

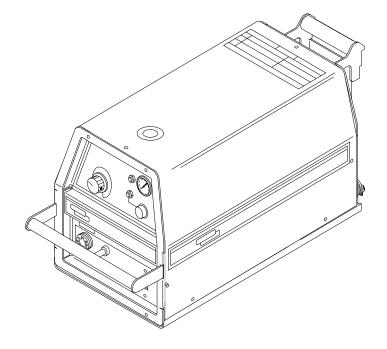


PRO CUT® 55

For use with machines having Code Numbers: **11011, 11012**

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.

SERVICE MANUAL



SAFETY

PLASMA CUTTING or GOUGING 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.

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



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ELECTRIC SHOCK can kill. 1.a. The electrode and work (or ground) circuits are electrically "hot" when the power source is on. Do not touch these "hot" parts with your bare skin

or wet clothing. Wear dry, hole-free gloves to insulate hands.

- 1.b. When the power source is operating voltages in excess of 250 volts are produced. This creates the potential for serious electrical shock potentially even fatal.
- 1.c. Insulate yourself from work and ground using dry insulation. When cutting or gouging in damp locations, on metal framework such as floors, gratings or scaffolds and when in positions such as sitting or lying, make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- 1.d. Always be sure the work cable makes a good electrical connection with the metal being cut or gouged. The connection should be as close as possible to the area being cut or gouged.
- 1.e. Ground the work or metal to be cut or gouged to a good electrical (earth) ground.
- 1.f. Maintain the plasma torch, cable and work clamp in good, safe operating condition. Replace damaged insulation.
- 1.g. Never dip the torch in water for cooling or plasma cut or gouge in or under water.
- 1.h. When working above floor level, protect yourself from a fall should you get a shock.
- 1.i. Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.
- 1.j. Also see Items 4c and 6.

ARC RAYS can burn.

2.a. Use safety glasses and a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when performing or observing plasma arc cutting or gouging. Glasses,headshield and filter lens should conform to ANSI Z87. I standards.

- 2.b. Use suitable clothing including gloves made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 2.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.

3.a. Plasma cutting or gouging may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When cutting or gouging, keep your head out of the fumes. Use enough ventilation and/or exhaust at the arc to

keep function and on the breathing zone. When plasma cutting or gouging on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes keep exposure as low as possible and below Threshold Limit Values (TLV) 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 plasma cutting or gouging on galvanized steel.

- 3. b. The operation of plasma cutting or gouging fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific 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.
- 3.c. Do not use plasma cutting or gouging equipment 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.
- 3.d. Gases used for plasma cutting and gouging can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 3.e. Read and understand the manufacturer's instructions for this equipment and follow your employer's safety practices.



CUTTING SPARKS can cause fire or explosion.

4.a. Remove fire hazards from the plasma cutting or gouging area. If this is not possible, cover them to prevent the cutting or gouging sparks from starting a fire. Remember that welding sparks

and hot materials from plasma cutting or gouging can easily go through small cracks and openings to adjacent areas. Avoid cutting or gouging near hydraulic lines. Have a fire extinguisher readily available.

4.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.

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- 4.c. When not cutting or gouging, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- 4.d. Do not cut or gouge 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).
- 4.e. Vent hollow castings or containers before heating, cutting or gouging. They may explode.
- 4.f. Do nor fuel engine driven equipment near area where plasma cutting or gouging.
- 4.g. Sparks and spatter are thrown from the plasma arc. Wear safety glasses, ear protection and oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when cutting or gouging out of position or in confined places. Always wear safety glasses with side shields when in a cutting or gouging area.
- 4.h. Connect the work cable to the work as close to the cutting or gouging area as practical. Work cables connected to the build-instance of the second ing framework or other locations away from the cutting or gouging area increase the possibility of the 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.



CYLINDER may explode if damaged.

5.a. Use only compressed gas cylinders containing the correct 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

- 5.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 5.c. Cylinders should be located:
 - · Away from areas where they may be struck or subjected to physical damage.
 - · A safe distance from plasma cutting or gouging, arc welding operations and any other source of heat, sparks, or flame.
- 5.d. Never allow any part of the electrode, torch or any other electrically "hot" parts to touch a cylinder.
- 5.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 5.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 5.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders,"available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



FOR ELECTRICALLY powered equipment.

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

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

PLASMA ARC can injure.

7.a. Keep your body away from nozzle and plasma arc.

7.b. Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.



ELECTRIC AND MAGNETIC FIELDS may be dangerous

8.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Cutting or gouging current creates EMF fields around torch cables and cutting machines.

8.b. EMF fields may interfere with some pacemakers, so operators having a pacemaker should consult their physician before cutting or gouging.

- 8.c. Exposure to EMF fields during cutting or gouging may have other health effects which are now not known.
- 8d. All operators should use the following procedures in order to minimize exposure to EMF fields from the cutting or gouging circuit:
 - 8.d.1. Route the torch and work cables together Secure them with tape when possible.
 - 8.d.2. Never coil the torch cable around your body.
 - 8.d.3. Do not place your body between the torch and work cables. If the torch cable is on your right side, the work cable should also be on your right
 - side.
 - 8.d.4. Connect the work cable to the workpiece as close as possible to the area being cut or gouged.
 - 8.d.5. Do not work next to cutting power source.





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TECHNICAL SPECIFICATIONS - PRO-CUT® 55

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| | | | | TPUT | | | |
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SAFETY PRECAUTIONS

Read entire Installation Section before installing the PRO-CUT $^{\circ}$ 55.

A WARNING

ELECTRIC SHOCK CAN KILL.



- Only qualified personnel should install this machine.
- Turn the input power OFF at the disconnect switch or fuse box and discharge input capacitors before working inside the equipment.
- Do not touch electrically hot parts.
- Always connect the PRO-CUT[®] 55 grounding terminal (located on the side of the Case Back Assembly) to a good electrical earth ground.
- Turn the PRO-CUT Power Switch OFF when connecting power cord to input power.

SELECT PROPER LOCATION

Place the PRO-CUT[®] 55 where clean cool air can freely circulate in through the rear louvers and out through the front/bottom opening. Dirt, dust or any foreign material that can be drawn into the machine should be kept at a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdown of the machine.

A source of clean, dry air or nitrogen must be supplied to the PRO-CUT[®] 55. Oil in the air is a severe problem and must be avoided. The supply pressure must be between 80 and 150 psi. The flow rate is approximately 6.0 cfm (170 l/min.). Failure to observe these precautions could result in excessive operating temperatures or damage to the torch.

STACKING

The PRO-CUT® 55 cannot be stacked.

LIFTING AND MOVING

Either the front or rear handles or both may be used to lift or move the machine.

DO NOT use the pull handle on the optional undercarriage, if installed, to lift the machine. This handle is not designed to support the full weight of the machine and using it to lift the machine could cause personal injury or damage to the machine.

TILTING

The PRO-CUT[®] 55 must be placed on a stable, level surface so it will not topple over.

HIGH FREQUENCY INTERFERENCE PROTECTION

The PRO-CUT[®] 55 employs a touch start mechanism for arc initiation which eliminates high frequency emissions from the machine as compared with spark gap and solid state type high frequency generators. Keep in mind, though, that these machines may be used in an environment where other high frequency generating machines are operating. By taking the following steps, high frequency interference into the Pro-Cut can be minimized

- Make sure the power supply chassis is connected to a good earth ground. The work terminal ground does NOT ground the machine frame.
- (2) Keep the work ground clamp isolated from other work clamps that have high frequency.
- (3) If the ground clamp cannot be isolated, then keep the clamp as far as possible from other work clamp connections.
- (4) When the machine is enclosed in a metal building, several good earth driven electrical grounds around the periphery of the building are recommended.

Failure to observe these recommended installation procedures may cause improper function of the Pro-Cut or possibly even damage to the control system or power supply components.

INPUT ELECTRICAL CONNECTIONS

Before installing the machine, check that input supply voltage, phase, and frequency are the same as the machine's voltage, phase, and frequency as specified on the machine's rating plate.

The PRO-CUT[®] 55 should be connected only by a qualified electrician. Installation should be made in accordance with all local and national codes (eg: U.S. National Electrical Code) and the information detailed below.

SINGLE PHASE INPUT CONNECTION FOR 208/230/460 VOLT MACHINES

The 208/230/460 Volt PRO-CUT[®] 55 is supplied with one 11 ft. #8 AWG 3-conductor input power cord (with a molded 230 VAC plug on one end) already connected to the machine. When received from the factory, this machine is internally connected for 230 VAC. Reconnection will be necessary if a higher or lower input voltage is used.

CONVERTING A 208/230/460 VOLT MACHINE FROM SINGLE PHASE TO THREE PHASE INPUT

To convert to three phase power, the 230 VAC 3-conductor power cord must be removed and replaced with a #10 AWG 4-conductor power cord.

- 1. Connect the green lead to ground per U.S. National Electrical Code.
- 2. Connect black, red and white leads to power.

THREE PHASE POWER INPUT CONNEC-TION FOR 200/380-415 VOLT & 460/575 VOLT MACHINES

The 200/380-415 Volt and 460/575 Volt PRO-CUT[®] 55's are supplied with one 10 ft. #10 AWG 4-conductor input power cord already connected to the machine. When received from the factory, these machines are internally connected for the higher input voltage. Reconnection will be necessary if a lower input voltage is used.

A WARNING

CORD REMOVAL:

1. Unplug line cord from the receptacle.

CONVERTING 200/380-415 VOLT & 460/575 VOLT MACHINES FROM THREE PHASE TO SINGLE PHASE INPUT

To convert to single phase power, the 4-conductor input cord may still be used, but the red lead must be disconnected and insulated.

- 1. Connect the green lead to ground per U.S. National Electrical Code.
- 2. Connect black and white leads to power
- 3. Wrap red lead with tape to provide 600V insulation.

INPUT POWER CORD CONNECTOR INSTALLATION

A cord connector provides a strain relief for the input power cord as it passes through the left rear access hole. The cord connector is designed for a cord diameter of .40 - 1.03 in (10.2 - 26.2mm) if it becomes necessary to install a different input cord.

CORD REMOVAL:

1. Unplug line cord from the receptacle.

NOTE: DO NOT PERFORM THE NEXT STEP UNTIL THE HIGH VOLTAGES INSIDE THE MACHINE HAVE BEEN ALLOWED TO DISSIPATE, APPROXIMATELY TWO MINUTES.

- 2. Remove wraparound by unscrewing the eleven screws on the case sides and top.
- 3. Unscrew the two screws that hold the line switch onto the case front.
- 4. Pull the line switch out of the case front.
- 5. Angle the line switch so the screws on the near side of the switch can be loosened.
- 6. Loosen the screws and remove the existing cord from the switch.
- 7. Remove the nut, lock washer, plain washer and green lead off of the ground screw assembly.
- 8. Loosen the cable connector on the case back.
- 9. Pull the line cord out of the machine, carefully feeding it under the aluminum bracket as you pull.

CORD INSTALLATION:

1. Feed the new cord through the cable connector and into the machine, carefully feeding it under the aluminum bracket.

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FRAME GROUNDING

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The frame of the PRO-CUT[®] 55 must be properly grounded. A ground terminal marked (\perp) is mounted on the case bottom directly behind the input power switch for this purpose. The cable that is sent attached to the machine is connected to this ground terminal. See the National Electric Code for details on proper grounding methods. Install in accordance with all local and national electrical codes.

INPUT VOLTAGE RECONNECTION PROCEDURE

When changing input voltages, it is necessary to change the settings behind the access door on the side of the machine.

🔒 WARNING

Failure to do so may result in damage to the machine.

To reconnect the Pro-Cut, follow the directions as outlined below. Follow this procedure ONLY while the Pro-Cut is disconnected from the input power and the capacitors have properly discharged.

- 1. Open the access door on the side of the machine.
- For 200 to 230 : Position the large switch to 200-230.

For 400 to 460 : Position the large switch to 400-460. For 550 to 575 : Position the large switch to 550-575.

Move the "A" lead to the appropriate terminal.

USE ON ENGINE DRIVEN POWER SUPPLIES

The PRO-CUT[®] 55 can be used on engine driven power supplies. However, the following AC Wave Form Voltage and Input Power Restrictions do apply.

AC Wave Form Restrictions

The PRO-CUT[®] 55 can be operated on engine driven generators as long as the engine drive output meets the following conditions:

The AC wave form frequency is between 45 and 65 Hz.

For 200 - 230 VAC Supplies:

The AC wave form peak voltage must be below 420 volts.

The RMS voltage must be 230VAC +/- 15%.

*The 230 VAC auxiliaries of Lincoln engine drives meet these conditions when run in the high idle mode.

For 380 - 415 VAC Supplies:

The AC wave form peak voltage must be below 840 volts.

The RMS voltage must be 400 VAC +/- 10%. For 460 VAC Supplies:

The AC wave form peak voltage must be below 840 volts.

The RMS voltage of the AC wave form must be 460 VAC +/- 10%.

Input Power Restrictions

The available output current of the PRO-CUT[®] 55 may be limited due to the output capacity of the engine driven power supply. The following are recommended output current settings when used with various Lincoln engine driven power supplies.

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GAS INPUT CONNECTIONS

Supply the PRO-CUT[®] 55 with clean compressed air or nitrogen.

- Supply pressure must be between 80 psi and 150 psi.
- Pressure guage, located on the front of the machine, should be set to approximately 70 PSI for a 25 ft. torch and 75 PSI for a 50 ft. torch while gas is flowing (purging or cutting).
- Flow rate should be approximately 6.0 cfm (170 l/min.).
- **NOTE:** Oil in the air supply to the PRO-CUT[®] 55 can cause severe problems. Use only a clean air supply.
- Connect the gas supply to the PRO-CUT[®] 55 regulator
- Compressed gas should be supplied to the fitting connection mounted on the filter at the rear of the machine. If necessary, this fitting can be removed allowing plumbing access through the 1/4" NPT input port on the filter body
- If compressed air is being used, it is highly recommended that an inline prefilter be installed in the air supply line ahead of the air connection to the PRO-CUT'S coalescing filter. While the coalescing filter is used to remove small amounts of oil and water aerosol particles from the air supply line, the prefilter can be used to remove larger particulates before they reach the coalescing filter element. This will prolong the life of the coalescing filter element by up to six times what it would be without the prefilter, and in turn, prolong the life of the PRO-CUT torch and consumables as well.
- A standard nominal 5 micron inline prefilter is rec ommended; however, for optimum performance, select a prefilter with a 3 micron absolute rating.If these filter ratings are unavailable, anything with a rating less than, or equal to, 20 micron would be acceptable to use. Inline filter elements will generally filter the air with little restriction to the airflow until the element is about 75% contaminated. After this point, there will be noticeable pressure drop in the line. Filter elements should be replaced when a pressure drop of 8-10 psi is indicated; however, for optimum performance of the PRO-CUT, the filter element should be replaced at or before the pressure drop reaches 8 psi. Be sure to select a prefilter that will accommodate the necessary flow rating for the PRO-CUT as specified in the Installation section of this instruction manual under the Gas Input Connections heading.

- While it is recommended that an inline prefilter be placed ahead of each PRO-CUT, that may be in stalled in a shared air supply line, one large in line prefilter may instead be used to accommodate several PRO-CUT's simultaneously. If a shared pre is desired, it must be rated to provide the necessary flow rate, as specified, to ensure proper operation of each of the PRO-CUT's sharing a connection.
- **NOTE:** When using nitrogen gas from a cylinder, the cylinder must have a pressure regulator.
 - Maximum psi from nitrogen gas cylinder to PRO-CUT[®] 55 regulator should never exceed 150 psi.
 - Install a hose between the nitrogen gas cylinder regulator and the PRO-CUT[®] 55 gas inlet.

A WARNING

CYLINDER could explode if damaged.

Keep cylinder upright and chained to a fixed support.



Keep cylinder away from areas where it could be damaged.

Never lift machine with cylinder attached.

- Never allow the cutting torch to touch the cylinder.
- · Keep cylinder away from live electrical parts.
- Maximum inlet pressure 150 psi.

OUTPUT CONNECTIONS

Torch Connection

The PRO-CUT[®] 55 is sent from the factory with a PCT 80 cutting torch. Additional cutting torches can be ordered from the K1571 series. Hand-held and mechanized torches come with 25' or 50' cables.

All torches are connected to the Pro-Cut with a quick connect on the casefront for easy change over. This feature is excellent for changing between a hand cutting torch and a mechanized torch.

For more information on the torch and its components, refer to the PCT80 Operator's Manual (IM588 latest version).



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PRO-CUT[®] 55

SAFETY PRECAUTIONS

Read and understand this entire section before operating the machine.



ELECTRIC SHOCK can kill.

- Do not touch electrically live parts or electrode with skin or wet clothing.
- · Insulate yourself from work and ground.
- Always wear dry insulating gloves.



FUMES AND GASES can be dangerous.

- - · Keep your head out of fumes.
 - Use ventilation or exhaust to remove fumes from breathing zone.



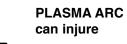
WELDING, CUTTING and GOUGING SPARKS can cause fire or explosion

- Keep flammable material away.
- · Do not weld, cut or gouge on containers that have held combustibles.



ARC RAYS can burn.

 Wear eye, ear and body protection.



- Keep your body away from nozzle and plasma arc.
- · Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.

Observe additional Safety Guidelines detailed in the beginning of this manual.

DESCRIPTION

The PRO-CUT® 55 is a constant current, continuous control plasma cutting power source. It provides superior and reliable starting characteristics, cutting visibility and arc stability. When cutting expanded metal, the PRO-CUT[®] 55 out performs the competition due to its quick, clean response to arc transfers. The power supply design provides high transfer-to-cut distances which makes pierce cutting more reliable and with less nozzle wear. The control system has a safety mechanism to insure that the nozzle and electrode are in place before cutting or gouging. This is extremely important due to the high voltages involved.

The PRO-CUT[®] 55 comes standard with an air regulator, coarse air filter, and pressure gauge. There are six different torch and cable systems to choose from: hand-held torch with 25' or 50' cable, machine and robotic torch both with 25' and 50' cable. Consumables are included so that cutting can begin right out of the box. Consumables can also be ordered as individual packages.

The PRO-CUT® 55 initiates the plasma arc with a simple, yet reliable, touch start mechanism. This system eliminates many of the failure problems associated with hi-frequency start systems. The PRO-CUT® 55 is capable of cutting with nitrogen or air.

The PRO-CUT[®] 55 is controlled by a microprocessorbased control board. The machine performs rudimentary self troubleshooting when powered up which aids in field servicing.

PREHEAT TEMPERATURE FOR PLASMA CUTTING

Preheat temperature control is not necessary in most applications when plasma arc cutting or gouging. Preheat temperature control may be necessary on high carbon alloy steels and heat treated aluminum for crack resistance and hardness control. Job conditions, prevailing codes, alloy level, and other considerations may also require preheat temperature control. The following minimum preheat temperature is recommended as a starting point. Higher temperatures may be used as required by the job conditions and/or prevailing codes. If cracking or excessive hardness occurs on the cut face, higher preheat temperature may be required. The recommended minimum preheat temperature for plate thickness up to 1/2" (12.7mm) is 70°F (21.1°C).



INCOLN ELECTRIC

USER RESPONSIBILITY

Because design, fabrication, erection and cutting variables affect the results obtained in applying this type of information, the serviceability of a product or structure is the responsibility of the user. Variation such as plate chemistry, plate surface condition (oil, scale), plate thickness, preheat, quench, gas type, gas flow rate and equipment may produce results different than those expected. Some adjustments to procedures may be necessary to compensate for unique individual conditions. Test all procedures duplicating actual field conditions.

RECOMMENDED PROCESSES AND EQUIPMENT

The PRO-CUT[®] 55 is capable of all cutting and gouging applications within its output capacity of 25 to 60 amps. These applications include thin gage sheet metal and expanded metal.

OPERATIONAL FEATURES AND CONTROLS

The PRO-CUT[®] 55 comes with an ON/OFF POWER SWITCH, OUTPUT CURRENT CONTROL, PURGE BUTTON and a SAFETY RESET BUTTON.

DESIGN FEATURES AND ADVANTAGES

The microprocessor controlled PRO-CUT[®] 55 design makes plasma cutting and gouging tasks uncomplicated. This list of design features and advantages will help you understand the machine's total capabilities so that you can get maximum use from your machine.

- Light weight and portable design for industrial use.
- Continuous control, 25 60 amps.
- Reliable touch start mechanism for plasma arc initiation.
- Unique microprocessor controlled starting sequence for safe and consistent starting.
- Rapid arc transfer for fast cutting of expanded metal.
- High transfer distance for ease of use.
- Soft start of input filter capacitors at start up.
- Input over voltage protection.

- Bright 3.0 second timed pilot arc.
- Purge momentary push button.
- Air regulator and pressure gage located on the front of machine for convenience.
- Parts-in-Place mechanism to detect proper installation of consumables and torch.
- Latching Parts-in-Place mechanism. Requires a positive operator reset.
- Automatic detection of faulty output control.
- In line coarse air filter.
- Preflow/Postflow timing. Preflow is eliminated if arc is re-initiated in Postflow.
- Thermostatic Protection.
- Solid state over-current protection.
- Works with pure nitrogen for cutting nonferrous materials.
- Reconnectable for multiple input voltages.
- Quick disconnect torch.
- Dead front display for machine status.
- Unique electrode and Vortech[™] nozzle design for optimum cooling and long life.
- Swirl texture inside Vortech[™] nozzle for better starting reliability and higher quality cuts.
- Unique drag cup design for durability and elimination of double arcing.

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CUTTING CAPABILITY

The PRO-CUT[®] 55 is rated at 55 amps, at 50% duty cycle on a 10 minute basis (runs 55 amps for 5 minutes, then idling for 5 minutes) or 40 amps, at 100% duty cycle (continuous use). If the duty cycle is exceeded, a thermal protector will shut off the output of the machine until it cools to the normal operating temperature.

Figure B.1

Lincoln's PRO-CUT 55

Mild Steel Cut Capacity Chart 100 Recommended Torch Travel Speed (IPM) 80 80% of Maximum Speed 60 40 20 25 A 45 A 55 A 35 A 0 0.000 0.125 0.250 0.375 0.500 0.750 0.625 Material Thickness

CONSUMABLE LIFE

The expected life for the PRO-CUT[®] 55's electrode under normal operating conditions is approximately 50 to 60 minutes of cutting time at the machine's maximum rated output. An erosion of approximately .060" in the electrode tip is typical-cal for the end of electrode life, however, the electrode may last longer. A sustained green and erratic arc will indicate definite electrode failure and both the electrode and nozzle should be replaced immediately. It is recommended that consumables (electrode and nozzle) be replaced in complete sets. This will maximize the performance of the PRO-CUT system.

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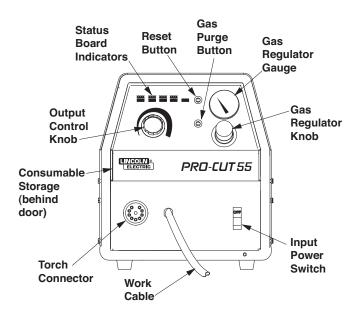
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LIMITATIONS

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Do not exceed output current and duty cycle rating of machine. Do not use the PRO-CUT® 55 for pipe thawing.

CONTROLS AND SETTINGS



When preparing to cut or gouge, position the machine as close to the work as possible. Make sure you have all materials needed to complete the job and have taken all safety precautions. It is important to follow these operating steps each time you use the machine.

- Turn the machine's ON/OFF POWER SWITCH to OFF position.
- · Connect the air supply to the machine.

1. Turn the main power and the machine power switch on.

- The fan should start.
- The pre-charge circuit will operate for 4 seconds, then the green "Power" LED should turn on.
- If the "SAFETY" LED is lit, push the "Reset" button. If there is no problem, the LED will go off. If there is a problem, refer to Step "SAFETY LED" in this section.
- · Be sure that the work lead is clamped to the workpiece before cutting.
- · Set the output current control knob at maximum position for high cutting speed and less dross forma-

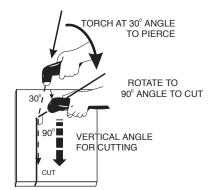
tion. Reduce the current, if desired to reduce the kerf (cut) width, heat affected zone or travel speed as required.

2. GAS PRESSURE SETTINGS

- · Push-in and hold the Purge button to check or set the gas pressure. Pull the pressure regulator cap out and turn it to set the pressure.
 - Adjust the gas regulator for 70 PSI for 25' torches or 75 PSI for 50' torches.
 - Release the Purge button.
 - The gas will immediately turn off. The pressure gage may show an increase in pressure after the air turns off but this is normal. Do NOT reset the pressure while the air is NOT flowing.

3. PREPARING TO CUT

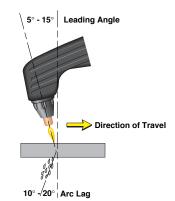
- · When ready to cut, place the torch near the work, make certain all safety precautions have been taken and pull the trigger.
 - The air will flow for a preflow time of 2 seconds and the pilot arc will start. (This is true unless the machine is in postflow, then the preflow time is skipped and the pilot arc will start immediately.)
 - The pilot arc will run for 3.0 seconds and shut off unless the arc is brought in contact with the work and the arc is transferred. Avoid excessive pilot arc time by transferring the arc to the workpiece quickly to improve parts life.
 - When the arc is brought within 1/4" from the work piece: the arc will transfer, the current will ramp up to the setting on the control panel, and the cut can last indefinitely (or until the duty cycle of the Pro-Cut is exceeded). Do not touch the nozzle to the work when cutting with the control panel setting above 45 amps or damage to the consumables will result.
- · Pierce the work piece by slowly lowering the torch onto the metal at a 30° angle away from the operator. This will blow the dross away from the torch tip. Slowly rotate the torch to vertical position as the arc becomes deeper.







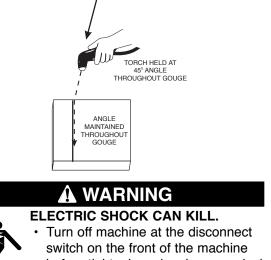
- · Hold the nozzle standoff 1/8" (3.2mm) to 3/16" (4.7mm) above the workpiece during cutting. Do not let the torch nozzle touch the work or carry a long arc.
- Keep moving while cutting. Cut at a steady speed without pausing. Maintain the cutting speed so that the arc leg is 10° to 20° behind the travel direction.
- Use a 5° 15° leading angle in the direction of the cut.



- · Use the drag cup to maintain constant standoff for better cut quality and to protect the nozzle from spatter.
- Use the drag cup with a metal template to prevent nozzle double arcing.
- · Finish the cut to be made and release the trigger.
- When the trigger is released, the arc will stop.

The gas will continue to flow for 10 seconds of postflow. If the trigger is activated within this time period, the pilot arc will immediately restart.

- If the dross is difficult to remove, reduce the cutting speed. High speed dross is more difficult to remove than low speed dross.
- · The right side of the cut is more square than the left as viewed along the direction of travel.
- Tilt the torch about 45° from the workpiece and hold the nozzle 1/8" (3.2mm) to 3/16" (4.7mm) above the workpiece for gouging.
- · Clean spatter and scale from the nozzle and drag cup frequently.



ANGLE OF APPROACH

before tightening, cleaning or replacing consumables.

1. SAFETY LED

- If the "SAFETY" LED lights at any time, check the following:
- 2. IN NORMAL OPERATION, THE "SAFETY" LED MAY TEMPORARILY ILLUMINATE AND CLEAR ITSELF AUTOMATICALLY WITH-OUT DEPRESSING THE RESET BUTTON.
- Check the assembly of the torch consumables. If they are not properly in place, the machine will not start. Make sure that the shield cup is hand tight. Do not use pliers or over tighten.
- Check the conditions of the inside of the nozzle. If debris has collected, rub the electrode on the inside bottom of the nozzle to remove any oxide layer that may have built up. Refer to "Suggestions for Extra Utility from the PRO-CUT system".
- Check the condition of the electrode. If the end has a crater-like appearance, replace it along with the nozzle. The maximum wear depth of the electrode is approximately .060". A green and erratic arc will indicate definite electrode failure and the electrode should be replaced immediately.
- Replace the nozzle when the orifice exit is eroded away or oval shaped.
- If the machine does not reset or continues to trip, consult the Troubleshooting Section.
- · Use the proper cutting or gouging procedures referred to in Procedure Recommendations.



PRO-CUT® 55 LINCOLN ELECTRIC

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PILOT ARC DISCUSSION

The PRO-CUT has a smooth, continuous pilot arc. The pilot arc is only a means of transferring the arc to the workpiece for cutting. Repeated pilot arc starts, in rapid succession, is not recommended as these starts will generally reduce consumable life. Occasionally, the pilot arc may sputter or start intermittently. This is aggravated when the consumables are worn or the air pressure is too high. Always keep in mind that the pilot arc is designed to transfer the arc to the workpiece and not for numerous starts without cutting.

When the pilot arc is started, a slight impulse will be felt in the torch handle. This occurrence is normal and is the mechanism which starts the plasma arc. This impulse can also be used to help troubleshoot a "no start" condition.

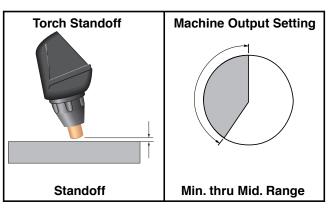
PROCEDURE RECOMMENDATIONS

When properly used, plasma arc cutting or gouging is a very economical process. Improper use will result in a very high operating cost.

General - In All Cases

• Follow safety precautions as printed throughout this operating manual and on the machine.

Thin Gauge Sheet Metal:



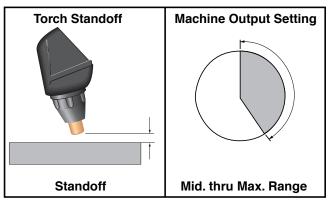
1. Output set below 45 amps.

• The nozzle may be dragged on the metal surface, touching it lightly to the surface after piercing a hole. Current control should be set below the mid range.

2. Current Control should be set below the mid range.

 Do not allow cable or body to contact hot surface.

Thick Sections of Metal



1. Output set above 45 amps.

• The best quality and consumable life will be obtained by holding the torch off the surface about 3/16". Too long an arc may compromise cut quality and consumable life. The nozzle should NOT be dragged on the work.

2. The nozzle should not be dragged on the work surface.

- Dragging the nozzle on the work surface will result in shortened consumable life
- Use of the S22151 Drag Cup will maintain the proper standoff and eliminate nozzle double arcing.
- If piercing is required, slowly lower the torch at an angle of about 30° to blow the dross away from the torch tip and slowly rotate the torch to a vertical position as the arc becomes deeper. This process will blow a lot of molten metal and dross. Be careful! Blow the dross away from the torch, the operator and any flammable objects.
- Where possible, start the cut from the edge of the work piece.
- Keep moving! A steady speed is necessary. Do not pause.
- Do not allow torch cable or body to contact hot surface.



Suggestions for Extra Utility from the PRO-CUT System:

ELECTRIC SHOCK CAN KILL.

- Turn off machine at the disconnect switch on the front of the machine before tightening, cleaning or replacing consumables.
- Occasionally an oxide layer may form over the tip of the electrode, creating an insulating barrier between the electrode and nozzle. This will result in the tripping of the Pro-Cut's safety circuit. When this happens turn the power off, remove the nozzle and electrode and use the electrode to rub against the inside bottom surface of the nozzle. This will help remove any oxide buildup. Replace the nozzle, turn on the power and continue cutting. If the Parts-in-Place circuit continues to trip after cleaning the consumables, then replace them with a new set. Do not continue to try and cut with excessively worn consumables as this can cause damage to the torch head and will degrade cut quality.
- 2. To improve consumable life, here are some suggestions that may be useful:
 - a. Never drag the nozzle on the work surface if the output control knob is above 45 amps.
 - b. Make sure the air supply to the Pro-Cut is clean and free of oil. Use several extra in line filters if necessary.
 - c. Use the lowest output setting possible to make a good quality cut at the desired cut speed.
 - d. Minimize dross buildup on the nozzle tip by starting the cut from the edge of the plate when possible.
 - e. Pierce cutting should be done only when necessary. If piercing, angle torch about 30° from the plane perpendicular to the work piece, transfer the arc, then bring the torch perpendicular to the work and begin parallel movement.
 - f. Reduce the number of pilot arc starts without transferring to the work.
 - g. Reduce the pilot arc time before transferring to the work.

- Set air pressure to recommended setting. A higher or lower pressure will cause turbulence in the plasma arc, eroding the orifice of the nozzle tip.
- i. Use only Lincoln consumable parts. These parts are patented and using any other replacement consumables may cause damage to the torch or reduce cut quality.



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PRO-CUT® 55

ALWAYS USE GENUINE LINCOLN ELECTRIC **ELECTRODES** AND VORTECH[™] NOZZLES

- Only Genuine Lincoln Electric consumables yield the best cutting performance for the PRO-CUT[®] 55.
- The patented VORTECH™ nozzle provides an extra "kick" of swirl as the arc exits the nozzle which improves cutting performance. No other nozzle has this capability or can match its performance.

GENERAL OPTIONS / ACCESSORIES

The following options/accessories are available for your PRO-CUT[®] 55 from your local Lincoln Distributor.

K1600-1 Undercarriage - A valet style undercarriage with pull-out handle for machine only. Provides Torch and Work Cable storage.

S22147-043 - VORTECH™ nozzle with an .043" (1.2 mm) Orifice

S22147-068 - VORTECH™ nozzle with an .068" (1.7 mm) Orifice

S22149 - Electrode - replacement electrodes for cutting.

S22150 - Shield Cup - This shields the torch tip and provides more visibility to the workpiece than the drag cup. Note: the shield cup does not prevent the torch tip from touching the workpiece.

S22151 - Drag Cup - The drag cup protects the torch by preventing the torch from touching the workpiece.

K1571 Series - PCT 80 Torches come in 25' and 50' lengths in either hand held or mechanized versions.

K1678-1 MACHINE INTERFACE KIT

This kit is compatible with the present models of the PRO-CUT[®] 55. Machines having code numbers 10473 and 10474 may require their Output PC Board to be upgraded to a G3326-2 board.

This kit provides the necessary hardware and instructions to install a14 Pin MS Type remote connector into the machine. This connector provides provisions for the following interface signals between the PRO-CUT® 55 and the controller.

ARC START:

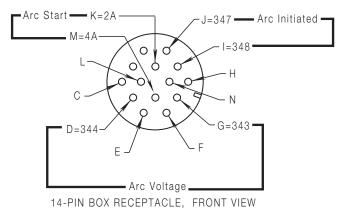
The Arc Start circuit allows for triggering of the power source to commence cutting. This circuit can be accessed through pins K and M of the 14 pin MS connector. The circuit has a 17 VDC nominal open circuit voltage and requires a dry contact closure to activate.

ARC INITIATED:

The Arc Initiated circuit provides information as to when a cutting arc has transferred to the work piece. This circuit can be accessed through pins I and J of the 14 pin MS connector. The circuit provides a dry contact closure when the arc has transferred. Input to this circuit should be limited to 0.3 A for either 120VAC or 30VDC.

ARC VOLTAGE:

The Arc Voltage circuit can be used for activating a torch height control. This circuit can be accessed through pins D and G of the 14 pin MS connector. The circuit provides full electrode to work arc voltage (no voltage divider, 335VDC maximum).



Users wishing to utilize the Machine Interface can order a K867 Universal Adapter (please adhere to the pin locations stated above) or manufacture a 14 pin MS connector cable assembly.



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PRO-CUT[®] 55



ELECTRIC SHOCK can kill.

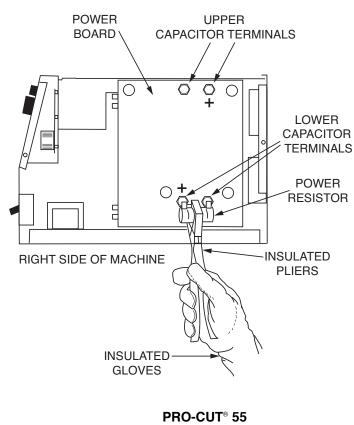
- Have an electrician install and service this equipment.
- Turn the input power off at the fuse box before working on equipment.
- · Do not touch electrically hot parts.
- Prior to Performing preventative maintenance, perform the following capacitor discharge procedure to avoid electric shock.

INPUT FILTER CAPACITOR DISCHARGE PROCEDURE

- 1. Turn off input power or disconnect input power lines.
- 2. Remove the 5/16" hex head screws from the side and top of the machine and remove wrap-around machine cover.
- Be careful not to make contact with the capacitor terminals that are located on the top and bottom of the Power Board on the right side of the machine.

- Obtain a high resistance and high wattage resistor (25-1000 ohms and 25 watts minimum). This resistor is not supplied with machine. NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.
- 5. Locate the two capacitor terminals (large hex head cap screws) on the top and bottom of the Power P.C. Board shown in Figure D.1.
- Use electrically insulated gloves and insulated pliers. Hold body of the resistor and connect resistor leads across the two capacitor terminals. Hold resistor in place for 10 seconds. DO NOT TOUCH CAPACITOR TERMINALS WITH YOUR BARE HANDS.
- 7. Repeat discharge procedure for the other capacitor.
- Check voltage across terminals of all capacitors with a DC voltmeter. Polarity of capacitor terminals is marked on PC board above terminals. Voltage should be zero. If any voltage remains, repeat this capacitor discharge procedure.

FIGURE D.1 - LOCATION OF INPUT FILTER CAPACITOR TERMINALS.



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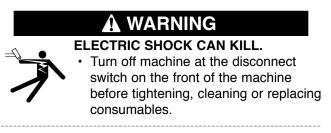
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ROUTINE MAINTENANCE

- 1. Keep the cutting or gouging area and the area around the machine clean and free of combustible materials. No debris should be allowed to collect which could obstruct air flow to the machine.
- 2. Every 6 months or so, the machine should be cleaned with a low pressure airstream. Keeping the machine clean will result in cooler operation and higher reliability. Be sure to clean these areas:
 - Power, Output and Control printed circuit boards and heat sinks
 - Power switch
 - Main Transformer
 - Input Rectifier
- 3. Examine the sheet metal case for dents or breakage. Repair the case as required. Keep the case in good condition to insure that high voltage parts are protected and correct spacings are maintained. All external sheet metal screws must be in place to insure case strength and electrical ground continuity.
- 4. Check the air regulator filter to be sure it does not become clogged. The air filter on the machine is self draining and will not have to be emptied.
- 5. Check the filter element every several months to see if it is clogged (weekly in very dirty environments). Replace if necessary by first removing the two screws that attach the filter cage to the back panel assembly, then slide the cage away from the back of the machine and remove. Next, twist the clear filter bowl until it comes off (be careful not to lose the o-ring seated at the top of the bowl threads). Unscrew the filter element and replace with new element. Assemble parts in reverse order as described above.
- 6. Inspect the cable periodically for any slits or puncture marks in the cable jacket. Replace if necessary. Check to make sure that nothing is crushing the cable and blocking the flow of air through the air tube inside. Also, check for kinks in the cable periodically and relieve any so as not to restrict the flow of air to the torch.

PERIODIC MAINTENANCE



Change consumables as required.

1. Thermal Protection

Two thermostats protect the machine from excessive operating temperatures. Excessive temperatures may be caused by a lack of cooling air or operating the machine beyond the duty cycle and output rating. If excessive operating temperatures should occur, the yellow thermal LED will light and the thermostat will prevent output voltage or current.

Thermostats are self-resetting once the machine cools sufficiently. If the thermostat shutdown was caused by excessive output or duty cycle and the fan is operating normally, the Power Switch may be left on and the reset should occur within a 15 minute period. If the fan is not turning or the air intake louvers were obstructed, then the power must be switched off and the fan problem or air obstruction must be corrected.

2. Filter Capacitor Conditioning (PRO-CUT[®] 55, 400-460 or 460-575 VAC only)

A protection circuit is included to monitor the voltage across filter capacitors C1 and C2. In the event that the capacitor voltage is too high, the protection circuit will prevent output. The protection circuit may prevent output providing all these circumstances are met:

- a. Machine is connected for 400-460 or 460-575 VAC input.
- b. Machine did not have power applied for many months.
- c. Machine will not produce output when power is first switched on.

If these circumstances apply, the proper action is to switch the machine on and let it idle for up to 30 minutes. This is required to condition the filter capacitors after an extended storage time. The protection circuit will automatically reset once the capacitor conditioning and resultant voltage levels are acceptable. It may be necessary to turn the power switch off and back on again after this period.



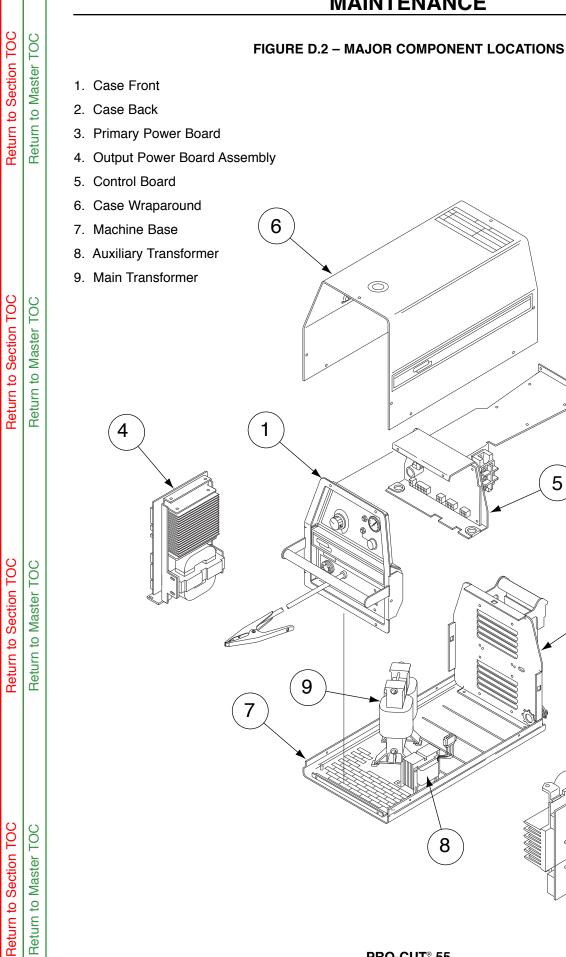
MAINTENANCE

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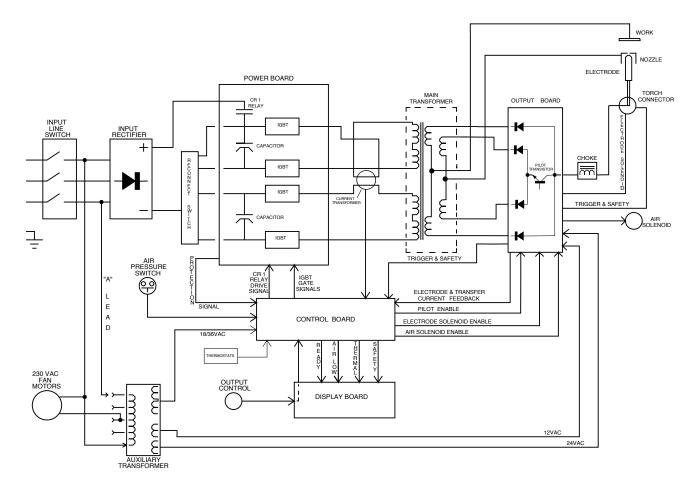
PRO-CUT® 55

Section E-1

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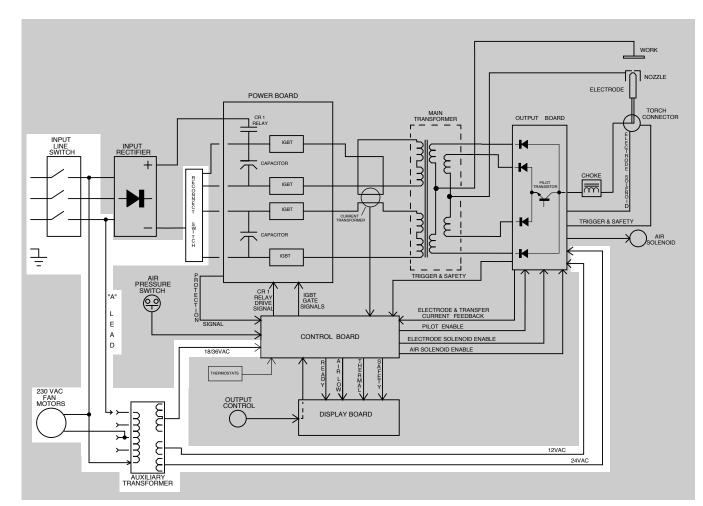
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FIGURE E.1 – PRO-CUT[®] 55 BLOCK LOGIC DIAGRAM



PRO-CUT® 55

FIGURE E.2 – INPUT LINE VOLTAGE



GENERAL DESCRIPTION

The PRO-CUT[®] 55 is a constant current, continuous control plasma cutting power source. The inverter based power supply design is controlled by a micro-processor control board. The control system has a safety mechanism to insure that the nozzle and electrode are in place before cutting or gouging. The PRO-CUT[®] 55 initiates the plasma arc with a simple, yet reliable, touch start mechanism. This system eliminates many of the problems associated with hi-frequency type start systems.

INPUT LINE VOLTAGE, CONTACTOR AND MAIN TRANSFORMER

The single-phase or three-phase input power of 200-230 or 400 to 460 volts AC is connected to the machine, via an input line cord, to a switch located on the front panel.

A reconnect panel and voltage range switch allow the user to configure the machine for either a low or high input voltage and also connect the auxiliary transformer for the appropriate input voltage.

The auxiliary transformer develops the appropriate AC voltages to operate the cooling fans, the control board and the plasma output board.

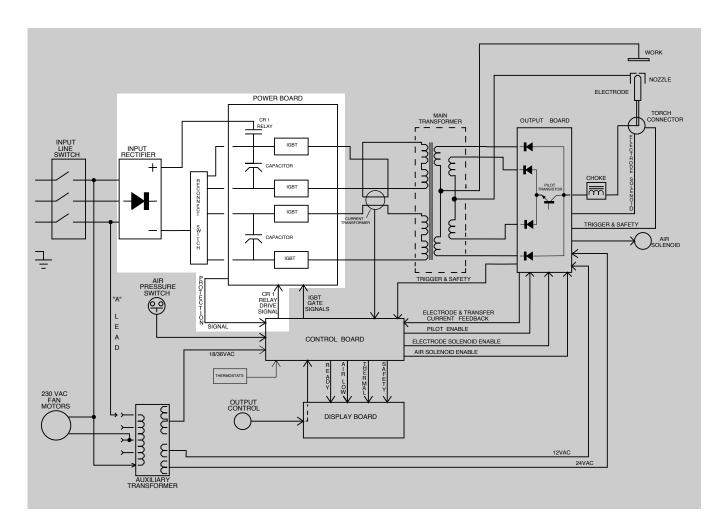
NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion.



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FIGURE E.3 – PRECHARGE AND PROTECTION



PRECHARGE AND PROTECTION

The input voltage is rectified by the input rectifier. The resultant DC voltage is applied, through the reconnect switch, to the power board. The power board contains precharging circuitry for the safe charging of the input filter capacitors. Once the capacitors are precharged and balanced the control board activates the CR1 input relay. This connects full input power to the filter capacitors. When the filter capacitors are fully charged they act as power supplies for the IGBT switching circuit. The Insulated Gate Bipolar Transistors supply the main transformer primary winding with DC current flow. See *IGBT Operation* discussion and diagrams in this section.

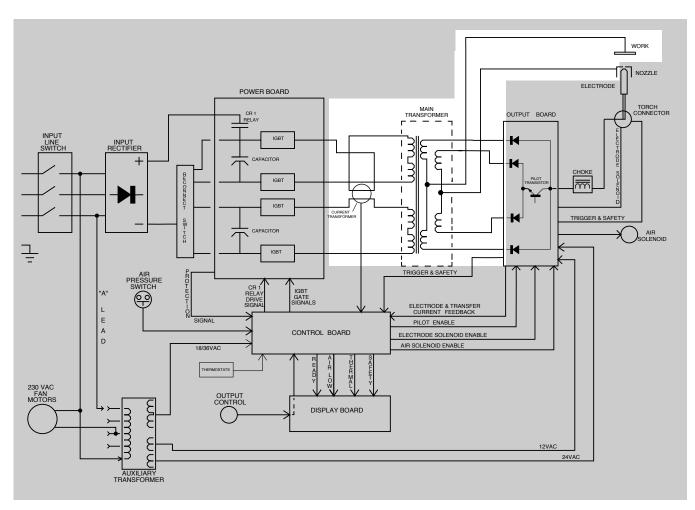
The power board also monitors the filter capacitors for voltage balance and under or overvoltage. If either should occur, the appropriate signal is sent to the control board to deactivate the CR1 input relay. The machine output will also be disabled.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion. PRO-CUT[®] 55



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FIGURE E.4 – MAIN TRANSFORMER



MAIN TRANSFORMER

Each IGBT pair acts as a switch assembly. Each assembly feeds a separate, oppositely wound primary winding of the main transformer. The reverse direction of current flow through the main transformer primaries and the offset timing of the IGBT pairs induce an AC square wave output signal at the secondary of the main transformer.

The DC current flow through each primary winding is redirected or "clamped" back to each respective filter capacitor when the IGBTs are turned off. This is needed due to the inductance of the transformer primary winding.

The primary currents also pass through the current transformer, which sends a signal to the control board. If the primary currents are not equal, the control board compensates by adjusting the IGBT gate signals.

The firing of both IGBT pairs occurs during halves of the 50 microsecond intervals, creating a constant 20KHZ output.

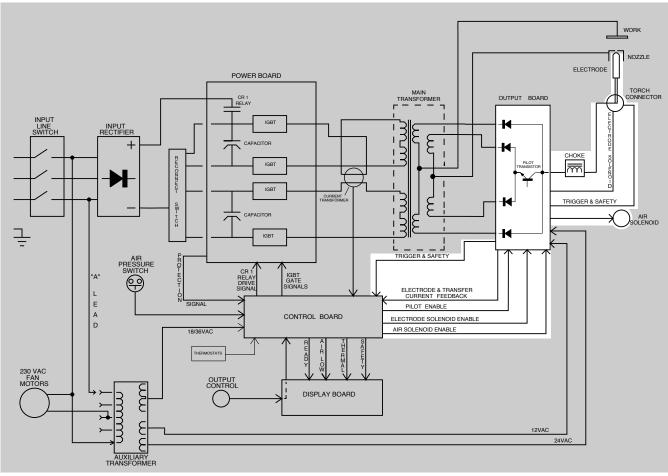
The secondary portion of the main transformer is made up of two separate windings. One secondary winding supplies the electrode-to-work voltage. This is the high current winding, which is capable of supplying maximum output current during the cutting process.

The other secondary winding supplies the electrode-tonozzle voltage for the pilot arc current. The conductor in this winding is smaller since the pilot current is considerably less than the cutting current. While one winding is conducting the other winding is at a limited voltage and aids in the arc transfer to and from the workpiece.



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FIGURE E.5 – PLASMA OUTPUT BOARD AND TORCH



OUTPUT BOARD AND TORCH

The output board contains an Insulated Gate Bipolar Transistor (IGBT) which, upon receiving a pilot signal from the control board, either enables or disables the current in the pilot winding. The cutting and pilot rectifier diodes are also incorporated in the output board. There are two diodes for each of the secondary windings.

There are two P.C. board mounted current sensors. One sensor regulates pilot and cutting current. The other sensor indicates to the control board when and how much current transfers to the workpiece.

The output board also includes the trigger circuitry, the gas solenoid driver, the electrode solenoid driver and the torch parts-in-place circuitry.

The output choke, which is in series with both the pilot circuit and the cutting circuit, provides current filtering to enhance arc stability.

The PCT 80 torch uses a patented touch start mechanism that provides superior starting performance over other touch start systems. The torch head consists of 3 major parts: torch body, insulator and piston. The insulator provides an electrical barrier between the piston and torch body. The piston provides a path for electrical current to the electrode. The piston also drives the electrode to the nozzle for arc initiation. The torch body contains the main torch components: the trigger, pilot arc, cutting arc, and air flow systems are included. A copper nozzle with a patented internal swirl is used to focus the arc. A small, precise hole in the end of the nozzle constricts the arc and increases the current density. As the air enters the torch head, it is directed between the electrode and nozzle for maximum electrode cooling. A portion of the cooling air exits the chamber through vents in the side of the nozzle. A swirl texture located inside the bottom of the nozzle increases the plenum air swirl strength, and improves arc start reliability and parts-inplace verification.

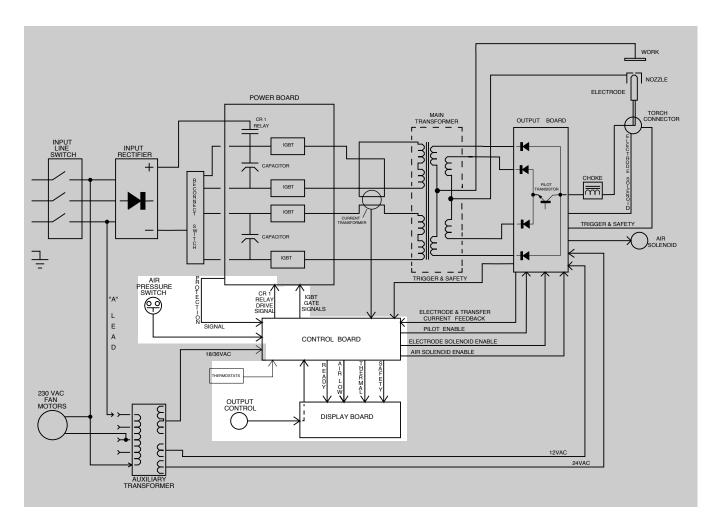
Plasma arc initiation occurs as follows: First, in the idle state, a spring inside the torch head pushes the piston and electrode forward to make continuity with the nozzle. When the trigger is pulled, air flow begins and creates enough back force on the electrode to overcome the force of the spring. However, the solenoid valve allows enough forward force on the piston to maintain continuity between the consumables. After this continuity has been verified by the Pro-Cut's parts-in-place circuit, output current is established and regulated. Once the current stabilizes, the solenoid valve turns off, removing the forward force on the piston. The back pressure drives the piston and electrode away from the nozzle, creating the plasma arc. The air stream forces the arc out the orifice of the nozzle. This appears as a pilot arc, which can then be transferred for cutting.

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FIGURE E.6 - CONTROL AND DISPLAY BOARDS



CONTROL AND DISPLAY BOARDS

The control board receives status and analog feedback signals from the output board, display board, power board and various sensors. The processor interprets these signals, makes decisions and changes machine mode and output to satisfy the requirements as defined by the internal software. The control board regulates the output of the machine by controlling the IGBT switching times through pulse width modulation circuitry. See Pulse Width Modulation in this section.

The display board receives commands from the control board and, via indicator lights, communicates PRO-CUT[®] 55 status and operating conditions to the user.

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PRO-CUT® 55 LINCOLN ELECTRIC

PROTECTION CIRCUITS

Protection circuits are designed into the PRO-CUT[®] 55 machine to sense trouble and shut down the machine before the trouble damages internal machine components. Both overload and thermal protection circuits are included.

OVERLOAD PROTECTION

The PRO-CUT[®] 55 is electrically protected from producing higher than normal output currents. If the output current exceeds 50-60 amps, an electronic protection circuit limits the current to within the capabilities of the machine.

Another protection circuit monitors the voltage across the input filter capacitors. If the filter capacitor voltage is too high, too low or not balanced the protection circuit may prevent machine output.

THERMAL PROTECTION

Two thermostats protect the machine from excessive operating temperatures. One thermostat is located on the output choke and the other on the power board IGBT heat sink. Excessive temperatures may be caused by a lack of cooling air or by operating the machine beyond the duty cycle and output rating. If excessive operating temperatures should occur, the thermal status indicator will light and the thermostat will prevent output voltage or current.

Thermostats are self-resetting once the machine cools sufficiently. If the thermostat shutdown was caused by excessive output or duty cycle and the fans are operating normally, the power switch may be left on and the reset should occur within a 15 minute period. If the fan or fans are not turning or the air intake louvers are obstructed, the input power must be removed and the fan problem or air obstruction must be corrected.

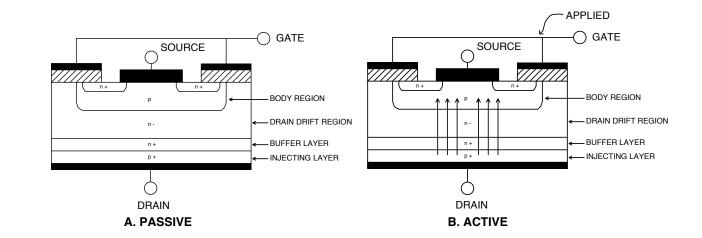
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INSULATED GATE BIPOLAR TRANSISTOR (IGBT) OPERATION

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

Drawing A shows an IGBT in a passive mode. There is no gate signal, zero volts relative to the source, and therefore, no current flow. The drain terminal of the IGBT may be connected to a voltage supply; but since there is no conduction the circuit will not supply current to components connected to the source. The circuit is turned off like a light switch in the OFF position. Drawing B shows the IGBT in an active mode. When the gate signal, a positive DC voltage relative to the source, is applied to the gate terminal of the IGBT, it is capable of conducting current. A voltage supply connected to the drain terminal will allow the IGBT to conduct and supply current to circuit components coupled to the source. Current will flow through the conducting IGBT to downstream components as long as the positive gate signal is present. This is similar to turning ON a light switch.

FIGURE E.7 – IGBT OPERATION



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PULSE WIDTH MODULATION

The term PULSE WIDTH MODULATION describes how much time is devoted to conduction in the positive and negative portions of the cycle. Changing the pulse width is known as MODULATION. Pulse Width Modulation (PWM) is the varying of the pulse width over the allowed range of a cycle to affect the output of the machine.

MINIMUM OUTPUT

By controlling the duration of the gate signal, the IGBT is turned on and off for different durations during a cycle. The top drawing below shows the minimum output signal possible over a 50-microsecond time period.

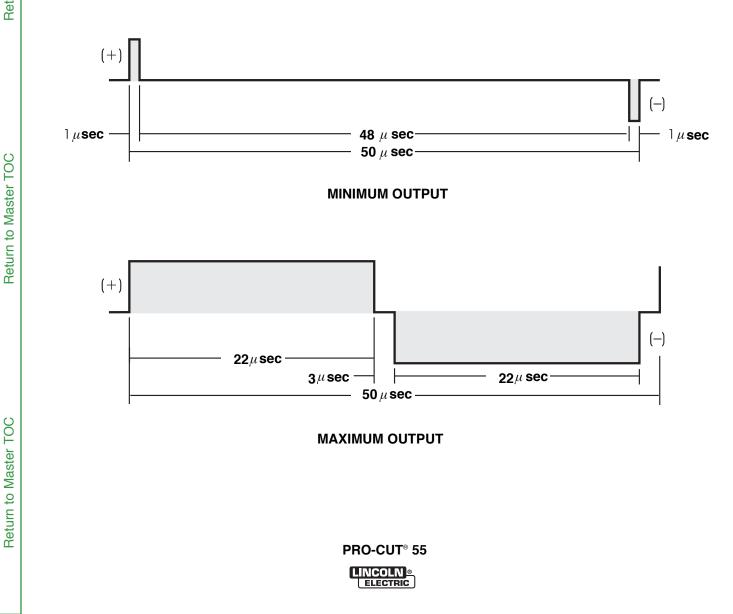
The positive portion of the signal represents one IGBT group¹ conducting for 1 microsecond. The negative portion is the other IGBT group¹. The dwell time (off time) is 48 microseconds (both IGBT groups off). Since only 2 microseconds of the 50-microsecond time period is devoted to conducting, the output power is minimized.

MAXIMUM OUTPUT

By holding the gate signals on for 22 microseconds each and allowing only 3 microseconds of dwell time (off time) during the 50-microsecond cycle, the output is maximized. The darkened area under the top curve can be compared to the area under the bottom curve. The more dark area under the curve, the more power is present.

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





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HOW TO USE TROUBLESHOOTING GUIDE

WARNING

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

A

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 (SYMP-TOMS). This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into four main categories: Output Problems, Function Problems, Cutting Problems and LED 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. PERFORM COMPONENT TESTS. The last column, labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

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

CAUTION

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



PC BOARD TROUBLESHOOTING PROCEDURES

WARNING

A

ELECTRIC SHOCK can kill.

Have an electrician install and service this equipment. Turn the machine OFF before working on equipment. Do not touch electrically hot parts.

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:

- 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.
- 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:



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

Reusable Container Do Not Destroy PC Board can be damaged by static electricity.

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

- If you don't have a wrist strap, touch an unpainted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.
- Tools which come in contact with the PC Board must be either conductive, anti-static or static-dissipative.

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

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- 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:** Allow the machine to heat up so that all electrical components can reach their operating temperature.
- 5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.
 - a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.
 - b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.
- 6. Always indicate that this procedure was followed when warranty reports are to be submitted.
- **NOTE:** Following this procedure and writing on the warranty report, "INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM," will help avoid denial of legitimate PC board warranty claims.

Observe Safety Guidelines detailed in the beginning of this manual.

TROUBLESHOOTING GUIDE

| PROBLEMS (SYMPTOMS) | POSSIBLE AREAS OF MISADJUSTMENT(S) | RECOMMENDED COURSE OF ACTION |
|---|---|--|
| | OUTPUT PROBLEMS | |
| Major physical or electrical damage is evident when the sheet metal cover(s) are removed. | Contact your local authorized Lincoln Electric Field Service Facility for technical assistance. | Contact the Lincoln Electric Service Department, 1-888-935 3877. |
| Machine is dead – no output – no fan – no status indicator lights. | Make sure that the input power switch is in the "ON" position. Check the input voltage at the machine. Input voltage must match the rating plate and the reconnect panel. Check for blown or missing fuses in the input lines and the 0.6 amp slow blow reconnect fuse. | Check the input power switch (S1) for proper operation. See the Wiring Diagram. Check the leads associated with the power switch (S1) and the auxiliary transformer (T2) fo loose or faulty connections See the Wiring Diagram. Perform the <i>Auxiliary Trans</i> <i>former Test.</i> |
| Machine is dead - not output - no status indicator lights - fans run. | Check the input voltage at the machine. Input voltage must match the rating plate and the reconnect panel. | Check the harness connections between the Control board and the Display board. Perform the Auxiliar Transformer Test. Perform the Low Voltage Circuit Test. Perform the Input Rectifie Test. The control board may be faulty Replace. The display board may be faulty. Replace. |
| All status indicators remain lit immediately after power up. | The microprocessor has experi- enced a memory fault. Contact your Local Lincoln Authorized Field Service Facility. | 1. The control board may be fault Replace. |

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

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TROUBLESHOOTING GUIDE

TROUBLESHOOTING & REPAIR

Observe Safety Guidelines detailed in the beginning of this manual.

| PROBLEMS (SYMPTOMS) | POSSIBLE AREAS OF MISADJUSTMENT(S) | RECOMMENDED COURSE OF ACTION |
|--|---|---|
| | FUNCTION PROBLEMS | |
| All the status lights begin to blink within 5 seconds of power up. | Make sure the PRO-CUT[®] 55 is reconnected correctly for the input voltage being applied. Be sure to remove input power and wait at least one minute before changing the position of the input voltage range switch. If the machine is connected for high input voltage, the input capacitors may need condition- ing. See Maintenance Section. | Perform the Primary Power Board Resistance Test and Capacitor Voltage Test. Perform the Input Rectifier Test. The control board may be faulty. Replace. The primary power board may be faulty. Replace. |
| The machine powers up properly, but there is no response when the gun trigger is pulled. Only the power LED is lit. | Make sure the torch is connected properly to the PRO-CUT® 55 machine. Make sure the air supply is connected and operating properly. Make sure the torch head consumable parts are in place and in good condition. Replace if necessary. | Perform the Auxiliary Transformer Test. Perform the Trigger Circuit Test. Perform the Gas Solenoid Test. Perform the Torch Continuity and Solenoid Test. The control board may be faulty. Replace. The output power board may be faulty. Perform the Output Board Resistance Test. |
| When the torch trigger is pulled, air begins to flow; but no pilot arc is established. | Make sure the torch consumables are in place and in good condition. Replace if necessary. Make sure the air pressure is set at 70 psi (448 kPa.) and the flow rate is at 6 CFM. Make sure there are no kinks or restrictions for air flow in the torch cable. | Perform the Torch Continuity and Solenoid Test. Perform the Low Voltage Circuit Test. The output board may be faulty. Perform the Output Board Resistance Test. The control board may be faulty. Replace. |

CAUTION

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

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Observe Safety Guidelines detailed in the beginning of this manual.

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| PROBLEMS (SYMPTOMS) | POSSIBLE AREAS OF MISADJUSTMENT(S) | RECOMMENDED COURSE OF ACTION |
|--|---|--|
| | FUNCTION PROBLEMS | |
| The air begins to flow when the torch trigger is pulled. There is a very brief pilot arc. (Normal is 3 seconds.) The sequence is repeat- ed with subsequent trigger pulls. | Make sure the air pressure is set at 70 psi (448 kPa.) and the flow rate is at 6 CFM. Make sure the torch consum- ables are in place and in good condition. Make sure the air flow is not restricted. Make sure the air hose and screen are not clogged. | Perform the Torch Continuity and Solenoid Test. The output board may be faulty Replace. The control board may be faulty Replace. |
| The cutting arc starts but sputters badly. | Make sure the operating proce- dure is correct for the process. See the <i>Operation</i> section of this manual. | Perform the <i>Torch Continuity</i> and Solenoid Test. The output board may be faulty |
| | Make sure the work clamp is connected tightly to the work- piece. | Replace. 3. The control board may be faulty Replace. |
| | 3. Make sure the torch consum- ables are in place and in good condition. | |
| | Make sure the air supply is not contaminated with oil or exces- sive water. | |
| | 5. Make sure the air pressure is set at 70 psi (448 kPa.) and the flow rate is at 6 CFM. | |
| | 6. Make sure the air hose and screen are not clogged. | |
| Nuisance safety trips | 1. See Safety LED in the opera- tion section. | The torch may be faulty. Chec or replace. |
| | 2. Make sure the correct nozzles are being used for the material thickness. See Operation Section. | 2. The control board may be faulty See Torch Continuity and Solenoid Test. |
| | 3. Make sure the output control is set correctly for the process. | |

CAUTION

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

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TROUBLESHOOTING & REPAIR

TROUBLESHOOTING GUIDE

Observe Safety Guidelines detailed in the beginning of this manual.

| CUTTING PROBLEMS he pilot arc is normal, but the arc ill not transfer to the workpiece. 1. Make sure the operating procedure is correct for the process. See the <i>Operation</i> section of the process. | |
|---|--|
| ill not transfer to the workpiece. dure is correct for the process See the Operation section of | |
| this manual. 2. Make sure the work clamp connected tightly to the worl piece. 3. The workpiece must be electrically conductive material. | 2. Check the output control potentiometer (R1). Normal resistance is 10 K ohms. Also check the associated leads for loose or faulty connections to the display board. See the Wiring |

CAUTION

A

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

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Observe Safety Guidelines detailed in the beginning of this manual.

| PROBLEMS | POSSIBLE AREAS OF | |
|----------------------------------|---|--|
| (SYMPTOMS) | MISADJUSTMENT(S) | COURSE OF ACTION |
| | LED FUNCTION PROBLEMS | |
| The Air Low LED is lit. | Make sure there is at least 80 psi (512kPa) of air pressure connected to the gas connec- tion at the back of the PRO- CUT[®] 55. | The pressure switch (S5) or associated leads may be faulty. See the Wiring Diagram. The control board may be faulty. Replace. |
| | 2. Press the purge button and set the regulator to 70 psi (448 kPa). Do not reset the air pres- sure while the air is off (not flow- ing). | |
| The Safety LED is flashing. | 1. Make sure there is a Lincoln PCT 80 torch connected proper- ly to the PRO-CUT [®] 55. | 1. Perform the Torch Continuity and Solenoid Test. |
| | Make sure the torch consum- ables are in place and in good condition. | Check the continuity of leads "N", "E", #364, and #369 between the torch receptacle and the output board. See the Wiring Diagram. |
| | | 3. The output board may be faulty. Replace. |
| The Safety LED is lit and ready. | Press the reset button. If the torch and consumables are properly installed, the Safety | The reset button or associated wiring may be faulty. See the Wiring Diagram. |
| | LED should turn off. | 2. Perform the Torch Continuity and Solenoid Test. |
| | | 3. The control board may be faulty. Replace. |
| | | If the machine operates normal- ly with the Safety LED on, the display board may be faulty. Replace. |
| | | |
| | | |

CAUTION

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



Observe Safety Guidelines detailed in the beginning of this manual.

TROUBLESHOOTING GUIDE

| PROBLEMS (SYMPTOMS) | POSSIBLE AREAS OF MISADJUSTMENT(S) | RECOMMENDED COURSE OF ACTION |
|-------------------------|---|---|
| | LED FUNCTION PROBLEMS | |
| The Thermal LED is lit. | One of the machine's thermostats has tripped. Do not turn the PRO-CUT® 55 off. Allow the machine to cool. The thermostat(s) will reset themselves. Either the duty cycle has been exceeded, the fans are not functioning or the louvers are blocked. | The thermostat may be faulty Replace. The control board may be faulty Replace. If the machine operates normal ly with the Thermal LED lit, the display board may be faulty Replace. |

CAUTION

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

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CONSUMABLE RELATED SAFETY LED TROUBLESHOOTING

A. If the Safety LED is LIT AND STEADY, perform the following:

- 1. If the reset button (when pressed) does not turn the safety LED off, the reset button or associated wiring may be faulty. See the Wiring Diagram.
 - Press the reset button. If the torch and consumables are properly installed, the Safety LED should turn off.
- 2. If this has occurred numerous times, clean consumables with a piece of fine emery cloth to remove any oxide build up on the tip of the electrode, or try replacing the electrode and nozzle.
 - Try to recount the number of times that the safety LED has come on lit and steady with this particular set of consumables.

If problems persist after completing steps 1 & 2, contact your local Lincoln Electric Field Service Facility.

B. If the Safety LED is **FLASHING**, perform the following:

- 1. Check the condition of the electrode. The maximum wear depth in the center of the electrode tip is approximately .060" relative to the surrounding tip. A green and erratic arc will indicate definite electrode failure as explained in the "Consumable Life" section of this manual.
 - Replace both electrode and nozzle if electrode is excessively worn. Otherwise, use a piece of fine emery cloth to remove any oxide build up on the tip of the electrode. Even if consumables appear to be in good working order, it is possible that they are the cause of the problem. Try replacing.
- 2. Check the condition on the inside of the nozzle. Make sure that both the electrode and nozzle are not dirty, oily or corroded.
 - If debris has collected, rub the electrode on the inside bottom of the nozzle to remove any oxide layer that may have built up. If problems persist, try replacing consumables.
- 3. Remove consumables from torch and check inside of torch head for contamination. Check incoming air flow for contaminant's.
- If torch head is contaminated, take a dry cotton swab and clean out the pollutants. If needed, replace air filter and check/change air supply . For more information, refer to the "Gas Input Connections" section in the manual.
- 4. Make sure there is a Lincoln PCT 80 torch connected properly to the PRO-CUT[®] 55 and that the consumables are properly installed. Make sure the shield cup is hand tight . Do not use pliers or over tighten.
- After verifying that the torch and consumables are properly set in place.
- **NOTE:** Make sure that the consumables are Lincoln Electric brand consumable parts. These parts are patented and using any other replacement consumables may cause damage to the torch or reduce cut quality. Also be sure to check that the nozzle is the correct part number (as identified on the top and side of the nozzle) for the Pro-Cut being used.

If problems still persist after completing steps 1 thru 4, contact your local Lincoln Electric Field Service Facility.

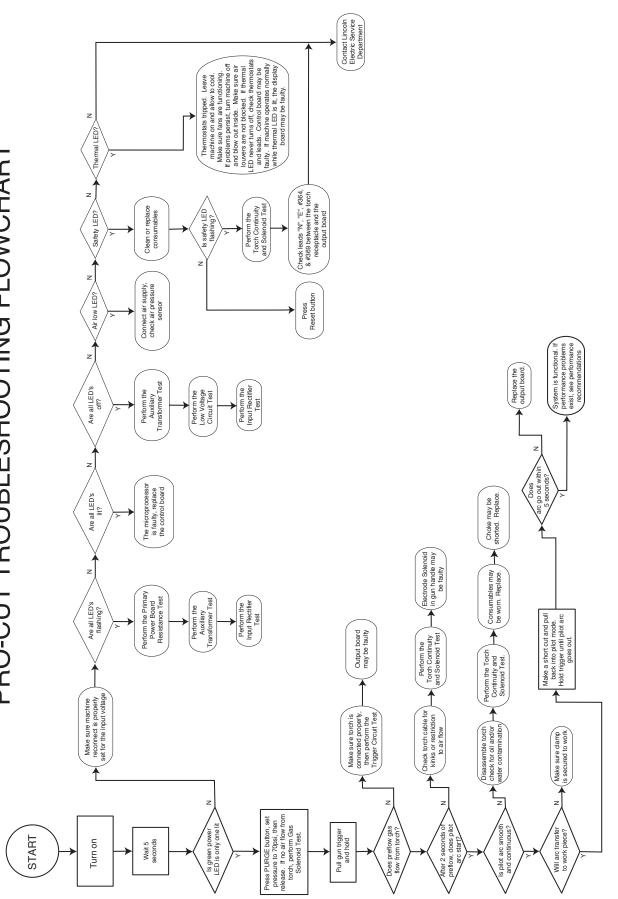




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INPUT FILTER CAPACITOR DISCHARGE PROCEDURE

WARNING

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

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

DESCRIPTION

This procedure will drain off any charge stored in the two large capacitors that are part of the Power Board Assembly. This procedure MUST be performed, as a safety precaution, before conducting any test or repair procedure that requires you to touch internal components of the machine.

MATERIALS NEEDED

Volt/Ohmmeter (Multimeter) 5/16" Nut driver Insulated gloves Insulated pliers High wattage resistor - 25 to 1000 ohms, 25 watts minimum

INPUT FILTER CAPACITOR DISCHARGE PROCEDURE (continued)

A WARNING

ELECTRIC SHOCK can kill.



- Have an electrician install and service this equipment.
- Turn the input power off at the fuse box before working on equipment.
- · Do not touch electrically hot parts.
- Prior to performing preventative maintenance, perform the following capacitor discharge procedure to avoid electric shock.

DISCHARGE PROCEDURE

- 1. Turn off input power and disconnect input power lines.
- 2. Remove the 5/16" hex head screws from the wraparound machine cover.
- 3. Be careful not to make contact with the capacitor terminals located in the top and bottom of the Input Power Board.

- 4. Obtain a high resistance and high wattage resistor (25-1000 ohms and 25 watts minimum). This resistor is not supplied with machine. NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.
- 5. Locate the four capacitor terminals (large hex head cap screws) shown in Figure F.1. One pair is at the top and one pair is at the bottom of the Power Board.
- Use electrically insulated gloves and insulated pliers. Hold the body of the resistor and connect the resistor leads across the two capacitor terminals. Hold the resistor in place for 10 seconds. DO NOT TOUCH CAPACITOR TERMINALS WITH YOUR BARE HANDS.
- 7. Repeat the discharge procedure for the capacitor on the other two terminals.
- Check the voltage across the terminals of all capacitors with a DC voltmeter. Polarity of the capacitor terminals is marked on the PC board above the terminals. Voltage should be zero. If any voltage remains, repeat this capacitor discharge procedure.

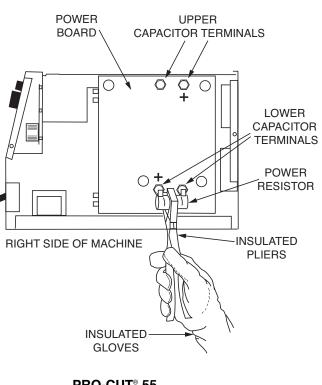


FIGURE F.1 – LOCATION OF INPUT FILTER CAPACITOR TERMINALS

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INPUT RECTIFIER TEST

WARNING

A

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

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

DESCRIPTION

This test will help determine if the Input Rectifier has "shorted" or "open" diodes.

MATERIALS NEEDED

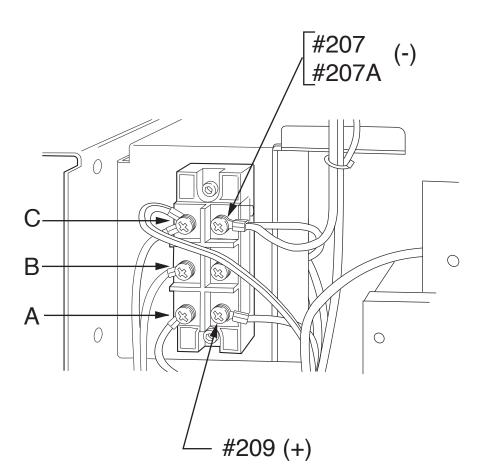
Analog voltmeter/ohmmeter (multimeter) Phillips head screw driver Wiring diagram

PRO-CUT[®] 55

TEST PROCEDURE

- 1. Remove main input power to the machine.
- 2. Perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Locate the input rectifier (D1) and lead locations. See Figure F.2.
- 4. With the phillips head screw driver, remove leads #207, 207A and #209 from the rectifier.
- 5. Use the analog ohmmeter to perform the tests detailed in *Table F.1.* See the Wiring Diagram.

FIGURE F.2 – INPUT RECTIFIER AND LEADS



INPUT RECTIFIER TEST (continued)

TABLE F.1 INPUT RECTIFIER TEST POINTS

| TEST POINT | TERMINALS | ANALOG METER X10 RANGE |
|------------|-----------|---------------------------|
| + Probe | - Probe | Acceptable Meter Readings |
| A | 207 | Greater than 1000 ohms |
| В | 207 | Greater than 1000 ohms |
| С | 207 | Greater than 1000 ohms |
| A | 209 | Less than 100 ohms |
| В | 209 | Less than 100 ohms |
| С | 209 | Less than 100 ohms |
| 207 | A | Less than 100 ohms |
| 207 | В | Less than 100 ohms |
| 207 | С | Less than 100 ohms |
| 209 | A | Greater than 1000 ohms |
| 209 | В | Greater than 1000 ohms |
| 209 | С | Greater than 1000 ohms |

- 6. If the input rectifier does not meet the acceptable readings outlined in Table F.1, the component may be faulty. Replace.
- **NOTE:** Before replacing the input rectifier (D1) check the input power switch (S1) and perform the *Primary Power Board Resistance Test.* Also check for leaky or faulty filter capacitors.
- If the input rectifier is good, be sure to reconnect leads #207, #207A and #209 to the correct terminals and torque to 31 in.-lbs. Apply a coating of Essex D-4-8 insulating compound.
- 8. If the input rectifier is faulty, see the *Input Rectifier Bridge Removal & Replacement Procedure*. See the Wiring Diagram and *Figure F.2.*

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NOTES

PRIMARY POWER BOARD RESISTANCE TEST AND CAPACITOR VOLTAGE TEST

WARNING

A

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

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

DESCRIPTION

This test will determine if the Primary Power Board has any "shorted" or "leaky" power diodes or Insulated Gate Bipolar Transistors (IGBTs). Also it will help to indicate any "shorted" Input Filter Capacitors.

MATERIALS NEEDED

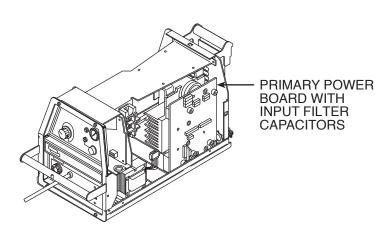
Analog voltmeter/ohmmeter (multimeter) Wiring Diagram 7/16" Wrench

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PRIMARY POWER BOARD RESISTANCE TEST AND **CAPACITOR VOLTAGE TEST** (continued)

FIGURE F.3 – PRIMARY POWER BOARD REMOVAL



CAPACITOR (C2) TERMINALS () 202 Ó 207 **0** 204 **O** 201 PRO-CUT 208 203 203 205 CAPACITOR (C1) TERMINALS

TEST PROCEDURE

- 1. Remove main input power to the PRO-CUT[®] 55.
- 2. Perform the Input Filter Capacitor Discharge Procedure detailed earlier in this section.
- 3. Locate the primary power board and associated lead locations. See Figure F.3.
- 4. Carefully remove the main transformer primary leads #201, #204, #205 and #208 from the power board.
- 5. Use the analog ohmmeter to perform the test outlined in Table F.2.

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PRIMARY POWER BOARD RESISTANCE TEST AND CAPACITOR VOLTAGE TEST (continued)

TABLE F.2 PRIMARY POWER BOARD RESISTANCE TEST POINTS

| TEST POINT | TERMINALS | ANALOG METER X10 RANGE |
|------------|-----------|---------------------------|
| + Probe | - Probe | Acceptable Meter Readings |
| 201 | 207A | Greater than 1000 ohms |
| 207A | 201 | Less than 100 ohms |
| 204 | 207A | Greater than 1000 ohms |
| 207A | 204 | Less than 100 ohms |
| 202A | 204 | Greater than 1000 ohms |
| 204 | 202A | Less than 100 ohms |
| 202A | 201 | Greater than 1000 ohms |
| 201 | 202A | Less than 100 ohms |
| 205 | 203A | Greater than 1000 ohms |
| 203A | 205 | Less than 100 ohms |
| 208 | 203A | Greater than 1000 ohms |
| 203A | 208 | Less than 100 ohms |
| 206 | 208 | Greater than 1000 ohms |
| 208 | 206 | Less than 100 ohms |
| 206 | 205 | Greater than 1000 ohms |
| 205 | 206 | Less than 100 ohms |

- 6. If the power board does not meet the acceptable readings outlined in Table F.2, the board is faulty. Replace. See **Power Board Removal and Replacement Procedure.**
 - NOTE: Complete power board and filter capacitor replacement is recommended.
- If the power board "passes" the resistance test, the IGBT portion of the board is good. However, other circuits on the power board may be faulty. These circuits are NOT readily tested or serviceable.
- 8. Reconnect leads #201, #204, #205 and #208 to their appropriate terminals.

PRIMARY POWER BOARD RESISTANCE TEST AND CAPACITOR VOLTAGE TEST (continued)

CAPACITOR VOLTAGE TEST

This test will help the technician to determine if the input filter capacitors are being charged equally to the correct voltage levels.

NOTE: This test should only be conducted with the PRO-CUT[®] 55 connected for 400 VAC and above, and with the appropriate input voltage applied.

TEST PROCEDURE

- 1. Remove main input power to the PRO-CUT® 55.
- 2. Perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Locate and familiarize yourself with the capacitor test locations on the primary power board. See *Figure F.3.*

4. The following tests will be performed with the input power applied to the PRO-CUT[®] 55. **BE CAREFUL.** ALWAYS REMOVE THE INPUT POWER AND PERFORM THE INPUT FILTER CAPACITOR DISCHARGE PROCEDURE BEFORE TOUCHING ANY MACHINE COMPONENT.

WARNING

ELECTRIC SHOCK can kill.



- Have an electrician install and service this equipment.
- Turn the input power off at the fuse box before working on equipment.

· Do not touch electrically hot parts.

- Apply the correct input power[†] and turn ON the PRO-CUT[®] 55.
- ⁺ NOTE: This test should only be conducted with the PRO-CUT[®] 55 reconnect switch and "A" jumper configured for 400 VAC and above.

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PRIMARY POWER BOARD RESISTANCE TEST AND CAPACITOR VOLTAGE TEST (continued)

- 6. Check for the appropriate voltages outlined in Table F.3.
 - **NOTE:** Voltages may vary with the input line voltage.
 - **NOTE:** If the capacitor voltage is too high (over 400 VDC) or too low (less than 220 VDC) the control board will deactivate relay CR1. This will prevent output.
- 7. If the test voltages do not meet the expected values as listed in Table F.3, the capacitors or other components on the power board may be faulty. Replace.
- **NOTE:** If the capacitor voltages are NOT balanced within 20 VDC, the capacitors may need "conditioning." See the *Maintenance* section.

| INPUT APPLIED | EXPECTED VOLTS DC AT CAPACITOR TERMINALS |
|---------------|--|
| 460VAC | 325VDC |
| 440VAC | 311VDC |
| 415VAC | 293VDC |
| 380VAC | 269VDC |

TABLE F.3 - CAPACITOR VOLTAGES

NOTE: If Capacitor C1 is found to be defective, both Capacitors C1 and C2 must be replaced at the same time. The capacitors must be replaced in matched sets.

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NOTES

OUTPUT POWER BOARD RESISTANCE TEST

WARNING

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

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

DESCRIPTION

This test will help the technician determine if the Output Power Board is faulty.

MATERIALS NEEDED

5/16" Nut driver Analog Volt/ohmmeter 7/16" Wrench

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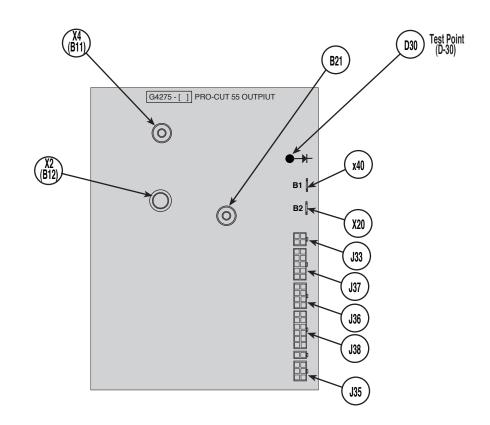
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OUTPUT POWER BOARD RESISTANCE TEST (continued)

FIGURE F.4 – OUTPUT POWER BOARD LEAD LOCATIONS



TEST PROCEDURE

- 1. Remove input power to the PRO-CUT[®] 55 machine.
- 2. Perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Remove the torch assembly from the machine.
- 4. Remove leads X4, X2, B21, X20, X40 and plugs J33, J37, J36, J38 & J35 from the output power board. See Figure F.4.
- 5. Using the analog ohmmeter, perform the resistance checks per *Table F.4.*

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TROUBLESHOOTING & REPAIR

OUTPUT POWER BOARD RESISTANCE TEST (continued)

TABLE F.4 - OUTPUT POWER BOARD RESISTANCE

| TEST POINTS | CIRCUIT OR COMPONENT(S) BEING TESTED | EXPECTED RESISTANCE |
|---|--|---------------------------|
| +Probe J33-Pin4 to –Probe Terminal B11 | Diode A1 and associated trace | Less than 100 ohms |
| +Probe Terminal B11 to –Probe J33-Pin4 | Diode A1 and associated trace | Greater than 1000 ohms |
| +Probe J33-Pin4 to –Probe Terminal B12 | Diode A1 and associated trace | Less than 100 ohms |
| +Probe Terminal B12 to –Probe J33-Pin4 | Diode A1 and associated trace | Greater than 1000 ohms |
| or D30 +Probe R5 Test Point to –Probe Terminal B1 | Diode A2 and associated trace | Less than 100 ohms |
| +Probe Terminal B1 to –Probe R5 Test Point or –Probe D30 Test Point | Diode A2 and associated trace | Greater than 1000 ohms |
| or D30 +Probe R5 Test Point to -Probe Terminal B2 | Diode A2 and associated trace | Less than 100 ohms |
| +Probe Terminal B2 to –Probe R5 Test Point or –Probe D30 Test Point | Diode A2 and associated trace | Greater than 1000 ohms |
| +Probe R5 Test Point to –Probe J32-Pin14 | Transistor A2 and associated trace | Less than 100 ohms |
| +Probe J32-Pin14 to –Probe R5 Test Point or –Probe D30 Test Point | Transistor A2 and associated trace | Greater than 1000 ohms |

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TROUBLESHOOTING & REPAIR

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- If any of the resistance checks are not correct, the output power board is faulty. Replace. See the *Output Power Board Removal and Replacement Procedure.* Note: Use D30 test point for boards G3326-2,3.
- 7. If the output power board "passes" the resistance test, the power diode and transistor portion of the board is good. However, other circuits on the power board may be faulty. These circuits are NOT readily tested or serviceable.
- 8. Reconnect the leads and plugs previously removed.

TORCH CONTINUITY AND SOLENOID TEST

WARNING

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

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

DESCRIPTION

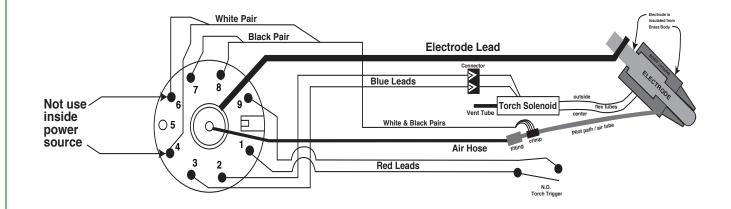
This procedure will help the technician determine if the Torch Cable, Consumables and Electrode Solenoid are functioning properly.

MATERIALS NEEDED

5/16" Nut driver Volt/ohmmeter 12 VDC @ 1 Amp Power Supply

TORCH CONTINUITY AND SOLENOID TEST (continued)

FIGURE F.5 - TORCH CONNECTOR - MACHINE END



TEST PROCEDURE

- 1. Remove input power to the PRO-CUT[®] 55 machine.
- 2. Remove the torch assembly from the machine.
- 3. Using the ohmmeter, check the torch resistances per *Table F.5.*
- **NOTE:** Take the "Pin" test point measurements at the machine end of the torch assembly. See Figure F.5.

TORCH CONTINUITY AND SOLENOID TEST (continued)

TEST TEST **CIRCUIT(S) BEING EXPECTED** POINTS TESTED RESISTANCE CONDITIONS Pin 7 to Pin 8 Parallel pilot arc 1.5 ohms maximum None leads Pin 7 to Torch One pilot arc lead to 1.0 ohm maximum Torch consumables Nozzle nozzle in place Pin 8 to Torch One pilot arc lead to 1.0 ohm maximum Torch consumables Nozzle nozzle in place Pin 1 to Pin 9 Torch trigger circuit 100K ohms minimum Torch trigger NOT pulled (not activated) Pin 1 to Pin 9 Torch trigger circuit 1.0 ohm maximum Torch trigger pulled (activated) Pin 2 to Pin 3 Electrode Solenoid 45 to 55 ohms None Pilot and Electrode Pin 7 to Torch 1.0 ohm maximum Torch consumables Electrode at machine circuit in place end of torch Pin 8 to Torch Pilot and Electrode 1.0 ohm maximum Torch consumables Electrode at machine circuit in place end of torch Pin 7 to Torch Pilot and Electrode Open Torch Electrode at machine circuit (very high) Consumables end of torch Removed Pin 8 to Torch Pilot and Electrode Open Torch Electrode at machine circuit (very high) Consumables end of torch Removed Pin 7 To **Electrical Isolation** Open Torch Pin 1 of Circuits (very high) Consumables Pin 2 Removed Pin 3 Pin 9 Pin 8 To **Electrical Isolation** Open Torch Pin 1 of Circuits Consumables (very high) Pin 2 Removed Pin 3 Pin 9 Pins 1 & 9 to **Electrical Isolation** Open None all other pins of Torch Trigger (very high) Circuit Pins 2 & 3 to **Electrical Isolation** Open None all other pins of Torch Solenoid (very high) Circuit

TABLE F.5 - TORCH ASSEMBLY RESISTANCES



TORCH CONTINUITY AND SOLENOID TEST (continued)

- 4. If any of the resistance checks are not correct, the torch assembly may be faulty. Repair or replace.
- Carefully apply the 12 VDC supply to the electrode solenoid. (positive to Pin 2 and negative to Pin 3). The electrode solenoid should activate. Listen for the solenoid action in the torch handle. If the solenoid does not activate, it may be faulty. Replace.

AIR/GAS SOLENOID TEST

WARNING

A

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

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

DESCRIPTION

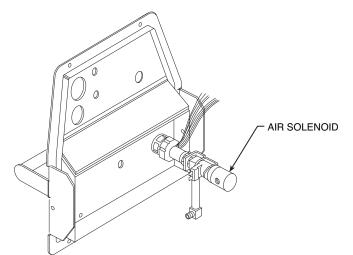
This procedure will help the technician determine if the Solenoid is functioning properly.

MATERIALS NEEDED

5/16" Nut driver 12 VDC @ 3 amp supply Volt/ohmmeter

AIR/GAS SOLENOID TEST (continued)

FIGURE F.6 – AIR SOLENOID



TEST PROCEDURE

- 1. Remove input power to the machine.
- 2. Perform the *Input Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Locate the air solenoid and leads. See Figure F.6.
- 4. Carefully remove plug J38 from the output power board. See Figure F.7.
- 5. Check the coil resistance of the solenoid at plug J38 pin 3 to J38 pin 4. Normal resistance is approximately 20 ohms. If the resistance is abnormal, check the continuity (zero or very low resistance) of leads #366 and #361 between the solenoid and plug J38.

See the Wiring Diagram. If the leads are good, the solenoid coil may be faulty.

 Carefully apply the 12 VDC supply to the solenoid leads at plug J38 (positive to J38 pin 3 lead #361 and negative to J38 pin 4 lead #366).

With proper air pressure applied, the solenoid should activate and air should flow.

If the solenoid activates but air does not flow, check for a restriction in the air line.

7. Install plug J38 back into the output power board.

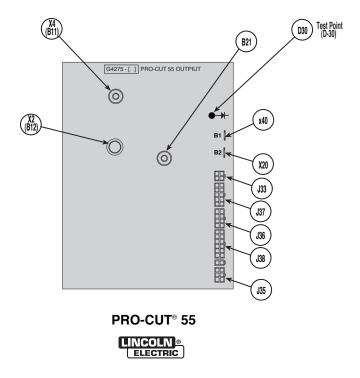


FIGURE F.7 – PLUG J31 LOCATION

(T2) AUXILIARY TRANSFORMER TEST

WARNING

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

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

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DESCRIPTION

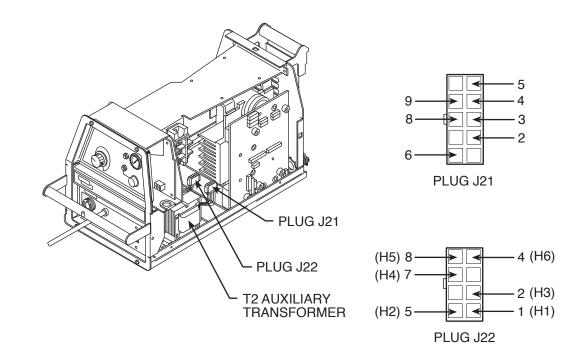
The test will determine if the Auxiliary Transformer is functional when the correct primary voltage is applied to the Primary Winding.

MATERIALS NEEDED

Volt/ohmmeter Machine wiring diagram 5/16" Nut driver 230 VAC isolated power supply

PRO-CUT[®] 55

FIGURE F.8 – T2 AUXILIARY TRANSFORMER



PROCEDURE

- 1. Remove main input power to the PRO-CUT[®] 55 machine.
- 2. Perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Locate the auxiliary transformer just behind the input line switch on the lower right side of the machine.
- 4. Locate and disconnect plugs J21 and J22 from the wiring harness. Cut any necessary cable ties. See Figure F.8.
- 5. Carefully apply the 230 VAC isolated supply to leads H1 (1J22) and H3 (2J22) of the auxiliary transformer. These leads are located in plug J22.
- Carefully check for the presence of the following primary and secondary voltages at the appropriate leads at plugs J21 and J22. See Figure F.8 and *Table F.6.*

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(T2) AUXILIARY TRANSFORMER TEST (continued)

| TEST POINT | TEST POINT | EXPECTED VOLTAGE |
|--------------|--------------|------------------|
| H1 (1J22) | H2 (5J22) | 200 - 208VAC |
| H1 (1J22) | H4 (7J22) | 380 - 415VAC |
| H1 (1J22) | H5 (8J22) | 440 - 460VAC |
| H1 (1J22) | H6 (4J22) | 560 - 600VAC |
| Brown (8J21) | Brown (3J21) | 12VAC |
| Red (2J21) | Red (6J21) | 24VAC |
| Blue (9J21) | White (5J21) | 18VAC |
| Blue (4J21) | White (5J21) | 18VAC |

TABLE F.6 J21 AND J22 (8 Pin) VOLTAGES

- 7. If the correct test voltages are present, the auxiliary transformer is good.
- 8. If any of the voltages are missing or very low with the proper primary voltage applied, the auxiliary transformer may be faulty.
- If the auxiliary transformer tests good but it does not function when connected to the PRO-CUT[®] 55, check the harness wiring to the auxiliary transformer. See the Wiring Diagram.
- 10. When finished with the test, replace plugs 21 and 22 and the case wraparound.
- **NOTE:** There should not be continuity between the isolated windings. With the input power removed from the transformer, check the windings using the table below.

TABLE F.7 J21 AND J22 (8 Pin) VOLTAGES

| TEST POINT | TEST POINT | EXPECTED RESISTANCE |
|-------------|------------------|-------------------------|
| H1 | Brown Lead | Greater than 100 K ohms |
| H1 | Red Lead | Greater than 100 K ohms |
| H1 | Blue/White Leads | Greater than 100 K ohms |
| Brown Leads | Red Leads | Greater than 100 K ohms |
| Brown Leads | Blue/White Leads | Greater than 100 K ohms |
| Red Leads | Blue/White Leads | Greater than 100 K ohms |

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TRIGGER CIRCUIT TEST

WARNING

A

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

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

DESCRIPTION

The procedure will help the technician determine if there is a problem or "fault" in the Internal Trigger Circuit.

MATERIALS NEEDED

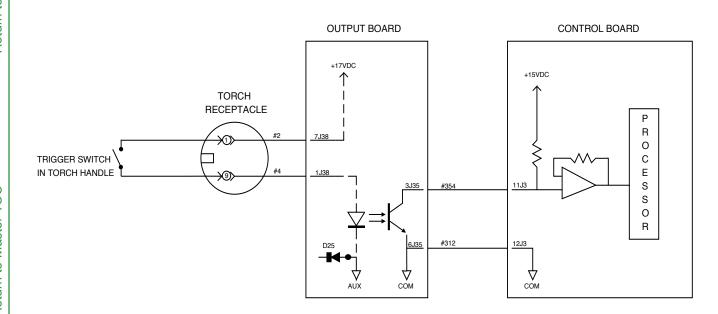
Ohmmeter/voltmeter (multimeter) 5/16" Nut driver Simplified Trigger Circuit Diagram

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TRIGGER CIRCUIT TEST (continued)

FIGURE F.9 – SIMPLIFIED TRIGGER CIRCUIT DIAGRAM (Later Versions)

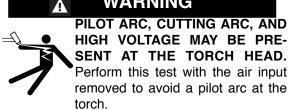


PROCEDURE

- 1. Remove input power to the PRO-CUT[®] 55 machine.
- 2. Perform the Input Filter Capacitor Discharge Procedure detailed earlier in this section.
- 3. Locate the torch cable receptacle and leads #2 and #4. See Figure F.9, the Simplified Trigger Circuit Diagram. These leads are best accessed at plug J38 on the output board. See Figure F.10.
- 4. Using the ohmmeter, check for continuity (less than one ohm) from lead #2 to lead #4. The torch trigger must be pulled and all input power removed from the machine. If continuity (less than one ohm) is not read, check the leads from plug J38 to the torch cable receptacle. Perform the Torch Continuity and Solenoid Test.
- 5. If less than one ohm is read (only when the torch trigger is pulled), proceed to the next step. Also see Output Board LED Definitions and related figures.

- 6. Apply the correct input power to the PRO-CUT[®] 55. Carefully check for approximately 17 VDC from plug J38 pin 7 (lead#2) (positive) to plug J38 pin 1. See Figure F.10. If the correct voltage is not present, perform the Low Voltage Circuit Test. Also see Output Board LED Definitions and related figures.
- 7. If the correct voltage is present in Step 6, carefully check for the presence of approximately 15 VDC from plug J35 pin-3 (lead#354) (positive) to plug J35 pin 6 (lead#312) (negative). See Figure F.10. Also see Control Board LED Definitions and related figures. If the correct voltage is not present, perform the Low Voltage Circuit Test.
- 8. If the correct voltage is present in the above test, carefully pull the torch trigger.

WARNING



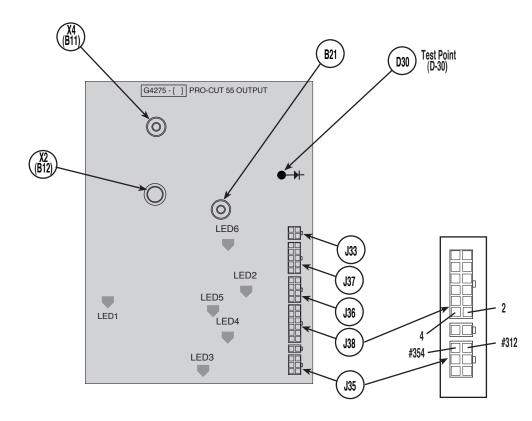
PRO-CUT® 55 LINCOLN ELECTRIC

TRIGGER CIRCUIT TEST (continued)

- With the torch trigger activated check the voltage at plug J35 pin 3 (lead#354) (positive) to plug J35 pin 6 (lead#312) (negative). Normal is less than 1 VDC. If more than 1 VDC is indicated, the power output board may be faulty. Release (deactivate) the torch trigger and remove input power to the PRO-CUT[®] 55.
- 10. Perform the *Input Filter Capacitor Discharge Procedure.*
- Check the continuity of leads #354 and #312 between the output board and the control board. See *Figure F.9*, the *Simplified Trigger Circuit Diagram*, and *Figure F.10*.
- 12. If all of the above checks are OK, the control board may be faulty. Replace.

TRIGGER CIRCUIT TEST (continued)

FIGURE F.10 - OUTPUT BOARD TRIGGER CIRCUIT TEST POINTS AND LEDS



PRO-CUT[®] 55 OUTPUT BOARD LED DEFINITIONS

LED1: (Red) This light indicates that 24 VAC is being supplied to the output board from the auxiliary transformer. It also shows that the 24 VAC is being rectified to approximately 28 VDC. This DC voltage is used for the "parts-in-place" check for the torch circuit.

LED2: (Red) This light indicates that 12 VAC is being supplied to the output board from the auxiliary transformer. It also shows that the 12 VAC is being rectified to approximately 17 VDC. This DC voltage is used to power the trigger circuit and solenoid driver circuits incorporated on the output board.

LED3: (Green) This light indicates that the air solenoid driver circuit is functioning. When this LED is lit, the air solenoid should be activated.

LED4: (Green) This light indicates that the trigger circuit on the output board has been activated. This LED should be lit when the torch or remote trigger is closed. This trigger circuit, on the output board, then sends a signal to the control board.

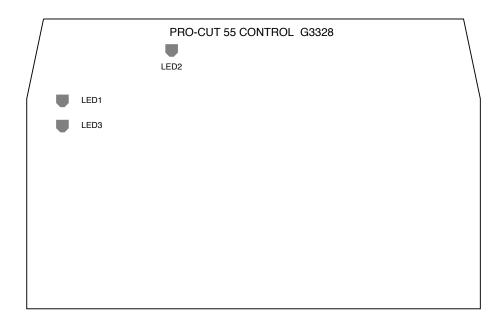
LED5: (Green) This light indicates that the electrode solenoid driver circuit is functioning. When this light is lit, the electrode solenoid should be activated. The electrode solenoid should be energized during gas (air) pre-flow time. During pilot and cutting arc periods, the LED should be off. When the arc goes out, the machine enters the post-flow state. Two seconds after the start of post-flow the electrode solenoid is activated a few times. The LED should blink to indicate this activity. The electrode solenoid will then be energized for the duration of post-flow. (The LED should be on.)

LED6: (Green) Indicates gate drive for pilot transistor.

PRO-CUT[®] 55

TRIGGER CIRCUIT TEST (continued)

FIGURE F.11 - CONTROL BOARD LEDs



CONTROL BOARD LED DEFINITIONS

LED1: (Red) This light indicates that 18 VAC is being supplied to the control board from the auxiliary transformer. It also shows that the 18 VAC is being rectified and should be regulated to +15 VDC. This +15 VDC supply is used to power the circuitry on the control board.

LED2: (Red) This light indicates that the +5.5 VDC is present. This voltage is derived from the +15 VDC supply. The +5.5 VDC supply is used to power the circuitry on the control board.

LED3: (Red) This light indicates that 18 VAC is being supplied to the control board from the auxiliary transformer. It also shows that the 18 VAC is being rectified and should be regulated to -15 VDC. This -15 VDC supply is used to power the circuitry on the control board.

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LOW VOLTAGE CIRCUIT TEST

WARNING

A

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

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

DESCRIPTION

These voltage checks will help the technician determine if the correct voltages are being applied and processed by the various P.C. Boards. Some of the voltage verification test points are not easily accessible. The presence of these voltages can also be confirmed by LEDs on the various P.C. Boards.

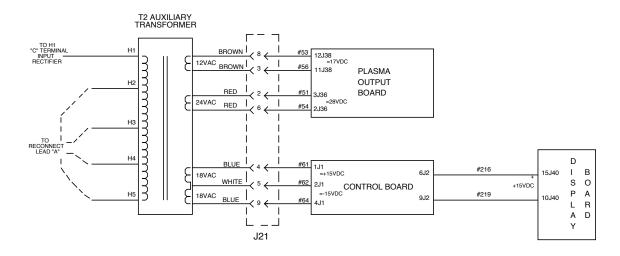
MATERIALS NEEDED

5/16" Nut driver Volt/ohmmeter (multimeter) F-45

PRO-CUT[®] 55

LOW VOLTAGE CIRCUIT TEST (continued)

FIGURE F.12 - LOW VOLTAGE CIRCUIT DIAGRAM



PROCEDURE

A

- 1. Remove input power to the PRO-CUT[®] 55 machine.
- 2. Using the 5/16" nutdriver remove the case wraparound cover.

WARNING

ELECTRIC SHOCK can kill.



Do not touch electrically hot parts.

- 3. Apply the correct input power to the machine and carefully check for the following voltages.
- 4. Check for the presence of approximately 28 VDC on the output board.
 - a. LED1 should be lit when 28 VDC is present. See *Figure F.13.* See *Output Board LED Definitions* and Figure F.12, Low Voltage Circuit Diagram.
 - b. To verify the presence of 28 VDC, check across capacitor C13. Make certain the voltmeter probes make good contact with the capacitor leads. See *Figure F.13*.

- 5. Check for the presence of 17 VDC on the output board.
 - a. LED2 should be lit when 17 VDC is present. See *Figure F.13.* See *Output Board LED Definitions* and Figure F.12, *L*ow Voltage Circuit Diagram.
 - b. To verify the presence of 17 VDC, check from plug J38 Pin 3 to diode D25 (anode). See *Figure F.13.* Make certain the voltmeter probes make good contact with pin-6 and the diode anode lead. Protective sealant may have to be removed to gain access to test points.
- Check for the presence of +15 VDC on the control board.
 - a. LED1 should be lit when +15 VDC is present. See *Figure F.13.* See *Control Board LED Definitions* and Figure F.12, Low Voltage Circuit Diagram.
- Check for the presence of -15 VDC on the control board.
 - a. LED3 should be lit when -15 VDC is present. See *Figure F.13.* See *Control Board, LED Definitions*, Figure F.12 and Low Voltage Circuit Diagram.



- 8. Check for the presence of +5 VDC on the control board.
 - a. LED2 should be lit when +5 VDC is present. See *Figure F.14.* See *Control Board LED Definitions* and *Figure F.12, Low Voltage Circuit Diagram.*
- Check for the presence of +15 VDC being applied to the display board from the control board. You may have to remove the display board to check it.
 - a. +15 VDC should be present at leads #216(+) to #219(-). See *Figure F.15* and *Figure F.12, Low Voltage Circuit Diagram.*
- 10. If any of the DC supply voltages are incorrect or missing, make certain the correct AC supply voltages are being applied to the P.C. boards. See *Figure F.12, Low Voltage Circuit Diagram* and *(T2) Auxiliary Transformer Test.*
- 11. When the test is complete, remove input power and replace the case wraparound cover.

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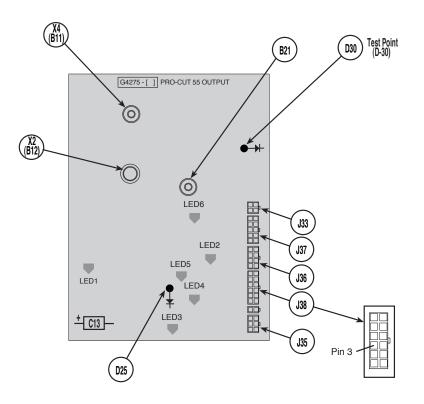
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LOW VOLTAGE CIRCUIT TEST (continued)

FIGURE F.13 – OUTBOARD LOW VOLTAGE CIRCUIT TEST POINTS AND LEDs



PRO-CUT[®] 55 OUTPUT BOARD LED DEFINITIONS

LED1: (Red) This light indicates that 24 VAC is being supplied to the output board from the auxiliary transformer. It also shows that the 24 VAC is being rectified to approximately 28 VDC. This DC voltage is used for the "parts-in-place" check for the torch circuit.

LED2: (Red) This light indicates that 12 VAC is being supplied to the output board from the auxiliary transformer. It also shows that the 12 VAC is being rectified to approximately 17 VDC. This DC voltage is used to power the trigger circuit and solenoid driver circuits incorporated on the output board.

LED3: (Green) This light indicates that the air solenoid driver circuit is functioning. When this LED is lit, the air solenoid should be activated.

LED4: (Green) This light indicates that the trigger circuit on the output board has been activated. This LED should be lit when the torch or remote trigger is closed. This trigger circuit, on the output board, then sends a signal to the control board. **LED5: (Green)** This light indicates that the electrode solenoid driver circuit is functioning. When this light is lit, the electrode solenoid should be activated. The electrode solenoid should be energized during gas (air) pre-flow time. During pilot and cutting arc periods, the LED should be off. When the arc goes out, the machine enters the post-flow state. Two seconds after the start of post-flow the electrode solenoid is activated a few times. The LED should blink to indicate this activity. The electrode solenoid will then be energized for the duration of post-flow. (The LED should be on).

LED6: (Green) Indicates gate drive for pilot transistor.

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FIGURE F.14 – CONTROL BOARD LEDs

| \int | | JT 55 CONTRC | DL G3328 | |
|--------|------|--------------|----------|--|
| / | LED1 | | | |
| | LED3 | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

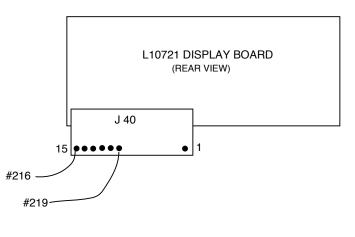
CONTROL BOARD LED DEFINITIONS

LED1: (Red) This light indicates that 18 VAC is being supplied to the control board from the auxiliary transformer. It also shows that the 18 VAC is being rectified and should be regulated to +15 VDC. This +15 VDC supply is used to power the circuitry on the control board.

LED2: (Red) This light indicates that the +5.5 VDC is present. This voltage is derived from the +15 VDC supply. The +5.5 VDC supply is used to power the circuitry on the control board.

LED3: (Red) This light indicates that 18 VAC is being supplied to the control board from the auxiliary transformer. It also shows that the 18 VAC is being rectified and should be regulated to -15 VDC. This 15 VDC supply is used to power the circuitry on the control board.

FIGURE F.15 – DISPLAY BOARD TEST POINTS



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CONTROL BOARD REMOVAL AND REPLACEMENT

WARNING

A

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

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

DESCRIPTION

The following procedure will aid the technician in removing the Control Board for maintenance or replacement.

MATERIALS NEEDED

5/16" Nut driver Needle-nose pliers

TOC

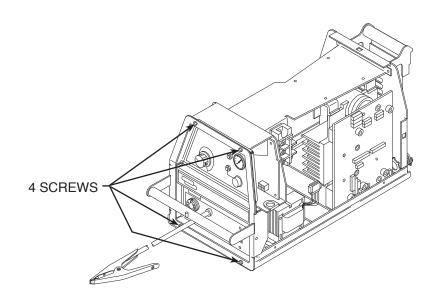
Return to Master

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PRO-CUT[®] 55

CONTROL BOARD REMOVAL AND REPLACEMENT (continued)

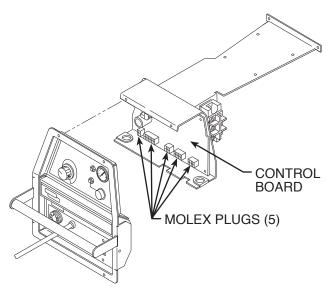
FIGURE F.16 - CASE FRONT SCREW REMOVAL



PROCEDURE

- 1. Remove input power to the PRO-CUT[®] 55 machine.
- 2. Remove the wraparound cover and perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Using the 5/16" nut driver, remove the four screws holding the front assembly to the top and base of the machine. See Figure F.16.
- 4. Carefully slide (do not force) the front away from the rest of the machine about one inch. This will allow more "working" room to remove the control board.

FIGURE F.17 - CONTROL BOARD MOLEX PLUG REMOVAL

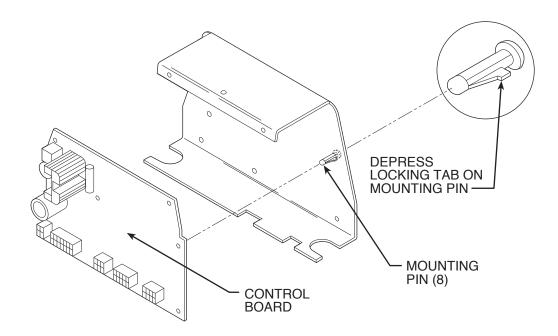


PRO-CUT[®] 55

CONTROL BOARD REMOVAL AND REPLACEMENT (continued)

- Locate the control board and the five molex type plugs connected to it. See *Figure F.17*.
- 6. Carefully remove the five molex type plugs by depressing the locking tabs and gently extracting the plugs from the P.C. board receptacles.

FIGURE F.18 - CONTROL BOARD REMOVAL FROM MOUNTING PINS



 Using the needle-nose pliers and screwdriver, gently remove the control board from the eight mounting pins by depressing the tabs on the mounting pins and carefully removing the board from the pins. See Figure F.18.

CAUTION

Be sure to follow the recommended static-free methods for handling printed circuit boards. Failure to do so can result in permanent damage to the equipment.

A

8. When replacing the control board, align the mounting holes with the eight mounting pins and gently slide the P.C. board onto the mounting pins until the board "snaps" onto the pins.

- 9. Replace the five molex type plugs in their respective receptacles. Be certain they are securely in place.
- 10. Carefully reposition the front assembly in place and install the four mounting screws previously removed.
- 11. Inspect, clear and secure all leads before installing the case wrap-around reassembly.
- 12. Using the 5/16" nut driver, install the case wraparound.

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PRO-CUT® 55

NOTES

DISPLAY BOARD REMOVAL AND REPLACEMENT

WARNING

A

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

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

DESCRIPTION

The following procedure will aid the technician in removing the Display Board for maintenance or replacement.

MATERIALS NEEDED

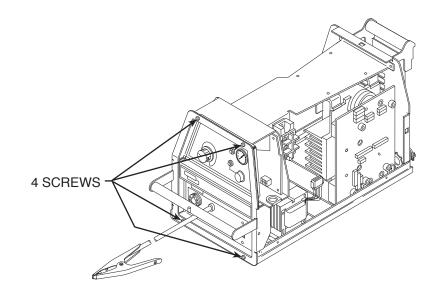
5/16" Nut driver Screw driver

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DISPLAY BOARD REMOVAL & REPLACEMENT (continued)

FIGURE F.19 - CASE FRONT SCREW REMOVAL

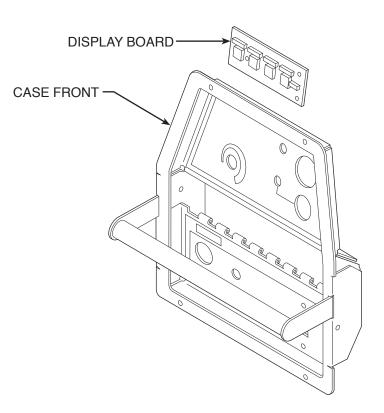


PROCEDURE

- Remove the input power to the PRO-CUT[®] 55 machine.
- 2. Remove the wraparound cover and perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Using the 5/16" nut driver, remove the four screws holding the front assembly to the top and base of the machine. See Figure F.19.
- 4. Carefully slide (do not force) the front away from the rest of the machine about one inch. This will allow more "working" room to remove the display board.

DISPLAY BOARD REMOVAL & REPLACEMENT (continued)

FIGURE F.20 - DISPLAY BOARD REMOVAL



- 5. Locate the display P.C. board and the one plug connected to it. See Figure F.20.
- 6. Gently remove the display P.C. board from the three mounting pins.

A CAUTION

Be sure to follow the recommended static-free methods for handling printed circuit boards. Failure to do so can result in permanent damage to the equipment.

7. Depress the locking tab and remove the plug connector from the display board.

- 8. When replacing the display board, carefully connect the plug into the board. Make certain the plug is secure and the locking tab is in place.
- 9. Align the display board with the three mounting pins and slide the display board into place.
- 10. Carefully reposition the front assembly in place and install the four mounting screws previously removed.
- 11. Inspect, clear and secure all leads in preparation for the case wraparound reassembly.
- 12. Using the 5/16" nut driver, install the case wraparound.

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OUTPUT POWER BOARD REMOVAL AND REPLACEMENT

WARNING

A

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

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

DESCRIPTION

The following procedure will aid the technician in removing the Output Power Board for maintenance or replacement.

MATERIALS NEEDED

5/16" Nut driver 3/16" Allen type wrench 7/16" Wrench Penetrox A-13 (Lincoln E2529) Electrical Joint Compound Phillips head screw driver Torque wrench

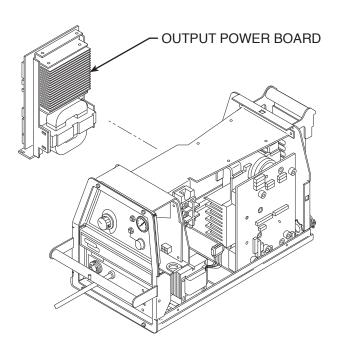
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PRO-CUT® 55



OUTPUT POWER BOARD REMOVAL & REPLACEMENT (continued)

FIGURE F.21 – OUTPUT POWER BOARD REMOVAL



PROCEDURE

- 1. Remove input power to the PRO-CUT[®] 55 machine.
- 2. Remove the case wraparound and perform the *Input Capacitor Filter Discharge Procedure* detailed earlier in this section.
- 3. Locate the output power P.C. board and associated lead and plug connections. See Figures F.21 and *F.22.*

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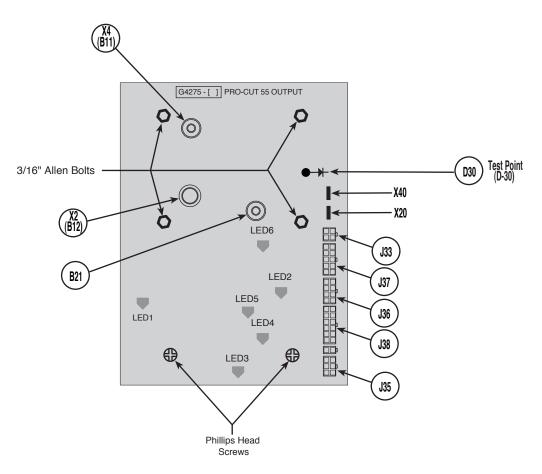
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OUTPUT POWER BOARD REMOVAL & REPLACEMENT (continued)

FIGURE F.22 – OUTPUT BOARD LEAD LOCATIONS



- 4. Using the 7/16" wrench, remove leads X4, X2 and B21 from the output power board.
- 5. Remove plugs J33, J37, J36, J38 and J35 from the output power board.
- Remove leads X20 and X40 from the output power board.
- Using the phillips head screw driver, remove the two screws from the lower left and right corners of the output power board.
- 8. Using the 3/16" allen head wrench, remove the four screws mounting the output power board to the heat sink.

9. Carefully remove the output power board from the heat sink.

Be sure to follow the recommended static-free methods for handling printed circuit boards. Failure to do so can result in permanent damage to the equipment.

OUTPUT POWER BOARD REMOVAL & REPLACEMENT (continued)

REPLACEMENT PROCEDURE

1. Apply a thin coating of Penetrox A-13 Electrical Joint Compound to the mating surfaces of the output power board and the heat sink. Make sure the surfaces are clean. Do not allow the compound to get into the threaded holes or on the screw threads.

Be sure to follow the recommended static-free methods for handling printed circuit boards. Failure to do so can result in permanent damage to the equipment.

- 2. Mount the output power board to the heat sink and pre-torque the four socket head screws to 25 inch-pounds.
- 3. Finish tightening the four screws to 40-48 inch-pounds.
- 4. Replace the two phillips head screws previously removed.
- 5. Replace leads X20 and X40.
- 6. Replace all plugs previously removed.
- 7. Replace leads X4 and X2.
- 8. Replace lead B21 and torque it to 70 inchpounds.
- 9. Clear and secure all leads and replace the wraparound cover.

PRO-CUT[®] 55



PRIMARY POWER BOARD AND FILTER CAPACITOR REMOVAL AND REPLACEMENT

WARNING

A

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

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

DESCRIPTION

The following procedure will aid the technician in removing the Primary Power Board and Filter Capacitors for maintenance or replacement.

MATERIALS NEEDED

5/16" Nut driver 3/16" Allen type wrench 7/16" Wrench Slot-Head screw driver Torque wrench 3/8" Wrench Penetrox A-13 (Lincoln E2529) Electrical Joint Compound

PRO-CUT[®] 55

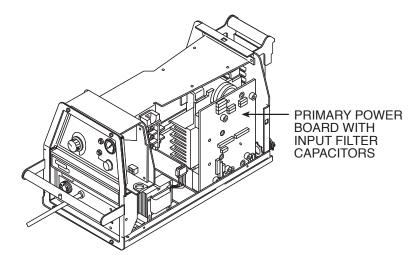
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PRIMARY POWER BOARD AND FILTER CAPACITOR REMOVAL AND REPLACEMENT (continued)

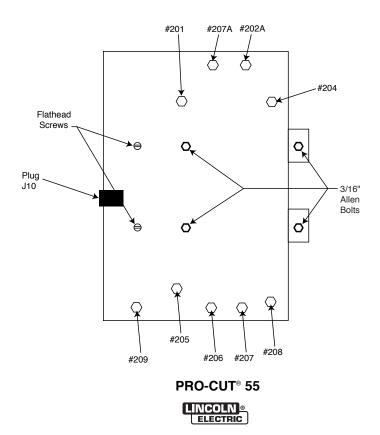
FIGURE F.23 - PRIMARY POWER BOARD REMOVAL



REMOVAL PROCEDURE

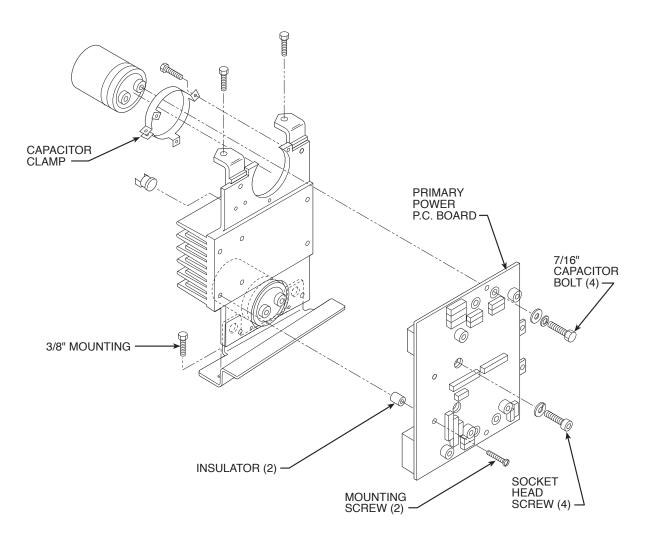
- 1. Remove input power from the PRO-CUT[®] 55 machine.
- 2. Remove the case wraparound and perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- Locate the primary power board and associated lead and plug connections. See Figure F.23.
- 4. Label the leads for reassembly.
- 5. Remove Plug J10.
- Using the 7/16" wrench, remove leads 201, 202A, 203A, 204, 205, 206, 207A, 208 and 209. See Figure F.24.

FIGURE F.24 – PRIMARY POWER BOARD REMOVAL



PRIMARY POWER BOARD AND FILTER CAPACITOR REMOVAL AND REPLACEMENT (continued)

FIGURE F.25 – POWER BOARD HEATSINK AND CAPACITOR REMOVAL



- Using the slot-head screw driver, remove the two mounting screws from the left side of the primary power board. See Figure F.25. Take note of insulator placement for reassembly.
- 8. Using the 3/16" allen type wrench, remove the four socket head screws and lock washers mounting the primary power board to the heat sink.
- 9. Carefully remove the primary power board from the heat sink.

A

CAUTION

Be sure to follow the recommended static-free methods for handling printed circuit boards. Failure to do so can result in permanent damage to the equipment.



PRIMARY POWER BOARD AND FILTER CAPACITOR REMOVAL AND REPLACEMENT (continued)

CAPACITOR REMOVAL

- 1. Using the 3/8" wrench, remove the four screws holding the heat sink assembly to the upper and bottom sections of the machine. See *Figure F.25.*
- 2. Remove the gas hose restraints from the bottom of the heat sink assembly.
- 3. Remove the two thermostat leads from the thermostat, which is located next to the upper capacitor.
- 4. Carefully remove the heat sink and capacitor assembly. Clear any necessary leads.
- Remove the faulty capacitors by using the slot head screw driver to loosen the clamps. Take note of capacitor position in the clamp. Observe polarity markings and terminal position.

CAPACITOR REPLACEMENT AND P.C. BOARD REPLACEMENT

- Replace the capacitors by positioning them in the clamps. Do not tighten the clamps. They must be loose when the P.C. board is assembled to the capacitors.
- 2. Apply a thin coating of Penetrox A-13 Electrical Joint Compound to the mating surfaces of the P.C. board and the heat sink and capacitor terminals.
- 3. Mount the P.C. board to the heat sink and capacitor assembly. Make sure the capacitor terminals line up with the holes in the P.C. board and with the correct capacitor polarities.

- 4. Assemble the four socket head screws and pre-torque them to 25 inch-pounds.
- Make certain the capacitors are lined up correctly so that when the capacitor bolts are assembled through the P.C. board, there will NOT be any distortion to the P.C. board.
- 6. Finish tightening the four screws to 40-48 inch-pounds.
- 7. Assemble the two slot head screws with their appropriate insulators.
- 8. Tighten the capacitor clamps.
- 9. Place the assembly into the machine and connect the two thermostat leads previously removed.
- 10. Secure the assembly to the upper and bottom sections of the unit using the 3/8" wrench and the four screws previously removed.
- 11. Connect the J10 plug.
- 12. Connect leads 201, 204, 205, 208 and 209 previously removed.
- 13. Connect leads 202A, 207A, 206, and 203A to the capacitor terminals. Torque to 50-60 inch-pounds.
- 14. Replace the gas hose restraints previously removed.
- 15. Clear and reposition any leads that may be disturbed.
- 16. Replace the case wraparound cover.



WARNING

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

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

DESCRIPTION

The following procedure will aid the technician in removing the Input Rectifier Bridge for maintenance or replacement.

MATERIALS NEEDED

3/16" Allen type wrench Phillips head screw driver Torque wrench Penetrox A13 (Lincoln E2529) Electrical Joint Compound Essex DC-4-8 (Lincoln E3539) Electrical Insulating Compound

PRO-CUT[®] 55

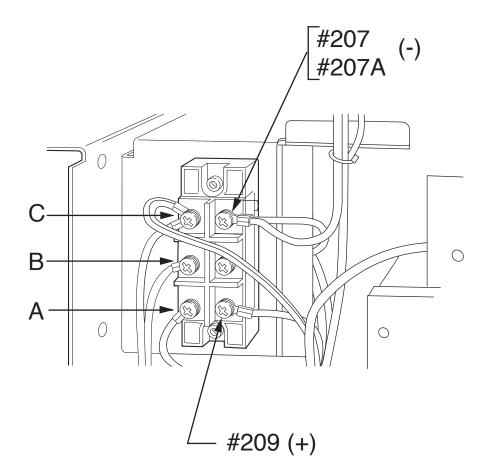
ELECTRIC

INPUT RECTIFIER BRIDGE REMOVAL AND REPLACEMENT (continued)

PROCEDURE

- 1. Remove input power to the PRO-CUT $^{\circ}$ 55.
- 2. Perform the *Input Filter Capacitor Discharge Procedure* detailed earlier in this section.
- 3. Locate the input rectifier and the leads connected to it. See Figure F.26.
- 4. Identify and mark the leads connected to the rectifier terminals.
- 5. With the phillips head screw driver, remove the lead terminals connected to the rectifier terminals.
- 6. Using the 3/16" allen wrench, remove the two cap head screws and washers mounting the input rectifier bridge to the center panel assembly.

FIGURE F.26 – INPUT RECTIFIER LEAD LOCATIONS



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INPUT RECTIFIER BRIDGE REMOVAL AND REPLACEMENT (continued)

- 7. Carefully remove the input rectifier bridge.
- 8. When installing a new input rectifier apply a thin coating of Penetrox A-13 Heat Sink Compound (Lincoln E2529) to the mating surfaces. Torque the mounting cap screws and nuts to 44 in-lbs.
- 9. Reconnect the 10 leads to the correct terminals and torque the phillips head screws to 31 in-lbs.
- 10. Apply Essex DC-4-8 Insulating Compound to all six screw heads and terminals. The heavy input lead terminals should be against the rectifier terminals.

ELECTRIC

RETEST AFTER REPAIR

Should a machine under test be rejected for any reason requiring the removal of any mechanical part that could affect the machine's electrical characteristics, or if any electrical components are repaired or replaced, the machine must be retested.

INPUT IDLE AMPS AND WATTS

| Input Volts/Hertz | Idle Amps | Idle Watts |
|-------------------|-----------|------------|
| 230/60 | 0.42 | 98 |

| Output Current Range | 25 - 60 Amps |
|----------------------|--------------|
| | |

| Maximum Open Circuit Voltage | 335 Volts |
|------------------------------|-----------|
| | |

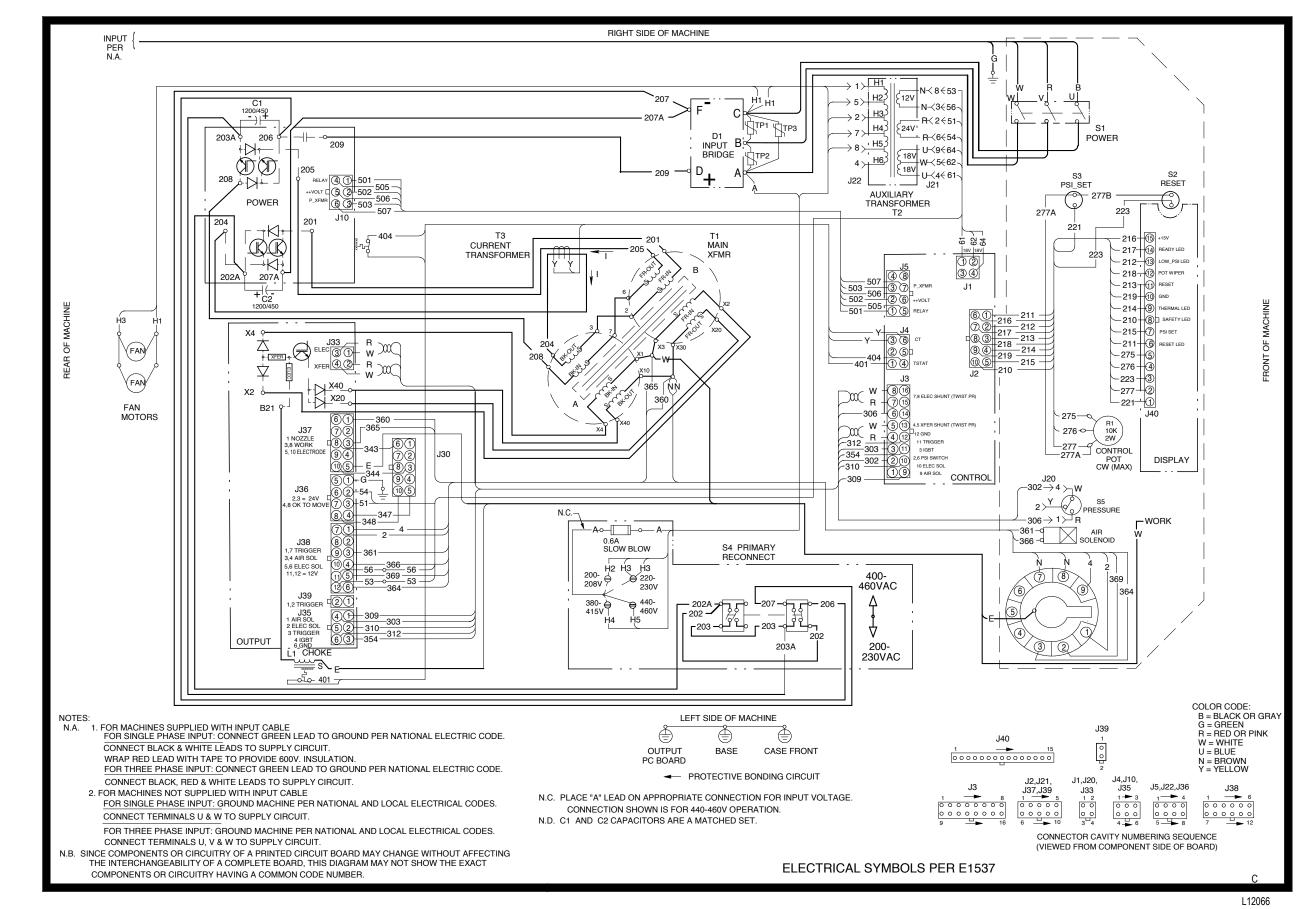
ELECTRICAL DIAGRAMS

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WIRING DIAGRAM - ENTIRE MACHINE (L12066)



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.





PROCUT® 55

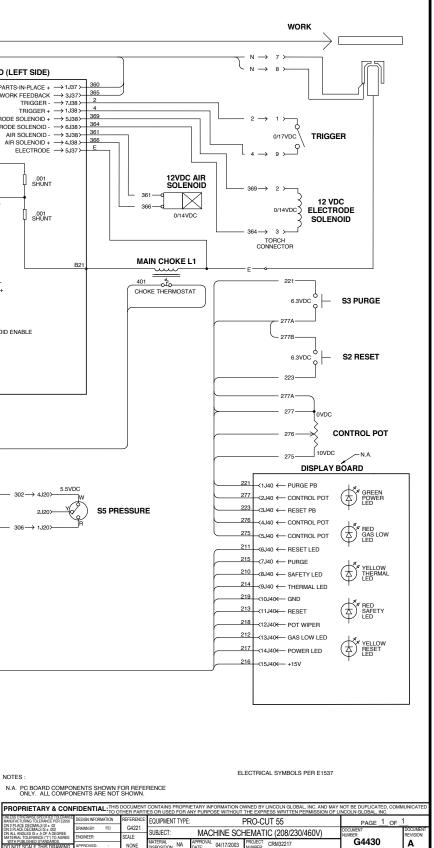
SCHEMATIC-ENTIRE MACHINE (G4430)

C4430 ENGINEERING CONTROLLED MANUFACTURER: No ANGE DETAIL: NEV — N.A POWER BOARD (RIGHT SIDE) INPUT RECTIFIER LINE SWITCH PRECHARGE RELAY - N.A. ТР2₽ OUTPUT BOARD (LEFT SIDE) PARTS-IN-PLACE + \rightarrow 1J37 > 360 WORK FEEDBACK \rightarrow 3J37 > 365 TRIGGER - \rightarrow 7J38 > 2 MAIN TRANSFORMER T1 205 F TRIGGER + \rightarrow 138 > 4 ELECTRODE SOLENOID + \rightarrow 5J38 > 369 ELECTRODE SOLENOID - \rightarrow 6J38 > 364 S1 C1 1200uF 7 450V D1 + _ 325VDC `(NOMINAL) (OUTER) B Gr \square RECONNECT SWITCH OWN FOR 380-460V OPERATION s (INNER) A OUTPUT DIODI MODULES 208 -A2 .001 SHUNT 6J10 GATE DRIVE PULSE TRANSFO 506 PRIMARY CAP OPTOCOUPLER + K 5J10€ PILOT IGBT 505 .001 SHUNT 4J10 RELAY DRIVE AUX. TRANSFORMER 51 503 AUX. TRANSFORMER 51 (3J36) AUX. TRANSFORMER 54 (2J36) AUX. TRANSFORMER 53 (12J38) 3J10 GATE DRIVE PULSE TRANSFORME >24VAC 502 ✓ 2J10 PRIMARY CAP OPTOCOUPLER -204 -12VAC AUX. TRANSFORMER 56 <11J38←__ 501 JI10 RELAY DRIVE + (OUTER) B < 1.I36 CHASSIS GND S < 1J33 ← ELECTRODE SHUNT R < 3J33← ELECTRODE SHUNT + R 2J33← TRANSFER SHUNT + (INNER) A C2 1200uF 7 450V 201 _____ . 325VDC (NOMINAL) W 4J33 TRANSFER SHUNT < 2J35← ELECTRODE SOLENOID ENABLE 354 ≺ 3J35← TRIGGER SIGNAL 309 - 1J35 SOLENOID ENABLE 303 ≺ 4J35← PILOT ENABLE ______ GJ35← COM REFERENCE 404 년 HEATSINK THERMOSTAT AUXILIARY TRANSFORMER T2 $\begin{array}{c} & & \\ & & \\ & & \\ \hline \\ & & \\ &$ 0.6A SLOW-BLOW AUX. RECONNECT 200-208 . H3 - 220-230V — N A H5 440-460V CONTROL BOARD \rightarrow 4J20 S5 PRESSURE SWITCH → 2.13 302 2J20> 303 PILOT ENABLE → 3J3≻ $306 \rightarrow 1.120$ THERMOSTAT 1J4 ← TRANSFER SHUNT $+ \rightarrow 4J3$ THERMOSTAT 404 < 4J4 ← PRIMARY CURRENT SENSE Y 3J4← 306 S5 PRESSURE SWITCH \rightarrow 6J3 PRIMARY CURRENT SENSE < 6J4← R w ELECTRODE SHUNT - → 8J3≻ AIR SOLENOID ENABLE -> 9J3> 309 310 ELECTRODE SOLENOID ENABLE -> 10J3> 354 TRIGGER SIGNAL → 11J3 COM REFERENCE → 12J3 RELAY DRIVE + 1,15← PRIMARY CAP OPTOCOUPLER -502 < 2J5← GATE DRIVE PULSE TRANSFORMER 503 3J5← RESET LED \rightarrow 1J2> 211 RELAY DRIVE -505 212 GAS LOW LED → 2J2≻ 5J5← RESET -> 3J2> 213 PRIMARY CAP OPTOCOUPLER + 506 6J5← GATE DRIVE PULSE TRANSFORMER 507 7J5 PURGE \rightarrow 5J2 \rightarrow 215 +15V -> 6J2> 216 AUX. TRANSFORMER ____64 → 4J1 ← _____62 → 2J1 ← ____18VAC AUX. TRANSFORMER POWER LED -> 7J2> 217 AUX. TRANSFORMER NOTES $GND \rightarrow 9J2 \rightarrow 219$ SAFETY LED \rightarrow 10J2> 210

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

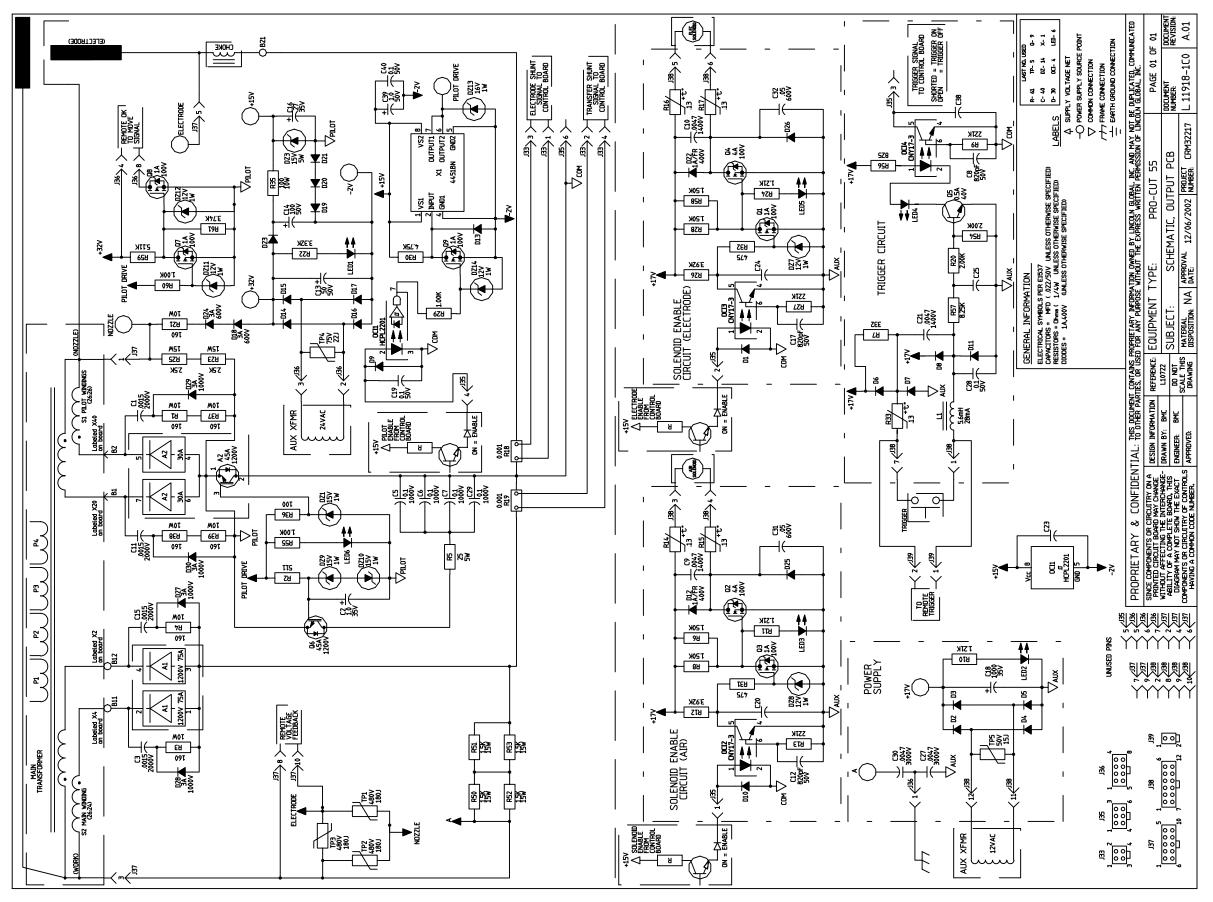
G-3





SCHEMATIC - OUTPUT BOARD (L11918-1C)

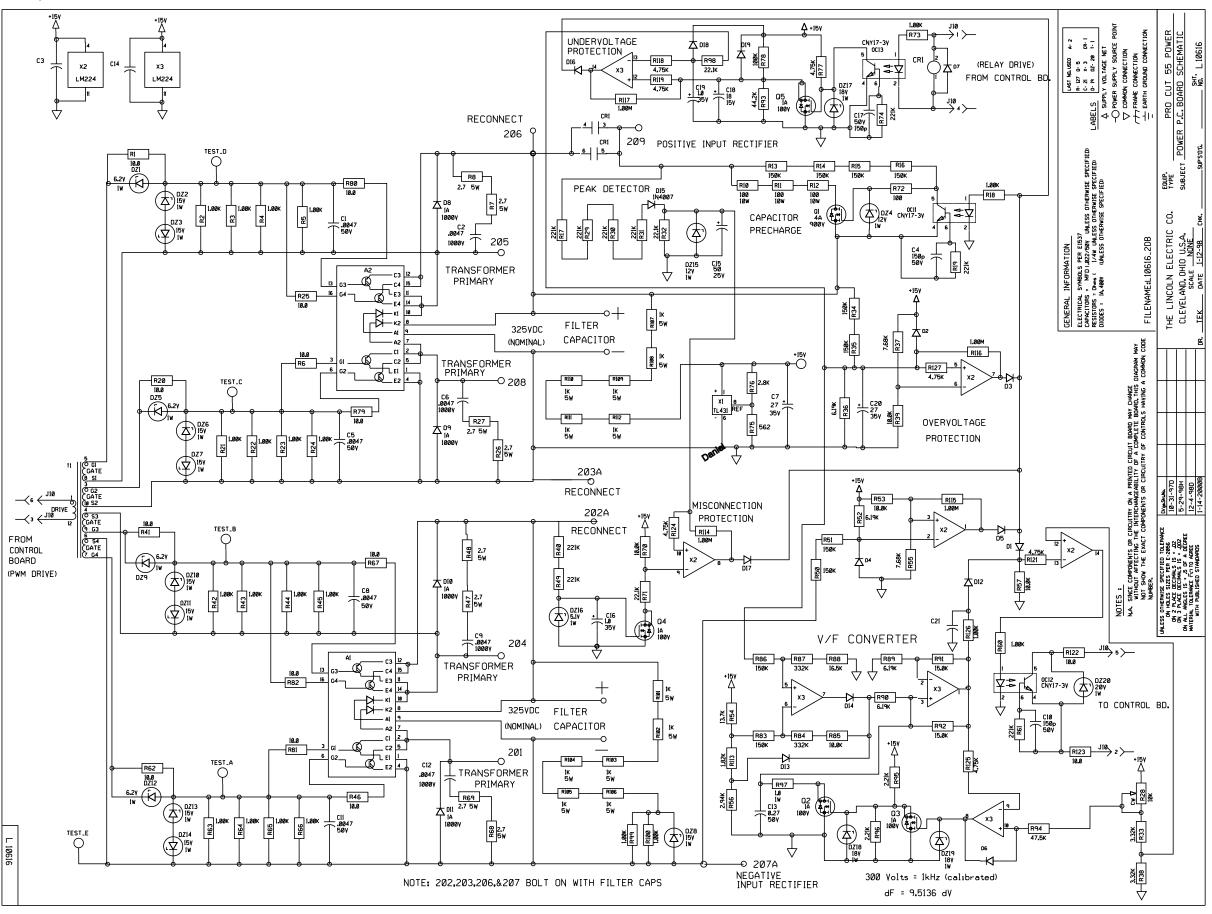
ELECTRICAL DIAGRAMS



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

SCHEMATIC-POWER PC BOARD (L10616-2D)

ELECTRICAL DIAGRAMS



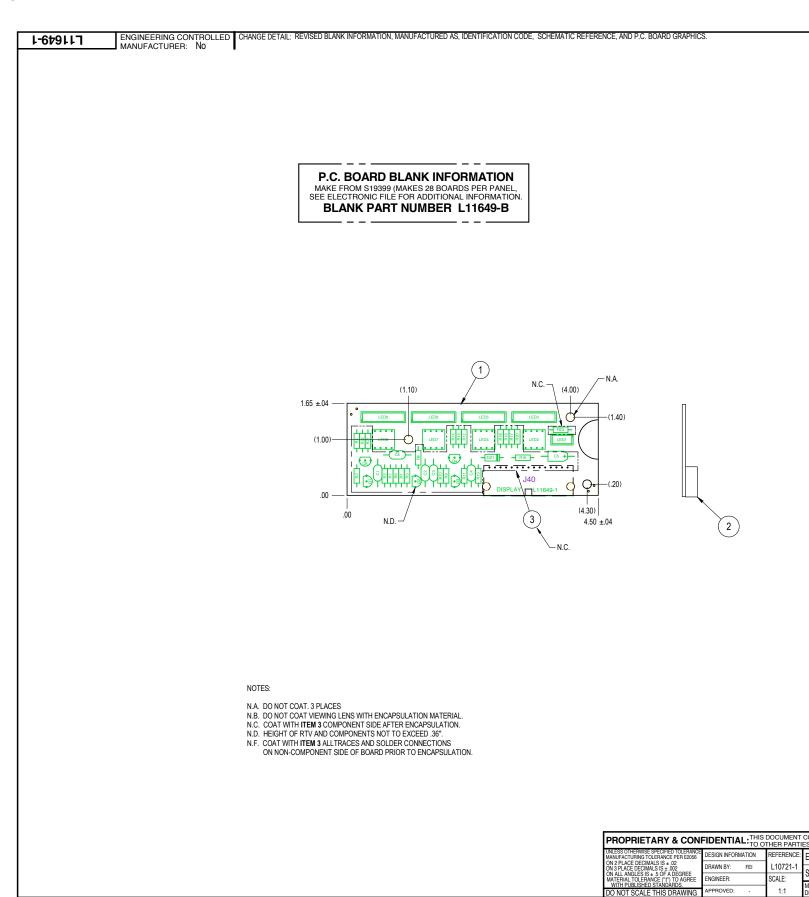
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

Return to Section TOC Return to Master TOC

Return to Section TOC Return to Master TOC

Return to Section TOC Return to Master TOC

PC BOARD ASSEMBLY-DISPLAY (L11649-1)



NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln Electric discourages board level troubleshooting and repair since it may compromise the quality of the design and may result in danger to the Machine Operator or Technician. Improper PC board repairs could result in damage to the machine.

| | ITEM | REQ'D | PART NO. | IDENTIFICATION |
|--------------|---------------------|-------|-------------|------------------------|
| | C1,C2,C3,C4,C6 | 5 | S16668-4 | 2700pF/50 |
| | C5 | 1 | S13490-25 | 4.7/35 |
| | DZ1 | 1 | T12702-27 | 1N4740 |
| | | | | |
| N.B. | LED1 | 1 | M18875-1 | LIGHT BAR, LED, YELLOW |
| N.B. | LED2,LED7 | 2 | M18875-5 | LIGHT BAR, LED, RED |
| N.B. | LED3,LED6 | 2 | M18875-2 | LIGHT BAR, LED, RED |
| N.B. N.B. | LED4 | 1 | M18875-6 | LIGHT BAR, LED, YELLOW |
| | LED5 | 1 | M18875-3 | LIGHT BAR, LED, YELLOW |
| N.B. | LED8 | 1 | M18875-7 | LIGHT BAR, LED, GREEN |
| N.B. | LED9 | 1 | M18875-4 | LIGHT BAR, LED, GREEN |
| | Q1,Q2,Q3,Q4,Q5 | 5 | T12704-68 | 2N4401 |
| | R1,R5,R9,R13,R20 | 5 | S19400-3321 | 3.32K 1/4W |
| | R2,R6,R10,R14,R21 | 5 | S19400-6811 | 6.81K 1/4W |
| | R3,R4,R7,R8,R11,R12 | 6 | S19400-1000 | 100 1/4W |
| | R15,R16 | 2 | S19400-75R0 | 75 1/4W |
| | R17 | 1 | S19400-8250 | 825 1/4W |
| | R18,R19 | 2 | S19400-2671 | 2.67K 1/4W |
| | R22,R23 | 2 | S19400-2670 | 267 1/4W |

CAPACITORS = MFD/VOLTS INDUCTANCE = HENRYS

| ITEM | REQ'D | PART NO. | DESCRIPTION | |
|---------|-------|-----------------|--------------------|--|
| 1 | 1 | SEE BLANK INFO. | P.C. BOARD BLANK | |
| 2 | 1 | S19365-15 | RIGHT ANGLE HEADER | |
| 3 3 OZ. | | E2861 | SEALANT | |

MANUFACTURED AS:

L11649-1B0 $\overline{}$

IDENTIFICATION CODE

MAKE PER E1911 ENCAPSULATE WITH E1844 TEST PER E4065-D

SCHEMATIC REFERENCE: M19849-1B0

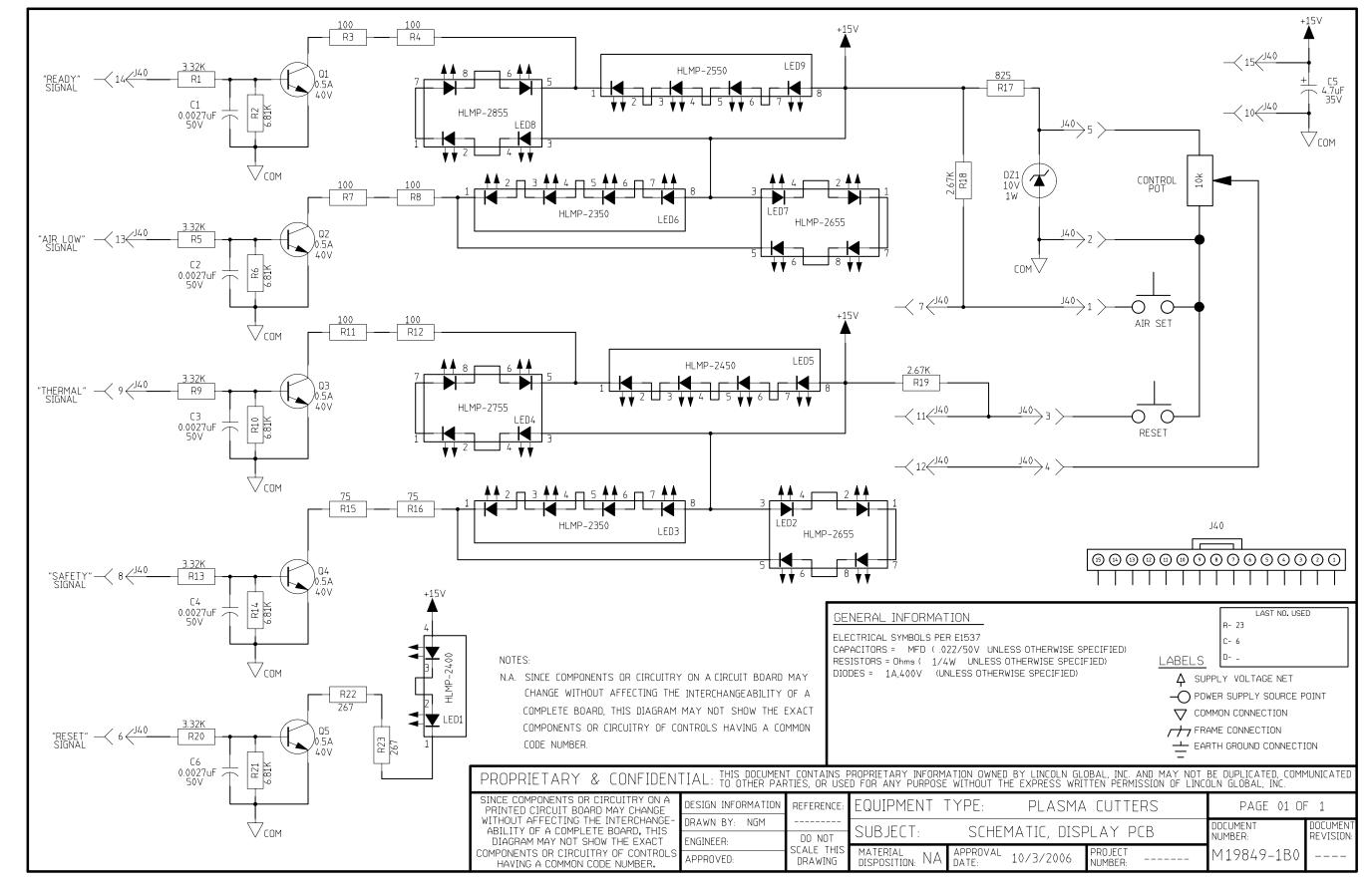
| | | | LN GLOBAL, INC. AND MAY I VRITTEN PERMISSION OF LI | NOT BE DUPLICATED, COMM NCOLN GLOBAL, INC. | IUNICATED |
|-----------------------------|------------------------------|------------------------|---|---|-----------|
| EQUIPMENT TYPE: | PLA | SMA CUTT | ERS | PAGE <u>1</u> OF <u>1</u> | |
| SUBJECT: | DISPLAY P.(| | DOCUMENT REVISION: | | |
| NATERIAL DISPOSITION: NA | APPROVAL DATE: 01/11/2007 | PROJECT NUMBER: CRM | 38378 | L11649-1 | В |

EFERENCE

L10721-1

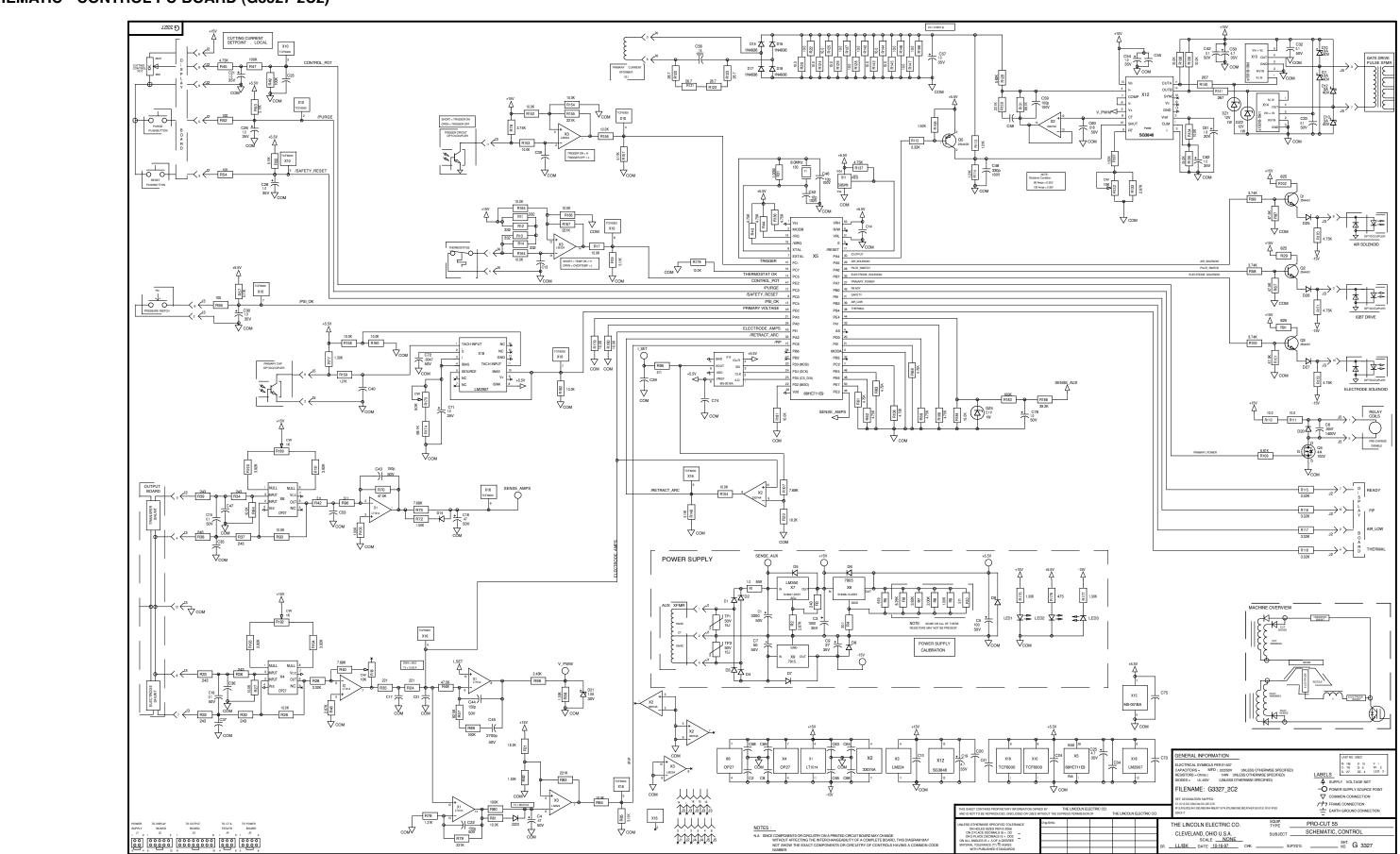
SCALE: 1.1

SCHEMATIC - DISPLAY PC BOARD (M19849-1B0)



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





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

Return to Section TOC Return to Master TOC

Return to Section TOC Return to Master TOC

Return to Section TOC Return to Master TOC

ELECTRICAL DIAGRAMS



Return to Section TOC Return to Master TOC

Return to Section TOC Return to Master TOC

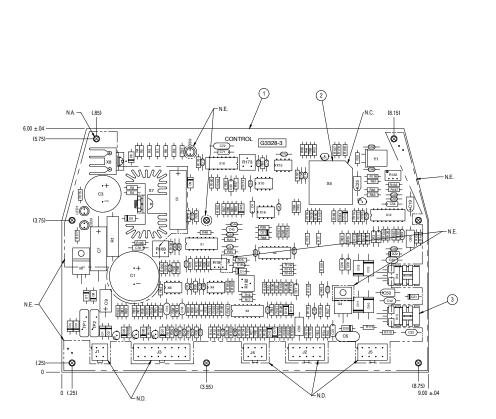
Return to Section TOC Return to Master TOC

P.C. BOARD BLANK INFORMATION BUY COMPLETE AS G3328-E (4-LAYER BOARD PER E3281). MAKES 4 BOARDS PER PANEL. PANEL SIZE PER E1911. SEE ELECTRONIC FILE FOR ADDITIONAL INFORMATION

PC BOARD ASSEMBLY-CONTROL (G3328-3)



C3338-3 ENGINEERING CONTROLLED MANUFACTURER: Yes HANGE DETAIL: REVISED BLANK INFORMATION AND BUY PART NUMBER. G3328-E, CHANGED ENGINEERING CONTROLLED MANUFACTURER FROM NO TO YES.



NA. DO NOT COAT WITH ENCAPSULATION MATERIAL (& PLACES) N.B. CAUTION: THIS DEVICE IS SUBJECT TO DAMAGE BY STATIC ELECTRICITY: SEE E2443 BEFORE HANDLING. NO. BEFORE ENCAPSULATION, PLACE TEM A OVER TOP OF X5. THEN PLACE A BEAD OF ITEM 3 AROUND BASE OF SOCKET TO COMPLETELY COVER ENCAPSULATION, PLACE TEM AND LOBES OF TAPE TO SOCKET USING TIEM 3 COAT SOCKET TERMINALS AND TRACES ON NON-COMPONENT SIDE OF BOARD. ND. DO NOT ENCAPSULATE OR COAT THESE COMPONETOR CANTIES. NE BEFORE ENCAPSULATION, COMPLETELY COVER ALL COMPONENTS IN TIEM 5 ZECETT THE AREAS NICLATED. COAT ALL COMPONENTS WITH ITEM 5 ZECETT THE AREAS NICLATED. COAT ALL COMPONENTS WITH ITEM 5 ZECETT THE AREAS NICLATED. COAT ALL COMPONENTS WITH

NOTES:

MAKE PER E1911 ENCAPSULATE WITH E1844, 2 COATS TEST PER E4065-C SCHEMATIC REFERENCE: G3327-3E0

MANUFACTURED AS:





PROPRIETARY



NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln Electric discourages board level troubleshooting and repair since it may compromise the quality of the design and may result in danger to the Machine Operator or Technician. Improper PC board repairs could result in damage to the machine.

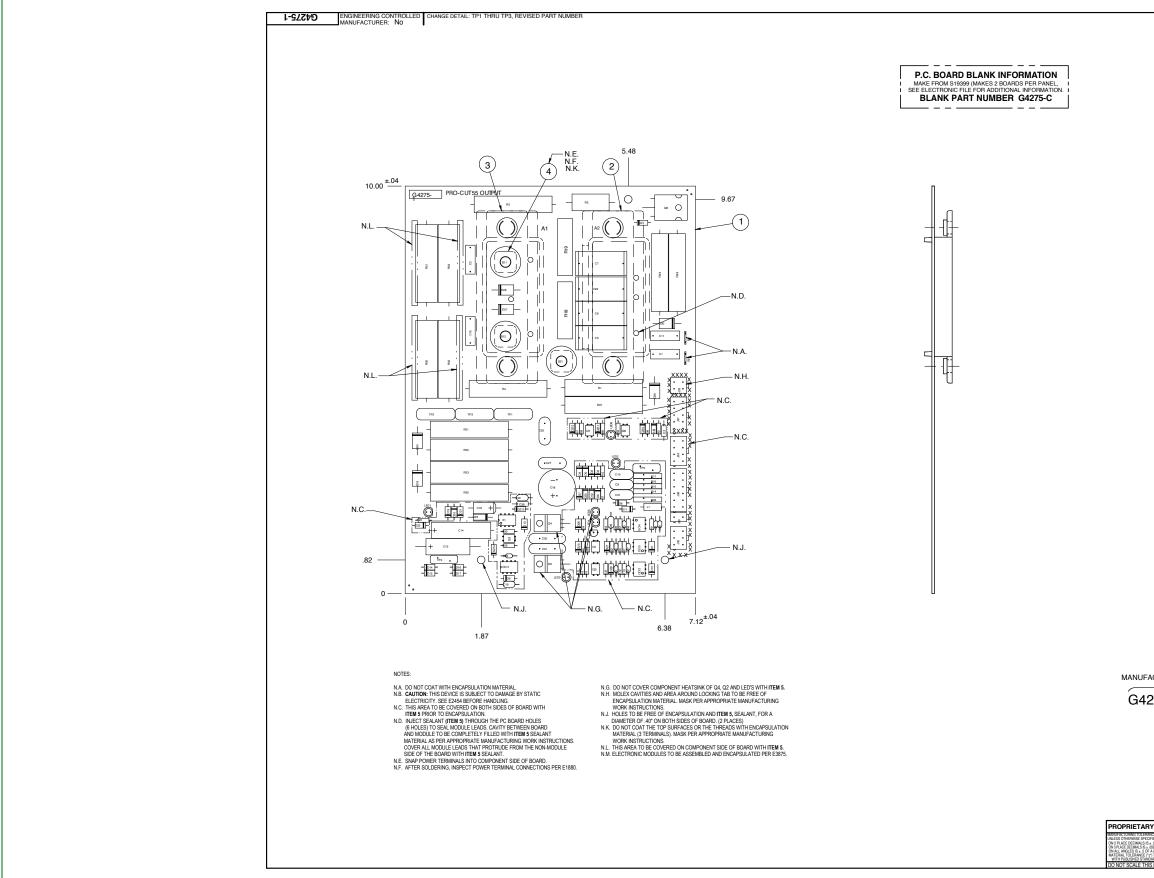
| V1 1 IS16665-5 8.0 MHZ INDUCTANCE = HENRIES RESISTORS OHMS | | | | | | | | | | | |
|---|------------------------|--------|-------------------|-----------------------------|-------------------|------------|-----------|-----------|---|---------------------|-----------------------|
| Y & CONFIDENTIAL: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OWNED BY LINCOLN GLOBAL, INC. AND MAY NOT BE DUPLICATED, COMMUNICATED TO OTHER PARTIES OR USED FOR ANY PURPOSE WITHOUT THE EXPRESS WRITTEN PERMISSION OF LINCOLN GLOBAL, INC. | | | | | | | | | | | |
| FIED TOLERANCE NCE PER E2056 | DESIGN INFORM | IATION | REFERENCE: | EQUIPMENT TYPE | : | PRO-C | CUT 55 (I | DOMESTIC |) | PAGE 1 OF | 1 |
| 8 ± .02 1± .002 F A DEGREE "t") TO AGREE | DRAWN BY: ENGINEER: | FEI | G3328-2 SCALE: | SUBJECT: | CC | NTROL F | P.C. BOA | RD ASSEM | | DOCUMENT NUMBER: | DOCUMENT REVISION: |
| NDARDS. S DRAWING | APPROVED: | | 1:1 | MATERIAL DISPOSITION: UF | APPROVAL DATE: | 09/14/2005 | PROJECT C | RM37489-B | | G3328-3 | Е |

| 122.06.00.013.07.40.072 31 S1668-5 52/20 123.07.09.014.01.07 1 S13480-121 100035 123.07.09.014.01.07 1 S13480-121 100035 123.07.09.014.01.07 1 S13480-121 100035 123.07.09.014.01.07.02 1 S13480-121 100035 123.07.01 1 S13480-121 100035 123.07.01 1 S13480-121 100035 123.07.01 1 S13480-121 100035 123.07.01 1 S13480-121 1000 123.07.01 1 S13480-121 1000 123.07.02.02 1 S13480-121 1000 123.07.01.02.02.02 1 S13480-121 10000 | 122.62.02.04.02.03 31 S15688-5 26250 22.62.02.02.03.04.050 0 S15480-121 100005 22.63.05.05.02.04.050 1 S15480-121 100005 23.63.05.05.02.04.050 1 S15480-121 100005 24.618 2 S15480-121 10005 25.7 1 S15480-121 10005 25.7 1 S15480-121 10005 25.7 1 S15480-121 10005 25.7 1 S15480-121 10075 25.7 1 S15480-124 10076 25.7 1 S15480-124 10076 25.7 1 S15480-124 10076 25.6 1 S15480-124 10076 25.6 1 S15480-124 10076 25.7 1 S15480-124 10076 25.7 1 S15480-124 10076 25.7 1 S15480-126 10070 25.7 1 S15480-126 <t< th=""><th></th><th>ITEM C1</th><th></th><th>PART NO. S13490-92</th><th>IDENTIFICATION 3300/50</th></t<> | | ITEM C1 | | PART NO. S13490-92 | IDENTIFICATION 3300/50 | | | | | |
|---|---|-----|---|----------|----------------------------|---|--|--|--|--|--|
| S3 1 ST3480-131 100035 C4C18 2 ST3480-131 100035 C4C18 1 ST3480-132 1000 C3 1 ST3480-132 1000 C3 1 ST3480-132 1000 C3 C3C2C3 2 ST3480-132 1000 C3C2C1 3 ST3480-23 1000 1000 C3C2C1 3 ST3480-23 1000 1000 1000 C3C2C1 3 ST3480-23 1000 | S3 1 51340-01 100035 C4 C18 1 51340-02 1003 C5 1 51340-02 0030 C5 1 51340-02 0030 C5 1 51340-02 0030 C5 1 51340-02 0030 C5 1 51340-02 1000 C5 1 51340-02 1000 C6 1 51340-02 1000 C6 1 51340-02 1000 C6 1 51340-01 1000 C7 1 51340-01 1000 C7 1 51340-01 1000 C7 1 51340-01 1000 C7< | | C2,C8,C10,C13,C14,C17,C20 C23,C24,C29,C31,C34,C35 C36,C37,C39,C40,C41,C47 C53,C55,C58,C63,C64,C65 | 31 | | | | | | | |
| BLC18 2 ST480-03 U0050 CS 1 T1107-62 DOT 07 0001400 CS 1 T1107-62 DOT 07 0001400 CS 3 ST480-71 T0057 CS 3 ST480-62 DOT 07 0001400 CS CS ST480-62 T0057 CS CS ST480-62 T0057 CS CS ST480-64 T0057 CA CS ST480-64 T0057 CA ST480-64 T0057 CO CA ST480-76 T0057 CO CA ST480-76 T00570 CO CA ST480-76 T00570 CO CA ST480-76 T00570 T00570 CA ST480-78 T00570 T00570 CA ST480-78 T1270-57 T00570 CA T17270-57 T14057 T40570 CA T17270-57 T14057 T40570 CA T17 | BALON 2 STANDAGE 4750 SS 1 STANDAGE 4000 SS 1 STANDAGE 4000 SS 1 STANDAGE 4000 SS 1 STANDAGE 4000 SS 1 STANDAGE 5 SS 1 STANDAGE 5 SS 1 STANDAGE 1 SS 1 STANDAGE 1 SS 1 STANDAGE 1 SS 1 STANDAGE 1 STANDAGE SS 1 STANDAGE STANDAGE STANDAGE STANDAGE 1 <td></td> <td></td> <td>1</td> <td>\$19400-191</td> <td>1000/25</td> | | | 1 | \$19400-191 | 1000/25 | | | | | |
| GS 1 11157-52 0047 or .0057400 G7 1 51340-72 05050 G3 G4 1 51340-72 05050 G3 G5 S1340-72 05050 0 0 G3 G3 S1340-72 1055 0 0 0 G2 G3 S1340-74 1055 0 | B 0 11157-52 0047 or 00571400 C7 1 513400-72 0050 C3 C3 C3 C3 C3 C3 | | C4,C18 | | S13490-63 | .47/50 | | | | | |
| C7 1 51340-09 27785 C15.C16.C22.C32.C42 51340-09 27785 C16.C16.C22.C32.C42 51340-09 7785 C16.C16.C22.C32.C42 51340-09 7785 C22.C43.C4 3<51668-8 | 67 1 51340-09 7775 63 513400-09 7775 63 513400-09 7775 63 513400-09 7775 63 513400-09 7775 63 513400-10 1035 64 513400-10 1035 65 1 51666-84 7000/750 66 1 51566-10 107700 658 1 51566-10 107700 659 1 51586-10 105070 660 1 51586-10 105070 673 1 51586-10 105070 673 1 51586-10 105070 673 1 51586-10 105070 674 1 17205-57 10820 675 1 51586-10 104004 01,02,02,02,02,02,02,02,02 1 17202-51 104004 01,02,02,02,02,02,02,02,02 1 17202-51 104004 1,11 1 | | | | | | | | | | |
| CITE_COLOR_COLOR_CALCY 6 516406-5 4.735 CITL_COLOR_COLOR_CALCY 8 51540-6 4.735 CITL_COLOR_COLOR_CALCY 8 51540-6 4.735 CITL_COLOR_COLOR_CALCY 8 51540-6 4.735 CITL_COLOR_CALCY 8 51540-6 4.735 CITL_COLOR_CALCY 8 51540-6 4.735 CITL_COLOR_CALCY 8 51540-6 4.735 CITL_COLOR_CALCY 8 51540-6 8.700 CITL_COLOR_CALCY 1 51540-15 1.600 CITL_COLOR_CALCY 1 51540-15 1.600 CITL_COLOR_CALCY 1 51540-15 1.600 CITL_COLOR_CALCY 1 1.1000 1.1000 CITL_COLOR_CALCY 1 1.10000 < | Chi Color, Color, Color, Color, Color, B S1980-26 | | | | S13490-72 | | | | | | |
| CIT 026, CSG 00 3 \$15400-02 4,756 COL 026, CSG 00, C54, CS7 6 \$15600-12 1005 CSG 026, CS1 6 155600-12 1005 CSG 026, CS2 2 \$15600-12 1007 CSG 03 1 \$15400-22 1007 100 CSG 04 1 \$15400-166 10100 1007 CSG 05 1 \$15400-168 1007 100 CSG 05 1 \$15400-168 1007 1000 CSG 05 1 \$15400-168 1007 1000 CSG 05 1 \$15400-168 1007 1000 CSG 05 1 \$15600-100 1000 1000 1000 CSG 05 1 \$15600-100 100 | C10.25.03 3 51340-28 4.735 C31.266.25.200.25.07 6 51540-24 1.055 C32.266.25.200.25.07 6 51540-24 1.056 C32.266.25.200.25.07 6 51540-24 1.056 C33.200.25.200 1.51540-130 1.057 1.056 C34.200.25.200 1.51540-130 1.057 1.050 C36.200.27.200 1.51540-130 1.050 1.050 C37.200.200.200.200 1.51540-130 1.0500 1.0500 C37.200.200.200.200 1.71270-31 1.0800.200 1.0500.200 D11.200.200.200.200 1.71270-40 1.0800.200 1.0500.200 D12.00.200.200.200 1.71270-40 1.0800.400 1.0500.400 D12.000.200.2000.2000.200 1 | | | | | | | | | | |
| C21_C20_C20_C30_C54_C57 8 515666-2 1.035 C22_C41_C44 3 515666-2 1.035 C24_C41_C44 3 515666-2 30p/F100 C46_C41_C44 1.515666-8 30p/F100 C56 1.515666-7 10p/F100 C56 1.515666-7 10p/F100 C56 1.51566-7 10p/F100 C57 1.51566-7 10p/F100 C56 1.51566-7 10p/F100 C57 1.51566-7 10p/F100 C57 1.51566-7 10p/F100 C56 1.51566-7 10p/F100 | C21. C262. C20. C24. C27 # \$15490-42 1.035 C22. C43. C44 - \$15999-10 - C24. C42 - \$15999-10 - C44. C42 - \$15999-10 - C44. C42 - \$15999-10 - C56 - \$15999-10 - C56 - \$15999-10 - C57 - \$15999-10 - C72 - \$17999-50 - | | | | | | | | | | |
| 222.03.C44 3 \$15669-9 Top/Fron C45 1 \$15669-13 Top/Fron C46.C52 2 \$15669-13 Top/Fron C46.C52 1 \$15569-15 Top/Fron C46 1 \$15569-15 Top/Fron C46 1 \$15569-15 Top/Fron C46 1 \$15669-10 Top/Fron C47 1 \$15669-10 Top/Fron D15.D16.D17.D18 4 T12700-11 ThAPAZA D15.D16.D17.D18 4 T12700-11 THAPAZA D15.D16.D17.D18 4 T15700-61 THAPAZA D15.D16.D17.D18 4 T15700-62 THAPAZA D15.D16.D17.D19 1 T12700-11 THAPAZA D15.D16.D17.D19 1 <t< td=""><td>282.03.C44 3 \$15669-9 156,07100 C45. 1 \$15669-13 106,7100 C46. 1 \$15669-13 106,7100 C46. 1 \$15669-13 106,7100 C46. 1 \$15669-13 106,97100 C46. 1 \$15669-10 106,9700 C47. 1 \$15669-10 106,970 C47. 1 \$15669-10 106,970 C47. 1 \$15669-10 106,970 C47. 1 \$17270-14 106,970 D10.D107,D13 4 17270-97 106828 D11.D107,D13 4 17270-97 106828 D1.D107,D13 4 17270-97 106828 D1.D107,D13 4 17270-97 106828 D1.D107,D13 1 17270-98 144,045 D1.D107,D13 1 17270-97 106828 D1.D107,D13 1 17270-97 106829 106 D1.D107,D13 1 <td< td=""><td></td><td></td><td></td><td></td><td></td></td<></td></t<> | 282.03.C44 3 \$15669-9 156,07100 C45. 1 \$15669-13 106,7100 C46. 1 \$15669-13 106,7100 C46. 1 \$15669-13 106,7100 C46. 1 \$15669-13 106,97100 C46. 1 \$15669-10 106,9700 C47. 1 \$15669-10 106,970 C47. 1 \$15669-10 106,970 C47. 1 \$15669-10 106,970 C47. 1 \$17270-14 106,970 D10.D107,D13 4 17270-97 106828 D11.D107,D13 4 17270-97 106828 D1.D107,D13 4 17270-97 106828 D1.D107,D13 4 17270-97 106828 D1.D107,D13 1 17270-98 144,045 D1.D107,D13 1 17270-97 106828 D1.D107,D13 1 17270-97 106829 106 D1.D107,D13 1 <td< td=""><td></td><td></td><td></td><td></td><td></td></td<> | | | | | | | | | | |
| CH6 1 ST006P10 CH6 ST006P10 ST006P10 CH6 ST006P10 ST006P10 CH7 ST006P10 ST006P10 D1001102P10 H T1270-S2 D1001102P10 H T1270-S3 D1001102P10 H T1270-S4 D1001102P10 H T1270-S4 D1001102P10 H T1270-S4 D1001102P10 H T1270-S4 D1001102P10 H | CH6 1 ST000P-100 CH6 1 ST000P-100 CH6 CH6 1 ST000P-100 CH6 CH6 C46 1 ST000P-100 CH6 CH6 CH6 C58 1 ST000P-100 CH6 CH6 CH6 CH6 CH6 C77 CDD AL FDD RD PDD D1 ST000P-100 CH6 CH7 CH7 <thch7< th=""> <thch7< th=""> <thch7< th=""></thch7<></thch7<></thch7<> | | | • | 040000.0 | 150-5/100 | | | | | |
| C46 2 \$15669-13 10pf*100 C48 1 \$15669-83 10pf*100 C58 1 \$15669-83 10pf*100 C58 1 \$15669-10 10pf*100 C58 1 \$15669-10 10pf*100 C57 1 \$15669-10 10pf*100 C76 1 \$15669-10 10pf*100 C10,C0,D,D,D,D,D,D,D,D,D 1 \$15490-135 10pf*100 C10,C1,D,D,D,D,D,D,D,D,D,D 4 \$1520-162 \$15720-19 D12,D,D,D,D,D,D,D,D,D,D 4 \$1520-162 \$15720-19 D12,D,D,D,D,D,D,D,D,D,D,D 4 \$1520-162 \$15720-19 D12,D,D,D,D,D,D,D,D,D,D,D,D,D,D,D,D,D,D, | Code 2 516669-13 Top/Fino Code 1 516669-16 15/100 Code 1 516669-16 15/100 Code 1 516669-10 16/00 Code 1 51569-10 16/00 Code 1 51569-10 16/00 Code 1 51569-10 16/00 Discot Lock Dock Dock Dock 1 17170-91 16/00 Discot Lock Dock Dock Dock 1 17170-92 16/00 Discot Lock Dock Dock Dock Dock 1 17170-93 16/00 Discot Lock Dock Dock Dock Dock Dock Dock Dock D | | | | | | | | | | |
| CS8 1 515400-108 15/100 CS9 1 515406-12 018/56/U CS9 1 515406-13 018/56/U CS9 1 51550-15 0550/U D10,011,012,013 4 112/02-52 14/5733. D12,012,012,013 4 112/02-52 14/5733. D12,012,012,013 1 515648-16 HEADER J1 1 515648-16 HEADER J2 1 515648-16 HEADER J3 1 515648-16 HEADER J3 1 515649-16 HEADER J3 1 51649-16 HEADER J4 1 51649-16 HEADER J4 1 51649-16 1<51641 | CS8 1 \$15400-106 15/100 CS9 1 \$15400-126 0.18/20/ CS8 1 \$15400-126 1.6/20 CS9 1 \$15100-126 1.7/20/ D10_01_10_D126 4 \$17270-54 1.46904 D10_01_10_D126 4 \$17270-54 1.46918 D10_01_10_D126 1 \$17270-54 1.46926 D10_01_10_D126 1 \$17270-58 1.44407 20 2 1.77270-58 2.44401 20 1 \$17470-58 2.44401 20 1 \$17470-58 2.44401 20 1 \$17470-58 2.44401 20 1 \$17470-58 2.4144V 20 1 \$17470-58 2.4144V </td <td></td> <td></td> <td></td> <td></td> <td>10pF/100</td> | | | | | 10pF/100 | | | | | |
| CS9 1 515480-12 100g/1100 C60 1 515480-12 10650V C72 1 515480-12 10650V C73 151668-10 10650V 10650V C74 1 51460-135 10650V D10.011.012.D13 1 117270-14 117270-37 D10.011.012.D13 1 117270-32 118436 D21.022 2 117270-33 1184245 D21.022 2 117270-34 1187446 D21.022 2 117270-34 1187446 D21.022 2 117270-48 114745A D21.022 2 117270-48 114745A D21.022 2 117270-48 114745A D21.022.023 3 151628-10 14745A D21.022.023 3 116872 2 2 D21.022.023 3 117676-48 244401 14444 D21.022.03 3 116444 144444 1514400-1444 | CSB 1 ST680-37 TOD/F100 CB0 1 ST640-126 TORSOV CF2 1 ST640-126 TORSOV CF2 ST660-10 TORSOV TORSOV CF2 ST660-10 TORSOV TORSOV CF2 ST660-10 TORSOV TORSOV D10.01.102.D13 TT2705-67 TR822 SC TORSOV D15.016.07.D19 4 TT2705-63 TR8436 D21.022 2.117270-19 TT2705-63 TR8436 D21.021 2.117270-19 TT2705-63 TR844A J3 TS16268-10 TR442A D21.022 2.117270-19 TT2705-63 TR844A J4 TS16268-10 TR442A D21.022 TT2705-63 TR442A D21.021.022 TT2705-63 TR442A D21.022 TT2705-64 TR442A D21.022.023 TT2706-64 TR442A D21.022.024 TT2706-65 TR4440 D17.626.03 TT3706-64 TS144 | | | | | | | | | | |
| 000 1 \$15400-126 0.1650V 071 0.164.00 KD, MD, DD, DD, DD, DD, DD, DD, DD, DD, D | 080 1 \$13400-126 0.1850V 071 1 \$13400-126 0.1820V 072 0.00000000000000000000000000000000000 | | | | | | | | | | |
| C72 1 ST689-10 4700/F80 C76 1.0520 Distano 10 Distano 10 Distano 10 D1.02.0.0.0.5.06.027 T15190-11 T14004 Distano 10.10.10.10 D1.02.0.0.0.5.06.027 T15270-54 T15270-54 T15270-54 D1.02.0.10.02.018 1 T15270-59 T14436 D24 1 T15270-59 T14733A J1 1 S18244-10 HEADER J2 1 S18244-10 HEADER J3 1.1 S18244-10 HEADER J4 1 S18244-0 HEADER J4 1 S18244-0 HEADER J4 1 S18244-0 HEADER J5 S1400-2012 ZFK 14M T15727-69 J6 CAC 3 S14400-30 J7727-49 FEWET FEWET J7727-49 FEWET FEWET J7727-49 FEWET FEWET J7727-40 FEWET FEWET J772 | C72 1 \$15689-10 4700/F90 C76 1.050V 1.050V 1.050V D1.02.02.04.05.040.02 1 171719-1 1.4004 D1.02.02.04.05.040.02 4 172705-27 1.8682 5C D1.02.01.07.0106 4 172705-27 1.46825 5C D21.01.01.0106 4 172705-26 1.4733A 1.1 | | C60 | | S13490-126 | .018/50V | | | | | |
| C76 1 \$15480-135 1.050V D12LD 2D, ND DD, DD, DD, DD 1 117105-1 116004 D12LD 2D, ND DD, DD, DD, DD 4 112705-57 116523 D12LD 10, DD, DD, DD, DD 4 112705-57 116523 D12LD 11, DD, DD, DD, DD 4 112705-58 116523 D21, D2 2 117720-59 114733A J1 1 515646-6 114742A D24, D2 1 515646-6 146ADER J2 1 515646-6 146ADER J3 1 515646-6 146ADER J3 1 515646-6 146ADER J4 1 151660-607 2.677.14 W J4 1 151660-607 2.677.14 W J4 1 51400-007 2.477.14 W J4 1 51400-007 2.677.14 W J4 1 51400-007 2.677.14 W J4 1 51400-007 2.677.14 W J4 51400-007 | Ста 1 513400-135 1.050V 01.20.20.20.20.20.00 1171190-1 114004 01.20.20.20.20.20.00 4 112706-57 114004 01.20.10.20.20.20.20 2 112106-17 114004 01.20.10.20.20.20 2 1127206-57 114622 1147233 01.20.10.20.20.20 2 1172706-16 1147423 1022.20 02.10.21 2 1172706-16 1147423 1024 1172706-16 02.10.21 1 11516246-1 1147424 10244 10244 1.3 11516246-1 114004 11404 11516266 11404 1.3 1112707-69 244403 11404 117270-69 244403 1.4 1171270-69 244403 11404 1144 11404 1.5 11400-0021 2451 144 102444 11404 1144 1.6 117270-69 244403 2451 144 1144 11414 11414 11414 11444 11444 11444 11444 </td <td></td> <td></td> <td></td> <td></td> <td></td> | | | | | | | | | | |
| bit Acou D23. D23. D27 INSE2 SC DIS.D11.2013 4 T12705-34 TNSE18 DIS.D11.2013 4 T12705-34 TNSE18 DIS.D11.2013 1 T12705-34 TNSE18 DIS.D11.2012 2 T12705-34 TNSE18 DIS.D11.2012 1 T12705-34 TNSE18 DIS.D11.2012 1 T12705-34 TNSE18 DIS.D11.2012 1 T12705-34 TNSE18 DIS.D11.2012 1 T151205-10 TNSE18 DIS.D11.2012 T1 T151205-10 TNSE38 DIS.D11.2012 DIS.D11.2012 TNSE38 TNSE38 DIS.D11.2012 DIS.D11.2012 TNSE38 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 DIS.D11.2012 | bit Acourson Display Transport Transport Display 4 Transport Transport Transport Display 1 Transport Transport Transport Jal 1 Steade-10 HEADER HEADER Jal 1 Steade-30 HEADER HEADER Jal 1 Transport Representation Transport Jal 1 Steade-30 Statu Transport Jal 1 Steade-30 Statu Transport Representation 3 Steade-30 Statu Transport Representation 1 Steade-30 Statu Transport Representation Steade-30 | | | | | | | | | | |
| DID.011.DIZ.D13 4 TI2705-37 TN828 SC DIS.016.D17.D18 4 T12705-23 TN8518 DZ1.DZ2 2 T12705-23 TN8518 DZ1.DZ2 2 T12705-24 TN8518 DZ1.DZ2 1 T12705-24 TN8518 DZ1.DZ2 1 T12705-24 TN8518 DZ2.DZ2 1 T12705-24 TN8518 DZ2.DZ2 1 T12705-26 TN8577-24 JA 1 T12705-26 TN8577-24 JA 1 T12704-26 PAM401 B DA 1 T12704-26 PAM401 B DA 1 T12704-26 PAM401 B DA 1 T13400-2671 ZO TM4 TN9 PB 1 T13400-2671 ZO TM4 TN9 PAM400-2671 PB 1 T13400-2671 ZO TM4 TN9 PAM400-2671 PB 1 T13400-2671 ZO TM4 TN9 PAM400-2671 | DID.011.D12.D13 4 T12705-87 TN882 SC D15.D16.D17.D19 4 T12705-23 TN8918 D21.D12 1 T12705-23 TN8918 D21.D12 1 T12705-23 TN8918 D21.D12 1 ST6246-01 TR40AA D24 1 ST6246-01 TR40AA D35.D16.D17.D18 4 T12705-23 TN8918-01 D12.D11.D12.D18 1 ST6246-01 TR40AA D24 1 ST6246-01 TR40AA J4 1 ST6246-01 TR40AA J4 1 ST6246-01 TR40AA J4 1 ST6400-2430 Z45 1/4W R2.P66.P133 ST6400-2430 Z45 1/4W R7400-2430 R3.R39 T151400-2630 Z42 1/4W R7400-2430 R4.R4 T151400-2630 Z32 1/4W R7400-872 R74.R98.R98 S15400-2630 Z3 2/4W R7400-872 R74.R98.R98.R96.R97 S15400-2630 Z3 2/4W R7400-872 | | | 15 | T12199-1 | 1N4004 | | | | | |
| DIS. DIL.DT.DIB 4 TI2705-34 TNAB18 D21 1 T12705-21 TNAB18 D21 1 T12705-21 TNAB18 D24 1 T12705-21 TNAB18 D24 1 T12705-21 TNAB18 D24 1 T12705-24 TNAB18 D24 1 T12705-26 TNAB18 D35 1 S1264-16 TNAD17 D36 1 T12705-26 TRANS (S) D50 1 T12705-27 FED LED D102.02.03 3 T12705-26 TNANS (S) D37 T2705-27 FED LED TNANS (S) D3 T12705-20 ZAK 744 WWW FR_2R46,113 S11400-2430 ZAK 744 WWW FR_2R46,R13,R13 S11400-2430 ZAK | DIS. DIS. DT. D18 4 T12705-34 TNA818 D21 1 T12705-31 TNA818 D21 1 T12705-32 TNA73A. J1 1 S1524-41 FEADER J2 1 S1524-41 FEADER J2 1 S1524-44 FEADER J3 1 S1524-45 FEADER J4 1 S1524-45 FEADER J5 1 S1524-45 FEADER J5 1 S1524-45 FEADER J5 1 S1524-45 FEADER J6 C4 1 T12704-80 FEATER J6 C5 1 T12704-80 FEATER J7070-102 C303 S11400-2010 S1140-40 S1400-510 J6 1 S1400-2010 S1140-40 S1400-410 R0 R0 S1400-510 S1140-40 S1400-510 R0 R0 S1400-510 S1400-400 S2407-31 | | | 4 | T12705-37 | 1N5822 SC | | | | | |
| D21,D22 2 T12702-19 TM-474A D24 1 112702-51 TM-473A J1 1 S1824-10 HEADER J2 1 S1824-10 HEADER J3 1 S1824-16 HEADER J3 1 S1824-16 HEADER J4 1 S1824-16 HEADER J5 J1270-49 PM-401 S1 J6 J2 S1500-50 J2 S1500-50 J7270-49 PM-401 S1 S1 S1 J7270-49 Z57K 114 W TS1 S1 S1 J1270-49 Z4X403 S1 S1 S1 S1 J1270-49 Z4X413 S1 S1 S1 S1 J270-172 Z57K 114 W TS2 S7 S1 S1 S1 J28-133 S1 < | D21,D22 2 117270-19 114742A D24 1 11270-59 114733A J1 1 15824-10 HEADER J2 1 15824-10 HEADER J3 1 15824-10 HEADER J3 1 15824-10 HEADER J4 1 15824-10 HEADER J5 1 15724-80 Reference J4 1 117276-80 Reference J5 1 17270-80 Reference Reference J4 1 11360-16 1.0 MM MERSTOR J4 1 15490-2630 2.01 1/4W MERSTOR Reference 1 15490-2630 3.22 1/4W MERSTOR Reference 1 | | D15,D16,D17,D18 | | T12705-34 | 1N4936 | | | | | |
| D24 1 <th1< th=""> 1 1 1</th1<> | D24 1 | | | | | | | | | | |
| JI 1 15824-0 HEADER J2 1 S1824-16 HEADER J3 1 S1824-16 HEADER J4 1 S1824-68 HEADER J5 1 S1824-68 HEADER J5 1 S1824-68 HEADER J6 1 117276-48 ZMAHOR J6 1 117376-16 DOM, GW RESISTOR J7 S19400-2040 ZAYTHANK (SS) S J7 S19400-2040 ZAYTHW RR R0.0133 (R3, R3A, R3A, R3A, R3A, R3A, R3A, R3A, R | JI 1 1 15824-0 HEADER JB 1 51824-0 HEADER JB 1 11956-10 1.0.0.M. Stresson RC 2.0.7.1.4.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0 | | | | | | | | | | |
| JA 1 IST8249-16 HEADER JA 1 S18249-8 HEADER JS 1 S18249-8 HEADER JS 1 S1704-86 ZHADER JS 1 T12704-80 ZHADER JS S14900-2807 ZAS 114W TABER JS S14900-2807 ZSS 114W TABER PB 1 S14900-2812 ZSS 114W TABER RARER, TUS S14900-2812 ZSS 114W TABER TABER RARER, TUS, TTABER S14900-2812 ZSS 114W TABER TABER RARER, TUS, TTABER S14900-2812 ZSE 114W TABER TAB | JA 1 158249 HEADER JA 1 518249 HEADER JS 1 518249 HEADER JS 1 11267468 204401 B 0.4 1 11270469 204401 B 0.4 1 11270469 204401 B 0.4 1 11270469 204403 B 0.5 1 113165-161 10 0.44, WH 2014 B 0.6 1 113165-161 0.44, WH 2014 10 B 1 151400-2011 20.11/WW 10 10494 PB 1 151400-2012 3.92K 1/4 W 10 10494 PB 1 151400-2012 3.92K 1/4 W 10 10.14W PR 1 151400-2012 3.92K 1/4 W 11.14W 11.14W PR PR 11.14W 11.14W 11.14W 11.14W 11.14W 11.14W 11.14W 11.14W 11.14W 11.11 | | J1 | 1 | S18248-4 | HEADER | | | | | |
| JA 1 ST6249-0 HEADER JS 1 ST6249 HEADER LEDILLEDZ.LED3 3 T1357-2 RED LED GI 0.2, 20 3 T1370-40 HEXFET TRANS. (SS). B. G6 1 T1370-40 HEXFET TRANS. (SS). B. GR 1 T1376-16 1 O.M. SV RESISTOR R2,R46,R133 S14400-2630 243 1/4W W R R0,R02,R32,R32,R34,R34,R36,R37 9 S14400-2630 243 1/4W R R0,R133 S14400-2630 243 1/4W R R R R1,R2,R13,R14 S14400-3610 20 K 1/4W R R R1,R2,R13,R14 S14400-3321 32 K 1/4 W R R R1,R2,R13,R14,R138,R19 R13,R2,R13,R14,R19 R14,R18,R19 R14,R18,R19 R14,R18,R19 R12,R13,R14,R18,R19 T3 S14400-3321 32 K 1/4 W R R17,R2,R12,R115,R116 T S14400-3321 32 K 1/4 W R R17,R2,R12,R1 | JA 1 IS 182496 HEADER LEDILEDZLEDS 3 11357-2 REDLED G GLOZOS 3 113274-80 REVET TRANS. (SS) B. CA 1 112704-80 REVET TRANS. (SS) B. CA 1 11365-16 10 OHM, WIRESISTOR B. R. RAGERISS 1 11360-16 10 OHM, WIRESISTOR RAGERISS 1 11360-2400 207.114/W RAGERISS 1 11400-2400 20.114/W RAGERISS 131400-2400 10.114/W 11.14W RAGERISS 131400-1600 10.114/W 11.14W< | | | | | | | | | | |
| JS I S18246-8 HEADER LED1_LED2_LED3 3 T13270-68 PM401 B G4 1 T12270-68 PM401 B G5 1 T12270-68 PM403 B G5 1 T12270-68 PM403 B G5 1 T1270-68 PM403 B G6 1 T1270-68 PM403 B T13850-02 Z47K 14 W TR R2, R0, R2, R33, R4, R8, R37 9 S19400-2630 243 14W R4 1 S19400-2610 2.0K 14W TR R4 1 S19400-2610 2.0K 14W TR R4 S19400-2610 2.0K 14W TR TR R7, R2, R2, R2, R4, R4, R3 S19400-200 2.0K 14W TR R11, R110 7 S19400-200 10K 14W TR R11, R110 7 S19400-200 10K 14W TR R11, R110, R11, R124 R116, R110, R114 TS S19400- | Js 1 <th1< th=""> 1 1 1</th1<> | | | | | | | | | | |
| B) Q4 1 112704-68 PM401 B) Q4 1 112704-68 PM403 B) Q5 1 112704-68 PM403 R1 1 11365-18 1.0.0M, SW RESISTOR R2,R0,R2,R3,R2,R3,R2,R3,R2,R3,R2,R3,R2,R3 S19400-2671 2.67K 1/4 W R4 1 S19400-2610 2.31 1/4W R4 1 S19400-2610 2.85K 1/4 W R4 1 S19400-2610 2.0K 1/4W R6 1 S19400-2610 2.0K 1/4W R6 1 S19400-2610 2.0K 1/4W R16,R2,R05,R86 1 S19400-2610 2.32K 1/4 W R11,R113,R14 1 S19400-2610 1.0K 1/4W R11,R113,R14 1 S19400-310 1.0K 1/4W R11,R12,R13,R14,R13,R193 R13 S19400-1002 1.0K 1/4W R14,R2,R143,R143,R193,R193 R13 S19400-1022 1.0K 1/4W R16,R2,R10,R11,R124 R13 S19400-1022 1.0K 1/4W R14,R2,R2,R143,R144,R145 | B) C4 1 17270-68 PK4401 B) C5 1 17270-68 PK4403 R1 1 1736-68 10.0.0.M. SW RESISTOR R2,R0,R2,R3,R04,R8,R7 9 S19400-2671 2.67K.14.W R2,R0,R2,R3,R04,R8,R7 9 S19400-2671 2.67K.14.W R4 1 S19400-2619 2.9K.14.W R R4 1 S19400-2619 2.9K.14.W R R6 1 S19400-2619 2.2K.14.W R R R6 1 S19400-2619 2.2K.14.W R R R R7,R190,R191,R192,R14 S19400-302 2.0K.14W R | | | | S18248-8 | | | | | | |
| B. 04 1 T1270-80 HEXFET TRANS. (SS) B. 05 1 T1270-80 HEXFET TRANS. (SS) B. 05 1 T1270-80 2N403 ST 10 OHM. SW RESISTOR R2.R46,R133 S19400-2871 2.67K 14 W R46,R13 K1 W R46,R13 | B. Cd 1 T1270-480 HEXPET TRANS. (S) B. Cit 1 T1270-480 PAR4633 B. Cit 1 T1365-16 1.0 OHM, SW RESIGN R2.R46,R133 S19400-2430 243 1/4W R4 1 S19400-2430 243 1/4W R4 1 S19400-2430 243 1/4W R4 1 S19400-2430 243 1/4W R5 S19400-510 S11 1/4W R R6 S19400-5101 S11 1/4W R R6 S19400-5101 S11 1/4W R R1 R7,R25,R86 1 S19400-321 325 1/4W R1 <r2,r13,r1,r18,r18< td=""> 4 S19400-321 326 1/4 W R1,R2,R13,R1,R18,R18 7 S19400-321 326 1/4 W R1,R2,R13,R1,R18,R18 1 S24073-1 10K,1/2W, TRIMMER R1,R2,R13,R1,R4,R38 2 S19400-1070 10 1/4W R1,R2,R13,R1,R4,R38 1 S24073-1 10K,1/2W, TRIMMER R1,R2,R3,R1,R164,R132</r2,r13,r1,r18,r18<> | | | | | HEB LEB | | | | | |
| B C I 1 12720-69 PN4403 RP, R46, R133 3 519400-2671 2.07K. 1/4 W PR | B C T T T T R R 1 T T T T T R R0, R0, R2, R3, R04, R8, R37 9 S19400-2671 2.67K: 14 W T R8, R0, R2, R3, R04, R8, R37 9 S19400-2630 243: 1/W T T R4 1 S19400-2630 243: 1/W T | в. | Q4 | | T12704-80 | HEXFET TRANS. (SS) | | | | | |
| R2, R46, R133 3 S 19400-2671 2.67K. 14.W R3, R30, R27, R3, R04, R36, R37 9 S 19400-3021 30, 11.4W R4 1 S 19400-30R1 30, 11.4W R5 1 S 19400-30R1 30, 11.4W R6 1 S 19400-30R1 30, 25K. 14.4W R6 1 S 19400-3021 2.0K. 14.4W R6 S 19400-1001 K 1.4W R7, R196, R45, R46 S 19400-3220 2.0K. 14.4W R7, R49, R45, R46, R46 S 19400-1002 10K. 1/4W R1, R12, R13, R14 4 S 19400-1002 10K. 1/4W R17, R28, R26, R27, R86, R149 7 S 19400-1002 10K. 1/4W R17, R28, R26, R178, R156, R156 7 S 19400-1002 10K. 1/4W R17, R28, R26, R178, R149 7 S 19400-1070 10.14W R17, R28, R28, R149, R178 7 S 19400-1070 10.14W R12, R12, R14, R148, R146, R147 R19 R117 S 19400-4751 5.144.4W R12, R12, R128, R148, R146, R147 R19 R1100 10.14W | R2, R46, R133 3 S 19400-2071 2.67K: 14 W R3, R0, R2, R3, R04, R04, R07 9 S 19400-30R1 30.1 1/4W R4 1 S 19400-30R1 30.1 1/4W R5 1 S 19400-30R1 30.1 1/4W R6 1 S 19400-30R1 30.2 K1/4 W R6 1 S 19400-30R1 30.2 K1/4 W R6 R6, R05, R05 1 S 19400-30R1 30.2 K1/4 W R7, R190, R191, R193, R14 4 S 19400-30R1 30.2 K1/4 W R1, R12, R13, R14 4 S 19400-1002 10K 1/4W R14, R12, R13, R14 4 S 19400-1002 10K 1/4W R17, R28, R28, R149, R156, R156 7 S 19400-1002 10K 1/4W R17, R28, R28, R149, R156, R156 7 S 19400-1002 10 K1/4W R12, R13, R14, R145, R146, R172 F 15 1400-1082 10 1/4W R13, R14, R145, R146, R172 F 19400-1082 10 1/4W R14, R145, R146, R147 R19 R1940-1004 10 1/4W R14, R145, R146, R147 R1940-1004 10 1/4W | в. | Q5 | 1 | T12704-69 | 2N4403 | | | | | |
| Rp. Rob. Rob. Rob. Rob. Rob. Rob. Rob. Rob | Rep. Rob. Rob. Rob. Rob. Rob. Rob. Rob. Rob | | | | | 1.0 OHM, 5W RESISTOR | | | | | |
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| R15, R28, R112, R115, R116 7 S19400-3821 3.28K 1/4 W R117, R116 R117, R116 7 S19400-1002 10K 1/4W R17, R148, R138, R139 R15 S19400-1002 10K 1/4W R140, R144, R138, R139 R15 S19400-1002 10K 1/4W R100, R144, R138, R139 R15 S19400-5111 S1.1K 1/4 W R17 R17, R18, R165, R166, R170 R178 S19400-5111 S1.1K 1/4 W R157 R20, R22, R110, R111, R124 R15 S19400-1822 I8.2K 1/4 W R22, R138, R144, R147 R198 Z S19400-210 22.1 1/4W R24, R35 Z S19400-210 Z1 1/4W R24, R35 Z S19400-210 Z2.1 1/4W R24, R35 R3 S19400-751 X75K R31 S19400-751 X75K R44, R45, R1, R42, R13 S19400-751 X75K R44, R45, R1, R45, R16, R163 S19400-751 X75K R44, R45, R0, R06, R106, R106 S19400-751 X75K R44, R46, R70, R47, R101 S19400-751 X75K R44, R47, R177, R172 S19400-101 | Ris Raz, Ritz, Rits S19400-321 3.28K 1/4 W Ritz, Rits Ritz, Rits S19400-1002 10K 1/4W Ritz, Rits Ritz, Rits Ritz, Rits Ritz, Rits Rits, Rits, Rits, Rits, Rits Rits S19400-1002 10K 1/4W Rits, Rits, Rits, Rits, Rits Rits S19400-1002 10K 1/4W Rits Rits S19400-1010 10 1/4W Rits, Rits, Rits, Rits, Rits S19400-1082 18.2K 1/4 W Rits, Ritz, Ritz, Ritz, Ritz, Ritz S19400-1082 18.2K 1/4 W Rits, Ritz, | | R10, R42, R95, R96 | | S19400-5110 | 511 1/4W | | | | | |
| R112,R116 Control R17,P26,R27,R18,P46,P80 25 \$19400-1002 10K 1/4W R17,P26,R27,P48,P45,P45,R193 R17,P26,R27,P48,P45,P45,R193 R172,P180,R174,P154,P156,P166,P178 R19,R25,R55,R57,P45,R142 1 \$24073-1 10K,1/2W, TRIMMER R19,R25,R55,R57,P45,R142 7 \$19400-5111 51,K 1/4 W R19,R25,R57,R25,R12,R127,R128,R142 R18 \$19400-5112 10,1/4W R143,R144,R5,146,R147 1 \$19400-5102 10,1/4W R143,R144,R5,146,R147 1 \$19400-1002 10,1/4W R143,R144,R5,146,R147 1 \$19400-1003 10,1/4W R44,R5 2 \$19400-1004 11,1/4W R40,R72,R107 1 \$19400-1003 10,0/1/4W R41,R5 5 \$19400-1003 10,0/1/4W R43,R44,R5,R61,R62,R63 \$19400-1003 10,0/1/4W R44,R45,R61,R62,R63 \$19400-1003 10,0/1/4W R47,R40,R64,R64,R64 \$19400-1003 10,0/1/4W R47,R46,R64,R64,R64,R64 \$19400-1003 10,0/1/4W R47,R46,R64,R64,R64,R64< | R117,R218,R128,R128,R139 R17,R228,R27,R158,R139 R17,R228,R27,R158,R139 R17,R228,R27,R158,R139 R120,R133,R134,R134,R136,R137 S19400-511 DK,172W,TRIMMER R19,R23,R53,R128,R142 S19400-511 DK,172W,TRIMMER R19,R23,R53,R27,R28,R142 R13 S19400-511 DK,172W,TRIMMER R19,R23,R53,R27,R28,R142 R13 S19400-511 DK,172W,TRIMMER R143,R144,R53,R46,R147 R1 S19400-510 D 1/4W R143,R144,R51,R46,R147 S19400-1622 18,2K 1/4 W R24,R23 R21,R23 2 S19400-1620 R21 1/4W R24,R23 R24,R23 2 S19400-751 4,75K R44 R40,R72,R107 S19400-751 4,75K 14W R41,R44,R45,R61,R62,R63 R519400-1003 100K 1/4W R44,R45,R61,R62,R63 R42,R45,R61,R62,R63 S19400-1003 100K 1/4W R44,R45,R61,R62,R63 R43,R44,R45,R61,R62,R63 S19400-1003 100K 1/4W R44,R45,R61,R62,R63 R44,R45,R61,R62,R63 S1940-1003 100K 1/4W R44,R44,R64,R64,R64,R64 R44,R7,R70, | | | | S19400-3320 | 332 1/4W | | | | | |
| R17, R28, R27, R81, R84, R93 25 \$19400-1002 10K 1/4W R04, R104, R143, R193, R193 R193, R153, R154, R156, R156 R177, R110, R111, R122 10K, 1/2W, TRIMMER R18 1 \$24073-1 10K, 1/2W, TRIMMER R19 R11 R11 \$11400-1102 \$11400-1102 R177, R20, R22, R110, R111, R124 R15 \$11400-1182 \$11400-1182 R172, R123, R144, R145, R146, R147 R198 \$19400-1822 \$1241/4W R24, R35 2 \$19400-2820 \$221 1/4W \$1282 R24, R35 2 \$19400-2820 \$221 1/4W \$1282 R24, R35 2 \$19400-2820 \$221 1/4W \$1283 R24, R35 2 \$19400-271 \$275K \$128400-1751 \$1275K R24, R35 2 \$19400-1751 \$1275K \$128400-1751 \$1275K R31 \$19400-1751 \$1275K \$128400-1751 \$1275K \$128400-1751 \$1275K R43, R44, R45, R51, R56, R57 \$159400-1751 \$1275K \$147W \$1277, R127 \$159400-1751 | R7.782,R27,R81,R84,R93 25 \$19400-1002 10K 1/4W R94,R104,R143,R193,R193 R195,R153,R154,R156,R165 10K,1/2W,TRIMMER R100,R164,R165,R165,R164 T \$19400-5111 \$1,1K 1/4 W R115 T \$19400-5111 \$1,1K 1/4 W R157 R00,R164,R162,R162,R144 T \$19400-5111 \$1,1K 1/4 W R157 R00,R22,R110,R111,R124 R16 \$19400-1822 \$18,2K 1/4 W R25,R126,R17,R152,R146,R147 R198 \$19400-1822 \$18,2K 1/4 W \$19400-8250 R21,R23 2 \$19400-8250 \$25,1/4W \$19400-8250 \$19400-8250 R21,R23 2 \$19400-8250 \$25,1/4W \$19400-8250 \$19400-8250 R21,R23 2 \$19400-8250 \$12,1/4W \$14400 \$14400 R24,R35 2 \$19400-82711 7,68K 1/4 W \$14400 \$14400 R43,R44,R45,R51,R52,R63 3 \$19400-4751 7,68K 1/4 W \$147,778,77,877 \$17,778,773 \$19400-8271 \$12,71,71,712 \$19400-4751 7,78K 1/4 W \$17,778,773,777,7 | | | 1 | 519400-3321 | 3.32K 1/4 W | | | | | |
| R18 1 SE4073-1 DIX, 12W, TRIMMER R19,RB2,R55,R57,R85,R149 7 S19400-5111 5.11K 1/4 W R15,7 7 S19400-5111 5.11K 1/4 W R16,72,R10,R111,R124 7 S19400-5111 5.11K 1/4 W R20,R22,R10,R111,R124 7 S19400-1020 10.1/4W R143,R144,R145,R146,R147 1 S19400-2501 22.1/4W R21,R23 2 S19400-2501 22.1/4W R24,R23 1.5 S19400-2501 22.1/4W R24,R23,R147,R107 1.5 S19400-751 4.7/5K R34,R45,R61,R62,R63 S19400-751 4.7/5K 4.7/5K R34,R45,R61,R62,R63 S19400-1501 1.5/5K 1/4W 7.6/5K 1/4W R44,R73,R70,R71,R172 S19400-1501 1.5/5K 1/4W 7.7/5K 1/4W R45,R76,R69,R100 5 S19400-1501 1.5/5K 1/4W R47,R85,R75,R75,R17 4 S19400-501 1.5/5K 1/4W R77,R82,R175,R177 1.519400-511 1.5/5K 1/4W 7.7/5K 1/4W R77,R82,R175,R177 1.519400-511 | R18 1 S24073-1 10K, 1/2W, TRIMMER R19,RB2,R55,R57,R85,R149 7 S19400-5111 5.11K 1/4W R19,RB2,R55,R57,R85,R149 7 S19400-5111 5.11K 1/4W R12,R2,R102,R112,R12,R12,R12 16 S19400-1020 10 1/4W R143,R144,R145,R146,R147 1 S19400-1020 18.2K 1/4 W 7 R21,R23 2 S19400-1020 18.2K 1/4 W 7 7 R21,R23 2 S19400-1020 18.2K 1/4 W 7 7 R21,R23 2 S19400-7501 1.2K 1/4 W 7 7 R21,R23 1 S19400-751 7.6K 1/4 W 7 7 R21,R23,R04,R45,R01,R02,R03 S19400-751 4.75K 7 7 7 R21,R27,R02,R10 5 S19400-751 4.75K 14W 7 7 R21,R27,R02,R170,R2,R101 5 S19400-751 1.75K 1/4W 7 7 7 7 7 7 7 7 7 7 7 7 </td <td></td> <td>R17, R26, R27, R81, R84, R93 R94, R104, R134, R138, R139 R152, R153, R154, R156, R158 R160, R164, R165, R166, R178</td> <td>25</td> <td>S19400-1002</td> <td>10K 1/4W</td> | | R17, R26, R27, R81, R84, R93 R94, R104, R134, R138, R139 R152, R153, R154, R156, R158 R160, R164, R165, R166, R178 | 25 | S19400-1002 | 10K 1/4W | | | | | |
| R19.R32,R55,R32,R83,R149 7 S19400-5111 S.11K 1/4 W R157 R20,R22,R110,R111,R124 R16 S19400-10R0 10 1/4W R25,R126,R12,R23,R144 R145 S19400-10R0 10 1/4W R25,R126,R12,R23,R144 R145,R146,R147 R198 S19400-1822 18.2K 1/4 W R24,R35 2 S19400-2210 221 1/4W R24,R35 R24,R35 R25,R126,R144 R31 S19400-8250 825 1/4W R24,R35 R25,R126,R32,R144 R24,R35 R31 S19400-8250 825 1/4W R24,R35 R24,R35 S19400-4751 4.75K R43,R44,R45,R51,R52,R63 S19400-4751 4.75K R24,R45,R51,R45,R51 S19400-4751 4.75K R44,R47,R717,R172 S19400-4751 4.75K 1/4 W R24,R45,R51,R45,R51 R319401-4751 1.75K 1/4W R44,R47,R71,R172 S19400-1751 1.75K 1/4 W R77,R42,R40,R48,R5R1,R10 1.75K 1/4W R44,R47,R71,R172 S19400-1651 1.5K 1/4W R77,R42,R40,R48,R5R1,R10 1.75K 1/4W R77,R48,R18,R18,R16 S19400-2101 1.2K 1/4 W | R19.R32,R55,R57,R85,R149 7 S19400-5111 S. 11K 1/4 W R157 R20,R22,R110,R111,R124 16 S19400-10R0 10 1/4W R25,R126,R127,R128,R142 16 S19400-10R0 10 1/4W R25,R126,R127,R128,R142 18 S19400-10R0 10 1/4W R25,R126,R127,R128,R142 18 S19400-1822 18,2K 1/4 W R24,R35 2 S19400-8250 825 1/4W R24,R35 1 S19400-8250 825 1/4W R31 1 S19400-7681 7.66K 1/4 W R44,R45,R51,R52,R63 S19400-4751 4.75K R47,R46,R06,R96,R163 S19400-4751 4.75K R48,R67,R70,R71,R172 S19400-1600 100K 1/4W R44,R67,R70,R60,R89,R163 S19400-1601 100K 1/4W R46,R67,R70,R71,R172 S19400-1601 100K 1/4W R46,R78,R70,R71,R172 S19400-1601 100K 1/4W R46,R78,R70,R71,R172 S19400-1601 1.5K 1/4W R77,R82,R166,R67 S19400-2621 2.2K 1/4W R77,R82,R167 S19400-6231 2.4K 1/4W R77,R82,R173,R174 S19400-6231 2.4K 1/4W <td></td> <td></td> <td>1</td> <td>S24073-1</td> <td>10K,1/2W, TRIMMER</td> | | | 1 | S24073-1 | 10K,1/2W, TRIMMER | | | | | |
| Rep. Re2, P110, P111, P1124 16 \$19400-10R0 10 1/4W P125, P126, R144, R145, R146, R147 R138, R144, R145, R146, R147 R196 P21, P23 2 \$19400-1822 18, 2K, 1/4 W P24, R35 2 \$19400-2201 221 1/4W P24, R35 2 \$19400-8250 825 1/4W P24, R35 1 \$19400-8250 825 1/4W P31 1 \$19400-8250 825 1/4W P31 1 \$19400-8250 825 1/4W P31 \$19400-8250 825 1/4W P344 P43, P44, R45, R61, R62, R63 \$159400-1003 100K 1/4W P43, P44, R45, R61, R62, R63 P43, P44, R45, R61, R62, R63 \$159400-1751 4.75K 14 P37 P44, R46, R70, R78, P101 \$159400-1751 1.00K 1/4W P44, R45, R61, R64, R64 100 1/4W P68, R78, R99, R100 \$159400-3741 1.37K 1/4 W P77, R82, R17, R17 \$159400-3741 1.37K 1/4 W P77, R82, R175, R177 \$159400-47511 1.21K 1/4 W P77, R82, R175, R177 \$159400-47511 1.21K 1/4 W | Rep. R22, R110, R111, R124 16 \$19400-1082 10 14W R125, R126, R144, R146, R147 R13 R13 R144, R145, R146, R147 R196 R19 R198 2 \$19400-1822 18, 2K. 1/4 W R14 R24, R35 2 \$19400-8250 825 1/4W R24 R35 R24, R35 1 \$19400-8250 825 1/4W R24 R35 R24 R35 R25 1/4W R24 R35 R24, R35 R25 1/4W R37 R36, R16, R102, R33 S19400-1001 111 1/4W R44 R43, R44, R56, R162, R33 S19400-1003 100K 1/4W R44, R45, R71, R17 S19400-1751 4.75K R44 R48, R67, R02, R101 S19400-3741 3.74K 1/4 W R44, R47, R71, R172 R47, R48, R163, R136 S19400-3741 3.74K 1/4 W R77, R82, R173, R173 S19400-3741 3.74K 1/4 W R77, R82, R173, R173 S19400-3741 3.74K 1/4 W R77, R82, R173, R173 S19400-3741 3.74K 1/4 W R77, R82, R175, R177 S19400-3741 3.74K 1/4 W R77, R82, R175, R177 S19400-3741 3.74K 1/4 W R77, R82, R175, R177 | | | 7 | S19400-5111 | | | | | | |
| PR1,P23 2 S19400-1822 18,2K 1/4 W P24,P35 2 S19400-220 221 1/4W P29,P07,F102 3 S19400-8250 825 1/4W P29,P07,F102 3 S19400-8250 825 1/4W P31 1 S19400-7681 7,68K 1/4 W P43,P44,R45,R61,P62,P63 15 S19400-4751 4,75K P48,P60,P106,P106,P106,P106 100 100K 1/4W P48,P67,P107,P17 P48,P60,P106,P106,P106 100K 1/4W P48,P67,P107,P17,F17 S19400-1003 100K 1/4W P48,P67,P107,P17,P172 S19400-1003 100K 1/4W P48,P67,P107,P17,P17 S19400-1301 1.5K 1/4W P77,P82,P17,P17,F177 S19400-1301 1.5K 1/4W P77,P82,P17,P17 S19400-1301 1.5K 1/4W P77,P82,P17,P17,F177 S19400-1301 1.5K 1/4W P77,P82,P17,P17 S19400-1301 1.5K 1/4W P77,P82,P17,P17,F177 S19400-5101 1.5K 1/4W P77,P82,P17,P17 S19400-1201 2.2K 1/4W P79,P83,P160 1 S19400-521 2.5K 1/4W P79,P83,P104 S19400-521 | PR1.P23 2 S19400-1822 18,2K 1/4 W P24.R35 2 S19400-8250 R25 1/4W P29.P31 P31 1 S19400-8250 R25 1/4W P29.P31 P31 S19400-8250 R25 1/4W P31 S19400-7681 7.68K 1/4 W P43.P44.R45.R1.P32.P63 IS S19400-7681 7.68K 1/4 W P43.P44.R45.R1.P32.P63 IS S19400-1003 100K 1/4W P43.P44.R45.R1.P32.P63 IS S19400-1003 100K 1/4W P44.P32.P43.P60.R89.R133 S IS19400-1751 1.75K 1/4 W P48.P67.P09.R100 S19400-1301 I.5K 1/4W P48.P67.P09.R100 P48.P67.P70.R57.R17 S19400-1301 I.5K 1/4W P77.P8.R17.S177 S19400-1301 I.5K 1/4W P77.P8.R175.R177 S19400-1301 I.SK 1/4W P77.P8.R17.S177 S19400-1301 I.SK 1/4W P79.R8.P165 S19400-2512 22.K 1/4W P77.P8.R17.S177 S19400-2521 22.K 1/4W P86 S19400-2521 22.K 1/4W P77.P8.R17.S177 S19400-2521 S12.K 1 | | R20,R22,R110,R111,R124 R125,R126,R127,R128,R142 R143,R144,R145,R146,R147 | 16 | S19400-10R0 | 10 1/4W | | | | | |
| Re4.Ras 2 19400-2210 221 1/4W Re3.PBJ.FID2 3 15400-2200 R25 1/4W Re3.PBJ.FID2 3 15400-2200 R25 1/4W Re3.PBJ.FID2 3 15400-1004 1/M 1/4W Re3.PBJ.FID2 3 15400-1004 1/M 1/4W Re3.PBJ.FID2 3 15400-4751 4.75K 1/4W Re3.PBJ.FID2.RBB.FIB3 5 154400-4752 4.75K 1/4W Re3.PBJ.FID2.BBJ.FIB3 5 151400-4752 4.75K 1/4W Re3.PBJ.FID2.BBJ.FIB3 5 151400-1000 100 1/4W Re3.PBJ.FID2.BBJ.FID3.FIT3 4 151400-2713 1/4W 7/4W R72.R187.R195 3 151400-1001 101 1/4W 7/7 R72.R187.R195.R175 4 514400-2213 2/1K 1/4W 7/7 R72.R187.R141.R149 514400-2213 2/1K 1/4W 7/7 R1310.7 1 514400-2213 2/1K 1/4W R190 <td>Re4 Ass 2 S19400-2210 221 1/4W Re2 AB / IND2 3 S19400-2200 R21 1/4W Re3 AB / IND2 3 S19400-2200 R21 1/4W Re3 AB / AS /</td> <td></td> <td></td> <td>2</td> <td>S19400-1822</td> <td>18.2K 1/4 W</td> | Re4 Ass 2 S19400-2210 221 1/4W Re2 AB / IND2 3 S19400-2200 R21 1/4W Re3 AB / IND2 3 S19400-2200 R21 1/4W Re3 AB / AS / | | | 2 | S19400-1822 | 18.2K 1/4 W | | | | | |
| R31 1 S19400-1004 IM 1/4W R40, FIZ, R107 S19400-751 4.75K R40, FIZ, R107, R17, R172 1 S19400-751 4.75K R47, FIZ, R108, R108, R103 S19400-4751 4.75K R47, FIZ, R108, R103, R103 S19400-4751 4.75K R47, FIZ, R108, R113, R177, R172 1 1 R47, FIZ, R108, R113, R114 S19400-1752 4.75K, 1/4 W R42, FIS, FIS, R177, R11 S19400-752 4.75K, 1/4 W R42, FIS, FIS, R177 S19400-7511 3.74K, 1/4 W R42, FIS, FIS, R177 S19400-7301 3.51, 1/4 W R47, R18, R13, R115 S19400-7301 3.51, 1/4 W R47, R14, R14, R149 S19400-7213 2.21K, 1/4 W R47, R13, R13, R14, R159 S19400-7213 2.21K, 1/4 W R47 R13, R14, R149 S19400-7213 2.21K, 1/4 W R40 1 S19400-7212 2.21K, 1/4 W R410 S19400-7212 2.21K, 1/4 W R130 1 S19400-7212 2.1K, 1/4 W R132 S19400-7502 7. | R31 1 S19400-1004 IM 1/4W R40, R72, R107 S19400-751 7.68K 1/4 W R40, R72, R107, R17, R172 15 S19400-751 4.75K R41, R72, R107, R171, R172 15 S19400-4751 4.75K R47, R48, R60, R108, R133 S19400-1003 100K 1/4W 4.75K R47, R49, R60, R08, R133 S19400-1003 100K 1/4W R44, R7, R09, R101 S19400-1000 100 1/4W R68, R78, R09, R100 4 S19400-3101 1.5K 1/4W R77, R82, R173, R177 4 S19400-3101 1.5K 1/4W R72, R187, R195, R167 4 S19400-1301 1.5K 1/4W R77, R82, R173, R177 4 S19400-1301 1.5K 1/4W R72, R187, R141, R169 S19400-1301 1.5K 1/4W R77, R82, R173, R177 4 S19400-2313 22K 1/4W R72, R187, R141, R169 S19400-8213 22K 1/4W R120, R12, R12, R12, R123 131940-9621 36K 1/4W R120, R12, R12, R12, R12, R12 1 S19400-8921 26K 1/4W R130 R130, R12, R12, R12, R12, R12, R12 1 S19400-8921 | | R24,R35 | 2 | S19400-2210 | 221 1/4W | | | | | |
| R40, R72, R107 3 S19400-7681 Z 69K 1/4 W R43, R44, R45, R1, R62, R63 15 S19400-4751 4, 75K R43, R44, R45, R1, R62, R63 15 S19400-4751 4, 75K R43, R44, R45, R1, R62, R63 15 S19400-4751 4, 75K R47, R40, R40, R89, R133 5 S19400-1003 100K 1/4W R47, R40, R80, R89, R133 5 S19400-1003 100K 1/4W R48, R97, R70, R7101 S19400-1501 1, 5K 1/4W R72, R87, R137 R68, R78, R99, R100 4 S19400-1301 1, 5K 1/4W R77, R82, R175, R177 R77, R82, R175, R177 4 S19400-1201 2, 12K 1/4W R77, R82, R175, R177 R79, R82, R156, R167 4 S19400-221 2, 22K 1/4W R44 R98 1 S19400-2621 2, 24K 1/4W R479, R82, R167 R120, R121, R122, R122, R123 S18400-5621 5, 62K 1/4W R120, R12, R122, R123 R120, R121, R122, R122, R123 S18400-5621 2, 24K 1/4W R132, R124, R124 R130 S18400-5621 5, 62K 1/4W R132, R144 | R40, R72, R107 3 S19400-7061 7, 68K, 1/4 W R43, R44, R45, R1, R62, R63 15 \$19400-7061 7, 68K, 1/4 W R43, R44, R45, R1, R62, R63 15 \$19400-4751 4, 75K R43, R44, R45, R1, R62, R63 15 \$19400-4751 4, 75K R47, R40, R60, R89, R136 5 \$19400-1003 100K 1/4W R47, R40, R60, R89, R133 5 \$19400-1003 100K 1/4W R48, R67, R70, R70, R101 \$19400-1501 1.5K 1/4W R68, R72, R99, R100 4 \$19400-1301 1.5K 1/4W R77, R82, R175, R177 4 \$19400-1301 1.5K 1/4W R77, R82, R175, R177 4 \$19400-2312 22K 1/4W R79, R83, R156, R167 4 \$19400-2312 22K 1/4W R79, R83, R157, R177 4 \$19400-2822 82, 5K 1/4W R100 1 \$19400-2822 82, 5K 1/4W R120, R121, R12, R12, R12, R12, R12 \$19400-6821 8, 6K 1/4W R130, R13, R14 \$19400-6821 8, 6K 1/4W R130, R174, R12 \$19400-6821 8, 1K 1/4W | | R29,R91,R102 | | S19400-8250 | 825 1/4W | | | | | |
| HA3, PA4, R45, R61, R62, R63 15 \$19400-4751 4.75K R68, R69, R106, R108, R103 S19400-1003 100K 1/4W A HA7, R49, R61, R69, R1163 \$19400-1003 100K 1/4W A HA7, R49, R61, R69, R1163 \$19400-1003 100K 1/4W A HA7, R49, R69, R113 \$19400-1003 100K 1/4W A H84, R67, R70, R87, R101 \$19400-1000 100 1/4W A H82, R49, R56 \$19400-1001 101 /4W A H82, R49, R70, R89, R100 4 \$19400-1301 1.3K 1/4W H72, R127, R178, R195 \$19400-2313 1.24 K 1/4W A H72, R127, R178, R177 4 \$19400-2321 2.21 K 1/4W A H73, R13, R114, R159 4 \$19400-2322 2.21 K 1/4W A R97 100, R141, R149 \$19400-2621 2.82 K 1/4W A R130 1 \$19400-2621 2.62 K 1/4W A R130 1 \$19400-2621 2.62 K 1/4W A R130 1 \$19400-2621 5.62 K 1/4W </td <td>HA3, HA4, R45, R61, R62, R63 15 \$19400-4751 4.75K R68, R69, R106, R108, R103 R137, R170, R171, R172 1 1 HA7, RA9, R60, R108, R103 \$151400-1003 100K 114W 1 HA7, RA9, R60, R08, R103 \$151400-1003 100K 114W 1 HA7, RA9, R60, R89, R183 \$151400-1000 100 114W 1 H82, R54, R56 \$151400-1000 100 114W 1 1 H82, R54, R56 \$151400-1001 100 114W 1 1 H82, R54, R56 \$151400-1001 100 114W 1 1 H82, R54, R57, R99, R100 4 \$151400-2011 12K 14W 1 H72, R187, R195 \$151400-20213 22K 14W 1 1 H72, R187, R14, R159 \$151400-26212 22K 14W 1 1 R17 \$151400-26271 22 K 14W 1</td> <td></td> <td></td> <td></td> <td></td> <td></td> | HA3, HA4, R45, R61, R62, R63 15 \$19400-4751 4.75K R68, R69, R106, R108, R103 R137, R170, R171, R172 1 1 HA7, RA9, R60, R108, R103 \$151400-1003 100K 114W 1 HA7, RA9, R60, R08, R103 \$151400-1003 100K 114W 1 HA7, RA9, R60, R89, R183 \$151400-1000 100 114W 1 H82, R54, R56 \$151400-1000 100 114W 1 1 H82, R54, R56 \$151400-1001 100 114W 1 1 H82, R54, R56 \$151400-1001 100 114W 1 1 H82, R54, R57, R99, R100 4 \$151400-2011 12K 14W 1 H72, R187, R195 \$151400-20213 22K 14W 1 1 H72, R187, R14, R159 \$151400-26212 22K 14W 1 1 R17 \$151400-26271 22 K 14W 1 | | | | | | | | | | |
| R48.R67/R70.R87.F101 5 519400-4752 47 SK 1/4 W R82.R54.R56 3 519400-000 100 1/4W R82.R54.R566 3 519400-000 100 1/4W R82.R54.R566 3 519400-000 100 1/4W R82.R54.R566 3 519400-1501 1,5K 1/4W R72.R187.R195 3 519400-1501 1,5K 1/4W R77.R183.R143.R159 4 519400-2213 221K 1/4W R78.R13.R14.R159 4 519400-2222 22 K 1/4W R97 1 519400-2622 82 K 1/4W R98 1 519400-2621 62 K 1/4W R109 1 519400-2621 62 K 1/4W R120 1 519400-2621 62 K 1/4W R130 1 519400-2620 25 K 1/4W R131 110812-86 10 K TRIMMER R132 1 519400-1502 15 K 1/4W R132 1 519400-2570 267 1/4W R132 1 519400-2570 27 1/4W | R48.RP7.R70.R87.F011 5 \$19400-4752 47.5K 1/4 W R82.R94.R96 \$19400-0752 47.5K 1/4 W R94.R70.R99.R100 4 \$19400-3741 3.74K 1/4 W R98.R70.R99.R100 4 \$19400-3741 3.74K 1/4 W R94.R70.R99.R100 4 \$19400-1501 1.5K 1/4W R72.R187.R195 \$19400-1501 1.5K 1/4W R77.R13.R171 4 \$19400-2213 221K 1/4W R77.R13.R11.R159 \$19400-2321 1.2K 1/4 W R77.R13.R171 4 \$19400-2323 221K 1/4W R97 1 \$19400-2621 2.2K 1/4W R97 R13.R172.R12.R122 4 \$19400-2652 8.2 K 1/4W R100 1 \$19400-2677 26.7 1/4W R122 R131.R174 2 \$19400-2672 22 K 1/4W R130 1 \$19400-5620 156.K 1/4W R131.R174 2 \$19400-5620 155.1 R141 1 \$19400-570 167.1/4W R141.1 2 \$19400-570 167.1/4W R147 R138.R172 1 \$19400-570 174.1/4W R143.1/4W< | | R43,R44,R45,R61,R62,R63 R68,R69,R106,R108,R136 R137,R170,R171,R172 | 15 | S19400-4751 | 4.75K | | | | | |
| Res. Rivo, Rep. Brito 4 S19400-3741 3.74K 1/4 W Rivo, Rivo | Res. R76, Rep. R100 4 S19400-3741 3.74K 1/4 W R72, R167, R195 3 S19400-1501 1.5K 1/4W R72, R167, R195 3 S19400-1501 1.5K 1/4W R77, R13, R117, 4 S19400-1501 1.5K 1/4W R77, R13, R117, 4 S19400-2213 221K 1/4W R78, R13, R11, R159 S19400-2213 221K 1/4W R97 S19400-2822 82 K 1/4W R98 1 S19400-2822 82 K 1/4W R99 1 S19400-2821 62 K 1/4W R100 1 S19400-2821 5.62 K 1/4W R120 S19400-2821 5.62 K 1/4W R130, R141 S19400-2870 267 1/4W R132 S19400-5102 IK 1/4W | | R48, R67, R70, R87, R101 | 5 | S19400-4752 | 47.5K 1/4 W | | | | | |
| PR2_BIR_FIGS 3 S19400-1501 1.5K 14W PR7_BR_BIR_FR7 S19400-1501 1.3K 14W PR7_BR_BIR_FR7 S19400-1211 1.2K 14W PR7_BR_BIR_FR7 S19400-1211 1.2K 14W PR7_BR_BIR_FR67 S19400-2212 22K 14W PR7_BR_BIR_FR67 S19400-2221 22K 14W PR7 S19400-2822 82 5K 14W PR6 S19400-2822 82 5K 14W PR6 S19400-2822 82 5K 14W PR7 S19400-5821 5.6K 14W R120_R121_R12_R12_R123 S19400-5821 5.6K 14W R130 S19400-5821 S2 5K 14W R131 S19400-5821 S2 5K 14W R132 S15400-5821 S6 5K 14W R133 S15400-582 S6 K 174W R132 S15400-582 S6 K 174W R133 S15400-582 S6 K 174W R135 S19400-392 92 K 14W R136 S19400-392 92 K 14W R140_R141 S19400-8126 IK 172W TRIMMER | PR2.Bit2.Bit3.Bit3 3 S19400-1501 1.5K 144W PR7.Bit3.Bit3.Bit3.Bit3.Bit3.Bit3.Bit3.Bit3 | | R52,R54,R56 | | S19400-1000 | 100 1/4W 3 74K 1/4 W | | | | | |
| H77.R82.R175.R177 4 S19400-1301 1.3K 14W H778.R113.R14.R159 4 S19400-2213 221K 14W H78.R113.R14.R159 4 S19400-2213 221K 14W H87 A13.R14.R159 4 S19400-2213 221K 14W H87 A13.R14.R159 A14.W4 Max Max H86 1 S19400-2822 82.SK 14W Max R86 1 S19400-2827 2.2K 14W Max R100 S19400-2821 5.62K 14W Max R120 1 S19400-2821 5.62K 14W Max R130 1 S19400-2821 5.62K 14W Max R131.R174 2 S19400-5821 5.62K 14W Max R132 1 <ts1528-61< td=""> IAK 14W Max Max R132 1 S19400-5970 277 14W Max R132 1 S19400-5920 15K 14W Max R1476 1 S19400-2920 39K 14W Max</ts1528-61<> | H77.782.R175.R177 4 S19400-1301 1.3K 14W H77.8R13.R14.R159 4 S19400-2213 221K 14W H78.R113.R14.R159 4 S19400-2213 221K 14W H87 1.519400-2213 221K 14W H87 H87 1.519400-2213 221K 14W H87 H86 1 S19400-2822 82.5K 14W H86 1 S19400-2821 2.4K 14W H86 1 S19400-2867 2.6X 14W H120 S19400-2867 2.6X 14W H120 H130 1 S19400-2862 2.5K 14W H130 1 S19400-2862 5.6K 14W H131 S19400-2862 5.6K 14W H131 H132 S19400-5802 15K 14W H131 H132 S19400-597 257 14W H141 H131 S19400-592 15K 14W H141 H141 S19400-292 15K 14W H141 H141 S19400-292 15K 14W H141 H15152 | | | | | | | | | | |
| PR7.9.88,R155,R167 4 S11400-2213 221K 14W R97 1 S11400-2223 221K 14W R98 1 S11400-2823 82.8K 14W R98 1 S11400-2831 2.4K 14W R98 1 S11400-2831 6.8K 14W R109 1 S11400-28617 6.8K 14W R120 S11400-28617 6.8K 14W R130 1 S11400-2861 6.8K 14W R130 1 S11400-2861 6.8K 14W R131 S115280-65 10K 14W 14W R132 1 S116280-50 15K 14W R135 1 S116280-50 15K 14W R141 2 S11400-1502 15K 14W R1476 1 S119400-322 39.2K 14W R1476 1 S119400-322 39.2K 14W R1476 1 S119400- | R79.88,R155,R167 4 S19400-2213 221K Y4W R97 1 S19400-2232 82.8K Y4W R98 1 S19400-2822 82.5K Y4W R98 1 S19400-2831 2.43K Y4W R98 1 S19400-2812 82.5K Y4W R100 1 S19400-28677 28.7 Y4W R130 1 S19400-2862 2.5K Y4W R130 1 S19400-2862 2.5K Y4W R130 1 S19400-2862 2.5K Y4W R131 S19400-2870 267 Y4W R132 1 S19400-1502 15K Y4W R141 2 S19400-1502 15K Y4W R1476 1 S19400-475 | | R77,R82,R175,R177 | 4 | S19400-1301 | 1.3K 1/4W | | | | | |
| R97 1 \$19400-8252 22 KK 1/4W R98 1 \$19400-8252 42 KK 1/4W R100 1 \$19400-8252 42 KK 1/4W R100 1 \$19400-8251 2.48 K 1/4W R100 1 \$19400-6871 26 S1K 1/4W R120, R121, R122, R123 1 \$19400-5621 26 K 1/4W R130 1 \$19400-5621 26 K 1/4W R131 S119400-5621 26 K 1/4W R131 R132, R174 2 \$19400-5621 15 K 1/4W R132, R144 2 \$19400-5620 15 K 1/4W R132, R144 2 \$19400-5620 15 K 1/4W R173 1 T10812-89 50 K 1/2W TRIMMER R173 1 \$19100-3270 475 1/4W R188 1 \$191400-3922 92 K 1/4W R188 1 \$15126-16 IC, 1/74W R188 1 \$15126-16 IC, 1/74W R180, R192 2 T13940-16 IC, 1/74W | BP7 Total 1 S19400-8822 22 KK 1/W R98 1 S19400-8822 24 KK 1/W R100 1 S19400-8821 2.48K 1/W R100 1 S19400-8821 2.48K 1/W R120, R121, R122, R123 1 S19400-5821 5.68K 1/W R120, R121, R122, R123 1 S19400-5821 5.68K 1/W R130 1 S19400-5821 5.68K 1/W R131 S19400-5821 2.6 KK 1/W R137 R132, R124 S19400-5822 10K TRIMMER R137 R132, R134 2 S19400-5920 10K TRIMMER R132, R134 2 S19400-3920 92 KK 1/W R136, R134 2 S19400-3920 92 KK 1/W R175 1 T10812-38 10K 1/2W TRIMMER R176 1 S19400-3922 92 KK 1/4W R188, R192 2 T10812-68 1K 1/2W TRIMMER R188, R192 2 T10812-68 1K 1/2W TRIMMER X1 S15128-12 IC, LM264, PME, ORA | | | | | | | | | | |
| R98 1 S11400-2431 2 40K 1/4W R109 1 S11400-2611 6.81K 1/4W R102 1 S11400-2617 28.7 1/4W R122 4 S11400-2687 28.7 1/4W R123 1 S11400-2687 28.7 1/4W R130 1 S11400-2681 5.62K 1/4W R130 1 S11400-2612 22.1K 1/4W R131 S115280-65 10K 1/4W 11.61K 1/4W R132 1 S115280-65 10K 1/4W R132 1 S116200-570 257 1/4W R141 2 S19400-570 475 1/4W R1475 1 S19400-570 475 1/4W R1476 1 S19400-4750 475 1/4W R148 1 S19400-4750 475 1/4W R148 1 S19400 | Ree 1 S19400-2431 2.40K 1/4W R109 1 S19400-2611 6.81K 1/4W R102 1 S19400-2617 2.87 1/4W R129 1 S19400-2617 2.87 1/4W R120 S19400-2617 2.87 1/4W R130 R130 1 S19400-2512 2.2 K1 1/4W R130 1 S19400-2512 2.2 K1 1/4W R131, R174 2 S19400-2612 1.6 K1 1/4W R132, R132 1 S11528-65 1.0 K7 TMMMER R132, R141 2 S19400-2670 2.67 1/4W R1475 1 S19400-2500 2.67 1/4W R1476 1 S19400-2500 2.67 1/4W R1476 1 S19400-1502 1.51 R1476 1 S19400-2300 2.67 1/4W R1476 1 S19400-1502 2.57 1/4W R1476 1 S19400-1502 2.57 1/4W R1476 1 S19400-1502 2.57 1/4W R148 < | | | | | 82.5K 1/4W | | | | | |
| R120,R121,R122,R123 4 S19400-26R7 28.7 1/4W R129 R130 1 S19400-26R1 5.62K 1/4W R130 1 S19400-2621 5.62K 1/4W R130 1 S19400-2621 5.62K 1/4W R131,R174 2 S19400-2612 68.1K 1/4W R132 1 S15280-5612 168.1K 1/4W R132 1 S15280-570 16K 1/4W R135,R184 2 S19400-570 257 1/4W R175 1 T19812-39 50K 1/2W TRIMMER R176 1 S19400-3750 475 1/4W R178 R176 1 S19400-3750 475 1/4W R178 R176 1 S19400-3750 475 1/4W R188 R176 1 S19400-322 39.2K 1/4W R187 R178 1 S19400-150 15.1 K 1/2W R14W R188 1 S19120-322 29.2K 1/4W R149 R149 R176 1 S1 | R120,R121,R122,R123 4 S19400-26R7 28.7 1/4W R129 R139 S19400-26R7 28.7 1/4W R130 1 S19400-26R1 5.62K 1/4W R130 1 S19400-26R1 6.82K 1/4W R130 1 S19400-26R1 6.81K 1/4W R131,R174 2 S19400-68R2 68.1K 1/4W R132 1 S1528-65 10K TRIMMER R135,R184 2 S19400-570 267 1/4W R1475 1 S19400-2750 475 1/4W R176 1 S19400-2750 475 1/4W R176 1 S19400-3750 475 1/4W R176 1 S19400-3750 475 1/4W R176 1 S19400-150 15.1 R176 1 S19400-150 15.1 X1 1 S15128-16 IC.UTW TRIMMER R178 1 S15128-16 IC.UTW TRIMMER X3 1 S15128-13 IC.UM224, OP-AMP X4 S15128-13< | | R98 | | S19400-2431 | 2.43K 1/4W | | | | | |
| R129 1 S19400-5621 5.62K 1/4W R130 1 S19400-5621 22.1K 1/4W R131,R174 2 S19400-5612 82.1K 1/4W R132 1 S159400-5612 82.1K 1/4W R132 1 S159400-5621 10K TRIMMER R132 1 S159400-5621 57.1K/4W R135,R164 2 S19400-1520 15K 1/4W R175 1 T10912-59 50K 1/2W TRIMMER R176 1 S19400-4750 475 1/4W R180,R192 2 T10912-58 50K 1/2W TRIMMER R177 1 S15128-16 EL,T1014, LINEAR INTEGRATED CIRCUIT X3 1 S15128-16 EL,T1014, LINEAR INTEGRATED CIRCUIT X4,08 2 S15128-16 EL,D2P 20, CP-AMP 00A Drep 4MP X4,08 2 S15128-16 EL,D2P 20, CP-AMP 00A Drep 4MP X4,08 2 S15128-16 EL,M059, VOLT REG WITH N'S ASSEMELY X4,08 2 S15128-17 C,2805, VOLT AGE REGULATOR ASSEM | R129 1 S19400-5621 5. 62K 1/4W R130 1 S19400-5621 22. K1 1/4W R131,R174 2 S19400-6612 92. K1 1/4W R132 1 S16206-52 10K THMMER R132 1 S16206-52 10K THMMER R132 1 S16206-50 267 1/4W R135,R164 2 S19400-5020 15K 1/4W R176 1 T10612-39 6K 1/2W THIMMER R1775 1 T10612-39 26K 1/2W R188,R162 2 T10401-48 IK 1/2W R189,R162 2 T1040-15 IC, 1/2W R180,R162 1 S15128-16 IC, C/P-AMP X1 1 S15128-16 IC, C/P-2AV,PCLAD,HGH-PERF X2 1 S15128-18 IC, C/P-2AV,PCLAD,HGH-PERF X3 1 S15128-18 IC, C/P-2AV,PCLAD,HGH-PERF X4/26 2 S15128-13 IC, C/P2AV,VOL TAGE REGUATOR ASSEM X3 1 S15128-12 IC, M2AV,VOL TAGE R | | | | | 6.81K 1/4W | | | | | |
| R130 1 S19400-2212 22 1K 1/4W R131,R174 2 S19400-2812 88,1K 1/4W R132,R174 2 S19400-5120 16K 1K 1/4W R132,R174 2 S19400-5120 15K 1/4W R132,R174 2 S19400-502 15K 1/4W R143,R174 2 S19400-5070 267 1/4W R147 1 T10812-39 50K 1/2W TRIMMER R175 1 S19400-370 267 1/4W R176 1 S19400-370 267 1/4W R176 1 S19400-4750 475 1/4W R176 1 S19400-150 151 R176 1 S19400-150 151 K1 1 S19128-16 IC,LTWITA INTEGRATED CIPCUIT X2 1 S15128-16 IC,LM224, OP-AMP X3 1 S15128-13 IC,O272, PECISION OP-AMP X4 2 S15128-13 IC,O272, PECISION OP-AMP X3 1 S15128-12 IC,780,50 VOLTAGE REGULATOR ASSEM | R130 1 S19400-2212 22 1K 1/4W R131, R174 2 S19400-6212 68, 1K 1/4W R132, R174 2 S19400-5120 68, 1K 1/4W R132, R174 2 S19400-5120 1K 1/4W R132, R174 2 S19400-502 15K 1/4W R147, R141 2 S19400-570 267 1/4W R176 1 S19400-2750 475 1/4W R176 1 S19400-3750 475 1/4W R176 1 S19400-3750 475 1/4W R178 1 S19400-4750 475 1/4W R178 1 S19120-922 392 K 1/4W R188 1 S19120-922 392 K 1/4W R199, R192 2 T10912-68 IL, UNEAR INTEGRATED CIRCUIT X2 1 S15128-16 IC, LIM24, OP-AMP X3 1 S15128-16 IC, M242, OP-AMP X4 2 S15128-18 IC, M242, OP-AMP X3 1 S15128-12 IC, M270, OUT, R6E REGULATOR ASSEM | | R129 | 1 | S19400-5621 | 5.62K 1/4W | | | | | |
| R132 1 S16280-5 TOK TRIMMER R135, R184 2 S19400-2670 267 1/4W R140, R141 2 S19400-2670 267 1/4W R173 R117 11011-260 207 1/4W R173 R173 R173 207 1/4W R173 R176 1 S19400-2670 267 1/4W R176 1 S19400-2670 267 1/4W R173 R176 1 S19400-2750 475 1/4W R173 R178 1 S19400-2750 475 1/4W R173 R178 1 S19400-222 29 282 /14W R149 R179 2 113960-15 ISJ ISJ ISI IAW R149 R149 IAW R149 IAW R149 IAW R149 ISI ISIS ISIS IC, IAWAY UNPAUADINGH-PERF ISIS | R132 1 S16286-5 Inc TRIMMER R135, R184 2 S19400-5602 ISK 1/4W INF R143, R184 2 S19400-5602 ISK 1/4W INF R147 1 T1081-280 GKK 1/2W TIMMER R173 1 T1081-280 GKK 1/2W TIMMER R176 1 S19400-2970 JKK 1/2W TIMMER R176 1 S19400-2922 J8 XK 1/4W R188 TI R188 1 S19400-2150 TK 1/2W TIMMER TE R172 2 T1081-268 K 1/2W TIMMER TE R179 2 T1386128 IC, OPAMP State S | | R130 | 1 | S19400-2212 | 22.1K 1/4W | | | | | |
| FI35,R184 2 519400-1502 15K, 14W R140,R141 2 519400-502 267,14W R140,R141 1 519400-502 267,14W R175 1 119112-20 26K, 12W TIRMMER R176 1 519400-502 267,14W MM R186 1 519400-3222 39,2K,14W MM R188 1 519400-3222 39,2K,14W MM R188 1 515126-16 LC,11014, LINEAR INTEGRATED CIRCUIT X1 1 515128-16 LC,0274, QP-AMP QUAD HIGH-PERF X2 1 515128-13 LC,0272, PEC/SIO NO P-AMP X4,X8 2 515128-13 LC,0272, PEC/SIO NO P-AMP X4,X8 1 515128-12 LC,205,VU T REG WITH VIS ASSEMBLY X7 1 515128-12 LC,2072,2012,74E (SIO NO P-AMP X4,X8 1 515128-12 LC,2075,000 (LT RGE WITH VIS ASSEMBLY X0 1 515128-12 LC,2075,000 (LT RGE WITH VIS ASSEMBLY X0 1 <t< td=""><td>Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits <t< td=""><td></td><td>H131,R174 B132</td><td></td><td></td><td></td></t<></td></t<> | Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits Fits <t< td=""><td></td><td>H131,R174 B132</td><td></td><td></td><td></td></t<> | | H131,R174 B132 | | | | | | | | |
| FI173 1 T10912-39 SK 1/2W TRIMMER FI176 1 S19400-3920 475 1/4W R188 1 S19400-3922 39,2K 1/4W R188 1 S19400-3922 39,2K 1/4W R188 1 S19400-3922 39,2K 1/4W R19172 2 T10912-68 IK 1/2W TRIMMER TV1, TP2 2 T13940-15 ISJ X1 1 S15128-16 IC, LT104, LINEAR INTEGRATED CIRCUIT X2 1 S15128-16 IC, DP2/02, PREDISION OP-AMP B, X6 1 S1408-16 IC, M20, OP-AMP B, X6 1 S14094-1 IC, M20, VOL TAGE REGULATIOR ASSEMBLY X0 1 S15128-12 IC, M30, VOL TAGE REGULATIOR ASSEMBLY X10 1 S15128-12 IC, M30, VOL TAGE REGULATIOR ASSEMBLY X3 1 S15128-12 IC, M30, VOL TAGE REGULATIOR ASSEMBLY X3 1 S15128-12 IC, M30, VOL TAGE REGULATIOR ASSEMBLY X40 1 S15128-12 IC, M30, VOL TAGE REGULATIOR ASSEMBLY <td>R173 1 T10912-39 20K 1/2W TRIMMER R176 1 S19400-4750 475 1/4W R188 1 S19400-4750 475 1/4W R188 1 S19400-3922 39.2K 1/4W R198 1 S19400-3922 39.2K 1/4W R198 1 S19400-3922 39.2K 1/4W R198 1 S19120-80 1K 1/2W TRIMMER T01172 2 T13940-15 1SJ X1 1 S15128-16 IC, CP-AMP OLAD, HIGH-PERF X2 1 S15128-12 IC, CP2702, PRECISION OP-AMP B, X6 1 S14065-14 IC, M260, VOL TAGE REGULATOR ASSEM X7 1 S15128-12 IC, M360, VOL TAGE REGULATOR ASSEM X10 1 S15128-12 IC, M360, VOL TAGE REGULATOR ASSEM X11 1 M15102-3 IC, 2715, VOL TAGE REGULATOR ASSEM X12 1 S15108-18 IC, AR64, PWI CONTROLLER (SS) X13 X14 2 S151018-18 IC, 2810, AIGW CONTROLLER (SS)</td> <td></td> <td>R135,R184</td> <td>2</td> <td>S19400-1502</td> <td>15K 1/4W</td> | R173 1 T10912-39 20K 1/2W TRIMMER R176 1 S19400-4750 475 1/4W R188 1 S19400-4750 475 1/4W R188 1 S19400-3922 39.2K 1/4W R198 1 S19400-3922 39.2K 1/4W R198 1 S19400-3922 39.2K 1/4W R198 1 S19120-80 1K 1/2W TRIMMER T01172 2 T13940-15 1SJ X1 1 S15128-16 IC, CP-AMP OLAD, HIGH-PERF X2 1 S15128-12 IC, CP2702, PRECISION OP-AMP B, X6 1 S14065-14 IC, M260, VOL TAGE REGULATOR ASSEM X7 1 S15128-12 IC, M360, VOL TAGE REGULATOR ASSEM X10 1 S15128-12 IC, M360, VOL TAGE REGULATOR ASSEM X11 1 M15102-3 IC, 2715, VOL TAGE REGULATOR ASSEM X12 1 S15108-18 IC, AR64, PWI CONTROLLER (SS) X13 X14 2 S151018-18 IC, 2810, AIGW CONTROLLER (SS) | | R135,R184 | 2 | S19400-1502 | 15K 1/4W | | | | | |
| R176 1 S19400-4750 475 1/4W R188 1 S19400-322 39.2K 1/4W R188 1 S19400-322 39.2K 1/4W R189,R192 2 T10812-68 If K 1/2W TRIMKER TP1,TP2 2 T13840-15 IsJ X1 1 S15128-16 IC,LT1014, LINEAR INTEGRATED CIPCUIT X2 1 S15128-18 IC,OP-MAP QUAD,HGH-PERF X3 1 S15128-13 IC,OPZ,ZC, PRECISION OP-AMP X4, X6 2 S15128-13 IC,OPZ,ZC, PRECISION OP-AMP X7 1 S18408-13 IC,7805,50V VOLTAGE REGULATOR ASSEM X8 1 S15128-12 IC,7015,0V UTAGE REGULATOR ASSEM X9 1 S15128-12 IC,7015,0V UTAGE REGULATOR ASSEM X10,X16 2 S151018-18 IC,ARRAY, CLAMPING, HEX X11 1 M15458-2 IC,3846,PWM CONTROLLER (SS) X13,X14 2 S15018-19 77414.53069-11 X16 1 M15105-8 IC,AD739,CONVERTER,F/V | Ri76 1 S19400-4750 475 1/4W Ri88 1 S19400-322 39.2K 1/4W Ri88, Ri92 2 T10812-68 I/K 1/2W TRIMMER TP1, TP2 2 T13840-15 I/K 1/2W TRIMMER TP1, TP2 2 T13840-15 I/K 1/2W TRIMMER TP1, TP2 2 T13840-15 I/K 1/2W TRIMMER X1 1 S15128-16 I/C, LTIO14, LINEAR INTEGRATED CIRCUIT X2 1 S15128-18 I/C, OP-AMP X3 1 S15128-13 I/C, OPZCZ PRECISION OP-AMP X4, X6 2 S15128-13 I/C, Z02C, ZPECISION OP-AMP X7 1 S15486-17 I/C, X030, VOLT REG WITH VS ASSEMBLY X8 1 S15128-12 I/C, 7180, S0V VOLTAGE REGULATOR ASSEM X9 1 S15128-12 I/C, 7180, S0V VOLTAGE REGULATOR X9 1 S15128-12 I/C, 7180, S0V VOLTAGE REGULATOR X11 1 M15459-2 I/C, 7390, S0V OLTAGE REGULATOR X13 1 S15128-19 I/C, 8440, FWM COMTR | | | | | | | | | | |
| R188 1 S19400-3922 39 2K 1/4W R189,R192 2 T1981-68 IK 1/2W TRIMMER TP1172 2 T19840-15 ISJ X1 1 S15128-16 IC, 1/104, LINEAR INTEGRATED CIRCUIT X2 1 S15128-16 IC, 1/104, LINEAR INTEGRATED CIRCUIT X3 1 S15128-18 IC, OP-AMP, OLD, Night-PERF X3 1 S15128-14 IC, M262, OP-AMP X4 2 S15128-14 IC, OP2742, PIECISION OP-AMP X4 2 S15128-13 IC, OP2742, PIECISION OP-AMP X4 3 IS9385-13 IC, OP2742, PIECISION OP-AMP X6 1 S15128-12 IC, 7915, VOLTAGE REGULATOR X10,X16 2 S151018-18 IC, ARRAY, IC, AMPING, HEX X11 I M15458-2 IC, 3946, PWIM CONTROLLER (SS) X13,X14 2 S151018-19 IVIN CONTROLLER (SS) X15 1 M15105-6 IC, A0739, CONVERTER, F/V Y1 1 S168665-5 IR, 0 MAZ <t< td=""><td>R188 1 S19400-3922 39-2K: 1/4W R188,R192 2 T1091-266 IK // JW TIMMLER TP1,TP2 2 T13940-15 ISJ X1 1 S15128-16 IC, LT104, LINEAR INTEGRATED CIRCUIT X2 1 S15128-16 IC, LT104, LINEAR INTEGRATED CIRCUIT X3 1 S15128-16 IC, LT104, LINEAR INTEGRATED CIRCUIT X4 1 S15128-16 IC, LT014, LINEAR INTEGRATED CIRCUIT X3 1 S15128-12 IC, D297G2, PRECISION OP-AMP X4 2 S15128-12 IC, M200, VOLTAGE REGULATOR ASSEM X4 1 S15128-12 IC, M300, VOLTAGE REGULATOR ASSEM X4 1 S15128-12 IC, M300, VOLTAGE REGULATOR X40 1 S15128-12 IC, M300, VOLTAGE REGULATOR X41 1 S15128-12 IC, M300, VOLTAGE REGULATOR X42 S151016-18 IC, A710, VOLTAGE REGULATOR X43 1 S15106-19 IC, M300, CONVENTELER (SS) X14 2 S151016-19 IC, M3</td><td></td><td>R176</td><td></td><td></td><td>475 1/4W</td></t<> | R188 1 S19400-3922 39-2K: 1/4W R188,R192 2 T1091-266 IK // JW TIMMLER TP1,TP2 2 T13940-15 ISJ X1 1 S15128-16 IC, LT104, LINEAR INTEGRATED CIRCUIT X2 1 S15128-16 IC, LT104, LINEAR INTEGRATED CIRCUIT X3 1 S15128-16 IC, LT104, LINEAR INTEGRATED CIRCUIT X4 1 S15128-16 IC, LT014, LINEAR INTEGRATED CIRCUIT X3 1 S15128-12 IC, D297G2, PRECISION OP-AMP X4 2 S15128-12 IC, M200, VOLTAGE REGULATOR ASSEM X4 1 S15128-12 IC, M300, VOLTAGE REGULATOR ASSEM X4 1 S15128-12 IC, M300, VOLTAGE REGULATOR X40 1 S15128-12 IC, M300, VOLTAGE REGULATOR X41 1 S15128-12 IC, M300, VOLTAGE REGULATOR X42 S151016-18 IC, A710, VOLTAGE REGULATOR X43 1 S15106-19 IC, M300, CONVENTELER (SS) X14 2 S151016-19 IC, M3 | | R176 | | | 475 1/4W | | | | | |
| TP1.1P2 2 T13840-16 ISJ. X1 1 S15128-16 IC_LT014_LINEAR INTEGRATED CIRCUIT X2 1 S15128-18 IC_OP-AMP_OLD_NIGH-PERF X3 1 S15128-18 IC_OP-AMP_OLD_NIGH-PERF X3 1 S15128-18 IC_OP-AMP_OLD_NIGH-PERF X4 2 1 S15128-14 IC_OP272, PRECISION OP-AMP X4 2 1 S15128-13 IC_OP272, PRECISION OP-AMP X5 1 S24085-14 CLMASS VOLTAGE REGULATOR ASSEM X6 1 S15128-12 IC_A715, VOLTAGE REGULATOR ASSEM X10,X16 2 S151018-18 IC_A7802, VOLTAGE REGULATOR X10,X16 2 S151018-18 IC_A7802, VOLTAGE REGULATOR X11 1 IM15105-3 IC_CA738, CANOS, CONV, DVA, SERIAL VOLTAGE X13,X14 2 S15018-19 T7141, S2306-11 X14 1 S16865-5 IC_A739, CONVERTER, F/V Y1 1 S16865-5 IC_AM20, CONVERTER, F/V Y1 1 S | TP1.1P2 2 T13840-15 15.J X1 1 S15128-16 IC, LTO14, LINEAR INTEGRATED CIRCUIT X2 1 S15128-16 IC, C/D14, LINEAR INTEGRATED CIRCUIT X3 1 S15128-18 IC, OP-AMP_OLD, MIGHPERF X4 5 IS S15128-18 IC, OP-AMP_OLD, MIGHPERF X8 2 S15128-13 IC, OP2702, PRECISION OP-AMP X8 2 S15128-13 IC, OP2702, PRECISION OP-AMP X9 1 S1528-4 ROM ASSEMBLY (SS) X10 1 S15128-12 IC, 780,5V VOLTAGE REGULATOR X10 1 S15128-12 IC, 780,5V VOLTAGE REGUATOR X10 1 M15108-3 IC, 2340,PWM CONTROLLER (SS) X13 1 M15108-3 IC, AD739, CANCE, CONV, DVA, SERIAL, 108, ISS X13 1 M15108-3 IC, AD739, CANCE, CONV, DVA, SERIAL, 108, ISS X14 2 S15016-19 T714, S3050-11 S1 N135 1 M15105-5 IC, AD739, CANCE, CONV, CAA, SERIAL, 108, ISS X1 | | R188 | | S19400-3922 | 39.2K 1/4W | | | | | |
| Xi 1 S15128-16 ICLITIOTA, LINEAR INTEGRATED CIRCUIT X2 1 S15128-16 IC, CP-MAP CUAD, MEH-PERF X3 1 S15128-13 IC, CP-MAP CUAD, MEH-PERF X4 2 S15128-13 IC, CP-ZQ, PECCISION OP-AMP X4.x6 2 S15128-13 IC, CPZQ, ZPECCISION OP-AMP X5 1 S15408-14 ICL M322, OPCLATER X6 1 S15428-13 IC, CPZQ, ZPECCISION OP-AMP X7 1 S18498-13 IC, Z7805, OV CIT, REG REGULATOR ASSEM X9 1 S15128-12 IC, 718, OV CIT, REG REGULATOR ASSEM X9 1 S15128-12 IC, 718, OV CIT, REG REGULATOR ASSEM X9 1 S15128-12 IC, 718, OV CIT, REG REGULATOR X10 1 M15458-2 IC, ARRAY, CLAMPING, MEX X11 1 M15105-8 IC, AD739, CMOS, CONV, DVA, SERIAL, 108, ISS X13 1 M15105-8 IC, AD739, CMOS, CONVERTER, FINI Y1 1 S16666-5 8.0 MHZ Y1 1 S1666 | xi 1 S15128-16 ICLITIONA, LINEAR INTEGRATED CROUIT xi 1 S15128-16 IC, OP-MAP OLAD, MEHPERF xi 1 S15128-13 IC, OP-MAP xix.8 2 S15128-13 IC, OP-MAP xix.8 2 S15128-13 IC, OP-XAMP xix.8 2 S15128-13 IC, OP-ZC, PRECISION OP-AMP xix.8 2 S15128-13 IC, OP-ZC, PRECISION OP-AMP xix.3 1 S1828-13 IC, ZR05, DV VOLTAGE REGULATOR ASSEM xix.3 1 S18385-13 IC, ZR05, DV VOLTAGE REGULATOR ASSEM xix.3 1 S15128-12 IC, ZR05, DV VOLTAGE REGULATOR ASSEM xix.3 1 S15128-12 IC, ZR05, DV VOLTAGE REGULATOR ASSEM xix.3 1 S15128-12 IC, ZR05, DV VOLTAGE REGULATOR ASSEM xix.3 1 S15128-12 IC, ZR05, DV VOLTAGE REGULATOR ASSEM xix.3 1 M15458-2 IC, ZR05, DV OLTAGE REGULATOR ASSEM xix.3 1 M15458-2 IC, ZR05, DONEONTROLER (SS) xix.3 | | | | | | | | | | |
| X2 1 S15128-16 C. OP-AMP_QUAD_HIGH-PERF X3 1 S15128-16 CLM202, OP-AMP X4, X8 2 S15128-13 C. OP2702, PRECISION OP-AMP B, X5 1 S24085-14 ROM ASSEMBLY (SS) X7 1 S18047 C. LM350, VOLT REG WITH HIS ASSEMBLY X8 1 S18385-13 C. 2015, VOLTAGE REGULATIOR ASSEM X9 1 S18385-13 C. 2015, VOLTAGE REGULATIOR ASSEM X0 1 S18128-12 C. 2015, VOLTAGE REGULATIOR X0.X16 2 S15011-18 C.4780, VOLTAGE REGULATIOR X11 1 M15102-3 I.C. (SS) B, X12 1 M15452-2 I.C. 2046, PWM CONTROLLER (SS) X13.X14 2 S15016-19 7/14.15, S2030-1) B, X15 1 M15105-4 I.C. AD738, CMACS, CONV, D/A, SERIAL, IDB (SI Y1 1 S16065-5 B.0 MHZ Y1 | xz 1 S15128-16 IC. OP-AMP_QUAD_HIGH-PERF x3 1 S15128-41 IC.M262 (OP-AMP x4.x8 2 S15128-13 IC.OP2702, PRECISION OP-AMP x4.x8 2 S15128-13 IC.OP2702, PRECISION OP-AMP x7 1 S18047 ICLM350 VOLT REG WITH HIS ASSEMBLY (SS) x7 1 S18047 ICLM350 VOLT REG WITH HIS ASSEMBLY x8 1 S1838-13 IC.2015 VVLTAGE REGULATOR ASSEM x8 1 S18128-12 IC.2715 VOLTAGE REGULATOR x8 1 IN15023 IC.3840,PWM CONTROLLER (SS) x11 1 M15102-8 IC.ARRAY_CLAMPINA,HEX B, X12 1 M15102-8 IC.ARRAY_CLAMPINA,HEX B, X15 1 M15102-8 IC.ARRAY_CLAMPINA,HEX X13.X14 2 S15016-19 77(HI S.28300-1) B, X15 1 M15105-2 IC.AD738,CMCS,CONV, DA.SERIAL, IDR (SS) x13 1 S15065-5 IS.0 MHZ | | X1 | | S15128-16 | IC,LT1014, LINEAR INTEGRATED CIRCUIT | | | | | |
| 94.26 2 15128-13 C. OP2702, PRECISION OP-AMP 54.37 1 524085-4 ROM ASSEMBLY (SS) 57 1 518647 ICLM350 VOLT REG WITH H/S ASSEMBLY (SS) 38 1 518513-13 IC.78055 VOLTAGE REGULATOR ASSEM 39 1 518128-12 IC.2715, VOLTAGE REGULATOR ASSEM 30 1 515128-12 IC.2715, VOLTAGE REGULATOR ASSEM 30 1 515128-12 IC.2614, VOLTAGE REGULATOR ASSEM 30 1 51518-18 IC.2614, VOLTAGE REGULATOR 310,X16 2 S15161-18 IC.2644, PMIO, HEX 8, X11 1 IM15452 IC. 2644, PMIO, HEX 8, X15 1 M15452 IC.2644, PMIO, ONTROLLER (SS) X13,X14 2 S15016-19 77(14, S.2006-1) 8, X15 1 M15105-6 IC.AD738, CMOS, CONV, D/A, SERIAL, INC, MISSING VERTER, F/V Y1 1 S16085-5 8.0 MHZ | bit /s 2 1515/26-13 C. OP2702, PRECISION OP-AMP B. X5 1 524065-4 ROM ASSEMBLY (SS) B. X7 1 518647 ICLM350 VOLT REG WITH HIS ASSEMBLY (SS) X8 1 518647 ICLM350 VOLT REG WITH HIS ASSEMBLY (SS) X9 1 518128-12 IC. 2915 VOLTAGE REGULATOR ASSEM X10,X16 2 5151818 IC. ARRAY, CLAMPING, HEX B. X11 1 M15102-3 IC. (S34, PWI CONTROLLER (SS) X13,X14 2 S15101818 IC. (S3500-1) B. X15 1 M15105-8 IC. AD739, CMOS, CONV, DA.SERIAL, 108 (SS) X16 1 S15065-5 IL. OMFRONCONVERTER, F/V Y1 1 S16665-5 IL. OMFRONCONVERTER, F/V Y1 1 S16665-5 IL. OMAY DAT BE DUPLICATED, COMMUNICA PROPRIETARY INFORMATION OWNED BY LINCOLN GLOBAL, INC. AND MAY NOT BE DUPLICATED, COMMUNICA DOWNOUS WITHOUT THE EXPRESS WRITTEN PERMISSION OF LINCOLN GLOBAL, INC. PROPORE TARY INFORMATION UT THE EXPRESS WRITTEN PERMISSION OF LINCOLN GLOBAL, INC. DOWNOUS OF LINCOLN GLOBAL, INC. | | | | | IC, OP-AMP,QUAD,HIGH-PERF | | | | | |
| B. X5 1 S24085-4 PROM ASSEMBLY (SS) X7 1 S18647 ICLMSOVOLT REG WITH KS ASSEMBLY X8 1 S18395-13 IC.7805,50V VOLTAGE REGULATOR ASSEM X9 1 S18398-13 IC.7805,50V VOLTAGE REGULATOR ASSEM X9 1 S15128-12 IC.7815,50V VOLTAGE REGULATOR ASSEM X10,X16 2 S151018-18 IC.ARRAY (CLAMPING HEX X11 1 M151052-8 IC.3846,PWM CONTROLLER (SS) X13,X14 2 S151018-19 IC.AD739,CMOS,CONV.DIA,SERIAL,108 (SS) X15 1 M15105-8 IC.AD739,CMOS,CONV.DIA,SERIAL,108 (SS) X16 1 N15105-8 IC.AD739,CMOS,CONV.DIA,SERIAL,108 (SS) Y1 1 S16685-5 I8.0 MHZ | B, X5 1 S24085-4 ROM ASSEMELY (SS) X7 1 S18498-13 IC, X700, VOLT REG WITH H'S ASSEMELY X8 1 S18398-13 IC, X700, SV VOLTAGE REGULATOR ASSEM X9 1 S18398-13 IC, X700, SV VOLTAGE REGULATOR ASSEM X9 1 S151829-12 IC, 718, VOLTAGE REGULATOR ASSEM X10, X16 2 S151018-18 IC, ARRAY, CLAMPING, HEX X11 1 M15105-20 IC, (SS) R, X12 1 M15105-19 IC, X53006-11 R, X15 1 M15105-8 IC, AD739, CANVE, CONVERTER, F/V Y1 1 S16666-5 8.0 MH2 | | | | | | | | | | |
| X8 1 S18398-13 IC.7805,5V VOLTAGE REGULATOR ASSEM X9 1 S15128-12 IC.7815,VOLTAGE REGULATOR ASSEM X10,X16 2 S151018-18 IC.ARRAY,GLAMPING,HEX S. X11 1 M151028-20 IC.3814, PWM CONTROLLER (SS) IS, X12 1 M151058-20 IC.3846, PWM CONTROLLER (SS) X13,X14 2 S15018-18 IC.AD739, CMVS, CONV. DJA, SERIAL, 108 (SS) N13,X14 2 S15018-18 IC.AD739, CMVS, CONV. DJA, SERIAL, 108 (SS) X18 1 M15105-8 IC.AD739, CMVS, CONV. DJA, SERIAL, 108 (SS) Y1 1 S16685-5 I8.0 MHZ | X8 1 S18395-13 IC. 7805,5V VOLTAGE REGULATOR ASSEM X9 1 S15128-12 IC. 7315,VOLTAGE REGULATOR ASSEM X10,X16 2 S151018-18 IC. ARRAY, CLAMPING, HEX X11 1 M15102-32 IC. (SS) R, X12 1 M15458-2 IC. (SS) X13,X14 2 S15018-19 IC. (SS) B, X15 1 M15105-8 IC. AD739, CANOS, CONV. DJA, SERIAL, TOB (SS) X18 1 M15105-8 IC. AD739, CANOS, CONV. DJA, SERIAL, TOB (SS) Y1 1 S16666-5 8.0 MHZ | в. | X5 | 1 | S24085-4 | ROM ASSEMBLY (SS) | | | | | |
| X9 1 S15128-12 IC. 7915. VOLTAGE REGUATOR X10,X16 2 S15016148 IC.ARRAY, CLAMEING, HEX B. X11 1 M15102-3 IC.ARRAY, CLAMEING, HEX B. X11 1 M15102-3 IC.3946, FWM CONTROLLER (SS) B. X12 1 M15498-2 IC.3946, FWM CONTROLLER (SS) B. X13 4 2 S15018-19 77914, S.30090-1) B. X15 1 M15102-3 IC.AD788, GMOS, COMV, DJA, SERIAL, 108 (S3 X18 IC.AD788, GMOS, COMV, DJA, SERIAL, 108 (S3 X18 IN1555-2 IC.LM2907, CONVERTER,F/V Y1 1 IS16665-5 8.0 MHZ MHZ | x9 1 Is15128-12 IC. 7315.VOLTAGE REGUATOR X10,X16 2 IS101161 IC.ARRAY.CLAMEING, HEX B. X11 1 M15102-3 IC.ARRAY.CLAMEING, HEX B. X11 1 M15102-3 IC.383 X12 1 M15498-2 IC.384 PWM CONTROLLER (ISS) X13 2 IS1018-19 77914.S.20590-1) X15 1 M15552-2 IC.LM2907,CONVERTER.FV Y1 1 IS16665-5 IS.0.MHZ | | | | | | | | | | |
| XIO.XI6 2 S15018-18 [C.ARRAY.CLAMPIG.HEX B. X11 1 M15102-3 [C. (SS) J.XI2 1 M15458-2 [C. (S4) J.XI3.XI4 2 S15018-19 77(H.S. S2059-1) B. X15 1 M15105-8 [C. AD739, CMVS, COV, DJA, SERIAL, 108 (SS) X18 1 M15105-8 [C.AD739, CMVS, COV, DJA, SERIAL, 108 (SS) X18 1 M15105-8 [C.AD739, CMVS, COV, CMV, SERIAL, 108 (SS) Y1 1 S16665-5 [8.0 MHZ] | X10.X16 2 S15018-18 IC_ARRAY_CLAMPIG_HEX B, X11 1 M15102-3 IC_(SS) B, X12 1 M15458-2 IC_3846,PWM CONTROLLER (SS) X13,X14 2 S15018-18 IC_AD739,CM05,CONV,DIA,SERIAL,108 (SS) B, X15 1 M15105-8 IC_AD739,CM05,CONV,DIA,SERIAL,108 (SS) Y1 1 S16665-5 IS.0 MHZ | | | | | IC,7915,VOLTAGE REGUATOR | | | | | |
| B, X12 1 M15458-2 C.3846, PWM CONTROLLER (SS) X13,X14 2 S15016-19 77(H.S.5006-1) B, X15 1 M15105-8 EC.AD739, CMVG, SCOW, D/A, SERIAL, 10B (SS) X18 1 M15105-8 EC.AD739, CMVG, SCOW, D/A, SERIAL, 10B (SS) Y1 1 M15666-5 B.0 MHZ | B, X12 1 M15458-2 C.3846,PWM CONTROLLER (SS) X13,X14 2 S15016-19 C.3846,PWM CONTROLLER (SS) X13,X14 2 S15016-19 77415.53050-11 B, X15 1 M15105-8 IC.A.D739,CMOS,CONV.D/A,SERIAL,108 (SS) X18 1 M15105-8 IC.A.D739,CMOS,CONVERTER,F/V Y1 1 S16665-5 8.0 MHZ | | X10,X16 | 2 | S15018-18 | IC,ARRAY,CLAMPING,HEX | | | | | |
| D: Xi 3, Xi 4 2 151018-19 17111 S 2029001 1000000000000000000000000000000000000 | b: Xi 3: Xi 4 2 S15016-19 77814 5 205960-11 S05960-11 b: Xi 5 1 M15105-8 IC AD39, CMOS, COW DIA SERIAL, 108 (St X18 b: Xi 8 1 M15105-8 IC AD39, CMOS, COW DIA SERIAL, 108 (St X18 V1 1 M1505-2 IC LIX2007, COWERTER, F/V V1 1 S16665-5 8.0 MHZ | | | | | IC, (SS) | | | | | |
| B. X15 1 M15105-8 C.A.D739, CMOS, CONV. D/A, SETRIAL, 106, [S: X18] Y1 1 M15105-8 IC.M49007, CONVERTER, F/V Y1 1 S16665-5 8.0 MHZ | B. X15 1 IN15105-8 IC.AD738 CMOS CONV. D/A SERIAL 108 (SS X18 1 M13505-2 IC.LM3907, CONVERTER, F/V Y1 1 S18665-5 8.0 MHZ | .В. | | | S15018-19 | IC,3846,PWM CONTROLLER (SS) ??(H.S.S20590-1) | | | | | |
| Y1 1 ST6665-5 8.0 MHZ PROPRIETARY INFORMATION OWNED BY LINCOLN GLOBAL, INC. AND MAY NOT BE DUPLICATED, COMMUNICA D FOR ANY PURPOSE WITHOUT THE EXPRESS WRITTEN PERMISSION OF LINCOLN GLOBAL, INC. | Y1 1 \$16665-5 8.0 MHZ PROPRIETARY INFORMATION OWNED BY LINCOLN GLOBAL, INC. AND MAY NOT BE DUPLICATED, COMMUNICA D FOR ANY PURPOSE WITHOUT THE EXPRESS WRITTEN PERMISSION OF LINCOLN GLOBAL, INC. VIT TYPE: PRO-CUT 55 (DOMESTIC) PAGE 1 OF 1 PORTURE | | X15 | | M15105-8 | IC,AD739,CMOS,CONV,D/A,SERIAL,10B (SS | | | | | |
| PROPRIETARY INFORMATION OWNED BY LINCOLN GLOBAL, INC. AND MAY NOT BE DUPLICATED, COMMUNICA D FOR ANY PURPOSE WITHOUT THE EXPRESS WRITTEN PERMISSION OF LINCOLN GLOBAL, INC. | PROPRIETARY INFORMATION OWNED BY LINCOLN GLOBAL, INC. AND MAY NOT BE DUPLICATED. COMMUNICA D FOR ANY PURPOSE WITHOUT THE EXPRESS WRITTEN PERMISSION OF LINCOLN GLOBAL, INC. INT TYPE: PRO-CUT 55 (DOMESTIC) PAGE 1 OF 1 | | | | | | | | | | |
| | NT TYPE: PRO-CUT 55 (DOMESTIC) PAGE 1 OF 1 | | p., | | 01000010 | o.o miliz | | | | | |
| | NT TYPE: PRO-CUT 55 (DOMESTIC) PAGE 1 OF 1 | | | | | | | | | | |
| | NT TYPE: PRO-CUT 55 (DOMESTIC) PAGE 1 OF 1 | | | | | | | | | | |
| | NT TYPE: PRO-CUT 55 (DOMESTIC) PAGE 1 OF 1 | _ | | | | | | | | | |
| | NT TYPE: PRO-CUT 55 (DOMESTIC) PAGE 1 OF 1 | PR | OPRIETARY INFORMATION OWN | ED BY LI | NCOLN GLOBAL, I | INC. AND MAY NOT BE DUPLICATED, COMMUNICAT | | | | | |
| | DOCIMENT DOCIN | | | | | | | | | | |

REQ'D PART NO. IDENTIFICATION

ITEM

PC BOARD ASSEMBLY-OUTPUT (G4275-1)



NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln Electric discourages board level troubleshooting and repair since it may compromise the quality of the design and may result in danger to the Machine Operator or Technician. Improper PC board repairs could result in damage to the machine.

D

| | | | | | WNED BY LINCOLN GLOBA THE EXPRESS WRITTEN P | | NOT BE DUPLICATED, COMM NCOLN GLOBAL, INC. | IUNICATE |
|----------|-------------------------------|----------------|-----------------------------|----------------------------|--|---------|---|----------------------|
| | | SCALE: NONE | EQUIPMENT TYPE: | PLAS | PAGE OF | | | |
| A DEGREE | DRAWN BY: fivory ENGINEER: | | SUBJECT: | OUTPUT P.C | . BOARD ASSE | EMBLY | DOCUMENT NUMBER: | DOCUMEN REVISION: |
| ARDS. | APPROVED: GWM | UNITS: INCH | MATERIAL DISPOSITION: UF | APPROVAL 7/9/2010 DATE: | PROJECT NUMBER:CRM38101-BD | G3326-2 | G4275-1 | D |
| | | | | | | | | |

| | ITEM | REQ'D | | PA | rt no. | IDENTIFICATION | | | |
|------|----------------------|------------------|-------|----------------------------|--------------------------------------|---|--|--|--|
| | 1 | 1 | | SEE BLANK INF | =O. | P.C. BOARD BLANK | | | |
| ι.M. | 2 | 1 | | M16100-27 | | ELECTRONIC MODULE (S | | | |
| .M. | 3 | 1 | | M16100-28 | | MODULE POWER TERMINAL | | | |
| ŀ | 4 | 3 | | S23006 | | | | | |
| L | 5 | 2.0 OZ. | ! | E2861 | | SEALANT | | | |
| - | | | | | | | | | |
| H | | ITEM | REQ'D | | | | | | |
| F | 81,B2 | | 2 | T13157-14 | CONNECTOR, 14 | B,QC,VERTICAL,1/4,REE | | | |
| F | C1,C3,C11,C | ME | 4 | S20500-5 | | AE 0015 00001/ BOX | | | |
| | 2 | /15 | 4 | S13490-42 | CAPACITOR, TAE | MF,.0015,2000V,BOX | | | |
| | 25,C6,C7,C2 | 0 | 4 | S20500-1 | | WF,0.1,1000V,10%,BOX | | | |
| | 8,C12,C17 | .5 | 3 | S16668-7 | CAPACITOR, CEI | | | | |
| | 9,C10,C21 | | 3 | T11577-52 | | .0047/.005,1400V,20% | | | |
| | 213 | | 1 | S13490-72 | CAPACITOR, ALEL, 50, 50V, +75/-10% | | | | |
| C | 14 | | 1 | S13490-71 | CAPACITOR, ALE | EL,100,50V,+75/-10% | | | |
| C | 216 | | 1 | S13490-93 | CAPACITOR, TAE | | | | |
| C | 218 | | 1 | S13490-121 | | EL,1000,35V,+30/-20% | | | |
| C | C19,C28,C40 |) | 3 | S16668-11 | CAPACITOR, CEI | | | | |
| | 20,C23,C24 | 1,C25,C38 | 5 | S16668-5 | | MO,.022,50V,20% | | | |
| | 27,C30 | | 2 | T11577-58 | | .0047,3000V,20% | | | |
| C | 31,C32 | | 2 | T11577-46 | | .05,600V,+80/-20% | | | |
| | 39 | | 1 | S13490-135 | CAPACITOR, TAE | | | | |
| | | ,D5,D6,D7,D8,D9 | 22 | T12199-1 | DIODE, AXLDS, 1/ | A,400V | | | |
| | | 3,D14,D15,D16 | | | | | | | |
| | |),D21,D23,D25 | | | | | | | |
| | 026 | | 2 | T10705.04 | | A,400V,FR,1N4936 | | | |
| | 012,D22 018.D24 | | 2 | T12705-34 T12705-50 | DIODE, AXLDS, 17 DIODE, AXLDS, 37 | | | | |
| | 027,D28,D29 | 0.030 | 4 | T12705-50 T12705-46 | DIODE, AXLDS, 3/ | | | | |
| | Z1,DZ9,DZ1 | | 3 | T12702-29 | | W,15V,5% 1N4744A | | | |
| | 73 | 10 | 1 | T12702-23 | | W,15V,5% 1N5352B | | | |
| _ LE | | 1,DZ12,DZ14 | 5 | T12702-19 | | W,12V,5% 1N4742A | | | |
| | Z13 | .,,_ | 1 | T12702-11 | ZENER DIODE, 1 | W,16V,5% 1N4745A | | | |
| - J | 33 | | 1 | S18248-4 | CONNECTOR.MO | IVV,16V,5% IN4745A IOLEX,MINI,PCB,4-PIN | | | |
| J | 35 | | 1 | S18248-6 | | OLEX, MINI, PCB, 6-PIN | | | |
| J | 36 | | 1 | S18248-8 | CONNECTOR, MO | MOLEX, MINI, PCB, 8-PIN | | | |
| J | 37 | | 1 | S18248-10 | CONNECTOR, MO | DLEX, MINI, PCB, 10-PIN | | | |
| | 38 | | 1 | S18248-12 | | DLEX, MINI, PCB, 12-PIN | | | |
| J | 39 | | 1 | S24952-2G | | OLEX,MINI,PCB,2-PIN,GC | | | |
| L | | | 1 | T12218-2 | CHOKE, RF, 5.6M | H,10%,28MA,MOLDED | | | |
| | ED1,LED2 | | 2 | T13657-2 | LED, T-1, 3/4, RED | ,HLMP-3003 | | | |
| | ED3,LED4, | LED5,LED6 | 4 | T13657-3 | LED, T-1, 3/4, GRE | | | | |
| | DCI1 | | 1 | S15000-26 | OPTOCOUPLER | LOGIC-OUT, HCPL2201 (S | | | |
| | 0Cl2,0Cl3,C | | 3 | S15000-10 | | PHOTO-Q,70V,CNY17-3 | | | |
| | 01,03,07,0 02.04 | 8,09 | 2 | T12704-73 T12704-80 | | DIP,1A,100V,RFD110(SS) | | | |
| | 22,Q4 25 | | 2 | T12704-60 | | MF,T220,4A,100V,IRF510(PN,TO226,0.5A,40V,2N44 | | | |
| - H | 25 06 | | 1 | T12704-08 | TRANSISTOR, N | BT, T247, 1200V, 45A, FAS | | | |
| | | 1,R37,R38,R39 | 7 | T12704-80 | RESISTOR, WW, | | | | |
| | 12 | 1,1107,1100,1100 | 1 | S19400-5110 | RESISTOR, MF, 1 | | | | |
| Ē | 15 | | 1 | T14648-2 | RESISTOR, WW, | | | | |
| | 6,R8,R28,F | 158 | 4 | | RESISTOR, MF, 1 | /4W,1.50K,1% | | | |
| | 87 | | 1 | S19400-3320 | RESISTOR, MF, 1 | /4W,332,1% | | | |
| | 9,R13,R27 | | 3 | S19400-2213 | RESISTOR.MF.1 | /4W.221K.1% | | | |
| F | R10,R11,R24 | 1 | 3 | S19400-1211 | RESISTOR, MF, 1 | /4W,1.21K,1% | | | |
| | R12, R26 | | 2 | S19400-3921 | RESISTOR, MF, 1 | /4W,3.92K,1% | | | |
| | R14,R15,R16 | 6,R17,R33 | 5 | S18380-3 | | TC,.08-0.19 OHMS,1.85A | | | |
| | 18,R19 | | 2 | S23995-1 | | ER,13W,0.001OHMS,1.5 | | | |
| | 20,R54 | | 2 | S19400-2001 | RESISTOR, MF, 1 | | | | |
| | 122 | | 1 | S19400-3321 | RESISTOR, MF, 1 | /4W,3.32K,1% | | | |
| | 123,R25 | | 2 | T14650-4 | | 15W,2.5K,5%,SQ | | | |
| | 29,R55,R60 |) | 3 | S19400-1001 | | | | | |
| _ Ľ | 30 101 D20 | | 1 | S19400-4751 S19400-4750 | RESISTOR, MF, 1 | /4VV,4./5K,1% | | | |
| | 31,R32 | | 2 | S19400-4750 T14649-4 | RESISTOR, MF, 1 | | | | |
| | 135 | | 1 | S19400-1000 | RESISTOR, WW, RESISTOR, MF, 1 | | | | |
| | 36 50,R51,R52 | DE2 | 1 4 | S19400-1000 T14650-1 | | /4W,100,1% 15W,1.5K,5%,SQ | | | |
| | 850, H51, H52 856 | .,nəə | 4 | 114650-1 S19400-8250 | RESISTOR, WW, RESISTOR, MF, 1 | | | | |
| | 156 | | 1 | S19400-8250 S19400-8251 | | | | | |
| | 157 | | 1 | | RESISTOR, MF, 1 RESISTOR, MF, 1 | /4vv,o.201,1% /4W 5 11K 1% | | | |
| | 159 161 | | 1 | S19400-3711 S19400-3741 | | /4W/3.74K/1% | | | |
| | P1,TP2,TP3 | 3 | 3 | T13640-29 | MOV,480VRMS, | | | | |
| | P4 | - | 1 | T13640-9K | MOV,75VRMS,2 | | | | |
| | P5 | | 1 | T13640-15K | MOV,50VRMS,1 | | | | |
| 3. X | | | 1 | S15018-21 | IC,CMOS,DRIVE | R,MOSFET,4451(SS) | | | |
| | | | | | | , | | | |

G-10

MANUFACTURED AS:

G4275-1C0 \neg -IDENTIFICATION CODE

MAKE PER E1911 ENCAPSULATE WITH E1844, 3 COATS TEST PER E4065-O SCHEMATIC REFERENCE: L11918-1C0

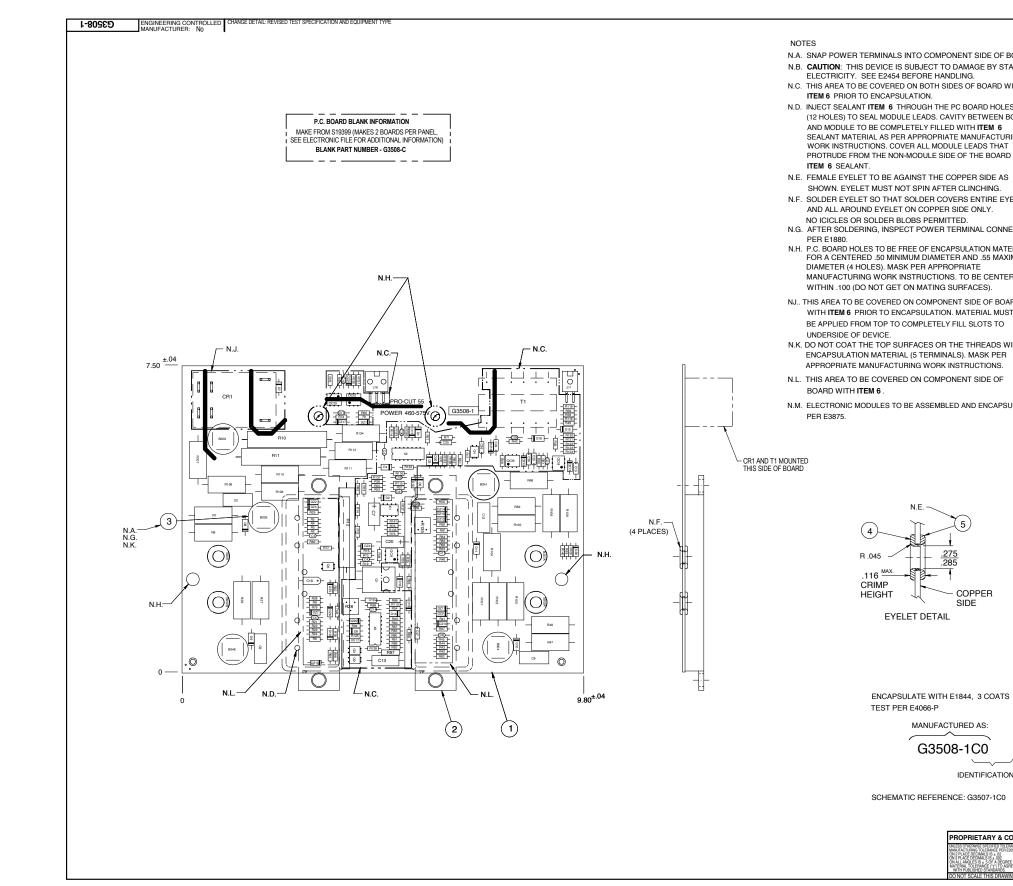
FOR PARTS ORDERS OR SUBSIDARY ORDERS:

INCLUDE (1) M18787PRINT, (1) S25191-1PRINT, (1) T12837-1 AND (2) S25347-1.

Return to Section TOC Return to Master TOC

Return to Section TOC Return to Master TOC

PC BOARD ASSEMBLY-POWER (G3508-1)



NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln Electric discourages board level troubleshooting and repair since it may compromise the quality of the design and may result in danger to the Machine Operator or Technician. Improper PC board repairs could result in damage to the machine.

| | | | | | ITEM | | REQ'D | PART NO | | | |
|---|---|---|-----------------|--|--------------------------|---------------------|-----------------------|---|----------------|----------------------------|------------|
| | C1,C5,C8,C11 C2,C6,C9,C12 | | | | | | 4 | S16668-6 S20500-4 | | 4700pF/50 | |
| | | | | | 1,C22,C28, | C29.C30 | 8 | S16668-5 | | .0047/1000 | v |
| OF BOARD. | | | | C31 | | , | | | | | |
| STATIC | | | | C4,C10,C1 | 7 | | 3 | S16668-9 | | 150pF/100 | |
| D WITH | | | | C7,C20 C13 | | 2 | S13490-9 S13490-8 | | 27/35 | | |
| | | | | C15,C16 | | | 2 | S13490-9 | | .33/50 | |
| 0. 50 | | | | C18 | | | 1 | S13490-3 | | 18/15 | |
| OLES | | | | | 24,C25,C26 | ,C27 | 6 | S13490-4 | | 1.0/35 | |
| EN BOARD | | | | CR1 | D4,D5,D6,D | 7 012 | 1 14 | S14293-1 T12199-1 | | DPST RELAY 1N4004 | |
| 6 TUDINO | | | | | 16,D17,D19 | | 14 | 112199-1 | | 114004 | |
| TURING HAT | | | | | ,D11,D15,D | | 6 | T12705-4 | 4 | DIODE 1000 | V/1A |
| ARD WITH | | | | DZ1,DZ5,D | | | 4 | T12702-4 | | 1N4735 | |
| | | | | | Z6,DZ7,DZ8 ,DZ14,DZ15 | | 11 | T12702-2 | 9 | 1N4744A | |
| AS | | | | DZ11, DZ13 | ,0214,0213 | ,0210 | 1 | T12702-1 | 9 | 1N4742A | |
| | | | | DZ17,DZ18 | ,DZ19,DZ20 | | 4 | T12702-4 | 5 | 1N4746A | |
| G. | | | | DZ21 | | | 1 | T12702-4 | | 1N4747 | |
| EYELET | | | | J10 J11 | | | 1 | S20351-6 S20351-4 | | HEADER | |
| | | | | | ,0CI3,0CI4 | ,OCI5 | 5 | S15000-2 | | OPTO ISOLA | TOR |
| | | | N.B. | | | | 1 | T12704-7 | | FET (SS) | |
| NNECTIONS | | | N.B. | Q2,Q3,Q4, | Q5 | | 4 | T12704-7 | | IC PKG MOSF | ET (SS) |
| | | | | | ,R25,R41,R | | 14 | S19400-1 | 0R0 | 10 1/4W | |
| /ATERIAL //AXIMUM | | | | R131 | 80,R81,R82 | ,RI30 | | | | | |
| | | | | R2,R3,R4, | R5,R18,R21 | ,R22 | 20 | S19400-1 | 001 | 1K 1/4W | |
| NTERED | | | | | 42,R43,R44 | | | | | | |
| 0 | | | | | 64,R65,R66 | ,R73 | | | | | |
| | | | | R127 R7,R8,R26 | ,R27,R47,R | 48,R68 | 8 | T14648-2 | 1 | 2.7 5W | |
| BOARD | | | | R69 | | | | | | | |
| NUST | | | | R9 | | | 1 | S19400-6 | | 681K 1/4W | |
| го | | | | R10,R11,R | | 225 | 3 | S24376-3 | | 100/10W 150K 1/4W | |
| | | | | R13,R14,R R50,R51,R | 15,R16,R34 83,R86 | , coo | 10 | 519400-1 | 202 | 130K 1/4W | |
| S WITH | | | | R17,R33,R | | | 3 | S19400-3 | 321 | 3.32K 1/4W | |
| ER | | | | | 74,R133,R1 | 37 | 5 | S19400-2 | | 221K 1/4W | |
| IS. | | | | R28 | 77,R125,R1 | 26 0120 | 1 8 | T10812-4 S19400-4 | | 10K 1/2W T 4.75K | RIMMER |
| DF | | | | R129,R32,R | | 20,8120 | l ° | 519400-4 | /51 | 4.75K | |
| | | | | R30,R49,R | 58,R59,R71 | | 13 | S19400-2 | 212 | 22.1K 1/4W | |
| | | | | | R119,R120, | R121 | | | | | |
| APSULATED | | | | R122,R123 | ,R124 | | 2 | S19400-4 | 753 | 475K 1/4W | |
| | | | | R31,R40 R36,R37,R | 52,R89,R90 | | 5 | S19400-4 S19400-6 | | 6.19K 1/4W | |
| | | | | R39,R53,R | | | 3 | S19400-1 | 002 | 10K 1/4W | |
| | | | | R54 | | | 1 | S19400-3 | | 33.2K 1/4W | |
| | | | | R55 R56 | | | 1 | S19400-5 S19400-6 | | 5.62K 1/4W 6.81K 1/4W | |
| | | | | R70 | | | 1 | S19400-2 | | 20K 1/4W | |
| | | | | R72,R136 | | 2 | S19400-1 | 000 | 100 1/4W | | |
| | | | | R75 | | | 1 | S19400-5 | | 562 1/4W | |
| | | | | R76 R78 | | | 1 | S19400-2 S19400-2 | | 2.94K 1/4W 26.7K 1/4W | |
| | | | | R84,R87,R | 141 | | 3 | S19400-3323 S19400-1212 S19400-1502 S19400-2802 S19400-4752 | | 332K 1/4W | |
| | | | | R85,R88 | | | 2 | | | 12.1K 1/4W | |
| | | | | R91,R92 | | | 2 | | | 15K 1/4W 28.0K 1/4W | |
| | | | | R93 R94 | | | 1 | | | 28.0K 1/4W 47.5K 1/4W | |
| | | | | R95,R96 | | | 2 | S19400-2 | | 2.21K 1/4W | |
| | | | | R97 | | | 1 | T12300-7 | | 1W 10HM 1% R | ESISTOR |
| | | | | R99,R100, | | 2105 | 3 | S19400-2001 T14648-10 | | 2.0K 1/4W | |
| | | | | | ,R103,R104 ,R108,R109 | | 12 | | | 1.2K 5W | |
| | | | | R111,R112 | | , | | | | | |
| | | | | R113 | | | 1 | S19400-2 | | 2.43K 1/4W | |
| | | | | | ,R116,R117 | | 4 | S19400-1 | | 1M 1/4W | |
| | | | | R134,R139 R135 | | | 2 | T14648-1 T10812-7 | | 700 5W 100 1/2W T | RIMMER |
| | | | | R135 | | | 1 | S19400-1 | | 133K 1/4W | |
| | | | | | | | | | | | |
| | | | | T1 X1 | | | 1 | S13000-4 S15128-1 | | TRANSFORME | |
| | | | | X2,X3 | | | 2 | S15128-1 S15128-4 | | IC,431,VOLT. IC,LM224,0 | |
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| | | | | | | CAPACT | TORS = | MFD/VO | LTS | | |
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| | | | | | ITEM | REQ'D | DAD | T NO | | TDENTIFIC | NOTTAT |
| | | | | | 1 | 1 | PART NO. SEE BLANK | | IDENTIFICATION | | |
| | | | | в., м.м. | 2 | M16100-25 | | P.C. BOARD BLANK ELECTRONIC MODULE | | | |
| N - | | | | D., N.M. | 3 | M16100-25 S23006 | | ELECTRONIC MODULE POWER TERMINAL | | | |
| | | | | | 4 | S23006 T9147-15 | | EYELETS (MALE) | | | |
| | | | | | 5 | - | | EYELETS (FEMALE) | | | |
| | | | | | | | | | | | ر تدبيد |
| 6 2.0 0Z. E2861 SEALANT | | | | | | | | | | | |
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| C0 FOR PARTS ORDERS OR SUBSIDIARY ORDE | | | | | | | | | IDEU9: | | |
| INCLUDE (1) T12837-1 JOINT COMPOUND | | | | | | | | | | | |
| | (2) S25347-2 INTERFACE PAD AND (1) S25191-1PRINT | | | | | | | | | | |
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