



**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.

## IDEALARC<sup>®</sup> AC-1200 / AC-1500

For use with machines having Code Numbers:

**10291C, 10292C, 10465, 10466,  
11418, 11869, 12387**

# SERVICE MANUAL



## ⚠ WARNING

### ⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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



### FOR ENGINE powered equipment.

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



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



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

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

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

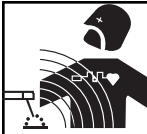


1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

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



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



### ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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



### ELECTRIC SHOCK can kill.

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

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

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

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

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

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

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

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

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

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

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

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



### ARC RAYS can burn.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.

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

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



### FUMES AND GASES can be dangerous.

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

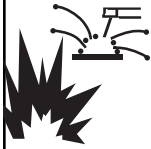
5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically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

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

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

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

5.f. Also see item 1.b.



## WELDING and CUTTING SPARKS can cause fire or explosion.

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

- 6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.
- 6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- 6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- 6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
- 6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- 6.h. Also see item 1.c.
- 6.i. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.
- 6.j. Do not use a welding power source for pipe thawing.



## CYLINDER may explode if damaged.

- 7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.
- 7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 7.c. Cylinders should be located:
  - Away from areas where they may be struck or subjected to physical damage.
  - A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.
- 7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
- 7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



## FOR ELECTRICALLY powered equipment.

- 8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.
- 8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
- 8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

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

## PRÉCAUTIONS DE SÛRETÉ

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

### Sûreté Pour Soudage A L'Arc

1. Protégez-vous contre la secousse électrique:
  - a. Les circuits à l'électrode et à la pièce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
  - b. Faire très attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
  - c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état de fonctionnement.
  - d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
  - e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
  - f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s'appliquent aussi au pistolet de soudage.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas où on reçoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.
3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:
  - a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
  - b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
  - c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.
4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.
5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans latéraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.
7. Quand on ne soude pas, poser la pince à un endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus près possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'échauffement des chaînes et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particulièrement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumées toxiques.
10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgène (gas fortement toxique) ou autres produits irritants.
11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le châssis du poste conformément au code de l'électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce à souder doit être branché à une bonne mise à la terre.
2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.
3. Avant de faire des travaux à l'intérieur de poste, la débrancher à l'interrupteur à la boîte de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

## Electromagnetic Compatibility (EMC)

### Conformance

Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

### Introduction

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

### Installation and Use

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

### Assessment of Area

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

- a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
- b) radio and television transmitters and receivers;
- c) computer and other control equipment;
- d) safety critical equipment, e.g., guarding of industrial equipment;
- e) the health of the people around, e.g., the use of pacemakers and hearing aids;
- f) equipment used for calibration or measurement
- g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
- h) the time of day that welding or other activities are to be carried out.

## Electromagnetic Compatibility (EMC)

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

### Methods of Reducing Emissions

#### Mains Supply

Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

#### Maintenance of the Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

#### Welding Cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

#### Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

#### Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

#### Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications. <sup>1</sup>

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<sup>1</sup> Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

**- MASTER TABLE OF CONTENTS FOR ALL SECTIONS -**

|   | Page   |
|---|--|
| <b>Safety</b> .....                     | <b>.i-vi</b>   |
| <b>Installation</b> .....               | <b>Section A</b>   |
| <b>Operation</b> .....                  | <b>Section B</b>   |
| <b>Maintenance</b> .....                | <b>Section D</b>   |
| <b>Theory of Operation</b> .....        | <b>Section E</b>   |
| <b>Troubleshooting and Repair</b> ..... | <b>Section F</b>   |
| <b>Electrical Diagrams</b> .....        | <b>Section G</b>   |
| <b>Parts Manual</b> .....               | <b>Idealarc AC-1200 - P-119</b><br><b>Starter - P-28</b><br><b>Remote Control - P-84</b> |



**Installation** ..... **A-1**

    Location ..... A-2

    Input Wiring ..... A-2

    Output Connections ..... A-2

    Duty Cycle ..... A-4

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

## LOCATION

Install the welder in a dry location where there is free circulation of air in through the louvers in front and out through the louvers in the back of the case. A location which minimizes the amount of smoke and dirt drawn into the machine reduces the chance of dirt accumulation that can block air passages and cause overheating.

## INPUT WIRING

### ⚠ 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.

**Failure to fuse the input lines per the specifications in this manual will constitute customer abuse and void the warranty.**

Have a qualified electrician make the complete input connection in accordance with the National Electrical Code, all local codes and the connection diagram located inside the machine.

Be sure the voltage, phase and frequency of the input power is as specified on the welder nameplate.

For most installations, connect the AC-1200 to single phase power or to one phase of a three phase line. Unbalanced line conditions can be easily avoided by properly balancing the AC-1200 with other machinery on the lines.

When installing two or four Scott connected AC-1200 machines for AC-AC tandem arc welding, three phase input power must be used. The terminals for connections to provide an output phase angle less than or greater than the usual 90% phase angle are included on the input panel.

The AC-1200 does not have an input contactor. Therefore, include an external starter or disconnect switch when planning the input circuit.

Remove the right side panel of the AC-1200 and bring the input power lines through the hole in the back of the case. See the table below for recommended sizing of input leads and overcurrent protection.

The frame of the welder must be grounded, A stud marked with the symbol  $\equiv$  located on the welder case back hole in the back of the case is provided for this purpose. See the National Electrical Code for details on proper grounding methods.

## OUTPUT CONNECTIONS

### A. Wire Feeder Connection

Turn the input power to the welder off. Remove the screw and lift the hinged door on the front of the control panel to expose the terminal strips. Connect the leads of the wire feeder input control cable to the terminal strips exactly as specified in the appropriate connection diagram. The AC-1200 to NA-4 connection diagrams are included in the NA-4 Operating Manual IM-278. Attach the control cables to the panel at the right of the terminal strip using the clamps provided.

If connecting the AC-1200 to an older NA-4 with the toggle switch type 'Current Control' (below code 7532), a K-775 'Remote Control' must be purchased and installed in accordance with the connection diagram S-15667 on page A-3. The 'Remote Control' cord can be lengthened to any length by properly splicing a four conductor cord to the standard 25' cord before connecting to the AC-1200 terminal strip.

If connecting the AC-1200 to an LAF-4 or the AC controls of the LT-34 tractor, the AC-1200 must be ordered with the required '-NL' optional circuit installed. This kit includes the K-775 'Remote Control'. Connect in accordance with diagram S-15666 on page A-3.

To connect the AC-1200 to any other wire feeder, write to the factory for instructions giving complete nameplate information for the specific equipment.

When connection to the terminal strips are completed, close the door and replace the screw.

**RATING: IP21 Enclosure, Insulation 155(f)**

IDEALARC® AC-1200

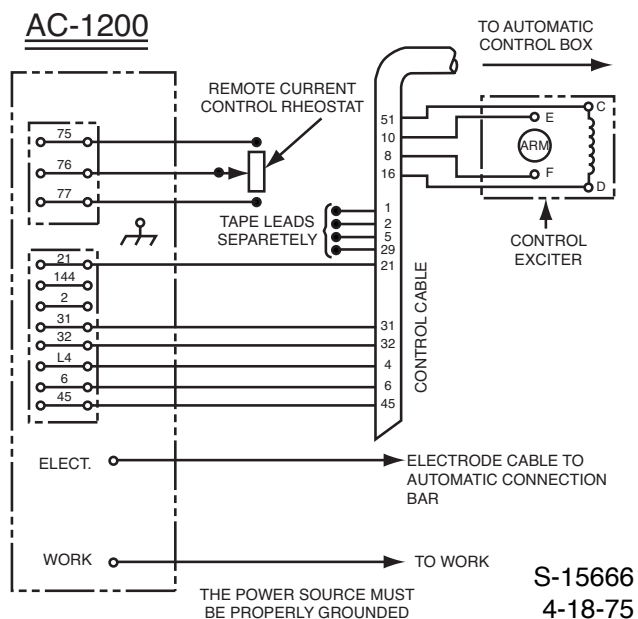


**FIGURE A.1 – RECOMMENDED INPUT WIRE, GROUNDING CONDUCTOR AND FUSE SIZES BASED ON NATIONAL ELECTRICAL CODE - 100% DUTY CYCLE 40°C (104°F) AMBIENT**

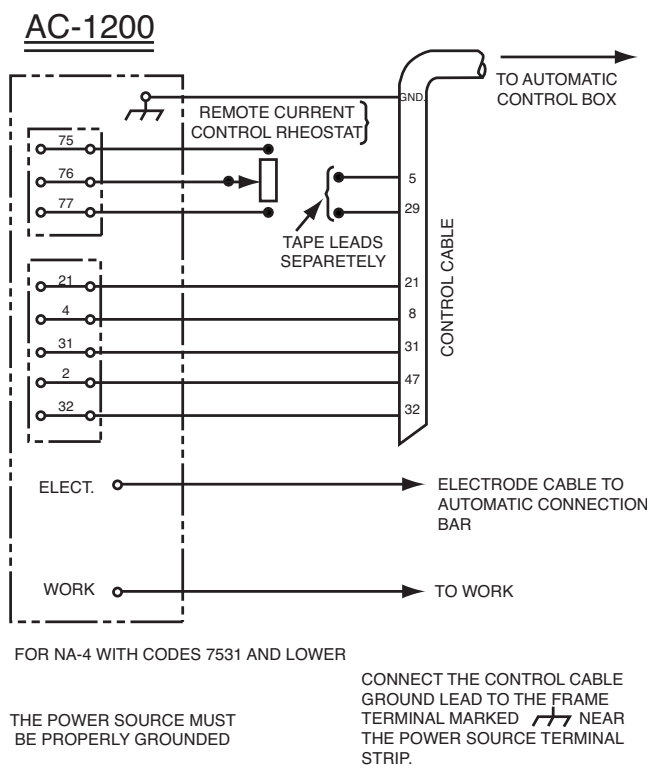
| Input Voltage / Hertz | Input Amps |             | Copper Wire Size - 75° in Conduit |             |             |             |                     |             |             |             | Super Lag Fuses Size In Amps |             |
|-----------------------|------------|-------------|-----------------------------------|-------------|-------------|-------------|---------------------|-------------|-------------|-------------|------------------------------|-------------|
|                       |            |             | Power Input Wires                 |             |             |             | Grounding Conductor |             |             |             |                              |             |
|                       | 1 Phase    | Scott Conn. | 1 phase                           | T & B Term. | Scott Conn. | T & B Term. | 1 phase             | T & B Term. | Scott Conn. | T & B Term. | 1 phase                      | Scott Conn. |
| 460/60                | 182        | 209         | #4/0                              | 31013       | 250MCM      | 31013       | #4                  | 31007       | #3          | 31007       | 300                          | 350         |
| 440/50/60             | 190        | 219         | #4/0                              | 31013       | 250MCM      | 31013       | #4                  | 31007       | #3          | 31007       | 300                          | 350         |
| 380/50/60             | 230        | 254         | 250MCM                            | 31013       | 350MCM      | 31015       | #3                  | 31007       | #3          | 31007       | 300                          | 400         |

Thomas & Betts wire terminals (or equal) recommended above are required to comply with applicable U.L. standards for safety. A #30 hex (Allen) key wrench is required for assembly of terminals to wire.

**FIGURE A.2 – CONNECTION OF AC-1200 (WITH NL OPTION) TO LAF-4 OR LT-34**




**FIGURE A.3 – CONNECTION OF AC-1200 TO NA-4 WITH SWITCH FOR 'CURRENT CONTROL'**



S-15667  
4-18-75

**FIGURE A.4 – CONNECTION OF AC-1200 TO NA-4 WITH RHEOSTAT FOR CURRENT CONTROL OR LT-6**

**WARNING:** Turn power source off before making these connections.

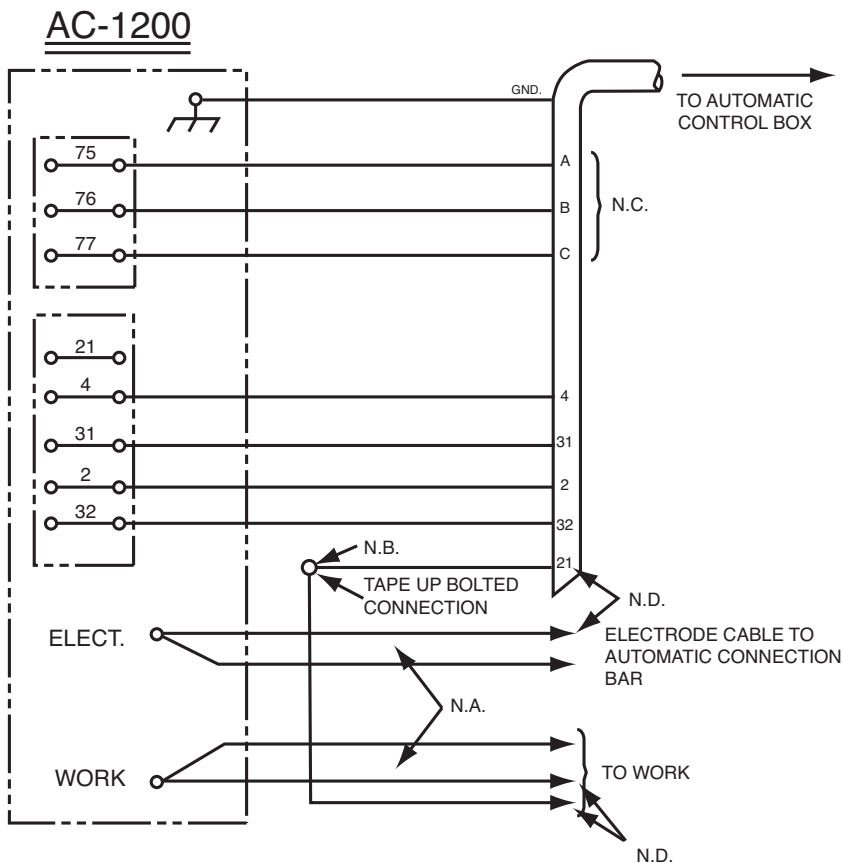
Connect the control cable ground lead to the frame terminal marked  near the power source terminal strip. The power source grounding terminal (marked and located near the power source input power connection) must also be connected to electrical ground per the power source Operating Manual.

**N.A.** Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications. See the Operating Manual for proper sizes.

**N.B.** Extend lead 21 using #14 or larger insulated wire physically suitable for the installation. An S16586-LENGTH remote voltage sensing work lead is available for this purpose. Connect it directly to the work piece keeping it electrically separate from the welding work lead circuit and connection.

**N.C.** If using an older control cable connect lead #75 to #75 on terminal strip, connect lead #76 to #76 on terminal strip, connect lead #77 to #77 on terminal strip.

**N.D.** To avoid possible induced NA-4 or LT-6 meter reading error; keep the control leads, including the extended #21 lead separated from the A.C. welding cables by at least 12 inches.



S-15602  
6-22-84H

## B. Output Studs

Connect the work cables to the 'To Work' stud on the front of the Ac-1200. Connect the electrode cables to the 'Min,' 'Med' or 'Max' studs for the output desired. Actual current ranges for each stud are indicated on the nameplate above each stud. Recommended cable sizes are listed below. Both the 'To Work' and 'Max' studs have two terminals to simplify connection of recommended cables in parallel. Tighten the nuts with a wrench.

Select cables required for combined work and electrode cable lengths up to 150' from the following table:

| Duty Cycle | One 4/0 | Two 4/0 | Three 4/0 | Four 4/0 |
|------------|---------|---------|-----------|----------|
| 100%       | 500     | 930     | 1150      | 1350     |
| 80%*       | 560     | 1040    | 1290      | 1510     |

\* Based on 10 minute cycle.

## Maximum Allowable Current for Copper Welding Cable

Cables in accessory kit recommended below have terminals as required to comply with applicable U.L. standards for safety.

150' combined length electrode and work cables.

## C. Auxiliary Power

1000 volt-amperes of 115 volt AC power are available from #31 and #32 on the AC-1200 terminal strip.

## DUTY CYCLE

The AC-1200 is rated for 100% duty cycle at 1200 amps and 44 volts.

**Operation** ..... **B-1**

    Safety Precautions ..... B-2

    To Set For Machine Or Remote Control ..... B-2

    To Set The Output Current ..... B-2

    To Weld With Manual Electrodes ..... B-2

    Connection Diagrams ..... B-3/B-6

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

## SAFETY PRECAUTIONS

Read and understand this entire section before operating the machine.

### WARNING



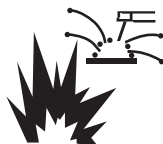
#### **ELECTRIC SHOCK can kill.**

- 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 SPARKS can cause fire or explosion**

- Keep flammable material away.
- Do not weld on containers that have held combustibles.



#### **ARC RAYS can burn.**

- Wear eye, ear and body protection.

Observe additional Safety Guidelines detailed throughout this manual.

## TO SET FOR MACHINE OR REMOTE CONTROL

The output can be controlled either from the AC-1200, the wire feeder or other remote locations.

To adjust the current from the wire feeder or other remote locations, set the toggle switch on the front of the AC-1200 to 'Output Control Remote'. To adjust the output current from the AC-1200, set this switch to 'Output Control at AC-1200'.

## TO SET THE OUTPUT CURRENT

Start the AC-1200 using the line disconnect switch or breaker installed with the input wiring. The red pilot light on the front panel indicates when the welder is on.

Adjust the output current from minimum to maximum within the range set by the output stud connections using either the 'Output Control' rheostat on the AC-1200 (toggle switch set on 'Panel Control') or the wire feeder or other remote rheostat (toggle switch set on 'Output Control Re-mote').


## TO WELD WITH MANUAL ELECTRODES

Turn the welder off, disconnect the wire feeder leads and connect a jumper between #2 and #4 on the AC-1200 terminal strip. This closes the output contactors making the output studs electrically 'hot' whenever the machine is on. Adjust the output current as described above. Caution: If the wire feeder electrode cables are left connected to the output studs, the wire feeder nozzle and electrode will be electrically 'hot'.

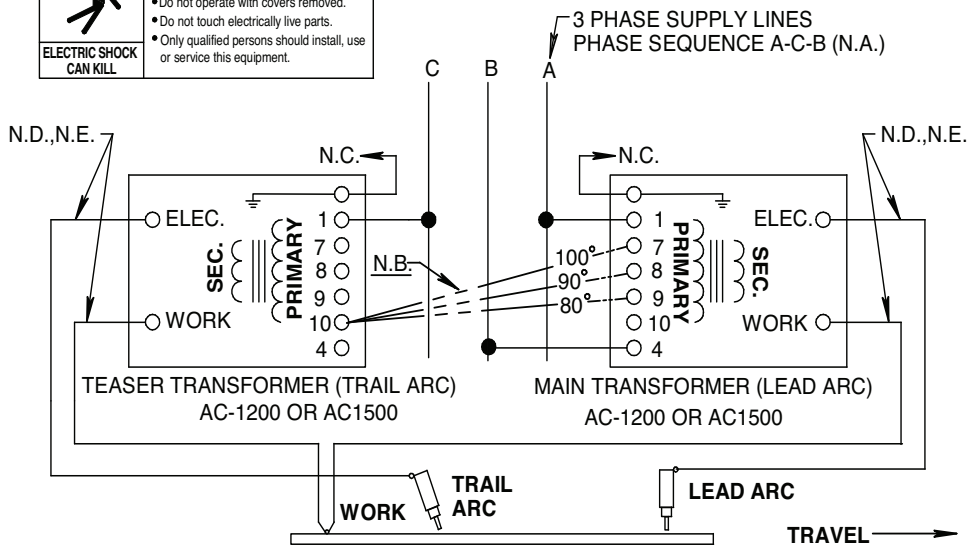
FIGURE B.1 – AC-1200 SCOTT CONNECTION DIAGRAM

## TWO SINGLE MACHINES SCOTT CONNECTED

**WARNING**



- Disconnect input power before servicing.
- Do not operate with covers removed.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.



NOTE: The two arcs must be properly phased relative to each other, if the electrical connections are not as shown above, poor welding will result.

A way to verify the proper phase angle and phase sequence is to measure the A.C. voltage at the welding nozzles.

1. **Do not weld** during the voltage measurements. Back the electrode out of each wire drive, then press the NA-4 start buttons.

**CAUTION** - Voltage will be high between the two electrode nozzles.

2. Voltage readings between nozzles to work, and nozzle to nozzle should be per table:

| PHASE ANGLE | LEAD ARC TO WORK<br>V | TRAIL ARC TO WORK<br>V | LEAD ARC TO TRAIL ARC |              |
|-------------|-----------------------|------------------------|-----------------------|--------------|
|             |                       |                        | Value                 | Relationship |
| 100°        | 90 VAC                | 90 VAC                 | 138 VAC               | 1.53 x V     |
| 90°         | 90 VAC                | 90 VAC                 | 127 VAC               | 1.41 x V     |
| 80°         | 90 VAC                | 90 VAC                 | 116 VAC               | 1.29 x V     |

If voltages do not agree, recheck all wiring and the proper sequence of the input supply lines.

- \* If using the 90° phase angle connection, the phase sequence cannot be determined by voltage measurement. To determine the phase sequence use one of the following methods.

1. Use a phase meter.
2. Use an oscilloscope.
3. Temporarily reconnect the machine to either the 100° tap or the 80° tap and check the voltage per note 2.

N.A. To obtain proper phase sequence at the welding arcs, the input line sequence must be A-C-B.

N.B. Interconnect machines as shown for the desired phase angle.

N.C. Frames of all welding power sources must be grounded per National Electric Code.

N.D. Electrode cables of paralleled machines should be connected to the same range tap.

N.E. The weld cables for each arc, and work must be of proper capacity for the current and duty cycle of the immediate and future applications.

B

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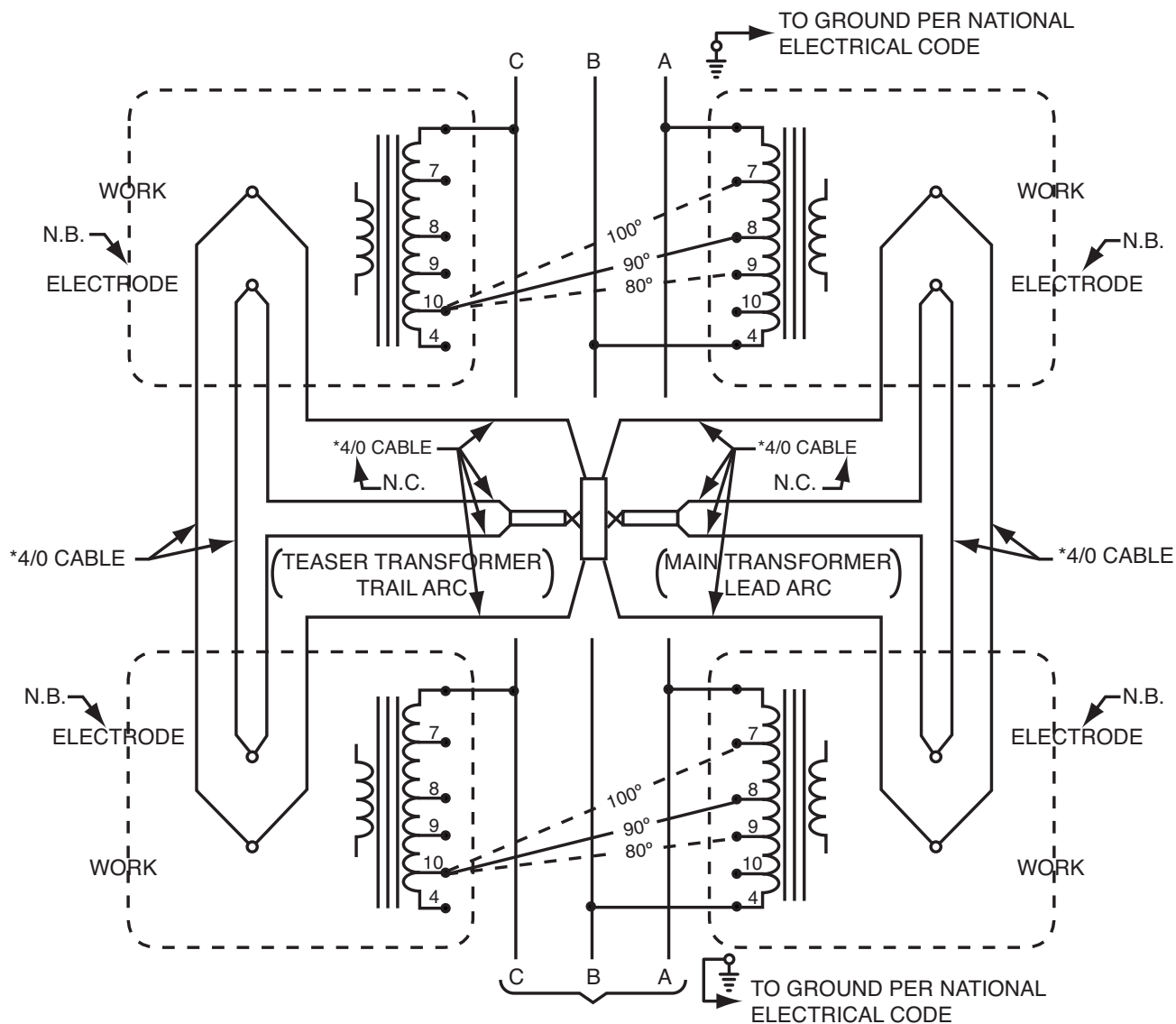
Return to Section TOC

Return to Master TOC

### FIGURE B.2 – AC-1200 SCOTT CONNECTION DIAGRAM

TWO PARALLEL MACHINES SCOTT CONNECTED TO TWO OTHER PARALLEL MACHINES

FOR DESIRED PHASE ANGLE, INTERCONNECT MACHINES (AS SHOWN BELOW). BOTH PHASE ANGLES MUST BE THE SAME.



3 PHASE SUPPLY LINES (N.A.)

N.A. TO OBTAIN PHASE SEQUENCE AT THE WELDING ARCS THE INPUT LINE PHASE SEQUENCE SHOULD BE A-C-B.

N.B. ELECTRODE CABLES OF PARALLELED MACHINES SHOULD BE CONNECTED TO THE SAME RANGE TAP.

N.C. NUMBER \*4/0 CABLES CONNECTED = 1 ON MIN. TAP; < PARALLEL ON MED. TAP; 3 PARALLEL ON MAX. TAP.

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

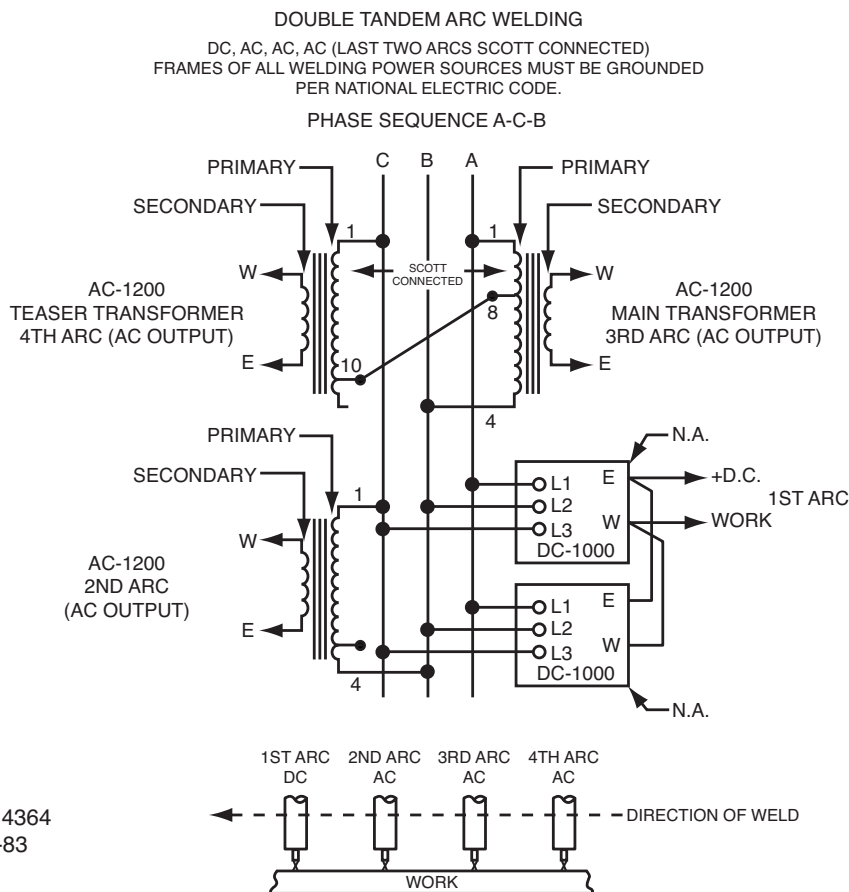
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## FIGURE B.3 – AC-1200 AND PARALLELED DC-1000'S



- NOTE:** THE THREE AC ARCS MUST BE PROPERLY PHASED RELATIVE TO EACH OTHER. IF THE ELECTRICAL CONNECTIONS ARE NOT AS SHOWN ABOVE, POOR WELDING WILL RESULT.
- (A.) ONE WAY TO VERIFY PROPER PHASE ANGLE AND PHASE SEQUENCE IS TO USE AN OSCILLOSCOPE AS FOLLOWS:
- 1.) DO NOT WELD DURING THE FOLLOWING MEASUREMENTS. BACK THE ELECTRODE OUT OF THE DRIVE ROLLS. PRESS THE NA-4 START BUTTONS.
  - 2.) EXTERNALLY TRIGGER THE SCOPE FROM THE VOLTAGE ON THE 4TH NOZZLE.
  - 3.) CONNECT THE SCOPE INPUT TO EACH AC NOZZLE AND NOTE THE TIME OR PHASE DIFFERENCE BETWEEN ALL THREE. THEY SHOULD LOOK LIKE FIG. 1.

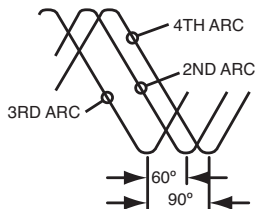


FIG. 1

| PHASE ANGLE | 50 HZ TIME | 60 HZ TIME |
|-------------|------------|------------|
| 60°         | 3.3 m sec. | 2.8 m sec. |
| 90°         | 5.0 m sec. | 4.2m sec.  |

- (B.) ANOTHER WAY TO VERIFY PROPER PHASE ANGLE AND PHASE SEQUENCE IS TO MEASURE THE AC VOLTAGES BETWEEN THE NOZZLES.
- 1.) DO NOT WELD DURING THE FOLLOWING MEASUREMENTS, BACK THE ELECTRODE OUT OF THE DRIVE ROLLS, PRESS THE NA-4 START BUTTONS.
  - 2.) THE VOLTAGE READINGS BETWEEN THE NOZZLES SHOULD BE PER THE TABLE BELOW.

| WELDER OCV<br>2ND ARC<br>NOZZLE TO WORK | VOLTAGE<br>BETWEEN<br>2ND & 3RD ARC<br>NOZZLES | VOLTAGE<br>BETWEEN<br>3RD & 4TH ARC<br>NOZZLES | VOLTAGE<br>BETWEEN<br>2ND & 4TH ARC<br>NOZZLES |
|---|--|--|--|
| V                                       | V  | 1.41 V   | .52 V  |
| 40                                      | 90   | 127  | 47   |

VOLTAGE RELATIONSHIPS →  
 VALUES AT RATED INPUT VOLTS (60 HZ) →

IF THE VOLTAGE READINGS DO NOT AGREE, RE-CHECK ALL WIRING AND FOR PROPER PHASE SEQUENCE OF THE INPUT SUPPLY LINES.

N.A. REFER TO DC-1000 PARALLELING KIT (T-14400). KIT CONTAINS CONTROL CABLE ASSEMBLY AND PARALLELING DIAGRAM INSTRUCTION SHEET. DIAGRAM SHOWS DETAILED INFORMATION FOR PARALLELING INPUTS, OUTPUTS AND CONTROL LEADS.

IDEALARC® AC-1200



Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

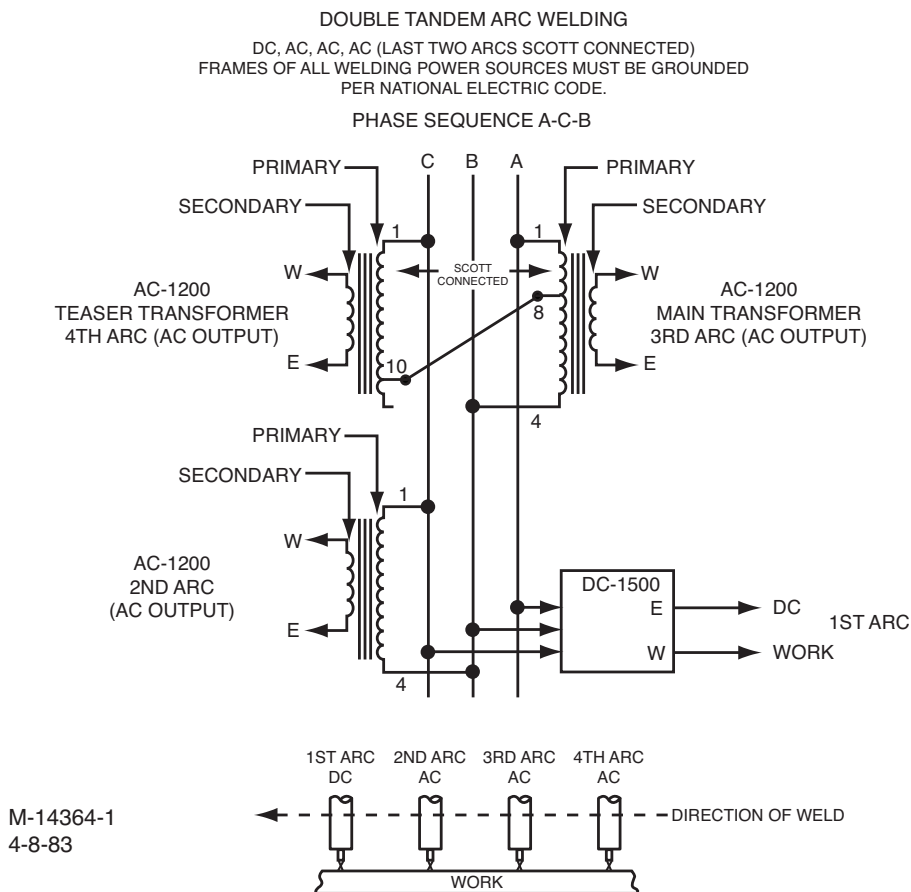
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Return to Master TOC

Return to Master TOC

**FIGURE B.4 – AC-1200 AND DC-1500'S**



**NOTE:** THE THREE AC ARCS MUST BE PROPERLY PHASED RELATIVE TO EACH OTHER. IF THE ELECTRICAL CONNECTIONS ARE NOT AS SHOWN ABOVE, POOR WELDING WILL RESULT.

- (A.) ONE WAY TO VERIFY PROPER PHASE ANGLE AND PHASE SEQUENCE IS TO USE AN OSCILLOSCOPE AS FOLLOWS:
- 1.) DO NOT WELD DURING THE FOLLOWING MEASUREMENTS. BACK THE ELECTRODE OUT OF THE DRIVE ROLLS. PRESS THE NA-4 START BUTTONS.
  - 2.) EXTERNALLY TRIGGER THE SCOPE FROM THE VOLTAGE ON THE 4TH NOZZLE.
  - 3.) CONNECT THE SCOPE INPUT TO EACH AC NOZZLE AND NOTE THE TIME OR PHASE DIFFERENCE BETWEEN ALL THREE. THEY SHOULD LOOK LIKE FIG.1.

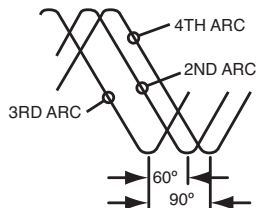


FIG. 1

| PHASE ANGLE | 50 HZ TIME | 60 HZ TIME |
|-------------|------------|------------|
| 60°         | 3.3 m sec. | 2.8 m sec. |
| 90°         | 5.0 m sec. | 4.2m sec.  |

- (B.) ANOTHER WAY TO VERIFY PROPER PHASE ANGLE AND PHASE SEQUENCE IS TO MEASURE THE AC VOLTAGES BETWEEN THE NOZZLES.

- 1.) DO NOT WELD DURING THE FOLLOWING MEASUREMENTS, BACK THE ELECTRODE OUT OF THE DRIVE ROLLS, PRESS THE NA-4 START BUTTONS.
- 2.) THE VOLTAGE READINGS BETWEEN THE NOZZLES SHOULD BE PER THE TABLE BELOW.

| WELDER OCV<br>2ND ARC<br>NOZZLE TO WORK | VOLTAGE<br>BETWEEN<br>2ND & 3RD ARC<br>NOZZLES | VOLTAGE<br>BETWEEN<br>3RD & 4TH ARC<br>NOZZLES | VOLTAGE<br>BETWEEN<br>2ND & 4TH ARC<br>NOZZLES |
|---|--|--|--|
| V                                       | V  | 1.41 V   | .52 V  |
| 40                                      | 90   | 127  | 47   |

VOLTAGE RELATIONSHIPS VALUES AT RATED INPUT VOLTS (60 HZ)

IF THE VOLTAGE READINGS DO NOT AGREE, RE-CHECK ALL WIRING AND FOR PROPER PHASE SEQUENCE OF THE INPUT SUPPLY LINES.

**Maintenance** .....D-1

Safety Precautions .....D-2

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

## SAFETY PRECAUTIONS

**⚠ WARNING**

**ELECTRIC SHOCK can kill.**

- Have qualified personnel do the maintenance and troubleshooting work.
- Turn the input power **OFF** at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically live parts or electrode with skin or wet clothing.
- Insulate yourself from work and ground.
- Always wear dry insulating gloves.

-----  
**See additional warning information throughout this operator's manual.**  
-----

1. Every three months, blow out the machine with compressed air. More frequent cleaning may be necessary in areas with chemical or metallic particles and large quantities of dust.
2. The fan motors have sealed bearings which require no service.

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Theory of Operation .....E-1

General Description .....E-2

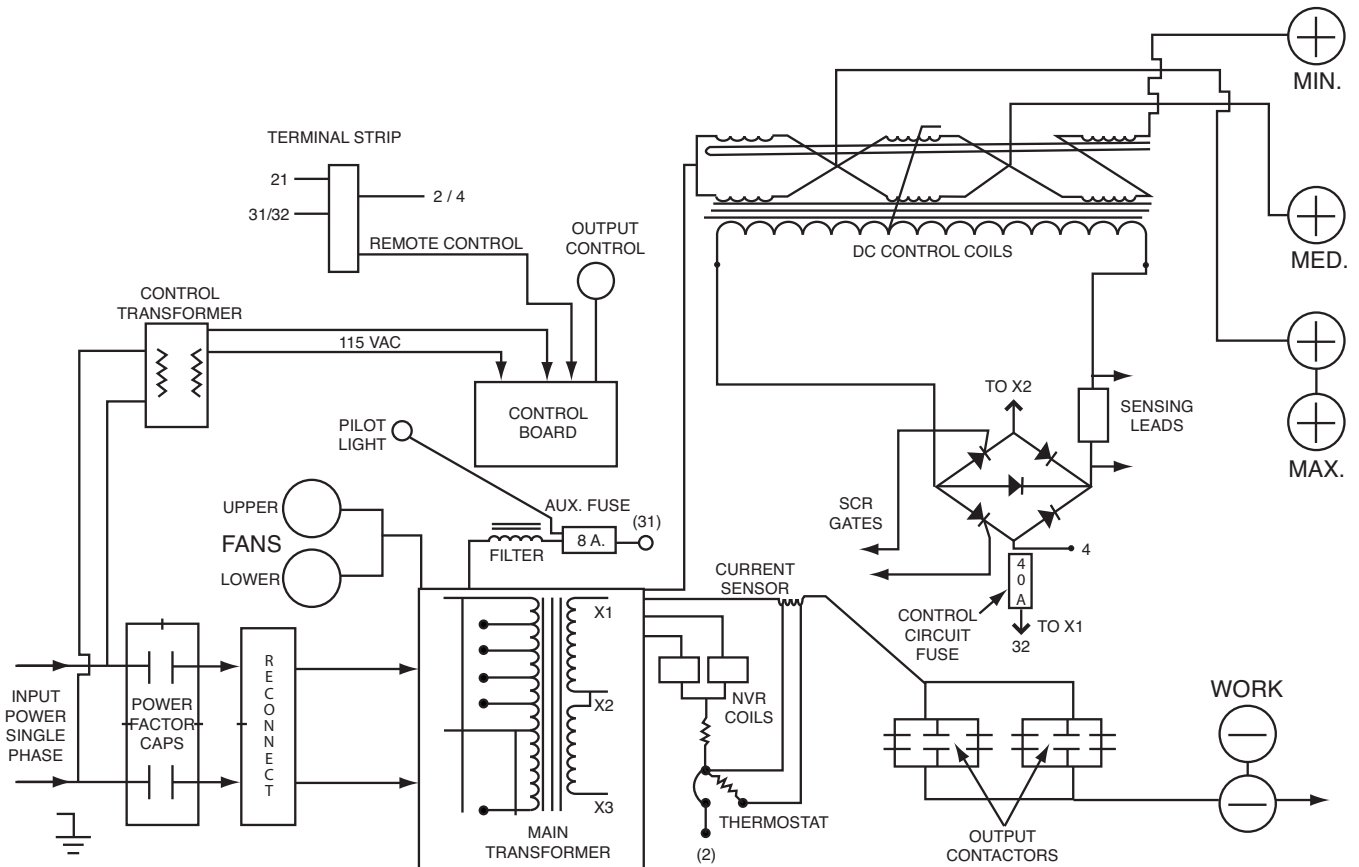
Input Line Voltage, Power Factor Correction Capacitors And Main Transformer .....E-2

Output, Control And Feedback .....E-3

Protection Devices And Circuits .....E-4

SCR Operation .....E-5

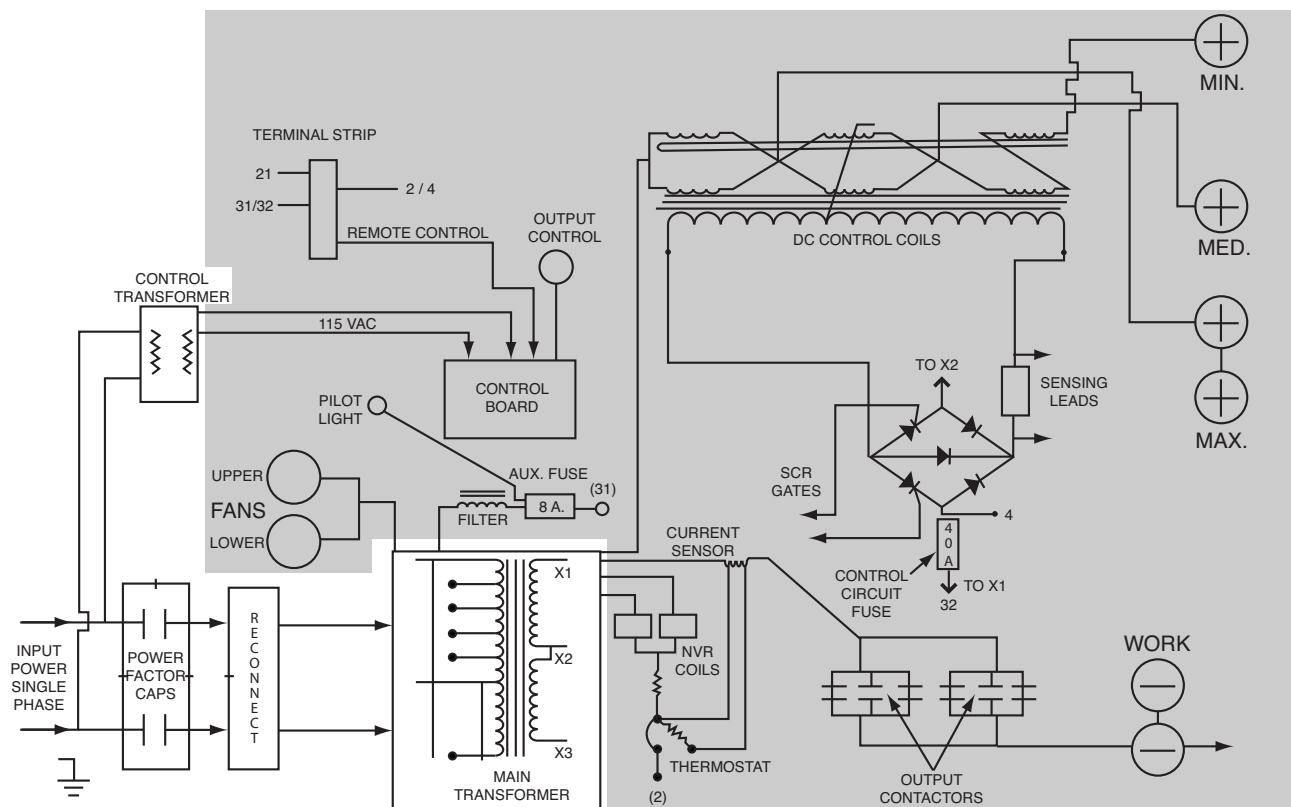
**FIGURE E.1 BLOCK LOGIC DIAGRAM**



**IDEALARC® AC-1200**



FIGURE E.2 - INPUT LINE VOLTAGE, POWER FACTOR CAPACITORS AND MAIN TRANSFORMER



## GENERAL DESCRIPTION

The AC-1200 is a single phase transformer-saturable reactor type power supply intended for use primarily in automatic or semiautomatic variable voltage (constant current) AC welding applications. It can be used to supply one automatic welder head or two units may be used in Scott connection to provide two phase power to welder heads in tandem. Control of welding current is obtained by solid state control of the DC saturation of the saturable reactor. It is designed to be controlled with a single range potentiometer output control.

## INPUT LINE VOLTAGE, POWER FACTOR CORRECTION CAPACITORS, AND MAIN TRANSFORMER

The desired single phase power is connected to the AC-1200 through an reconnect panel located at the rear of the machine. The input lines are also connected to the Power Factor Capacitors and the Control Transformer, which supplies 115 VAC to the P.C. board.

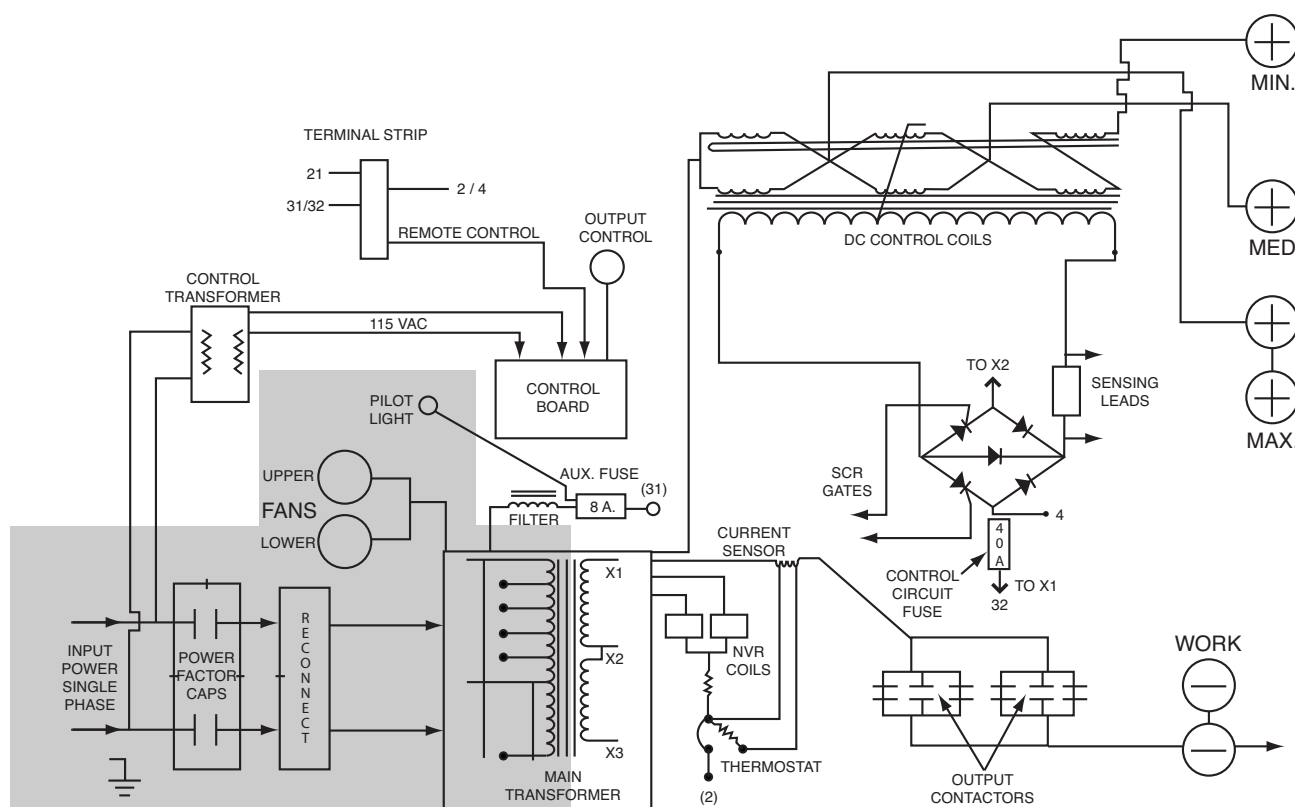
A Reconnect Panel allows the user to configure the machine for the desired input voltage. This AC input voltage is applied to the primary of the Main Transformer and also to the Power Factor Capacitors, required due to the high inductance of the Main Transformer. The transformer changes the high voltage, low current input power to a low voltage, high current output. The secondary windings supply power to the fans, the output contactor coils, and the DC control coils.

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

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FIGURE E.3 - OUTPUT RECTIFICATION, CONTROL &amp; FEEDBACK



## OUTPUT, CONTROL AND FEEDBACK

The three secondary taps of the Main Transformer provide AC voltage to the saturable reactor, the fans, the output contactor coils and the Work Stud. The solid state control of the saturable reactor consists of two assemblies; a PC board and a Diode-SCR Bridge Assembly. The Control Transformer provides the 115VAC for the PC board portion of the circuit while the welder transformer secondary provides 90VAC power for the Diode-SCR Bridge. The Bridge provides the reactor DC saturating ampere-turns. The Output Contactors are closed by a connection of the #2 and #4 leads on the Terminal Strip, which supplies voltage to the Output contactor coils.

Auxiliary power of 115 VAC is available at terminals #31 and #32 on the terminal strip. A filter choke is required in the auxiliary power circuit to provide an acceptable waveshape for wire feeder operation.

Output welding current is available in three overlapping ranges by means of externally connecting the electrode cables to the Min., Med., or Max. tap electrode studs.

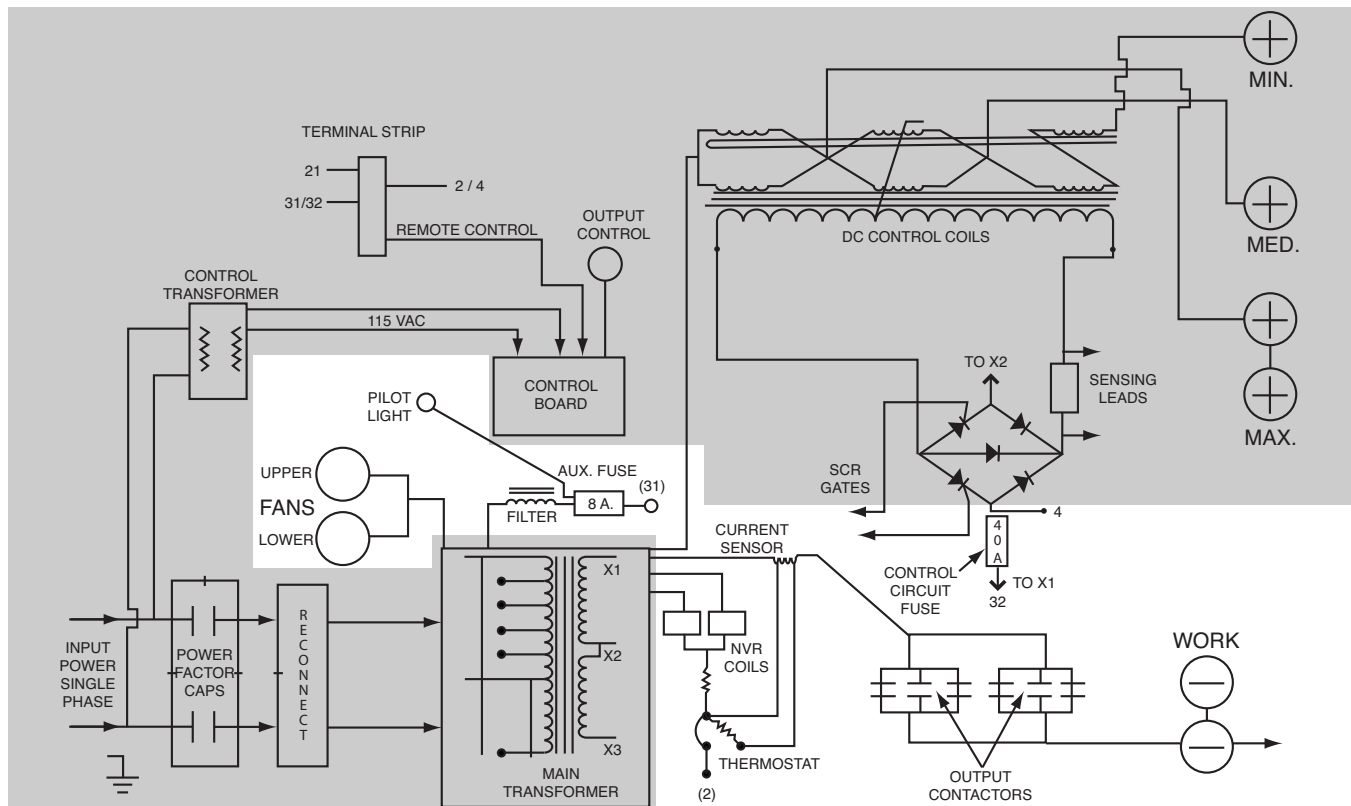
Output current is sensed from the D.C. control coils and the output voltage is monitored from the output terminals. This feedback information is processed in the PC control board. The control board receives the command of the Output Control Potentiometer (or Remote Control) with the feedback information and sends the appropriate signal to the SCR assembly. When the gate signal is supplied by the control board the SCR will turn "ON". The amount of "ON" time versus "OFF" time determines the output of the machine by saturating the iron in the reactor. **See SCR Operation Section.**

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

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FIGURE E.4 - PROTECTION DEVICES &amp; CIRCUITS



## PROTECTION DEVICES AND CIRCUITS

The Pilot Light indicates when the supply lines to the welder are electrically “hot”, this means that the welder power and control transformers are energized when the pilot light is on. Cooling of the welder is accomplished by drawing air in through the louvered case front panel, through the reactor and transformer assemblies and out the louvered case rear panel. The two fan motors, one on the top and one on the bottom are mounted to the rear louvered panels.

Overload protection is provided in three areas; the saturable reactor control power circuit is protected by a 40 amp fuse; the welder output power circuit is protected by the current transformer-thermostat breaker in the event of a control circuit or welder overload, the output contactors will open and the fan motors will continue to operate.

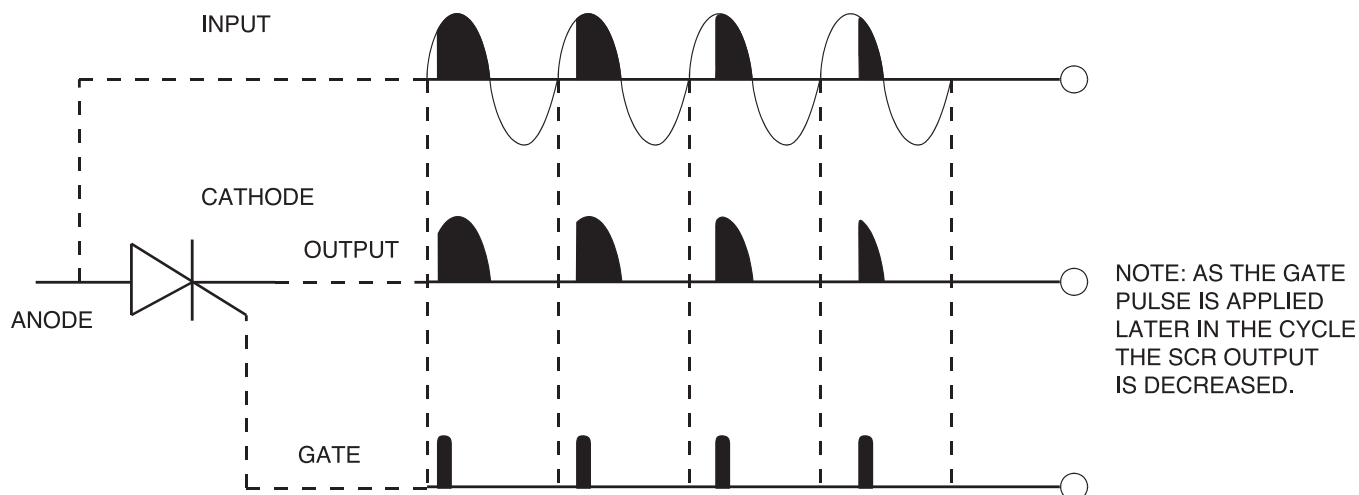
NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

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FIGURE E.5 - SCR OPERATION



## SCR OPERATION

A silicon controlled rectifier (SCR) is a three terminal device used to control rather large currents to a load. An SCR acts very much like a switch. When a gate signal is applied to the SCR it is turned ON and there is current flow from anode to cathode. In the ON state the SCR acts like a closed switch. When the SCR is turned OFF there is no current flow from anode to cathode thus the device acts like an open switch. As the name suggests, the SCR is a rectifier, so it passes current only during positive half cycles of the AC supply. The positive half cycle is the portion of the sine wave in which the anode of the SCR is more positive than the cathode.

When an AC supply voltage is applied to the SCR, the device spends a certain portion of the AC cycle time in the on state and the remainder of the time in the off state. The amount of time spent in the ON state is controlled by the Gate.

An SCR is fired by a short burst of current into the gate. This gate pulse must be more positive than the cathode voltage. Since there is a standard PN junction between gate and cathode, the voltage between these terminals must be slightly greater than 0.6 V. Once the SCR has fired it is not necessary to continue the flow of gate current. As long as current continues to flow from anode to cathode the SCR will remain on. When the anode to cathode current drops below a minimum value, called holding current, the SCR will shut off. This normally occurs as the AC supply voltage passes through zero into the negative portion of the sine wave. If the SCR is turned on early in the positive half cycle, the conduction time is longer resulting in greater SCR output. If the gate firing occurs later in the cycle the conduction time is less resulting in lower SCR output.

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

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

IDEALARC® AC-1200



**Troubleshooting and Repair** .....F-1

    How to Use Troubleshooting Guide ..... F-2

    PC Board Troubleshooting Procedures ..... F-3

    Troubleshooting Guide .....F-4/F-5

    Test Procedures ..... F-7

        Control Transformer Voltage Test Procedure ..... F-7

        D.C. Control Coils Voltage And Amperage Test Procedure .....F-11

        Control Board Test Procedure .....F-13

    Retest and Repair .....F-15

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

## HOW TO USE TROUBLESHOOTING GUIDE

**⚠ WARNING**

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

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

**Step 1. LOCATE PROBLEM (SYMPTOM).**

Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into the following categories: output problems, function problems, wire feeding problems, and welding problems.

**Step 2. PERFORM EXTERNAL TESTS.**

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

**Step 3. RECOMMENDED COURSE OF ACTION**

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

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

**⚠ CAUTION**

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

## PC BOARD TROUBLESHOOTING PROCEDURES

**WARNING**

**ELECTRIC SHOCK  
can kill.**

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

**CAUTION**

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

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

**PC board can be damaged by static electricity.**

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

- 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 un-painted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.

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

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

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

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

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

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

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

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

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

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

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

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

Observe Safety Guidelines detailed in the beginning of this manual.

| PROBLEMS (SYMPTOMS)                                   | POSSIBLE AREAS OF MISADJUSTMENT(S)   | RECOMMENDED COURSE OF ACTION   |
|---|--|--|
| <b>OUTPUT PROBLEMS</b>                                |  |  |
| Welder will not start.                                | <ol style="list-style-type: none"> <li>1. Supply line fuse blown.</li> <li>2. Open supply line lead.</li> <li>3. Wrong supply line voltage.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Look for possible cause and repair.</li> <li>2. Replace fuse.</li> <li>3. Provide nameplate specified voltage.</li> </ol>  |
| Welder will not weld (Contactors operating properly). | <ol style="list-style-type: none"> <li>1. Electrode or ground cable loose or broken.</li> <li>2. Welder control circuit dead; No voltage across Control Transformer X1-X2.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Tighten connection or repair broken cable.</li> <li>2. Perform <b>Control Transformer Voltage Test</b>.</li> </ol>   |
| Welder will not weld (Contactors not operating).      | <ol style="list-style-type: none"> <li>1. Thermostat on coil tripped. Welder overheated (Fan motors operating).</li> <li>2. Fuse (or thermostat - below code 7600) on control panel open; Control circuit overloaded. (Fan motors operating)</li> <li>3. Circuit across #2 and #4 not working properly.</li> <li>4. Wire feeder control power; No voltage across #31 and #32.</li> </ol> | <ol style="list-style-type: none"> <li>1. Check operation of fans and make sure there is no obstruction to air flow. Do not operate in excess of welder rating.</li> <li>2. SCR's or diodes on heat sink assembly or P.C. board failed - See Trouble "Welder welds at max. or min. only - no control". Make repairs and replace fuse.</li> <li>3. Check connections at terminal strip and wire feeder. Relay contacts not closing. Repair as required. See Wiring Diagram. Check fuse and replace if no good.</li> </ol> |
| Contacts chatter.                                     | <ol style="list-style-type: none"> <li>1. Low supply line voltage.</li> <li>2. Faulty connector.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check with power company.</li> <li>2. Repair or replace.</li> </ol> <p><b>NOTE:</b> The two 120V contactors have different part numbers.</p>   |

### ⚠ CAUTION

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

IDEALARC® AC-1200



Observe Safety Guidelines detailed in the beginning of this manual.

| PROBLEMS (SYMPTOMS)                   | POSSIBLE AREAS OF MISADJUSTMENT(S)  | RECOMMENDED COURSE OF ACTION  |
|---------------------------------------|---|---|
| <b>OUTPUT PROBLEMS</b>                |   |   |
| Welder welds at min. only no control. | <ol style="list-style-type: none"> <li>1. Remote control switch in wrong position.</li> <li>2. Control rheostat open.</li> <li>3. Control circuit open.</li> <li>4. Open saturable reactor control coil or connection.</li> </ol>   | Switch to "Panel Control" for welder rheostat. Control and "Remote Control" for other control.<br><br>Replace rheostat.<br><br><ol style="list-style-type: none"> <li>1. No voltage across #41 and #44 - Repair broken leads or reconnect loose leads.</li> <li>2. Diodes or SCR's on heat sinks open or disconnected. Repair or replace.</li> <li>3. P.C. board plug disconnected - Check plug connection and plug in properly.</li> <li>4. P.C. board failed. Determine cause and replace board.</li> <li>5. Open circuit at R1 - Repair or replace. Repair connection or replace coil.</li> <li>6. Perform <b><i>D.C. Control Coils Test.</i></b></li> <li>7. Perform <b><i>Control Board Test.</i></b></li> </ol> |
| Welder welds at max. only on control. | <ol style="list-style-type: none"> <li>1. Diodes or SCR's on heat sink assemblies shorted.</li> <li>2. Shorted or grounded current control rheostat.</li> <li>3. Output by-pass capacitors open or disconnected.</li> <li>4. Free wheeling diode open or disconnected.</li> <li>5. P.C. board components failed.</li> </ol> | <ol style="list-style-type: none"> <li>1. Determine cause if possible and replace shorted device.</li> <li>2. Replace rheostat.</li> <li>3. Replace or reconnect.</li> <li>4. Replace or reconnect.</li> <li>5. Perform <b><i>Control Board Test.</i></b></li> </ol>  |

**⚠ CAUTION**

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

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

Return to Master TOC

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**CONTROL TRANSFORMER VOLTAGE TEST PROCEDURE****⚠ WARNING**

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

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

**TEST DESCRIPTION**

This test will determine if the correct voltage is being:

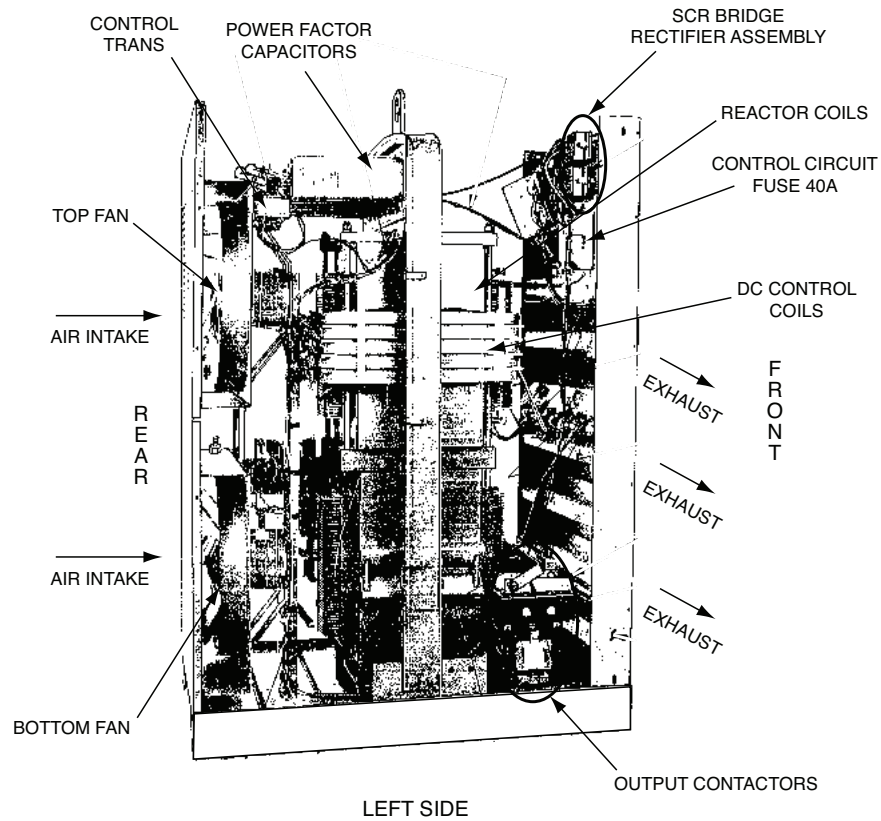
- a. applied to the Primary of the Control Transformer.
- b. induced on the Secondary Winding of the Control Transformer.

**MATERIALS NEEDED**

Volt / Ohmmeter (Multimeter)  
Wiring Diagram

## CONTROL TRANSFORMER VOLTAGE TEST PROCEDURE (continued)

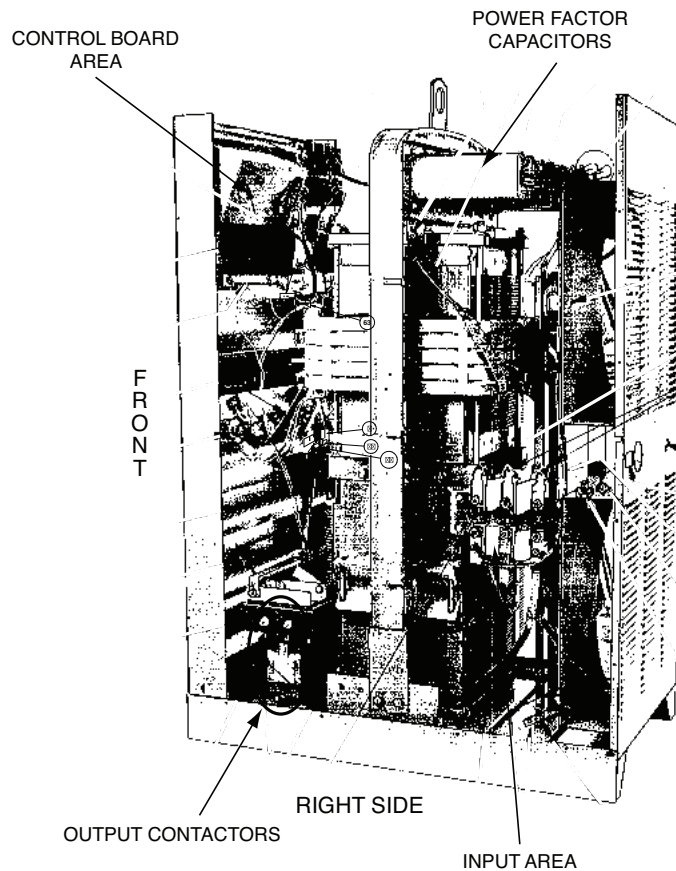
FIGURE F.1 – CONTROL TRANSFORMER LOCATION

**PROCEDURE**

1. Disconnect main AC input power to the machine.
2. Remove the lower left and right case sides.
3. Locate the Control Transformer on the left upper right rear of machine. See Figure F.1.
4. Locate the Control Transformer primary lead connections on the Power Factor Capacitors. See Wiring Diagram.

## CONTROL TRANSFORMER VOLTAGE TEST PROCEDURE (continued)

FIGURE F.2 – CONTROL TRANSFORMER - P.C. BOARD X1 AND X2 LOCATION



5. Locate Control Transformer leads X1 and X2 on the P.C. board. See Wiring Diagram and Figure F.2.
6. Apply power and test for 115 VAC between leads X1 and X2.
7. If 115 VAC is not present between leads X1 and X2, test for correct main AC input power to the Control Transformer primary windings at the at the Power Factor Capacitors. See Wiring Diagram.
8. With the input power disconnected check for meg ohms of resistance to case ground of welder from Primary leads to case, from X1 and X2 leads to case. If less than 1 meg ohm, replace Transformer.

If the correct main AC input power to the Control Transformer is present, and the secondary voltage is not correct, the Control Transformer may be faulty. Replace.

Return to Section TOC      Return to Section TOC      Return to Section TOC  
Return to Master TOC      Return to Master TOC      Return to Master TOC

IDEALARC® AC-1200



**D.C. CONTROL COILS VOLTAGE AND AMPERAGE TEST PROCEDURE****⚠ WARNING**

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

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

**TEST DESCRIPTION**

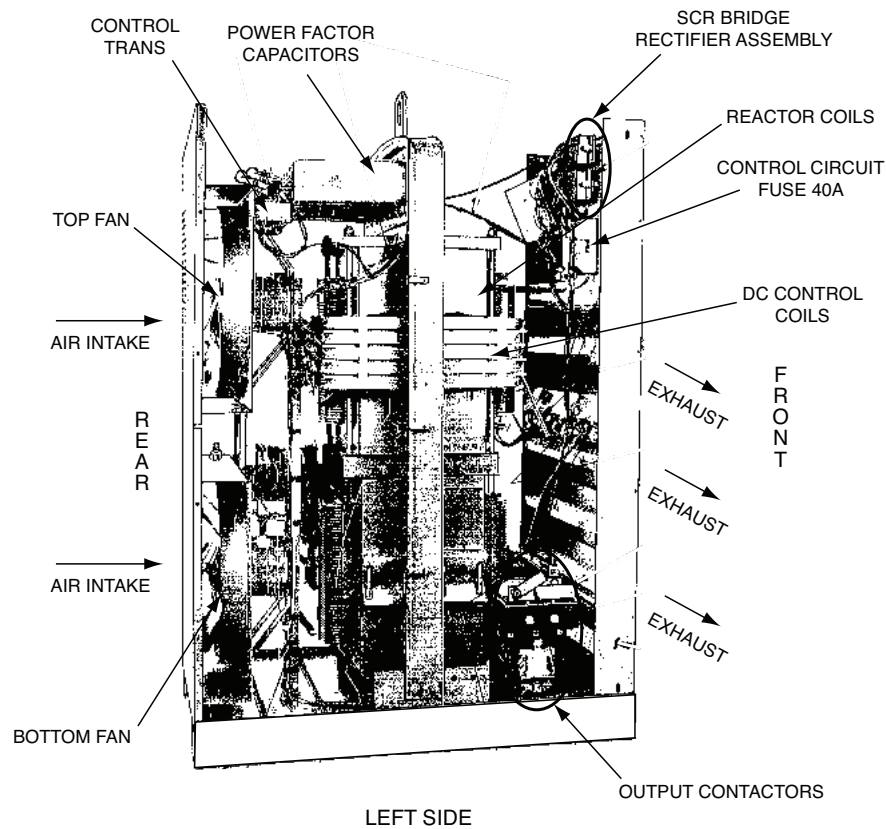
This test will determine if the correct voltage and amperage are being supplied by the D.C. Control Coils.

**MATERIALS NEEDED**

Volt / Ohmmeter (Multimeter)  
Wiring Diagram

## D.C. CONTROL COILS VOLTAGE AND AMPERAGE TEST PROCEDURE (continued)

FIGURE F.3 – D.C. CONTROL COILS LOCATION



### PROCEDURE

1. Disconnect main AC input power to the machine.
2. Remove the left and right case sides.
3. Locate the D.C. Control Coils on the saturable reactor. See Figure F.3.
4. Locate D.C. Control Coil start and finish connections, #55 and #56. See Wiring Diagram.
5. Apply power to the machine and test:  
Coil Voltage: 1.3 VDC min. pot. to 23.5 VDC max. pot.  
Coil Amperage: .1 amp min. pot. to 20 amps max pot.
6. If readings are not correct, remove input power from machine, and open the #55 and #56 connections on the D.C. Control Coils. Resistive measurement between both #55 and #56 to chassis ground should be 1 megohm or greater.

# TROUBLESHOOTING AND REPAIR

## CONTROL BOARD TEST PROCEDURE

### WARNING

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

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

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### TEST DESCRIPTION

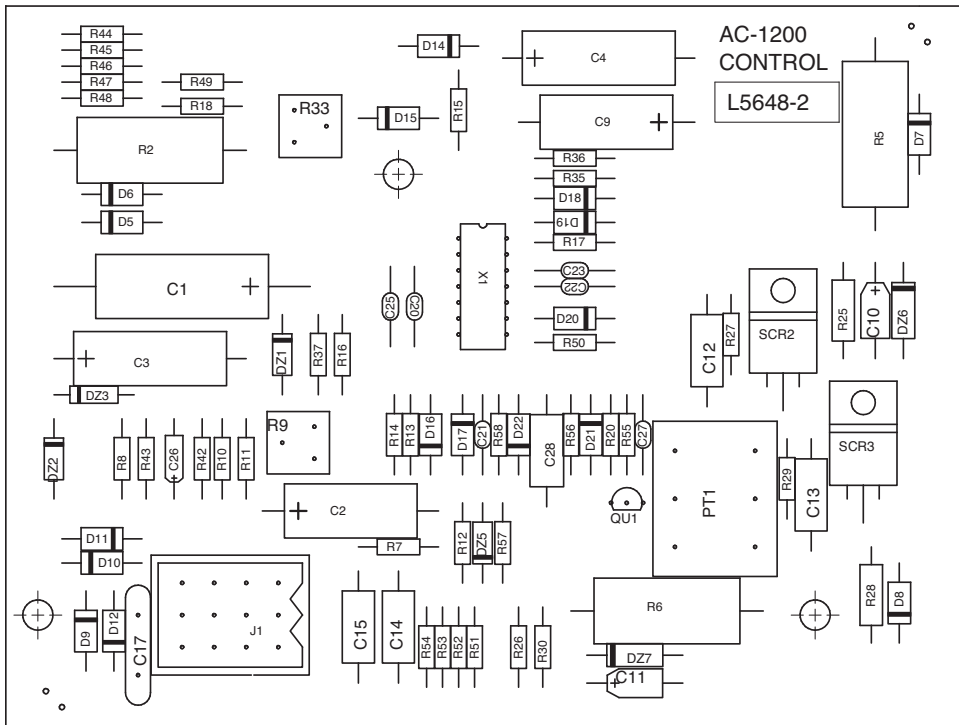
This test will determine if the Control Board is receiving the correct voltages and feedback signals.

### MATERIALS NEEDED

- Volt / Ohmmeter (Multimeter)
- Wiring Diagram
- Control Board Schematic

**CONTROL BOARD TEST PROCEDURE (continued)**

**FIGURE F.4 – JUMPER**



|    |   |   |   |
|----|---|---|---|
| 12 | 9 | 6 | 3 |
| 11 | 8 | 5 | 2 |
| 10 | 7 | 4 | 1 |

- Pin 1 - Lead #43
- Pin 2 - Lead #42
- Pin 3 - Lead #45
- Pin 4 - Lead #41
- Pin 5 - Empty
- Pin 6 - Lead #46
- Pin 7 - Lead #44
- Pin 8 - Lead #48
- Pin 9 - Lead #49
- Pin 10 - Lead #X2
- Pin 11 - Lead #X1
- Pin 12 - Lead #52

**PROCEDURE FOR NORMAL CONTROL BOARD OPERATION**

1. Remove main supply power to the AC-1200.
2. Remove the roof and both sides of the machine. Remove screws and drop down the P.C. board panel inside the casefront.
3. Apply the correct three-phase input power to the AC-1200. Turn on the machine.
4. Connect a jumper wire from terminal #2 to terminal #4 on the terminal strip. These can be accessed through the front panel assembly.
5. Control board readings:
  - Lead #X1 to Lead#X2 - 115 VAC
  - Lead #41 to Lead #44 - 90 VAC
  - Lead #45 to Lead #48 - 0 to 200MV
  - Lead #49 to Lead #52 - 10K Pot Supply 6.2V
  - Lead #46 - Pot Wiper

**⚠ WARNING**

**JUMPERING LEADS 2 AND 4 ELECTRICALLY ENERGIZES MACHINES OUTPUT TERMINAL. DO NOT TOUCH ELECTRICALLY HOT COMPONENTS.**

**POSSIBLE PROBLEMS PERTAINING TO THE CONTROL BOARD**

1. Machine goes to Max. with no control. Unplug the P.C. board and output should go to min. If it does not: you have shorted SCR's. If it stays at min. output you have a bad P.C. board.
  - Be sure that the control pot tests good and the power is to the board.

Return to Section TOC | Return to Section TOC | Return to Section TOC | Return to Section TOC

Return to Master TOC | Return to Master TOC | Return to Master TOC | Return to Master TOC



## RETEST AFTER REPAIR

Testing is required after the removal of any mechanical part that could affect the machine's electrical characteristics, or if any electrical components are repaired or replaced.

### INPUT IDLE AMPS AND WATTS

| Input Volts/Phase/Hertz | Maximum Idle Amps |           | Maximum Idle KW |
|-------------------------|-------------------|-----------|-----------------|
|                         | With Cond.        | W/O Cond. |                 |
| 460/1/60                | 70/94             | 10.0      | 4.6             |
| 575/1/60                | 56/75             | 8.0       | 4.6             |

### OPEN CIRCUIT VOLTAGES

| Mode                       | Input Hertz | Open Circuit Volts     |
|----------------------------|-------------|------------------------|
| Variable Voltage           | 60          | 86/94                  |
| Auxiliary Output (#31-#32) | 60          | 113-127 AC @ 5amp load |

### MAXIMUM ACCEPTABLE OUTPUT VOLTAGE - AT MINIMUM OUTPUT SETTINGS

| Mode             | Input Hertz | Load                  |
|------------------|-------------|-----------------------|
| Variable Voltage | 60          | 190 amps @ 20/180 VDC |

### MINIMUM ACCEPTABLE OUTPUT VOLTAGE AT MAXIMUM OUTPUT SETTINGS

| Mode             | Input Hertz | Load                  |
|------------------|-------------|-----------------------|
| Variable Voltage | 60          | 1200 Amps @ 60/65 VDC |

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

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**Electrical Diagrams** ..... **G-1**

    Wiring Diagram - Typical 60 HZ. Models ..... G-2

    Wiring Diagram - Typical 50/60 HZ. Models ..... G-3

    Schematic – Complete Machine - Typical Models ..... G-4

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

Return to Master TOC

Return to Master TOC

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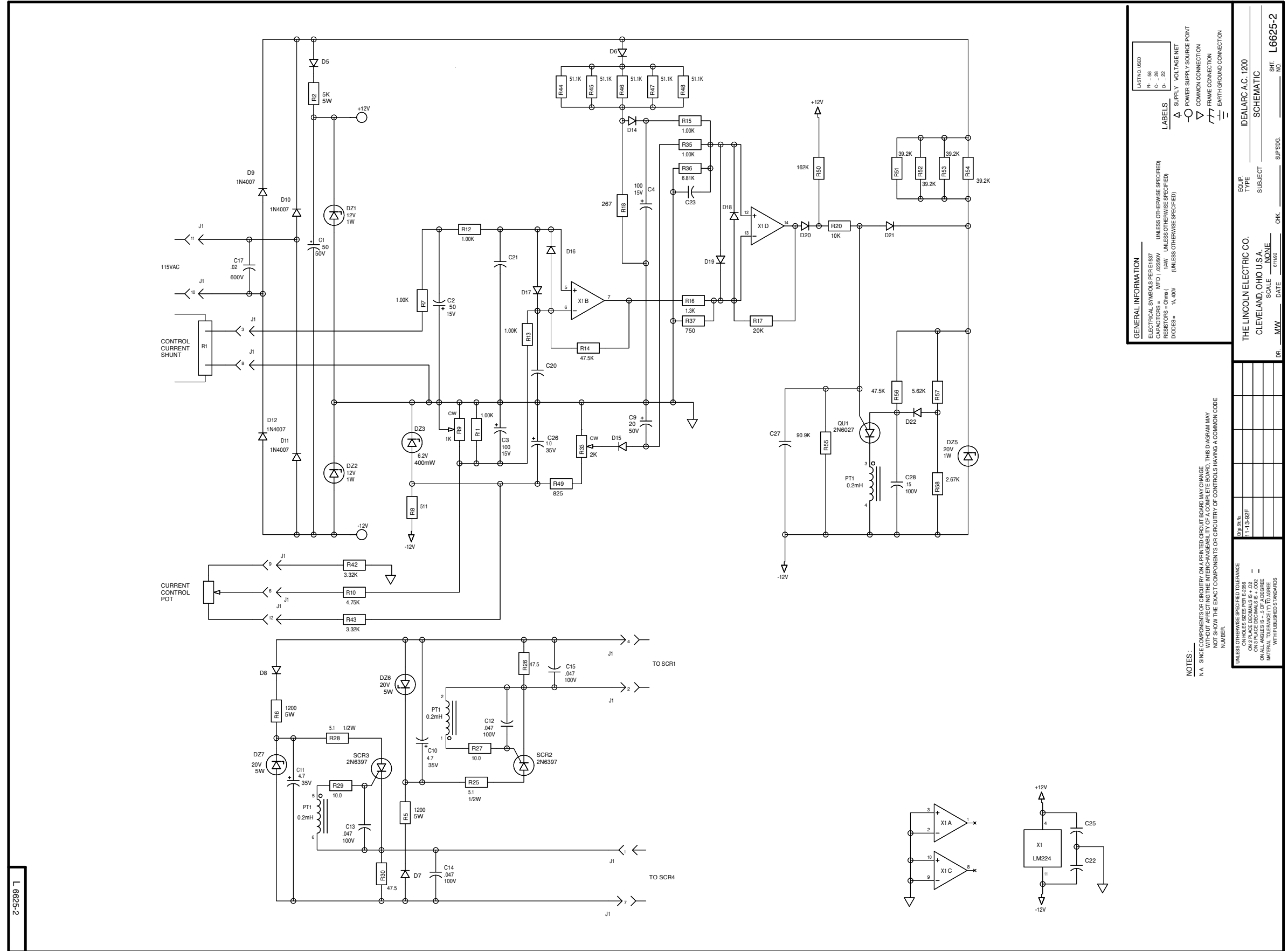
SCHEMATIC - TYPICAL MODELS

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC



L 6625-2

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

**GENERAL INFORMATION**

ELECTRICAL SYMBOLS PER E167 UNLESS OTHERWISE SPECIFIED  
 CAPACITORS = MFD (0.225KV UNLESS OTHERWISE SPECIFIED)  
 RESISTORS = Ohms ( UNLESS OTHERWISE SPECIFIED)  
 DIODES = 1A .40V (UNLESS OTHERWISE SPECIFIED)

LASTING USED  
 R - 56  
 C - 28  
 D - 22

▲ SUPPLY VOLTAGE NET  
 ○ POWER SUPPLY SOURCE POINT  
 ○ COMMON CONNECTION  
 ▽ FRAME CONNECTION  
 ⊥ EARTH GROUND CONNECTION

THE LINCOLN ELECTRIC CO.  
 CLEVELAND, OHIO U.S.A.  
 IDEALARC A.C. 1200  
 SCHEMATIC

DR. M.V. DATE 6/1/92  
 BR. SP/SDG. CHK. L6625-2  
 SHT. NO.

**NOTES**

N.A. SINCE COMPONENTS OR CIRCUITRY ON A PRINTED CIRCUIT BOARD MAY CHANGE WITHOUT AFFECTING THE INTERCHANGEABILITY OF A COMPLETE BOARD, THIS DIAGRAM MAY NOT SHOW THE EXACT COMPONENTS OR CIRCUITRY OF CONTROLS HAVING A COMMON CODE NUMBER.

UNLESS OTHERWISE SPECIFIED TOLERANCE  
 ON HOLES SIZES PER E2066  
 ON ALL ANGLES 8° ± 0.01° UNLESS OTHERWISE SPECIFIED  
 ON ALL ANGLES 8° ± 0.01° UNLESS OTHERWISE SPECIFIED  
 WITH PUBLISHED STANDARDS