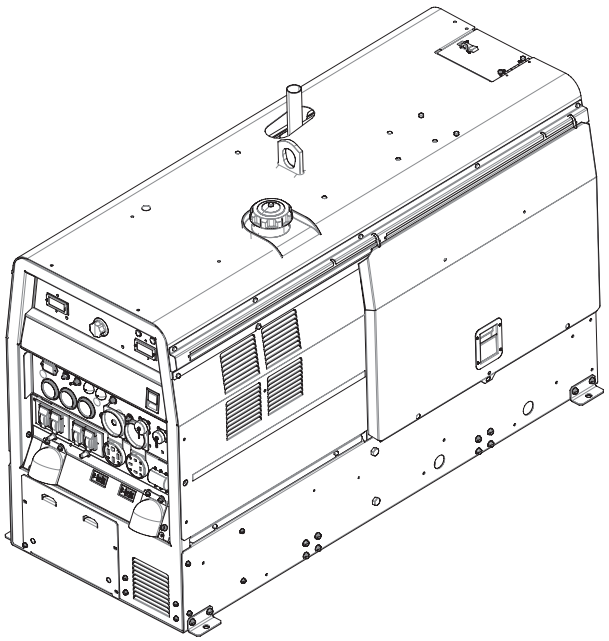
Vantage® 500

For use with machines having Code Numbers:

Vantage 500: 11467, 11786, 11922, 11923, 11962, 12359, 12360, 12361, 12373, 12656, 12694

SERVICE MANUAL



SVM285 | Issue Date 18-Feb

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

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. 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.

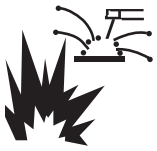
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

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.

Vantage® 500

Service Manual

Last update: 2018/01/01

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 four main categories: Output Problems, Function Problems, Welding Problems and Engine 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**
OUTPUT PROBLEMS		
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.
No welding output or auxiliary power. The engine operates normally.	1. Check for loose or faulty connections in the auxiliary circuit to the output receptacles and/or the weld circuit to the output terminals. See Wiring Diagram. 2. Check the brushes for wear and proper contact to the rotor slip rings.	1. Perform the ***Brush And Slip Ring Service Procedure***. 2. Check for flashing voltage at the slip rings (3 - 5 VDC @ .5 amp until generator builds up, then 160 volts). Perform the ***Flashing Voltage Test Procedure***. 3. Perform the ***Output Rectifier Bridge Test Procedure***. 4. Perform the ***Rotor Voltage Test Procedure***. 5. Perform the ***Rotor Resistance And Ground Test Procedure (Static)***. 6. Perform the ***Rotor Resistance And Ground Test Procedure (Dynamic)***. 7. Perform the ***Stator Voltage 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.		

Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
OUTPUT PROBLEMS		
No welding output in any mode. The auxiliary output is normal. The engine operates normally.	1. Place the welding terminals switch in the "Weld Terminals On" position. If the problem is solved and there is a control cable, wire feeder, amptrol or arc start switch connected, the fault may lie in the above attached accessories. 2. If the correct OCV is present at the weld output terminals, check the welding cables, connectors, work clamp, electrode holder, etc. For loose or faulty connections. 3. Check for damaged conductors or faulty connections on the heavy current carrying leads that connect the output studs to the chopper module and the output rectifier. Also check the shunt and the choke assemblies for damage and faulty connections.	1. Check the welding terminals switch and associated leads. See Wiring Diagram. 2. Check gate leads 23 and 25 and weld control board power leads 13 and 14 for loose or faulty connections. See Wiring Diagram. 3. Perform the ***Chopper Module Function Test Procedure***. 4. Perform the ***Stator Voltage Test Procedure***. 5. Perform the ***Output Rectifier Bridge Test Procedure***. 6. Perform the ***Weld Control Board PWM Gate Signal Test Procedure***. 7. The weld control board may be faulty.
VRD lights do not illuminate.	1. Ensure VRD ON/OFF switch is in the "ON" position. (Factory setting is "OFF"). 2. See the VRD indicator light information in the operation section of the Operators Manual.	1. Check connections at the VRD ON/OFF switch. 2. Check the VRD ON/OFF switch for proper operation. 3. VRD display board may be faulty
⚠ CAUTION If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.		

Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
OUTPUT PROBLEMS		
No auxiliary power at one or more receptacles or at the 14 pin Amphenol. Weld output is normal and the engine operates normally.	1. Check for loose or faulty connections at the output receptacles or 14 pin Amphenol. 2. Check for tripped circuit breaker and/or tripped GFCI receptacles.	1. Perform the ***Stator Voltage Test Procedure***. 2. Check the wiring between the auxiliary receptacle and the stator.
The machine has low welding output and low auxiliary output.	1. The engine RPM may be low. 2. The brushes may be sticking or poorly seated or the slip rings may be dirty.	1. The engine high idle speed may be low. 2. Perform the ***Engine Electronic Governor Control Module Test Procedure***. Full load speed should be about 1800 RPM. Inspect and if necessary service the brushes and slip rings per the ***Brush and Slip Ring Service Procedure***. 3. Perform the ***Rotor Voltage Test Procedure***. 4. Perform the ***Rotor Resistance And Ground Test Procedure (Static)***. 5. Perform the ***Rotor Resistance And Ground Test Procedure (Dynamic)***. 6. Perform the ***Stator Voltage 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.

Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
OUTPUT PROBLEMS		
The machine will weld but the welding arc is "COLD". The engine runs normally and the auxiliary power is normal.	1. Make sure the machine is properly set for the electrode and process is being used. Check electrode size, mode switch setting and amps or voltage setting. If gas is used make sure of correct type and gas flow. 2. Make sure the process does not demand more power than the machine can produce. 3. If the current is correct try increasing the "ARC CONTROL" setting. 4. Check for loose or faulty connections at the weld output terminals and welding cable connections. 5. Check for good connections between the work cable and the work piece. 6. The weld cables may be too long or too small diameter causing excessive voltage drop. 7. The weld cables should not be coiled or wrapped around metal racks or reels. This can cause excessive inductance in the weld circuit. Try welding with a short set of adequately sized weld cables.	1. The engine RPM may be too low. Perform the ***Engine Electronic Governor Control Module Test Procedure***. 2. Disconnect all external equipment and perform a "load" test using a resistive load bank and accurate meters. Adjust the load for about 500 Amps at 40 Volts; Check that the engine speed holds at 1800rpm. If not perform engine maintenance. If the Vantage 500 has meters, make sure that they read the same as the load bank meters. If not, perform the ***Weld Control Board Feedback Test Procedure***. 3. If the maximum weld output cannot be obtained and the front panel displays are reading accurately, check for damaged conductors or loose connections in the large current carrying conductors of the stator, output rectifier, chopper modules, choke, shunt and output terminals. See Wiring Diagram. 4. If all these connections are good perform the ***Stator Voltage Test Procedure***, the ***Output Rectifier Bridge Test Procedure*** and the ***Chopper Module Board Resistance Test Procedure***. 5. Perform the ***Control Potentiometer and Mode***

		Switch Resistance Test Procedure. 6. Perform the ***Remote Receptacle Resistance Test Procedure***. 7. Perform the ***Choke Test Procedure***. 8. Replace the weld control board.

⚠ CAUTION

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

Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
FUNCTION PROBLEMS		
The machine welds but it will not maintain a steady output.	1. This condition may be normal in the Downhill Pipe Mode. The downhill pipe mode allows the arc current to increase and decrease slightly as the arc length changes. 2. Check that the electrode is of good quality, dry and free from contamination. Try using some Lincoln Electrode and setting the machine per Lincoln's recommendation. 3. If shielding gas is used, check that the gas and gas flow are correct. Check for damaged, pinched or leaking gas lines. 4. Check for proper work and electrode leads and connections (size, length, coils or bad connections).	1. The machine may not be maintaining the correct RPM. Perform the ***Engine Electronic Governor Control Module Test Procedure***. 2. If the engine will not maintain the correct load RPM, the engine may be in need of service. Air and fuel filters should be checked. 3. Check large current carrying leads that connect to the stator, chopper module, shunt, choke and output terminals. See Wiring Diagram. Look for damaged conductors or faulty connections. 4. Check the connections at the weld control board and the chopper module board. 5. The output control or the arc control potentiometer may be defective or grounded. The mode switch may also be faulty. Perform the ***Control Potentiometer and Mode Switch Resistance Test Procedure***. 6. The Amphenol receptacles may be contaminated or defective. Perform the ***Remote Receptacle Resistance Test Procedure***. 7. Replace the weld control board.

⚠ CAUTION

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

Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
FUNCTION PROBLEMS		
The weld output cannot be adjusted with the front panel output control knob in one or more weld modes. The weld output terminals have normal OCV (open circuit voltage). The AC auxiliary power is normal and the engine operates normally.	1. Remote control devices completely disable the front output in all modes except TOUCH START TIG mode. *Make sure there is nothing plugged into the Amphenol receptacles. 2. Check for dirt or moisture contamination in either 6 pin or the 14 pin Amphenol.	1. Perform the ***Remote Receptacle Resistance Test Procedure***. 2. The output control potentiometer may be defective. Perform the ***Control Potentiometer and Mode Switch Resistance Test Procedure***. 3. Check the shunt and associated leads and the voltage feedback leads for loose or faulty connections. See Wiring Diagram. 4. The weld control board may be faulty.
One of the meters is not working properly. The welder works OK in all modes.	1. Both the “AMPS” and “VOLTS” displays use the same part numbered display unit.	1. Swap the display board connectors (J4 and J5) on the weld control board (they are both the same), if the good display functions normally in bad display’s place then the weld control board is OK and only the malfunctioning display needs to be replaced. 2. If the good display malfunctions when plugged into the other connector, then the weld control board is defective.

⚠ CAUTION

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

Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
FUNCTION PROBLEMS		
The machine front panel output control is still active when the remote control unit is connected to one of the Front Panel Amphenol's.	1. This condition is normal in the "TOUCH START TIG MODE". *See the operators manual. 2. The remote control unit may be defective. 3. Check the Amphenol receptacles. Look for damage or corroded contact pins in the receptacle and in the plug of the remote control unit.	1. Check Connector P1 on the weld control board to see that it is properly seated and the pins in both the plug and the board receptacle are in good condition. 2. Check for continuity between the P1 connector and the Amphenol connectors. See Wiring Diagram. 3. The weld control board may be defective.
The machine seems to be locked into the "CC-stick" mode of operation.	1. Check the position of the WELD MODE selector switch. The switch should positively snap into each mode position and should not feel 'gritty' or get stuck between positions.	1. Check Connector P7 on the weld control board to see that it is properly seated and the pins in both the plug and the board receptacle are in good condition. 2. Perform the ***Control Potentiometer and Mode Switch Resistance Test Procedure***. 3. The weld control board may be faulty.
⚠ 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.		

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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
FUNCTION PROBLEMS		
The arc quality is poor with excessive spatter. The arc heat can be controlled and maintained normally, the auxiliary output is normal and the engine operates normally.	1. The ARC CONTROL may be set too high. 2. The output control may be set too high for the electrode being used. Check that the electrode is of good quality, dry and free from contamination. Try using some Lincoln Electrode and setting the machine per Lincoln's recommendations. 3. If shielding gas is used, check that the gas and gas flow are correct. 4. Check for damaged, pinched or leaking gas lines. 5. Check for proper work and electrode leads and connections (size, length, coils or bad connections).	1. Perform the ***Control Potentiometer and Mode Switch Resistance Test Procedure***. 2. The weld control board may be faulty. 3. Perform the ***Choke test Procedure***.
A control cable type feeder does not function when connected to the 14 pin Amphenol. Machine operates normally in the "CC-STICK" mode and has normal AC auxiliary output.	1. Check the circuit breaker CB2 if using a 120 Volt AC wire feeder. Check CB6 if using a 42 VAC wire feeder. Reset breaker if tripped. 2. Check the Amphenol receptacle for damaged, corroded or dirty contact pins. 3. The wire feeder control cable may be defective. 4. The wire feeder may be defective.	1. Use a volt meter to check for the presence of supply voltage at the 14 pin Amphenol receptacle. 120 Volt AC power supplied through pins A and J, 42 VAC power is supplied through pins I and K. 2. Perform the ***Stator Voltage Test Procedure***.

⚠ CAUTION

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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
WELDING PROBLEMS		
An Across-the-Arc type wire feeder does not function when connected to the weld output of the machine. The Vantage operates normally in the CC-STICK mode and has normal AC auxiliary output.	1. Check that the welding terminals switch is in the "WELD TERMINALS ON" position. 2. Check the that WELD MODE switch is in the correct position for the process being used, typically "CV-WIRE" mode. 3. Check for poor weld cable connections between the feeder and the welder output terminal and between the work piece and the other output terminal. 4. Check that the wire feeder's work sensing lead is properly connected to work piece and is in good condition. 5. If there is a voltage reading on the wirefeeder voltmeter, the wire feeder may be defective.	1. Use a voltmeter to check for the presence of about 60 VDC open circuit voltage (OCV) across the output studs of the machine. 2. If the OCV is low, there may be a problem with the mode switch. 3. Perform the ***Control Potentiometer and Mode Switch Test Procedure***. 4. If there is no OCV, check the weld terminal switch and associated wiring. See Wiring Diagram.

⚠ CAUTION

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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine will not crank when the start button is pushed.	1. Check the circuit breaker (CB1). Reset if tripped. 2. The battery may be low or faulty. If the battery will not accept a charge, replace it.	1. Check the wiring and the connections at the starter motor, glow plug button, CB5 circuit breaker, run/stop switch and the start button. See Wiring Diagram. 2. Check the chassis ground connections between the engine block and the negative battery terminal. 3. Place the run/stop switch to the "RUN" position. Press the start button, while checking for voltage between a good clean chassis ground connection (-) and lead 231 (+) at the starter solenoid. See Wiring Diagram. 4. If battery voltage is present, the starter motor or solenoid may be defective or the engine may be prevented from turning due a mechanical failure.

⚠ CAUTION

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Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The battery does not stay charged.	1. Check for loose, corroded or faulty connections at the battery. 2. Check for loose or damaged alternator drive belt. 3. The battery may be faulty.	1. Perform the ***Engine Alternator Test Procedure***. 2. There may be a defective component or faulty wiring causing a current draw when the run/stop switch is in the "stop" position. 3. Check the Run/Stop switch, the glow plug button, the alternator and the starter solenoid. Also check for damaged wiring and insulation. 4. If the engine charging system is operating properly but the battery is not staying charged, the battery is defective and should be replaced.

⚠ CAUTION

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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine cranks when the start button is pressed but will not start.	1. The battery voltage may be low (normally results in slow cranking speed). The batter should be checked and recharged if it is not producing adequate voltage and replaced if it will not accept a full charge. 2. Make sure the glow plug button is pressed while pressing the start button. See the Operators Manual for proper starting procedure. 3. Make sure the fuel valve on the fuel sediment filter is in the open position. 4. Check that the machine has an adequate supply of fresh, clean fuel.	1. The fuel filter may be clogged, replace if necessary. 2. Fuel pump may be faulty. Check for fuel flow through filters. Contact local authorized engine service shop. 3. Check oil level. 4. ON/OFF switch on for more than 60 seconds before starting. The ON/OFF switch will need to be switched off and turned back on again. 5. Perform the ***Engine Electronic Governor Control Module Test Procedure***. 6. The engine may be in need of mechanical repairs.

⚠ CAUTION

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Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine starts but shuts down immediately when the start button is released.	1. Make sure the glow plug button is pressed while pushing the button (10 SECONDS MAXIMUM AFTER THE ENGINE STARTS). See the Operators manual for proper starting procedure. 2. Check the oil level. 3. Be certain that the engine is not overheated. 4. Check that the machine has an adequate supply of fresh, clean fuel. 5. The fuel filter may be clogged. Replace if necessary. 6. High coolant temperature or low oil pressure (indicator light lit) Check oil and coolant levels to proper level. 7. Check for loose or broken fan belt. 8. Start engine and check for fuel leaks. 9. Faulty oil pressure switch, temperatures switch or other engine component.	1. The engine may have inadequate oil pressure. 2. Check the oil and temperature Sensors. 3. Perform the ***Engine Electronic Governor Control Module Test Procedure***. 4. Perform the ***Engine Protection Relay (CR2) 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.		

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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine shuts down shortly after starting.	1. Check that the machine has an adequate supply of fresh, clean fuel. 2. Check fuel and air filters, replace if necessary. 3. Check oil level, add oil as required. Look for oil leakage. 4. Check for loose or faulty battery cable connections. 5. High coolant temperature or low oil pressure (indicator light lit). Check oil and coolant levels to proper level. Check for loose or broken fan belt. Start engine and check for leaks. 6. Faulty oil pressure switch, temperatures switch or other engine component.	1. The oil pressure switch or coolant temperature switch may be faulty. Check the oil pressure switch and oil temperature switch. 2. Make sure the engine has oil and oil pressure and engine is not overheated. 3. Disconnect lead 234 from the engine electronic governor control module, if the engine continues to run, oil pressure switch or temperature switch is faulty. 4. Check the oil pressure switch and oil temperature switch. 5. Check for faulty run/stop switch. 6. Check for poor electrical connections at the run/stop switch. See Wiring Diagram. 7. Perform the ***Engine Electronic Governor Control Module Test Procedure***.
⚠ CAUTION		
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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine shuts down shortly after starting and trips the battery circuit breaker (CB5).	1. Try resetting the breaker. If it trips again do not attempt to use the machine. **NOTE:** Repeated tripping and resetting of the circuit breaker can damage it or alter its trip point. If the breaker has been tripped and reset many times, it should be replaced once the cause is determined.	1. Examine the CB5 circuit breaker, run/stop switch and the start button. Look for damaged or out of place wiring that may be in contact with other conductors or chassis ground. See Wiring Diagram. 2. Perform the ***Idle Relay (CR1) Test Procedure***.
The engine will not develop full power.	1. The fuel may be old or contaminated. Supply the engine with clean fresh fuel. 2. The fuel filter may be clogged, replace if necessary. 3. The air filter may be clogged, replace if necessary.	1. The engine may be in need of adjustment or repair.
⚠ 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.		

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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine will not idle down to low RPM. The machine has normal weld and auxiliary output.	1. Make sure the idle switch is in the "AUTO IDLE" position. 2. Make sure there is no external load on the weld terminals or the auxiliary power receptacles.	1. Perform the ***Idle Relay Test Procedure***. 2. If the solenoid does not hold in the low idle position, remove plug J6 from the weld control board and wait about 30 seconds. 3. Check that leads 3 and 6 are properly routed through the toroidal current sensor. See Wiring Diagram. The leads should be wrapped tightly and tie wrapped in place. 4. Check the toroidal current sensor for any signs of damage. 5. Check leads 260 and 261 for poor connections and damage to the conductors and insulation between the toroid current sensor and the J3 connector in the weld control Board. Unplug plug J3 from the weld control board and check for damaged, dirty or corroded pins. 6. The weld control board may be defective.

⚠ CAUTION

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Observe Safety Guidelines detailed in the beginning of this manual.		**TROUBLESHOOTING GUIDE**
PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine will not go to high idle when using auxiliary power. Auxiliary power is normal when the idler switch is in the "HIGH" idle position, the automatic idle function works properly when welding.	1. The load on the auxiliary receptacle may be too low. 2. The automatic idle system will not function reliably if the low is less than 100 watts. 3. The device connected to the auxiliary power may be defective, try another device. 4. Make sure the connections to the auxiliary device are tight. 5. Some devices are designed to sense for adequate input power. Product of this type may not turn on due to low voltage and frequency of the machine at low idle. If this happens the current draw will likely be insufficient to activate the automatic idle system. Devices of this type may require that the Automatic Idle switch be in the "HIGH IDLE" position.	1. Check that leads 3 and 6 are properly routed through the toroidal current sensor. Each lead must have three turns and must pass through the sensor in the opposite directions. See Wiring Diagram. The leads should be wrapped tightly and tie wrapped in place. 2. Check the toroidal sensor for any signs of damage. 3. Check leads 260 and 261 for poor connections and damage to the conductors and insulation between the toroid current sensor and the J3 connector on the weld control board. Unplug plug J3 from the weld control board and check for damaged, dirty or corroded pins. 4. The toroidal current sensor may be faulty. 5. The weld control board may be defective.

⚠ CAUTION

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PROBLEMS (SYMPTOMS)	**POSSIBLE AREAS OF MISADJUSTMENT(S)**	**RECOMMENDED COURSE OF ACTION**
ENGINE PROBLEMS		
The engine will not go to high idle when striking arc. The automatic idle system functions normally when using auxiliary power. Welding and auxiliary outputs are normal when the idle switch is in the "HIGH IDLE" position.	1. Check that the welding cables are in good working condition and the connections are tight. Make sure the work clamp is attached to clean, bare material.	1. Check the leads and connections at the SHUNT at the positive output stud. Check lead 204S and 206S for continuity from the shunt to J6-1 and J6-2 on the weld control board. Check the pins and connections at J6. 2. The weld control board may be defective.
The engine will not go to high idle when attempting to strike and arc or when a load is applied to any of the auxiliary power receptacles.	1. Check that the welding cables and the auxiliary power lead connections are tight.	1. The weld control board may be defective.
The engine goes to low idle, but will not stay at low idle.	1. Make sure there are no auxiliary loads on either the weld terminals or the auxiliary receptacles. 2. Check that the welding cables and the auxiliary power lead connections are tight and that the insulation is not damaged.	1. The weld control board may be defective. 2. Perform the ***Idle Relay (CR1) Test Procedure***.
Engine will not shut off.	1. Stop engine by shutting off valve on main fuel filter. Contact authorized local Engine Service Shop.	1. Perform the ***Engine Electronic Governor Control Module 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.

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

3/8” Nutdriver
Wiring Diagram

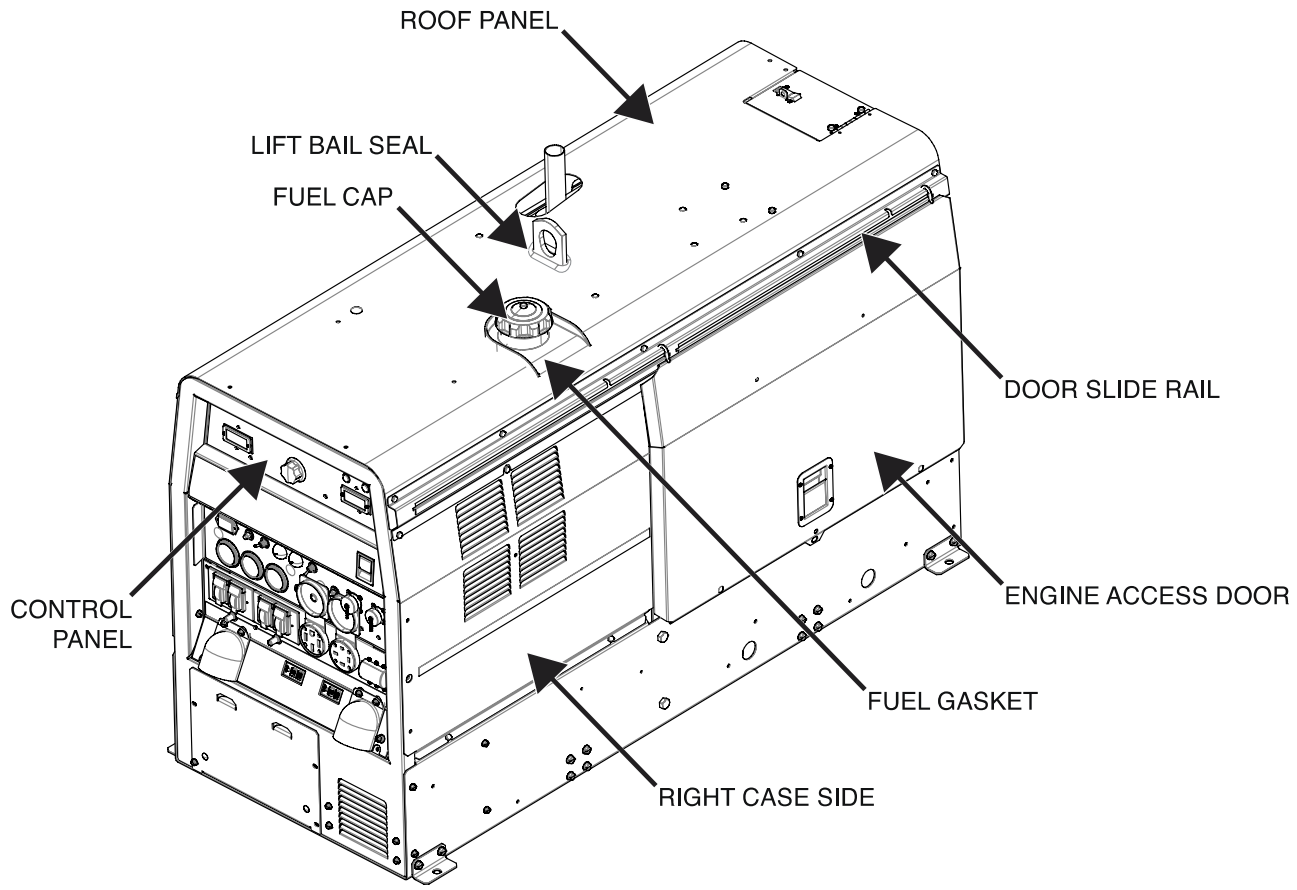
REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Slide the engine access door off of the slide rail. See ***Figure F.1***.
3. Using a 3/8” nutdriver, remove the nine screws securing the door slide rail to the machine. See ***Figure F.1***. Carefully remove the slide rail.
4. Remove the fuel cap, fuel gasket and lift bail seal. See ***Figure F.1***.
5. Using a 3/8” nutdriver, remove the sixteen screws securing the roof panel to the machine. See ***Figure F.1***.
6. Attach the fuel cap.
7. Using a 3/8” nutdriver, loosen (do not remove) the two bottom screws securing the right case side panel to the machine. See ***Figure F.1***.
8. Using a 3/8” nutdriver, remove the six screws securing the right case side to the machine. See ***Figure F.1***.
9. Using a 3/8” nutdriver, loosen (do not remove) the four bottom screws securing the left case side panel to the machine.
10. Using a 3/8” nutdriver, remove the seven screws securing the left case side to the machine.
11. Using a 3/8” nutdriver, remove the four screws securing the control panel in the upright position. See ***Figure F.1***. Lower the control panel to gain access to the components inside.
12. Remove the shield.
13. Perform any tests / replacement procedure.

REPLACEMENT PROCEDURE

1. Position the shield into the machine.
2. Using a 3/8” nutdriver, attach the four screws securing the control panel in the upright position.
3. Carefully position the left case side panel onto the machine.
4. Using a 3/8” nutdriver, attach the seven screws securing the left case side to the machine.
5. Using a 3/8” nutdriver, tighten the four bottom screws securing the left case side panel to the machine.
6. Carefully position the right case side panel onto the machine.
7. Using a 3/8” nutdriver, attach the six screws securing the right case side to the machine.
8. Using a 3/8” nutdriver, tighten the two bottom screws securing the right case side panel to the machine.
9. Remove the fuel cap.
10. Carefully position the roof panel onto the machine.
11. Using a 3/8” nutdriver, attach the sixteen screws securing the roof panel to the machine.
12. Attach the fuel cap, fuel gasket and lift bail seal.
13. Carefully position the slide rail onto the machine.
14. Using a 3/8” nutdriver, attach the nine screws securing the door slide rail to the machine.
15. Slide the engine access door into the slide rail.

Figure F.1 – Case cover removal



CHOPPER MODULE 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 large Capacitors on the Chopper Module Board have been discharged. This procedure should be performed whenever work is to be attempted on or near the Chopper Module Board.

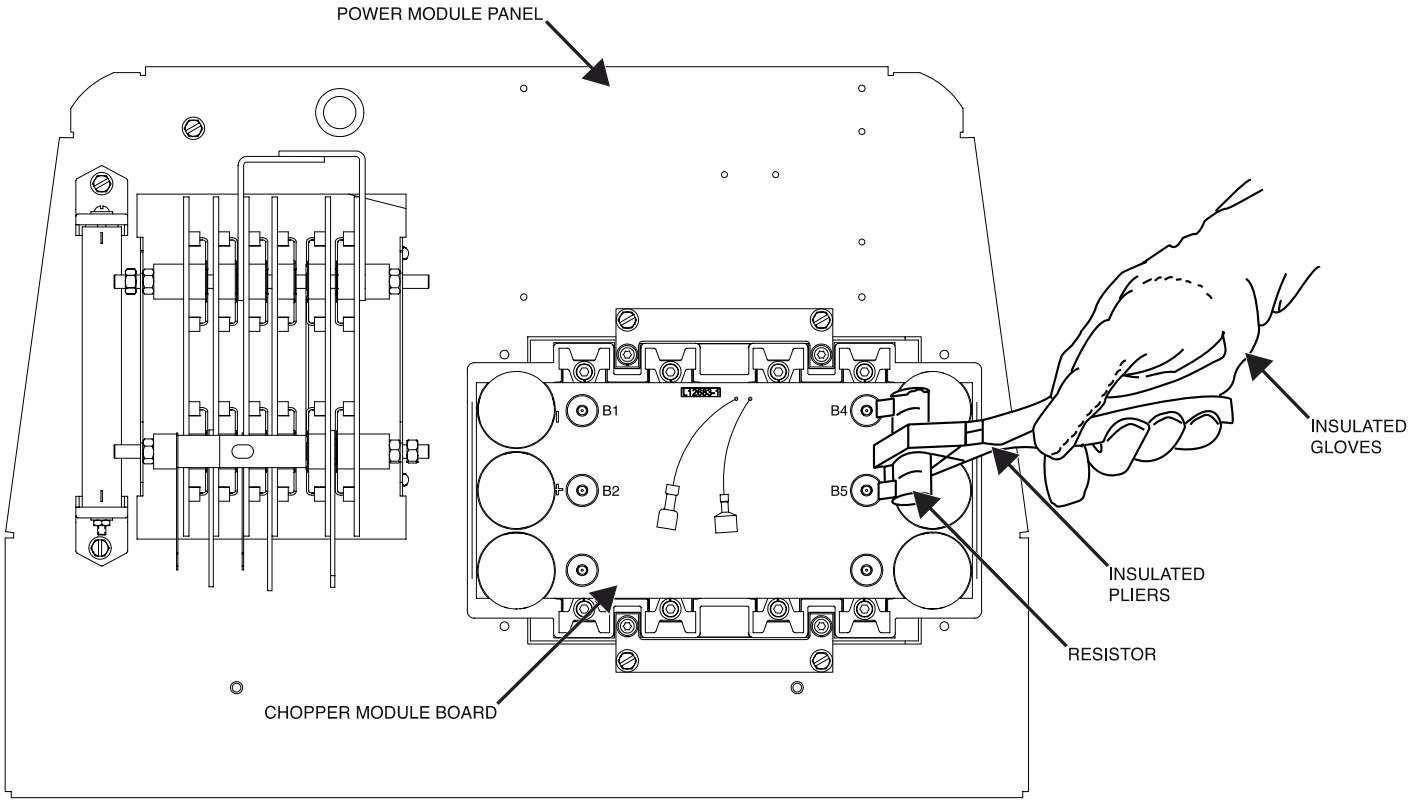
MATERIALS NEEDED

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

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the chopper module board on the power module panel. See ***Figure F.2***. See Wiring Diagram.
4. NEVER USE A SHORTING STRAP TO DISCHARGE CAPACITORS. If the Lincoln recommended resistor or an equivalent resistor is used, the capacitors can be discharged by holding the resistor with insulated gloves and insulated pliers and using the resistor terminals to bridge chopper module terminals B1 to B2 and B4 to B5. DO NOT TOUCH THE TERMINALS OR METAL PARTS OF THE PLIERS WITH YOUR BARE HANDS. Hold the resistor in place for about ten seconds. If another type of resistor is used, jumper leads may need to be attached to the resistor. The leads can then be used to connect terminals B1 to B2 and B4 to B5. See ***Figure F.2***. See Wiring Diagram.
5. Using a volt/ohmmeter, check the voltage across terminals B1 and B2 then across terminals B4 and B5. See ***Figure F.2***. See Wiring Diagram. Voltage should be zero.
6. If any voltage is present, repeat step 4 until reading is zero volts.
7. Perform the ***Case Cover Replacement Procedure***.

Figure F.2 – Chopper module board discharge



BRUSH AND SLIP RING SERVICE 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 provides guidance in testing and maintaining the Brush and Slip Ring system.

MATERIALS NEEDED

Volt/Ohmmeter
500 or 600 Grit Sand Paper
180 Grit Sand Paper
Low Pressure Compressed Air
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Remove the brush holder bracket.
5. Examine brushes and slip rings. The slip rings, brush holder and brushes should be clean and free from oil or grease. The brushes should be making good, continuous contact with the slip rings.
6. The brushes should be of sufficient length and have adequate spring tension. Generally, the brushes should be replaced if either brush has less than 1/4” remaining before it reaches the end of its travel. Spring tension should be sufficient to hold the brushes firmly against the slip rings.
7. The brushes should be removed from the brush holder and examined. The terminals should be clean. The shunt, (braided lead connecting the carbon brush to the terminal) should be in good condition and firmly connected to the carbon brush and to the connection terminal.
8. If the slip rings are discolored, display evidence of excessive sparking or the brushes have worn prematurely; these may be signs of a grounded or shorted rotor. Perform the ***Rotor Resistance and Ground Test Procedures (Static)*** and ***(Dynamic)***.
9. Check for evidence of sticking brushes. Sticking brushes will normally result in the slip rings being pitted and discolored from excessive arcing. Another sign of sticking brushes is intermittent instability or loss of both weld and auxiliary output. If there is any evidence that the brushes may have been sticking in the brush holders, a new brush holder and brush assembly should be installed.

CLEANING SLIP RINGS:

10. In the event that the slip rings have become dirty, discolored or mildly pitted, it will be necessary to clean them, using very fine, 500 or 600 grit sand paper or a 220 or 320 grit commutator stone.

SEATING BRUSHES:

11. If brushes have been replaced, repositioned or are not making full contact with the slip rings, it may be necessary to re-seat them. This can be done by placing a strip of 180 grit sandpaper between the slip rings and the brushes, with the abrasive side against the brushes. Pull the sandpaper strip around the circumference of the slip rings in the direction of rotor rotation only. Repeat this procedure until the surface of each brush is in full contact with its matching slip ring.
12. Use a low pressure compressed air to thoroughly blow the carbon, commutator stone and/or sandpaper dust from the machine before operating.
13. Perform the ***Case Cover Replacement Procedure***.

ENGINE ELECTRONIC GOVERNOR CONTROL MODULE TEST PROCEDURE

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

TEST DESCRIPTION

This test will help determine if the Electronic Engine Governor System is working properly. It should be performed if the Engine will not start and it has been determined that there is no air in the Diesel Fuel System. See the Engine Operators Manual for fuel system bleeding instructions.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Locate the electronic engine governor module. See ***Figure F.3***.
5. Turn on the run/stop switch and observe that the light on the electronic engine governor module is illuminated (momentarily). See ***Figure F.4***. Note that the light is illuminated continuously when the engine is running.
6. If the light is not illuminated (momentarily), using a volt/ohmmeter check for battery voltage between pins 9 and 4 on plug J31 (leads 232 and lead 5S). See ***Figures F.4*** and ***F.5***. See Wiring Diagram.
7. If battery voltage is present and the light is not illuminated (momentarily) the electronic engine governor module may be faulty, perform the ***Electronic Engine Governor Module Removal And Replacement Procedure***.
8. Locate the fuel actuator. It is mounted on the injection pump, which is on the right side of the engine. See Wiring Diagram.
9. Disconnect plug from the fuel actuator. See Wiring Diagram.
10. Using a volt/ohmmeter, test the resistance of the fuel actuator. It should measure about 4 Ohms. See Wiring Diagram.
11. If the resistance reading is significantly different from 4 Ohms, the fuel actuator may be faulty. See the Engine manufacturers service manual.
12. Locate the magnetic pickup sensor. It is located on the right lower side of the engine. See Wiring Diagram.

13. Unplug the magnetic sensor quick-connect leads. See Wiring Diagram.
14. Using a volt/ohmmeter, test the resistance of the magnetic pickup sensor. The sensor resistance should be 180 to 200 Ohms.
15. If the resistance reading is significantly different than expected, the magnetic pickup sensor is faulty, perform the ***Magnetic Pickup Sensor Replacement And Adjustment Procedure***.
16. Connect the magnetic sensor quick-connect leads to the magnetic pickup sensor.
17. Connect the RMS AC voltmeter to the magnetic pickup leads. Start the engine and check for 3880 Hz at high idle speed and 2938 Hz at low idle speed. See Wiring Diagram.
18. If the expected reading is not present, perform the ***Magnetic Pickup Sensor Replacement and Adjustment Procedure***.
19. Check the appropriate leads for loose or faulty connections. See Wiring Diagram.
20. If the electronic governor module is getting power and the magnetic pickup and actuator test good, perform the ***Electronic Engine Governor Module Removal And Replacement Procedure***.
21. Connect any previously disconnected leads and plugs.
22. Perform the ***Case Cover Replacement Procedure***.

Figure F.3 – Electronic engine governor module location

Figure F.4 – Electronic engine governor module light location

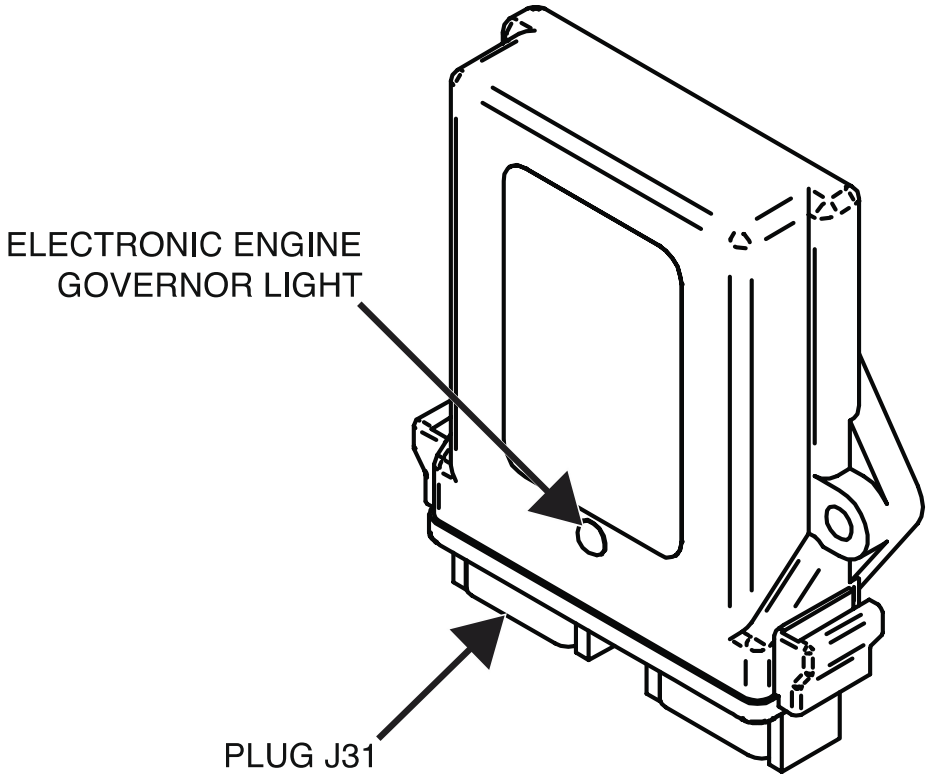
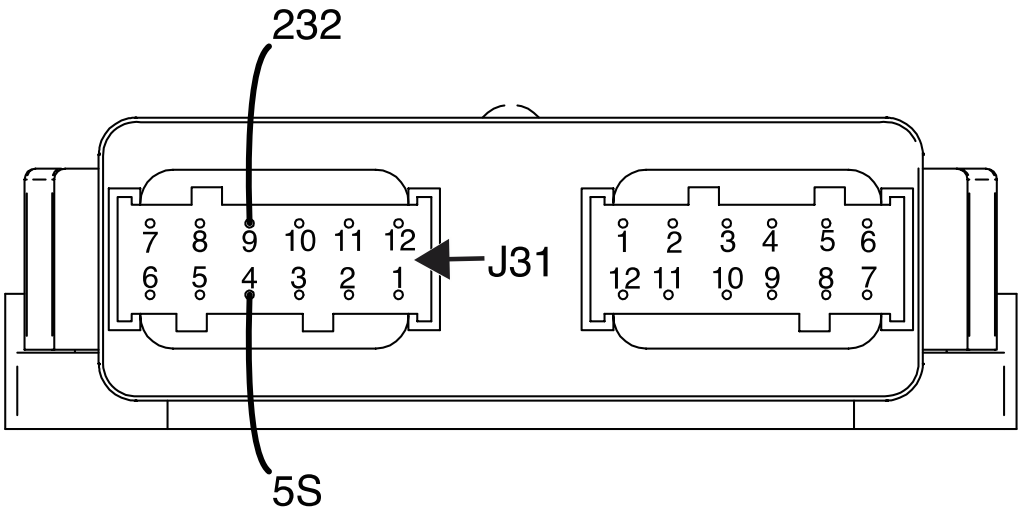


Figure F.5 – Electronic engine governor module lead locations



IDLE RELAY (CR1) 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 Idle Relay (CR1) is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
12 VDC Power Supply
Wiring Diagram

TEST PROCEDURE

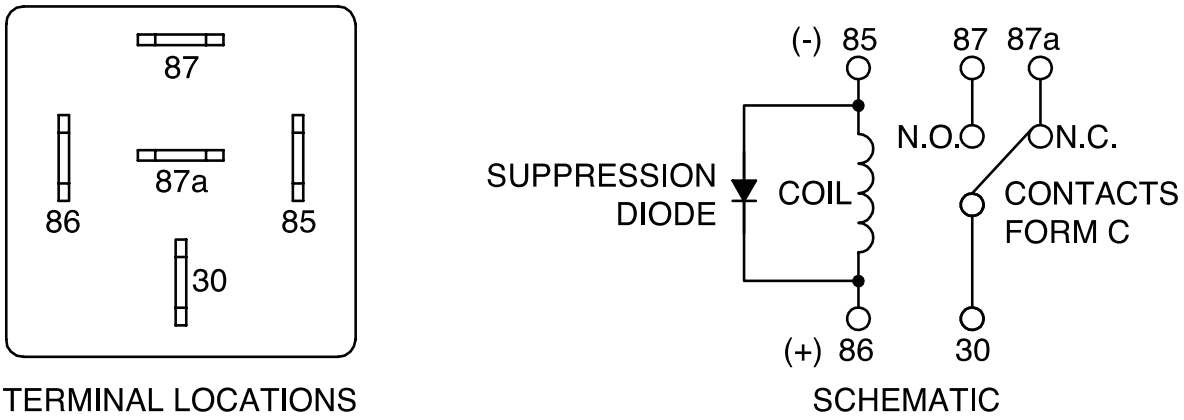
1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Locate the idle relay (CR1). See ***Figure F.6***. See Wiring Diagram.
5. Remove the relay to be tested from its mount. To remove relay lift up and out of it's mounting / wiring bracket.
6. Using a volt/ohmmeter, measure the resistance of the relay coil from terminal 86 (+) to terminal 85 (-). See ***Figure F.7***. See Wiring Diagram. Normal resistance should be approximately 90 ohms.
7. Using a volt/ohmmeter and a 12 VDC power supply, perform the tests outlined in ***Table F.1***. See ***Figure F.7***. See Wiring Diagram. Apply positive 12 VDC to terminal 86 and negative to terminal 85.
8. If any of the tests fail, the relay may be faulty.
9. If faulty, perform the ***Idle Relay (CR1) Removal And Replacement Procedure***.
10. Perform the ***Case Cover Replacement Procedure***.

Table F.1 – Idle relay (CR1) relay resistance tests

TEST POINT	TEST POINT	EXPECTED READING	MACHINE CONDITION
TERMINAL 87	TERMINAL 30	OPEN (HIGH RESISTANCE)	NO POWER APPLIED TO RELAY COILS.
TERMINAL 87A	TERMINAL 30	CLOSED (LOW RESISTANCE)	NO POWER APPLIED TO RELAY COILS.
TERMINAL 87	TERMINAL 30	CLOSED (LOW RESISTANCE)	12 VDC APPLIED TO RELAY COILS. POSITIVE TO TERMINAL 86.
TERMINAL 87A	TERMINAL 30	OPEN (HIGH RESISTANCE)	12 VDC APPLIED TO RELAY COILS. POSITIVE TO TERMINAL 86.

Figure F.6 – Idle relay (CR1) location

Figure F.7 – Idle relay (CR1) terminal location and schematic



ENGINE PROTECTION RELAY (CR2) 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 Engine Protection Relay (CR2) is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
12 VDC Power Supply
Wiring Diagram

TEST PROCEDURE

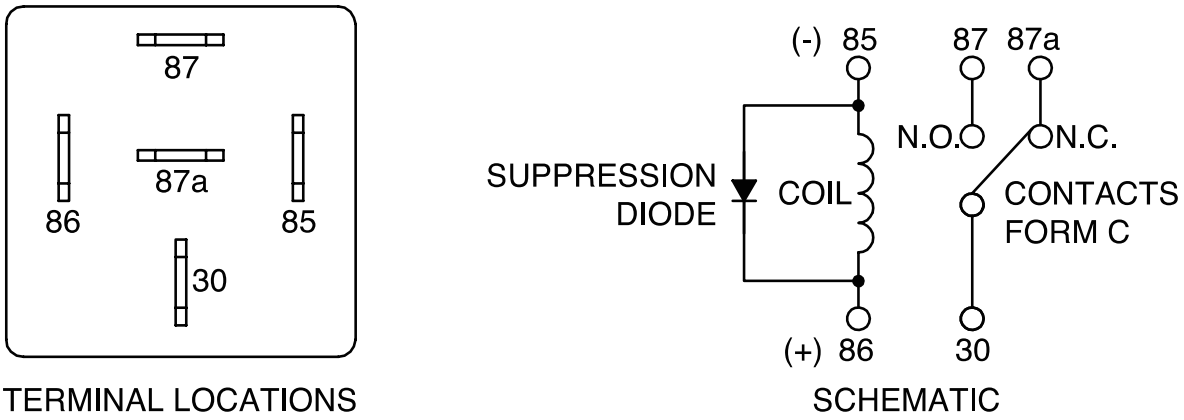
1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Locate the engine protection relay (CR2). See ***Figure F.8***. See Wiring Diagram.
5. Remove the relay to be tested from its mount. To remove relay lift up and out of it's mounting / wiring bracket.
6. Using a volt/ohmmeter, measure the resistance of the relay coil from terminal 86 (+) to terminal 85 (-). See ***Figure F.9***. See Wiring Diagram. Normal resistance should be approximately 90 ohms.
7. Using a volt/ohmmeter and a 12 VDC power supply, perform the tests outlined in ***Table F.2***. See ***Figure F.9***. See Wiring Diagram. Apply positive 12 VDC to terminal 86 and negative to terminal 85.
8. If any of the tests fail, the relay may be faulty.
9. If faulty, perform the ***Engine Protection Relay (CR2) Removal And Replacement Procedure***.
10. Perform the ***Case Cover Replacement Procedure***.

Table F.2 – Engine protection relay (CR2) relay resistance tests

TEST POINT	TEST POINT	EXPECTED READING	MACHINE CONDITION
TERMINAL 87	TERMINAL 30	OPEN (HIGH RESISTANCE)	NO POWER APPLIED TO RELAY COILS.
TERMINAL 87A	TERMINAL 30	CLOSED (LOW RESISTANCE)	NO POWER APPLIED TO RELAY COILS.
TERMINAL 87	TERMINAL 30	CLOSED (LOW RESISTANCE)	12 VDC APPLIED TO RELAY COILS. POSITIVE TO TERMINAL 86.
TERMINAL 87A	TERMINAL 30	OPEN (HIGH RESISTANCE)	12 VDC APPLIED TO RELAY COILS. POSITIVE TO TERMINAL 86.

Figure F.8 – Engine protection relay (CR2) location

Figure F.9 – Engine protection relay (CR2) terminal location and schematic



ENGINE ALTERNATOR 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 Engine Alternator is functioning properly.

MATERIALS NEEDED

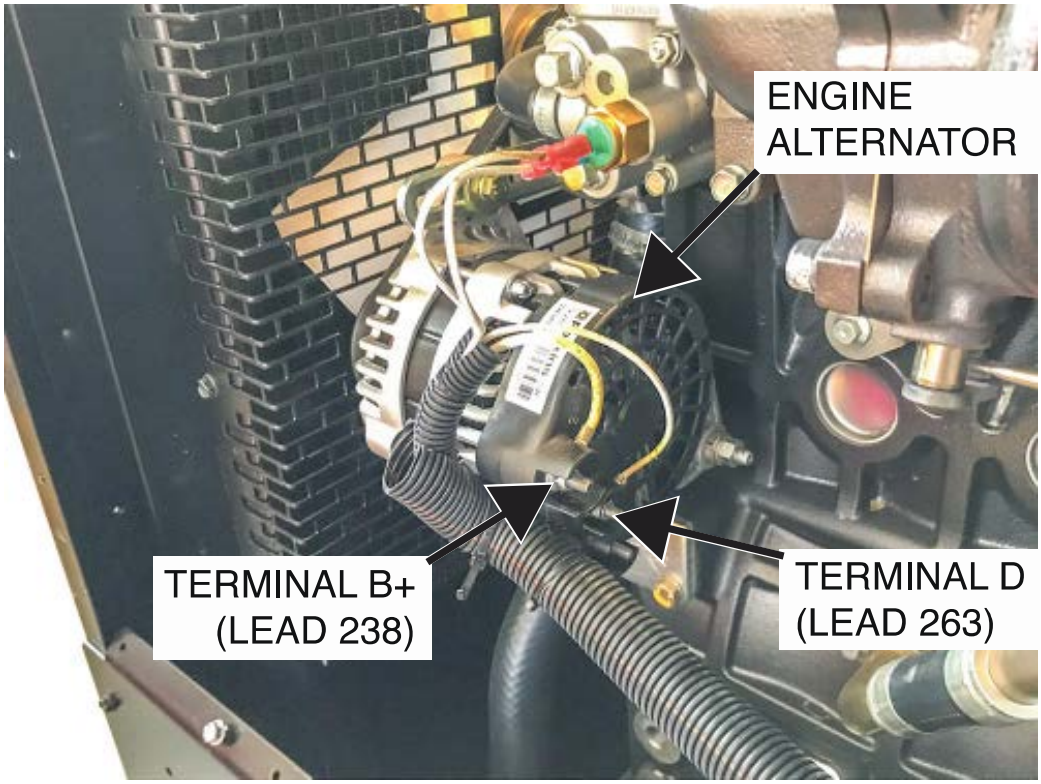
Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Using a volt/ohmmeter, measure the voltage at the battery terminals. The voltage should be approximately 12 VDC. See Wiring Diagram.
5. Attach the meter leads to the battery terminals, being careful to position them so they stay clear of moving parts while the engine is running.
6. Place the idle switch in the “HIGH IDLE” position, start the engine and allow it to run at high idle speed for about 15 to 30 seconds.
7. Using a volt/ohmmeter, measure the battery voltage. See Wiring Diagram. The meter should read about 13.7 to 14.2 VDC.
8. If the meter reads correctly, the engine alternator is producing adequate power to charge the battery and this test is complete.
9. If the voltage is significantly higher than the above values, the alternator is not properly regulating the battery charging voltage and should be replaced. If the voltage reads the same or less than the measurement taken in Step 4, proceed with the following tests.
10. Turn off the engine and disconnect the meter from the battery.
11. Make sure the idle switch is still in the “high” position, start the engine and allow it to run at high idle speed for about 15 to 30 seconds.
12. Place the negative meter probe on a good chassis ground or the negative battery terminal. Place the positive meter probe on the ‘B+’ terminal (lead 238) on the back of the alternator. See ***Figure F.10***. See Wiring Diagram.
13. The meter should read about 13.7 to 14.2 VDC.

14. Move the positive probe to the 'D' terminal on the back of the alternator (lead 263). See ***Figure F.10***.
15. The meter should read about 13.7 to 14.2 VDC.
16. If the meter reads correctly, check the connections between the alternator and the battery. See Wiring Diagram.
17. If the voltage at both of the above test points reads the same or less than the battery voltage measurement in Step 4, the alternator is defective. Repair or replace it.
18. If voltage is present at the battery terminal of the alternator, but not at lead 263; check wiring between the weld control board and the engine alternator. See Wiring Diagram.
19. Perform the ***Case Cover Replacement Procedure***.

Figure F.10 – Engine alternator lead and terminal locations



ROTOR RESISTANCE AND GROUND TEST PROCEDURE (STATIC)

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 Rotor Winding is open, shorted or grounded.

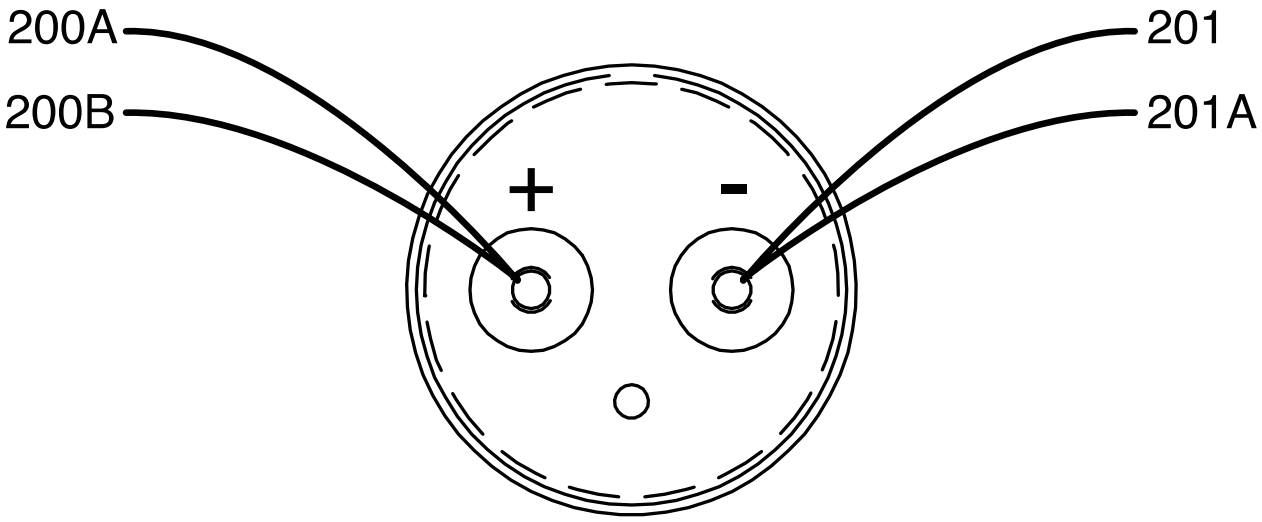
MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Label and disconnect leads 201 and 200B from the field capacitor located on the right side of the stator fan shroud. See ***Figure F.11***. See Wiring Diagram. This will electrically isolate the rotor windings.
5. Using the volt/ohmmeter, measure the resistance from lead 201 to 200B. It should read approximately 27 ohms. See ***Figure F.11***. See Wiring Diagram.
6. If reading is incorrect, remove the brush holder bracket and measure directly across the slip rings. If reading is correct, check the brushes and the leads. If reading is still incorrect, the rotor is defective.
7. Measure the resistance to ground from either of the slip rings to any good unpainted chassis ground. The resistance should be very high, at least 500,000 ohms (500k).
8. If the test does not meet the resistance specifications, then the rotor is grounded and should be cleaned or replaced.
9. If this test meets the resistance specifications, continue testing using the ***Rotor Resistance and Ground Test Procedure (Dynamic)***.
10. Re-connect leads 201 and 200B to the field capacitor. Be sure to connect them to the proper polarity terminals. See ***Figure F.11***. See Wiring Diagram.
11. Perform the ***Case Cover Replacement Procedure***.

Figure F.11 – Capacitor lead and terminal locations



ROTOR RESISTANCE AND GROUND TEST PROCEDURE (DYNAMIC)

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 checks for faults in the Rotor Winding, while these windings are being stressed by the mechanical forces encountered during normal operation.

MATERIALS NEEDED

Volt/Ohmmeter (Analog type meter required for dynamic resistance test)
Wiring Diagram
NOTE: This test is best performed with a good quality analog type ohmmeter. Many digital meters will not provide stable or accurate resistance readings while the rotor is spinning.

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. This test requires that the brushes and slip rings are clean, in good condition and are properly seated.
5. Perform the ***Brush and Slip Ring Service Procedure***, if necessary.
6. Label and disconnect leads 201 and 200B from the field capacitor and connect an ohmmeter across the two leads and insulate the connections. See Wiring Diagram.
7. Start the engine and run it at high idle speed (1850 RPM). The resistance should read approximately 27 ohms. The resistance of the windings will change with temperature. Higher temperatures will produce higher resistance and lower temperatures will produce lower resistance.
8. Shut off engine and move one of the ohmmeter leads to a good clean chassis ground.
9. Restart the engine and run it at high idle speed (1850 RPM). The resistance should be very high, at least 500,000 (500k) ohms.
10. If the resistance readings differ significantly from the values indicated, re-check the brushes and the brush spring tension. If the brushes and slip rings are good, replace the rotor.
11. If all testing is finished, reconnect the leads to the field capacitor.
12. Perform the ***Case Cover Replacement Procedure***.

ROTOR VOLTAGE 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 Rotor Winding is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Connect the voltmeter probes to the field capacitor terminals (201 & 200B). See Wiring Diagram.
5. Set the RUN/STOP switch to “RUN” and the IDLE switch to “HIGH”. Start the engine and allow the RPM to stabilize for about 15 to 30 seconds. The meter should read 145-175 VDC.
6. Set the RUN/STOP switch to “STOP”.
7. If the meter reading is normal, this test is complete.
8. If the voltage measures zero or very near zero, the rotor flashing circuit may be faulty, the leads may be open or the rotor may be shorted.
9. Perform the ***Rotor Resistance and Ground Test Procedures (Static)*** and ***(Dynamic)*** and the ***Flashing Voltage Test Procedure***.
10. If voltage is higher than 175 VDC, the engine RPM may be too high or there may be voltage intrusion from one of the higher voltage stator windings to the stator exciter winding.
11. If the voltage is lower than 145, the engine RPM may be too low or there may be problems in the windings or other exciter circuit components or connections. Perform the ***Engine Electronic Governor Module Test Procedure*** and then perform the testing described in Step 14.
12. If the meter reading indicates battery voltage, about 12 to 14 VDC, the rotor may be open or the brushes may be faulty or not making proper contact with the slip rings.
13. Perform the ***Rotor Resistance and Ground Test Procedures (Static)*** and ***(Dynamic)*** and ***Brush and Slip Ring Service Procedure***.
14. If the voltage measures about 3 to 5 VDC, the generator is not building-up to normal output even though the flashing circuit appears to be functioning normally. This condition could be caused by one of several failed components or connections. Continue with the following test.

15. Check the field bridge rectifier and capacitor, also check the wiring and terminals connecting them. See Wiring Diagram.
16. Perform the ***Rotor Resistance and Ground Test Procedures (Static)*** and ***(Dynamic)***.
17. When the tests have been completed, reconnect leads to the field bridge rectifier. All other stator leads should remain disconnected and isolated at this time.
18. Be sure that there are no leads of any kind across any of the stator windings, except the 5 & 6 leads. Examine stator wiring for damage, pinched leads, chafed insulation, etc. If necessary, disconnect and isolate the stator output leads as close to the stator as possible. See Wiring Diagram.
19. All of these disconnected leads should be insulated and/or positioned so they cannot come in contact with any other wiring or chassis ground and cannot be damaged by moving parts when the engine is running.
20. Re-start the machine and measure the rotor voltage.
21. If rotor voltage continues to read significantly lower than 120 VDC, the stator is probably defective and should be replaced.
    NOTE: The field bridge rectifier and field capacitor may appear to function normally when tested independently, but may malfunction when placed under the stress of normal operation. For this reason, it is recommended that the bridge rectifier and the capacitor be replaced with known good components before replacing the stator.
22. Perform the ***Case Cover Replacement Procedure***.

FLASHING VOLTAGE TEST PROCEDURE (ENGINE NOT RUNNING)

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 checks the Flashing Voltage with the engine stopped, by simulating a running condition.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Make sure that the battery is fully charged and in good condition and the battery connections are clean and tight.
5. Place the RUN/STOP switch in the “RUN” position (the engine protection light should remain on).
6. Connect the voltmeter probes to the terminals of the field capacitor.
7. Carefully apply 12 VDC from the battery to the positive lead (262A) located on the hour meter **(engine not running)**. See Wiring Diagram.
8. Measure the voltage; it should read about 3 to 7 VDC. Remove the 12 VDC on lead 262A.
9. Set the RUN/STOP switch to the “STOP” position.
10. If the meter reading indicates battery voltage, about 12 to 14 VDC, the rotor may be open or the brushes may be faulty or not making proper contact with the slip rings.
11. Perform the ***Rotor Resistance and Ground Test Procedures (Static)*** and ***(Dynamic)***. Perform the ***Brush and Slip Ring Service Procedure***.
12. If the voltage measures zero or very near zero; this condition could be caused by a poor connection or a defective component in the flashing circuit or a shorted or grounded rotor winding. See Wiring Diagram.
13. Perform the ***Rotor Resistance and Ground Test Procedures (Static)*** and ***(Dynamic)***.
14. Perform the ***Case Cover Replacement Procedure***.

STATOR VOLTAGE 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 Stator is able to produce correct voltage from its Windings. It will only yield meaningful data if the engine high idle speed is correct (1850 RPM) and approximately 160 VDC is present across the Rotor Slip Rings.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
   NOTE: Voltage tests of the 120 and 120/240 VAC receptacles can be performed by placing the meter probes directly into the appropriate connection slots in the front of the receptacles rather than testing at the lead connections described below. If the meter probes are not long enough to make contact with the conductors inside the receptacles, test pins may be used.
   To test the 120 VAC auxiliary winding:
4. Connect the volt/ohmmeter probes to either 120 VAC receptacles. Place the probes directly into receptacle or connect to leads A and J of the 14 pin Amphenol. See ***Figures F.12*** and ***F.13***. See Wiring Diagram.
5. Start the engine and run it at high idle (1850 RPM).
6. Check the AC voltage reading. It should read between 115 and 132 VAC.
7. Connect the negative meter probe to lead 5D or insert into terminal W of the single-phase 120/240VAC receptacle. See ***Figures F.12*** and ***F.13***. See Wiring Diagram.
8. Connect the positive meter probe to either leads 3D/3C, 6D/6F or insert into the terminal X or Y of the single-phase 120/240VAC receptacle. See ***Figure F.12***. See Wiring Diagram.
9. Start the engine and run it at high idle (1860-1890 RPM).
10. Check the AC voltage reading. It should read between 230 and 264 VAC.
    To test the 240 VAC auxiliary winding:
11. Connect the negative meter probe to lead GND-L or insert into the ground terminal of the three-phase 240VAC receptacle. See ***Figure F.12***. See Wiring Diagram.

12. Connect the positive meter probe to either lead 4A, 6C or 3B or insert into the terminal Z, Y or X of the three-phase 240VAC receptacle. See ***Figure F.12***. See Wiring Diagram.
13. Start the engine and run it at high idle (1850 RPM).
14. Check the AC voltage reading. It should read between 230 and 264 VAC.
15. Connect the negative meter probe to leads 6D/6F or insert into the terminal Y of the single-phase 120/240VAC receptacle. See ***Figure F.12***. See Wiring Diagram.
16. Connect the positive meter probe to leads 3D/3C or insert into the terminal X of the single-phase 120/240VAC receptacle. See ***Figure F.12***. See Wiring Diagram.
17. Start the engine and run it at high idle (1860-1890 RPM).
18. Check the AC voltage reading. It should read between 230 and 264 VAC.
19. If these voltage readings are not within the specified limits, check for tripped or defective circuit breakers, loose connections or broken wires between the test points and the stator windings. If there are no wiring problems and the circuit breakers are not tripped or defective, the stator is defective and should be replaced.

    To test the 120 VAC wire feeder supply:

    NOTE: The wire feeder AC voltage supply tests require that the meter probes be inserted into the Amphenol connection cavities. Be careful not to damage or expand the terminals when inserting the probes.

    NOTE: The 120 VAC power supplied to the 14 pin Amphenol connector originates from the same winding that supplies the 120 VAC receptacles. If the machine has previously passed 120VAC auxiliary winding test, this test indicates problems in connections between the Amphenol and the stator winding.
20. Connect the voltmeter probes to terminals “A” (lead 32) and “J” (lead 31) of the 14 pin Amphenol. See ***Figures F.12*** and ***F.13***. See Wiring Diagram.
21. Start the engine and run it at high idle (1850 RPM).
22. The AC voltage reading should be between 115 and 132 VAC. If this voltage is not within specifications, check for a tripped or defective circuit breaker, faulty connections or broken wires between the test points and the stator windings. See Wiring Diagram.

    To test the 42 VAC wire feeder winding:
23. Connect the voltmeter probes to terminals “I” (lead 41A) and “K” (lead #42A) of the 14 pin Amphenol. See ***Figures F.12*** and ***F.13***.
24. Start the engine and run it at high idle (1860 to 1890 RPM).
25. The AC voltage reading should be between 40 and 50 VAC. If this voltage is not within the specified limits, check for tripped or defective circuit breakers, loose connections or broken wires between the test points and the stator windings. If OK, the stator is defective and should be replaced.

    To test the three-phase weld winding:
26. Locate the weld winding leads W1/W6, W2/W3 and W4/W5 where they connect to the three-phase output rectifier bridge. See ***Figure F.14***. See Wiring Diagram.
27. Start the engine and run it at high idle (1860 to 1890 RPM).
28. Check for about 60 to 65 VAC from leads W1/W6 to W2/W3, W2/W3 to W4/W5 and W4/W5 to W1/W6. See Wiring Diagram.
29. If these voltage readings are not within the specified limits, check for loose connections or broken wires between the test points and the stator windings. If there are no wiring problems, the stator is defective and should be replaced.
30. Perform the ***Case Cover Replacement Procedure***.

Figure F.12 – Receptacle and Amphenol locations

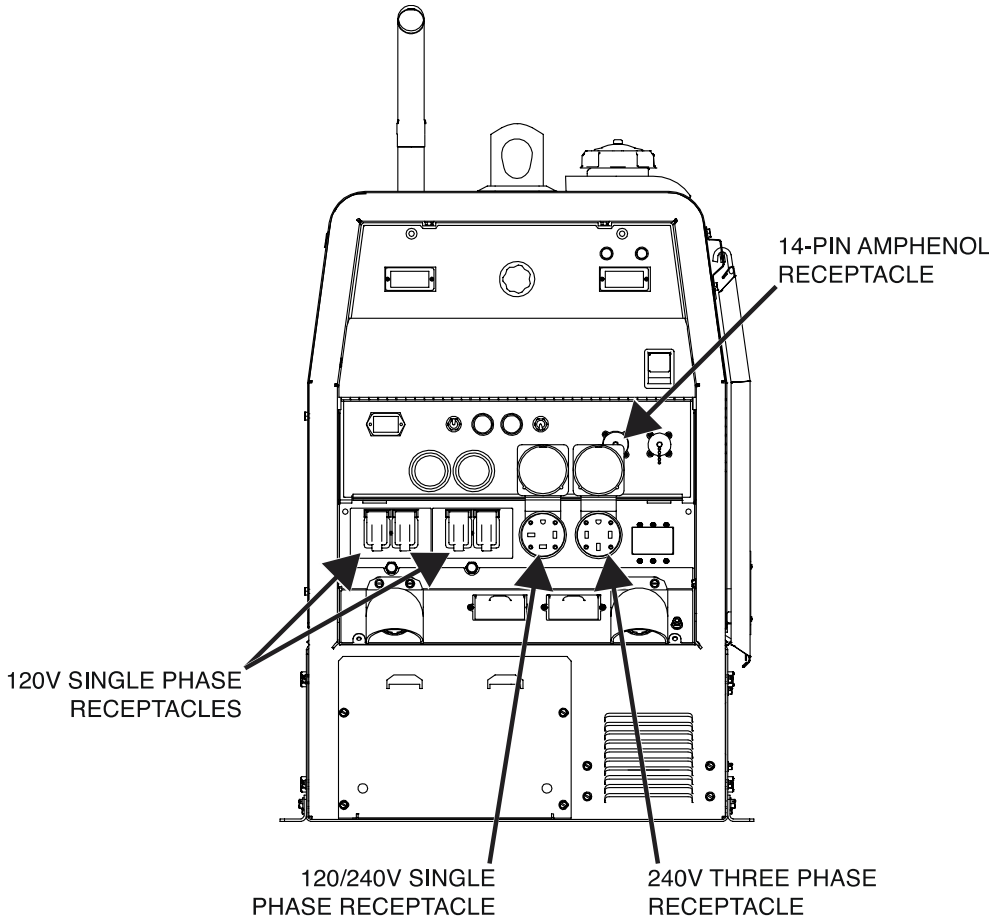


Figure F.13 – 14 Pin Amphenol terminal locations

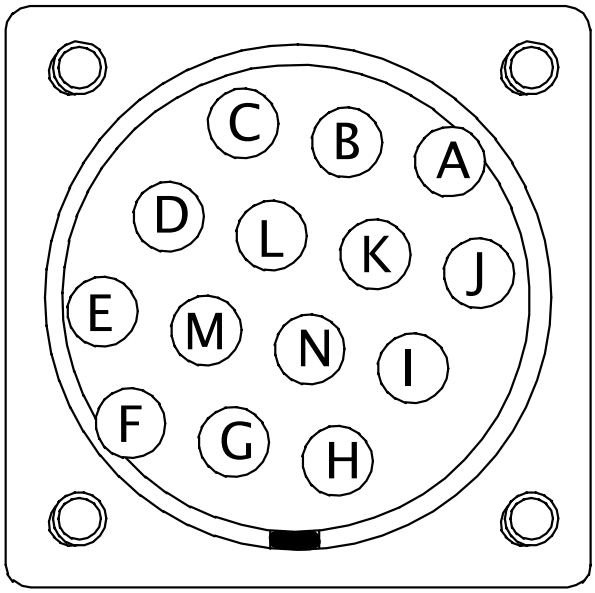
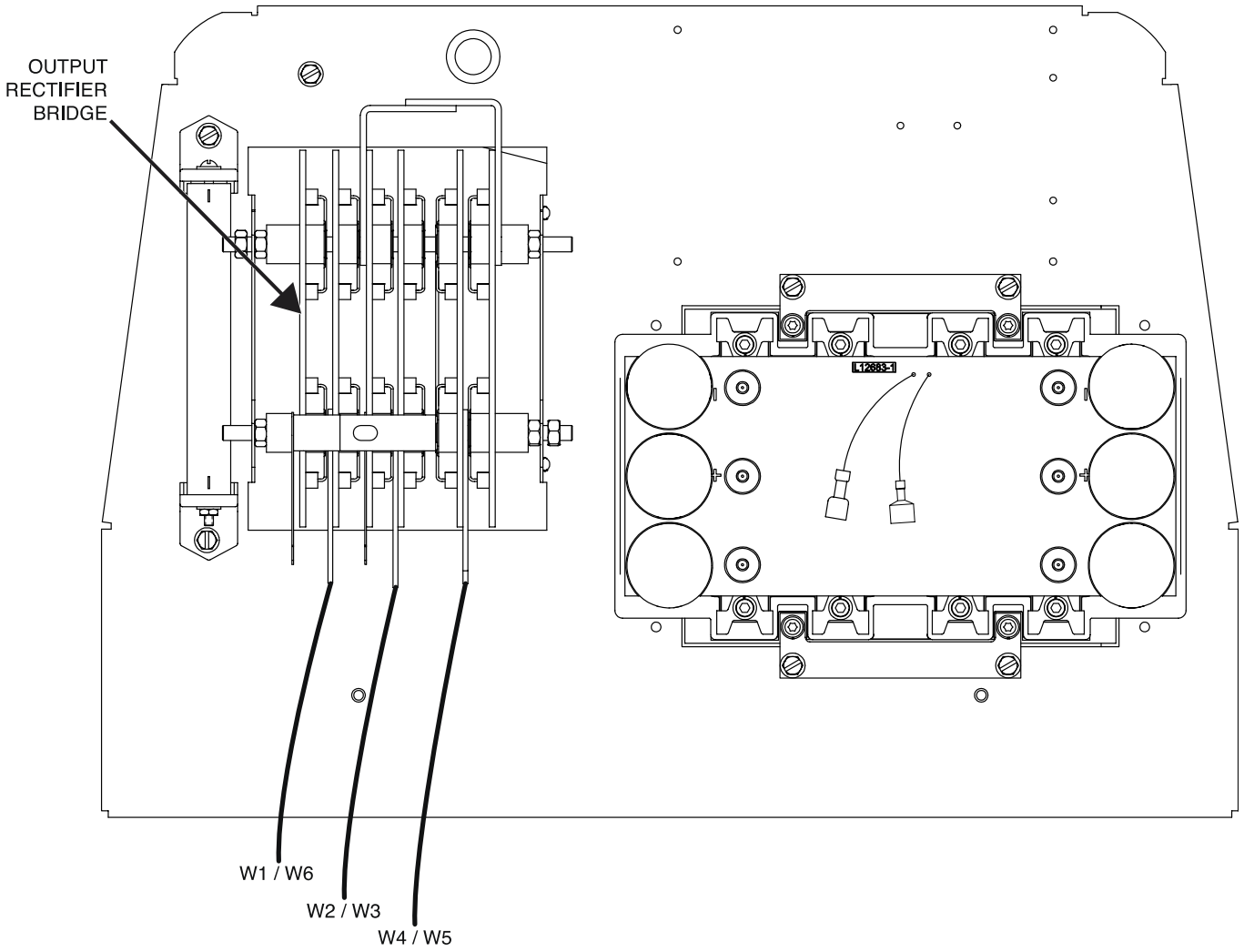


Figure F.14 – Output rectifier bridge lead locations



OUTPUT RECTIFIER BRIDGE 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 Output Rectifier Bridge is grounded or if there are any failed Diode groups.
NOTE: This test will not be able to detect individual open Diodes within a group.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

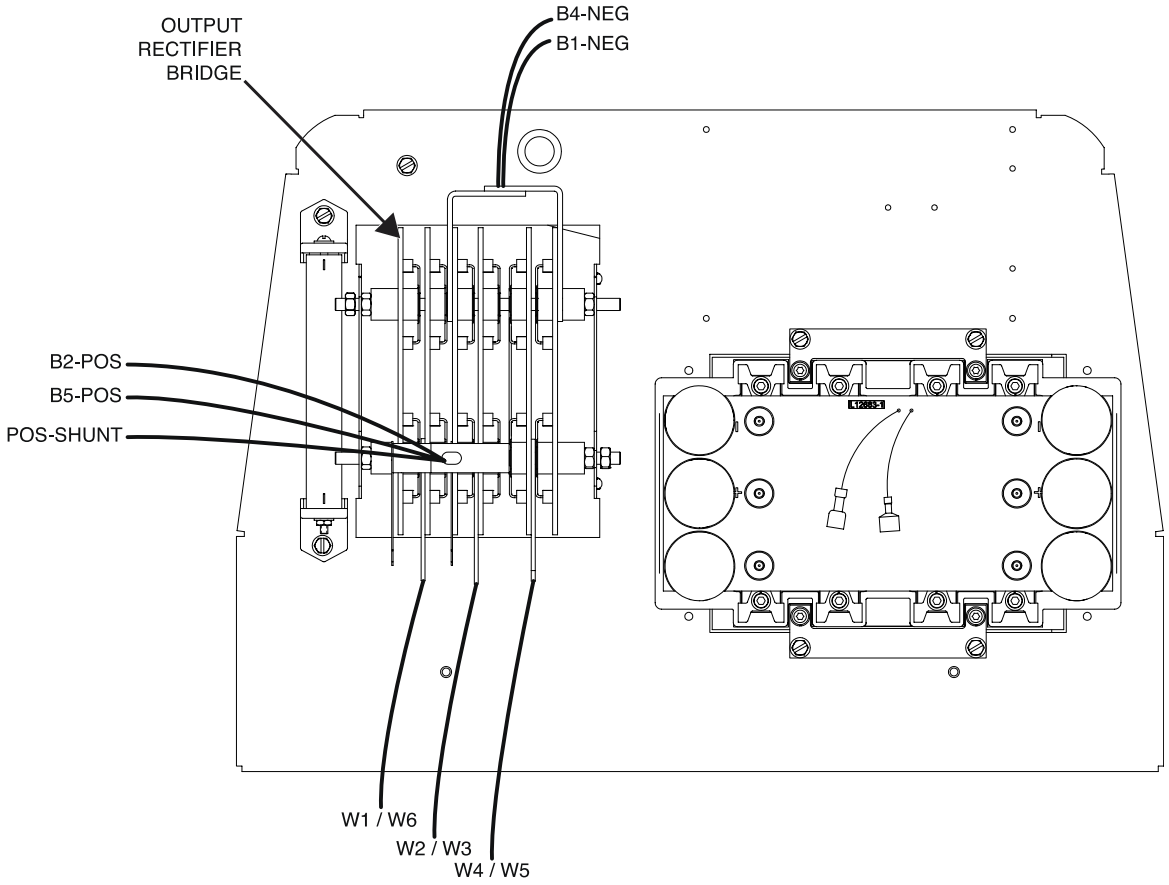
1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
   Electrically isolate the three-phase input terminals of the output rectifier bridge as follows:
4. Label and disconnect leads W1/W6, W2/W3 and W4/W5 and position them so they do not come in contact with any part of the rectifier. See ***Figure F.15***. See Wiring Diagram.
   Electrically isolate the DC output terminals of the rectifier:
5. Label and disconnect leads POS-SHUNT, B2 and B5 from the positive terminal of the rectifier and leads B4-NEG and B1-Neg from the negative terminal. Position these leads so they do not come to contact with any part of the rectifier. See ***Figure F.15***. See Wiring Diagram.
6. Check for grounds by placing one of the ohmmeter probes on a clean, unpainted metal surface of the machine. Touch the other probe to each of the five rectifier terminals. The resistance to chassis ground from each terminal should be very high, 500,000 (500K) ohms minimum. If the resistance reading is less than specified, the rectifier is grounded and should be replaced.
7. If using diode checker or a multi-meter with diode check functionality, read and understand the instructions that accompany your test equipment.
8. If using an analog ohmmeter, the forward bias test will indicate low resistance and the reverse bias test will indicate high resistance. Precise ohm values for this test will vary depending on the test equipment used.
   NOTE: A digital Ohmmeter is not recommended for this test. While it may indicate a shorted or open device, typical digital meter does not provide enough voltage or current flow to reliably test the diodes used in this rectifier.

9. Using the appropriate volt/ohmmeter, perform the tests outlined in ***Table F.3***. See ***Figure F.15***. See Wiring Diagram.
10. If any tests fail, the output rectifier bridge may be faulty.
11. If faulty, perform the ***Output Rectifier Bridge Removal And Replacement Procedure***.
12. When testing is complete, reconnect all previously disconnected leads to the output rectifier bridge.
13. Perform the ***Case Cover Replacement Procedure***.

Table F.3 – Diode test table

RECTIFIER TERMINAL CONNECTIONS	TEST POINT (+)	TEST POINT (–)	DIODE BIAS AND EXPECTED RESULT
	AC1	DC(+)	0.3 - .7V
	AC2	DC(+)	0.3 - .7V
	AC3	DC(+)	0.3 - .7V
	DC(-)	AC1	0.3 - .7V
	DC(-)	AC2	0.3 - .7V
	DC(-)	AC3	0.3 - .7V
	AC1	DC(-)	OL
	AC2	DC(-)	OL
	AC3	DC(-)	OL
	DC(+)	AC1	OL
	DC(+)	AC2	OL
	DC(+)	AC3	OL

Figure F.15 – Output rectifier bridge lead locations



CHOPPER MODULE FUNCTION TEST PROCEDURE

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

TEST DESCRIPTION

This test will help determine if the Chopper Module is functioning properly and receiving the correct input from the Output Rectifier and the Weld Control Board.
This test can only provide meaningful results if the machine is producing normal AC auxiliary output.

MATERIALS NEEDED

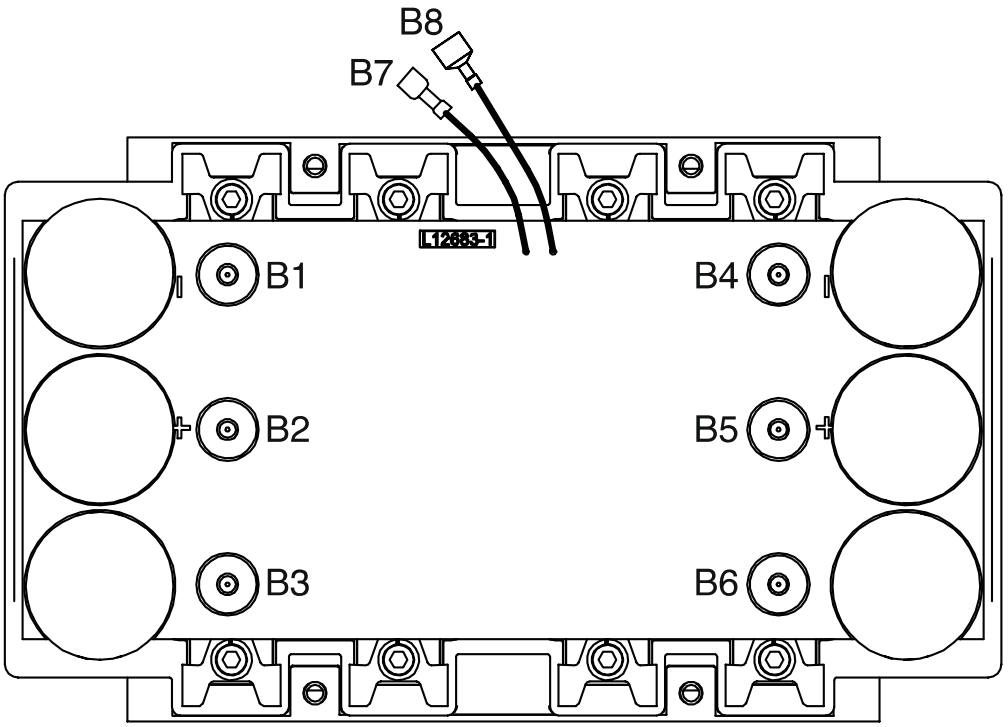
Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Make sure that there is nothing plugged into either of the Amphenol receptacles.
5. Place idle switch in the “HIGH” position.
6. Place the mode switch in the “CC-STICK” position.
7. Place the welding terminal switch in the “REMOTELY CONTROLLED” position.
8. Start the engine and allow it to stabilize at high idle RPM.
9. Check for 80 to 100 VDC at terminals B1- to B2+ and B4- to B5+ of the chopper module. See ***Figure F.16***. See Wiring Diagram.
10. If the correct DC voltage is not present at terminals B1- to B2+ and B4- to B5+, check for damaged conductors or faulty connections between the chopper module, the output rectifier and the stator weld winding. See ***Figure F.16***. See Wiring Diagram. Perform the ***Stator Voltage Test Procedure*** and the ***Output Rectifier Bridge Test Procedure***.
11. If the correct voltage is present at terminals B1- to B2+ and B4- to B5+ of the chopper module, check for DC voltage at the chopper module terminals B2+ to B3- and B5+ to B6-, if significant voltage is present, disconnect leads 23 and 25 from the chopper module board. If voltage is still present, the chopper module is shorted and should be replaced.
12. If the voltage drops to 0 VDC after leads 23 and 25 have been disconnected, the control board is driving the chopper module when it should not be doing so. Reconnect leads 23 and 25 and perform the ***Weld Control Board PWM Gate Signal Test Procedure***.
13. Place the welding terminal switch into the “WELD TERMINALS ON” position.

14. Check for about 58 VDC between chopper module terminals B2+ to B3- and B5+ to B6 and between the welder output terminals. See ***Figure F.16***. See Wiring Diagram.
15. If about 58 VDC is present at chopper module terminals B2+ to B3- and B5+ to B6-, but not at the output terminals, there is a problem between the chopper module and one of the output terminals. Check for damaged conductors or faulty connections, on leads B3-Choke and B6-Choke. Also check the shunt, the choke and the connections at the back of the output terminals. See Wiring Diagram.
16. If the voltage at terminals B2+ to B3- and B5+ to B6- of the chopper module is significantly higher than 58 VDC, check for an open R4 load resistor. Also check for damaged conductors or faulty connections at leads 13A and 15. See Wiring Diagram.
17. If the voltage at terminals B2+ to B3- and B5+ to B6- of the chopper module is very low or not present, use the frequency counter to check for the presence of a 20 kHZ PWM signal between leads 23+ and 25-, where they connect to the chopper module board.
18. If the 20 kHz signal is present, the chopper module is defective. Perform the ***Chopper Module Board Removal And Replacement Procedure***.
19. If the 20 kHz signal is not present, perform the ***Weld Control Board PWM Gate Signal Test Procedure***.
20. If the weld control board is producing a PWM gate signal, check leads 23 and 25 for damaged conductors and faulty connections between the control board and the chopper module.
21. When testing is complete, perform the ***Case Cover Replacement Procedure***.

Figure F.16 – Chopper module terminal locations



CHOPPER MODULE RESISTANCE TEST PROCEDURE

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

TEST DESCRIPTION

This test will help determine if the Chopper Module is shorted. This test can only detect some problems in the "Power" section of the Module. Problems in some other board components may not be detected.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

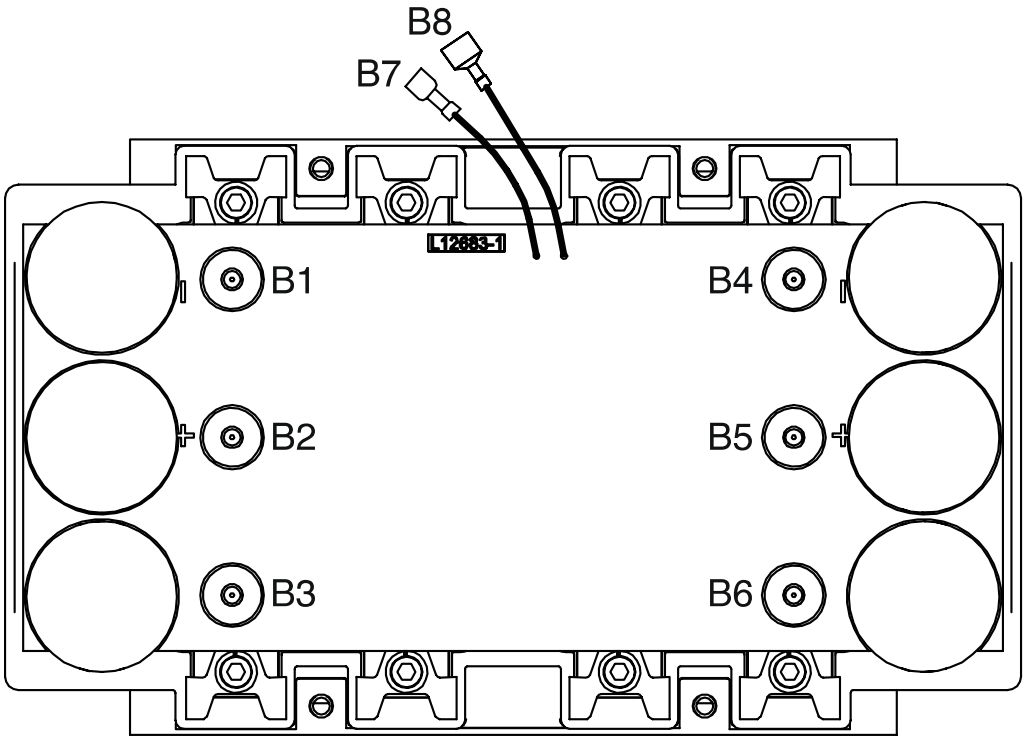
TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Label and disconnect all of the leads from the chopper module and position them so they do not make electrical contact with any part of the chopper module. See ***Figure F.17***. See Wiring Diagram.
5. Using a volt/ohmmeter, perform the tests outlined in ***Table F.4***. See ***Figure F.17***. See Wiring Diagram.
6. When testing is complete, connect all previously disconnected leads to the chopper module. See Wiring Diagram.
7. Perform the ***Case Cover Replacement Procedure***.

Table F.4 – Diode test table

	TEST POINT (+)	TEST POINT (–)	EXPECTED RESULT
CHOPPER TERMINAL CONNECTIONS	B5	B6	1.7V
	B6	B5	.3V
	B4	B5	.3V
	B5	B4	.3V
	B4	B6	1.6V
	B6	B4	.7V
	B2	B3	.5V
	B3	B2	.3V
	B4	B2	.4V
	B2	B4	.3V
	B4	B3	.3V
	B3	B4	.3V

Figure F.17 – Chopper module terminal locations



WELD CONTROL BOARD PWM GATE SIGNAL 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 Weld Control Board is able to produce the PWM (Pulse Width Modulated) gate signal needed to control the IGBTs (Insulated Gate Bipolar Transistor) on the Chopper Module. This test will also verify that the Weld Control Board can turn the PWM gate signal on and off properly.

MATERIALS NEEDED

Volt/Ohmmeter
Frequency counter or digital multi-meter with frequency counter function
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Unplug any device that may be attached to either the 6-pin or the 14-pin Amphenol receptacles.
5. Place the idle switch in the “HIGH IDLE” position.
6. Place the mode switch in the “CC-STICK” position.
7. Place the weld terminals switch into the “WELD TERMINALS ON” position.
8. Start the engine and let it run and stabilize at high idle RPM.
9. Locate plug J3 on the weld control board. See ***Figure F.18***. See Wiring Diagram.
10. Using the frequency counter, test for 20kHz PWM gate signal between leads 23+ (J3-10) and 25- (J3-9). See ***Figure F.19***. See Wiring Diagram.
11. If the 20KHz gate signal is present, place the weld terminals switch in the ”REMOTELY CONTROLLED” position. The gate signal should turn off.
12. If the 20 KHz gate signal responds as described above, this test is complete.
13. If there is no 20 KHz gate signal, test for the presence of 80 to 100 VDC, at leads 13+ (J3-8) to 14- (J3-16) of the weld control board. See Wiring Diagram.
14. If voltage is very low or not present, check leads 13 and 14 for faulty or damaged wiring or connections between the weld control board and the chopper module. See Wiring Diagram.
15. Using a volt/ohmmeter, test for 80 to 100 VDC at the terminals where the leads 13 and 14 connect to the chopper module. See Wiring Diagram. If there is no voltage at the chopper module, perform the ***Chopper Module Function Test Procedure***.

16. If the 80 to 100 VDC supply voltage is present at the weld control board, but there is no PWM gate signal, check the voltage between leads 2+ (J1-4) and 4 (J1-3). The voltage should be about 0 VDC.
17. If about 5 VDC is detected, the welding terminal control circuit is open. Check for damaged leads for faulty connections at leads 2 and 4; also check for a defective welding terminal switch. See Wiring Diagram.
18. If the PWM signal remains after the welding terminal switch has been placed in the "REMOTELY CONTROLLED" position, check the voltage between leads 2+ (J1-4) and 4- (J1-3) at the weld control board.
19. If the voltage reads 0 or very near 0, check for damaged insulation at leads 2 and 4, also check for a shorted welding terminal switch or damaged or contaminated Amphenol receptacle. See Wiring Diagram.
20. If the above wiring and components are undamaged and functioning properly, the weld control board may be faulty.
21. If the voltage reads about 5 VDC and the PWM signal remains, the weld control board may be faulty.
22. If faulty, perform the ***Weld Control Board Removal And Replacement Procedure***.
23. Perform the ***Case Cover Replacement Procedure***.

Figure F.18 – Weld control board plug locations

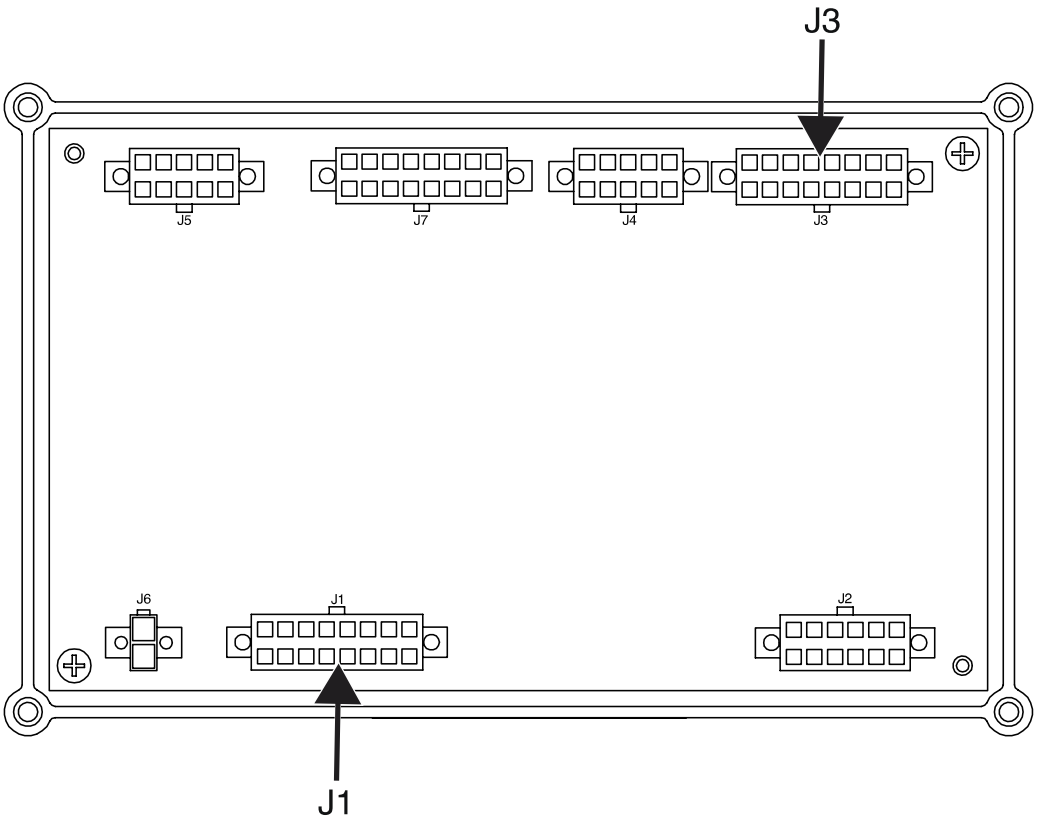
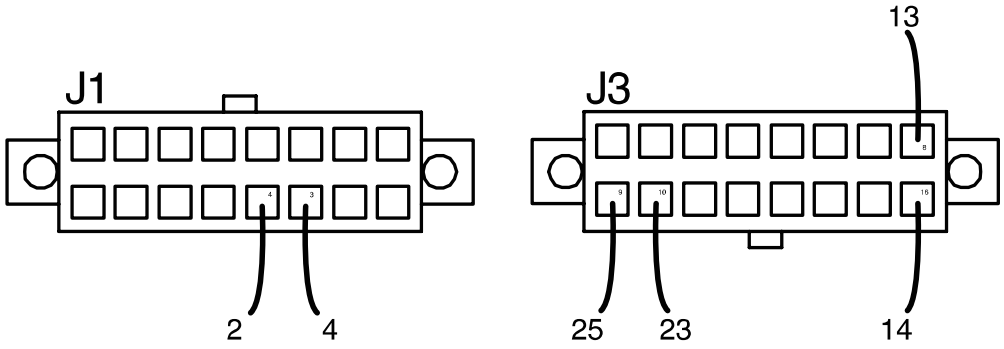


Figure F.19 – Weld control board plug J1 and J3 lead locations



WELD CONTROL BOARD FEEDBACK 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 Weld Control Board is receiving accurate current and voltage feedback from the weld circuit.
This test will only yield usable information if the machine is producing some weld output.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Place the idle switch in the “HIGH IDLE” position.
5. Place the mode switch in the “CC-STICK” position.
6. Place the weld terminals switch in the “WELD TERMINALS ON” position.
7. Make sure that nothing is plugged into either Amphenol receptacle.
8. Connect the resistive load bank and the ammeter to the weld output terminals per the equipment manufacturer’s instructions; also connect the voltmeter probes across the weld output terminals.
9. Start the machine and apply a load of about 200 Amps, as shown on the external ammeter. If the machine will not produce 200 amps, apply as much load as you can.
10. Compare the readings shown on the external ammeter and voltmeter to the amps and volts displayed on the front panel of the machine.
11. If the readings shown on the front panel displays are about the same or very close to the reading on the external meters, the feedback is probably good and this test is complete.
12. If the readings differ significantly, continue with this procedure.
13. Remove the load from the weld terminals and turn off the engine. (The load bank and ammeter can remain connected).
14. Locate plugs J3 and J6 on the weld control board. See ***Figure F.20***. Remove the plugs and check for dirt, corrosion, damaged, expanded or incorrectly positioned terminals. Repair or replace wiring components as needed and reconnect the plugs to the control board. See Wiring Diagram.

15. Restart the machine and apply a load across the weld terminals that measures about 200 amps. If the machine will not produce 200 amps of current, apply as much load as you can.
16. Using the voltmeter, measure and note the DC voltage at the weld output terminals.
17. Check the voltage between leads 204S+ (J6-1) and lead 208C- (J3-15) at the weld control board Molex plugs. See ***Figures F.20*** and ***F.21***. See Wiring Diagram. The voltage should be the same as was measured at the weld terminals.
18. If the voltage readings are different, check the wiring and connections between the welding terminals and the weld control board. See Wiring Diagram.
19. Connect the millivolt meter probes between lead 206S+ (J6-2) and lead 204S- (J6-1). See ***Figures F.20*** and ***F.21***. See Wiring Diagram. If the machine is currently producing 200 amps the millivolt meter should read about 25 millivolts.
20. If the machine cannot produce 200 amps of weld current, the correct millivolt signal will need to be calculated by dividing the reading displayed on the external ammeter by 8. See the following explanation.

    The shunt used in this machine will produce 50 millivolts at a load of 400 amps or 8 amps per millivolt.

    To calculate the correct millivolt signal for a given load, you divide the number of amps displayed on the ammeter by 8.

    Example: If your ammeter reads 75, (75/8= 9.4). If the shunt is working correctly and the wiring between the shunt and the weld control board is in good condition, the meter connected at the weld control board should be reading about 9.4 millivolts.
21. If the millivolt reading is incorrect, check the wiring between the shunt and the weld control board for damage, grounds and faulty connections. If the wiring is good, the shunt and lead assembly is faulty and should be replaced.
22. Perform the ***Case Cover Replacement Procedure***.

Figure F.20 – Weld control board plug locations

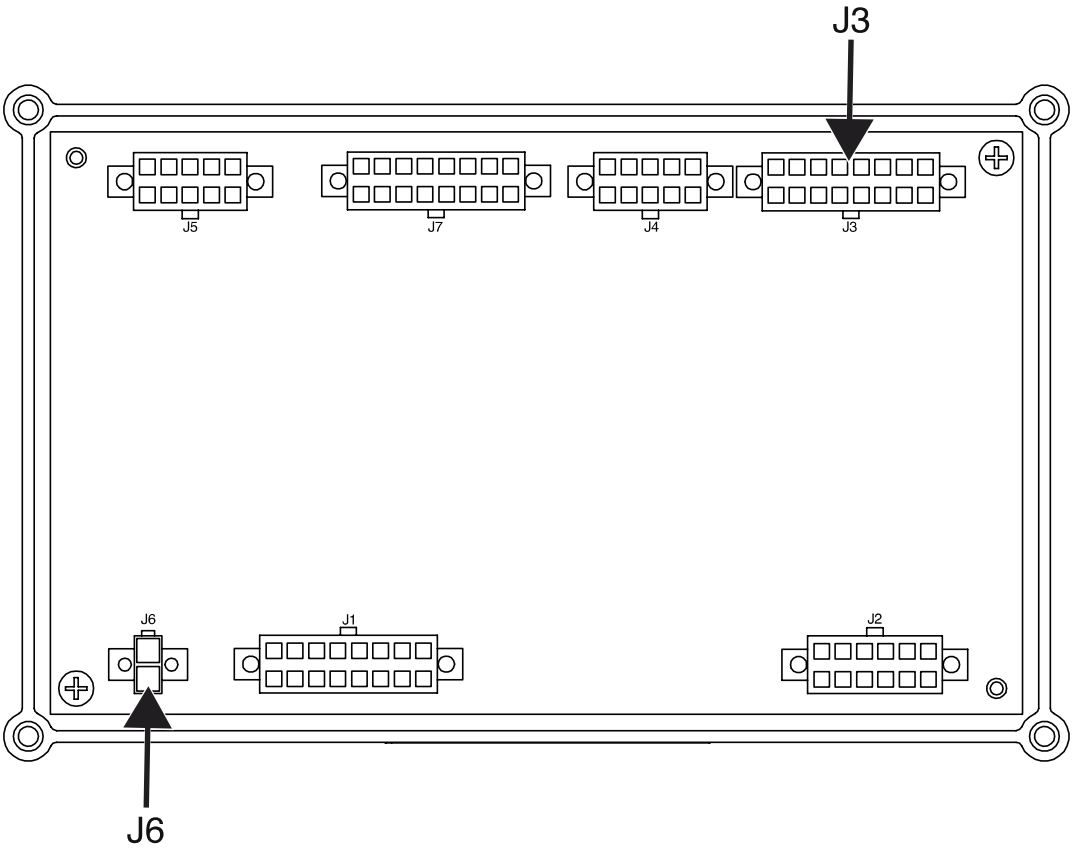
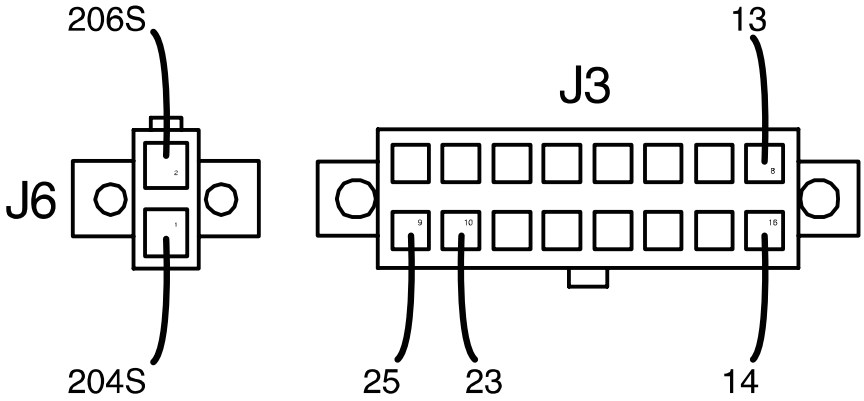


Figure F.21 – Weld control board plug J3 and J6 lead locations



CONTROL POTENTIOMETER AND MODE 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 check the Output Control Potentiometer, Arc Control Potentiometer, Mode Switch and associated wiring for damage, proper operation, tracking and grounds.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Label and disconnect plug J7 from the weld control board and visually check the plug and attached wiring for damage, corrosion, improperly seated or damaged contact pins. Plug J7 will remain unplugged for the following test. See ***Figure F.22***. See Wiring Diagram.
5. Set the mode switch into the “CC-Stick” position.
6. Using a volt/ohmmeter, measure the resistance between each of the leads in plug J7 and a good clean chassis ground connection. Be very careful that the connection pins in J7 are not damaged or spread out. The resistance should be very high. A reading of 500,000 (500k) ohms or higher is acceptable.
7. If the resistance is lower than 500k Ohms, replace the potentiometer, mode switch plug and lead assembly or replace the defective component within the assembly. See Wiring Diagram.
8. Perform the resistance tests outlined in ***Table F.5***. See ***Figures F.22*** and ***F.23***. See Wiring Diagram.
9. If the resistance readings are not as specified in ***Table F.5***, replace the potentiometer, mode switch plug and lead assembly or replace the defective component. See Wiring Diagram.
10. If testing is complete, connect plug J7 to the weld control board. See Wiring Diagram.
11. Perform the ***Case Cover Replacement Procedure***.

Table F.5 – Control potentiometer and mode switch test points

POT/MODE SWITCH RESISTANCE TEST		
MODE SWITCH SETTING	OHMMETER CONNECTION	OHMMETER READING
CC-STICK	J7-9 (214) TO J7-14 (218)	500K OR HIGHER
CC-STICK	J7-9 (214) TO J7-15 (220)	500K OR HIGHER
CC-STICK	J7-9 (214) TO J7-16 (222)	500K OR HIGHER
CC-STICK	J7-14 (218) TO J7-15 (220)	500K OR HIGHER
CC-STICK	J7-14 (218) TO J7-16 (222)	500K OR HIGHER
CC-STICK	J7-15 (220) TO J7-16 (222)	500K OR HIGHER
TOUCH START TIG	J7-15 (220) TO J7-16 (222)	*
DOWNHILL PIPE	J7-14 (218) TO J7-16 (222)	*
CV-WIRE	J7-9 (214) TO J7-16 (222)	*
N/A	J7-5 (75) TO J7-1 (77)	ABOUT 10K
N/A	J7-1 (77) TO J7-4 (76)	OHMS VALUE SHOULD SWEEP SMOOTHLY FROM 10K TO 0 WHEN OUTPUT CONTROL IS TURNED FROM MIN. TO MAX.
N/A	J7-6 (279) TO J7-8 (277)	ABOUT 10K
N/A	J7-8 (277) TO J7-7 (278)	OHMS VALUE SHOULD SWEEP SMOOTHLY FROM 10K TO 0 WHEN ARC CONTROL IS TURNED FROM MIN. TO MAX.
*Resistance should be very low, the ohmmeter should read about the same value as one would get by touching the two meter probes together.		

Figure F.22 – Weld control board plug J7 location

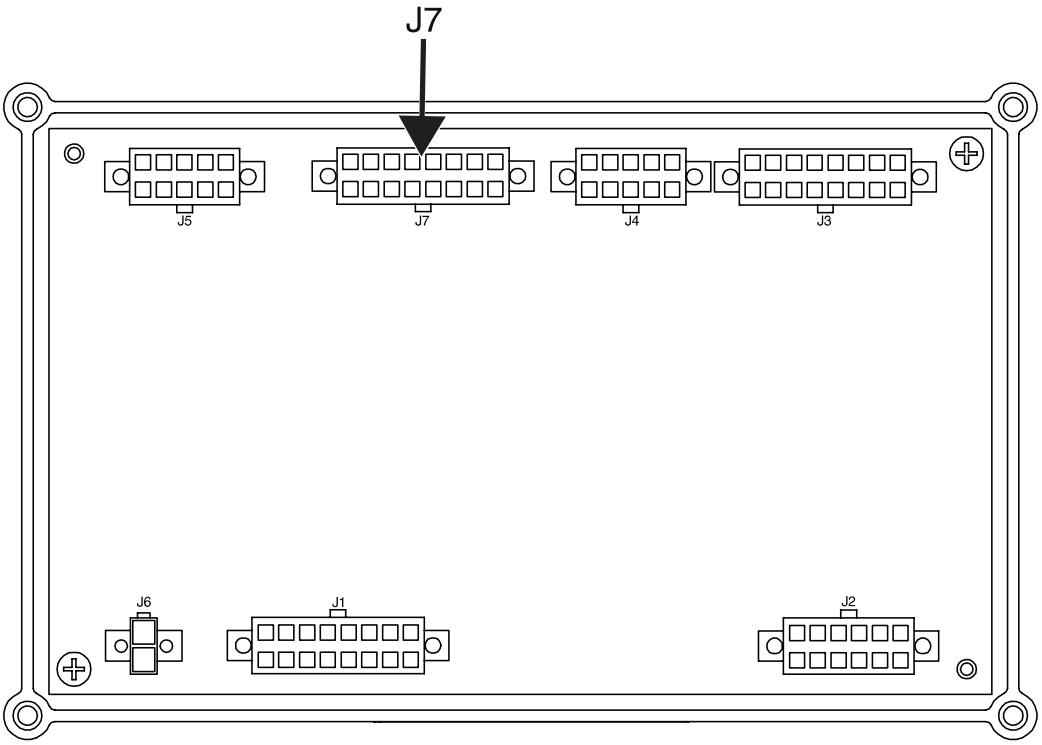
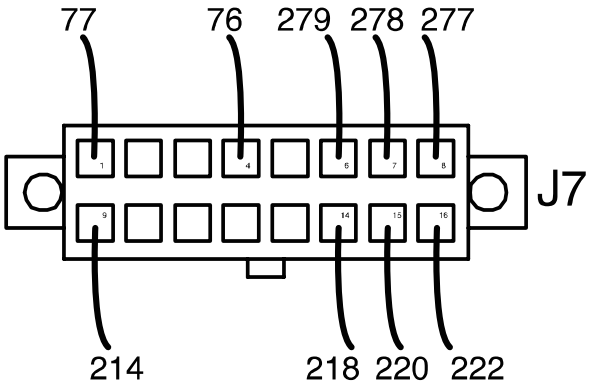


Figure F.23 – Weld control board plug J7 lead locations



REMOTE RECEPTACLE RESISTANCE TEST PROCEDURE

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

TEST DESCRIPTION

This test will help determine if there is a problem with the Remote Receptacle Control wiring, relating to electrical tracking between other Control Conductors, Power Conductors or ground. This test also checks the function of the Weld Terminal Switch.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Make sure that there are no devices of any kind plugged into either of the Amphenol receptacles.
5. Label and disconnect plug J1 from the weld control board. See ***Figure F.24***. See Wiring Diagram. Examine the plug and the receptacle on the weld control board for dirt, corrosion, damaged or out-of-position pins. Repair or replace any damaged components. Position plug J1 so it cannot make electrical contact with any other conductor or chassis ground.
6. Using a volt/ohmmeter, perform the resistance tests outlined in ***Table F.6***. See ***Figure F.25***. See Wiring Diagram. Be very careful not to damage or spread any of the connection pins in the Amphenol receptacle.
7. If the resistances do not meet values specified, check for damage, dirt or moisture contamination in the Amphenol receptacles and plug J1. Check for damaged or grounded wiring.
8. If the resistance values are found to be too low, due to contaminated electrical components in the Amphenol harness assembly. Try removing the contamination and drying the components completely. If the resistance values are still too low, replace the Amphenol harness assembly.
9. If the values are incorrect for the last two tests in the table, (Pin C to Pin D) check the welding terminal switch and the wiring connected to that switch. See Wiring Diagram. Repair any faulty connections or replace the switch if necessary.
10. Connect plug J1 to the weld control board. See Wiring Diagram.
11. Perform the ***Case Cover Replacement Procedure***.

Table F.6 – Remote receptacle resistance tests

WELDING TERMINAL SWITCH SETTING	OHMMETER CONNECTION	EXPECTED READING
N/A	PIN G (75B) TO PIN A (32)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN B (GND-A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN C (2B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN D (4B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN E (77B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN F (76B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN H (21)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN I (41A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN J (31)	500,000 (500K) OHMS OR HIGHER
N/A	PIN G (75B) TO PIN K (42A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN A (32)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN B (GND-A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN C (2B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN D (4B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN E (77B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN H (21)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN I (41A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN J (31)	500,000 (500K) OHMS OR HIGHER
N/A	PIN F (76B) TO PIN K (42A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN A (32)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN B (GND-A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN C (2B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN D (4B)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN H (21)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN I (41A)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN J (31)	500,000 (500K) OHMS OR HIGHER
N/A	PIN E (77B) TO PIN K (42A)	500,000 (500K) OHMS OR HIGHER
REMOTELY CONTROLLED	PIN C (2B) TO PIN D (4B)	500,000 (500K) OHMS OR HIGHER
WELD TERMINALS ON	PIN C (2B) TO PIN D (4B)	RESISTANCE SHOULD BE VERY LOW. THE OHMMETER SHOULD READ ABOUT THE SAME VALUE AS ONE WOULD GET BY TOUCHING THE METER PROBES TOGETHER.

Figure F.24 – Weld control board plug J1 locations

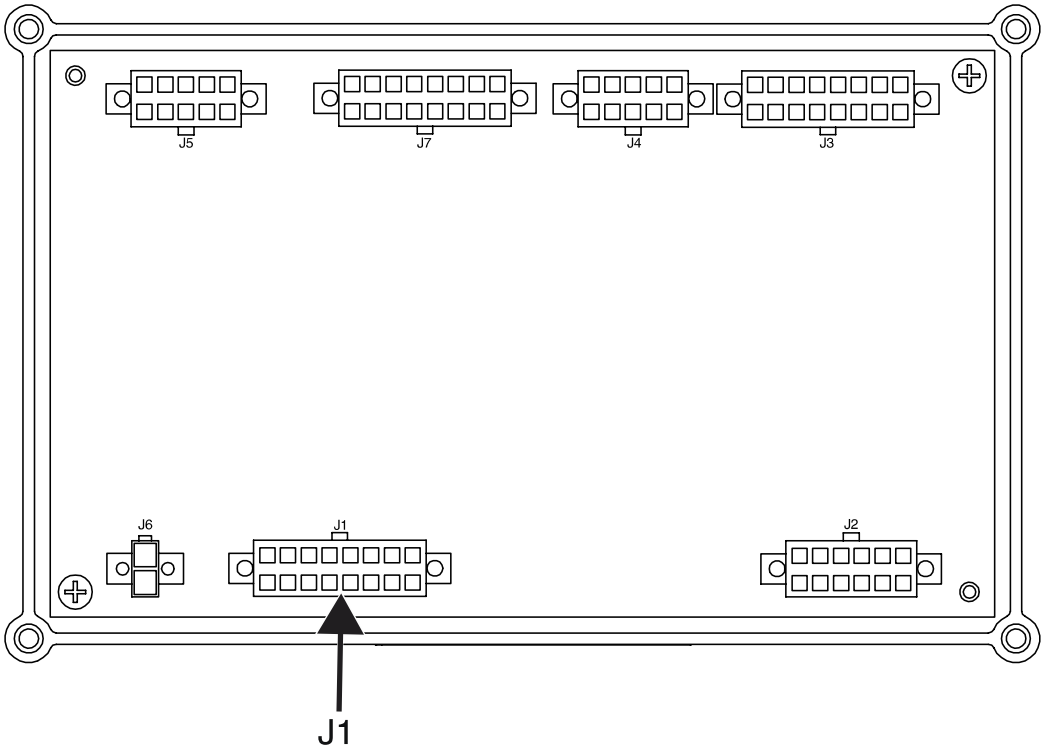
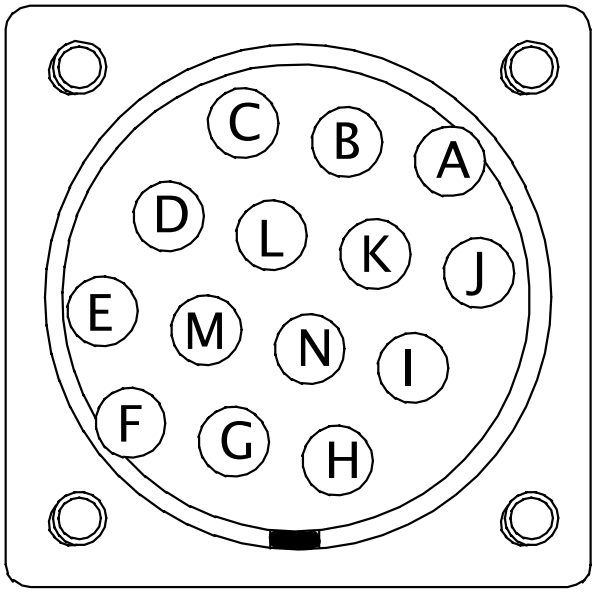


Figure F.25 – 14-pin amphenol terminal locations



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, shorted (turn to turn) or grounded.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

TEST PROCEDURE

1. Turn off the engine on the Vantage 500 machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Locate the choke assembly. See ***Figure F.26***. See Wiring Diagram.
5. **Open:** No weld output. Using a digital volt/ohmmeter, test the resistance from the B6-Choke lead to the negative output stud. See ***Figures F.26*** and ***F.27***. See Wiring Diagram. Typical resistance is less than one ohm (B6-Choke lead should be disconnected from the chopper board for testing).
6. **Turn To Turn Short:** Reduced inductance, arc instability, excessive heating of the choke. Check for any physical signs of arcing within the choke assembly. See Wiring Diagram.
7. **Choke Coil Grounded:** Reduced inductance, alternate weld current path. Electrically isolate the choke coil by disconnecting the leads B3-Choke and B6-Choke from the chopper board and the heavy choke lead from the negative output stud. Using a digital volt/ohmmeter, check the resistance from choke coil to chassis ground. Resistance should be at least 500,000 ohms. See Wiring Diagram.
8. If any of the tests fail, the choke may be faulty.
9. 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.26 – Choke assembly location

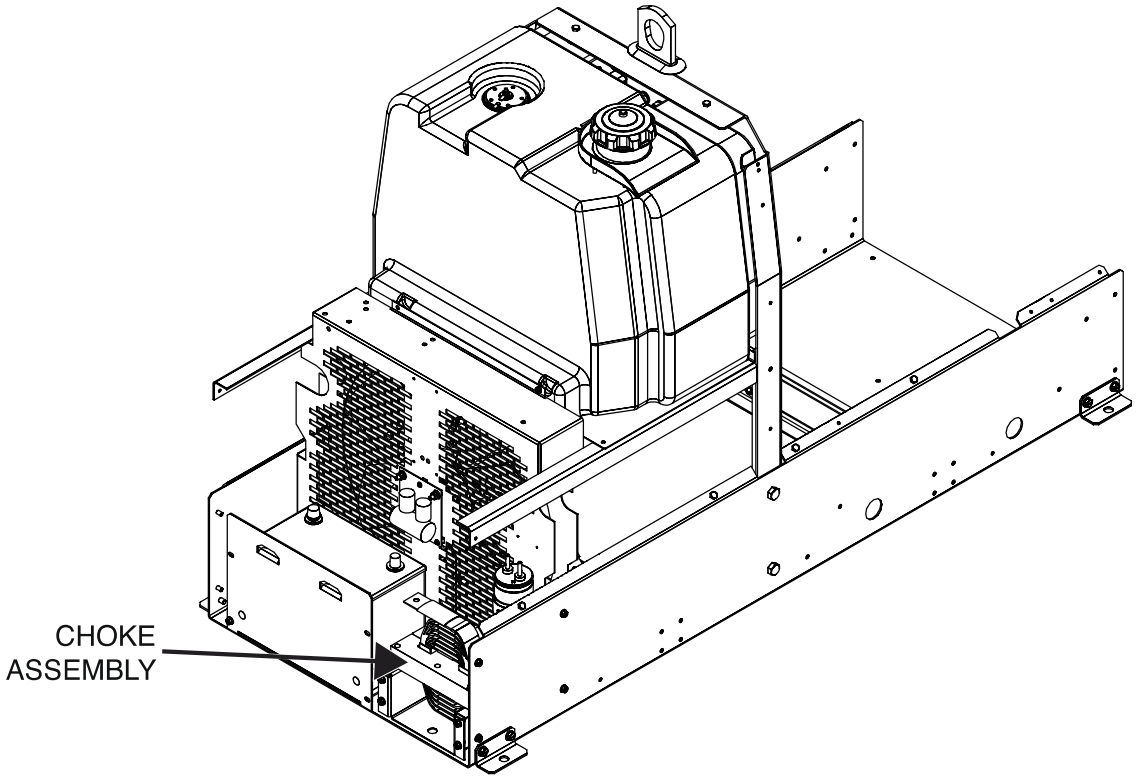
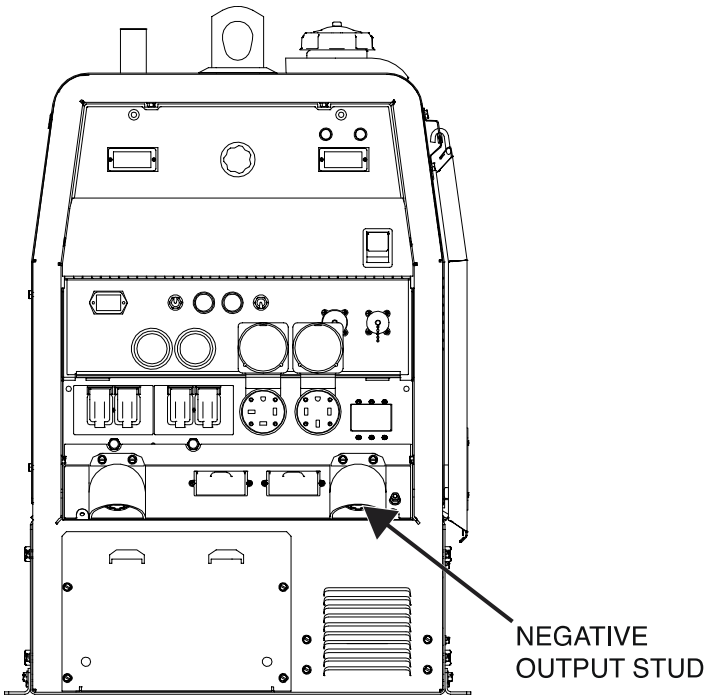


Figure F.27 – Negative output stud location



Removal And Replacement Procedures

ENGINE ELECTRONIC GOVERNOR CONTROL MODULE REMOVAL AND REPLACEMENT PROCEDURE

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

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Engine Electronic Governor Control Module.

MATERIALS NEEDED

3/8” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Label and disconnect plugs J31 and J32 from the engine electronic governor control module. See ***Figure F.28***. See Wiring Diagram.
4. Using a 3/8” nutdriver, remove the two screws securing the engine electronic governor control module to the lift bale frame. See ***Figure F.29***.
5. The engine electronic governor control module can now be replaced.

REPLACEMENT PROCEDURE

1. Carefully position new engine electronic governor control module onto the lift bail frame.
2. Using a 3/8” nutdriver, attach the two screws securing the engine electronic governor control module to the lift bale frame.
3. Connect plugs J31 and J32 to the engine electronic governor control module. See Wiring Diagram
4. Perform the ***Case Cover Replacement Procedure***.
5. Perform the ***Retest After Repair Procedure***.

Figure F.28 – Engine electronic governor control module plug locations

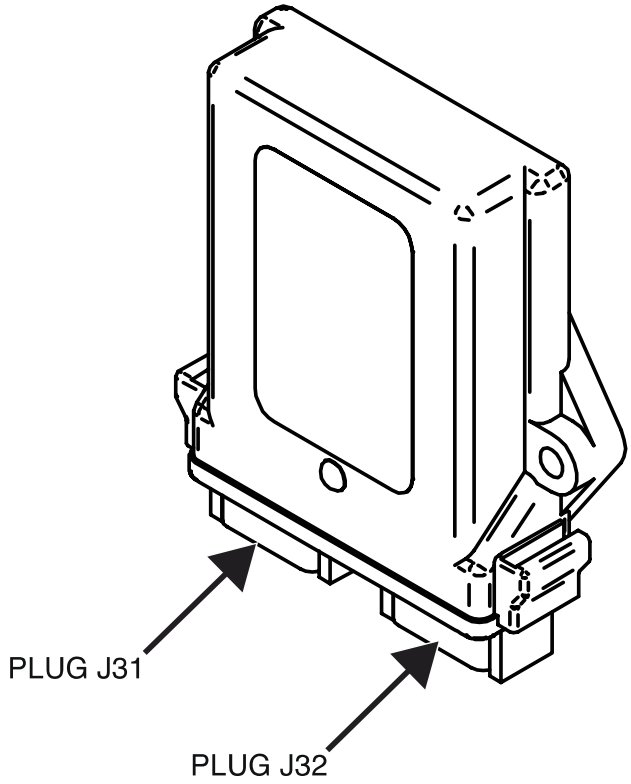
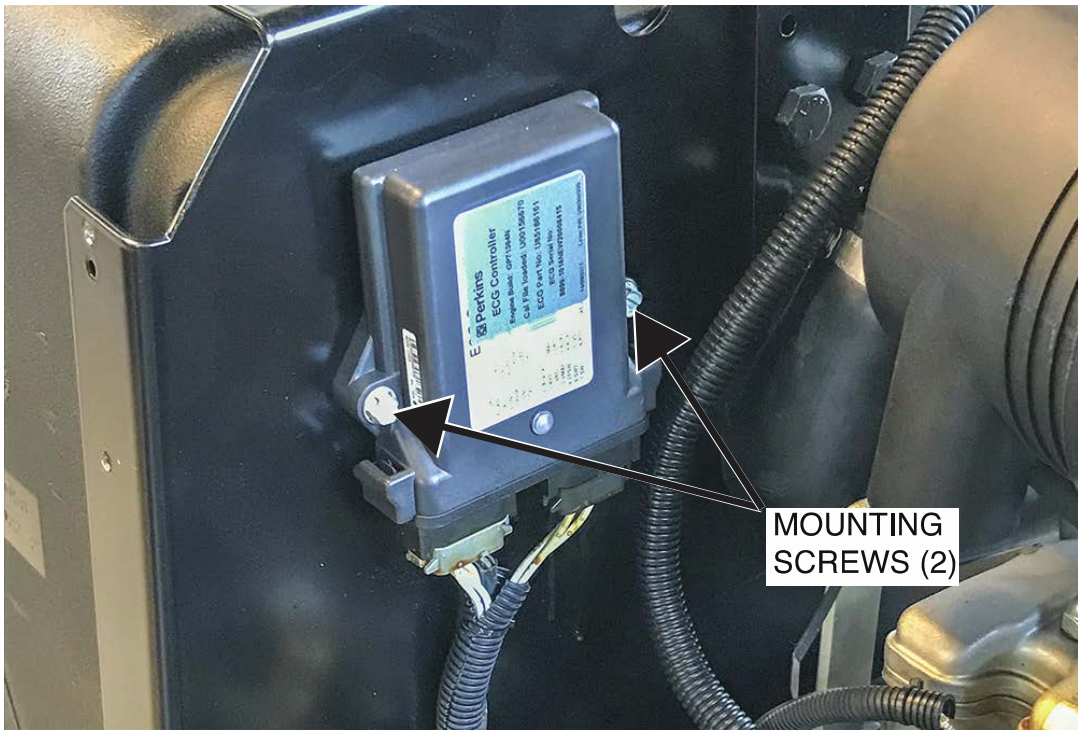


Figure F.29 – Engine electronic governor control module mounting screws location



BATTERY 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 Battery.

MATERIALS NEEDED

3/8” Nutdriver
1/2” Nutdriver
7/16” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Using a 3/8” nutdriver, remove the four screws securing the battery tray to the machine. See ***Figure F.30***.
3. Using a 1/2” nutdriver, loosen the hose clamps securing the positive and negative leads the positive and negative battery terminals. See Wiring Diagram.
4. Using a 7/16” nutdriver, remove the two nuts securing the battery bracket to the battery tray. See ***Figure F.31***.
5. Carefully slide the battery tray out of the front panel.
6. The battery can now be removed from the battery tray.

REPLACEMENT PROCEDURE

1. Carefully position the new battery into the battery tray.
2. Carefully position the battery tray into the front panel.
3. Using a 7/16” nutdriver, attach the two nuts securing the battery bracket to the battery tray.
4. Using a 1/2” nutdriver, tighten the hose clamps securing the positive and negative leads the positive and negative battery terminals. See Wiring Diagram.
5. Using a 3/8” nutdriver, attach the four screws securing the battery tray to the machine.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Retest After Repair Procedure***.

Figure F.30 – Battery tray mounting screw locations

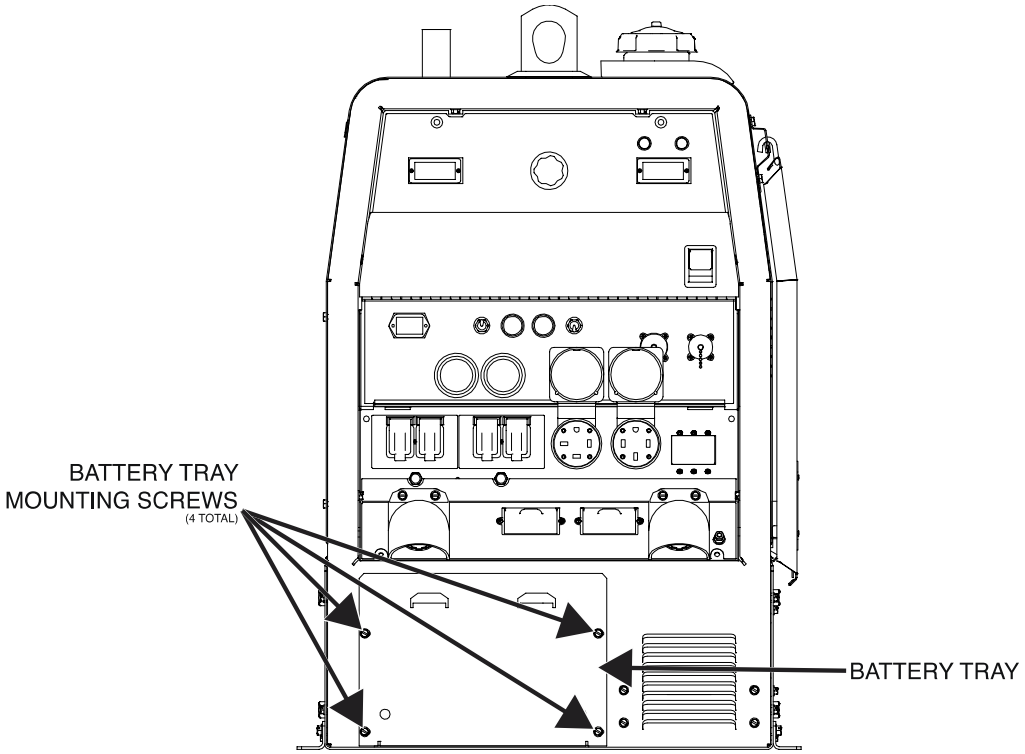
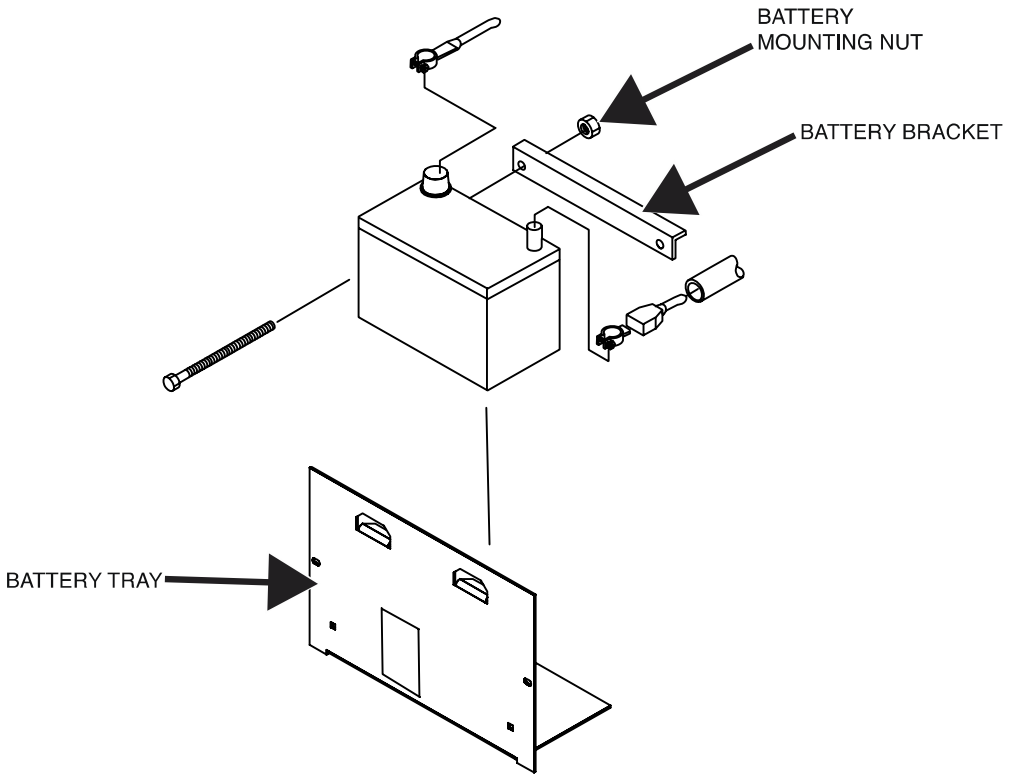


Figure F.31 – Battery cable, tray and mounting nut locations



IDLE RELAY (CR1) AND ENGINE PROTECTION RELAY (CR2) 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 Idle Relay (CR1) and the Engine Protection Relay (CR2).

MATERIALS NEEDED

Philips Screwdriver
Wiring Diagram

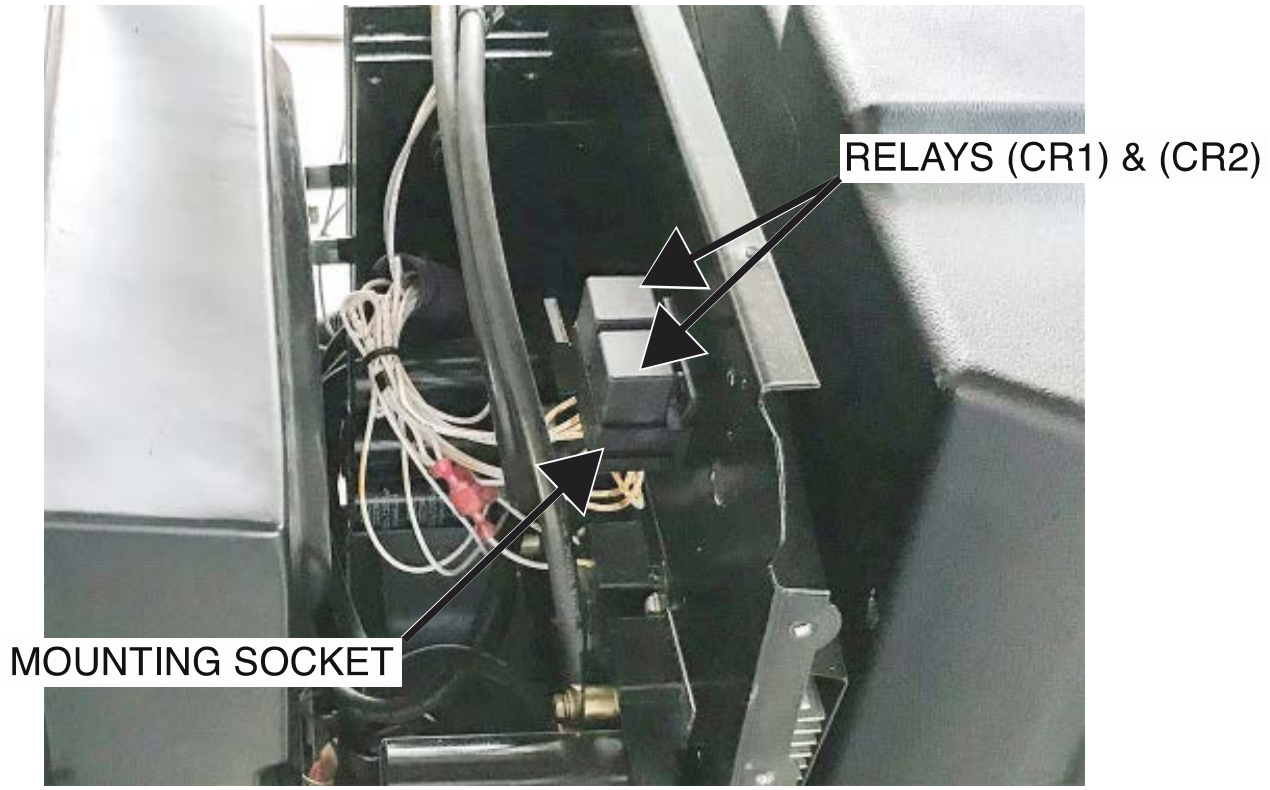
REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Unplug the idle relay (CR1) and the engine protection relay (CR2) from the mounting socket. See ***Figure F.32***. See Wiring Diagram.
4. Using a Phillips screwdriver, remove the two screws securing the mounting socket to the power module panel (if necessary). See ***Figure F.32***.
5. The idle (CR1) and engine protection (CR2) relays can now be replaced.

REPLACEMENT PROCEDURE

1. Carefully position the mounting socket onto the power module panel.
2. Using a Phillips screwdriver, attach the two screws securing the mounting socket to the power module panel.
3. Plug the idle relay (CR1) and the engine protection relay (CR2) into the mounting socket. See Wiring Diagram
4. Perform the ***Case Cover Replacement Procedure***.
5. Perform the ***Retest After Repair Procedure***.

Figure F.32 – Relay and mounting socket locations



OUTPUT RECTIFIER BRIDGE REMOVAL AND REPLACEMENT PROCEDURE

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

TEST DESCRIPTION

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

MATERIALS NEEDED

1/2” Nutdriver
1/2” Open-End Wrench
7/16” Nutdriver
7/16” Open-End Wrench
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Using a 1/2” nutdriver and a 1/2” open-end wrench, remove the bolt, nut, lock washer and two flat washers securing leads B2-POS, B5-POS and POS-SHUNT to the positive terminal of the output rectifier. See ***Figure F.33***. See Wiring Diagram. Label leads for reassembly.
5. Using a 1/2” nutdriver and a 1/2” open-end wrench, remove the bolt, nut, lock washer and two flat washers securing leads B1-NEG and B4-NEG to the negative terminal of the output rectifier. See ***Figure F.33***. See Wiring Diagram. Label leads for reassembly.
6. Using a 7/16” nutdriver and a 7/16” open-end wrench, remove the bolt, nut, lock washer and two flat washers securing the W1/W6 to the left terminal of the output rectifier bridge. See ***Figure F.33***. See Wiring Diagram. Label leads for reassembly.
7. Using a 7/16” nutdriver and a 7/16” open-end wrench, remove the bolt, nut, lock washer and two flat washers securing the W2/W3 to the middle terminal of the output rectifier bridge. See ***Figure F.33***. See Wiring Diagram. Label leads for reassembly.
8. Using a 7/16” nutdriver and a 7/16” open-end wrench, remove the bolt, nut, lock washer and two flat washers securing the W4/W5 to the right terminal of the output rectifier bridge. See ***Figure F.33***. See Wiring Diagram. Label leads for reassembly.
9. Using a 1/2” nutdriver, loosen the two nuts securing the output rectifier bridge to the mounting posts on the power module panel. See ***Figure F.34***.
10. The output rectifier bridge can now be replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new output rectifier bridge onto the mounting posts on the power module panel.
2. Using a 1/2” nutdriver, tighten the two nuts securing the output rectifier bridge to the mounting posts on the power module panel.
3. Using a 7/16” nutdriver and a 7/16” open-end wrench, attach the bolt, nut, lock washer and two flat washers securing the W4/W5 to the right terminal of the output rectifier bridge. See Wiring Diagram.
4. Using a 7/16” nutdriver and a 7/16” open-end wrench, attach the bolt, nut, lock washer and two flat washers securing the W2/W3 to the middle terminal of the output rectifier bridge. See Wiring Diagram.
5. Using a 7/16” nutdriver and a 7/16” open-end wrench, attach the bolt, nut, lock washer and two flat washers securing the W1/W6 to the left terminal of the output rectifier bridge. See Wiring Diagram.
6. Using a 1/2” nutdriver and a 1/2” open-end wrench, attach the bolt, nut, lock washer and two flat washers securing leads B1-NEG and B4-NEG to the negative terminal of the output rectifier. See Wiring Diagram.
7. Using a 1/2” nutdriver and a 1/2” open-end wrench, attach the bolt, nut, lock washer and two flat washers securing leads B2-POS, B5-POS and POS-SHUNT to the positive terminal of the output rectifier. See Wiring Diagram.
8. Perform the ***Case Cover Replacement Procedure***.
9. Perform the ***Retest After Repair Procedure***.

Figure F.33 – Output rectifier bridge lead locations

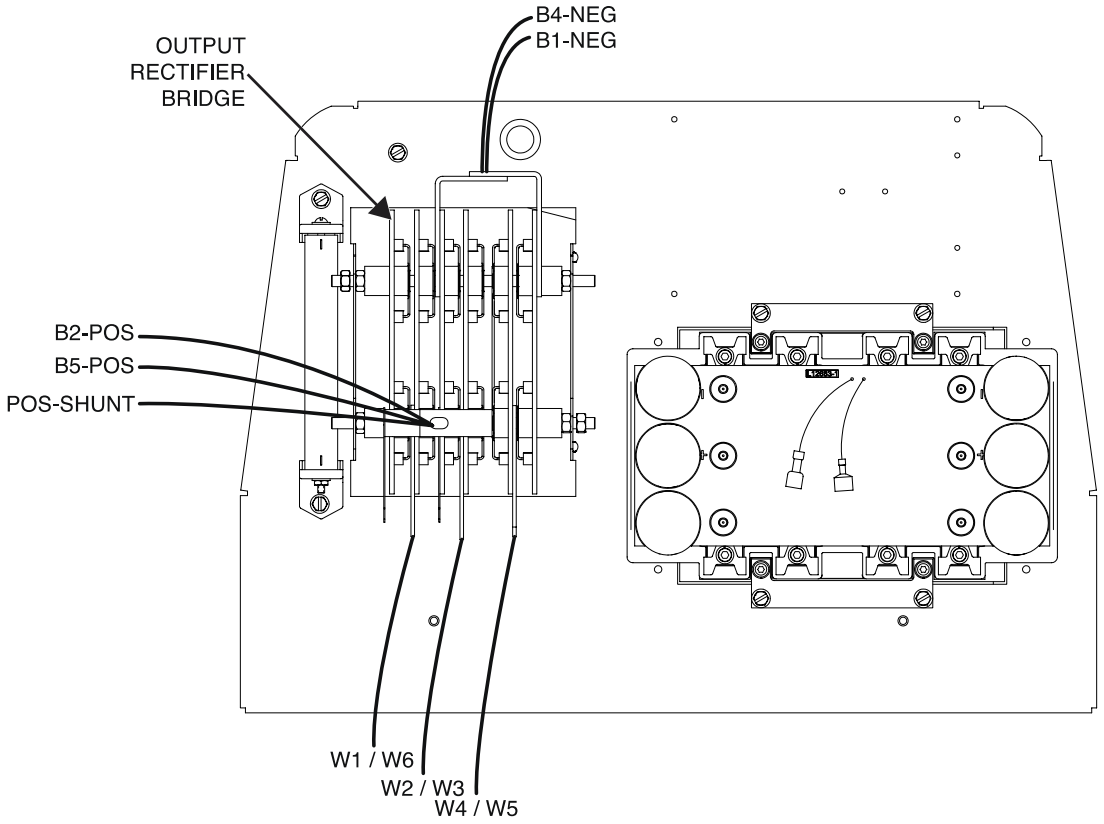
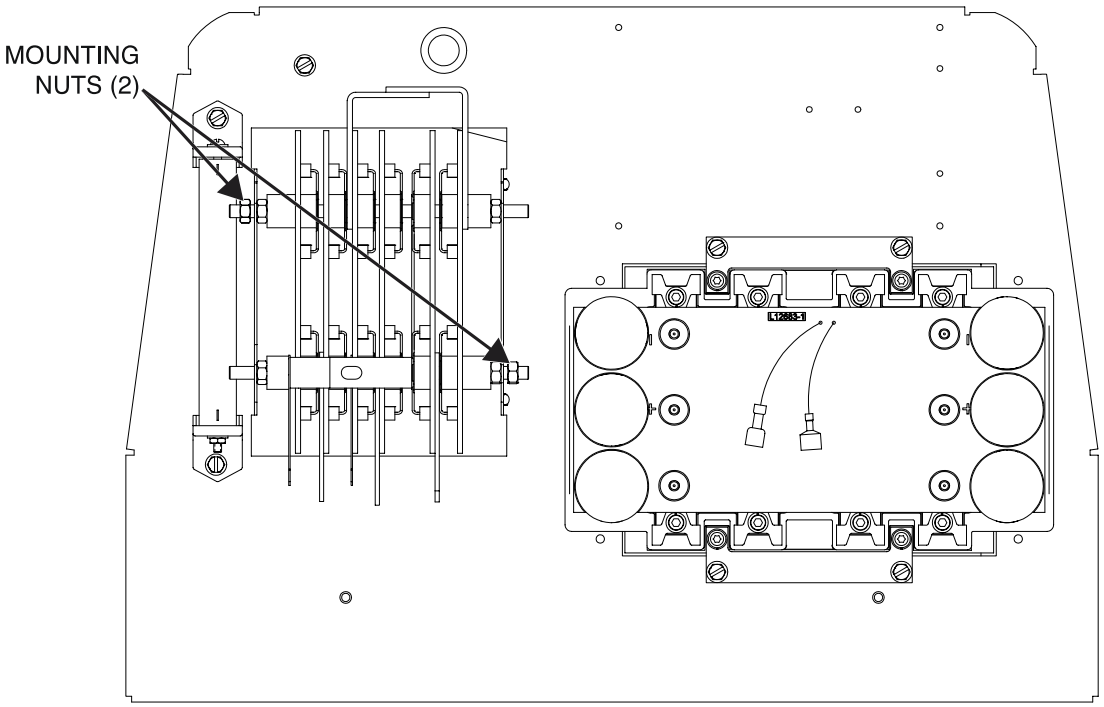


Figure F.34 – Output rectifier bridge mounting nut locations



CHOPPER MODULE 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 Chopper Module Board.

MATERIALS NEEDED

7/16” Nutdriver
3/8” Nutdriver
Torx Nutdriver (Size T-25)
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Using a 7/16” nutdriver, remove the six screws, lock washers and flat washers securing the leads 14, 14C, B1-NEG, 13A, 13C, 13, B2-POS, 15, B3-CHOKE, B4-NEG, B5-POS and B6-CHOKE to terminals B1, B2, B3, B4, B5 and B6 of the chopper module board. See ***Figure F.35***. See Wiring Diagram. Label leads for reassembly.
5. Label and disconnect the quick-connect terminals securing leads 23 and 25 to terminals B7 and B8. See ***Figure F.35***. See Wiring Diagram. Label leads for reassembly.
6. Using a 3/8” nutdriver, remove the four screws securing the chopper board bracket to the power module panel. See ***Figure F.36***.
7. The chopper module board can now be removed from the power module panel.
8. Using a Torx nutdriver (size T-25), remove the four screws securing the chopper board brackets to the chopper module board assembly. See ***Figure F.36***.
9. The chopper module board can now be replaced.

REPLACEMENT PROCEDURE

1. Using a Torx nutdriver (size T-25), attach the four screws securing the chopper module brackets to the chopper module board assembly.
2. Carefully position new chopper module board assembly into the power module panel.

3. Using a 3/8” nutdriver, attach the four screws securing the chopper board bracket to the power module panel.
4. Connect the quick-connect terminals securing leads 23 and 25 to terminals B7 and B8.
5. Using a 7/16” nutdriver, attach the six screws, lock washers and flat washers securing the leads 14, 14C, B1-NEG, 13A, 13C, 13, B2-POS, 15, B3-CHOKE, B4-NEG, B5-POS and B6-CHOKE to terminals B1, B2, B3, B4, B5 and B6 of the chopper module board. See Wiring Diagram.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Retest After Repair Procedure***.

Figure F.35 – Chopper module board lead locations

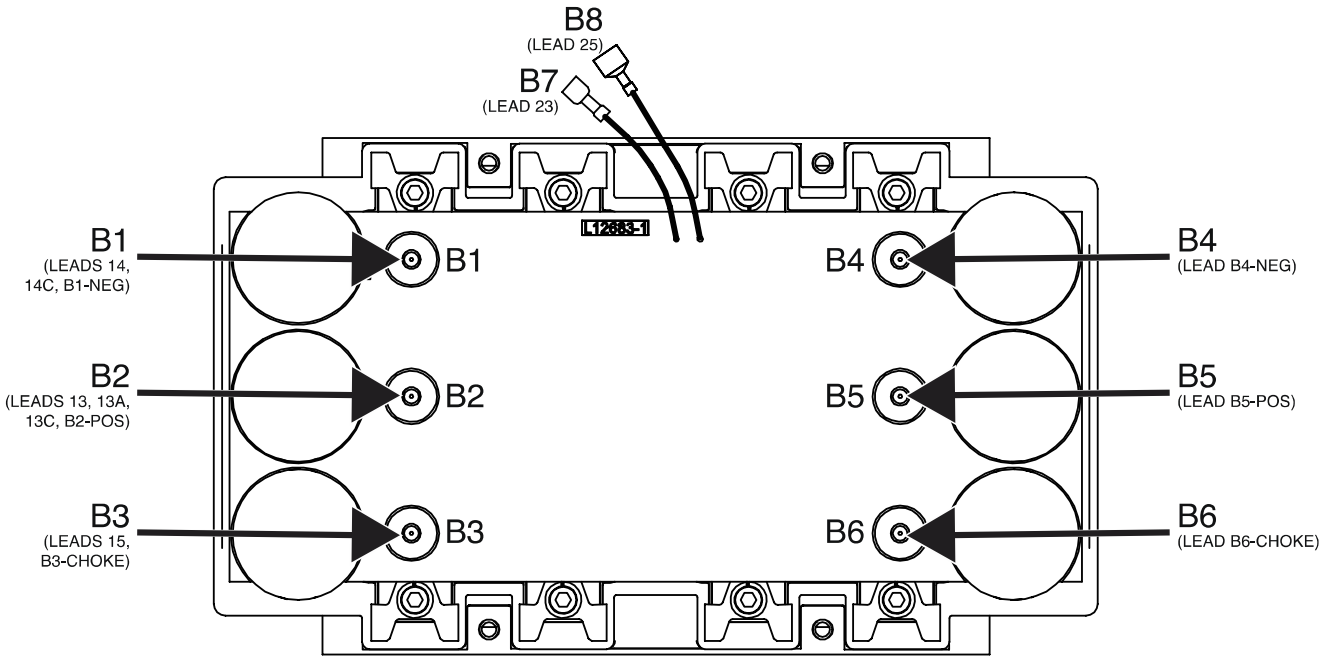
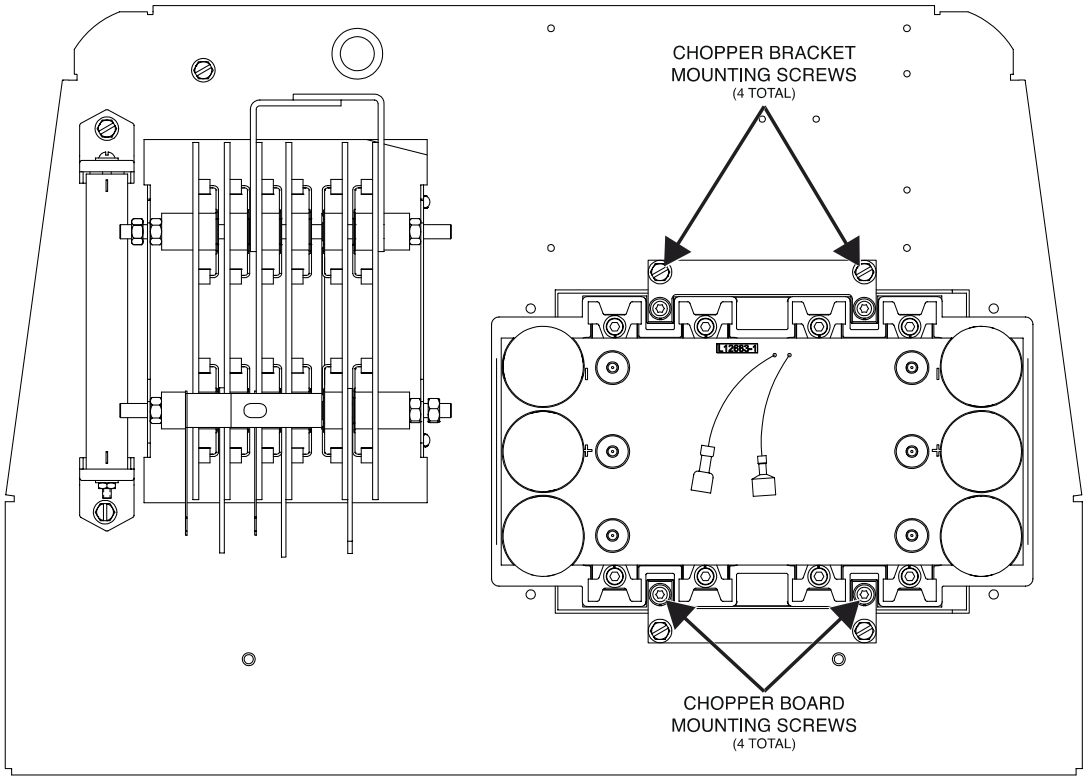


Figure F.36 – Chopper board and bracket mounting screw locations



WELD CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

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

TEST DESCRIPTION

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

MATERIALS NEEDED

Phillips Screwdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Label and disconnect plugs J1, J2, J3, J4, J5, J6 and J7 from the weld control board. See ***Figure F.37***. See Wiring Diagram.
4. Using a Phillips screwdriver, remove the four screws securing the weld control board to the control panel. See ***Figure F.38***.
5. The weld control board can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new weld control board onto the control panel.
2. Using a Phillips screwdriver, attach the four screws securing the weld control board to the control panel.
3. Connect plugs J1, J2, J3, J4, J5, J6 and J7 to the weld control board. See Wiring Diagram.
4. Perform the ***Case Cover Replacement Procedure***.
5. Perform the ***Retest After Repair Procedure***.

Figure F.37 – Weld control board plug locations

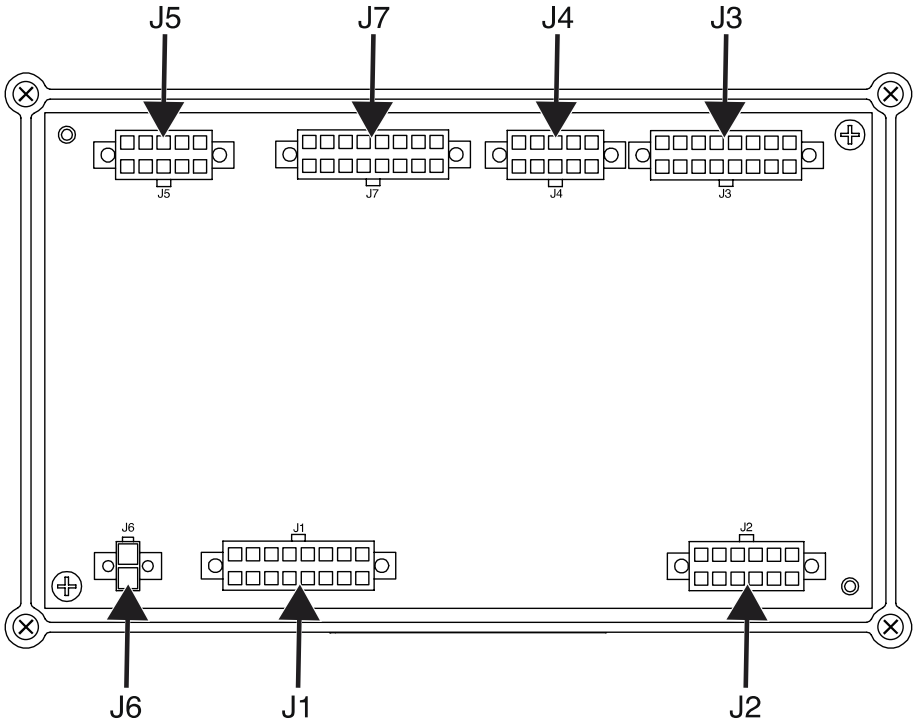
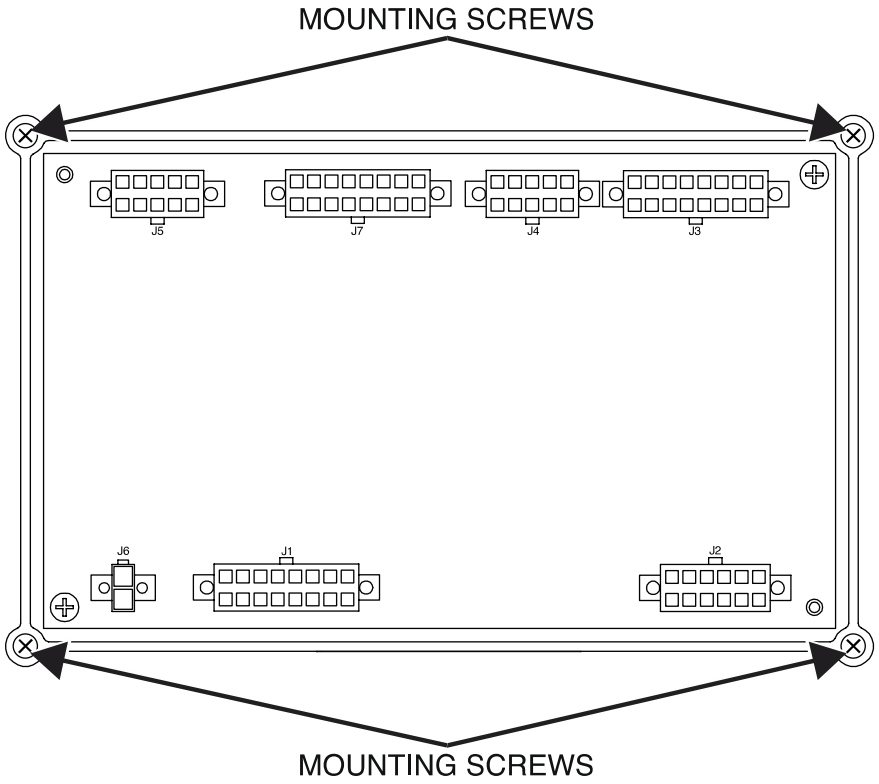


Figure F.38 – Weld control board mounting screw locations



CHOKE REMOVAL AND REPLACEMENT PROCEDURE

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

TEST DESCRIPTION

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

MATERIALS NEEDED

3/8” Nutdriver
7/16” Nutdriver
Two 1/2” Open-End Wrenches
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Using a 3/8” nutdriver, remove the four screws securing the front panel to the machine base. See ***Figure F.39***.
5. Using a 3/8” nutdriver, remove the two screws securing the support rails to the front panel. See ***Figure F.39***.
6. Using a 3/8” nutdriver, remove the nut, lock washer and flat washer securing lead 5A to the neutral stud on the auxiliary power receptacle panel. See ***Figure F.40***. See Wiring Diagram. Label lead for reassembly.
7. Label and disconnect lead 6A from the field bridge rectifier. See ***Figure F.41***. See Wiring Diagram. Cut cable ties as necessary.
8. Using a 3/8” nutdriver, remove the nut, lock washer and flat washer securing lead 5 to the ground stud on the auxiliary power receptacle panel. See ***Figure F.40***. See Wiring Diagram. Cut cable ties as necessary. Label lead for reassembly.
9. Using a 3/8” nutdriver, remove the nut, lock washer and flat washer securing lead GND-M to the ground stud on the upper control panel. See ***Figure F.41***. See Wiring Diagram. Label lead for reassembly.
10. Label and disconnect any other leads necessary to allow the front panel to be moved to the side.
11. Using a 7/16” nutdriver, remove the nut, lock washer and flat washer securing leads 200A, 201A, 200B and 201 to the positive and negative terminals of the field capacitor. See ***Figure F.42***. See Wiring Diagram.

12. Carefully maneuver the front panel assembly out to allow for the removal of the choke assembly.
13. Using two 1/2”open-end wrenches, remove the bolt, nut, lock washer and two flat washers securing the heavy choke lead (from the rear of the negative output stud) to the choke terminal. See ***Figure F.43***. See Wiring Diagram.
14. Using two 1/2”open-end wrenches, remove the bolt, nut, lock washer and two flat washers securing leads B3-Choke and B6-Choke to the choke terminal. See ***Figure F.43***. See Wiring Diagram.
15. Using two 1/2” open-end wrenches, remove the two bolts, nuts, flat washers and lock washers securing the choke to the mounting bracket. See ***Figure F.43***.
16. The choke assembly can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new choke assembly into it’s mounting bracket.
2. Using two 1/2” open-end wrenches, attach the two bolts, nuts, flat washers and lock washers securing the choke to the mounting bracket.
3. Using two 1/2”open-end wrenches, attach the bolt, nut, lock washer and two flat washers securing leads B3-Choke and B6-Choke to the choke terminal. See Wiring Diagram.
4. Using two 1/2”open-end wrenches, attach the bolt, nut, lock washer and two flat washers securing the heavy choke lead (from the rear of the negative output stud) to the choke terminal. See Wiring Diagram.
5. Carefully maneuver the front panel assembly in the front of the machine.
6. Using a 7/16” nutdriver, attach the nut, lock washer and flat washer securing leads 200A, 201A, 200B and 201 to the positive and negative terminals of the field capacitor. See Wiring Diagram.
7. Using a 3/8” nutdriver, attach the nut, lock washer and flat washer securing lead GND-M to the ground stud on the upper control panel. See Wiring Diagram.
8. Using a 3/8” nutdriver, attach the nut, lock washer and flat washer securing lead 5 to the ground stud on the auxiliary power receptacle panel. See Wiring Diagram. Replace cable ties as necessary.
9. Connect lead 6A to the field bridge rectifier. See Wiring Diagram. Replace cable ties as necessary.
10. Using a 3/8” nutdriver, attach the nut, lock washer and flat washer securing lead 5A to the neutral stud on the auxiliary power receptacle panel. See Wiring Diagram.
11. Connect any other previously disconnected leads to the front panel.
12. Using a 3/8” nutdriver, attach the two screws securing the support rails to the front panel.
13. Using a 3/8” nutdriver, attach the four screws securing the front panel to the machine base.
14. Perform the ***Case Cover Replacement Procedure***.
15. Perform the ***Retest After Repair Procedure***.

Figure F.39 – Front panel mounting screw locations

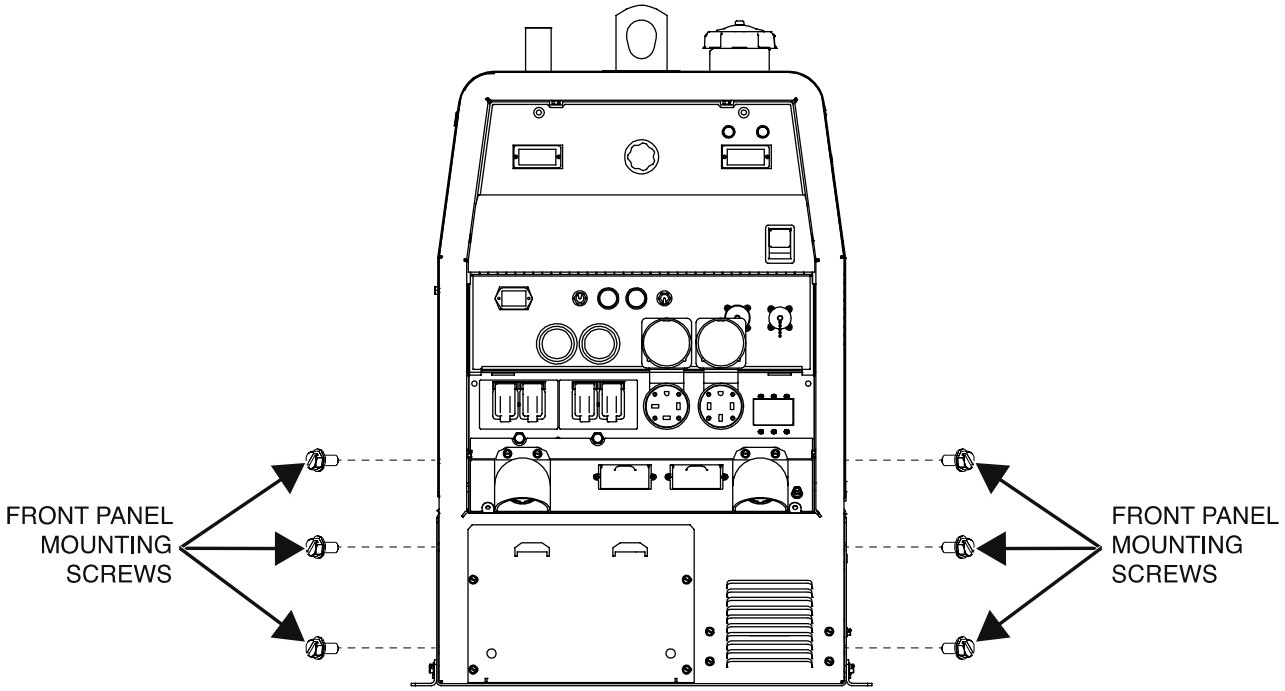


Figure F.40 – Auxiliary receptacle panel lead location

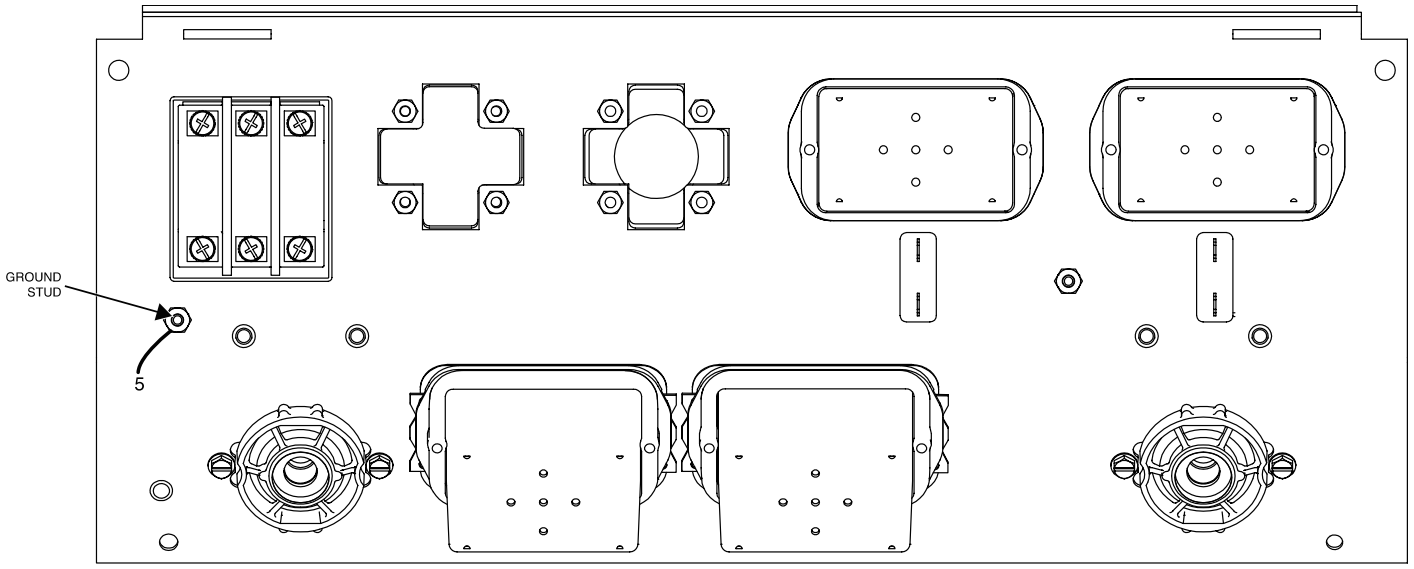


Figure F.41 – Upper control panel lead locations

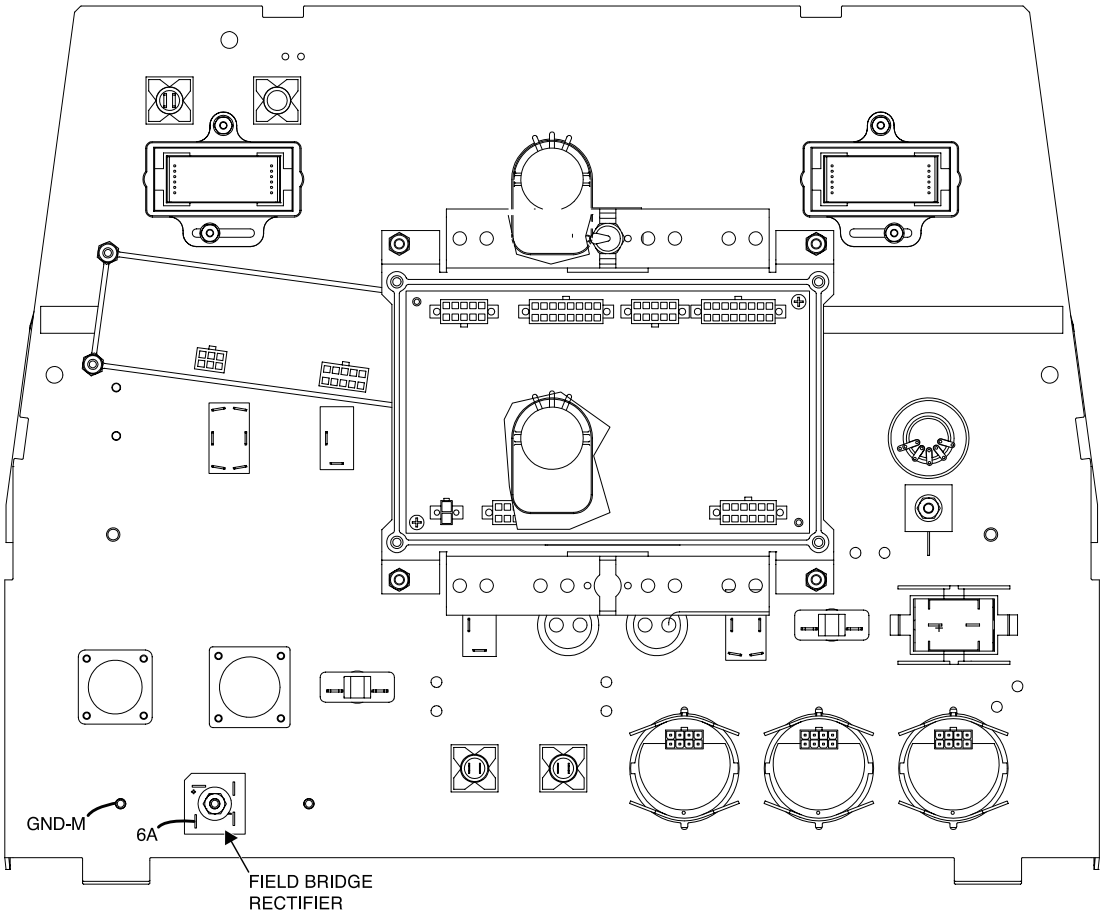


Figure F.42 – Field capacitor lead location

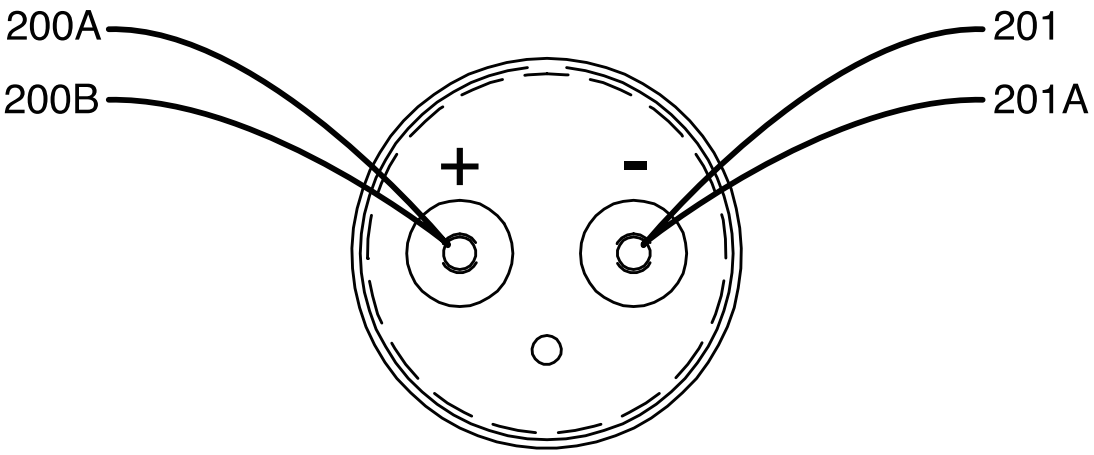
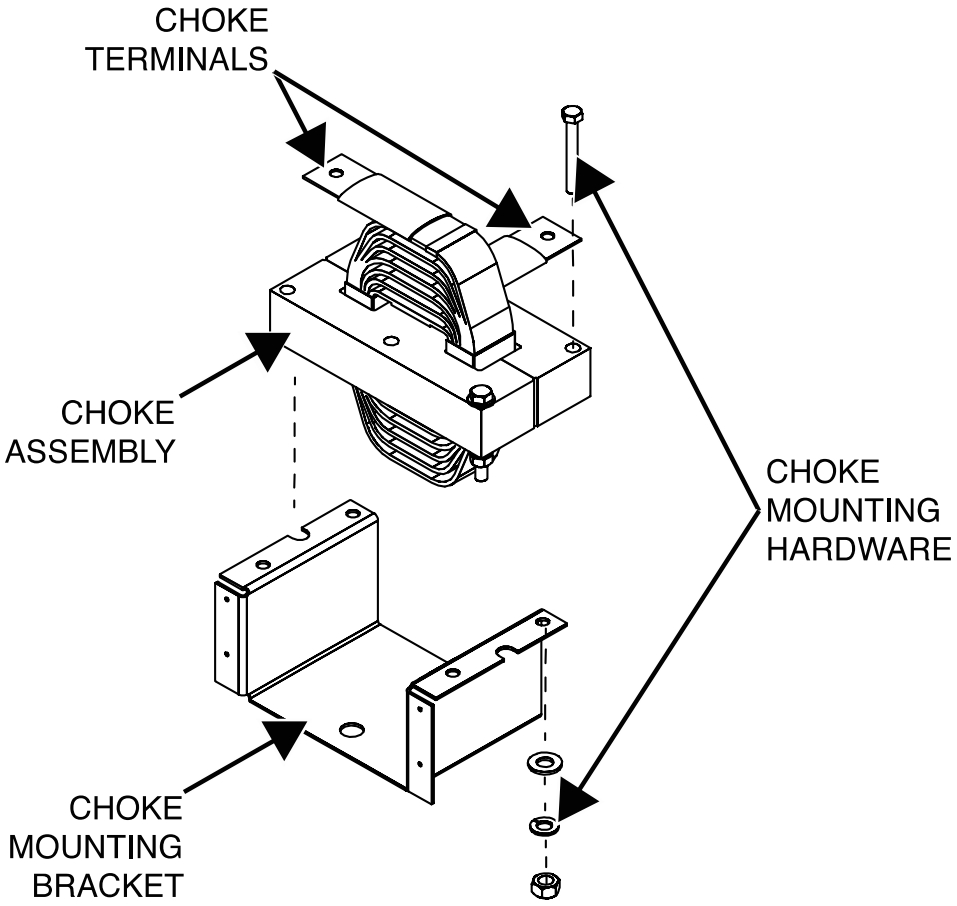


Figure F.43 – Choke assembly mounting hardware and terminal locations



FUEL TANK 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 Fuel Tank Assembly.

MATERIALS NEEDED

3/8” Nutdriver
Fuel Siphon
Fuel Storage Container
Needle-Nose Pliers
Paper Towels
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Board Removal Procedure***.
4. Perform the ***Output Rectifier Bridge Removal Procedure***.
5. Perform the ***Idle Relay (CR1) and Engine Protection Relay (CR2) Removal Procedure***.
6. Perform the ***Engine Electronic Governor Control Module Removal Procedure***.
7. Label and disconnect leads 13A and 15 from the resistor (R4). See ***Figure F.44***. See Wiring Diagram.
8. Label and disconnect leads 229 and 5J from the fuel level sender. See ***Figure F.45***. See Wiring Diagram. Cut cable ties as necessary. Route leads thru the power module panel.
9. Using a 3/8” nutdriver, remove the two screws securing the power module panel to the support rails. See ***Figure F.45***.
10. Using a 3/8” nutdriver, remove the two screws securing the power module panel to the fan guard. See ***Figure F.45***.
11. Carefully slide the power module panel out of the machine.
12. Using a fuel siphon, remove the fuel from the fuel tank and store in an appropriate fuel storage container.
13. Using needle-nose pliers, loosen the hose clamps securing the fuel hoses to the fuel tank.
    NOTE: To avoid spills, temporarily wrap fuel hoses with paper towels to absorb any residual fuel. If there is any fuel left in the fuel tank, drain it into an appropriate fuel storage container.
14. Carefully lift the fuel tank out of the machine.

15. Carefully remove the fuel tank tray.

REPLACEMENT PROCEDURE

1. Carefully position the fuel tank tray into the machine.
2. Carefully position the fuel tank into the machine.
3. Using needle-nose pliers, tighten the hose clamps securing the fuel hoses to the fuel tank.
4. Carefully position the power module panel into the machine.
5. Using a 3/8” nutdriver, attach the two screws securing the power module panel to the fan guard.
6. Using a 3/8” nutdriver, attach the two screws securing the power module panel to the support rails.
7. Route leads 229 and 5J thru the power module panel. Connect leads 229 and 5J to the fuel level sender. See Wiring Diagram. Replace cable ties as necessary.
8. Connect leads 13A and 15 to the resistor (R4). See Wiring Diagram.
9. Perform the ***Engine Electronic Governor Control Module Replacement Procedure***.
10. Perform the ***Idle Relay (CR1) and Engine Protection Relay (CR2) Replacement Procedure***.
11. Perform the ***Output Rectifier Bridge Replacement Procedure***.
12. Perform the ***Chopper Module Board Replacement Procedure***.
13. Perform the ***Case Cover Replacement Procedure***.
14. Perform the ***Retest After Repair Procedure***.

Figure F.44 – Resistor (R4) lead locations

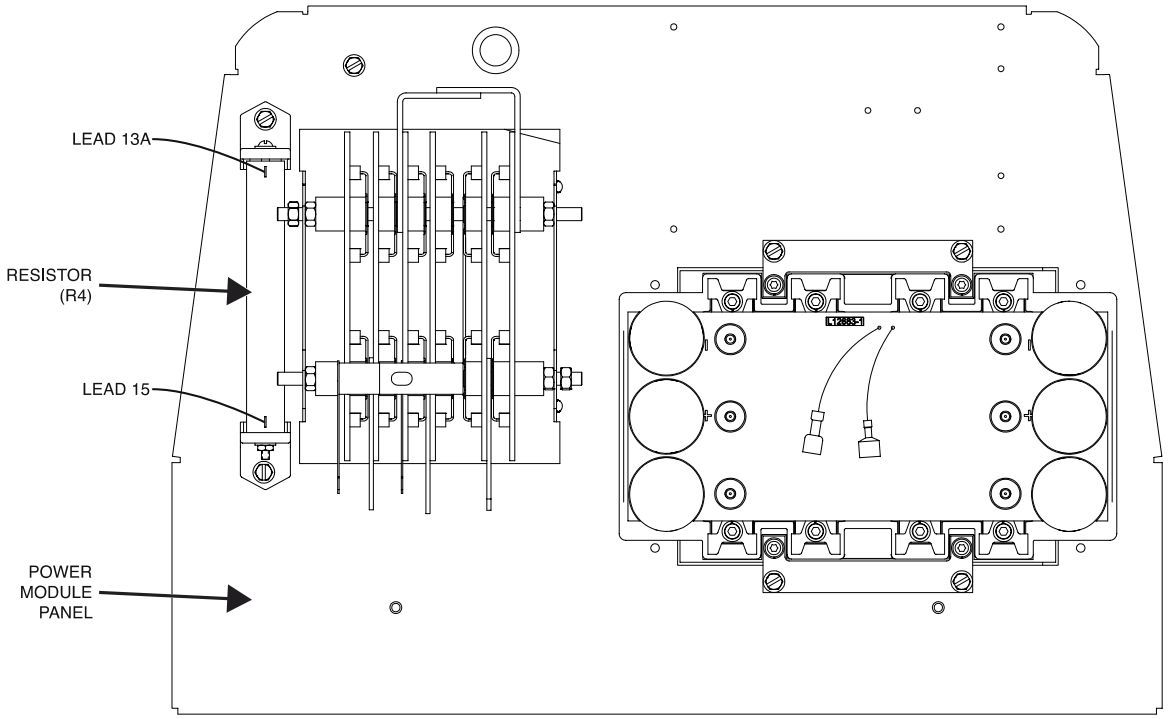
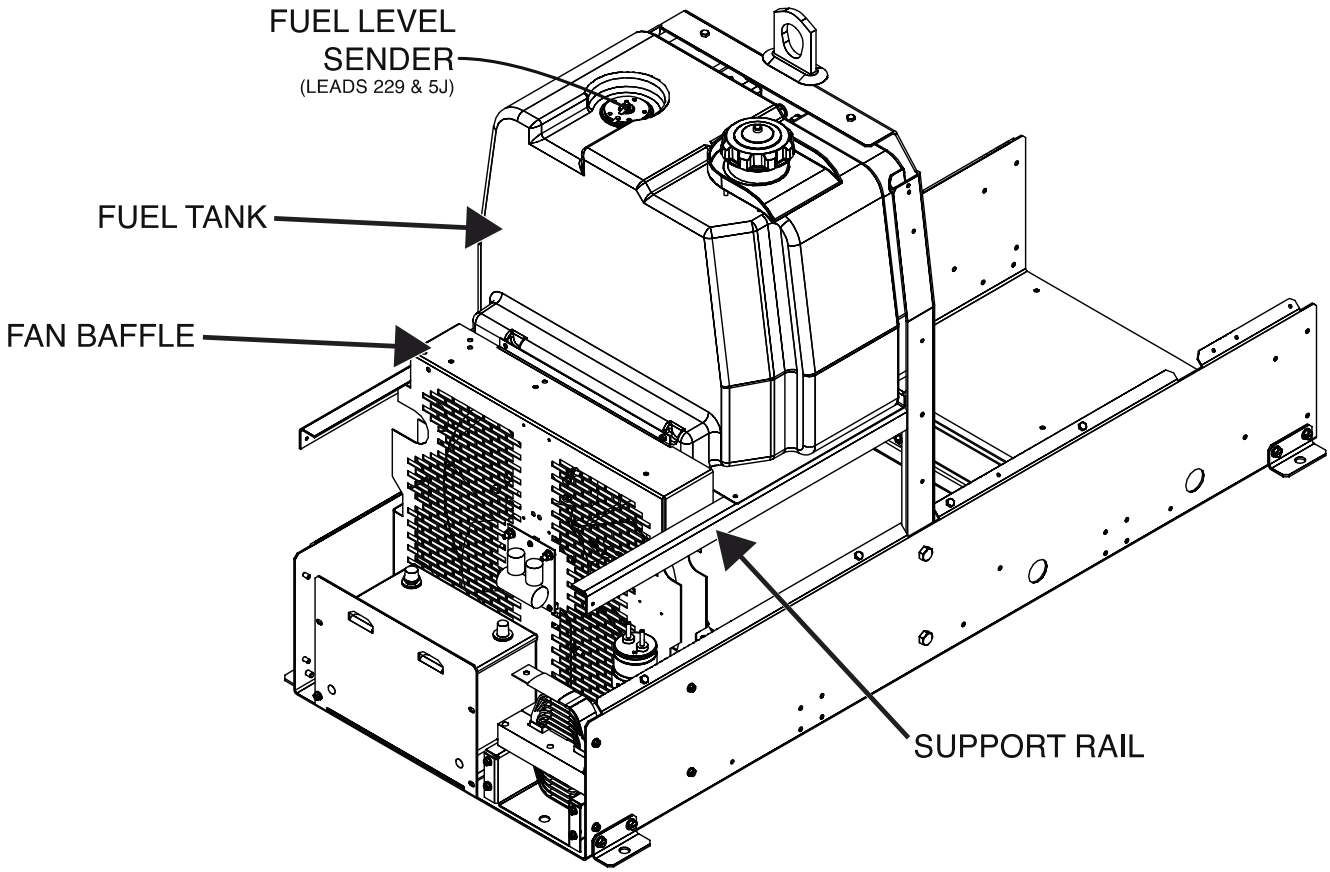


Figure F.45 – Fuel tank, fuel level sender, fan guard, support rail locations



ROTOR AND STATOR 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 Rotor and Stator assemblies.

MATERIALS NEEDED

3/8” Nutdriver
Phillips Screwdriver
7/16” Nutdriver
Large Crescent Wrench
Small Piece Of Wood
9/16” Socket
Hoist & Appropriate Rigging
Wood Or Steel Blocking
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Chopper Module Capacitor Discharge Procedure***.
4. Perform the ***Battery Removal Procedure***.
5. Perform the ***Fuel Tank Removal Procedure***.
6. Using a 3/8” nutdriver, remove the four screws securing the front panel to the machine base. See ***Figure F.46***.
7. Using a 3/8” nutdriver, remove the two screws securing the support rails to the front panel. See ***Figure F.46***.
8. Using a 3/8” nutdriver, remove the nut, lock washer and flat washer securing lead 5A to the neutral stud on the auxiliary power receptacle panel. See ***Figure F.47***. See Wiring Diagram. Label lead for reassembly.
9. Label and disconnect lead 6A from the field bridge rectifier. See ***Figure F.48***. See Wiring Diagram. Cut cable ties as necessary.
10. Using a 3/8” nutdriver, remove the nut, lock washer and flat washer securing lead 5 to the ground stud on the auxiliary power receptacle panel. See ***Figure F.47***. See Wiring Diagram. Cut cable ties as necessary. Label lead for reassembly.

11. Using a 3/8" nutdriver, remove the nut, lock washer and flat washer securing lead GND-M to the ground stud on the upper control panel. See ***Figure F.48***. See Wiring Diagram. Label lead for reassembly.
12. Using a Phillips screwdriver, loosen the three screws securing leads 3, 4 and 6 to the terminals of circuit breaker (CB1). See ***Figure F.47***. See Wiring Diagram. Label lead for reassembly.
13. Route leads 3 and 6 thru the toroid. Take note of the direction and number of turns for reassembly.
14. Label and disconnect any other leads necessary to allow the front panel to be moved to the side.
15. Using a 3/8" nutdriver, remove the two screws securing the output stud cover to the fan guard.
16. Using a 7/16" nutdriver, remove the nut, lock washer and flat washer securing leads 200A, 201A, 200B and 201 to the positive and negative terminals of the field capacitor. See ***Figure F.49***. See Wiring Diagram.
17. Using a 3/8" nutdriver, remove the screw securing the capacitor bracket to the fan guard.
18. The field capacitor can now be removed.
19. Carefully maneuver the front panel assembly out and to the left side of the machine to allow for the removal of the stator and rotor assemblies.
20. Using a 3/8" nutdriver, remove the two screws securing the brush holder assembly to the machine. See ***Figure F.50***.
21. Label and disconnect the quick connects securing leads 201 and 200B to the brush terminals. See Wiring Diagram.
22. Using a 3/8" nutdriver, remove the four screws securing the fan guard to the machine.
23. Carefully slide the fan guard out of the machine.
24. Use a small piece of wood to prevent the fan blades from turning during removal.
25. Using a large crescent wrench, remove the nut and bolt securing the fan to the rotor shaft. See ***Figure F.50***.
26. Slide the fan off the rotor shaft.
27. Using a 9/16" socket, remove the screw, lock washer and flat washer securing the stator frame to the machine base. See ***Figure F.50***.
28. Using a hoist and the appropriate rigging, slightly lift the stator frame off of it's mount. See ***Figure F.50***.
29. Place wood or steel blocking under the flywheel housing to support the engine.
30. Using a 9/16" socket, remove the eight screws and lock washers securing the stator frame to the engine.
31. Using a hoist and appropriate rigging, carefully remove the stator frame form the engine.
32. Using a hoist and appropriate rigging, support the rotor and shaft assembly.
33. Remove the six screws securing the rotor coupling disc to the engine.
34. The rotor assembly can now be removed.

REPLACEMENT PROCEDURE

1. Using a hoist and appropriate rigging, carefully mate the rotor and shaft assembly with the engine.
2. Attach the six screws securing the rotor coupling disc to the engine. See Wiring Diagram.
3. Using a hoist and appropriate rigging, carefully position the stator frame onto the engine.
4. Using a 9/16" socket, attach the eight screws and lock washers securing the stator frame to the engine.
5. Using a hoist and the appropriate rigging, slightly lift the stator frame off of it's mount.

6. Carefully remove the wood or steel blocking from under the flywheel housing.
7. Using a hoist and the appropriate rigging, lower the stator frame onto it's mount.
8. Using a 9/16" socket, attach the screw, lock washer and flat washer securing the stator frame to the machine base.
9. Slide the fan onto the rotor shaft.
10. Use a small piece of wood to prevent the fan blades from turning during replacement.
11. Using a large crescent wrench, attach the nut and bolt securing the fan to the rotor shaft.
12. Carefully slide the fan guard into the machine.
13. Using a 3/8" nutdriver, attach the four screws securing the fan guard to the machine.
14. Connect the quick connects securing leads 201 and 200B to the brush terminals. See Wiring Diagram.
15. Using a 3/8" nutdriver, attach the two screws securing the brush holder assembly to the machine.
16. Using a 3/8" nutdriver, attach the screw securing the capacitor bracket to the fan guard.
17. Carefully position the front panel assembly on the front of the machine.
18. Using a 7/16" nutdriver, attach the nut, lock washer and flat washer securing leads 200A, 201A, 200B and 201 to the positive and negative terminals of the field capacitor. See Wiring Diagram.
19. Using a 3/8" nutdriver, attach the two screws securing the output stud cover to the fan guard.
20. Route leads 3 and 6 thru the toroid. Ensure the proper direction and number of turns. See Wiring Diagram.
21. Using a Phillips screwdriver, tighten the three screws securing leads 3, 4 and 6 to the terminals of circuit breaker (CB1). See Wiring Diagram.
22. Using a 3/8" nutdriver, attach the nut, lock washer and flat washer securing lead GND-M to the ground stud on the upper control panel. See Wiring Diagram.
23. Using a 3/8" nutdriver, attach the nut, lock washer and flat washer securing lead 5 to the ground stud on the auxiliary power receptacle panel. See Wiring Diagram. Attach cable ties as necessary.
24. Connect lead 6A to the field bridge rectifier. See Wiring Diagram. Cut cable ties as necessary.
25. Using a 3/8" nutdriver, attach the nut, lock washer and flat washer securing lead 5A to the neutral stud on the auxiliary power receptacle panel. See Wiring Diagram.
26. Connect any other previously disconnected leads to the front panel. Attach cable ties as necessary. See Wiring Diagram.
27. Using a 3/8" nutdriver, attach the two screws securing the support rails to the front panel.
28. Using a 3/8" nutdriver, attach the four screws securing the front panel to the machine base.
29. Perform the ***Fuel Tank Replacement Procedure***.
30. Perform the ***Battery Replacement Procedure***.
31. Perform the ***Case Cover Replacement Procedure***.
32. Perform the ***Retest After Repair Procedure***.

Figure F.46 – Front panel mounting screws location

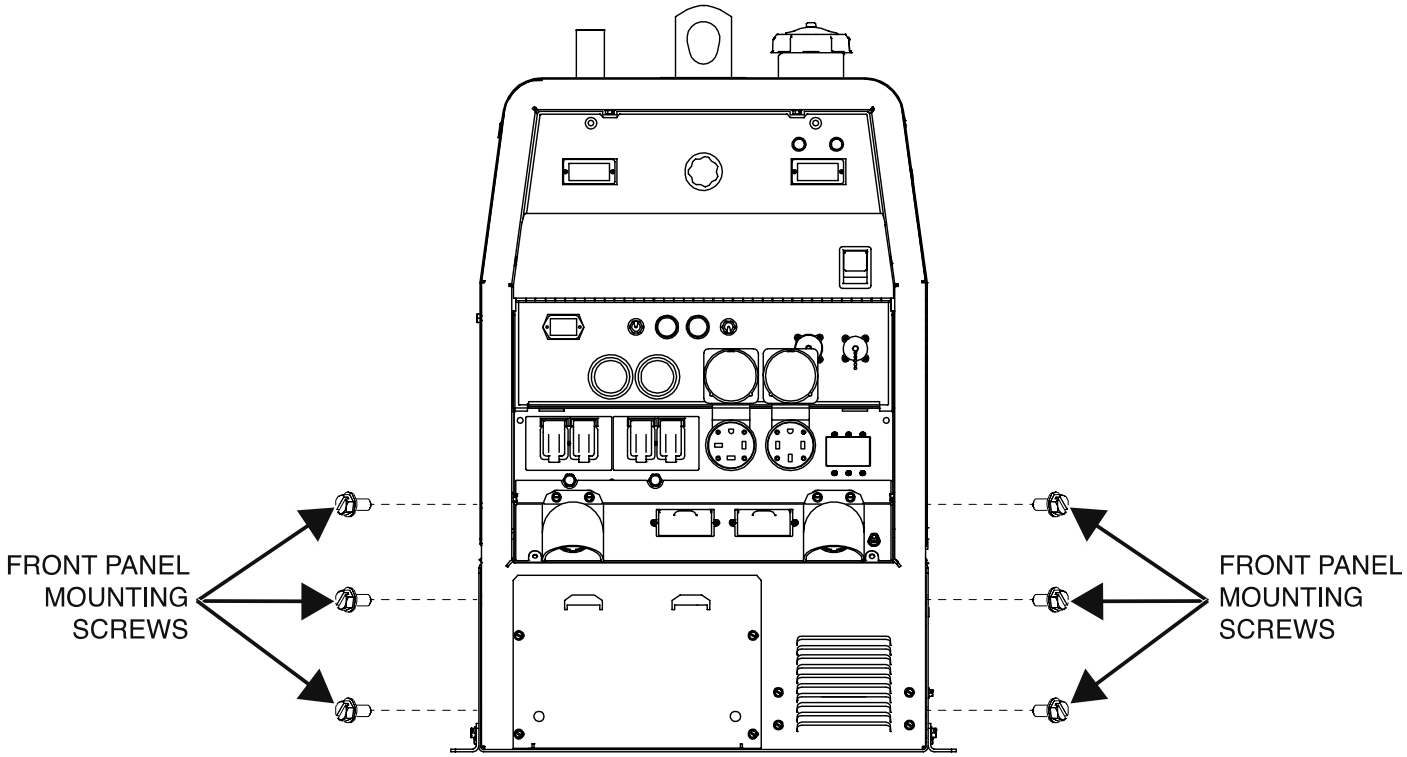


Figure F.47 – Auxiliary receptacle panel lead locations

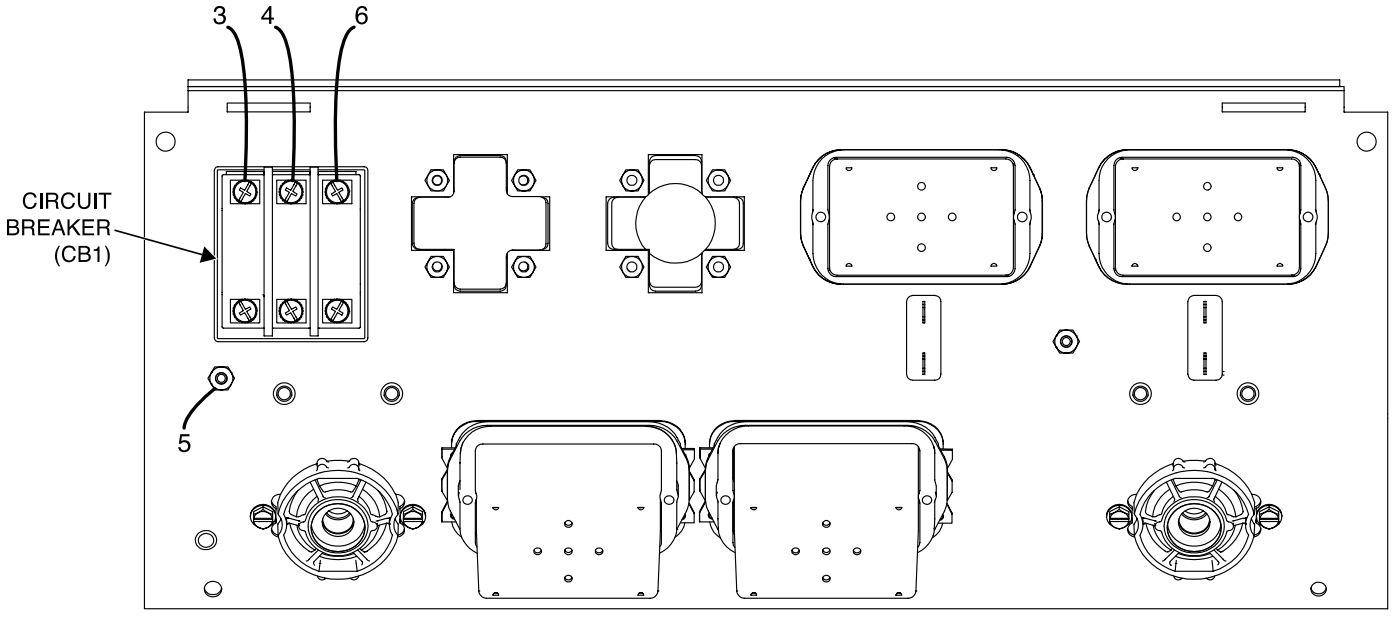


Figure F.48 – Upper control panel lead locations

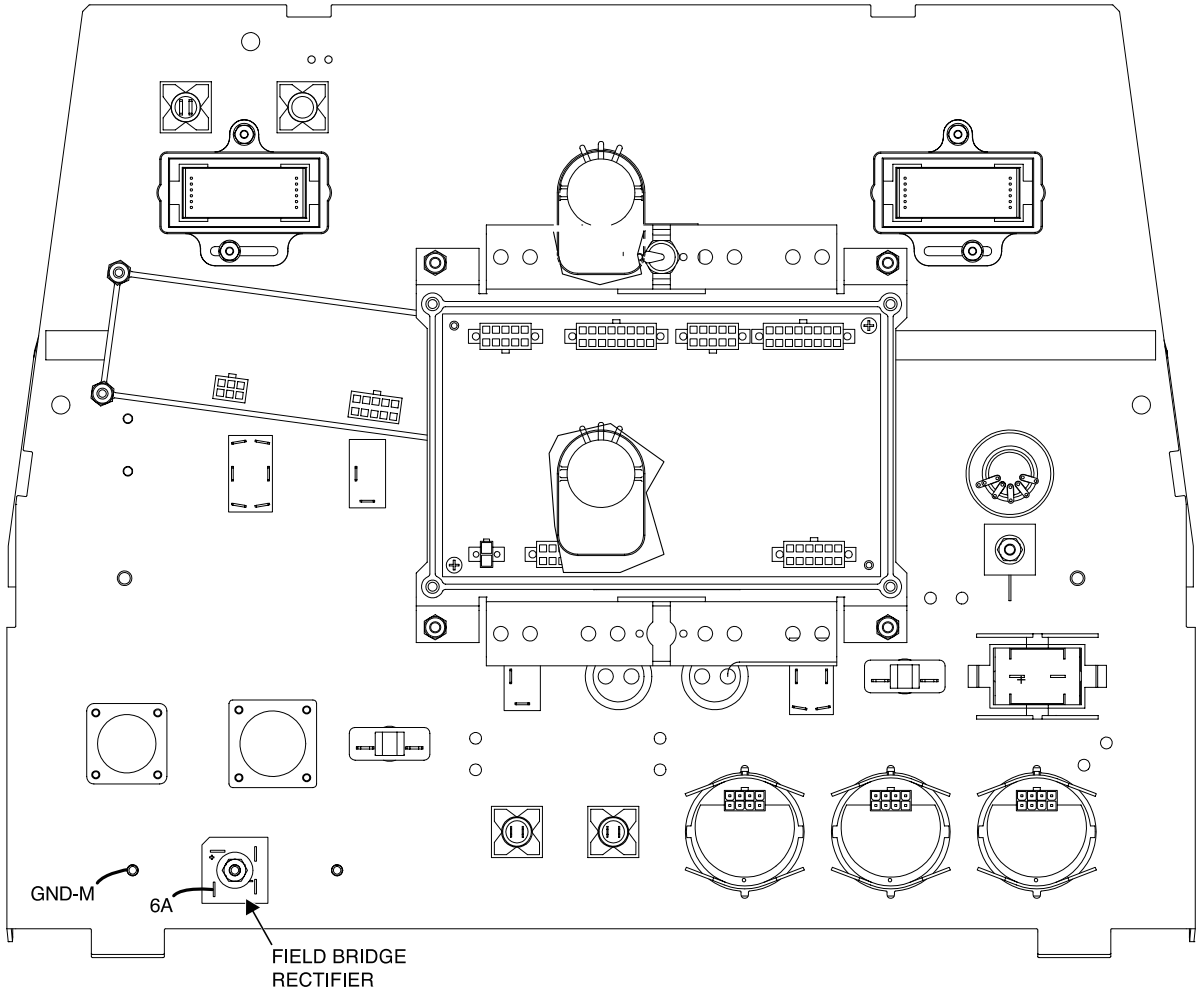


Figure F.49 – Field capacitor lead locations

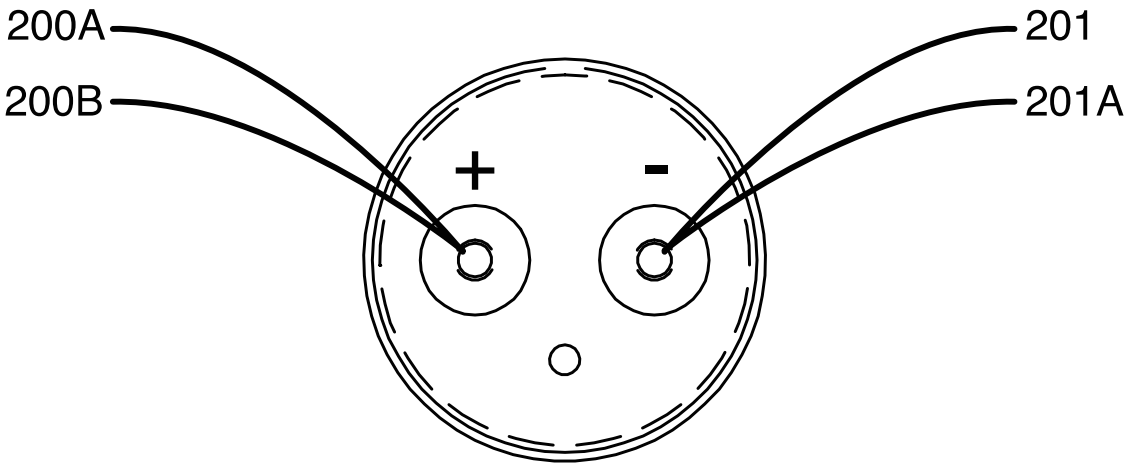
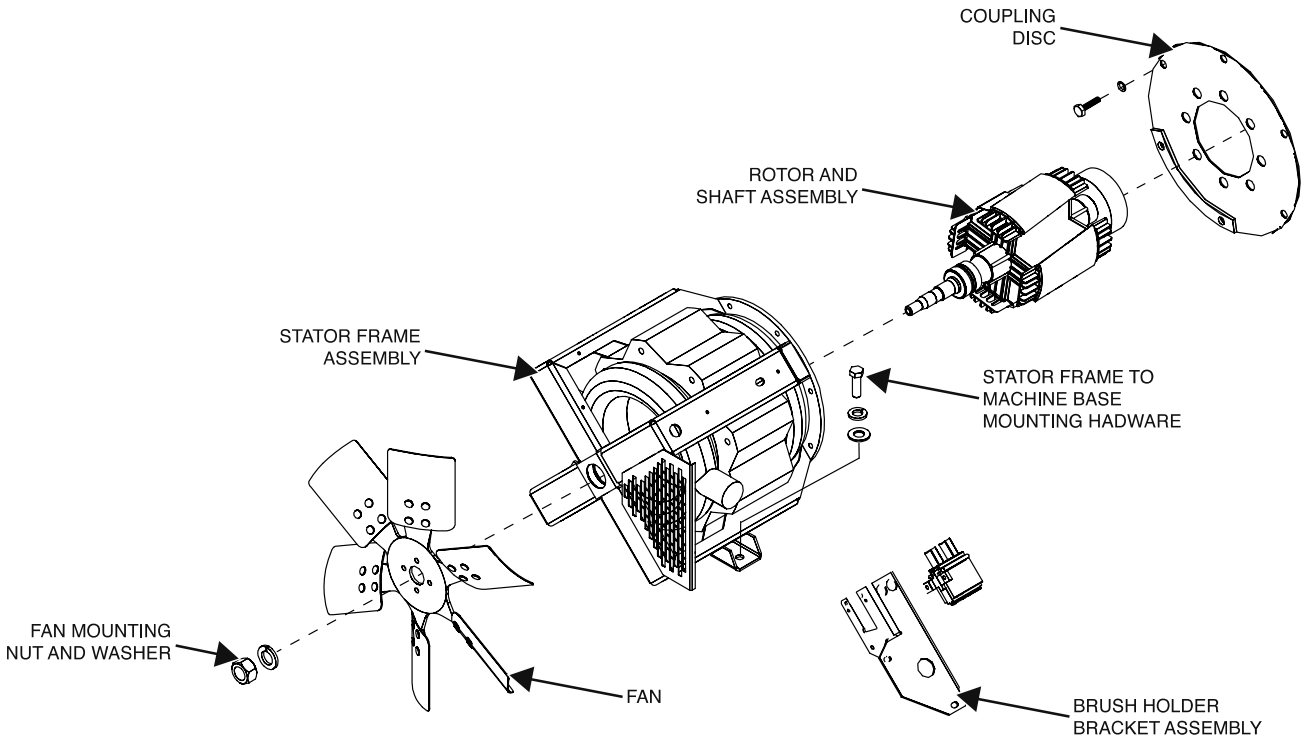


Figure F.50 – Stator, fan and rotor assembly locations



MAGNETIC PICKUP SENSOR REPLACEMENT AND ADJUSTMENT 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 should be followed if a new Magnetic Pickup Sensor is installed or if the existing Magnetic Pickup Sensor requires adjustment.

MATERIALS NEEDED

3/4” Open End Wrench
1” Open End Wrench
Adjustable Wrench
Thread Locking Compound (Loctite #242 or equivalent)
Wiring Diagram

REMOVAL PROCEDURE

1. Turn off the engine of the Vantage 500.
2. Open the engine service door.
3. Label and disconnect the two wires coming out of the rear of the magnetic pickup sensor. See ***Figure F.51***. See Wiring Diagram.
4. Using a 3/4” open-end wrench and a 1” open-end wrench to hold the bushing in place, loosen the jam nut on the magnetic pickup sensor. See ***Figure F.52***.
5. Using a 1” open-end wrench, remove the bushing from the flywheel housing. See ***Figure F.52***.
6. The magnetic pickup sensor and bushing can now be removed from the machine.

REPLACEMENT PROCEDURE

1. Before installing a new magnetic pickup sensor, clean the threads thoroughly so the magnetic pickup sensor and bushing can be screwed in easily by hand.
2. Carefully apply thread locking compound (Loctite #242 or equivalent) to the bushing and tighten it securely into the flywheel housing opening.
3. Carefully apply thread locking compound (Loctite #242 or equivalent) on the threads of the pickup and place the jam nut on the pickup body, positioning it near the end where the leads exit.
4. Carefully thread the magnetic pickup sensor body into the bushing by hand. Keep turning the magnetic pickup sensor clockwise until it just touches the flywheel.
5. Back the magnetic pickup sensor out 1/4 turn.

6. Using an adjustable wrench, hold the magnetic pickup sensor in place.
7. Using a 3/4” open-end wrench, tighten the jam nut.
8. Connect the two lead wires on the magnetic pickup sensor and replace any cable ties as necessary. See Wiring Diagram.
9. Secure the engine service door.
10. Perform the ***Retest After Repair Procedure***.

Figure F.51 – Magnetic pickup sensor leads location

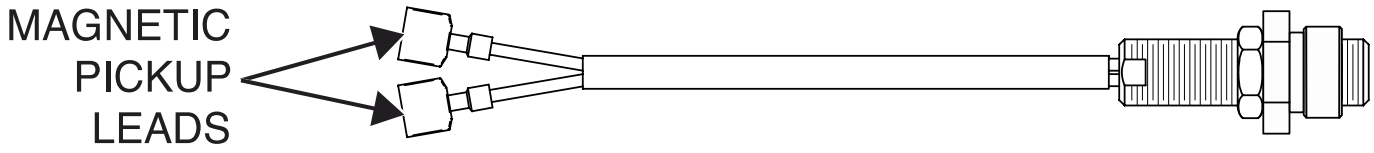
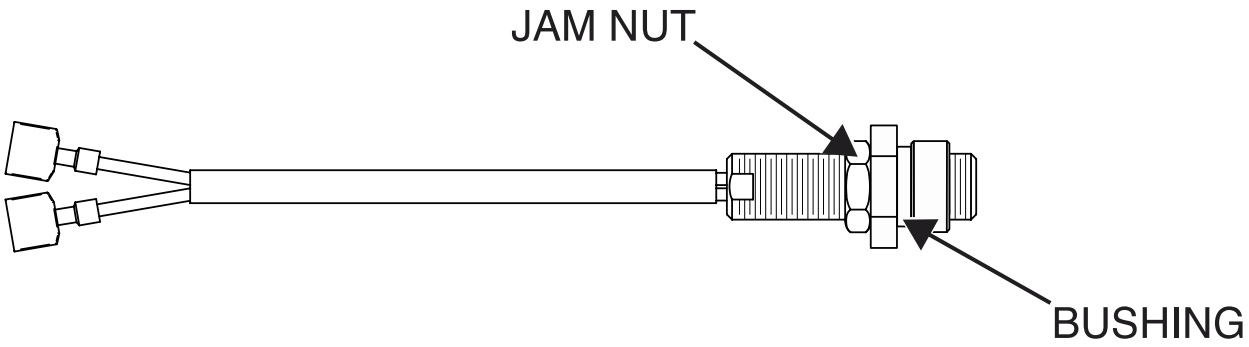


Figure F.52 – Jam nut and bushing locations



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.

ENGINE OUTPUT

MODE	NO LOAD RPM	LOAD RPM
LOW IDLE	1400	N/A
HIGH IDLE	1850	1850

RATED OUTPUT @ 104° F (40° C) – WELDER

WELDING PROCESS	WELDING OUTPUT CURRENT/VOLTAGE/DUTY CYCLE	OUTPUT RANGE	MAX. WELD OCV @ RATED LOAD RPM
DC CONSTANT CURRENT	500A / 40V / 100%	30 TO 525 AMPS	60 VOLTS
	525A / 38V / 60%		
DC PIPE CURRENT	300A / 32V / 100%	40 TO 300 AMPS	
TOUCH-START™ TIG	250A / 30V / 100%	20 TO 250 AMPS	
DC CONSTANT VOLTAGE	500A / 40V / 100%	14 TO 40 VOLTS	60 VOLTS
	525A / 38V / 60%		
ARC GOUGING	500A / 40V / 100%	90 TO 500 AMPS	

RATED OUTPUT @ 104° F (40° C) - GENERATOR

AUXILIARY POWER
13,000 WATTS PEAK / 12,000 WATTS CONTINUOUS, 60 HZ 120/240 VOLTS SINGLE PHASE 22,000 WATTS PEAK / 20,000 WATTS CONTINUOUS, 60 HZ 240 VOLTS 3 PHASE

MACHINE SPECIFICATIONS

RECEPTACLES	AUXILIARY POWER CIRCUIT BREAKER	OTHER CIRCUIT BREAKERS
(2) 120VAC DUPLEX (5-20R) GFCI PROTECTED (1) 120/240 VAC DUAL VOLTAGE FULL KVA (14-50R) (1) 240 VAC 3-PHASE (15-50R)	TWO 20 AMP FOR TWO DUPLEX RECEPTACLE (1) 50 AMP FOR DUAL VOLTAGE AND FOR 3-PHASE (3-POLE)	10 AMP FOR BATTERY CHARGING CIRCUIT 10 AMP FOR 42V WIRE FEEDER POWER