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TCRS A-102 VERTICAL WELDER MANUAL

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INTRODUCTION

TCRS, the leader in torque converter rebuilding equipment, would like to thank you for purchasing the “A-102 VERTICAL WELDER”. Please refer to this owner’s manual and instructional videotape for operating and installation instructions. Please contact TCRS service at 1-888-442-5546 if you have any questions or comments.



TABLE OF CONTENTS

SAFETY INSTRUCTIONS	4
GETTING TO KNOW YOUR VERTICAL WELDER.....	5
SPECIFICATIONS	6
SPINDLE CYLINDER INSTALLATION.....	6
A-102 VERTICAL WELDER FEATURES.....	8
ELECTRICAL CONTROL FEATURES	8
ELECTRONIC CONTROLS.....	9
SPINDLE CONTROL FEATURES	15
SPINDLE CONTROLS	16
AUXILIARY FEATURES	17
OPERATING PROCEDURES	18
WELDING IMPELLER HUBS.....	27
MAINTAINING YOUR A-102 VERTICAL WELDER	28
COLLET SEAL REPLACEMENT	31
MACHINE ALIGNMENT	32
SPINDLE TO TURNTABLE CONCENTRICITY	33
TABLE PERPENDICULARITY	34
TROUBLE SHOOTING.....	35

SAFETY INSTRUCTIONS

<u>IMPORTANT:</u>	Power must be connected in accordance with local electrical codes. In all instances, the machine must be properly wired for ground and a mechanical means of power disconnect must be supplied within unobstructed visual range of the machine operator or service personnel.
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Before Hooking Up Your Vertical Welder:

- Read and understand the contents of these instructions and safety material. Contact TCRS if you have any questions regarding these instructions.
- Read the enclosed instructions for the wire feeder and power source for important electrical and procedural information.

WARNING: ELECTRIC SHOCK CAN KILL

- Do not touch live electrical parts.
- Do not hook up the electrical cords for the Welder Power Source, or the 110 Volt Motor Drive until all sub-assemblies are properly connected.
- Make sure the power switches on the electronic control panel, the wire feeder, and the welder are switched off before plugging in the electrical cords.
- Properly secure the welding gas bottle before installing flow-meter and gas hose.
- Before transporting or moving the welding gas bottle, be sure the safety cap is threaded on tightly.
- Position the machine on a level floor surface. If a slight incline exists, block the wheel casters to prevent sudden movement of the machine.

WARNING; ULTRA-VIOLET RAYS

- Do not look at the weld arc.
- Always wear UV resistant eye protection when welding.
- Weld is HOT
- Always use leather welding gloves when handling welded material.
- Ultra-violet rays can cause serious burns.

GETTING TO KNOW YOUR VERTICAL WELDER

The **TCRS AUTO-WELD ALIGNER** is a machine for precisely aligning and holding internal and external tolerances in a torque converter while welding the converter assemblies or sub- assemblies.

The **TCRS AUTO-WELD ALIGNER** is made up of the following major assemblies:

HEADSTOCK

1. **Air Cylinder** – raises and lowers spindle assembly.
2. **Spindle Assembly** – contains the closure collet assembly
3. **Spindle Controls** – operate the closure collet and spindle motion.
4. **Electronic Controls (ORIGINAL)** – start the AUTO-TACK, AUTO-WELD sequences, and govern table speed.

Electronic Controls (TAC12Plus OPTION): set number of tacks with TAC(dial), place initial TAC, start AUTO-TACK, AUTO-WELD, govern table speed with TABLE SPEED (dial), and monitor with the LCD display.

5. **Emergency Shutoff Switch** – shuts off power to the electronic control panel abruptly stopping a welding sequence.
6. **Filter/Oil Regulator** – governs and oils incoming air.
7. **Clearance Adjust Indicator** – measures internal converter clearance.
8. **Run-out Indicator** – measures total indicated run-out of a converter.
9. **Turntable** – supports and rotates the converter as it is being welded.

CABINET

1. **Power source** – MIG welding power supply and controller.
2. **Wire Feeder** – supplies MIG wire and gas to the welding gun.
3. **Welding Gun** – creates welding arc with .035” diameter wire.
4. **Gun Holder** – holds gun in an infinite number of positions.
5. **Fine Adjustment Knob** – (clearance setting)

SPECIFICATIONS

Welder Electrical Requirements:

Check the Power Source manual for appropriate specifications for your shop

- Voltage 230 V
- Phase 1 or 3
- Amperes Input 40A (Single Phase)
32A (Three Phase)
- Frequency 50/60 Hz

Optional Welder Electrical Requirements:

- Voltage 460 V
- Phase Three Phase
- Amperes Input 20A (Three Phase Only)

Electronic Control Requirements:

- Voltage 110 V AC
- Outlet Three Prong
Grounded Type

Motor:

Permanent Magnet DC Gear Motor

- Voltage 90 V
- Maximum H.P. ¼ HP
- Amperes 3.3A
- Phase Single Phase
- Shaft Rotation Counter Clockwise
(reversible)

Air Supply:

- 115 psig. Minimum

Physical Size:

- Dimension: 48"W X 33"D
X 100"H
- Mount 4 Heavy Duty Caster
Wheels

Welding Supplies:

- Wire specification ER70S-6 or ER70S-4
- Wire Diameter 0.035"
- Welding gas 90%
- Electrical Conductive grease

SPINDLE CYLINDER INSTALLATION

The **TCRS AUTO-WELD ALIGNER** is shipped from the factory with the spindle air cylinder removed. This cylinder assembly must be installed before attempting to operate the machine.

1. Unpack and remove the protective materials from the assembly and from the spindle end inside the head-stock.
2. Orient the cylinder with the mounting flange toward the top of the head-stock.
3. Locate the lower pancake cylinder to the right of the spindle when facing the **AUTO-WELD ALIGNER**.
4. Verify that a thrust bearing is in place on the joint end of the spindle. Ensure that the bearing is free of grit and dust.
5. Place the swivel end of the air cylinder into the female port in the top end of the spindle shaft. Make sure the "O" ring is in place on the tip of the swivel end. Lubricate with air compatible grease if the "O" ring is dry.
6. Place a four inch wood block on the turntable under the collet.
7. When the tip of the swivel is engaged, lower the air cylinder assembly until the supporting flange mates to the top of the head-stock.
8. Install the 4 cap screws through the 4 holes on the mounting flange to secure the air cylinder assembly to the head-stock.
9. Attach the five colored air lines to the 5 corresponding colored input sleeves:
 RED line to the **RED** sleeve, second from the top
 BLUE line to the **BLUE** sleeve, third from the top
 YELLOW line to the **YELLOW** sleeve, inside fourth from the top
 ORANGE line to the **ORANGE** sleeve, inside fifth from the top
 CLEAR line to the **CLEAR** sleeve, top
10. Connect the air pressure to the machine at the filter regulator on the left side. Pull down on the **SIDE LEVER** to lower the spindle against the 4" block on the turntable. This removes pressure on the threads of the thrust bearing nut connected to the air cylinder assembly.
11. Hand tighten the thrust bearing nut again.
12. Raise the **SIDE LEVER** and remove the wood block from the table

****This completes the installation**

A-102 VERTICAL WELDER FEATURES

The **TCRS AUTO-WELD ALIGNER** is designed to accommodate all torque converter configurations. This is accomplished by the use of adapter bushings unique to each specific converter. The referenced bushings are used both to align the converter on the turntable by: 1) centering the front cover pilot with a pilot bushing and, 2) gripping the impeller hub with a hub bushing mounted within a collet assembly directly above the front cover.

The center of the turntable is precisely located relative to the centerline of the spindle which positions the pump drive hub. By rigidly maintaining this relationship, the converter can be welded with precise alignment between the pump hub, turbine drive, and the converter pilot centerline. A precisely aligned converter can readily be balanced and will reduce run-out of the pump hub, thereby reducing seal wear and increasing the life of the converter.

In addition to welding a converter together, the **TCRS Auto-Weld Aligner** can weld a new impeller hub to an impeller, weld a new turbine hub to a turbine, perform a “bowl build-up” on an excessively cut converter, and build-up a worn pilot.

A unique proprietary Auto-Tack system is incorporated to quickly and accurately tack the converter body into position to assist in maintaining clearance and alignment.

ELECTRICAL CONTROL FEATURES

An electronic controller controls the turntable's rotation, speed, and stopping point. In addition, the controller commands the welder wire feed unit to tack and weld. Actual weld settings are made on the welder, and wire feed unit, and are covered in the welder manufacturer's manual supplied herewith.

Power to the controller is supplied from a 110 V AC electrical power source in your shop.

A power switch on the controller panel further governs power to the controller.

EMERGENCY: A red 'mushroom' shaped emergency switch is incorporated on the front face of the head-stock. When quick, safe shut down is required, the red emergency switch will stop the wire feeder process and the turntable rotation. The off condition will be maintained until the emergency switch is reset. Turn the red emergency switch clockwise until it 'snaps' out to restart the machine operation.

CAUTION: Anytime the power is on and the switches are set to their respective 'on' position, the welder will fire when started.

ELECTRIC CONTROLS (ORIGINAL PANEL)

IMPORTANT: When experimenting with controls or settings, disengage the wire feeder rollers on the wire feed unit to preclude inadvertent wire feed and welding.

POWER SWITCH

Turns power on and off to the controller. In order to weld, the Welder Power Source and Wire Feeder must also be turned on, and also release the emergency switch. Please refer to the Welder Power Source and Wire Feeder Operations Manual for power on instructions.

POSITION COUNTER

The counter counts the rotational position of the table. A pulser located below the motor counts the shaft rotations. Your counter has been set for 199, or 102 for a dual gun, so that a slight weld overlap ensures a good seal on the converter.

SPEED CONTROL

The speed control governs the rotational speed of the turntable. Table speed is adjusted to accommodate the different diameters and weld bead configuration.

WELD SWITCH

This switch basically controls the Wirefeeder Trigger functions. Welding will not occur with this switch OFF.

WARNING: This switch should always be turned off for safety.

TAC BUTTON

This button acts as a welding trigger. The welder is “live” as long as the button is depressed. Before initiating an automated weld sequence, the wire leader extending from the gun needs to be “burned back” or trimmed towards the gun nozzle. When the gun is positioned and you are ready to weld, press the TAC button briefly to tack the piece being welded and to burn back the wire leader.

AUTO-TACK START

Once the weld gun has been set up the entire tack and weld process can be done automatically. The controller has a proprietary feature called ‘AUTO-TACK’. When commanded, the AUTO-TACK automatically rotates the converter to the required position and signals the wire feed to weld the tack at each position. At the end of the AUTO-TACK cycle, continuous welding is commenced and carried to completion at 360 degrees of rotation. The control is set to make six equally spaced tacks with the AUTO-WELD cycle beginning at the sixth tack. The WELD switch must be ON for this sequence to occur.

ELECTRIC CNTLS - ORIGINAL PANEL (CONTINUED)

AUTO-WELD START

For welding operations in which the AUTO-TACK cycle is not necessary, the AUTO-WELD option can be used. AUTO-WELD commences continuous welding automatically and stops after 360 degrees of rotation. The WELD switch must be ON for this sequence to occur.

JOG

A provision is made in the controller to rotate the turntable without welding and to provide for manual tack capability. The JOG button enables the turntable to rotate quickly, for positioning of a unit to be welded, or for a quick visual inspection of your work.

BREAKER

Used only when a circuit failure has caused power interruption to take place. (Resettable)

TACK TIME

This adjustment switch is factory set. If larger or smaller tacks are required, this potentiometer is manually adjusted by loosening the lock nut and using a screwdriver to turn the adjustment screw. A.) Clockwise to increase tack size, or B.) Counter clockwise to reduce tack size. Re-lock the jam nut after adjustment.

****Note:** Tac adjustment cannot be made during a cycle. It must be made prior to pressing the Auto-Tac Button.

ELECTRIC CONTROLS (TAC12PLUS VERSION)

IMPORTANT: When experimenting with controls or settings, disengage the wire feeder rollers on the wire feed unit to prevent inadvertent wire feed and welding.



POWER SWITCH

Turns power on and off to the controller. In order to weld, the welder power source and wire feeder must also be turned on. Please refer to the welder power source and wire feeder operations manual for power on instructions.

RESET SWITCH

Used only when a circuit failure has caused power interruption to take place. If the breaker trips, it can be reset by pushing it back in.

AUTO WELD

Auto weld commences continuous welding automatically and stops after 360° of rotation. The WELD switch must be on for this sequence to occur.

WELD ON/OFF

This switch controls the wire feed trigger. The welder will not feed wire with this switch off.

WELD

This switch acts as a control emergency stop. When welding and a problem occurs this switch can be pressed, all welding and table movement will stop.

WARNING: This switch will not interrupt power, it only disrupts control signal.

ELECTRIC CNTLS - TAC12PLUS (CONTINUED)

JOG

A provision is made in the controller to rotate the turntable without welding and to provide for manual tac capability. The JOG button enables the turntable to rotate quickly for positioning of a unit to be welded or for a quick visual inspection of your work.

TAC

This button acts as a welding trigger used to place the initial tac on a converter before the AUTO TAC sequence is carried out.

AUTO TAC

Once the weld gun has been set up the entire tack and weld process can be done automatically. The controller has a proprietary feature called AUTO TAC. After the initial tac has been carried out the AUTO TAC feature takes over and automatically rotates the converter to the required position and signals the wire feed to weld the tacs at each position. At the end of the AUTO TAC cycle, continuous welding is commenced and carried to completion at 360° of rotation. The control is adjustable to make 4, 6, 8, or 12 tacs with the AUTO WELD cycle beginning at the last tac placed. The WELD switch must be on for this sequence to occur.

TACS (DIAL)

The TACS dial is used to set the number of tacs placed around the converter before the AUTO WELD cycle is commenced.

TABLE SPEED (DIAL)

The speed control governs the rotational speed of the turntable. Table speed is adjusted to accommodate the different diameters and weld bead configurations. The TABLE SPEED dial only controls the table speed during the AUTO WELD cycle it does not affect the JOG speed.

TAC TIME (DIAL)

The TAC TIME dial is used to adjust the trigger time of the wire feeder for each tac in the AUTO TAC cycle.

LCD DISPLAY

The LCD display is used to monitor the tac time, table speed, and counts on the table motors encoder. All of these features are described below.

ELECTRIC CNTLS - TAC12PLUS (CONTINUED)

TAC/SPD/COUNT/RESET (DIAL)

This dial has many different functions and is mainly used for diagnostic purposes.

TAC-This setting will give the operator a visual display in milliseconds (mS) of how long the trigger on the wire feeder lasted during a tac.

SPD-This setting gives the operator a visual display of the table speed. The value that is displayed is mS between pulses on the motor's encoder. The higher the number displayed the slower the table will be moving.

COUNT-This setting will give the operator a visual display of the pulses on the table motors encoder. Depending on the machine one full revolution will be either 196 counts or 135 counts. This setting is designed for troubleshooting purposes only.

RESET

The reset position is used to zero out the LED display. To operate, simply turn the dial to RESET and the display will revert to 0000.

SPINDLE CONTROL FEATURES

WARNING: Always keep hands and fingers clear of the collet closure end of the spindle. The spindle moves up and down with considerable force. Anytime air is available to the machine, spindle movement can be caused to occur by movement of control positions.

WARNING: Keep hands and fingers clear of the end of the collet closure since the hold down ram will extend through the collet closure and compress anything in its way. The hold down ram will move anytime the HOLD DOWN switch is opened.

CAUTION: DO NOT operate the collet closure without a work piece such as, a plastic DELRIN hub bushing, bull nose live center, or alignment pin. Repeated, unnecessary over travel on an empty collet will rapidly degrade holding power and accuracy.

This spindle has air-powered movement up and down its own axis to facilitate placement and removal of the converter. In addition the spindle provides for rotation about its own axis to allow rotation of the converter on the turntable during welding and alignment. When a converter is ready to be welded together and placed on the turntable, an air-powered chuck engages and aligns the hub of the converter. The spindle is precisely aligned relative to the turntable so as to maintain a high degree of concentricity between converter pilot and hub.

Coincident with the spindle axis is an air-powered ram which extends through the converter to hold the converter front cover securely against the turntable to ensure that internal clearance settings are accurate.

SPINDLE CONTROLS

Side Lever

The SIDE LEVER controls up and down motion.

Collet Switch

Closes and opens the collet to grip the impeller hub bushings, the bull nose live-center adapter, or the alignment pin.

Clamp Switch

Clamps the CLEARANCE ADJUSTMENT KNOB to the spindle for setting internal clearance of the converter.

Lock Switch

Locks the spindle assembly in position at the time of lock. The spindle assembly will not move up or down when LOCK is on. Internal clearance cannot be adjusted when LOCK is on.

Hold Down Switch

Activates an internal plunger that locks the converter to the table to preclude the lower body from moving when adjusting internal clearance.

Clearance Adjustment Knob

When the CLAMP switch is on, the adjustment knob is engaged and will move the spindle up or down to set internal converter clearance. The knob will not operate if LOCK is on.

Hold Down Pressure Regulator

This air pressure regulator governs the retracting speed of the hold down rod. It is located inside the head-stock and can be accessed from the top of the machine. The pressure which is pre-set at the factory, should be set so that the hold down rod raises up into the spindle assembly very slowly and retracts entirely upward into the collet housing. To decrease the pressure, pull upward on the knob and turn counter clockwise. To increase the pressure is vice versa.

AUXILIARY FEATURES

Clearance Adjust Indicator

This 1” travel indicator mounted on the left side of the head-stock is used to measure the amount of internal clearance a converter is to be given via the CLEARANCE ADJUSTMENT KNOW.

Run-Out Indicator

This dial test indicator is used to measure the Total Indicator Run-Out (T.I.R.) of a converter after one is welded together. It is also used to ‘dial in’ a new impeller hub that is to be welded to an impeller. The Run-Out Indicator is mounted on the right side of the head-stock, and, like the Clearance Adjust Indicator, it is moved into position by loosening the tension knob and pulling down on the rod. Both of these indicators must be replaced to their original position up high before welding.

Filter/Oil Regulator

The Filter/Oil Regulator regulates incoming air pressure, filters that air from sediment and water, and then lubricates the air line system. Pressure should be at least 115 psig and no more than 130 psig. A knob on top of the oiler governs the amount of lubricant exhausted into the system. To add more oil, which should be air tool grade oil, first disconnect air from the system and then twist the lower bowl on the Bayonet style junction and pull down.

OPERATING PROCEDURES (ORIGINAL CNTL PANEL)

Machine Start Up

The following steps should be taken at the start of each shift. These steps presume the entire weld unit has been powered down by turning 'off' the power switches on each sub system, the Control Panel, the Welder Power Source, and Wire Feeder:

1. Set all spindle control switches to the 'off' position (to the left).
2. Verify the air supply to the machine is at proper level (115psig. – 130 psig).
3. Open welding gas bottle valve fully open. If it is not opened fully the valve may leak gas.
4. Verify the switches on the **AUTO-WELD ALIGNER** control panel are **OFF**.
5. Check to see that the turntable is free from any obstruction or loose tools.
6. Turn the Welder **ON**.
7. Turn the Welder Wire Feeder **ON**.
8. Turn the AUTO-WELD ALIGNER control panel **ON**. The turntable will automatically rotate one full revolution.
9. Adjust turntable speed as desired by turning the SPEED CONTROL knob while rotating.
10. Turn Weld Switch **ON**.

Welding a Converter - Original CNRL Panel

1. Verify desired setting on the Wire Feeder, Welder, and Turntable speed.
2. Select proper hub collet bushing and pilot bushing for the converter to be installed as a work piece. See bushing charts in the back of this manual.
3. Insert the hub collet bushing into the spindle collet closure.
4. Insert the pilot bushing into the turntable tooling hole.
5. Adjust the table drive pin to engage one of the torque converter pads unless the converter has threaded drive studs. In either case, it is imperative that the converter rests on the table squarely and entirely by the flats of the drive pads or studs. If the converter has drive studs, it may be necessary to place spacers under the converter, so that it is resting on the flats of the front cover, not any protruding bulge, or machine a "flat area" on the front cover

Warning: The spindle is powered down with a force of up to 550 lbs. **DO NOT** attempt to force the collet closure on if it does not engage properly. In the event of difficulty in engaging the collet closure, find and correct the difficulty before proceeding. Serious damage to the converter and/or the collet closure may occur if forced when improperly matched or aligned.

CAUTION: Keep hands and fingers clear of the hub and collet of the hub and collet closure while attempting to engage the spindle

Welding a Converter - Original Control Panel (Continued)

6. Using the spindle direction control lever. Lower the spindle down into engagement with the converter hub. Engage at least 2/3 of the hub, but **DO NOT** lower the spindle into contact with the converter hub weld.
7. Place left side indicator on converter impeller then ("O" out).
8. Turn the COLLET switch on to lock the hub bushing in the collet.
9. Turn the CLAMP switch on. **[NEVER ACTIVATE THE COLLET SWITCH WITH A EMPTY COLLET]**
10. Turn the LOCK switch on.
11. Turn the HOLD DOWN switch on. This engages the hold down ram through the converter to securely seat and hold everything in contact with the turntable.
12. Turn the LOCK switch off.
13. Turn the CLEARANCE ADJUST KNOB clockwise until bowl clearance is achieved on the indicator.
14. Turn the LOCK switch on.
15. Adjust the MIG gun for proper angle and wire contact point. The MIG gun holder is fully articulated and capable of achieving any required angle.
16. Verify that the WELD switch is on. At this point the converter is ready to be welded.

CAUTION: Always use suitable eye protection when welding. Use a tinted filter recommended by your welding supplier suitable for MIG welding.

Recommended shade # 9 minimum.

NEVER watch weld arc without a filtered lens or a safety curtain to protect the eyes from the ultra-violet rays!

17. Use an appropriate welding hood to watch the weld arc and puddle formation. Recommended shade 9 – 12 used.
18. Push the TAC, JOG then AUTO-TACK – Sequence will automatically occur, followed by continuous 360 degree auto welding.
19. Turn the WELD switch off.
20. Push the JOG button to rotate the converter and inspect the weld. This rotation also helps symmetric cooling to help maintain run-out tolerances.
21. Turn the LOCK switch OFF.
22. Turn the CLAMP switch OFF.
23. Turn the COLLET switch OFF.
24. Return the CLEARANCE ADJUSTMENT KNOB to the neutral position (white mark pointing straight down).
25. Raise the spindle to the full 'up' position using the SIDE ARM LEVER.
26. Bring the RUNOUT INDICATOR into position near the middle of the impeller hub.
27. Press the JOG button for several rotations of the turntable to read the total Indicated run-out.

Welding a Converter - Original Control Panel (Continued)

28. Turn the HOLD DOWN switch off.
29. When the weld is cool enough the handle with gloves remove the converter from the machine. Use heavy leather gloves to handle the converter as the welds will still be hot. The procedure is now complete.

NOTE: Desired run-out is from .000" to .007" T.I.R. Maximum allowable is .010". If run-outs over .005" persist, the machine should be checked out to determine the reason for high run-out.

WARNING: Never touch a welded piece with bare hands. The welded piece is extremely HOT and serious burns will be inflicted without using proper protection.

Leather welding gloves should be worn at all times when handling hot welded parts!!

OPERATING PROCEDURES (TAC12PLUS CNTL PANEL)



Machine Start Up

The following steps should be taken at the start of each shift. These steps presume the entire weld unit has been powered down by turning 'off' the power switches on each sub system, the Control Panel, the Welder Power Source, and Wire Feeder:

1. Set all spindle control switches to the 'off' position (to the left).
2. Verify the air supply to the machine is at proper level (115psig. – 130 psig).
3. Open welding gas bottle valve fully open. If it is not opened fully the valve may leak gas.
4. Verify the switches on the **TAC 12 PLUS** control panel are **OFF**.
5. Check to see that the turntable is free from any obstruction or loose tools.
6. Turn the Welder **ON**.
7. Turn the Welder Wire Feeder **ON**.
8. Turn the **TAC 12 PLUS** control panel **ON**. The power button will light up.
9. Adjust turntable speed as desired by turning the SPEED CONTROL knob while rotating.
10. Turn Weld Switch **ON**.

Controls Set Up

Setting the Tac Time

1. Before beginning these steps make sure either the welder is **OFF**, the **WELD ON/OFF** switch is in the **OFF/OUT** position, or the gun is pointed away from any metal to prevent accidental welding.
2. Turn the top right knob to the **TAC** position.
3. Using a screwdriver, adjust the knob labeled **TAC TIME**.

Welding a Converter - TAC 12 PLUS (Continued)

*Turned fully clockwise is approx. 570 milliseconds (mS) of wire feed;
turned fully clockwise is approx. 1670mS of wire feed.*

4. Adjust the knob to an approximate position and momentarily press the **TAC** button, the LCD display will give you a readout in mS as to how long the wire will feed for at each tac.
5. Repeat step 4 until you achieve the desired time.
6. If you want to physically see the wire feeding out as opposed to looking at the time frame
 - a. Point the gun out of the way of any metal.
 - b. Turn the welder on.
 - c. Push the **WELD ON/OFF** switch to the **ON/IN** position.
 - d. Adjust the **TAC TIME** knob to the desired position and momentarily press the **TAC** button; you will physically see wire feed out of the gun for the set time.
 - e. Repeat procedure 'D' until you have the tac time adjusted accordingly.

Rotating the Table

1. To move the table to a desired position press and hold the **JOG** button until the table gets into position.

Adjusting the Table Speed

1. Before beginning these steps make sure that the welder is turned **OFF** and/or the switch labeled **WELD ON/OFF** is in the **OFF/OUT** position.
2. Adjust the dial labeled **TABLE SPEED** to an approximate position.

Turned fully counterclockwise is min speed and turned fully clockwise is max speed.
3. Momentarily press the button labeled **AUTO WELD** and the table will begin to move. At this point you can tune the table speed by adjusting the **TABLE SPEED** dial.

NOTE: The table speed setting is only effective in the auto weld cycle and the final weld cycle of the auto tac.

Welding a Converter - TAC 12 PLUS (Continued)

1. Verify desired setting on the Wire Feeder, Welder, and Turntable speed. See **Recommended Weld Settings** table.
2. Select proper hub collet bushing and pilot bushing for the converter to be installed as a work piece. See bushing charts in the back of this manual.
3. Insert the hub collet bushing into the spindle collet closure.
4. Insert the pilot bushing into the turntable tooling hole.
5. Adjust the table drive pin to engage one of the torque converter pads unless the converter has threaded drive studs. In either case, it is imperative that the converter rests on the table squarely and entirely by the flats of the drive pads or studs. If the converter has drive studs, it may be necessary to place spacers under the converter, so that it is resting on the flats of the front cover, not any protruding bulge, or machine a “flat area” on the front cover

Warning: The spindle is powered down with a force of up to 550 lbs. **DO NOT** attempt to force the collet closure on if it does not engage properly. In the event of difficulty in engaging the collet closure, find and correct the difficulty before proceeding. Serious damage to the converter and/or the collet closure may occur if forced when improperly matched or aligned.

CAUTION: Keep hands and fingers clear of the hub and collet of the hub and collet closure while attempting to engage the spindle

6. Using the spindle direction control lever. Lower the spindle down into engagement with the converter hub. Engage at least 2/3 of the hub, but **DO NOT** lower the spindle into contact with the converter hub weld.
7. Place left side indicator on converter impeller then (“O” out).
8. Turn the COLLET switch on to lock the hub bushing in the collet.
9. Turn the CLAMP switch on. [**NEVER ACTIVATE THE COLLET SWITCH WITH A EMPTY COLLET**]
10. Turn the LOCK switch on.
11. Turn the HOLD DOWN switch on. This engages the hold down ram through the converter to securely seat and hold everything in contact with the turntable.
12. Turn the LOCK switch off.
13. Turn the CLEARANCE ADJUST KNOB clockwise until bowl clearance is achieved on the indicator.
14. Turn the LOCK switch on.
15. Adjust the MIG gun for proper angle and wire contact point. The MIG gun holder is fully articulated and capable of achieving any required angle.

Welding a Converter - TAC 12 PLUS (Continued)

COMPLETING AN AUTO TAC CYCLE

16. Press the button labeled **WELD** to clear the memory and ensure a proper weld.
17. Press the button labeled **WELD ON/OFF** to the **IN/ON** position.
18. To set the number of tacs the welder will place around the converter before an auto weld cycle is carried out you adjust the dial labeled **TACS**. Position 1 (fully counterclockwise) is 4 tacs, pos 2 is 6 tacs, pos 3 is 8 tacs, and pos 4 (fully clockwise) is 12 tacs.

CAUTION: Always use suitable eye protection when welding. Use a tinted filter recommended by your welding supplier suitable for MIG welding.

Recommended shade # 9 minimum.

NEVER watch weld arc without a filtered lens or a safety curtain to protect the eyes from the ultra-violet rays!

19. Use an appropriate welding hood to watch the weld arc and puddle formation. Recommended shade 9 – 12 used.
20. When you get the number of tacs you want set, momentarily press the button labeled **TAC** to make the first tac on the converter.
21. Now momentarily press the button labeled **AUTO TAC** and the controller will automatically take over placing the remainder of the tacs around the converter and finishing off with a complete AUTO WELD around the converter with a 3/8" weld overlap.
22. To repeat an AUTO TAC on another converter repeat steps 16-20 above.

Welding a Converter - TAC 12 PLUS (Continued)

COMPLETING AN AUTO WELD CYCLE (FROM STEP 15)

16. Press the button labeled **WELD** to clear the memory and ensure a proper weld.
17. Press the button labeled **WELD ON/OFF** to the **IN/ON** position.

CAUTION: Always use suitable eye protection when welding. Use a tinted filter recommended by your welding supplier suitable for MIG welding.

Recommended shade # 9 minimum.

NEVER watch weld arc without a filtered lens or a safety curtain to protect the eyes from the ultra-violet rays!

18. Momentarily press the button labeled **AUTO WELD**. The table will begin to turn and the welder will then automatically start to feed wire out of the gun. Once the table makes a revolution, the welder and table will stop giving you a weld all the way around your converter plus 3/8" overlap.
19. To complete another AUTO WELD cycle repeat steps 16 & 17 above.

FINISHING THE AUTO TAC OR AUTO WELD CYCLE

1. Turn the **WELD ON/OFF** switch off.
2. Push the **JOG** button to rotate the converter and inspect the weld. This
3. rotation also helps symmetric cooling to help maintain run-out tolerances.
4. Turn the **LOCK** switch OFF.
5. Turn the **CLAMP** switch OFF.
6. Turn the **COLLET** switch OFF.
7. Return the **CLEARANCE ADJUSTMENT KNOB** to the neutral position (white mark pointing straight down).
8. Raise the spindle to the full 'up' position using the **SIDE ARM LEVER**.
9. Bring the **RUNOUT INDICATOR** into position near the middle of the impeller hub.
10. Press the **JOG** button for several rotations of the turntable to read the total indicated run-out.
11. Turn the **HOLD DOWN** switch off.
12. When the weld is cool enough the handle with gloves remove the converter from the machine. Use heavy leather gloves to handle the converter as the welds will still be hot. The procedure is now complete.

WARNING: Never touch a welded piece with bare hands. The welded piece is extremely HOT and serious burns will be inflicted without using proper protection.

Leather welding gloves should be worn at all times when handling hot welded parts!!

WELDING IMPELLER HUBS

Similar to welding converters together in precise alignment, the A-102 is capable of welding a new hub to an impeller. Instead of using the hub-collet and pilot bushings, however, the procedure requires the use of the bull nose live center and spring loaded steel cones.

CAUTION: Keep hands and fingers clear of the hub and collet closure while attempting to engage the spindle.

1. Load the bull nose live center into the collet housing.
2. Turn the COLLET switch on.
3. Place a 1-1/2" long spring into the pilot bushing hole.
4. Select one of the four steel cones and place it in the pilot bushing hole on the turntable. Wipe the turntable clean from debris.
5. Set a properly machined impeller face down on the turntable so that it is centered on the cone. Ensure the Impeller rests flat on the turntable when pushed down and that the cone is applying upward pressure on the Impeller. If the cone does not touch the Impeller, either install a larger size cone or a larger spring.
6. Spray Anti-Spatter on the new Impeller hub avoiding the area below the weld line.
7. Lightly spray Anti-Spatter on the Impeller.
8. Put the new hub on the Impeller with the pump drive facing up.
9. Indicate new hub to .001", TAC then weld

MAINTAINING YOUR A-102 VERTICAL WELDER

After Each Use

1. Brush off excess slag on the turntable. Spray lightly with Anti-Spatter.
2. Clear slag from the weld gun tip and set wire leader (about 3/8" from the nozzle).

After Each Configuration Change

1. Remove and wipe previous pilot and hub bushings clean.
2. Wipe out the turntable-bushing hole and use light oil film on new pilot bushing before installing.
3. Wipe out the collet closure on the spindle assembly.

Daily

1. Wipe down the turntable and spindle collet,
2. Clean the base of the turntable.
3. Spray the exposed areas with Anti-Spatter compound.
4. Check for and drain any water accumulated in the airline filter.
5. Check the oil level on the in-line oiler. Use a light weight air tool oil to replenish.
6. Pre-2000 models: Grease the Spindle 2 times daily. 2000 and newer models Grease the spindle 3 times a week.
7. Remove the shroud from the tip of the MIG gun. Gently tap/scrape the slag buildup.
8. Use an air nozzle to blow out and clean the gas orifices at the head of the welder tip.
9. Replace the shroud (Bolts should be finger tight) DO NOT OVERTIGHTEN the threads. A 9/16 – 18 tap and die set should be used to chase the threads should they become difficult to thread.
10. Spray the interior of the nozzle with Anti-Spatter.

After Each Spool of Wire

Replace the weld gun contact tip and thoroughly clean the gun and gas passages.

Weekly

1. Apply grease to the turntable fitting located on the left cabinet panel.
2. Check the spindle assembly for alignment.
3. Check the alignment of the turntable bushing hole with respect to the spindle assembly.
4. Check the perpendicularity of the turntable with respect to the axis of the spindle.

Maintenance (Continued)

Quarterly

Rotary Ground Fitting

The rotary ground fitting is located on the left side of the machine. It is marked with a Label. (Use E6-1000 only). Integrity of the ground path through this connection is essential for a good weld. During manufacturing assembly this joint is lubricated with an electrical contact compound to aid in maintaining a good circuit path. Experience has shown this initial treatment will last for prolonged periods of time without a need for maintenance. Pre-2000 models removing side panel – zerk fitting is located right on rotary ground. 2000 & newer all zerk fittings are external and this is marked.

CAUTION: Make sure the electrical power is disconnected from the machine before removing any panel or access covert.

At least quarterly, the left side cabinet panel should be removed for access to the turntable drive assembly, and a tactile inspection made of the joint.

While the panel is removed, disconnect the ground cable at the sleeve. Reach in and hand torque the ground sleeve by rotating at the ground cable connection. If rotation is easily accomplished, there is no need for further action. Reconnect the ground cable and replace the side panel.

If there is evidence of sticking or intermittent grounding.

A-102 models without a grease zerk fitting on the brass ground sleeve, do the following:

1. Loosen the bolt, which holds the photo optic sensor in place. Retract the sensor and allow it to hang down freely. Be especially careful not to allow contact of the sensor surface and slotted disc.
2. Disconnect the ground cable at the brass sleeve.
3. Remove the four bolts, which mount the motor in place and remove the motor. The **Lovejoy** coupling will allow removal of the motor. Do not remove the coupling joints from either of the mating ends.
4. Restrain the turntable against clockwise rotational force.
5. Using a suitable tool, engage the driven coupling slots and unscrew the drive shaft from the turntable spindle.
6. Do not remove the coupling from the drive shaft.
7. Remove the brass sleeve from the drive shaft.

Maintenance (Continued)

8. Use a contact cleaner to clean both the sleeve and the shaft. Look for any evidence of galling or other material pickup on either part. Use a fine emery cloth to smooth out any blemishes. Clean and clear away any grit or removed material.
9. Using **TCRS Part #EG-1000** electrical conductive grease, lightly apply a coating to both the shaft and the brass sleeve inner diameter
10. Slide the brass sleeve over the shaft.
11. Adjust the allen screws on the side of the brass sleeve to create a slight resistance to rotation. **DO NOT** over tighten. Make sure drag force is consistent throughout a full revolution.
12. Engage the assembled drive shaft onto the turntable spindle and tighten.
13. Install the rubber 'spider' on motor coupling and install the motor in place.
14. Hook up the ground cable to the brass sleeve.
15. Replace the side panel.
16. Conduct a setup dry run to verify reinstallation.

For **A-102** models with a grease-zerk fitting, simply apply **TCRS Part #EG-1000** electrical conductive grease gun.

Rotary Seals on the Air Collet Assembly

Rotary seals are used to contain the air pressure used to actuate (lock) the collet which holds the converter hub tooling. Should there be evidence of excessive leakage at these joints the seals would need to be replaced.

COLLET SEAL REPLACEMENT

1. Remove the 2 tabs on the Collet Seal Ring.
2. Disconnect the air hose that is attached to the Collet Seal Ring.
3. Unscrew the three spring loaded ball plunger screws. (Page 38, Figure 1)
4. Check plungers for damage. Replace if damaged (must be nylon tip)
5. Drop the Collet Seal Ring.
6. Remove the old seals.
7. Replace with the new style seals (2 piece design 1 O-Ring with 1 Teflon one piece seal)
8. First place the O-Ring in the groove. Then slide the one piece teflon seal over the O-Ring. (Page 38, Figure 2)
9. After replacing both seals carefully replace the Collet Seal Ring using grease to install. (Be careful not to force the ring and cut or pinch the seal.)
10. Tighten set screw plungers tight, back off 1/2 turn.
11. Place the alignment rod into the slot located behind the spindle.
12. Screw the three spring loaded ball plungers. To adjust properly you must screw in until it bottoms out, then back the screw out 1/2 turn.
13. Replace the air line on the Collet Seal Ring.
14. Replace the two tabs onto the Collet Seal Ring.

MACHINE ALIGNMENT

The concentricity of the spindle to the turntable is critical to successful alignment of the converter hub and pilot. If consistent excessive run-out is encountered during welding, the machine's rotating assemblies must be aligned to achieve concentricity of each of the rotating axes. Three alignment checks are required when adjusting the alignment of the A-102.

Spindle to Collet Concentricity

1. Install the factory supplied alignment pin into the collet (must be bottomed out) and lock in place. (Page 38, Figure 3)
2. Inject a shot of grease into the fitting located on the left side of the head-stock
3. Use the run-out indicator located on the right side of machine to indicate on the alignment pin.
4. Insert a shaft through the hole on the lower end of the alignment pin and rotate the collet/spindle in the counter clockwise direction. The measured run-out of the spindle to collet should be less than .001 T.I.R.
(Page 38, Figure 3)
5. If the reading is .001 T.I.R. or less the collet is indicated.
6. If the reading is more than .001 T.I.R. back out every other buck screw on the bucking ring. Set your indicator at Zero. Then rotate collet 180 degree. Check your reading using the bucking screws, move the collet until you achieve a reading of .001 T.I.R. or less. Rotate your collet 90 degree and repeat the above procedure. After this is completed, fully rotate the collet. It should read .001 T.I.R. or less. Tighten the other 4 screws while watching the indicator, not to exceed .001 T.I.R.
7. Check the run-out again, Repeat the process as necessary until .001" T.I.R. is maintained.
8. Retract the indicator to its original position.

SPINDLE TO TURNTABLE CONCENTRICITY

Located right below the turntable are four equally spaced steel blocks and adjusting or 'bucking' screws. This assembly allows for adjustment of the turntable/spindle alignment.

1. With the alignment pin still intact in the spindle housing, place a 6" magnetic base and dial test indicator on the lower portion of the alignment pin. NOTE: Alignment pin must be installed fully bottomed out!
2. Lower the spindle approximately half the distance of its normal travel.
3. Lock the CLAMP switch.
4. Lock the **LOCK** switch. **DO NOT** lock the **HOLD DOWN** switch as this may drive the alignment pin out of the collet housing.
5. Position the indicator so that it's indicating needle is touching the inside diameter of the turntable pilot hole (Page 26, Figure 5).
6. Insert a shaft into the lower hole of the alignment pin, and rotate the spindle and indicator a few revolutions in the (counter-clockwise) direction of the turntable's rotation. Begin each swing at one of the steel blocks and proceed ¼ turn to the next one, reading the indicator at each position. These are the points where the adjustment screws are effective. If the indicator reads more than .001" T.I.R. the turntable needs to be adjust.
7. To align the turntable, loosen the hex-lock nut on each of the four steel blocks.
8. Using a 3/8" Allen wrench, slightly loosen the four bucking screws. (Page 26, Figure 5)
9. Determine a low point on the swing of the indicator, tighten the bucking screw opposite the side of the table which the needle is resting on. This action will push the table towards the indicator.
10. Tighten the bucking screw on the opposite side.
11. Again rotate the alignment pin/indicator stopping at the location of each steel block, Read the T.I.R. at each position.
12. Repeat steps 8-11 until a T.I.R. of .0005" or less is obtained.

TABLE PERPENDICULARITY

Below the turntable base are three large 1" -12 adjusting bolts, which control perpendicularity between the surface of the table to the axis of the spindle assembly.

1. Set up the magnetic base assembly as shown on Page 25 , Figure 4.
2. Rotate the collet/magnetic base assembly stopping at the location of each of the three Allen cap screws lying underneath the turntable.
3. Measure the fluctuation between the table and alignment on the indicator at each of these cap screw locations. If the fluctuation exceeds .0005" adjustment will be necessary.

CAUTION: Make sure the electrical power is disconnected from the Machine before removing any panel or access cover

4. Remove the nine cap screws from the front cabinet panel in order to gain access to the three large 1"- 12 adjusting bolts, which attach the turntable to the A-102 frame. (Refer to drawing on Page 26, Figure 6)
5. Verify that the lock nuts, adjusting screws, and Allen cap screws are all tight.
6. Determine which point(s) are low and TIGHTEN the respective bolt(s), with a 1-1/2" boxed end wrench. *[Be careful not to loose control of the wrench as damage to the photo-optic sensor or slotted wheel may result. Later models may not have photo-optic sensor.]* By tightening the bolt(s) you are bringing the low point(s) of the turntable up to the highest point.
7. Check the indicator fluctuation again. Repeat steps 3 and 5 until a fluctuation of less than .0005" T.I.R. is obtained.
8. Replace the front cabinet panel.
9. Remove the magnetic base assembly.
10. Turn the LOCK switch off.
11. Turn the **CLAMP SWITCH OFF**
12. Hold on to the alignment pin and turn the **COLLET SWITCH OFF**
13. Reconnect the electrical power to the machine.

*****NOTE: With these three alignment checks and adjustments made once a week, consistent converter pilot-hub run-outs can be achieved. (if the machine is maintained, adjustment may not be necessary on a weekly basis, but it is recommended to at least inspect the alignment)***

TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
1. Porosity in weld	Gas not turned on Gas bottle is empty Clogged gas nozzle on MIG Gun Air or wind blowing the gas away Dirt, oil grease, on weld surface	Turn on gas bottle valve Replace bottle Remove and clean spatter Shield weld area from breeze. Clean all parts
2. Weld skips in small places around converter	Liner clogged Contact tip clogged Table speed too fast Wirefeed Wheels too tight Not enough grease in the rotary ground Wire speed too slow	Clean or replace Clean or replace Adjust table speed Re-adjust wheel pressure Grease rotary ground with TCRS P/N EG-1000 Adjust wire speed
3. Weld stopping part way around converter	Liners clogged Contact tip clogged Converter driver not placed correctly against front cover pad Counter not correctly	Clean or replace Clean or replace Position and tighten Adjust counter per page 6
4. Bad run-outs	Worn Pilots Tacking sequence not applied correctly Tacks breaking as converter is welded Wrong pilot hub bushing Machine out of alignment Low air pressure No grease in spindle bushings	Fix and replace front cover Tack with proper sequence and as fast as possible Tacks are too small, or weld is too hot, or too slow Select proper tooling Re-align spindles Maintain at least 115-130psi Add grease to bushings using grease gun
5. Machine will not jog	Control Panel power switch not on Emergency Stop button switch is pushed in An object is obstructing free rotation of the turntable	Turn power switch on Turn knob until it pops out Remove object from table area

6. Machine will not weld	Wire feeder power switch is not on	Turn power switch on
	Proper contact is not established on turntable surface to the part welder	Clean table and parts being welded
	Power is off (breaker)	Check power switch and breaker
TAC 12 PLUS (only)	Weld Switch not pressed	Press Weld Switch
7. Weld overlap to short or to long.	Counter is not set at 199 – 102	Adjust counter to read 199 – 102
(Not applicable for TAC 12 PLUS)	Timing wheel is dirty	Clean and re-align wheel
	Pick-up Sensor is dirty	Clean and re-align sensor
8. Pin holes in weld around tac area	Tac time is to long, or weld is to cold	Adjust Tac time or Volts to allow weld to burn through tacs
9. Collet will not lock	Improper air pressure. Low or high	Adjust to 115 – 130 psi
	Water in air lines	Drain Filter Daily, Re-oil
	No oil in lines	Confirm operation of oiler, re-oil
10. Can't Pull Desired Clearance	Worn-out clamp block	Replace
	Clamp out of Adjustment	Re-adjust clamp back to factory Specification's Refer to pages 31 and 32
	Dirt, Grease & Oil build-up on air cylinder shaft	Clean the shaft with Brake cleaner or equivalent cleaner

TOTAL STACK HEIGHTS FOR COMMON CONVERTERS

	CONVERTER	AVERAGE OVERALL HEIGHT	PILOT DIAMETER
FORD Note: All Ford readings are with converter inverted on the hub.			
C-4	10" Ribbed Cover	5.785	1.375
	11" Ribbed Cover	5.650	1.375
	12" Ribbed Cover	5.950	1.375
C-5	12" Ribbed Cover	6.625	1.375
C-6	12" Ribbed Cover	5.925	1.375
	12" Smooth Cover	5.925	1.375 or 1.849
FMX	12" Ribbed Cover	5.965	1.375
	12" Smooth Cover	5.965	1.375
	11" Ribbed Cover	5.600	1.375
	A4LD	5.750	0.750 - 0.824
	AOD	6.685	1.375
	E4OD	6.925	1.375
	CD4E	3.625	
	AXOD, AXOD-E	5.175	
	ATX - Planetary Type	3.820	

GENERAL MOTORS Note: All readings are from tip of the hub to mounting pad.

GM 13" THM 400	6.210	1.703
GM 12" THM 350	6.150	1.703
2004R, 7000R4	5.835min-5.901max	1.703
250C, 350C	5.901min-6.050max	1.703
10" 700R4	5.875	0.823
125c, 440-T4 (Inverted on Hub)	4.130	0.823
125 NON L/U	4.200	0.823
THM 180c	5.480	0.823
4L80E	6.925	

CHRYSLER Note: All readings are from tip of the hub to mounting pad.

A727 NON L/U	5.500	1.810
A727 L/U	5.500	1.810
A904 NON L/U	5.375	1.810
A904 L/U	5.375	1.810
A404-470	4.950	1.336
A604	4.931	1.336
A606	6.375	
Cummins 6 PAD NON L/U	5.555	1.812
A999 GERMAN	5.475	0.825



FIGURE 1

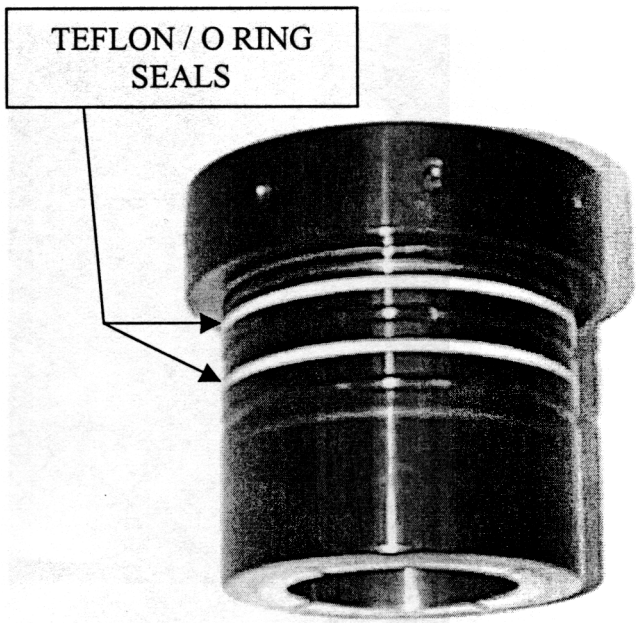


FIGURE 2

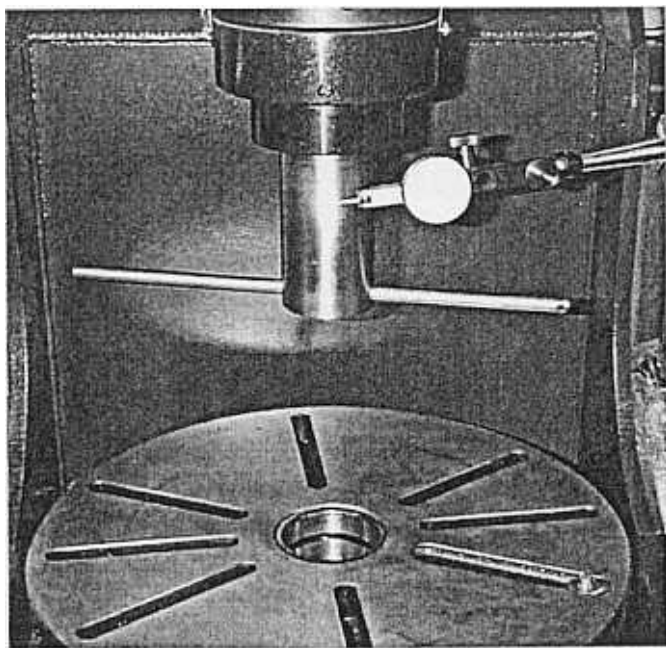


FIGURE 3

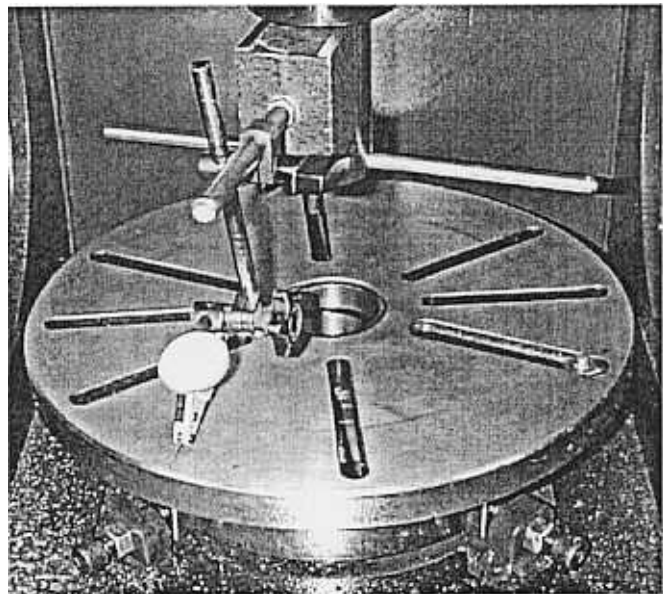


FIGURE 4



FIGURE 5

ALLEN WRENCH

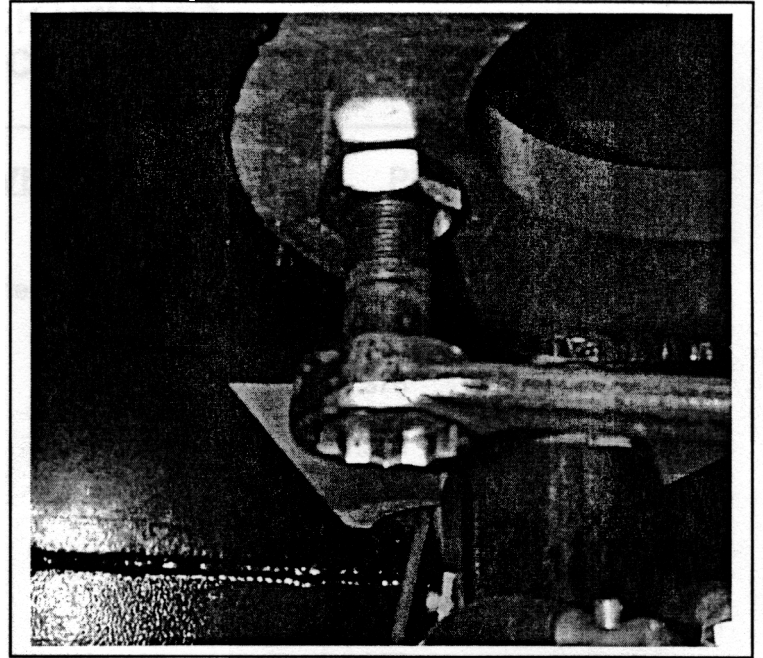
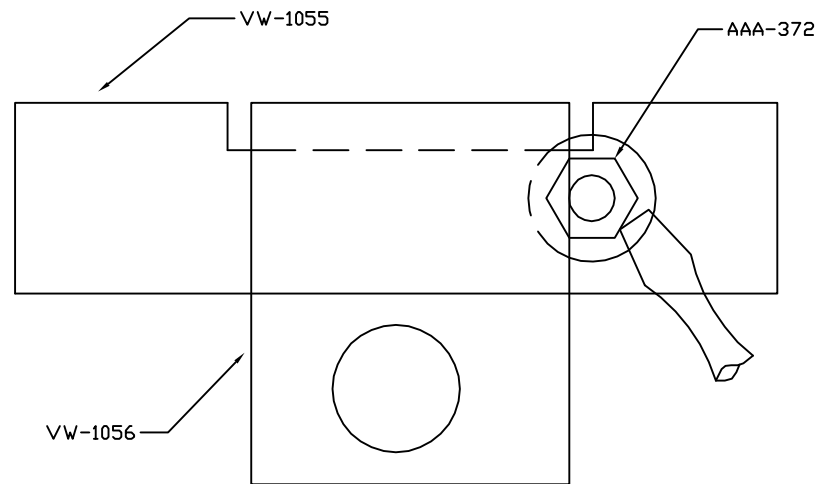


FIGURE 6

HUB (COLLET) BUSHINGS

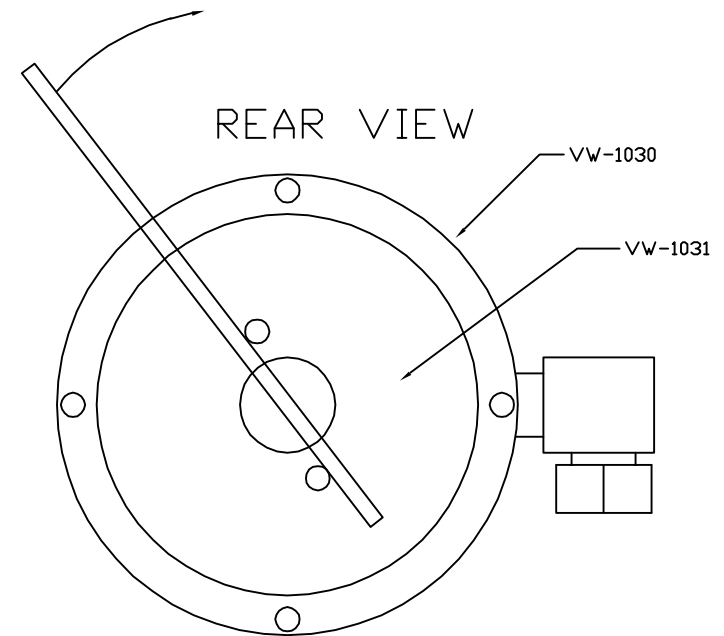
PART NO.	HUB DIA	APPLICATION
HB-01	1.498	TF 404 / 904
HB-02	1.608	C-3 / A4LD
HB-03	1.65	JATCO / VW
HB-04	1.684	MODEL 35 / GERMAN 904
HB-05	1.748	GM125/200/700
HB-06	1.875	GM 350 / 400 / 180 - CHRYSLER 727
HB-07	1.937	FMX B/W
HB-08	1.997	C4/C5/C6/AOD/AXOD/K480E/E40D
HB-09	1.787	GM 125C / 440 / T4
HB-10	1.731	MERCEDES
HB-11	1.888	NISSAN 4WD
HB-12	1.768	MAZDA / VW
HB-13	1.574	BMW / PUGUET / ZF
HB-14	1.691	MITSUBISHI / MERCEDES
HB-15	2.367	ATX
HB-16	2.674	NISSAN FWD / PROBE
HB-17	1.18	NISSAN MAXIMA
HB-18	2.225	MAZDA
HB-19	1.812	NISSAN
HB-20	1.38	MERCEDES / LATE
HB-21	1.731/1.574	HONDA
HB-22	2.131	MERCURY E-CAT
HB-23	1.999	GM 4L80E
HB-24	1.652/1.582	SATURN
HB-25	1.1	MERC. FLUID COUPLER
HB-26	1.965/1.900	SUBARU LEGACY
HB-27	1.998/1.966	SUBARU LEGACY AWD
HB-28	2.296	ALLISON 1000

TO ADJUST MICROMETER CLAMP
TAKE FRONT TOP PLATE OFF. LOOK FOR
7/16" NUT ON RIGHT SIDE OF BRACKET



FRONT VIEW

LOCK SCREW DRIVER BETWEEN NUT AND
SHOLDER

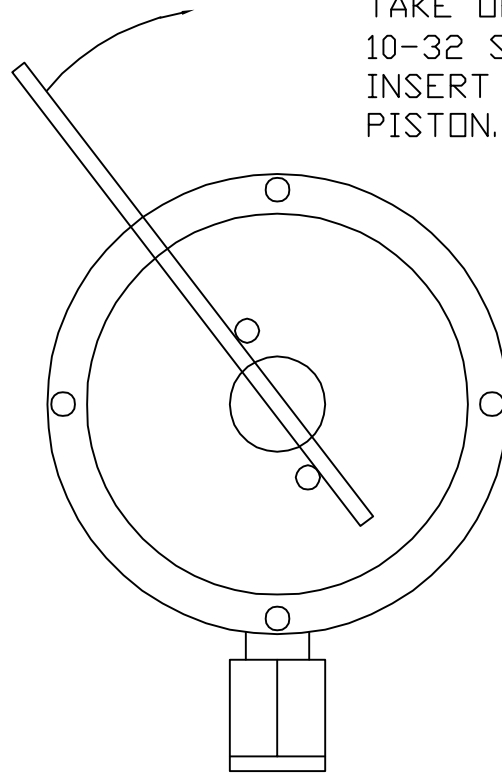


REAR VIEW

TAKE OFF BACK COVER (4) 10-32 SCREWS.
INSERT (2) 10-32 SCREWS INTO PRE
TAPPED HOLES IN PISTON.
INSERT BAR BETWEEN SCREWS AND
TIGHTEN

TOP CLAMP

TAKE OFF COVER (4) 10-32 SCREWS. INSERT (2) 10-32 SCREWS IN PRE TAPPED HOLES IN PISTON. INSERT SCREW DRIVER BETWEEN SCREWS AND LOOSEN PISTON. HOLD HOUSING SO FITTING POINTS DOWN

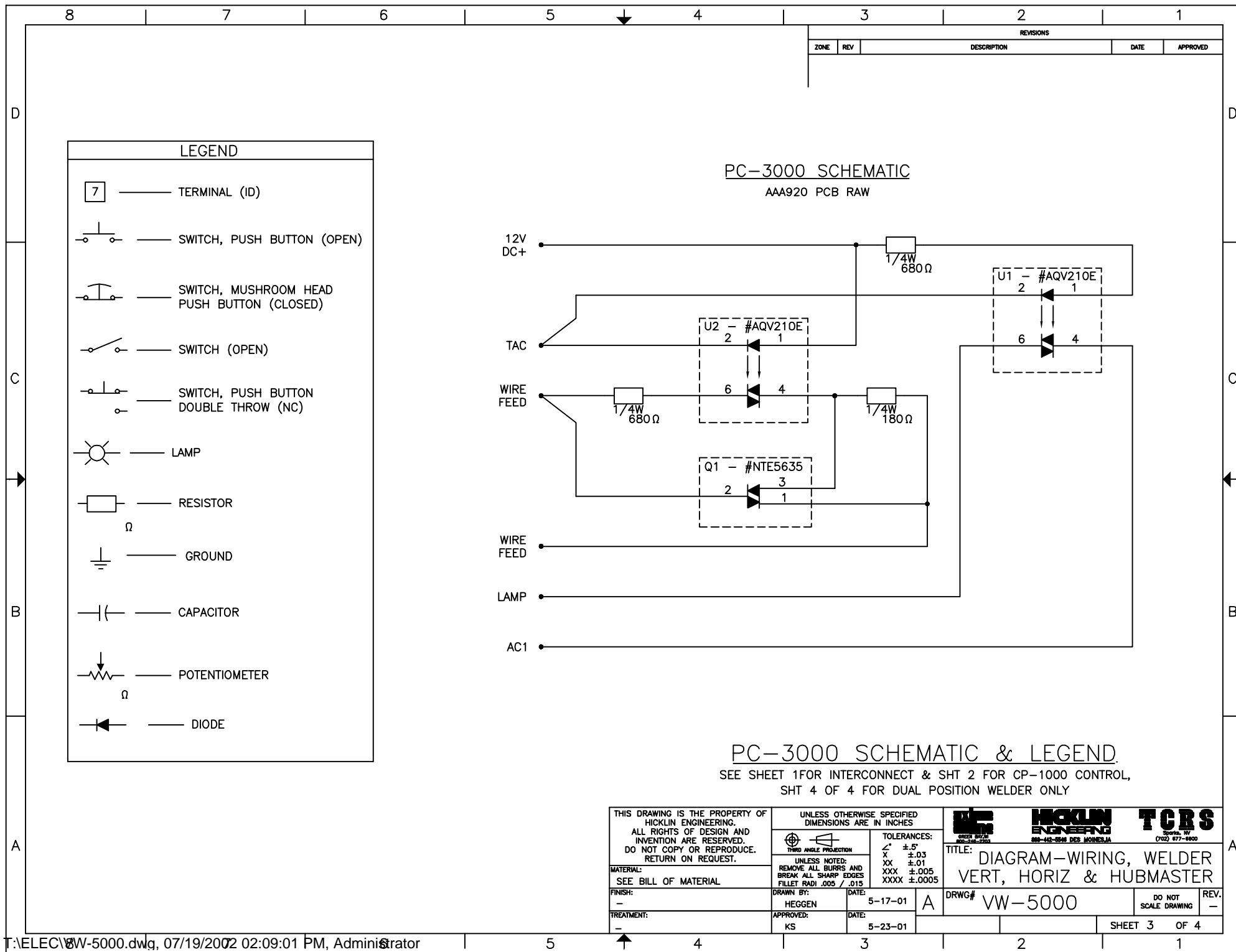


STEEL PILOT BUSHINGS

PART NO.	PILOT DIA	APPLICATION
PB-01	1.706	GM 350/400/4L80E
PB-02	1.968	MERCEDES (EARLY)
PB-03	1.849 - 1.375	C-6 EARLY / LATE / 4L80E
PB-3B	1.375	C-4 / AOD
PB-04	1.81	TF727 / 904
PB-05	1.257	TOYOTA / BMW
PB-06	1.377	MERCEDES (LATE)
PB-07	1.336	TF404
PB-08	1.101	TOYOTA
PB-09	0.823	GM125 / 700R4 9 1/2" LU
PB-10	0.824	PINTO C4
PB-11	0.824	VW / AUDI
PB-12	0.787	JATCO (NISSAN / MAZDA)
PB-13	0.750 - 0.825	C-3 / A4LD
PB-14	1.088	TH180 / 200
PB-15	0.823	904 / GERMAN
PB-16	0.863	KM170
PB-17	1.06	KM171 / 172
PB-18	1.552	TF904 (EARLY)
PB-19	1.572	C-4 EARLY / VOLVO
PB-20	0.63	SUBARU / RENAULT
PB-21	0.560 - 0.900	OPEL
PB-22	0.945	VOLVO / HONDA
PB-23	0.75	TF / COLT
PB-25	--	PILOT BUSHING ADAPTER
PB-26	1.576	AMC EAGLE / TALON ADAPTER
PB-27	1.652	TOYOTA LANDCRUISER
PB-28	0.378	AISIN WARNER

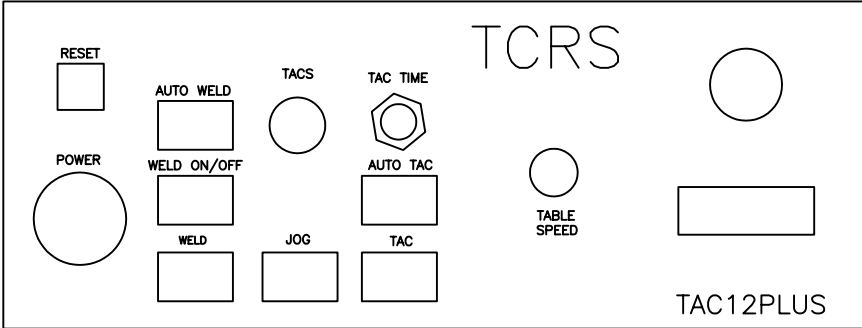
RECOMMENDED WELDER SET-UP

Part #	Table speed	Tac	Wire speed	Voltage	TAC #
B-29	800-850	425-475	375	20.3	8
B-85	800-875	400-450	350	19.5	12
B-81	800-850	425-475	375-400	20.5-21.5	12
B-21	525	300-350	350	19.3	8
878	800-850	300-350	300-350	18.2-19.2	6
783	800-850	300-350	300-350	18.5-19.2	6
582-Y	800-850	300-350	300-350	18.5-19.2	6
585	1000	803	200	16	6
585-90	850-900	300-350	350	19.3	6
586	1000	800	200	16	6
586-90	850-900	300-350	350	19.3	6
F-68-E	800-850	400	350	19.5	12
F-67	825-875	300-350	350	19.5	8
F-66	850-900	275-325	300-350	18.5-19.0	8
F-59-6	850	480	312	18.2	8
F-59-L/S	950	480	300	18.2	8
F-60	850-900	300-350	300-350	18.5-19.3	8
F-49	850-900	300-350	300-350	18.5-19.0	8
TO-51	850-900	300-350	300-350	18.5-19.0	8
TO-42	850-900	300-350	300-350	18.5-19.0	8
TO-39	875-925	300-350	300-350	18.2-19.2	8
TO-67	800-900	350-400	300-375	18.5-19.5	8
CT-12-1	825-925	300-375	300-350	18.2-19.2	8
CT-15-	825-925	300-375	300-350	18.2-19.2	8
DA-24	660	480	350	19.5	12
TO-28	651	484	350	19.2	12



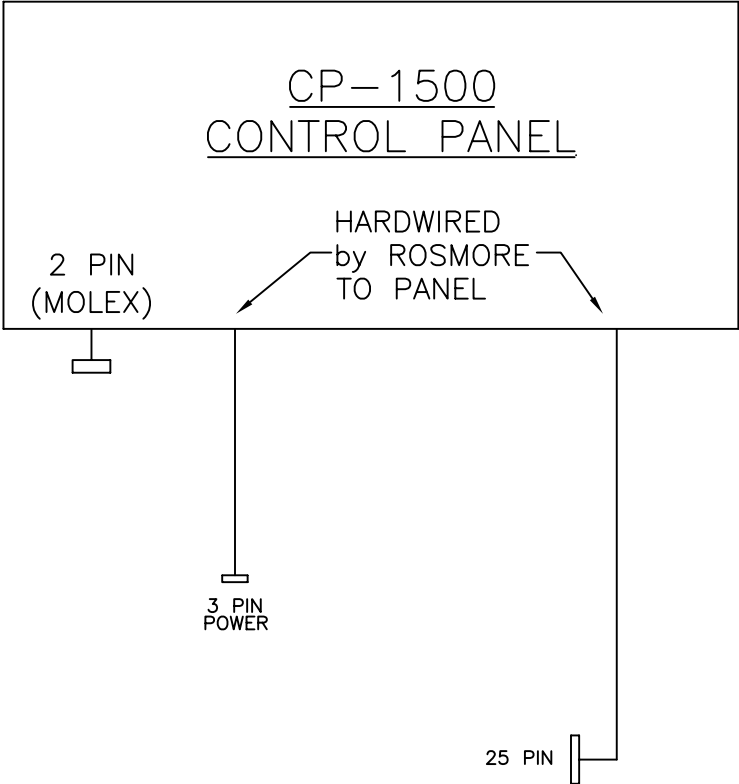
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

FRONT VIEW



NOT TO SCALE

TOP VIEW



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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

UNLESS NOTED: REMOVE ALL BURRS AND BREAK ALL SHARP EDGES FILLET RADI .005 / .015

TOLERANCES:
 < ±.5"
 X ±.03
 XX ±.01
 XXX ±.005
 XXXX ±.0005

MATERIAL:
SEE BILL OF MATERIAL

FINISH:
-

TREATMENT:
-

DRAWN BY:
JLN

APPROVED:

DATE:
07-09-04

DATE:

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TITLE:
VERT, HORIZ WELDER & HUBMASTER W/TAC12PLUS

DRWG#
VW-5004

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REV.
-

SHEET 2 OF 2

PNEUMATIC DIAGRAM
FOR
VERTICAL WELDER
WITH PNEUMATIC
CLEARANCE
ADJUSTMENT

PNEUMATIC DIAGRAM
FOR
VERTICAL WELDER
WITH PNEUMATIC
CLEARANCE
ADJUSTMENT

