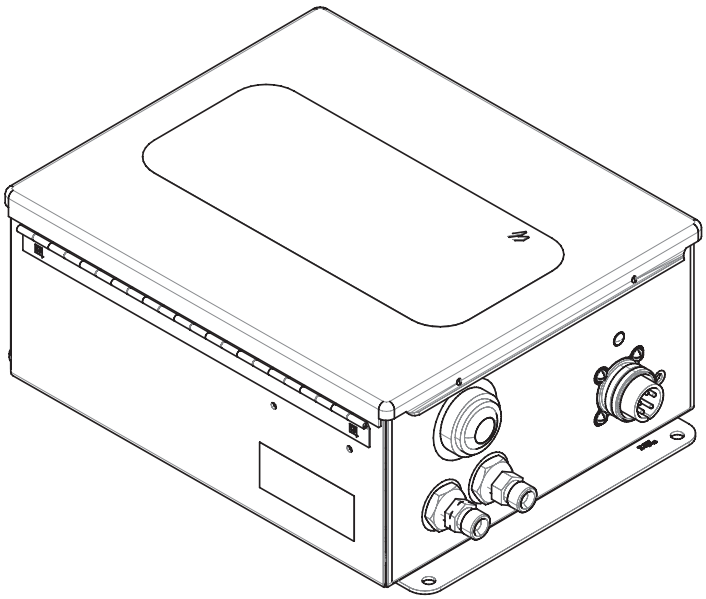
LINCOLN ELECTRIC

FlexStart™

For use with machines having Code Numbers:

FlexStart™: 12749

SERVICE MANUAL



SVM294 | Issue Date 18-Sep

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

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

SAFETY DEPENDS ON YOU

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

⚠ WARNING

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

⚠ CAUTION

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

KEEP YOUR HEAD OUT OF THE FUMES.

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

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

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

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

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

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

WEAR CORRECT EYE, EAR & BODY PROTECTION

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

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

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

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

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

SPECIAL SITUATIONS

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

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

Additional precautionary measures

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

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

REMOVE all potential fire hazards from welding area.

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

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

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

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

For more information go to www.P65 warnings.ca.gov/diesel

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

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

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

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

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

FOR ENGINE POWERED EQUIPMENT.

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

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

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

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

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

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

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

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

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

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

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

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

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

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

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

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

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

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

ELECTRIC SHOCK CAN KILL.

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

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

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

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

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

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

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

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

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

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

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

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

ARC RAYS CAN BURN.

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

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

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

FUMES AND GASES CAN BE DANGEROUS.

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

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

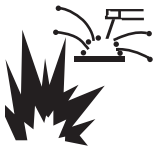
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

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

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



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

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

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

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

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

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

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

6.h. Also see item 1.c.

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

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

CYLINDER MAY EXPLODE IF DAMAGED.

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

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

7.c. Cylinders should be located:

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

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

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

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

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "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.

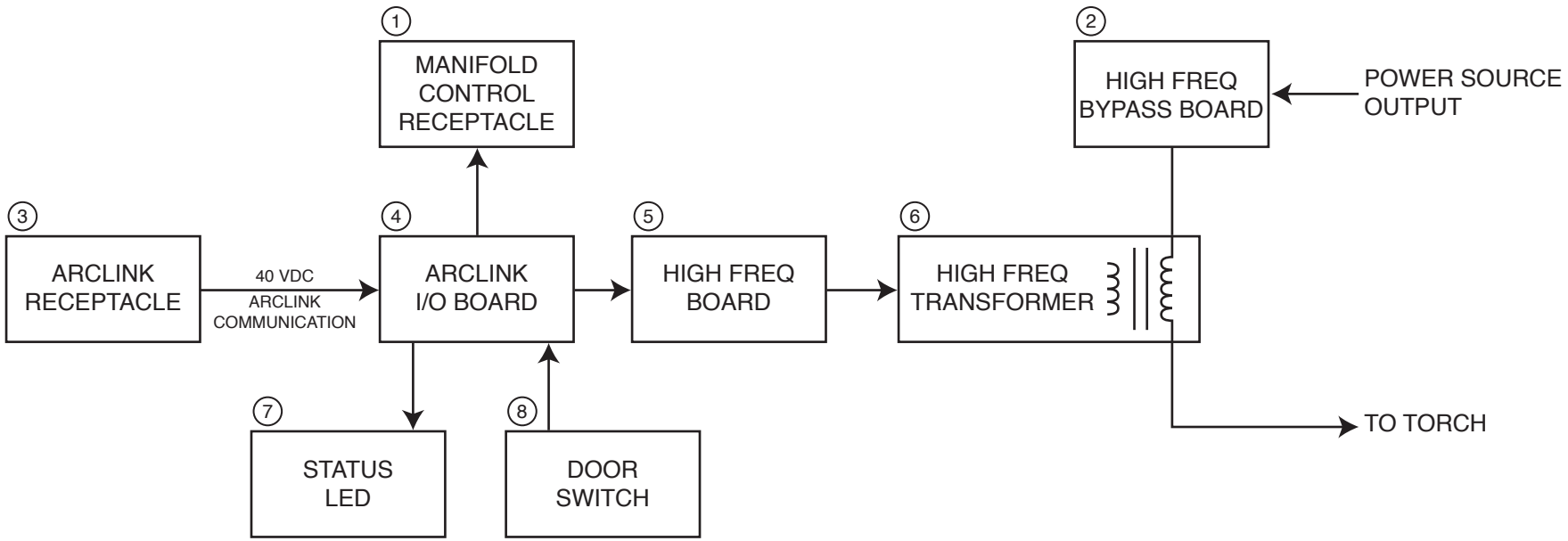
Refer to http://www.lincolnelectric.com/safety for additional safety information.

FlexStart™

Service Manual

Last update: 2018/09/01

FlexStart Block Diagram



1. **MANIFOLD CONTROL RECEPTACLE**
   2-gang gas manifold control cable connection point.

2. **HIGH FREQUENCY BYPASS BOARD**
   Couples output of the power source to the high frequency transformer.

3. **ARCLINK RECEPTACLE**
   Interface connection to a FlexCut or other Arclink peripheral.

4. **ARCLINK I/O BOARD**
   Provides power and enable signal to the high frequency board. Monitors door switch status. Communicates with FlexCut or other Arclink peripherals.

5. **HIGH FREQUENCY BOARD**
   Generates high frequency for arc starting.

6. **HIGH FREQUENCY TRANSFORMER**
   Couples high frequency to pilot circuit. 30:2 turns ratio.

7. **STATUS LED**
   Indicates machine status and error codes.

8. **DOOR SWITCH**
   Pressure activated switch. Switch is closed when door is closed.

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 one main category: Function Problems.

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

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

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

⚠ CAUTION

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

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

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

⚠ CAUTION

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

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

PC board can be damaged by static electricity.

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

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

Reusable Container
Do Not Destroy

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

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

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

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

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

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

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

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

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.

a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks and terminal strips.

b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.

6. Always indicate that this procedure was followed when warranty reports are to be submitted.

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

Troubleshooting guide

Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
FUNCTION PROBLEMS		
Error 447 – FlexStart not found.	1. Arclink cable disconnected. 2. 40V circuit breaker on machine is tripped.	1. Perform the ***Arclink I/O Board Test Procedure***.
Error 811 – FlexStart door open.	1. Door on FlexStart open or not latched. 2. Door switch disconnected or damaged.	1. Perform the ***Door Switch Test Procedure***.
Front LED does not light up.	1. LED disconnected from case front lens.	N/A
No High Frequency.	1. Make sure all connections are correct and secure. 2. Torch may be faulty.	1. Perform the ***High Frequency Board Test Procedure***. 2. Perform the ***High Frequency Transformer Test Procedure***. 3. Perform the ***High Frequency Bypass Board Test Procedure***.
⚠ CAUTION		
If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.		

USING THE STATUS LED TO TROUBLESHOOT SYSTEM PROBLEMS

The FlexStart is equipped with a status light. If a problem occurs it is important to note the condition of the status lights. **Therefore, prior to cycling power to the system, check the power source status light for error sequences in *Table F.1***.

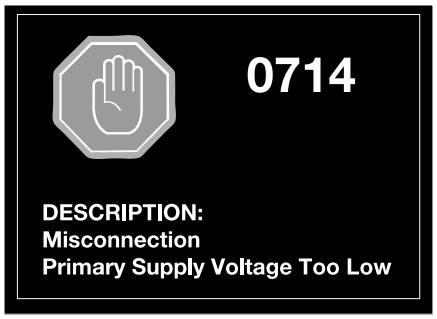
Table F. 1 – Status LED conditions

LIGHT CONDITION	MEANING
STEADY GREEN	System OK. FlexStart is operational and is communicating normally with all healthy equipment connected to its ArcLink network.
BLINKING GREEN	Occurs during power up or a system reset and indicates the FlexStart is mapping (identifying) each component in the system. Normal for first 1-10 seconds after power is turned on or if the system configuration is changed during operation.
FAST BLINKING GREEN	Under normal conditions indicates Auto-mapping has failed. Also used by the diagnostic utility to identify the selected machine when connecting to a specific IP address.
ALTERNATING GREEN AND RED	Non-recoverable system fault. If the Status lights are flashing any combination of red and green, errors are present. **Read the error code(s) before the machine is turned off**. Error Code interpretation through the Status light is detailed in this manual. Individual code digits are flashed in red with a long pause between digits. If more than one code is present, the codes will be separated by a green light. Only active error conditions will be accessible through the Status Light. To clear the active error(s), turn power source off and back on to reset.
STEADY RED	Not applicable.
BLINKING RED	Not applicable.

ERROR CODES

Observe Safety Guidelines detailed in the beginning of this manual.	**ERROR CODES**	
ERROR CODE	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
	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.
	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.
	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 work piece 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.
	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.

	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.
	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.
	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.
	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.
	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.

	The water cooler object was not found and is required in the system.	Connect a water cooler that has a control board (FlexStart). 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.
	The FlexStart object was not found and is required in the system.	Connect a FlexStart.
	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.
	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.

	Trigger locked.	Release the trigger before continuing. The trigger must be disabled at machine startup or when changing modes.
	The door to the FlexStart console is open.	Close the FlexStart door and latch it tightly. Check door switch if problem persists.
	Coolant hoses not connected, leaking or blocked.	Check coolant hoses and replace if necessary.
	Not enough coolant in cooler reservoir.	Add more coolant to reservoir of cooler. Check for leaks or disconnected hoses.
	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.

	Thermistor missing.	NTC thermistor is not plugged in, ambient temperature is too low or thermistor is damaged.

Test Procedures

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

Phillips Screwdriver
Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
   NOTE: It will be necessary to manually close the door switch during most testing.
4. Locate the arclink I/O board. See ***Figure F.1***. See Wiring Diagram.
5. Carefully apply the correct input power to the machine and turn ON the machine.
6. Using a volt/ohmmeter, perform the voltage tests outlined in ***Table F.2***. See ***Figures F.2*** and ***F.3***. See Wiring Diagram.
7. Perform the LED inspections outlined in ***Tables F.3*** and ***F.4***. See ***Figure F.2***. 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. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Table F. 2 – Arclink I/O board voltage tests

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
INPUT VOLTAGE FROM ARCLINK RECEPTACLE	PLUG J61 PIN 4 (LEAD 540)	PLUG J61 PIN 3 (LEAD 500)	40 VDC
CAN SIGNAL	PLUG J61 PIN 1 (LEAD 541)	PLUG J61 PIN 2 (LEAD 542)	2 VDC
OUTPUT VOLTAGE TO HIGH FREQUENCY BOARD	PLUG J60 PIN 4 (LEAD 540F)	PLUG J60 PIN 3 (LEAD 500F)	40 VDC
DOOR SWITCH (SWITCH CLOSED)	PLUG J62 PIN 1 (LEAD 621)	PLUG J62 PIN 6 (LEAD 626)	0 VDC
DOOR SWITCH (SWITCH OPEN)	PLUG J62 PIN 1 (LEAD 621)	PLUG J62 PIN 6 (LEAD 626)	12 VDC
CUTTING SOLENOID PWM	PLUG J63 PIN 1 (LEAD 631)	PLUG J63 PIN 7 (LEAD 637)	40 VDC (WHEN ACTIVATED)
SHIELD SOLENOID PWM	PLUG J63 PIN 2 (LEAD 632)	PLUG J63 PIN 6 (LEAD 636)	40 VDC (WHEN ACTIVATED)
HIGH FREQUENCY ENABLE	PLUG J63 PIN 4 (LEAD 634)	PLUG J63 PIN 8 (LEAD 638)	12 VDC (WHEN ACTIVATED)

Table F.3 – 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.4 – 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 ***ERROR CODES*** IN TROUBLESHOOTING GUIDE.

Figure F.1 – Arclink I/O board location

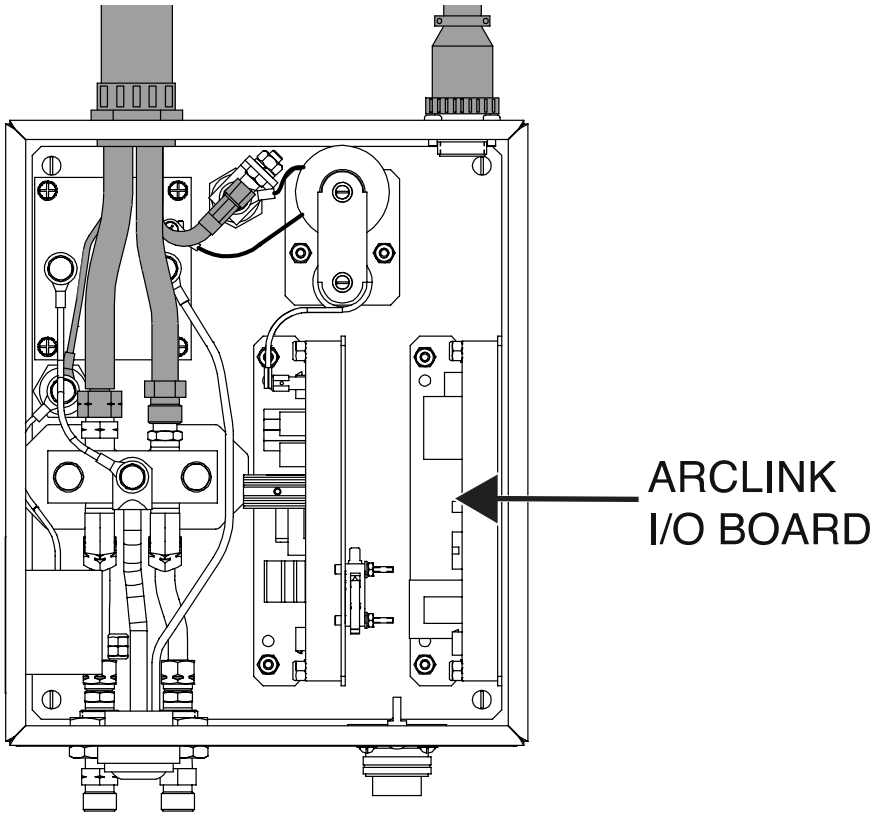


Figure F.2 – Arclink I/O board plug and LED locations

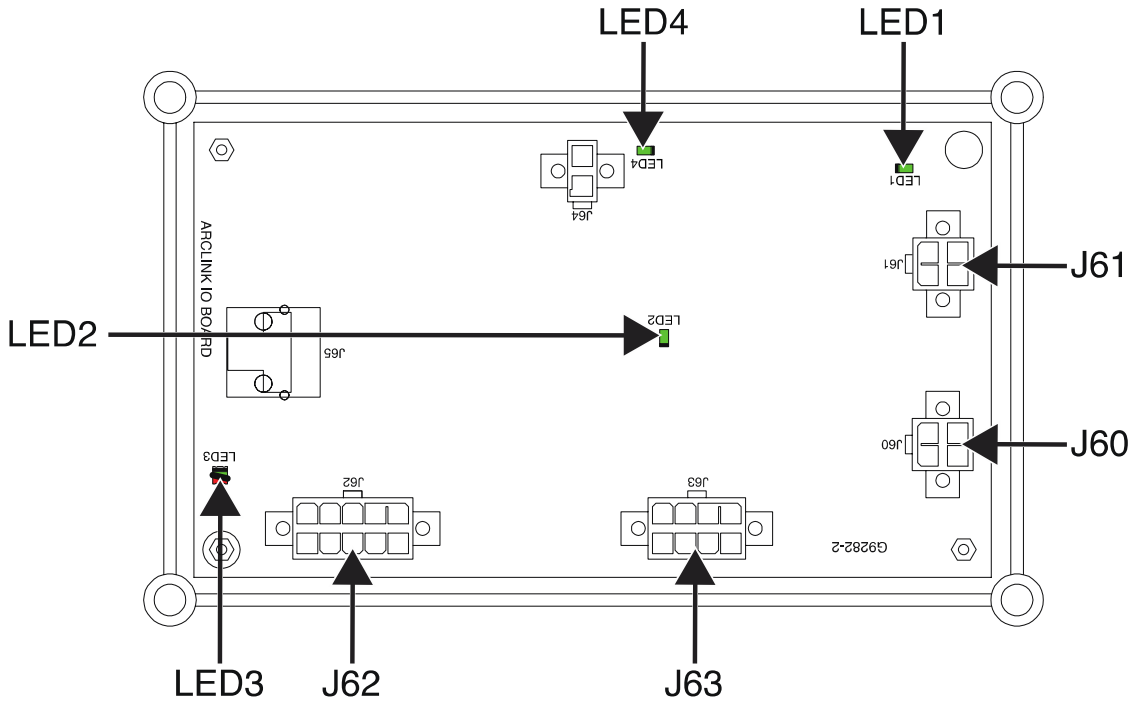
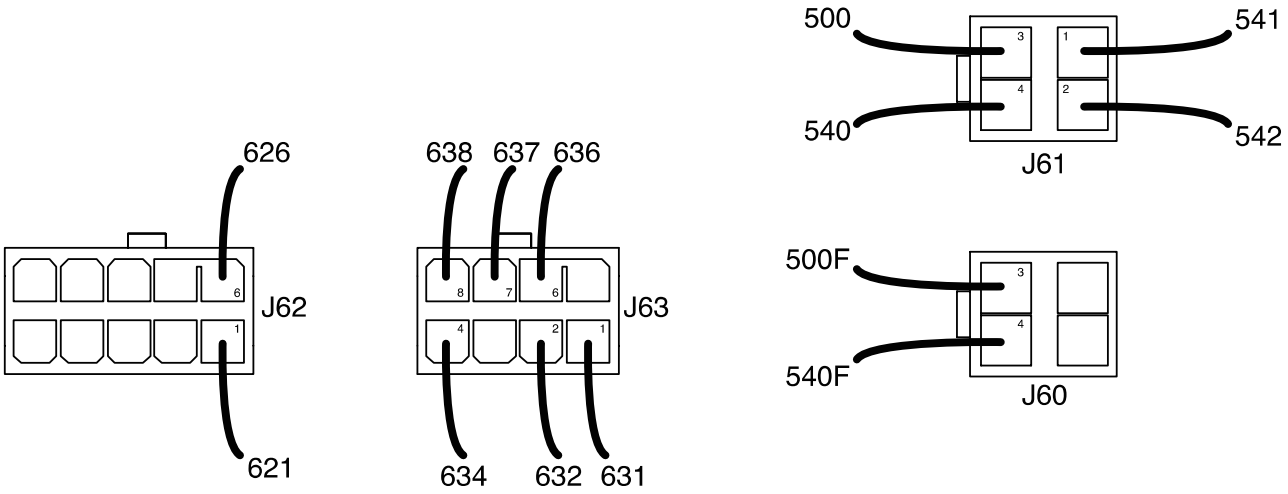


Figure F.3 – Arclink I/O board lead locations



HIGH FREQUENCY 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 High Frequency Board is functioning properly.

⚠ WARNING

High voltage is present in the High Frequency Circuit and can damage measuring equipment. It is recommended that you do NOT attempt to measure any voltages until the High Frequency Circuit is disabled.

MATERIALS NEEDED

Phillips Screwdriver
Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
   NOTE: It will be necessary to manually close the door switch during most testing.
4. Locate the high frequency board. See ***Figure F.4***. See Wiring Diagram.
5. Carefully apply the correct input power to the machine via the arclink receptacle. See Wiring Diagram.
6. Manually close the door switch during all testing. See Wiring Diagram.
7. Perform the LED inspections outlined in ***Table F.5***. See ***Figures F.4*** and ***F.5***. See Wiring Diagram.
8. If the LEDs are illuminated and high frequency is not present at the torch, perform the ***High Frequency Transformer Test***. The torch may be faulty.
9. To further test the high frequency board remove all input power to the machine.
10. Label and disconnect plug J3 from the high frequency board. See ***Figure F.5***. See Wiring Diagram. This will prevent the high frequency board from turning on and damaging measuring equipment.
11. Carefully apply the correct input power to the machine via the arclink receptacle. See Wiring Diagram.

12. If LED2 (Green) is illuminated with plug J3 removed, the high frequency board may be faulty.
13. Using a volt/ohmmeter, measure the voltage on plug J1 pin 4 to pin 3 (plug J3 should still be disconnected). See ***Figures F.5*** and ***F.6***. Normal voltage is 40 VDC.
14. If the 40 VDC is not present, perform the ***ArcLink I/O Board Test Procedure***.
15. To further test the high frequency board remove all input power to the machine.
16. Label and disconnect the two high frequency transformer primary leads from terminals B1 and B2 of the board. See ***Figure F.6***. See Wiring Diagram.
17. Using a volt/ohmmeter, measure the resistance from terminals B1 and B2. See ***Figure F.5***. See Wiring Diagram. Normal resistance is approximately 2.5k ohms.
18. If the resistance is significantly higher or lower the board may be faulty.
19. If faulty, perform the ***High Frequency Board Removal And Replacement Procedure***.
20. Connect all previously disconnected leads and plugs.
21. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Table F.5 – High frequency board LED descriptions

LED #	COLOR	FUNCTION	FUNCTION
1	RED	POWER SUPPLY	40 VDC ARCLINK SUPPLY TO BOARD AND 15 VDC SUPPLY FUNCTIONING ON BOARD. THE OUTPUT MUST BE ACTIVATED (TRIGGERED).
2	GREEN	HIGH FREQUENCY ENABLE	INDICATES THE HIGH FREQUENCY ENABLE SIGNAL IS BEING APPLIED FROM THE ARCLINK I/O BOARD TO THE HIGH FREQUENCY BOARD. THE OUTPUT MUST BE ACTIVATED (TRIGGERED).

Figure F.4 – High frequency board location

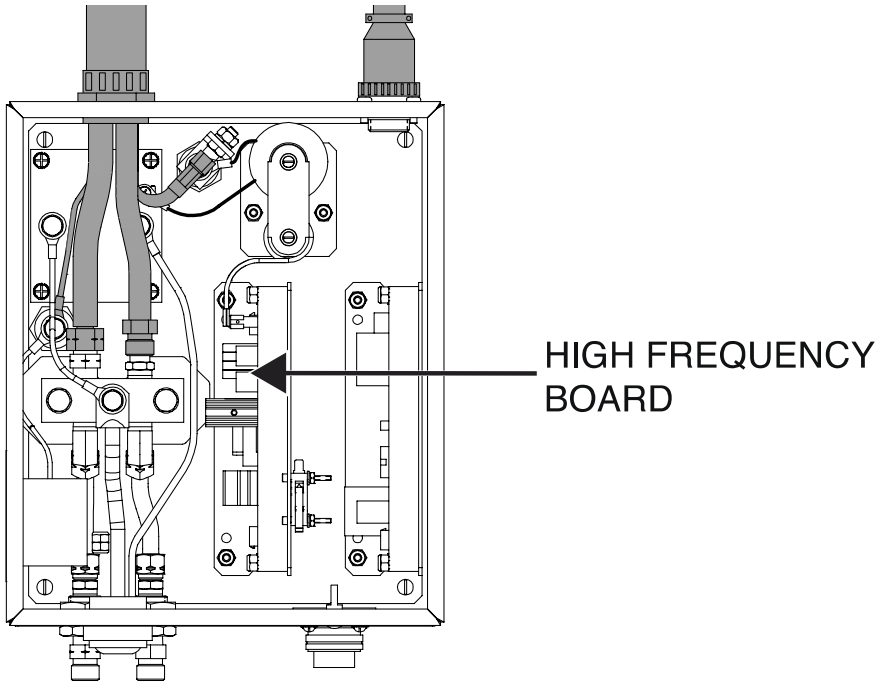


Figure F.5 – High frequency board plug and LED locations

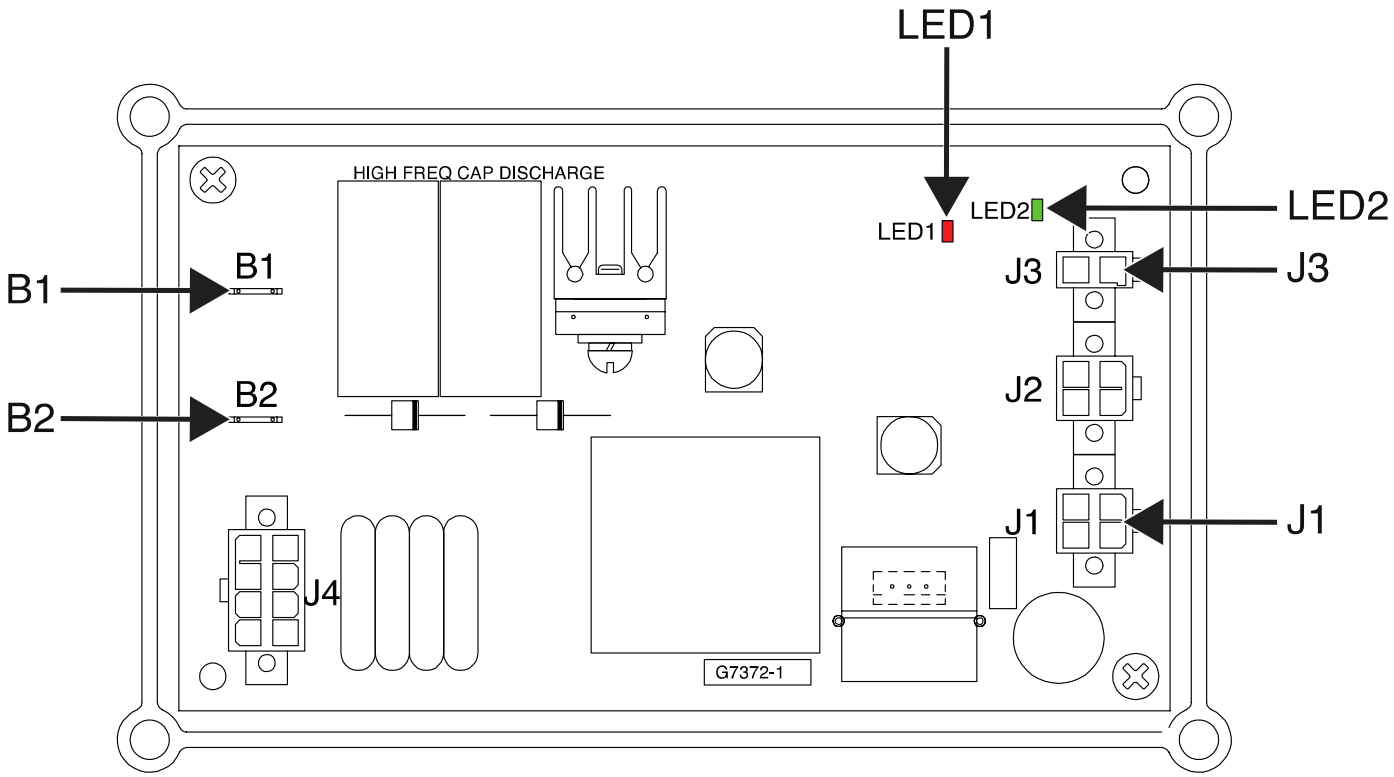
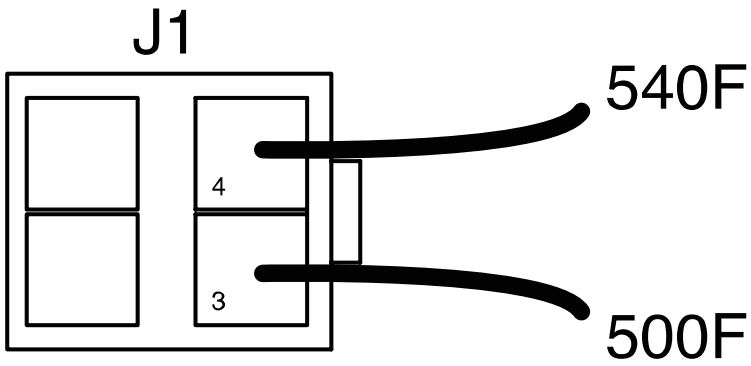


Figure F.6 – High frequency board lead locations



HIGH FREQUENCY BYPASS 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 High Frequency Bypass Board is functioning properly.

MATERIALS NEEDED

Phillips Screwdriver
Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Locate the high frequency bypass board. See ***Figure F.7***. See Wiring Diagram.
5. Using a Phillips screwdriver, remove the screw and lock washer securing the high frequency transformer secondary lead to terminal B3 of the high frequency bypass board. See ***Figure F.8***. See Wiring Diagram.
6. Using a volt/ohmmeter, perform the resistance tests outlined in ***Table F.6***. See ***Figures F.7*** and ***F.8***. See Wiring Diagram.
7. If the tests fail, the high frequency bypass board may be faulty.
8. If faulty, perform the ***High Frequency Bypass Board Removal And Replacement Procedure***.
9. Using a Phillips screwdriver, attach the screw and lock washer securing the high frequency transformer secondary lead to terminal B3 of the high frequency bypass board. See Wiring Diagram.
10. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Table F.6 – High frequency bypass board resistance tests

TEST POINT	TEST POINT	EXPECTED READING
TERMINAL B1	TERMINAL B3	1 M OHM
TERMINAL B1	GROUND	2 M OHM
TERMINAL B3	GROUND	1 M OHM

Figure F.7 – High frequency bypass board location

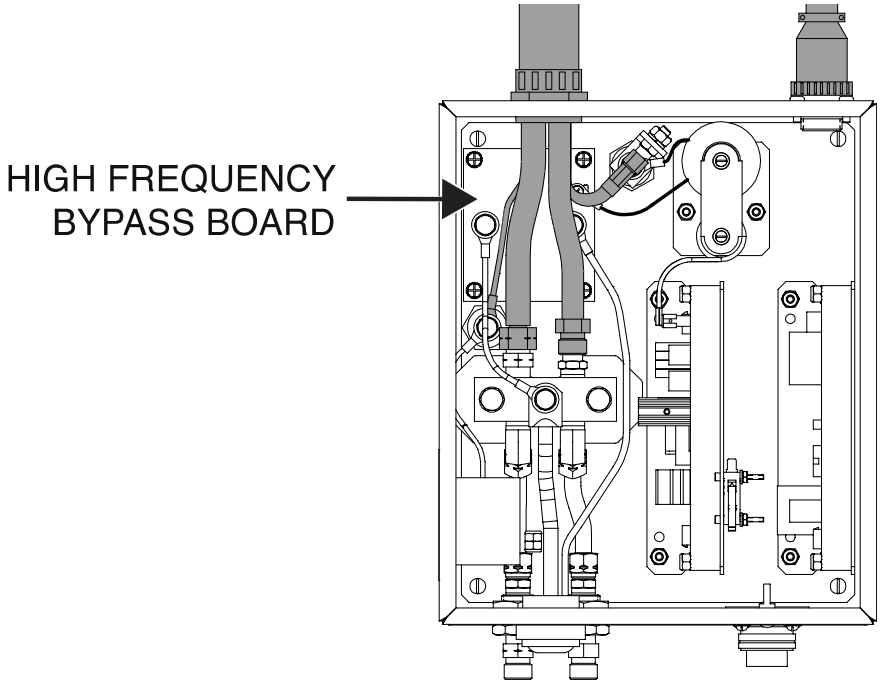
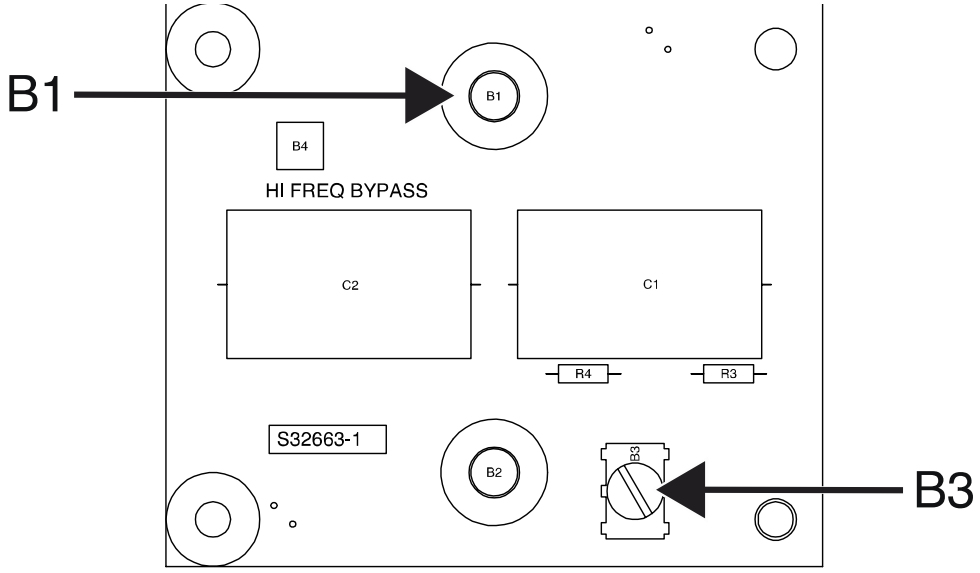


Figure F.8 – High frequency bypass board terminal locations



HIGH FREQUENCY TRANSFORMER TEST PROCEDURE

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the High Frequency Transformer is functioning properly.

MATERIALS NEEDED

Phillips Screwdriver
Volt/Ohmmeter (With Inductance Testing Capabilities)
7/16” Nutdriver
Wiring Diagram

TEST PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Locate the high frequency transformer. See ***Figure F.9***. See Wiring Diagram.
5. Visually inspect the high frequency transformer for any signs of damage.
6. Visually inspect the ferrite core to make sure it is not cracked or damaged.
7. Make sure the primary flex lead makes only two complete turns around the primary ferrite core and the leads are connected to terminals B1 and B2 of the high frequency board. See ***Figure F.10***. See Wiring Diagram.
8. Using a 7/16” nutdriver, remove the screw and lock washer securing the secondary lead to the angled bus bar. See ***Figure F.9***. See Wiring Diagram.
9. Using a Phillips screwdriver, remove the screw and lock washer securing the secondary lead to terminal B3 of the high frequency bypass board. See ***Figure F.9***. See Wiring Diagram.
10. Label and disconnect the primary leads from terminals B1 and B2 of the high frequency board. See ***Figure F.10***. See Wiring Diagram.
11. Using a volt/ohmmeter, measure the resistance of the secondary coil and the primary turn. They both should measure less than .5 ohms. See Wiring Diagram.
12. Using a volt/ohmmeter, measure the resistance of the two coils to chassis ground. See Wiring Diagram. The resistance should be at least 500,000 ohms.
13. Using a Multimeter inductance test, measure the inductance of the secondary coil. It should be approximately 660uH. See Wiring Diagram.

14. If any of the tests fail, the high frequency transformer may be faulty.
15. If faulty, perform the ***High Frequency Transformer Removal And Replacement Procedure***.
16. Using a 7/16" nutdriver, attach the screw and lock washer securing the secondary lead to the angled bus bar. See Wiring Diagram.
17. Using a Phillips screwdriver, attach the screw and lock washer securing the secondary lead to terminal B3 of the high frequency bypass board. See Wiring Diagram.
18. Connect the primary leads to terminals B1 and B2 of the high frequency board. See Wiring Diagram.
19. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Figure F.9 – High frequency transformer and primary and secondary lead locations

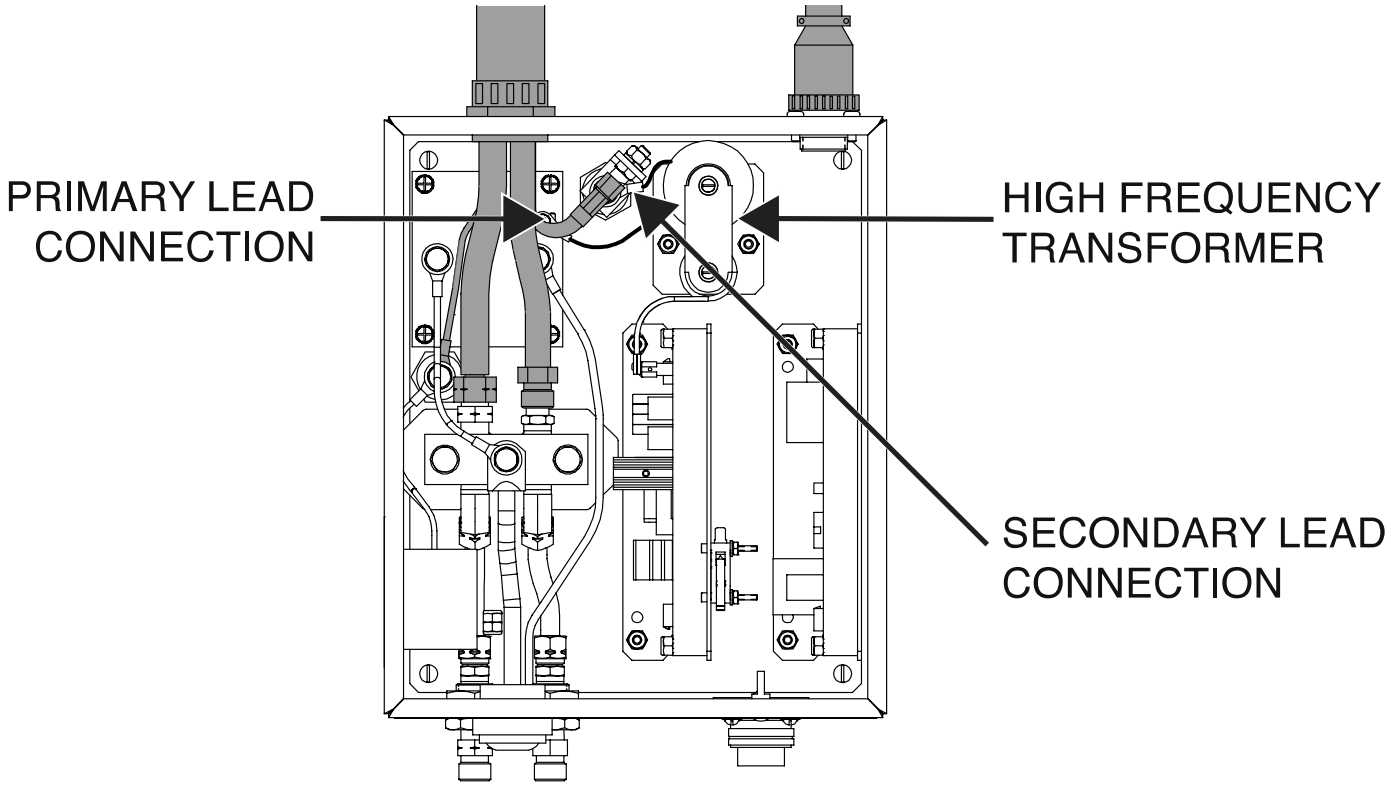
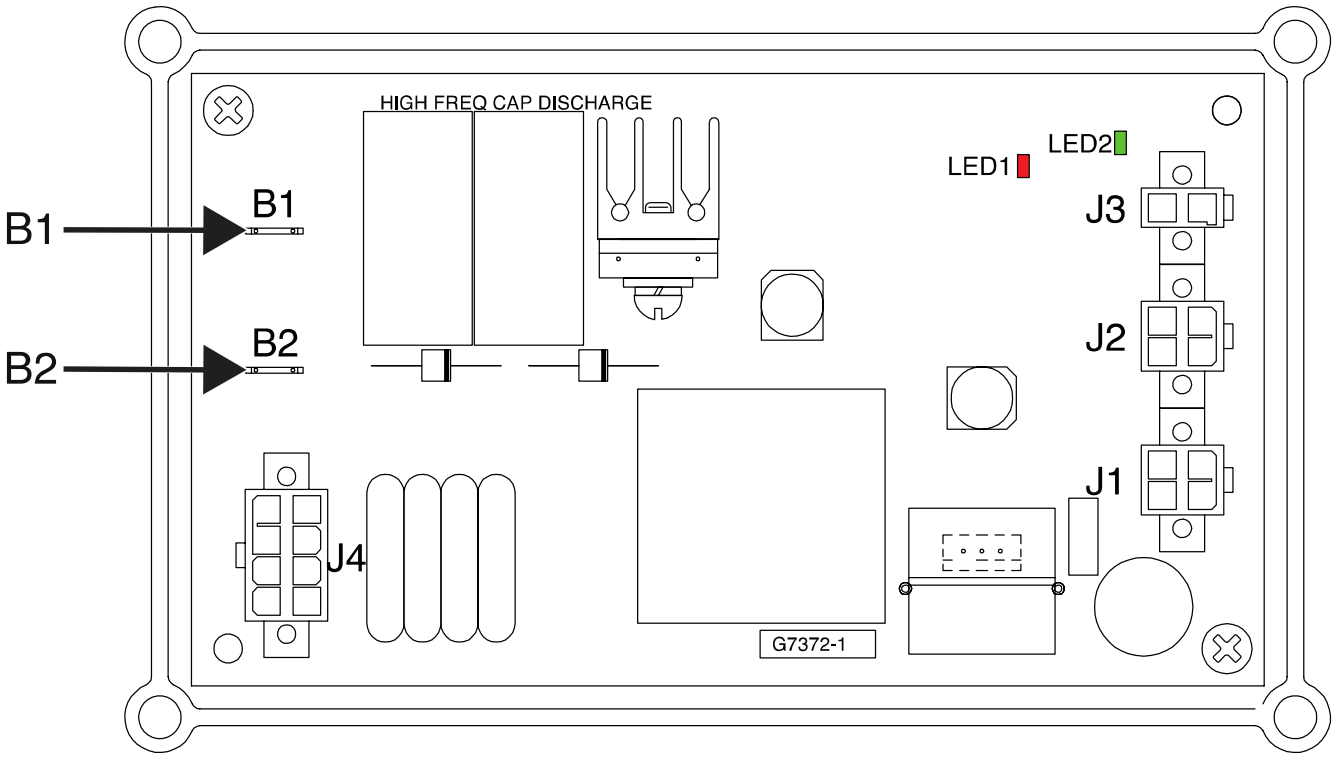


Figure F.10 – High frequency board terminal B1 and B2 locations



DOOR 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 Door Switch is functioning properly.

MATERIALS NEEDED

Phillips Screwdriver
Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Locate the door switch. See ***Figure F.11***. See Wiring Diagram.
5. Label and disconnect leads 621 and 626 from the door switch terminals. See ***Figure F.12***. See Wiring Diagram.
6. Using a volt/ohmmeter, perform the resistance tests outlined in ***Table F.7***. See ***Figure F.12***. See Wiring Diagram.
7. If the tests fail, the door switch may be faulty.
8. If faulty, perform the ***Door Switch Removal And Replacement Procedure***.
9. Connect leads 621 and 626 to the door switch terminals. See Wiring Diagram.
10. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Table F. 7 – Door switch resistance tests

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
DOOR SWITCH (SWITCH CLOSED)	TERMINAL NO3	TERMINAL COM	VERY LOW RESISTANCE (LESS THAN ONE OHM)
DOOR SWITCH (SWITCH OPEN)	TERMINAL NO3	TERMINAL COM	VERY HIGH RESISTANCE (AT LEAST 500K OHMS)

Figure F.11 – Door switch location

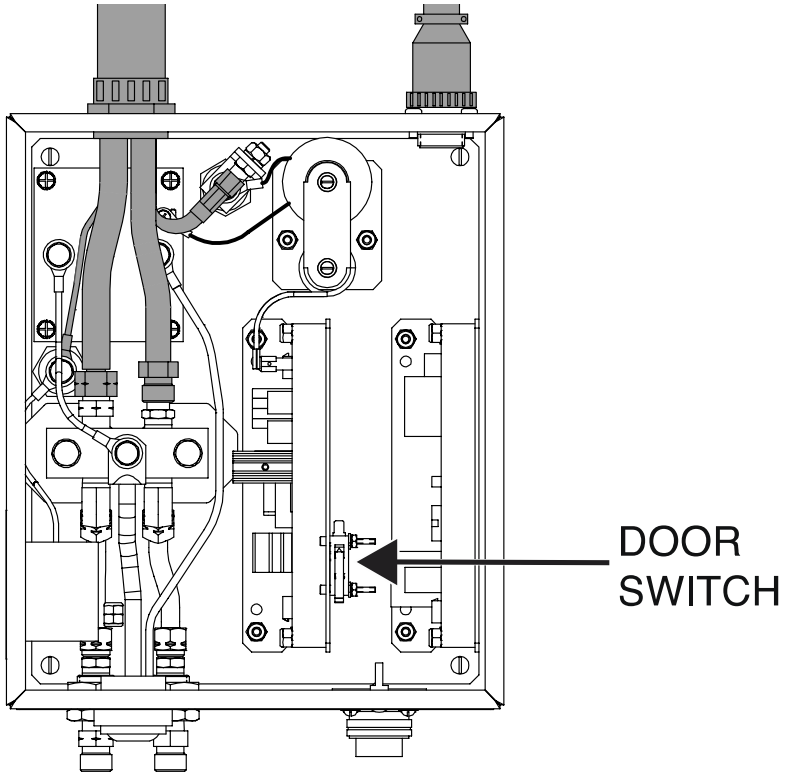
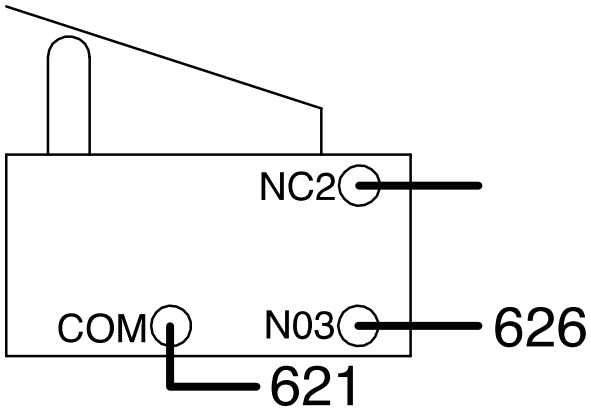


Figure F.12 – Door switch terminal locations



Removal And Replacement Procedures

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

Phillips Screwdriver
3/8” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Label and disconnect plugs J60, J61, J62 and J63 from the arclink I/O board. See ***Figure F.13***. See Wiring Diagram.
5. Using a 3/8” nutdriver, remove the two nuts securing the arclink I/O board to the mounting posts. See ***Figure F.14***.
6. The arclink I/O board can now be removed form it’s mounting posts and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new arclink I/O board onto it’s mounting posts.
2. Using a 3/8” nutdriver, attach the two nuts securing the arclink I/O board to the mounting posts
3. Connect plugs J60, J61, J62 and J63 to the arclink I/O board. See Wiring Diagram.
4. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Figure F.13 – Arclink I/O board plug locations

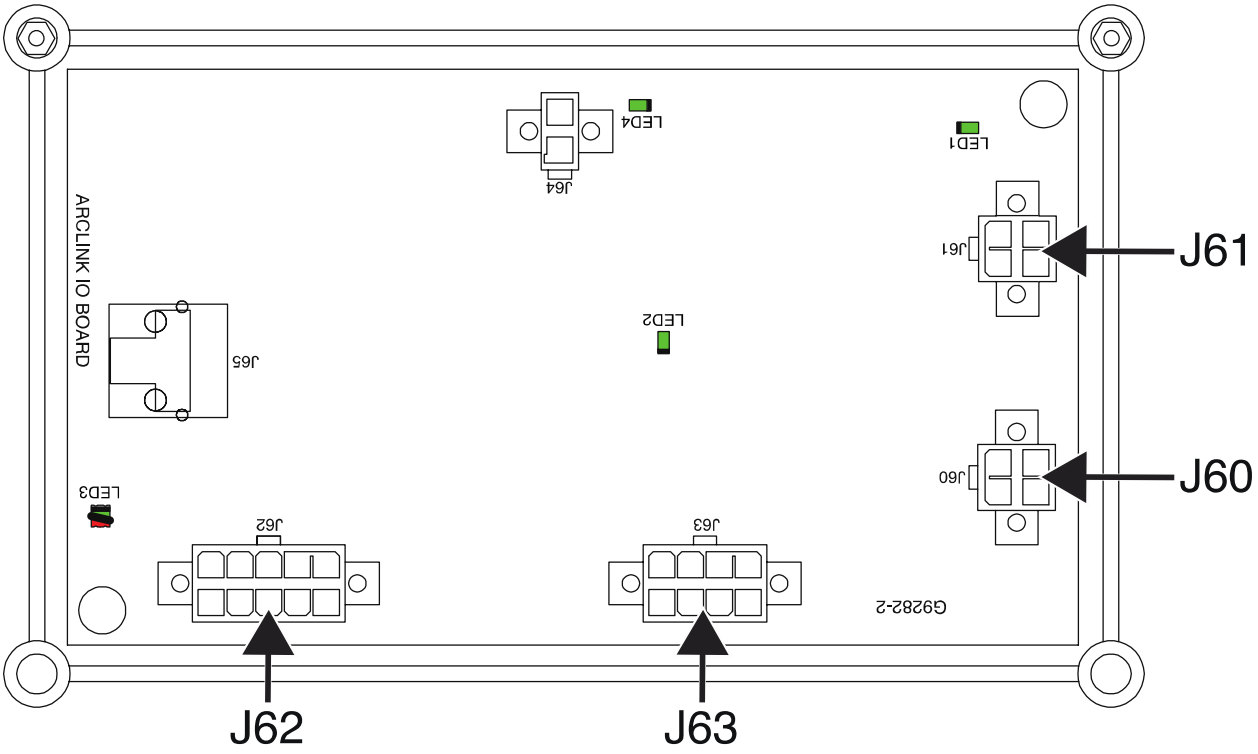
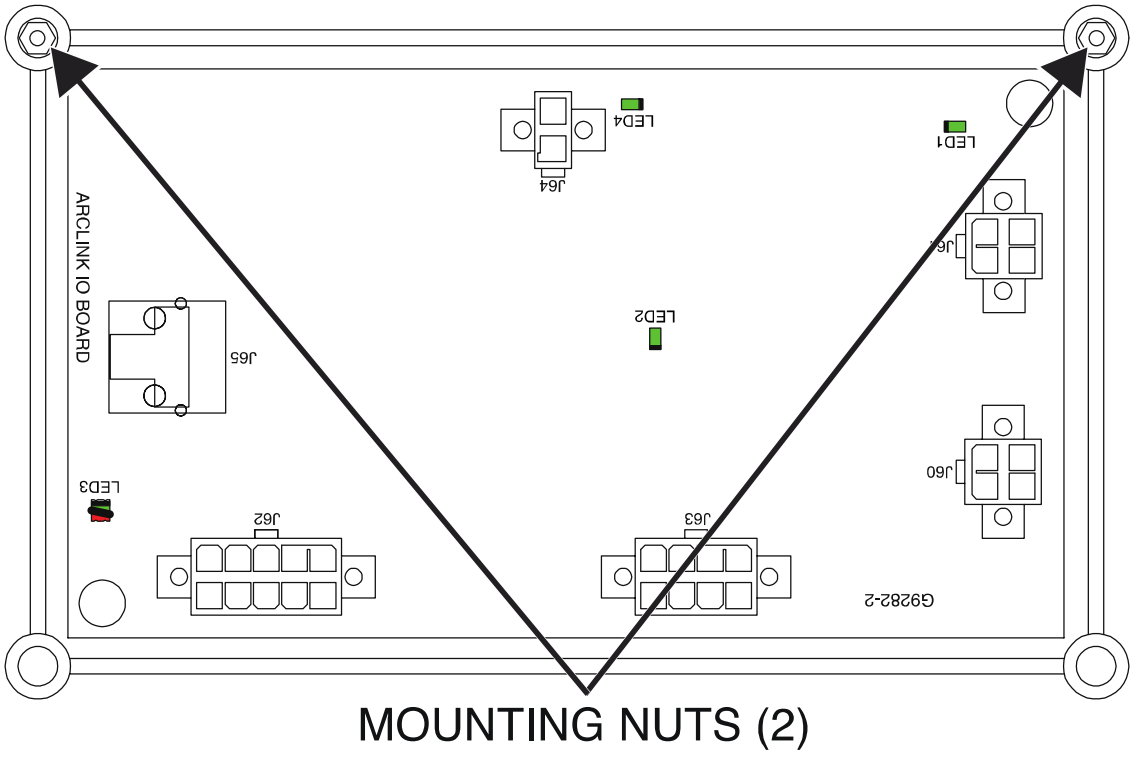


Figure F.14 – Arclink I/O board mounting hardware locations



HIGH FREQUENCY BOARD REMOVAL AND REPLACEMENT PROCEDURE

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TEST DESCRIPTION

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

MATERIALS NEEDED

Phillips Screwdriver
3/8” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Label and disconnect the high frequency transformer primary leads from terminals B1 and B2 of the high frequency board. See ***Figure F.15***. See Wiring Diagram.
5. Label and disconnect plugs J1 and J3 from the high frequency board. See ***Figure F.15***. See Wiring Diagram.
6. Using a 3/8” nutdriver, remove the two nuts securing the high frequency board to the mounting posts. See ***Figure F.16***.
7. The high frequency board can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new high frequency board onto it’s mounting posts.
2. Using a 3/8” nutdriver, attach the two nuts securing the high frequency board to the mounting posts.
3. Connect plugs J1 and J3 to the high frequency board. See Wiring Diagram.
4. Connect the high frequency transformer primary leads to terminals B1 and B2 of the high frequency board. See Wiring Diagram.
5. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Figure F.15 – High frequency board plug and terminal locations

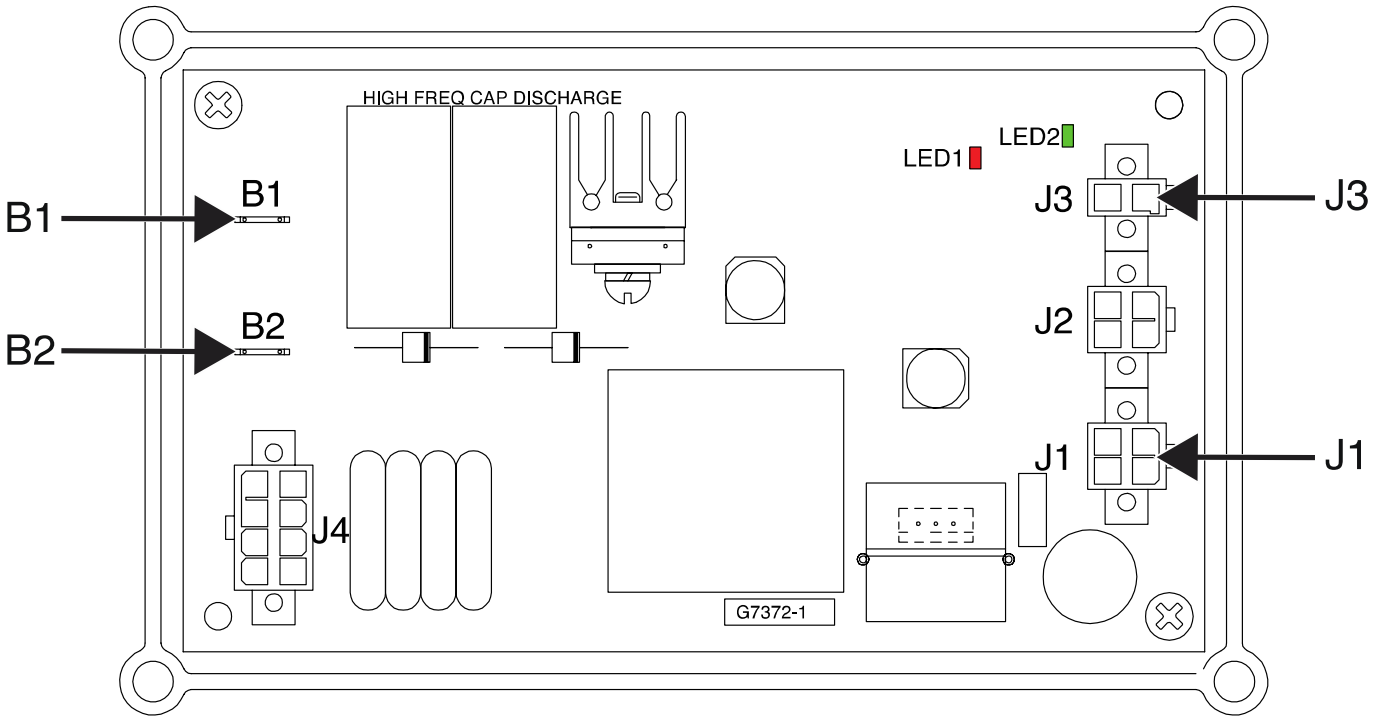
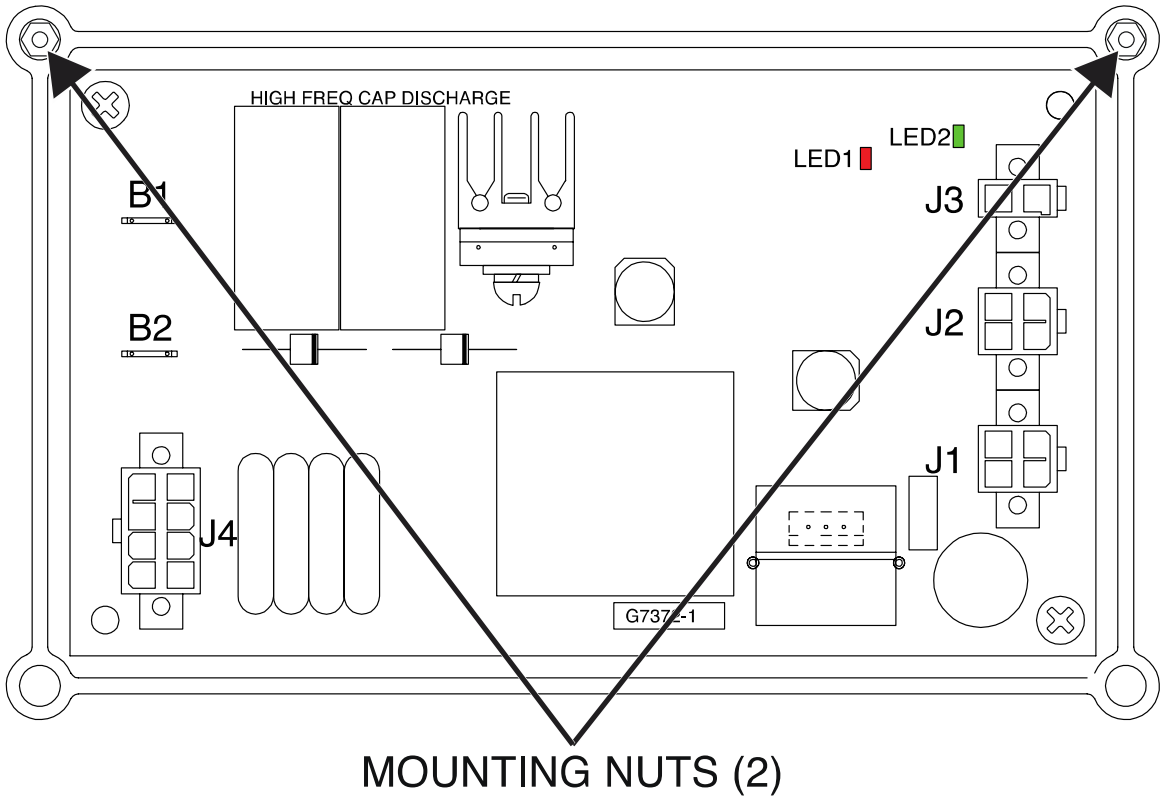


Figure F.16 – High frequency board mounting hardware locations



HIGH FREQUENCY BYPASS 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 High Frequency Bypass Board.

MATERIALS NEEDED

Phillips Screwdriver
3/8” Nutdriver
3/8” Open End Wrench
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Using a Phillips screwdriver, remove the screw and lock washer securing the high frequency transformer secondary lead to the high frequency bypass board terminal B3. See ***Figure F.17***. See Wiring Diagram.
5. Using a Phillips screwdriver, remove the four screws and washers securing the high frequency bypass board to the mounting stand-offs. See ***Figure F.18***.
6. Using a 3/8” nutdriver and a 3/8” open end wrench, remove the bolt and nut securing the high frequency transformer secondary lead to the high frequency bypass board terminal B1. See ***Figure F.17***. See Wiring Diagram.
7. The high frequency bypass board can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Using a 3/8” nutdriver and a 3/8” open end wrench, attach the bolt and nut securing the high frequency transformer secondary lead to the high frequency bypass board terminal B1. See Wiring Diagram.
2. Carefully position the new high frequency bypass board into the machine.
3. Using a Phillips screwdriver, attach the four screws and washers securing the high frequency bypass board to the mounting stand-offs.

4. Using a Phillips screwdriver, attach the screw and lock washer securing the high frequency transformer secondary lead to the high frequency bypass board terminal B3. See Wiring Diagram.
5. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Figure F.17 – High frequency bypass board terminal locations

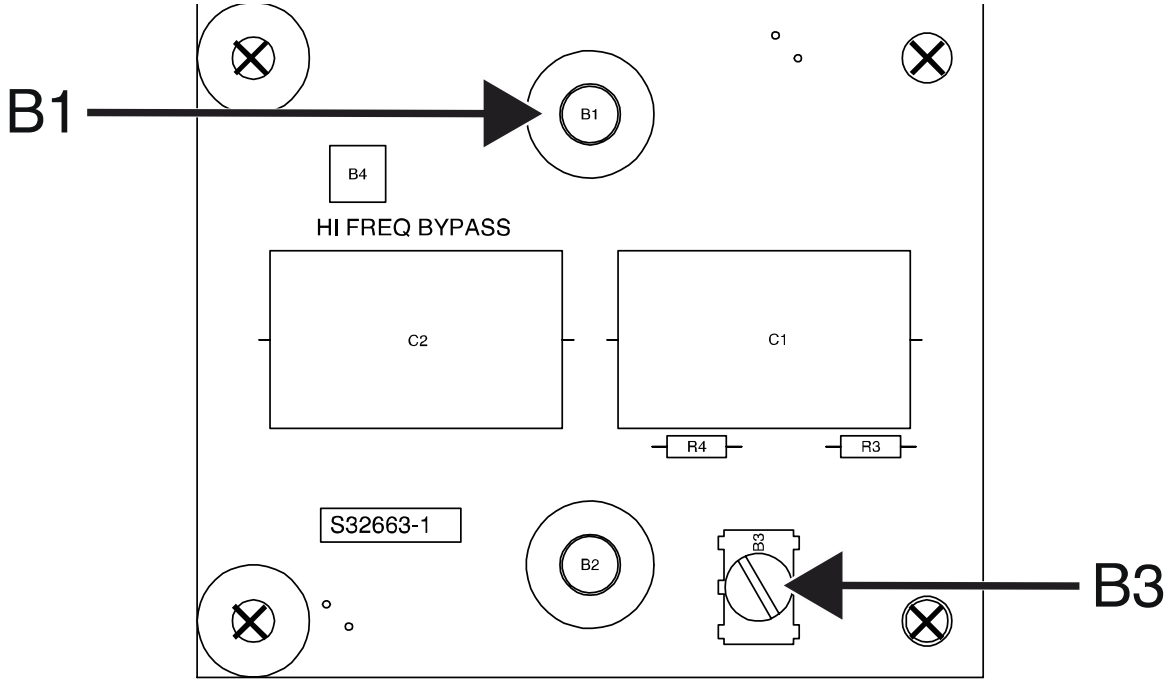
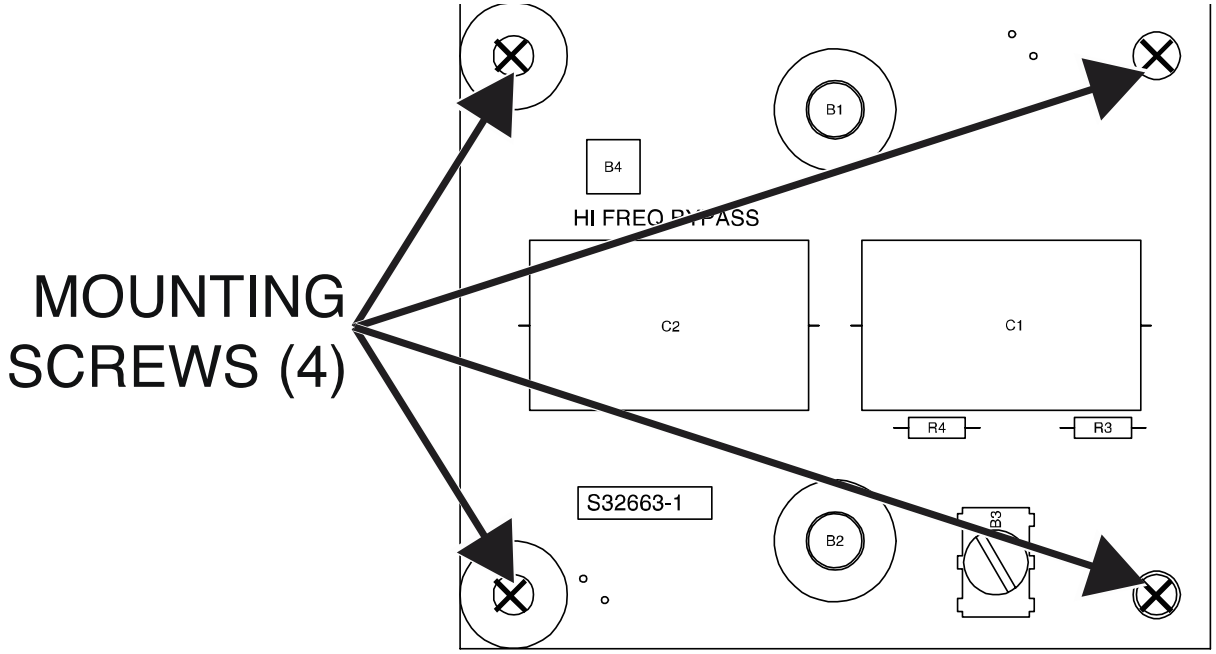


Figure F.18 – High frequency bypass board mounting hardware locations



DOOR 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 Door Switch.

MATERIALS NEEDED

Phillips Screwdriver
3/32” Allen Wrench
1/4” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Label and disconnect leads 626 and 621 from the door switch terminals. See ***Figure F.19***. See Wiring Diagram.
5. Using a 3/32” Allen wrench and a 1/4” nutdriver, remove the two screws, lock washers and flat washers securing the door switch to the high frequency board mounting bracket. See ***Figure F.20***.
6. The door switch can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new door switch into the machine.
2. Using a 3/32” Allen wrench and a 1/4” nutdriver, attach the two screws, lock washers and flat washers securing the door switch to the high frequency board mounting bracket.
3. Connect leads 626 and 621 to the door switch terminals. See Wiring Diagram.
4. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Figure F.19 – Door switch terminal locations

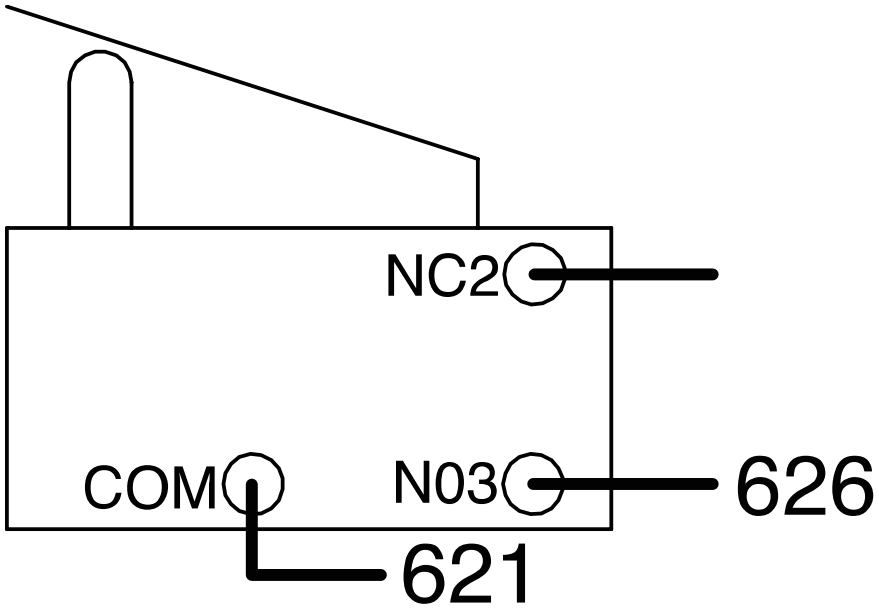
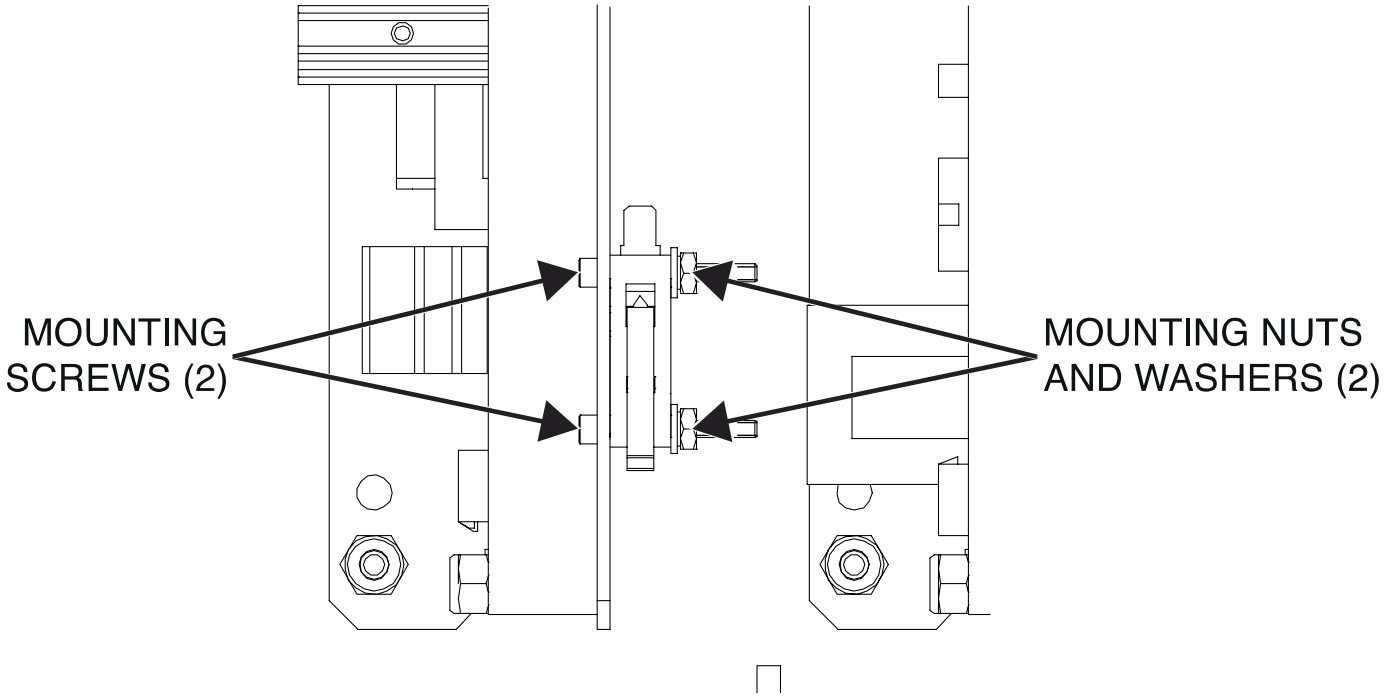


Figure F.20 – Door switch mounting hardware locations



HIGH FREQUENCY TRANSFORMER REMOVAL AND REPLACEMENT PROCEDURE

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the High Frequency Transformer.

MATERIALS NEEDED

Phillips Screwdriver
7/16” Nutdriver
3/8” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove power from the FlexStart machine.
2. Using a Phillips screwdriver, loosen the two screws from the latches securing the hinged enclosure door.
3. Open the enclosure door to gain access to internal components.
4. Label and disconnect the primary leads from terminals B1 and B2 of the high frequency board. See ***Figure F.21***. See Wiring Diagram.
5. Using a 7/16” nutdriver, remove the screw and lock washer securing the transformer secondary lead to the angled bus bar. See ***Figure F.22***. See Wiring Diagram.
6. Using a Phillips screwdriver, remove the screw and lock washer securing the transformer secondary lead to the high frequency bypass board terminal B3. See ***Figure F.22***. See Wiring Diagram.
7. Using a 3/8” nutdriver, remove the two nuts securing the transformer to the base of the machine. See ***Figure F.22***.
8. The high frequency transformer can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new transformer onto it’s mounting posts.
2. Using a 3/8” nutdriver, attach the two nuts securing the transformer to the base of the machine.
3. Using a Phillips screwdriver, attach the screw and lock washer securing the transformer secondary lead to the high frequency bypass board terminal B3. See Wiring Diagram.
4. Using a 7/16” nutdriver, attach the screw and lock washer securing the transformer secondary lead to the angled bus bar. See Wiring Diagram.

5. Connect the primary leads to terminals B1 and B2 of the high frequency board. See Wiring Diagram.
6. Close the hinged enclosure door and using a Phillips screwdriver, tighten the two screws securing the latches.

Figure F.21 – High frequency board terminals B1 and B2 location

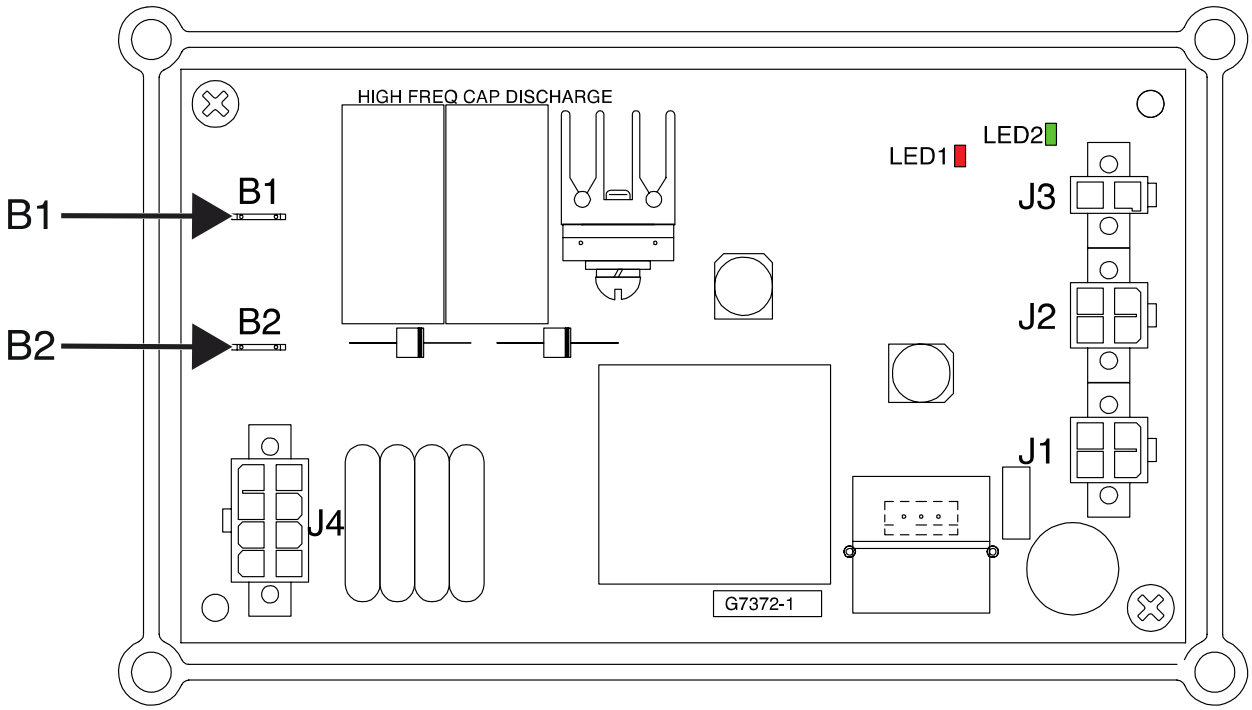


Figure F.22 – High frequency transformer mounting hardware and secondary lead locations