RETURN TO MAIN MENU

INVERTEC V205-T® AC/DC TIG

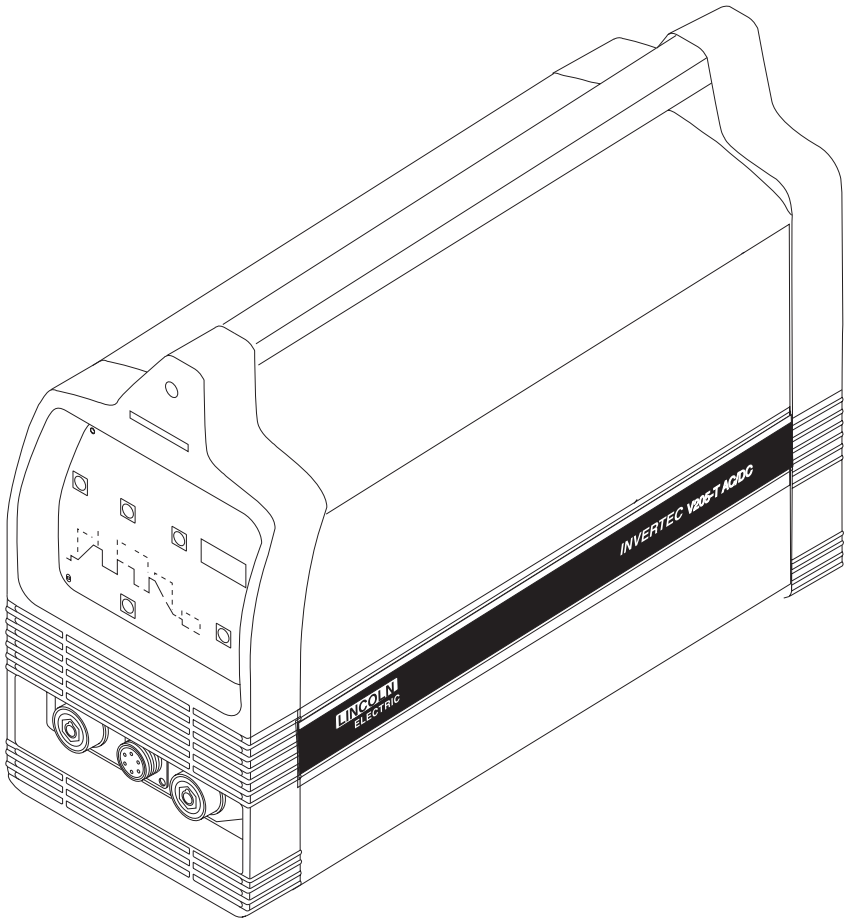
IM728

February, 2002

For use with machines having Code Numbers: **10860**

Safety Depends on You

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.



Date of Purchase:_____
Serial Number:_____
Code Number:_____
Model:_____
Where Purchased:_____

OPERATOR'S MANUAL

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LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •
• Sales and Service through Subsidiaries and Distributors Worldwide •
Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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

FOR ENGINE powered equipment.

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

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

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

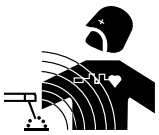
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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

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

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

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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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ELECTRIC SHOCK can kill.

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

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

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

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

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

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

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

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

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

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

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

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

ARC RAYS can burn.

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

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

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

FUMES AND GASES can be dangerous.

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

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

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

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

5.e. Also see item 1.b.

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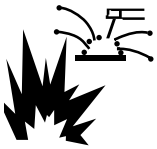


WELDING SPARKS can cause fire or explosion.

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

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

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

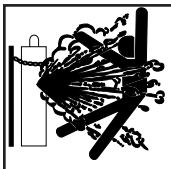
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe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

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

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

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

6.h. Also see item 1.c.



CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

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

FOR ELECTRICALLY powered equipment.

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

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

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

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PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Mar. '93

Thank You —— for selecting a **QUALITY** product by Lincoln Electric. We want you to take pride in operating this Lincoln Electric Company product ••• as much pride as we have in bringing this product to you!

Please Examine Carton and Equipment For Damage Immediately

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, Claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Model Name & Number _____

Code & Serial Number _____

Date of Purchase _____

Whenever you request replacement parts for or information on this equipment always supply the information you have recorded above.

Read this Operators Manual completely before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. The level of seriousness to be applied to each is explained below:

⚠ WARNING

This statement appears where the information **must** be followed **exactly** to avoid **serious personal injury** or **loss of life**.

⚠ CAUTION

This statement appears where the information **must** be followed to avoid **minor personal injury** or **damage to this equipment**.

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS - V205-T AC/DC TIG K1855-1 (Code Number 10860)

INPUT - SINGLE PHASE ONLY

Input Voltages / 50 /60 Hz.	Max. Input Current
115	34A at Rated Output
230	30A at Rated Output

RATED OUTPUT

Duty Cycle	Output Amps	Volts at Rated Amperes	Input Amps
(115V) 35%	(Stick) 110	24.4V	34A
60%	90	23.6V	28A
100%	70	22.8V	20A
(115V) 40%	(TIG) 150	16V	34A
60%	120	14.8V	25A
100%	100	14V	20A
(230V) 35%	(Stick) 180	27.2V	30A
60%	150	26V	23A
100%	130	25.2V	19A
(230V) 40%	(TIG) 200	18V	30A
60%	170	16V	18A
100%	140	15.6V	15A

OUTPUT

Output Current Range	Maximum Open Circuit Voltage	Type of Output
6-200 Amps	54 Volts Max.	AC/DC

RECOMMENDED INPUT WIRE AND FUSE SIZES FOR MAXIMUM RATED OUTPUT

INPUT VOLTAGE / FREQUENCY (HZ)	TYPE S, SO ST, STO, OR EXTRA HARD USAGE INPUT CORD AWG	TIME-DELAY CIRCUIT BREAKER OR FUSE SIZE (AMPS)
115/50/60 230/50/60	#12	30A

PHYSICAL DIMENSIONS

Height	Width	Depth	Weight
11.53 in. 293 mm	7.04 in. 179 mm	16.93 in. 430 mm	Approx. 35.2lbs. 16 kgs.

TEMPERATURE RANGES

OPERATING TEMPERATURE RANGE	STORAGE TEMPERATURE RANGE
-20°C to +40°C	-50°C to +85°C

Read entire installation section before starting installation.

Safety Precautions

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment. Allow machine to sit for 5 minutes minimum to allow the power capacitors to discharge before working inside this equipment.**
- **Insulate yourself from the work and ground.**
- **Always wear dry insulating gloves.**
- **Always connect the V205-T to a power supply grounded according to the National Electrical Code and local codes.**

SELECT SUITABLE LOCATION

The Invertec will operate in harsh environments. Even so, it is important that simple preventative measures are followed in order to assure long life and reliable operation.

- The machine must be located where there is free circulation of clean air such that air movement in the back and out the front will not be restricted.
- Dirt and dust that can be drawn into the machine should be kept to a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdown.

STACKING

The Invertec V205-T AC/DC can not be stacked.

TILTING

Place the machine directly on a secure, level surface. The machine may topple over if this procedure is not followed.

ENVIRONMENTAL AREA

Keep the machine dry. Do not place it on wet ground or in puddles.

MACHINE GROUNDING AND HIGH FREQUENCY INTERFERENCE PROTECTION

The Capacitor Discharge Circuit used in the high frequency generator, can be blamed for many radio, TV and electronic equipment interference problems. These problems may be the result of radiated interference. Proper grounding methods can reduce or eliminate radiated interference.

The Invertec V205-T AC/DC has been field tested under recommended installation conditions. It complies with FCC allowable limits for radiation.

Radiated interference can develop in the following four ways:

1. Direct interference radiated from the welder.
2. Direct interference radiated from the welding leads.
3. Direct interference radiated from feedback into the power lines.
4. Interference from re-radiation of “pickup” by ungrounded metallic objects.

Keeping these contributing factors in mind, installing equipment per the following instructions should minimize problems.

1. Keep the welder power supply lines as short as possible and enclose as much of them as possible in rigid metallic conduit or equivalent shielding for a distance of 50 feet (15.2m). There should be good electrical contact between this conduit and the welder case ground. Both ends of the conduit should be connected to a driven ground and the entire length should be continuous.
2. Keep the work and electrode leads as short as possible and as close together as possible. Lengths should not exceed 25 ft (7.6m). Tape the leads together when practical.

3. Be sure the torch and work cable rubber coverings are free of cuts and cracks that allow high frequency leakage. Cables with high natural rubber content, such as Lincoln Stable-Arc® better resist high frequency leakage than neoprene and other synthetic rubber insulated cables.
4. Keep the torch in good repair and all connections tight to reduce high frequency leakage.
5. The work terminal must be connected to a ground within ten feet of the welder, using one of the following methods.
   a) A metal underground water pipe in direct contact with the earth for ten feet or more.
   b) A 3/4" (19mm) galvanized pipe or a 5/8" (16mm) solid galvanized iron, steel or copper rod driven at least eight feet into the ground.

   The ground should be securely made and the grounding cable should be as short as possible using cable of the same size as the work cable, or larger. Grounding to the building frame electrical conduit or a long pipe system can result in re-radiation, effectively making these members radiating antennas.
6. Keep all panels securely in place.
7. All electrical conductors within 50 ft (15.2m) of the welder should be enclosed in grounded, rigid metallic conduit or equivalent shielding. Flexible metallic conduit is generally not suitable.
8. When the welder is enclosed in a metal building, several earth driven electrical grounds connected (as in 5b above) around the periphery of the building are recommended.

Failure to observe these recommended installation procedures can cause radio or TV interference problems.

INPUT CONNECTIONS

Be sure the voltage, phase, and frequency of the input power is as specified on the rating plate, located on the bottom of the machine.

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Have a qualified electrician install and service this equipment.**
- **Turn the input power OFF and unplug the machine from the receptacle before working on this equipment.**

Allow machine to sit for 5 minutes minimum to allow the power capacitors to discharge before working inside this equipment.

- **Do not touch electrically hot parts.**
- **Machine must be plugged into a receptacle that is grounded according to the National Electrical Code and local codes.**
- **Do not remove or defeat the purpose of the power cord ground pin.**

RECONNECT PROCEDURE

The Invertec V205-T AC/DC auto reconnects to either 115V or 230V supply.

Fuse the input circuit with the time delay fuses or delay type[1] circuit breakers. Using fuses or circuit breakers smaller than recommended may result in "nuisance" shut-offs from welder inrush currents even if not welding at high currents.

The Invertec V205-T AC/DC is recommended for use on an individual branch circuit.

[1]Also called "inverse time" or "thermal/magnetic" circuit breakers. These circuit breakers have a delay in tripping action that decreases as the magnitude of the current increases.

230V INPUT

The equipment is provided with a with a 230/115V cable, 6.6ft.(2m) in length with a 230V 6-50P attachment plug.

The Invertec V205-T AC/DC performs best when connected to 230VAC inputs. This input allows full output of the machine (200 amps).

115V INPUT

A suitable 115V attachment plug must be installed on the power cord to use the V205-T AC/DC with a 115V input supply. The rated output of the V205-T AC/DC is available when connected to a 30A branch circuit. When connected to a branch circuit with lower amp rating, lower welding current and duty cycle must be used. An output guide is provided below. The values are approximate and must be adjusted downward if the fuse or circuit breaker trips off. Other loads on the circuit and fuse/circuit breaker characteristics will affect the available output. Do not exceed these welding conditions:

15A branch circuit
10% duty cycle
Stick: 75A
TIG: 105A

20A branch circuit
10% duty cycle
Stick: 90A
TIG: 130A

ATTACHMENT PLUG INSTALLATION

Connect the white (neutral) wire under terminal clamp with silver screw, and black (hot) wire under terminal clamp with brass screw. Connect green wire under terminal clamp with green screw.

⚠ WARNING

- **Failure to wire as instructed may cause personal injury or damage to equipment. To be installed or checked by an electrician or qualified person only.**

In all cases, the green or green/yellow grounding wire must be connected to the grounding pin of the plug, usually identified by a green screw.

Attachment plugs must comply with the Standard for Attachment Plugs and Receptacles, UL498.

The product is considered acceptable for use only when an attachment plug as specified is properly attached to the supply cord.

For use on engine drives, keep in mind the above input draw restrictions and the following precaution.

ENGINE DRIVEN GENERATOR

The Invertec V205-T AC/DC can be operated on engine driven generators as long as the 230 volt auxiliary meets the following conditions:
- The AC waveform peak voltage is below 400 volts*.
- The AC waveform frequency is between 45 and 65Hz.
- The RMS voltage of the AC waveform is always greater than 208VAC *.

* for 115 VAC input divide these values in half.

The following Lincoln engine drives meet these conditions when run in the high idle mode:
- Ranger 250,305
- Commander 300, 400, & 500

Many engine drives do not meet these conditions (eg Miller Bobcats, etc). Operation of the Invertec V205-T AC/DC is not recommended on engine drives not conforming to these conditions. Such combinations may overvoltage the Invertec V205-T AC/DC power source.

OUTPUT CONNECTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Keep the electrode holder, TIG torch and cable insulation in good condition and in place.**
- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**
- **Turn the input line Switch on the Invertec V205-T AC/DC "off" before connecting or disconnecting output cables or other equipment.**

OUTPUT AND GAS CONNECTION FOR TIG WELDING (FIGURE A.1)

The TIG Torch Dinse and ground lead Dinse Connectors are supplied with the welder. To connect the cables, turn the Power Switch "OFF". Connect the torch cable quick connect plug into the DC-Electrode/Gas Output Receptacle on the front of the welder and turn it clockwise until tight. This is a quick connect terminal and also provides the gas connection for the shielding gas to the torch.

⚠ WARNING

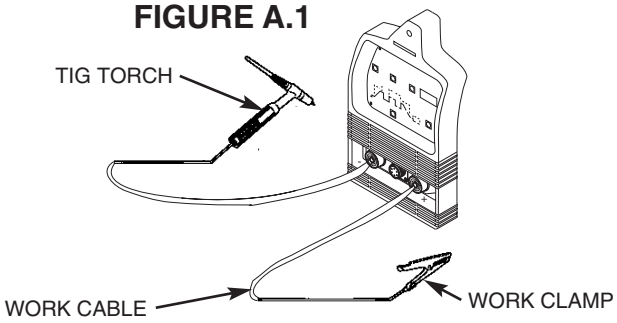
To avoid receiving a high frequency shock, keep the TIG torch and cable Insulation in good condition.

WORK CABLE CONNECTION

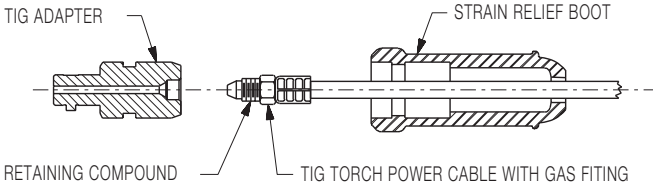
Next, connect the work cable to the "+" output terminal in the same way.

To minimize high frequency interference, refer to **Machine Grounding and High Frequency Interference Protection** section of this manual for the proper procedure on grounding the work clamp and work piece.

FIGURE A.1



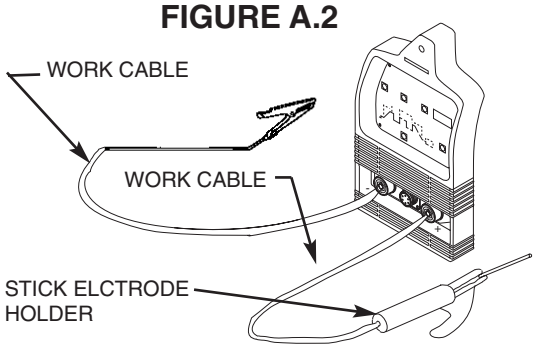
This unit does not include a TIG torch, but one may be purchased separately. The Lincoln PTA-9 (K1781-1 or K1781-3 only with no gas valve) or PTA-17 (K1782-1 or K1782-3) are recommended for use with these machines for this purpose; however, any similar TIG torch can be used. To attach the Twist-Mate Plug to a Lincoln Torch, slide the rubber boot onto the torch cable (enlarge the boot opening if necessary), screw the fitting on the torch cable into the brass connector snugly and slide the boot back over the brass connector.



OUTPUT CONNECTION FOR STICK WELDING (FIGURE A.2)

First determine the proper electrode polarity for the electrode to be used. Consult the electrode data for this information. Then connect the output cables to the output terminals corresponding to this polarity. For instance, for DC(+) welding, connect the electrode cable (which is connected to the electrode holder) to the "+" output terminal and the work cable (which is connected to the work clamp) to the "-" output terminal. Insert the connector with the key lining up with the keyway, and rotate approximately 1/4 turn clockwise; until the connection is snug. Do not over tighten.

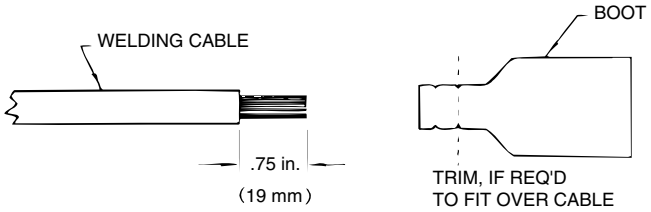
FIGURE A.2



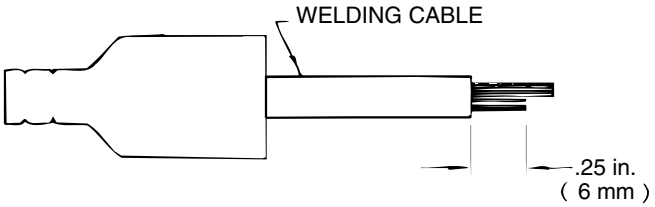
QUICK DISCONNECT PLUG (FOR STICK ELECTRODE CABLE and WORK CABLE)

A quick disconnect system is used for the welding cable connections. The stick electrode cable will need to have a plug attached.

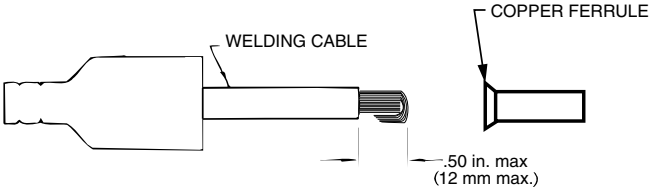
1. Cut off welding cable lug, if present.
2. Remove .75 in. (19mm) of welding cable insulation.
3. Slide rubber boot onto cable end. The boot end may be trimmed to match the cable diameter. Use soap or other nonpetroleum-based lubricant to help slide the boot over the cable, if needed.



4. Cut 45-50% of the copper strands back 1/4" (6 mm).

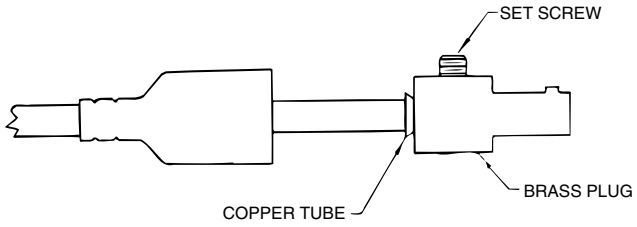


5. Fold copper strands over cut strands and insert into ferrule.



6. Slide the copper ferrule into the brass plug.

7. Tighten set screw to collapse copper tube. Screw must apply pressure against welding cable. The top of the set screw will be well below the surface of the brass plug after tightening.

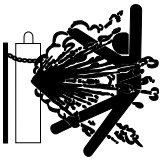


8. Slide rubber boot over brass plug. The rubber boot must be positioned to completely cover all electrical surfaces after the plug is locked into the receptacle.

SHIELDING GAS CONNECTION

Obtain the necessary inert shielding gas. Connect the cylinder of gas with a pressure regulator and flow gage. Install a gas hose between the regulator and gas inlet (located on the rear of the welder). The gas inlet has a 5/16-18 right hand female thread; CGA #032.

⚠ WARNING



CYLINDER could explode if damaged.

- Keep cylinder upright and chained to a support.
- Keep cylinder away from areas where it could be damaged.
- Never allow the torch or welding electrode to touch the cylinder.
- Keep cylinder away from live electrical circuits.

REMOTE CONTROL CONNECTION

A remote control receptacle is provided on the lower center case front of the welder for connecting a remote control to the machine. Refer to the Optional Accessories section of this manual for available remote controls.

Read and understand this entire section before operating your machine.

SAFETY INSTRUCTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals, electrode or internal wiring.
- Insulate yourself from the work and ground.
- Always wear dry insulating gloves.

FUMES AND GASES can be dangerous.

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

WELDING, CUTTING and GOUGING SPARKS can cause fire or explosion

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

ARC RAYS can burn.

- Wear eye, ear and body protection.

Only qualified personnel should operate this equipment. Observe all safety information throughout this manual.

GENERAL DESCRIPTION

The Invertec V205-T AC/DC is an industrial 200 amp arc welding power source which utilizes single phase input power, to produce constant current output. The welding response of this Invertec has been optimized for stick (SMAW) and TIG (GTAW). The unit is ideal for industrial applications where portability is important.

The Invertec V205-T AC/DC is a power source that can perform the following types of welding with excellent results:

TIG (with high frequency or Touch Start Tig Starting).

- TIG AC with square, sinusoidal and triangular waveforms
- Tig DC

The following items can be connected to the 6 pin socket on the front panel:

- Remote control potentiometer (K857) for Stick welding.
- Remote Foot Amptrol (K870), Hand Amptrol (K963-1)
- Arc Start Switch

WELDING CAPABILITY

The Invertec V205-T AC/DC is rated at 200 amps, 18 volts, at 40% duty cycle on a ten minute basis. It is capable of higher duty cycles at lower output currents. It is capable of 140 amps, 15.6 volts at at 100% duty cycle. If the duty cycle is exceeded, a thermal protector will shut off the output until the machine cools. See Technical Specifications in A-1 for other rated outputs.

The Invertec V205-T is recommended for stick welding with such popular electrodes as Fleetweld 35, Fleetweld 37, Fleetweld 180 and LH 78.

LIMITATIONS

The V205-T is not recommended for pipe thawing.

REAR CONTROL PANEL (FIGURE B.1)

⚠ WARNING

- **I1: Off/On switch turns on the electric power to the welder. It has two positions, "O" off, and "I" on.**

---

* With "I1" in the "I" (ON) position, the welding machine is operational and there is voltage between the positive (+) and negative (-) sockets in stick welding. In TIG, the welding process needs a trigger closure command at the remote control connection.(Usually via an Arc Start Switch or Foot Amptrol)

* The welder is connected to the mains supply even if the "I1" switch is in the "O" position, and therefore there are electrically live parts inside the power source. Carefully follow the instructions given in this manual.

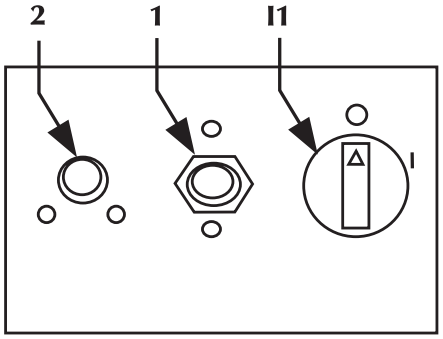


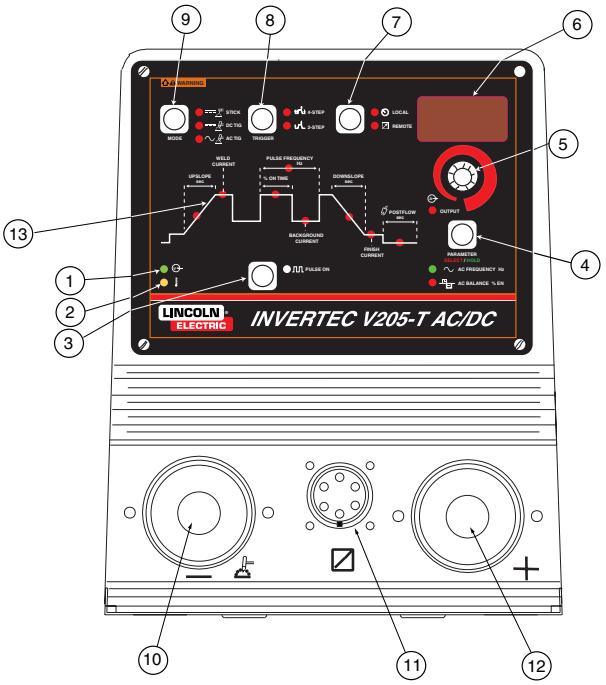
FIGURE B.1

* 1 : Supply cable
* 2 : Gas attachment

CONTROLS AND SETTINGS

All operator controls and adjustments are located on the case front of the V205-T machine. Refer to Figure B.2 and the corresponding explanations.

FIGURE B.2



1. Output Light Green LED
2. Thermal / Device Warning Light Yellow LED
3. Pulse On/Off Button
4. Setup/Parameter Select Button
5. Output/Parameter Adjust Knob
6. Digital Display
7. Local/Remote Button
8. Trigger Selection Button
9. Welding Process Button
10. Electrode Connection (Negative)
11. Remote Control Connector
12. Electrode Connection (Positive)
13. Welding Parameter Drawing

1. Input Voltage warning light green LED - Indicates that the machine is on and input voltage is within acceptable range.

2. Thermal Shutdown Light (yellow LED) - Indicates thermal over load or output disabled for incorrect supply voltage.

- With the "Yellow LED" on, and in alarm code blinking on "Digital Display Item 6" (see Troubleshooting Section E, "Possible electrical problems"), the generator will not supply power at the output.
- If over-heating occurs, the "Yellow LED" will stay on until the fault has been removed. Leave the power source on to allow the fan to cool the unit.

3. Pulse On/OFF push button - CONSTANT current - PULSED current

4. Setup/Parameter Select push button - “Setup/Parameter" push button has three (3) different functions:

- Accesses Welding Parameter. Momentarily pressing the Parameter button will step through the Welding Parameter waveform lights on the front panel. Parameters which can be changed.
  - Upslope
  - Weld Current (Peak Current)
  - Pulse Frequency
  - % on Time
  - Background Current
  - Downslope
  - Finish Current
  - Postflow sec.

  There is a LED for each welding parameter. When lit, it has confirmed the mode or selection chosen.
- Accesses the "AC Frequency" and "AC Balance" by pressing and holding the Parameter button for three (3) seconds.
- Accesses the "Set Up Menu". See Set Up Menu section.

5. Output / Parameter Adjust Knob- Allows you to continuously adjust the current both in TIG and in Stick welding. Allows you to change the value, shown on "Digital Display Item 6", of the parameter selected with "Setup/Parameter Item 4".

6. Digital Display - displays current values for each mode or welding parameter.

7. Local/Remote push button - Selects the welding current adjusting system:
- from front panel
- from remote control

The LED beside the symbol confirms the selection.

8. **Tig Trigger Sequences -**
For the V205-T AC/DC, TIG welding can be done in either the 2-step or 4-step mode which is selected with the Trigger Mode Push Button.

2-Step Sequence
With the Trigger Mode switch in the 2-step position, the following welding sequence will occur.

1. Press and hold the Arc Start Switch to start the sequence.

   The machine will open the gas valve to start the flow of the shielding gas. After a 0.5 second preflow time, to purge air from the torch hose, the output of the machine is turned ON. At this time the arc is started.

   After the arc is started the output current will be increased to the welding current. This increase, or upslope, is presettable. The default is 5 seconds.

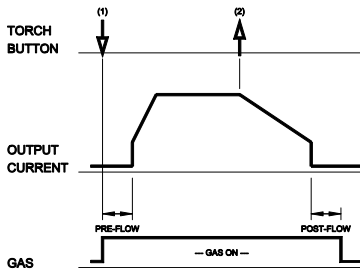
2. Release the Arc Start Switch to stop welding.

   The machine will now decrease the output current at a controlled rate, or downslope time, until the Start/Crater current is reached and the output of the machine is turned OFF. The downslope time is adjusted by the Downslope Parameter.

   After the arc is turned OFF, the gas valve will remain open to continue the flow of the shielding gas to the hot electrode and work piece. The duration of this postflow shielding gas is adjusted by the Postflow Parameter.

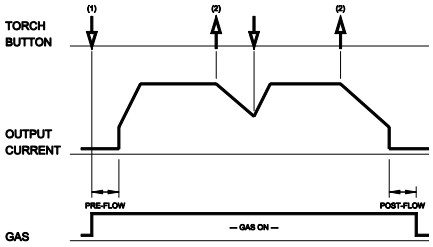
Possible variations of this standard sequence is shown in (2 step diagram 1).

2 STEP DIAGRAM 1



It is possible to press and hold the TIG torch trigger a second time during downslope to restart. After the trigger is pressed the output current will increase to the welding current. This operation is shown in (2 step diagram 2).

2 STEP DIAGRAM 2



4-Step Sequence
With the 4-step Selected, the following welding sequence will occur.

1. Press and hold the Arc Start Switch to start the sequence.

   The machine will open the gas valve to start the flow of the shielding gas. After a 0.5 second preflow time, to purge air from the torch hose, the output of the machine is turned ON. At this time the arc is started.

   After the arc is started the output current will be at the Start/Finish current. This condition can be maintained as long or as short as necessary.

   If the Start/Finish current is not necessary, do not hold the TIG torch trigger as described at the beginning of this step. Instead, quickly press and release the trigger. In this condition, the machine will automatically pass from Step 1 to Step 2 when the arc is started.

2. Release the TIG torch trigger to start the main part of the weld.

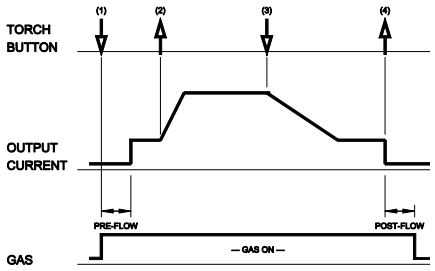
The output current will be increased to the welding current. This increase, or upslope, is presettable. The default is 0.5 seconds.

3. Press and hold the TIG torch trigger when the main part of the weld is complete.

The machine will now decrease the output current at a controlled rate, or downslope time, until the Start/Finish current is reached. The downslope time is adjusted by the Downslope Parameter. This Start/Finish current can be maintained as long or as short as necessary.

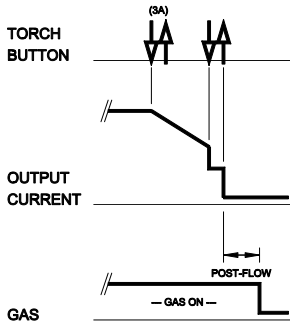
4. Release the TIG torch trigger.
The output current of the machine will turn OFF and the gas valve will remain open to continue the flow of the shielding gas. The duration of this postflow time is adjusted by the Postflow control knob.This operation is shown in (4 step diagram 1).

4 STEP DIAGRAM 1



Possible variations of this standard sequence are shown below.
It is possible to press and hold the TIG torch trigger another time to end the downslope time and maintain the output current at the Start/Finish current. When the TIG torch trigger is released the output will turn OFF and postflow will begin. This operation shown in (4 step diagram 2).

4 STEP DIAGRAM 2



9. **Welding selection button -** Permits selection of the welding mode. The LED beside the symbol confirm the selection:
   - Stick
   - TIG DC
   - TIG AC
10. **Electrode Connection (Negative) -** For quick disconnect system using Twist-Mate™ cable plugs with gas pass through for Tig Torches.

11. **Remote Control Connector** - For the connection of a Lincoln Foot Amptrol, Hand Amptrol or Arc Start Switch. See the ACCESSORIES section for available options.

12. **Electrode Connection (Positive) -** For quick disconnect system using Twist-Mate™ cable plugs

13. **Welding Parameter Drawing -** LED's show which mode or welding parameter is activated for adjustment.

- If it is necessary to modify the welding parameters "Item 13":
  - Wait four seconds after the LED's on the panel have gone out, the welding current LED will be lit.
  - Press the SETUP/Parameter push button "Item 4"; every time the push button is pressed, one of the LED's in the diagram "Item 13" comes on (in clockwise sequence) and the value of the parameter appears on the Digital display "Item 6". Stop at the desired parameter.
  - Rotate the Output/Parameter Adjust Knob"Item 5" and modify the parameter value.
  - Press the SETUP/parameter "Item 4" push button again to pass to another parameter, or wait five seconds and the Weld Current LED will come on again.

PARAMETER DEFAULTS
The following are the defaults for the adjustable parameters:

Parameter	MU	min	max	Default
Upslope	Sec	0	10	0.2
Peak Current Amp	6	max	100	
Downslope	Sec	0.5	10	1
Finish Current Amp	6	max	8	
Post Flow	Sec	0.2	60	5
Pulse Frequency	Hz	0.25	500	0.5
Peak %	%	5	95	50
Background	Amp	6	max	20
AC Frequency	Hz	20	150	100
AC Balance	% EN	35	85	65
Mode				DC TIG
Trigger				2 Step
Remote / Local				Local

SET UP MENU

Many additional parameters can be modified via the Set Up Menu. To access the Set Up Menu:

• Position the ON/OFF switch to OFF “0”.

• Depress and hold the Parameter select Push Button.

• Position the On/Off switch to on "I" at the back of the machine; the input voltage light "Item 1" (green LED) confirms normal operation.

• The Digital display "Item 1" will show the figure 0, the SETUP mode is confirmed by a center "0" on the Digital display

- Rotate the Output / Parameter Adjust Knob, the Digital Display shows the numbers corresponding to the parameters in sequence; stop at the desired parameter and push the "Setup/Parameter Push Button".

-With parameter (9) all the modifications made in the SETUP mode are cancelled and the standard values set by Invertec V205-T AC/DC are restored.

- The number on the Digital display "Item 6" is replaced by the value of the parameter that can be modified through the potentiometer "Item 5".

- To exit the Set Up Menu, return to “0” and press the Setup/Parameter Push Button

Indicator	Parameter	Default
0	Exit From Set Up	
1	Setting the initial "I" percentage on the welding "I"(2 – 200%)	50%
2	Pre Flow Time (0-25s)	0.5s
3	Arc Force, Percent above Peak Current for Stick only (0 – 100%)	30%
4	Hot Start, Percent above Peak Current for Stick only (0 – 100%)	80%
5	Setting the AC Wave Form 0 = Sinusoidal (+ and -) 1 = Triangular (+ and -) 2 = Square (+ and -)	2 (Square)
6	Min Current Value with Remote Control (6 Amps – Peak Current)	6 Amps
7	Max Current Value with Remote Control (6 Amps – Peak Current)	Peak Current
8	Touch Start or HF Start in DC, Ignored in AC 0 = HF, 1 = Touch Start	0
9	Reset of all Parameters	
10	Not Used	
11	Not Used	
12	2 Step Trigger Selection 0 = Restart Disabled 1 = Restart Enabled	1
13	4 Step Trigger Selection 0 = Restart Disabled 1 = Restart Enabled	0
14	Start Power, for TIG only This function increases the initial Start Current. (1 = min., 5 = max.)	1

OUTPUT LIMITATIONS

The maximum output current is derated in two situations; alternate AC Wave Forms and elevated AC Frequencies.

- Alternate AC Wave Forms (Set Set Up Menu)
  - Square 200 amps max. output
  - Sinusoidal 150 amps max. output
  - Triangular 120 amps max output

- Elevated AC Frequencies
  - Above 85Hz (AC output) the square wave output is limited to 170 amps. Elevated AC Frequencies do not effect the output of Sinusoidal and Triangular Waveforms.

These derated values have been programmed into the Invertec V205-T AC/DC to ensure reliable operation.

DC TIG WELDING

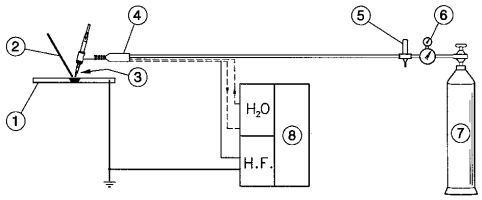
(see FIGURE B.3)
The TIG (Tungsten Inert Gas) welding process is based on the presence of an electric arc between a non-consumable electrode (pure or alloyed tungsten with an approximate melting temperature of 3370°C) and the workpiece. An inert gas (argon) atmosphere protects the weld pool.

To avoid dangerous inclusions of tungsten in the joint, the electrode should not contact the workpiece. For this reason the arc is started through a Hi. Freq. generator.

For situations requiring no Hi. Freq., Touch Start Tig reduces the short-circuit current to keep tungsten inclusions to the minimum.

To improve weld bead quality at the end of the weld it is important to carefully control the downslope of current and ensure proper gas coverage over the weld.

FIGURE B.3



1) Workpiece
2) Filler material
3) Non-consumable electrode
4) Torch
5) Flowmeter
6) Pressure reducer
7) Inert gas (argon)
8) Power source

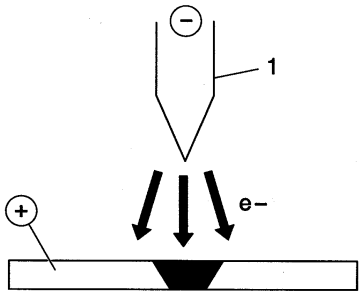
WELDING POLARITY

D.C.S.P. (Direct Current Straight Polarity)
(see FIGURE B.4)
While Welding, there is a continuous flow of electrons from the electrode to the workpiece.

This is the most used polarity, ensuring limited wear of the electrode, since the majority of the heat concentrates on the anode (workpiece). Narrow and deep welds are obtained with high travel speeds.

Most materials, with the exception of aluminum and magnesium, are welded with this polarity.

FIGURE B.4



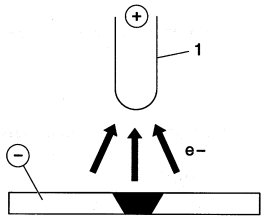
D.C.R.P. (Direct Current Reverse Polarity)
(see Figure B.5)

In this case, there is a continuous flow of electrons from the workpiece to the electrode. The reverse polarity is used for welding alloys covered with a layer of refractory oxide.

With this polarity the electrode functions as anode and is subjected to a high degree of heat; the workpiece is bombardment by positive ions sent from the electrode which break the surface oxide.

In D.C.R.P, high currents cannot be used, since they would cause an excessive wear of the electrode.

FIGURE B.5



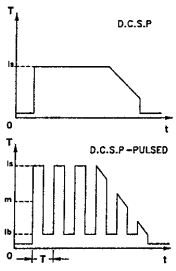
D.C.S.P.-Pulsed (Direct Current Straight Polarity Pulsed)
(see Figure B-6)

The use of pulsed direct current allows better control of the weld pool during certain operating conditions.

When compared with traditional TIG welding performed at the same average current, pulsed welding results in a smaller heat affected zone which results in fewer deformations and reduced chance of cracking and gas entrapment.

Increasing the frequency constricts the arc, increases stability and improves weld quality.

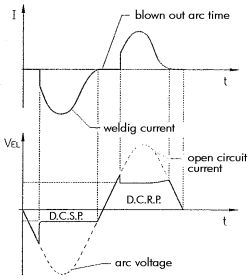
FIGURE B.6



A.C. (Alternating Current)
(see Figure B.7)

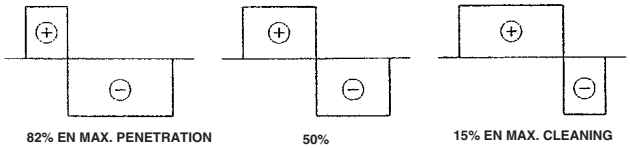
Alternating Current welding is typically used for Tig welding aluminum (and its alloys) or magnesium. During the positive half-wave (D. C. R. P.) the oxide is broken. During the negative half-wave (D.C.S.P.), the electrode cools, the workpiece melts and penetration occurs.

FIGURE B.7



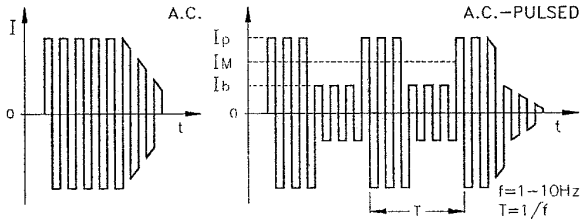
Changing the wave balance alters the the ratio between the cleaning and the penetrating current.

FIGURE B.8



A.C.-PULSED (ALTERNATING CURRENT PULSED)
When AC welding, a pulsed current can be used, with similar effects to those described in **pulsed direct current welding**.

FIGURE B.9



STEEL TIG WELDING

The TIG process is very effective for welding both carbon steel and alloy steel, especially in applications requiring precision results. Straight polarity (D.C.S.P.) is required. Since this process does not include the removal of impurities, proper cleaning and preparation of the edges is required.

FILLER MATERIAL:

The filler rods must have mechanical characteristics comparable to those of the base material.

If materials with chemical composition different from that of the base material are used, generally with greater quantities of alloys, it is necessary to take in consideration the final properties of the joint, be they mechanical or anticorrosive.

COPPER TIG WELDING

Since the TIG welding is a process characterized by high heat concentration, it is particularly suitable for welding materials with high thermal conductivity, like copper. As for steel, the direct polarity (D.C.S. P.) is employed, with argon as protective gas.
Considering the fluidity of molten copper, the use of backup support may prove useful.

FILLER MATERIAL

In order to avoid the oxidation of the molten material, filler materials containing phosphorus, silicon or other deoxidating materials are typically used. The mechanical properties can also be improved through the use of silver.

TIG WELDING OF ALUMINUM USING ALTERNATING CURRENT

The process can be applied to all positions. Given the difficulties of controlling the weld pool, flat welding is preferable. Cleaning the welding material is highly recommended.
In full penetration joints, it is important to use gas shielding as on the back side of the weld to reduce the risk of oxidation.

SETTING UP AND USE OF ELECTRODE

Since the electrode is subjected to high heat in alternating current TIG welding, a pointed tip will round off to obtain the proper tip shape. Tips resulting in a drop shape during welding, indicates over-loading. In this situation the electrode should be replaced with one having a larger diameter or the AC Balance should be increased (more E.N.)

WELDING MATERIAL

The welding material is selected in accordance with the base material on which you have to work.

GTAW Process

Electrode Polarity	DC-	AC	Approximate Argon Gas Flow Rate C.F.H. (l/min.)	
Electrode Tip Prepration	Sharpened	Sharpened		
Electrode Type / Electrode Size (in.)	EWTh-2, EWLa-1	EWTh-2, EWLa-1	Aluminum	Stainless Steel
.010	Up to 15 A.	Up to 15 A.	3-8 (2-4)	3-8 (2-4)
.020	Up to 15 A.	Up to 20 A.	5-10 (3-5)	5-10 (3-5)
.040	Up to 80 A.	Up to 60 A.	5-10 (3-5)	5-10 (3-5)
1/16	Up to 150 A.	Up to 130 A.	5-10 (3-5)	9-13 (4-6)
3/32	Up to MAX. A.	Up to MAX. A.	13-17 (6-8)	11-15 (5-7)
1/8	X	X	15-23 (7-11)	11-15 (5-7)

Tungsten electrodes are classified as follows by the American Welding Society (AWS):
+2% Thoria .....EWTh-2...red
+1.5% Lanthana .....EWLa-1 ...black

PROTECTIVE GAS

Both argon and helium work when welding aluminum. Argon is preferred, due to its lower cost and consumption. This gas also tends to stabilize the arc, thus making it easy to operate. For some applications, however, the use of helium, or argon-helium blends, is recommended due to better weld penetration and faster travel speed. Helium is especially suitable for welding thick workpieces. The recommended gas flow rates are shown in table 5.

TABLE 5

Current (A)	Helium cfh-(l/min)
50	29 - 14
100	29 - 14
150	42 - 20
200	42 - 20
250	53 - 25
300	53 - 25

AC TIG WELDING QUICK START UP

⚠ WARNING

• Following the installation of input power by a QUALIFIED ELECTRICIAN, make sure the power source is turned off at switch on rear panel.

Connect the shielding gas – argon – using a appropriate regulator. Connect the foot amptrol, torch and work lead to the power source.

With the work cable connected to a properly grounded work piece, turn the power source on.

The Invertec V205 T AC/DC TIG is ready to AC TIG weld with the following features:

• AC TIG
• Trigger Mode in 2 step mode
• Local control
• Pulser off
• AC Square Wave
• AC Balance 65% EN
• AC Frequency 100HZ
• Pre Flow .5sec.
• Post Flow 5 sec.
• High Freq Start

Change from Local to Remote control by pushing front panel push button.

Set the maximum output current desired using the Output Control. Initiate the arc by closing the arc start switch. The Amptrol will control the output current from 6 amps to current level set by Output Control.

To change the AC Frequency, press and hold the Parameter button for 3 seconds. The AC Frequency is now selected and can be varied by the Output Control. The frequency is displayed on the digital meter. After about 5 seconds, the power source will switch back to the welding mode ready to weld with the new selected AC Frequency.

To change the AC Balance, press and hold the Parameter button for 3 seconds, AC Frequency is selected, press the Parameter button again and AC Balance is selected. Adjust the Output Control for the desired AC Balance. After about 5 seconds, the power source will switch back to the welding mode ready to weld with the new selected AC Balance.

To change the Post Flow time, momentarily push the Parameter button until the Post Flow indicator light is on. Adjust the Output control to the desired Post Flow time as indicated on digital display.

DC TIG WELDING QUICK START UP

⚠ WARNING

- **Following the installation of input power by a QUALIFIED ELECTRICIAN, make sure the power source is turned off at switch on rear panel.**

Connect up the shielding gas – argon – using an appropriate regulator. Connect foot amptrol, torch and work lead to power source.

With the Work cable connected to a properly grounded work piece, turn the power source on.

The Invertec V205 T AC/DC TIG is ready to AC TIG weld. To change for DC TIG welding:

- Press Mode button to select "DC TIG."
- Press Trigger Mode button and set to 2-step.
- Press Local / Remote Mode button and set for Remote.
- Pulsing parameters selected by Parameter button, and changed using Output Control.

Set the maximum output current desired using the Output Control.

Initiate the arc by closing the Foot Amptrol's arc start switch. The Amptrol will control the output current from 6 amps to current level set by output control.

To change the Post Flow time, momentarily push the Parameter button until the Post Flow indicator light is on. Adjust the Output control to the desired Post Flow time as indicated on digital display.

To change from High Frequency to Lift Start, turn power source off. Press and hold the Parameter button while the power source is turned on. The Set Up Menu is now active. Rotate the Output Control until # 8 is displayed. Press the Parameter button again and rotate the Output Control until LIFT is displayed.

OPTIONAL ACCESSORIES
AND COMPATIBLE EQUIPMENT

Factory Installed

Twist-Mate Cable Connectors
1 – standard for Ground Clamp
1 – Gas Pass through for Tig Torch
Strap Packet
Instruction Manual

Field Installed

K870 - Foot Amptrol™ for TIG welding. When the V205-T's Output Control is in the "REMOTE" position, the foot Amptrol energizes the output and controls the output remotely. The Foot Amptrol connects directly to the 6 pin Amphenol.

K963-1 - Hand Amptrol™ for TIG welding. When the V205-T's Output Control is in the "Remote" position, the hand Amptrol energizes the output and controls the output remotely. The Hand Amptrol connects directly to the 6 pin Amphenol.

K814 - Arc Start Switch - Energizes the output for TIG welding if remote output control of the amperage is not desired. It allows on/off TIG welding at the current set by the Current Control on the control panel. When using the Arc Start Switch set the Output Control to the "LOCAL" position.

Magnum® PTA-9 and PTA-17 TIG Torches - The following standard Magnum® TIG torches with one-piece cable may be used with the Invertec V205-T.

• K1781-1	PTA-9	12.5 ft	medium back cap
• K1781-3	PTA-9	25 ft	medium back cap
• K1782-1	PTA-17	12.5 ft	long back cap
• K1782-3	PTA-17	25 ft	long back cap

NOTE: Each torch requires a Twist-Mate adapter,(one is included with the machine). Collets, collet bodies, and nozzles are not included and must be ordered separately.

CABLE PLUGS

K852-70 - Cable Plug Kit for 1/0-2/0 cable. Attaches to welding cable to provide quick disconnect from machine.

Twist-Mate Torch Adapter K1622-1 - One is shipped with the welder torch. If you do not care to interchange this part between torches (one is required to connect Magnum PTA-9 or PTA-17 TIG torches with one-piece cable to the V205-T) you may order an additional adapters. The quick connect plug provides connection for both gas and welding current.

TIG Torch Parts Kits - Parts kits are available for the PTA-9 and PTA-17 TIG torches. These kits include back cap, collets, collet bodies, nozzles and tungstens.
Order KP507 for PTA-9 torches
Order KP508 for PTA-17 torches
See publication E12.150 for parts kits breakdown.
Cut Length Consumables - TIG welding filler metals are available for welding stainless steel, mild steel, aluminum and copper alloys. See publication C9.10.

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- Have an electrician install and service this equipment.
- Turn the input power off at the fuse box, disconnect supply lines and allow machine to sit for five minutes minimum to allow the power capacitors to discharge before working inside this equipment.
- Do not touch electrically hot parts.

INPUT FILTER CAPACITOR DISCHARGE PROCEDURE

⚠ WARNING

The machine has internal capacitors which are charged to a high voltage during power-on conditions. This voltage is dangerous and must be discharged before the machine can be serviced. Discharging is done automatically by the machine each time the power is switched off. However, you must allow the machine to sit for at least 5 minutes to allow time for the process to take place.

ROUTINE MAINTENANCE

Prevent metal powder from accumulating near the aeration fins and over them.

⚠ WARNING

- **Disconnect the power supply before every operation**.

Carry out the following periodic controls on the power source:

- Clean the power source inside by means of low-pressure compressed air.
- Check the electric connections and all the connection cables.

⚠ CAUTION

- **Disconnect the power supply before every operation.**

- Check the temperature of the component and make sure that they are not overheated.
- Always use gloves in compliance with the safety standards.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.
The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause, generally it states to contact you local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact you local Lincoln Authorized Field Service Facility.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
PROBLEMS IN STICK WELDING		
Excessive spatter	1. Long arc 2. High current	
Craters	1. Fast movement of the electrode away from piece.	
Inclusions	1. Poor cleanliness or distribution of the Welding passes. 2. Improper movement of the electrode.	
Insufficient penetration	1. High progression speed. 2. Welding current too low. 3. Narrow chamfering.	
Sticking	1. Arc too short. 2. Current too low.	If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
Porosity	1. Humidity in electrode. 2. Long arc.	
Cracks	1. Current too high. 2. Dirty materials. 3. Hydrogen in weld (present on electrode coating).	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
PROBLEMS IN TIG WELDING		If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
Oxidation	1. Insufficient gas. 2. No protection on the back side.	
Tungsten inclusions	1. Incorrect electrode sharpening. 2. Electrode too small. 3. Operating failure (contact of the tip with the workpiece).	
Porosity	1. Dirt on the edges. 2. Dirt on the filler material. 3. Excessive travel speed. 4. Current intensity too low.	
Hot cracking	1 Unsuitable filler material. 2. High heat supply. 3. Dirty materials.	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

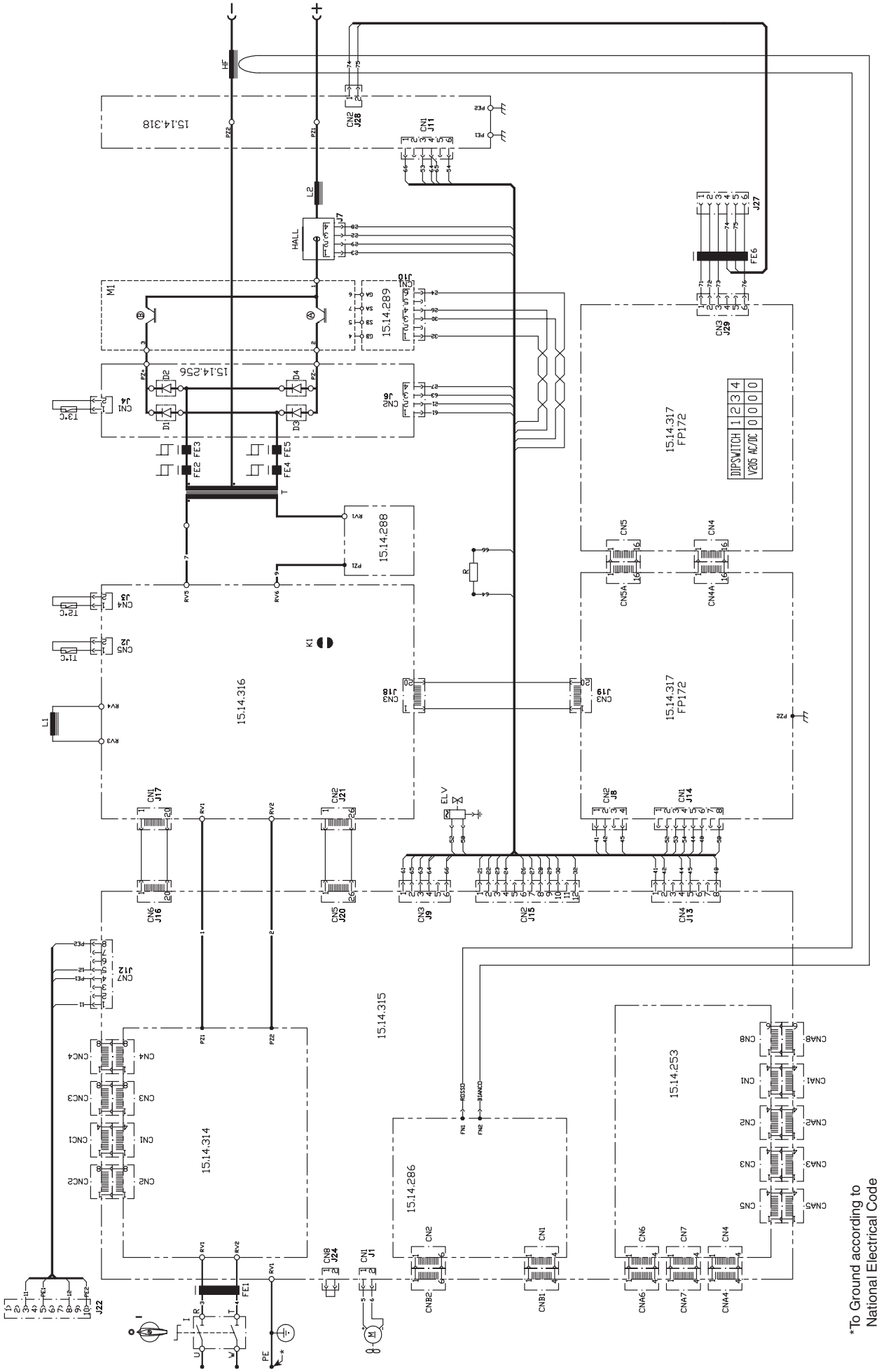
Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
ELECTRICAL FAILURES		If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
Machine fails to come on (Green LED off)	1. No Input Voltage. 2. Faulty supply plug or cable. 3) Internal fuse blown.	
Power output incorrect (Green LED on)	1. Incorrect setting up of the welding parameters. 2. Low mains supply voltage	
No output current (Green LED on)	1. Yellow LED on and "E10" flashing on "Digital Display": equipment has overheated. Await cooling with welding machine turned on. 2. "E11" blinking on "Digital Display": power supply voltage too high. 3. "E12" blinking on "Digital Display": power supply voltage too low. 4. "E20" flashing on "Digital Display": serial memory error (contact service). 5. "E24" flashing on "Digital Display": RC calibration error (contact service). 6. "E25" flashing on "Digital Display": serial memory error (contact service).	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

WIRING DIAGRAM (K1855-1)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment code number..

NOTES

Now Available...12th Edition
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Cleveland, Ohio 44117-1199.

and ask for bulletin ED-80 or call 216-383-2259 and ask for the Welding School Registrar.

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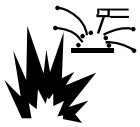
James F. Lincoln Arc Welding Foundation Book Information **(JFLF-515)** _____

Titles:	Price	Code	Quantity	Cost
New Lessons in Arc Welding	$5.00	L		
Procedure Handbook "Twelfth Edition"	$15.00	PH		
How to Read Shop Drawings	$4.50	H		
Incentive Management	$5.00	IM		
A New Approach to Industrial Economics	$5.00	NA		
The American Century of John C. Lincoln	$5.00	AC		
Welding Preheat Calculator	$3.00	WC-8		
Pipe Welding Charts	$4.50	ED-89		
			SUB TOTAL	
			Additional Shipping Costs if any	
			TOTAL COST	

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絕緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀捍材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

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