LINCOLN ELECTRIC

GENUINE LINCOLN PARTS™

NOTE: This manual will cover most of the troubleshooting and repair procedures for the code numbers listed. Some variances may exist when troubleshooting/repairing later code numbers.

VRTEX® MOBILE

For use with machines having Code Numbers:

11380, 11381

SERVICE MANUAL

SVM235-B | Issue Date 15-Mar

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

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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

FOR ENGINE powered equipment.

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

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

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

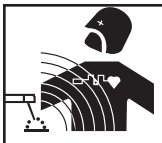
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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

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

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

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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

ELECTRIC SHOCK can kill.

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

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

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

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

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

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

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

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

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

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

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

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

ARC RAYS can burn.

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

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

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

FUMES AND GASES can be dangerous.

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

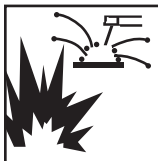
5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically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

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

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

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

5.f. Also see item ***1.b***.



WELDING and CUTTING SPARKS can cause fire or explosion.

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

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

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

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

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

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

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

6.h. Also see item ***1.c***.

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

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

CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

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

FOR ELECTRICALLY powered equipment.

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

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

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

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

PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

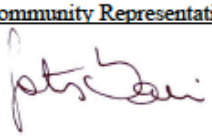
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

THE LINCOLN ELECTRIC COMPANY

EC DECLARATION OF CONFORMITY

Manufacturer and technical documentation holder:	The Lincoln Electric Company
Address:	22801 St. Clair Ave. Cleveland Ohio 44117-1199 USA
EC Company:	Lincoln Electric Europe S.L.
Address:	c/o Balmes, 89 - 8º 2ª 08008 Barcelona SPAIN
Hereby declare that equipment:	VRTEX® Mobile
Sales code:	K3165 (Sales codes may contain suffixes and prefixes.)
Is in conformity with Council Directives and amendments:	Low Voltage Directive (LVD) 2006/95/EC; Electromagnetic Compatibility (EMC) Directive 2004/108/EC;
Standards (only major standards listed):	EN 61010-1:2010, Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements; EN 61326-1:2006, Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements;

CE marking affixed in 12.

Manufacturer		European Community Representative	
Signature:		Signature:	
Name:	Frank Stupczy	Name:	Dario Gatti
Position:	Compliance Engineering Manager	Position:	European Engineering Director Machines
Date:	2 October 2012	Date:	3 October 2012

MCD348a

NOTES

- MASTER TABLE OF CONTENTS FOR ALL SECTIONS -

TABLE OF CONTENTS-THEORY OF OPERATION

FIGURE E.1 BLOCK LOGIC DIAGRAM

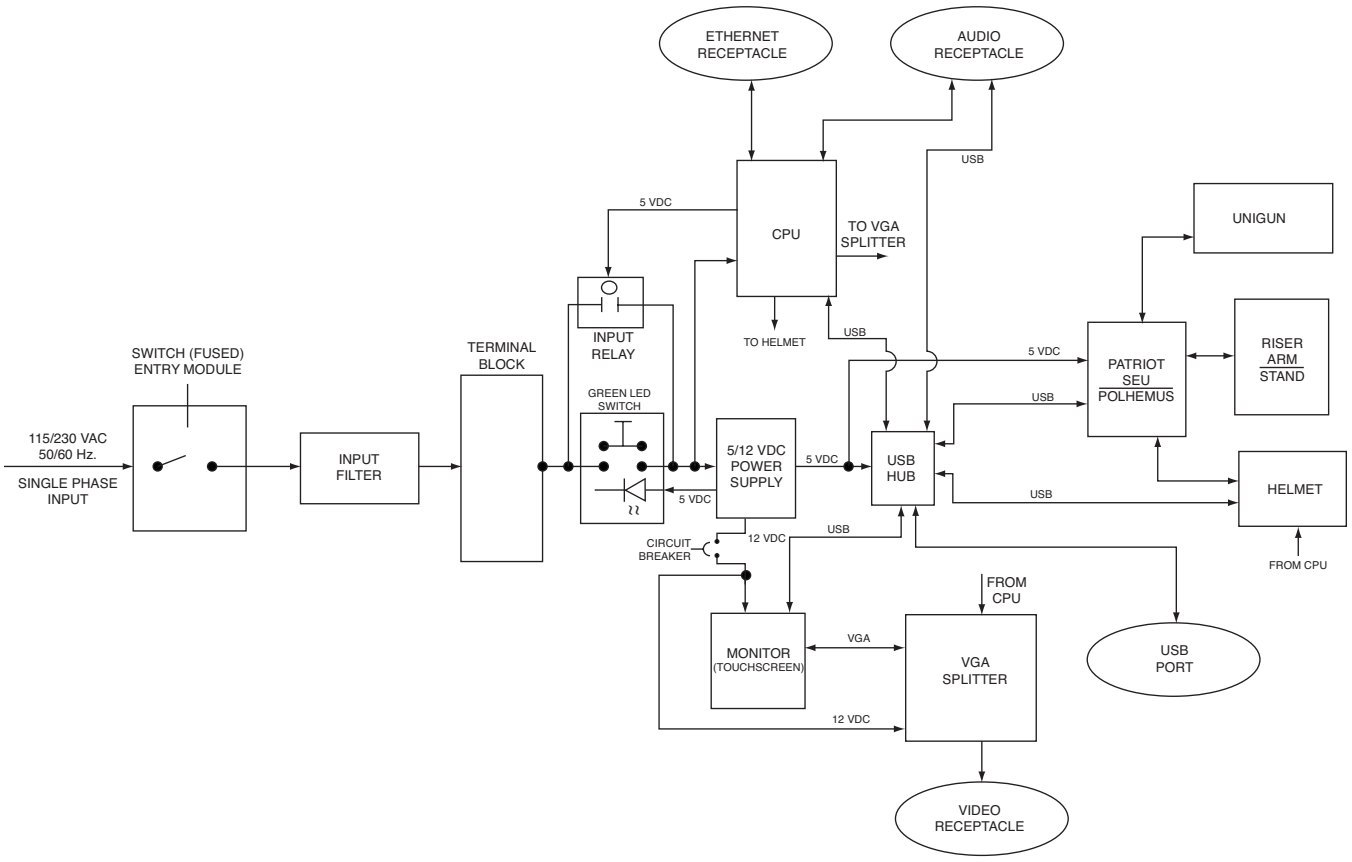
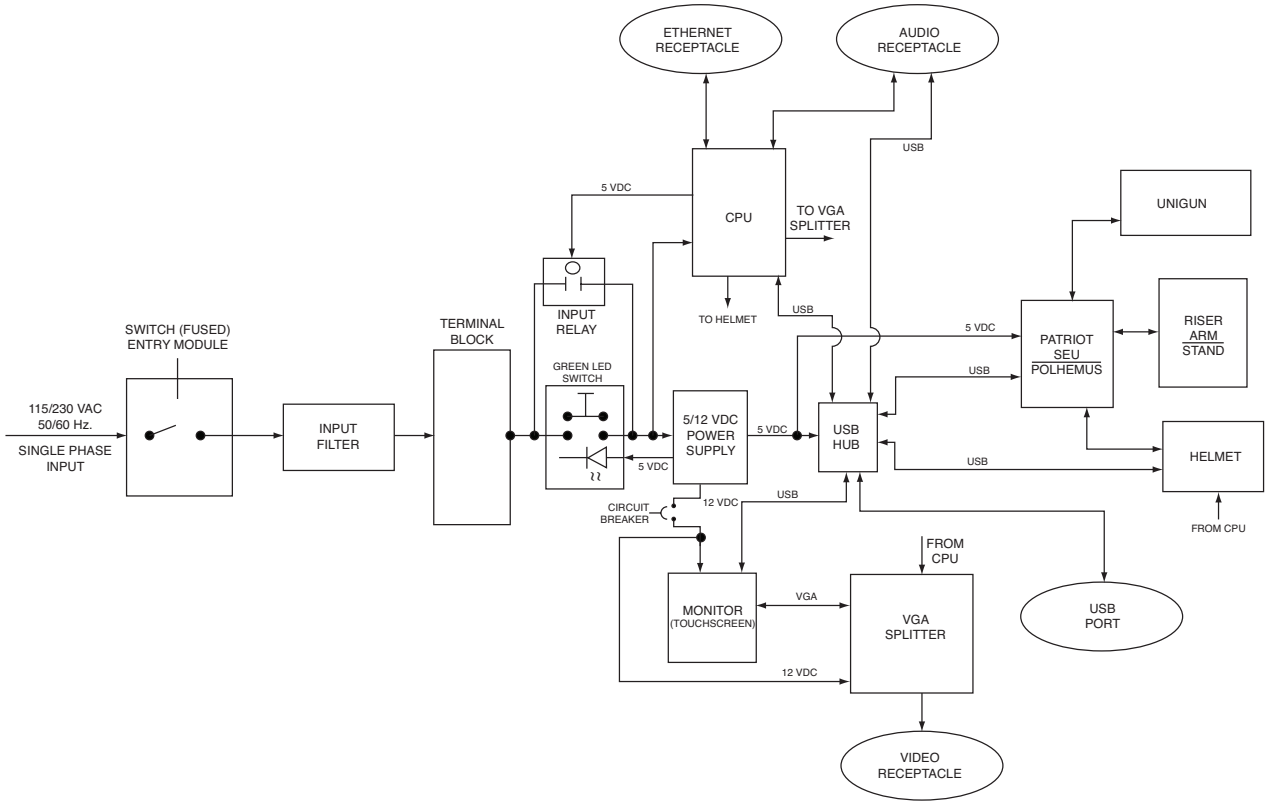


FIGURE E.2 - GENERAL DESCRIPTION

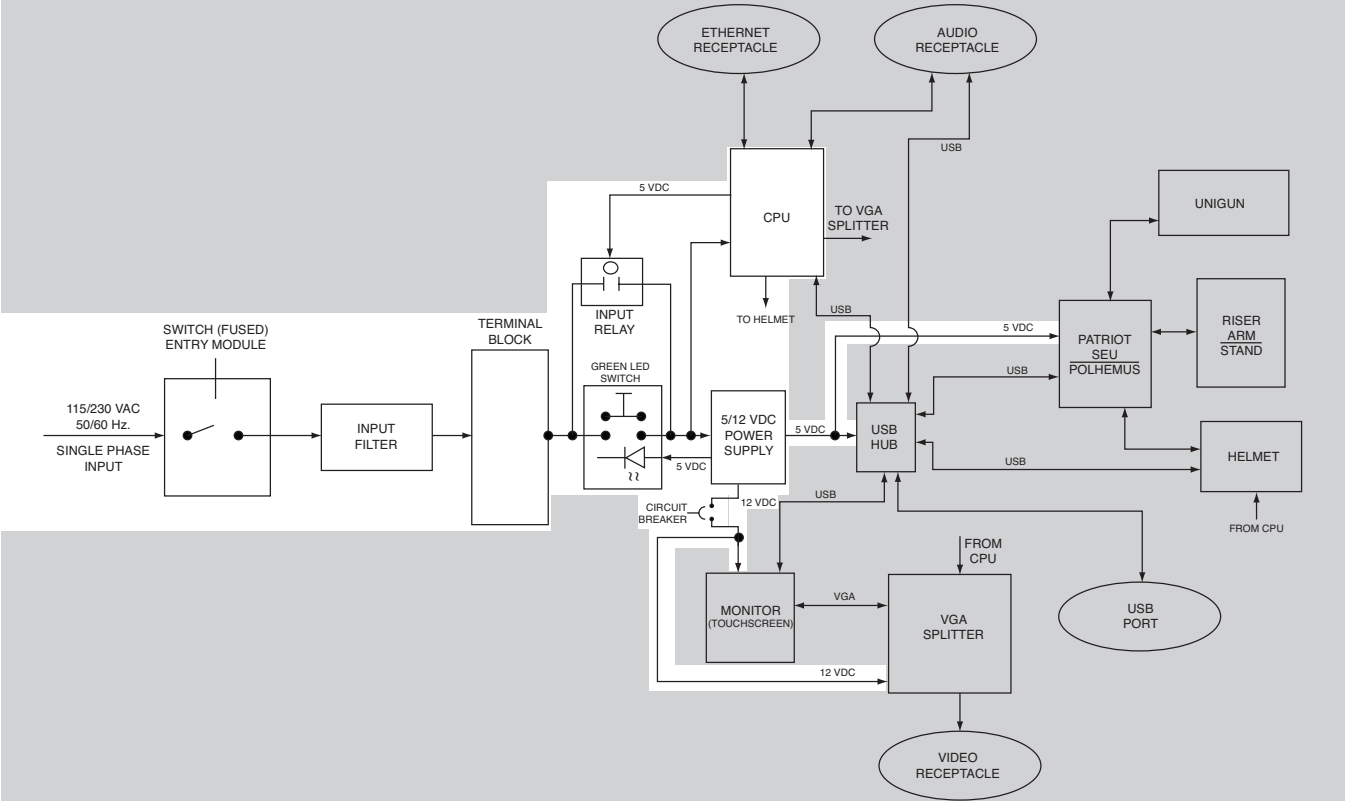


GENERAL DESCRIPTION

The VRTEX® MOBILE is a virtual reality arc welding trainer. This computer based mobile training system is an educational tool designed to allow students to practice their welding technique in a simulated environment. It promotes the efficient transfer of welding skills from the classroom to the welding booth, while reducing the material waste and energy consumption associated with traditional welding training.

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

FIGURE E.3 - INPUT POWER AND DISTRIBUTION



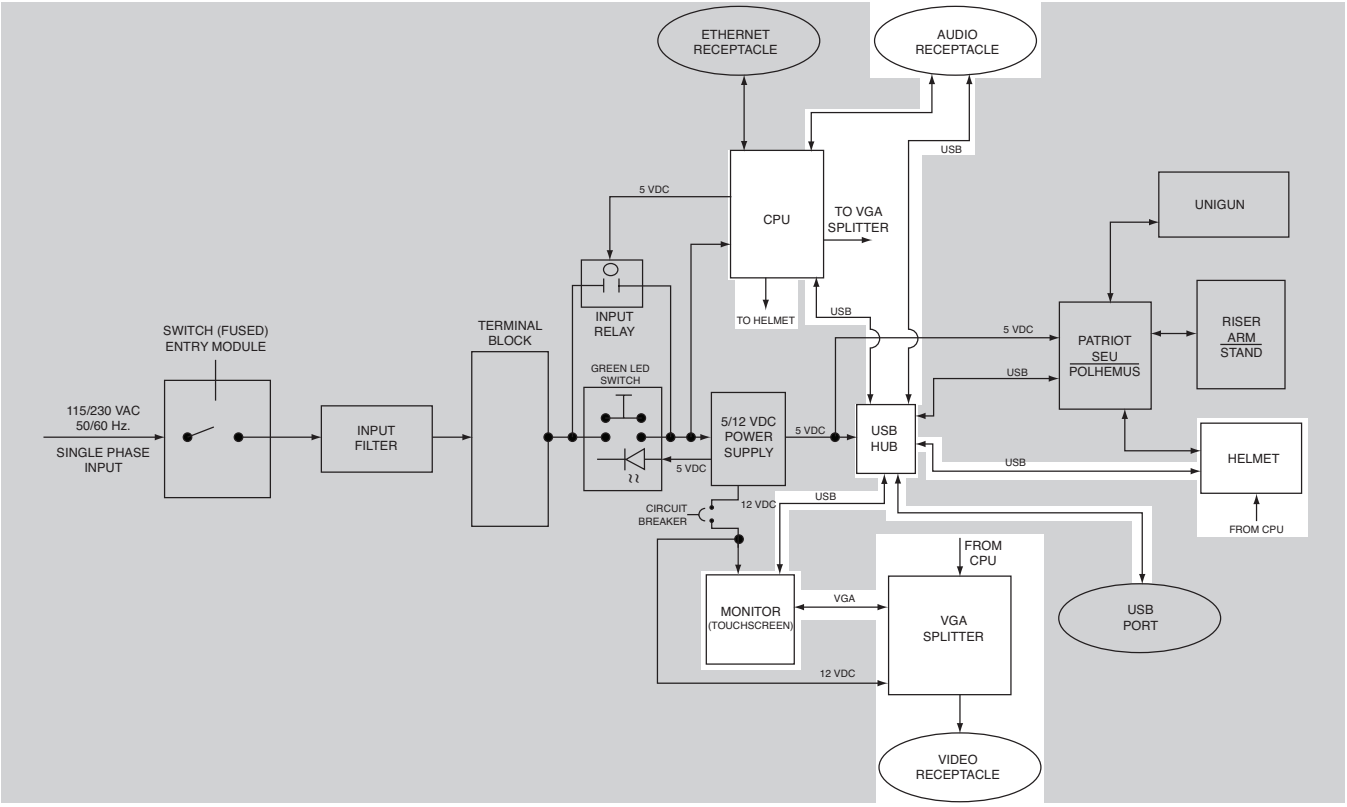
INPUT POWER AND DISTRIBUTION

The single phase input power (115/230VAC) is applied through a fused input switch, an input filter, a terminal block and a momentary switch to two discreet components. The computer assembly (CPU) and the 5/12VDC power supply receive the input power. These two components rectify and regulate the AC input voltage to lower DC voltages to power up and operate the internal components of the VRTEX® MOBILE virtual welding machine.

When the CPU has been energized, the momentary “ON” switch is bypassed by the input relay. The 5VDC created by the CPU is applied, via leads 801D+ and 701F- to the input relay. The independent 5/12VDC power supply module supplies, through the terminal block, 5VDC to the USB hub and the Polhemus/Patriot SEU module. It also supplies, through the terminal block, 12VDC to the monitor and the VGA splitter. The output of the 12VDC supply is protected by a 5 amp/ 32VDC circuit breaker.

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

FIGURE E.4 - VIDEO AND AUDIO OUTPUT, COMPUTER ASSEMBLY (CPU), TOUCHSCREEN MONITOR, USB HUB AND VGA SPLITTER



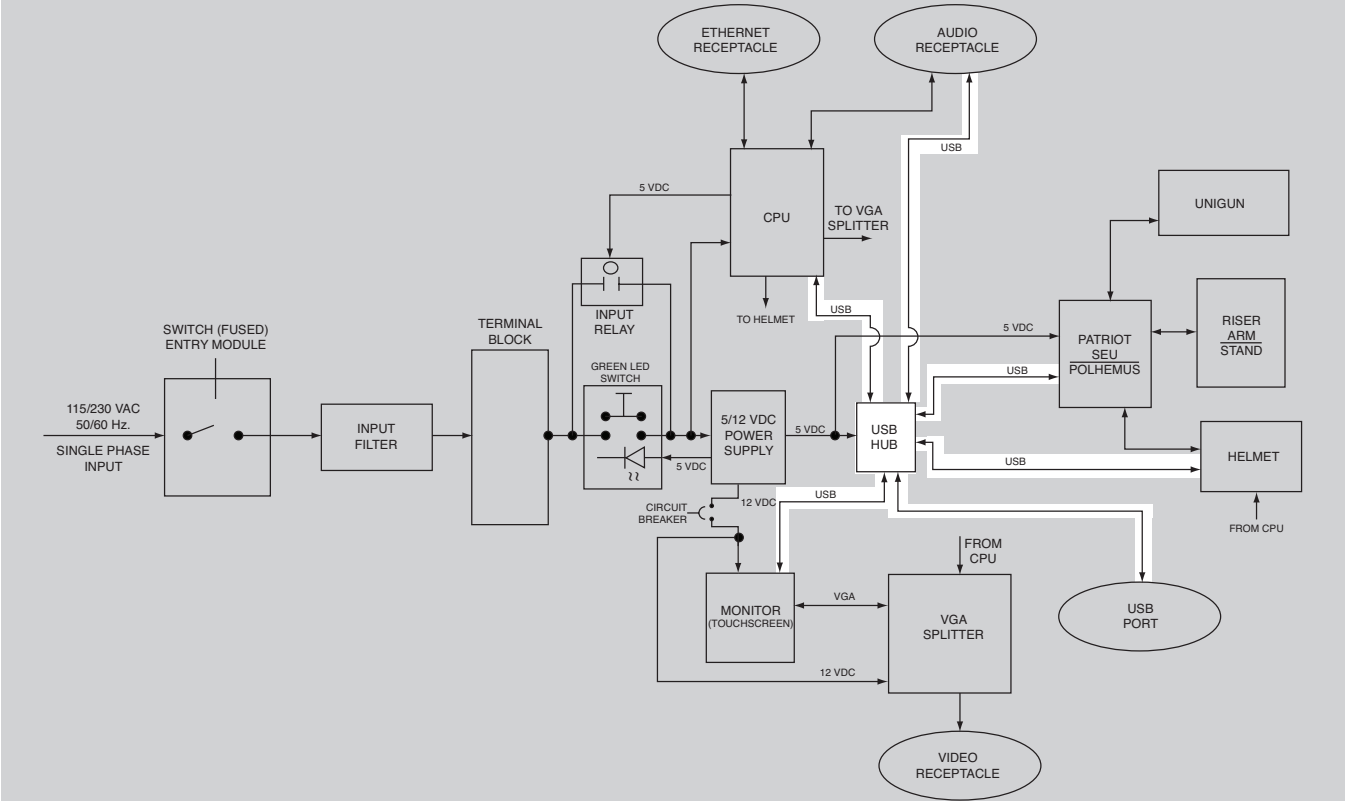
VIDEO AND AUDIO OUTPUT, COMPUTER ASSEMBLY (CPU), TOUCHSCREEN MONITOR, USB HUB AND VGA SPLITTER

Once the CPU is powered up it becomes the main information processing component of the VRTEX® MOBILE. The USB HUB provides the signal interfacing between the touchscreen monitor and the CPU. The CPU receives the user commands from the touchscreen monitor and sends acceptance information back to the touchscreen monitor.

The CPU receives real time feedback signals from the touchscreen monitor via the USB HUB. The CPU compares this feedback data with the commands and procedure selections set forth by the user. This processed video information is then sent via the VGA splitter to the touchscreen monitor. The audio information is sent directly from the CPU to the audio receptacle.

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

FIGURE E.5 - USB HUB AND CONNECTIONS

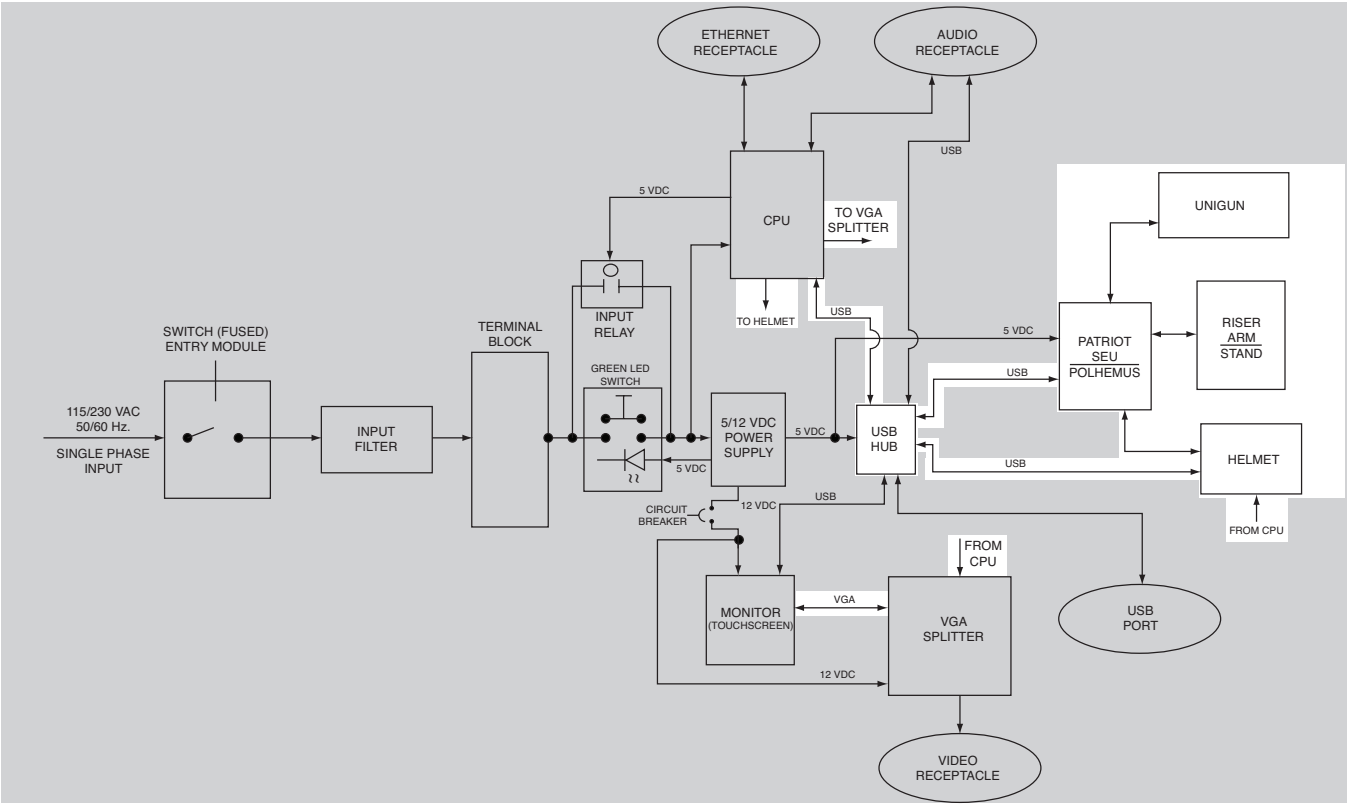


USB HUB AND CONNECTIONS

The USB (Universal Serial Bus) Hub is the center of the USB communication network. This self-powered USB Hub expands a single USB port into several so that there are more ports available to connect devices to a host system. In the VRTEX® MOBILE the USB Hub interfaces the CPU with the Patriot SEU/Polhemus, Helmet, Monitor, USB Port located on front panel of machine and Audio Receptacle (external speakers).

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

FIGURE E.6 - MAGNETIC TRACKING, PATRIOT SEU/POLHEMUS, HELMET, RISER ARM ASSEMBLY, UNIGUN AND USB HUB



MAGNETIC TRACKING, PATRIOT SEU/POLHEMUS, HELMET, RISER ARM ASSEMBLY, UNIGUN AND USB HUB

The Patriot SEU/Polhemus processes feedback signals. The Patriot SEU/Polhemus receives signals from the riser arm assembly, Unigun and helmet. The USB HUB provides interactive performance information to the CPU. The riser arm assembly and the Unigun device interact through magnetic signals. All of this information is processed at the CPU and the corresponding video information is displayed on the touchscreen monitor and the user helmet.

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

TABLE OF CONTENTS - TROUBLESHOOTING AND REPAIR

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

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

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

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

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

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/ repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

⚠ 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:

ESD SENSITIVITY

This headset eyepiece device may be sensitive to electrostatic discharge of 8 kV or higher. Observe static precautions such as discharging the body by touching the metal chassis of the grounded equipment prior to touching the eyepiece.

- 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.

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 blocks.
   b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.
6. Always indicate that this procedure was followed when warranty reports are to be submitted.

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

Observe Safety Guidelines detailed in the beginning of this manual.

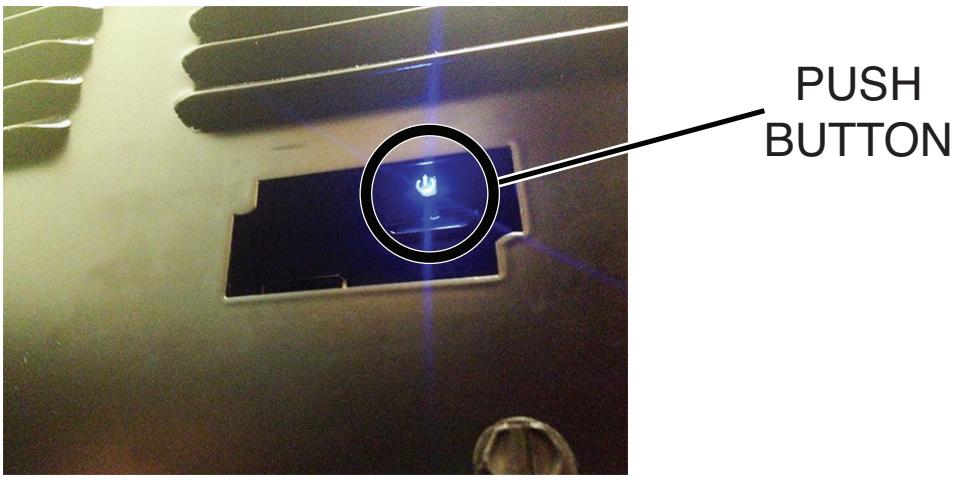
PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
POWER-UP PROBLEMS		
The VRTEX® MOBILE does not start up when the green circular button is pressed.	1. Make sure the correct input power is being applied to the machine. 2. Verify fused power switch is in the ON position. 3. Check the input cord for loose or faulty connections at the machine and at the plug. 4. Be sure to hold the green circular button in for at least 5 seconds. 5. If the green circular button does not stay on, remove the plug button on lower part of case front. Press and hold the green circular button and then press up the push button inside the sheet metal. See ***Figures F.1*** and ***F.2***. 6. Check 5 amp circuit breaker at rear of machine. Reset if tripped. 7. Possible drained or faulty CMOS battery.	1. Carefully check for the correct input voltage at lead 501A on the red terminal block and lead 601A on the Grey terminal block. See the Wiring Diagram. (115 / 230VAC) 2. If the correct voltage is not present check the continuity of leads 501A and 601A. See Wiring Diagram. 3. If the correct voltage is not present at the Terminal Blocks (leads 501A to 601A) check the functionality of the ON Switch. See the Wiring Diagram. Perform the ***Input Filter Test***. 4. Also check for the correct input voltage at the CPU (leads 502C to 601B) when the green “ON” button is pressed. If the correct voltage is present at leads 502C to 601B check for 5VDC at leads 801D(+) to 701F(–). 5. If the correct input voltage is present at leads 501A to 601A, check to see if the correct input voltage is present at the 5/12 VDC power supply when the green “ON” button is pressed. See Wiring Diagram. (Leads 502D to 601C). 6. If the correct input voltage is present at leads 502D to 601C at the 5/12 VDC, perform the ***5/12 VDC Power Supply Test***. 7. The input relay may be faulty. Perform the ***Input Relay Test***. 8. If the correct input voltage is being applied to the CPU and the VRTEX® MOBILE does not power-up the CPU may be faulty. 9. Perform the ***CMOS Battery Removal and Replacement Procedure***.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

FIGURE F.1 – PLUG BUTTON LOCATION

FIGURE F.2 – PUSH BUTTON LOCATION



Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
POWER-UP PROBLEMS		
The VRTEX® MOBILE does not power up when the ON button is pressed. The green indicator light does come on but does NOT stay on when the ON Switch is released.	1. Make certain the correct input voltage is being applied to the VRTEX® MOBILE. (115/230 VAC). 2. If the green circular button does not stay on, remove the plug button on lower part of case front. Press and hold the green circular button and then press up the push button inside the sheet metal. See ***Figures F.1*** and ***F.2***.	1. With the ON button activated 5VDC should be present at the Input Relay Coil. Terminal A1 (801D+) to Terminal A2 (701F–). See the Wiring Diagram. If not, go to step 5. 2. Check for loose or faulty connections between the Input Relay, the Red Terminal Block and the ON button. Check leads 502A and 501C. See the Wiring Diagram. 3. If the 5VDC is being applied to the Input Relay Coil and the above mentioned connections and leads are OK the Input Relay Coil may be faulty. Perform the ***Input Relay Test***. 4. If the 5VDC is not present with the ON button pressed at Terminals A1 (801D+) to A2 (701F–) check for loose or faulty connections between the Input Relay Coil and the CPU. See the Wiring Diagram. 5. With the ON button pressed, check for 5VDC at leads 801D+ to 701F- at the CPU. If the 5VDC is not present at the CPU, it may be faulty.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
POWER-UP PROBLEMS		
The VRTEX® MOBILE does not power up when the ON button is pushed. The green indicator light comes on and stays on.	1. Check monitor is in ON position. See Powering ON, in the ***Operation*** section. See ***Figure B.2***. 2. Check all cable connections at the monitor, speaker, unigun, coupon stand and helmet. 3. Connect another monitor to VGA6 located on case back. Monitor may be faulty.	1. Perform the ***5/12 VDC Power Supply Test***. 2. Check to make sure the USB hub is receiving +5VDC. See Wiring Diagram. 3. Check to make sure the VGA splitter is receiving 12VDC. See Wiring Diagram. 4. Check to make sure the Polhemus / Patriot SEU is receiving 5VDC. See Wiring Diagram. 5. Check to make sure the monitor is receiving 12VDC. See Wiring Diagram. Check VGA connection to CPU. 6. The CPU may be faulty. (i.e., graphics card faulty).

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
No image on monitor. Monitor does not turn on.	1. Make sure the monitor power button is ON. See ***Figure B.2***. 2. Check all cable connections at the monitor, speaker, unigun, coupon stand and helmet. 3. Check if (FMD) back light in helmet is on.	1. Check for 12VDC at leads 901B(+) to 701D(–). If the 12VDC is not present check the associated wiring and perform the ***5/12 VDC Power Supply Test***. If the 12 VDC is present at leads 901B(+) to 701D(–) then perform the ***Main Cable Assembly Test***. 2. If the 12 VDC is present at the monitor and the monitor DOES NOT turn on the monitor may be faulty. 3. Check to make sure that VGA/ DVI connections are secured on the CPU. 4. Connect a different VGA cable from the touchscreen monitor to the VGA6 port on the back of the machine. See Wiring Diagram. 5. Perform the ***VGA Splitter Test***.
No audio - External port	1. Make sure the audio cables are plugged in (USB4 and audio cable). 2. Make sure the volume is UP in the sound option (instructor mode).	1. Audio cables may be faulty. 2. Speakers may be faulty.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
All of the User Interface icons and Indicators do not function. The machine powers up.	1. USB2 not connected to monitor. 2. Touchscreen monitor not calibrated properly. 3. See the ***Touchscreen Monitor Calibration Procedure***.	1. Check for loose or faulty connections (USB cable) between the CPU, USB hub and monitor. See Wiring Diagram. 2. Make sure the USB hub is receiving 5VDC from the 5/12 VDC power supply. See the Wiring Diagram. 3. The CPU may be faulty.
Some of the User Interface icon Controls and/or Indicators do not function.	1. Touchscreen monitor not calibrated properly. 2. Possible software issues.	1. Perform the ***Touchscreen Monitor Calibration Procedure***. 2. Contact the Lincoln Electric Automation Department at 1-888-935-3878.
The user is not receiving any visual feedback information in the helmet (FMD).	1. Make sure the helmet is connected properly. 2. Make sure the software is in the virtual environment stage. (If not in virtual environment, back light in helmet should be lit).	1. Check the connections between the USB 6 on the USB hub and the helmet. See the Wiring Diagram. 2. Check the DVI1 connection on CPU. See Wiring Diagram.
Machine powers up, but login screen does not appear correctly on the monitor.	1. Cables not properly connected. 2. CMOS battery may be faulty.	1. Check for loose or faulty connections. 2. Perform the ***CMOS Battery Removal And Replacement Procedure***. 3. Perform the ***BIOS Setup Procedure***. 4. Perform the ***NVIDIA Control Panel Setup Procedure***. 5. Perform the ***Uninstall NVIDIA Programs Procedure.***

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
As viewed through the helmet and the monitor, the entire stand assembly appears in the middle of the screen and the environment does not move.	1. Restart VRTEX® MOBILE. 2. Verify Polhemus / Patriot SEU switch is on. 3. Verify USB3 cable is connected to Polhemus / Patriot SEU and to USB3 on the USB hub. See the Wiring Diagram.	1. Check all cables and leads to the Polhemus / Patriot SEU for loose or faulty connections. 2. Perform the ***Polhemus Interface Module / Patriot SEU Test.*** 3. See ***Hardware Initialization (PIMAN.EXE) Procedure*** in the Polhemus/Patriot SEU Module Test.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The weld coupon image is a different configuration than the physical coupon.	1. Either the wrong coupon is on the stand or the wrong configuration as been selected in the software. 2. Press the menu icon and select change coupon type. Change the software selections so that the images on the screen match the coupon in the stand. 3. Verify welding on correct side of coupon. Weld side of coupon that has "VRTEX®" logo on it.	1. If still error, contact Lincoln Electric Automation Department at 1-888-935-3878.
Holding the green button in does not shut down the VRTEX® MOBILE.	1. To shut down the VRTEX® MOBILE select menu, logout and then shutdown.	1. If still error, contact Lincoln Electric Automation Department at 1-888-935-3878.
Sometimes the view in the helmet seems to shake, wobble or jitter.	1. Make sure the helmet is close to the work piece. The further the helmet is from the work piece the more jitter there may be in the helmet display. Also make sure there are not other objects or high frequency sources that are interfering with the system. See the ***Installation Section*** of this manual. 2. Make sure the work piece is at least 18 inches from the monitor to avoid interference and/or distortion.	1. Check SEN2 connection from Patriot to helmet. See Wiring Diagram. 2. Check Source connector from riser arm to Polhemus Interface Module / Patriot. See Wiring Diagram. 3. Perform the ***Polhemus Interface Module / Patriot SEU Test.*** 4. If still error, contact Lincoln Electric Automation Department at 1-888-935-3878.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The students' reports are not accessible.	1. The students' reports can only be saved via the USB port on the front of the VRTEX® MOBILE. If a USB memory stick is not plugged into the USB port or if there is not available memory on the USB stick the students' reports will not be saved. 2. "End Pass" must be activated before starting a new pass. If a new coupon is started the data will only be available for the first pass. Again "End Pass" must be pressed before a new pass is started. 3. Note that some configurations only have one pass capabilities. See the Lincoln default tolerances.	1. If still error, contact Lincoln Electric Automation Department at 1-888-935-3878.
Some or none of the welding parameters, defects, or discontinuities are graphing on the LASER screen.	1. These features may be "turned" off. Touch to select the desired features. Also, make sure that you are on a currently welded pass.	1. If still error, contact Lincoln Electric Automation Department at 1-888-935-3878.
The user is not sure which tolerances they are using.	1. Go to the instructor mode to change tolerances.	1. If still error, contact Lincoln Electric Automation Department at 1-888-935-3878.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Automation Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3878.

5/12 VDC POWER SUPPLY TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

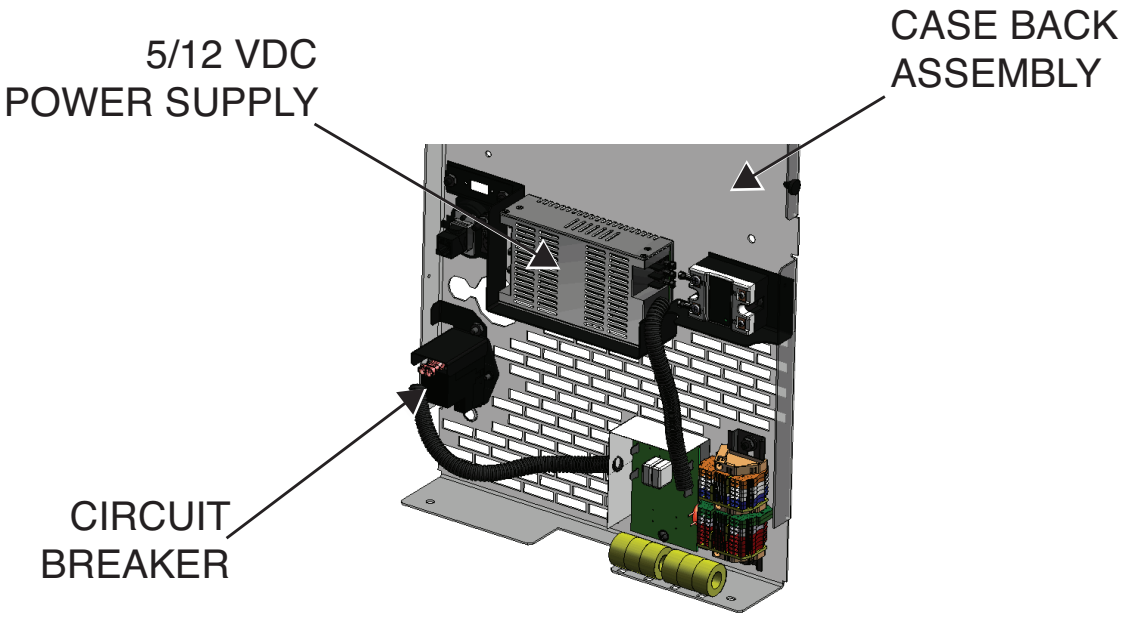
This procedure will aid the technician in determining if the 5/12 VDC Power Supply is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

5/12 VDC POWER SUPPLY TEST (continued)

FIGURE F.3 – 5/12 VDC POWER SUPPLY LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

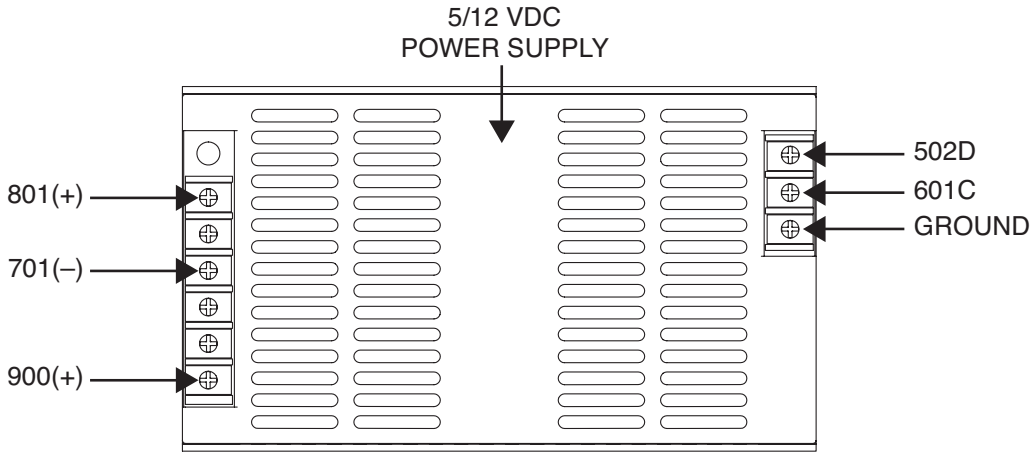
- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Perform the ***Case Cover Removal Procedure***.
2. Locate the 5/12 VDC power supply. See Figure F.3.
3. Carefully apply the correct input voltage to the machine.
4. Locate leads 601C and 502D at the 5/12 VDC power supply. See ***Figure F.4***. See Wiring Diagram.
5. Check for the presence of line voltage at leads 601C and 502D. See ***Figure F.4***. See Wiring Diagram.

NOTE: Voltage should be present when the green "ON" button is pressed. This is the input power to the machine. If voltage is not present, check the voltage at the terminal blocks and the Green "ON" button. See Wiring Diagram.

5/12 VDC POWER SUPPLY TEST (continued)

FIGURE F.4 – POWER SUPPLY TEST POINTS



6. Check for 12 VDC from leads 701(-) to lead 900(+). See Figure F.4. See Wiring Diagram.

NOTE: Check continuity between leads 900 and 901. The circuit breaker may be tripped.

7. Check for 5 VDC from leads 701(-) to lead 801(+). See Figure F.4. See Wiring Diagram.
8. If the input voltage to the power supply is present from leads 601C to 501D and either the 5 VDC or the 12 VDC is not present, the 5/12 VDC power supply may be faulty.
9. If faulty, Perform the ***5/12 VDC Power Supply Removal and Replacement Procedure***.
10. Perform the ***Case Cover Replacement Procedure***.
11. Perform ***Retest After Repair Procedure***.

NOTES

INPUT FILTER TEST (EARLIER MODELS)

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

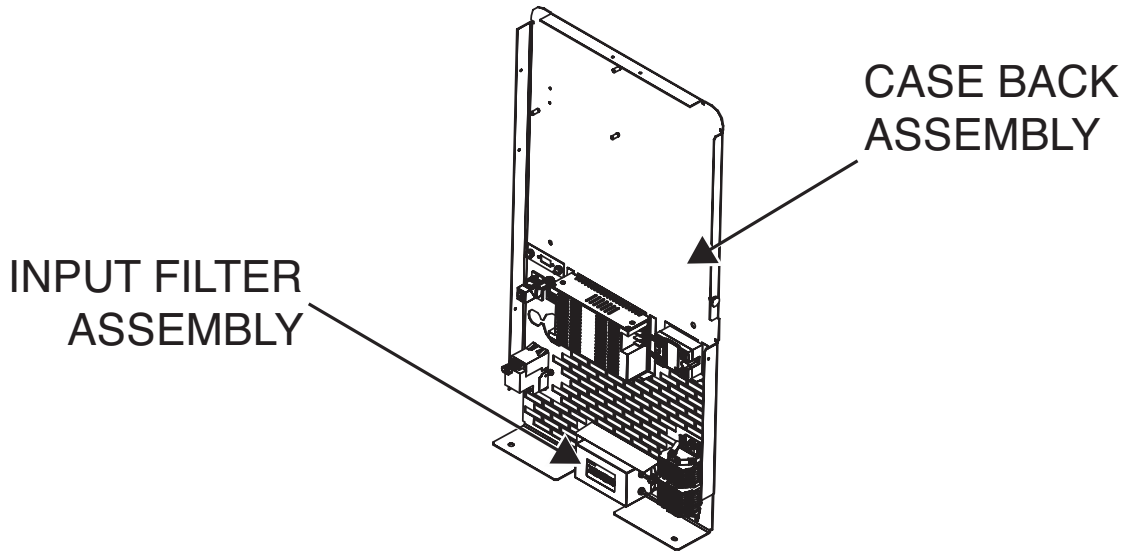
This procedure will aid the technician in determining if the Input Filter is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

INPUT FILTER TEST (EARLIER MODELS) (continued)

FIGURE F.5 – INPUT FILTER ASSEMBLY LOCATION



PROCEDURE

⚠ WARNING

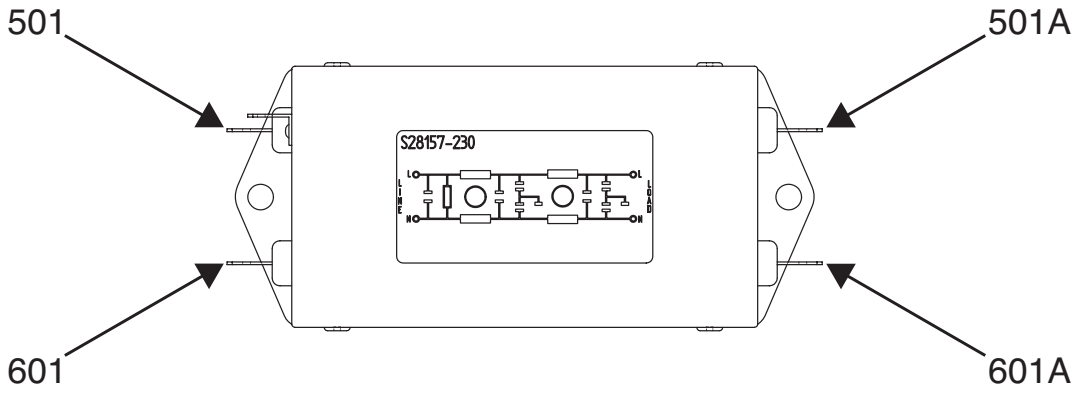
ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Make certain that the switched fused entry module (on/off switch) on the back of the machine is in the OFF (O) position.
3. Perform the ***Case Cover Removal Procedure***.
4. Locate the Input Filter. See Figure F.5.

INPUT FILTER TEST (EARLIER MODELS) (continued)

FIGURE F.6 – INPUT FILTER TEST POINTS



5. Check the resistance from leads 501 to 601 at the input filter. Resistance should be 4.5 meg ohms. See Wiring Diagram.
6. Check the resistance from leads 501 to 501A at the input filter. Normal resistance should be less than 1 ohm. See Wiring Diagram.
7. Check the resistance from leads 601 to 601A at the input filter. Normal resistance should be less than 1 ohm. See Wiring Diagram.
8. If any readings are not correct, the Input Filter may be faulty.
9. If faulty, replace Input Filter.
10. Perform the ***Case Cover Replacement Procedure***.
11. Perform ***Retest After Repair Procedure***.
12. Make certain that the switched fused entry module (on/off switch) on the back of the machine is in the ON (-) position.

NOTES

INPUT FILTER TEST (LATER MODELS)

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

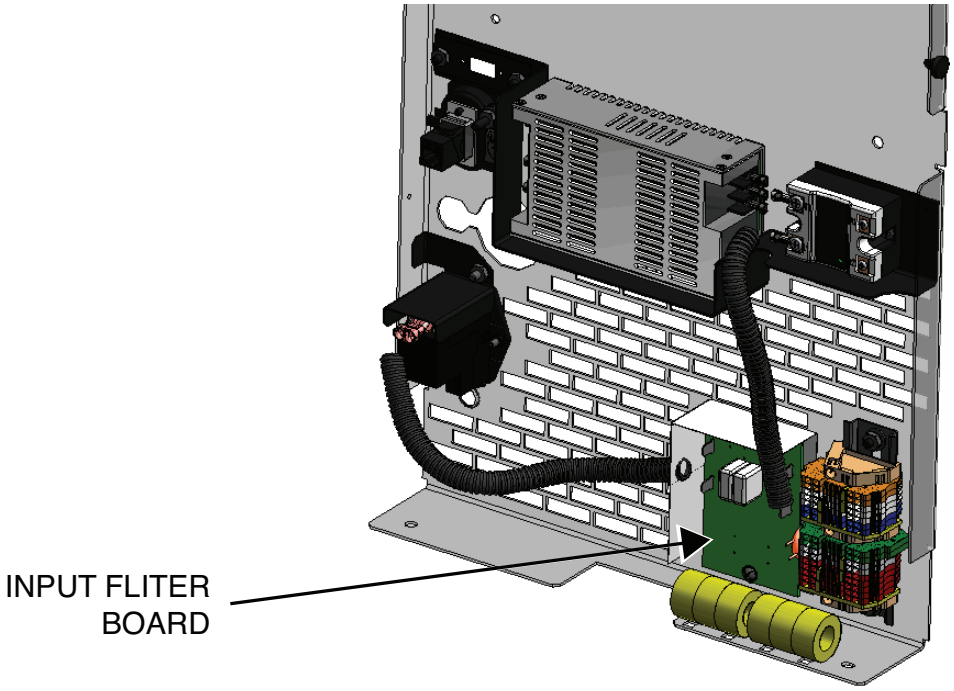
This procedure will aid the technician in the removal and replacement of the case sheet metal covers.

MATERIALS NEEDED

Multimeter with functionality to check capacitance.

INPUT FILTER TEST (LATER MODELS) (continued)

FIGURE F.7 – INPUT FILTER BOARD LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

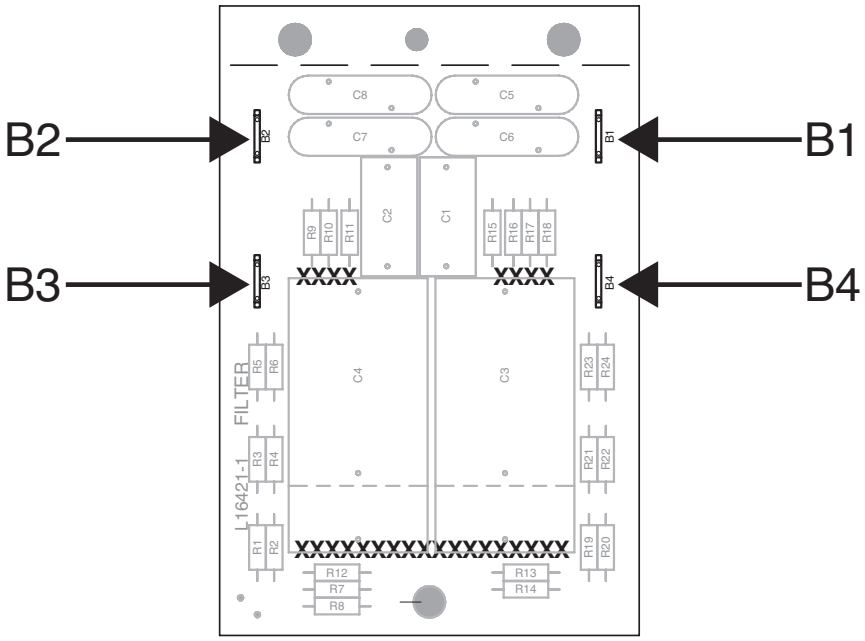
1. Remove input power to the machine.
2. Make certain that the switched fused entry module (on/off switch) on the back of the machine is in the OFF (O) position.
3. Perform the ***Case Cover Removal Procedure***.
4. Locate the Input Filter board. See Figure F.7.

NOTE: Make certain that the PC board mounting screws are tight. This will ensure that the mounting pads have good contact with the chassis.

5. Label and disconnect the four leads (B1, B2, B3 and B4) from the input filter board. See ***Figure F.8***. See Wiring Diagram.
5. Check resistance from B1 or B4 to B2 or B3. It should be 530k Ohms. See ***Figure F.8***.
6. Check resistance from B2 to B3. It should be 0 Ohms. See ***Figure F.8***.
7. Check resistance from B1 to B4. It should be 0 Ohms. See ***Figure F.8***.

INPUT FILTER TEST (LATER MODELS) (continued)

FIGURE F.8 – INPUT FILTER BOARD



8. Use a capacitance meter that meets the following requirements:

Full scale accuracy:	Less than 1% ±1 digit
Resolution:	Minimum 3 digits
nF range display:	Minimum of 3 significant digits

9. Using a capacitance meter perform the capacitance and resistance tests. See ***Table F.1***.
10. If any of the resistance/capacitance tests fail, the input filter board may be faulty. Replace.
11. When testing is complete, reattach the four previously removed leads (B1, B2, B3 and B4).

INPUT FILTER TEST (LATER MODELS) (continued)

TABLE F.1 – CAPACITANCE AND RESISTANCE TESTS

DESCRIPTION	TEST POINT	TEST POINT	EXPECTED READING
Resistance Measurement	B1 or B4	B2 or B3	530,000 ohms
Resistance Measurement	B2	B3	0 ohms
Resistance Measurement	B1	B4	0 ohms
Capacitance Measurement	B1 or B4	Ground pad at mounting screw	39nF - 59nF
Capacitance Measurement	B2 or B3	Ground pad at mounting screw	39nF - 59nF
Capacitance Measurement	B1 or B4	B2 or B3	.880uF - 1.32uF

MAIN CABLE ASSEMBLY TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

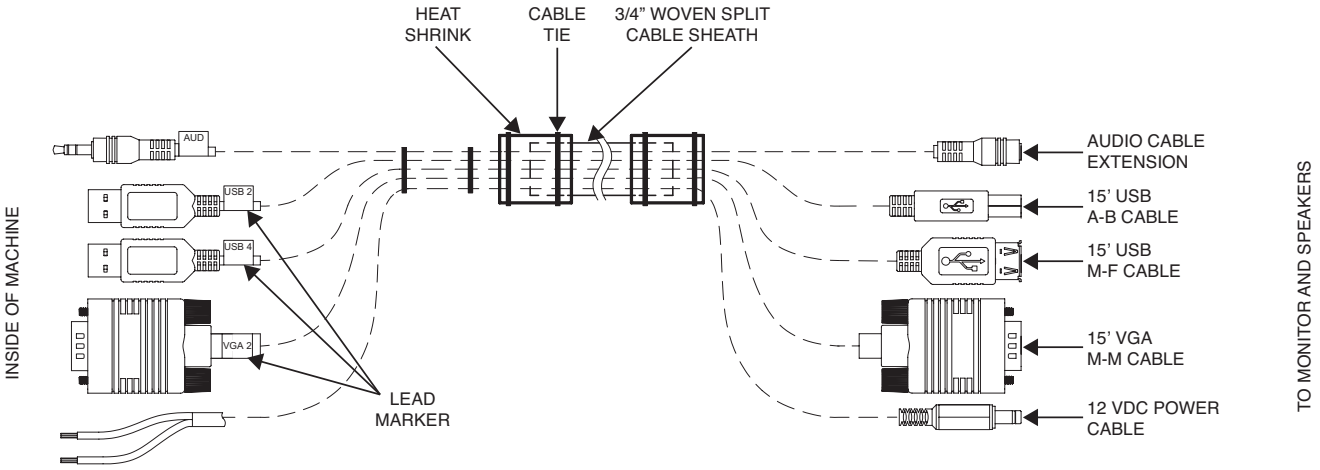
This procedure will aid the technician in determining if the Main Cable Assembly is in need of repair or replacement.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram
A Known Good VGA M-M Cable
A Known Good USB M-F Cable
A Known Good USB A-B Cable
A Known Good Audio Extension Cable

MAIN CABLE ASSEMBLY TEST (continued)

FIGURE F.9 – MAIN CABLE ASSEMBLY



MAIN CABLE ASSEMBLY TEST PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

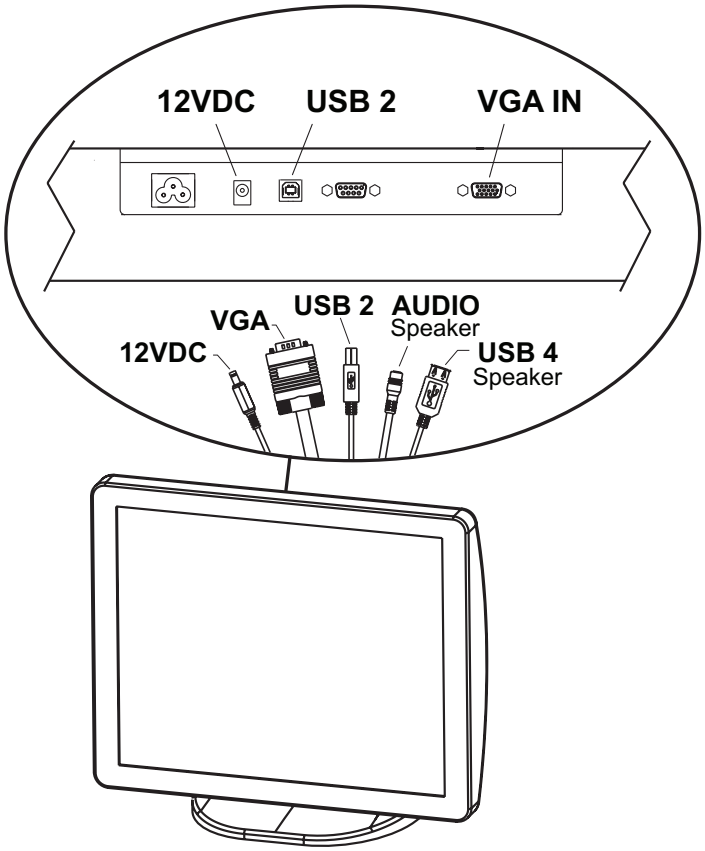
- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

12VDC POWER CABLE TEST PROCEDURE

1. Apply input power and turn on machine.
2. Locate the end of the 12 VDC monitor power cable. Disconnect from monitor. See ***Figure F.10***.
3. Check for 12VDC output on monitor power cable. See Figure F.9. See ***Figure F.10***.
4. Remove input power to the machine.
5. Locate leads 901B (RED) and 701D (BLACK) at the terminal blocks. See ***Figure F.12*** and ***Figure F.13***. See Wiring Diagram.
6. Check the resistance between 901B and 701D from the terminal blocks to the power cable end. See ***Figure F.11*** and ***Figure F.12*** and ***Figure F.13***. Resistance should be less than 1 ohm.
7. If high resistance is present, the power cable may be faulty.
8. Perform the ***Main Cable Assembly Removal and Replacement Procedure***.
9. Perform the ***Case Cover Replacement Procedure***.
10. Perform ***Retest After Repair Procedure***.

MAIN CABLE ASSEMBLY TEST (continued)

FIGURE F.10 – MONITOR CABLE CONNECTIONS



VGA M-M CABLE TEST PROCEDURE

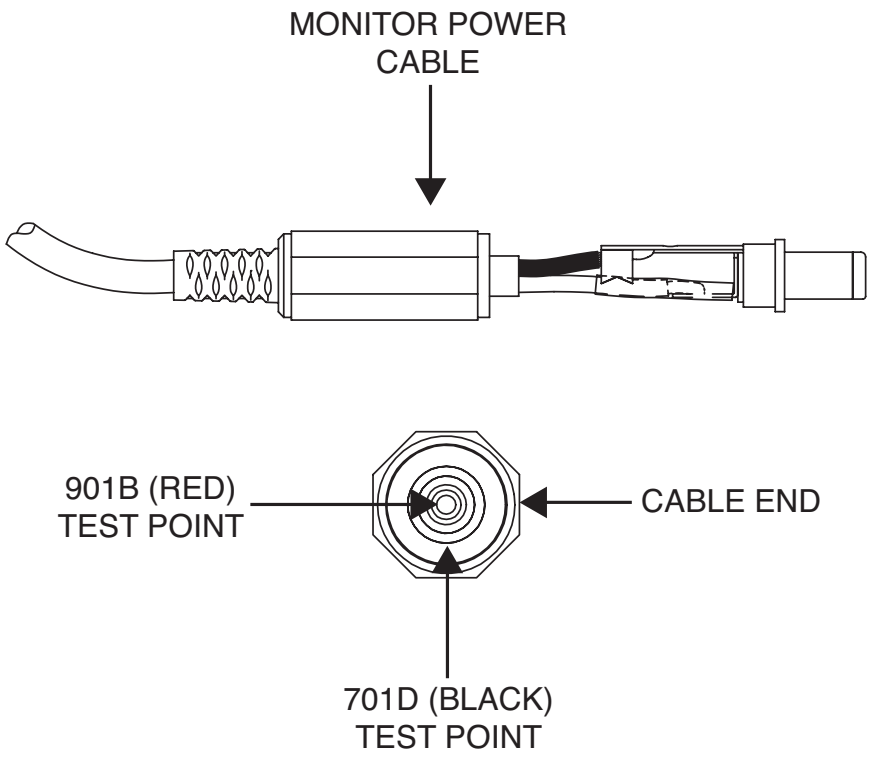
1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the VGA M-M cable, in the main cable assembly. See ***Figure F.9 and Figure F.14***.
4. Using a known good VGA cable, connect one end to monitor in the appropriate location and the other end to the appropriate location on the CPU.
5. If image appears on monitor, the main cable assembly is faulty.
6. If faulty, perform the ***Main Cable Assembly Removal and Replacement Procedure***.
7. Perform the ***Case Cover Replacement Procedure***.
8. Perform ***Retest After Repair Procedure***.

USB M-F CABLE TEST PROCEDURE

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the USB M-F cable, in the main cable assembly. See ***Figure F.9***.
4. Using a known good USB M-F cable, connect one end to speakers in the appropriate location and the other end to the appropriate location on the CPU.
5. If sound returns, the main cable assembly is faulty.
6. If faulty, perform the ***Main Cable Assembly Removal and Replacement Procedure***.
7. Perform the ***Case Cover Replacement Procedure***.
8. Perform ***Retest After Repair Procedure***.

MAIN CABLE ASSEMBLY TEST (continued)

FIGURE F.11 – MONITOR POWER CABLE END



USB A-B CABLE TEST PROCEDURE

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the USB A-B cable, in the main cable assembly. See ***Figure F.9***.
4. Using a known good USB A-B cable, connect one end to monitor in the appropriate location and the other end to the appropriate location on the CPU.
5. If touchscreen icon functionality returns, the main cable assembly is faulty.
6. If faulty, perform the ***Main Cable Assembly Removal and Replacement Procedure***.
7. Perform the ***Case Cover Replacement Procedure***.
8. Perform ***Retest After Repair Procedure***.

AUDIO CABLE EXTENSION TEST PROCEDURE

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the audio cable extension, in the main cable assembly. See ***Figure F.9 and Figure F.15***.
4. Using a known good audio cable extension, connect one end to speakers in the appropriate location and the other end to the appropriate location on the CPU.
5. If sound returns, the main cable assembly is faulty.
6. If faulty, perform the ***Main Cable Assembly Removal and Replacement Procedure***.
7. Perform the ***Case Cover Replacement Procedure***.
8. Perform ***Retest After Repair Procedure***.

MAIN CABLE ASSEMBLY TEST (continued)

FIGURE F.12 – TERMINAL BLOCK LOCATION

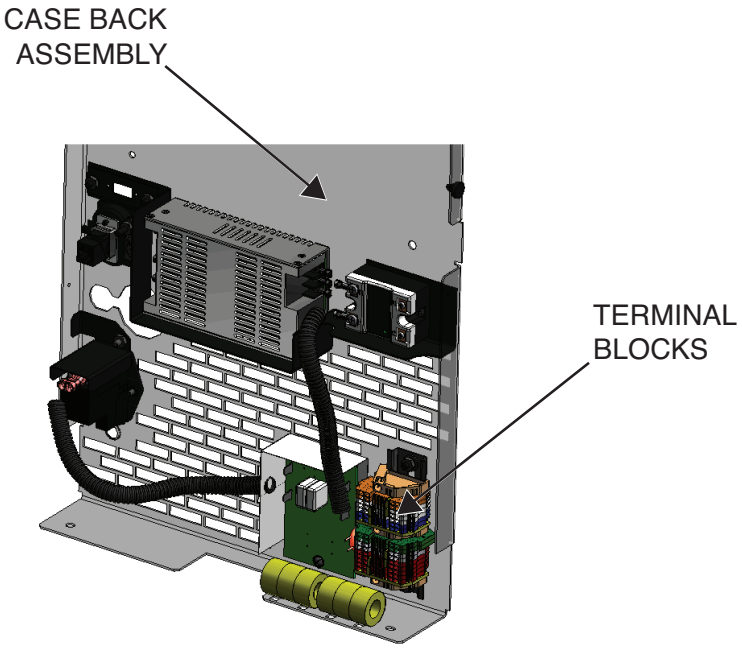
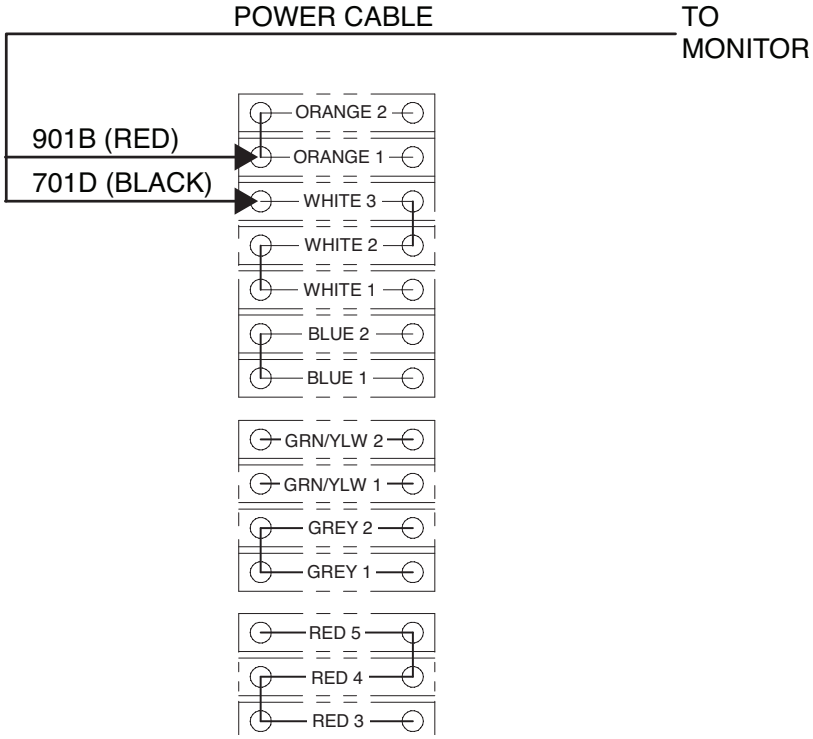


FIGURE F.13 – TERMINAL BLOCK LEAD LOCATIONS



MAIN CABLE ASSEMBLY TEST (continued)

FIGURE F.14 – VGA M-M CABLE

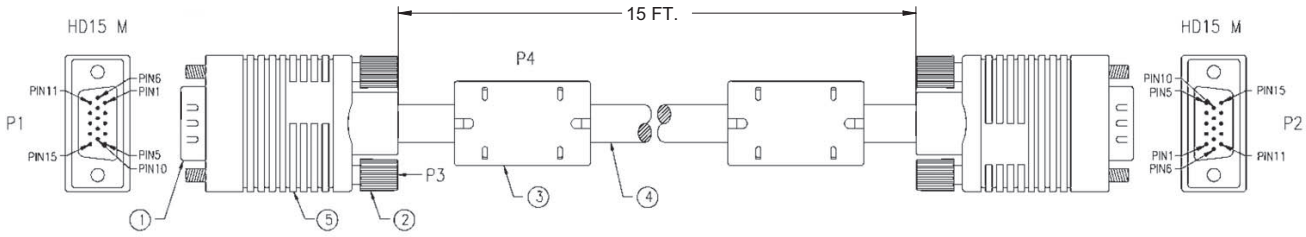
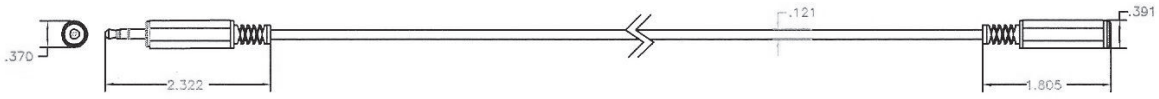


FIGURE F.15 – AUDIO CABLE EXTENSION

PIN–OUT

3.5MM M		3.5MM F
TIP–	RED	–TIP
RING–	BLACK	–RING
SLEEVE–	DRAIN	–SLEEVE



INPUT RELAY TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

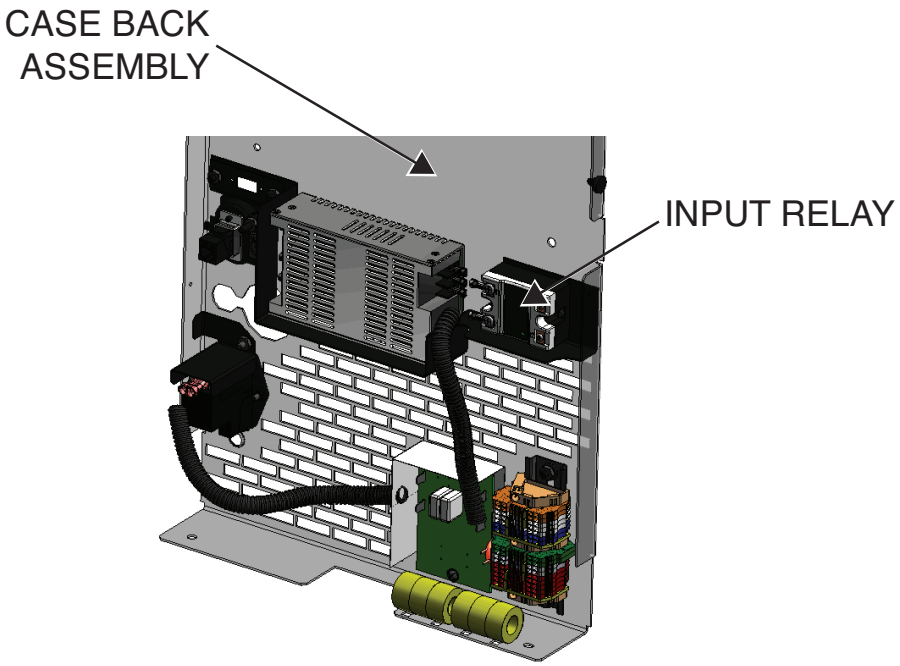
This procedure will aid the technician in determining if the Input Relay is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

INPUT RELAY TEST (continued)

FIGURE F.16 – INPUT RELAY ASSEMBLY LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

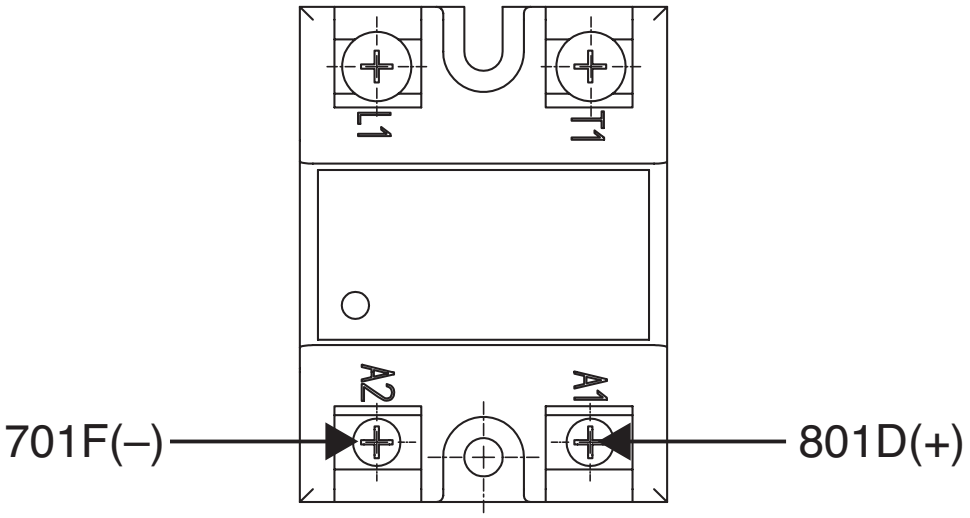
1. Perform the ***Case Cover Removal Procedure***.
2. Carefully apply input power to the machine.
3. Press and hold the green "ON" button on the front of the machine. Hold for five seconds to start system.

NOTE: If Green "ON" button does not remain ON, it must be held in when testing voltages.

4. Locate the Input Relay. See Figure F.16.
5. Check for the presence of 5 VDC from lead 801D(+) to lead 701F(-) at the input relay. If 5 VDC is not present, perform the ***CPU Test***. See ***Figure F.17***. See Wiring Diagram.
6. If the Input Relay does not activate, it may be faulty.
7. If faulty, Perform the ***Input Relay Removal and Replacement Procedure***.
8. Perform the ***Case Cover Replacement Procedure***.
9. Perform ***Retest After Repair Procedure***.

INPUT RELAY TEST (continued)

FIGURE F.17 – INPUT RELAY TEST POINTS



NOTES

VGA SPLITTER TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

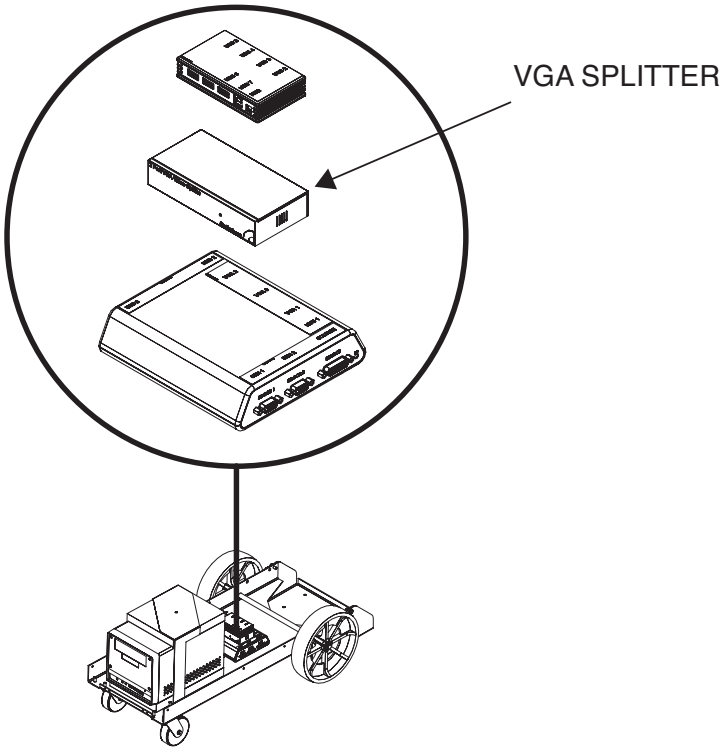
This procedure will aid the technician in determining if the VGA Splitter is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

VGA SPLITTER TEST (continued)

FIGURE F.18 – VGA SPLITTER LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Perform the ***Case Cover Removal Procedure***.
2. Locate the VGA splitter. See Figure F.18.
3. Carefully apply input power to the machine.
4. Make certain the red light on the VGA splitter is on.
5. Check for the presence of 12 VDC at leads 901A(+) to 701E(–) at the terminal block. See ***Figure F.19*** and ***Figure F.20***. See Wiring Diagram.
6. Check for loose or faulty connections at the VGA splitter and CPU.
7. Disconnect VGA 2 and VGA 1 from the VGA splitter and connect them together. If the start-up screen appears on the monitor, the VGA splitter is faulty.
8. If faulty, Perform the ***VGA Splitter Removal and Replacement Procedure***.
9. Perform the ***Case Cover Replacement Procedure***.
10. Perform ***Retest After Repair Procedure***.

VGA SPLITTER TEST (continued)

FIGURE F.19 – TERMINAL BLOCK LOCATION

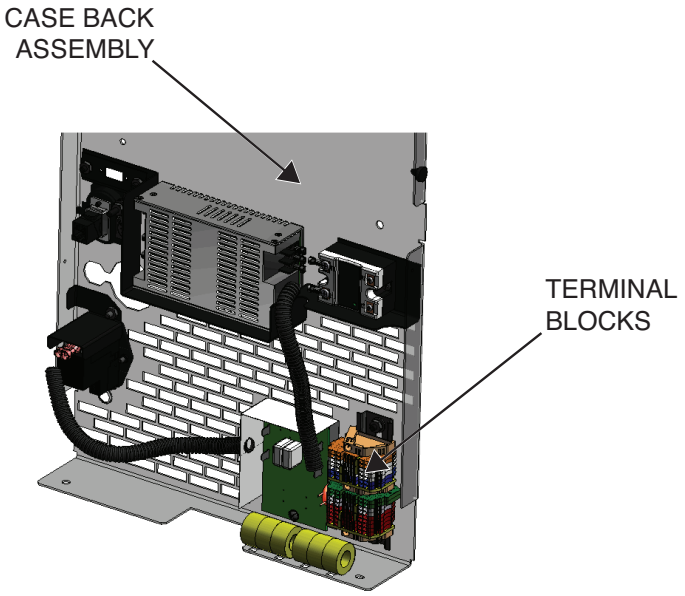
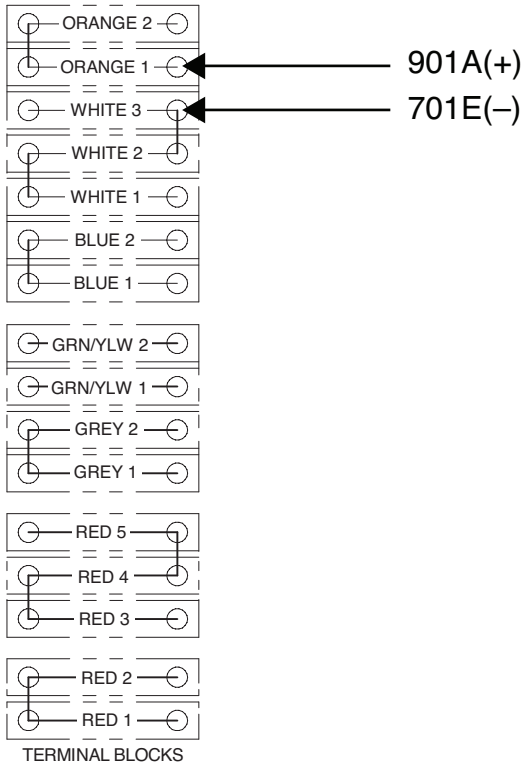


FIGURE F.20 – TERMINAL BLOCK LEAD LOCATIONS



NOTES

USB HUB TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

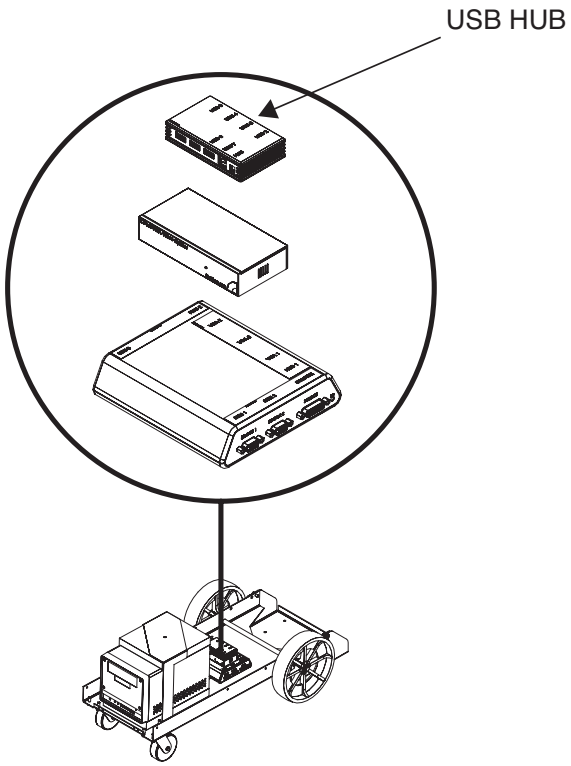
This procedure will aid the technician in determining if the USB Hub is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram
Luminating USB Mouse

USB HUB TEST (continued)

FIGURE F.21 – USB HUB LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Perform the ***Case Cover Removal Procedure***.
2. Locate the USB hub. See Figure F.21.
3. Carefully apply input power to the machine.
4. Check for loose or faulty connections at the USB hub and components attached to the hub.
5. One port at a time, plug a USB mouse with a visible LED into each port of the hub. If the LED on the mouse illuminates, that port is fine. Repeat process for every port on the USB hub. If one or multiple ports fail to illuminate, the USB hub is faulty.
6. Verify USB 7 connection between CPU and USB hub.
7. Check for the presence of 5 VDC from 701A(–) to 801A(+) at the terminal block. See ***Figure F.22*** and ***Figure F.23***. See Wiring Diagram.
8. If faulty, Perform the ***USB Hub Removal and Replacement Procedure***.
9. Perform the ***Case Cover Replacement Procedure***.
10. Perform ***Retest After Repair Procedure***.

USB HUB TEST (continued)

FIGURE F.22 – TERMINAL BLOCK LOCATION

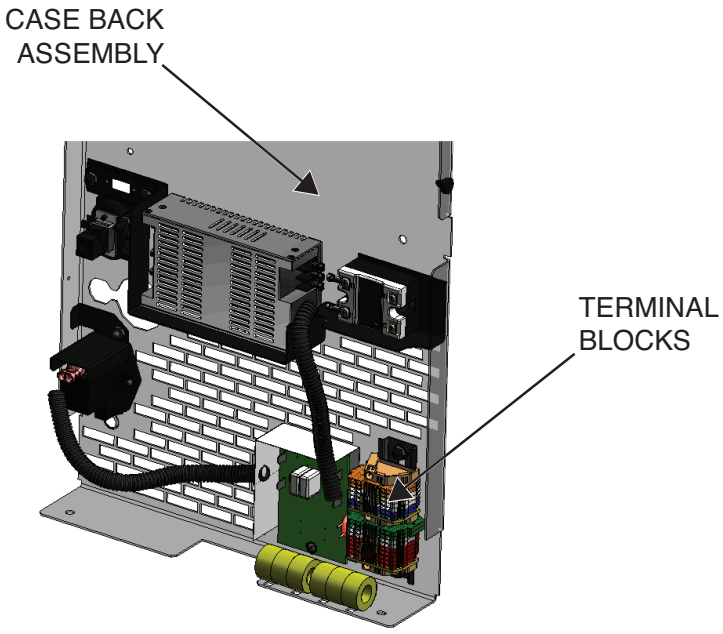
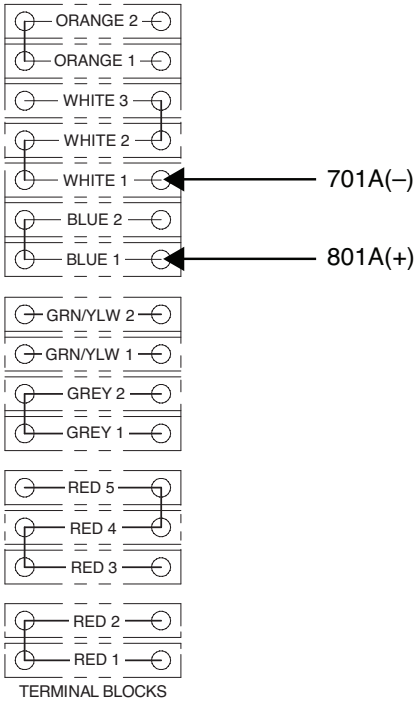


FIGURE F.23 – TERMINAL BLOCK LEAD LOCATIONS



NOTES

CPU TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

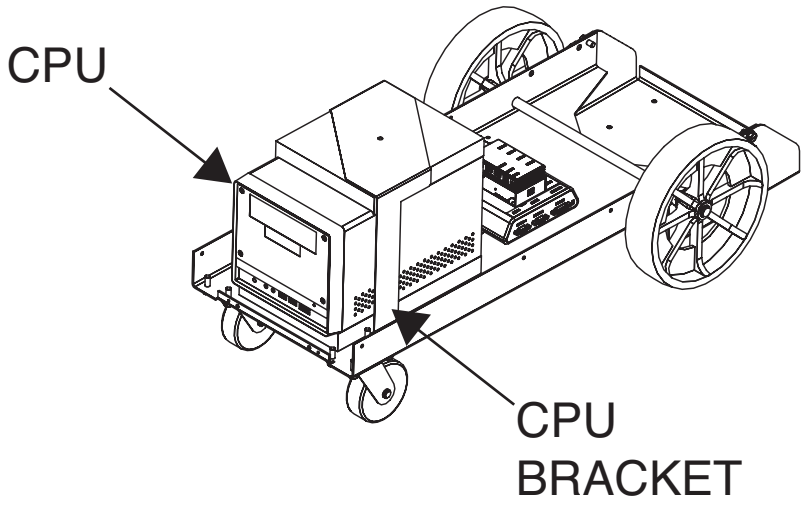
This procedure will aid the technician in determining if the CPU is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

CPU TEST (continued)

FIGURE F.24 – CPU LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Perform the ***Case Cover Removal Procedure***.
2. Locate the CPU. See Figure F.24.
3. Carefully apply input power to the machine.
4. Press and hold the green “ON” button on the front of the machine. Hold for five seconds to start system.

NOTE: If Green “ON” button does not remain ON, it must be held in when testing voltages.

5. Check for blue CPU light on front of CPU. See ***Figure F.25***.
6. Check for loose or faulty connections at CPU and all connected components.
7. Check for presence of 115/230 VAC at the input power receptacle on the back of the CPU. See ***Figure F.26***.
8. If line voltage is not present, check connections between the CPU and the terminal block.
9. If correct voltage is present, check for 5 VDC at leads 801D(+) to 701F(–) on the input relay. See ***Figure F.27***. See Wiring Diagram.
10. The CPU may be faulty. Perform the ***CPU Removal and Replacement Procedure***.
11. Perform the ***Case Cover Replacement Procedure***.
12. Perform ***Retest After Repair Procedure***.

CPU TEST (continued)

FIGURE F.25 – CPU LIGHT LOCATION

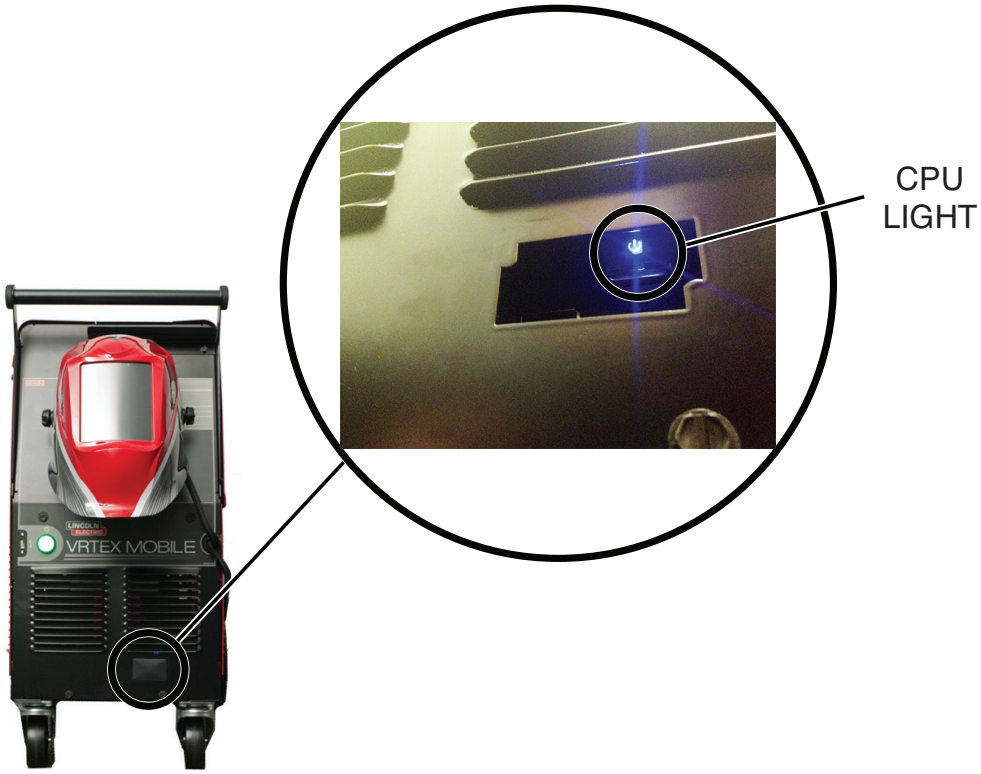
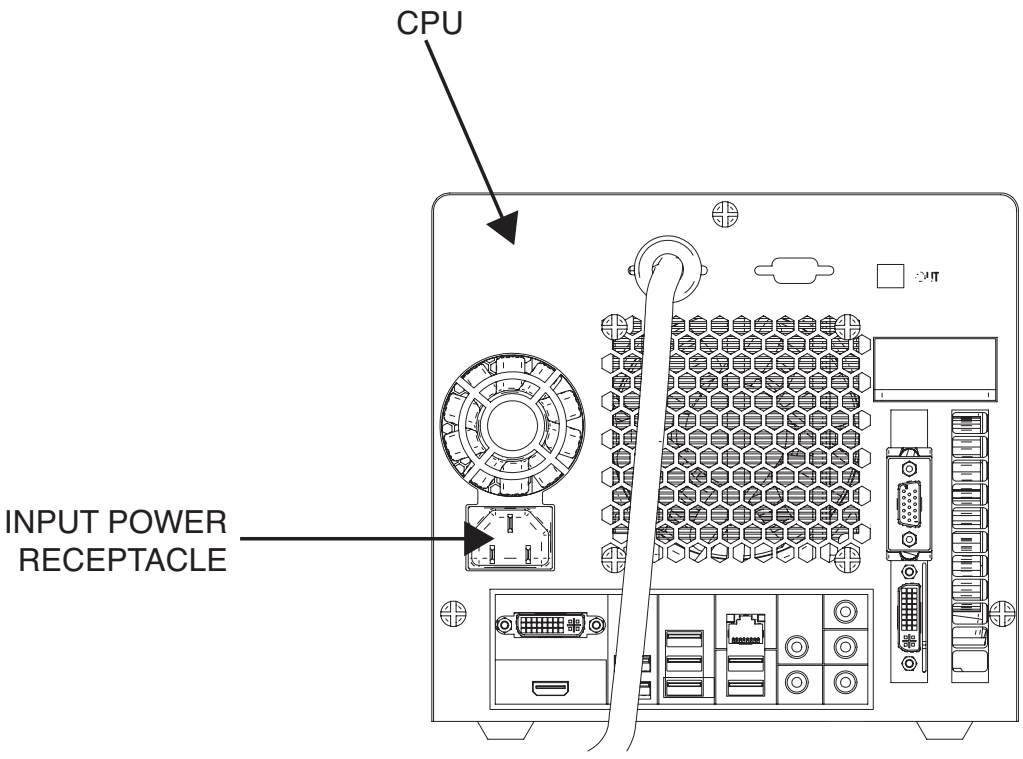
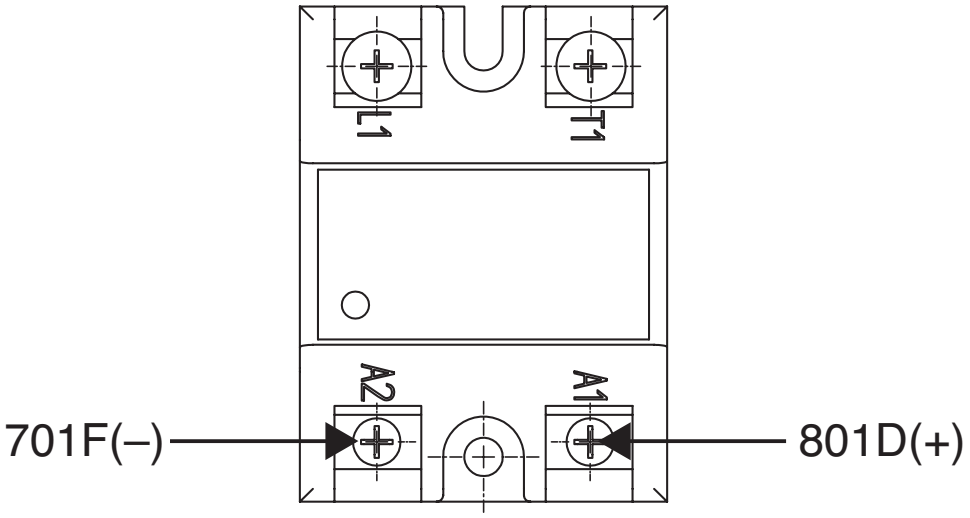


FIGURE F.26 – INPUT POWER RECEPTACLE LOCATION



CPU TEST (continued)

FIGURE F.27 – INPUT RELAY TEST POINTS



POLHEMUS / PATRIOT SEU MODULE TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

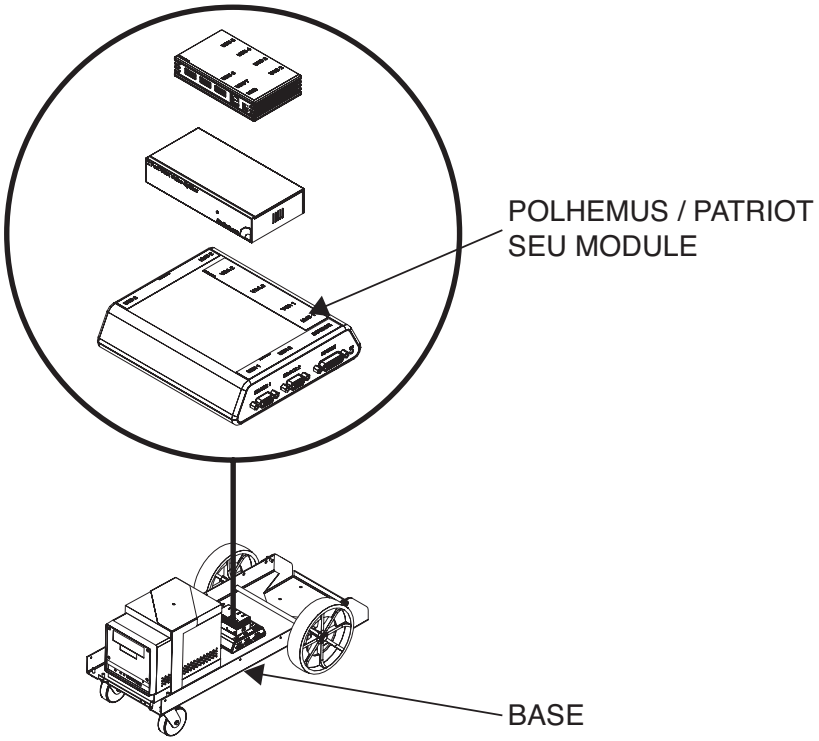
This procedure will aid the technician in determining if the Polhemus / Patriot SEU Module is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram
Keyboard
Mouse

POLHEMUS / PATRIOT SEU MODULE TEST (continued)

FIGURE F.28 – POLHEMUS / PATRIOT SEU MODULE LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Perform the ***Case Cover Removal Procedure***.
2. Locate the Polhemus / Patriot SEU Module. See Figure F.28.
3. Carefully apply input power to the machine, make sure switch is “ON” and check for LED light. See ***Figure F.29***.
4. Check for loose or faulty connections at the Polhemus/Patriot SEU module and all other connected components.
5. Check for the presence of 5 VDC from lead 801B(+) to 701B(–) at the terminal block. See ***Figure F.30*** and ***Figure F.31***. See Wiring Diagram.
6. If faulty, Perform the ***Polhemus / Patriot SEU Module Removal and Replacement Procedure***.
7. Perform the ***Case Cover Replacement Procedure***.
8. Perform ***Retest After Repair Procedure***.

POLHEMUS / PATRIOT SEU MODULE TEST (continued)

FIGURE F.29 – POLHEMUS / PATRIOT SEU MODULE

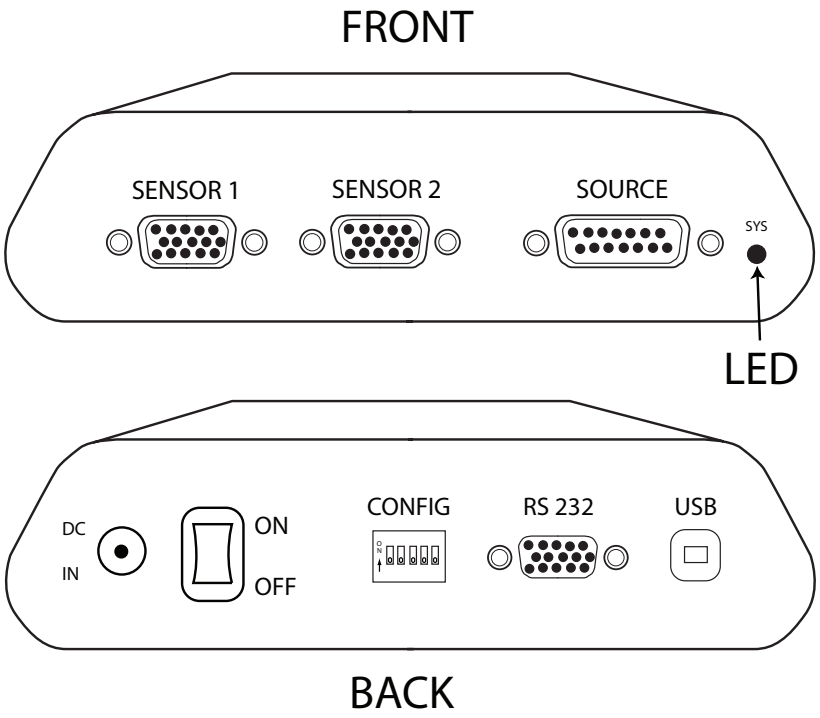
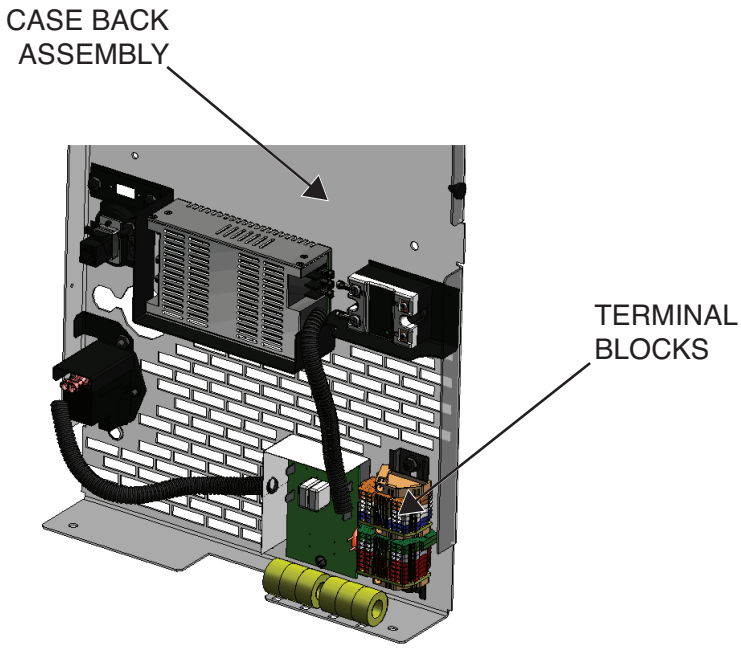
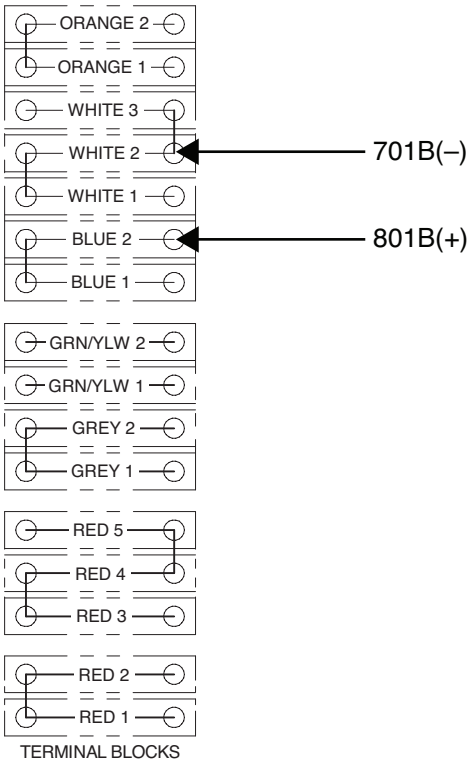


FIGURE F.30 – TERMINAL BLOCK LOCATION



POLHEMUS / PATRIOT SEU MODULE TEST (continued)

FIGURE F.31 – TERMINAL BLOCK LEAD LOCATIONS



HARDWARE INITIALIZATION (PIMAN. EXE)

If necessary

1. Before the VRTEX is powered on, connect the USB mouse and USB keyboard to the unused USB ports on the back of the CPU, on the left side (as viewed from behind the VRTEX).
2. Allow the CPU to power up and the VRTEX log on screen to appear.
3. Press the Windows key (next to the spacebar) and the letter D (on the keyboard) to allow the Windows desktop to appear.
4. Move the mouse to the bottom of screen to display the Windows Task Bar.
5. Right-click mouse.
6. Choose 'Close all programs'.
7. Right-click mouse on the START button, select EXPLORE, Go to "C:SimWelder/VRplugins". Double click on "piman.exe". Click "Flush". Click "OK". Double click on "piman.exe" again. Click "Rescan".
8. Close all open windows.
9. Power off the CPU by selecting Start> Shutdown> from the drop down box, select Shutdown.
10. Once the CPU powers off, disconnect the mouse and keyboard.
11. Power on the VRTEX and verify operation.

UNIGUN TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

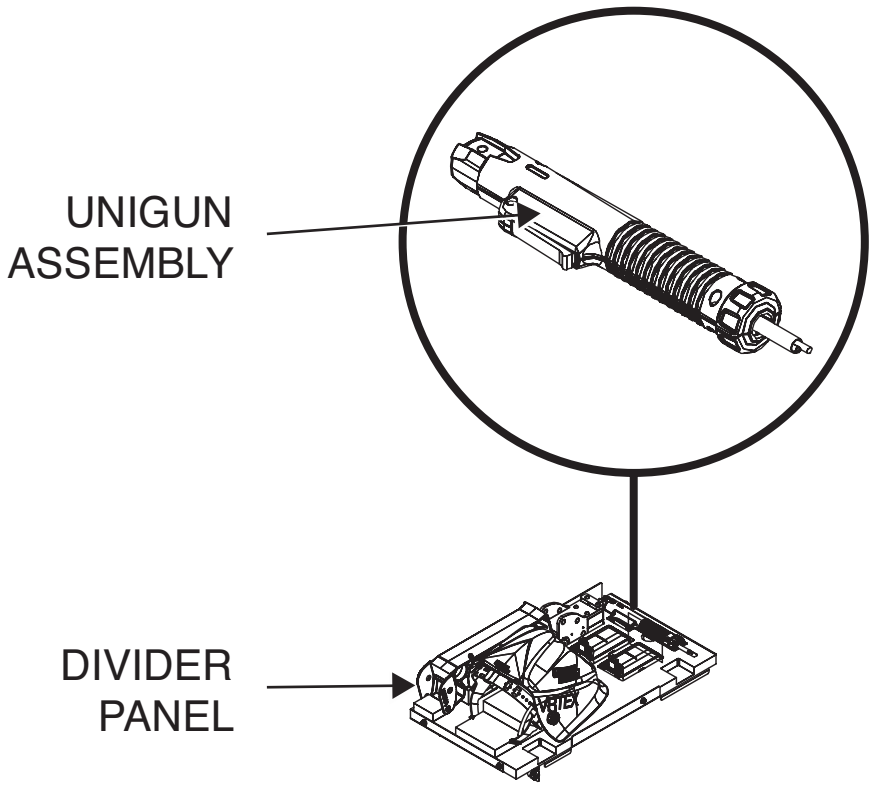
This procedure will aid the technician in determining if the Unigun is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

UNIGUN TEST (continued)

FIGURE F.32 – UNIGUN LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the Unigun. See Figure F.32.
4. Check for loose or faulty connections on the cable.
5. Locate the in-line RCA type plug at the "Y" adapter. See ***Figure F.33***. See Wiring Diagram.
6. Unplug (separate) the RCA type plug on the Y adapter.
7. With the trigger pulled, the resistance should be less than 1 ohm. See ***Figure F.34***.
8. If resistance is greater than 1 ohm, the Unigun may be faulty.
9. If faulty, Perform the ***Unigun Removal and Replacement Procedure***.
10. Perform the ***Case Cover Replacement Procedure***.
11. Perform ***Retest After Repair Procedure***.

UNIGUN TEST (continued)

FIGURE F.33 – "Y" ADAPTER AND RCA PLUG LOCATION

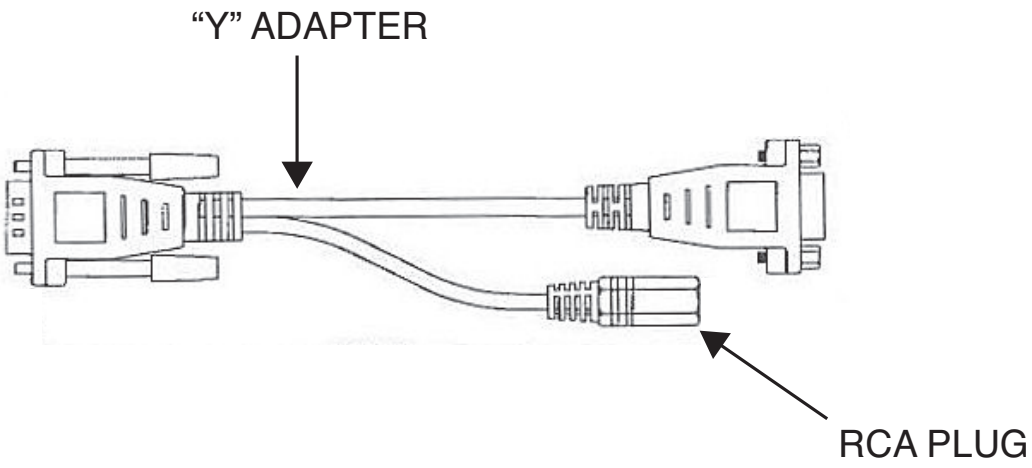
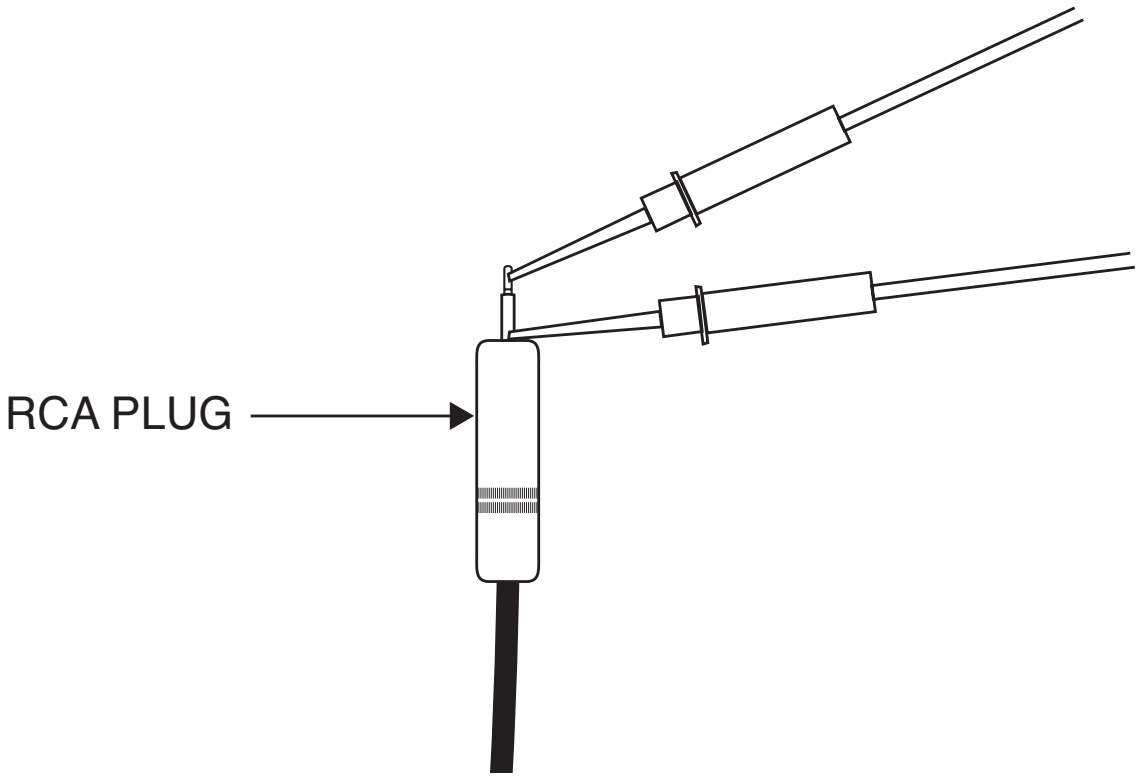


FIGURE F.34 – RCA PLUG TEST POINTS



NOTES

HELMET TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

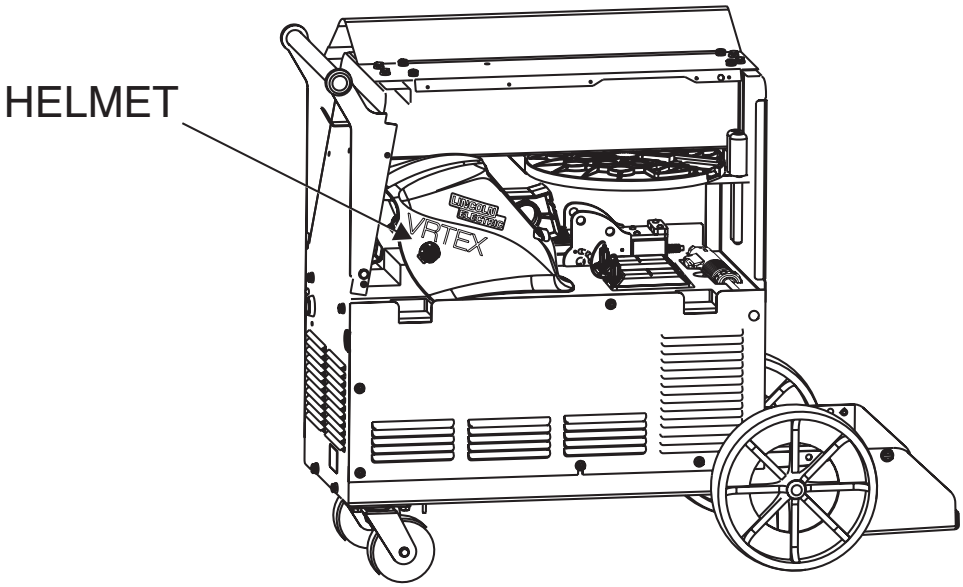
This procedure will aid the technician in determining if the Helmet is functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

HELMET TEST (continued)

FIGURE F.35 – HELMET LOCATION



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

---

1. Perform the ***Case Cover Removal Procedure***.
2. Locate the Helmet. See Figure F.35.
3. Apply input power to the machine.
4. Check for loose or faulty connections at USB 6 on the USB hub and DVI 1 to CPU. See Wiring Diagram.

NOTE: Do not remove DVI connections prior to removing and USB connections.

5. Move the USB plug from USB 6 to an open port on the USB hub. If the visuals in the helmet do not appear, perform the ***USB Hub Test***.
6. If the USB hub test passes, plug the helmet directly into an open USB port in the back of the CPU. Check for visuals in the helmet. If no visuals appear, the helmet may be faulty.

NOTE: Make sure the software is in the virtual environment stage. If not in virtual environment, backlight in helmet should be lit.

7. If faulty, Perform the ***Helmet Removal and Replacement Procedure***.
8. Perform the ***Case Cover Replacement Procedure***.
9. Perform ***Retest After Repair Procedure***.

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

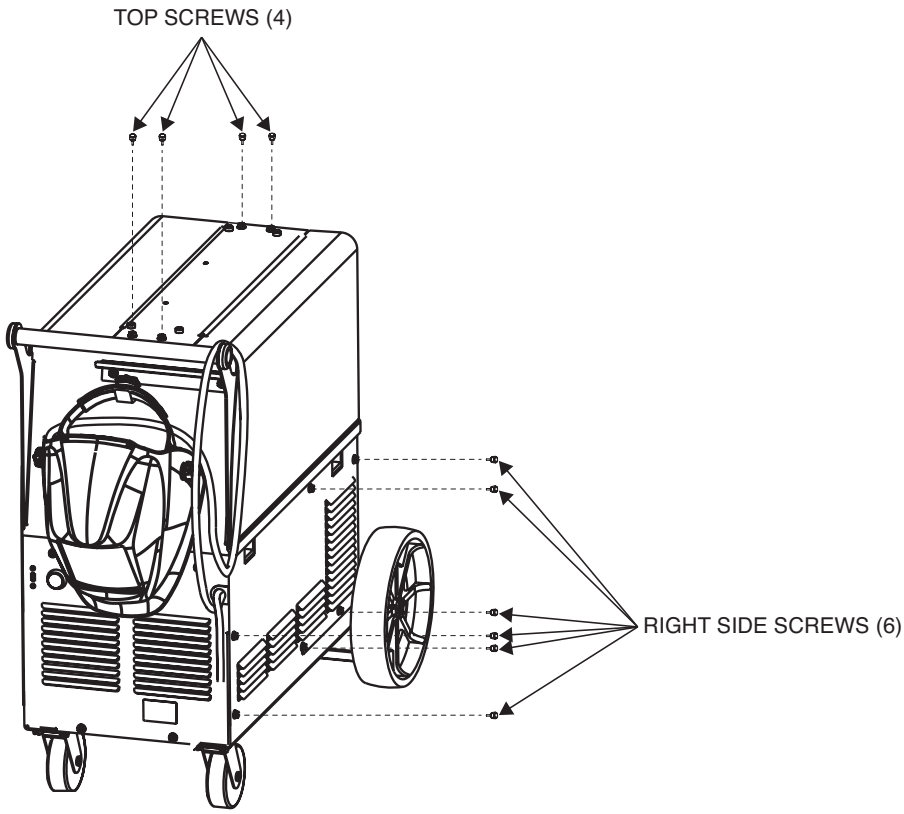
This procedure will aid the technician in the removal and replacement of the Case Covers.

MATERIALS NEEDED

3/8” Nutdriver

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.36 – CASE COVER MOUNTING SCREWS



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Using a 3/8” nutdriver, remove the four screws securing the case top. See Figure F.36.
3. Using a 3/8” nutdriver, remove the six screws securing the right case side cover. See Figure F.36.
4. Using a 3/8” nutdriver, remove the eleven screws securing the left side case cover. (Not shown).

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE (continued)

REPLACEMENT PROCEDURE

1. Using a 3/8” nutdriver, replace the eleven screws securing the left side case cover.
2. Using a 3/8” nutdriver, replace the six screws securing the right case side cover. See ***Figure F.36***.
3. Using a 3/8” nutdriver, replace the four screws securing the case top. See ***Figure F.36***.

NOTES

5/12 VDC POWER SUPPLY REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

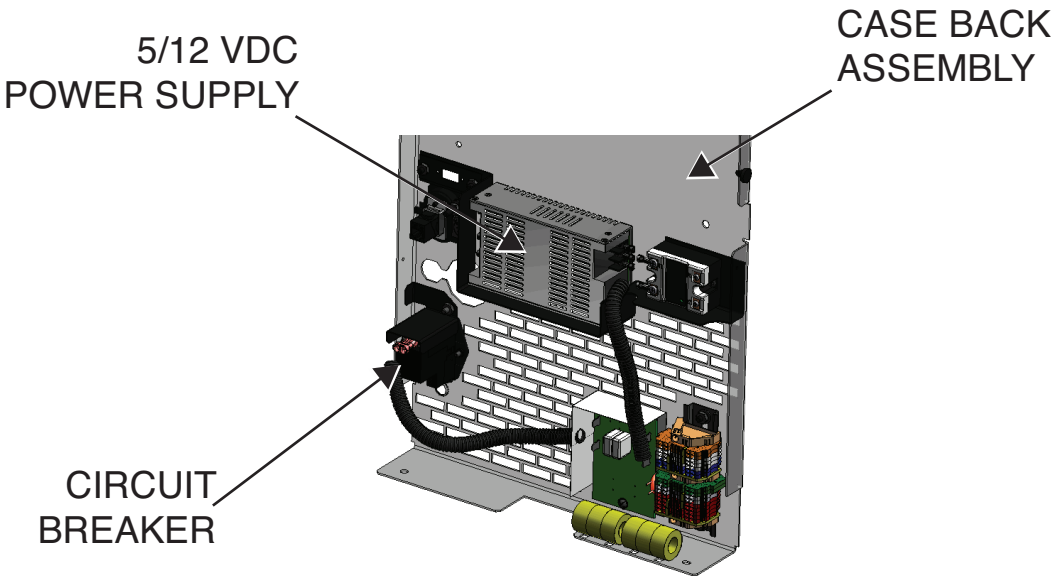
This procedure will aid the technician in the removal and replacement of the 5/12 VDC Power Supply.

MATERIALS NEEDED

Phillips Screwdriver
Small Phillips Screwdriver
Wiring Diagram

5/12 VDC POWER SUPPLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.37 – 5/12 VDC POWER SUPPLY LOCATION



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the 5/12 VDC power supply. See Figure F.37.
4. Using a phillips screwdriver, label and remove leads 801(+), 701(–), 900(+), 502D, 601C and ground leads from the 5/12VDC power supply. See ***Figure F.38***. See Wiring Diagram.
5. Using a small phillips screwdriver, remove the four mounting screws securing the 5/12 VDC power supply to the case back assembly. See ***Figure F.39***.

NOTE: Note placement of insulator if applicable.

5/12 VDC POWER SUPPLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.38 – 5/12 VDC POWER SUPPLY LEADS

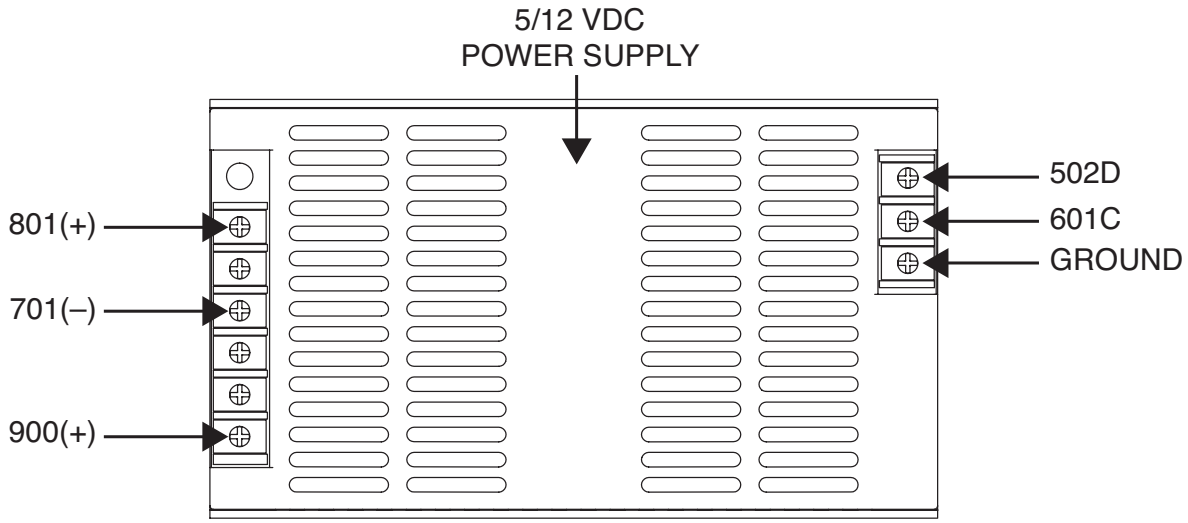
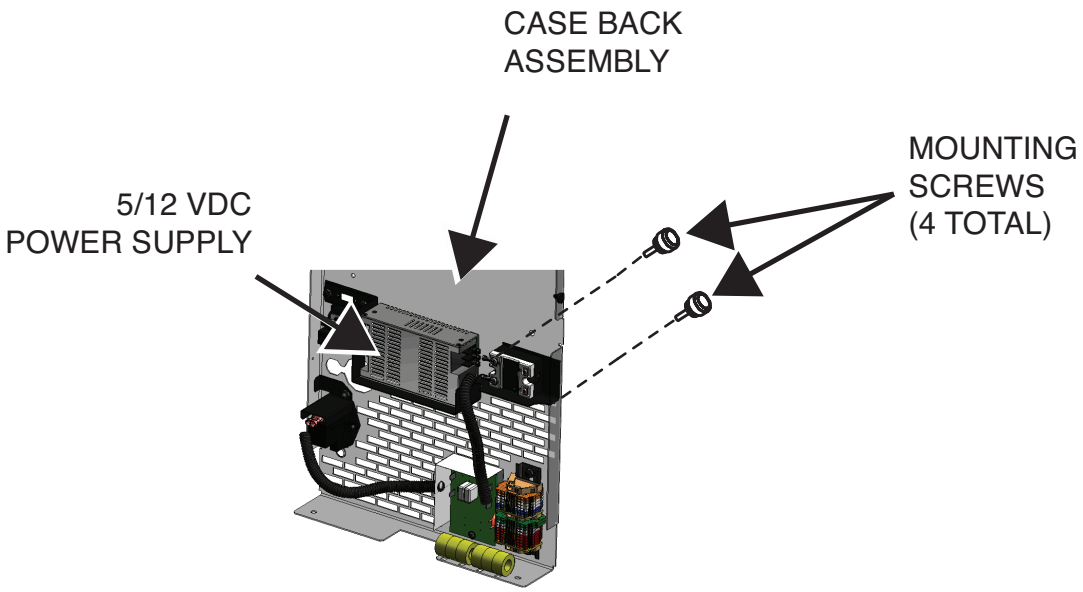


FIGURE F.39 – 5/12 VDC POWER SUPPLY MOUNTING SCREW LOCATION



5/12 VDC POWER SUPPLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

REPLACEMENT PROCEDURE

1. Place new 5/12 VDC power supply into position in the machine. See ***Figure F.37***.

NOTE: Note placement of insulator if applicable.

2. Using a small phillips screwdriver, replace the four previously removed mounting screws and associated washers securing the 5/12 VDC power supply to the case back assembly. See ***Figure F.39***.
3. Using a phillips screwdriver, replace the previously removed leads 801(+), 701(–), 900(+), 502D, 601C and ground leads to the 5/12VDC power supply. See ***Figure F.38***. See Wiring Diagram.
4. Perform the ***Case Cover Replacement Procedure***.
5. Perform ***Retest After Repair Procedure***.

MAIN CABLE ASSEMBLY
REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

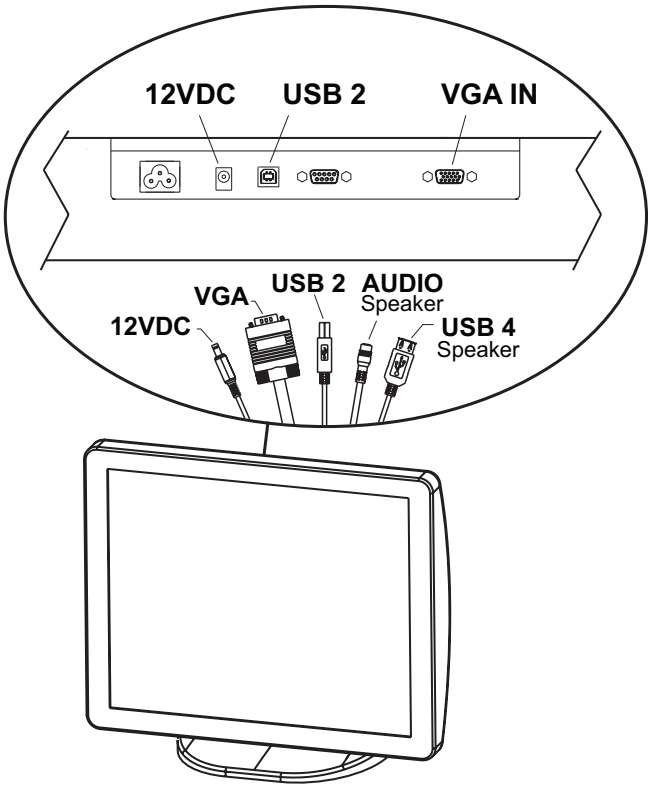
This procedure will aid the technician in the removal and replacement of the Main Cable Assembly.

MATERIALS NEEDED

Miscellaneous Hand Tools
Small Slot Head Screwdriver
Cable Ties

MAIN CABLE ASSEMBLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.40 – MONITOR POWER CABLE END



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Disconnect all leads from monitor and speakers. See Figure F.40.
4. Carefully remove any cable ties from wires running from the machine to monitor.
5. Carefully open and remove toroid from around the associated wiring.

NOTE: For reassembly be sure to take note of how many turns of wire pass through the toroid and also the direction and location.

6. Disconnect USB 2 cable and USB 4 cable from USB hub. See ***Figure F.41*** and ***Figure F.42***.
7. Disconnect VGA 2 cable from VGA splitter. See ***Figure F.41*** and ***Figure F.42***.
8. Disconnect audio cable from the green audio port on the back of the CPU. See ***Figure F.41*** and ***Figure F.43***.
9. Carefully remove plug button from case back assembly. See ***Figure F.44***.
10. Remove and open retaining grommet at case back. See ***Figure F.44***.
11. Using a small slot head screwdriver, disconnect leads 901B and 701D from the terminal block. See ***Figures F.45 and F.46***. See Wiring Diagram.
12. Carefully remove and replace the main cable assembly.

MAIN CABLE ASSEMBLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.41 – MAIN CABLE ASSEMBLY

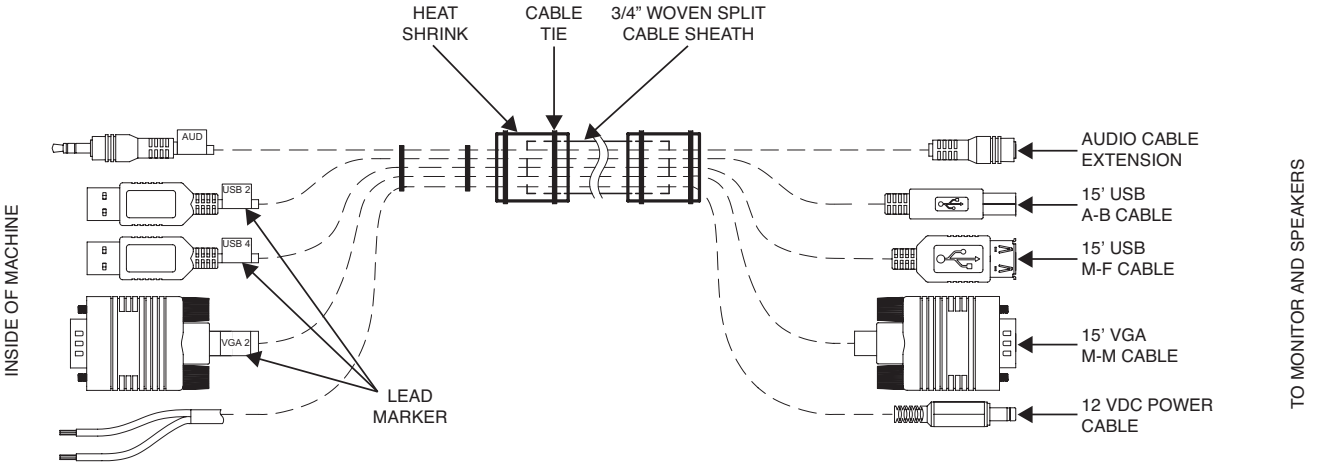
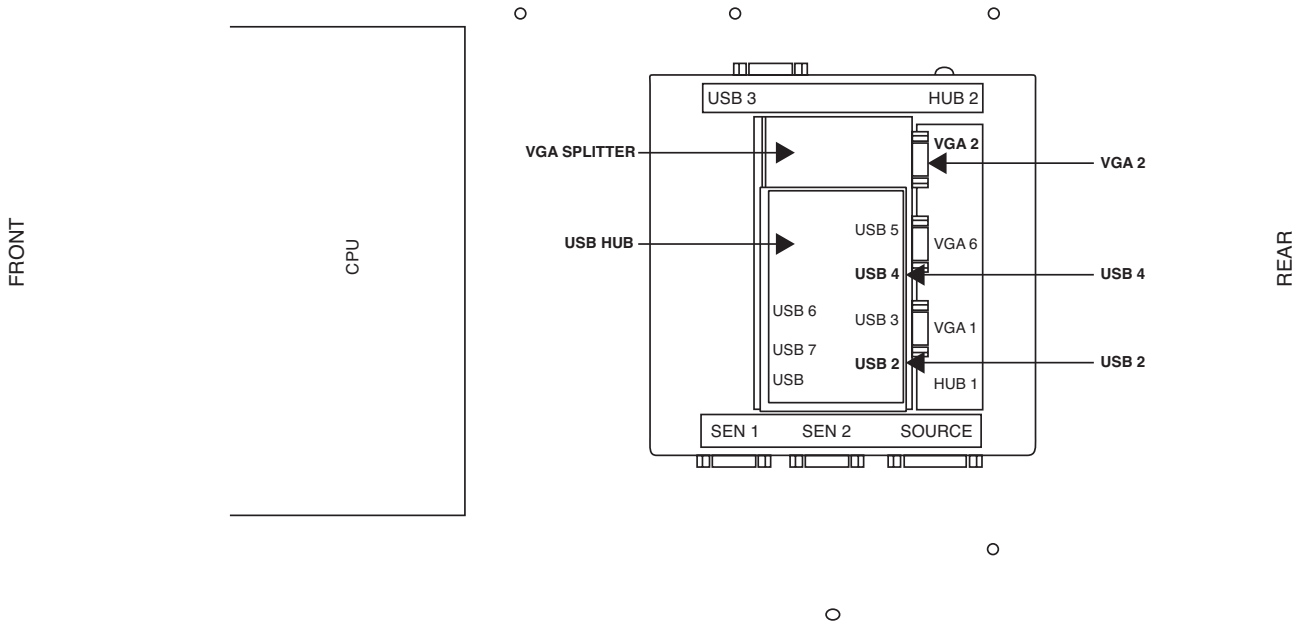


FIGURE F.42 – USB2, USB 4 AND VGA 2 LEAD CONNECTION POINTS



MAIN CABLE ASSEMBLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.43 – AUDIO PORT LOCATION

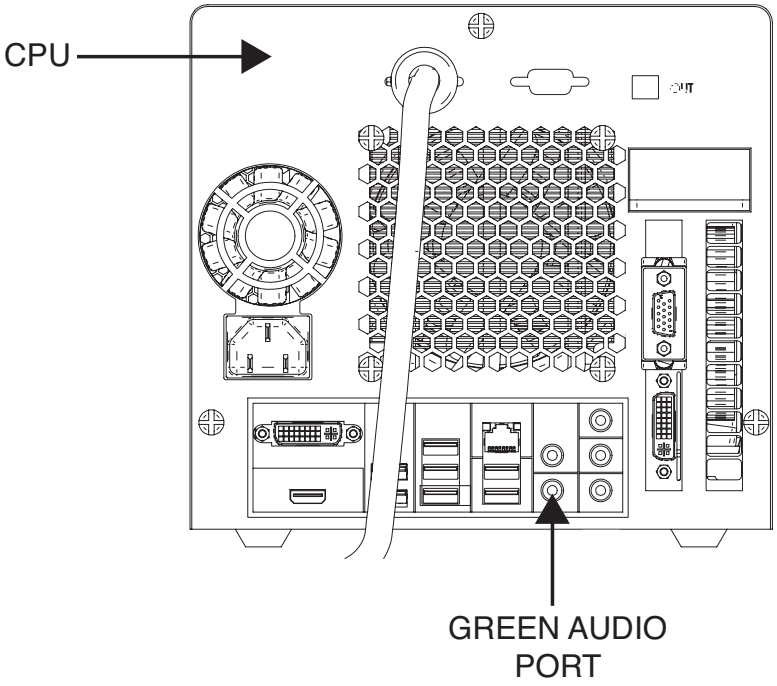
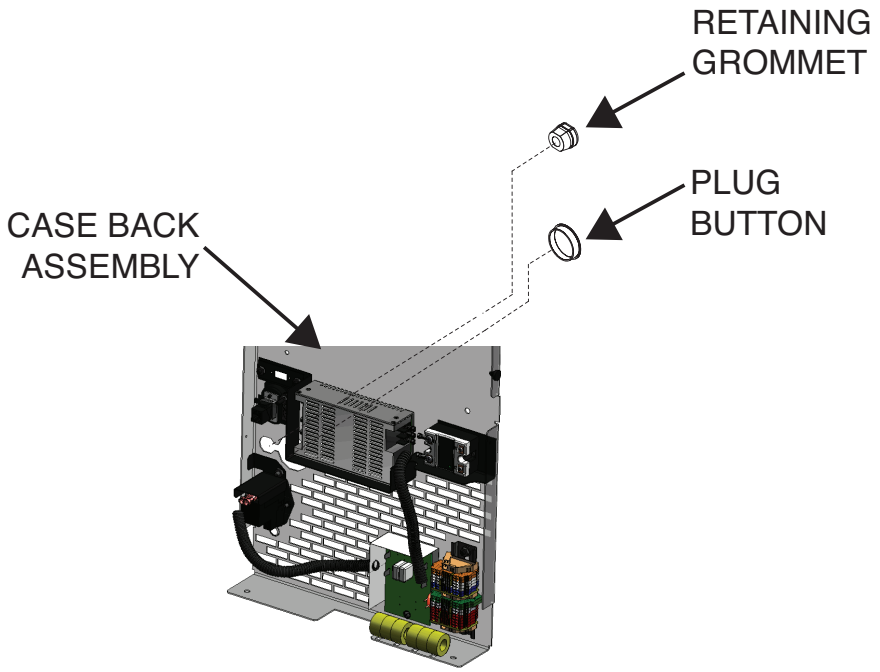


FIGURE F.44 – RETAINING GROMMET LOCATION



MAIN CABLE ASSEMBLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.45 – TERMINAL BLOCK LOCATION

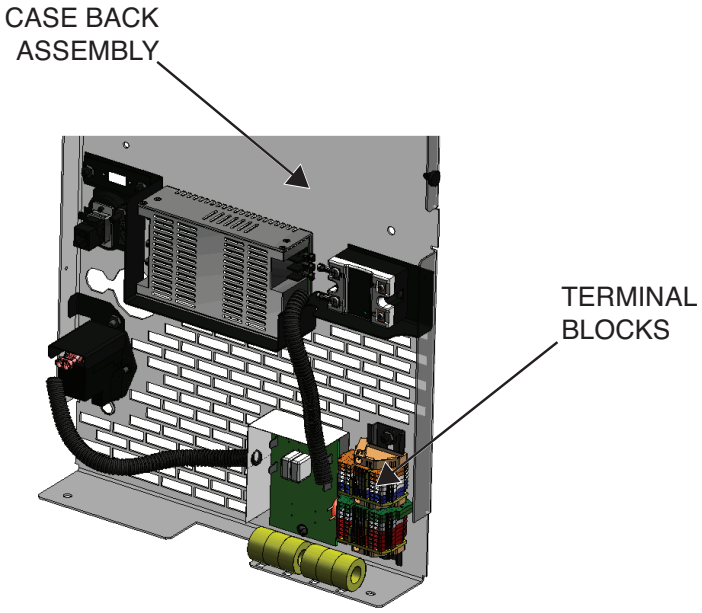
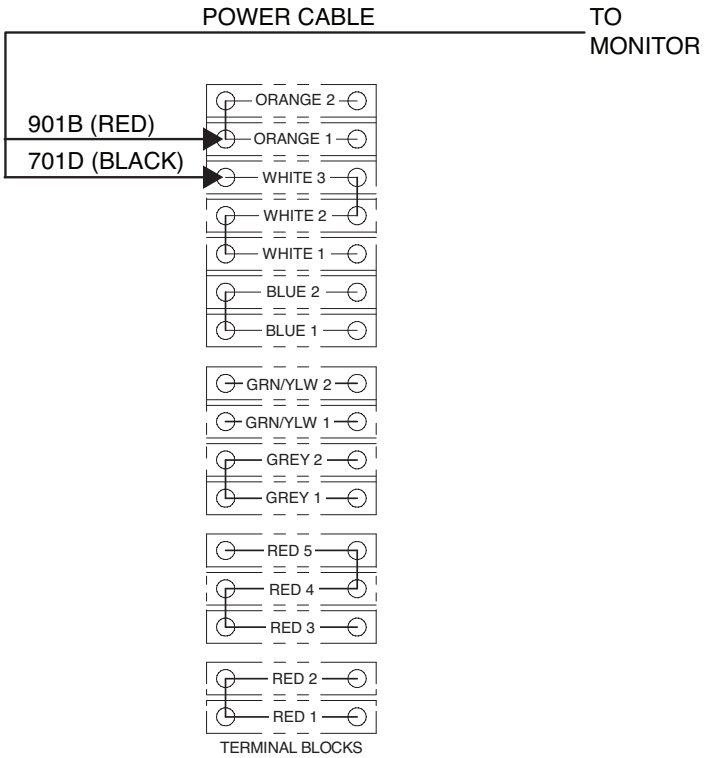


FIGURE F.46 – TERMINAL BLOCK LEAD LOCATIONS



MAIN CABLE ASSEMBLY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

REPLACEMENT PROCEDURE

1. Carefully install the new main cable assembly.
2. Using a small slot head screwdriver, connect leads 901B and 701D to the terminal block. See ***Figures F.45 and F.46***. See Wiring Diagram.
3. Connect audio cable to the green audio port on the back of the CPU. See ***Figure F.41*** and ***Figure F.43***.
4. Connect VGA 2 cable to VGA splitter. See ***Figure F.41*** and ***Figure F.42***.
5. Connect USB 2 cable and USB 4 cable to corresponding ports on USB hub. See ***Figure F.41*** and ***Figure F.42***.
6. Carefully close and place toroid around the associated wiring.

NOTE: For reassembly be sure to take note of how many turns of wire pass through the toroid and also the direction and location.

7. Carefully replace any previously removed cable ties to wires running from the machine to monitor.
8. Close the retaining grommet at case back. See ***Figure F.44***.
9. Carefully replace plug button into case back assembly. See ***Figure F.44***.
10. Connect previously removed leads to speakers and monitor.
11. Perform the ***Case Cover Replacement Procedure***.
12. Perform ***Retest After Repair Procedure***.

INPUT RELAY REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

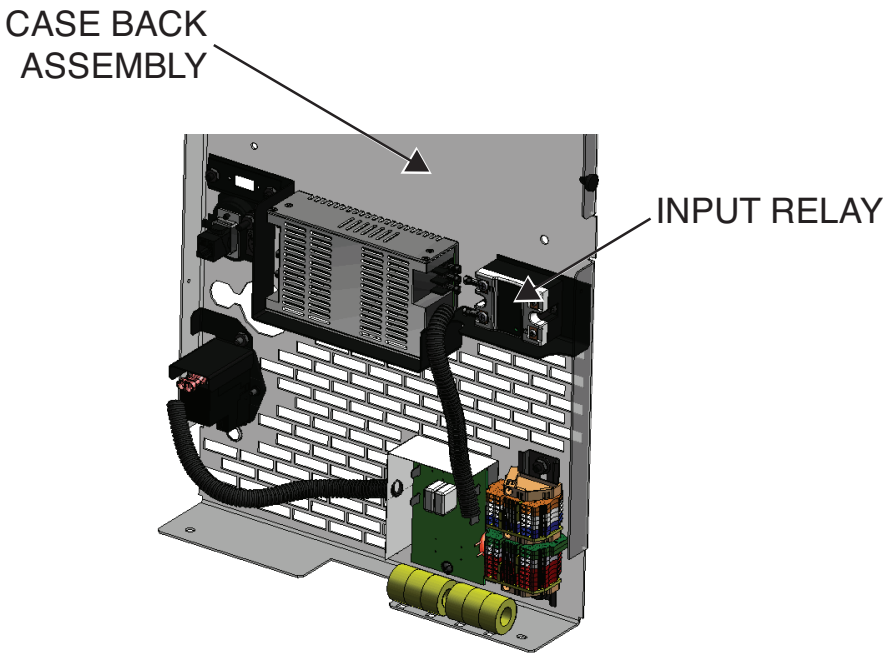
This procedure will aid the technician in the removal and replacement of the Input Relay.

MATERIALS NEEDED

Phillips Screwdriver
Small Phillips Screwdriver

INPUT RELAY REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.47 – INPUT RELAY LOCATION



REMOVAL PROCEDURE

⚠ WARNING

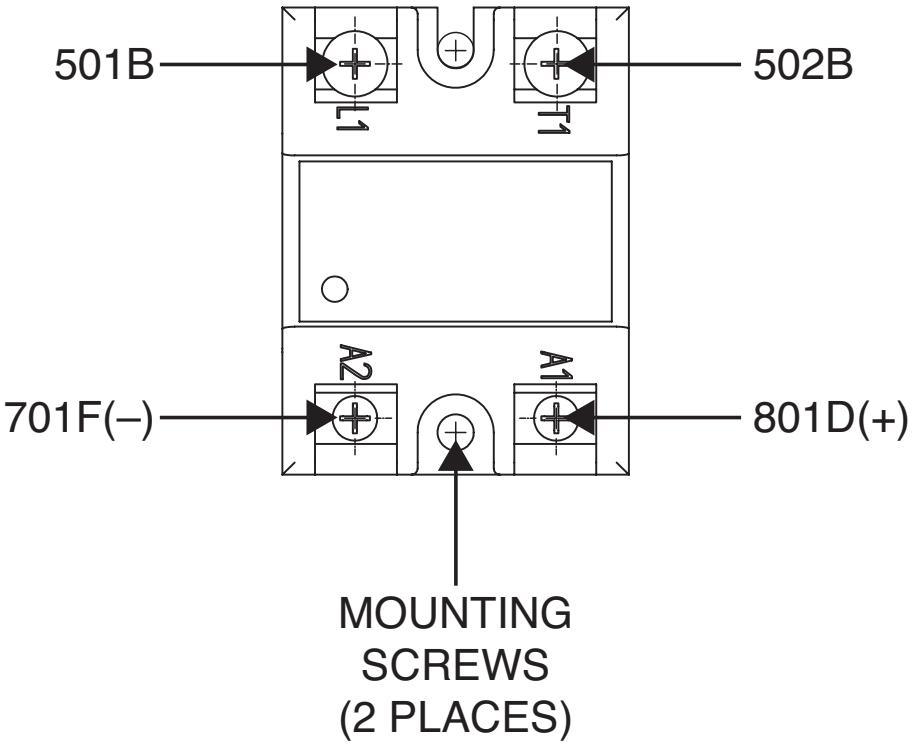
ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the Input Relay. See Figure F.47.
4. Label leads 801D, 701F, 501B and 502B and their appropriate terminals. See ***Figure F.48***. See Wiring Diagram.
5. Using a phillips head screwdriver, remove the two input relay mounting screws. See ***Figure F.48***.
6. Using a small phillips screwdriver, disconnect the four previously labeled leads from terminals A1, A2, T1 and L1. See ***Figure F.48***.
7. Carefully remove and replace the input relay. Be sure to take note of position of plastic insulator upon removal if present during disassembly.

INPUT RELAY REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.48 – INPUT RELAY LEAD LOCATIONS



REPLACEMENT PROCEDURE

1. Carefully place new input relay into position. Take note to replace plastic insulator previously removed (if present during disassembly).
2. Using a small phillips screwdriver, connect the four previously labeled and removed leads to terminals A1, A2, T1 and L1. See Figure F.48.
3. Using the two previously removed mounting screws, mount the input relay. See Figure F.48.
4. Perform the ***Case Cover Replacement Procedure***.
5. Perform ***Retest After Repair Procedure***.

NOTES

USB HUB REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

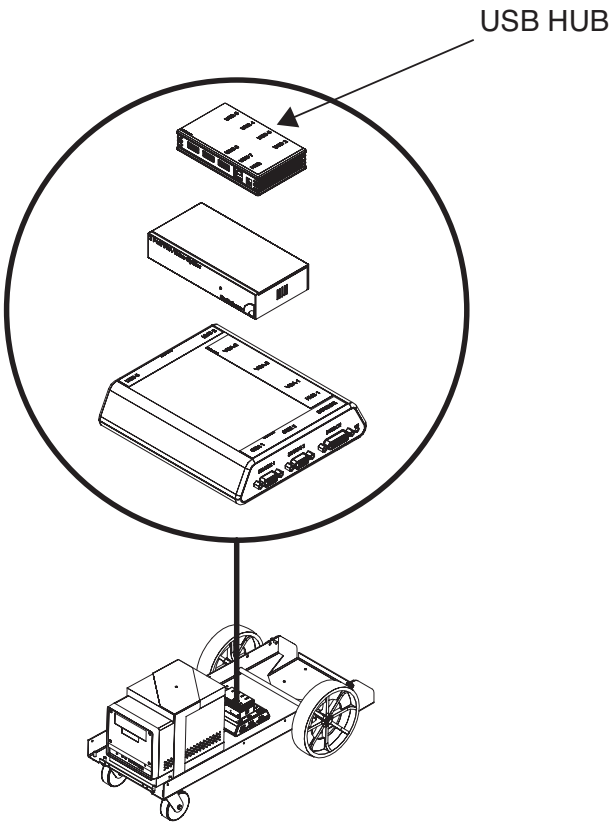
This procedure will aid the technician in the removal and replacement of the USB Hub.

MATERIALS NEEDED

Miscellaneous Hand Tools

USB HUB REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.49 – USB HUB LOCATION



REMOVAL PROCEDURE

⚠ WARNING

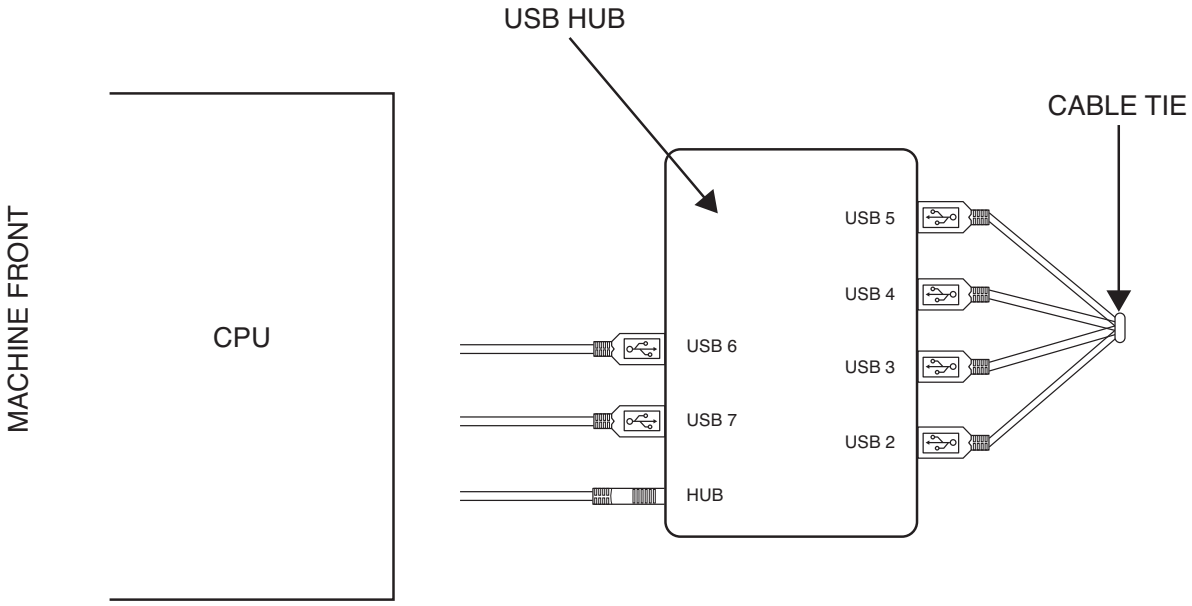
ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the USB hub. See Figure F.49.
4. Label and remove all leads from hub terminals. See ***Figure F.50***.
5. Remove cable ties (if applicable). See ***Figure F.50***.
6. Remove and replace the USB hub. The hub is secured to the VGA splitter with a hook and loop type fastener.

USB HUB REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.50 – USB HUB LEAD LOCATIONS



REPLACEMENT PROCEDURE

1. Carefully place the new USB hub into position in the machine. See ***Figure F.49***.
2. Using the hook and loop type fastener, secure the USB hub to the VGA splitter.
3. Connect all previously removed leads to the USB hub terminals. See Figure F.50.
4. Replace any previously removed cable ties. See Figure F.50.
5. Perform the ***Case Cover Replacement Procedure***.
6. Perform ***Retest After Repair Procedure***.

NOTES

VGA SPLITTER REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

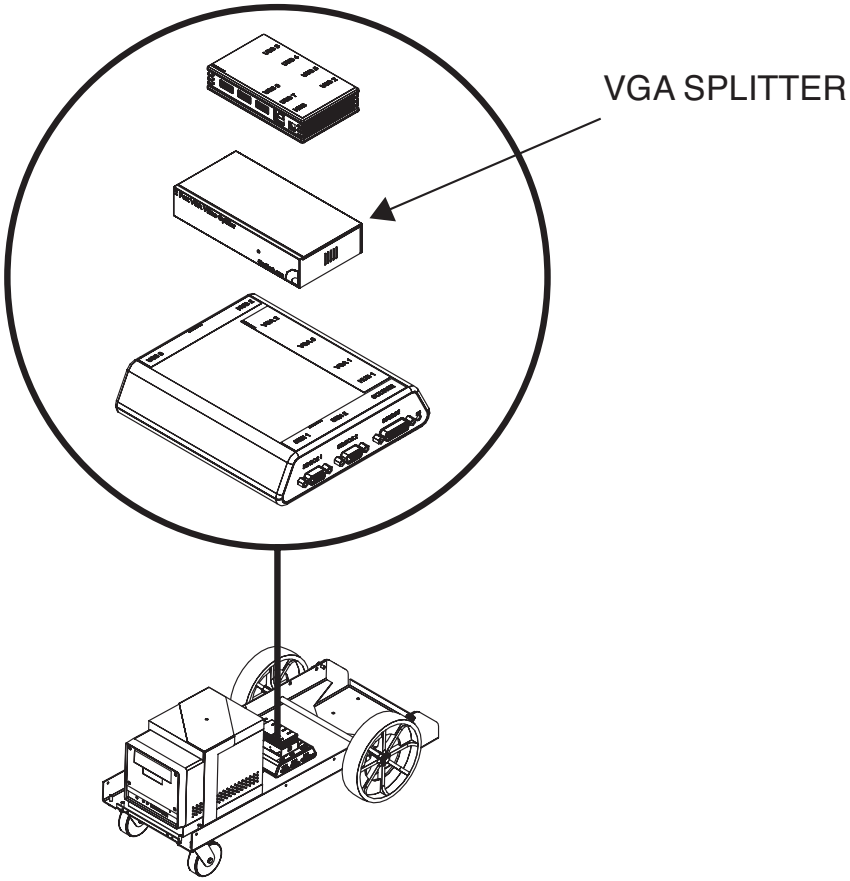
This procedure will aid the technician in the removal and replacement of the VGA Splitter.

MATERIALS NEEDED

Miscellaneous Hand Tools

VGA SPLITTER REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.51 – VGA SPLITTER LOCATION



REMOVAL PROCEDURE

⚠ WARNING

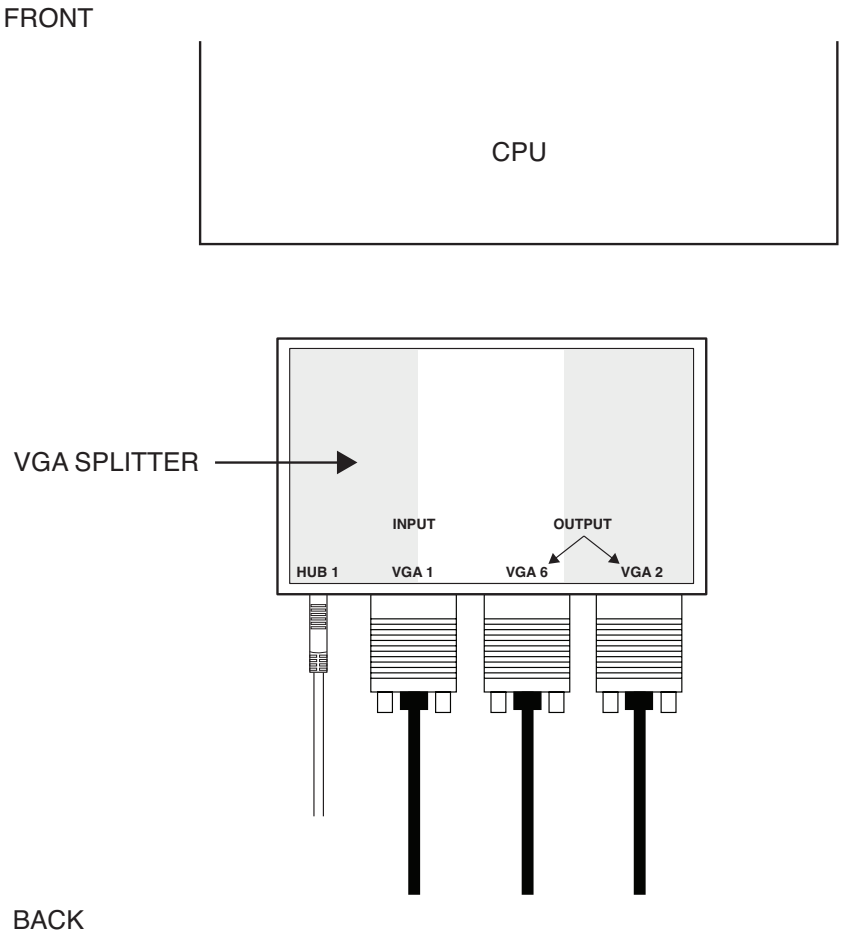
ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the VGA splitter. See Figure F.51.
4. Perform the ***USB Hub Removal Procedure***.
5. Label and remove VGA 2, VGA 6, VGA 1 and the source power from the VGA splitter. See ***Figure F.52***.
6. Remove cable ties (if applicable).
7. Remove and replace the VGA splitter. The VGA splitter is secured to the Polhemus/Patriot SEU module with a hook and loop type fastener.

VGA SPLITTER REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.52 – VGA SPLITTER LEAD LOCATIONS



REPLACEMENT PROCEDURE

1. Place the new VGA splitter into position in the machine. The VGA splitter is secured to the Polhemus/Patriot SEU module by a hook and loop type fastener.
2. Connect all previously removed leads and source power to the VGA splitter. See Figure F.52.
3. Perform the ***USB Hub Replacement Procedure***.
4. Perform the ***Case Cover Replacement Procedure***.
5. Perform ***Retest After Repair Procedure***.

NOTES

POLHEMUS / PATRIOT SEU MODULE REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

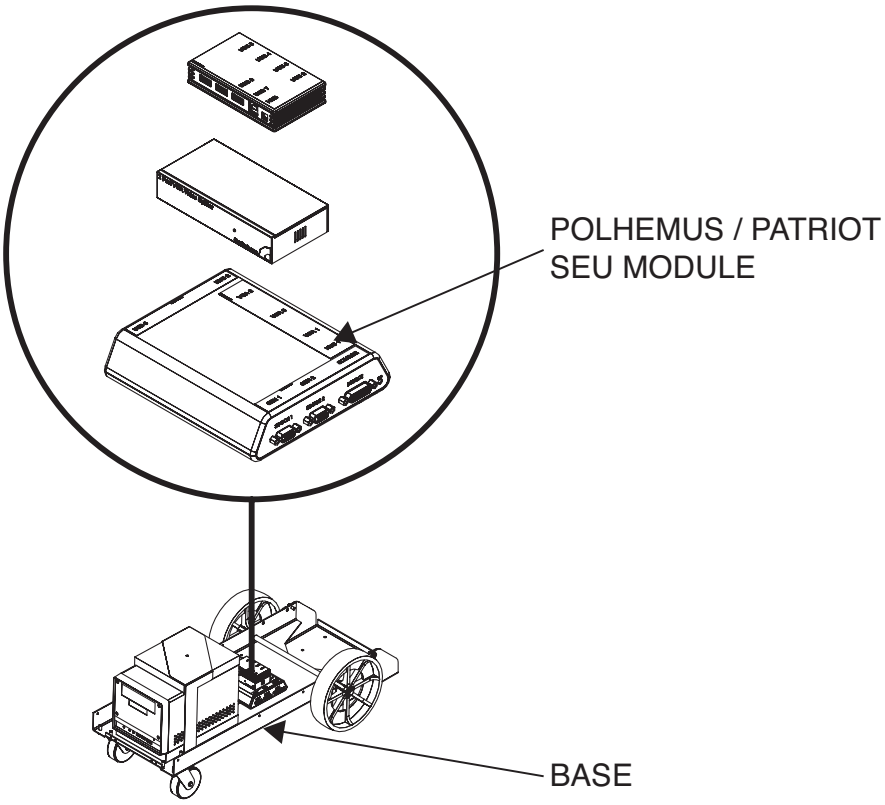
This procedure will aid the technician in the removal and replacement of the Polhemus / Patriot SEU Module.

MATERIALS NEEDED

Wiring Diagram

POLHEMUS / PATRIOT SEU MODULE REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.53 – POLHEMUS / PATRIOT SEU MODULE LOCATION



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

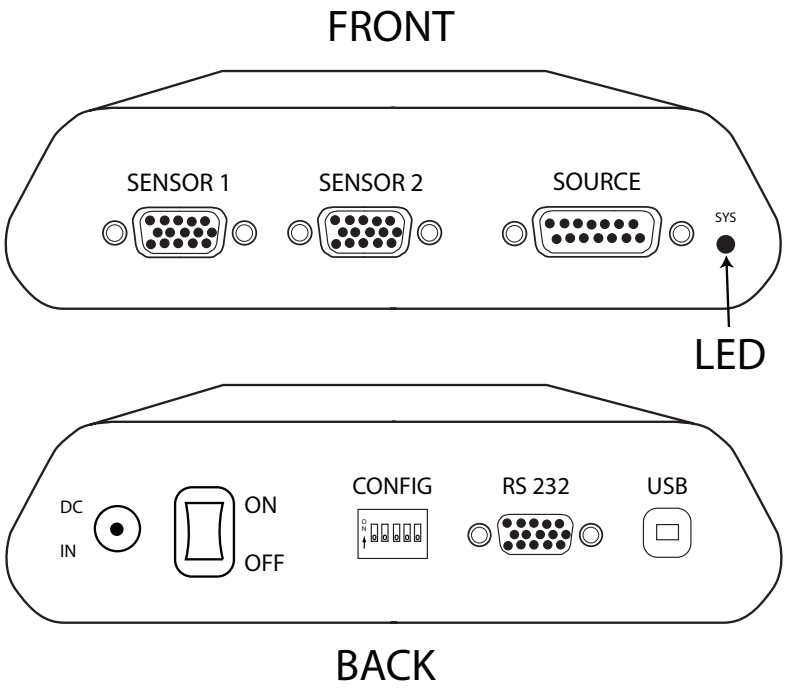
- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the Polhemus / Patriot SEU Module. See Figure F.53.
4. Perform the ***USB Hub Removal Procedure***.
5. Perform the ***VGA Splitter Removal Procedure***.
6. Label all cables and connections for reassembly. See Wiring Diagram.
7. Remove the five associated cables connected to the Polhemus / Patriot SEU Module. Note and label the locations before disconnecting. See ***Figure F.54***.
8. Carefully remove Polhemus / Patriot SEU Module from base. See ***Figure F.54***.

NOTE: The Polhemus / Patriot SEU Module is secured to the base with hook & loop type fasteners.

POLHEMUS / PATRIOT SEU MODULE
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.54 – POLHEMUS / PATRIOT SEU MODULE LEAD LOCATIONS



REPLACEMENT PROCEDURE

1. Carefully position new Polhemus / Patriot SEU Module in the machine. The Polhemus / Patriot SEU Module is secured to the base with hook & loop type fasteners. See ***Figure F.53***.
2. Connect all previously removed cables to the Polhemus / Patriot SEU Module. See Figure F.54.
3. Make certain that the on/off switch is in the ON position.
4. Perform the ***VGA Splitter Replacement Procedure***.
5. Perform the ***USB Hub Replacement Procedure***.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Hardware Initialization (PIMAN.EXE) Procedure***, located in the Polhemus/ Patriot SEU Module Test.
8. Perform ***Retest After Repair Procedure***.

NOTES

CPU REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

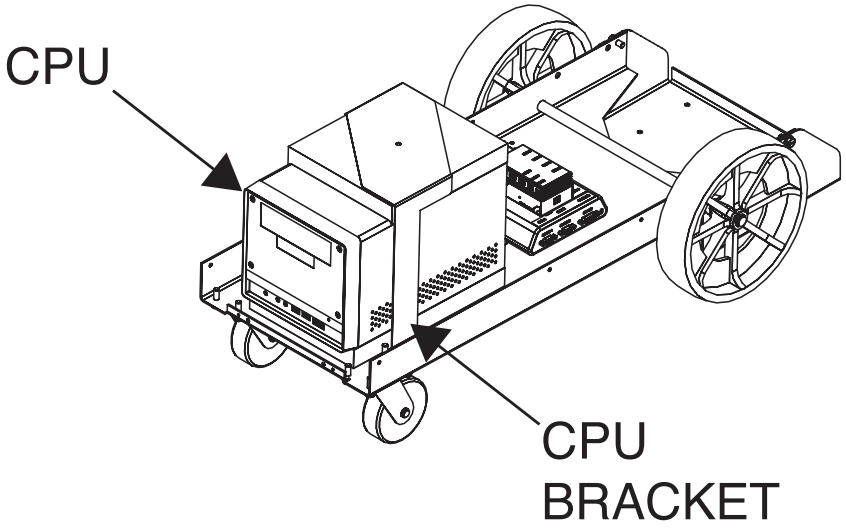
This procedure will aid the technician in the removal and replacement of the CPU.

MATERIALS NEEDED

7/16” Deepwell Nutdriver
Small Phillips Screwdriver

CPU REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.55 – CPU LOCATION



REMOVAL PROCEDURE

⚠ WARNING

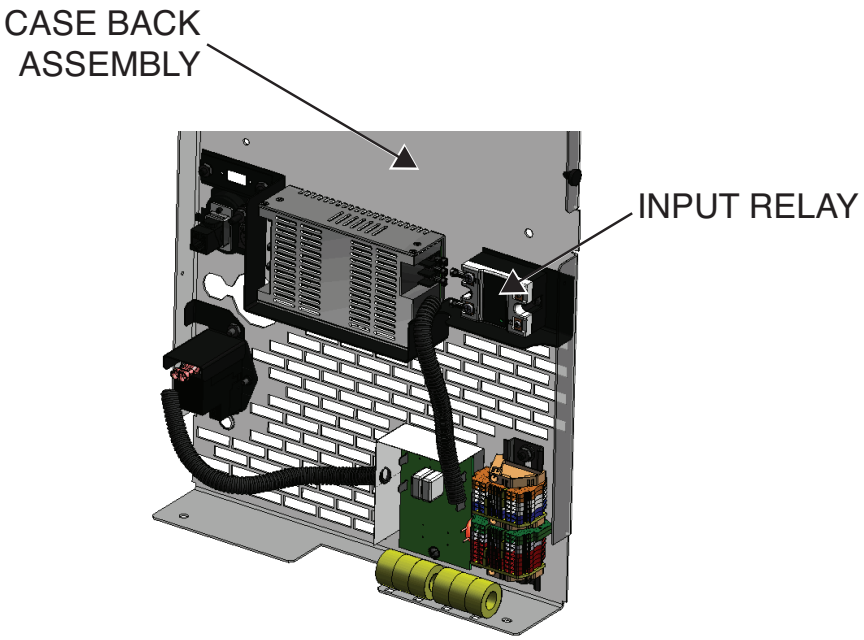
ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the CPU. See Figure F.55.
4. Disconnect input power cord to CPU.
5. Using a phillips screwdriver, label and disconnect leads 701F and 801D from terminals A1 and A2 on the input relay. See ***Figures F.56*** and ***F.57***.
6. Label and disconnect leads DVI 1 and DVI 2 from the back of the CPU. See ***Figure F.58***.
7. Label and disconnect the RED ENET cable from the back of the CPU. See ***Figure F.58***.
8. Label and disconnect the audio cable from the GREEN audio port on the back of the CPU. See ***Figure F.58***.
9. Label and disconnect USB 7 cable from the back of the CPU. See ***Figure F.58***.
10. Using a deepwell 7/16” nutdriver, remove the two nuts and associated washers from the bottom of the machine securing the CPU bracket. See ***Figure F.59***.

CPU REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.56 – INPUT RELAY LOCATION



11. The CPU bracket can now be carefully moved toward the back of the machine to make way for CPU removal out of the left side of the machine.

NOTE: The CPU mounting bracket does not need to be removed from the machine in order to remove CPU. The mounting bracket simply needs to be moved toward the rear of the machine to make room.

12. Remove CPU foam pad from top of CPU.
13. Carefully remove CPU out of the left side of the machine. Be sure to clear all wires prior to removal.
14. Replace CPU.

CPU REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.57 – INPUT RELAY LEAD LOCATIONS

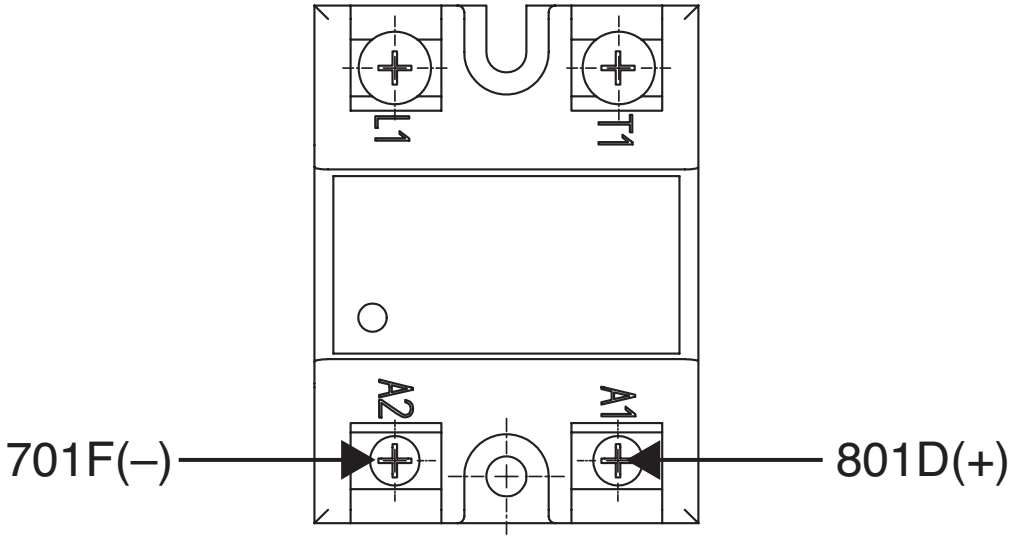
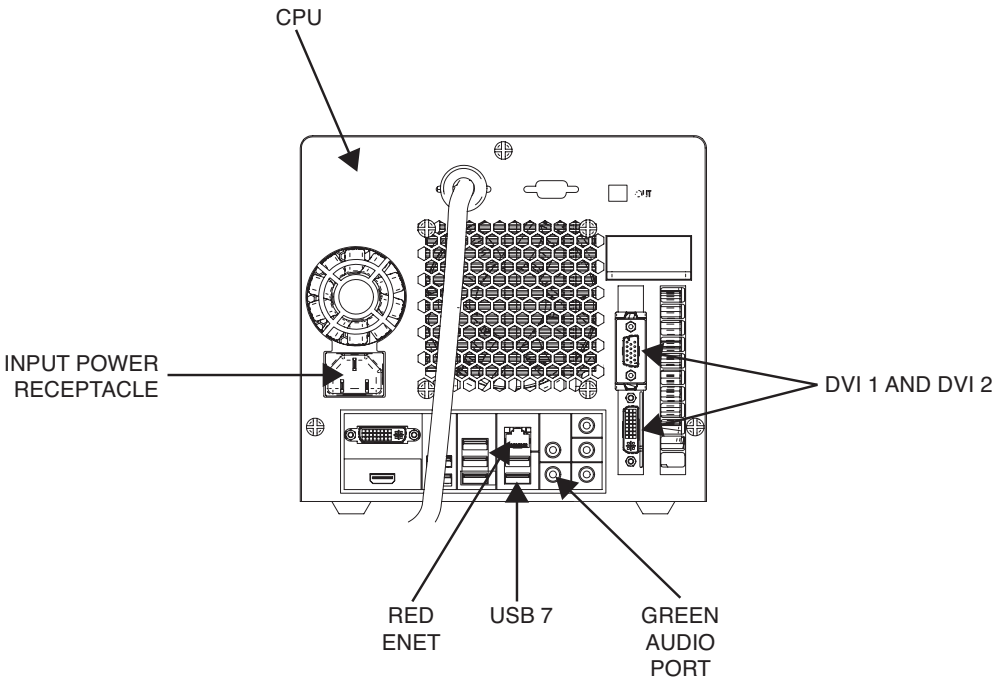
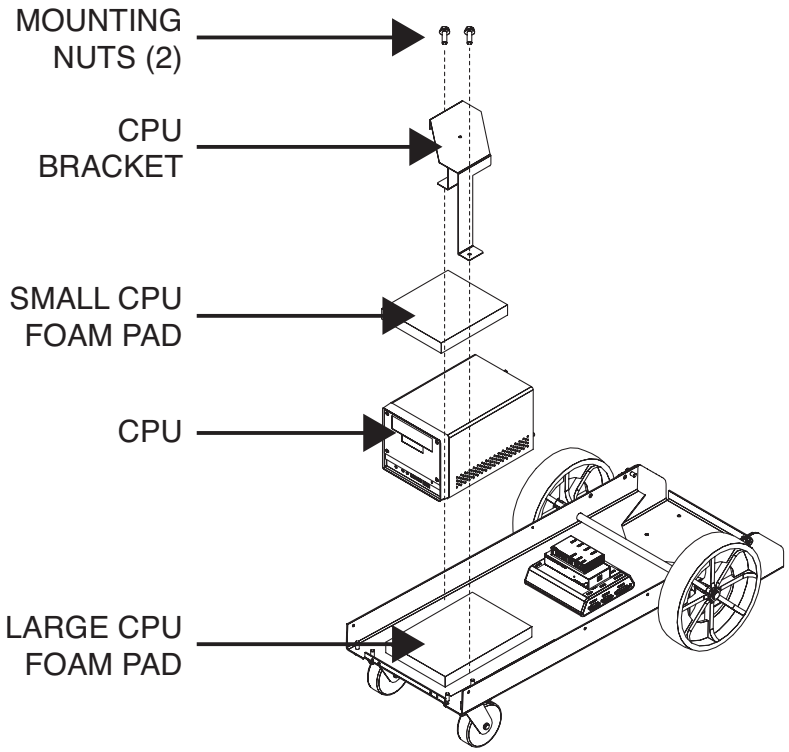


FIGURE F.58 – CPU LEAD LOCATIONS



CPU REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.59 – CPU MOUNTING BOLTS



REPLACEMENT PROCEDURE

1. Carefully position CPU through the left side of the machine. Be sure to clear all wires.
2. Place the CPU foam pad to top of CPU.
3. Using a deepwell 7/16" nutdriver, attach the two screws, nuts and associated washers to the bottom of the machine securing the CPU bracket. See Figure F.59.
4. Connect input power cord to CPU.
5. Connect previously removed USB 7 cable to the back of the CPU. See ***Figure F.58***.
6. Connect previously removed audio cable to the GREEN audio port on the back of the CPU. See ***Figure F.58***.
7. Connect previously removed RED ENET cable to the back of the CPU. See ***Figure F.58***.
8. Connect previously removed leads DVI 1 and DVI 2 to the back of the CPU. See ***Figure F.58***.
9. Connect previously removed leads 701F and 801D to the input relay. See ***Figures F.56*** and ***F.57***.

NOTE: If optional K3165-3 (SMAW kit) was installed, please call 1-888-935-3878 for further instruction.

10. Perform the ***Case Cover Replacement Procedure***.
11. Perform the ***Touchscreen Monitor Calibration Procedure***.
12. Perform the ***Hardware Initialization (PIMAN. EXE) Procedure***, located in the Polhemus/ Patriot SEU Module Test.
13. Perform ***Retest After Repair Procedure***.

NOTES

CMOS BATTERY REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

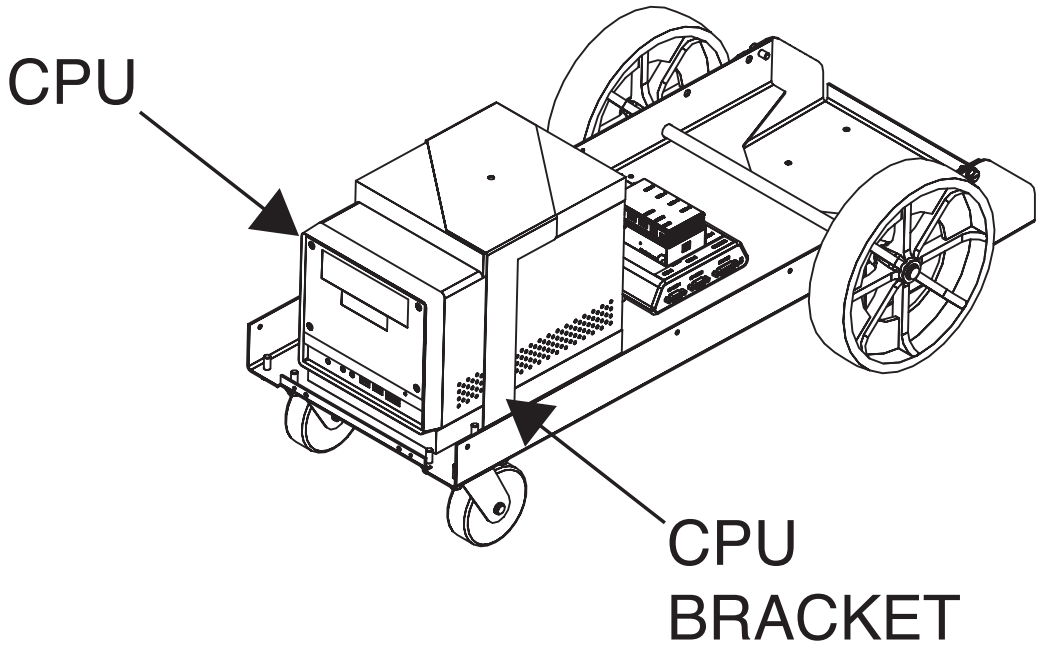
This procedure will aid the technician in the removal and replacement of the CMOS Battery.

MATERIALS NEEDED

3/8” Socket/Wrench/Nutdriver
Deepwell 7/16” Socket/Wrench
Phillips Screwdriver
Small Slotted Screwdriver
USB Keyboard
USB Mouse
CMOS Battery (CR2032)

CMOS BATTERY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.60 – CPU LOCATION



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

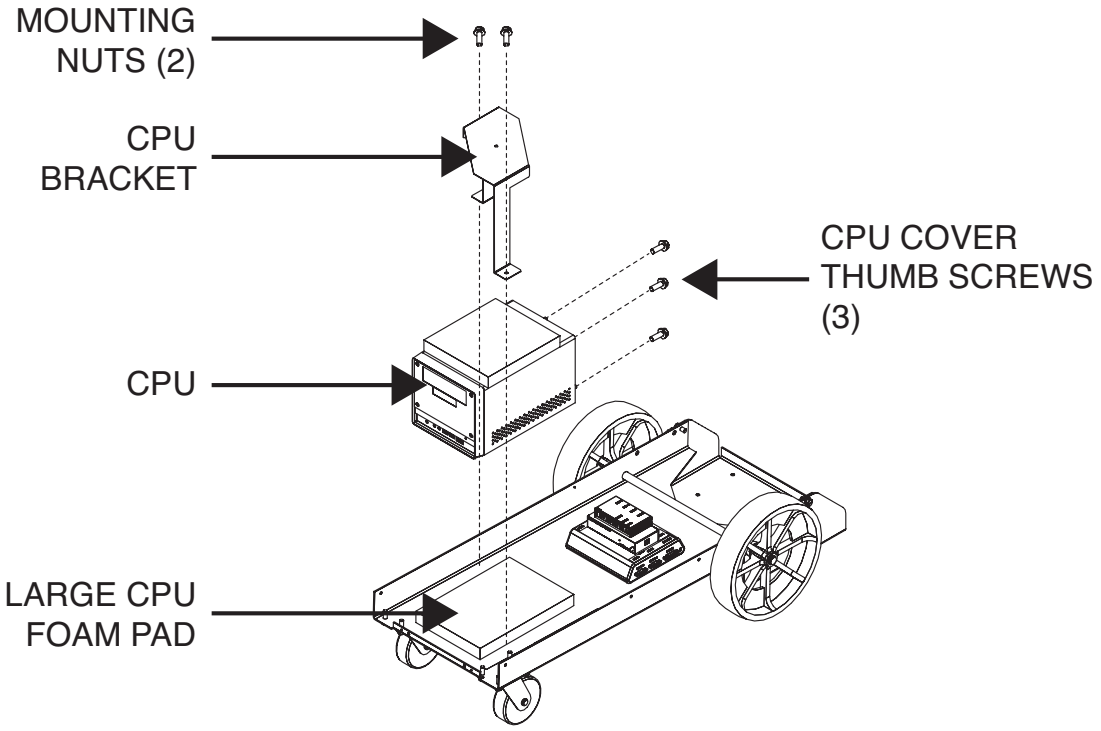
STATIC-SENSITIVE DEVICE
Static electricity can damage sensitive internal components of CPU. Use caution when working inside of CPU.

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the CPU. See Figure F.60.
4. Disconnect input power cord to CPU.
5. Using a deepwell 7/16” socket/wrench, remove the two nuts and associated washers from the bottom of the machine securing the CPU bracket. See Figure F.60 and ***Figure F.61***.
6. The CPU bracket can now be carefully moved toward the back of the machine.

NOTE: The CPU mounting bracket does not need to be removed from the machine. The mounting bracket simply needs to be moved toward the rear of the machine to make room.

CMOS BATTERY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.61 – CMOS BATTERY REMOVAL

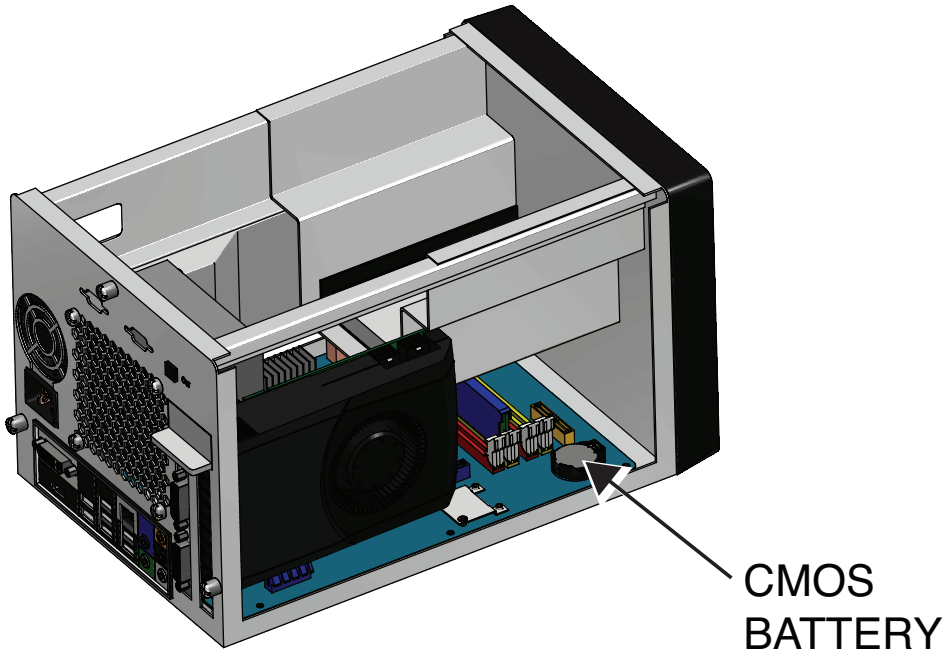


7. Using a phillips screwdriver (if necessary), remove the three thumb screws from the back of the CPU securing the CPU cover. See Figure F.61.
8. Carefully maneuver the CPU cover up and back to gain access to the internal components of the CPU.
9. Locate the circular CMOS battery. CMOS battery is located on motherboard inside of CPU and is easily accessible from the left side of the machine. See ***Figure F.62***.
10. Carefully remove CMOS battery from motherboard.

NOTE: A small flathead screwdriver may be necessary to gently lift up and remove the CMOS battery.

CMOS BATTERY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.62 – CMOS BATTERY LOCATION



REPLACEMENT PROCEDURE

1. Carefully insert new CMOS battery (CR2032) into appropriate location on the motherboard.

NOTE: Plus "+" of the CMOS battery will be facing upwards.

2. Carefully place the CPU cover into position on the CPU.
3. Using the three thumb screws previously removed, secure the CPU cover. See ***Figure F.61***.
4. Connect the input power cord the CPU.
5. Remove the plug button on the lower right of the case front.
6. Connect the USB mouse and keyboard to the USB ports located on the rear of the CPU.
7. Carefully apply input power to the machine.

NOTE: It may be necessary to view some of the images, setup screens and control panels through the FMD.

8. Perform the ***BIOS Setup Procedure***.

⚠ WARNING

BIOS setup must be performed before proceeding. Potentially fatal software failure possible.

9. Machine will now proceed to load the VRTEX Mobile software. At login screen, verify correct image (Login screen) on monitor. See Figure F.63.

NOTE: Initial Lincoln Electric Green Initiative splash screen may not appear.

CMOS BATTERY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.63 – Login screen

10. If the correct image (Login screen) is showing proceed with steps 11 thru 14. If the correct image is not present proceed to step 15. See Figure F.63.

11. Proceed to enter the weld environment and verify duplicate image on the monitor and the FMD.

12. On the touchscreen monitor press MENU and then select shutdown and then YES to shut down the machine.

13. Cycle the machine again and verify the correct image (Login screen) and operation.

14. Proceed to step 25 to complete the CMOS Battery Replacement Procedure.

15. If the correct image (Login screen) is not present, perform the ***NVIDIA Control Panel Setup Procedure***.

16. The machine will now proceed to load the VRTEX Mobile software.

17. At the login screen, verify the correct image (Login screen) on the monitor.

18. If the correct image (Login screen) is on the monitor, proceed to step 11. If the correct image does not appear on the screen, proceed to step 19.

19. Perform the ***Uninstall NVIDIA Programs Procedure***.

20. The machine will now proceed to load the VRTEX Mobile software.

21. At the login screen, verify the correct image (Login screen) on the monitor.

22. If the correct image (Login screen) is on the monitor, proceed to step 11.

23. If the correct image (Login screen) is not present, using the touchscreen monitor or USB keyboard and mouse press start and then press shutdown to shut the machine down.

24. Proceed to step 8.

CMOS BATTERY
REMOVAL AND REPLACEMENT PROCEDURE (continued)

25. Using the touchscreen monitor, press MENU, select shutdown and then Yes to shut down the machine.

26. Remove input power to the machine.

27. Disconnect the USB keyboard and mouse from the USB ports.

28. Attach the plug button to the lower right part of the case front.

29. Using a deepwell 7/16” socket/wrench, attach the two nuts and associated washers securing the CPU bracket to the bottom of the machine.

30. Perform the ***Case Cover Replacement Procedure***.

31. Perform ***Retest After Repair Procedure***.

BIOS SETUP PROCEDURE

⚠ WARNING

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

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

TEST DESCRIPTION

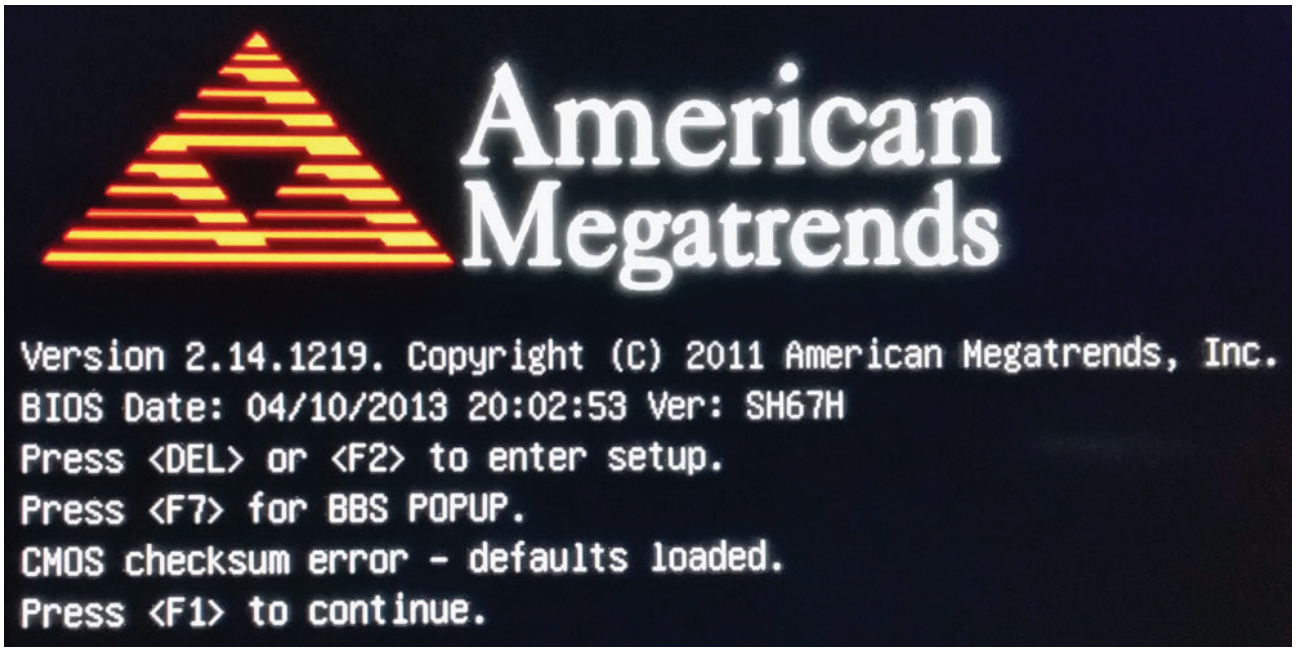
This procedure will aid the technician in completing the CMOS Battery Replacement Procedure.

MATERIALS NEEDED

USB Keyboard

BIOS SETUP PROCEDURE (continued)

FIGURE F.64 – BIOS screen



PROCEDURE

⚠ WARNING

BIOS setup must be performed when replacing the CMOS battery. Potentially fatal software failure possible.

1. Turn machine on by depressing the green circular button on case front. If the green button does not stay on, press and hold the green button and then press up and release the CPU push button located inside the opening in lower part of the case front. DO NOT HOLD THE CPU PUSH BUTTON.

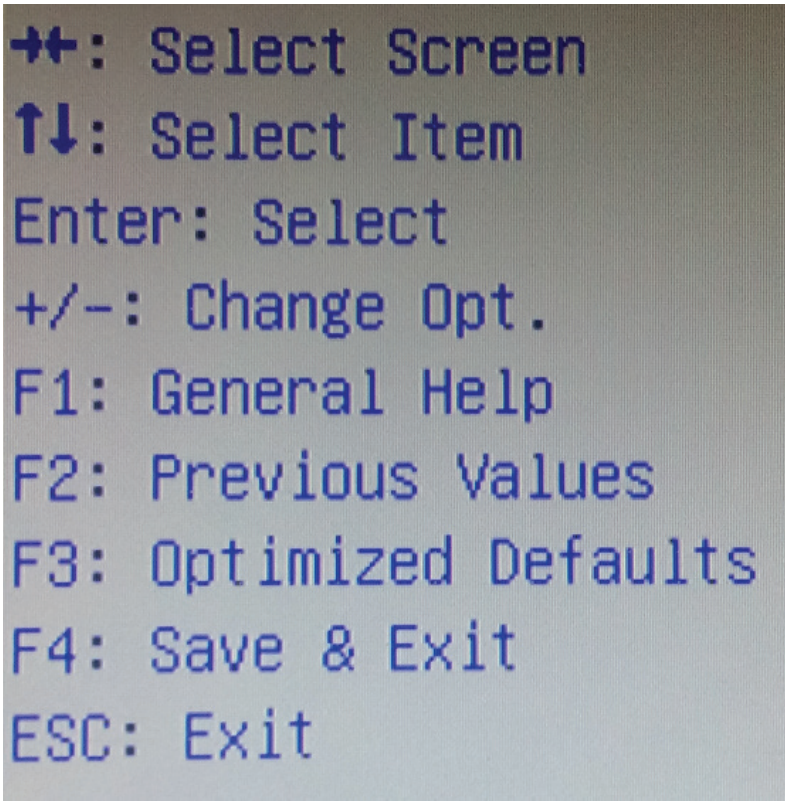
NOTE: If after performing above step the machine continues to turn off, repeat above step and continue to hold the green button until machine turns on.

NOTE: Using the USB keyboard, immediately press the F2 key until the BIOS setup utility appears or until boot screen appears. See Figure F.64.

2. If the boot screen appears, it will read “Press <F1> to continue.”.
3. Using the USB keyboard, Press the F1 key, then immediately press the F2 key until the BIOS setup utility appears. See Figure F.64.
4. To navigate in the BIOS setup utility, use the keys shown in ***Figure F.65***.
5. Once in the BIOS setup utility, if requested to “Load Previous Values?” appears on the screen, select Yes. See ***Figure F.66***.
6. Using the USB keyboard, set the System Date and System Time to the current date and time. See ***Figure F.67***.
7. Using the USB keyboard, navigate to the “Advanced” tab. Navigate to power management configuration. See ***Figure F.68***.

BIOS SETUP PROCEDURE (continued)

FIGURE F.65 – BIOS setup navigation keys



8. Set the 'EuP Function' to 'Disabled'. Also set the 'Power-On after Power-Fail' to 'Power On' or 'Enabled'. See ***Figure F.69***.
9. Using the USB keyboard, navigate to the "Boot" tab. See ***Figure F.70***.
10. In the "Boot" tab under Boot Configuration, set '1st Boot' to 'Hard Disk: KINGSTON ...'. Also set '6th Boot' to 'Disabled'. See ***Figure F.70***.

NOTE: Use the enter key to make changes to the boot configuration, not the + or - keys. The boot configuration must match ***Figure B.70***.

11. Using the USB keyboard, press the F4 key to save configuration. Press the enter key for Yes. See ***Figure F.71***.
12. Return to the ***CMOS Battery Replacement Procedure***, step 9.

BIOS SETUP PROCEDURE (continued)

FIGURE F.66 – Load previous values

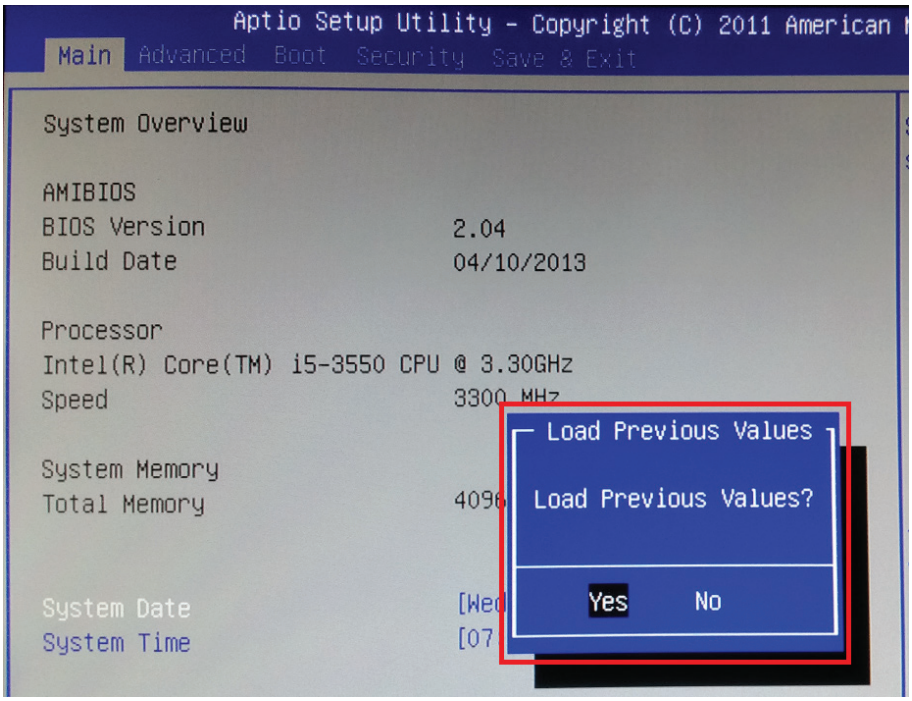
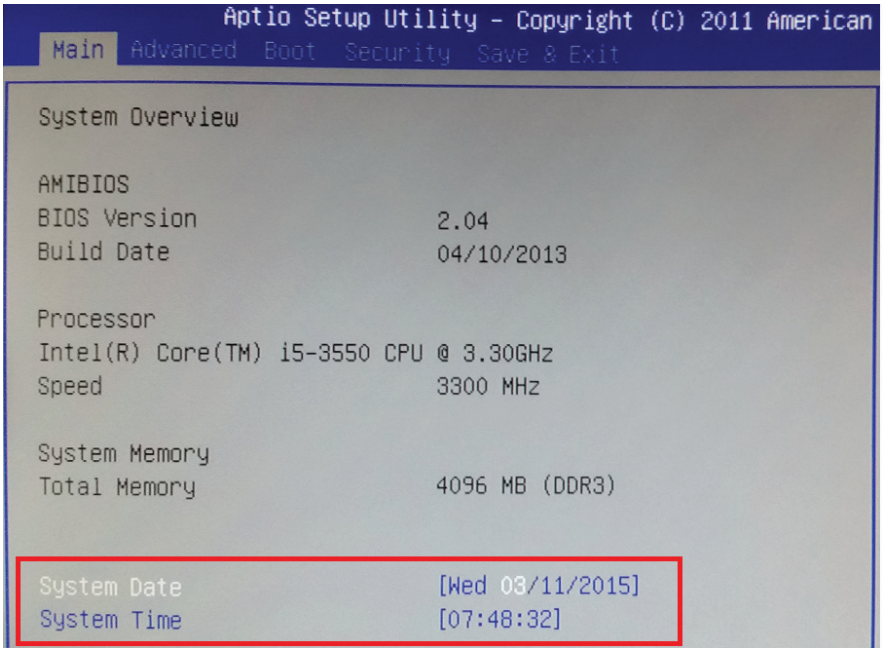


FIGURE F.67 – Set system date and time



BIOS SETUP PROCEDURE (continued)

FIGURE F.68 – Advanced tab

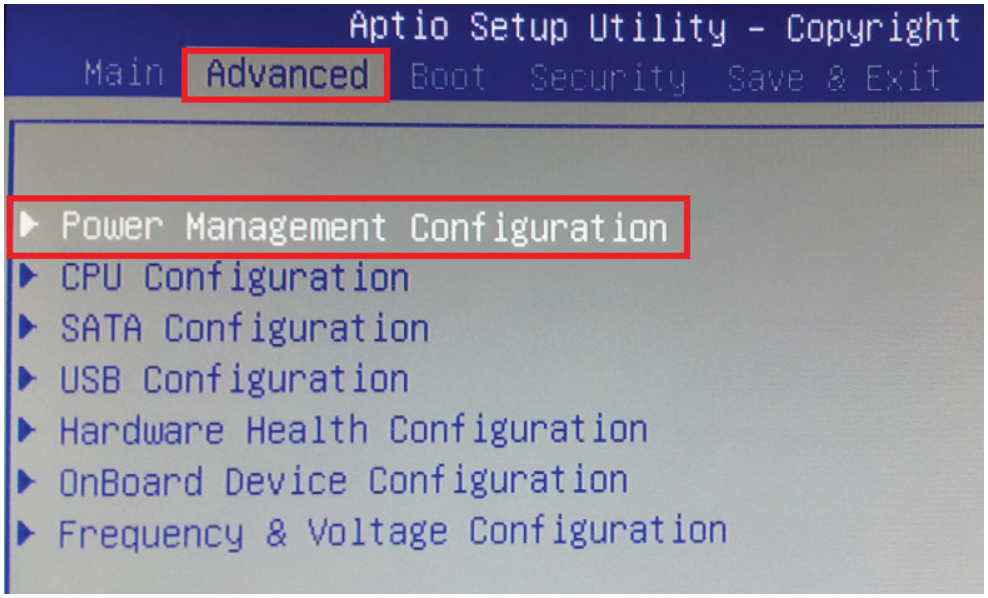
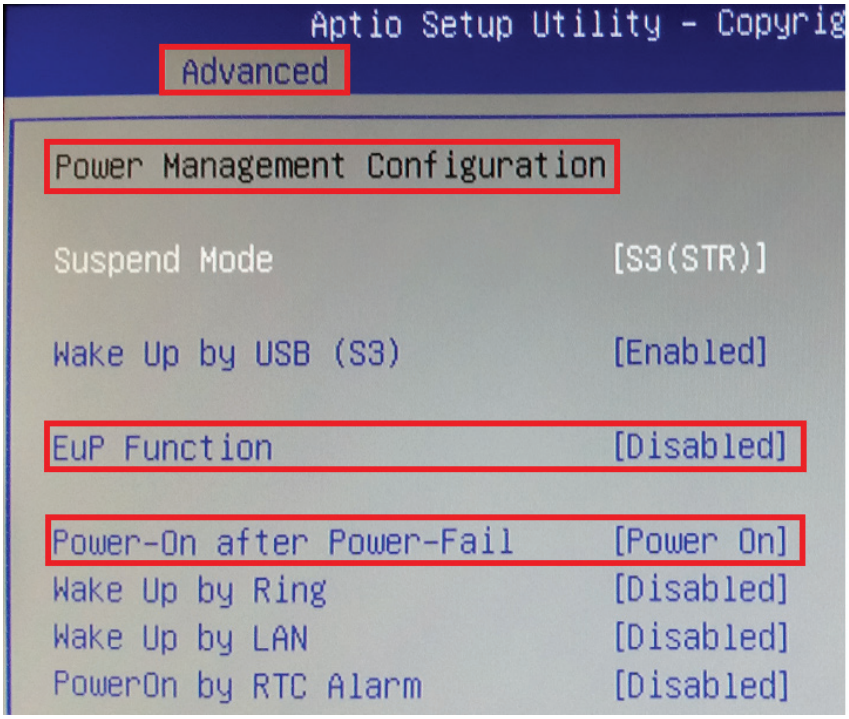


FIGURE F.69 – Power management configuration



BIOS SETUP PROCEDURE (continued)

FIGURE F.70 – Boot tab

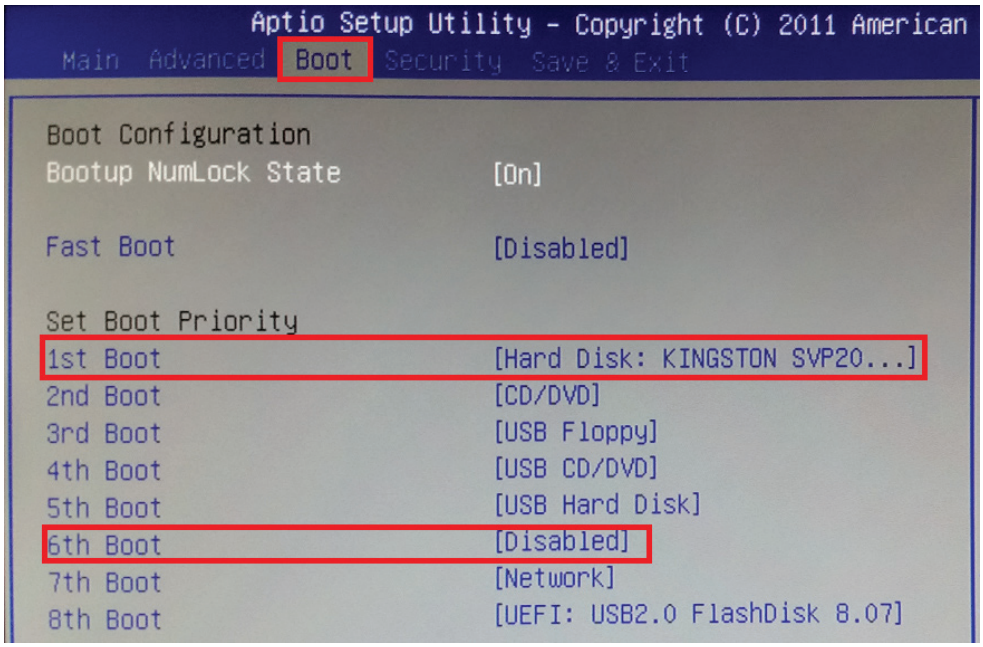
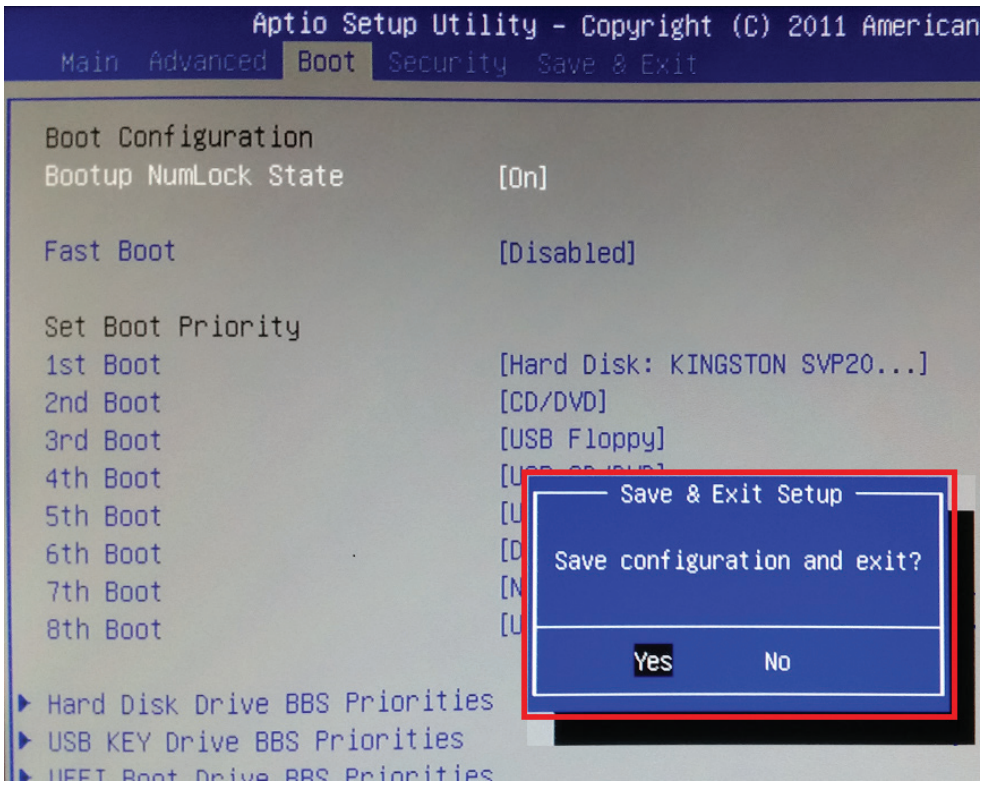


FIGURE F.71 – Save configuration



NVIDIA CONTROL PANEL SETUP PROCEDURE

⚠ WARNING

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

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

TEST DESCRIPTION

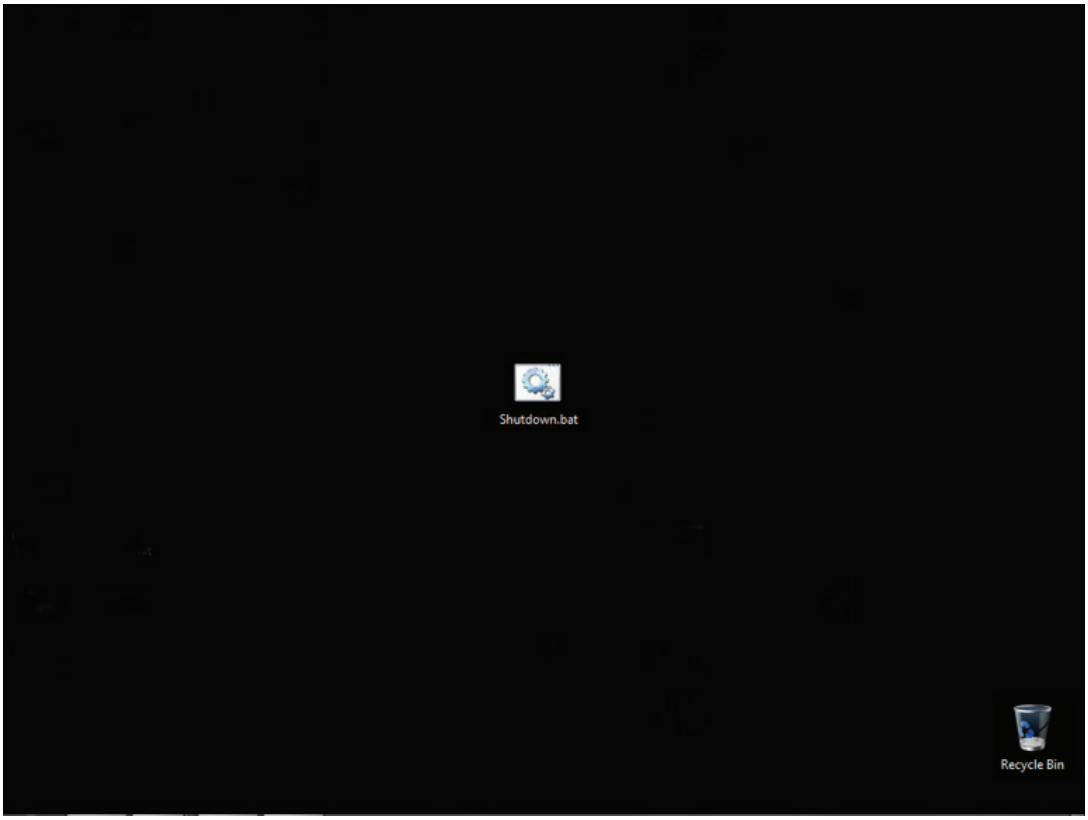
This procedure will aid the technician in completing the CMOS Battery Replacement Procedure.

MATERIALS NEEDED

USB Keyboard
USB Mouse

NVIDIA CONTROL PANEL SETUP PROCEDURE (continued)

FIGURE F.72 – Desktop



PROCEDURE

NOTE: Icons, programs and message boxes may appear both in the helmet's FMD (face mounted display) and on the touchscreen monitor.

1. Using the USB keyboard, press and hold the Windows key and then press the D key, the desktop will now be visible. See Figure F.72.
2. Using the USB mouse, move the cursor towards the bottom of the monitor until the taskbar appears. See ***Figure F.73***.
3. Using the USB mouse, right click on Crosstrainer.exe and close all windows. See ***Figure F.74***.
4. Using the USB mouse, move the cursor towards the bottom of the monitor until the taskbar appears.
5. Using the USB mouse, right click on Host Application (Main Menu.vi) and close all windows. See ***Figure F.75***.
6. Using the USB mouse, right click on the desktop and select NVIDIA Control Panel from the menu. See ***Figure F.76***.
7. If necessary, open the Display tree in the NVIDIA Control Panel and select Setup Multiple Displays. See ***Figure F.77***.
8. The displays should be set up as shown in ***Figure F.77***.

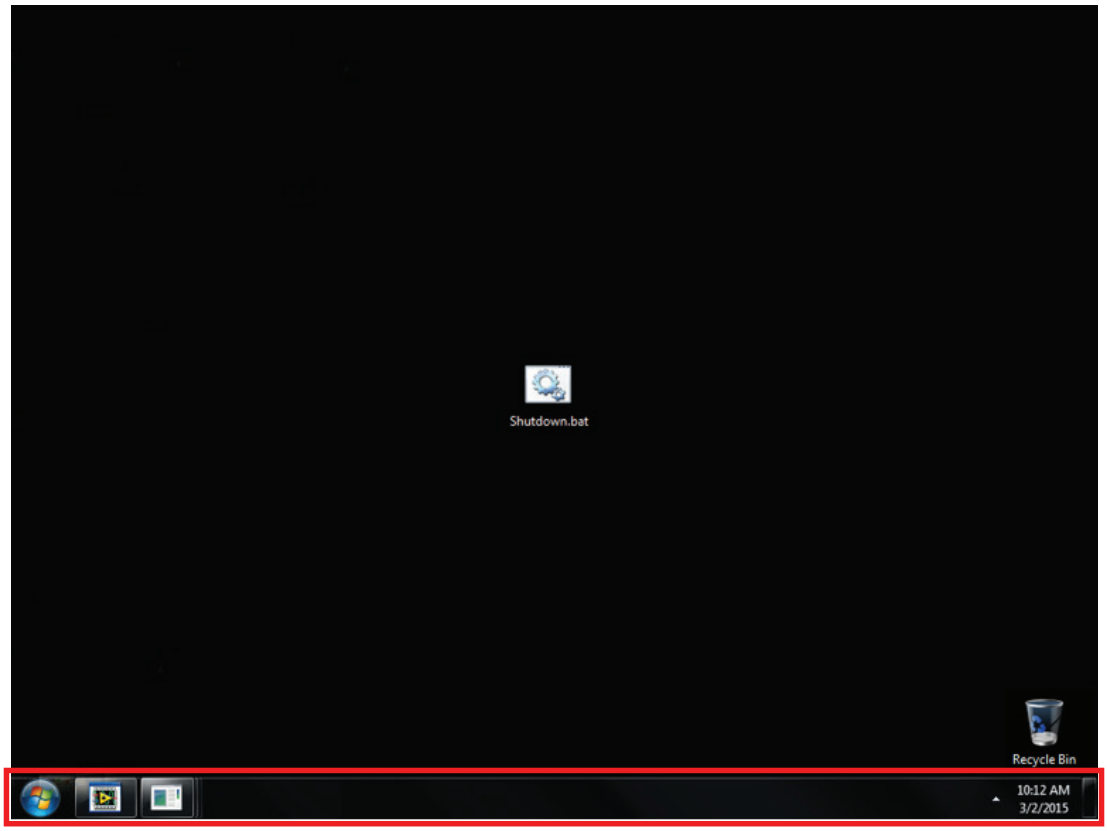
NOTE: Be sure to align the top of box 2 and 1 as indicated in ***Figure F.77***.

NOTE: If box 2 does not contain the asterix (*), right click the box and select Make Primary. See ***Figure F.78***.

9. After all changes have been made, click the Apply button and then select Yes.
10. Close the NVIDIA Control Panel.

NVIDIA CONTROL PANEL SETUP PROCEDURE (continued)

FIGURE F.73 – Taskbar



11. Using the USB keyboard and mouse, press start and then press shutdown to shut the machine down.
12. Turn machine on by depressing the green circular button on case front. If the green button does not stay on, press and hold the green button and then press up and release the CPU push button located inside the opening in lower part of the case front. DO NOT HOLD THE CPU PUSH BUTTON.

NOTE: If after performing above step the machine continues to turn off, repeat above step and continue to hold the green button until machine turns on.

13. Return to the ***CMOS Battery Removal And Replacement Procedure***, step 16.

NVIDIA CONTROL PANEL SETUP PROCEDURE (continued)

FIGURE F.74 – Crosstrainer.exe

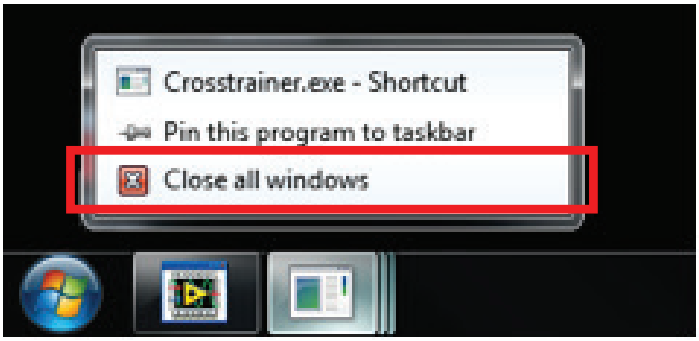
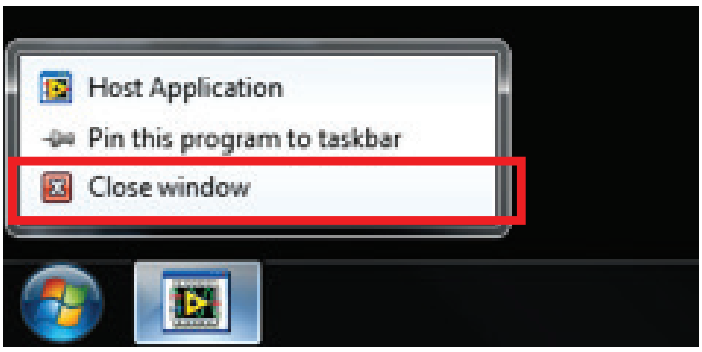


FIGURE F.75 – Host application



NVIDIA CONTROL PANEL SETUP PROCEDURE (continued)

FIGURE F.76 – NVIDIA control panel

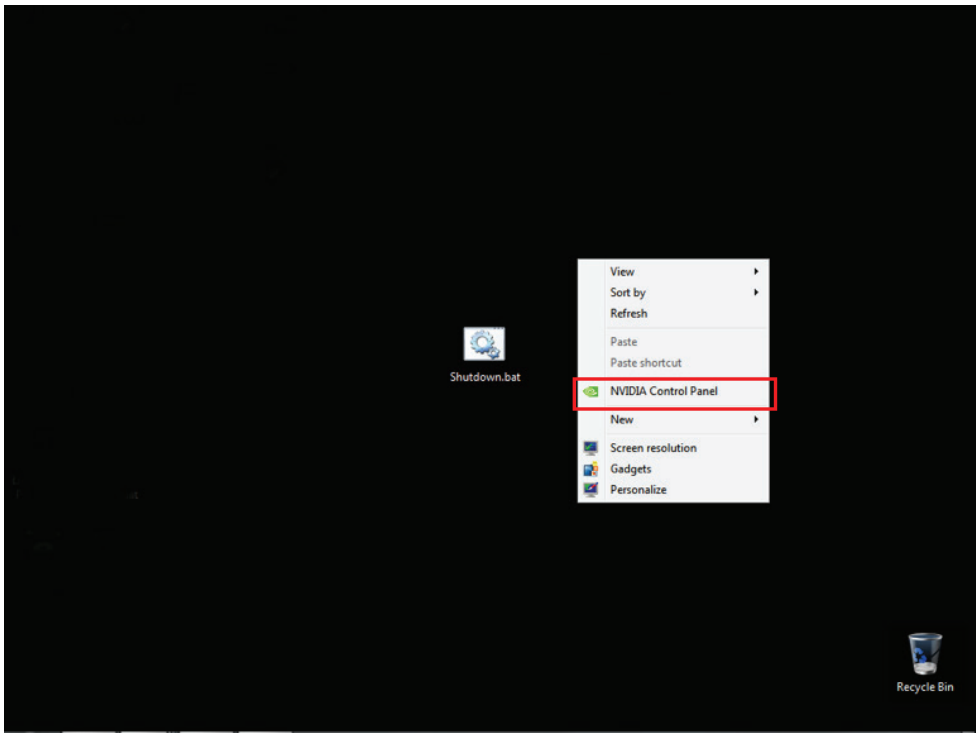
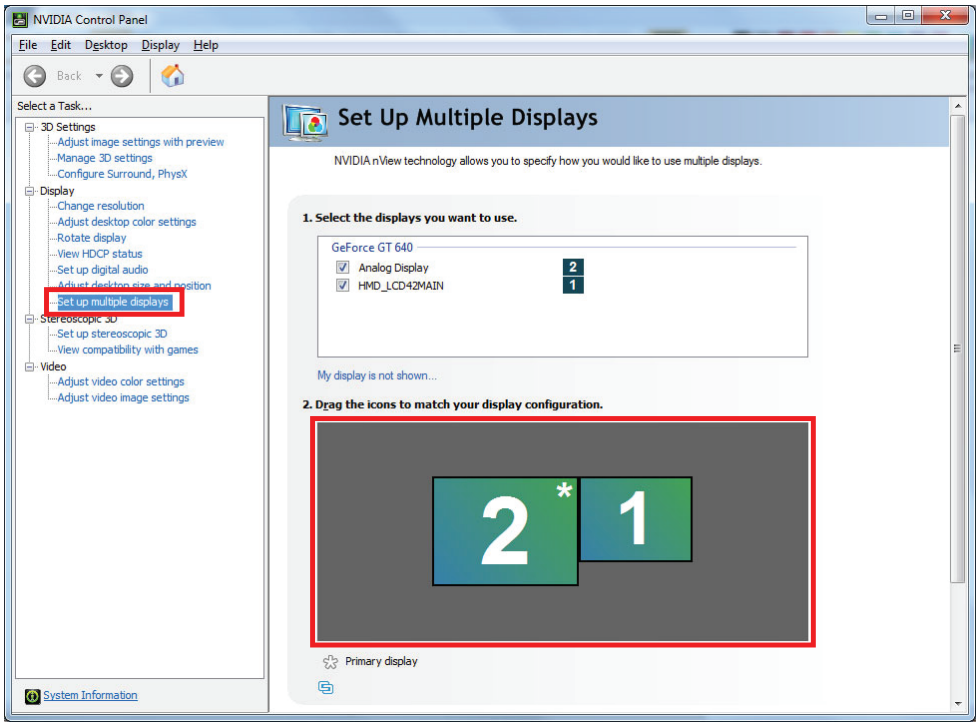
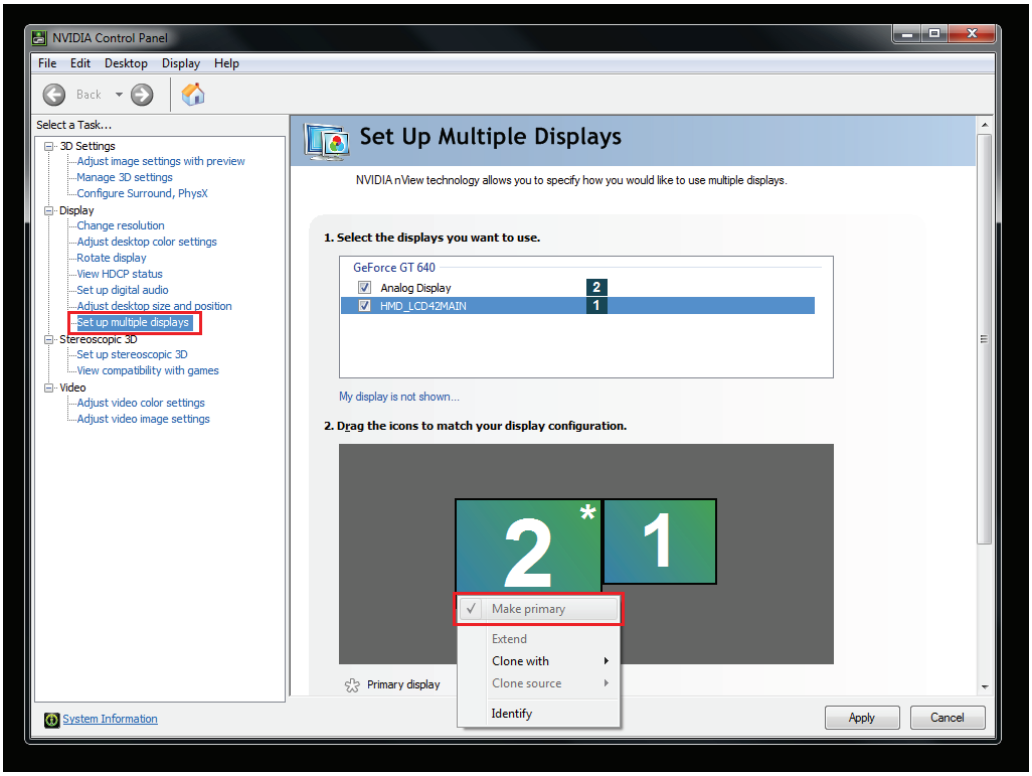


FIGURE F.77 – Setup multiple displays



NVIDIA CONTROL PANEL SETUP PROCEDURE (continued)

FIGURE F.78 – Make primary



UNINSTALL NVIDIA PROGRAMS PROCEDURE

⚠ WARNING

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

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

TEST DESCRIPTION

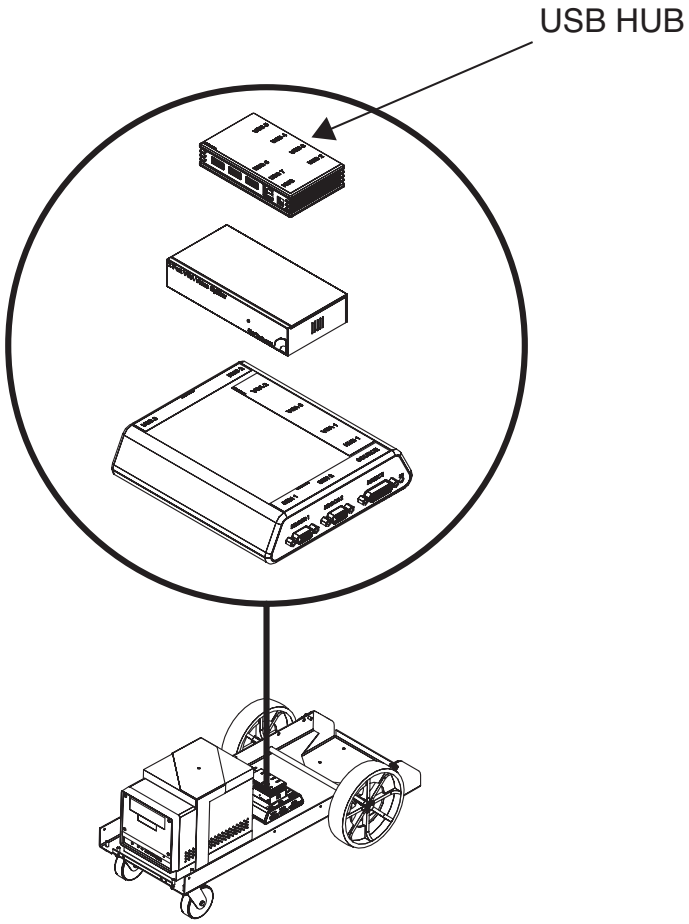
This procedure will aid the technician in the completion of the CMOS Battery Removal Procedure.

MATERIALS NEEDED

USB Keyboard
USB Mouse

UNINSTALL NVIDIA PROGRAMS PROCEDURE (continued)

FIGURE F.79 – USB hub location



PROCEDURE

NOTE: Icons, programs and message boxes may appear both in the helmet's FMD (face mounted display) and on the touchscreen monitor.

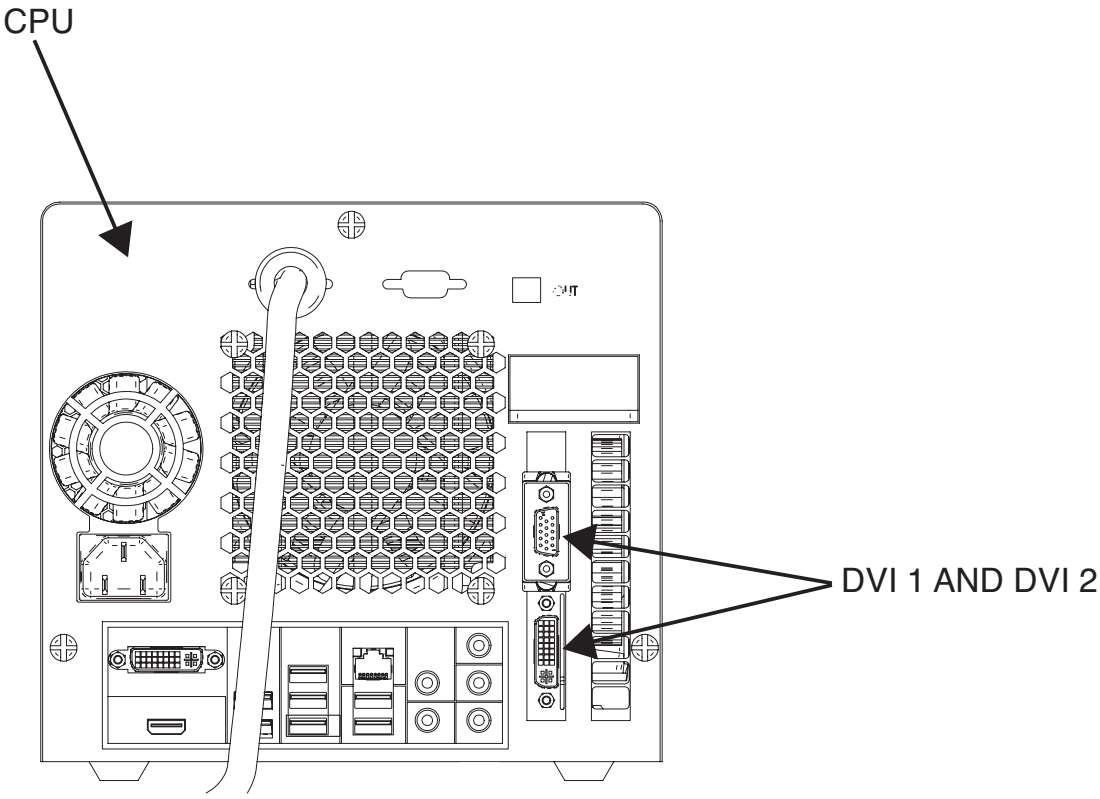
1. Using the USB mouse, click start and then select shutdown to shutdown machine.
2. Remove input power to the machine.
3. Label and disconnect the FMD's (face mounted display) USB6 from the 7 port USB hub located inside of the machine. See Figure F.79.
4. Label and disconnect FMD's (face mounted display) DVI1 cable from the rear of the CPU. See ***Figure F.80***.
5. Carefully connect the correct input power to the machine.
6. Turn machine on by depressing the green circular button on case front. If the green button does not stay on, press and hold the green button and then press up and release the CPU push button located inside the opening in lower part of the case front. DO NOT HOLD THE CPU PUSH BUTTON.

NOTE: If after performing above step the machine continues to turn off, repeat above step and continue to hold the green button until machine turns on.

7. When the VRTEX login image appears on the monitor, press and hold the Windows key and then press the D key, the desktop will now be visible. See ***Figure F.81***.
8. Using the USB mouse, move the cursor towards the bottom of the monitor until the taskbar appears. See ***Figure F.82***.
9. Using the USB mouse, right click on Crosstrainer.exe and close all windows. See ***Figure F.83***.

UNINSTALL NVIDIA PROGRAMS PROCEDURE (continued)

FIGURE F.80 – DVI1 connection location



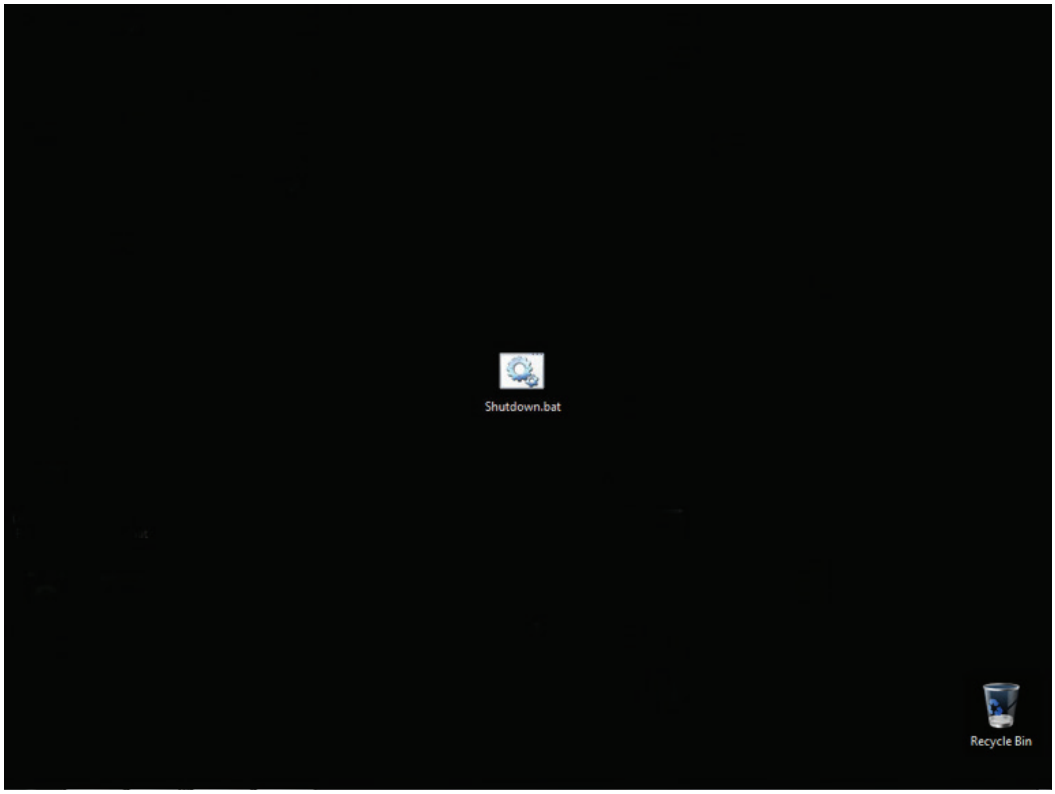
10. Using the USB mouse, move the cursor towards the bottom of the monitor until the taskbar appears. See ***Figure F.82***.
11. Using the USB mouse, right click on Host Application (Main Menu.vi) and close all windows. See ***Figure F.84***.
12. Using the USB mouse, remove StartUpSim.bat shortcut from startup by left clicking the start icon, select all programs, select startup and drag and drop StartUpSim.bat onto desktop. See ***Figure F.85***.
13. Using the USB mouse, open the control panel by left clicking the start icon and selecting control panel. See ***Figure F.86***.
14. Using the USB mouse, select programs and features (icon view) or uninstall a program (category view). See ***Figure F.87***. If necessary, scroll so that all NVIDIA programs are present.
15. Uninstall all NVIDIA programs from top to bottom by right clicking the program, select uninstall and follow all screen prompts. See ***Figure F.88***.

NOTE: Several restarts will be needed. DO NOT choose to restart later. After restarts, default drivers will be installed.

16. When all NVIDIA programs are uninstalled, close the control panel.
17. Using the USB keyboard and mouse, press start and then press shutdown to shut the machine down.
18. Remove input power to the machine.
19. Connect FMD's (face mounted display) DVI1 cable to the rear of the CPU.

UNINSTALL NVIDIA PROGRAMS PROCEDURE (continued)

FIGURE F.81 – Desktop



20. Connect the FMD's (face mounted display) USB6 to the 7 port USB hub located inside of the machine.
21. Carefully connect the correct input power to the machine.
22. Turn machine on by depressing the green circular button on case front. If the green button does not stay on, press and hold the green button and then press up and release the CPU push button located inside the opening in lower part of the case front. DO NOT HOLD THE CPU PUSH BUTTON.

NOTE: If after performing previous step the machine continues to turn off, repeat above step and continue to hold the green button until machine turns on.

23. Place StartUpSim.bat shortcut into startup by left clicking the start icon, select all programs and then right click open. Drag and drop StartUpSim.bat shortcut into open explorer window.
24. Install the NVIDIA drivers by left clicking the start icon, select computer, select local disk (C:), select drivers, select video and double click "306.97_desktop..." application, select OK, select agree and continue, select next and restart now. See ***Figure F.89***. The machine will now restart.
25. Return to ***CMOS Battery Removal And Replacement Procedure***, step 20.

UNINSTALL NVIDIA PROGRAMS PROCEDURE (continued)

FIGURE F.82 – Taskbar

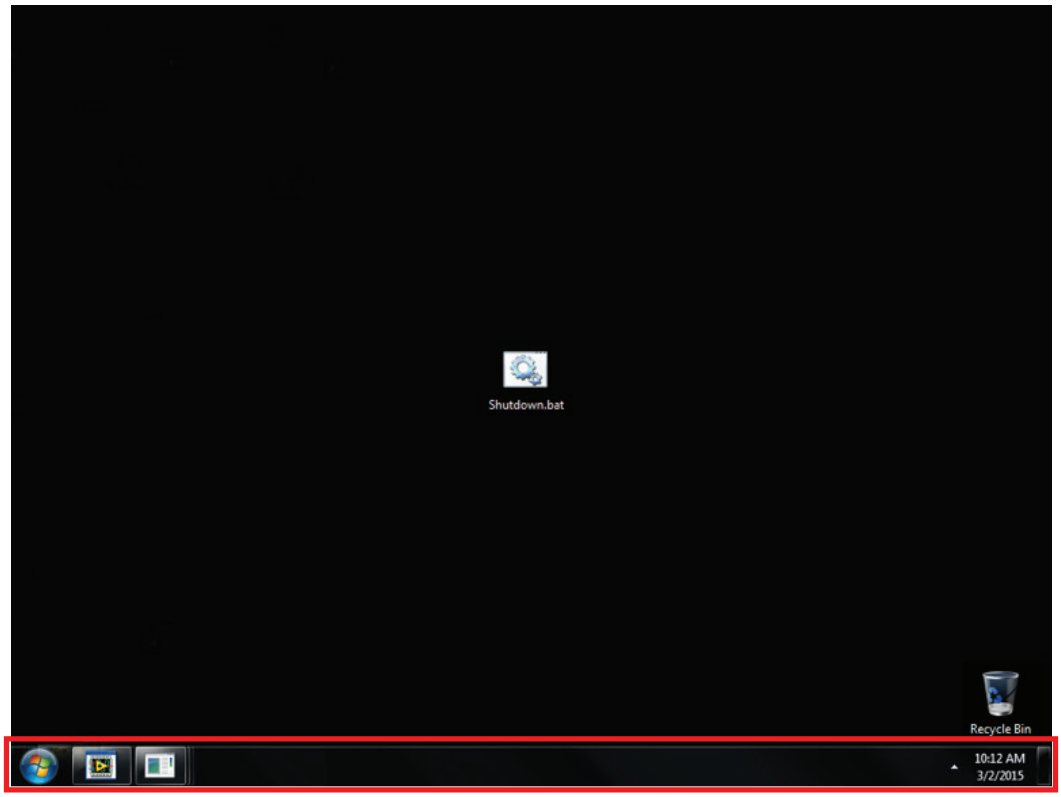
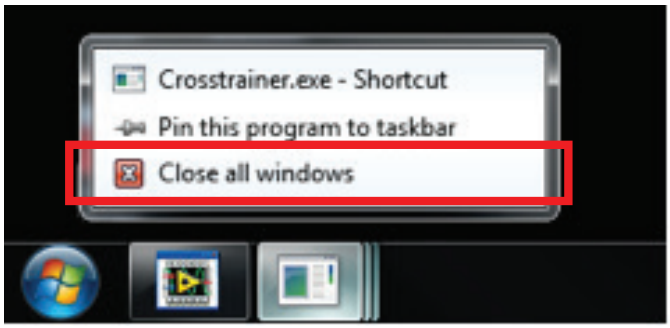


FIGURE F.83 – Crosstrainer.exe



UNINSTALL NVIDIA PROGRAMS PROCEDURE (continued)

FIGURE F.84 – Host application

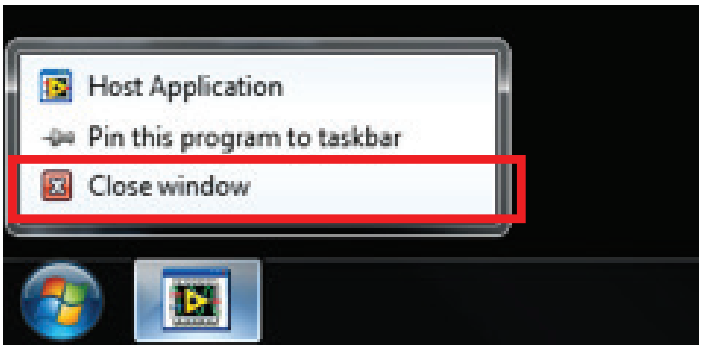
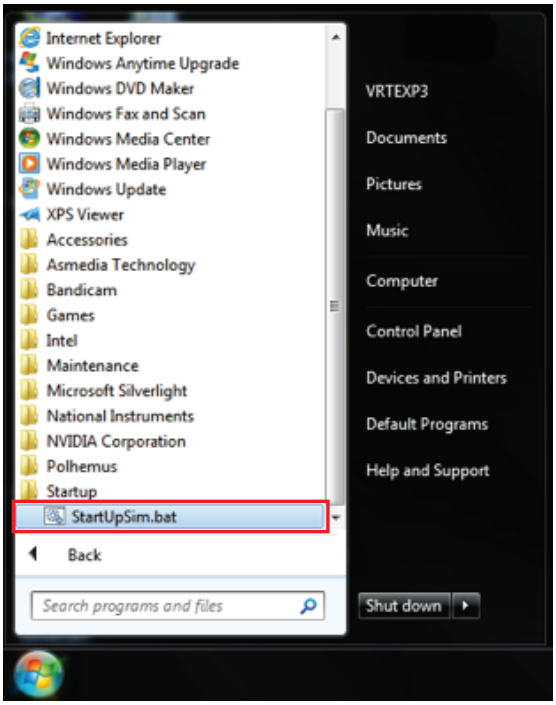


FIGURE F.85 – StartUpSim.bat



UNINSTALL NVIDIA PROGRAMS PROCEDURE (continued)

FIGURE F.86 – Control panel

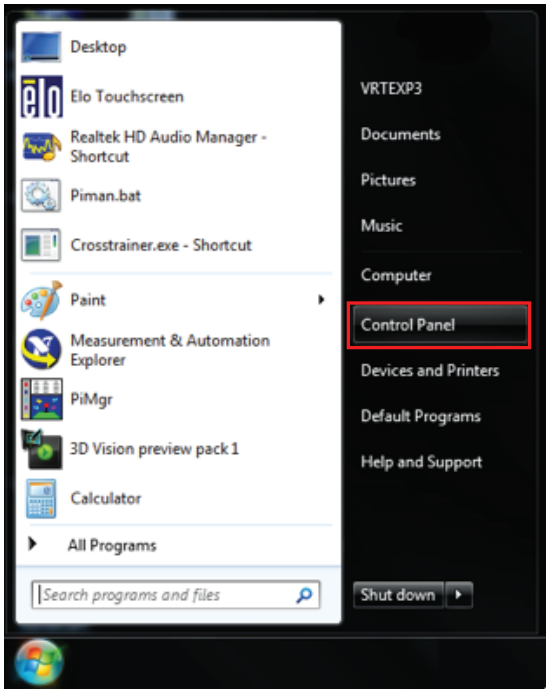
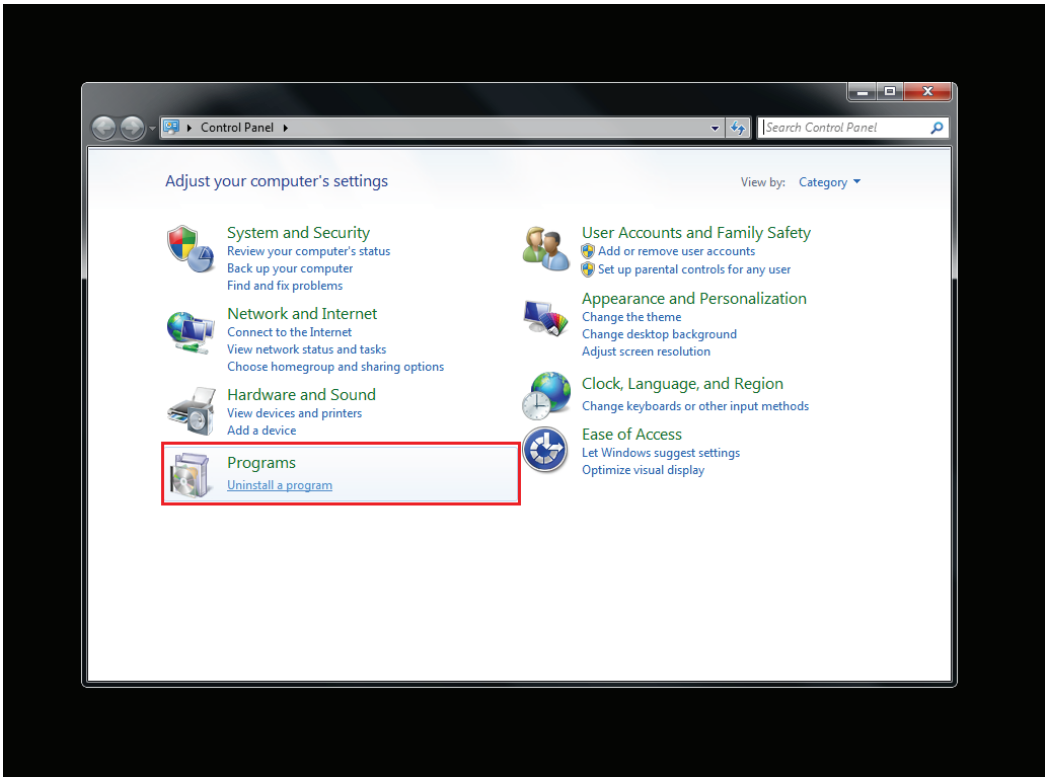


FIGURE F.87 – Uninstall programs



UNINSTALL NVIDIA PROGRAMS PROCEDURE (continued)

FIGURE F.88 – NVIDIA programs

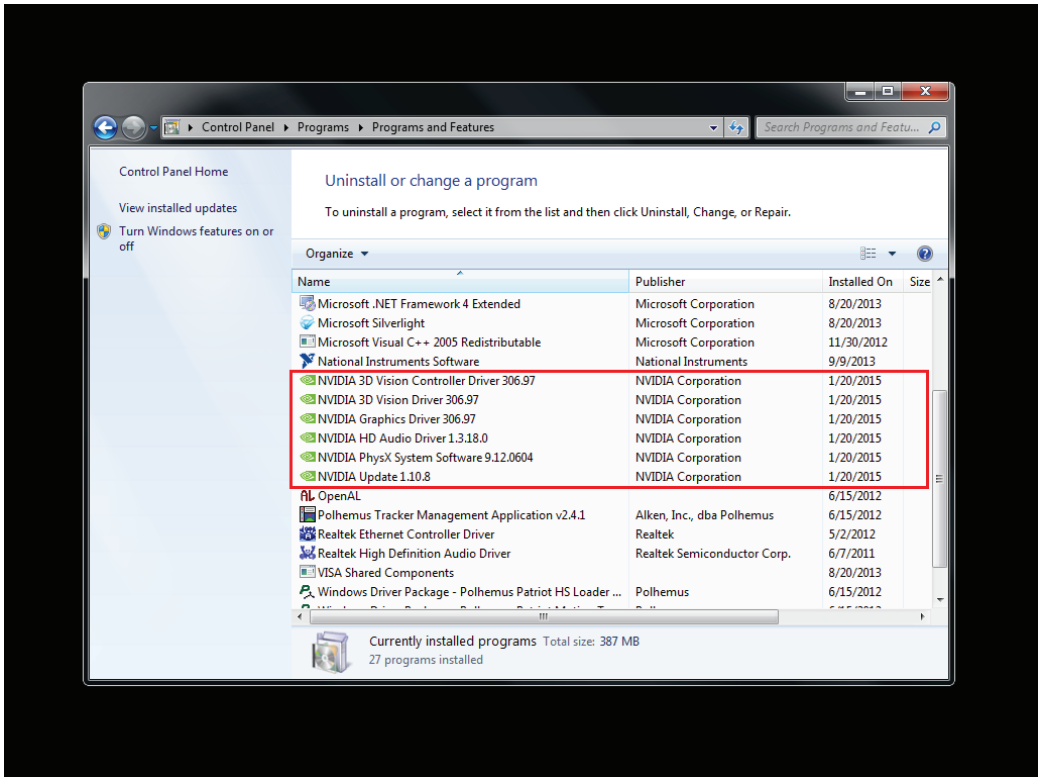
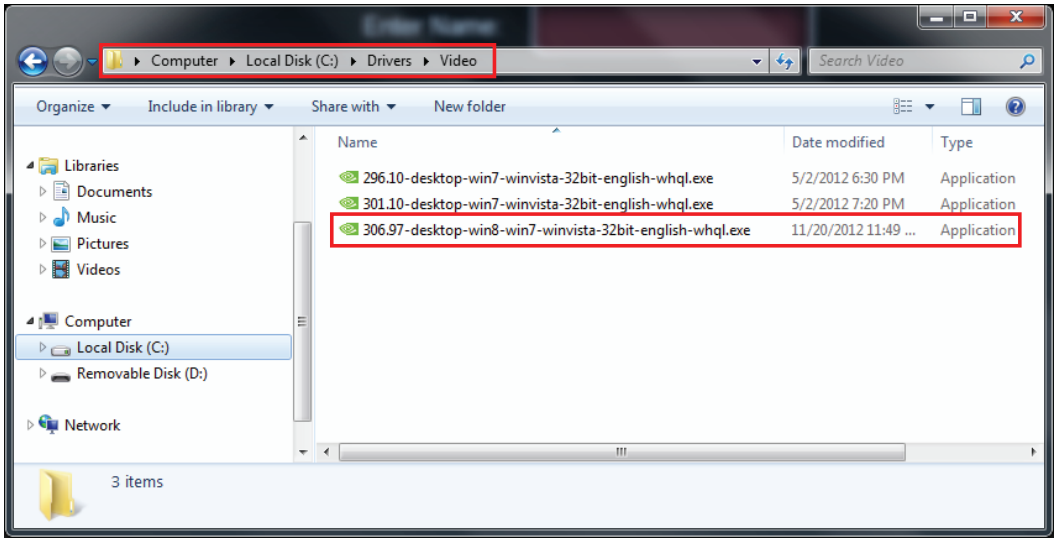


FIGURE F.89 – Install NVIDIA programs



UNIGUN REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

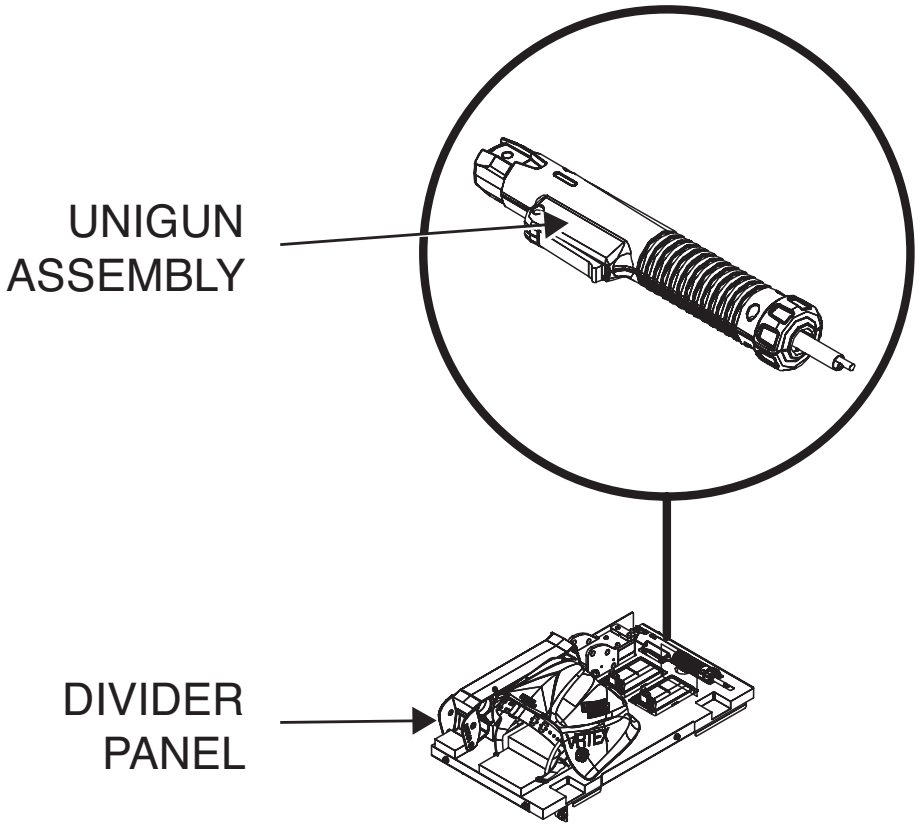
This procedure will aid the technician in the removal and replacement of the Unigun.

MATERIALS NEEDED

Miscellaneous Hand Tools

UNIGUN REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.90 – UNIGUN LOCATION



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the Unigun. See Figure F.90.
4. Remove any and all attachment(s) (tips) on Unigun.
5. Remove toroid and follow Unigun leads to the "Y" adapter. See Wiring Diagram.

NOTE: For reassembly be sure to take note of how many turns of wire pass through the toroid and also the direction and location.

6. Remove any necessary cable ties.
7. Label and disconnect SEN 1 and RCA plug located at "Y" adapter. See ***Figure F.91***. See Wiring Diagram.
8. Carefully remove Unigun cables through associated input cable grommet on machine case front. See ***Figure F.92***.
9. Replace Unigun.

UNIGUN REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.91 – "Y" ADAPTER AND RCA PLUG LOCATION

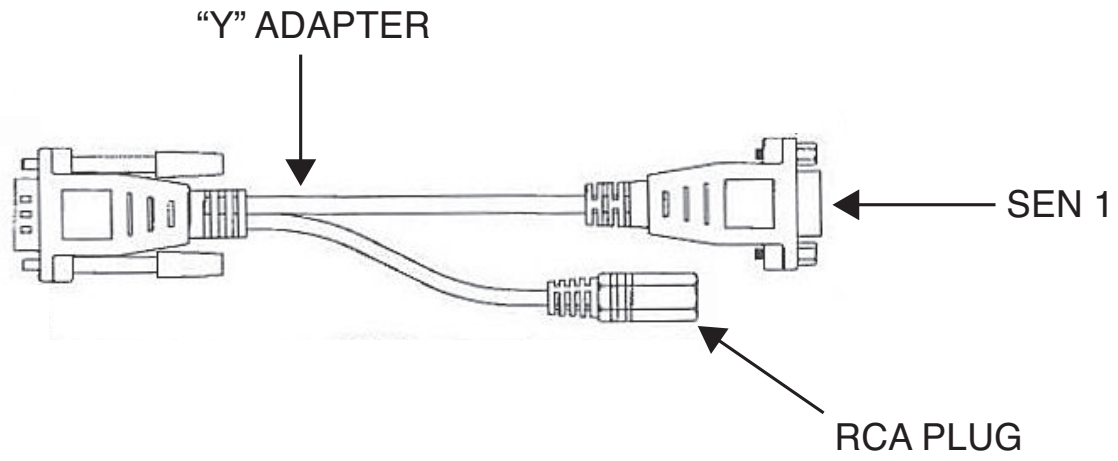
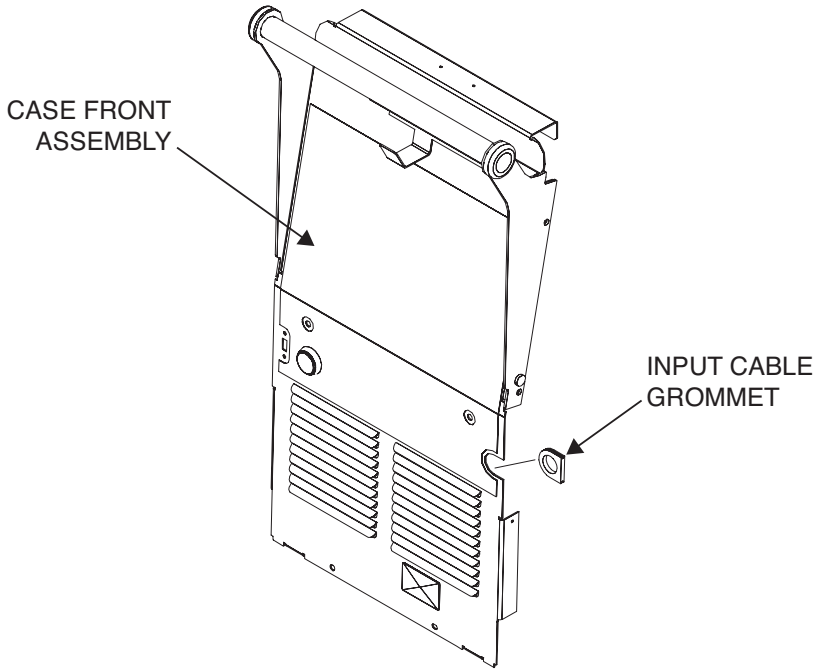


FIGURE F.92 – INPUT CABLE GROMMET LOCATION



UNIGUN REMOVAL AND REPLACEMENT PROCEDURE (continued)

REPLACEMENT PROCEDURE

1. Carefully place Unigun cables through input cable grommet on machine case front. See ***Figure F.92***.
2. Connect SEN 1 and RCA plug located at "Y" adapter. See ***Figure F.91***. See Wiring Diagram.
3. Replace any necessary cable ties previously removed.
4. Replace toroid and connect Unigun leads to the "Y" adapter. See Wiring Diagram.

NOTE: For reassembly be sure to take note of how many turns of wire pass through the toroid and also the direction and location.

5. Perform the ***Case Cover Replacement Procedure***.
6. Perform the ***Hardware Initialization (PIMAN. EXE) Procedure***, located in the Polhemus/ Patriot SEU Module Test.
7. Perform ***Retest After Repair Procedure***.

HELMET REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

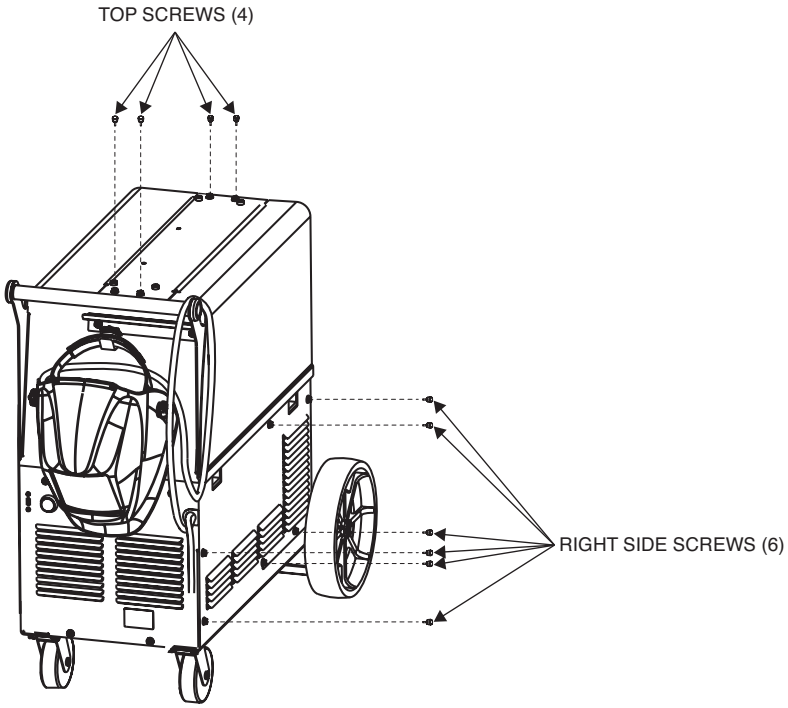
This procedure will aid the technician in the removal and replacement of the Helmet.

MATERIALS NEEDED

Miscellaneous Hand Tools

HELMET REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.93 – HELMET LOCATION



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

1. Remove input power to the machine.
2. Remove right side panel. See Figure F.93.
3. Locate the Helmet. See ***Figure F.94***.
4. Disconnect USB 6 cable from the USB Hub. See ***Figure F.95***. See Wiring Diagram.
5. Disconnect SEN 2 serial connection from Polhemus/Patriot SEU. See ***Figure F.95***. See Wiring Diagram.
6. Disconnect DVI 1 from the back of the CPU. See ***Figure F.96***.
7. Remove any necessary cable ties.
8. Note the number of passes on toroid core. Remove toroid core and save for replacement procedure.
9. Remove strain relief grommet from wires and save for replacement procedure.
10. Remove Helmet.

HELMET REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.94 – HELMET LOCATION

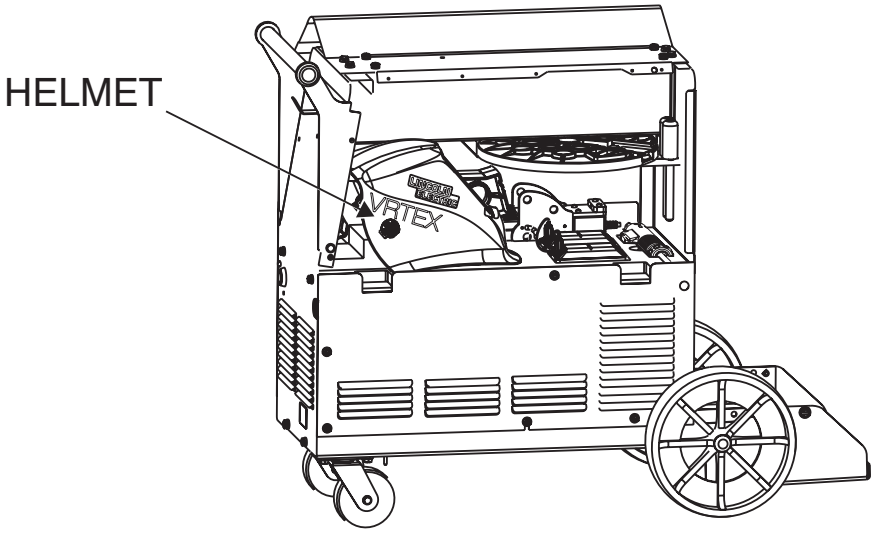
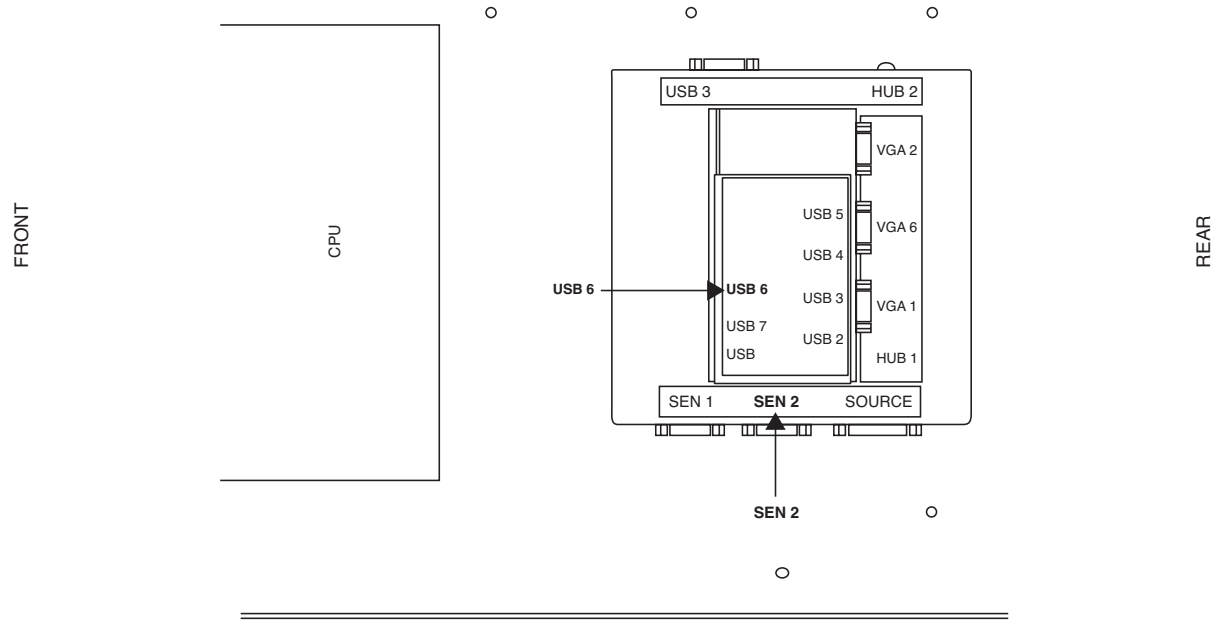
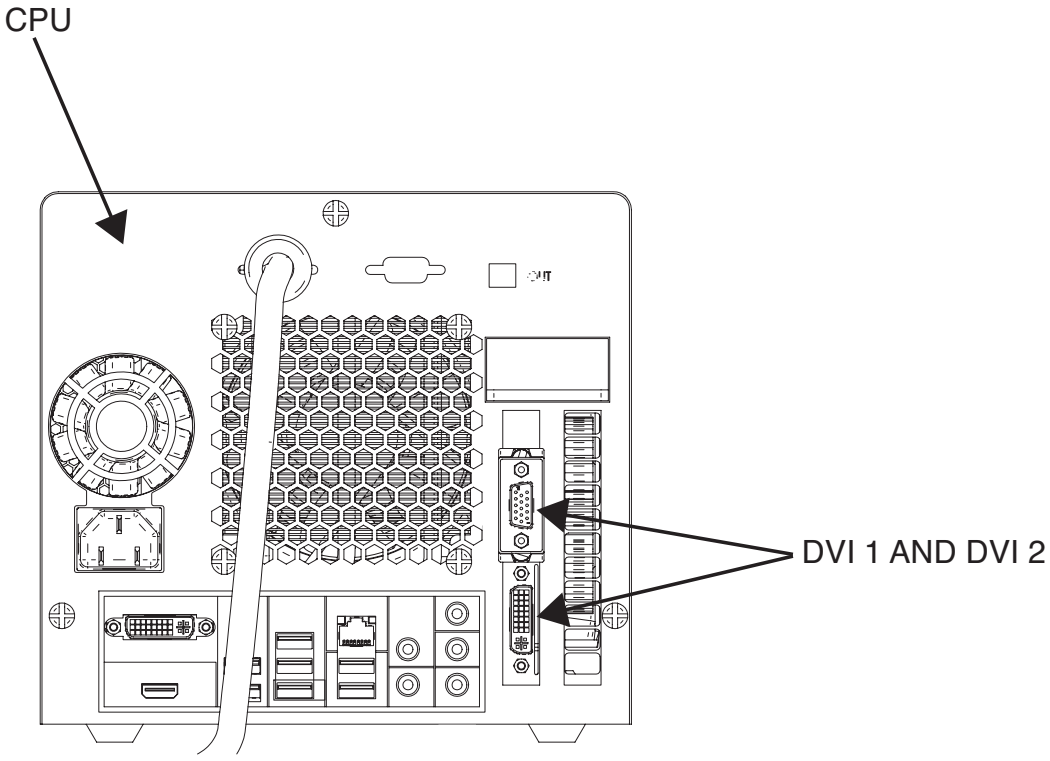


FIGURE F.95 – USB 6 AND SEN2 LEAD CONNECTION LOCATIONS



HELMET REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.96 – DVI 1 CONNECTION LOCATION



REPLACEMENT PROCEDURE

1. Replace Helmet.
2. Secure leads using the previously removed strain relief grommet.
3. Install previously removed toroid core on Helmet and Unigun cables.
4. Connect DVI 1 to the back of the CPU. See Figure F.95.

NOTE: Be sure to install DVI1 connection to the correct DVI port on the back of the CPU.

5. Connect USB 6 cable to USB Hub. See ***Figure F.94***. See Wiring Diagram.
6. Connect SEN 2 serial connection to Polhemus/ Patriot SEU. See ***Figure F.94***. See Wiring Diagram.
7. Install any previously removed cable ties.
8. Install right side panel previously removed.
9. Perform the ***Hardware Initialization (PIMAN. EXE) Procedure***, located in the Polhemus/ Patriot SEU Module Test.
10. Perform the ***Retest After Repair Procedure***.

TOUCHSCREEN MONITOR CALIBRATION PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

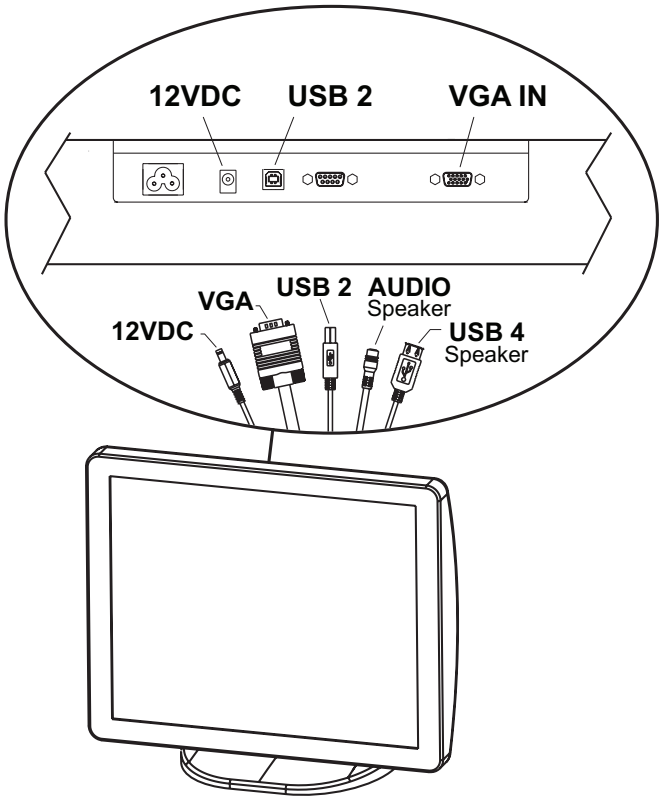
This procedure will aid the technician in the calibration of the Touchscreen Monitor.

MATERIALS NEEDED

USB Mouse
USB Keyboard

TOUCHSCREEN MONITOR CALIBRATION PROCEDURE (continued)

FIGURE F.97 – TOUCHSCREEN MONITOR CONNECTIONS



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

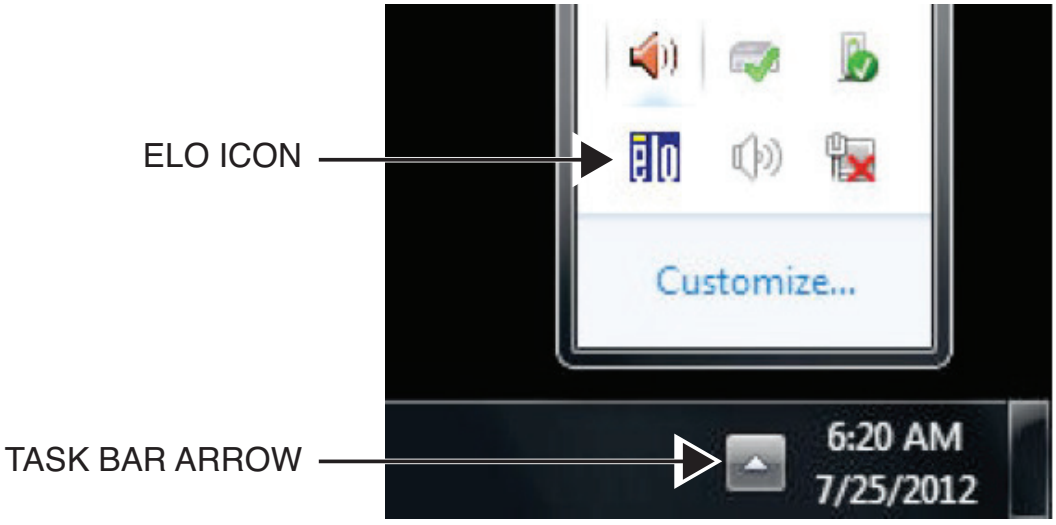
1. Connect monitor to cable assembly. See Figure F.97.
2. Remove plug button on lower part of case front of the machine.
3. Connect a USB mouse and USB keyboard to the two USB ports on the front of the machine. One port is near the ON button and the second port is located behind the plug button accessing CPU.
4. Apply input power and start up the machine by pressing and holding the green ON button for 5 seconds.

NOTE: The monitor power button is located to the lower right of the monitor screen; allow the machine to start up the simulation software until the keyboard login screen appears.

5. Press “WINDOWS” key + letter “D” to allow the Windows desktop to appear.
6. Move the mouse cursor to the bottom of the screen to display the Windows Task Bar.
7. Right click the mouse and close all programs. If prompted, select “CLOSE THE PROGRAM” in the message box that may appear.

TOUCHSCREEN MONITOR CALIBRATION PROCEDURE (continued)

FIGURE F.98 – MONITOR CALIBRATION SCREENSHOT



8. Left click the arrow icon on the right side of the task bar. Double-click the “ELO” icon and select “Align.” See Figure F.98.
9. Three separate targets will appear on the screen. Touch target icons to calibrate accordingly.
10. Select the “Sound” tab and uncheck “Beep on touch.” Select “Apply” and click “OK.” Close program.
11. Navigate the mouse cursor to the bottom of the desktop to display the task bar and shut down the CPU.
12. Disconnect USB mouse and keyboard.
13. Install previously removed plug button on lower part of case front of the machine.
14. Perform the ***Retest After Repair Procedure***.

NOTES

GREEN ON BUTTON
REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Automation Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3878.

TEST DESCRIPTION

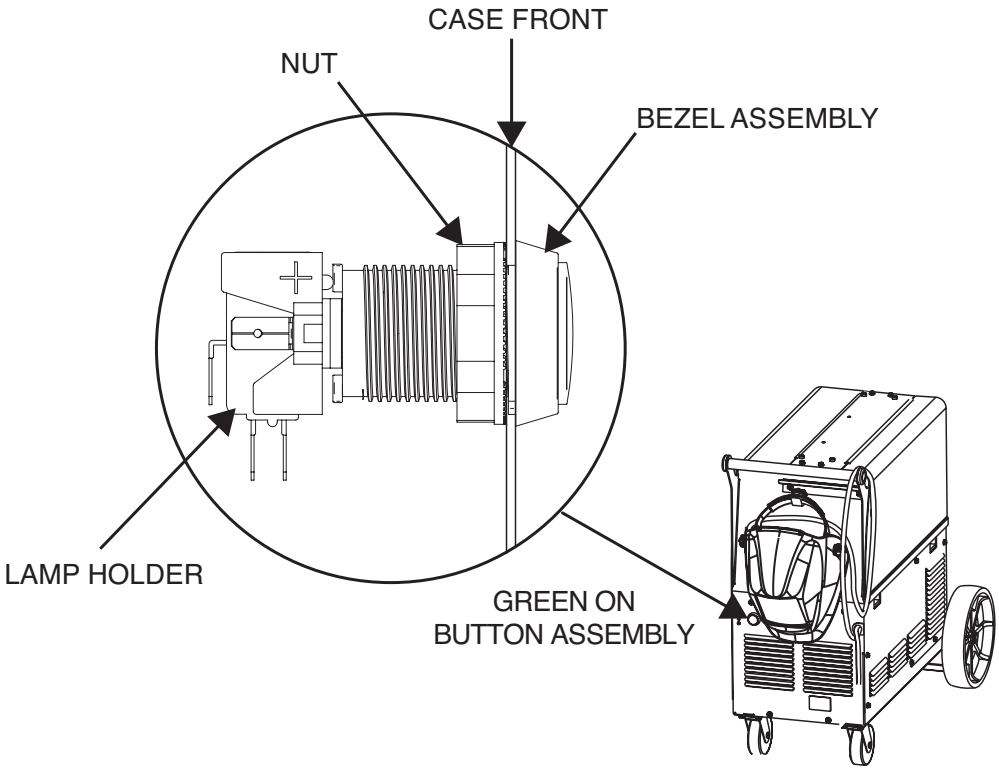
This procedure will aid the technician in the removal and replacement of the Green ON Button.

MATERIALS NEEDED

Crescent Wrench
Wiring Diagram

GREEN ON BUTTON
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.99 – GREEN START BUTTON LOCATION



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**
- **Always connect the VRTEX® MOBILE to a power supply grounded according to the National Electrical Code and local codes.**

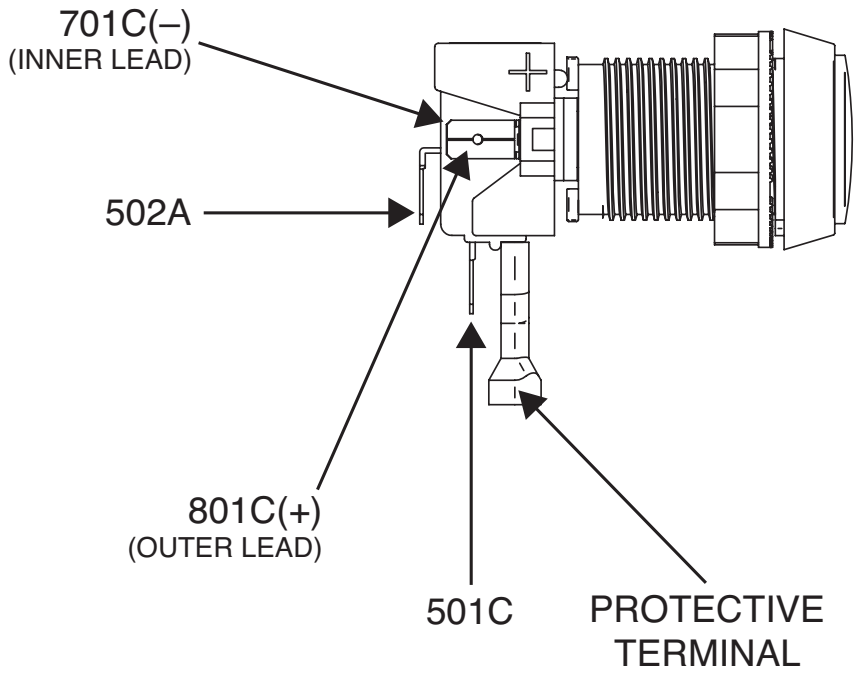
1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the GREEN ON button. See Figure F.99.
4. Take hold of the lamp holder assembly and gently rotate (counter-clockwise) and remove from the bezel assembly. See Figure F.99.

NOTE: Take note of the angle of the lamp holder assembly for reassembly.

5. Disconnect leads 502A, 501C, 801C and 701C from the lamp holder assembly. See ***Figure F.100***. See Wiring Diagram.
6. Using a adjustable wrench, remove the nut securing the bezel assembly to the case front. See Figure F.99.
7. Remove the black bezel assembly from the front of the machine. See Figure F.99.
8. Replace the GREEN ON button.

GREEN ON BUTTON
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.100 – GREEN START BUTTON LEAD LOCATIONS



REPLACEMENT PROCEDURE

1. Secure the bezel assembly to the case front.
2. Connect leads 502A, 501C, 801C and 701C to the lamp holder assembly. See Figure F.100. See Wiring Diagram.
3. Assure the protective terminal is in place on the new lamp holder assembly. Failure to do so may cause electric shock. All terminals must be covered prior to machine start-up.
4. Install the lamp holder assembly by gently pushing and rotate clockwise into position in the bezel assembly.
5. Perform the ***Case Cover Replacement Procedure***.
6. Perform ***Retest After Repair Procedure***.

RETEST AFTER REPAIR

DESCRIPTION

This procedure will aid the technician in testing the basic operations of the VRTEX® MOBILE after any repair or replacement procedure has been completed.

1. Make sure the stand, the monitor, the VR GMAW/FCAW gun and the VR SMAW (optional) device are properly connected to the unit and are not damaged.
2. Connect the external speakers.
3. Connect the machine to the 115/230VAC power source.
4. Using the green ON button, turn on the VRTEX® MOBILE. Keep the button depressed for at least 5 seconds.
5. When the unit has “booted-up” proceed with login. See ***Operation*** section of this manual.
6. Insert a USB memory device into the USB port on the front of the machine.
7. Navigate through the following: See the ***Operation*** section of this manual.
   a. Select coupon – must match actual coupon in arm (i.e., 3/8” plate must show when selected).
   b. Using the process selector icon, select GMAW.
   c. Proceed with settings. See the ***Default Weld Process Settings.***
8. Check the functionality of all icons. They must function as labeled. Listen for an audible signal when icons are pressed.
9. Check the functionality of the VR GMAW/FCAW gun in all positions and with every coupon. When welding there must be visual information in the helmet. If external speakers are used there must be audio information when welding.
10. Check all three different views using the right and left select arrow icons.
11. Make certain that weld pass information can be saved in the USB memory device. See the ***Operation*** section of this manual.
12. Select menu, logout, then “Yes”. Login screen with keyboard appears.
13. Press the key icon and enter the pass code. The instructor mode screen should appear. Press back button.

NOTE: If no pass code available. Call Lincoln Electric Automation Department at 1-888-935-3878.

14. Select menu, then “Shutdown”. Select “Yes”. The machine should shutdown.

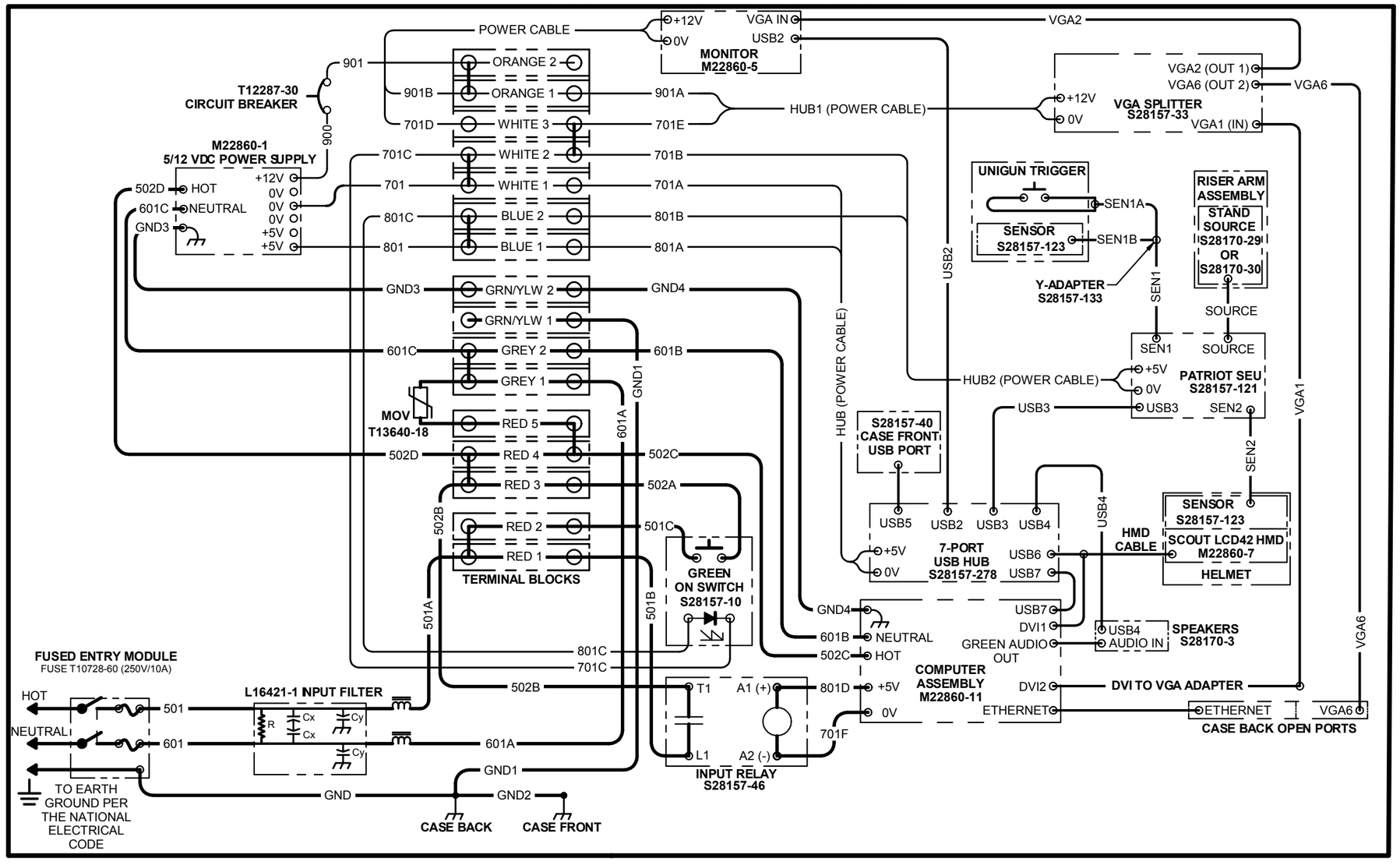
NOTES

TABLE OF CONTENTS - DIAGRAM SECTION

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

WIRING DIAGRAM - CODES 11380 & 11381 (M22860-14)

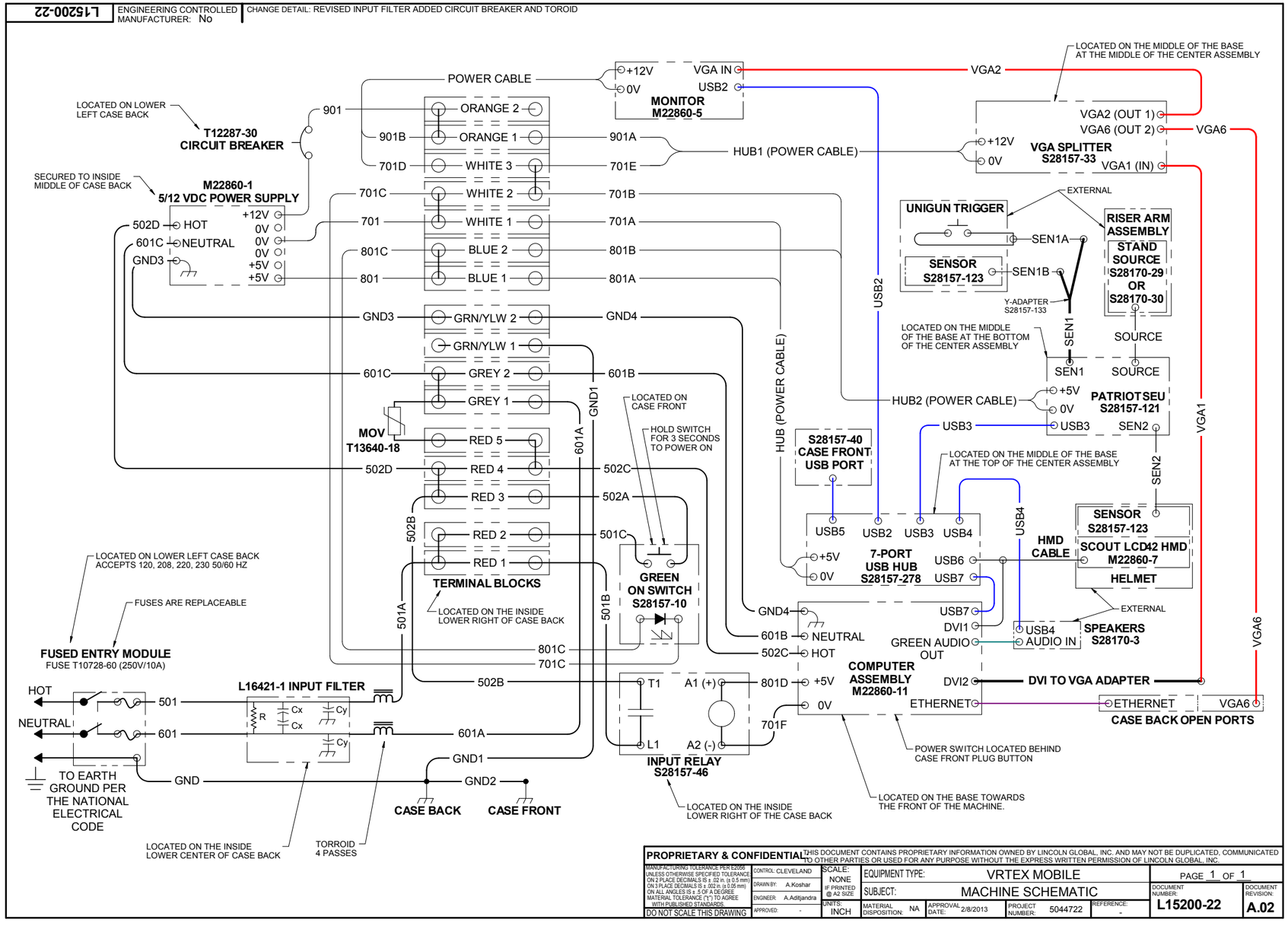
K3165-SERIES WIRING DIAGRAM



M22860-14 A.06

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

SCHEMATIC - CODES 11380 & 11381 (L15200-22)



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