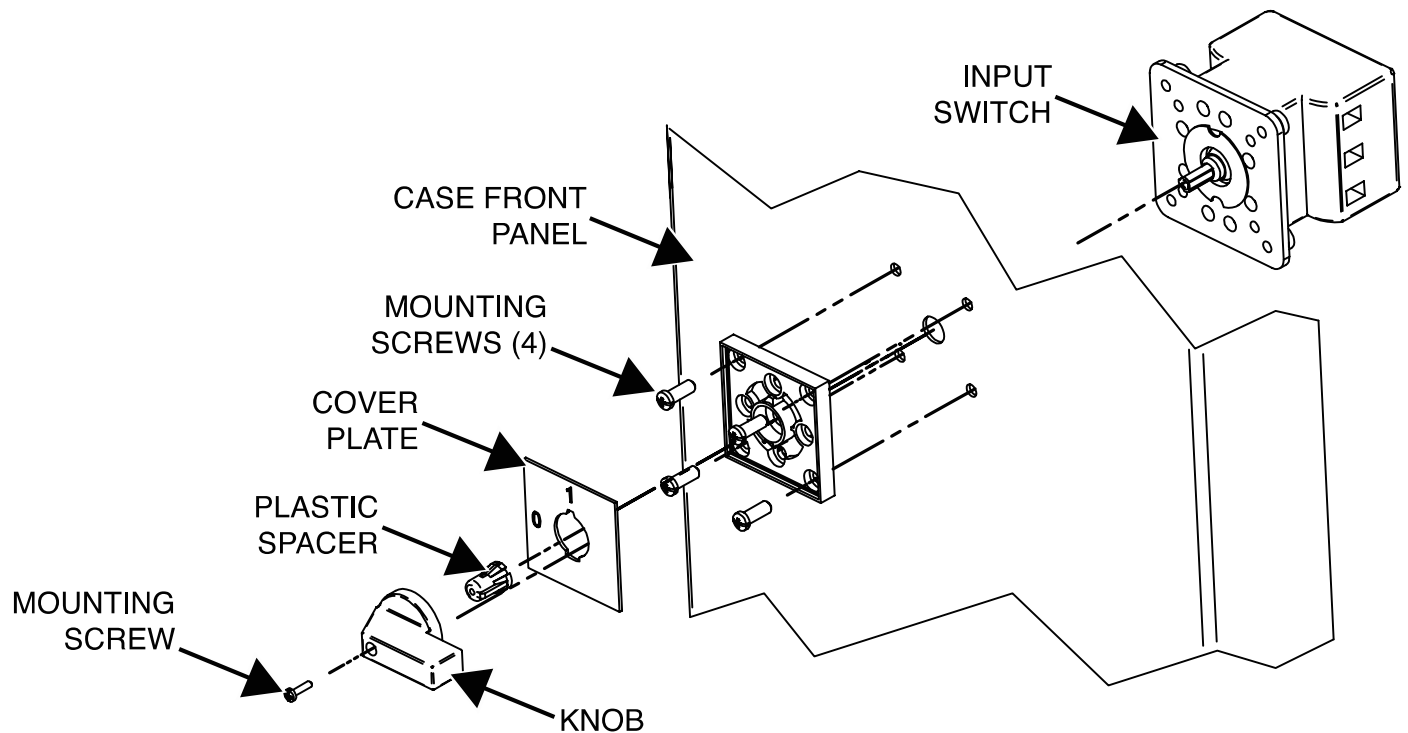


Figure F.77 – Input switch mounting hardware locations



## SOLENOID 1, 2 AND 3 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 Solenoids 1, 2 and 3.

### MATERIALS NEEDED

1/4" Nutdriver  
Phillips Screwdriver  
Molex Extraction Tool  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect the seven hoses from the solenoids 1, 2 and 3. See **Figure F.78**. See Wiring Diagram.
5. Using a 1/4" nutdriver, remove the four mounting nuts, lock washers and flat washers securing the solenoids to the vertical divider panel. See **Figure F.79**.
6. Using a Phillips screwdriver, remove the two screws and lock washers securing solenoids 1 and 2 to each other. See **Figure F.79**.

**NOTE:** Retain all solenoid spacers for reassembly.

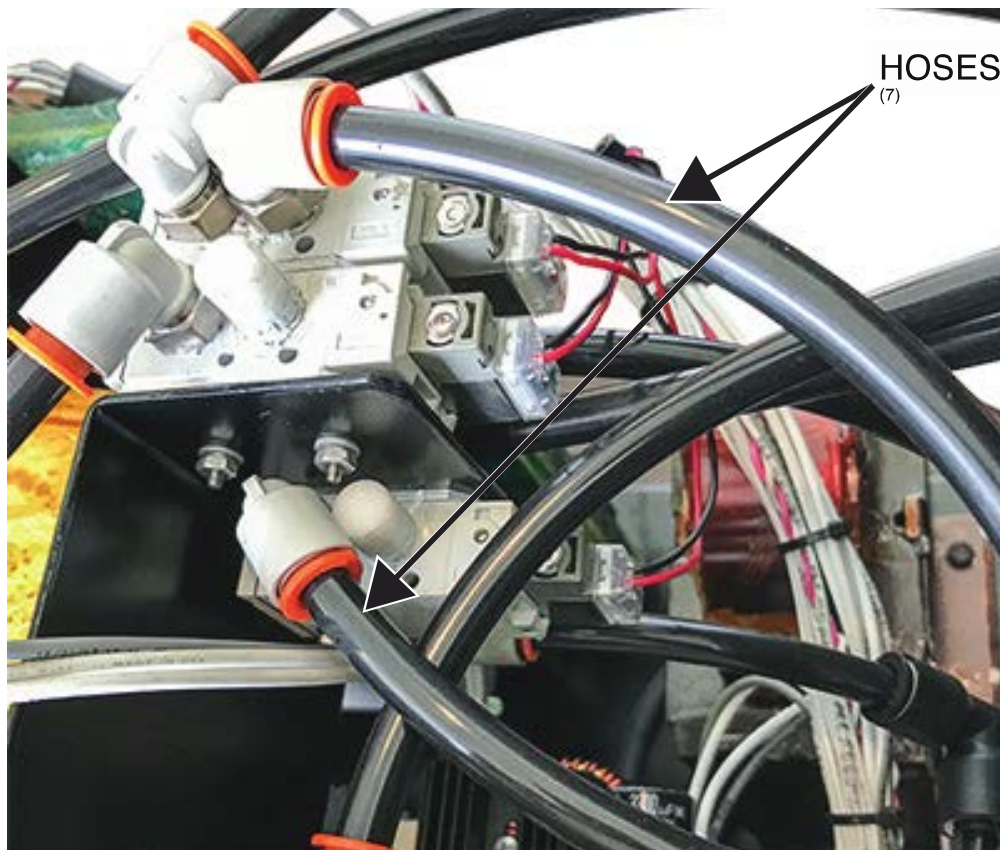
7. Using a Molex extraction tool, remove the solenoid leads from switch board plug J22. See **Figure F.80**. See Wiring Diagram.
8. Remove and retain air hose fittings as necessary.
9. The solenoids can now be removed and replaced.

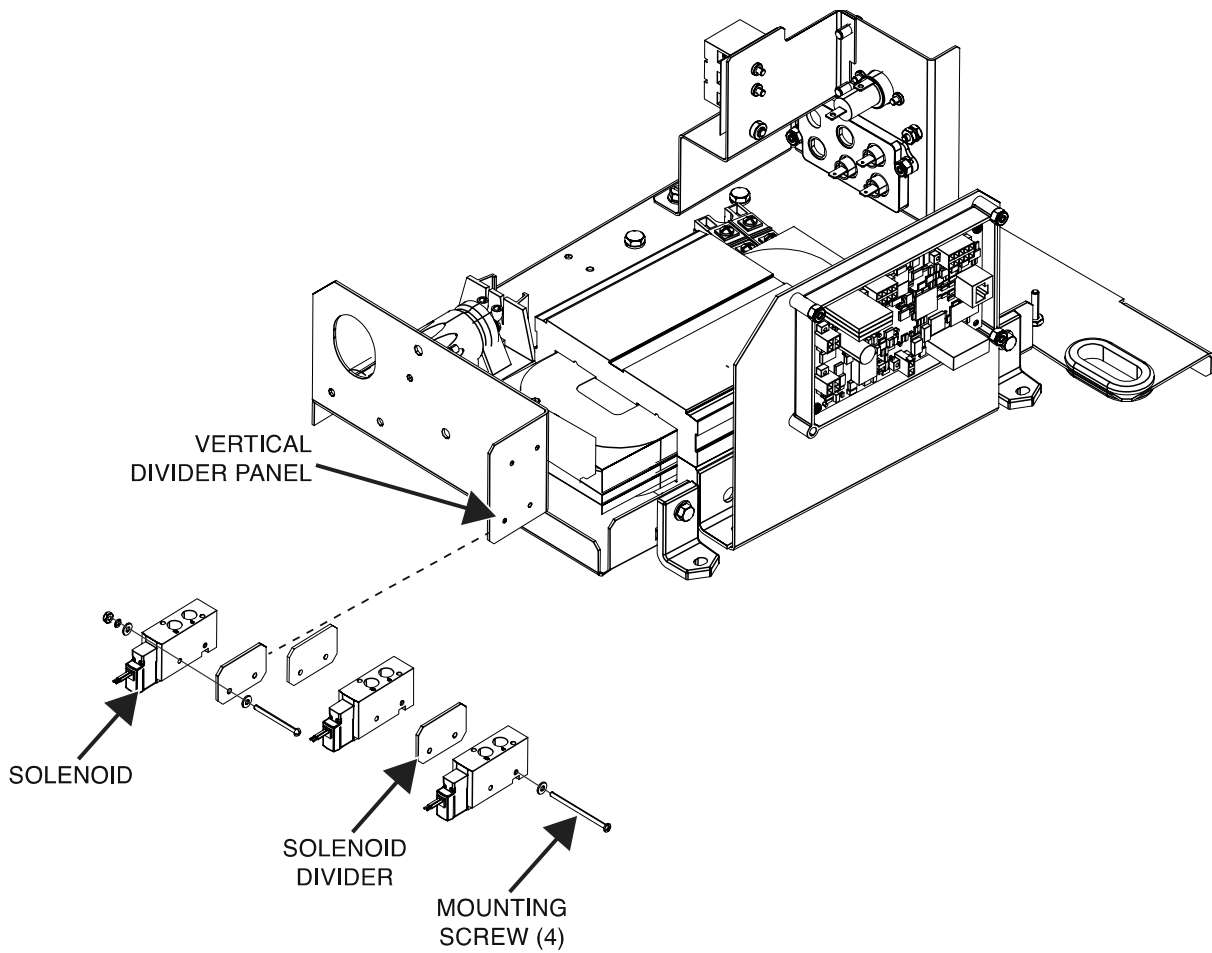
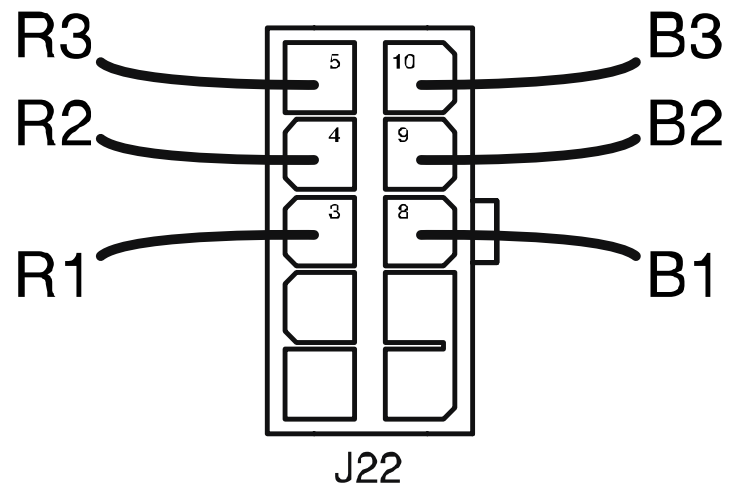
### REPLACEMENT PROCEDURE

1. Using a Molex extraction tool, attach the solenoid leads to switch board plug J22. See Wiring Diagram.
2. Carefully position the new solenoid 3 into the machine and use solenoid spacers between the solenoid and the upper shelf.

3. Using a Phillips screwdriver, attach the two screws and lock washers securing solenoid 3 to the vertical divider panel.
4. Using a 1/4" nutdriver, attach the two mounting nuts, lock washers and flat washers securing solenoid 3 to the vertical divider panel.
5. Carefully position the new solenoids 1 and 2 together, use solenoid spacers between the two solenoids and between the solenoids and upper shelf.
6. Using a Phillips screwdriver, attach the two screws and lock washers securing solenoids 1 and 2 to each other.
7. Using a 1/4" nutdriver, attach the two mounting nuts, lock washers and flat washers securing the solenoids to the vertical divider panel.
8. Connect the seven previously disconnected hoses to the solenoids 1, 2 and 3. See Wiring Diagram.
9. Perform the **Case Cover Replacement Procedure**.
10. Perform the **Retest After Repair Procedure**.

Figure F.78 – Solenoid hose locations



**Figure F.79 – Solenoid mounting hardware locations****Figure F.80 – Switch board plug J22 lead locations**

## POWER 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 Power Transformer (T1).

### MATERIALS NEEDED

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

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Perform the **Switch Board Removal Procedure**.
5. Using a 3/8" nutdriver, remove the screw securing leads X2 and X4 into the cable grommet in front of the snubber board. See **Figure F.81**. See Wiring Diagram. Remove leads from cable grommet and retain cable grommet for reassembly.
6. Using a 7/16" nutdriver, remove the two screws, lock washers and flat washers securing leads X2 and X4 to the bus bars. See **Figure F.81**. See Wiring Diagram. Label and disconnect leads X2 and X4.
7. Using a 3/8" nutdriver, remove the two left side screws securing the transformer mounting bracket to the base of the machine. See **Figure F.81**. Remove leads from cable grommet and retain cable grommet for reassembly.
8. Using a 3/8" nutdriver, remove the two right side screws securing the transformer mounting bracket to the machine.
9. The power transformer (T1) can now be removed from the machine.
10. Using a 3/8" nutdriver, remove the four screws securing the power transformer (T1) to the transformer mounting bracket. See **Figure F.82**.

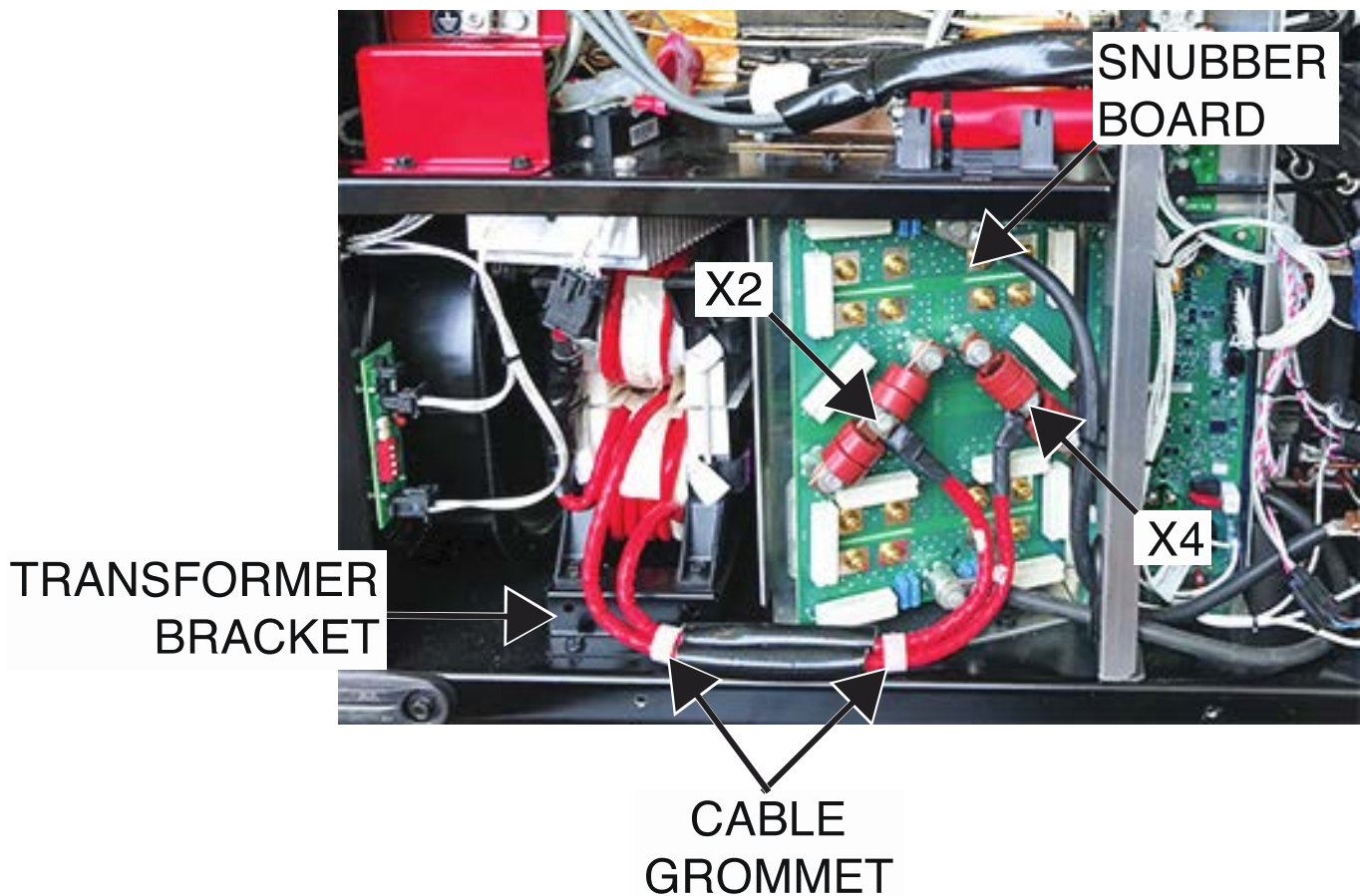
### REPLACEMENT PROCEDURE

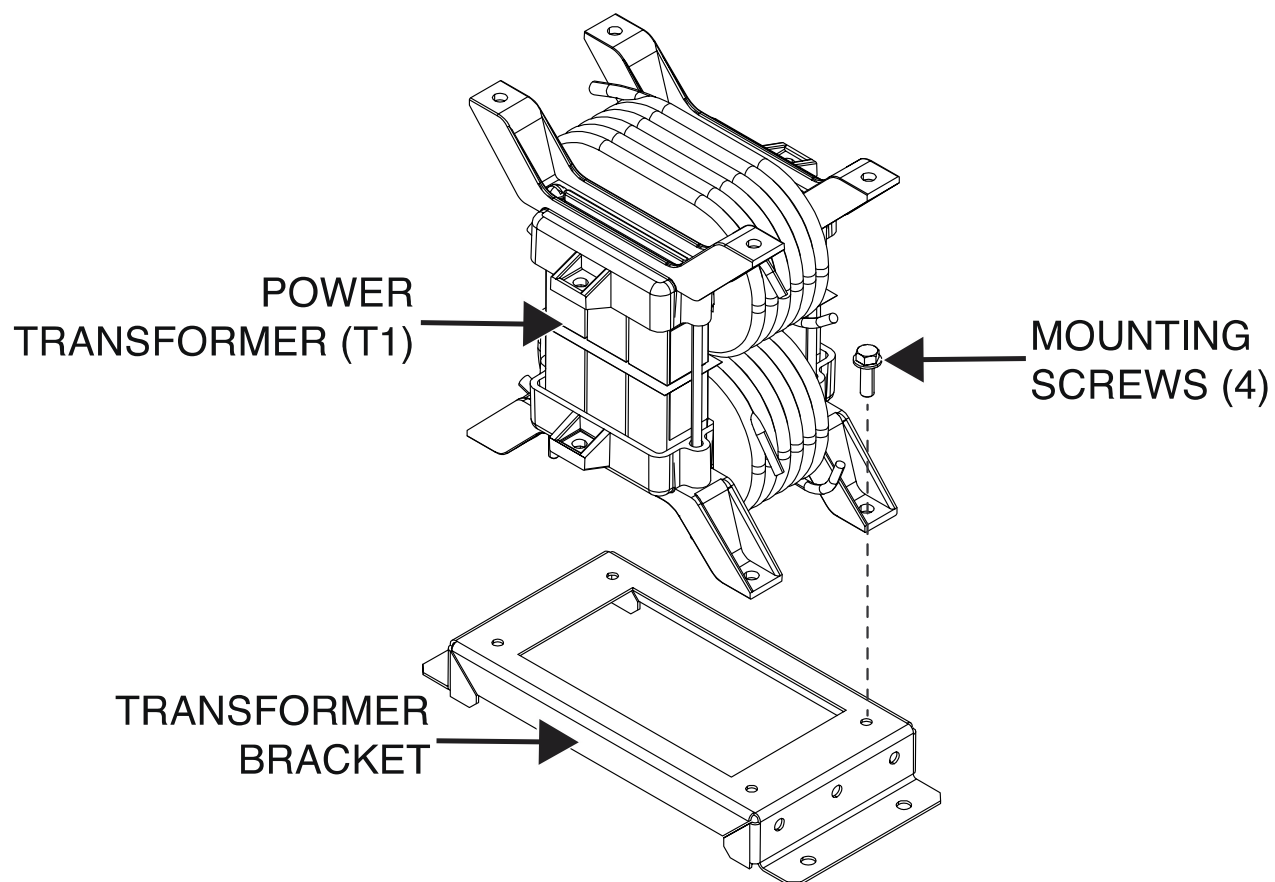
1. Using a 3/8" nutdriver, attach the four screws securing the power transformer (T1) to the transformer mounting bracket.



2. Carefully position the new power transformer (T1) into the machine.
3. Using a 3/8" nutdriver, attach the two right side screws securing the transformer mounting bracket to the base of the machine.
4. Route leads X2 and X4 thru the previously disconnected cable grommet. See Wiring Diagram.
5. Using a 3/8" nutdriver, attach the two left side screws securing the transformer mounting bracket to the base of the machine.
6. Using a 7/16" nutdriver, attach the two screws, lock washers and flat washers securing leads X2 and X4 to the bus bars. See Wiring Diagram.
7. Route leads X2 and X4 thru the previously disconnected cable grommet in front of the snubber board. See Wiring Diagram.
8. Using a 3/8" nutdriver, attach the screw securing leads X2 and X4 into the cable grommet in front of the snubber board. See Wiring Diagram.
9. Perform the **Switch Board Replacement Procedure**.
10. Perform the **Case Cover Replacement Procedure**.
11. Perform the **Retest After Repair Procedure**.

Figure F.81 – Power transformer (T1) mounting hardware locations



**Figure F.82 – Transformer bracket mounting hardware location**



## VOLTAGE DIVIDER 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 Voltage Divider Board.

### MATERIALS NEEDED

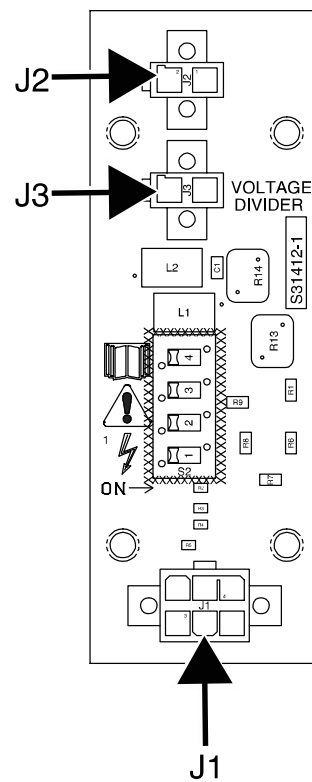
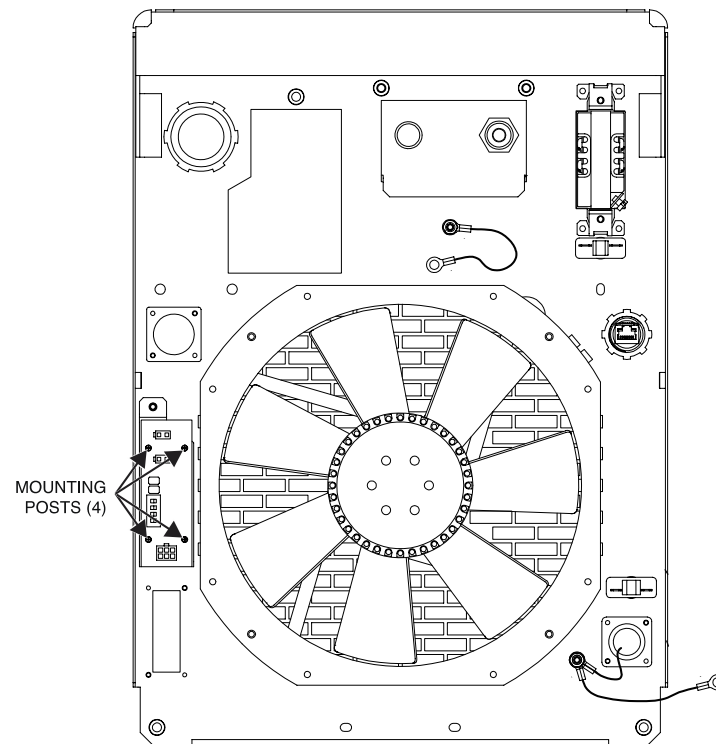
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect plugs J1, J2 and J3 (if necessary) from the voltage divider board. See **Figure F.83**. See Wiring Diagram.
5. Carefully pry the voltage divider board off the mounting posts. See **Figure F.84**.
6. The voltage divider board can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully position the new voltage divider board into the machine and press onto the mounting posts.
2. Connect plugs J1, J2 and J3 (if necessary) to the voltage divider board. See Wiring Diagram.
3. Perform the **Case Cover Replacement Procedure**.
4. Perform the **Retest After Repair Procedure**.

**Figure F.83 – Voltage divider board plug locations****Figure F.84 – Voltage divider board mounting posts location**

## SNUBBER 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 Snubber Board.

### MATERIALS NEEDED

7/16" Nutdriver  
Phillips Screwdriver  
Torx Nutdriver (Size T25)  
Dow Corning 340 Heat Sink Compound (Lincoln Part #T12837)  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Using a 7/16" nutdriver, remove the two screws, lock washers and flat washers securing leads to terminals B4 and B6 of the snubber board. See **Figure F.85**. See Wiring Diagram.
5. Using a 7/16" nutdriver, remove the four screws, lock washers and flat washers securing the bus bars, torroids and leads X2 and X4 to terminals B1/B2 and B3/B5 on the snubber board. See **Figure F.85**. See Wiring Diagram.
6. Cut cable ties as necessary and route leads to allow for the removal of the board.
7. Using a Phillips screwdriver, remove the sixteen screws, lock washers and flat washers securing the snubber board to the IGBT modules. See **Figure F.86**.
8. The snubber board can now be removed and replaced.
9. Using a Torx nutdriver (size T25), remove the four screws and lock washers securing each of the four IGBT modules. See **Figure F.87**.
10. The IGBT modules can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Apply a thin coating of Dow Corning 340 heat sink compound to the mating surfaces of the IGBT modules and the heat sink. See **Figure F.88**.

2. Using a Torx nutdriver (size T25), attach the four screws and lock washers securing each of the four IGBT modules to the heat sink.
3. Carefully position the new snubber board into the machine.
4. Using a Phillips screwdriver, attach the sixteen screws, lock washers and flat washers securing the snubber board to the IGBT modules.
5. Using a 7/16" nutdriver, attach the four screws, lock washers and flat washers securing the bus bars, torroids and leads X2 and X4 to terminals B1/B2 and B3/B5 on the snubber board. See Wiring Diagram.
6. Using a 7/16" nutdriver, attach the two screws, lock washers and flat washers securing leads to terminals B4 and B6 of the snubber board. See Wiring Diagram.
7. Perform the **Case Cover Replacement Procedure**.
8. Perform the **Retest After Repair Procedure**.

**Figure F.85 – Snubber board terminal locations**

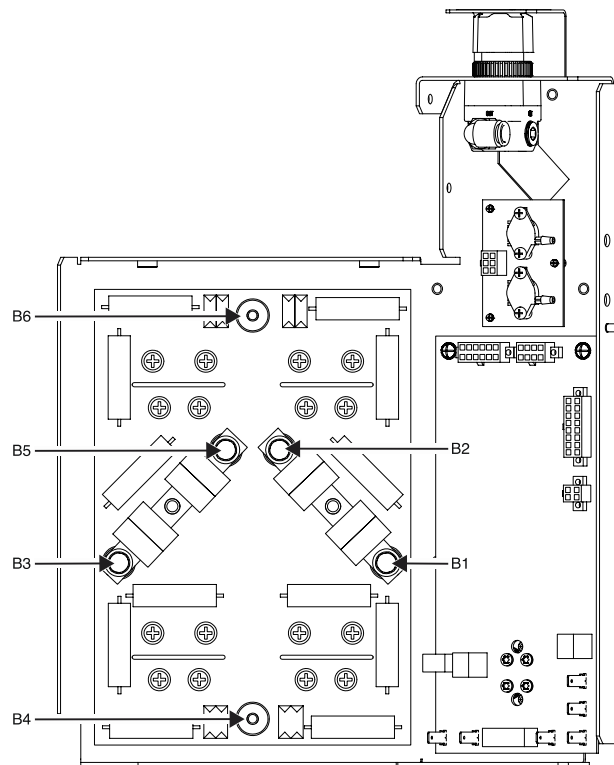


Figure F.86 – Snubber board mounting hardware locations

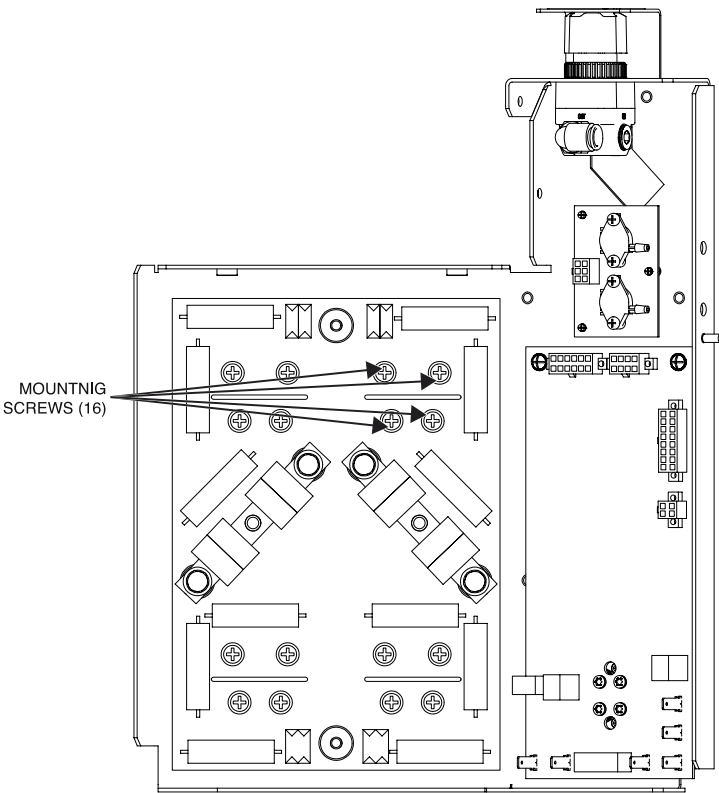
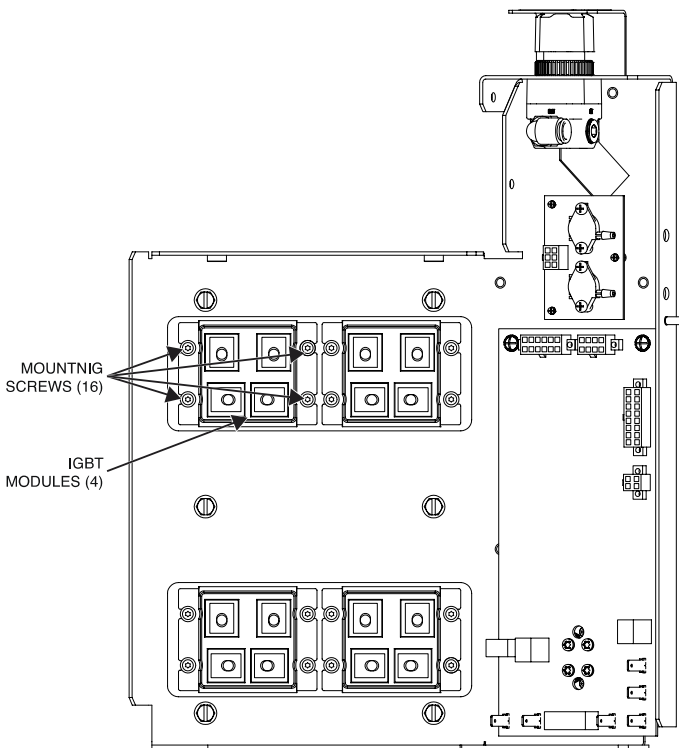
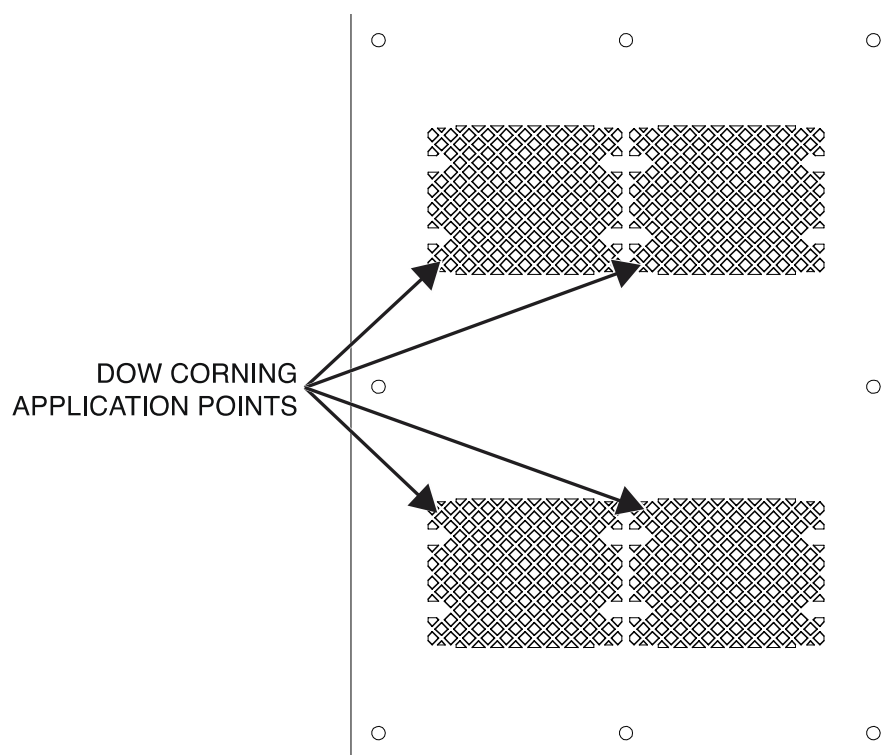


Figure F.87 – IGBT module mounting hardware locations



**Figure F.88 – IGBT module Dow Corning application points**

## PILOT 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 Pilot Board.

### MATERIALS NEEDED

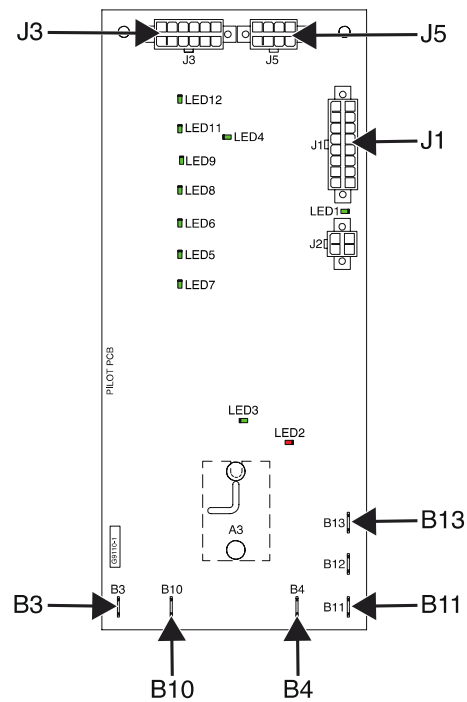
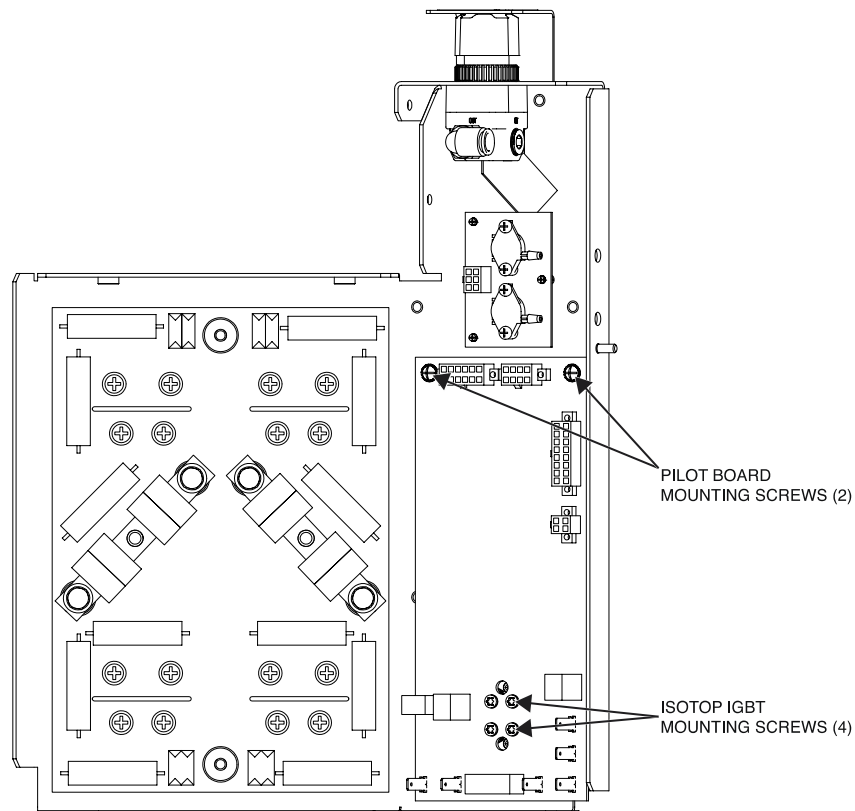
Phillips Screwdriver  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Label and disconnect plugs J1, J3 and J5 from the pilot board. See ***Figure F.89***. See Wiring Diagram.
5. Label and disconnect leads from terminals B3, B4, B10, B11 and B13 from the pilot board. See ***Figure F.89***. See Wiring Diagram.
6. Using a Phillips screwdriver, remove the four screws, lock washers and flat washers securing the pilot board to the isopot IGBT. See ***Figure F.90***.
7. Using a Phillips screwdriver, remove the two screws and washers securing the pilot board to the machine. See ***Figure F.90***.
8. The pilot board can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully position the new pilot board into the machine.
2. Using a Phillips screwdriver, attach the two screws and washers securing the pilot board to the machine.
3. Using a Phillips screwdriver, attach the four screws, lock washers and flat washers securing the pilot board to the isopot IGBT.
4. Connect previously disconnected leads to terminals B3, B4, B10, B11 and B13 on the pilot board. See Wiring Diagram.
5. Connect plugs J1, J3 and J5 to the pilot board. See Wiring Diagram.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Retest After Repair Procedure***.

**Figure F.89 – Pilot board plug and lead locations****Figure F.90 – Pilot board mounting hardware locations**



## MAIN CURRENT LEM 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 Current LEM.

### MATERIALS NEEDED

Two 7/16" Open End Wrenches  
1/4" Nutdriver  
Wiring Diagram

### REMOVAL PROCEDURE

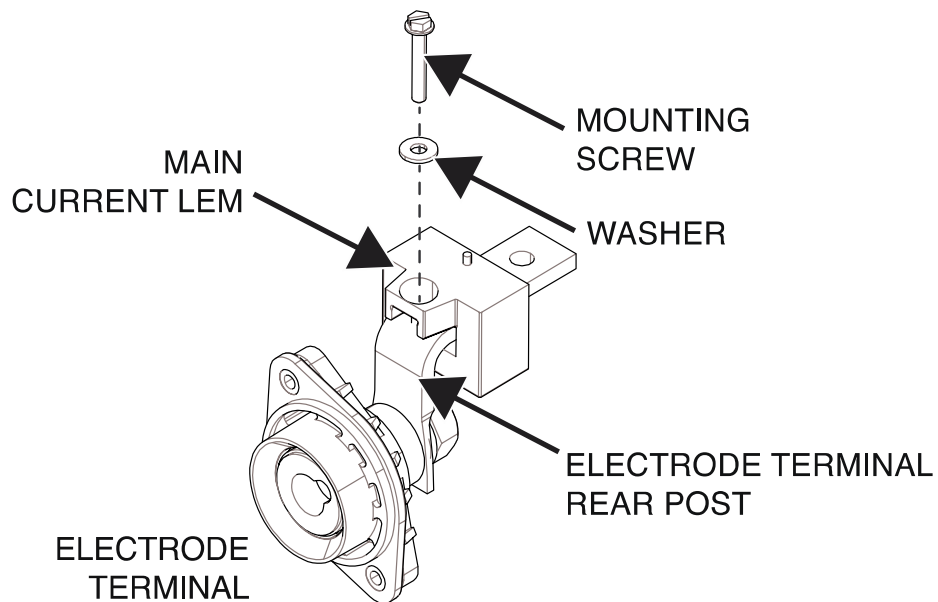
1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect plug J1 from the main current LEM. See Wiring Diagram.
5. Using two 7/16" open-end wrenches, remove the bolt, flat washer, lock washer and nut securing the leads to the rear post of the electrode terminal. See **Figure F.91**. See Wiring Diagram.
6. Label and disconnect all leads from the rear post of the electrode terminal. See Wiring Diagram.
7. Using a 1/4" nutdriver, remove the screw and washer securing the main current LEM to the rear of the electrode terminal. See **Figure F.91**.
8. The main current LEM can now be removed and replaced. Note orientation of the main current LEM for reassembly. See **Figure F.92**.

### REPLACEMENT PROCEDURE

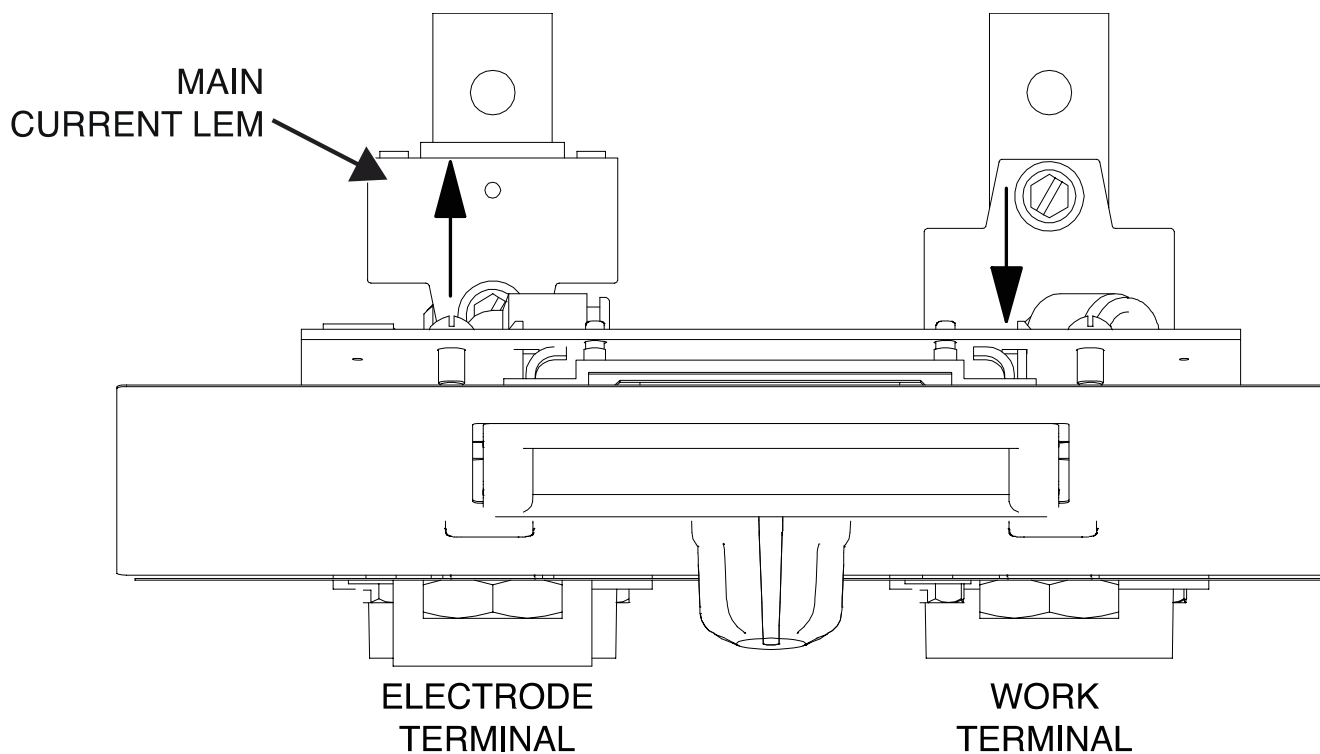
1. Carefully position the new main current LEM into the machine. Ensure the proper orientation of the main current LEM. See **Figure F.92**.
2. Using a 1/4" nutdriver, attach the screw and washer securing the main current LEM to the rear post of the electrode terminal.
3. Connect all previously disconnected leads to the rear post of the electrode terminal. See Wiring Diagram.
4. Using two 7/16" open-end wrenches, attach the bolt, flat washer, lock washer and nut securing the leads to the rear of the electrode terminal. See Wiring Diagram.
5. Connect plug J1 to the main current LEM. See Wiring Diagram.

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

**Figure F.91 – Main current LEM mounting hardware locations**



**Figure F.92 – Main current LEM orientation**



## PILOT CURRENT LEM 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 Pilot Current LEM.

### MATERIALS NEEDED

Two 7/16" Open End Wrenches  
1/4" Nutdriver  
Wiring Diagram

### REMOVAL PROCEDURE

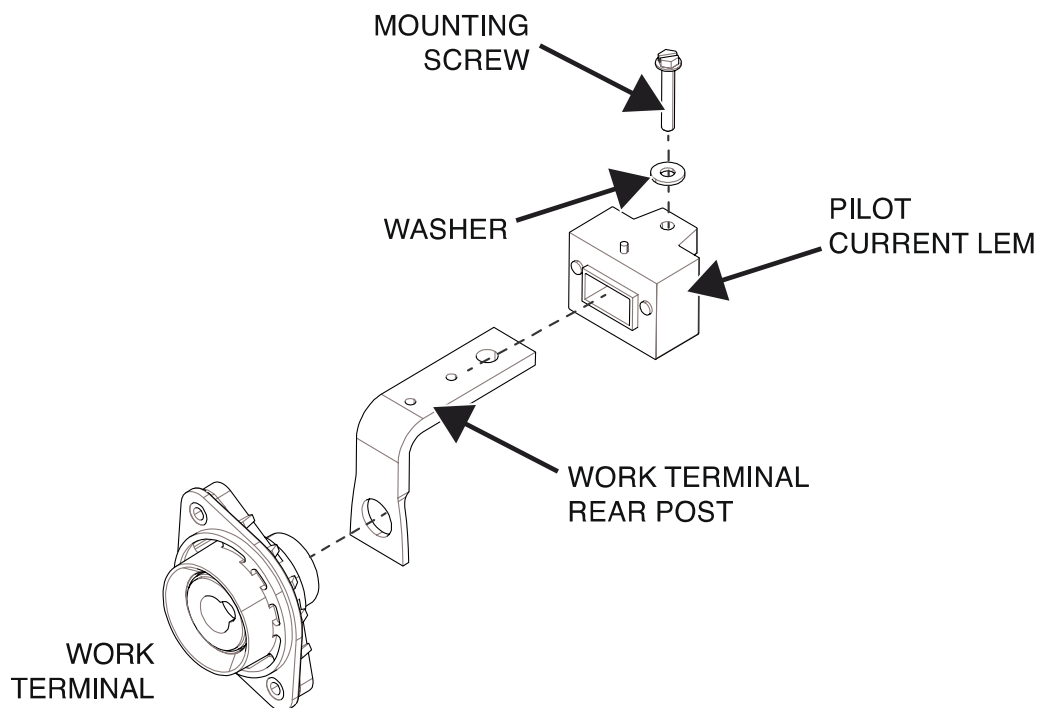
1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Label and disconnect plug J1 from the pilot current LEM. See Wiring Diagram.
5. Using two 7/16" open-end wrenches, remove the bolt, flat washer, lock washer and nut securing the leads to the rear post of the work terminal. See ***Figure F.93***. See Wiring Diagram.
6. Label and disconnect all leads from the rear post of the work terminal. See Wiring Diagram.
7. Using a 1/4" nutdriver, remove the screw and washer securing the pilot current LEM to the rear of the work terminal. See ***Figure F.93***.
8. The pilot current LEM can now be removed and replaced. Note orientation of the pilot current LEM for reassembly. See ***Figure F.94***.

### REPLACEMENT PROCEDURE

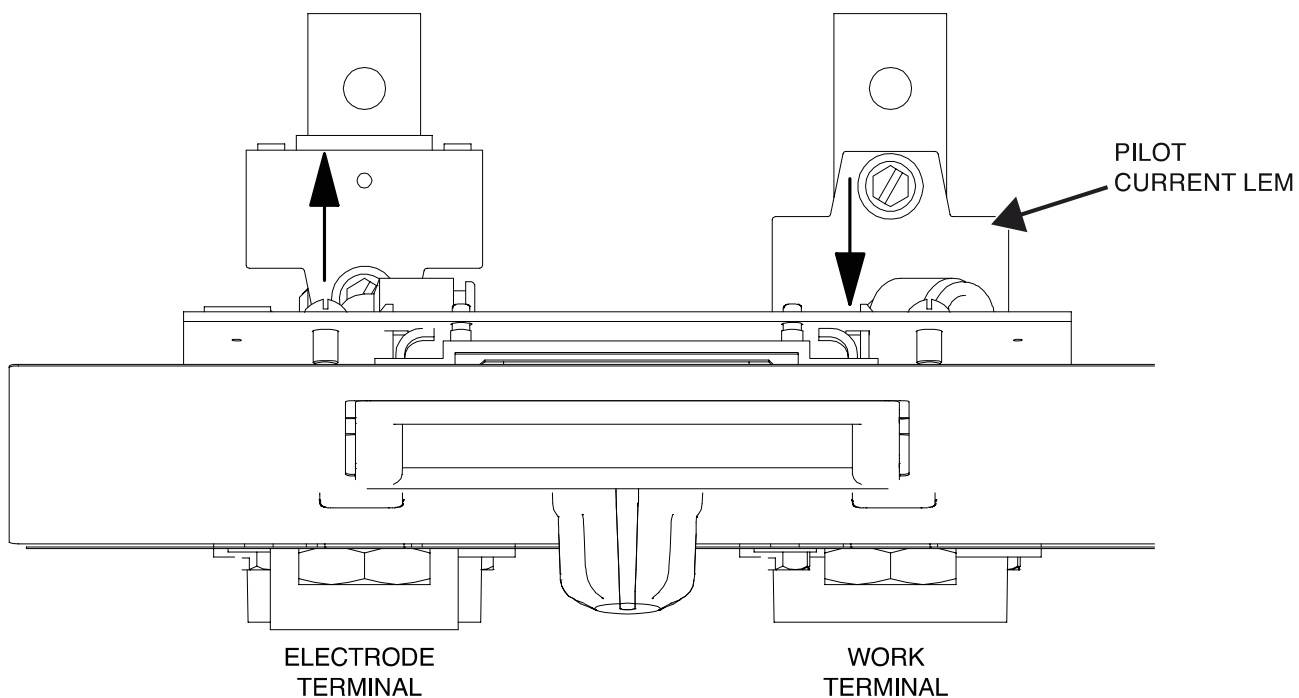
1. Carefully position the new pilot current LEM into the machine. Ensure the proper orientation of the pilot current LEM. See ***Figure F.94***.
2. Using a 1/4" nutdriver, attach the screw and washer securing the pilot current LEM to the rear post of the work terminal.
3. Connect all previously disconnected leads to the rear post of the work terminal. See Wiring Diagram.
4. Using two 7/16" open-end wrenches, attach the bolt, flat washer, lock washer and nut securing the leads to the rear of the work terminal. See Wiring Diagram.
5. Connect plug J1 to the pilot current LEM. See Wiring Diagram. See Wiring Diagram.

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

**Figure F.93 – Pilot current LEM mounting hardware locations**



**Figure F.94 – Pilot current LEM orientation**



## ARCLINK I/O 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 ArcLink I/O Board.

### MATERIALS NEEDED

3/8" Nutdriver  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Label and disconnect plugs J60 and J61 from the arclink I/O board. See ***Figure F.95***. See Wiring Diagram.
5. Label and disconnect the Ethernet cable from the arclink I/O board. See ***Figure F.95***. See Wiring Diagram.
6. Using a 3/8" nutdriver, remove the three nuts securing the arclink I/O board to it's mounting posts. See ***Figure F.96***.
7. Carefully slide the arclink I/O board off of the mounting posts.
8. The arclink I/O board can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully position the new arclink I/O board onto the mounting posts.
2. Using a 3/8" nutdriver, attach the three nuts securing the arclink I/O board to the mounting posts.
3. Connect the Ethernet cable to the arclink I/O board. See Wiring Diagram.
4. Connect plugs J60 and J61 to the arclink I/O board. See Wiring Diagram.
5. Perform the ***Case Cover Replacement Procedure***.
6. Perform the ***Retest After Repair Procedure***.

Figure F.95 – Arclink I/O board plug locations

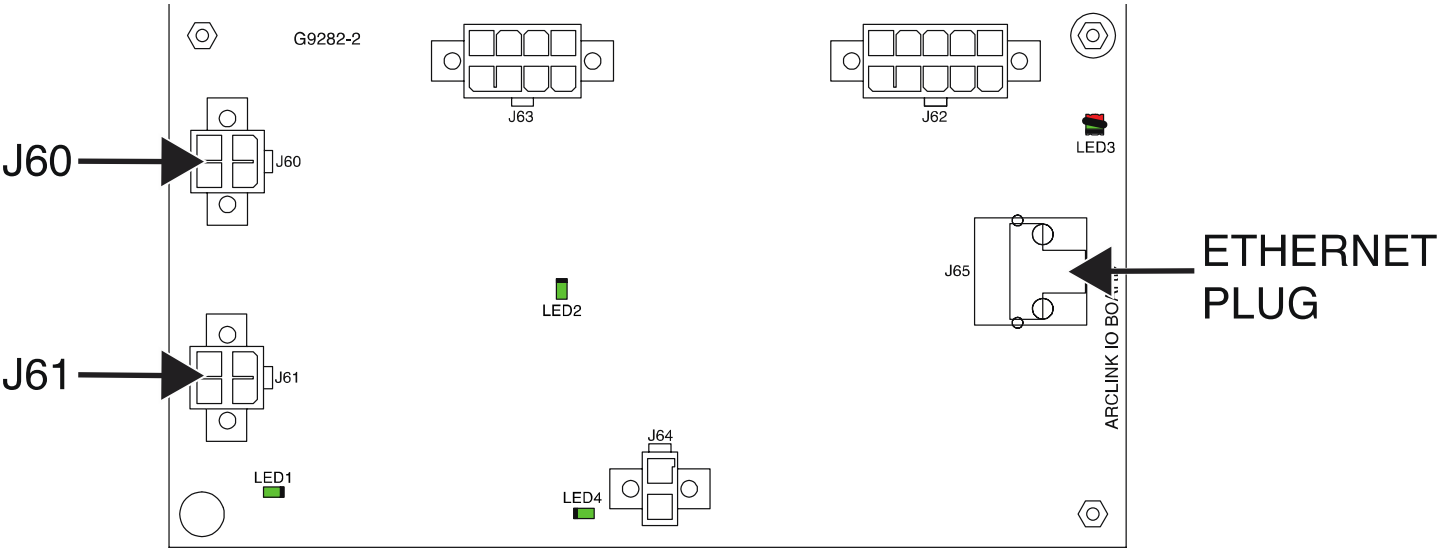
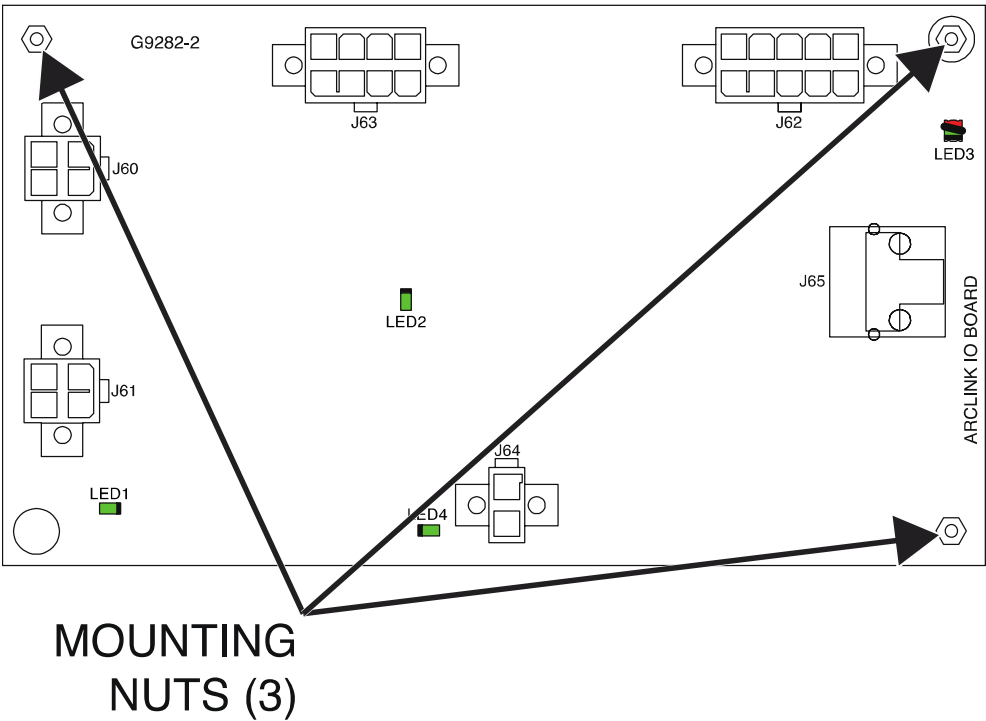


Figure F.96 – Arclink I/O board mounting hardware locations



## PRESSURE SENSE 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 Pressure Sense Board.

### MATERIALS NEEDED

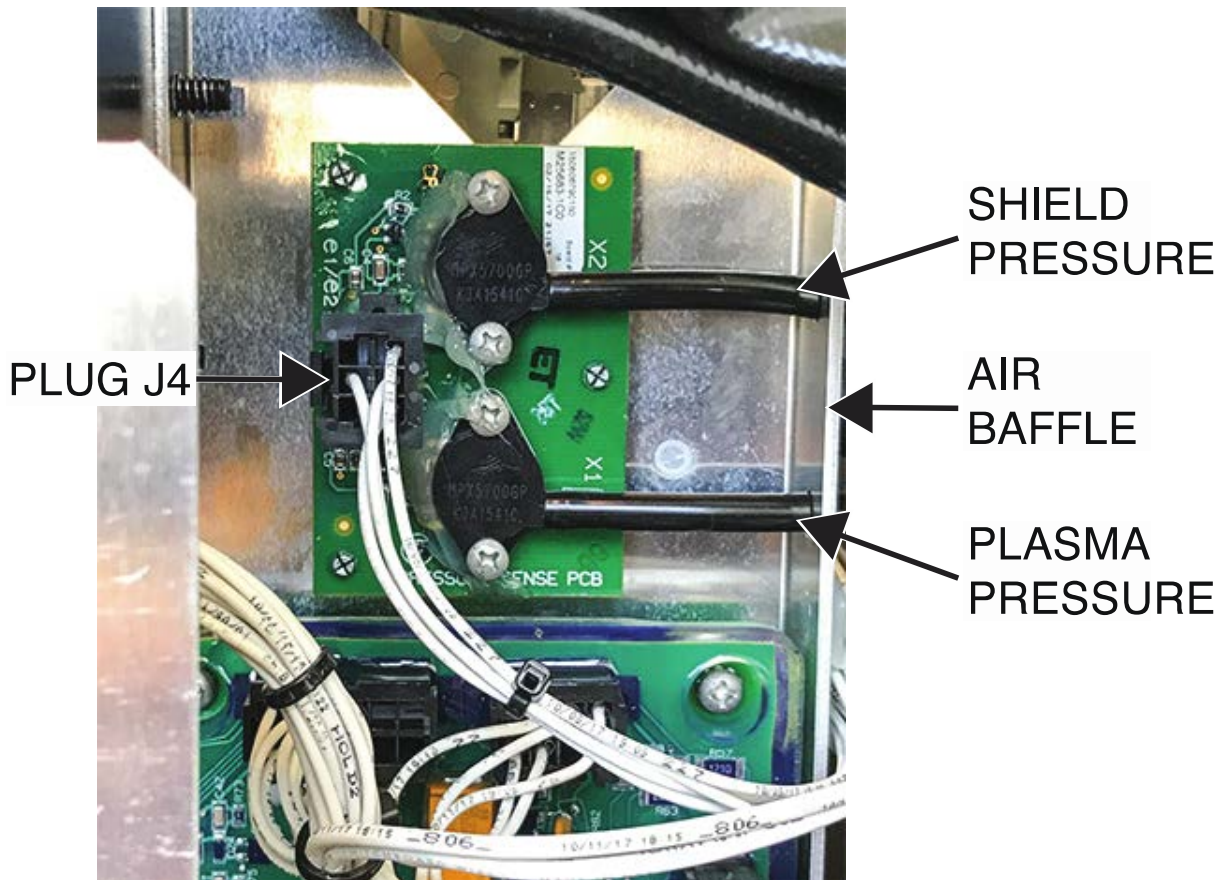
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect the plasma pressure hose and the shield pressure hose from the press fit connections. See **Figure F.97**. See Wiring Diagram.
5. Label and disconnect plug J4 from the pressure sense board. See **Figure F.97**. See Wiring Diagram.
6. Carefully remove the pressure sense board from it's mounting posts.
7. Route the plasma pressure hose and the shield pressure hose through the air baffle. See **Figure F.97**.
8. Carefully disconnect the plasma pressure hose and the shield pressure hose from the pressure sense board. See **Figure F.97**.
9. The pressure sense board can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Connect the plasma pressure hose and the shield pressure hose to the pressure sense board.
2. Route the plasma pressure hose and the shield pressure hose through the air baffle.
3. Carefully position the new pressure sense board onto it's mounting posts.
4. Connect plug J4 to the pressure sense board. See Wiring Diagram.
5. Connect the plasma pressure hose and the shield pressure hose to the press fit connections. See Wiring Diagram.
6. Perform the **Case Cover Replacement Procedure**.
7. Perform the **Retest After Repair Procedure**.

**Figure F.97 – Pressure sense board hose and plug locations**



## 40 VDC 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 40 VDC Bus Board.

### MATERIALS NEEDED

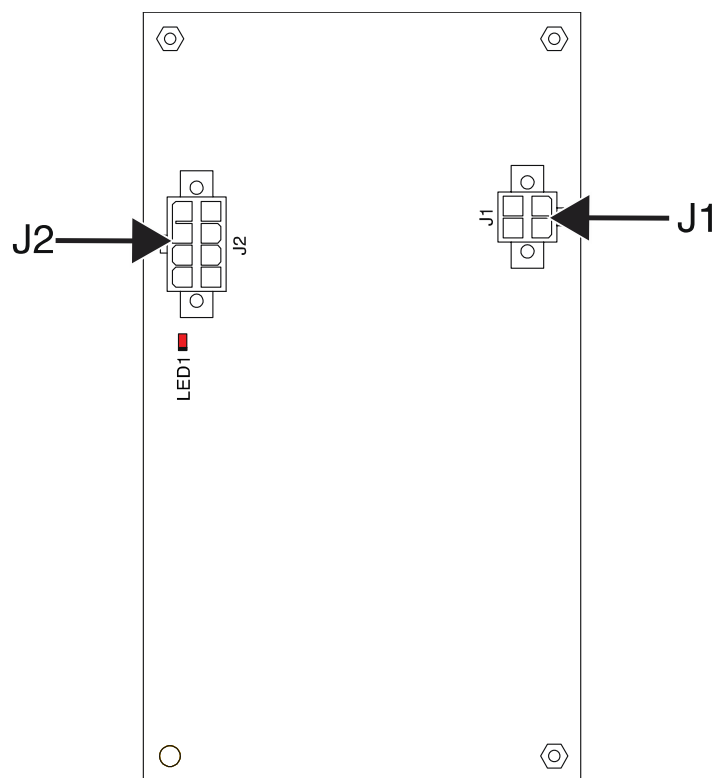
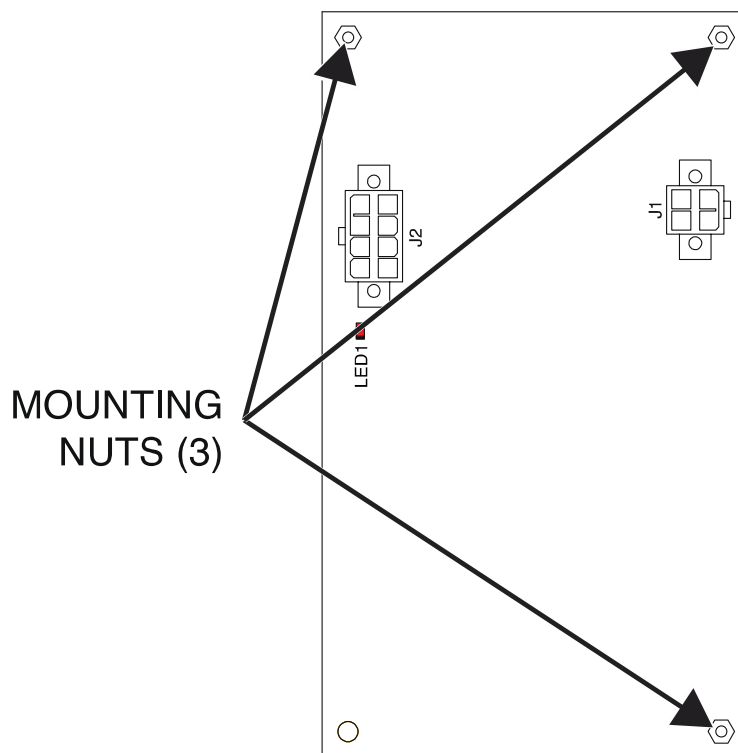
3/8" Nutdriver  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the **Case Cover Removal Procedure**.
3. Perform the **Capacitor Discharge Procedure**.
4. Label and disconnect plugs J1 and J2 from the 40 VDC bus board. See **Figure F.98**. See Wiring Diagram.
5. Using a 3/8" nutdriver, remove the three nuts securing the 40 VDC bus board to the machine. See **Figure F.99**.
6. Carefully slide the 40 VDC bus board off the mounting posts.
7. The 40 VDC bus board can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Carefully position the new 40 VDC bus board onto the mounting posts.
2. Using a 3/8" nutdriver, attach the three nuts securing the 40 VDC bus board to the machine.
3. Connect plugs J1 and J2 to the 40 VDC bus board. See Wiring Diagram.
4. Perform the **Case Cover Replacement Procedure**.
5. Perform the **Retest After Repair Procedure**.

**Figure F.98 – 40 VDC bus board plug locations****Figure F.99 – 40 VDC bus board mounting hardware locations**

## ISOTOP IGBT 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 Isotop IGBT.

### MATERIALS NEEDED

7/64" Allen Wrench  
Dow Corning 340 Heat Sink Compound (Lincoln Part #T12837)  
Wiring Diagram

### REMOVAL PROCEDURE

1. Carefully remove input power from the FlexCut 200 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Capacitor Discharge Procedure***.
4. Perform the ***Pilot Board Removal Procedure***.
5. Using a 7/64" Allen wrench, remove the two screws, lock washers and flat washers securing the isotop IGBT to the heat sink. See ***Figure F.100***. Note orientation for reassembly.
6. The isotop IGBT can now be removed and replaced.

### REPLACEMENT PROCEDURE

1. Apply a thin coating of Dow Corning 340 heat sink compound to the mating surface of the isotop IGBT.
2. Carefully position the new isotop IGBT onto the heat sink with the slot facing up. See ***Figure F.101***.
3. Using a 7/64" Allen wrench, attach the two screws, lock washers and flat washers securing the isotop IGBT to the heat sink.
4. Perform the ***Pilot Board Replacement Procedure***.
5. Perform the ***Case Cover Replacement Procedure***.
6. Perform the ***Retest After Repair Procedure***.

Figure F.100 – Isotop IGBT mounting hardware locations

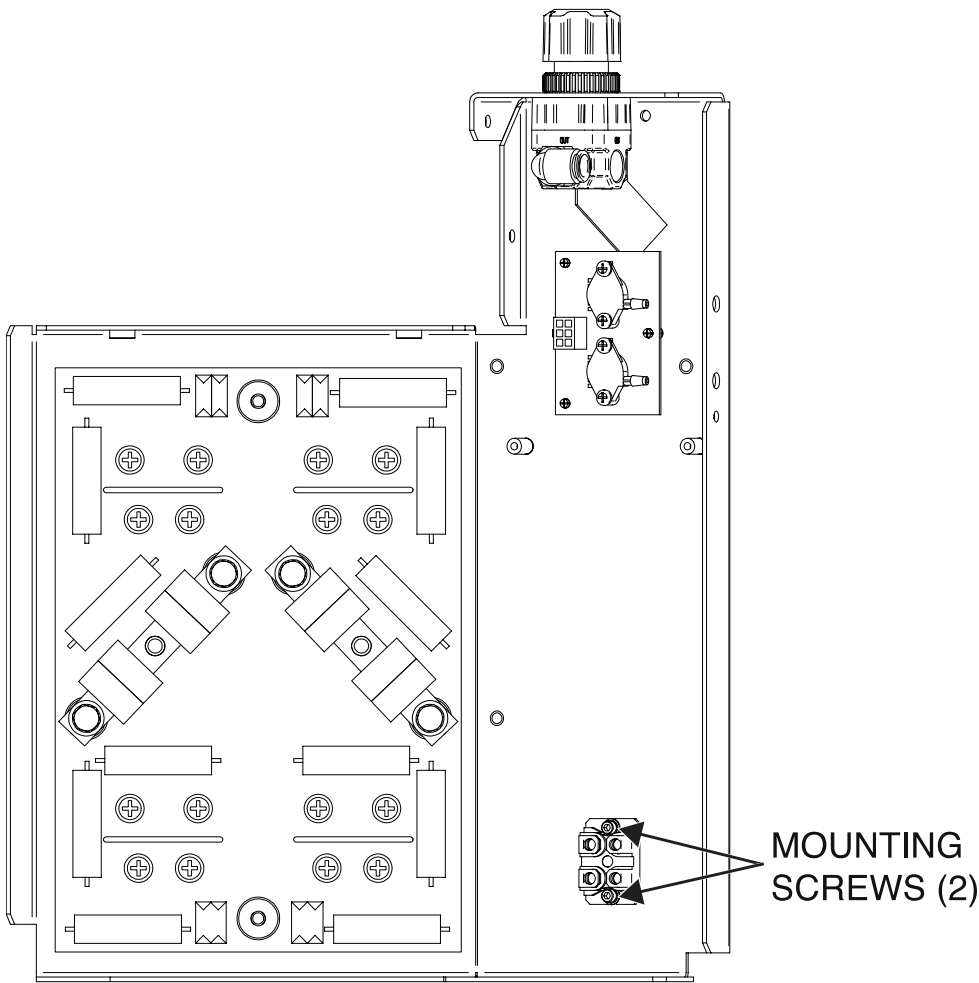
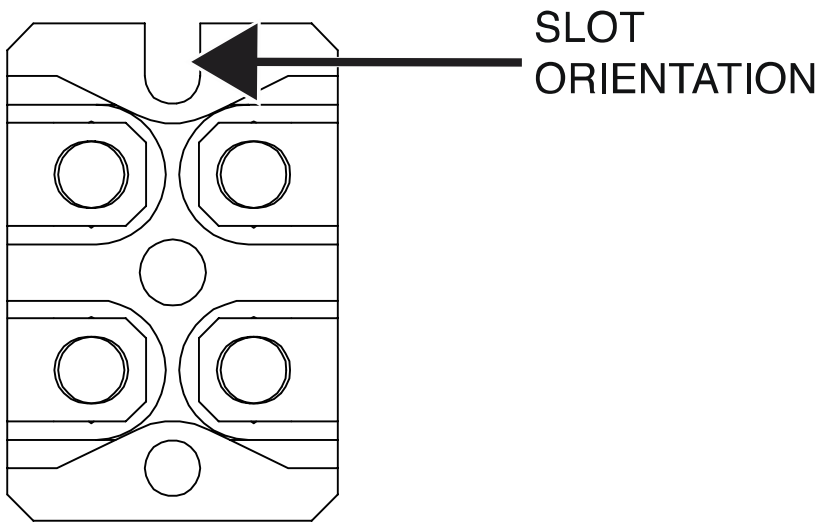


Figure F.101 – Isotop IGBT orientation



## RETEST AFTER REPAIR

### Retest a machine:

- If it is rejected under test for any reason that requires you to remove any part which could affect the machine's electrical characteristics.

### OR

- If you repair or replace any electrical components.

### MACHINE INPUT AND OUTPUT

INPUT VOLTS / HERTZ	INPUT AMPS	RATED OUTPUT	IDLE POWER (W)	POWER FACTOR
380-400-415V / 3 / 50/60HZ	71 AMPS	200A @ 100% DUTY CYCLE	225	.95
460V / 3 / 50/60HZ	63 AMPS			
575V / 3 / 50/60HZ	55 AMPS			

OUTPUT CURRENT RANGE	20 – 200 AMPS DC
----------------------	------------------

MAXIMUM OPEN CIRCUIT VOLTAGE	300 VOLTS DC
------------------------------	--------------

PILOT CURRENT	30 AMPS
---------------	---------

1. Connect the machine to 460 VAC three phase input power and an air supply (130psi minimum).
2. Turn on the machine and verify the following:
  - The fan is functional.
  - The user interface screen is illuminated.
3. Test cut with FlexCut 200 at its maximum recommended cut thickness with 1.5" steel max. Turn current dial to maximum.
4. Turn the machine off. Test complete.