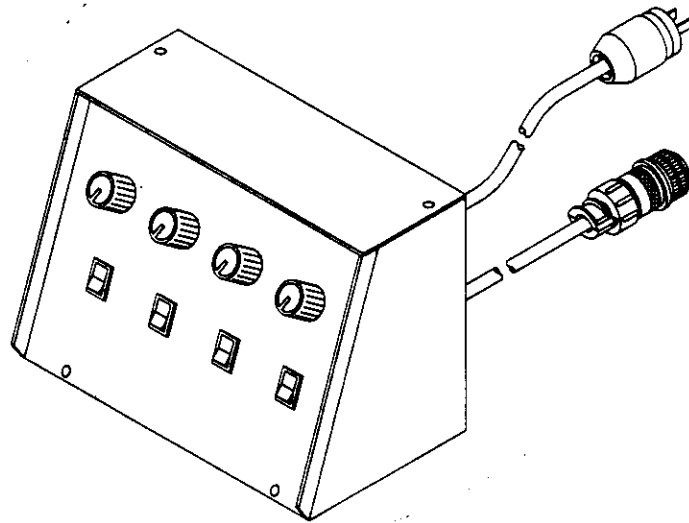




August 1989 FORM: OM-898
Effective With Serial No. JK661862

MODEL: PC-300



OWNER'S MANUAL

IMPORTANT: Read and understand the entire contents of both this manual and the power source manual used with this unit, with special emphasis on the safety material throughout both manuals, before installing, operating, or maintaining this equipment. This unit and these instructions are for use only by persons trained and experienced in the safe operation of welding equipment. Do not allow untrained persons to install, operate, or maintain this unit. Contact your distributor if you do not fully understand these instructions.

MILLER ELECTRIC Mfg. Co.
A Miller Group Ltd. Company

P.O. Box 1079
Appleton, WI 54912 USA
Tel. 414-734-9821

LIMITED WARRANTY

EFFECTIVE: MARCH 15, 1989

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

LIMITED WARRANTY – Subject to the terms and conditions hereof, Miller Electric Mfg. Co., Appleton, Wisconsin warrants to its Distributor/Dealer that all new and unused Equipment furnished by Miller is free from defect in workmanship and material as of the time and place of delivery by Miller. No warranty is made by Miller with respect to engines, trade accessories or other items manufactured by others. Such engines, trade accessories and other items are sold subject to the warranties of their respective manufacturers, if any. All engines are warranted by their manufacturer for one year from date of original purchase, except Tecumseh and Onan engines which have a two year warranty.

Except as specified below, Miller's warranty does not apply to components having normal useful life of less than one (1) year, such as spot welder tips, relay and contactor points, MILLER-MATIC parts that come in contact with the welding wire including nozzles and nozzle insulators where failure does not result from defect in workmanship or material.

Miller shall be required to honor warranty claims on warranted Equipment in the event of failure resulting from a defect within the following periods from the date of delivery of Equipment to the original user:

1. Arc welders, power sources, robots, and 1 year components
2. Load banks 1 year
3. Original main power rectifiers 3 years (labor – 1 year only)
4. All welding guns, feeder/guns and torches 90 days
5. All other Millermatic Feeders 1 year
6. Replacement or repair parts, exclusive of labor . 60 days
7. Batteries 6 months

provided that Miller is notified in writing within thirty (30) days of the date of such failure.

As a matter of general policy only, Miller may honor claims submitted by the original user within the foregoing periods.

In the case of Miller's breach of warranty or any other duty with respect to the quality of any goods, the exclusive remedies therefore 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, therefore, no compensation for transportation costs of any kind will be allowed. Upon receipt of notice of apparent defect or failure, Miller shall instruct the claimant on the warranty claim procedures to be followed.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

EXCEPT AS EXPRESSLY PROVIDED BY MILLER IN WRITING, MILLER PRODUCTS ARE INTENDED FOR ULTIMATE PURCHASE BY COMMERCIAL/INDUSTRIAL USERS AND FOR OPERATION BY PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT AND NOT FOR CONSUMERS OR CONSUMER USE. MILLER'S WARRANTIES DO NOT EXTEND TO, AND NO RESELLER IS AUTHORIZED TO EXTEND MILLER'S WARRANTIES TO, ANY CONSUMER.

ERRATA SHEET

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

AMENDMENT TO SECTION 3 – INSTALLATION OR RELOCATION

Add Section 3-7. MOUNTING BRACKET INSTALLATION

A mounting bracket is supplied to secure the Pulser Control in a permanent location.



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down welding power source, and be sure it cannot be accidentally energized before installing mounting bracket.
- Turn off Pulser Control, and remove input power plug from receptacle before moving unit.
- Turn off high-frequency unit, if applicable.

1. Place Pulser Control on top of welding power source to determine location. The bracket may be used as shipped or it may be removed and turned outward.
2. Remove mounting bracket from Pulser Control, and mark location of mounting holes on welding power source cover using the mounting bracket as a template.
3. Remove cover from welding power source.



CAUTION: METAL FILINGS AND/OR TOOL CONTACT WITH INTERNAL COMPONENTS can damage unit.

- Cover internal components.
- Clean unit, and remove internal covering material before resuming operation.

4. If there is sheet metal under the cover, drill two 3/16 in. (4.7 mm) clearance holes at marked location. Place cover on welding power source, and use as a template to mark holes in unit sheet metal. Remove cover and drill two 5/32 in. (4 mm) holes in sheet metal.
5. If there is no sheet metal under the cover and the Pulser Control will only be attached to the cover, drill two 5/32 in. (4 mm) holes in the cover.
6. Reinstall welding power source cover.
7. Using two No. 8 sheet metal screws (not supplied), secure bracket to cover.
8. Secure Pulser Control to bracket.

AMENDMENT TO SECTION 4 – OPERATOR CONTROLS

Delete WARNING of Section 4-1. POWER SWITCH

Amend WARNING of Section 4-7. OUTPUT (CONTACTOR) SWITCH as follows:



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Do not touch the weld output terminals on the welding power source when the contactor is energized.
- Do not touch torch or electrode and work clamp at the same time.

Amend Table 4-1. Availability Of Open-Circuit Voltage When Welding Power Source Is Energized

Table 4-1. Availability Of Open-Circuit Voltage When Welding Power Source Is Energized

Power Switch	Remote Control Switch Position	Pulser Control Output (Contactor) Switch Position	Welding Power Source Output (Contactor) Switch Position	Open-Circuit Voltage
ON	ON or OFF	ON	ON	Available
ON	ON or OFF	ON	REMOTE	Available
ON	ON or OFF	REMOTE 14	ON	Available
ON	OFF	REMOTE 14	REMOTE	Not Available
ON	ON	REMOTE 14	REMOTE	Available
OFF	ON or OFF	ON or REMOTE 14	REMOTE	Not Available
OFF	ON or OFF	ON or REMOTE 14	ON	Available

AMENDMENT TO SECTION 7 – ELECTRICAL DIAGRAMS

IMPORTANT: Use Serial Number of unit to select appropriate diagram.

Amend Diagram 7-1. Circuit Diagram For Pulser Control (See Page 3 on this Errata Sheet)

Amend Diagram 7-2. Wiring Diagram For Pulser Control (See Page 4 on this Errata Sheet)

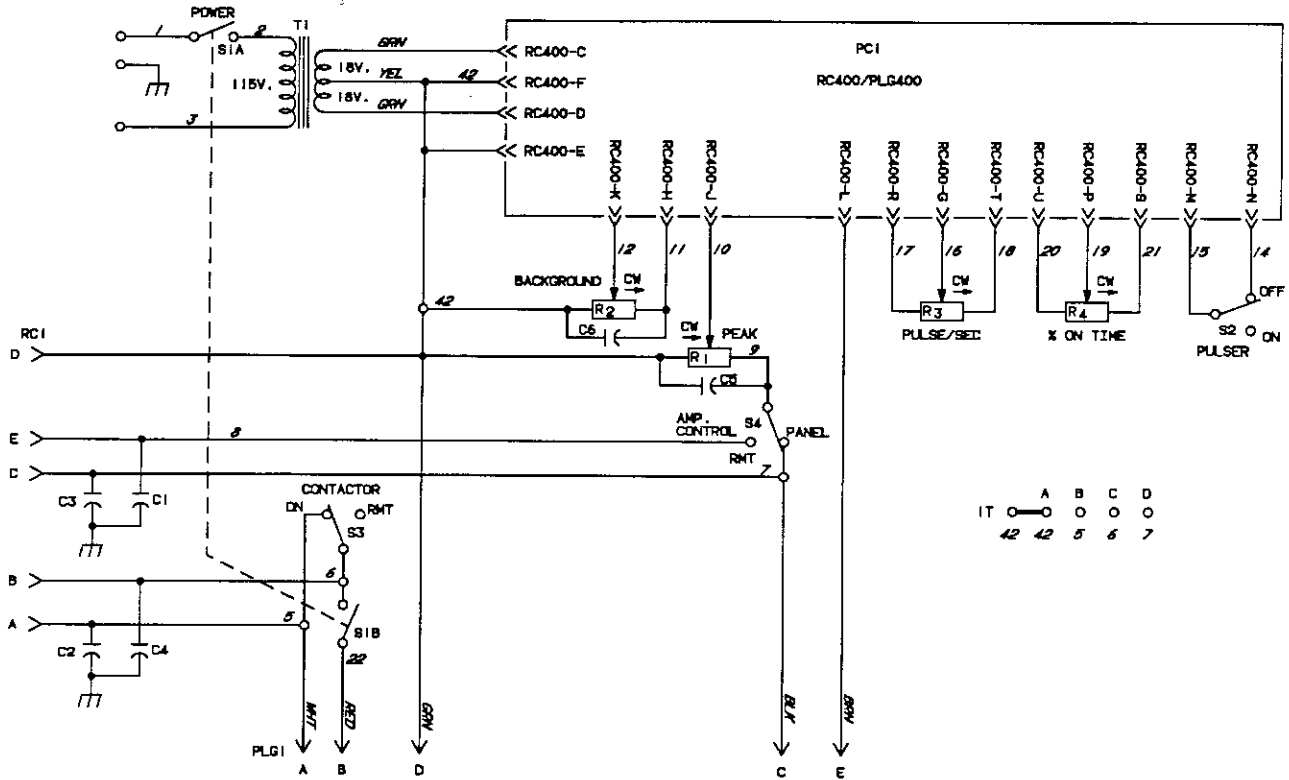
AMENDMENT TO SECTION 8 – PARTS LIST

Amend Parts List as follows:

**	Dia. Mkgs.	Part No.	Replaced With	Description	Quantity
15-19	T1	128 908	035 759	TRANSFORMER, control mintr 115/36VCT	1
15-		Added	131 515	LABEL, warning electric shock and arc welding	1
15-25	S1	127 788	131 663	SWITCH, rocker DPDT 8A 125VAC (Eff w/JK721125)	1
15-		130 003	Deleted	Eff w/KA771754	
15-		110 089	Deleted	Eff w/KA771754	
15-	PL1	Added	027 645	LIGHT, ind red lens 125VAC (Eff w/KA861609)	1
15-		Added	138 583	BRACKET,mtg unit (Eff w/KA861609)	1
16-	R24	Added	035 823	RESISTOR, CF .25W 100 ohm (Eff w/JK660587)	1

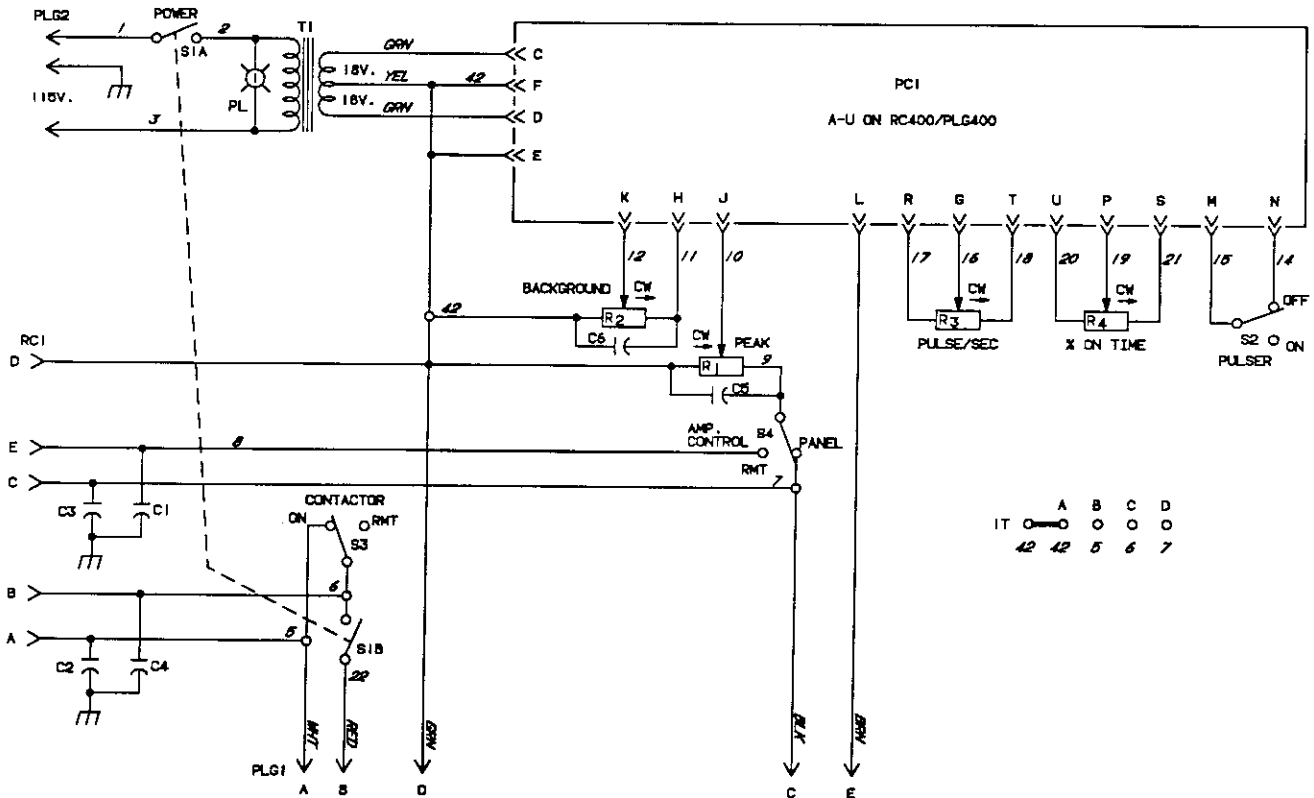
**First digit represents page no - digits following dash represent item no.

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.



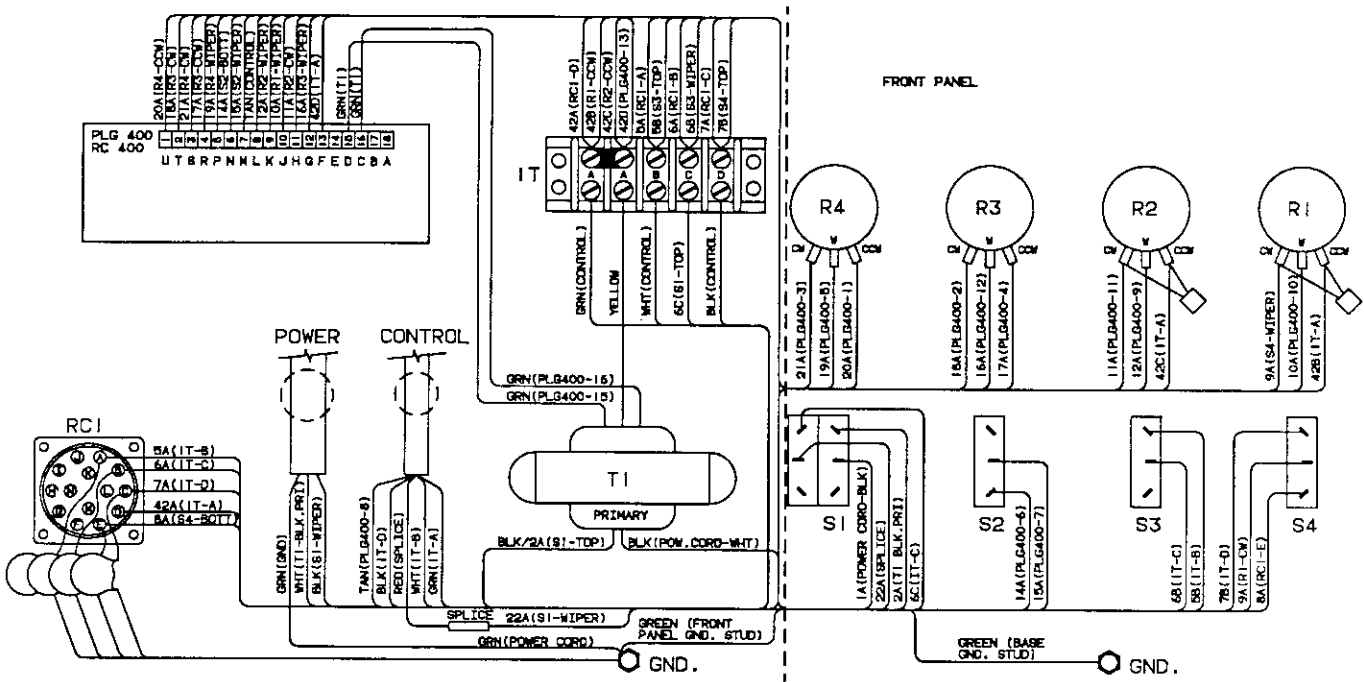
Circuit Diagram No. SB-131 707

Diagram 7-1. Circuit Diagram For Pulser Control Effective With Serial No. JK721125 Thru KA861608



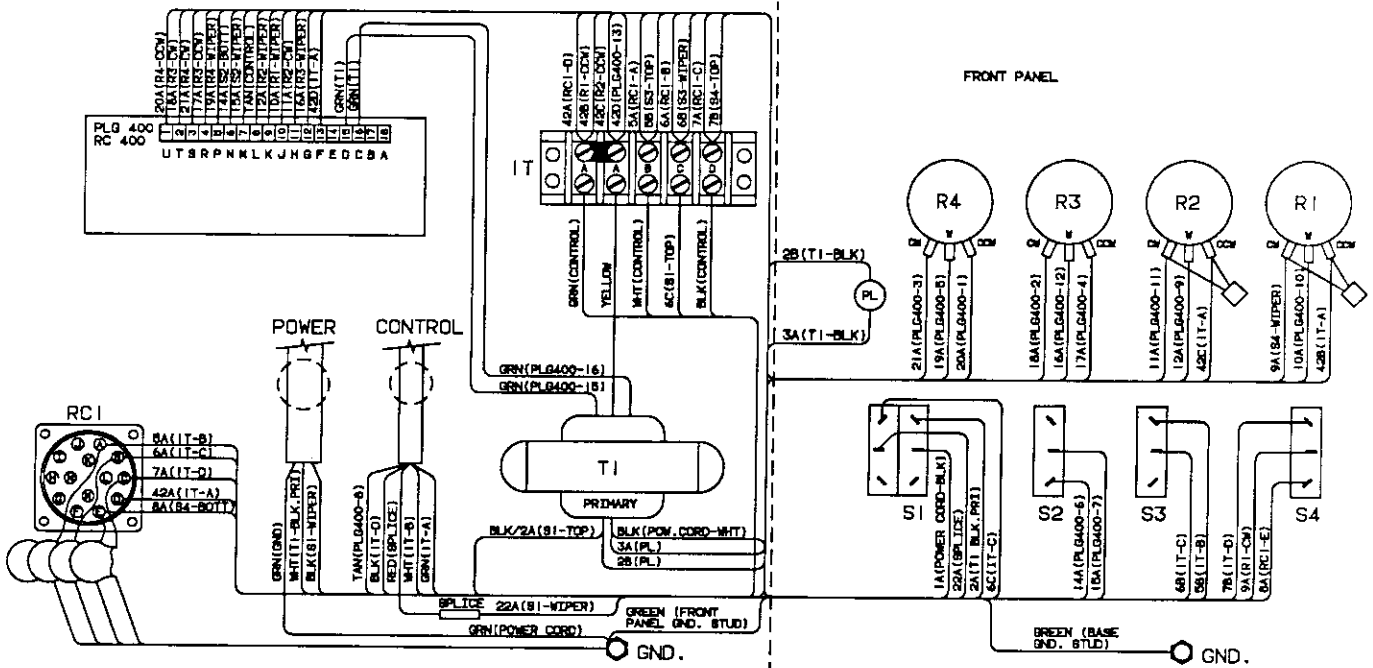
Circuit Diagram No. SB-138 254

Diagram 7-1. Circuit Diagram For Pulser Control Effective With Serial No. KA861609



Wiring Diagram No. SB-131 766

Diagram 7-2. Wiring Diagram For Pulser Control Effective With Serial No. JK721125 Thru KA861608



Wiring Diagram No. SB-138 562

Diagram 7-2. Wiring Diagram For Pulser Control Effective With Serial No. KA861609

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage **with the delivering carrier**. Assistance for filing or settling claims may be obtained from the distributor and/or the equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide the Model Description and Serial or Style Number.

Use the following spaces to record the Model Designation and Serial or Style Number of your unit. The information is located on the data card or the nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____

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SECTION 1 – SAFETY PRECAUTIONS AND SIGNAL WORDS

1-1. GENERAL INFORMATION AND SAFETY

A. General

Information presented in this manual and on various labels, tags, and plates on the unit pertains to equipment design, installation, operation, maintenance, and troubleshooting which should be read, understood, and followed for the safe and effective use of this equipment.

The nameplate of this unit uses international symbols for labeling the front panel controls. The symbols also appear at the appropriate section in the text.

B. Safety

The installation, operation, maintenance, and troubleshooting of arc welding equipment requires practices and procedures which ensure personal safety and the safety of others. Therefore, this equipment is to be installed, operated, and maintained only by qualified persons in accordance with this manual and all applicable codes such as, but not limited to, those listed at the end of Section 1 – Safety Rules For Operation Of Arc Welding Power Source in the power source Owner's Manual.

1-2. SAFETY ALERT SYMBOL AND SIGNAL WORDS

The following safety alert symbol and signal words are used throughout this manual to call attention to and identify different levels of hazard and special instructions.



This safety alert symbol is used with the signal words **WARNING** and **CAUTION** to call attention to the safety statements.



WARNING statements identify procedures or practices which must be followed to avoid serious personal injury or loss of life.



CAUTION statements identify procedures or practices which must be followed to avoid minor personal injury or damage to this equipment.

IMPORTANT statements identify special instructions necessary for the most efficient operation of this equipment.

SECTION 2 – SPECIFICATIONS

Table 2-1. Specifications

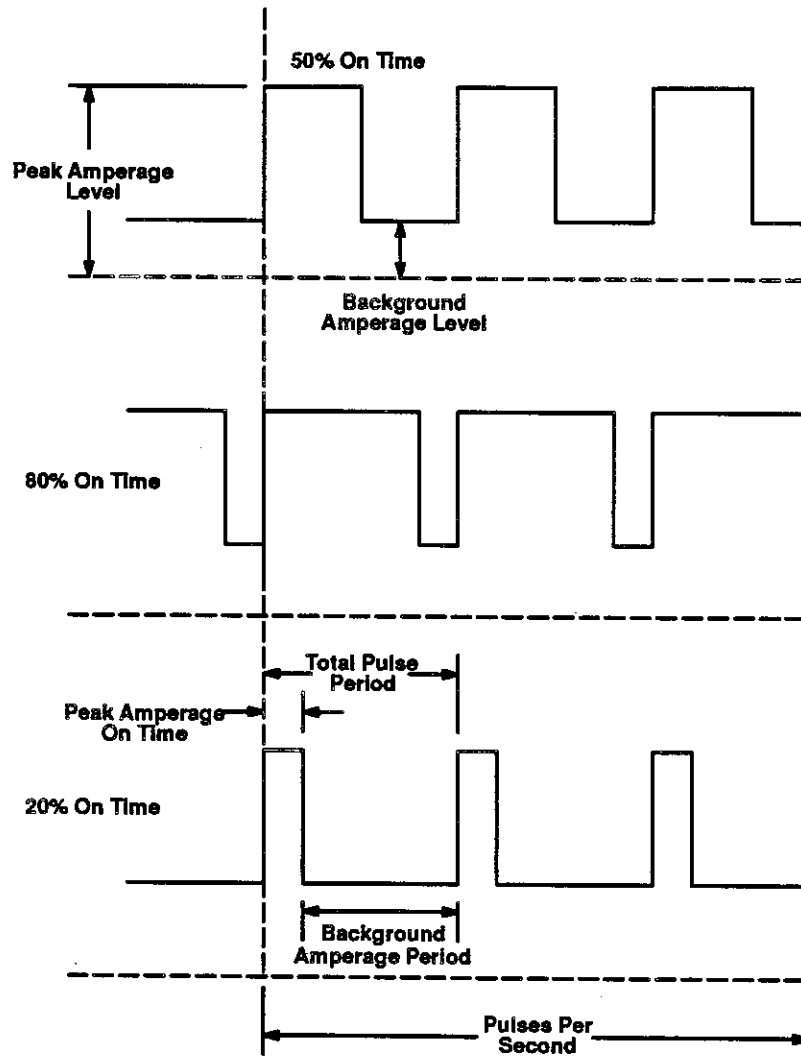
Input Power Requirements 50/60 Hz Single-Phase	Overall Dimensions	Weight	
		Net	Ship
115 Volts AC At 0.5 Amperes	Height – 7-1/8 in. (181 mm) Width – 9-1/4 in. (235 mm) Length – 5-1/2 in. (140 mm)	7.2 lbs. (3.3 kg)	8.8 lbs. (4 kg)

2-1. DESCRIPTION (Figure 2-1)

This Pulser Control can be used with different welding power sources to provide variable pulsed weld output primarily for the Gas Tungsten Arc Welding – Pulsed Arc (GTAW-P) process. This unit is designed for use with welding power sources using a positive reference command signal not to exceed +10 volts dc. When properly connected to the welding power source, the unit provides contactor control and control of peak amperage, background amperage, percent on time, and pulses per second. The unit also provides remote peak amperage, remote background amperage, and remote contactor control. The unit is equipped with an 8 ft. (2.4 m) inter-

connecting cord and plug and an 8 ft. (2.4 m) input power cord and plug.

Pulsing refers to the alternate raising and lowering of the weld output at a periodic rate (see Figure 2-1). The raised portions of the weld output are controlled in width, frequency, and amplitude, forming pulses of weld output. These pulses and the lower output between them (called the background amperage) alternately heat and cool the molten weld puddle. The combined effect gives the operator better control of penetration, bead width, crowning, undercutting, and puddle sag in out-of-position welding, especially vertical-up.



S-0259

Figure 2-1. Pulsed Output

SECTION 3 – INSTALLATION OR RELOCATION

3-1. LOCATION



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down welding power source, and be sure it cannot be accidentally energized before installing this unit.
- Turn off Pulser Control, and remove input power plug from receptacle before moving unit.
- Turn off high-frequency unit, if applicable.

The service life and efficiency of the unit are reduced when it is subjected to high levels of dust, dirt, moisture, corrosive vapors, and extreme heat.

3-2. DIP SWITCH FOR PULSES PER SECOND SELECTION (Figure 3-1)



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down welding power source, and be sure it cannot be accidentally energized before inspecting or installing.
- Turn off Pulser Control, and remove input power plug from receptacle before inspecting or installing.
- Turn off high-frequency unit, if applicable.

Table 2-1 gives overall dimensions of the Pulser Control.

The Pulser Control can be located where desired as long as cord lengths are considered before installing. The location should allow room to remove wrapper for installation, maintenance, and repair procedures.



CAUTION: ELECTROSTATIC DISCHARGE (ESD) can damage circuit boards.

- Put on properly grounded wrist strap BEFORE changing DIP switch positions or handling circuit boards.

The Pulser Control has an internal DIP switch consisting of two switches located on the Pulser circuit board for selecting the desired range for the PULSES PER SECOND control (see Section 4-4). The Pulser Control is shipped with the switches set for the 0.5 to 20 pulses per second range. To check or change the the switch positions on the DIP switch, proceed as follows:

IMPORTANT: Be sure the selected range matches the pulsing capability of the welding power source being used.

1. Remove four screws from the front panel, and open enclosure.
2. Locate the pulses per second DIP switch on the Pulser circuit board (see Figure 3-1), and place the switches in the desired positions (positions are marked on circuit board near switches) as follows:
 - a. To select the 0.5 to 20 pulses per second range, place switch 1 in the ON position and switch 2 in the OFF position. The PULSES PER SECOND control will function using the inner scale.
 - b. To select the 10 to 300 pulses per second range, place switch 1 in the OFF position and switch 2 in the ON position. The PULSES PER SECOND control will function using the outer scale.

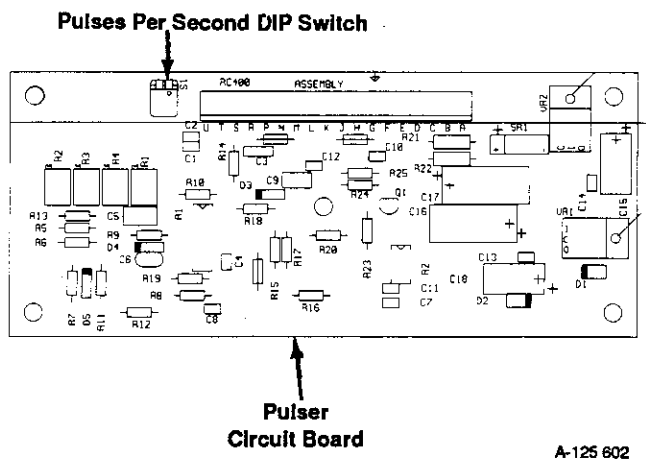


Figure 3-1. Pulses Per Second Dip Switch Location

3-3. GAS TUNGSTEN ARC WELDING – PULSED ARC (GTAW-P) SYSTEM SET-UP (Figure 3-2)

To perform Gas Tungsten Arc Welding – Pulsed Arc (GTAW-P) using a welding power source without built-in high frequency, several pieces of equipment are re-

quired: the welding power source, high-frequency unit, remote amperage/contacter control, Pulser Control, and proper interconnecting cords. Use the following diagram to connect this equipment for operation as a Gas Tungsten Arc Welding – Pulsed Arc (GTAW-P) system using an external high-frequency unit.

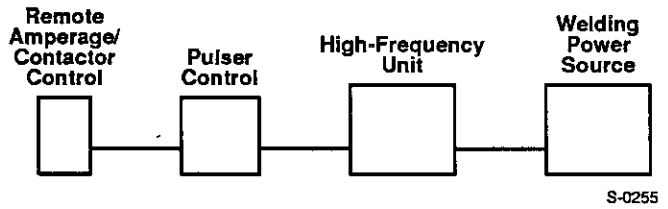


Figure 3-2. Connection Diagram

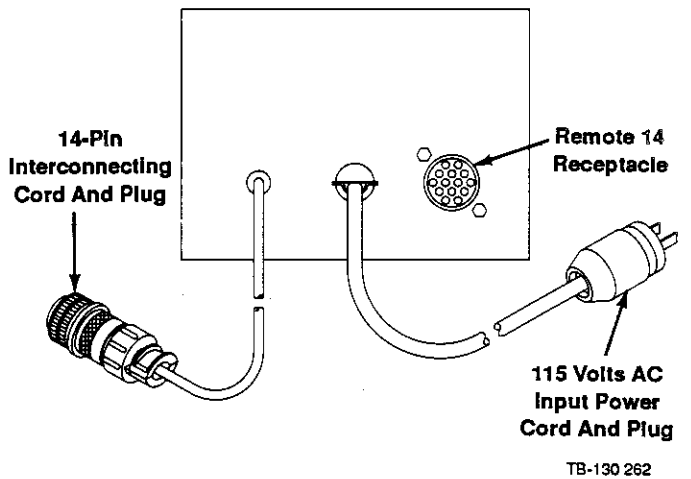


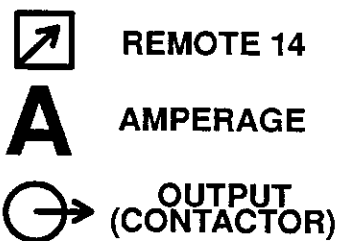
Figure 3-3. Rear Panel View And Information

3-4. INTERCONNECTING CORD AND PLUG CONNECTIONS TO HIGH-FREQUENCY UNIT OR WELDING POWER SOURCE (Figure 3-2 And Figure 3-3)

IMPORTANT: The Pulser Control can be used with different welding power sources to provide variable pulsed weld output. The selected welding power source must provide a positive reference command voltage not to exceed +10 volts dc.

A 14-pin Amphenol plug PLG1 is provided on the interconnecting cord for connection to a matching receptacle on the high-frequency unit or welding power source as applicable. To make connections, align keyway, insert plug, and rotate threaded collar fully clockwise.

3-5. REMOTE 14 RECEPTACLE AND INFORMATION (Figure 3-3 And Figure 3-4)



REMOTE 14 receptacle RC1 is used to connect any of the following equipment to the Pulsar Control circuitry:

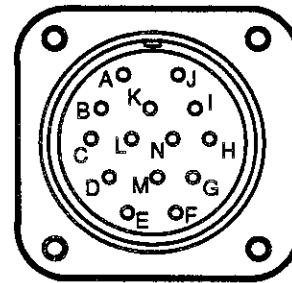
- a. Remote Contactor
- b. Remote Amperage control
- c. Combination of above.

To make connections, align keyway, insert plug, and rotate threaded collar fully clockwise.

The following socket information is included in case the supplied cord is not suitable, and it is necessary to wire a plug or cord to interface with REMOTE 14 receptacle RC1.

- Socket A: Contactor control switch connection.
- Socket B: Contactor control switch connection.
- Socket C: Amperage control connection (maximum side).
- Socket D: Amperage control connection (minimum side).
- Socket E: Amperage control connection (wiper contact).

IMPORTANT: *The remaining sockets in the receptacle are not used.*



S-0004

Figure 3-4. Front View Of 14-Socket Amphenol Receptacle With Socket Locations

3-6. ELECTRICAL INPUT CONNECTIONS (Figure 3-3)

An 8 ft. (2.4 m) cord with plug attached is provided on this unit. Connect the plug to a properly grounded, 50/60 Hz single-phase, 115 volts ac receptacle.

SECTION 4 – OPERATOR CONTROLS

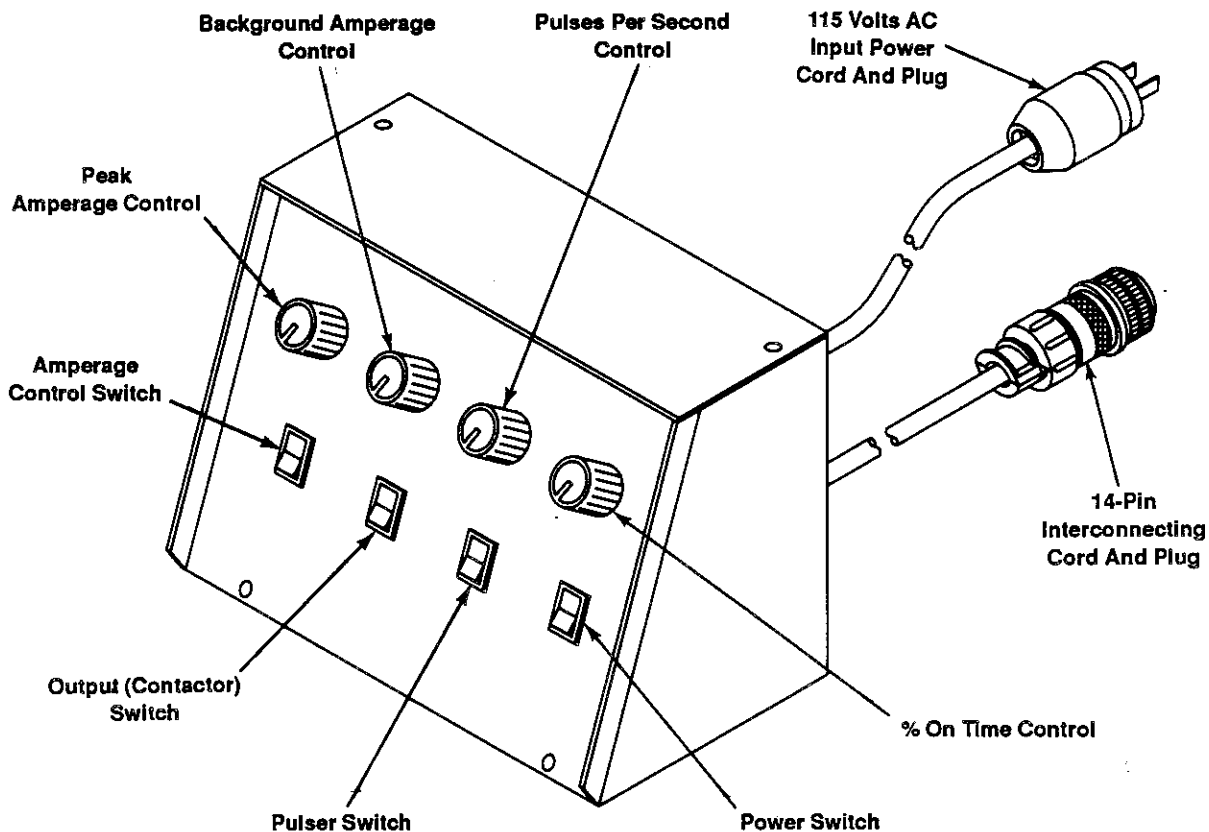
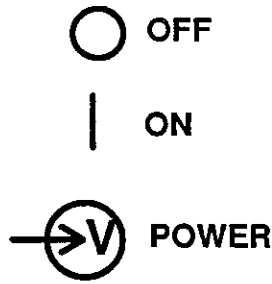


Figure 4-1. Operator Controls

TB-130 261

4-1. POWER SWITCH (Figure 4-1)



Placing the POWER switch in the ON position energizes the Pulser Control. Placing the POWER switch in the OFF position turns off the Pulser Control.



WARNING: UNEXPECTED WELD OUTPUT can cause serious personal injury or damage to workpiece or equipment.

- Use POWER switch on welding power source to shut down weld output.

The POWER switch on this unit disconnects the 115 volts ac but does not interrupt the output (contactor) circuitry. As a result, the OUTPUT (CONTACTOR) switch on the Pulser Control is functional even when the POWER switch on this unit is OFF. If the contactor is energized, the welding power source will provide open-circuit voltage at minimum output level without control.

4-2. PEAK AMPERAGE CONTROL (Figure 4-1)

The PEAK AMPERAGE control is a fine amperage control for the Amperage control on the welding power source. For example, if the Amperage control on the welding power source is set at the mid-range position, the PEAK AMPERAGE control will provide (from its minimum to maximum adjustment) fine amperage control of one half the welding power source output. If complete control of weld output is desired through the Pulser Control, set the welding power source Amperage control to its maximum setting. Rotating the control clockwise increases the peak amperage. The scale surrounding the control is calibrated from 0 to 100 percent and should not be read as an amperage or voltage value.

IMPORTANT: The PEAK AMPERAGE control may be adjusted while welding.

4-3. BACKGROUND AMPERAGE CONTROL (Figure 4-1)

The BACKGROUND AMPERAGE control provides a means of setting the weld output background amperage level. The background amperage is a percentage of the peak amperage and can never be set to a value higher than the peak amperage. Rotating the control clockwise increases the background amperage. The scale surrounding the control is calibrated from 0 to 100 percent and should not be read as an amperage or voltage value.

IMPORTANT: The BACKGROUND AMPERAGE control may be adjusted while welding.

4-4. PULSES PER SECOND CONTROL (Figure 4-1)

The PULSES PER SECOND control provides a means of selecting the pulse frequency (pulses per second) when the PULSER switch is in the ON position. Rotating the control clockwise increases the pulse frequency. The two scales surrounding the control are calibrated in pulses per second. The inner scale is calibrated from 0.5 to 20 pulses per second. The outer scale is calibrated from 10 to 300 pulses per second. The desired scale is selected by an internal DIP switch (see Section 3-2).

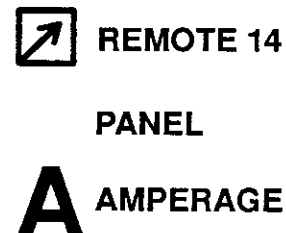
IMPORTANT: The PULSES PER SECOND control may be adjusted while welding.

4-5. % ON TIME CONTROL (Figure 4-1)

The % ON TIME control provides a means of selecting the pulse width when the PULSER switch is in the ON position. Rotating the control clockwise increases the peak output time in relation to the entire pulse time as set on the PULSES PER SECOND control. The scale surrounding the control is calibrated from 5 to 95 percent and represents the peak output on time during one pulse.

IMPORTANT: The % ON TIME control may be adjusted while welding.

4-6. AMPERAGE SWITCH (Figure 4-1)



If remote amperage control is desired, make connections to the REMOTE 14 receptacle as instructed in Section 3-5, and place the AMPERAGE switch in the REMOTE 14 position. When a Remote Amperage control is used and the PULSER switch is in the ON position, the peak and background amperage will increase and decrease proportionately with the setting on the Remote Amperage control. When the PULSER switch is in the OFF position, the PEAK AMPERAGE control will be a slave to the Remote Amperage control, which is a slave to the Amperage control on the welding power source. The BACKGROUND AMPERAGE control does not function when the PULSER switch is in the OFF position.

If remote amperage control is not desired, place the AMPERAGE switch in the PANEL position. The PEAK AMPERAGE and BACKGROUND AMPERAGE controls will control the available amperage.

4-7. OUTPUT (CONTACTOR) SWITCH (Figure 4-1 And Table 4-1)



REMOTE 14



ON



OUTPUT (CONTACTOR)



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Do not touch the weld output terminals on the welding power source when the contactor is energized.
- Do not touch torch or electrode and work clamp at the same time.

UNEXPECTED WELD OUTPUT can cause serious personal injury or damage to workpiece or equipment.

- Use **POWER** switch on welding power source to shut down weld output.
- Read and follow safety information at beginning of Section 4-1 before proceeding.

When the OUTPUT (CONTACTOR) switch is in the ON position, open-circuit voltage is present at the weld output terminals for as long as the welding power source is energized.

The OUTPUT (CONTACTOR) switch has two positions, ON and REMOTE 14. Availability of open-circuit voltage depends on the position of the Pulser Control OUTPUT (CONTACTOR) switch and the position of the welding power source Output (Contactor) switch (see Table 4-1).

If remote contactor control is desired, make connections to the REMOTE 14 receptacle as instructed in Section 3-5. Place the OUTPUT (CONTACTOR) switch in the REMOTE 14 position. Open-circuit voltage is present at the weld output terminals whenever the remote contactor switch is closed.

If remote contactor control is not desired, place the OUTPUT (CONTACTOR) switch in the ON position. Open-circuit voltage will be available at the weld output terminals whenever the welding power source is energized.

4-8. PULSER SWITCH (Figure 4-1)



OFF



ON

PULSER

When the PULSER switch is placed in the ON position, the welding power source output amperage will pulse between the background amperage setting on the BACKGROUND AMPERAGE control and the peak amperage setting on the PEAK AMPERAGE control. When the PULSER switch is placed in the OFF position, the welding power source will not pulse, but rather remain at the peak amperage level.

The PULSER switch may be placed in either the ON or OFF position before or during the welding process. If the PULSER switch is placed in the ON position before welding, the output amperage may be at either the peak or background amperage level. If the PULSER switch is placed in the ON position while welding, pulsing begins with the output amperage remaining at the peak amperage level and pulsing to the background amperage level.

Table 4-1. Availability Of Open-Circuit Voltage When Welding Power Source Is Energized

Remote Control Switch Position	Pulser Control Output (Contactor) Switch Position	Welding Power Source Output (Contactor) Switch Position	Open-Circuit Voltage
ON or OFF	ON	ON	Available
ON or OFF	ON	REMOTE	Available
ON or OFF	REMOTE 14	ON	Available
OFF	REMOTE 14	REMOTE	Not Available
ON	REMOTE 14	REMOTE	Available

SECTION 5 – SEQUENCE OF OPERATION



WARNING: ELECTRIC SHOCK can kill; EXPOSURE TO ENVIRONMENT can damage internal parts.

- Do not touch live electrical parts.
- Keep all covers and panels in place while operating.

Warranty is void if the unit is operated with any portion of the outer enclosure removed.

ARC RAYS, SPARKS, AND HOT SURFACES can burn eyes and skin; NOISE can damage hearing.

- Wear correct eye, ear, and body protection.

FUMES AND GASES can seriously harm your health.

- Keep your head out of the fumes.
- Ventilate to keep from breathing fumes and gases.
- If ventilation is inadequate, use approved breathing device.

HOT METAL, SPATTER, AND SLAG can cause fire and burns.

- Watch for fire.
- Keep a fire extinguisher nearby, and know how to use it.
- Do not use near flammable material.
- Allow work and equipment to cool before handling.

MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

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

See Section 1 - Safety Rules For Operation Of Arc Welding Power Source in the welding power source Owner's Manual for basic welding safety information.

5-1. GAS TUNGSTEN ARC WELDING – PULSED ARC (GTAW-P)



WARNING: Read and follow safety information at beginning of entire Section 5 before proceeding.

1. Install and prepare welding power source according to its Owner's Manual.
2. Install Pulser Control as instructed in Section 3.
3. Install and prepare high-frequency unit according to its Owner's Manual, if applicable. Scratch start Gas Tungsten Arc Welding – Pulsed Arc (GTAW-P) does not require the use of high frequency.
4. Place the PEAK AMPERAGE control in the desired position (see Section 4-2).

5. Place the BACKGROUND AMPERAGE control in the desired position (see Section 4-3).
6. Place the PULSES PER SECOND control in the desired position (see Section 4-4).
7. Place the % ON TIME control in the desired position (see Section 4-5).
8. Place the AMPERAGE switch in the desired position (see Section 4-6).



WARNING: Read and follow safety information at beginning of entire Section 4-1 before proceeding.

9. Place the OUTPUT (CONTACTOR) switch in the desired position (see Section 4-7).
10. Place the PULSER switch in the ON position.
11. Wear dry insulating gloves and clothing, and wear welding helmet with proper filter lens according to ANSI Z49.1.
12. Prepare for welding as follows:
 - a. Connect work clamp to clean, bare metal at workpiece.
 - b. Select proper tungsten electrode (see Table 6-2).
 - c. Prepare tungsten electrode according to Section 6-2, and insert into torch.
13. Turn on shielding gas and water supplies as applicable.
14. Place the POWER switch on the Pulser Control in the ON position.
15. Turn on the welding power source.
16. Turn on and adjust the high-frequency unit, if applicable.
17. Begin welding.

5-2. SHUTTING DOWN

1. Stop welding.
2. Shut down the welding power source.
3. Place the POWER switch on the Pulser Control in the OFF position.
4. Turn off high-frequency unit, if applicable.
5. Turn off shielding gas and water supplies as applicable.



WARNING: HIGH CONCENTRATION OF SHIELDING GAS can harm health or kill.

- Shut off gas supply when not in use.

SECTION 6 – MAINTENANCE & TROUBLESHOOTING

6-1. ROUTINE MAINTENANCE (Table 6-1)

IMPORTANT: Every six months inspect the labels on this unit for legibility. All precautionary labels must be maintained in a clearly readable state and replaced when necessary. See Parts List for part number of precautionary labels.



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down welding power source, and be sure it cannot be accidentally energized before inspecting, maintaining, or servicing.
- Turn off Pulser Control, and remove input power plug from receptacle before inspecting, maintaining, or servicing.
- Turn off high-frequency unit, if applicable.

Maintenance to be performed only by qualified persons.

Table 6-1. Maintenance Schedule

Frequency*	Maintenance
Every month.	Units in heavy service environments: Check labels, and interconnecting cords.
Every 6 months.	Check all labels (see IMPORTANT block, Section 6-1) and interconnecting cords.

*Frequency of service is based on units operated 40 hours per week. Increase frequency of maintenance if usage exceeds 40 hours per week.

Every six months, inspect all interconnecting cords and plugs for damage to the insulation jacket. Repair or replace the cord(s) as necessary.

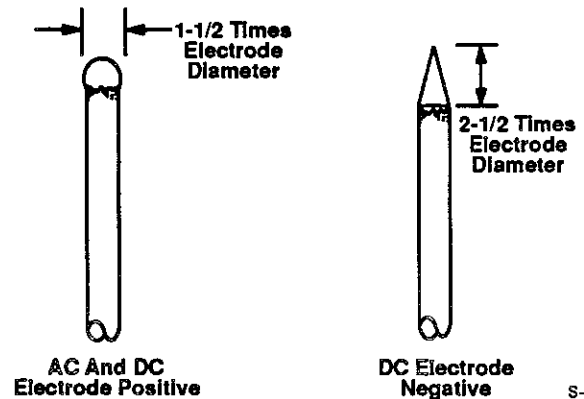
6-2. TUNGSTEN ELECTRODE (Table 6-2, Figure 6-1, And Figure 6-2)

Use Table 6-2 to select the correct size and type tungsten electrode. Prepare the tungsten electrode using the following guidelines. A properly prepared tungsten electrode is essential in obtaining a satisfactory weld.

A. For AC Or DC Electrode Positive Welding (Figure 6-1)

Ball the end of tungsten electrodes used for ac and dc electrode positive welding before beginning the welding

operation. Weld amperage causes the tungsten electrode to form the balled end. The diameter of the end should not exceed the diameter of the tungsten electrode by more than 1-1/2 times. For example, the end of a 1/8 in. (3.2 mm) diameter tungsten electrode should not exceed 3/16 in. (4.8 mm) diameter.



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Figure 6-1. Properly Prepared Tungsten Electrodes

B. For DC Electrode Negative Welding (Table 6-2 And Figure 6-2)



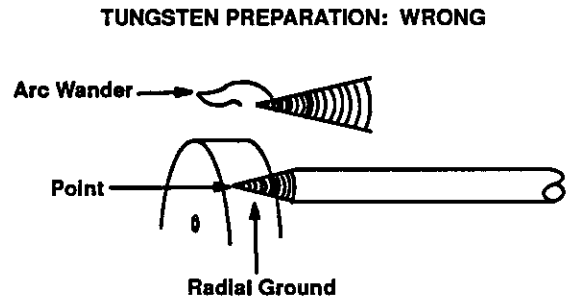
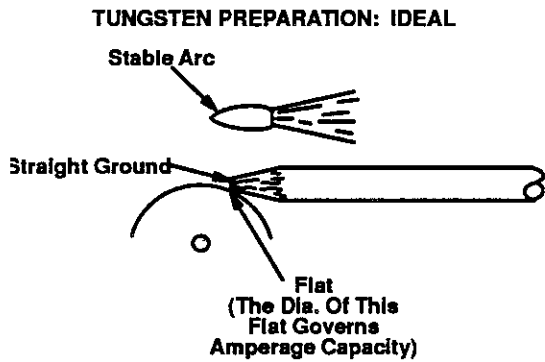
CAUTION: HOT FLYING METAL PARTICLES can injure personnel, start fires, and damage equipment; TUNGSTEN CONTAMINATION can lower weld quality.

- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Do not use same wheel for any other job, or the tungsten will become contaminated.

Shape tungsten electrodes on a fine grit, hard abrasive wheel used only for tungsten shaping. Grind tungsten electrodes so that grinding marks run lengthwise with the electrode. These procedures reduce the possibility of the tungsten electrode transferring foreign matter into the weld and help reduce arc wander.

Grind the end of the tungsten to a taper for a distance of 2 to 2-1/2 electrode diameters in length. For example, the ground surface for a 1/8 in. (3.2 mm) diameter tungsten electrode should be 1/4 to 5/16 in. (6.4 to 8.0 mm) long.

For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding – Pulsed Arc (GTAW-P) process.



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Figure 6-2. Tungsten Preparation

Table 6-2. Tungsten Size

Electrode Diameter	Amperage Range - Polarity - Gas Type			
	DC-Argon Electrode Negative/Straight Polarity	DC-Argon Electrode Positive/Reverse Polarity	AC-Argon Using High Frequency	AC-Argon Balanced Wave Using High Freq.
Pure Tungsten (Green Band)				
.010"	Up to 15	*	Up to 15	Up to 10
.020"	5-20	*	5-20	10-20
.040"	15-80	*	10-60	20-30
1/16"	70-150	10-20	50-100	30-80
3/32"	125-225	15-30	100-160	60-130
1/8"	225-360	25-40	150-210	100-180
5/32"	360-450	40-55	200-275	160-240
3/16"	450-720	55-80	250-350	190-300
1/4"	720-950	80-125	325-450	250-400
2% Thorium Alloyed Tungsten (Red Band)				
.010"	Up to 25	*	Up to 20	Up to 15
.020"	15-40	*	15-35	5-20
.040"	25-85	*	20-80	20-60
1/16"	50-160	10-20	50-150	60-120
3/32"	135-235	15-30	130-250	100-180
1/8"	250-400	25-40	225-360	160-250
5/32"	400-500	40-55	300-450	200-320
3/16"	500-750	55-80	400-500	290-390
1/4"	750-1000	80-125	600-800	340-525
Zirconium Alloyed Tungsten (Brown Band)				
.010"	*	*	Up to 20	Up to 15
.020"	*	*	15-35	5-20
.040"	*	*	20-80	20-60
1/16"	*	*	50-150	60-120
3/32"	*	*	130-250	100-180
1/8"	*	*	225-360	160-250
5/32"	*	*	300-450	200-320
3/16"	*	*	400-550	290-390
1/4"	*	*	600-800	340-525

***NOT RECOMMENDED**

The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

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6-3. CIRCUIT BOARD HANDLING PRECAUTIONS



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down welding power source, and be sure it cannot be accidentally energized before inspecting, maintaining, or servicing.
- Turn off Pulser Control, and remove input power plug from receptacle before inspecting, maintaining, or servicing.
- Turn off high-frequency unit, if applicable.



CAUTION: ELECTROSTATIC DISCHARGE (ESD) can damage circuit boards.

- Put on properly grounded wrist strap BEFORE handling circuit boards.
- Transport circuit boards in proper static-shielding carriers or packages.
- Perform work only at a static-safe work area.

INCORRECT INSTALLATION or misaligned plugs can damage circuit board.

- Be sure that plugs are properly installed and aligned.

EXCESSIVE PRESSURE can break circuit board.

- Use only minimal pressure and gentle movement when disconnecting or connecting board plugs and removing or installing board.

6-4. TROUBLESHOOTING (Table 6-3)



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down welding power source, and be sure it cannot be accidentally energized before inspecting, maintaining, or servicing.
- Turn off Pulser Control, and remove input power plug from receptacle before inspecting, maintaining, or servicing.
- Turn off high-frequency unit, if applicable.

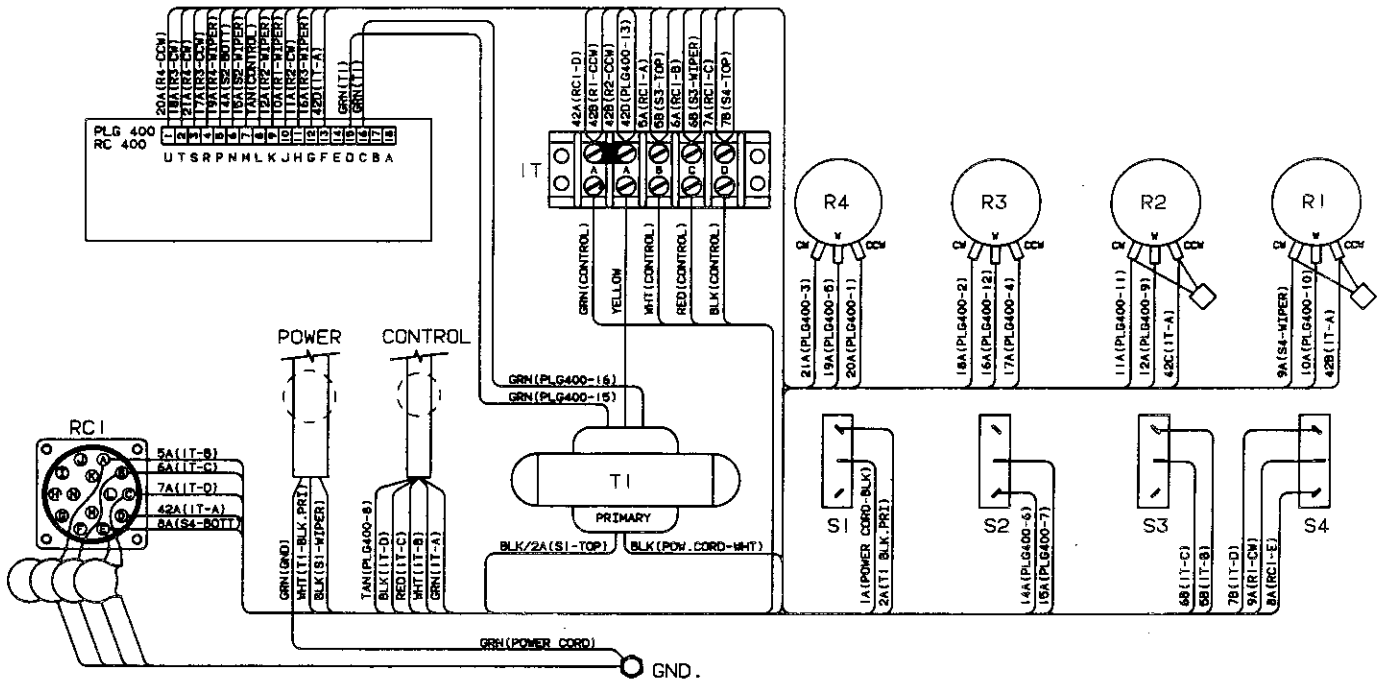
Troubleshooting to be performed only by qualified persons.

It is assumed that the unit was properly installed according to Section 3 of this manual, the operator is familiar with the function of controls, the welding power source was working properly, and that the trouble is not related to the welding process.

The following table is designed to diagnose and provide remedies for some of the troubles that may develop in this unit. Use this table in conjunction with the circuit diagram while performing troubleshooting procedures. If the trouble is not remedied after performing these procedures, contact the nearest Factory Authorized Service Station. In all cases of equipment malfunction, strictly follow the manufacturer's procedures and instructions.

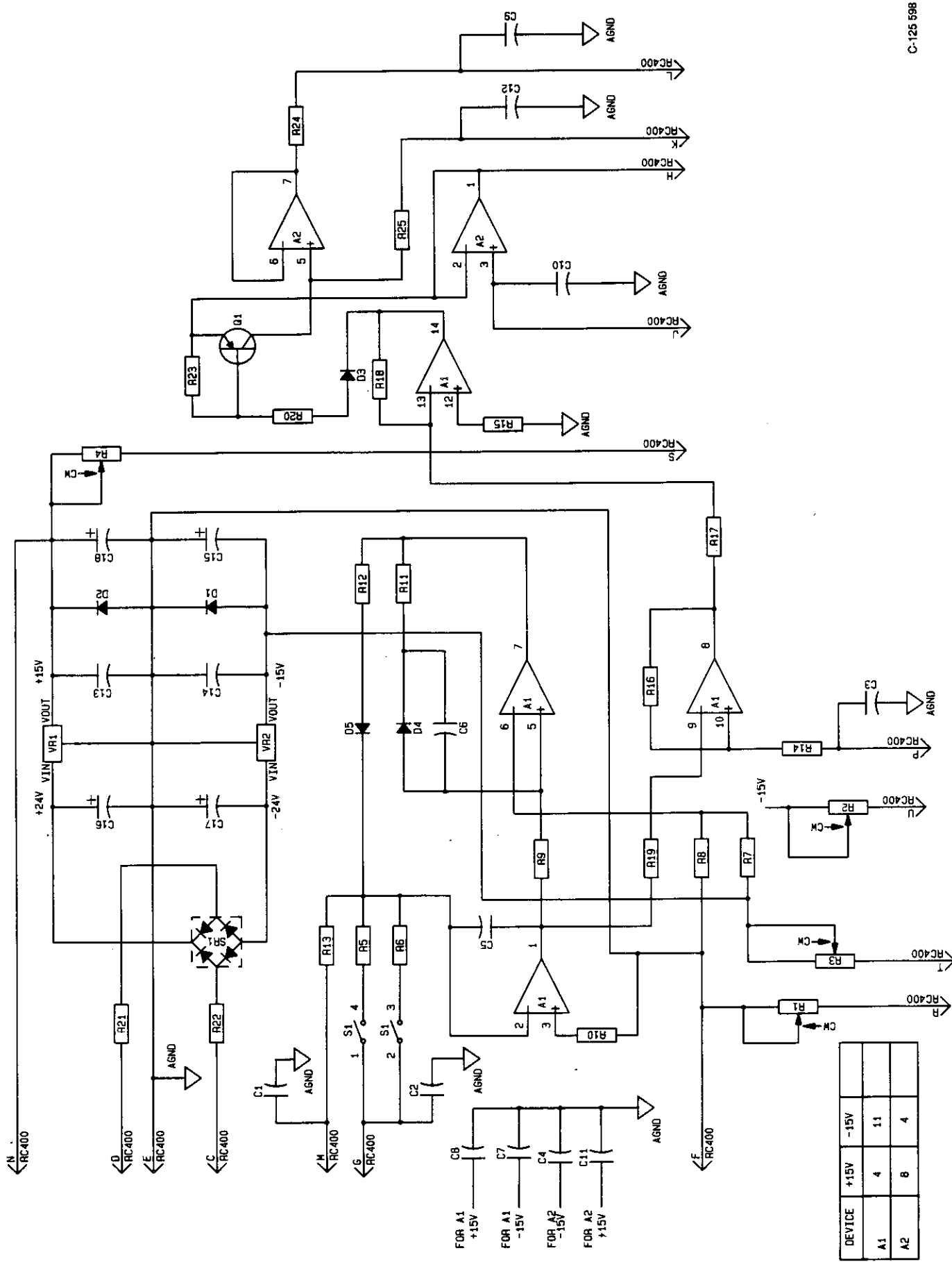
Table 6-3. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
No pulsing.	Power cord plug not secure in power receptacle.	Secure power cord plug.
	POWER switch S1 in the OFF position.	Place S1 in the ON position.
	PULSER switch S2 in the OFF position.	Place S2 in the ON position.
	Interconnecting cord plug PLG1 not connected to welding power source or high-frequency unit.	Connect PLG1 to welding power source or high-frequency unit as applicable (see Section 3-4).
	AMPERAGE switch S4 in REMOTE 14 position with no Remote Amperage control connected to REMOTE 14 receptacle RC1.	Place S4 in PANEL position or connect Remote Amperage control to RC1 (see Section 3-5).
	OUTPUT (CONTACTOR) switch S3 in REMOTE 14 position with no Remote Contactor connected to REMOTE 14 receptacle RC1.	Place S3 in ON position or connect Remote Contactor to RC1 (see Section 3-5).
No amperage control.	AMPERAGE switch S4 in REMOTE 14 position with no Remote Amperage control connected to REMOTE 14 receptacle RC1.	Place S4 in PANEL position or connect Remote Amperage control to RC1 (see Section 3-5).



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Diagram 7-2. Wiring Diagram For Pulser Control



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Diagram 7-3. Circuit Diagram For Pulser Board PC1

DEVICE	+15V	-15V	
A1	4	11	
A2	8	4	

SECTION 8 – PARTS LIST

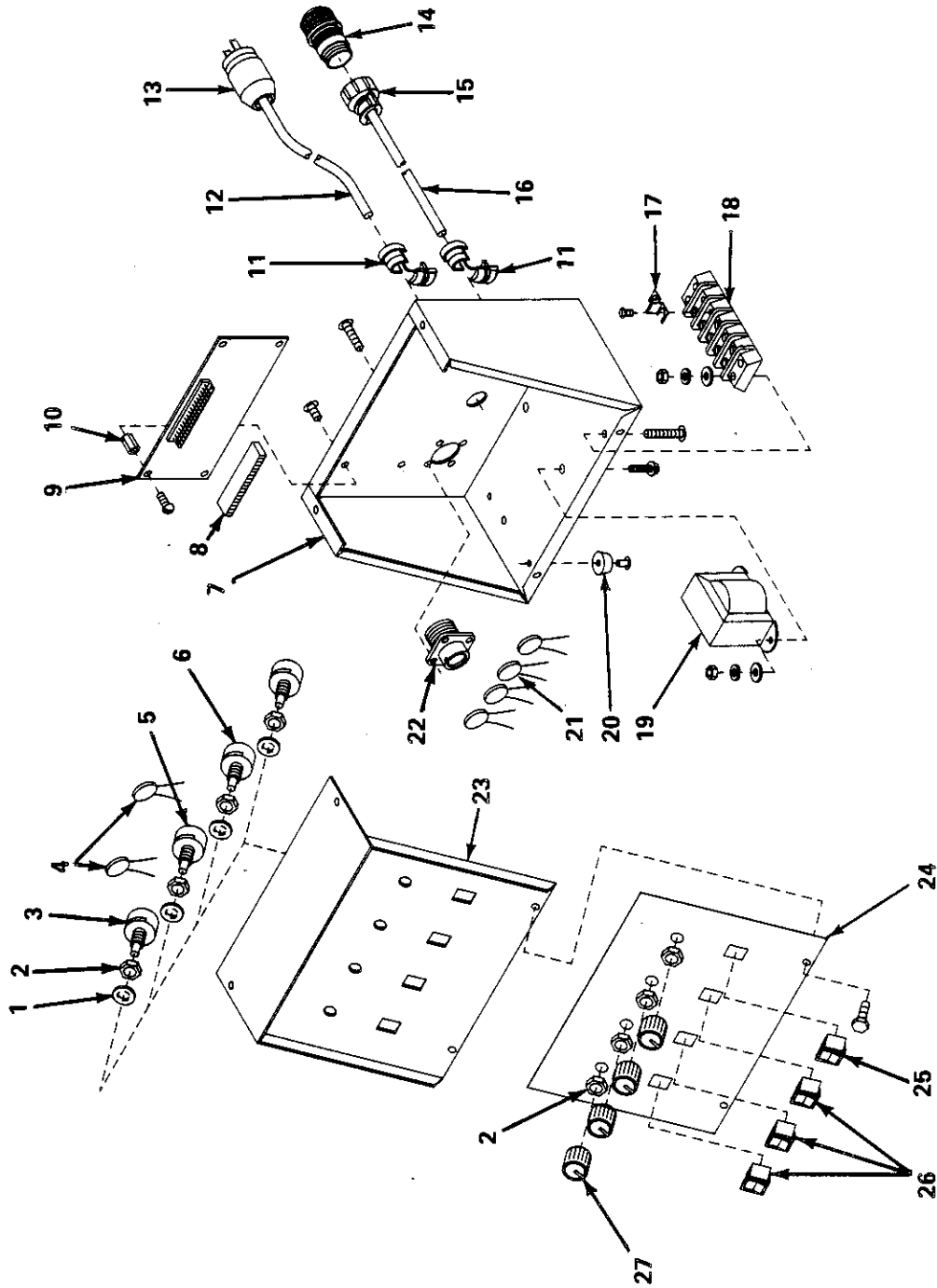


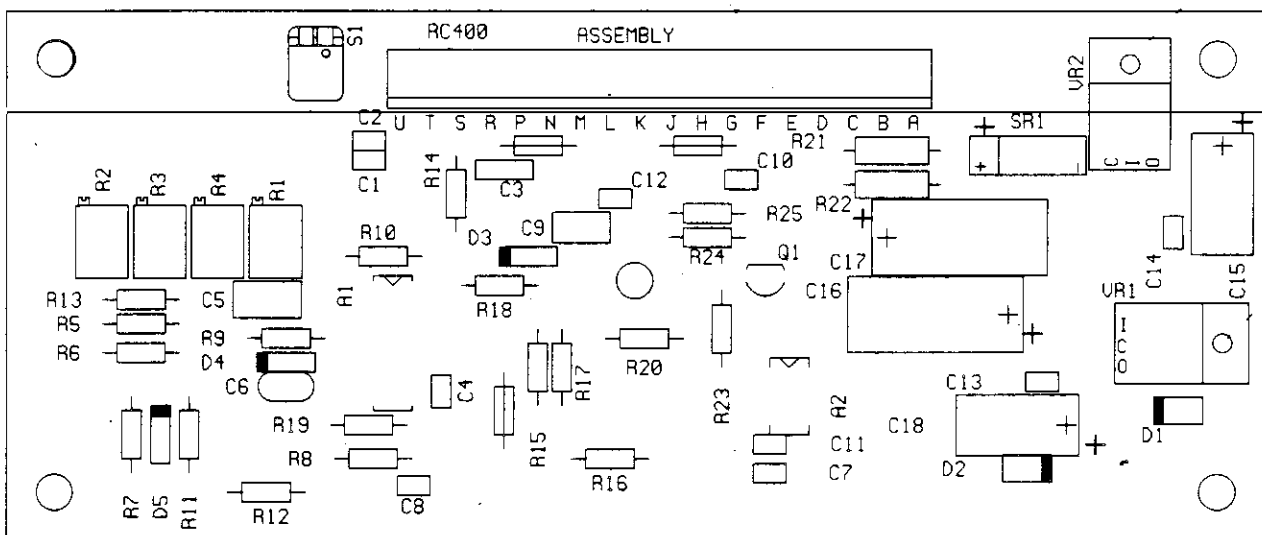
Figure 8-1. Main Assembly

TC-130 263

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 8-1. Main Assembly				
1		605 339	WASHER, lock stl intl tooth .375	4
2		604 645	NUT, stl hex .375-32	8
3	R1	073 562	POTENTIOMETER, C sltd sft 1/T 2W 10K ohm	1
4	C5,6	003 530	CAPACITOR, cer mono 1uf 50VDC	2
5	R2,4	030 109	POTENTIOMETER, C sltd sft 1/T 2W 5000 ohm	2
6	R3	004 186	POTENTIOMETER, C sltd sft 1/T 2W 5000 ohm	1
7		127 342	CASE SECTION, sides/bottom/rear	1
8	PLG400	079 748	HOUSING, term header 18 pin	1
9	PC1	125 601	CIRCUIT CARD, pulser (Fig 8-2)	1
10		073 756	STAND-OFF, No. 6-32 x .625 lg	5
11		070 654	BUSHING, strain relief .300 ID x .500	2
12		007 826	CABLE, port No. 18 3/c (order by ft)	8ft
13		073 690	PLUG, str grd armd 2P3W 15A 125V	1
14	PLG1	111 122	HOUSING PLUG & PINS, (consisting of)	1
		109 770	· TERMINAL, male	14
15		073 296	CLAMP, cable 97-3057-12-6	1
16		052 246	CABLE, pwr No. 20ga 5/c (order by ft)	8ft
17		601 219	LINK, jumper term blk 20A	1
18	1T	038 839	BLOCK, term 20A 5P	1
19	T1	128 908	TRANSFORMER, control	1
20		019 663	MOUNT, nprm 15/16 OD X 3/8	4
21	C1-4	097 749	CAPACITOR, cer disc .05uf 500VDC	4
22	RC1	109 769	RECEPTACLE, 14skt 97-4102A-20-27S	1
		109 766	PLUG, amphenol 14 pin 97-4106A-20-27P	
		109 770	TERMINAL, male 1 pin	
		039 734	CLAMP, cable AN-3057-12	
23		127 343	PANEL, front	1
24			NAMEPLATE, (order by model & serial number)	1
25	S1	127 788	SWITCH, rocker SPDT 8A 125VAC	1
26	S2-4	120 376	SWITCH, rocker SPDT 4A 230V	3
27		097 922	KNOB, pointer	4
		130 003	CABLE, adapter 12.000 (consisting of)	1
		039 273	· PLUG, 5 pin MS-3106A-16S-8P	1
		052 246	· CABLE, pwr No. 20ga 5/c (order by ft)	1ft
		039 685	· CLAMP, cable AN-3057-8	1
		111 161	· HOUSING PLUG & SOCKETS, (consisting of)	1
		109 771	· TERMINAL, female	14
		110 089	CABLE, interconnecting (consisting of)	1
		094 481	· PLUG, 14 pin MS-3106A-20-27P	1
		039 685	· CLAMP, cable AN-3057-8	1
		600 343	· CABLE, port No. 16 5/c (order by ft)	1ft
		039 734	· CLAMP, cable AN-3057-12	1
		052 654	· RECEPTACLE, 5skt MS-3101A-16S-8S	1

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Dia. Mkgs.	Part No.	Description	Quantity
PC1	125 601	Figure 8-2. Circuit Card, Pulser (Fig 8-1 Item 9)	
A1	093 065	IC, linear 347	1
A2	114 176	IC, linear 353	1
C1,2,4, 7,8,10-14	122 723	CAPACITOR, cer mono .1uf 50VDC	10
C3	003 530	CAPACITOR, cer mono 1uf 50VDC	1
C5	121 684	CAPACITOR, polye met film .47uf 100V	1
C6	052 141	CAPACITOR, cer disc 33pf 1000VDC	1
C9	108 035	CAPACITOR, cer mono .047uf 50VDC	1
C15,18	031 630	CAPACITOR, elctft 22uf 50VDC	2
C16,17	000 859	CAPACITOR, elctft 220uf 35VDC	2
D1,2	026 202	DIODE, rect 1A 400V SP	2
D3-5	028 351	DIODE, sig .020A 75V SP	3
Q1	037 201	TRANSISTOR, PNP 200MA 40V	1
R1	003 913	POTENTIOMETER, cermet trmr 25/T .5W 500 ohm	1
R2-4	039 359	POTENTIOMETER, cermet trmr 25/T .5W 5000 ohm	3
R5	039 326	RESISTOR, CF .25W 68K ohm	1
R6	108 434	RESISTOR, CF .25W 3K ohm	1
R7	039 332	RESISTOR, CF .25W 15K ohm	1
R8,9,14, 17-20,23,25	035 827	RESISTOR, CF .25W 10K ohm	9
R10	035 884	RESISTOR, CF .25W 100K ohm	1
R11,15	039 331	RESISTOR, CF .25W 4.7K ohm	2
R12,13	605 916	RESISTOR, C .25W 1K ohm	2
R16	076 712	RESISTOR, C .25W 220K ohm	1
R21,22	030 089	RESISTOR, C .5W 2.7 ohm	2
	092 648	RESISTOR, WW fxd zero ohm	3
RC400	079 749	TERMINAL, header 18 pin	1
S1,2	092 367	SWITCH, dip SPST 2 posn	1
SR1	035 841	RECTIFIER, integ 1.5A 200V	1
VR1	081 832	IC, linear 78M15	1
VR2	046 932	IC, linear 7915	1



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Figure 8-2. Circuit Card, Pulser

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

