OM-196 188K

July 2003

Processes

MIG (GMAW) Welding

Pulsed MIG (GMAW-P)

Flux Cored (FCAW) Welding

Automatic Welding

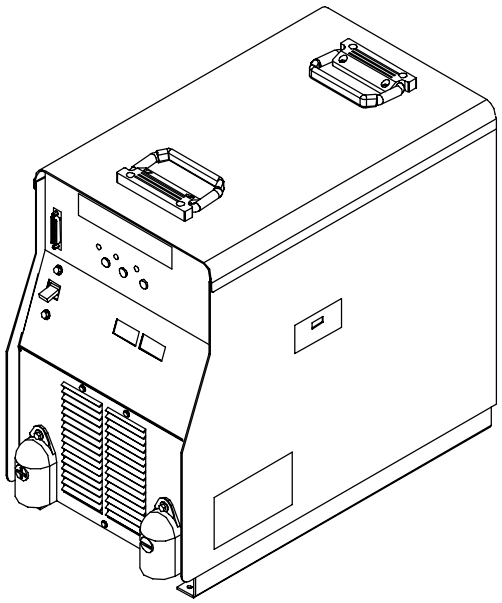
Description

Automatic Welding Interface And
Arc Welding Power Source

CE

Operating Instructions and Programming Instructions for

Auto Invision II



OWNER'S MANUAL

Visit our website at

www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001:2000 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller®

⚠ WARNING

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

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Declaration of Conformity For European Community (CE) Products

Manufacturer's Name: Miller Electric Mfg. Co.

Manufacturer's Address: 1635 W. Spencer Street
Appleton, WI 54914 USA

Declares that the product: **Auto Invision II**

conforms to the following Directives and Standards:

Directives

Electromagnetic compatibility Directives: 89/336/EEC, 92/31/EEC

Low Voltage Directive: 73/23/EEC

Machinery Directives: 89/392/EEC, 91/368/EEC, 93/C 133/04, 93/68/EEC

Standards

Electromagnetic compatibility (EMC) Product standard for arc welding equipment: EN50199: December 1995

Arc Welding Equipment part 1: CEI IEC 60974

Degrees of Protection provided by Enclosures (IP code): IEC 529: 1989

Draft IEC 60974-5 Arc Welding Equipment part 5: wire feeders JWG1 (Sec) 158 July 2000

Insulation coordination for equipment within low-voltage systems: Part 1: Principles, requirements and tests: IEC 664-1: 1992

European Contact: Mr. Danilo Fedolfi, Managing Director
ITW WELDING PRODUCTS ITALY S.r.l.
Via Privata Iseo 6/E
20098 San Giuliano
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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

ARC RAYS can burn eyes and skin.

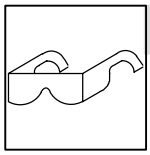
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather and wool) and foot protection.

WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.

MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

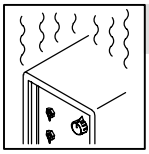
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

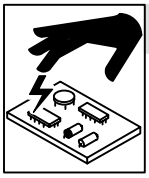
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

MOVING PARTS can cause injury.

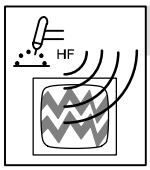
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION

1-1. Signification des symboles

Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*

Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

1-2. Dangers relatifs au soudage à l'arc

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-4. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**

UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

Il y a DU COURANT CONTINU IMPORTANT dans les convertisseurs après la suppression de l'alimentation électrique.

- Arrêter les convertisseurs, débrancher le courant électrique, et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie entretien avant de toucher les pièces.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- A l'intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

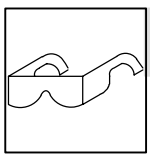
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (cuir ou laine) et une protection des pieds.

LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



DES PARTICULES VOLANTES peuvent blesser les yeux.

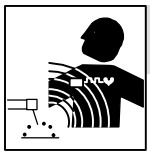
- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.

LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.

DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues
- Prévoir une période de refroidissement avant d'utiliser le pistolet ou la torche.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

LE BRUIT peut affecter l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.

Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publications P-1 CGA énumérées dans les normes de sécurité.

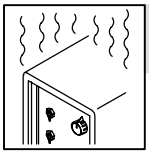
1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infllammables.
- Ne pas installer l'appareil à proximité de produits inflammables
- Ne pas surcharger l'installation électrique – s"assurer que l'alimentation est correctement dimensionné et protégé avant de mettre l'appareil en service.

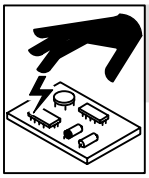
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement, respecter le cycle opératoire nominal.
- Réduire le courant ou le cycle opératoire avant de recommancer le soudage.
- Ne pas obstruer les passages d'air du poste.



LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.

DES ORGANES MOBILES peuvent provoquer des blessures.

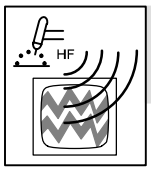
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gachette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.

DES ORGANES MOBILES peuvent provoquer des blessures.

- Rester à l'écart des organes mobiles comme le ventilateur.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute frequence peut provoquer des interférences avec les équipements de radio–navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.

LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

1-4. Principales normes de sécurité

Safety in Welding and Cutting, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

Safety and Health Sandards, OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.

2 Mettre tous les câbles du côté opposé de l'opérateur.

3 Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.

4 Garder le poste de soudage et les câbles le plus loin possible de vous.

5 Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci–dessus.

SECTION 2 – DEFINITIONS

2-1. Manufacturer's Warning Label Definitions

Warning! Watch Out! There are possible hazards as shown by the symbols.

1 Electric shock from welding electrode or wiring can kill.

1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.

1.2 Protect yourself from electric shock by insulating yourself from work and ground.

1.3 Disconnect input plug or power before working on machine.

2 Breathing welding fumes can be hazardous to your health.

2.1 Keep your head out of the fumes.

2.2 Use forced ventilation or local exhaust to remove the fumes.

2.3 Use ventilating fan to remove fumes.

3 Welding sparks can cause explosion or fire.

3.1 Keep flammables away from welding. Do not weld near flammables.

3.2 Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.

3.3 Do not weld on drums or any closed containers.

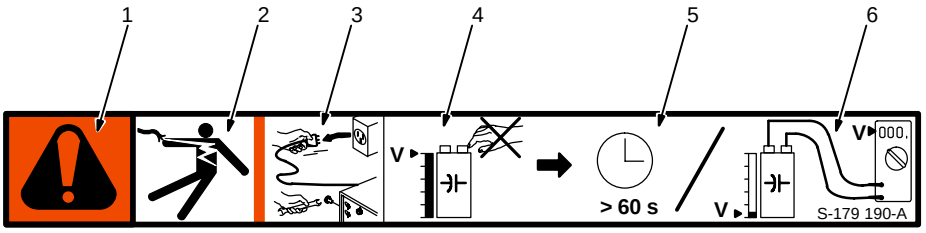
4 Arc rays can burn eyes and injure skin.

4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.

5 Become trained and read the instructions before working on the machine or welding.

6 Do not remove or paint over (cover) the label.

1/96



1 Warning! Watch Out! There are possible hazards as shown by the symbols.

2 Electric shock from wiring can kill.

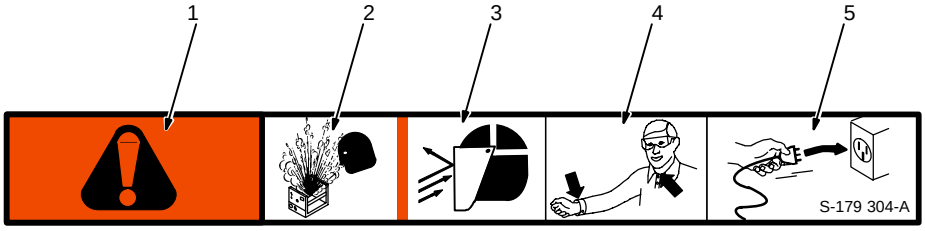
3 Disconnect input plug or power before working on machine.

4 Hazardous voltage remains on input capacitors after power is turned off. Do not touch fully charged capacitors.

5 Always wait 60 seconds after power is turned off before working on unit, OR

6 Check input capacitor voltage, and be sure it is near 0 before touching any parts.

4/96



1 Warning! Watch Out! There are possible hazards as shown by the symbols.

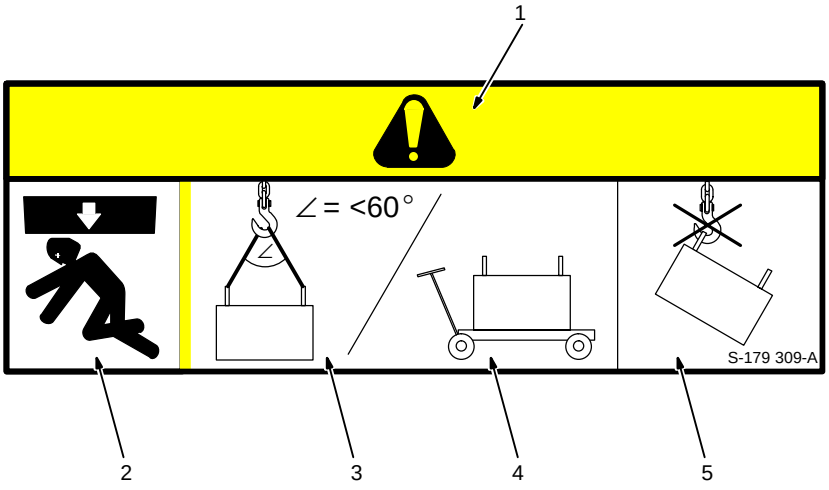
2 When power is applied failed parts can explode or cause other parts to explode.

3 Flying pieces of parts can cause injury. Always wear a face shield when servicing unit.

4 Always wear long sleeves and button your collar when servicing unit.

5 After taking proper precautions as shown, connect power to unit.

4/96



1 Warning! Watch Out! There are possible hazards as shown by the symbols.

2 Falling equipment can cause injury and damage to unit.

3 Always lift and support unit using both handles. Keep angle of lifting device less than 60 degrees.

4 Use a proper cart to move unit.

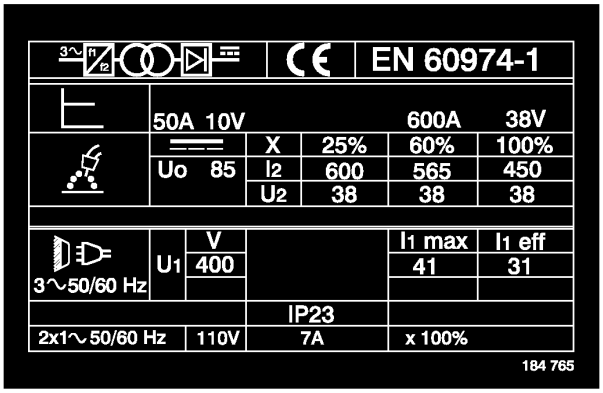
5 Do not use one handle to lift or support unit.

1/96

2-2. Symbols And Definitions

A	Amperage	+	Positive		Remote	V	Voltage
	Output		Circuit Breaker	−	Negative	I	On
O	Off		Inductance		Protective Earth (Ground)	V	Voltage Input

2-3. Manufacturer's Rating Label



S-184 765

2-4. Harmonic Data

HARMONIC DATA per IEC 61000-3-12, draft 2000-9-29

PRIMARY; 400V/30.5A/60hz
LOAD; 450A/38Vdc/390IPM/,MAXIMUM OUTPUT, GMAW.

R sce = 227.28

THD	61 Amps
PWHD	35 Amps

Table 4, balanced three phase equipment.

SECTION 3 – INSTALLATION

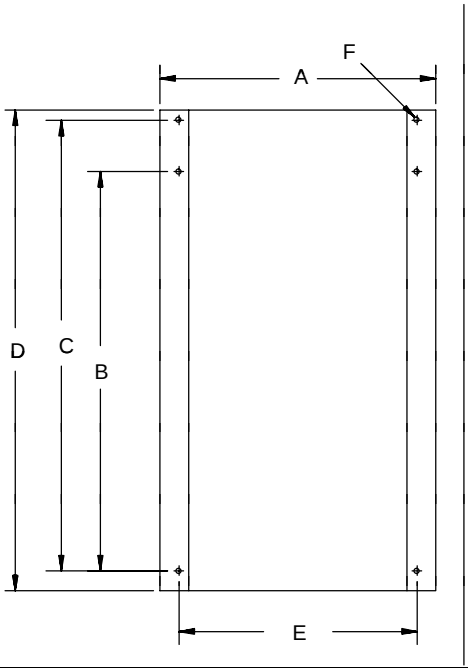
3-1. Specifications

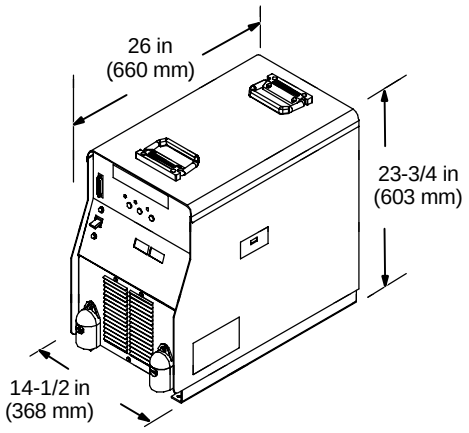
Input Power	Rated Welding Output	Voltage Range	Wire Feed Speed Range*	Wire Diameter Range	Maximum Open-Circuit Voltage DC	Amperes Input At Rated Load Output 60 Hz, Three-Phase	KVA	KW
Three Phase	450 A @ 38 Volts DC, 100% Duty Cycle; 565 A @ 43 Volts DC, 60% Duty Cycle	10 – 38	Standard: 50 To 780 ipm (1.3 To 19.8 mpm)	.030 To .062 in (0.8 To 1.6 mm)	95	31	21.6	19.4

*Wire feed speed ranges are for GMAW welding. While pulse welding, wire feed speed ranges may be more limited (see Section 9)
**While idling

3-2. Dimensions And Weight

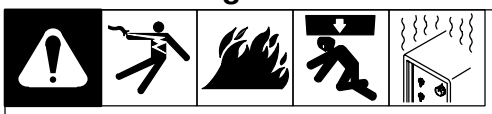
Hole Layout Dimensions	
A	14-21/64 in (363.9 mm)
B	20-3/4 in (527.1 mm)
C	23-27/64 in (594.9 mm)
D	24-31/32 in (634.2 mm)
E	12-3/8 in (314.3 mm)
F	9/32 in (7.1 mm) Dia.
Weight	
130 lb (59 kg)	



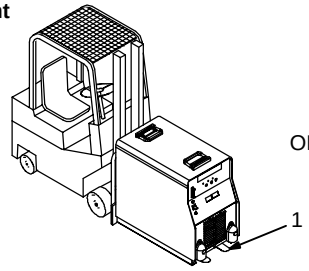


801 914-A

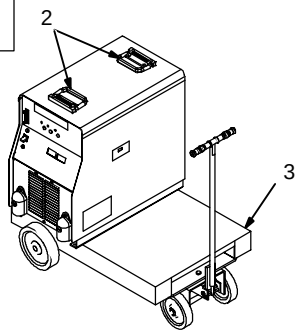
3-3. Selecting A Location



Movement

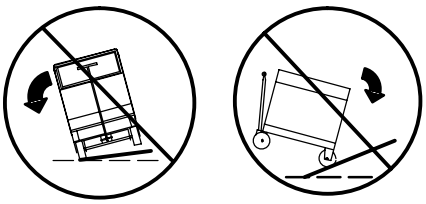


OR



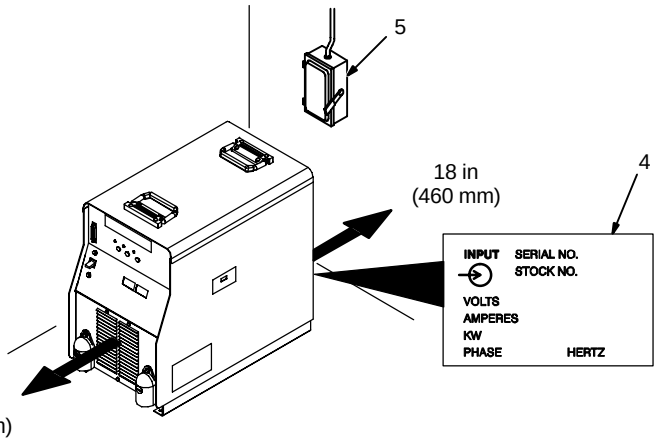
Tipping

▲ **Do not move or operate unit where it could tip.**



Location

▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**



1 Lifting Forks

Use lifting forks to move unit.

Extend forks beyond opposite side of unit.

2 Lifting Handles

Use handles to lift unit.

3 Hand Cart

Use cart or similar device to move unit.

4 Rating Label

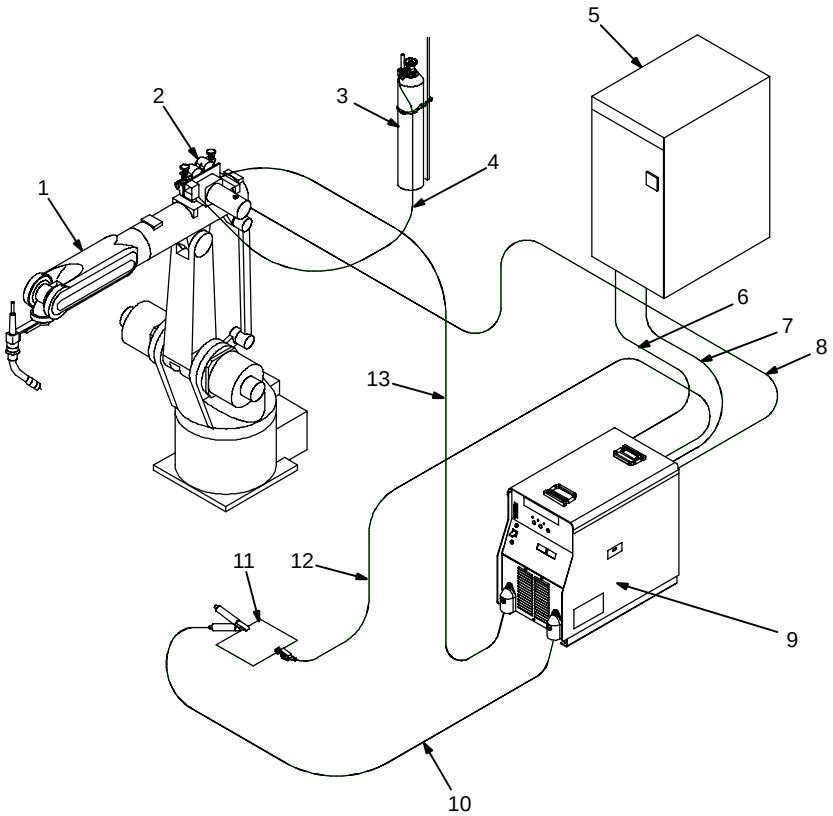
Use rating label to determine input power needs.

5 Line Disconnect Device

Locate unit near correct input power supply.

loc_2 3/96 - 801 958 / 801 914-A

3-4. Connection Diagram



☞ *The proper interface kit must be installed in the interface unit to allow it to be connected to the robot.*

1 Robot (Will Vary According To Application)

2 Motor/Drive Assembly

3 Gas Cylinder

4 Gas Hose

5 Robot Control

6 Robot Input/Output Cable

7 Remote Program Select Cable (Optional)

8 Gas And Motor Control Cable

9 Welding Power Source/Interface Unit

10 Negative (–) Weld Cable

11 Workpiece

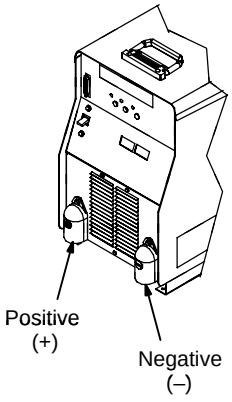
12 Voltage Sensing Lead

☞ *Positive (+) voltage sensing lead is contained in the motor cable.*

13 Positive (+) Weld Cable

801 915-B

3-5. Weld Output Terminals And Selecting Cable Sizes

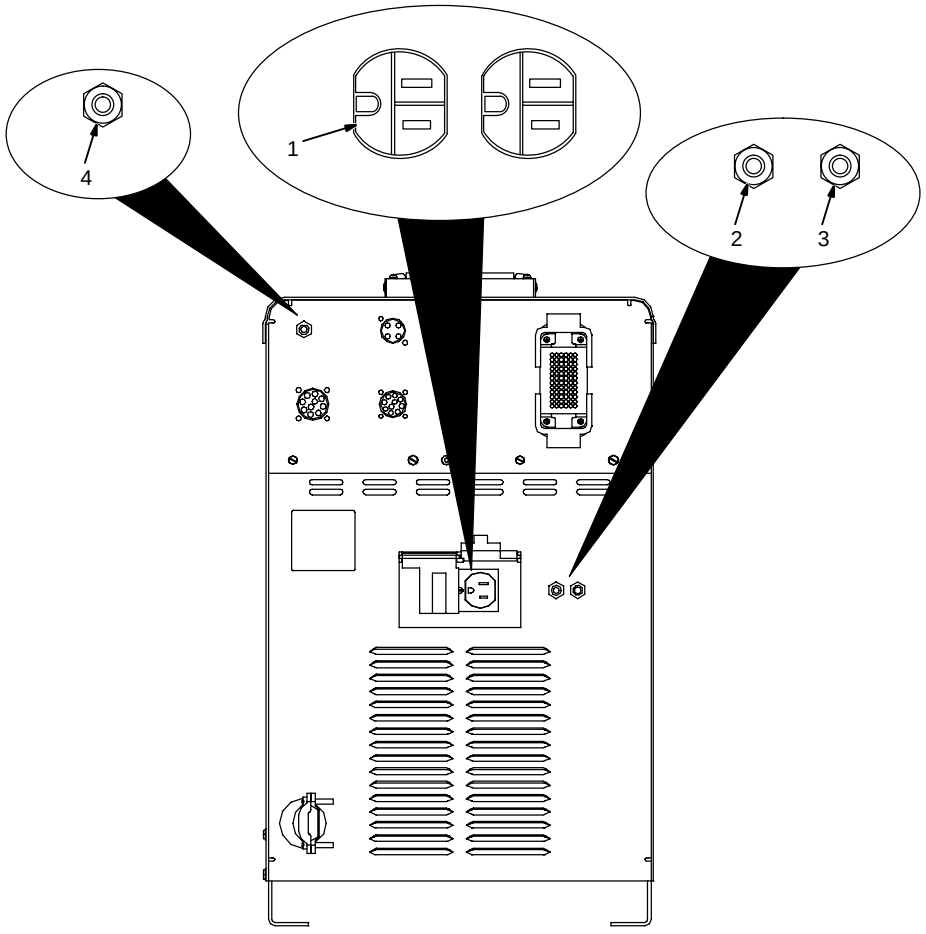


Ref. 801 914-A

Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding							
	30 m (100 ft) Or Less		45 m (150 ft)	60 m (200 ft)	70 m (250 ft)	90 m (300 ft)	105 m (350 ft)	120 m (400 ft)
	10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
100	25	25	25	35	35	50	55	55
150	35	35	35	50	55	70	95	95
200	35	35	50	55	70	95	120	120
250	35	50	55	70	95	120	2-70	2-70
300	50	55	70	95	120	2-70	2-95	2-95
350	55	70	95	120	2-70	2-95	2-95	2-120
400	55	70	95	120	2-70	2-95	2-120	2-120
500	70	95	120	2-70	2-95	2-120	3-95	3-95
600	95	120	2-70	2-95	2-120	3-95	3-120	3-120

*Weld cable size (mm^2) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere. S-0007E

3-6. 115 Volts AC Duplex Receptacle And Circuit Breakers



1 115 V 10 A AC Receptacle

Power is shared between duplex receptacle and internal 14 socket receptacle.

2 Circuit Breaker CB1

3 Circuit Breaker CB2

CB1 protects duplex receptacle and 115 volts ac portion of internal 14 socket receptacle from overload.

Press button to reset breaker.

CB2 protects 24 volts ac portion of internal 14 socket receptacle from overload.

Press button to reset breaker.

4 Circuit Breaker CB1

CB1 protects the motor control circuitry from overload. If CB1 trips, the wire drive motor is inoperative.

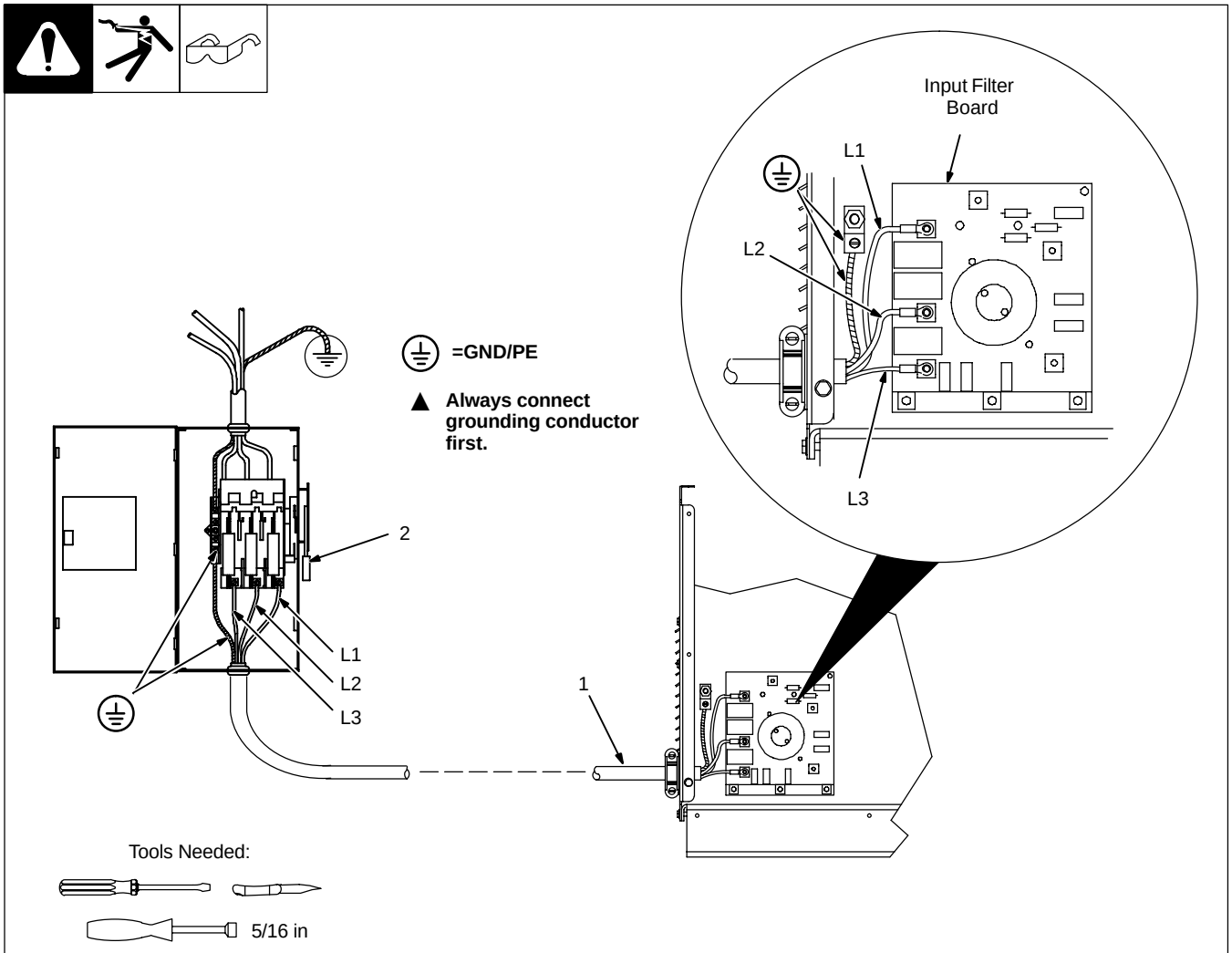
Press button to reset breaker.

802 748

3-7. Electrical Service Guide

	Three-Phase
Input Voltage	400
Input Amperes At Rated Output	31
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	45
Min Input Conductor Size In AWG/Kcmil	10
Max Recommended Input Conductor Length In Feet (Meters)	264 (80)
Min Grounding Conductor Size In AWG/Kcmil	10
Reference: 1993 National Electrical Code (NEC).	S-0092J

3-8. Connecting Input Power



ssb2.4* 1/94 – ST-801 718 / ST-801 946

▲ **Turn Off welding power source, and check voltage on input capacitors according to Section 5-3 before proceeding.**

Check input voltage available at site.

Remove left side panel.

1 Input And Grounding Conductors

See Section 3-7.

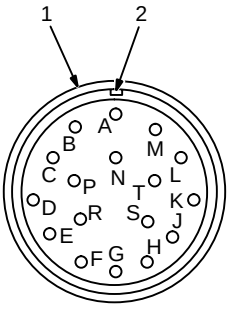
Install ring terminals of proper size onto input conductors for connection to input filter board terminals (see illustration).

2 Line Disconnect Device

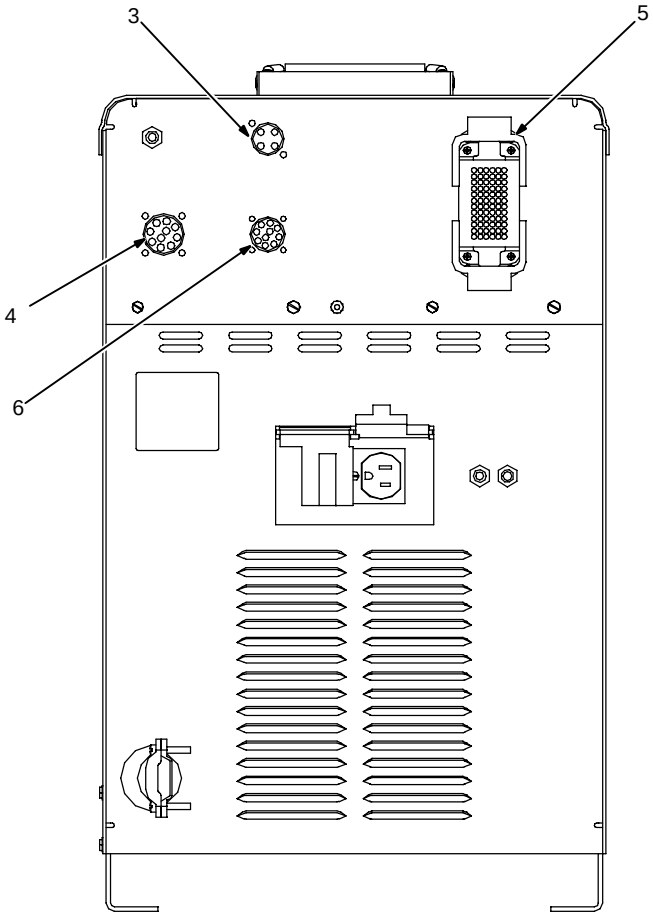
Select type and size of overcurrent protection using Section 3-7. Connect input and grounding conductors to a deenergized line disconnect device.

Reinstall left side panel.

3-9. Rear Panel Connections



Example Receptacle



1 Receptacle

2 Keyway

3 4-Pin Receptacle (Optional External Voltage Sensing Connection)

To connect interconnecting cord to receptacle, align keyway, insert plug, and tighten threaded collar.

Secure ring terminal on remaining end of cord to work.

4 Peripheral Receptacle

Receptacle provides connection to touch sensor, water flow switch, jog +/–, and n/o relay contacts circuitry.

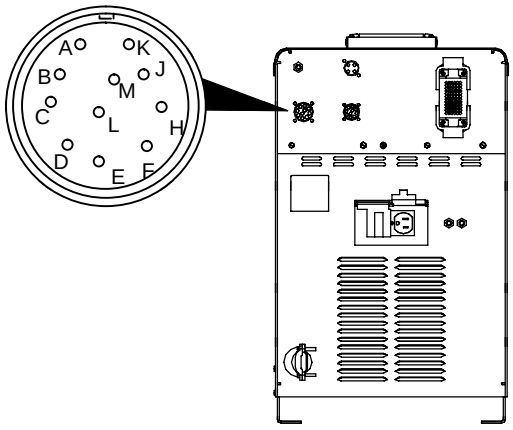
5 Robot Control Receptacle (Remote Program Select Connection To Robot Control)

To connect matching interconnecting cord to one of the above receptacles, align keyway, insert plug, and tighten threaded collar. Connect remaining end of cord to matching receptacle on applicable equipment (see Section 3-4).

6 10-Socket Receptacle (Wire Feed/Shielding Gas Control Connection To Motor Drive Assembly)

Ref. S-0003-A / 802 748

3-10. Peripheral Receptacle Functions



802 748

Function	Socket	Socket Information
Programmable Output Relay Contacts	A	Contact closure to B dependent upon state of programmed output (see Section 14-5). The closure between A and B can carry a maximum of 0.6 amps at 125 VAC; or a maximum of 0.6 amps at 110 VDC.
	B	Contact closure to A dependent upon state of programmed output (see Section 14-5). See socket A information for current carrying capacity of closure.
Purge	C*	Circuit common.
	D	Contact closure to C completes 24 volts dc solenoid circuit to purge shielding gas line.
Coolant Flow Switch Input Signal	E	Contact closure to F indicates coolant flow switch is closed and recirculating coolant system is operational.
	F*	Circuit common.
Jog +	H**	Contact closure to circuit common advances welding wire at wire drive assembly.
Jog –	J**	Contact closure to circuit common retracts welding wire at wire drive assembly.
Touch Sensor ON And Output Signal	K	Contact closure to L energizes Touch Sensor circuitry.
	L*	Circuit common.
	M†	Part touched is selectable for either 0 volts dc (common) or +24 volts dc (see Section 3-12). Part touched +24 volts dc output signal referenced to circuit common is factory default setting.

*Circuit common is same electrical reference point.

**Speed of Jog + and Jog – is at setup value for Jog IPM parameter.

† Socket M can be changed to 0 volts dc (common) for part touched output signal (see Section 3-12).

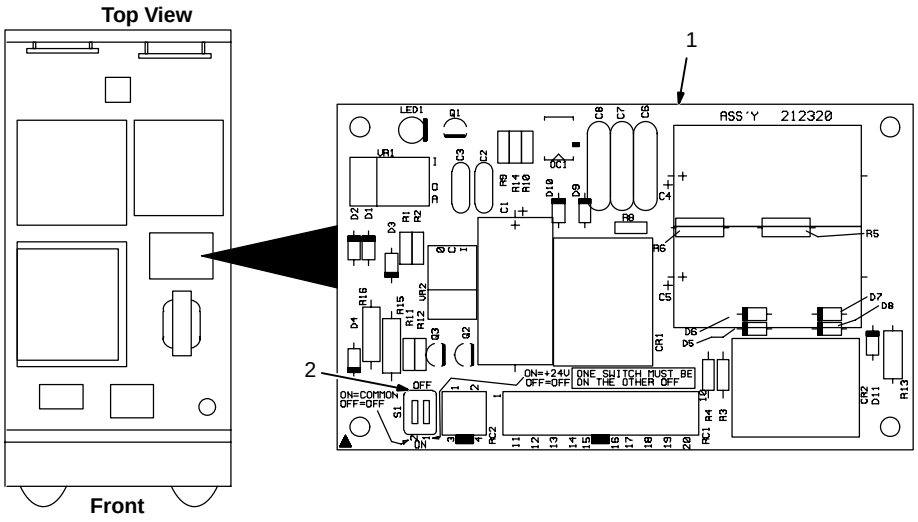
Note: A customer supplied matching amphenol plug [Miller Part No. 194 847 (Amphenol Part No. MS3106A20-33P and strain relief clamp AN3057-12)] is required to use peripheral receptacle.

3-11. Touch Sensor Operation

The touch sensor feature allows the robot to locate a weldment using the wire feed system and welding power source. Voltage sense leads provide a path for touch sensor voltage when this feature is turned on at the peripheral receptacle. Turning on touch sensor causes a dc voltage to be present on the welding wire. When welding wire touches the weldment, the voltage sensing circuit closes, and a +24 volts dc output signal is sent to the robot control indicating weldment detection. Touch sensor dc voltage on the welding wire will vary from 60 to 150 volts dc depending on the welding power source. As soon as touch sensor turns on, DANGER SENSOR ON appears on the front panel display.

3-12. Touch Sensor Board PC18 Switch S1 Settings

▲ **WARNING: One of S1 switches must be ON and the other must be OFF.**



1 Touch Sensor Board PC18

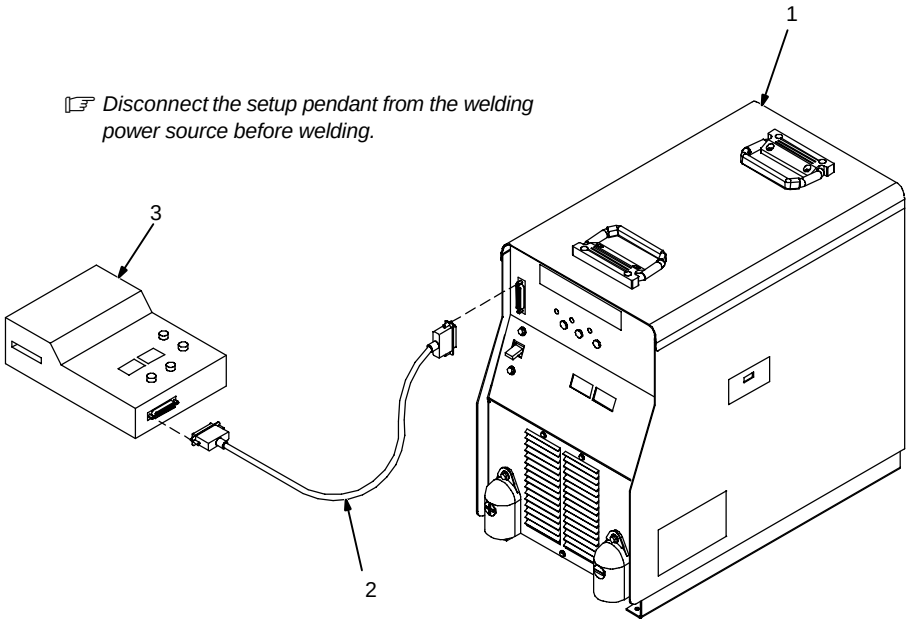
2 Switch S1

When S1 switch 1 is On, output is +24 volts dc (factory default).

When S1 switch 2 is On, output is common.

212 321-A

3-13. Connecting Setup Pendant To Welding Power Source



☞ *Disconnect the setup pendant from the welding power source before welding.*

▲ **Turn Off welding power source and weld control.**

1 Welding Power Source

2 Interconnecting Cord

3 Setup Pendant

To make connections, align plug with receptacle, insert plug, and use thumb screws on receptacle to secure plug.

802 816

SECTION 4 – OPERATION

4-1. Operational Terms

The following is a list of terms and their definitions as they apply to this interface unit:

General Terms:

Adaptive Pulse Welding	When the “adaptive pulse” welding process is selected, the unit will attempt to automatically regulate pulse frequency in order to maintain a constant arc length, regardless of change in welding wire stick-out.
Abk (Background Amperage)	Abk is the low weld current. Background current preheats welding wire and maintains the arc. When background current is too low, the arc is unstable and hard to maintain.
Apk (Peak Amperage)	Apk is the high pulse of welding current. Peak current melts the welding wire and forms a droplet. The droplet is forced into the weld puddle.
Vpk (Peak Voltage)	Arc voltage during peak current phase of the pulse waveform. This determines arc length during adaptive pulse welding.
Inductance	In short circuit GMAW welding, an increase in inductance will decrease the number of short circuit metal transfers per second (provided no other changes are made) and increase the arc-on time. The increased arc-on time makes the pool more fluid.
PPS (Pulses Per Second)	PPS, pulse rate, and frequency (Hz) are used interchangeably. A PPS or pulse rate of 60 Hz means 60 pulses of current are produced each second.
PWms (Pulse Width in Milliseconds)	PWms is the time spent at peak current (1.2 ms is .0012 seconds). This time must be long enough to form a droplet of welding wire. The stiffness or fluidity of the molten weld puddle is controlled by PWms.
Synergic	Synergic refers to the unit’s ability to use preprogrammed pulse parameters to determine the actual pulse settings of Peak Amperage, Background Amperage, Pulse Frequency and Pulse Width at any specific wire feed speed setting.
Trim	Term used to represent arc length adjustments in pulse programs. Increasing trim increases the actual arc length. Likewise, decreasing trim shortens arc length. Trim is replaced by volts in MIG programs.

Setup Pendant Terms:

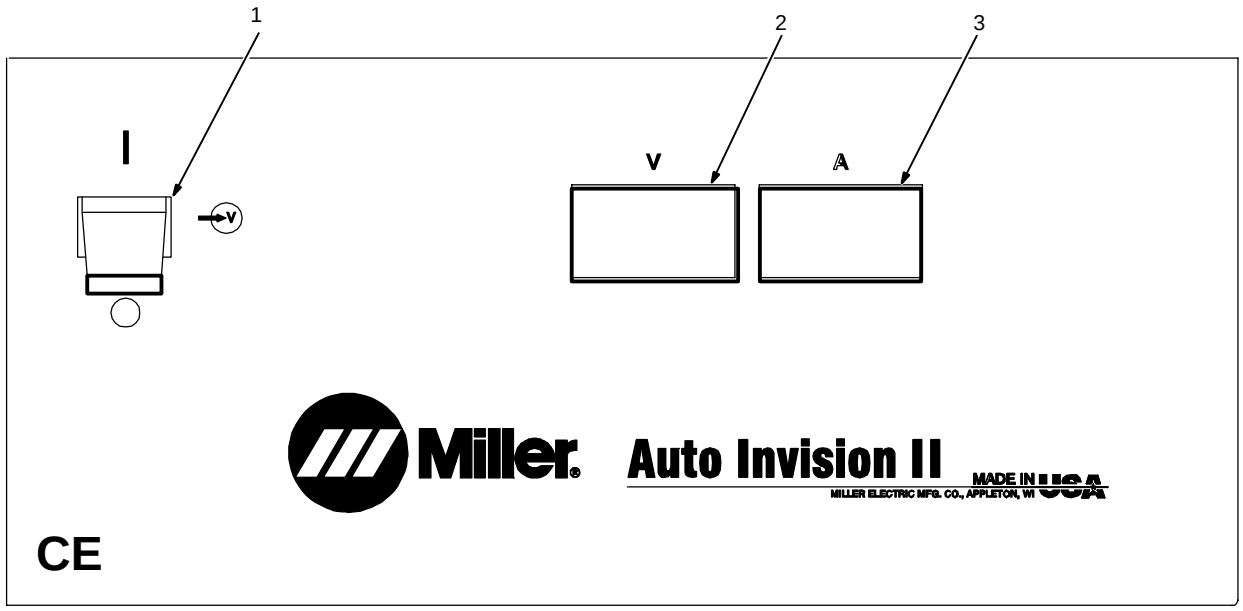
Card Mode	Is used to select use of the optional data card storage and retrieval capabilities.
Process Mode	Is used to select the type of process to be used, including Pulse, Adaptive Pulse, or Mig.
Sequence Mode	Is used to select and program the weld sequences which include preflow, run-in, weld, crater, burnback, and postflow.

Setup Screen Terms:

Access Code	NOTE: The optional Data Card is required to activate this feature. With code off, access to the setup displays is not restricted. With code on, the operator must know and enter the access code to access or change any of the setup displays. To use code, press Parameter Select button to enter access code. When the correct letter is entered, the indicator automatically moves to the next character. When the final access code letter is entered, the display automatically changes to the initial setup display.
Arc Start	NOTE: Do not use the Hot Start setting for .035 in (9 mm) or smaller wire. Use the Hot Start mode for pulse welding with 450 Ampere Inverter Model when high initial weld current is necessary to start large diameter welding wires. When in Hot Start, the 450 Ampere Inverter Model starts the arc in the CV mode and switches to CC once the arc is started. Do not use Hot Start unless using 450 Ampere Inverter Model.
Arc Time	Allows actual arc time up to 9,999.99 hours and weld cycles up to 999,999 to be accumulated and displayed on the digital display, and can be reset to zero as required.
Mig Type (Voltage Correction)	With DVC Voltage Correction On, the unit uses closed-loop control based on voltage feedback to maintain set voltage parameters. With DVC Voltage Correction Off, feedback from the arc is not used for closed-loop feedback to maintain voltage parameters. Feedback from the arc is still used for other functions.
Name Feature	When using the optional Data Card and turning the name feature on, programs written to the card can be identified by name, number, job number, etc.
Program Reset	By selecting program reset in the memory reset mode, the unit defaults to original factory program settings for the program last active. All other program and setup information remains the same.
Range	The interface requires that the voltage and amperage range of the welding power source be entered. Obtain this information from the welding power source Owner’s Manual.
Security	NOTE: The optional Data Card is required to activate this feature. Is used to limit what the operator can control. This includes accessing the number of the program, 1 through 8, and the range of welding parameters within the program.
Software Screen	Selection of this function will display the software version of the unit. When talking with factory service personnel, this number may be required.

System Reset	By selecting system reset in the memory reset mode, the unit defaults to original factory settings for all programs and all set up excluding System, Arc Time, and Model Type.
Voltage (Control Feedback)	Allows voltage to be monitored at the output terminals by two methods. This can be selected through the internal connections of the unit, or through the unit's external voltage sense lead. When using the V. Sense setting, arc voltage feedback is through the voltage sense leads connected to the feeder. Use this setting when there is more than 50 ft (15 m) of weld cable used.
Arc Start/Volt Sense Shutdown	When this feature is on, the system immediately shuts down if no arc voltage is sensed. An error message is displayed. When this feature is off, wire feeds even when there is no arc voltage sensed.
Wire Feed Mode	Allows the selection of inches per minute or meters per minute for wire feed speed. This mode is also used to select motor type; standard speed, low speed, or high speed.

4-2. Lower Front Panel Controls



1 Power Switch

☞ *The fan motor is thermostatically controlled and only runs when cooling is needed.*

2 Voltmeter (see Section 4-3)

3 Ammeter (see Section 4-3)

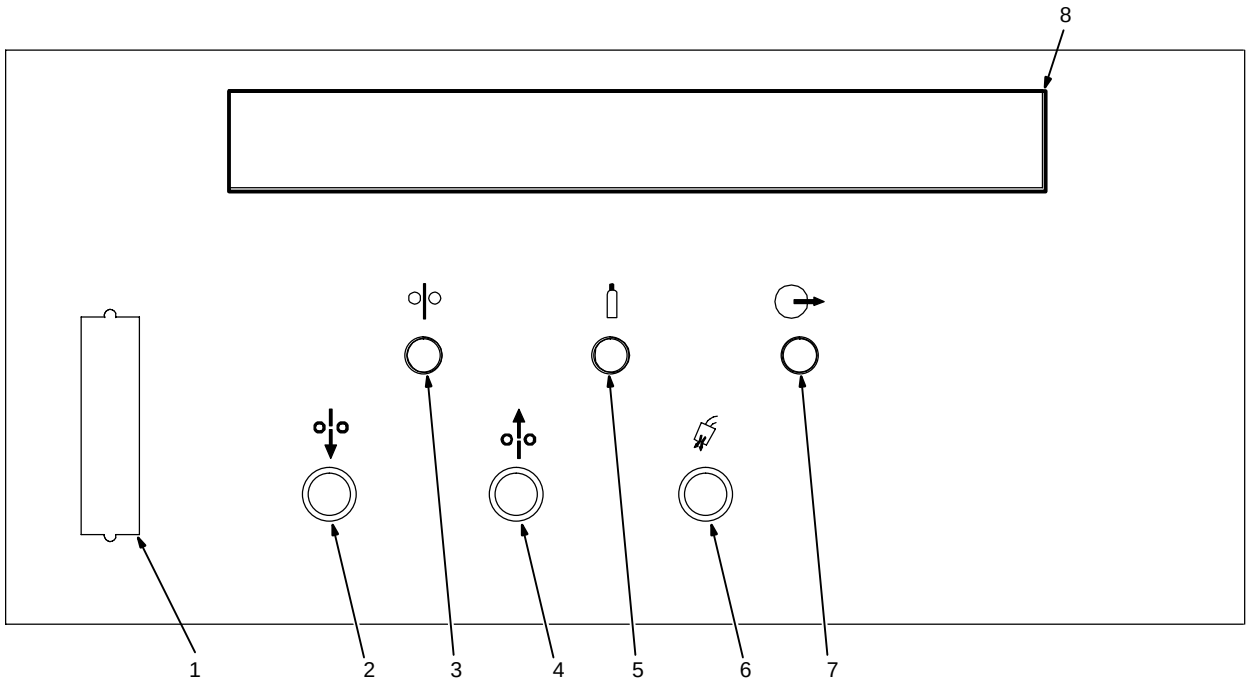
Ref. 186 067

4-3. Meter Functions

Note ☞ *The meters display the actual weld output values for approximately three seconds after the arc is broken.*

Mode	Meter Reading At Idle		Meter Reading While Welding	
MIG	V **24.5** Preset Volts	A Blank	V **24.5** Actual Volts	A **250** Actual Amps
Pulsed MIG	V **PPP** Pulse Display	A **PPP** Pulse Display	V **24.5** Actual Volts	A **250** Actual Amps

4-4. Upper Front Panel Controls



1 Setup Pendant Receptacle

Receptacle for connecting pendant interconnecting cord.

2 Jog Forward Push Button

Advances wire out of the gun.

3 Wirefeed Indicator LED

LED lights when wire feed motor is energized.

4 Jog Reverse Push Button

Retracts wire up into the gun.

5 Gas Indicator LED

LED lights when gas solenoid is energized.

6 Purge Push Button

Momentarily energizes gas solenoid to purge air from gun shielding gas line, or to adjust shielding gas regulator.

7 Contactor Indicator LED

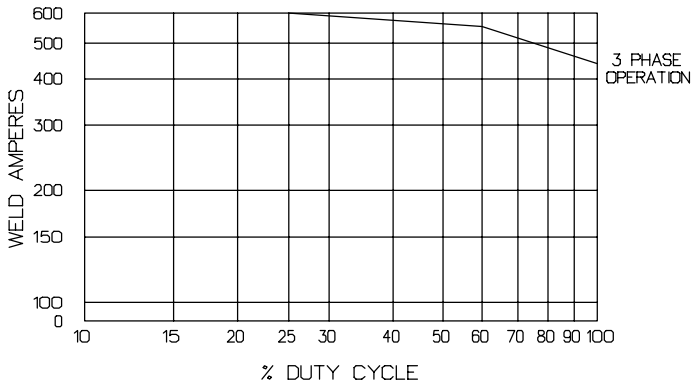
LED lights when welding power source contactor is energized.

8 Main Display

Shows system state, active program, error messages, weld parameters at idle and during welding.

184 197

4-5. Duty Cycle And Overheating

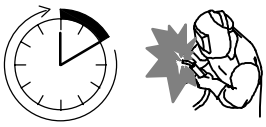


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

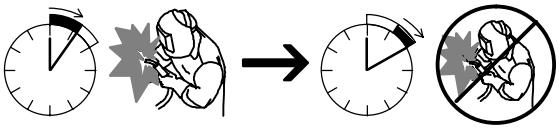
▲ **Exceeding duty cycle can damage unit and void warranty.**

100% Duty Cycle At 450 Amperes



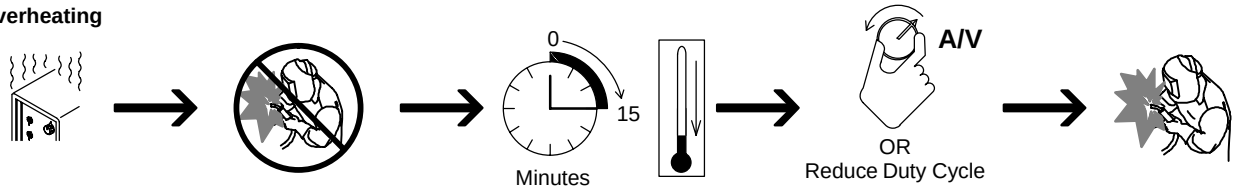
Continuous Welding

60% Duty Cycle At 565 Amperes



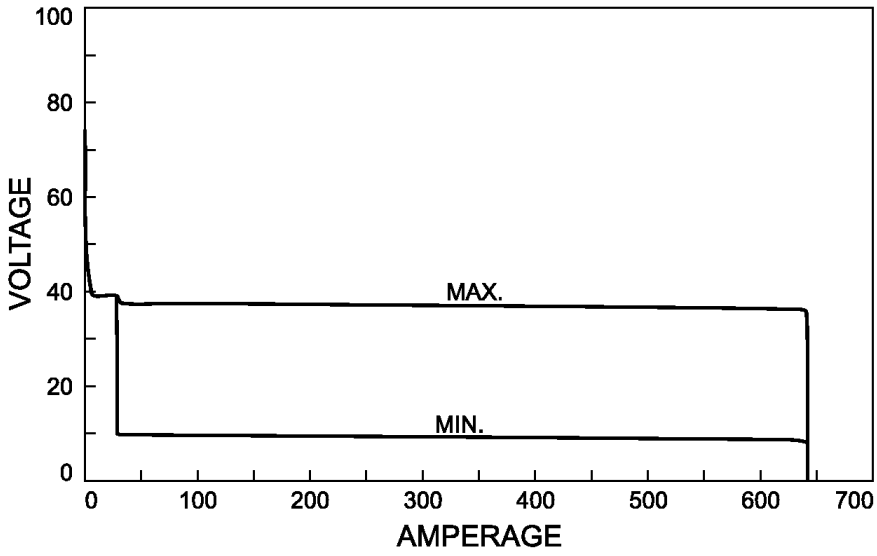
6 Minutes Welding 4 Minutes Resting

Overheating



duty1 4/95 – 181 560

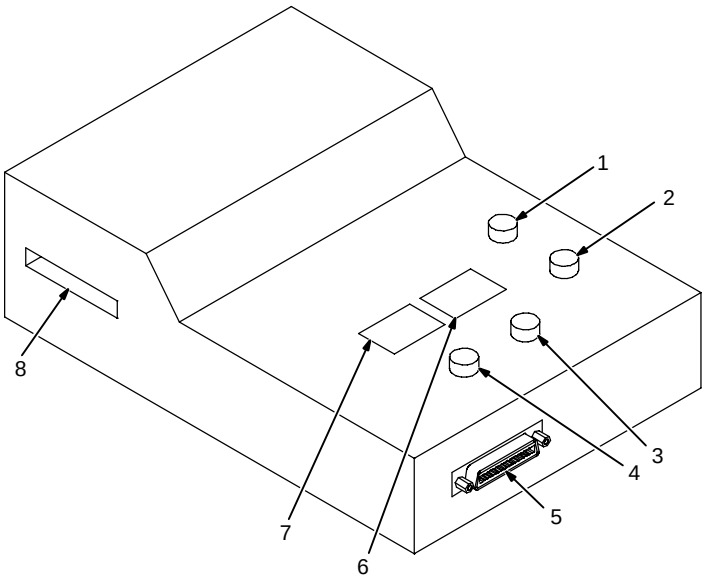
4-6. Volt-Ampere Curves



Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of unit. Curves of other settings fall between curves shown.

va_curve1 4/95 – 181 562

4-7. Setup Pendant Controls



802 815

1 Increase Button

Works with security feature on welding power source to allow increasing weld parameter values within the allowable range.

2 Decrease Button

Works with security feature on welding power source to allow decreasing weld parameter values within the allowable range.

3 Parameter Select Button

Press button to move indicator in right window display, and to make selections in setup screens.

4 Mode Select Button

Press button to move indicator in left window display.

5 Interconnecting Cable Receptacle

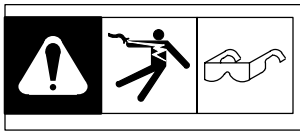
6 Parameter Display

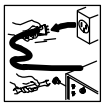
7 Mode Display

8 Card Slot

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

5-1. Routine Maintenance



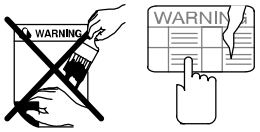


▲ **Disconnect power before maintaining.**

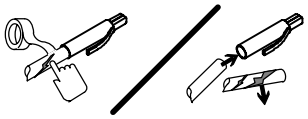
☞ *Maintain more often during severe conditions.*

3 Months

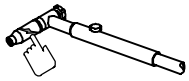
Replace damaged or unreadable label.



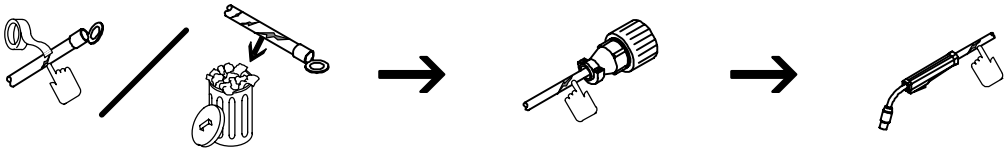
Repair or replace cracked cables.



Replace cracked torch body.

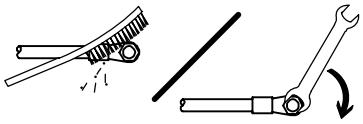


Repair or replace cracked cables and cords.

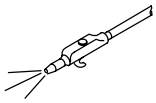


6 Months

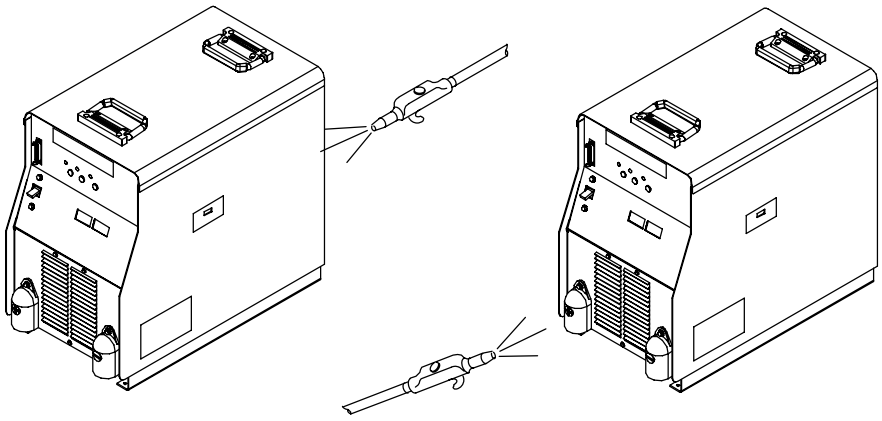
Clean and tighten weld terminals.



Blow out inside.



5-2. Blowing Out Inside Of Unit

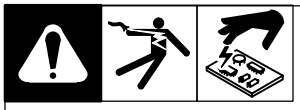


▲ **Do not remove case when blowing out inside of unit.**

To blow out unit, direct airflow through front and back louvers as shown.

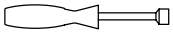
801 914

5-3. Removing Case and Measuring Input Capacitor Voltage

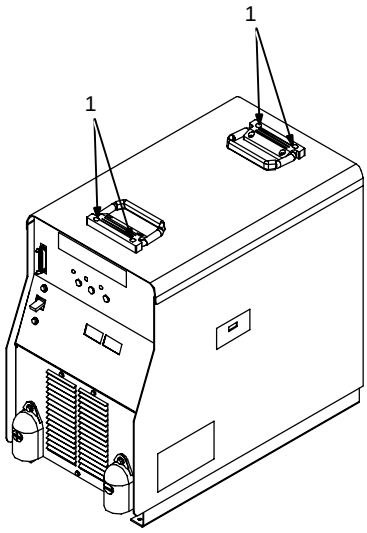


▲ **Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.**

Tools Needed:



5/16 in



Turn Off welding power source, and disconnect input power.

1 Outside Handle Screws

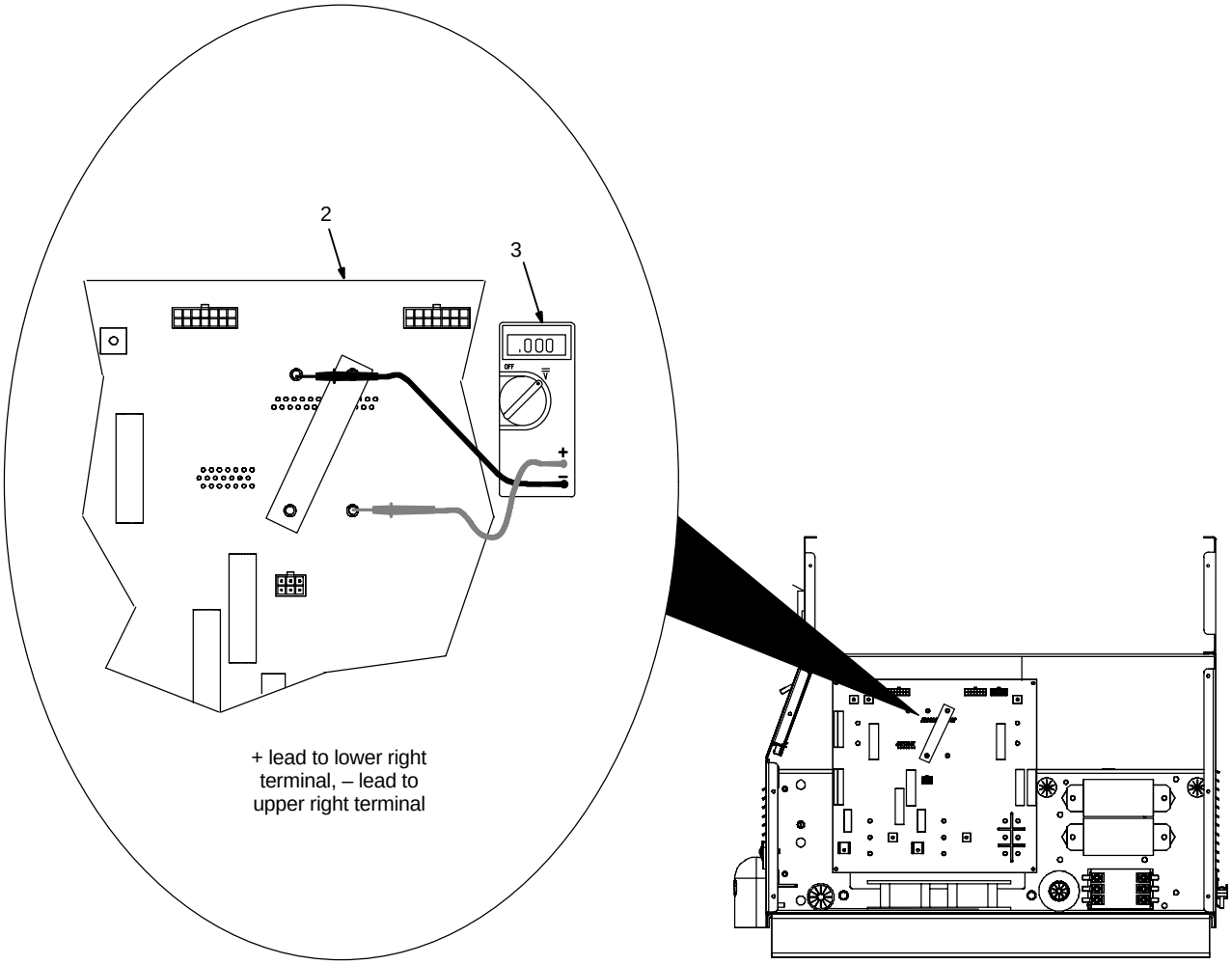
To loosen top, remove two outside handle screws from both handles and all side bolts.

2 Interconnect Board PC2

3 Voltmeter

Measure the dc voltage across the screw terminals on PC2 as shown until voltage drops to near 0 (zero) volts.

Proceed with job inside unit. Reinstall cover when finished.



Ref. 801 914 / Ref. 801 917

5-4. Voltmeter/Ammeter Help Displays

☞ *All directions are in reference to the front of the unit. All circuitry referred to is located inside the unit.*

1 Help 1 Display

Indicates a malfunction in the primary power circuit. If this display is shown, contact a Factory Authorized Service Agent.

2 Help 2 Display

Indicates a malfunction in the thermal protection circuitry located on the left side of the unit. If this display is shown, contact a Factory Authorized Service Agent.

3 Help 3 Display

Indicates the left side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-5). Operation will continue when the unit has cooled.

4 Help 4 Display

Indicates a malfunction in the thermal protection circuitry located on the right side of the unit. If this display is shown, contact a Factory Authorized Service Agent.

5 Help 5 Display

Indicates the right side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 4-5). Operation will continue when the unit has cooled.

6 Help 6 Display

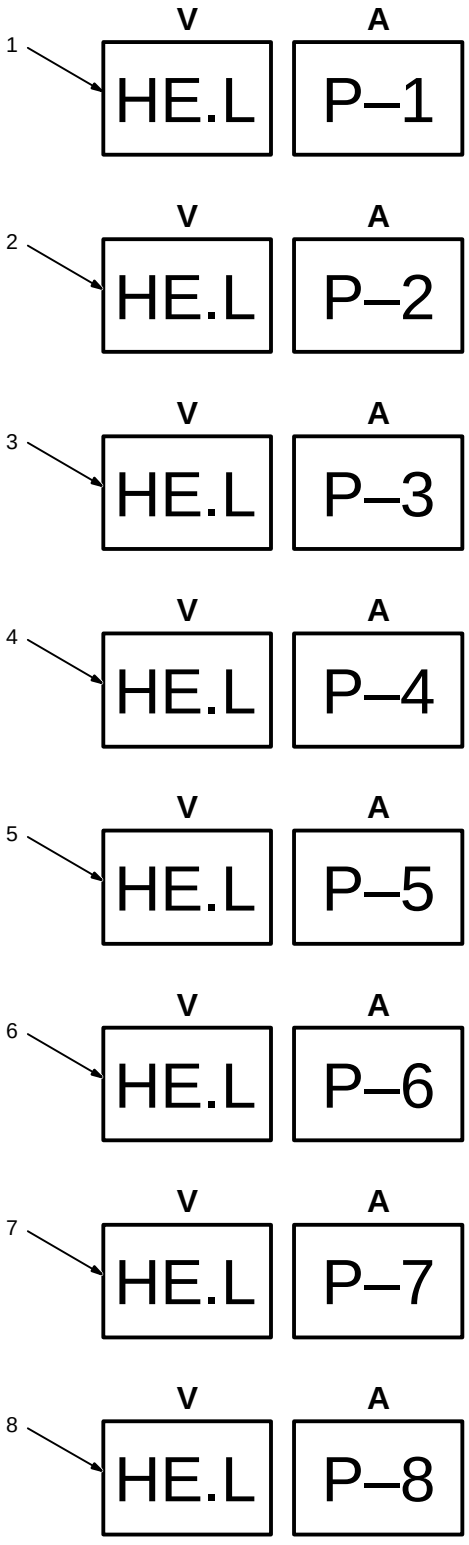
Indicates that the input voltage is too low and the unit has automatically shut down. Operation will continue when the voltage is within ±15% of the operating range. If this display is shown, have an electrician check the input voltage.

7 Help 7 Display

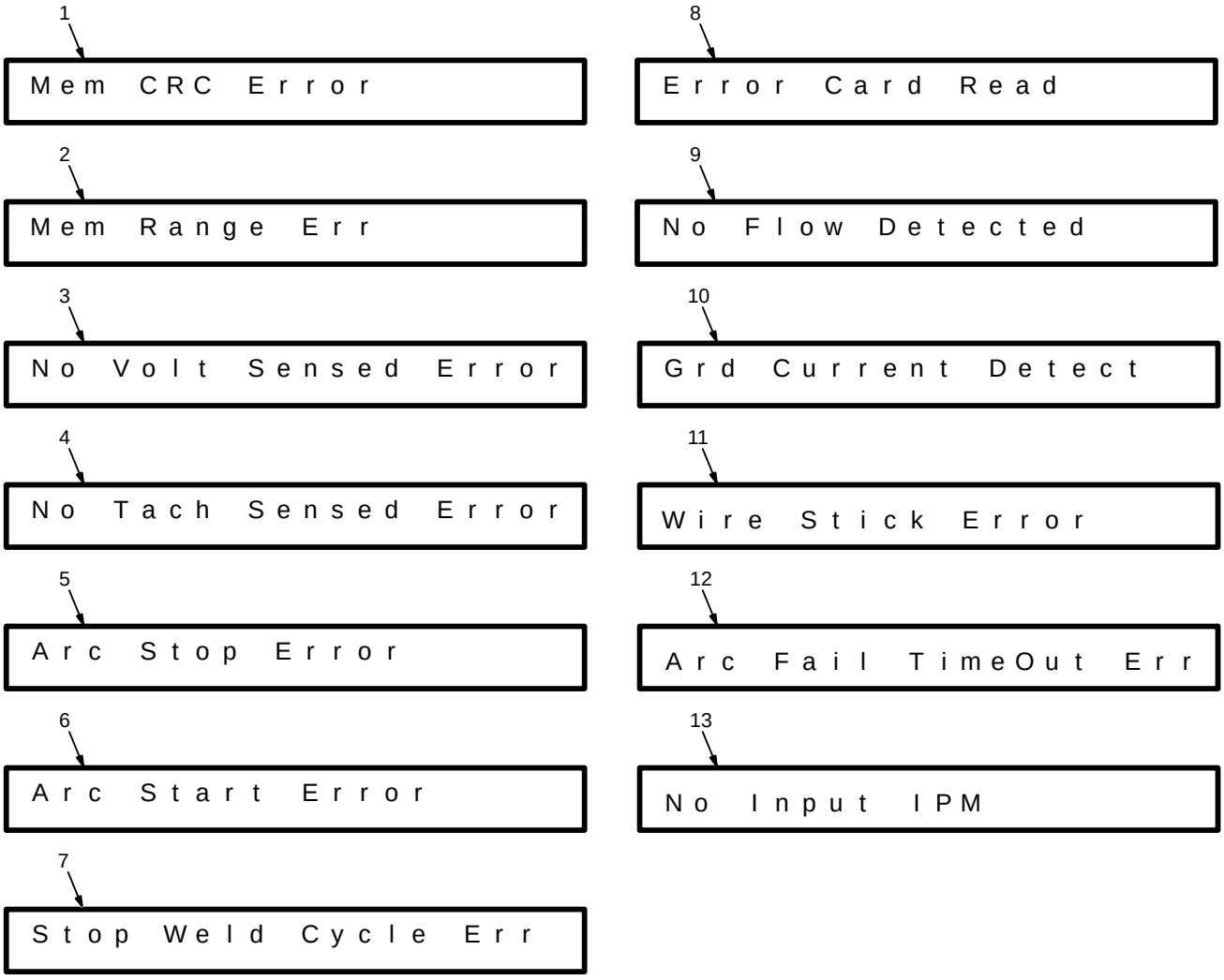
Indicates that the input voltage is too high and the unit has automatically shut down. Operation will continue when the voltage is within ±15% of the operating range. If this display is shown, have an electrician check the input voltage.

8 Help 8 Display

Indicates a malfunction in the secondary power circuit of the unit. If this display is shown, contact a Factory Authorized Service Agent. In addition, when the optional ground current sensor is installed, this display indicates weld current in the ground conductor. When this occurs, have an electrician check the primary and secondary connections.



5-5. Front Panel Error Displays



1 Memory CRC Error Display

Corrupted program data has been detected or loaded. The “X” value indicates the program number.

May be caused by incompatible information on the data card or bad memory.

2 Memory Range Error Display

Improper welding power source range is selected. The “X” value indicates the program number.

May be caused by improper range settings or improper data loaded into the interface unit.

3 No Volt Sensed Error Display

The arc voltage sense circuit did not receive feedback within the required time after an arc was established.

May be caused by an inability to establish an arc in the pulse schedule, or a lack of voltage feedback.

4 No Tach Sensed Error Display

The motor tachometer feedback is not reaching the control.

May be caused by obstructions in the wire feed system or a faulty wire drive system.

5 Arc Stop Error Display

Trouble is occurring at arc end.

May be caused by obstructions in the wire feed system or a faulty wire drive system or torch is touching part at end of weld.

6 Arc Start Error Display

Trouble is occurring at arc start.

May be caused by obstructions in the wire feed system or a faulty wire drive system.

7 Stop Weld Cycle Error Display

An error has been detected and the robot hasn’t stopped the weld cycle, causing the interface unit to stop the weld cycle and wait for the robot to stop.

8 Error Card Read Display

The card reader is not working properly.

May be caused by a bad data card, a bad data card reader, a faulty microprocessor circuit board, or a wiring problem.

9 No Flow Detected

No coolant is detected after preflow in the weld cycle. Check coolant system and flow switch for proper operation.

10 Ground Current Detect Error Display

Weld current has been detected in the earth ground connection.

May be caused by a conductor making connection to the unit chassis.

11 Wire Stick Error Display

The welding wire has stuck to the workpiece at the end of the weld.

May be caused by poor weld conditions.

12 Arc Fail Time Out Error Display

An arc was not established within the allotted time.

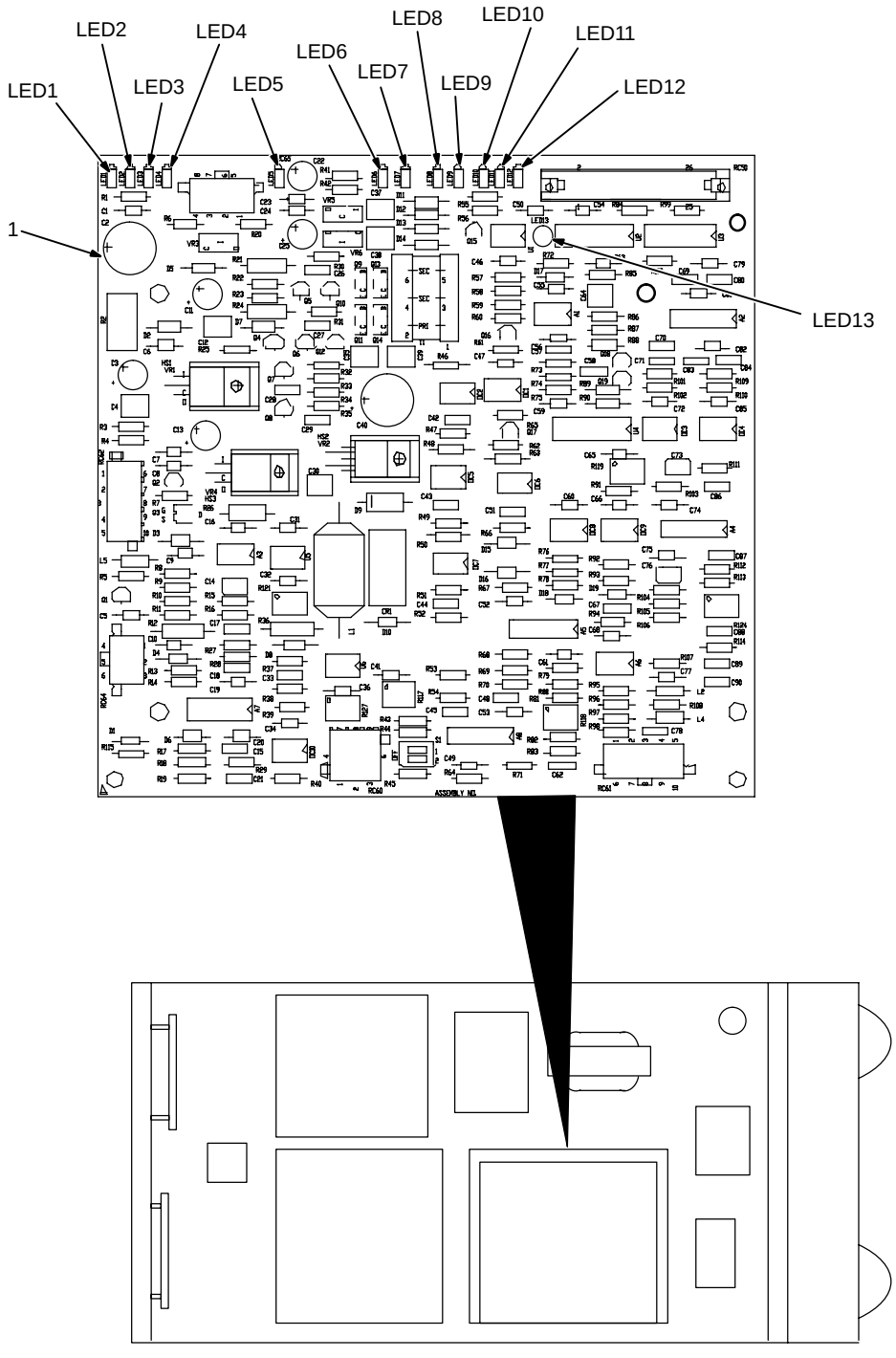
May be caused by an inoperable wire drive, absence of shield gas, or improperly operating welding power source.

13 No Input IPM Display

Analog IPM (inches per minute) from robot is not being received.

May be caused by having no wire feed speed programmed at the robot.

5-6. Weld Interface Board PC12 Diagnostic LED's



Top View

1 Weld Interface Board PC12

Diagnostic LED's are visible inside unit, located on PC12 (see illustration for board location).

Refer to Section 5-7 for information on diagnostic LED's.

Reinstall cover and left side panel after checking diagnostic LED's.

191 842

5-7. Diagnostic LED's On Weld Interface Board PC12

LED	Status	Diagnosis
1	On	Indicates auxiliary output relay is not energized.
	Off	Indicates auxiliary output relay is energized.
2	On	Indicates gas valve is not energized.
	Off	Indicates gas valve is energized.
3	On	Indicates +24 volts dc is present for gas valve.
	Off	Indicates +24 volts dc is not present for gas valve.
4	On	Indicates +15 volts dc is present on weld interface board PC12.
	Off	Indicates +15 volts dc is not present on weld interface board PC12.
5	On	Indicates –15 volts dc is present on weld interface board PC12.
	Off	Indicates –15 volts dc is not present on weld interface board PC12.
6	On	Indicates +15 volts dc power source supply is present on weld interface board PC12.
	Off	Indicates +15 volts dc power source supply is not present on weld interface board PC12.
7	On	Indicates –15 volts dc power source supply is present on weld interface board PC12.
	Off	Indicates –15 volts dc power source supply is not present on weld interface board PC12.
8	On	Indicates +5 volts dc is present on weld interface board PC12.
	Off	Indicates +5 volts dc is not present on weld interface board PC12.
9	On	Input signal for no Jog retract.
	Off	Input signal for Jog retract.
10	On	Input signal for no Jog advance.
	Off	Input signal for Jog advance.
11	On	Indicates CV mode is selected.
	Off	Indicates CC mode is selected.
12	On	Input signal for no welding power source contactor.
	Off	Input signal for welding power source contactor.
13	On	Indicates an Emergency Stop condition is not present.
	Off	Indicates an Emergency Stop condition is present.

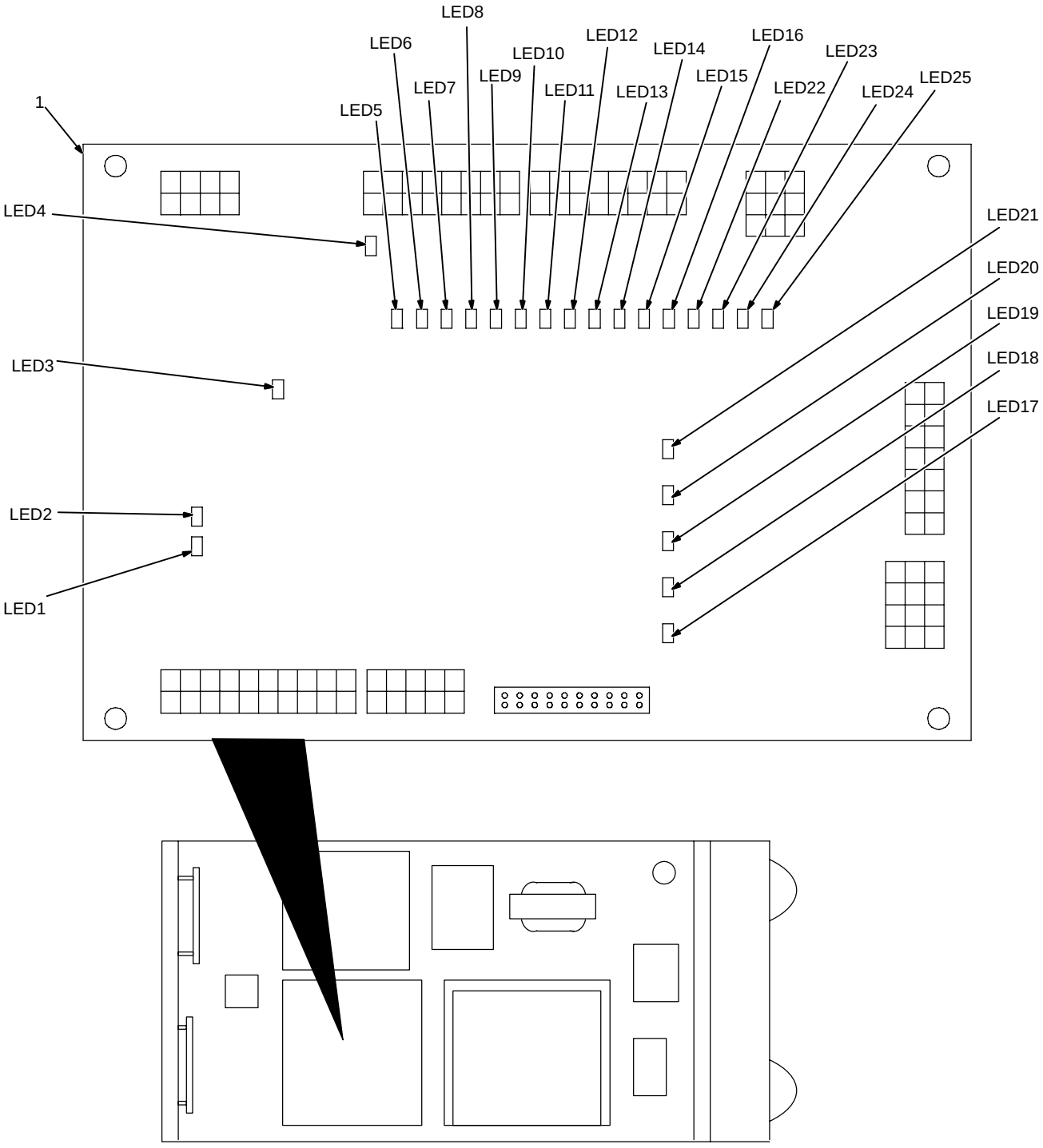
5-8. Customer Interface Board PC14 Diagnostic LED's

1 Customer Interface Board PC14

Diagnostic LED's are visible inside unit, located on PC14 (see illustration for board location).

Refer to Section 5-9 for information on diagnostic LED's.

Reinstall top cover after checking diagnostic LED's.



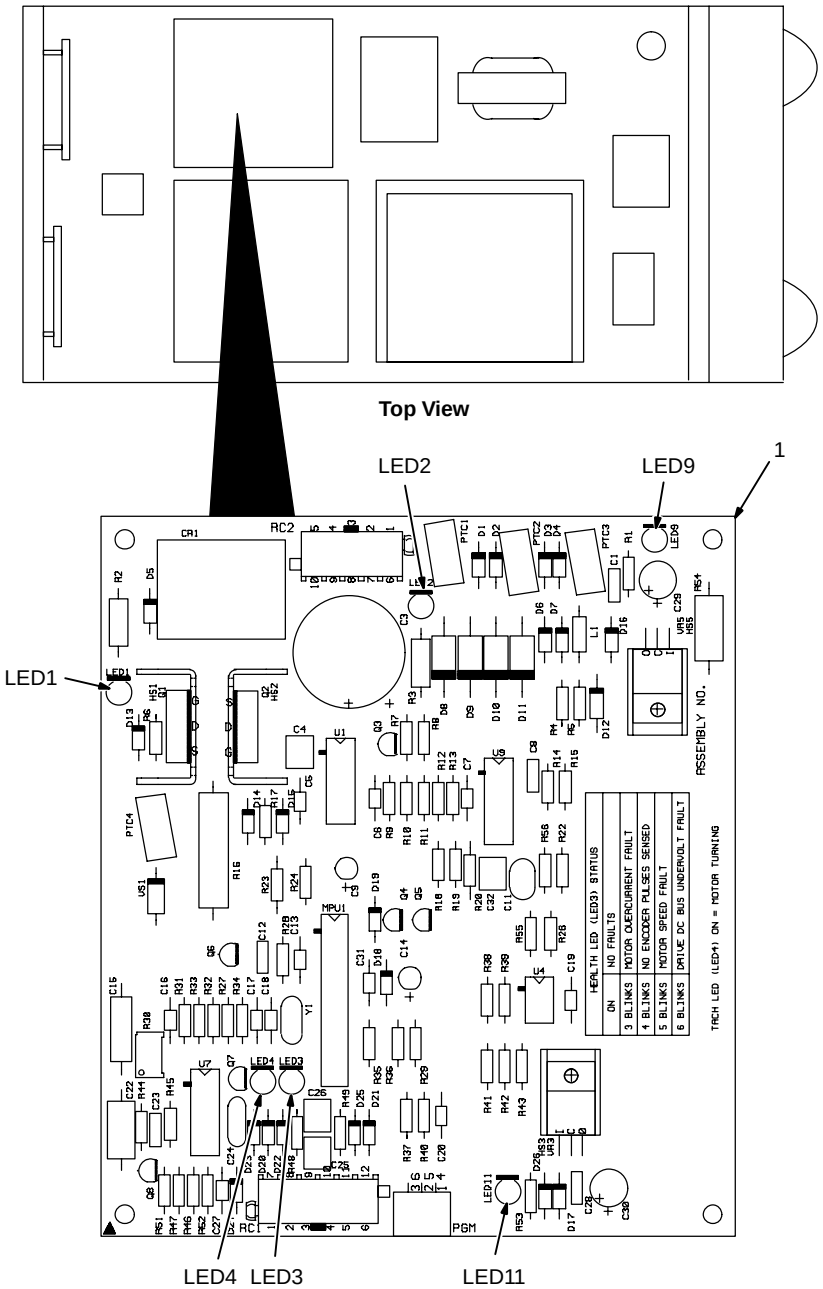
Top View

5-9. Diagnostic LED's On Customer Interface Board PC14

LED	Status	Diagnosis
1	On	Indicates –15 volts dc RA supply is present on customer interface board PC14.
	Off	Indicates –15 volts dc RA supply is not present on customer interface board PC14.
2	On	Indicates +15 volts dc RA supply is present on customer interface board PC14.
	Off	Indicates +15 volts dc RA supply is not present on customer interface board PC14.
3	On	Input signal On from robot for no Emergency Stop.
	Off	Input signal Off from robot for Emergency Stop.
4	On	Indicates +24 volts dc RD supply is present on customer interface board PC14.
	Off	Indicates +24 volts dc RD supply is not present on customer interface board PC14.
5	On	Input signal On from robot for shielding gas.
	Off	Input signal Off from robot for no shielding gas.
6	On	Input signal On from robot to energize contactor.
	Off	Input signal Off from robot to not energize contactor.
7	On	Input signal On from robot for jog retract.
	Off	Input signal Off from robot for no jog retract.
8	On	Input signal On from robot for jog advance.
	Off	Input signal Off from robot for no jog advance.
9	On	Indicates automatic configuration Bit D is set.
	Off	Indicates automatic configuration Bit D is not set.
10	On	Input signal On for RPS-C.
	Off	Input signal Off for RPS-C.
11	On	Input signal On for RPS-B.
	Off	Input signal Off for RPS-B.
12	On	Indicates remote program A selected.
	Off	Indicates remote program A not selected.
13	On	Input signal On from peripheral for touch sensor.
	Off	Input signal Off from peripheral for no touch sensor.
14	On	Indicates automatic configuration Bit B is set.
	Off	Indicates automatic configuration Bit B is not set.
15	On	Indicates automatic configuration Bit A is set.
	Off	Indicates automatic configuration Bit A is not set.
16	On	Indicates automatic configuration Bit C is set.
	Off	Indicates automatic configuration Bit C is not set.
17	On	Input signal On from relay CR4 for wire stuck in weld joint.
	Off	Input signal Off from relay CR4 for wire not stuck in weld joint.
18	On	Input signal On from relay CR6 for flow (shielding gas or coolant) present.
	Off	Input signal Off from relay CR6 for flow (shielding gas or coolant) not present.
19	On	Input signal On from relay CR5 for arc detect.
	Off	Input signal Off from relay CR5 for no arc detect.
20	On	Input signal On from relay CR2.
	Off	Input signal Off from relay CR2.
21	On	Input signal On from relay CR1 for welding power source ready and no detected errors present.
	Off	Input signal Off from relay CR1 for welding power source not ready, detected errors are present, or unit is in Setup or Control mode.
22	On	Input signal On from peripheral for flow switch.
	Off	Input signal Off from peripheral for no flow switch.

LED	Status	Diagnosis
23	On	Input signal On from peripheral for jog advance.
	Off	Input signal Off from peripheral for no jog advance.
24	On	Input signal On from peripheral for jog retract.
	Off	Input signal Off from peripheral for no jog retract.
25	On	Input signal On from peripheral for shielding gas purge.
	Off	Input signal Off from peripheral for no shielding gas purge.
26	On	Input signal On for touch sensor.
	Off	Input signal Off for no touch sensor.

5-10. Motor Board PC13 Diagnostic LED's



1 Motor Board PC13

Diagnostic LED's are visible inside unit, located on PC13 (see illustration for board location).

Refer to Section 5-11 for information on diagnostic LED's.

Reinstall cover after checking diagnostic LED's.

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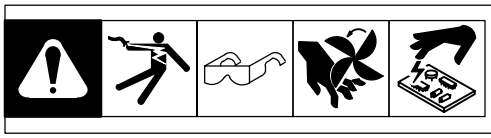
5-11. Diagnostic LED's On Motor Board PC13

LED	Status	Diagnosis
1 Red	On	Indicates motor reverse relay is energized.
	Off	Indicates motor reverse relay is not energized.
2 Red	On	LED should be On. Indicates 115 volts ac input is sufficiently charging +170 volts dc bus for motor.
	Off	If LED is Off, check 115 volts ac input.
9 Red	On	LED should be On. Indicates +15 volts dc regulated bus is on.
	Off	If LED is Off, check for a short at board traces between bus and ground or at RC1-6 for 24 volts ac input to regulator.
11 Red	On	LED should be On. Indicates +5 volts dc regulated bus is on.
	Off	If LED is Off, check for a short at board traces between bus and ground or at RC1-6 for 24 volts ac input to regulator.
4 Green	On	Indicates encoder input from motor to microprocessor is greater than 3 ipm.
	Off	Indicates motor is off or encoder input from motor to microprocessor is less than 3 ipm.
3 Green	On	Indicates microprocessor is operating without sensing any faults.
	Blinking	If microprocessor senses a fault, LED blinks to indicate type of fault.
	3 Blinks	PC13 sensed an overcurrent condition in wire drive. Check motor cables and connections for short circuits or bad connections. Check motor armature resistance, typical range is 10 to 20 ohms.
	4 Blinks	PC13 PWM (pulse width modulation) output was on, but no encoder pulses were sensed for more than 1 second. Check motor cables and connections for short circuits or bad connections. Electronic resetable fuses called PTCs protect encoder power supply. If motor cable has a short circuit, PTCs will go to high resistance to protect PC13. Do a pin-to-pin check for shorted conductors inside cable jacket, and replace cable if necessary. Check motor encoder, and replace encoder if necessary.
	5 Blinks	Motor was not operating at proper speed for over 2 seconds. This fault results from monitoring amount of velocity error (command speed – actual speed) to make sure that motor is running within a calculated percentage of command speed. For example, if motor is at a high speed and PWM is at maximum voltage, a dirty liner or other load drags down motor speed will result in this fault condition. Clean liner, correct other load conditions, such as spool hub tension too tight, or reduce wire feed speed.
	6 Blinks	+170 volts dc motor bus has dropped below +90 volts dc. Check 115 volts ac input to PC13.

5-12. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 3-8).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Section 3-8).
	Check for proper input power connections (see Section 3-8).
No weld output; meter display On.	Check, repair, or replace remote control.
	Unit overheated. Allow unit to cool with fan On (see Section 4-5).
	Check voltmeter/ammeter Help displays.
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 3-5).
	Clean and tighten all weld connections.
No 115 volts ac output at duplex receptacle, Remote 14 receptacle.	Reset circuit breaker CB1 (see Section 3-6).
No 24 volts ac output at Remote 14 receptacle.	Reset circuit breaker CB2 (see Section 3-6).

Notes

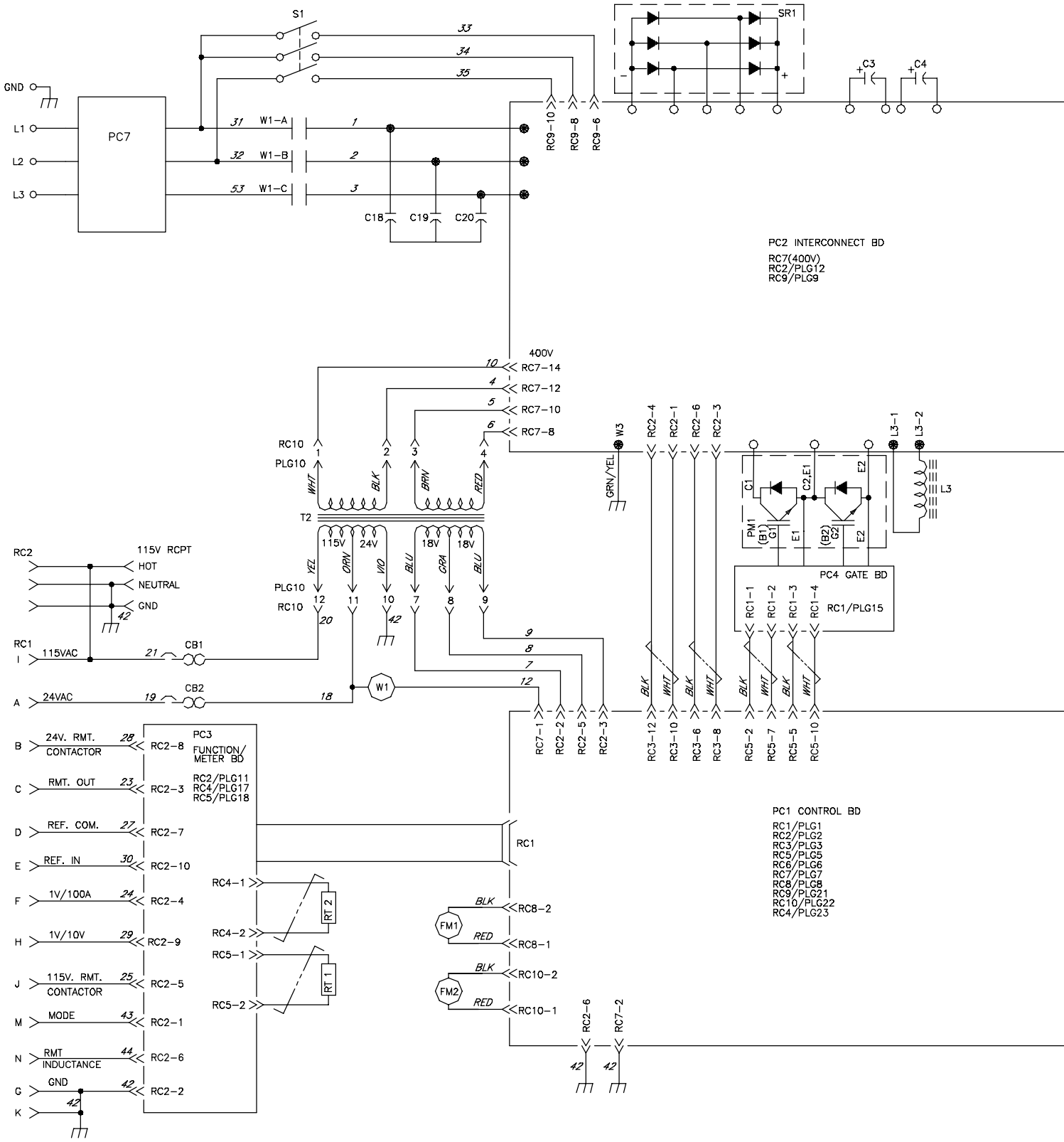
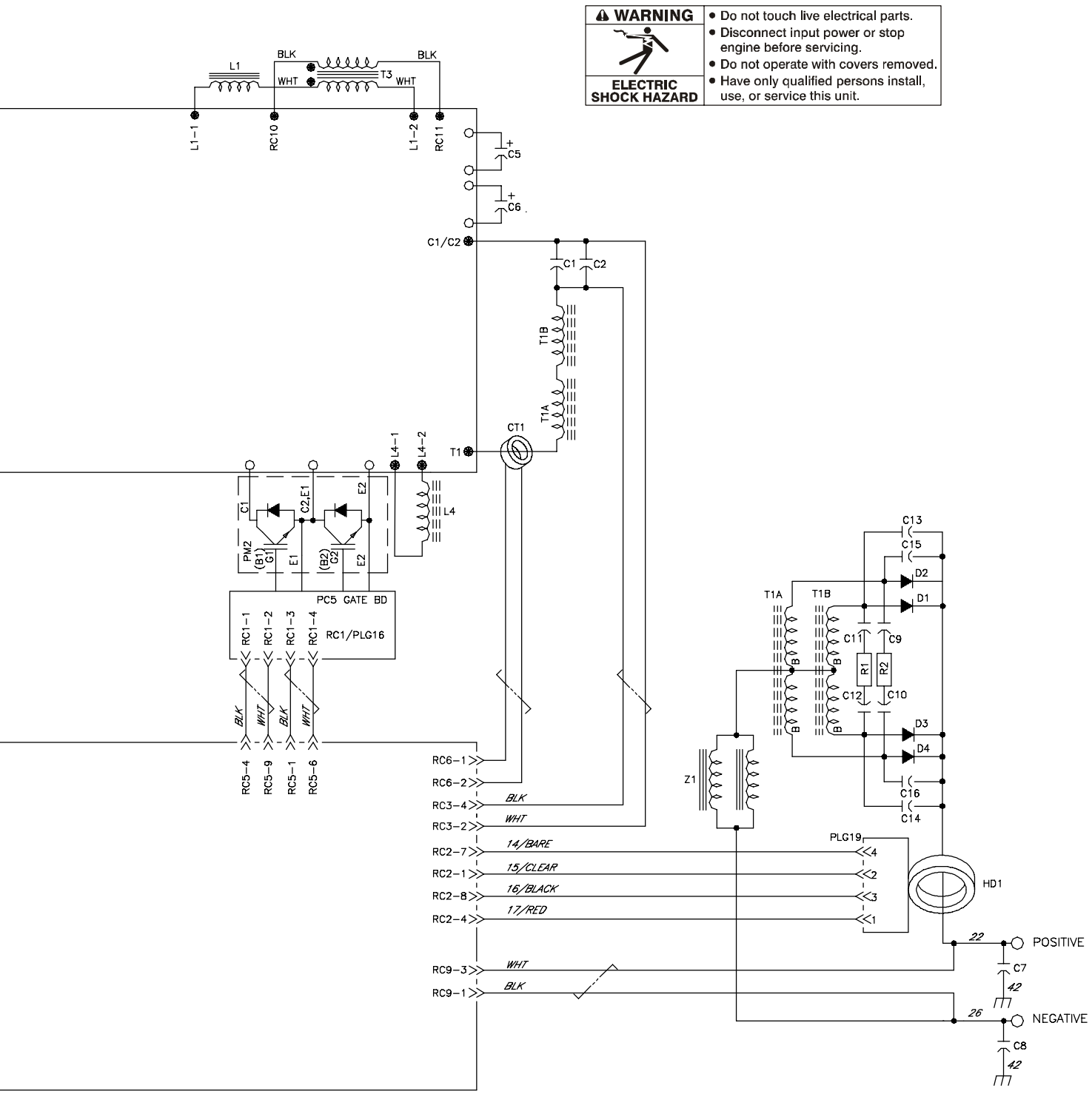


Figure 6-1. Circuit Diagram For Welding Power Source


WARNING
Do not touch live electrical parts.
Disconnect input power or stop engine before servicing.
Do not operate with covers removed.
Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD
L1
BLK
BLK
WHT
T3
WHT
L1-1
RC10
L1-2
RC11
C5
C6
C1/C2
C1
C2
T1B
T1A
CT1
T1
L4-1
L4-2
L4
C1
C2,E1
E2
PM2
(B1) G1
E1
(B2) G2
E2
PC5 GATE BD
RC1-1
RC1-2
RC1-3
RC1-4
RC1/PLG16
BLK
WHT
BLK
WHT
RC5-4
RC5-9
RC5-1
RC5-6
RC6-1
RC6-2
RC3-4
BLK
RC3-2
WHT
RC2-7
14/BARE
RC2-1
15/CLEAR
RC2-8
16/BLACK
RC2-4
17/RED
RC9-3
WHT
RC9-1
BLK
Z1
T1A
T1B
C13
C15
D2
D1
C11
C9
R1
R2
C12
C10
D3
D4
C16
C14
PLG19
4
2
3
1
HD1
22
POSITIVE
C7
42
26
NEGATIVE
C8
42

203 505-A

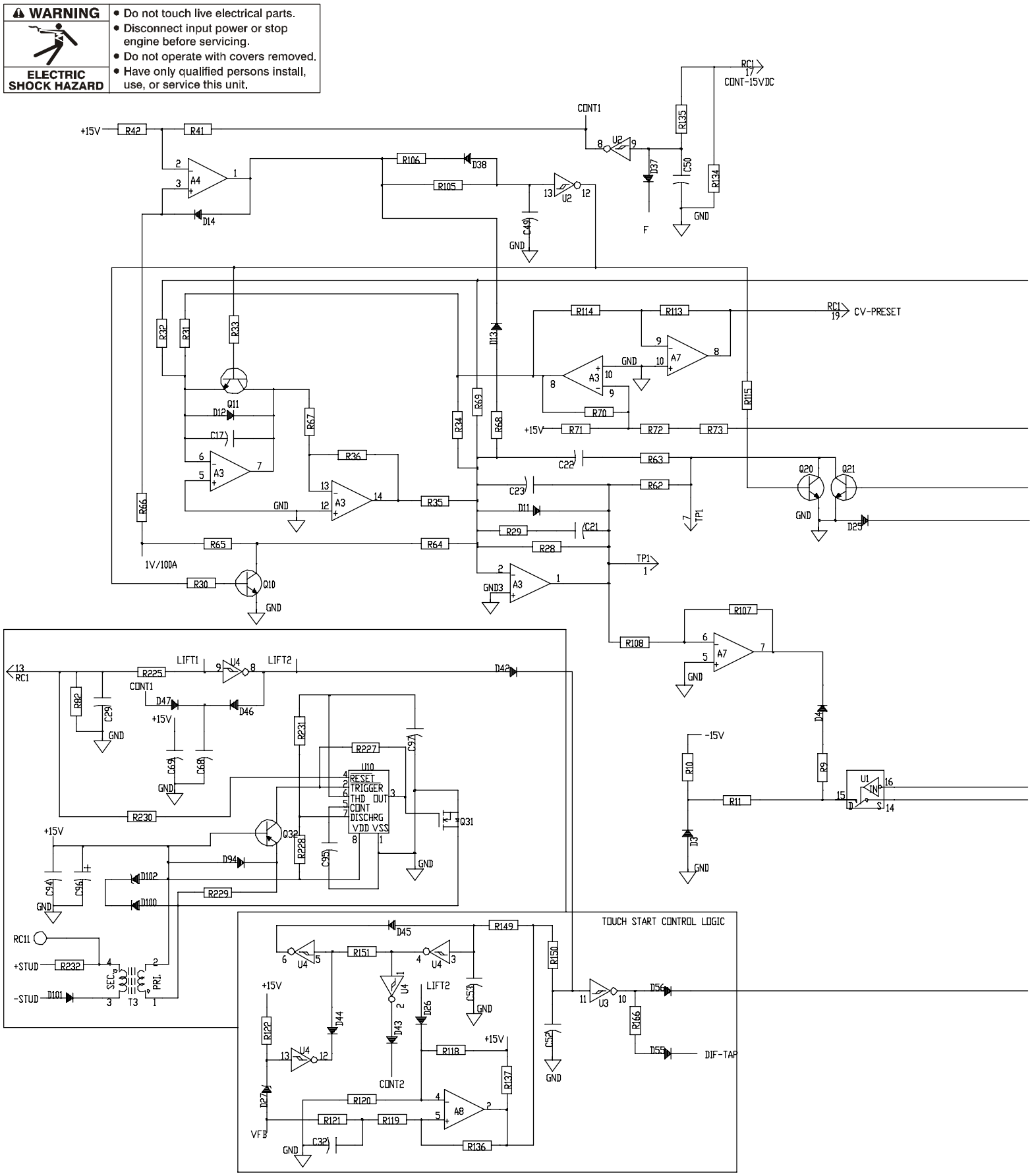
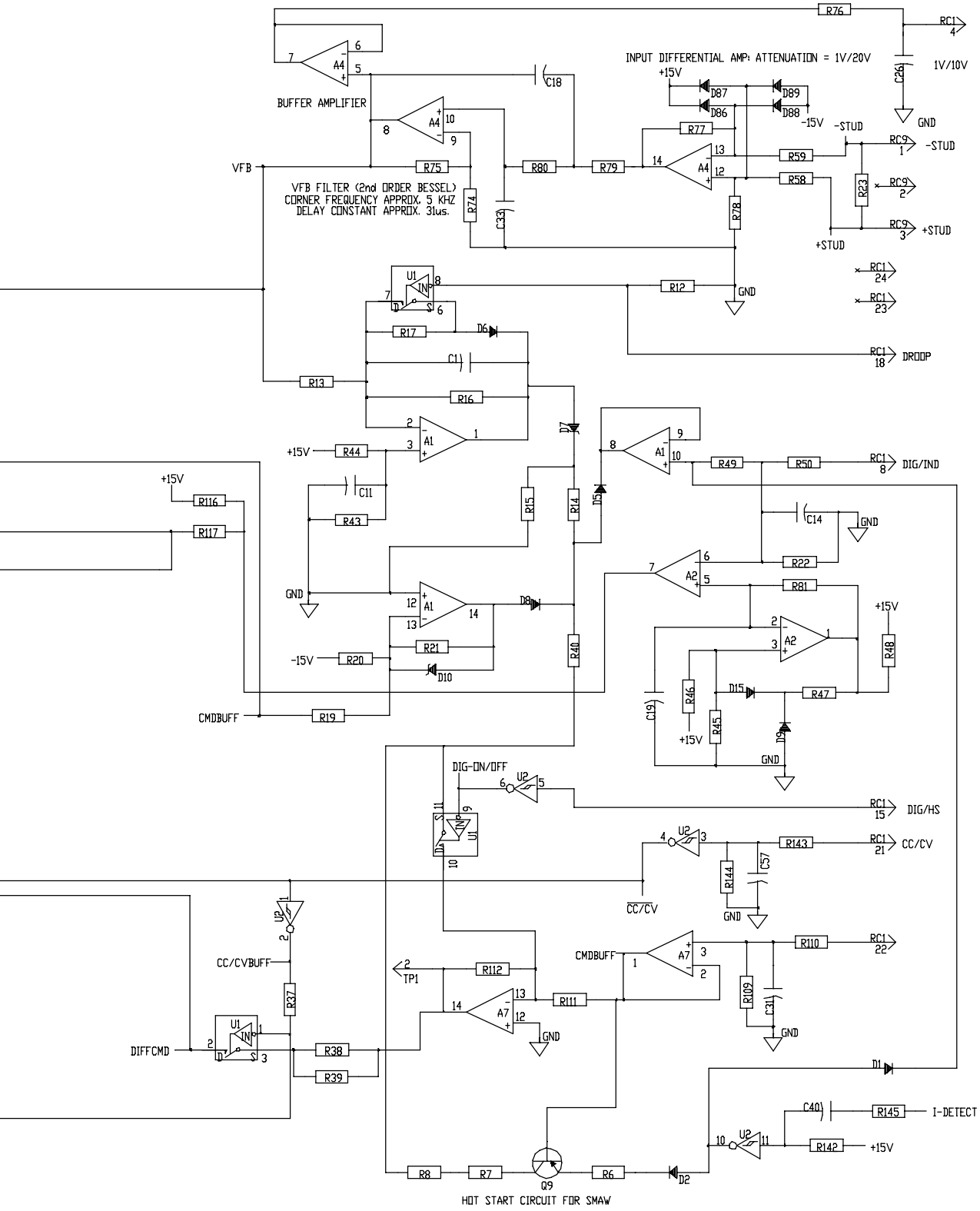


Figure 6-2. Circuit Diagram For Control Board PC1 (Part 1 of 3)


INPUT DIFFERENTIAL AMP: ATTENUATION = 1V/20V
BUFFER AMPLIFIER
VFB FILTER (2nd ORDER BESSEL)
CORNER FREQUENCY APPROX. 5 KHZ
DELAY CONSTANT APPROX. 31us.
VFB
1V/10V
-STUD
+STUD
DROOP
DIG/IND
DIG/HS
CC/CV
I-DETECT
DIG-ON/OFF
CMDBUFF
CC/CVBUFF
DIFFCMD
HOT START CIRCUIT FOR SMAW
+15V
-15V
GND

⚠ WARNING

ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

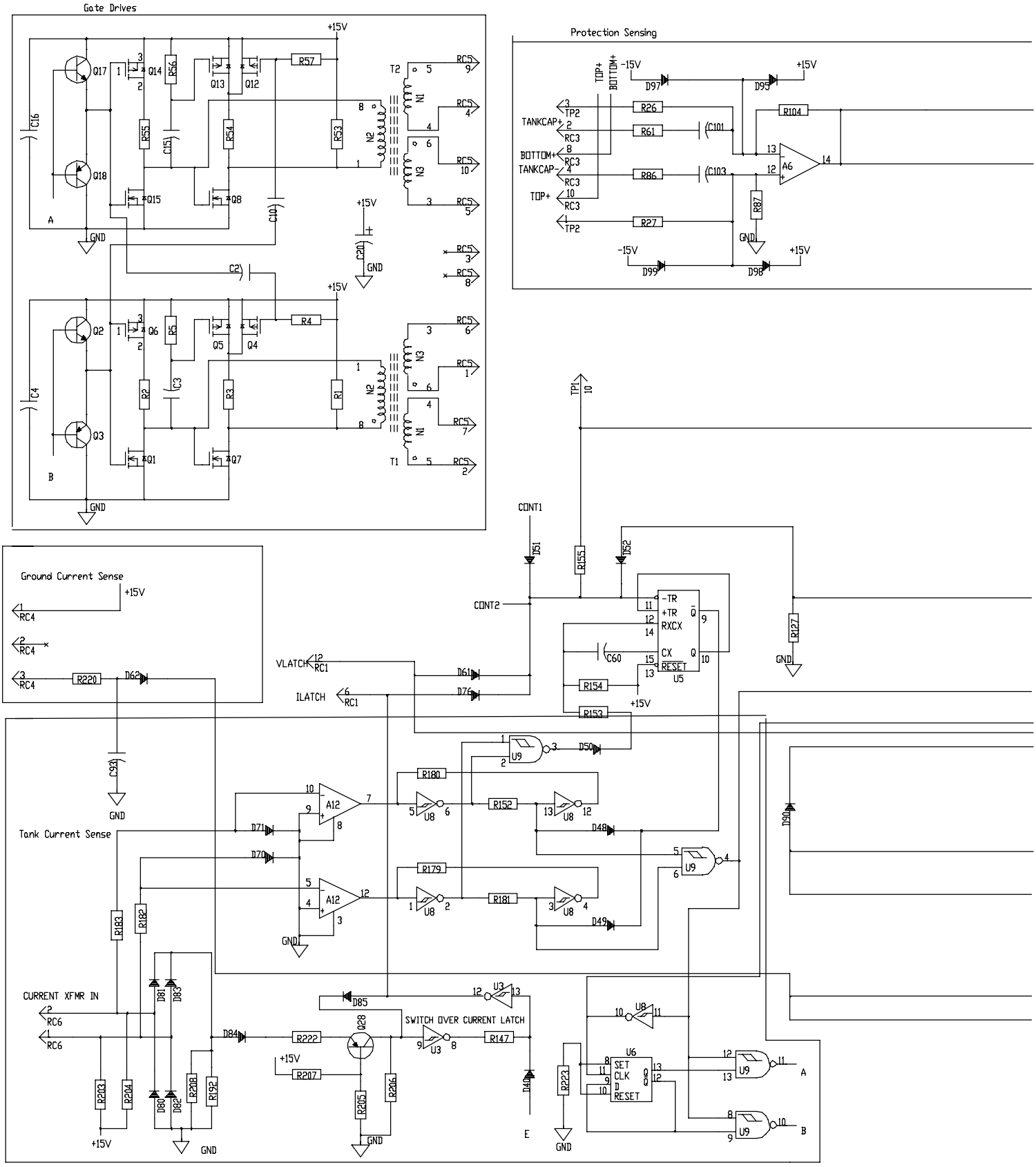
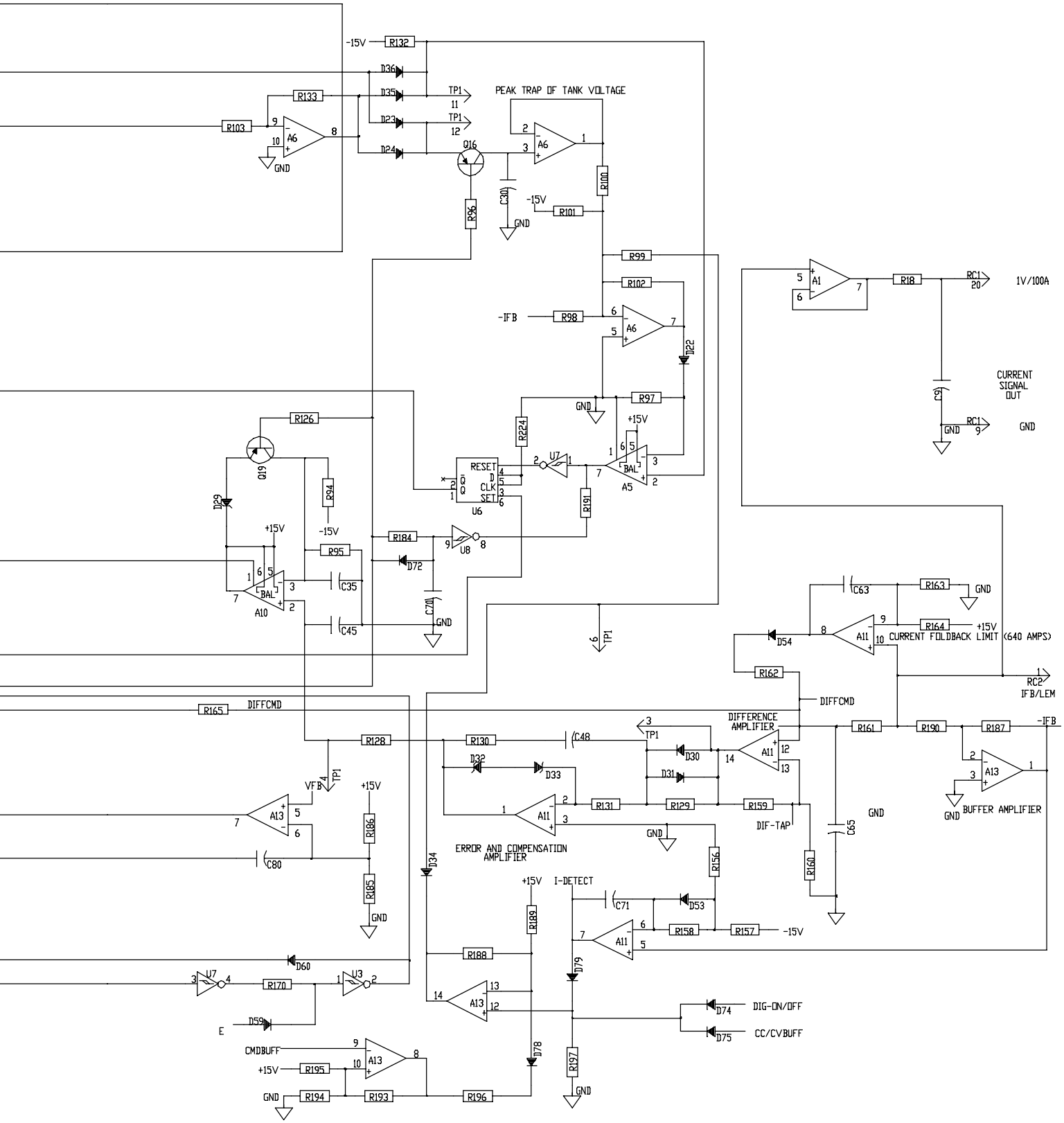


Figure 6-3. Circuit Diagram For Control Board PC1 (Part 2 of 3)


PEAK TRAP OF TANK VOLTAGE
1V/100A
CURRENT SIGNAL OUT
CURRENT FOLDBACK LIMIT (640 AMPS)
RC2 IFB/LEM
DIFFERENCE AMPLIFIER
DIFFCMD
-IFB
BUFFER AMPLIFIER
ERROR AND COMPENSATION AMPLIFIER
DIF-TAP
I-DETECT
DIG-ON/OFF
CC/CVBUFF
CMDBUFF
VFB
E
RESET
CLK
SET
BAL
GND
+15V
-15V
-IFB

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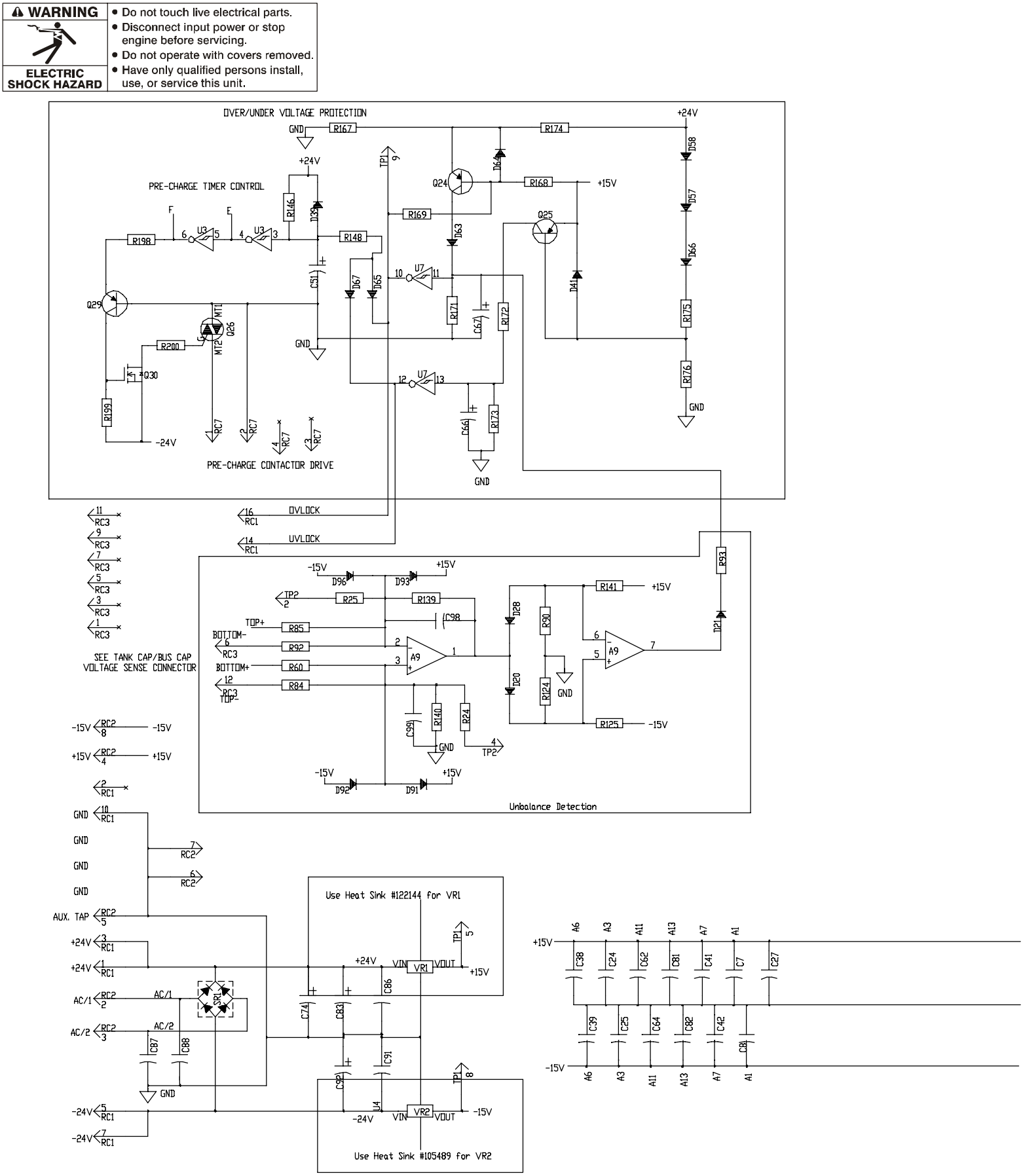
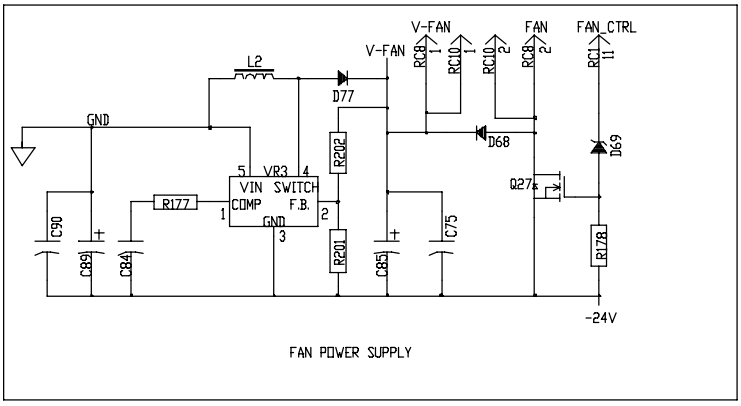
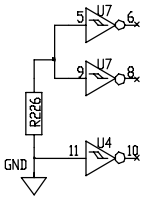


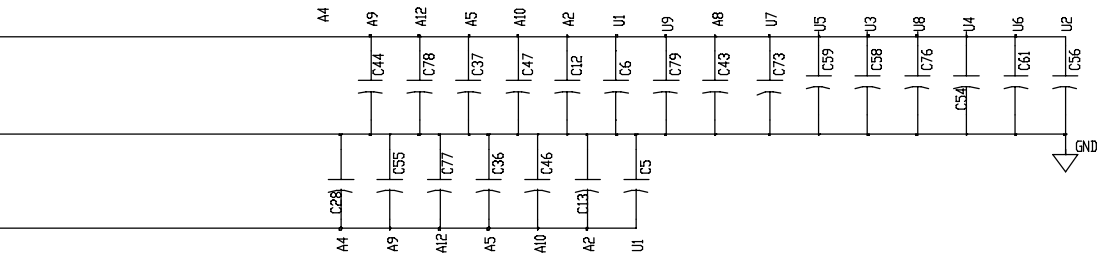
Figure 6-4. Circuit Diagram For Control Board PC1 (Part 3 of 3)

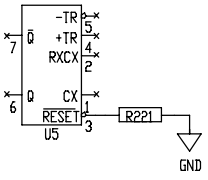


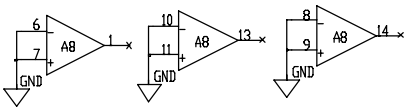
FAN POWER SUPPLY

POWER/GROUND NETS FOR CHIPS		BYPASS CAPS
U1	4=-15V,5=GND,12=+15V,13=+15V	C5 C6
U2	7=GND,14=+15V	C56
U3	7=GND,14=+15V	C58
U4	7=GND,14=+15V	C54
U5	8=GND,16=+15V	C59
U6	7=GND,14=+15V	C61
U7	7=GND,14=+15V	C73
U8	7=GND,14=+15V	C76
U9	7=GND,14=+15V	C79
A1	4=+15V,11=-15V	C7 C8
A2	4=-15V,8=+15V	C12 C13
A3	4=+15V,11=-15V	C24 C25
A4	4=+15V,11=-15V	C27 C28
A5	4=-15V,8=+15V	C36 C37
A6	4=+15V,11=-15V	C38 C39
A7	4=+15V,11=-15V	C41 C42
A9	4=-15V,8=+15V	C55 C44
A10	4=-15V,8=+15V	C46 C47
A11	4=+15V,11=-15V	C62 C64
A12	6=-15V,11=+15V	C72 C78
A13	4=+15V,11=-15V	C81 C82
A8	12=GND,3=+15V	C43

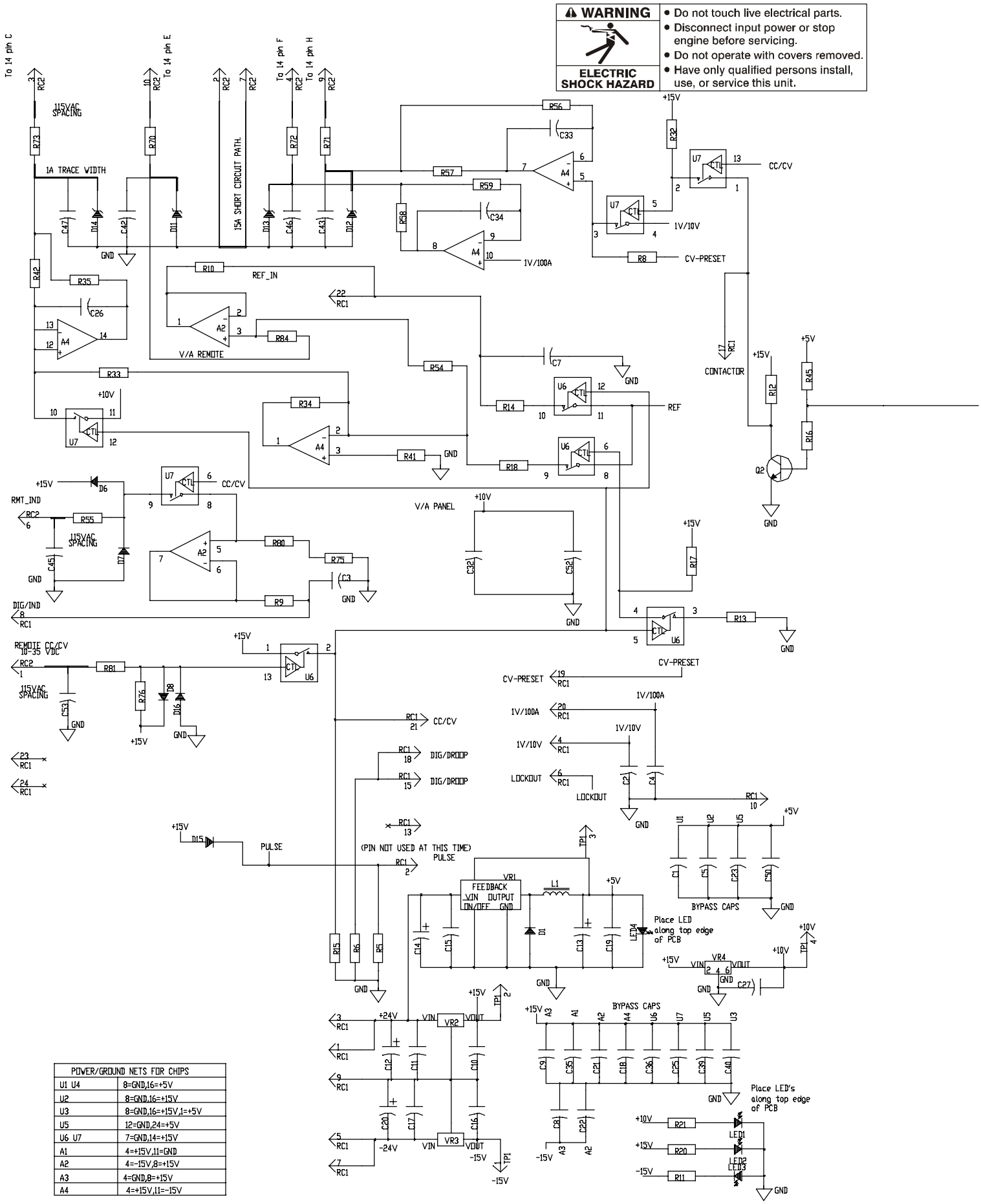






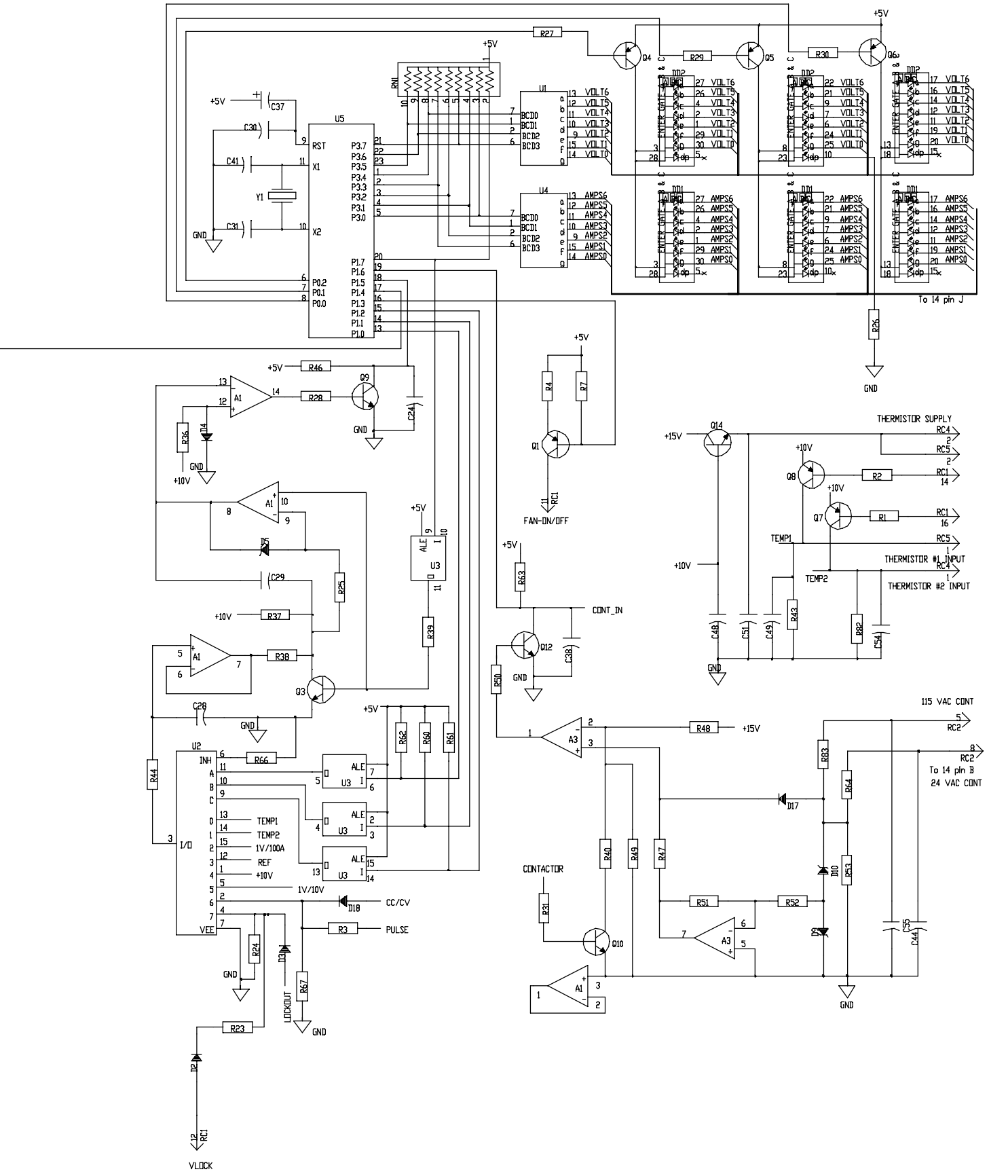


203 311 (3 of 3)



POWER/GROUND NETS FOR CHIPS	
U1 U4	8=GND,16=+5V
U2	8=GND,16=+15V
U3	8=GND,16=+15V,1=+5V
U5	12=GND,24=+5V
U6 U7	7=GND,14=+15V
A1	4=+15V,11=GND
A2	4=-15V,8=+15V
A3	4=GND,8=+15V
A4	4=+15V,11=-15V

Figure 6-5. Circuit Diagram For Function/Meter Board PC3


+5V
R27
Q4
R29
Q5
R30
Q6
RN1
U1
U4
U5
RST
X1
X2
Y1
C37
C30
C41
C31
GND
P3.7
P3.6
P3.5
P3.4
P3.3
P3.2
P3.1
P3.0
P1.7
P1.6
P1.5
P1.4
P1.3
P1.2
P1.1
P1.0
P0.2
P0.1
P0.0
BCD0
BCD1
BCD2
BCD3
VOLT6
VOLT5
VOLT4
VOLT3
VOLT2
VOLT1
VOLT0
AMPS6
AMPS5
AMPS4
AMPS3
AMPS2
AMPS1
AMPS0
To 14 pin J
R26
R46
Q9
R28
C24
R36
D14
A1
+10V
R4
R7
Q1
FAN-ON/OFF
RC1
THERMISTOR SUPPLY
RC4
RC5
RC1
Q14
Q8
Q7
R2
R1
TEMP1
TEMP2
THERMISTOR #1 INPUT
THERMISTOR #2 INPUT
C48
C51
C49
R43
R82
C54
D5
C29
R25
R37
R39
R38
Q3
C28
U3
ALE
R63
CONT_IN
Q12
C38
R50
U2
INH
I/O
TEMP1
TEMP2
1V/100A
REF
+10V
1V/10V
R66
R62
R60
R61
R44
D18
CC/CV
R3
PULSE
R24
D3
R67
LOCKOUT
R23
D2
VLOCK
R48
A3
115 VAC CONT
To 14 pin B
24 VAC CONT
R83
R64
D17
R40
R49
R47
R53
D10
D9
C35
C44
CONTACTOR
R31
Q10
R51
R52

190 696

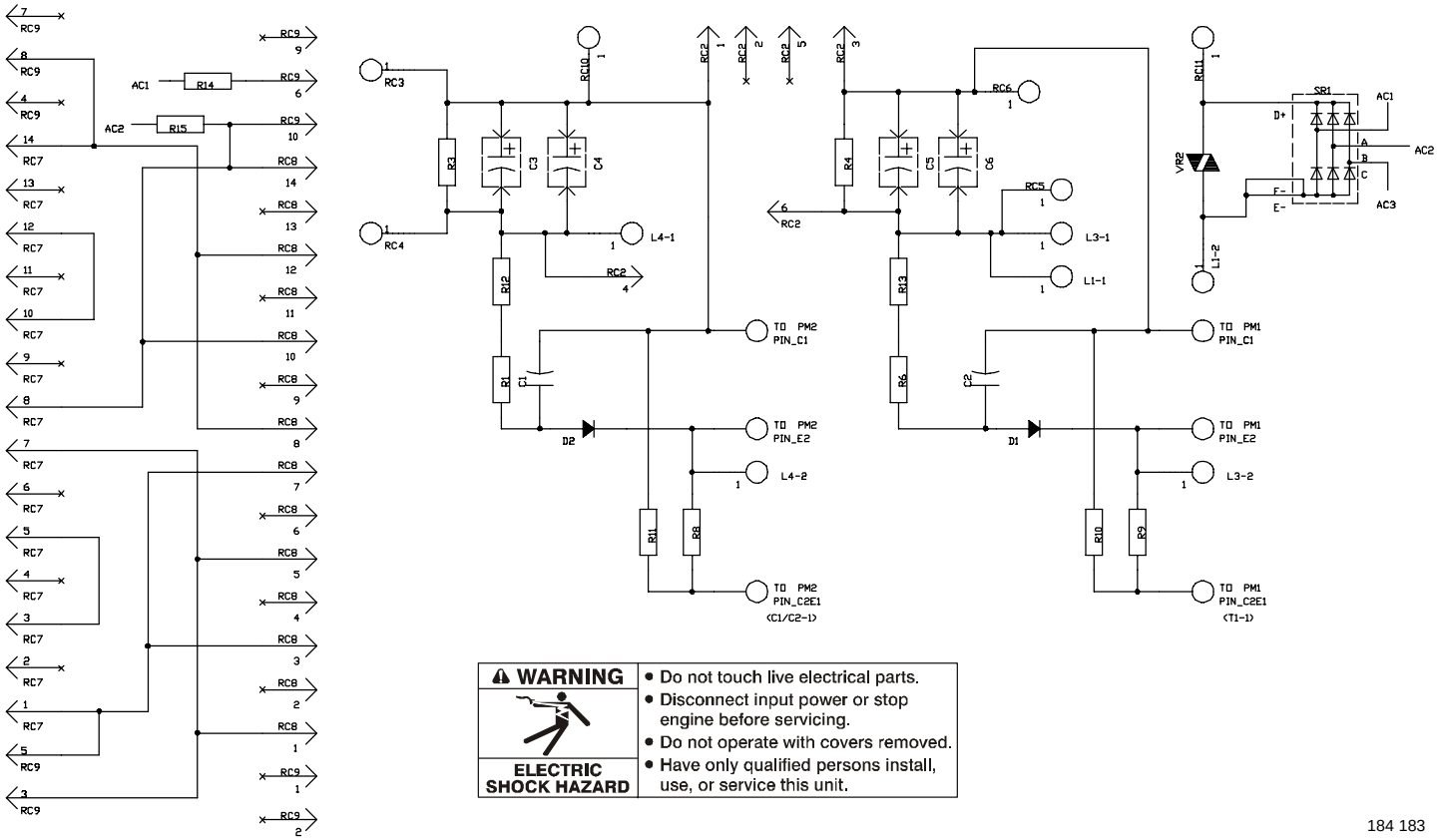


Figure 6-6. Circuit Diagram For Interconnect Board PC2

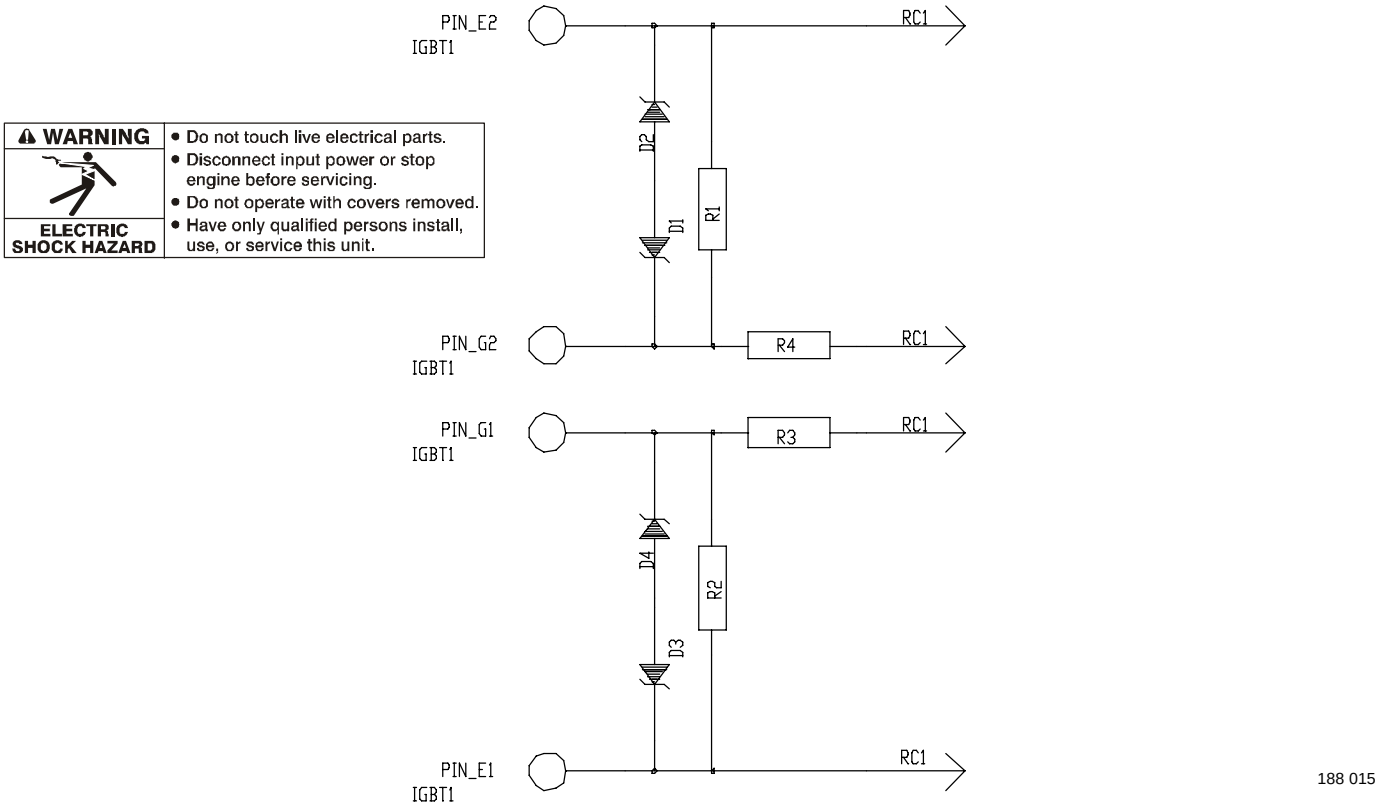


Figure 6-7. Circuit Diagram For Gate Boards PC4 And PC5

Notes

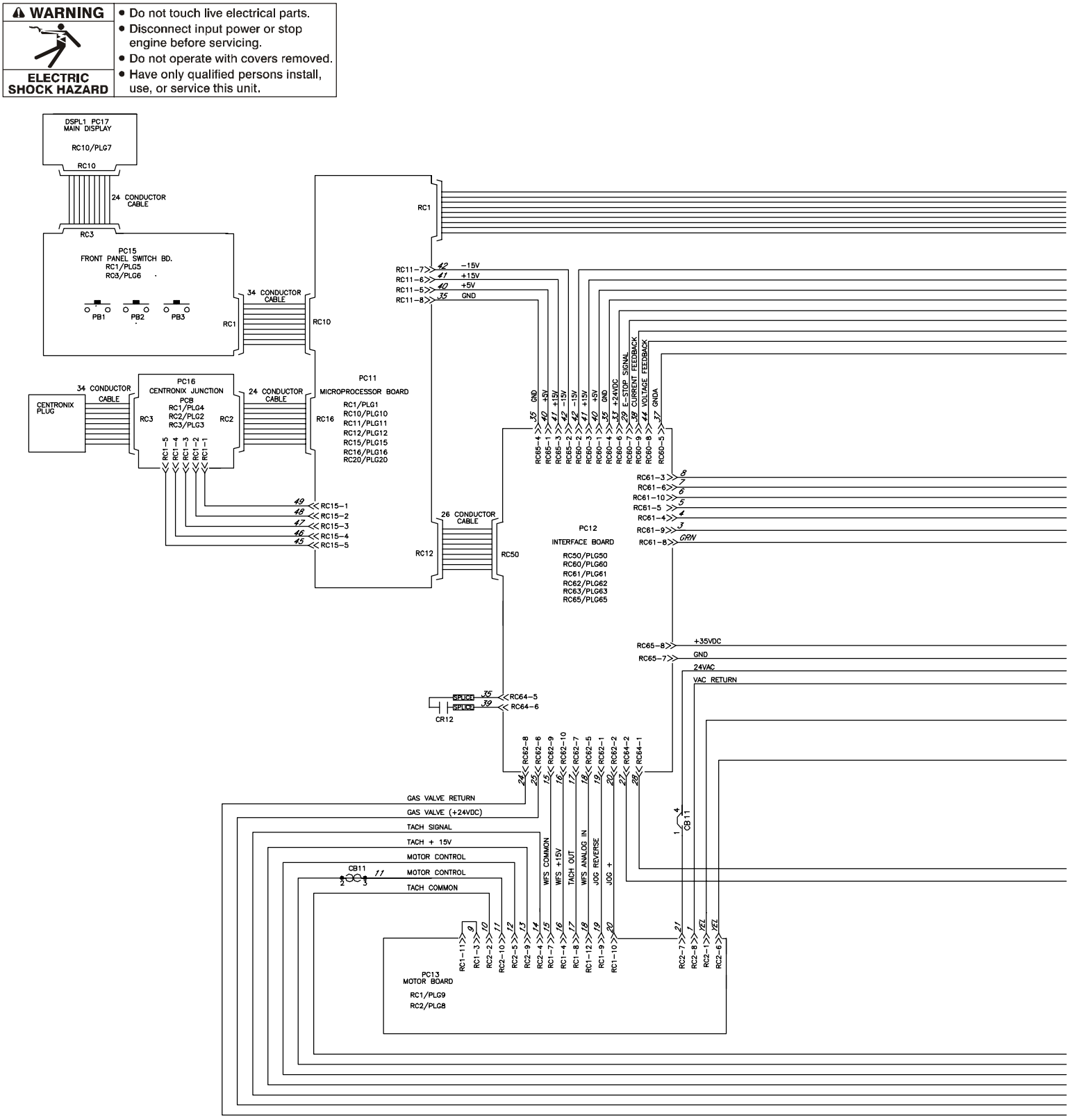
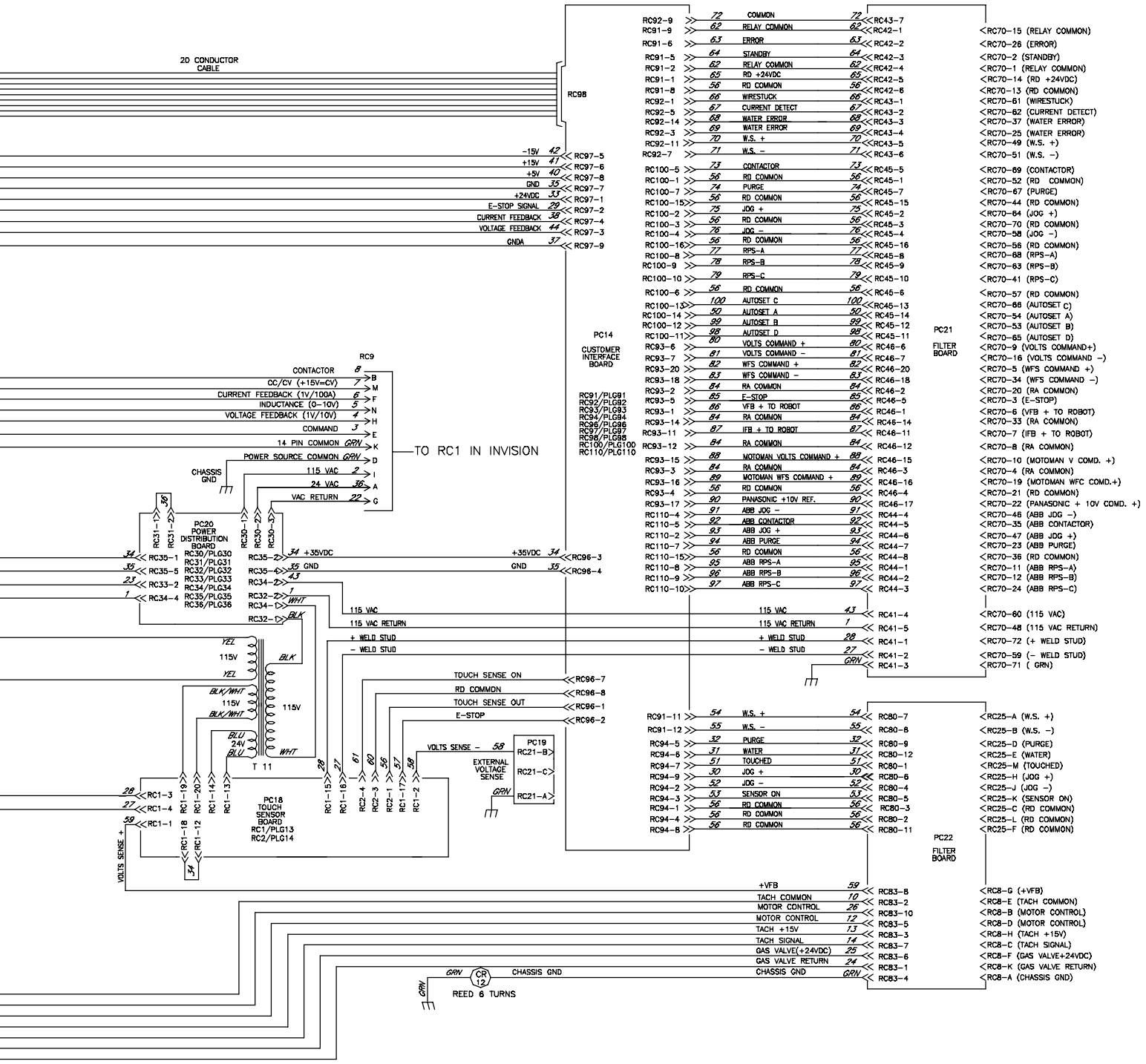
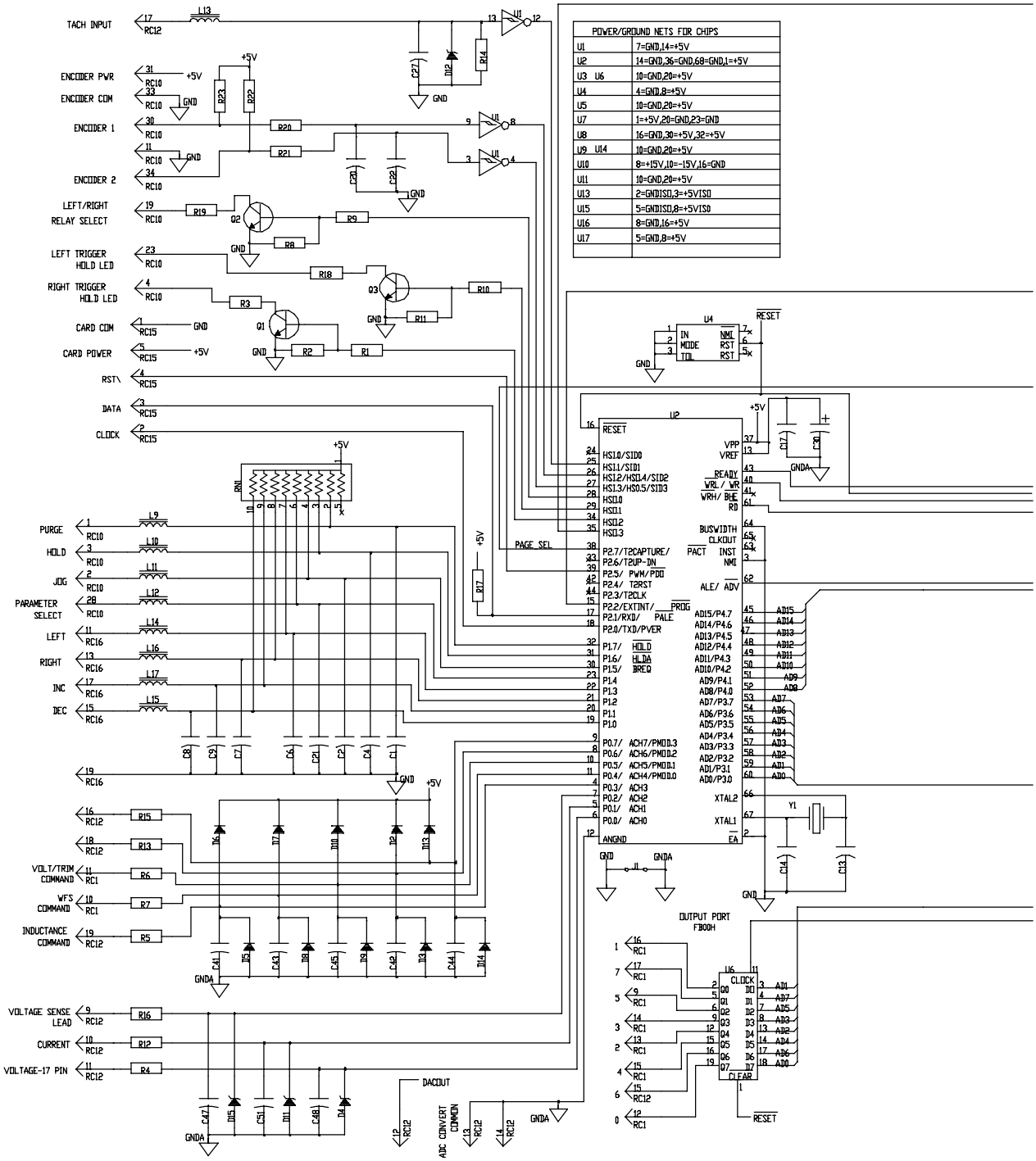


Figure 6-8. Circuit Diagram For Interface Module

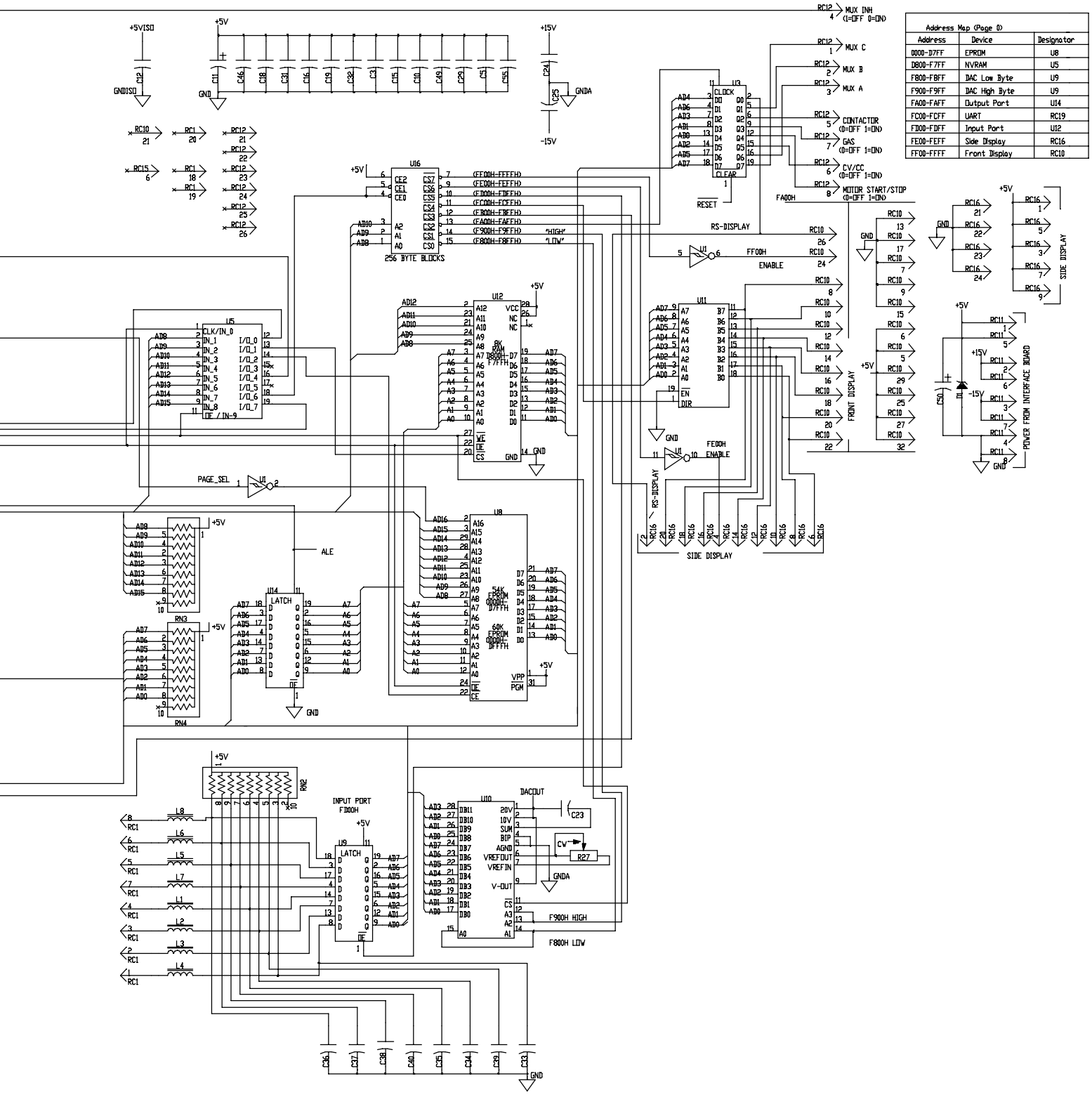

20 CONDUCTOR CABLE
RC98
-15V 42 RC97-5
+15V 41 RC97-6
+5V 40 RC97-8
GND 35 RC97-7
+24VDC 33 RC97-1
E-STOP SIGNAL 29 RC97-2
CURRENT FEEDBACK 38 RC97-4
VOLTAGE FEEDBACK 44 RC97-3
GNDA 37 RC97-9
RC92-9 72 COMMON 72 RC43-7
RC91-9 62 RELAY COMMON 62 RC42-1 <RC70-15 (RELAY COMMON)
RC91-6 63 ERROR 63 RC42-2 <RC70-26 (ERROR)
RC91-5 64 STANDBY 64 RC42-3 <RC70-2 (STANDBY)
RC91-2 62 RELAY COMMON 62 RC42-4 <RC70-1 (RELAY COMMON)
RC91-1 65 RD +24VDC 65 RC42-5 <RC70-14 (RD +24VDC)
RC91-8 56 RD COMMON 56 RC42-6 <RC70-13 (RD COMMON)
RC92-1 66 WIRESTUCK 66 RC43-1 <RC70-61 (WIRESTUCK)
RC92-5 67 CURRENT DETECT 67 RC43-2 <RC70-62 (CURRENT DETECT)
RC92-14 68 WATER ERROR 68 RC43-3 <RC70-37 (WATER ERROR)
RC92-3 69 WATER ERROR 69 RC43-4 <RC70-25 (WATER ERROR)
RC92-11 70 W.S. + 70 RC43-5 <RC70-49 (W.S. +)
RC92-7 71 W.S. - 71 RC43-6 <RC70-51 (W.S. -)
RC100-5 73 CONTACTOR 73 RC45-5 <RC70-69 (CONTACTOR)
RC100-1 56 RD COMMON 56 RC45-1 <RC70-52 (RD COMMON)
RC100-7 74 PURGE 74 RC45-7 <RC70-67 (PURGE)
RC100-15 56 RD COMMON 56 RC45-15 <RC70-44 (RD COMMON)
RC100-2 75 JOG + 75 RC45-2 <RC70-64 (JOG +)
RC100-3 56 RD COMMON 56 RC45-3 <RC70-70 (RD COMMON)
RC100-4 76 JOG - 76 RC45-4 <RC70-58 (JOG -)
RC100-16 56 RD COMMON 56 RC45-16 <RC70-56 (RD COMMON)
RC100-8 77 RPS-A 77 RC45-8 <RC70-68 (RPS-A)
RC100-9 78 RPS-B 78 RC45-9 <RC70-63 (RPS-B)
RC100-10 79 RPS-C 79 RC45-10 <RC70-41 (RPS-C)
RC100-6 56 RD COMMON 56 RC45-6 <RC70-57 (RD COMMON)
RC100-13 100 AUTOSET C 100 RC45-13 <RC70-66 (AUTOSET C)
RC100-14 50 AUTOSET A 50 RC45-14 <RC70-54 (AUTOSET A)
RC100-12 99 AUTOSET B 99 RC45-12 <RC70-53 (AUTOSET B)
RC100-11 98 AUTOSET D 98 RC45-11 <RC70-65 (AUTOSET D)
PC14 CUSTOMER INTERFACE BOARD
RC93-6 80 VOLTS COMMAND + 80 RC46-6
RC93-7 81 VOLTS COMMAND - 81 RC46-7
RC93-20 82 WFS COMMAND + 82 RC46-20
RC93-18 83 WFS COMMAND - 83 RC46-18
RC93-2 84 RA COMMON 84 RC46-2
RC93-5 85 E-STOP 85 RC46-5
RC93-1 86 VFB + TO ROBOT 86 RC46-1
RC93-14 84 RA COMMON 84 RC46-14
RC93-11 87 IFB + TO ROBOT 87 RC46-11
RC93-12 84 RA COMMON 84 RC46-12
RC91/PLG91 RC92/PLG92 RC93/PLG93 RC94/PLG94 RC95/PLG95 RC97/PLG97 RC98/PLG98 RC100/PLG100 RC110/PLG110
PC21 FILTER BOARD
<RC70-9 (VOLTS COMMAND+)
<RC70-16 (VOLTS COMMAND -)
<RC70-5 (WFS COMMAND +)
<RC70-34 (WFS COMMAND -)
<RC70-20 (RA COMMON)
<RC70-3 (E-STOP)
<RC70-6 (VFB + TO ROBOT)
<RC70-33 (RA COMMON)
<RC70-7 (IFB + TO ROBOT)
<RC70-8 (RA COMMON)
RC93-15 88 MOTOMAN VOLTS COMMAND + 88 RC46-15 <RC70-10 (MOTOMAN V COMD. +)
RC93-3 84 RA COMMON 84 RC46-3 <RC70-4 (RA COMMON)
RC93-16 89 MOTOMAN WFS COMMAND + 89 RC46-16 <RC70-19 (MOTOMAN WFC COMD.+)
RC93-4 56 RD COMMON 56 RC46-4 <RC70-21 (RD COMMON)
RC93-17 90 PANASONIC +10V REF. 90 RC46-17 <RC70-22 (PANASONIC + 10V COMD. +)
RC110-4 91 ABB JOG - 91 RC44-4 <RC70-46 (ABB JOG -)
RC110-5 92 ABB CONTACTOR 92 RC44-5 <RC70-35 (ABB CONTACTOR)
RC110-2 93 ABB JOG + 93 RC44-6 <RC70-47 (ABB JOG +)
RC110-7 94 ABB PURGE 94 RC44-7 <RC70-23 (ABB PURGE)
RC110-15 56 RD COMMON 56 RC44-8 <RC70-36 (RD COMMON)
RC110-8 95 ABB RPS-A 95 RC44-1 <RC70-11 (ABB RPS-A)
RC110-9 96 ABB RPS-B 96 RC44-2 <RC70-12 (ABB RPS-B)
RC110-10 97 ABB RPS-C 97 RC44-3 <RC70-24 (ABB RPS-C)
115 VAC 43 RC41-4 <RC70-60 (115 VAC)
115 VAC RETURN 1 RC41-5 <RC70-48 (115 VAC RETURN)
+ WELD STUD 28 RC41-1 <RC70-72 (+ WELD STUD)
- WELD STUD 27 RC41-2 <RC70-59 (- WELD STUD)
GRN RC41-3 <RC70-71 (GRN)
RC9
CONTACTOR 8 B
CC/CV (+15V=CV) 7 M
CURRENT FEEDBACK (1V/100A) 6 F
INDUCTANCE (0-10V) 5 N
VOLTAGE FEEDBACK (1V/10V) 4 H
COMMAND 3 E
14 PIN COMMON GRN K
POWER SOURCE COMMON GRN D
115 VAC 2 I
24 VAC 36 A
VAC RETURN 22 G
TO RC1 IN INVISION
CHASSIS GND
PC20 POWER DISTRIBUTION BOARD
RC30/PLG30 RC31/PLG31 RC32/PLG32 RC33/PLG33 RC34/PLG34 RC35/PLG35 RC36/PLG36
RC35-1 34 +35VDC
RC35-5 35 GND
RC33-2 23
RC34-4 1
RC35-2 34 +35VDC
RC35-4 35 GND
RC34-2 43
RC32-2 1
RC34-1 WHT
RC32-1 BLK
+35VDC 34 RC96-3
GND 35 RC96-4
115 VAC
115 VAC RETURN
+ WELD STUD
- WELD STUD
T 11
YEL 115V BLK
YEL
BLK/WHT 115V BLK/WHT
BLU 24V BLU
WHT
115V
TOUCH SENSE ON RC96-7
RD COMMON RC96-8
TOUCH SENSE OUT RC96-1
E-STOP RC96-2
VOLTS SENSE - 58
PC19
RC21-B
RC21-C
RC21-A
EXTERNAL VOLTAGE SENSE
GRN
PC18 TOUCH SENSOR BOARD
RC1/PLG13
RC2/PLG14
RC1-3 28
RC1-4 27
RC1-1 59
RC1-19 RC1-20 RC1-14 RC1-13 RC1-15 RC1-16 RC2-4 RC2-3 RC2-1 RC1-17 RC1-2
RC1-18 RC1-12 34
VOLTS SENSE +
RC91-11 54 W.S. + 54 RC80-7 <RC25-A (W.S. +)
RC91-12 55 W.S. - 55 RC80-8 <RC25-B (W.S. -)
RC94-5 32 PURGE 32 RC80-9 <RC25-D (PURGE)
RC94-6 31 WATER 31 RC80-12 <RC25-E (WATER)
RC94-7 51 TOUCHED 51 RC80-1 <RC25-M (TOUCHED)
RC94-9 30 JOG + 30 RC80-6 <RC25-H (JOG +)
RC94-2 52 JOG - 52 RC80-4 <RC25-J (JOG -)
RC94-3 53 SENSOR ON 53 RC80-5 <RC25-K (SENSOR ON)
RC94-1 56 RD COMMON 56 RC80-3 <RC25-C (RD COMMON)
RC94-4 56 RD COMMON 56 RC80-2 <RC25-L (RD COMMON)
RC94-8 56 RD COMMON 56 RC80-11 <RC25-F (RD COMMON)
PC22 FILTER BOARD
+VFB 59 RC83-8 <RC8-G (+VFB)
TACH COMMON 10 RC83-2 <RC8-E (TACH COMMON)
MOTOR CONTROL 26 RC83-10 <RC8-B (MOTOR CONTROL)
MOTOR CONTROL 12 RC83-5 <RC8-D (MOTOR CONTROL)
TACH +15V 13 RC83-3 <RC8-H (TACH +15V)
TACH SIGNAL 14 RC83-7 <RC8-C (TACH SIGNAL)
GAS VALVE(+24VDC) 25 RC83-6 <RC8-F (GAS VALVE+24VDC)
GAS VALVE RETURN 24 RC83-1 <RC8-K (GAS VALVE RETURN)
CHASSIS GND GRN RC83-4 <RC8-A (CHASSIS GND)
GRN CR 12 CHASSIS GND
GRN
REED 6 TURNS

⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	



POWER/GROUND NETS FOR CHIPS	
U1	7=GND,14=+5V
U2	14=GND,36=GND,68=GND,1=+5V
U3 U6	10=GND,20=+5V
U4	4=GND,8=+5V
U5	10=GND,20=+5V
U7	1=+5V,20=GND,23=GND
U8	16=GND,30=+5V,32=+5V
U9 U14	10=GND,20=+5V
U10	8=+15V,10=-15V,16=GND
U11	10=GND,20=+5V
U13	2=GNDISO,3=+5VISO
U15	5=GNDISO,8=+5VISO
U16	8=GND,16=+5V
U17	5=GND,8=+5V

Figure 6-9. Circuit Diagram For Microprocessor Board PC11


Address Map (Page 0)
Address | Device | Designator
0000-07FF | EPROM | U8
0800-0FFF | NVRAM | U5
F800-F8FF | DAC Low Byte | U9
F900-F9FF | DAC High Byte | U9
FA00-FAFF | Output Port | U14
FC00-FCFF | UART | RC19
FD00-FDFF | Input Port | U12
FE00-FEFF | Side Display | RC16
FF00-FFFF | Front Display | RC10
MUX INH (1=OFF 0=ON)
MUX C
MUX B
MUX A
CONTACTOR (0=OFF 1=ON)
GAS (0=OFF 1=ON)
CV/CC (0=OFF 1=ON)
MOTOR START/STOP (0=OFF 1=ON)
FA00H
RESET
RS-DISPLAY
FF00H
ENABLE
FE00H
ENABLE
PAGE_SEL
ALE
INPUT PORT FD00H
DACOUT
F900H HIGH
F800H LOW
256 BYTE BLOCKS
FRONT DISPLAY
SIDE DISPLAY
POWER FROM INTERFACE BOARD

⚠ WARNING

ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

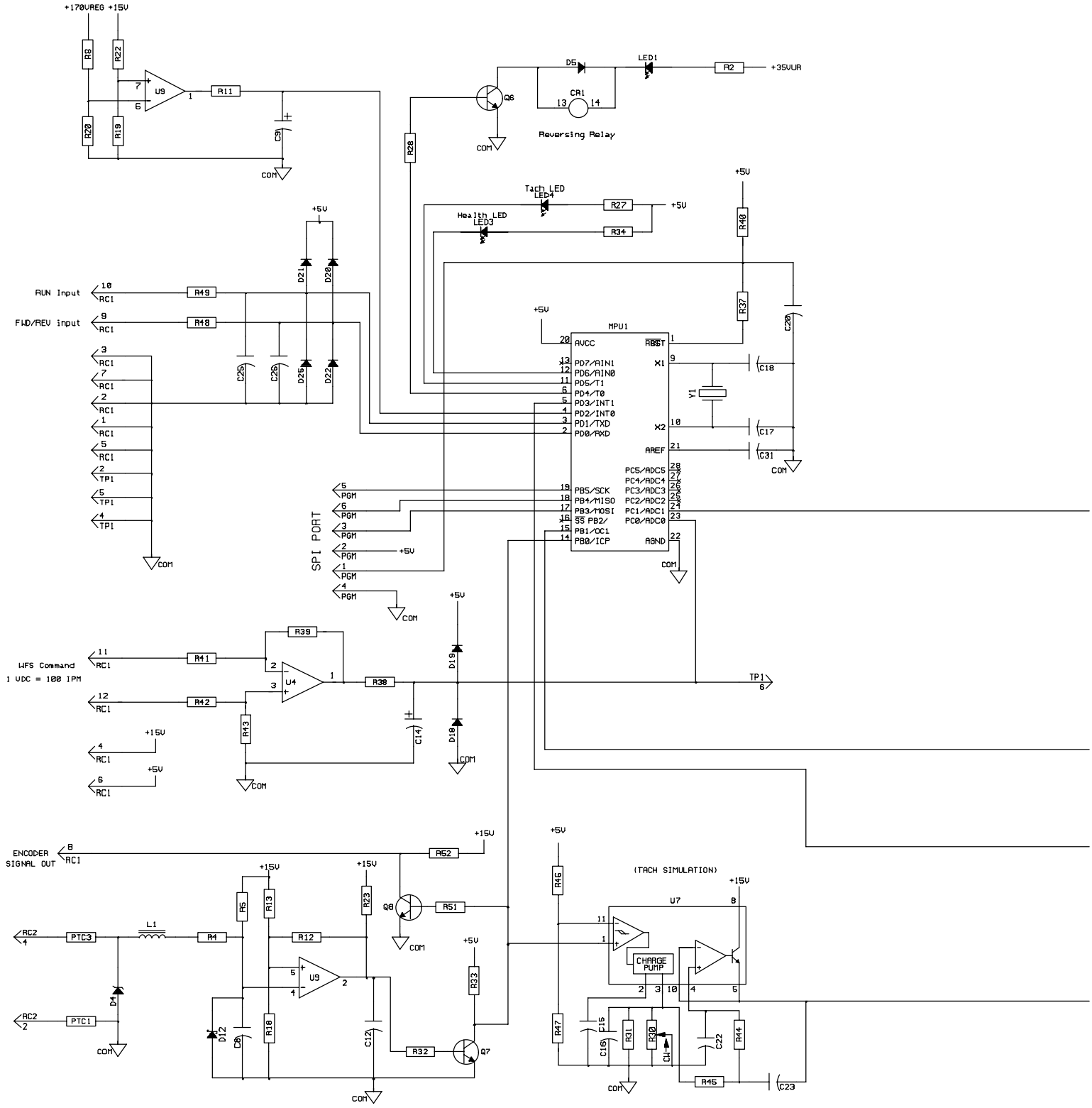
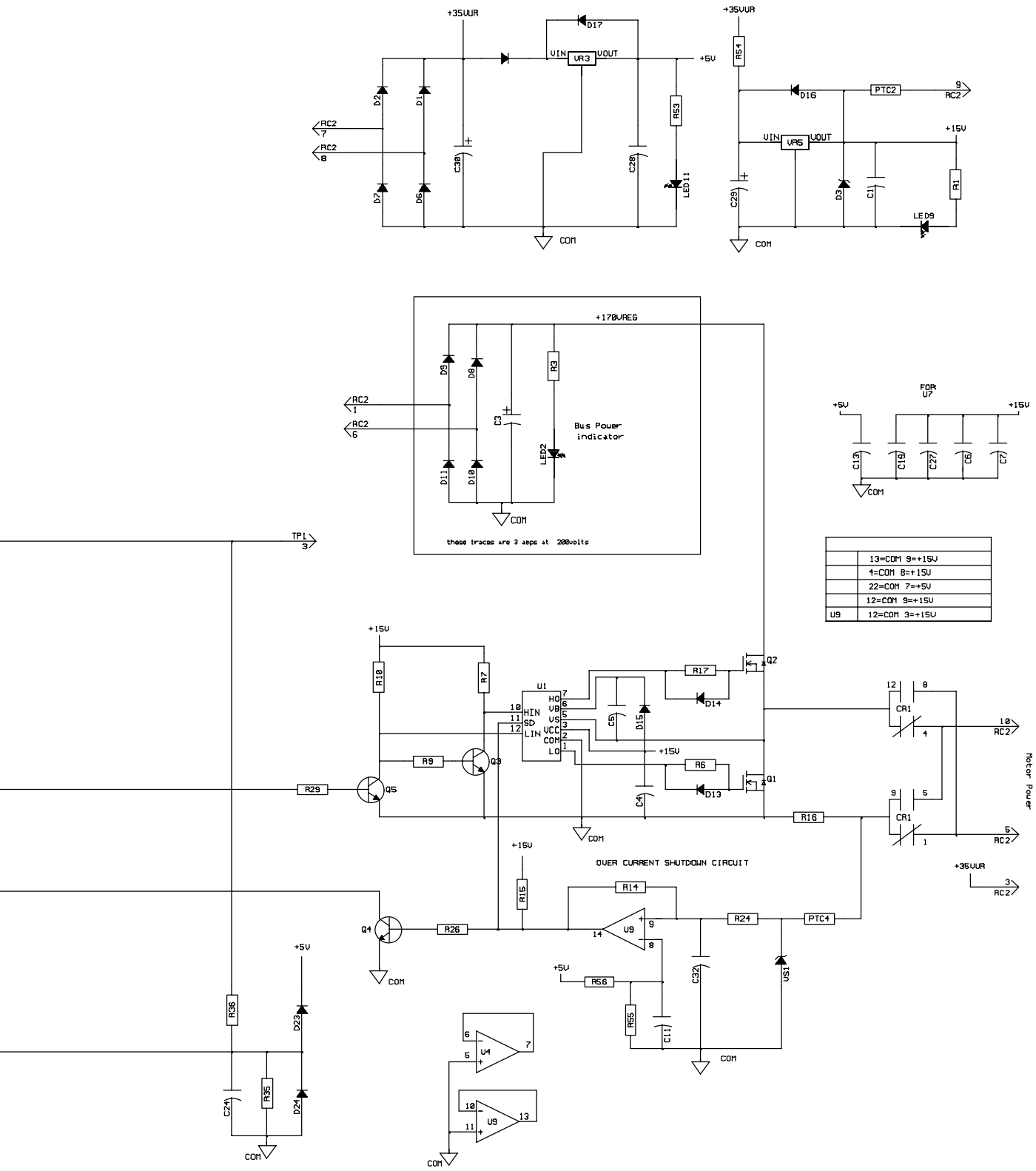
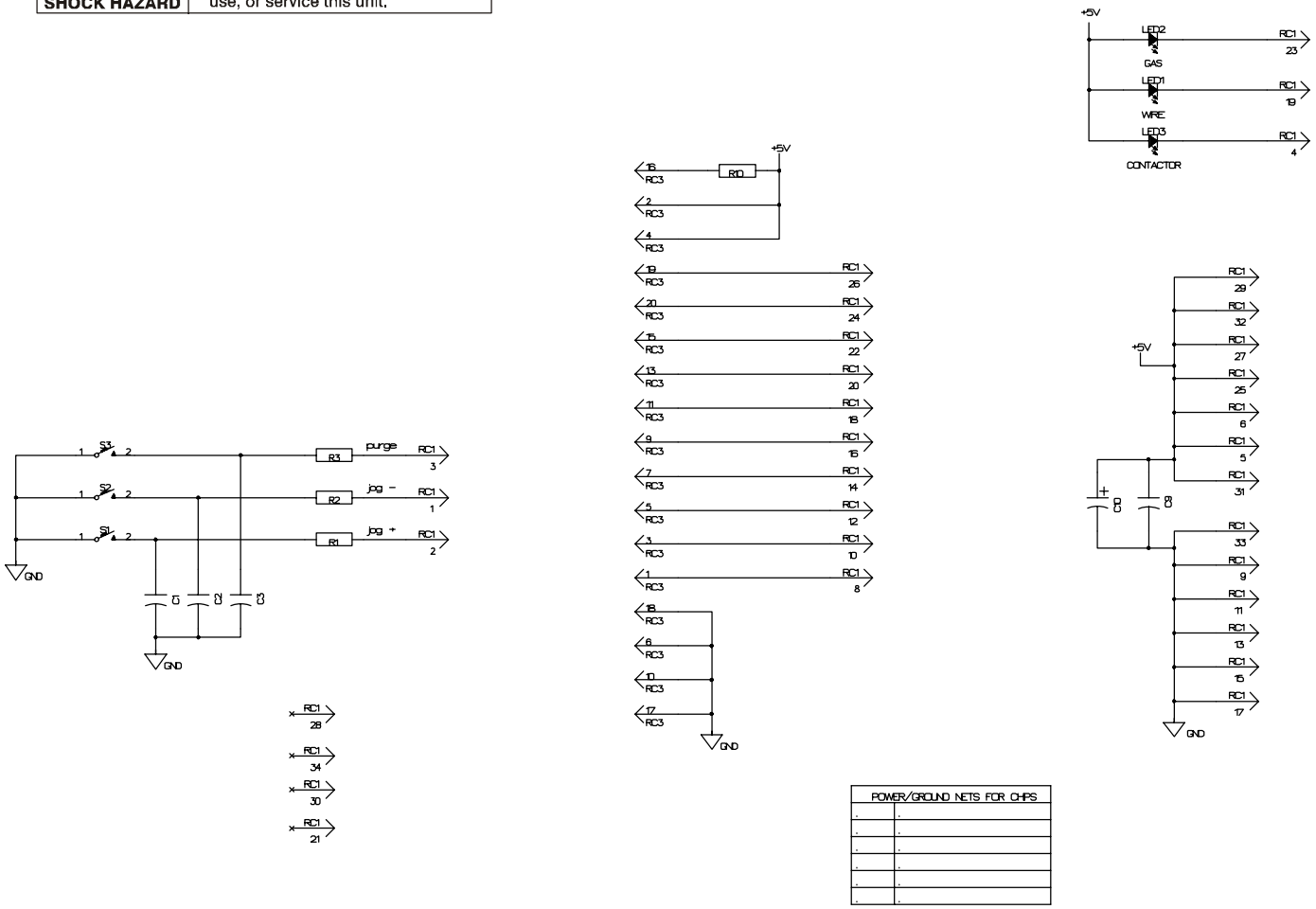


Figure 6-10. Circuit Diagram For Motor Board PC13


+35VUR
D17
VIN
VR3
VOUT
+5V
D2
D1
RC2
7
RC2
8
C30
C28
RS3
LED11
D7
D6
COM
+35VUR
RS4
D16
PTC2
9
RC2
VIN
VR5
VOUT
+15V
C29
D3
C11
R1
LED9
COM
+170VREG
D9
D8
R3
RC2
1
RC2
6
C3
Bus Power
indicator
LED2
D11
D10
COM
these traces are 3 amps at 200volts
FOR
U7
+5V
+15V
C13
C19
C27
C6
C7
COM
TP1
3
13=COM 9=+15V
1=COM 8=+15V
22=COM 7=+5V
12=COM 9=+15V
U9
12=COM 3=+15V
+15V
R10
R7
U1
HO
VB
HIN
VS
SD
VCC
LIN
COM
LO
R17
Q2
D14
C5
D15
+15V
R9
Q3
R6
Q1
D13
C4
R29
Q5
R16
COM
CR1
12
8
10
AC2
4
9
5
CR1
1
5
AC2
Motor Power
+15V
OVER CURRENT SHUTDOWN CIRCUIT
+35VUR
3
AC2
R15
R14
Q4
R26
U9
R24
PTC4
+5V
R56
C32
US1
R55
C11
COM
+5V
R36
D23
U4
C24
R35
D24
U9
COM
COM

212 354-A

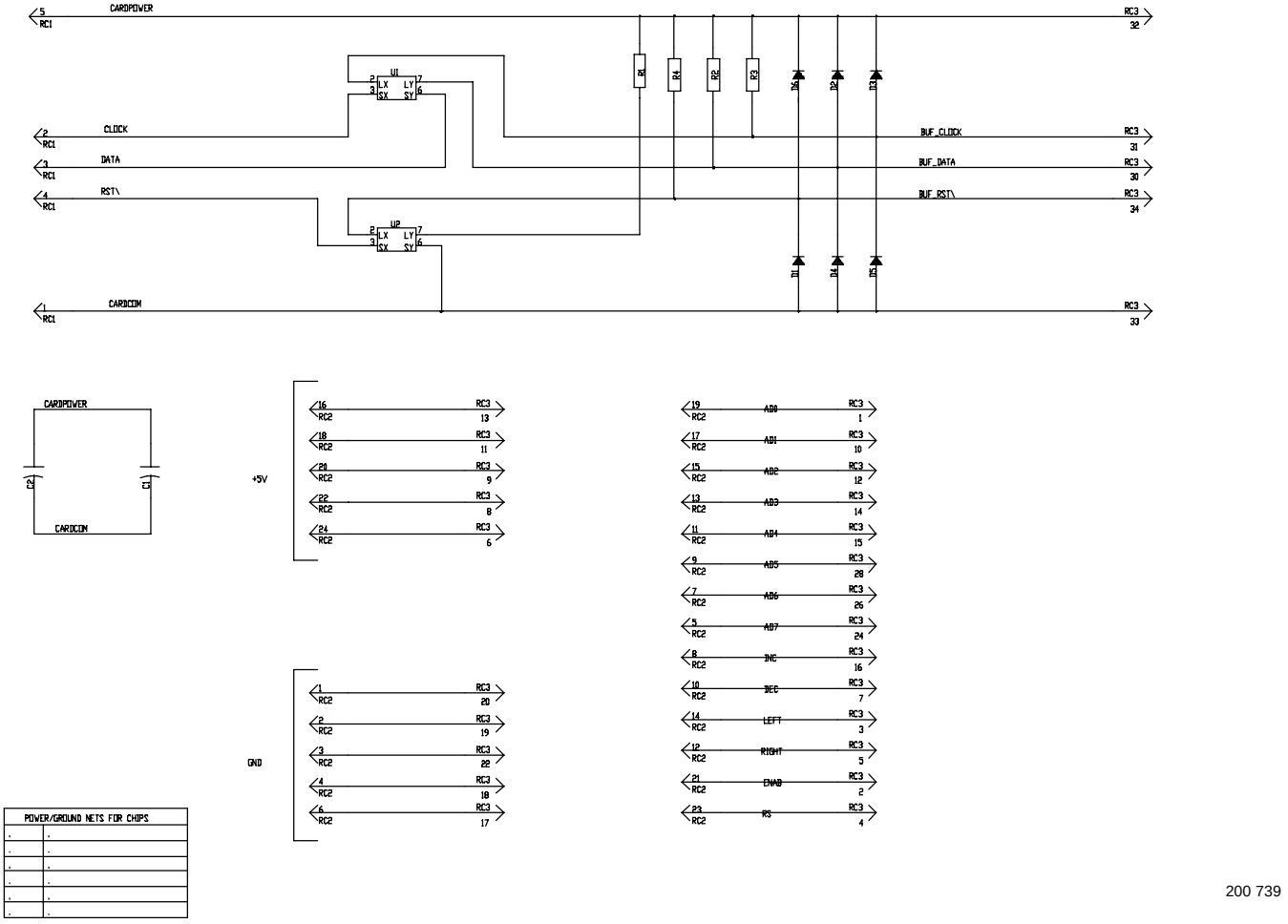
⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	



182 996

Figure 6-11. Circuit Diagram For Switch Board PC15

⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	



200 739

Figure 6-12. Circuit Diagram For Junction Board PC16

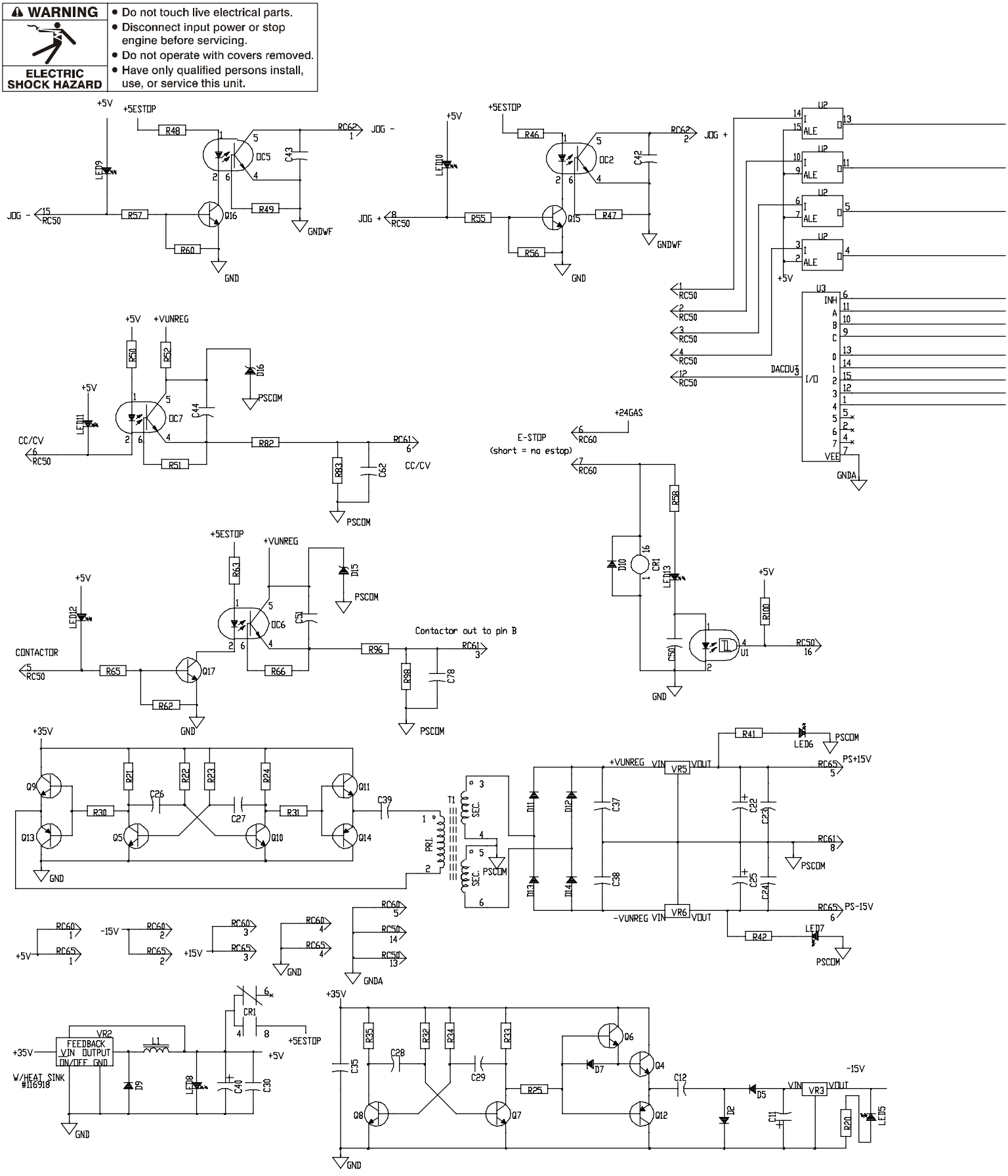
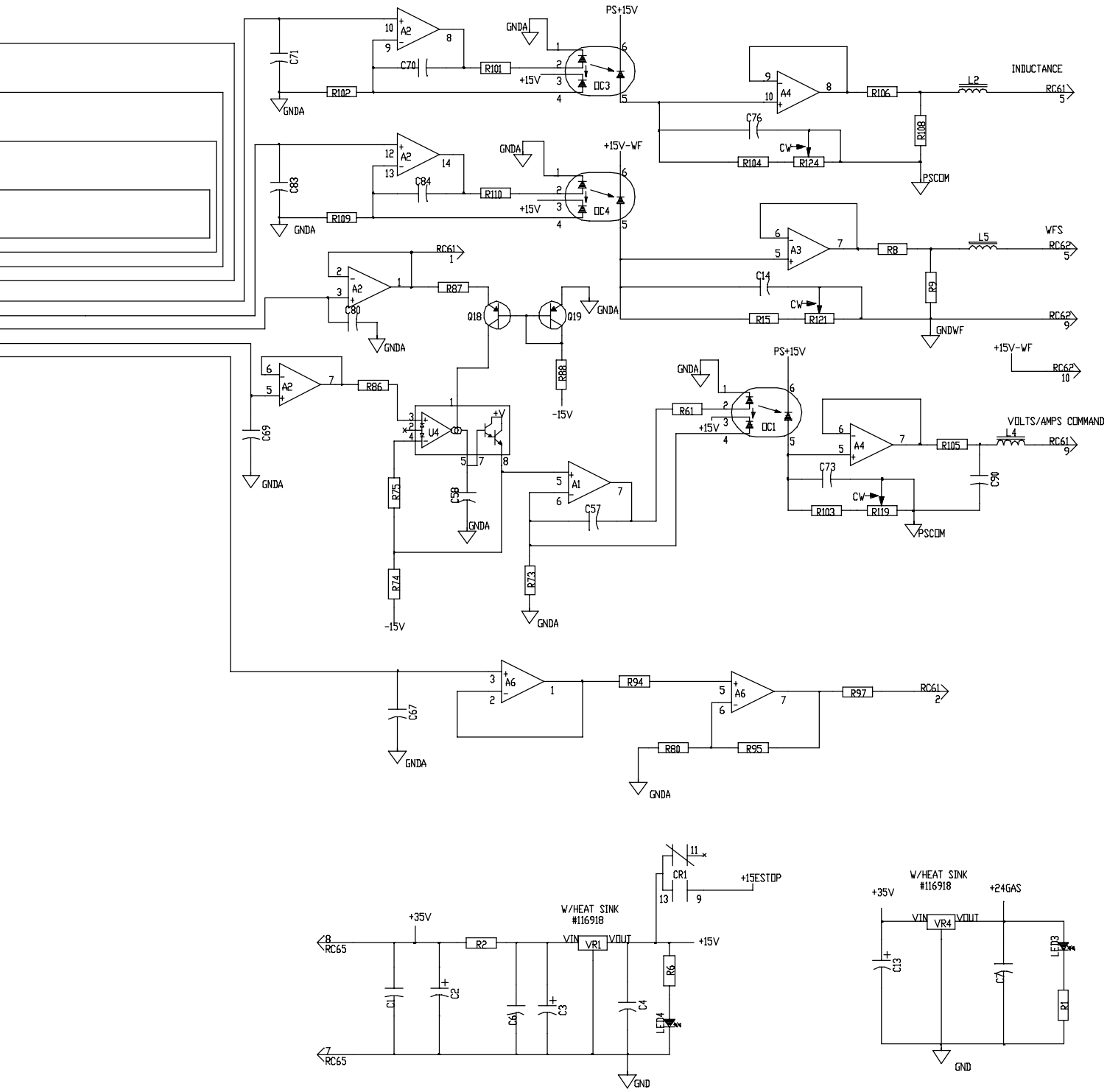


Figure 6-13. Circuit Diagram For Interface Board PC12 (Part 1 of 2)



191 843-A (Part 1 of 2)

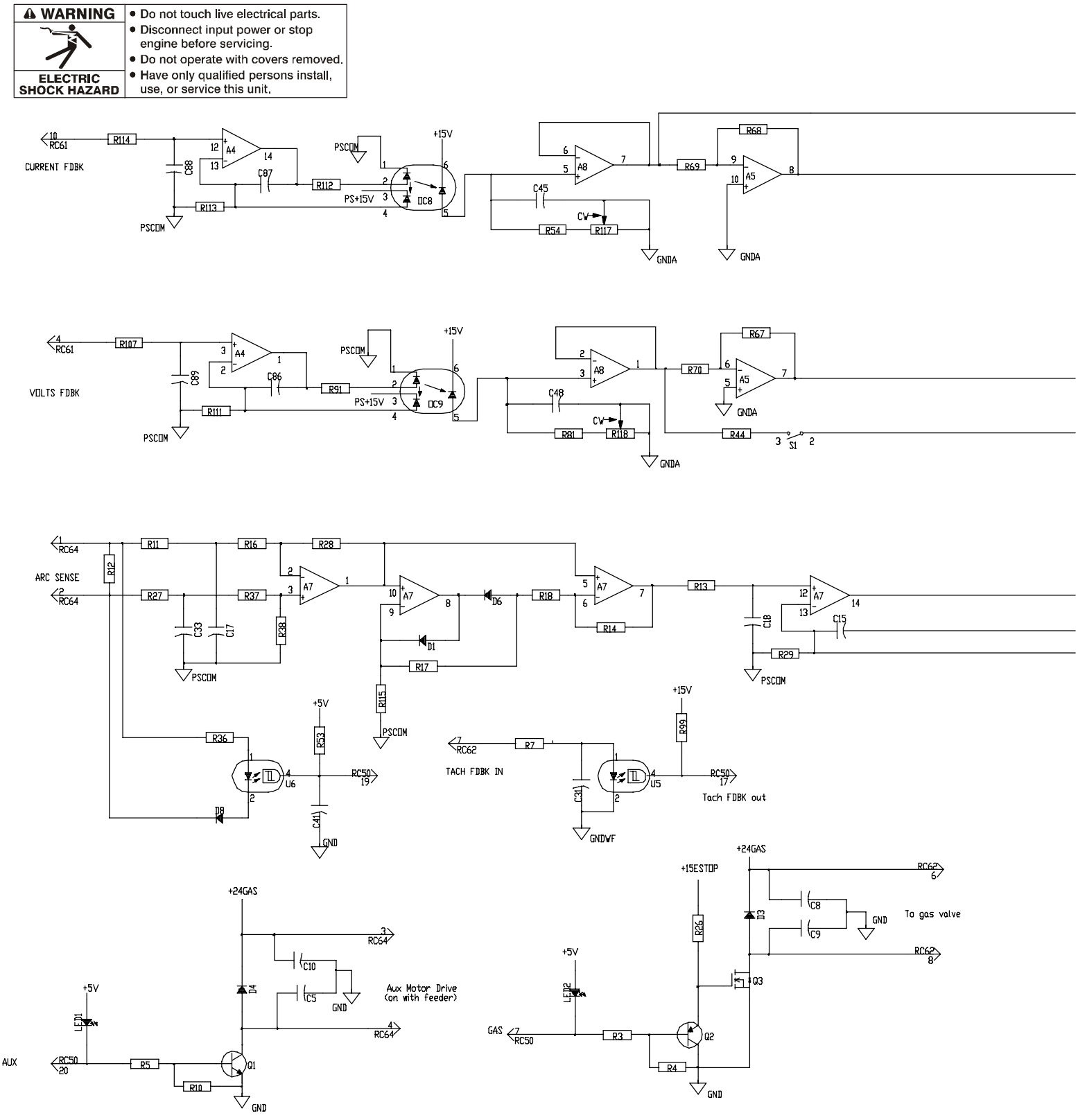
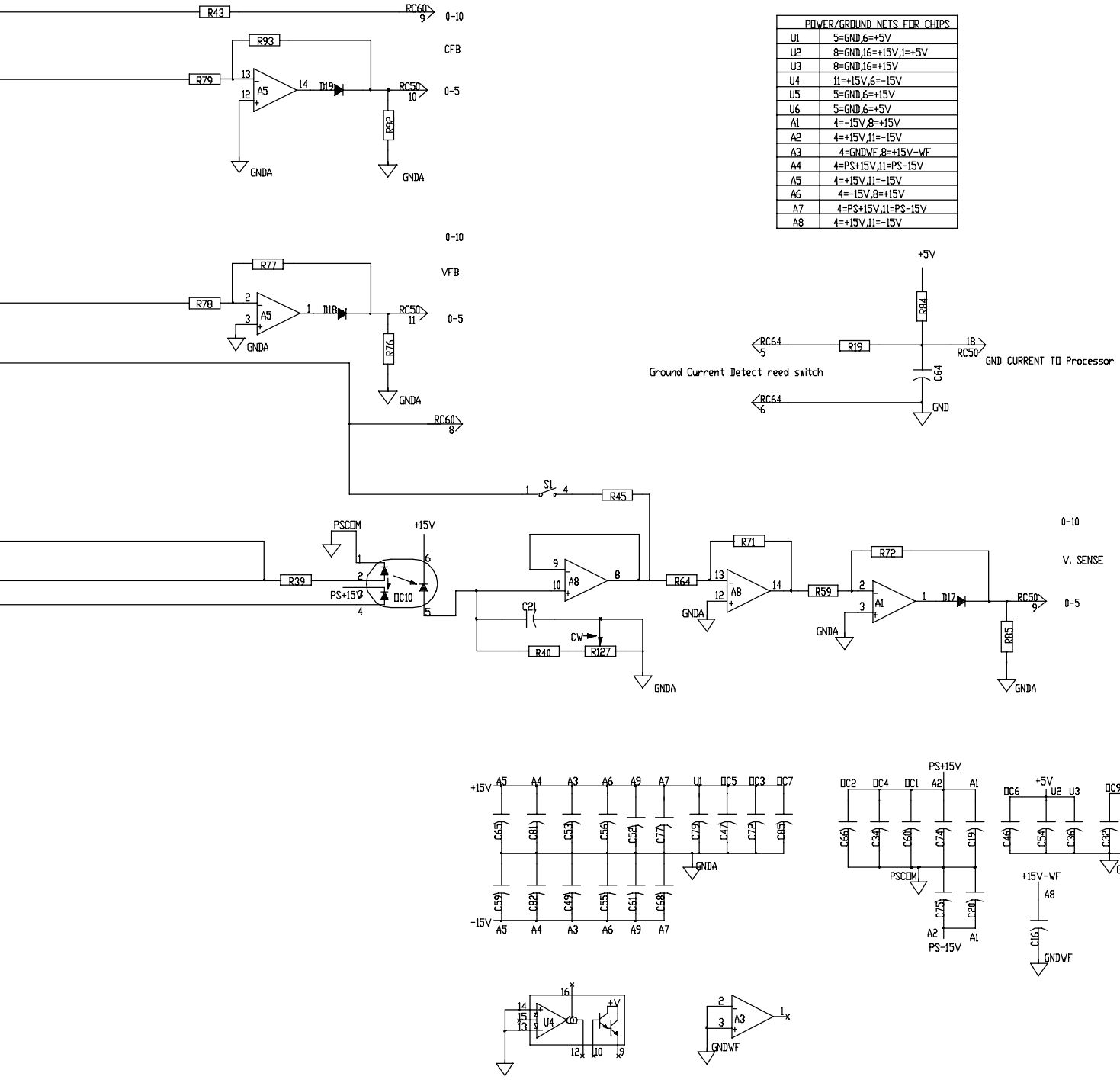


Figure 6-14. Circuit Diagram For Interface Board PC12 (Part 2 of 2)



POWER/GROUND NETS FOR CHIPS	
U1	5=GND,6=+5V
U2	8=GND,16=+15V,1=+5V
U3	8=GND,16=+15V
U4	11=+15V,6=-15V
U5	5=GND,6=+15V
U6	5=GND,6=+5V
A1	4=-15V,8=+15V
A2	4=+15V,11=-15V
A3	4=GNDWF,8=+15V-WF
A4	4=PS+15V,11=PS-15V
A5	4=+15V,11=-15V
A6	4=-15V,8=+15V
A7	4=PS+15V,11=PS-15V
A8	4=+15V,11=-15V

191 843-A (Part 2 of 2)

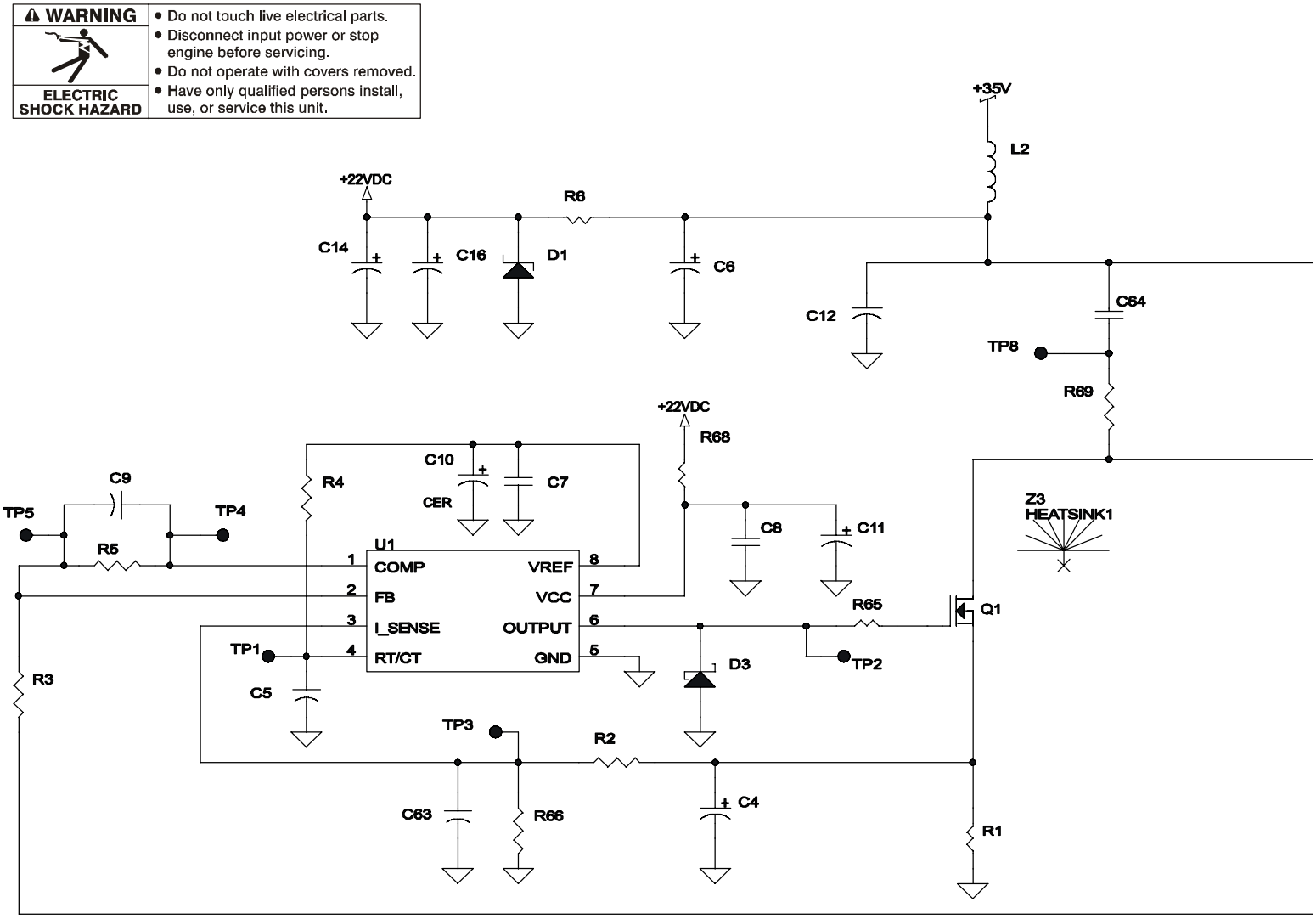
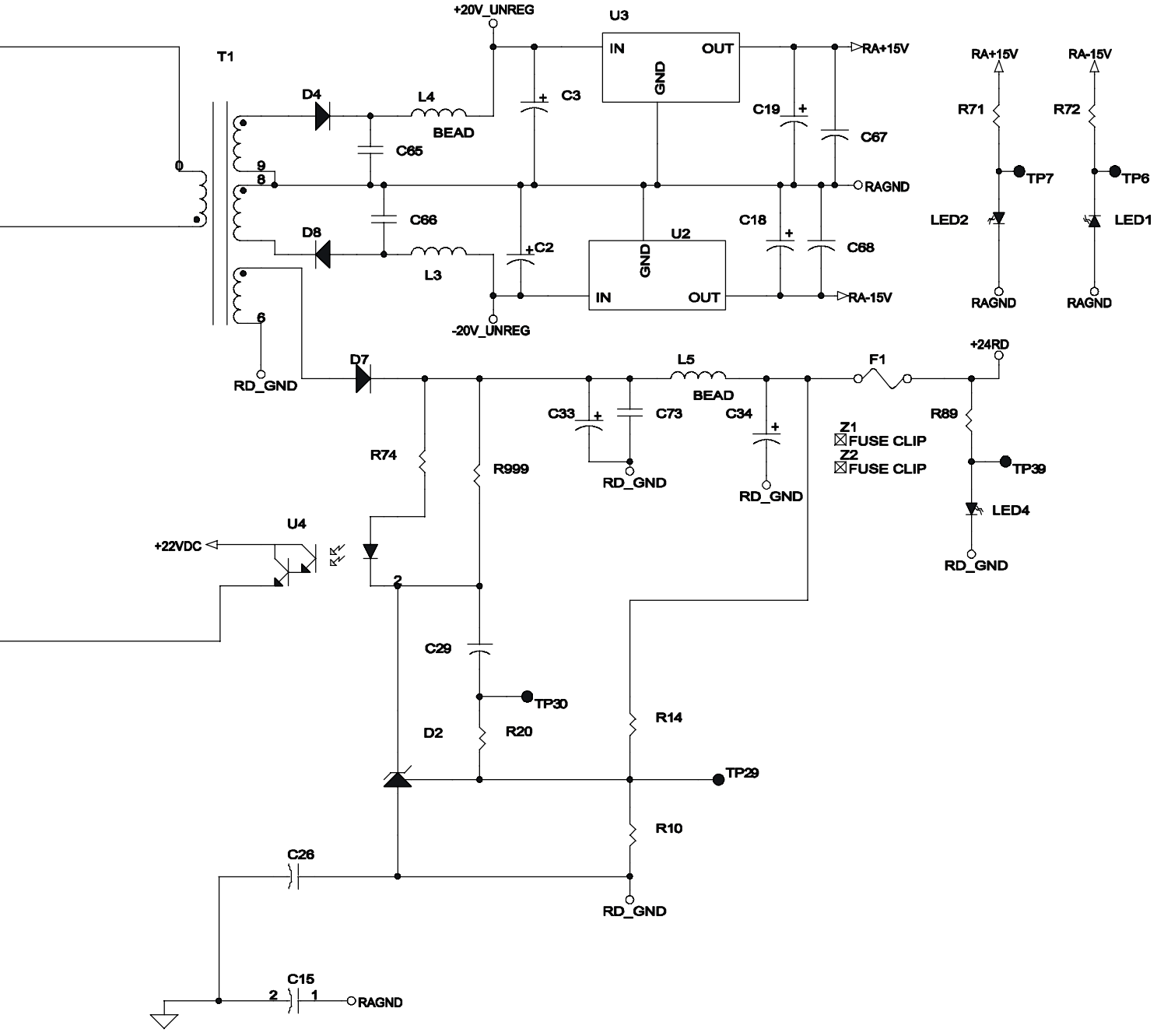


Figure 6-15. Circuit Diagram For Customer Interface Board PC14 (Part 1 of 3)



Pensar 86147s03 (Part 1 of 3)

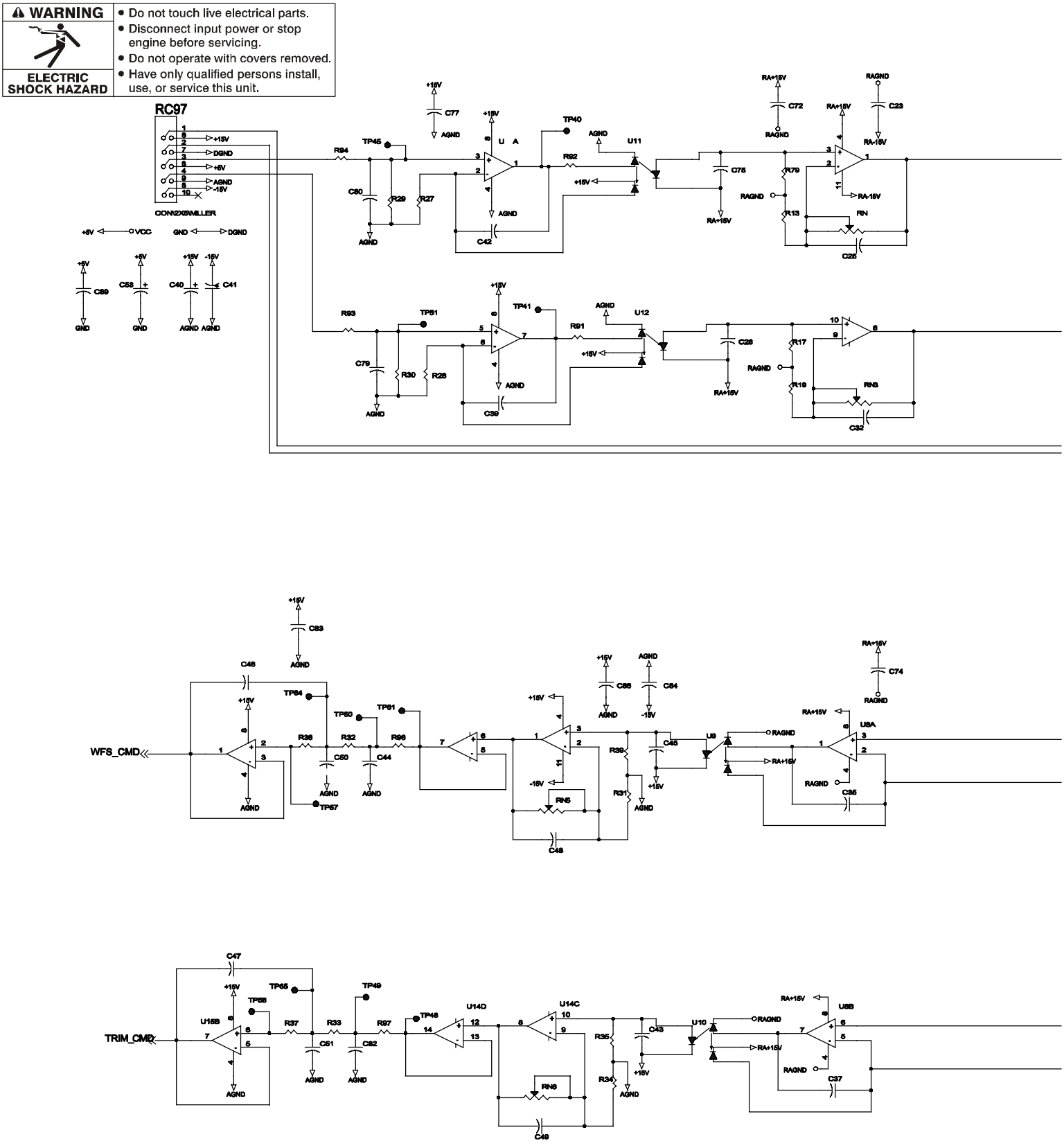
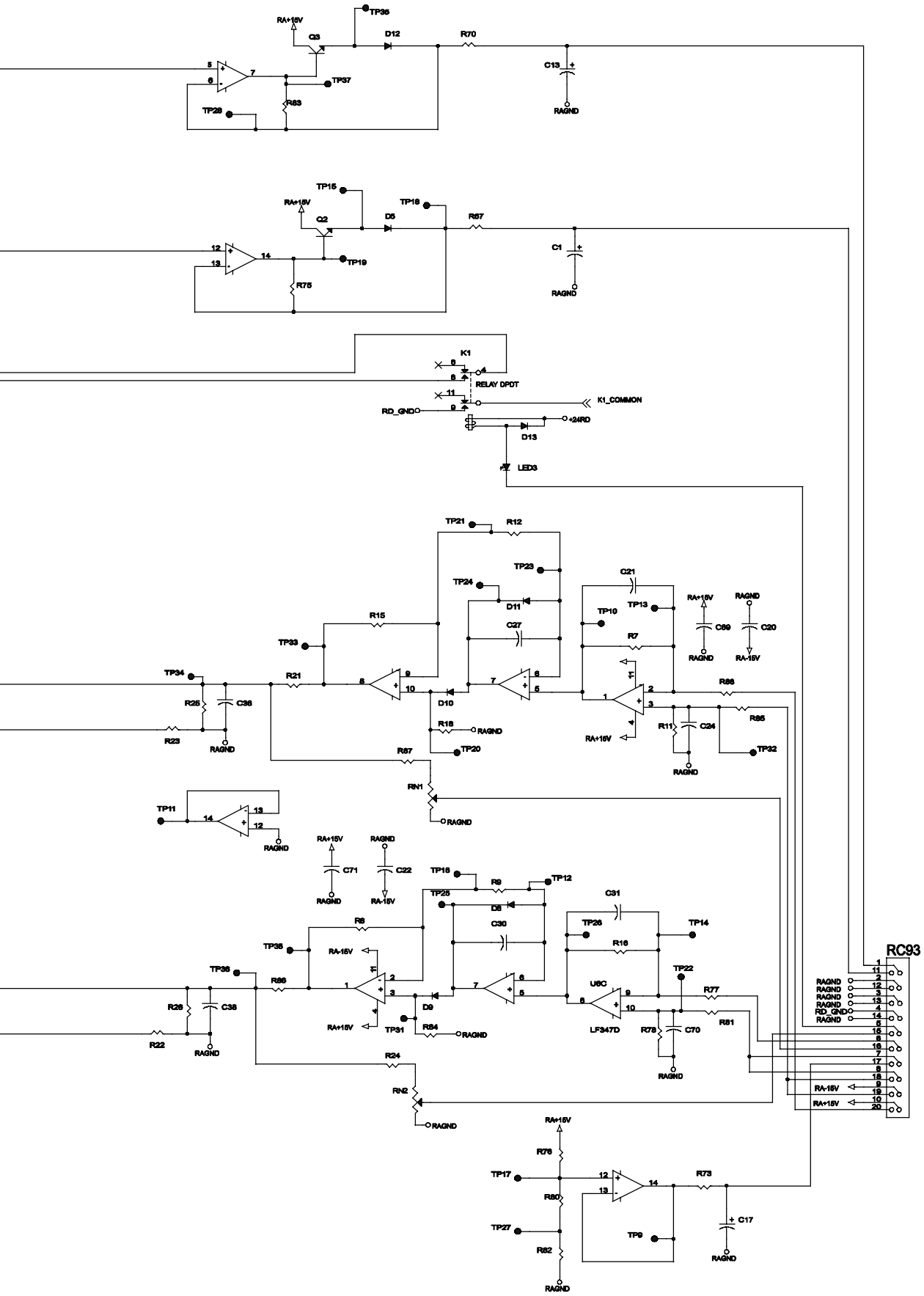


Figure 6-16. Circuit Diagram For Customer Interface Board PC14 (Part 2 of 3)



Pensar 86147s03 (Part 2 of 3)

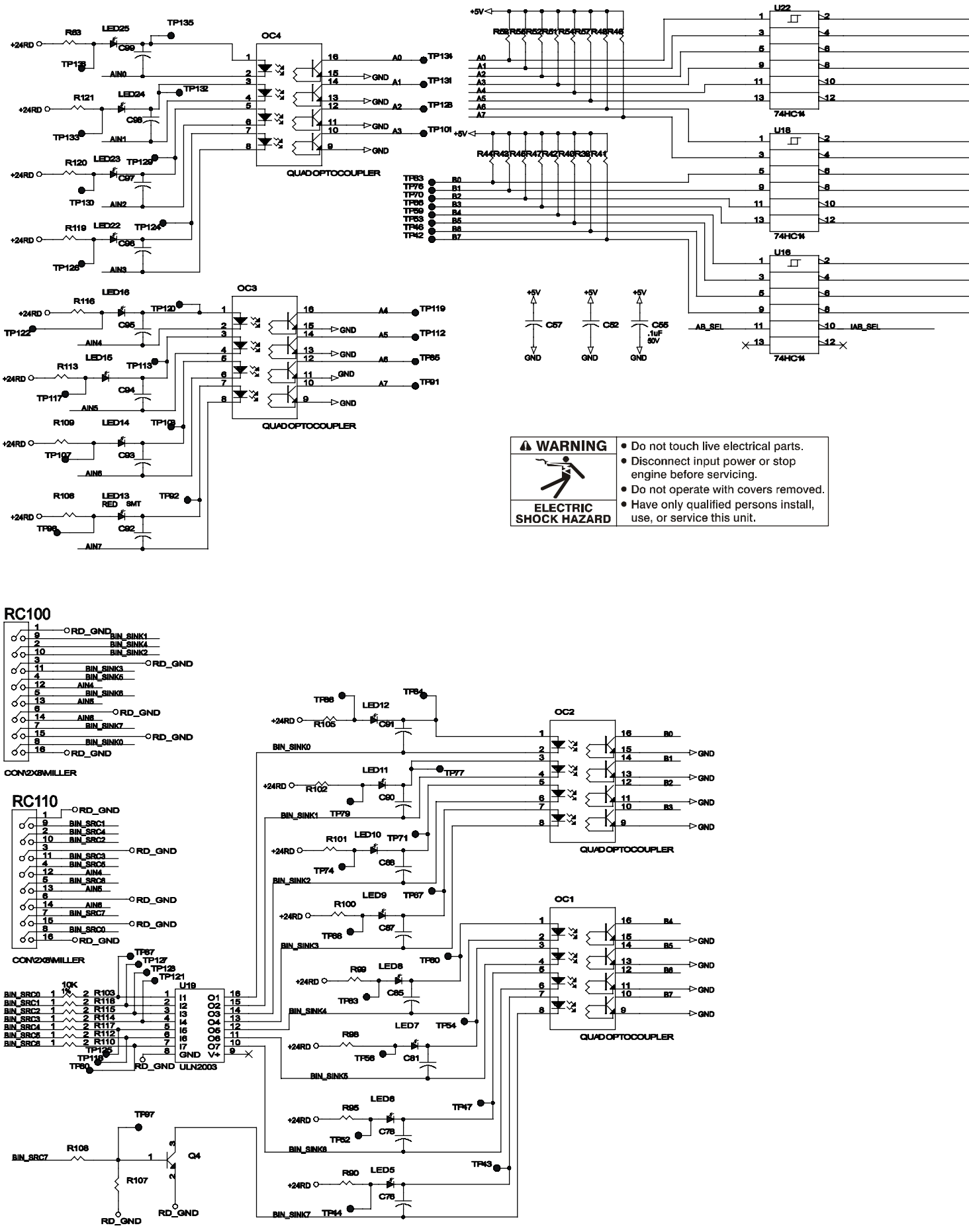
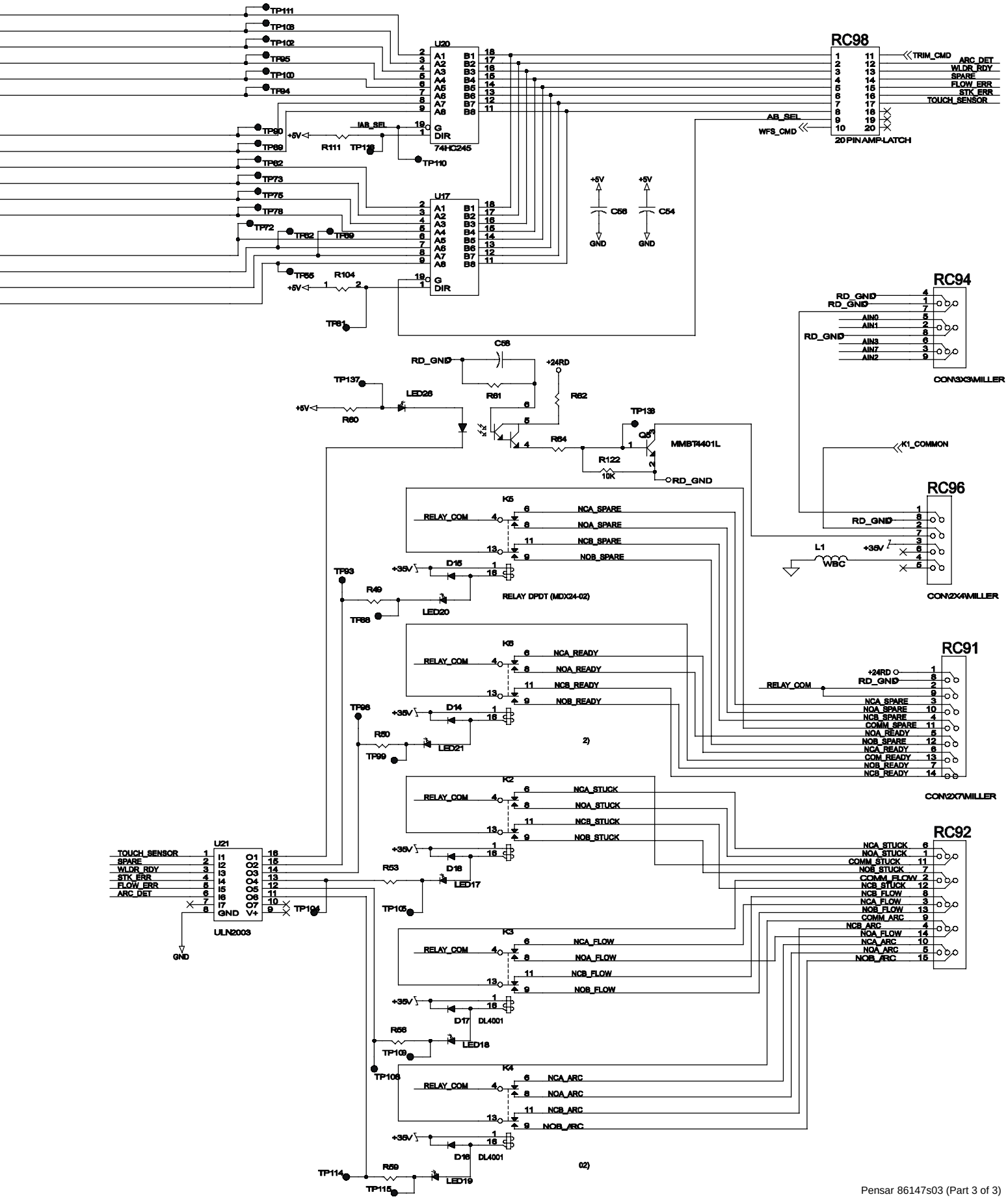


Figure 6-17. Circuit Diagram For Customer Interface Board PC14 (Part 3 of 3)



Pensar 86147s03 (Part 3 of 3)

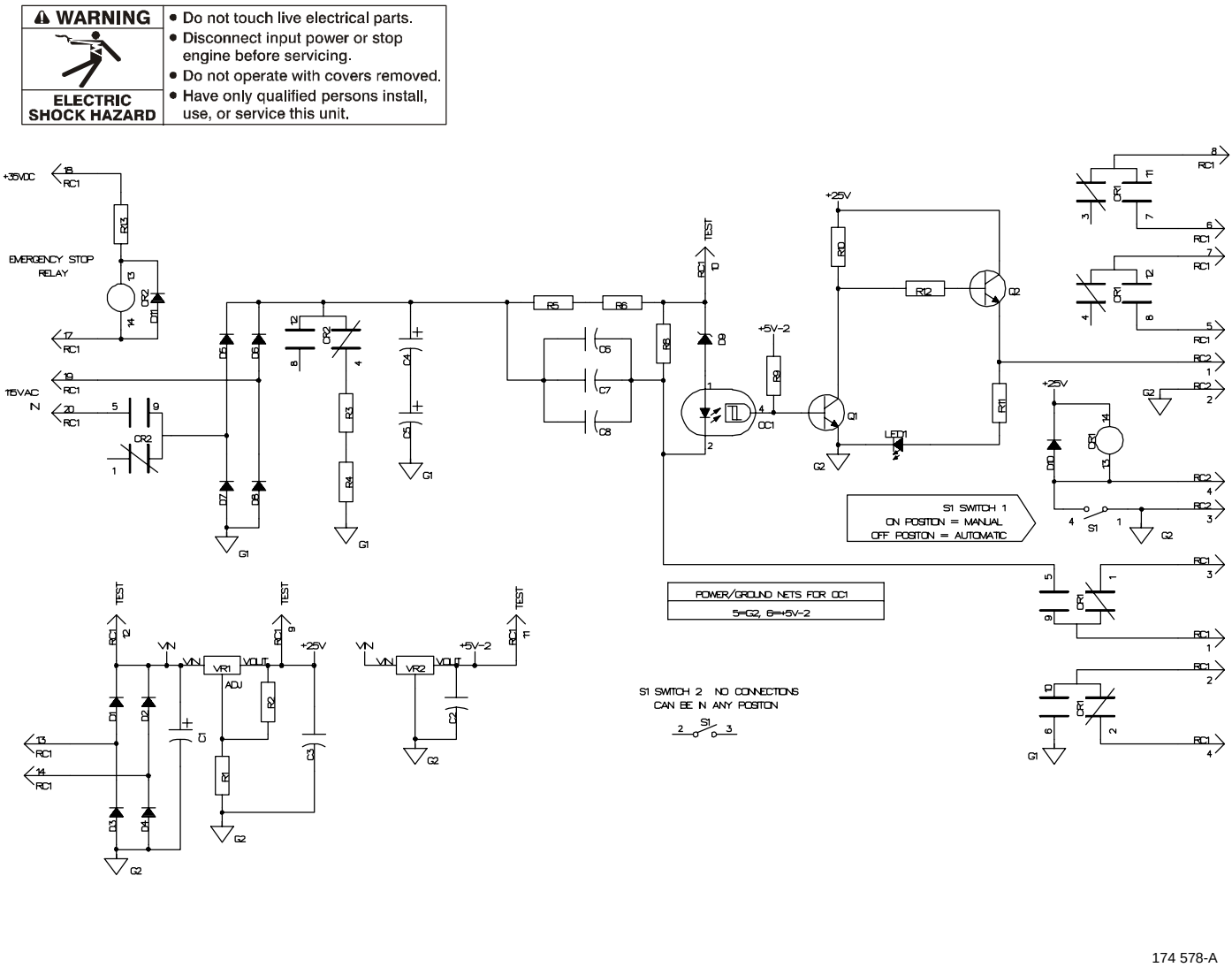


Figure 6-18. Circuit Diagram For Touch Sensor Board PC18

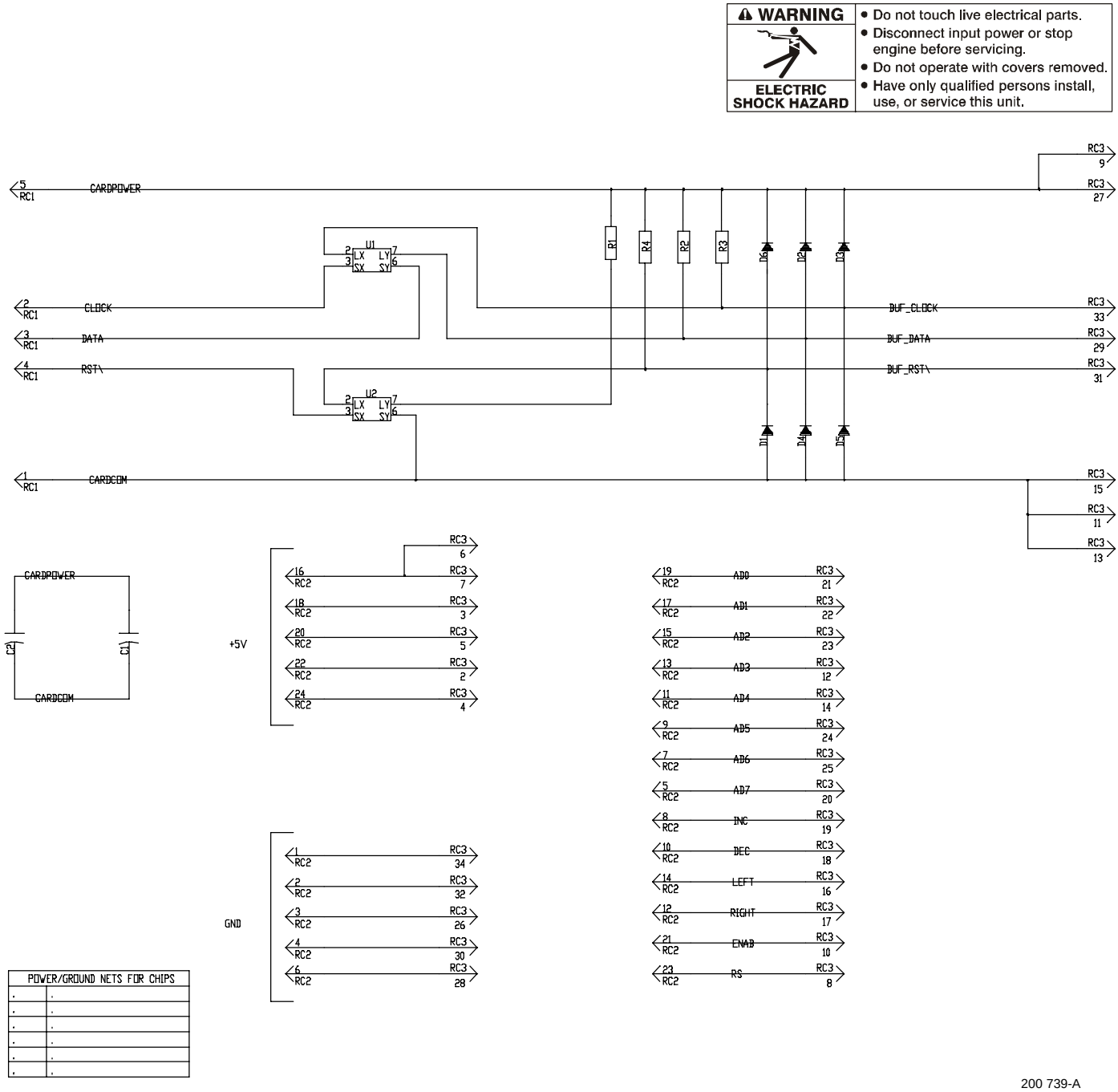


Figure 6-19. Circuit Diagram For Setup Pendant

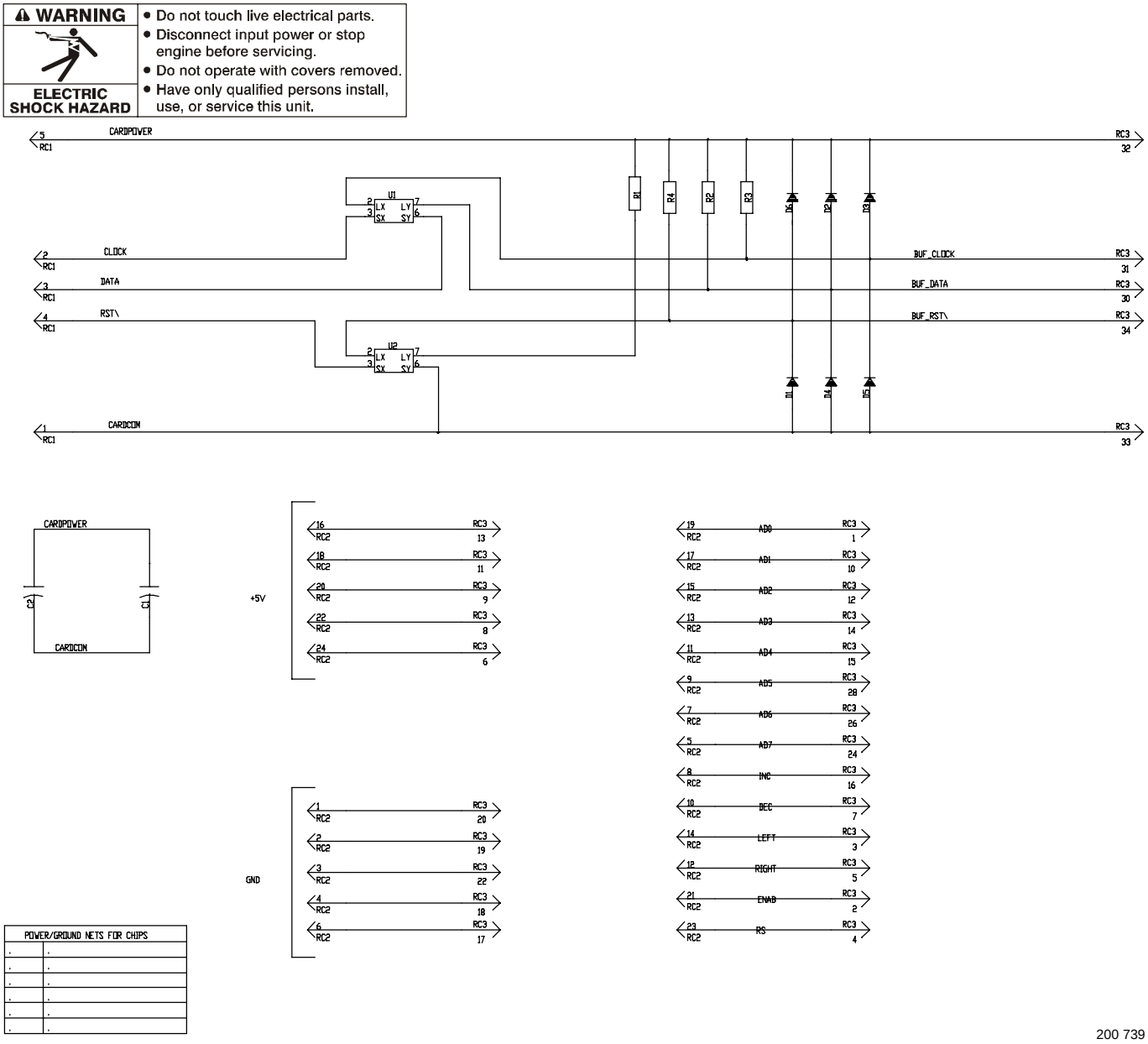


Figure 6-20. Circuit Diagram For Setup Pendant Centronix Junction Board PC3

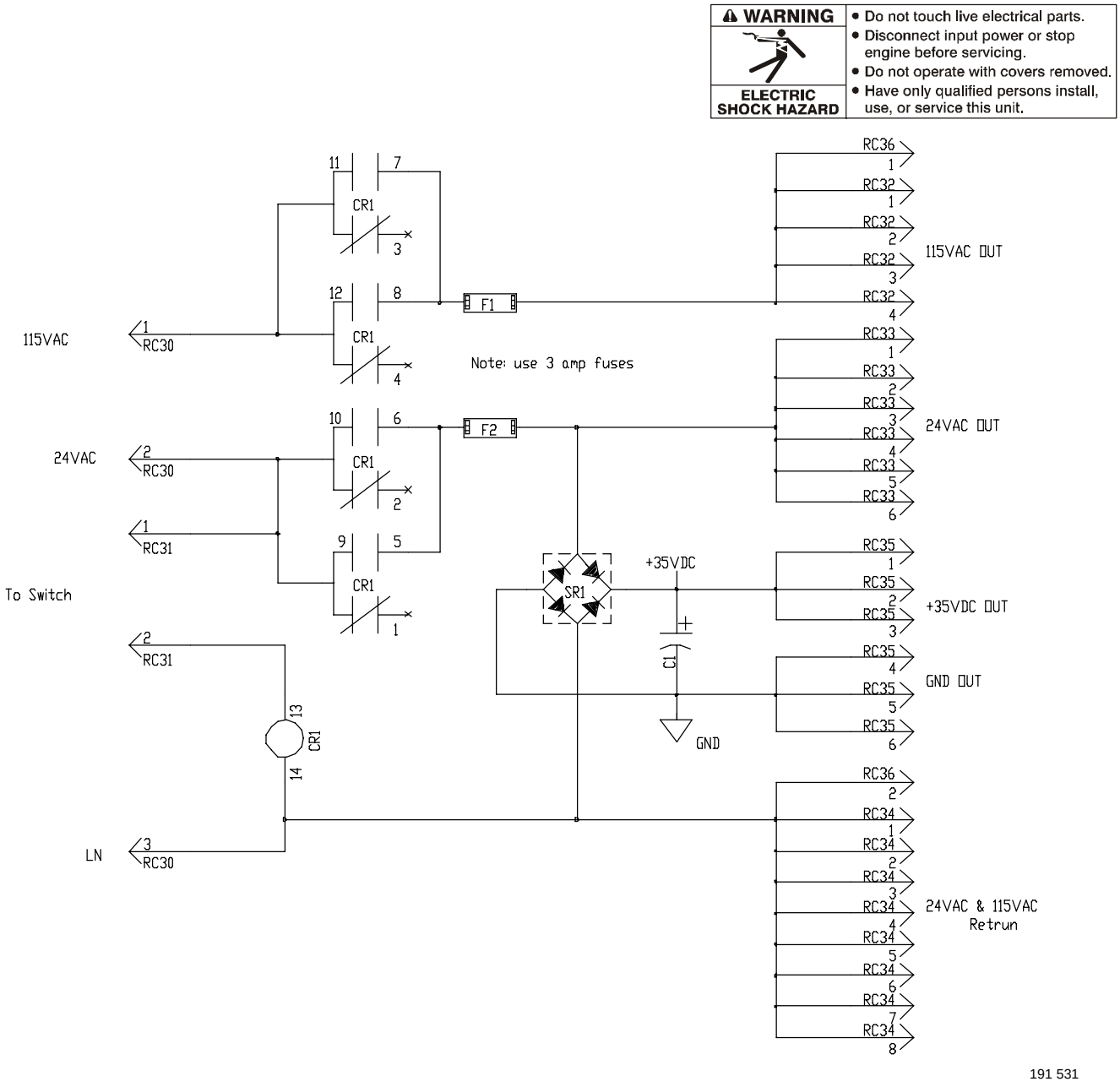


Figure 6-21. Circuit Diagram For Power Distribution Board PC20

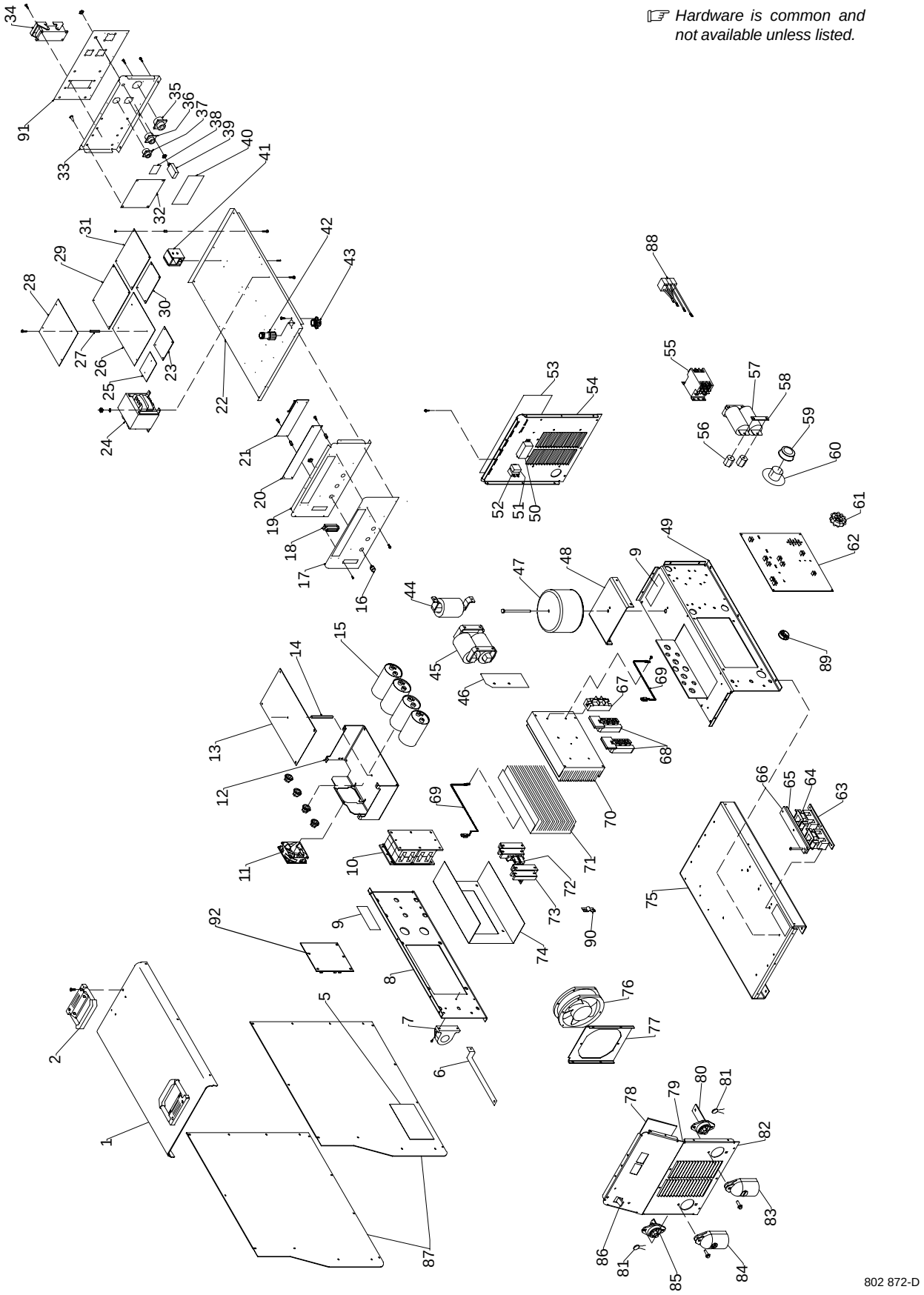


Figure 7-1. Complete Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 7-1. Complete Assembly

1		185 970	COVER, top	1
2		195 585	HANDLE, carrying rubber	2
5		179 310	LABEL, warning general precautionary	2
6		183 827	BUS BAR, output	1
7	HD1	168 829	TRANSDUCER, current 600A	1
	PLG19	115 094	HOUSING PLUG & SOCKETS	1
8		+179 902	WINDTUNNEL, LH	1
9		185 836	LABEL, warning electric shock	3
10	T1	185 524	TRANSFORMER, HF	1
11	FM2	183 918	MOTOR, fan 24VDC 3000RPM 43CFM w/10 ohm resistor	1
12		194 450	BRACKET, mtg capacitor/PC board/fan	1
13	PC1	203 309	CIRCUIT CARD ASSEMBLY, control (400 volt model)	1
	PLG2	115 092	HOUSING PLUG & SOCKETS	1
	PLG3	130 203	HOUSING PLUG & SOCKETS	1
	PLG5	113 752	HOUSING PLUG & SOCKETS	1
	PLG7	115 094	HOUSING PLUG & SOCKETS	1
	PLG21	211 138	PLUG, w/leads	1
14		194 371	SPACER, al 3.500 log	1
15	C3-6	192 935	CAPACITOR, elctlt 2700uf 420	4
16		144 842	ACTUATOR, switch	3
17		209 310	NAMEPLATE, front upper	1
18		201 387	CIRCUIT CARD ASSY, connector	1
19		208 824	PANEL, front	1
20	PC17	203 663	DISPLAY, vfd dotmatrix 1x20 alphanumeric 20 pin	1
21	PC15	182 998	CIRCUIT CARD ASSY, switch board	1
22		193 716	PANEL, center	1
23	PC20	191 533	CIRCUIT CARD ASSY, power distribution	1
24	T11	193 706	TRANSFORMER, control	1
25	PC16	201 387	CIRCUIT CARD ASSY, junction board	1
26	PC12	191 841	CIRCUIT CARD ASSY, interface board	1
27		097 132	STAND-OFF, No. 6-32 x .375	28
28	PC11	202 005	CIRCUIT CARD ASSY, micro board	1
29	PC14	203 665	CIRCUIT CARD ASSY, customer interface	1
30	PC18	212 320	CIRCUIT CARD ASSY, touch sensor	1
31	PC13	213 193	CIRCUIT CARD ASSY, motor board	1
32	PC21	200 077	CIRCUIT CARD ASSY, filter board	1
33		195 994	PANEL, rear	1
34	RC70	201 058	CONNECTOR, receptacle 72-pin	1
35	RC8	200 591	CONNECTOR, circ ms/met 11 pin	1
36	RC21	200 589	CONNECTOR, circ ms/met 10 pin	1
37	RC25	200 082	CONNECTOR, circ ms/met 4 pin size 14s	1
38	PC19	134 560	CIRCUIT CARD ASSY, filter board	1
39	CB11	011 991	CIRCUIT BREAKER, man reset 1P 1.5A 250 VAC	1
40	PC22	200 073	CIRCUIT CARD	1
41	CR12	187 252	SWITCH, reed	1
42	RC9	134 734	CONNECTOR, circ ms/cpc 14 pin size 20	1
		079 739	CONNECTOR, clamp	1
43	RC1	134 735	CONNECTOR, circ ms/cpc 14 skt size 20	1
44	L1	180 026	INDUCTOR, input	1
45	Z1	180 029	STABILIZER, output	1
46		181 925	INSULATOR, stabilizer lead	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 7-1. Complete Assembly (Continued)

47	T2	185 231	TRANSFORMER, control 200/400 VAC	1
	RC10	166 679	HOUSING RECEPTACLE PINS & SOCKETS	1
48		180 105	BRACKET, mtg transformer aux	1
49		+194 449	WINDTUNNEL, RH	1
50	RC2	604 176	RECEPTACLE, str dx grd 2P3W 15A 125V	1
		175 282	COVER, receptacle weatherproof	1
51	CB1	161 078	CIRCUIT BREAKER, man reset 1P 7A 250 VAC	1
52	CB2	093 995	CIRCUIT BREAKER, man reset 1P 15A 250 VAC	1
53		179 847	PLATE, identification (order by model & serial number)	1
54		195 847	PANEL, rear	1
55	W1	180 270	CONTACTOR, def prp 40A 3P 24VAC	1
56		025 248	STAND-OFF, insul .250-20	4
57	C1,2	188 446	CAPACITOR, polyp .5uf 900VAC	2
58		185 992	BUS BAR, capacitor	2
59	CT1	181 271	TRANSFORMER, current	1
60		177 547	BUSHING, snap-in nyl ct	1
61	T4	185 208	CHOKE, common mode	1
62	PC2	206 778	CIRCUIT CARD, interconnecting	1
	PLG4	131 056	HOUSING RECEPTACLE & SOCKETS	1
	PLG9	115 091	HOUSING PLUG & SOCKETS	1
	PLG12	115 093	HOUSING PLUG & SOCKETS	1
63		176 844	CORE, ferrite	2
64		180 103	COIL, DI/DT	2
65		182 654	GASKET, DI/DT rubber	1
66		180 271	BRACKET, mtg choke	1
		182 738	HOLDER, DI/DT coils	1
67	SR1	184 260	KIT, diode power module	1
68	PM1,2	186 656	KIT, transistor IGBT module	1
69	RT1,2	173 632	THERMISTOR, NTC 30K ohm	2
70		179 930	HEAT SINK, power module	1
71		204 165	HEAT SINK, rect dual diode	1
72	R1,2,C9-12	175 194	RESISTOR/CAPACITOR	2
73	D1-4	201 531	KIT, diode ultra-fast recovery	4
74		179 826	INSULATOR, rectifier	1
		181 853	INSULATOR, screw	4
75		179 900	BASE	1
76	FM1	175 084	MOTOR, fan 24VDC 3000 RPM	1
77		179 928	SHROUD, fan	1
78	PC3	190 694	CIRCUIT CARD, front panel	1
	PLG11	115 091	HOUSING PLUG & SOCKETS	1
		185 959	CABLE, ribbon 34 posn	1
79		200 324	NAMEPLATE,	1
80		182 707	TERMINAL, pwr output black	1
81		186 543	CAPACITOR ASSEMBLY	2
82		187 139	PANEL, front	1
83		180 732	BOOT, negative output stud	1
84		179 848	BOOT, positive output stud	1
		181 169	SPACER, output stud	2
		180 735	WASHER, output stud	2
85		181 245	TERMINAL, pwr output red	1
86	S1	128 756	SWITCH, tgl 3PST 40A 600VAC	1
		176 226	INSULATOR, switch power	1
87		+185 968	PANEL, side	2
		178 551	INSULATOR, side	2

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 7-1. Complete Assembly (Continued)	
		144 844	STAND-OFF, No. 6-32 x .875	5
		091 772	STAND-OFF, No. 6-32 x .625	4
88		208 478	CAPACITOR MODULE	1
89		179 276	BUSHING, snap-in nyl 1.000 x 1.375mtg hole	1
90		199 840	BUS BAR, diode	4
91		196 261	NAMEPLATE, rear	1
92	PC7	206 776	CIRCUIT CARD, input filter	1

♦OPTIONAL
+When ordering a component originally displaying a precautionary label, the label should also be ordered.
To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
		194 850	**Setup Pendant**	
		201 990	CASE, front/bottom	1
		186 529	WRAPPER	1
		173 111	PANEL, rear	1
		185 963	NAMEPLATE	1
	PC1	158 160	CIRCUIT CARD ASSY, side display	1
	PC2	156 623	CIRCUIT CARD ASSY, data card	1
	PC3	200 738	CIRCUIT CARD ASSY, connector	1
		186 530	CABLE, ribbon	1
	PB1-4	144 842	ACTUATOR, switch	4
		201 425	CABLE, 6ft	1
		604 804	SCREW, 8-15 x .375 hexwhd-pln stl pld sht met	9
		072 785	SCREW, 6-32 x .375 hexwhd-slt stl pld slffmg	12
		181 157	STAND-OFF, No. 6-32 x .843 lg	4
		098 691	STAND-OFF, No. 6-32 x .500 lg	2
		133 528	RIVET, al .125 dia x .188-.250 grip blk blind dome	11
		602 062	SCREW, 4-40 x .375 pa hd-phl stl pld cone	2
		019 663	MOUNT, NPRN 15/16OD x 3/8REC 3/16 x 3/8	4
		601 892	RIVET, al .125 dia x .188-.250 grip blind domed hd	4
		150 316	CONNECTOR, rect univ 039 6p/s 3 row	2
		155 024	LENS, clear anti-glare .030 x 2.000 x 4.250	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

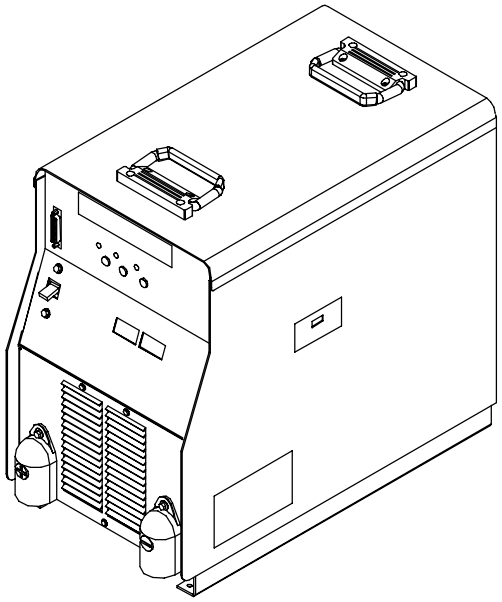
Notes

OM-196 188K
July 2003

Miller

Programming Instructions for

Auto Invision II



SECTION 8 – INTRODUCTION TO PROGRAMMING

8-1. Pulse MIG Programs

☞ *Selecting hardwire or softwire is done during setup (see Section 14)*

Program	Hardwire Selected	Softwire Selected
1	.035” Steel, Argon – Oxy	.045” 4043, Argon
2	.045” Steel, Argon – Oxy	.045” 5356, Argon
3	.035” Steel, Argon – CO2	.035” 4043, Argon
4	.045” Steel, Argon – CO2	.035” 5356, Argon
5	.035” 309, Argon – CO2	1/16” 4043, Argon
6	.045” Steel, 309, Argon – CO2	1/16” 5356, Argon
7	3/64” 5356, Argon	.045” Steel, Argon – CO2
8	.035” SIB, Argon	.045” Steel, Argon – Oxy

FUTURE APPLICATION

The interface unit is designed for use in pulse MIG welding (adaptive or standard), or MIG welding.

The unit is factory-equipped with eight programs for pulse MIG welding.

The unit also provides memory for the creation of up to eight MIG programs (see Section 11).

The weld programs require the user to enter information specific to the welding application. This information is entered as a part of program development (see Section 9 for pulsed MIG information), and during setup (see Section 14).

The eight pulse programs are shown in the table. Each program can be used in standard pulse MIG or adaptive pulse MIG.

In an adaptive pulse MIG program, the unit manipulates certain weld variables to hold arc voltage constant. This feature is described in Section 10-5.

The factory-set parameters for each program can be changed to customize them for an application (see Section 10).

8-2. Standard Pulse Welding Programs

The following sixteen (16) pulse welding programs are in the control memory. Use this information if it is necessary to change a standard program, or as a basis to build your own custom program. If at any time while changing a standard program, or while building your own custom program, you want to go back to the standard program in the control memory, see Section 14-12 for System memory Reset instructions. See Section 10 for explanation of Pulse welding settings.

Apk = Peak Amperage, Abk = Background Amperage, PPS = Pulses Per Second, PWms = Pulse Width (milliseconds), Vpk = Peak Voltage

8-3. Program 1 – 1.2 mm Steel (.045”), 98-2 Argon-Oxy

Wire Size/Type: 1.2 mm (.045”) Steel		Gas: Ar - Oxy / 19 L/min (40 CFH)				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.1 / 750	540	159	263	3.1	34.5	
17.8 / 700	530	150	250	3.0	33.9	
16.5 / 650	520	141	237	2.9	33.3	
15.2 / 600	510	133	225	2.9	32.7	
14.0 / 550	500	124	212	2.8	32.0	
12.7 / 500	490	115	200	2.8	31.4	
11.4 / 450	480	110	187	2.7	31.0	
10.2 / 400	470	105	175	2.7	30.6	
8.9 / 350	460	100	162	2.6	30.2	
7.6 / 300	450	95	150	2.6	29.8	
6.4 / 250	422	82	132	2.4	28.7	
5.1 / 200	395	69	114	2.3	27.6	
3.8 / 150	367	56	96	2.1	26.4	
2.5 / 100	340	43	78	2.0	25.3	
1.3 / 50	312	30	60	1.8	24.2	

8-4. Program 2 – 1.0 mm Steel (.040”), 80-20 Argon-CO_2

Wire Size/Type: 1.0 mm (.040”) Steel		Gas: Ar - CO_2/ 19 L/min (40 CFH)				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
17.9 / 705	471	90	206	2.3	38.4	
17.8 / 700	470	90	205	2.3	38.4	
16.5 / 650	460	87	196	2.3	38.2	
15.2 / 600	450	85	188	2.3	38.0	
14.0 / 550	440	82	179	2.2	37.7	
12.7 / 500	430	80	170	2.2	37.5	
11.4 / 450	410	77	160	2.1	36.1	
10.2 / 400	390	75	150	2.1	34.8	
8.9 / 350	370	72	140	2.0	33.4	
7.6 / 300	350	70	130	2.0	32.1	
6.4 / 250	355	62	111	1.8	32.3	
5.1 / 200	360	55	92	1.6	32.5	
3.8 / 150	365	47	73	1.4	32.6	
2.5 / 100	370	39	53	1.2	32.8	

8-5. Program 3 – 1.2 mm Steel (.045”), 80-20 Argon-CO_2

Wire Size/Type: 1.2 mm (.045”) Steel	Gas: Ar - CO_2 / 19 L/min (40 CFH)					
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.1 / 750	570	134	246	2.9	41.2	
17.8 / 700	560	130	235	2.9	40.6	
16.5 / 650	550	126	224	2.9	40.0	
15.2 / 600	540	123	213	2.9	39.5	
14.0 / 550	530	119	201	2.8	38.9	
12.7 / 500	520	115	190	2.8	38.3	
11.4 / 450	502	107	177	2.7	37.4	
10.2 / 400	485	100	165	2.7	36.6	
8.9 / 350	467	92	152	2.6	35.7	
7.6 / 300	450	85	140	2.6	34.9	
6.4 / 250	435	74	120	2.4	34.1	
5.1 / 200	420	64	100	2.3	33.4	
3.8 / 150	405	53	80	2.1	32.6	
2.5 / 100	390	43	60	1.9	31.8	
1.3 / 50	375	32	40	1.7	31.0	

8-6. Program 4 – .8 mm 316 (.030”), 98-2 Argon-CO_2

Wire Size/Type: .8 mm (.030”) 316	Gas: Ar - CO_2 / 19 L/min (40 CFH)					
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
15.6 / 615	301	66	117	2.0	33.1	
15.2 / 600	300	65	115	2.0	33.1	
14.0 / 550	295	61	109	1.9	33.0	
12.7 / 500	290	58	103	1.9	33.0	
11.4 / 450	285	54	96	1.8	32.9	
10.2 / 400	280	50	90	1.8	32.9	
9.2 / 360	271	47	84	1.8	32.1	
8.3 / 325	263	45	78	1.8	31.3	
7.3 / 290	254	42	71	1.7	30.5	
6.4 / 250	245	40	65	1.7	29.7	
5.6 / 220	246	38	56	1.6	29.7	
4.8 / 190	248	37	47	1.6	29.8	
4.0 / 160	249	35	37	1.5	29.8	
3.2 / 125	250	34	28	1.4	29.9	
3.0 / 120	250	34	26	1.4	29.9	

8-7. Program 5 – 1.0 mm 316 (.040”), 98-2 Argon-CO_2

Wire Size/Type: 1.0 mm (.040”) 316		Gas: Ar - CO_2 / 19 L/min (40 CFH)				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.1 / 750	443	144	183	2.6	34.0	
17.8 / 700	425	130	175	2.5	33.8	
16.5 / 650	407	116	167	2.4	33.6	
15.2 / 600	390	103	160	2.3	33.4	
14.0 / 550	372	89	152	2.2	33.1	
12.7 / 500	355	75	145	2.1	32.9	
11.4 / 450	351	71	136	2.0	32.7	
10.2 / 400	348	68	128	2.0	32.5	
8.9 / 350	344	64	119	1.9	32.3	
7.6 / 300	340	60	110	1.9	32.1	
6.7 / 265	330	54	99	1.8	31.1	
5.7 / 225	320	48	89	1.8	30.1	
4.7 / 185	310	41	78	1.7	29.0	
3.8 / 150	300	35	67	1.7	28.0	
2.8 / 110	290	29	56	1.6	27.0	

8-8. Program 6 – 1.2 mm 316 (.045”), 98-2 Argon-CO_2

Wire Size/Type: 1.2 mm (.045”) 316		Gas: Ar - CO_2 / 19 L/min (40 CFH)				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
18.6 / 735	491	180	215	3.3	35.2	
17.1 / 675	480	175	205	3.2	34.4	
15.7 / 620	469	164	195	3.1	33.6	
14.3 / 565	458	153	185	3.1	32.8	
12.9 / 510	446	141	175	3.0	32.0	
11.4 / 450	435	130	165	2.9	31.2	
10.0 / 395	421	117	151	2.7	30.7	
8.6 / 340	408	105	138	2.6	30.3	
7.1 / 285	394	92	124	2.4	29.8	
5.7 / 225	380	80	110	2.3	29.3	
5.1 / 200	375	75	100	2.2	29.1	
4.4 / 175	370	70	90	2.1	28.9	
3.8 / 150	365	65	80	1.9	28.6	
3.2 / 125	360	60	70	1.8	28.4	
2.5 / 100	355	55	60	1.7	28.2	

8-9. Program 7 – 1.0 mm 308L (.040”), 98-2 Argon-CO_2

Wire Size/Type: 1.0 mm (.040”) 308L	Gas: Ar - CO_2 / 19 L/min (40 CFH)					
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.1 / 750	436	120	183	2.5	34.2	
17.8 / 700	425	115	175	2.4	33.7	
16.5 / 650	414	110	167	2.3	33.2	
15.2 / 600	403	105	160	2.3	32.7	
14.0 / 550	391	100	152	2.2	32.1	
12.7 / 500	380	95	145	2.1	31.6	
11.4 / 450	370	86	136	2.0	31.1	
10.2 / 400	360	78	128	2.0	30.6	
8.9 / 350	350	69	119	1.9	30.3	
7.6 / 300	340	60	110	1.9	29.5	
6.7 / 265	330	54	100	1.8	29.0	
5.7 / 225	320	48	90	1.8	28.6	
4.7 / 185	310	41	80	1.7	28.1	
3.8 / 150	300	35	70	1.7	27.7	
2.8 / 110	290	29	60	1.6	27.2	

8-10. Program 8 – 1.2 mm 308L (.045”), 98-2 Argon-CO_2

Wire Size/Type: 1.2 mm (.045”) 308L	Gas: Ar - CO_2 / 19 L/min (40 CFH)					
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
18.6 / 735	491	186	274	3.5	36.0	
17.1 / 675	480	175	210	3.4	34.8	
15.7 / 620	464	164	196	3.3	33.6	
14.3 / 565	458	153	183	3.2	32.5	
12.9 / 510	446	141	169	3.1	31.3	
11.4 / 450	435	130	155	3.0	30.1	
10.0 / 395	422	119	141	2.9	29.9	
8.6 / 340	410	108	128	2.8	29.7	
7.1 / 285	397	96	114	2.6	29.4	
5.7 / 225	385	85	100	2.5	29.2	
5.1 / 200	379	79	92	2.3	29.1	
4.4 / 175	373	73	85	2.2	29.1	
3.8 / 150	366	66	71	2.0	29.0	
3.2 / 125	360	60	70	1.8	29.0	
2.5 / 100	354	54	62	1.6	28.9	

8-11. Program 1 – 1.2 mm Metal Core (.045”), 95-5 Argon-CO_2

Note ☞ *The next 8 programs are available after changing software wiretype (see Section 14-10).*

Wire Size/Type: 1.2 mm (.045”) Metal Core		**Gas: Ar - CO_2 / 19 L/min (40 CFH)**				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.1 / 750	525	160	211	2.9	31.6	
17.8 / 700	515	155	205	2.9	31.3	
16.5 / 650	505	150	199	2.9	31.0	
15.2 / 600	495	145	193	2.9	30.8	
14.0 / 550	485	140	186	2.8	30.5	
12.7 / 500	475	135	180	2.8	30.3	
11.4 / 450	462	124	172	2.7	30.3	
10.2 / 400	450	113	165	2.7	30.4	
8.9 / 350	437	101	157	2.6	30.4	
7.6 / 300	425	90	149	2.5	30.5	
6.4 / 250	381	81	138	2.2	28.8	
5.1 / 200	338	72	127	2.0	27.2	
3.8 / 150	294	62	116	1.7	25.5	
2.5 / 100	250	53	105	1.5	23.9	
1.3 / 50	206	44	94	1.2	22.2	

8-12. Program 2 – 1.4 mm Metal Core (.052”), 95-5 Argon-CO_2

Wire Size/Type: 1.4 mm (.052”) Metal Core		**Gas: Ar - CO_2 / 19 L/min (40 CFH)**				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
18.1 / 715	562	194	206	3.8	34.0	
17.8 / 700	560	190	206	3.7	33.9	
16.5 / 650	551	175	208	3.5	33.7	
15.2 / 600	543	160	210	3.3	33.5	
14.0 / 550	534	145	211	3.0	33.2	
12.7 / 500	525	130	213	2.8	33.0	
11.4 / 450	512	121	199	2.7	32.2	
10.2 / 400	500	113	185	2.7	31.5	
8.9 / 350	487	104	171	2.6	30.7	
7.6 / 300	475	95	157	2.5	29.9	
6.4 / 250	427	82	142	2.4	28.2	
5.1 / 200	380	70	127	2.3	26.6	
3.8 / 150	332	57	111	2.2	24.9	
2.5 / 100	284	45	96	2.1	23.3	
2.2 / 90	272	42	92	2.1	22.9	

8-13. Program 3 – 1.2 mm ER 4043 (.045”), Argon

Wire Size/Type: 1.2 mm (.045”) ER 4043 Gas: Ar / 19 L/min (40 CFH)						
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
17.9 / 705	492	160	190	2.9	31.6	
17.8 / 700	490	160	190	2.9	31.5	
16.5 / 650	451	167	195	2.8	30.1	
15.2 / 600	412	174	200	2.8	28.8	
14.0 / 550	373	180	205	2.7	27.4	
12.7 / 500	334	187	210	2.7	26.1	
11.4 / 450	316	169	196	2.6	26.1	
10.2 / 400	298	151	183	2.5	26.1	
8.9 / 350	279	133	169	2.3	26.1	
7.6 / 300	261	115	155	2.2	26.1	
6.4 / 250	259	91	135	2.0	25.5	
5.1 / 200	258	68	115	1.8	24.9	
3.8 / 150	256	44	95	1.5	24.2	
2.5 / 100	255	20	74	1.3	23.6	

8-14. Program 4 – 1.0 mm ER 4043 (.040”), Argon

Wire Size/Type: 1.0 mm (.040”) ER 4043 Gas: Ar / 19 L/min (40 CFH)						
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.4 / 760	476	136	176	1.8	33.2	
18.5 / 725	470	130	170	1.7	32.5	
17.7 / 695	464	124	164	1.6	31.8	
16.9 / 665	459	118	158	1.6	31.2	
16.1 / 630	453	111	152	1.5	30.5	
15.2 / 595	448	105	146	1.4	29.9	
13.8 / 540	421	95	136	1.4	29.4	
12.4 / 485	394	85	127	1.4	29.0	
11.0 / 430	367	75	117	1.3	28.5	
9.7 / 380	340	65	108	1.3	28.1	
8.3 / 325	318	54	93	1.3	27.4	
6.9 / 270	297	44	79	1.4	26.7	
5.5 / 215	275	33	64	1.4	26.0	
4.1 / 160	254	22	50	1.4	25.3	
2.7 / 105	232	11	35	1.4	24.6	

8-15. Program 5 – 1.0 mm 5356 (.040”), Argon

Wire Size/Type: 1.0 mm (.040”) 4043		Gas: Ar / 19 L/min (40 CFH)				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
18.6 / 735	410	75	156	1.3	27.0	
18.5 / 730	410	75	156	1.3	27.0	
17.7 / 695	407	69	152	1.3	26.9	
16.9 / 665	405	64	148	1.3	26.8	
16.1 / 630	402	58	144	1.3	26.6	
15.2 / 600	400	52	140	1.3	26.5	
13.8 / 540	369	51	134	1.3	26.2	
12.4 / 485	338	51	128	1.3	26.0	
11.0 / 430	306	50	122	1.2	25.7	
9.7 / 380	275	50	116	1.2	25.5	
8.3 / 325	281	44	94	1.1	25.4	
6.9 / 270	288	38	72	1.1	25.3	
5.5 / 215	294	31	50	1.0	25.2	
4.1 / 160	300	25	28	1.0	25.1	
4.0 / 155	300	25	27	1.0	25.1	

8-16. Program 6 – 1.2 mm ER 5356 (.045”), Argon

Wire Size/Type: 1.2 mm (.045”) ER 5356		Gas: Ar / 19 L/min (40 CFH)				
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.4 / 760	378	149	254	2.8	25.3	
18.5 / 725	374	144	245	2.7	25.3	
17.7 / 695	370	139	236	2.6	25.3	
16.9 / 665	366	135	278	2.5	25.3	
16.1 / 630	362	130	219	2.4	25.3	
15.2 / 595	358	126	210	2.3	25.3	
13.8 / 540	346	115	200	2.2	24.6	
12.4 / 485	334	104	190	2.1	23.9	
11.0 / 430	322	92	180	2.0	23.2	
9.7 / 380	310	81	170	1.9	27.5	
8.3 / 325	302	72	142	1.7	22.4	
6.9 / 270	295	63	114	1.6	22.4	
5.5 / 215	287	54	85	1.4	22.3	
4.1 / 160	280	45	57	1.2	22.2	
2.7 / 105	272	36	29	1.0	22.1	

8-17. Program 7 – .8 mm Steel (.030”), 98-2 Argon-Oxy

Wire Size/Type: .8 mm (.30”) Steel			Gas: Ar - Oxy / 19 L/min (40 CFH)			
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
19.7 / 775	384	121	143	2.0	33.9	
17.8 / 700	375	110	135	1.9	33.6	
15.9 / 625	366	99	127	1.8	33.3	
14.0 / 550	358	88	120	1.7	33.0	
12.1 / 475	349	76	112	1.6	32.6	
10.2 / 400	340	65	104	1.5	32.3	
8.9 / 350	334	56	94	1.5	31.8	
7.6 / 300	328	48	85	1.5	31.3	
6.4 / 250	321	39	75	1.4	30.7	
5.1 / 200	315	30	65	1.4	30.2	
4.4 / 170	306	29	58	1.3	29.5	
3.8 / 150	298	28	51	1.3	28.9	
3.2 / 125	289	26	44	1.2	28.2	
2.5 / 100	280	25	37	1.1	27.6	
1.9 / 75	271	24	30	1.0	26.9	

8-18. Program 8 – 1.0 mm Steel (.040”), 98-2 Argon-Oxy

Wire Size/Type: 1.0 mm (.040”) Steel			Gas: Ar - Oxy/ 19 L/min (40 CFH)			
MPM / IPM	**Apk**	**Abk**	**PPS**	**PWms**	**Vpk**	**COMMENTS**
17.9 / 705	451	90	201	2.4	33.7	
17.8 / 700	450	90	200	2.4	33.6	
16.5 / 650	440	90	192	2.4	32.8	
15.2 / 600	430	90	185	2.4	32.0	
14.0 / 550	420	90	177	2.3	31.1	
12.7 / 500	410	90	170	2.3	30.3	
11.4 / 450	392	82	162	2.3	29.4	
10.2 / 400	375	75	155	2.3	28.5	
8.9 / 350	357	67	147	2.2	27.5	
7.6 / 300	340	60	140	2.2	26.6	
6.4 / 250	320	55	120	2.1	26.9	
5.1 / 200	300	50	100	2.0	27.3	
3.8 / 150	280	45	80	1.9	27.6	
2.5 / 100	260	40	60	1.8	27.9	
2.4 / 95	257	39	57	1.8	27.9	

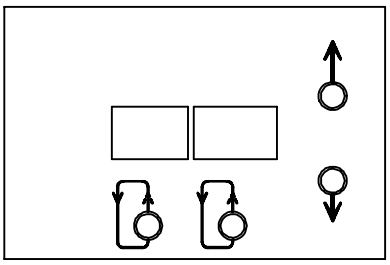
8-19. Setup Pendant Mode Select Button

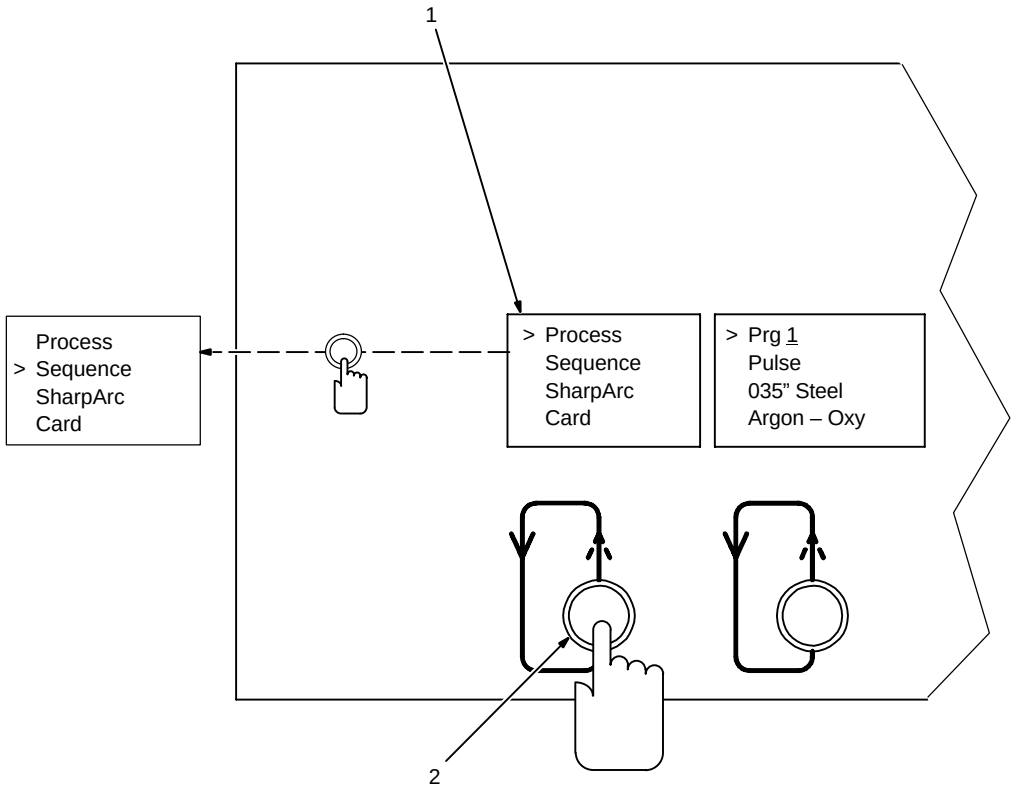
1 Mode Display

2 Mode Select Button

Press Mode Select button to move indicator in left window display.

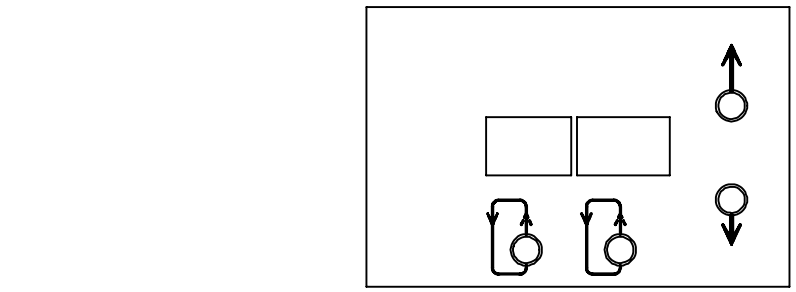
Go to Section 8-20.





Ref. 154 109

8-20. Setup Pendant Parameter Select Button



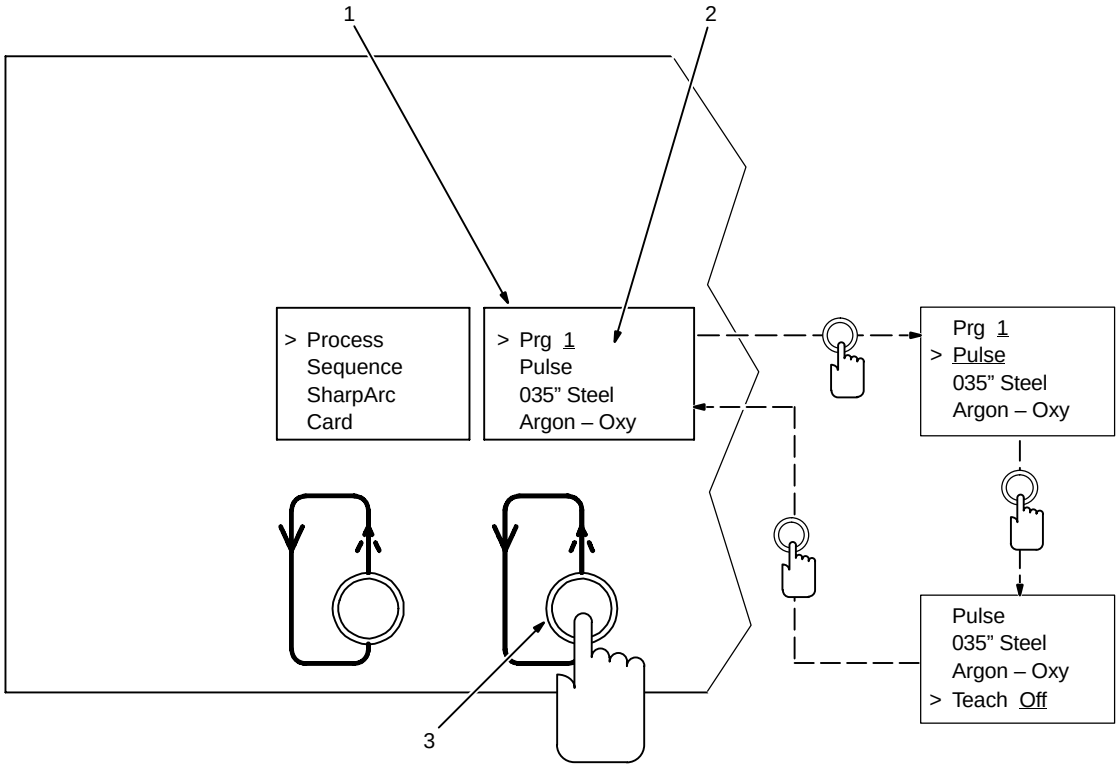
1 Parameter Display

2 Moving Line

Moving line is under value that can be changed.

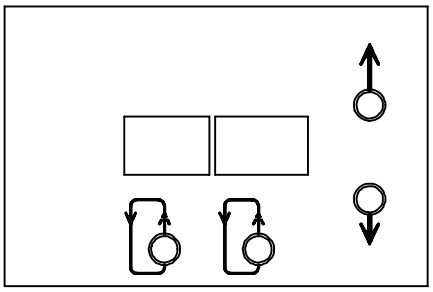
3 Pulse Panel Parameter Select Button

Press pulse panel parameter select button to move indicator in right window display.



Ref. 154 109

8-21. Setup Pendant Parameter Increase And Decrease Buttons



Use mode select button to select mode to be changed (see 8-19).

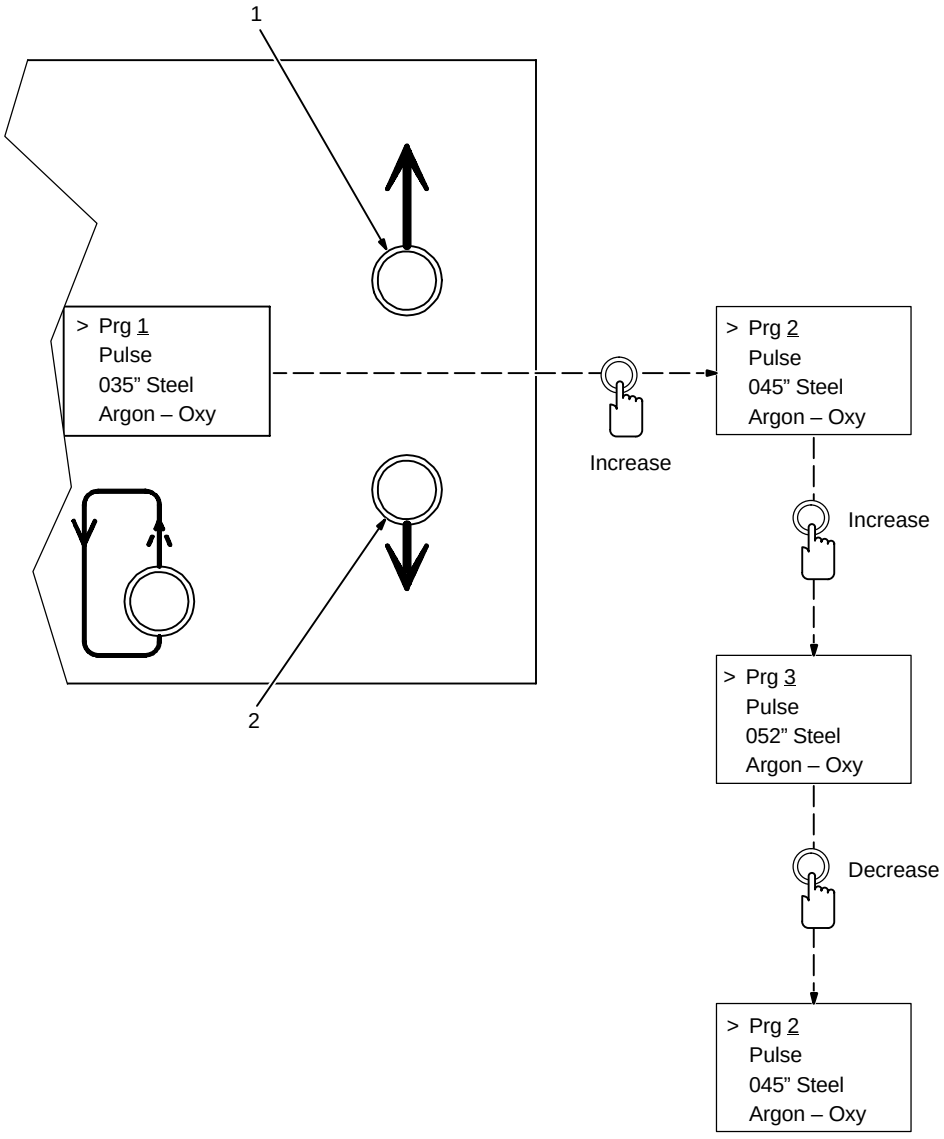
Use pulse panel parameter select button to select parameter to be changed (see 8-20).

1 Increase Button

Press button to increase value that is underlined by the moving line.

2 Decrease Button

Press button to decrease value that is underlined by the moving line.

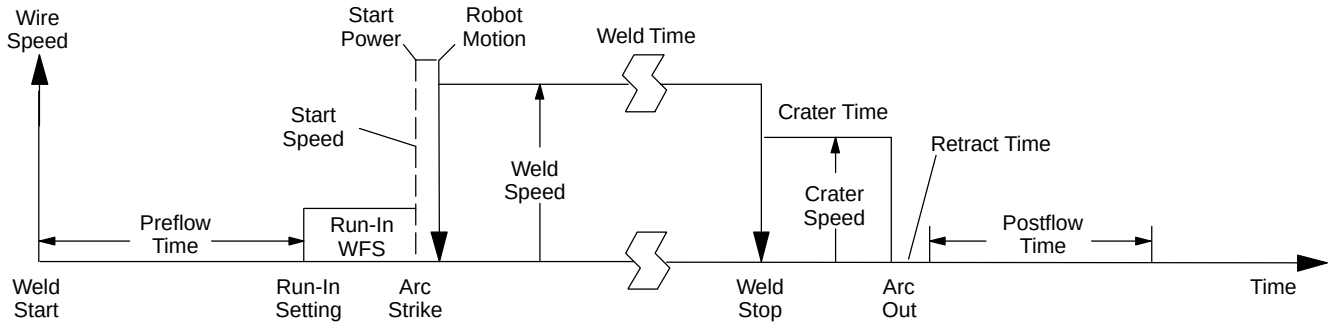


Ref. 154 109

SECTION 9 – GETTING STARTED FOR PULSE WELDING

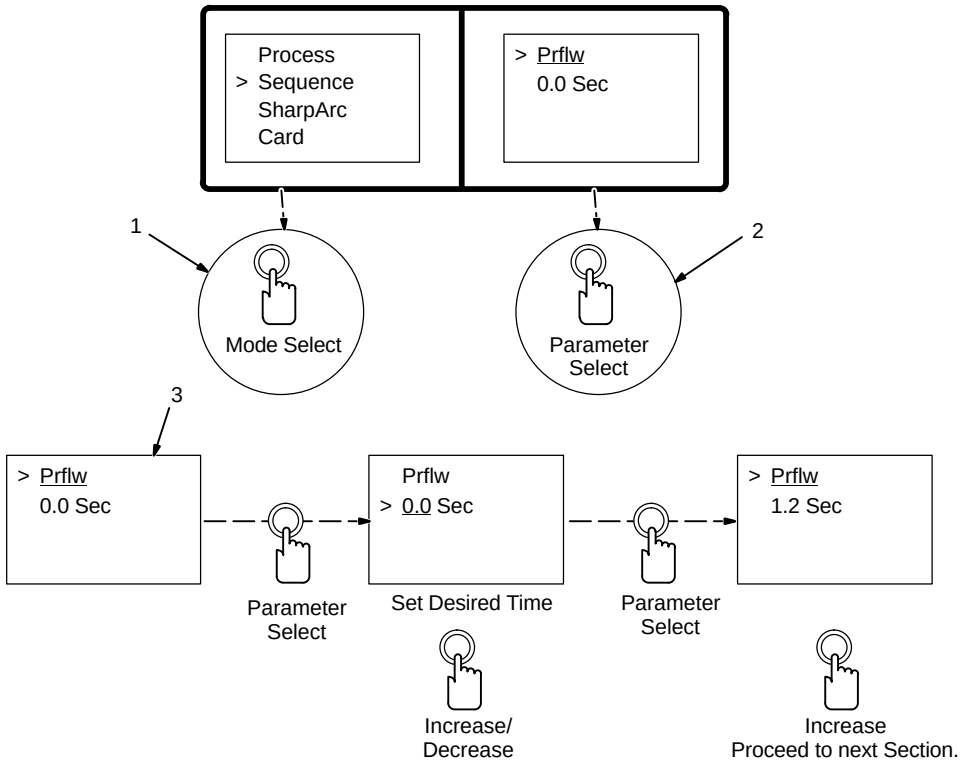
9-1. Weld Cycle For Pulse Welding

☞ *The type of robot connected determines what combination of parameters are available.*



Ref. S-0271

9-2. Setting Preflow Sequence Display



1 Mode Select Button

When unit is turned On, Process is the default mode, at other times, use mode select button to select Sequence.

2 Parameter Select Button

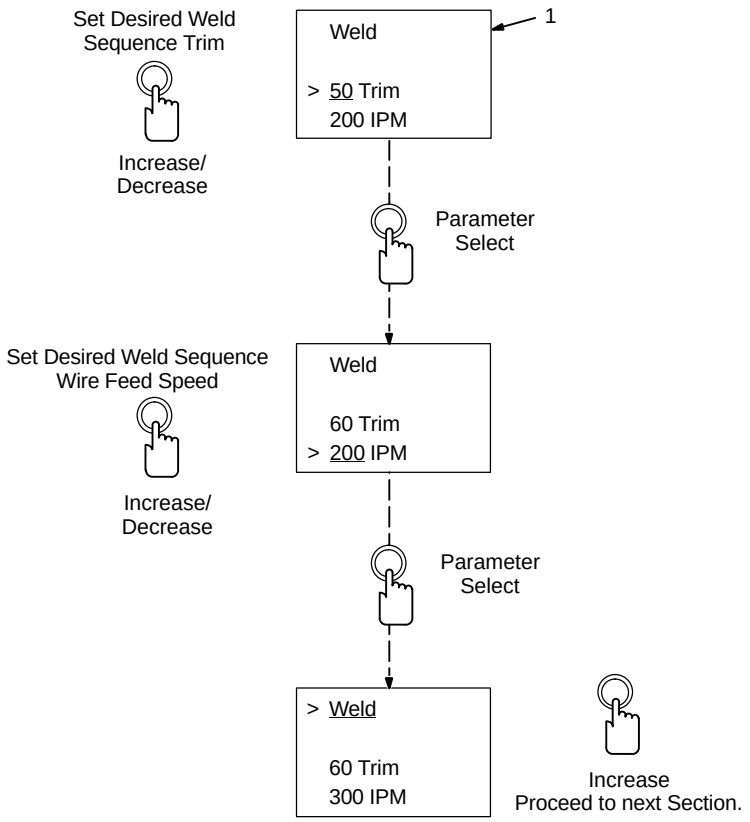
Use parameter select button to select parameters.

3 Preflow Parameters Display

Preflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Preflow sequence.

Go to Section 9-3.

9-3. Setting Weld Sequence Display



1 Weld Parameters Display

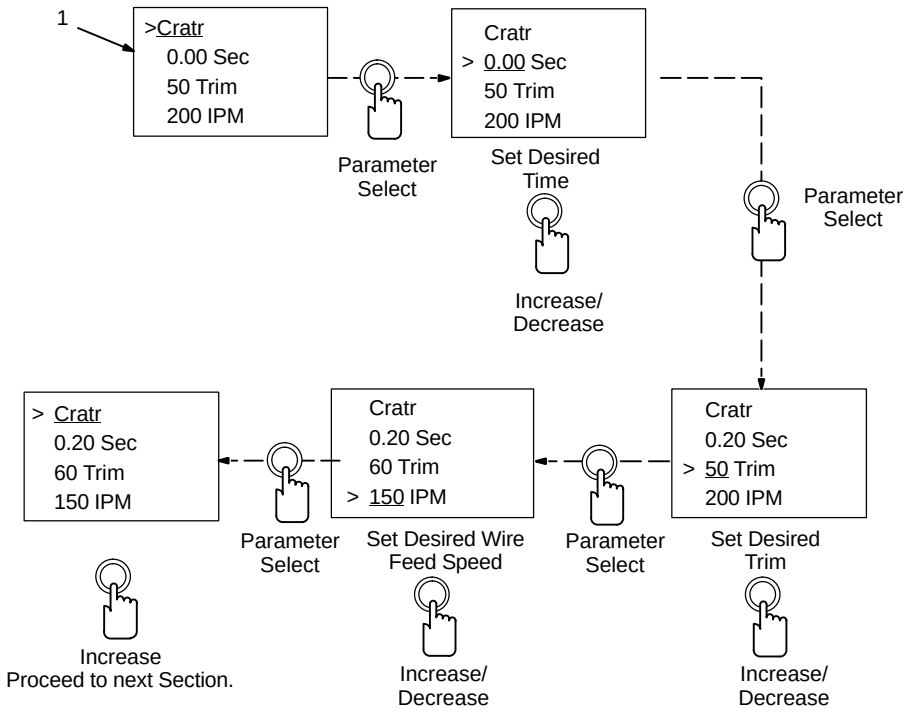
Parameter ranges are as follows:

Trim (Arc Length), 0-99

Wire Feed Speed, 50-780 Inches Per Minute, IPM

Go to Section 9-4.

9-4. Setting Crater Sequence Display



1 Crater Parameters Display

Parameter ranges are as follows:

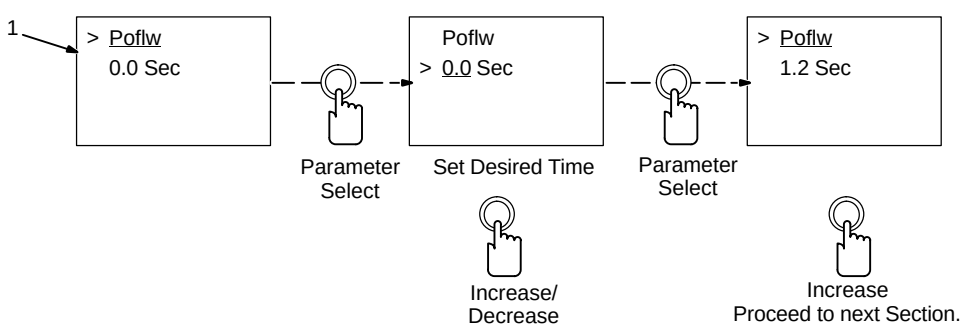
Seconds, 0-2.50 Sec. If value set is zero (0), there is no Crater sequence.

Trim (Arc Length), 0-99

Wire Feed Speed, 50-780 Inches Per Minute, IPM

Go to Section 9-5.

9-5. Setting Postflow Sequence Display



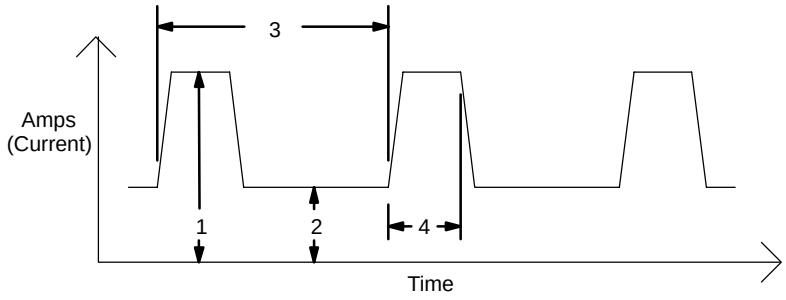
1 Postflow Parameters Display

Postflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Postflow sequence.

SECTION 10 – TEACHING A PULSE WELDING PROGRAM

NOTE ☞ *See GMAW-P (Pulsed MIG) Process Guide supplied with unit for more information.*

10-1. Pulse Waveform Explained



This unit controls weld output for pulsed welds.

1 Apk – Peak Current Of 100-600 Amperes

Apk is the high pulse of welding current. Peak current melts the welding wire and forms a droplet. The droplet is forced into the weld puddle.

2 Abk – Background Current Of 10-255 Amperes

Abk is the low weld current. Background current preheats welding wire and maintains the arc. When background current is too low, the arc is unstable and hard to maintain.

3 PPS – Pulses Per Second Of 20-400

PPS, pulse rate, and frequency (Hz) are used interchangeably. A PPS or pulse rate of 60 Hz means 60 pulses of current are produced each second.

4 PWms – Pulse Width Of 1.0-5.0 Milliseconds

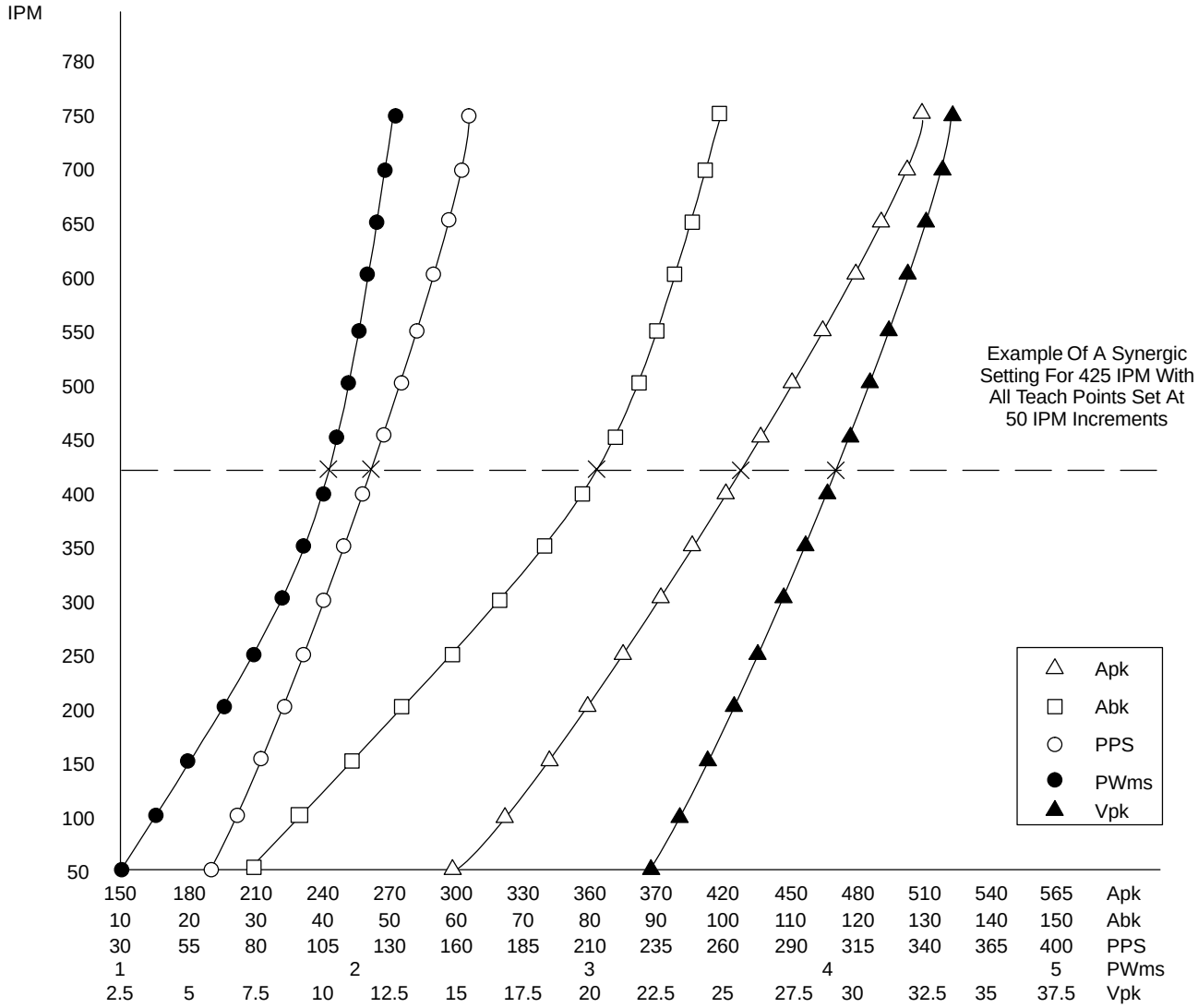
PWms is the time spent at peak current (1.2 ms is .0012 seconds). This time must be long enough to form a droplet of welding wire. The stiffness or fluidity of the molten weld puddle is controlled by PWms.

Vpk = Peak Voltage

Arc Voltage during peak current phase of the pulse waveform. This determines arc length during adaptive pulse welding.

Ref. S-0259

10-2. Teach Points Explained



The teach mode allows the user to create custom pulse MIG welding programs. The teach mode has 15 teach points. At each teach point, the user can adjust five parameters: peak amperage (Apk), background amperage (Abk), pulses per second (PPS), pulse width in milliseconds (PWms), and peak voltage (Vpk) to shape the pulse waveform of the weld output.

Wire feed speed teach points can range from the minimum to the maximum wire feed speed of the feeder. When using a standard speed motor, wire feed speed teach points typically range from 50 to 750 ipm. The feeder uses pulse parameters at teach points to establish the pulse parameters at any wire feed speed setting.

Below the wire feed speed of the lowest teach point, and above the wire feed speed of the highest teach point, the unit may limit wire feed speed settings in pulse MIG to maintain all pulse parameters within the capability of the unit.

Pulse MIG programs made by the manufacturer have pulse waveform information entered for all 15 teach points. The operator can relocate and modify the setting of one, or any number of the 15 teach points if the factory set information is not appropriate for a specific application.

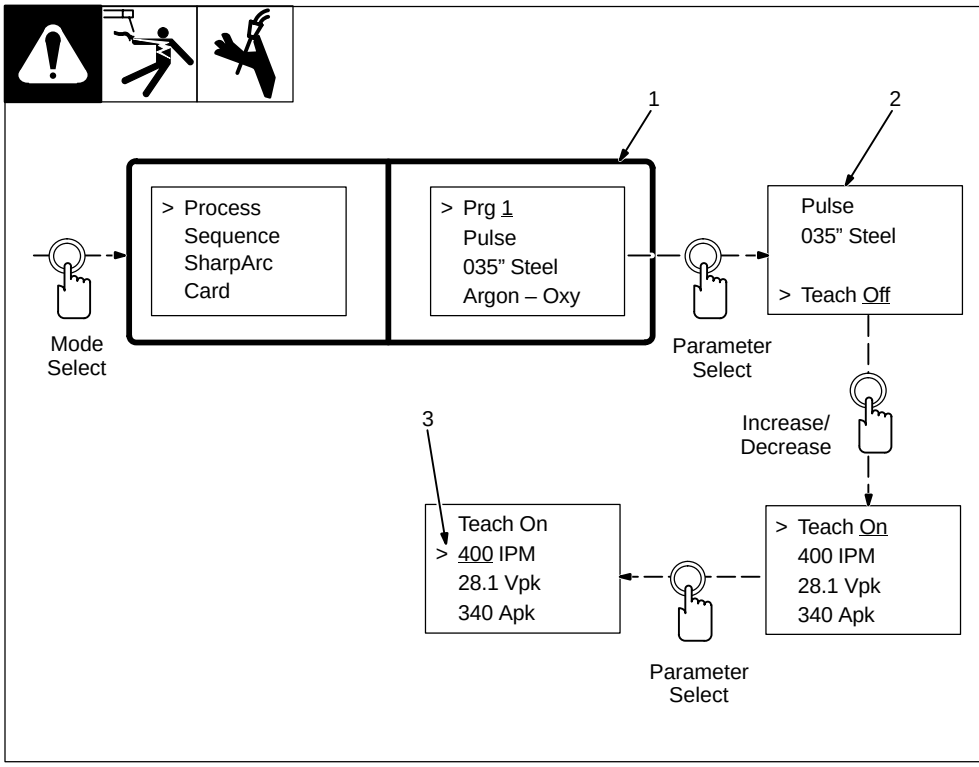
After the parameters for each teach point are established, an arc must be struck and maintained for at least 5 seconds in teach mode. This allows the wire feeder to learn the arc voltage length associated with the taught pulse parameters. To ensure a proper arc length reading, electrode stick-out must be carefully maintained. An alternate method is to adjust the Vpk value, then turn off Teach Mode and weld. If welding is performed with Teach Mode on, Vpk will be updated for other parameter settings.

The taught arc length represents a Trim (arc length) setting of 50. Increasing the value of Trim, increases the actual arc length. Likewise, decreasing the value of Trim will decrease actual arc length.

In the Pulse mode, the unit does not maintain a constant arc length with variations in electrode stick-out. In the Adaptive Pulse mode, the unit adjusts pulse frequency to maintain a constant arc length regardless of variations in electrode stick-out.

Proceed to next section to teach a pulse MIG program.

10-3. Selecting Teach Point Wire Feed Speed For Pulse Welding Program



1 Process Display

When unit is first turned On, Process is the default screen, at other times use mode select button to select Process.

2 Teach Display

Use parameter select button to select Teach.

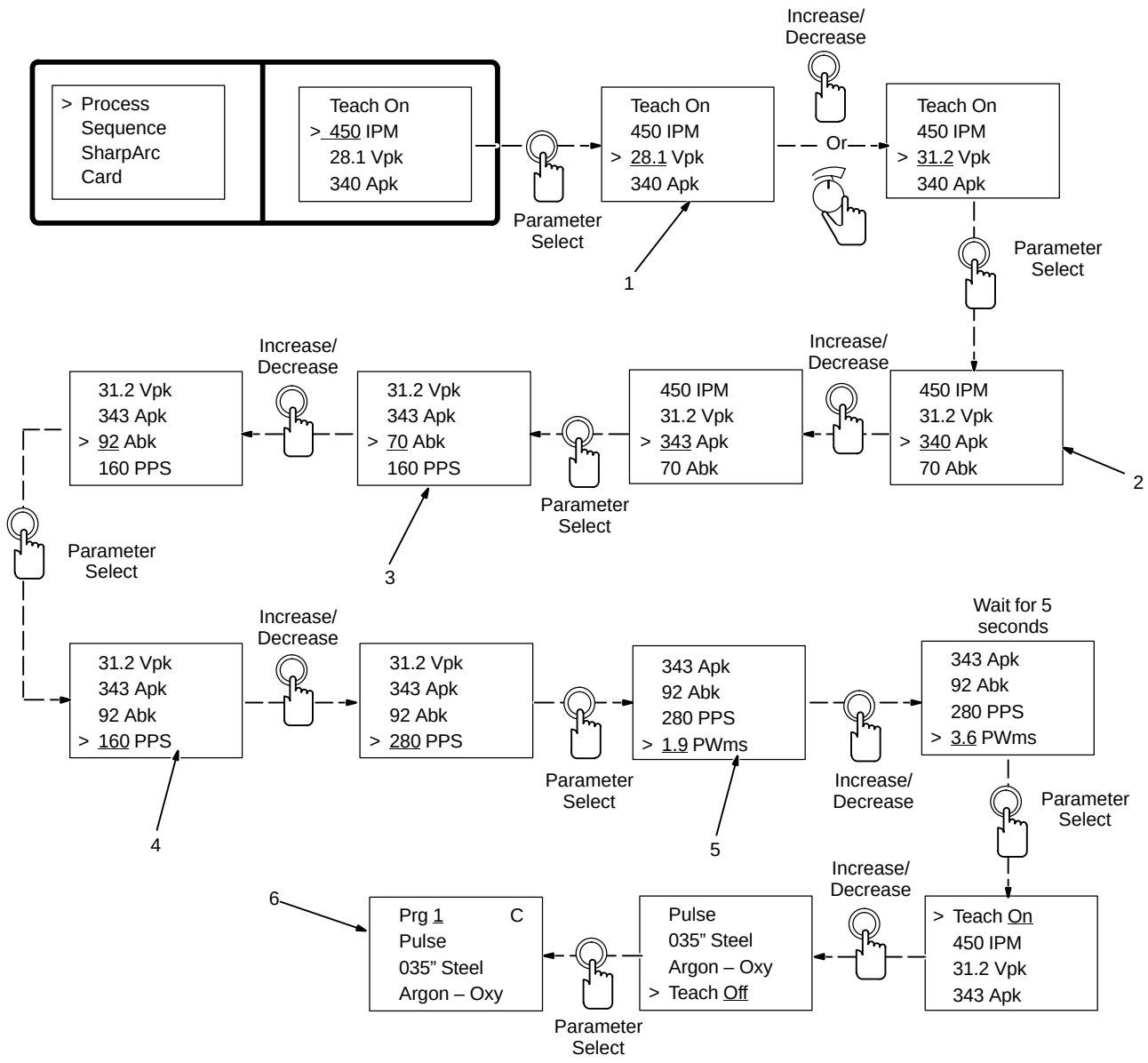
Use increase/decrease buttons to select On.

3 IPM (Teach Point)

The parameters associated with this wire feed speed teach point can be modified. The wire feed speed value itself cannot be changed from the set point.

To set or adjust teach point parameters, go to Section 10-4.

10-4. Setting Teach Point Parameters For Pulse Welding Program



When the Process Teach mode is On, and one of the following pulse parameters is selected: Apk, Abk, PPS, PWms, or Vpk, the pulse panel displays the selected pulse parameter instead of Trim (arc length). When the pulse parameter is selected, the value can be changed with the pulse panel controls as follows:

1 Vpk Display

2 Apk Display

3 Abk Display

4 PPS Display

5 PWms Display

When values have been set for a teach point, strike and maintain an arc for five seconds. Repeat procedure at each teach point until custom program is complete (see Section 10-2).

Turn Teach mode Off.

6 Custom Pulse Screen

The letter C will appear in the upper right corner of all customized programs.

Customized programs can be reverted back to factory-set values through memory reset (see Section 14-12).

NOTE ☞	*Make copies of this chart for future use.*

Program #_____ **Wire Size/Type**_____ **Gas**_____

Program Name_____ **Card #**_____

Gun Model_____ **Flowrate**_____**CFH**

IPM	Apk	Abk	PPS	PWms	Vpk	COMMENTS

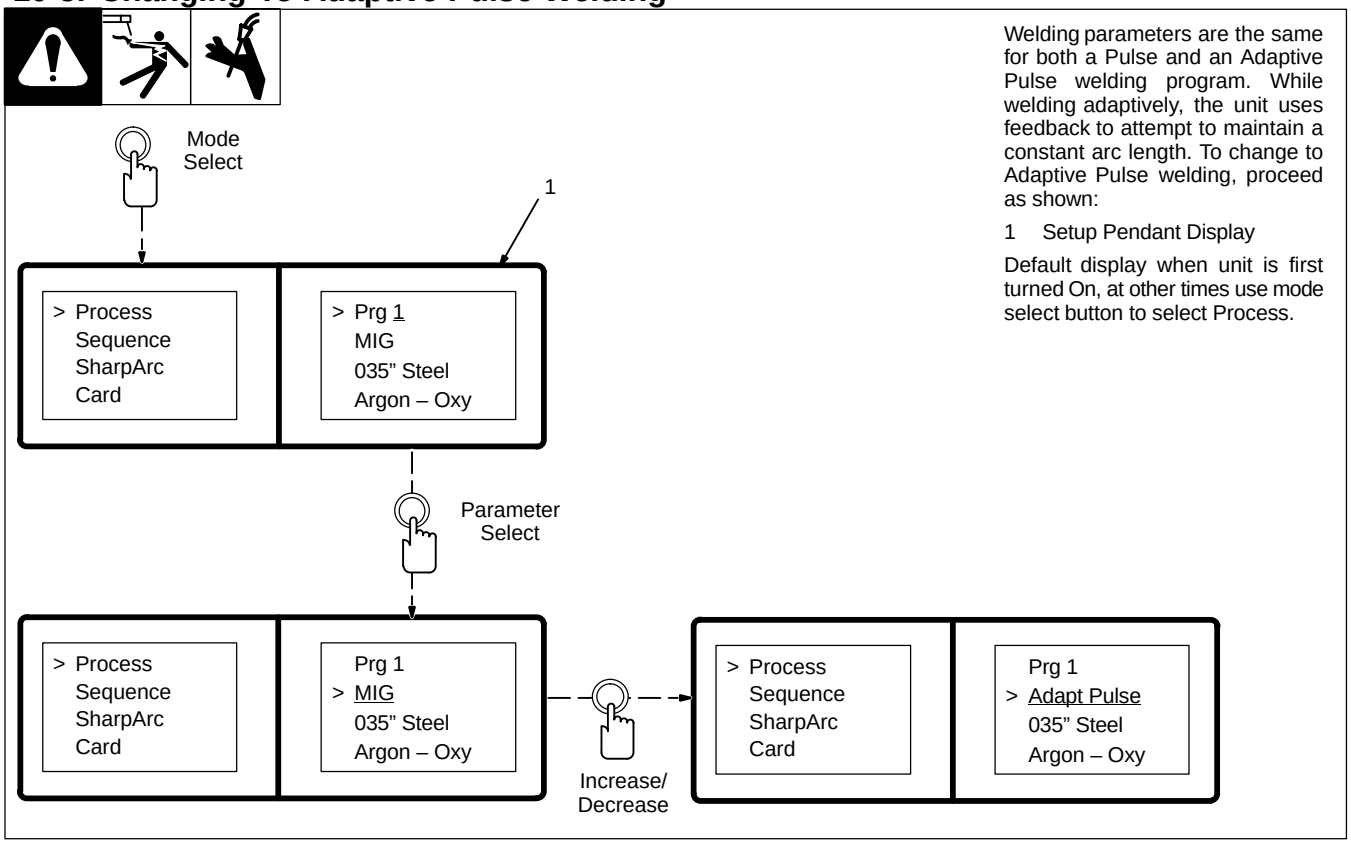
Preflow:_____ **Sec.**

Run-In Trim:_____ **IPM:**_____ **Sec.:**_____

Crater Trim:_____ **IPM:**_____ **Sec.:**_____

Postflow:_____ **Sec.**

10-5. Changing To Adaptive Pulse Welding



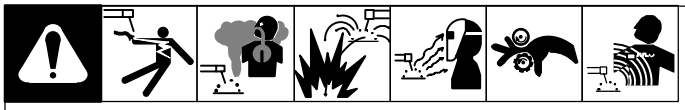
Welding parameters are the same for both a Pulse and an Adaptive Pulse welding program. While welding adaptively, the unit uses feedback to attempt to maintain a constant arc length. To change to Adaptive Pulse welding, proceed as shown:

1 Setup Pendant Display

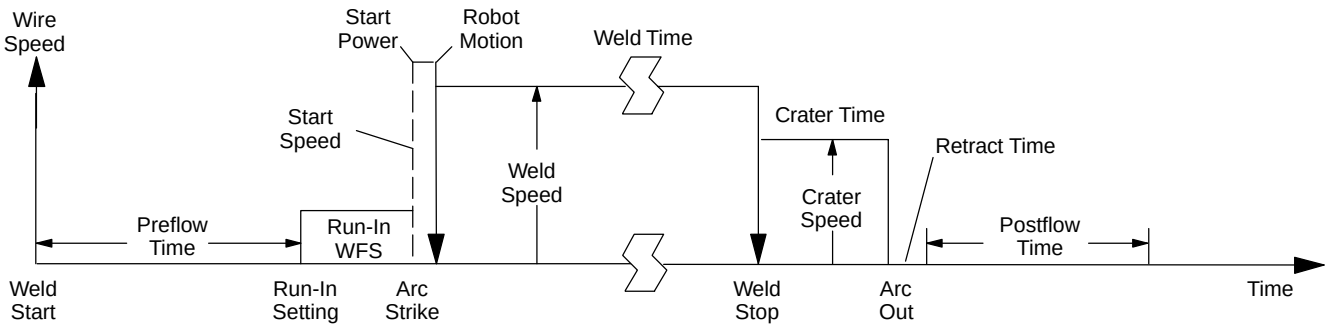
Default display when unit is first turned On, at other times use mode select button to select Process.

SECTION 11 – TEACHING A MIG WELDING PROGRAM

11-1. Weld Cycle For Mig Welding

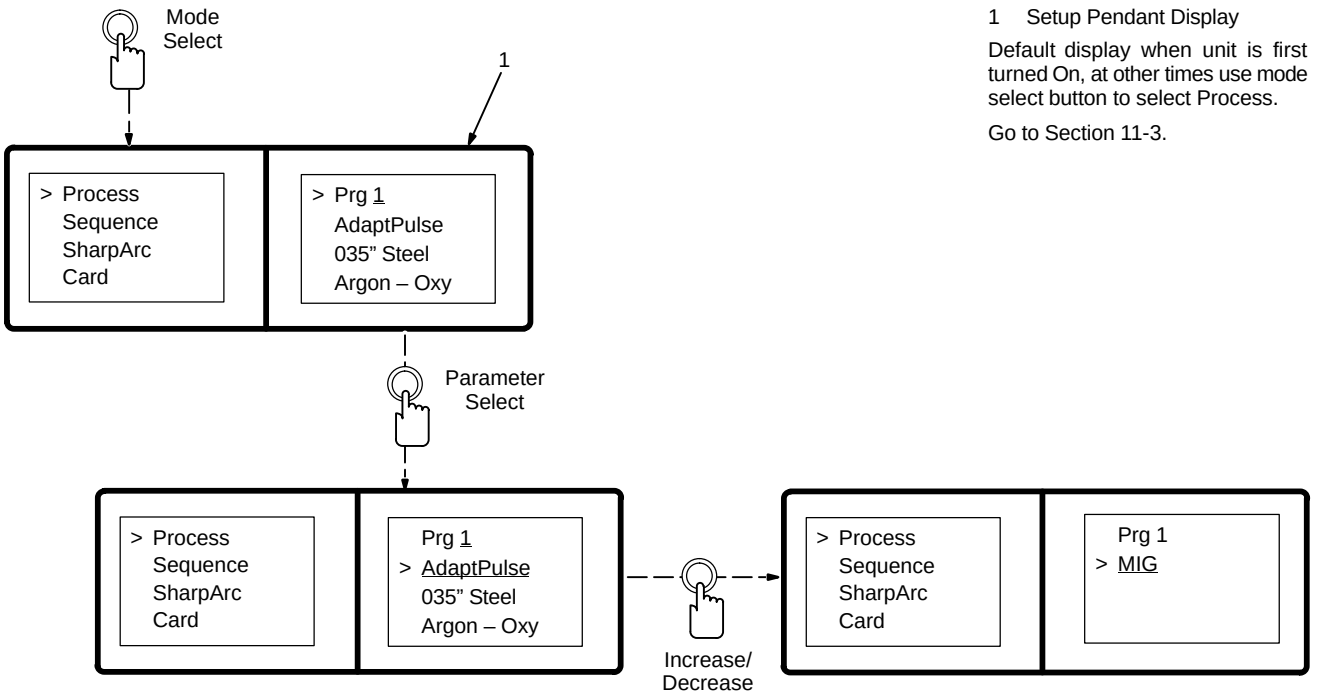


☞ *The type of robot kit installation will determine what combination of parameters are available.*



Ref. S-0271

11-2. Changing To Mig Welding

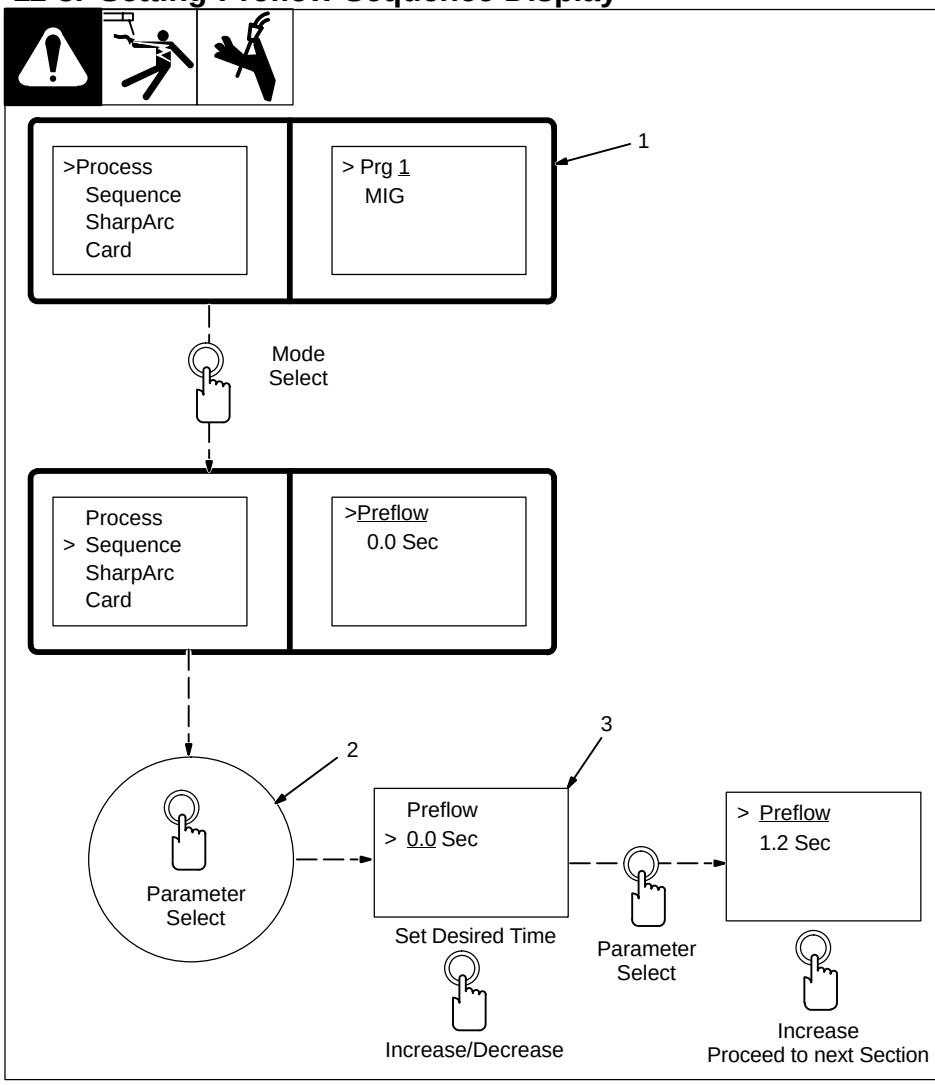


1 Setup Pendant Display

Default display when unit is first turned On, at other times use mode select button to select Process.

Go to Section 11-3.

11-3. Setting Preflow Sequence Display



1 Setup Pendant Display

When unit is turned On, Process is the default mode. Use mode select button to select Sequence.

2 Parameter Select Button

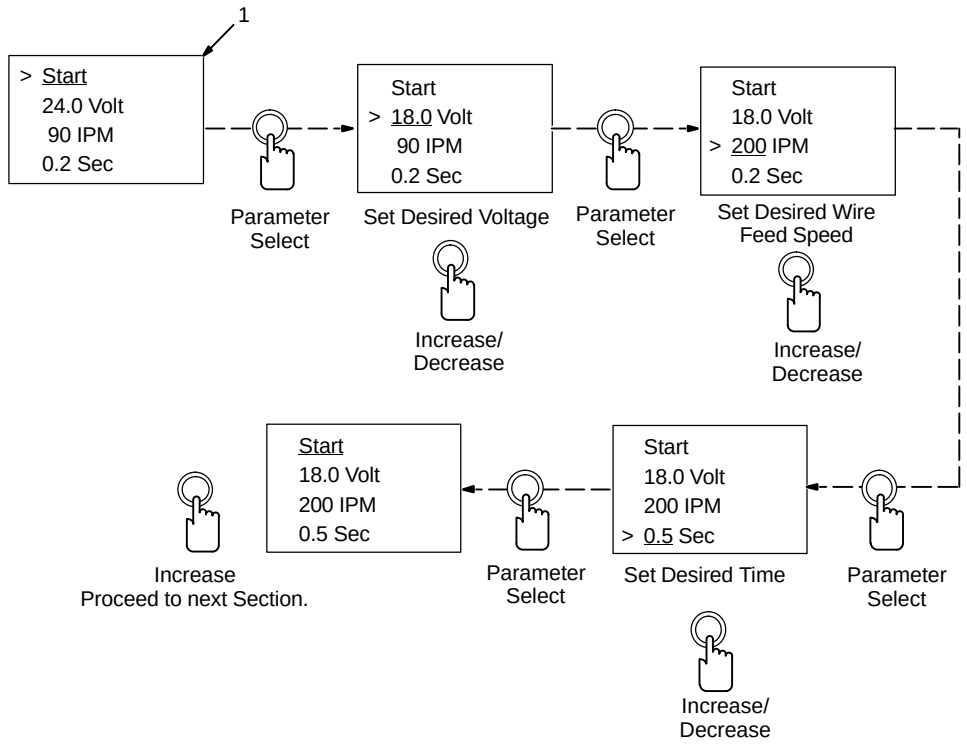
Use parameter select button to select parameters.

3 Preflow Parameters Display

Preflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Preflow sequence.

Go to Section 11-4.

11-4. Setting Start Sequence Display



1 Start Parameters Display

Parameter ranges are as follows:

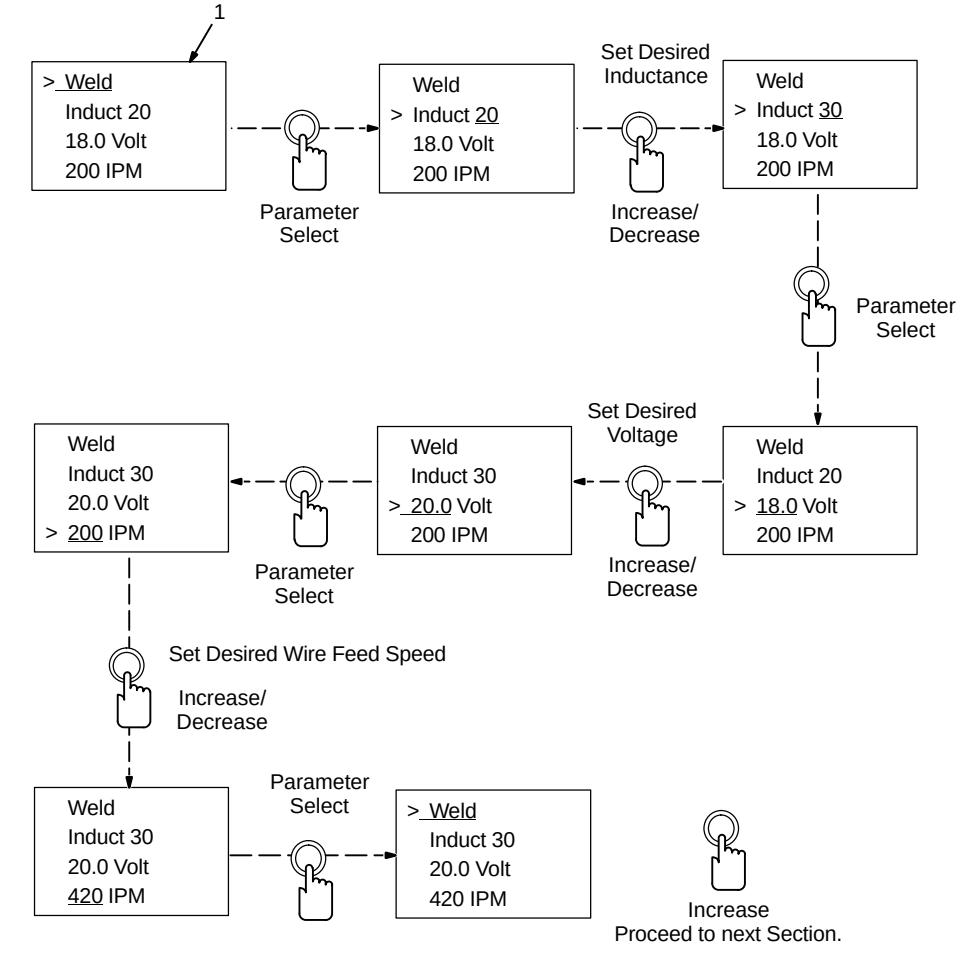
Seconds, 0-2.5 Sec. If value set is zero (0), there is no Run-In sequence. With zero (0) time value, programmed values for volts and wire feed speed are used until a valid arc condition is detected.

Volts, 10.0-38.0 Volts

Wire Feed Speed, 50-780 inches per minute, IPM

Go on to Section 11-5.

11-5. Setting Weld Sequence Display



1 Weld Parameters Display

Parameter ranges are as follows:

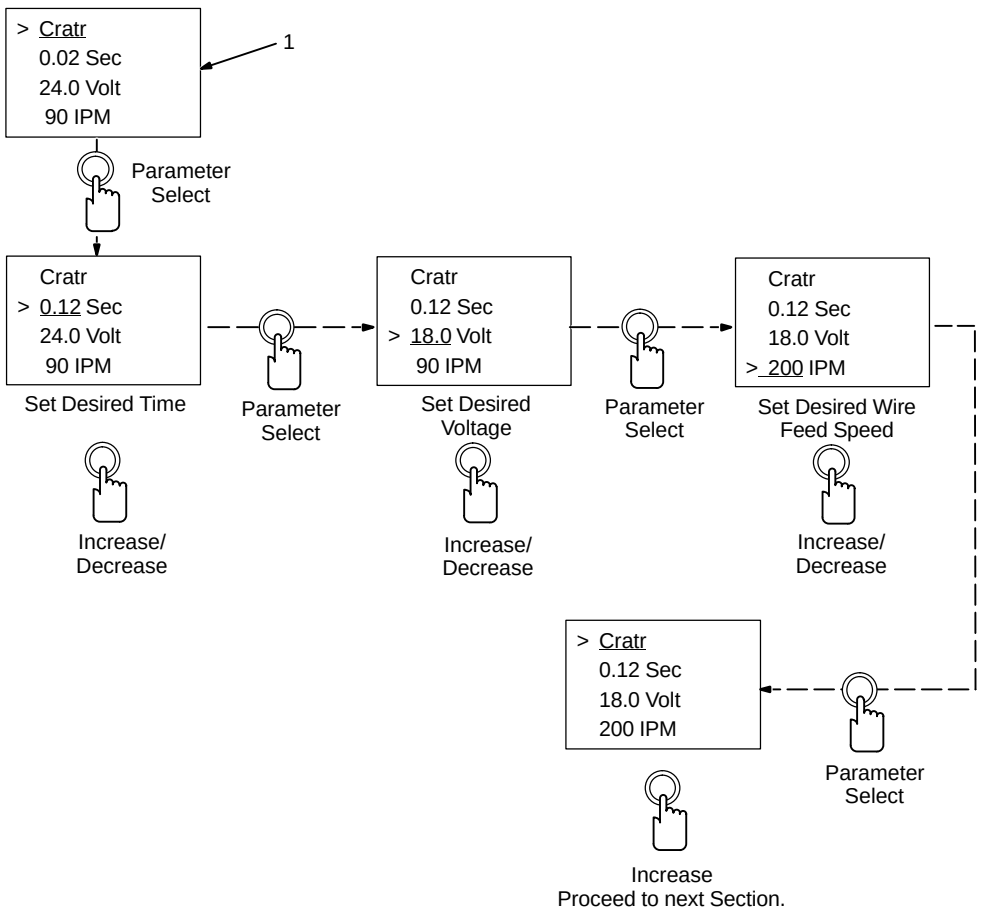
Inductance, 0-99

Volts, 10.0-38.0 Volts

Wire Feed Speed, 50-780 Inches Per Minute, IPM

Go to Section 11-6.

11-6. Setting Crater Sequence Display



1 Crater Parameters Display

Parameter ranges are as follows:

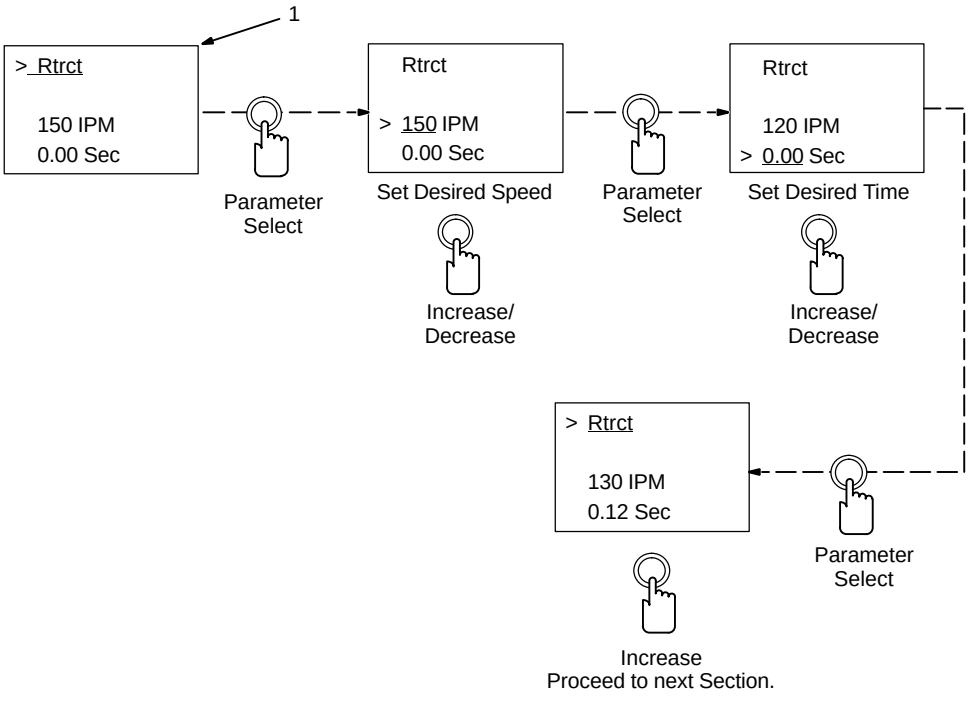
Seconds, 0-2.50 Sec. If value set is zero (0), there is no Crater sequence.

Volts, 10.0-38.0 Volts.

Wire Feed Speed, 50 to 780 inches per minute, IPM.

Go to Section 11-7.

11-7. Setting Retract Sequence Display



1 Retract Parameter Display

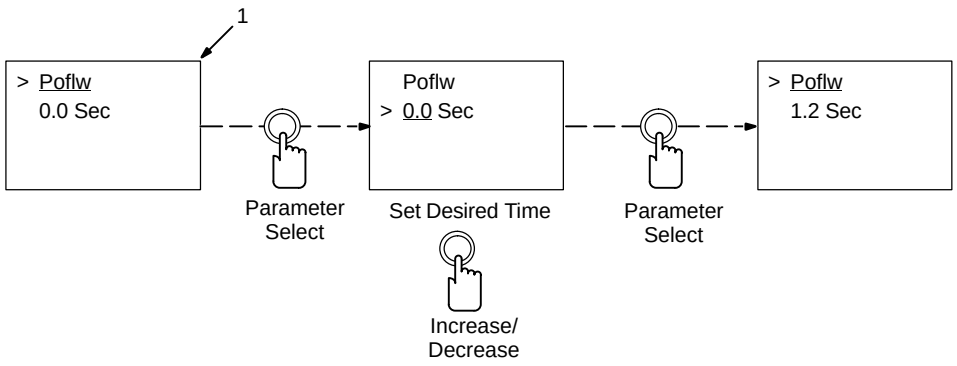
Parameter range is as follows:

Seconds, 0-1.00 seconds. If value set is zero (0), there is no Burnback sequence.

IPM 50-780 (1.3-19.8 mpm). Speed is program dependent.

Go to Section 11-8.

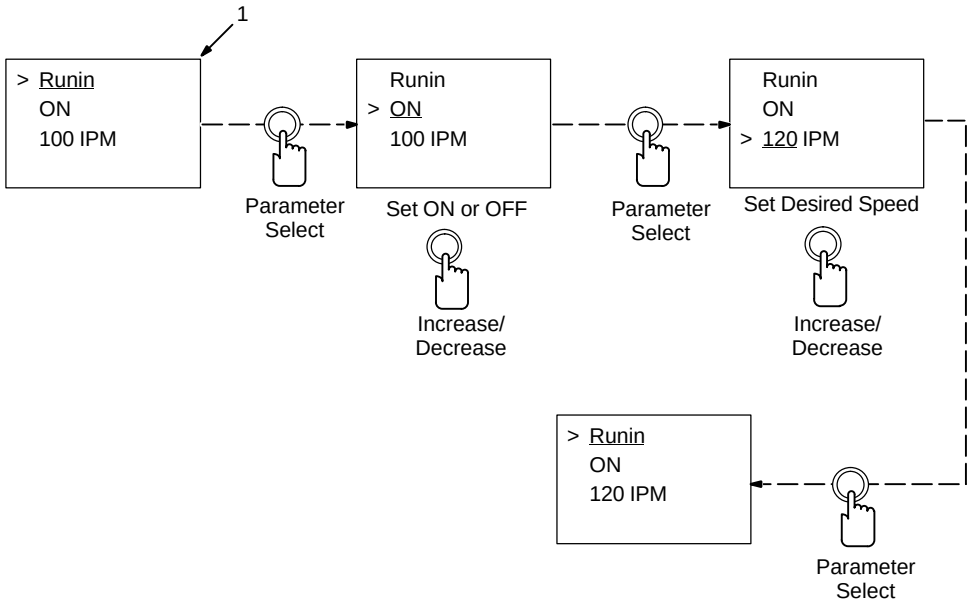
11-8. Setting Postflow Sequence Display



1 Postflow Parameters Display

Postflow can be adjusted from 0-9.9 seconds. If value set is zero (0), there is no Postflow sequence.

11-9. Setting Run-in Sequence Display



☞ *Run-in parameters are not global across multiple programs; instead, run-in wire speed is local at the run-in program level.*

1 Run-in Parameters Display

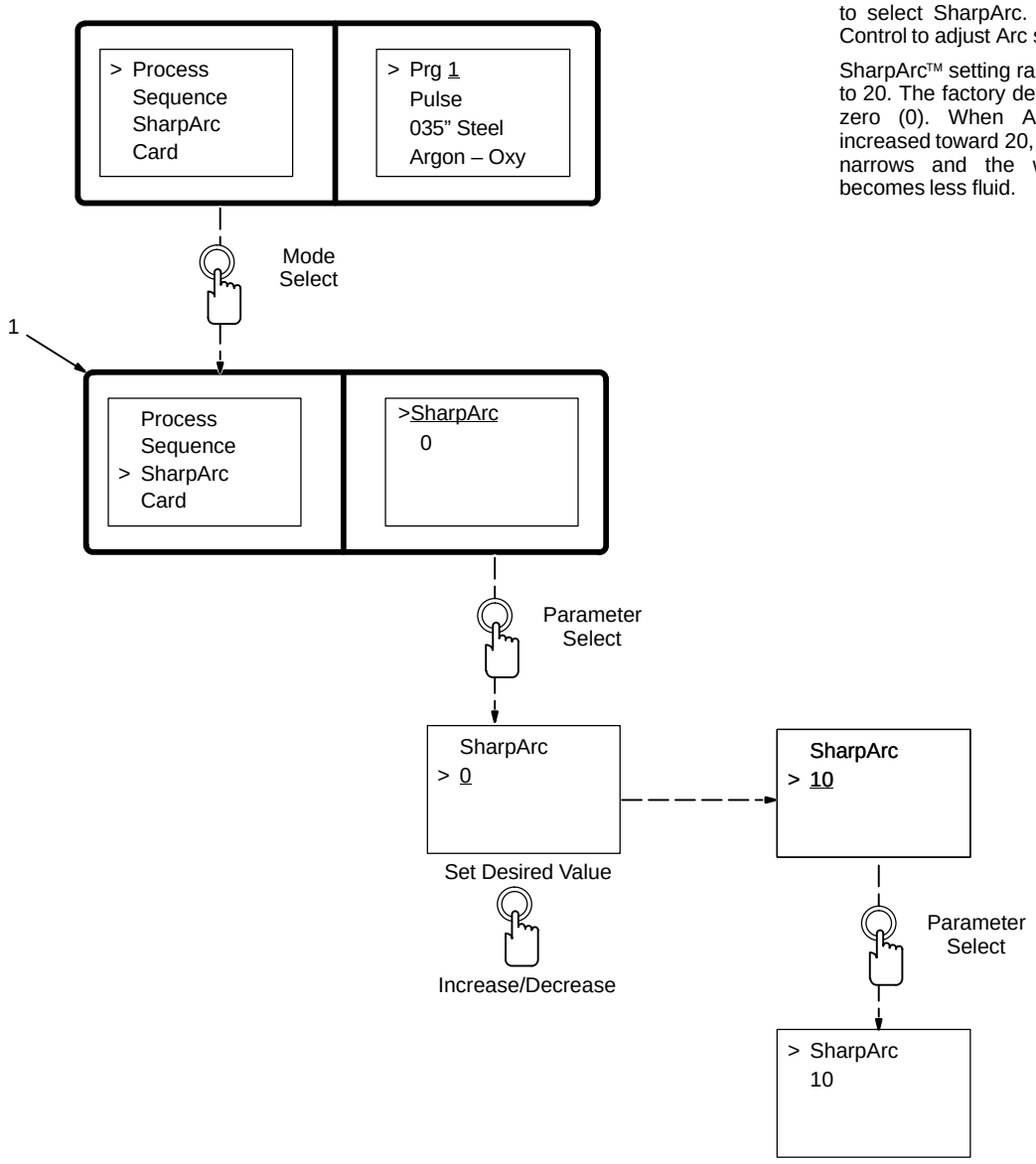
Runin can be turned On or Off. Runin is a function of wire feed speed only. This is the speed at which wire feeds until an arc is established.

IPM 25-780 (0.6-19.8 mpm).

The voltage setting will be the same as Start sequence if time is set in that sequence; otherwise, this sequence will use the welding power source voltage setting.

SECTION 12 – SETTING SharpArc™ CONTROL

12-1. Selecting And Adjusting SharpArc™ Control



1 SharpArc

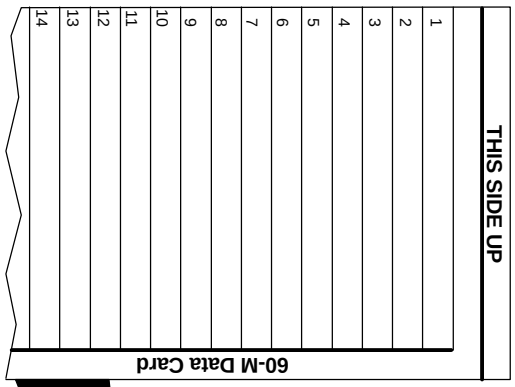
SharpArc™ is used to adjust arc cone width and arc characteristics.

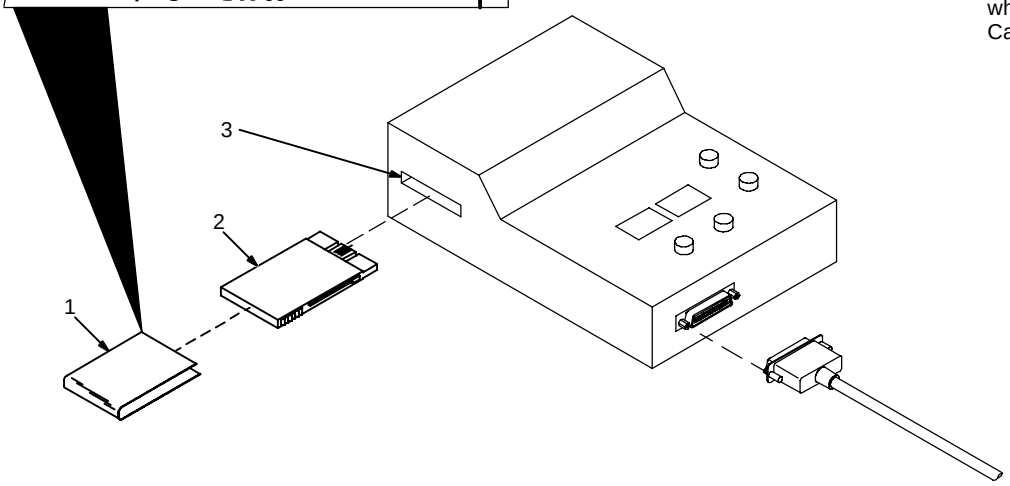
Use mode select button to move > to select SharpArc. Use Display Control to adjust Arc setting.

SharpArc™ setting range is from 0 to 20. The factory default is set at zero (0). When Arc value is increased toward 20, the arc cone narrows and the weld puddle becomes less fluid.

SECTION 13 – USING THE OPTIONAL DATA CARD

13-1. Installing Data Card





1 Label

Peel backing from label and apply to data card with THIS SIDE UP by metal pins.

Write the names of the programs stored on the card on the label. Write the name of the piece of equipment the card is used with on the label.

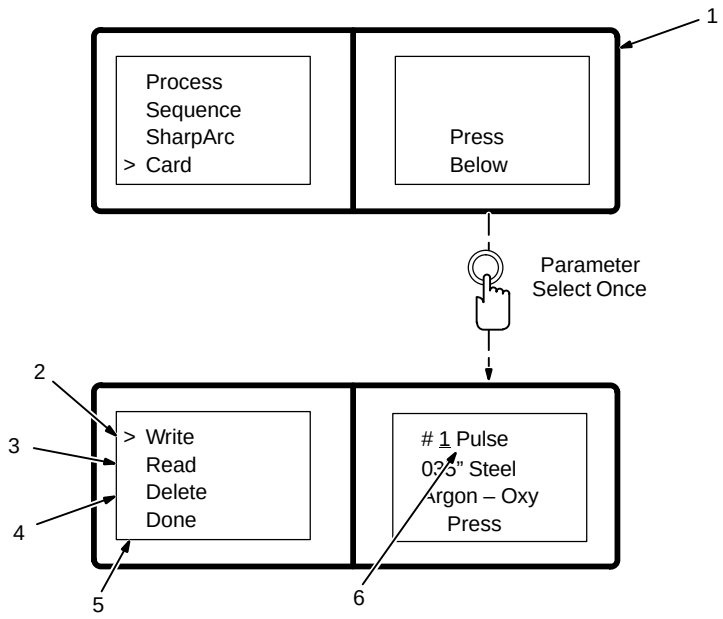
2 Data Card

3 Card Slot

Insert card into slot. To format card, turn On power to the unit. Select Card from menu. Data card formats when unit enters Card mode. Exit Card mode and turn Off power.

Ref. 802 816 / Ref. 155 823

13-2. Using The Data Card



Use Mode Select button to select Card.

1 Card Display

2 Write

Used to transfer program data from unit to card. The program card can hold up to 32 programs. When writing to the card, the next available program number is automatically assigned.

3 Read

Used to transfer program data from card to unit.

4 Delete

Used to delete program data from card.

5 Done

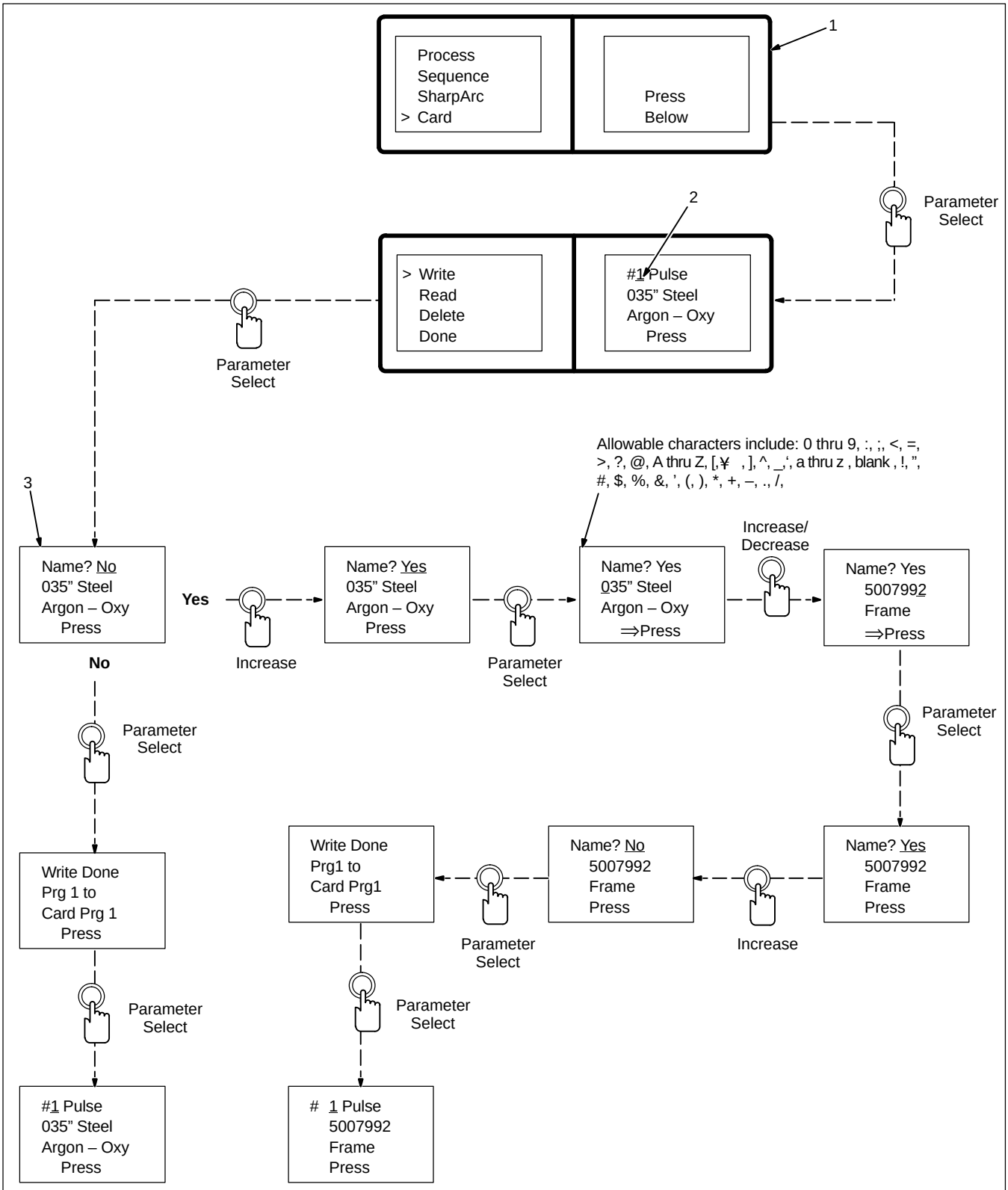
Used to exit card display.

6 Moving Line

Moving line is under value that can be changed.

13-3. Naming Programs And Writing To Card

NOTE ☞ *All program types (Pulse, Adaptive Pulse, and MIG) can be stored on a data card and retrieved. Setup and Control menus do not save to the card.*



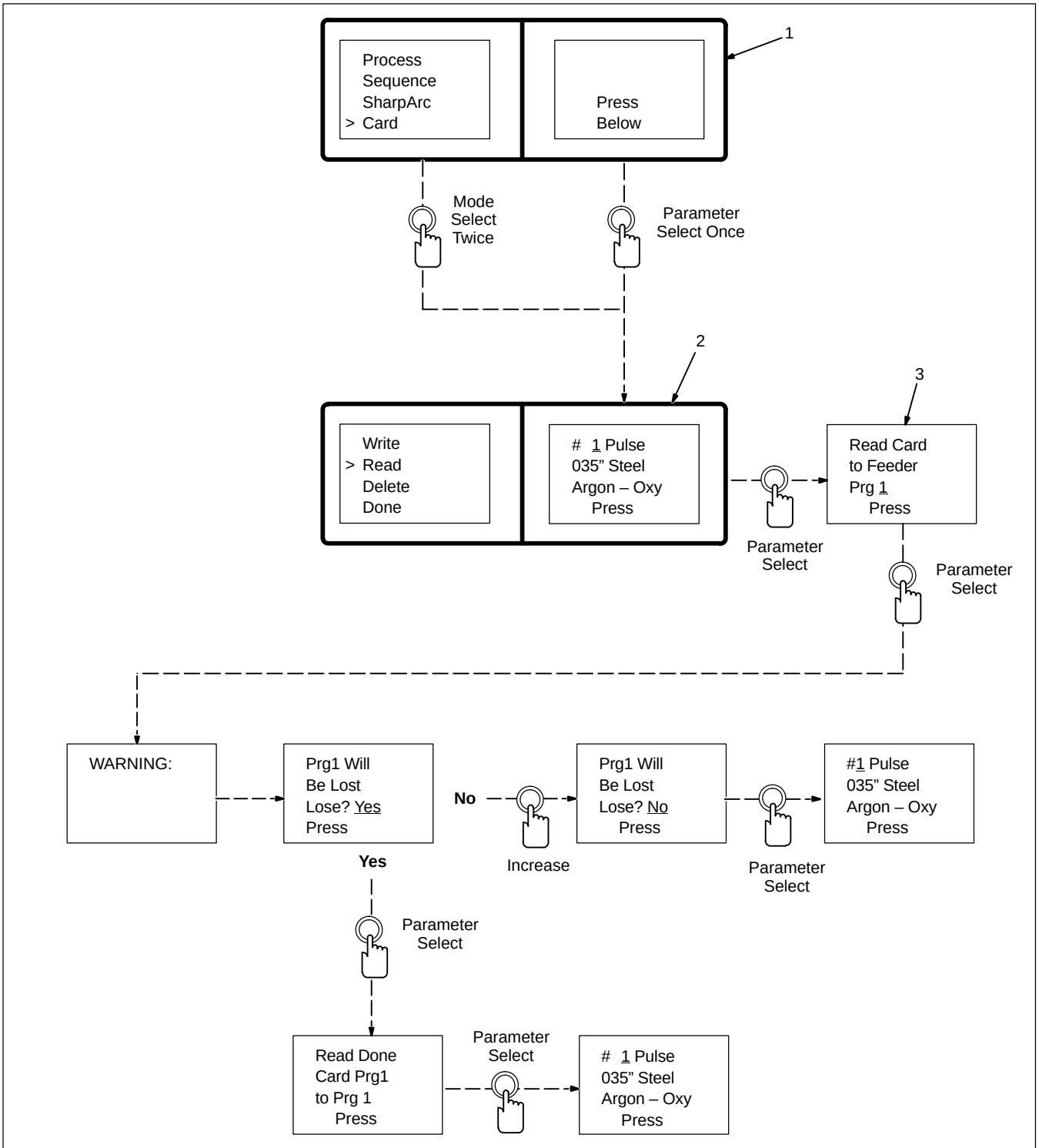
1 Card Display
Use Mode Select button to select Card.

2 Moving Line
Moving line is under value that can be changed. Use increase or decrease button to change value.

3 Name Display
If no name is desired, press Parameter Select button to continue the write procedure.

13-4. Reading From Card

NOTE ☞ *Programs developed on the Auto Invision will not run the same on Auto Invision II.*



Use Mode Select button to select Card.

1 Card Display

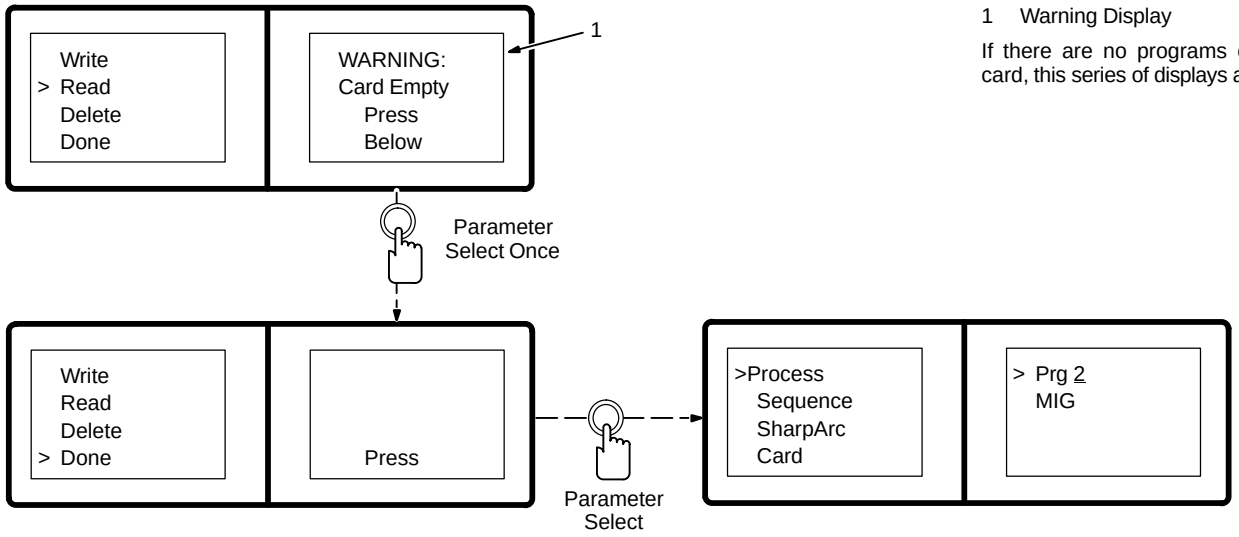
2 Moving Line

Moving line is under value that can be changed. Use increase or decrease button to select program number to read from card to feeder.

3 Read Display

Use increase or decrease button to select feeder program number where the card program goes.

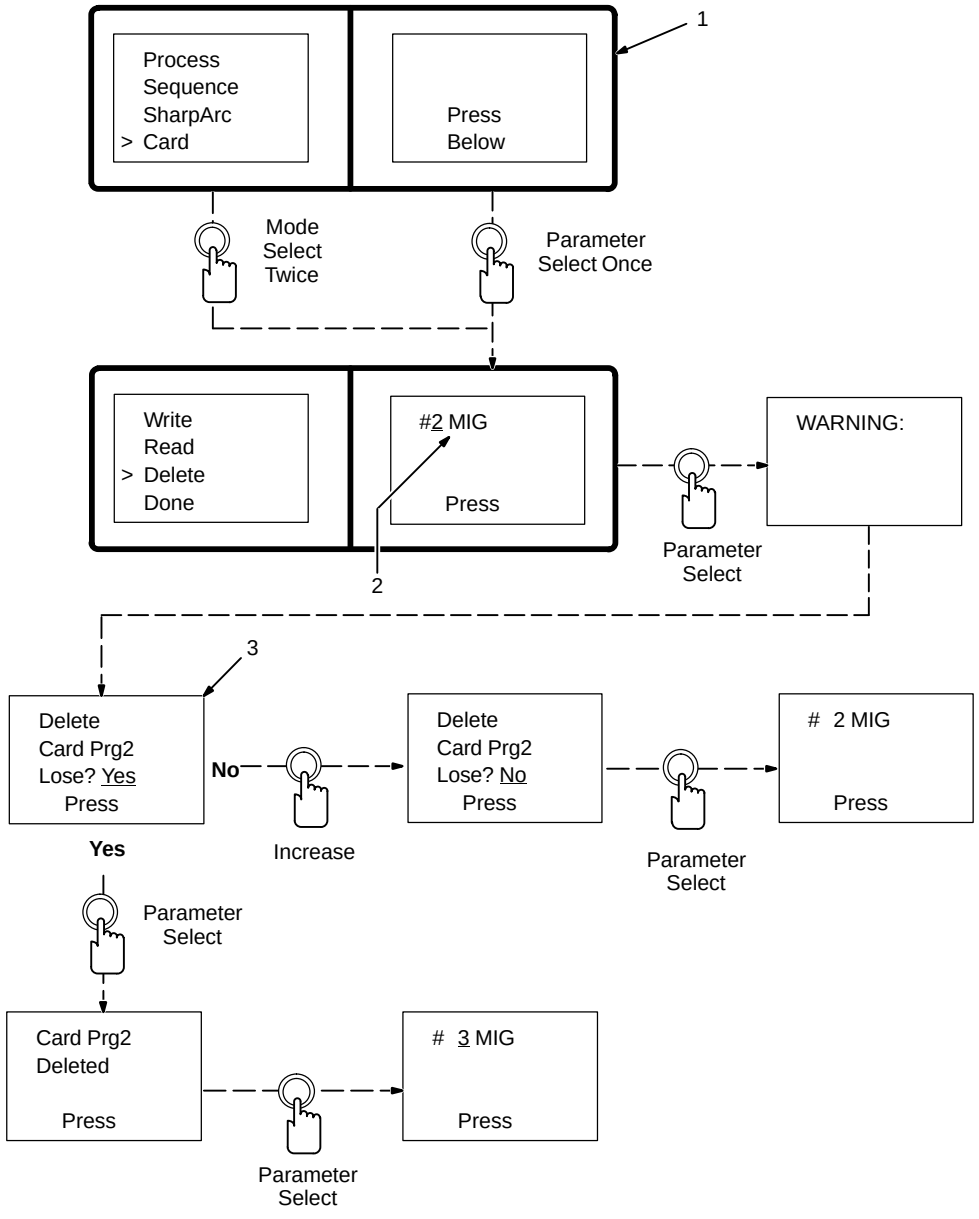
13-5. Reading (Or Deleting) From An Empty Card



1 Warning Display

If there are no programs on the card, this series of displays appear.

13-6. Deleting Programs From Card



Use Mode Select button to select Card.

1 Card Display

2 Moving Line

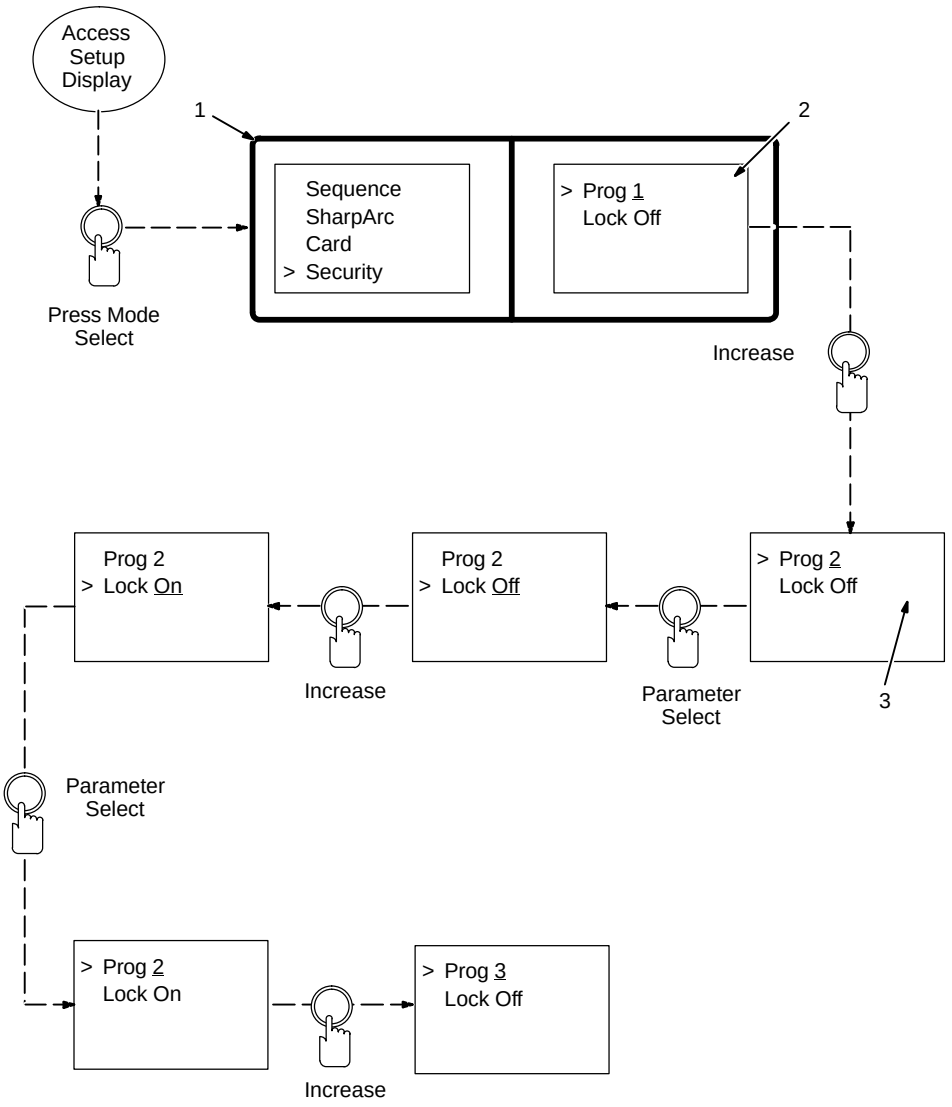
Moving line is under value that can be changed.

3 Delete Display

Select program number to be deleted from card.

13-7. Selecting Security Lock

NOTE ☞ *Security lock works only when a data card is inserted.*



1 Security Display

Use this display to lock a program's weld parameters so that changes can not be made using pulse panel controls.

2 Program Number

Choose the program number (1 through 8) to be locked.

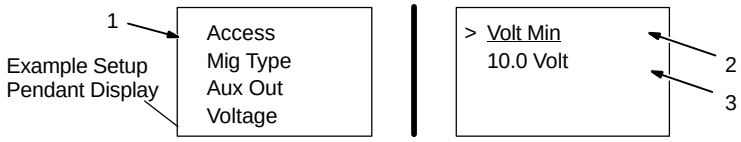
3 Program Lock Display

When lock is off a program, the operator can change all weld parameters of that program without restriction.

With lock on a program, the operator cannot change parameters of that program.

SECTION 14 – SETUP

14-1. Setup Flow Chart



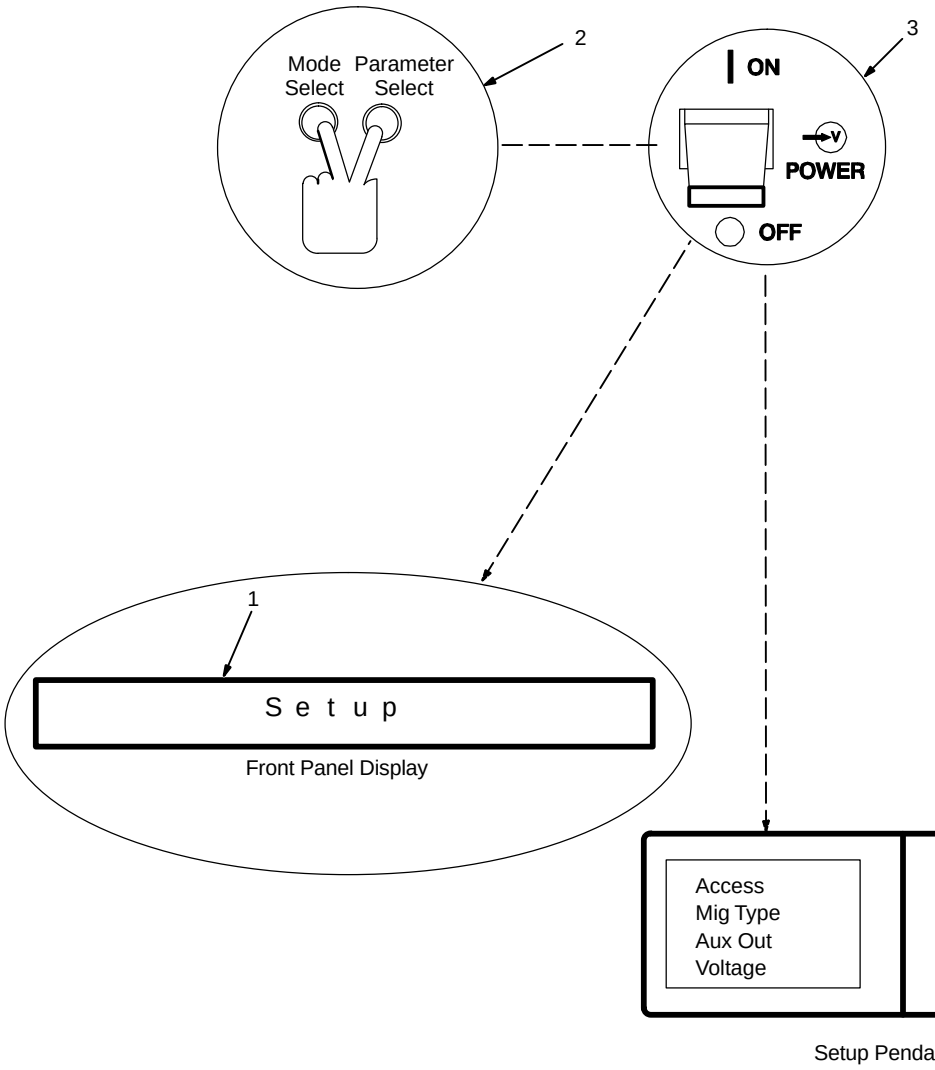
1 Display Selections
2 Features
3 Settings

To set up features that customize operation, use the setup displays. Features that can be customized are as follows:

Display Selection	Features	Settings	Default	Section
>Access	Code	Off/On	Off	14-3
	Press Mode Select To Go To Next Setup Display			
>Mig Type	Voltage Correction	DVC On/Off	Off	14-4
>Aux Output	Auxiliary Output	Output On w/Feeder w/Arc w/Weld Cycle Never	Never	14-5
>Voltage	Control Feedback	Internal Volt Sense	Internal	14-6
>Arc Start	Arc Start Type	Standard Hot Start Soft Start	Standard	14-7
>Arc Time	Run Hours	0–9999.99 Hours 0–999,999 Cycles		14-8
	No Reset		No Reset	
	Reset			
>Wire Feed	Display	IPM/MPM	IPM	14-9
	Motor Type	Standard	Standard Low Speed High Speed	
>Wiretype	Wire Type	Hardwire/ Softwire	Hardwire	14-10
>Display		Actual Amps Command	Command	14-11

Display Selection	Features	Settings	Default	Section
>Memory	No Reset		No Reset	14-12
	Program Reset			
	System Reset			
	Total Reset			
>Shutdown	Arc Start/ Volt Sense	Off/On	On	14-13
>Name	Card Programs	Off/On	On	14-14
>Program	Remote Select	Off/On	Off	14-15
>Jog IPM	Robot Jog Local Jog	Remote/Local	Local	
	IPM	50 - 780	200	14-17
>Flow	Detect Flow	Off/On	Off	14-18
>Monitor	Arc Volts	Off/On	Off	14-19
	Range	0.1 - 9.9	2.0 Volts	
	Sec	0.1 - 25	1.0 Sec.	
>Stick	Stick Check	Off/On	Off	14-20
>Ramps	Program	Number	1	14-21
	Start	Off/On	Off	
	Crater	Off/On	Off	
>Software Number	Version			14-22
>Exit	Exit Setup Menu Now	Press		14-23

14-2. Using Setup Displays



1 Front Panel Setup Display

Front panel display during setup.

2 Pulse Panel Mode And Parameter Select Buttons

3 Power Switch On Rear Panel

Press and hold down both buttons while turning On unit.

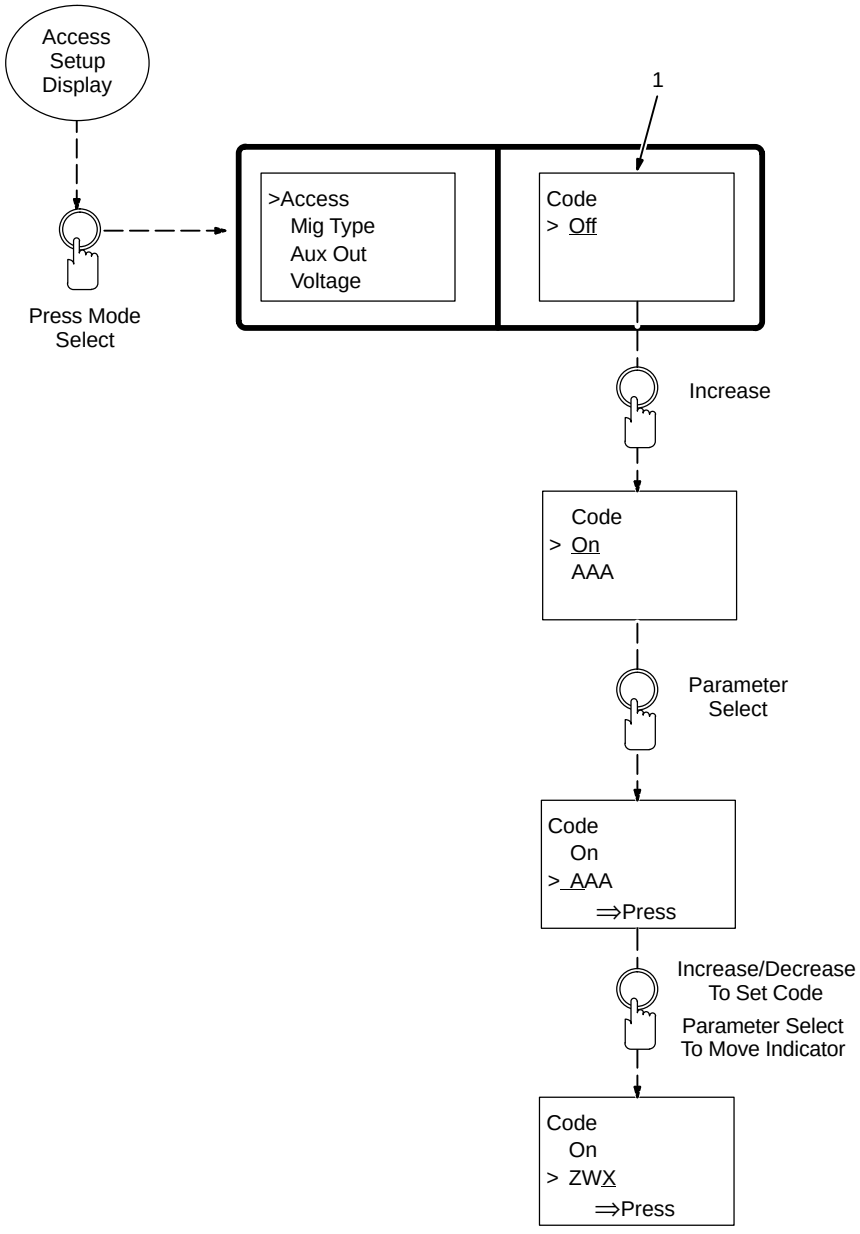
4 Setup Pendant Display

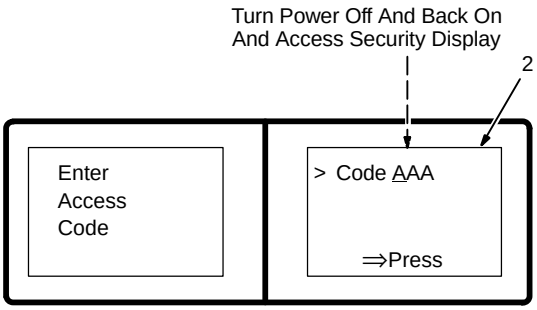
Follow this procedure any time access is required. Once in the set-up displays, use the Mode Select button to select a particular display.

To save any or all of the changes made while in the setup displays, and/or to exit the setup displays, turn power to the unit Off and back On.

14-3. Selecting Or Changing Access Code

NOTE ☞ *Access code works only when a data card is inserted (see Section 13).*





1 Code Display

With code off, access to the setup displays is not restricted.

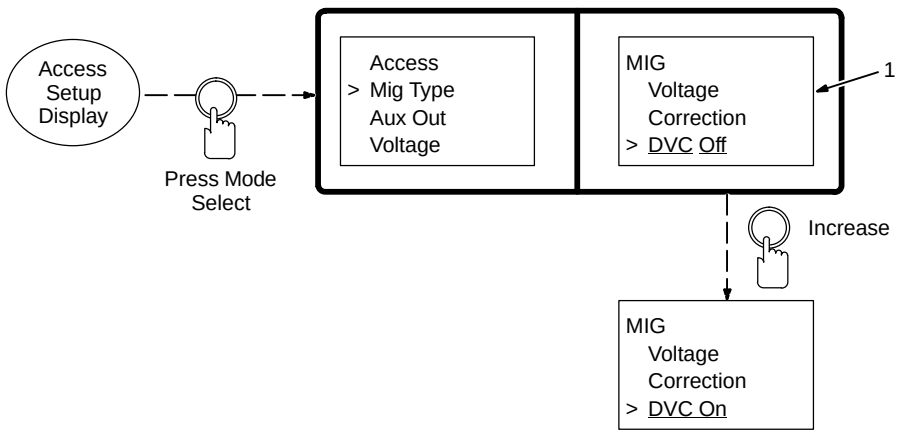
With code on, the operator must know and enter the access code to access or change any of the setup displays.

2 Access Display

With a code set, this display appears when power is turned on while holding the pulse panel Mode and Parameter Select buttons.

Press Parameter Select button to enter access code. When the correct letter is entered, the indicator automatically moves to the next character. When the final access code letter is entered, the display automatically changes to the initial setup display.

14-4. Selecting Voltage Correction



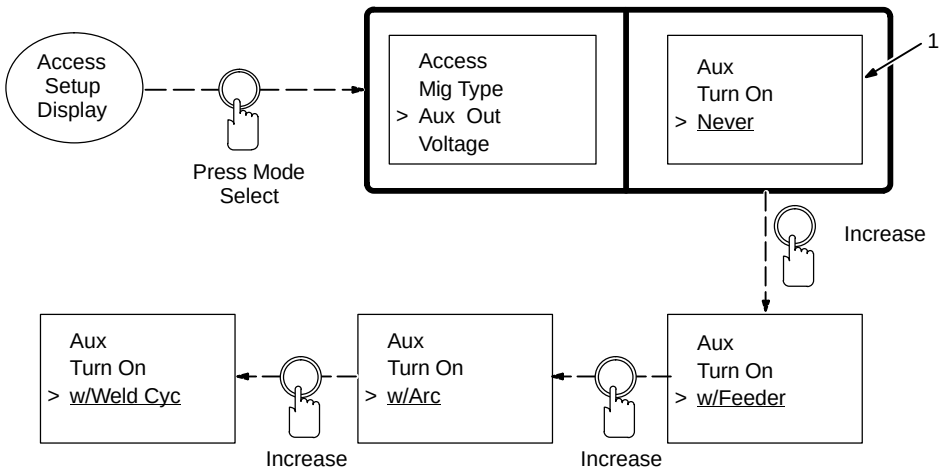
1 Mig Type Display

With DVC Voltage Correction On, the unit uses closed-loop feedback or voltage sensing leads to maintain set voltage parameters.

With DVC Voltage Correction Off, feedback from the arc is not used for closed-loop feedback to maintain voltage parameters. Feedback from the arc is still used for other functions.

Be sure voltage sensing leads are connected.

14-5. Selecting Auxiliary Output



1 Auxiliary Output

This output can be set to several conditions:

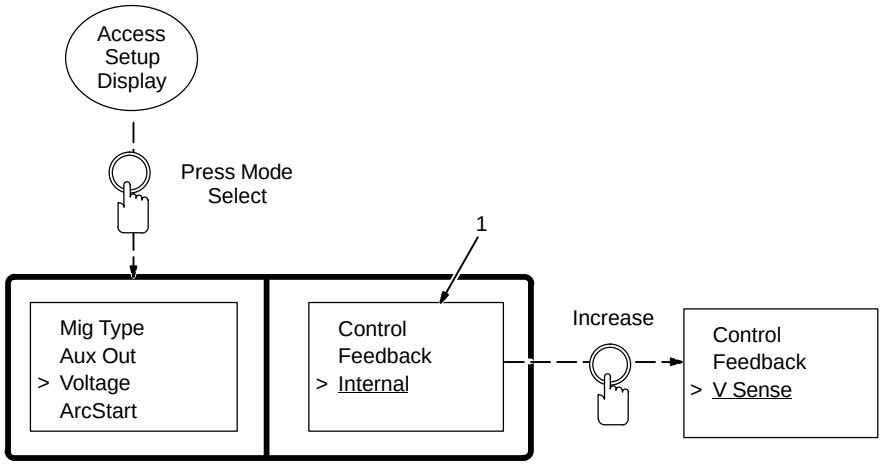
On whenever the wire feeder is operating

On during the welding arc until arc goes out

On during the entire weld cycle

Off or never On.

14-6. Selecting Voltage Sensing Method



1 Voltage Feedback Display

The Internal setting allows the unit to obtain voltage feedback directly from the welding power source output terminals.

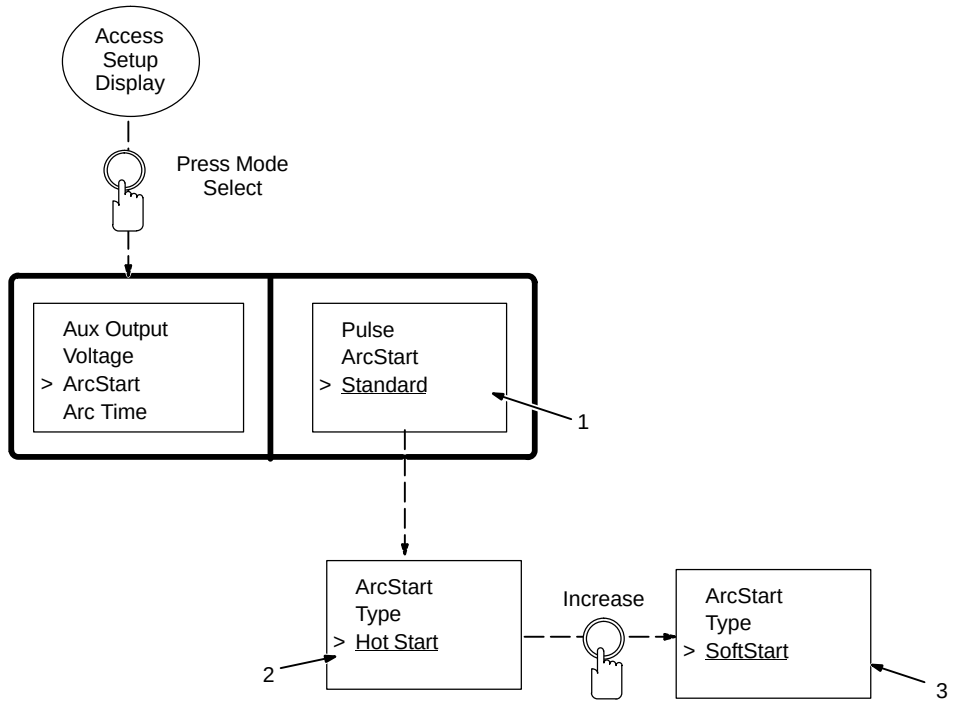
When using the V. Sense setting, arc voltage feedback is through the voltage sense leads connected to the feeder. Use this setting when there is more than 50 ft (15 m) of weld cable used or when using Touch Sensor.

14-7. Selecting Arc Start Method

NOTE ☞

Arc Start selection is not used when welding in non-pulsed MIG.

Do not use the Hot Start setting for .035 in (9 mm) or smaller wire.



1 Standard Start

Welding operation is performed at set values for welding parameters.

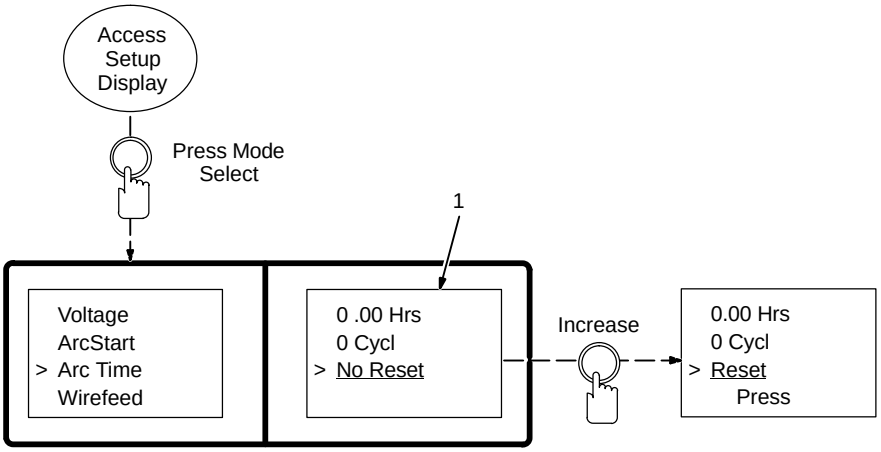
2 Hot Start

Use the Hot Start mode for pulse welding when high initial weld current is necessary to start large diameter welding wires. When in Hot Start, welding power source starts the arc in the CV mode and switches to CC once the arc is started.

3 Soft Start

Use the Soft Start mode for .035 in (9 mm) or smaller wire. Low wire feed speeds may also require the Soft Start mode. Arc start is at 75% of maximum amperage for pulse welding and once an arc is established, welding is performed at set parameter values.

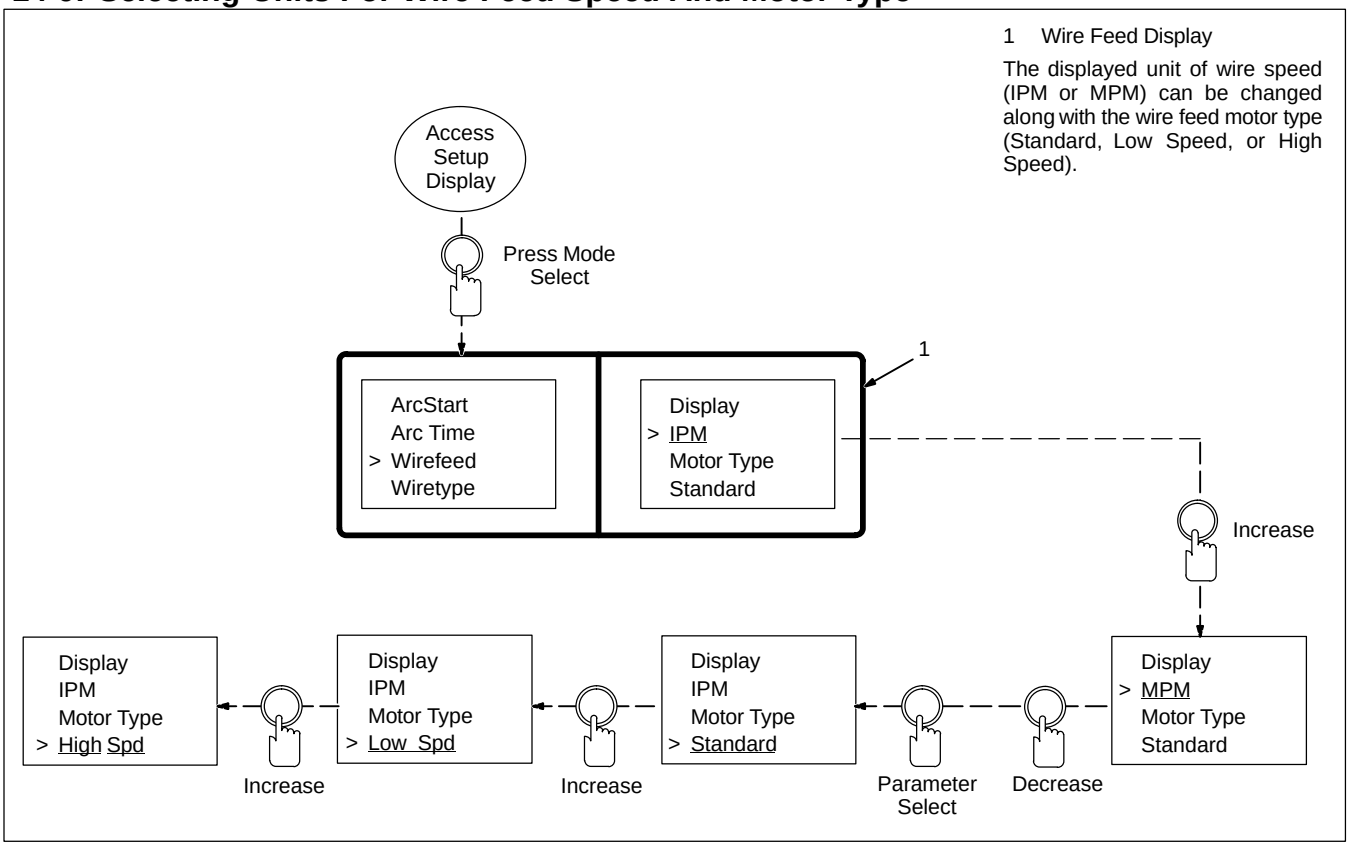
14-8. Resetting Arc Time



1 Arc Time Display

The unit accumulates arc hours up to 9999.99 hours or 999999 weld cycles before rolling over to zero (0). The arc timer can be reset using this display or by performing a total reset (see Section 14-12).

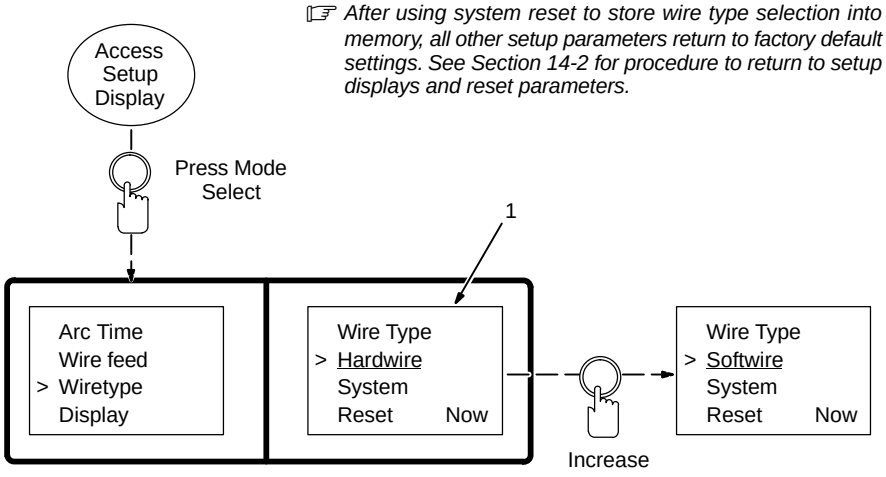
14-9. Selecting Units For Wire Feed Speed And Motor Type



14-10. Selecting Wire Type

NOTE ☞	*If wire type is changed, perform a system reset (see Section 14-12) immediately after selecting wire type to bring up the correct welding programs.*

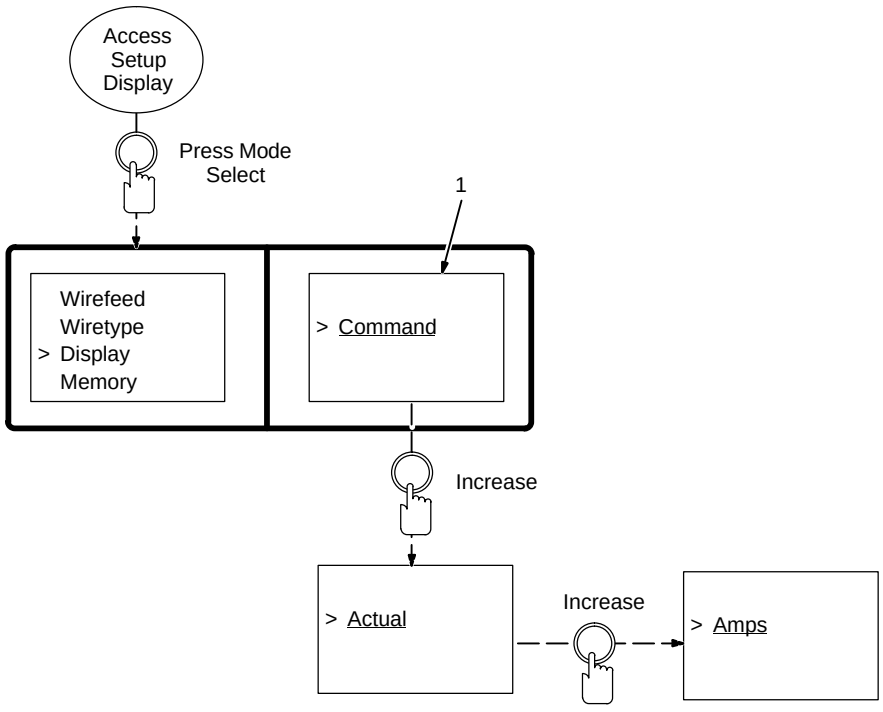
☞ *After using system reset to store wire type selection into memory, all other setup parameters return to factory default settings. See Section 14-2 for procedure to return to setup displays and reset parameters.*



1 Wire Type Display

Select soft wire when using aluminum wire in the wire feeder. Select hard wire when using any other kind of wire.

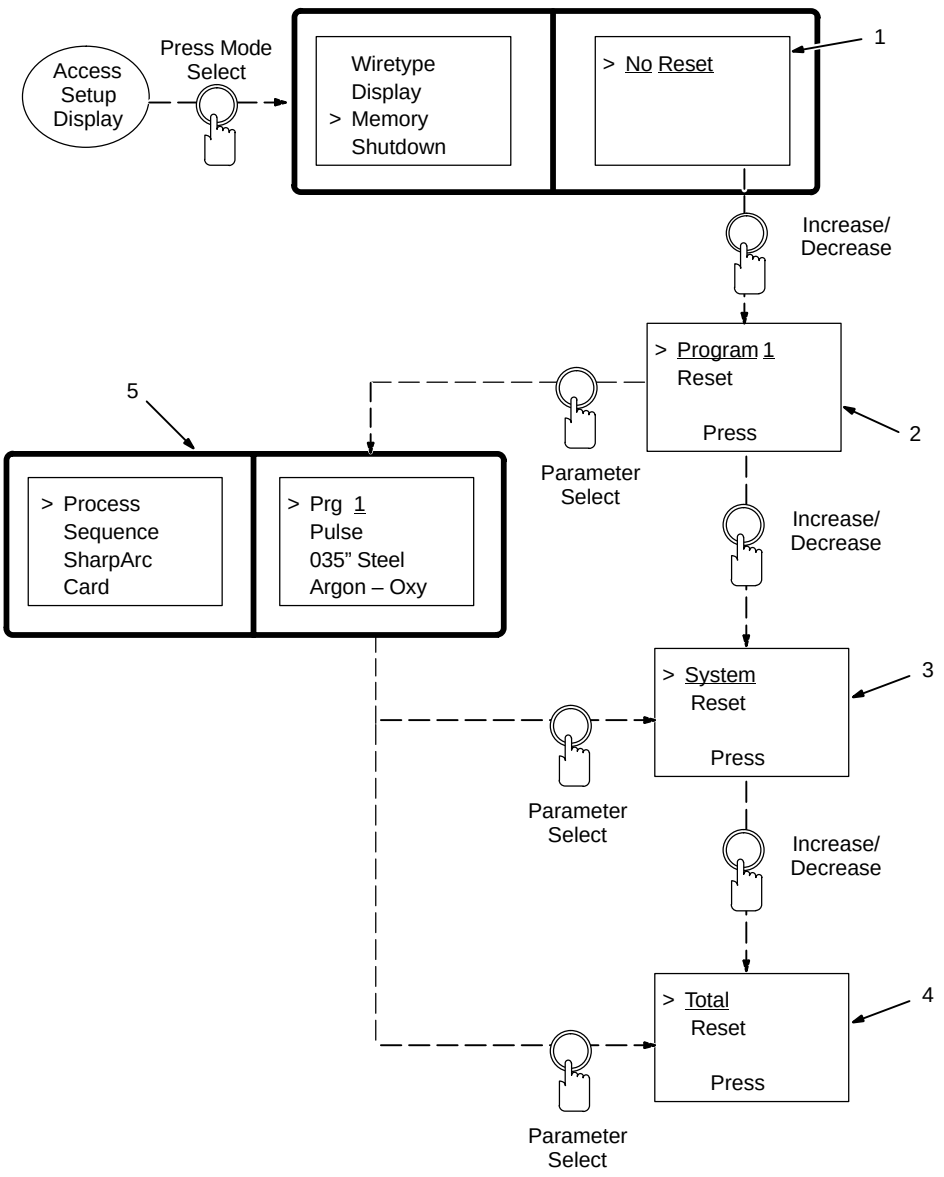
14-11. Defining Display Value



1 Display Select Display

The display can show amps, actual reading or print out command.

14-12. Resetting Memory



1 No Reset

Press Parameter Select button to exit memory reset parameter without resetting any data.

2 Program Reset

Press Parameter Select button to reset last active program to original factory program settings. All other program and setup information remains the same. If setup card is in card slot, program will be loaded from card.

3 System Reset

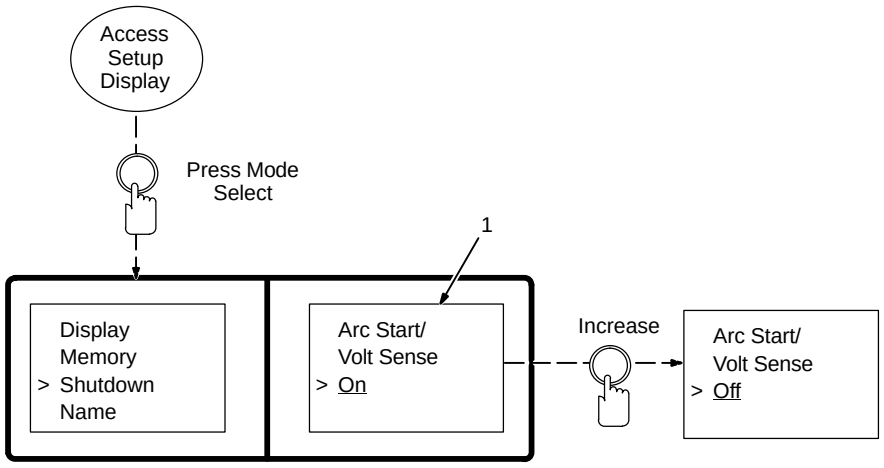
Press Parameter Select button to reset programs and setup to original factory settings. System, Arc Time, and Robot Control settings are not affected by the system reset. If setup card is in card slot, program will be loaded from card.

4 Total Reset

Press Parameter Select button to reset programs and setup to original factory settings for all programs and setup including System and Arc Time. If setup card is in card slot, program will be loaded from card.

5 Reset (Default) Displays

14-13. Selecting Arc Start/Volt Sense Error Shutdown

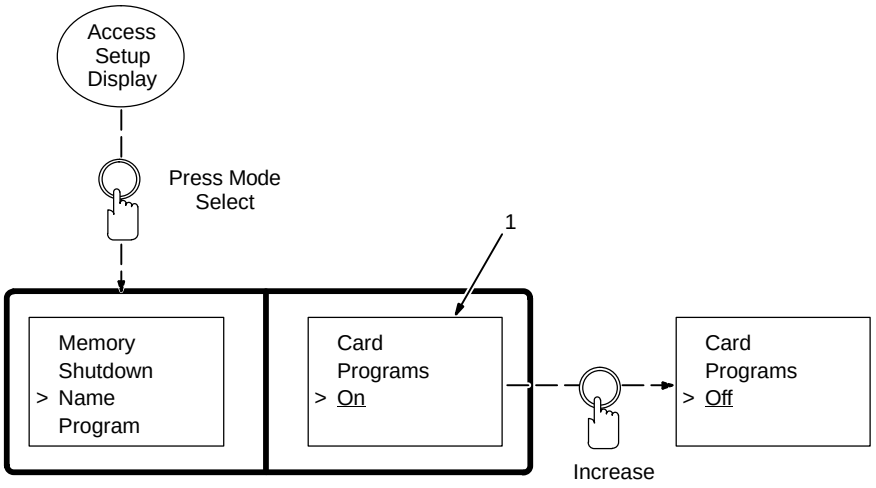


1 Voltage Shutdown Display

With Arc Start/Volt Sense on, the unit shuts down when no arc voltage is sensed. If the unit shuts down, an error message appears (see Section 5-5).

With Arc Start/Volt Sense off, the unit continues to feed wire even when there is no arc voltage sensed.

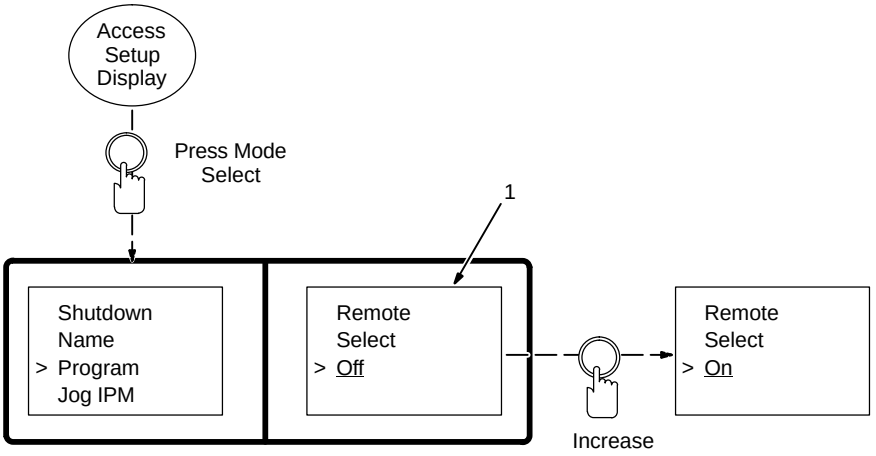
14-14. Selecting Program Name Feature



1 Name Display

When a data card is used, the programs written from the unit to the card can be named.

14-15. Remote Program Select



1 Program Display

When Program is On, a remote device or robot Teach Pendant may be used to select programs (see Section 14-16). When Off, program selection must be done from Setup Pendant.

14-16. Remote Program Setting

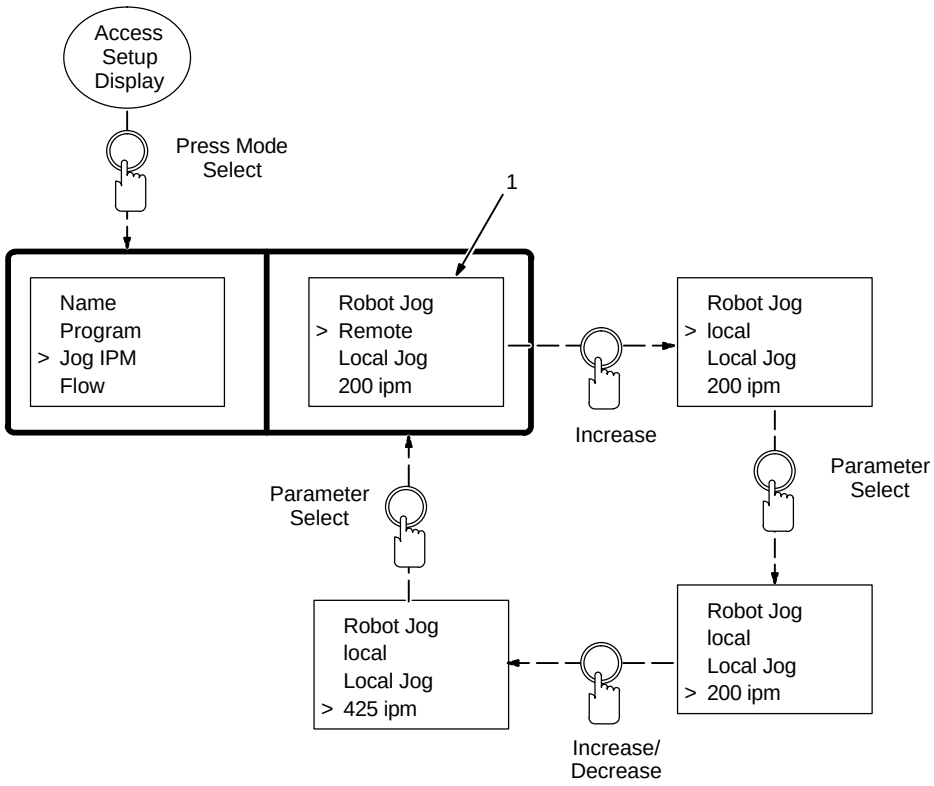
NOTE ☞

When Remote Program Select is "On", program selection will be determined by remote input once a weld is intiated. In "Standby" mode, program selection can be done in a normal manner from the Setup Pendant.

See the following table for the remote program select binary code.

Program No.	Output A	Output B	Output C
1	Off	Off	Off
2	On	Off	Off
3	Off	On	Off
4	On	On	Off
5	Off	Off	On
6	On	Off	On
7	Off	On	On
8	On	On	On

14-17. Jog Wire Feed Speed Selection



1 Jog IPM Display

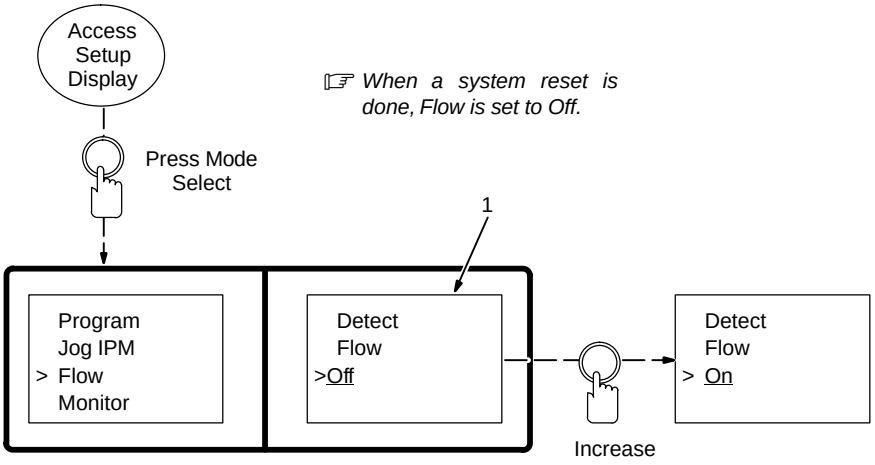
Jog wire feed speed can be varied between 50 and 780 inches per minute, IPM.

When not welding, a Robot Jog local setting will jog wire at the Local Jog ipm setting, even if robot provides wire jog signal.

A Robot Jog remote setting requires that the robot provide a jog command and jog speed signal.

Auxiliary jog connections at the peripheral receptacle and front panel jog push buttons will jog wire at the Local Jog ipm setting even if Robot Jog is set for remote.

14-18. Flow Selection



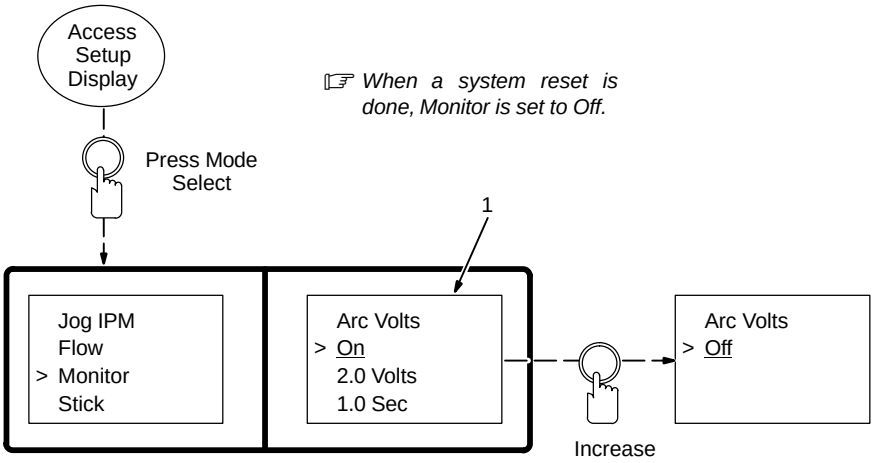
1 Flow Display

Provides a means to enable/disable the flow switch input.

When this feature is off, no monitoring is done for a flow switch input signal.

When this feature is on, the flow detect input monitors flow switch signal and will cause an error if flow is not present.

14-19. Arc Voltage Error Selection



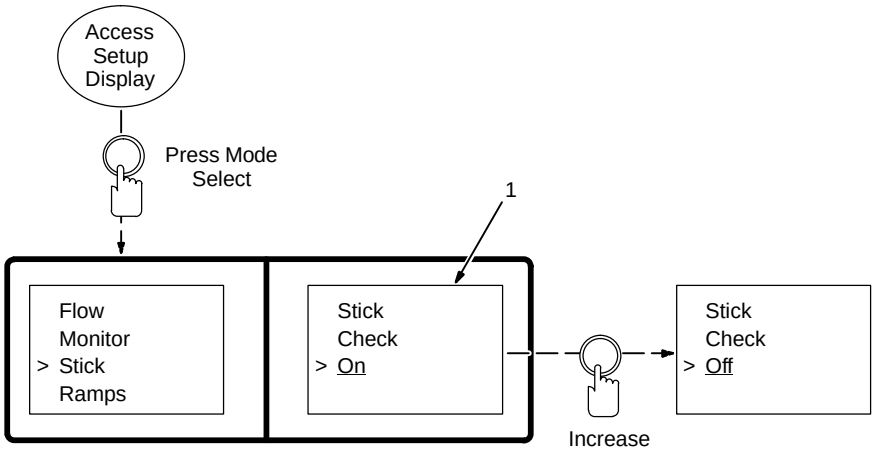
1 Monitor Display

Provides a means to enable/disable the arc voltage error feature and to set an acceptable range of deviation from set arc voltage or arc length (trim) before the error will actuate.

When this feature is off, arc voltage or arc length variations will not cause an error or shut the unit down.

When this feature is on and a range of deviation is set (the range limits are ±0.1 to 9.9 volts from desired weld voltage, and ±0.1 to 9.9 seconds), arc voltage or arc length variations outside of the defined range, for a period of time exceeding the defined acceptable time period, cause either the error relay to energize or the unit to shut down depending on the Arc Start/Volt Sense shutdown error setting.

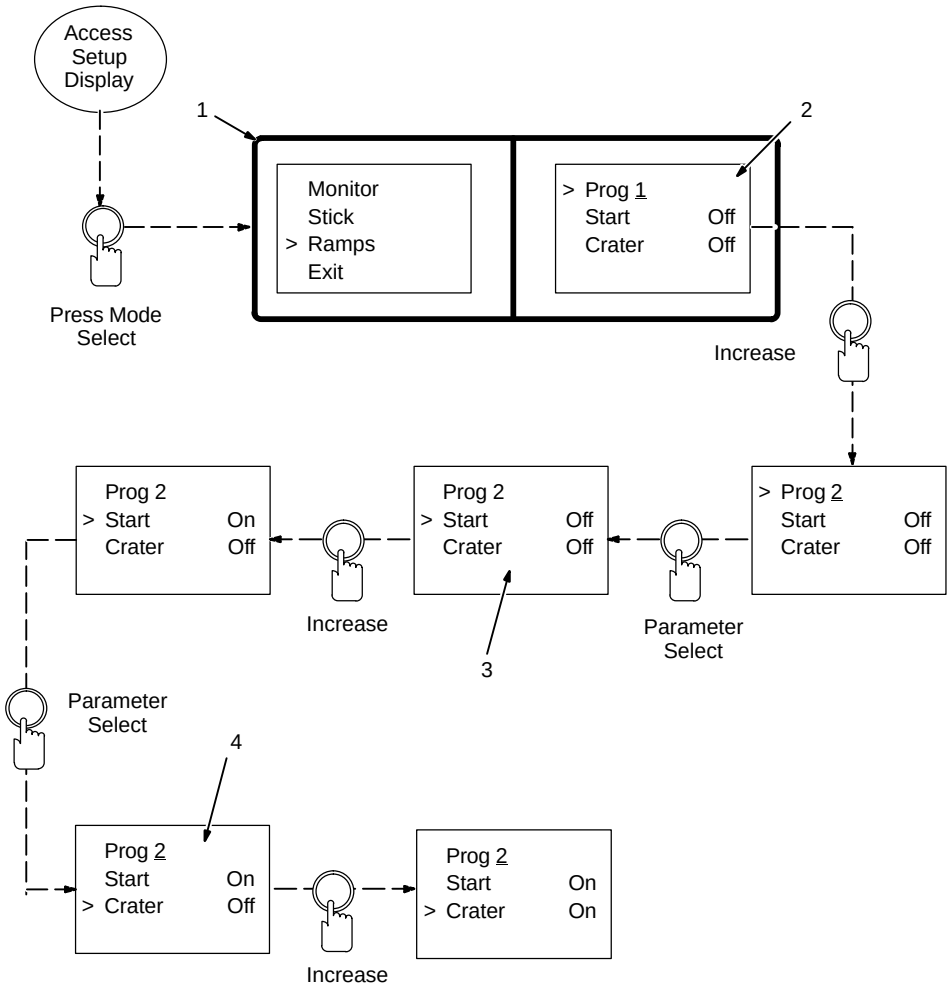
14-20. Stick Check Selection



1 Stick Check Display

When stick check is On, a stick check routine is performed at the end of each weld. When Off, no stick check is done.

14-21. Setting Ramps Function



1 Ramps Display

The ramps function allows output power to be tapered from start to weld and/or from weld to crater.

2 Program Number

Choose the desired program number (1 through 8). Turns start and/or crater ramping On or Off as desired.

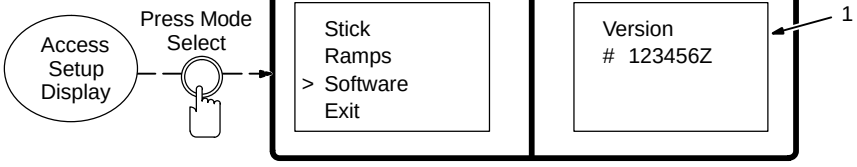
3 Start Display

Turns start ramping On or Off as defined.

4 Crater Display

Turns crater ramping On or Off as defined.

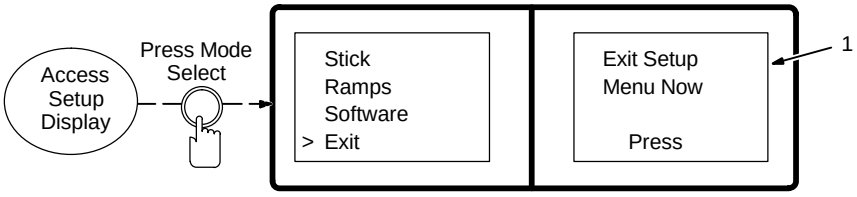
14-22. Software Version Number



1 Example Version Number Display

When talking with service personnel, this number may be required. (Check actual unit display for number.) The factory keeps this number on file with the serial number of the unit.

14-23. Exiting The Setup Menu



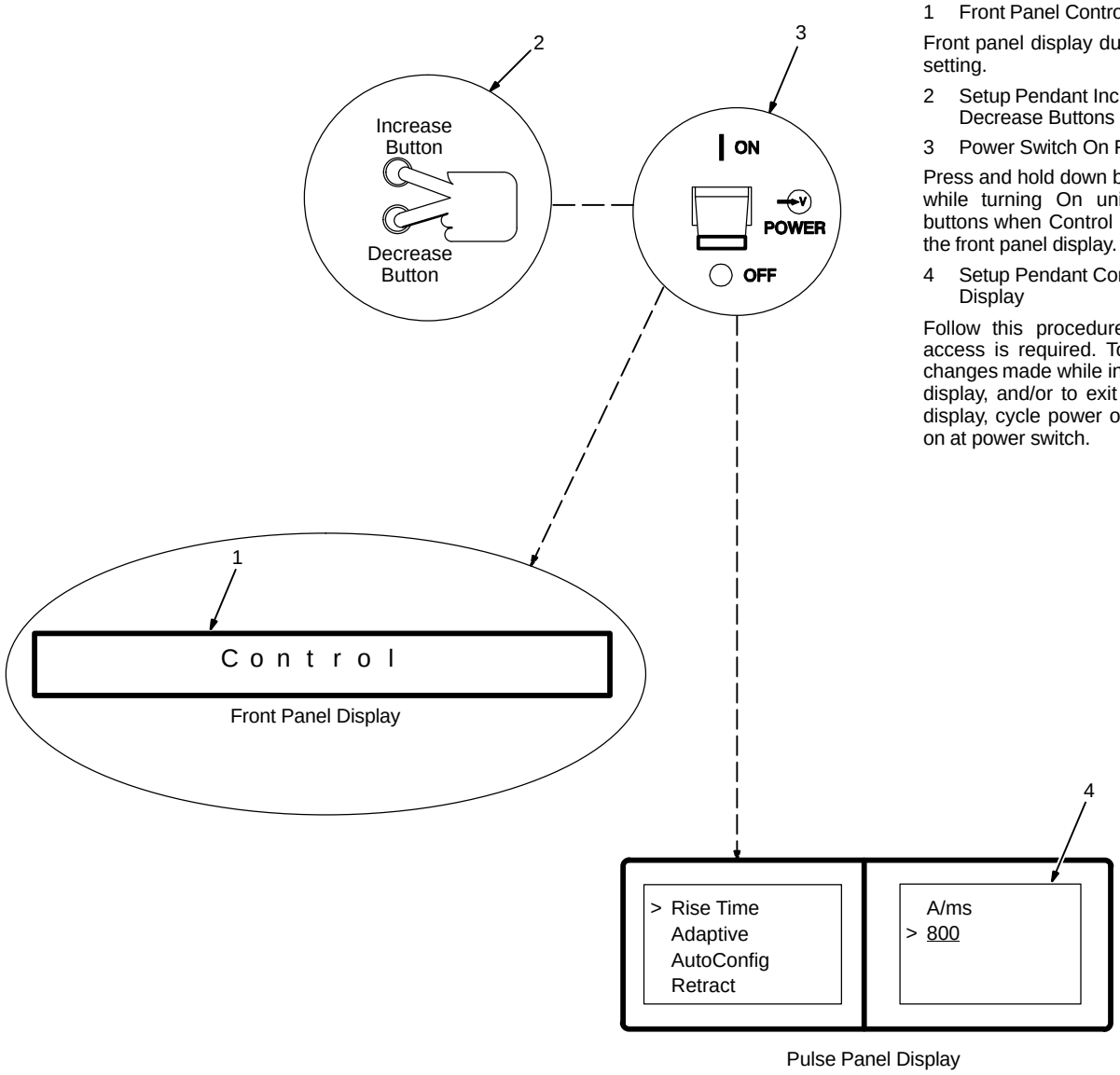
1 Exit Setup Menu Display

Allows user to exit setup menu without cycling power.

SECTION 15 – CONTROL MENU

The control menu allows the user access to rise time setting that controls rise and fall time of the pulse square wave. Changing the rise time setting changes the square wave shape by rounding off the corners, and makes it possible to quiet the pulse arc by just changing the rise time.

15-1. Using Menu Display



1 Front Panel Control Display

Front panel display during control setting.

2 Setup Pendant Increase And Decrease Buttons

3 Power Switch On Front Panel

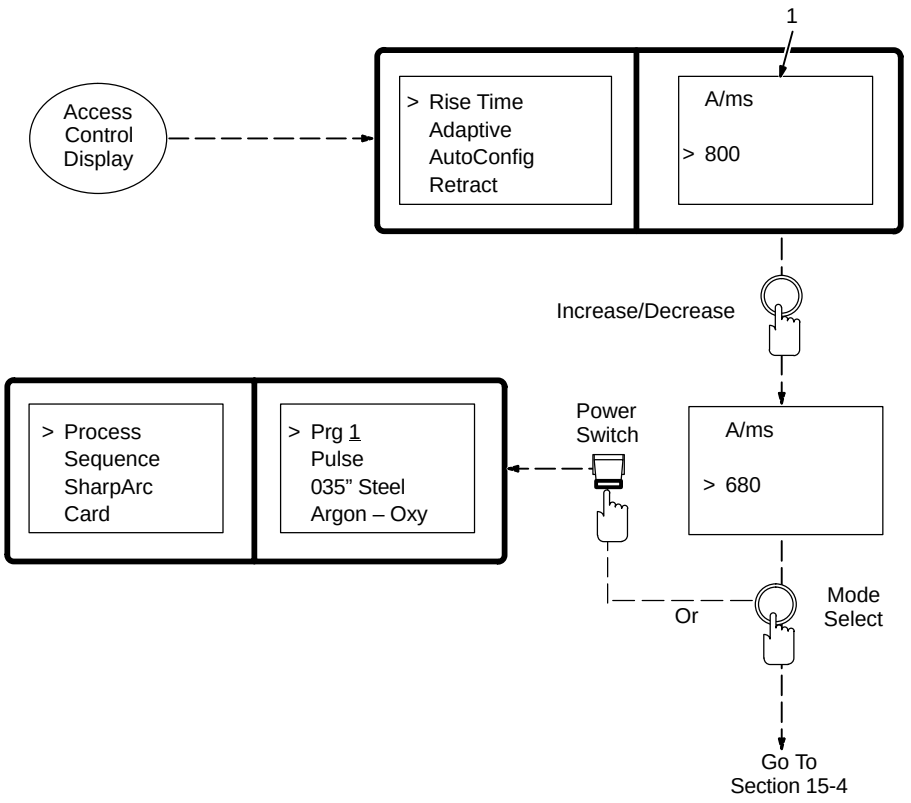
Press and hold down both buttons while turning On unit. Release buttons when Control appears on the front panel display.

4 Setup Pendant Control Display

Follow this procedure any time access is required. To save any changes made while in the control display, and/or to exit the control display, cycle power off and back on at power switch.

15-2. Setting Rise Time Parameter

NOTE ☞ *Maximum Rise Time setting will make the welding power source go to its maximum output in the maximum amount of time (1250 amperes per millisecond).*



1 Rise Time Display

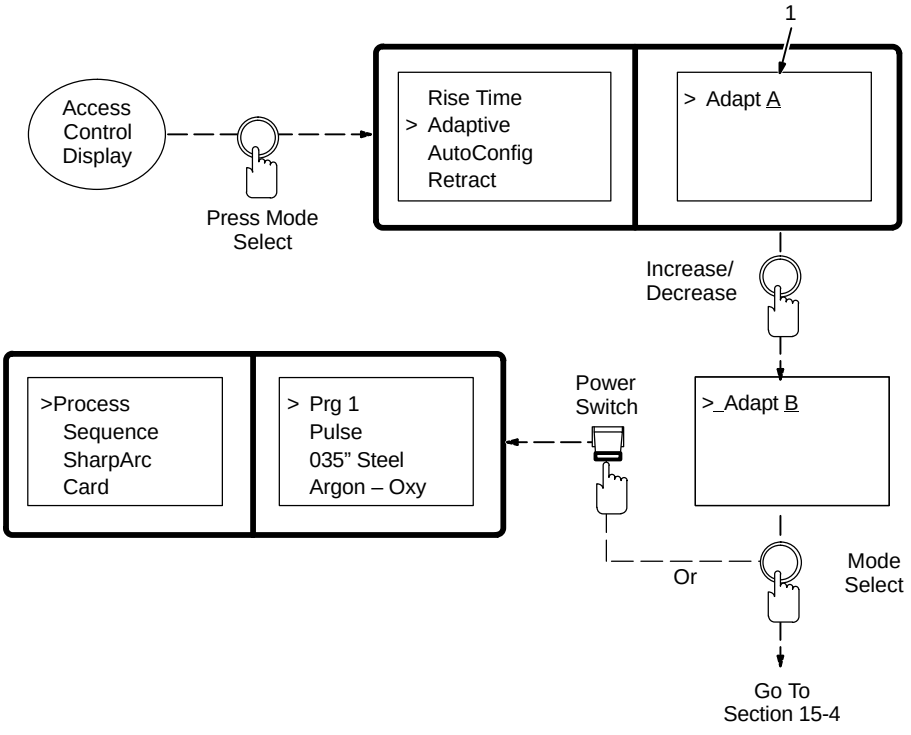
Setting is depend on desired arc characteristics. Make a sample weld after each setting until desired arc characteristics are obtained.

Use Increase or Decrease button to change setting.

Range is 250 to 1250 amperes per millisecond (A/ms).

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

15-3. Setting Adaptive Parameters



1 Adaptive Parameter Display

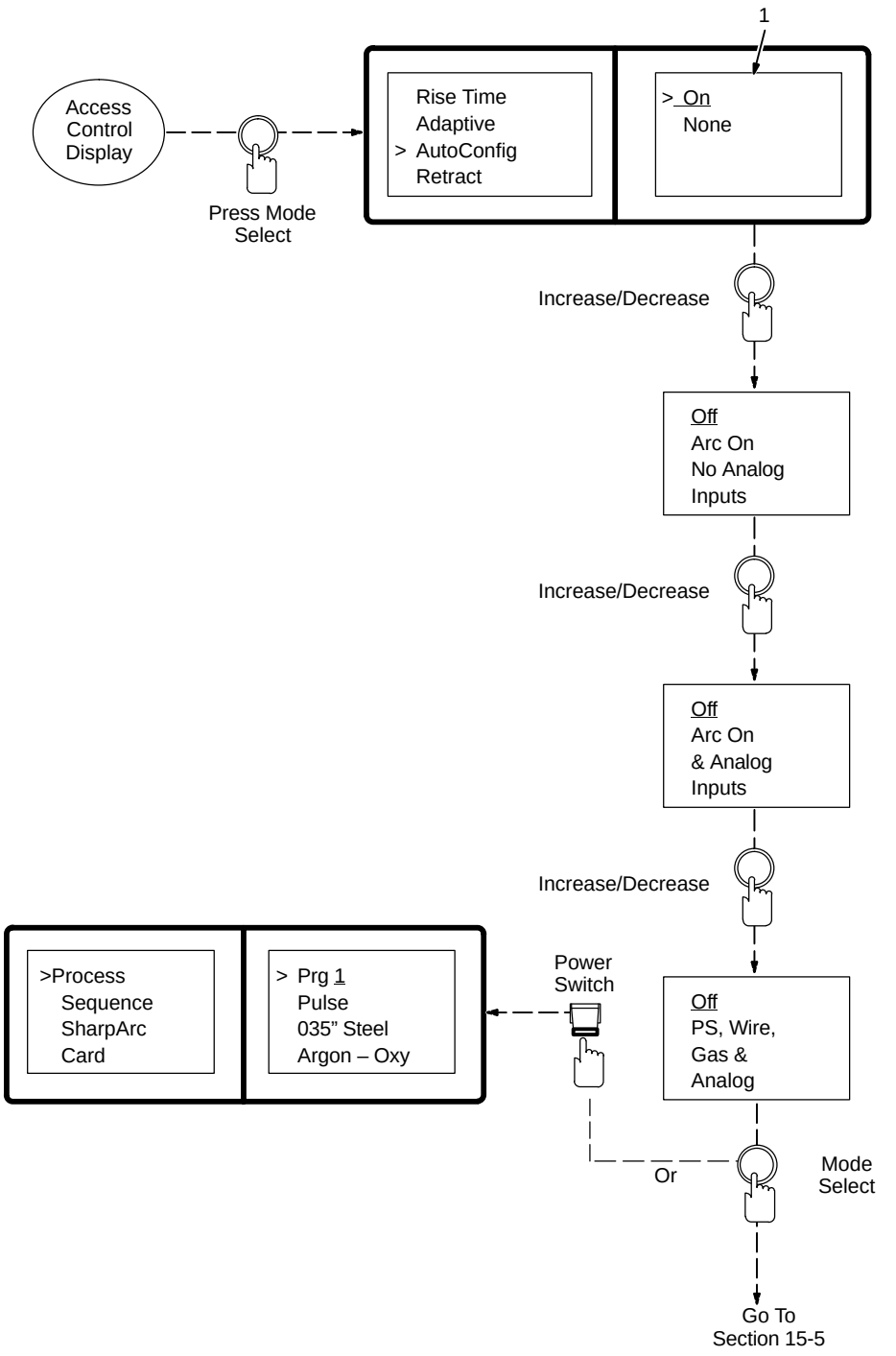
Settings allow user to choose between two adaptive programs, A or B.

Use Increase or Decrease button to change setting.

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

☞ *For more detailed information on A vs. B adaptive programs, consult factory specialist.*

15-4. Setting Auto Configure Parameter



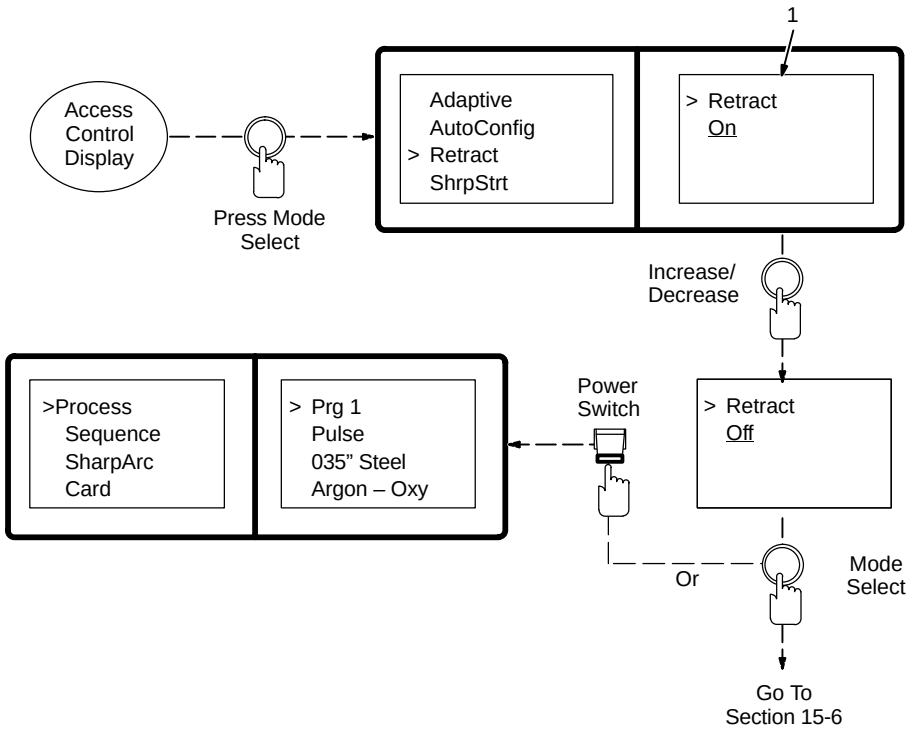
1 Auto Configure Display

Setting allows user to do manual configuration or automatic configuration by welding power source/interface.

Use Increase or Decrease button to change setting.

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

15-5. Setting Retract On/Off



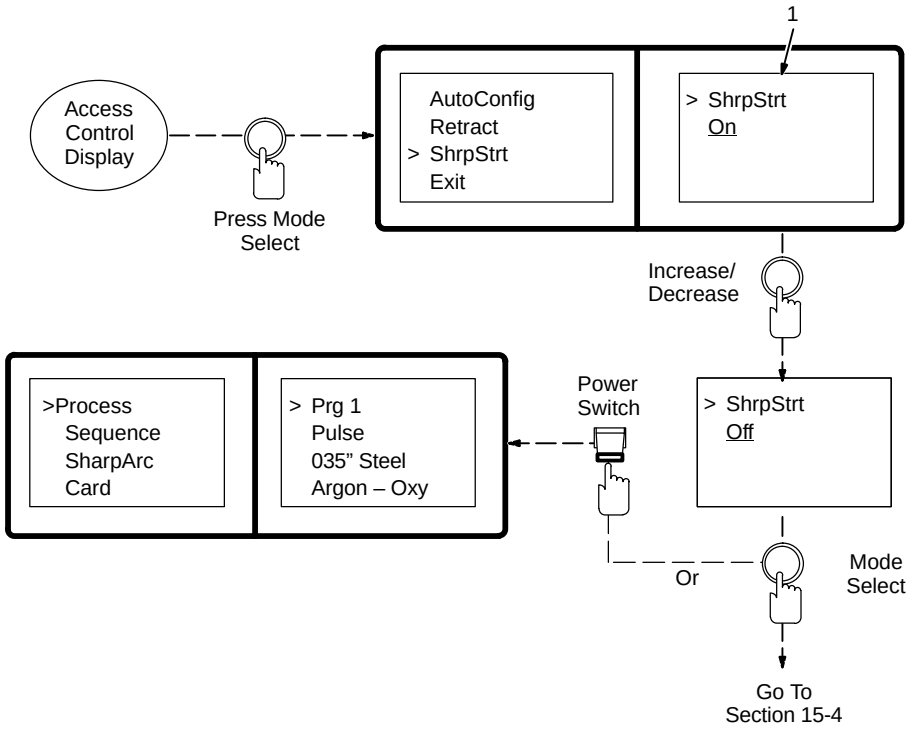
1 Retract Display

Settings allow user to turn the retract feature On or Off. The retract feature allows the user to set a time and wire feed speed to pull wire away from work when the weld is done.

Use Increase or Decrease button to change setting. If the retract feature is turned On, a weld sequence step is added in the process screens.

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

15-6. Setting Sharp Start On/Off



1 Sharp Start Display

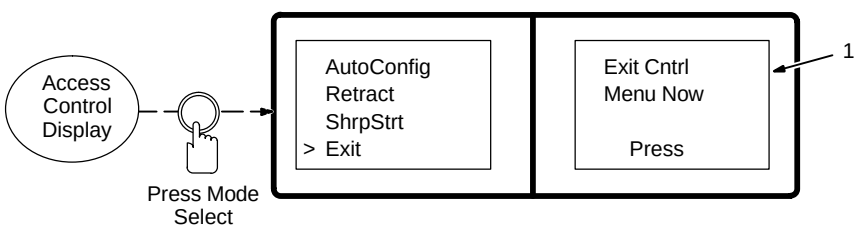
Settings allow user to turn the sharp start feature On or Off.

☞ *Sharp start should normally be left On. The ability to turn sharp start Off is provided in case the user experiences problems with weld ends using flux cored wires.*

Use Increase or Decrease button to change setting.

Press Mode Select button to go to next parameter or cycle power off and back on at power switch to save setting and exit Control menu.

15-7. Exiting The Control Menu



1 Exit Control Menu Display

Allows the user to leave the control menu.

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Miller

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Effective January 1, 2002
(Equipment with a serial number preface of "LC" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

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Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

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1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Maxstar 150
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Maxstar 85, 140
   * Spot Welders
   * Load Banks
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

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Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip

For Service

Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Training (Schools, Videos, Books) Technical Manuals (Servicing Information and Parts) Circuit Diagrams Welding Process Handbooks
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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