Arcair®

N6000 Automatic System

English
Français
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Safety and Operating Instructions

Issue Date: October 1, 2007

Manual No: 89210000

Arcair®

WE APPRECIATE YOUR BUSINESS!

Congratulations on your new Arcair® product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency call 800-426-1888, or visit us on the web at www.tweco.com.

This Manual has been designed to instruct you on the correct installation and use of your Arcair® product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore, please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

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Arcair® is a Global Brand of Carbon-Arc Gouging Products for Thermadyne Industries Inc. We manufacture and supply to major welding industry sectors worldwide including; Manufacturing, Construction, Mining, Automotive, Aerospace, Engineering, Rural and DIY/Hobbyist.

We distinguish ourselves from our competition through market-leading, dependable products that have stood the test of time. We pride ourselves on technical innovation, competitive prices, excellent delivery, superior customer service and technical support, together with excellence in sales and marketing expertise.

Above all, we are committed to develop technologically advanced products to achieve a safer working environment within the welding industry.

WARNINGS

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment. While the information contained in this Manual represents the Manufacturer's judgment, the Manufacturer assumes no liability for its use.

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Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date: _____

Equipment Serial #: _____

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SECTION 1:
SAFETY PRECAUTIONS

WARNING

SERIOUS INJURY OR DEATH *may result if welding and cutting equipment is not properly installed, used, and maintained. Misuse of this equipment and other unsafe practices can be hazardous. The operator, supervisor, and helper must read and understand the following safety warnings and instructions before installing or using any welding or cutting equipment, and be aware of the dangers of the welding or cutting process. Training and proper supervision are important for a safe work place. Keep these instructions for future use. Additional recommended safety and operating information is referenced in each section.*

ELECTRIC SHOCK CAN CAUSE INJURY OR DEATH

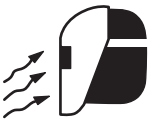
Install and maintain equipment in accordance with the National Electrical Code (NFPA 70) and local codes. **Do not** service or repair equipment with power on. **Do not** operate equipment with protective insulators or covers removed. Service or repair to equipment must be done by qualified and/or trained personnel only.

Do not contact electrically live parts. **Always** wear dry welding gloves that are in good condition. Aluminized, protective clothing can become part of the electrical path. Keep oxygen cylinders, chains, wires, ropes, cranes, and hoists away from any part of the electrical path. All ground connections must be checked periodically to determine if they are mechanically strong, and electrically adequate for the required current. When engaged in AC welding/cutting under wet conditions or where perspiration is a factor, the use of automatic controls for reducing the no load voltage is recommended to reduce shock hazards. Accidental contact must be prevented when using open circuit voltage exceeding 80 volts AC, or 100 volts DC by adequate insulation or other means. When welding is to be suspended for any length of time, such as during lunch or overnight, all electrode holders and electrodes should be removed from the electrode holder and the power supply should be turned off to prevent accidental contact. Keep MIG-Guns, electrode holders, Tig torches, Plasma torches, and electrodes away from moisture and water. **See safety and operating references 1, 2, and 8.**

SMOKE, FUMES, AND GASES CAN BE DANGEROUS TO YOUR HEALTH

Ventilation must be adequate to remove smoke, fumes, and gases during operation to protect operators and others in the area. Vapors of chlorinated solvents can form the toxic gas "Phosgene" when exposed to ultraviolet radiation from an electric arc. All solvents, degreasers, and potential sources of these vapors must be removed from the operating area. Use air-supplied respirators if ventilation is not adequate to remove all fumes and gases. Oxygen supports, and vigorously accelerates fire and should **never** be used for ventilation. **See safety and operating references 1, 2, 3, and 4.**

ARC RAYS, HOT SLAG, AND SPARKS CAN INJURE EYES AND BURN SKIN



Welding and cutting processes produce extreme localized heat and strong ultraviolet rays. **Never** attempt to weld/cut without a federally compliant welding helmet with the proper lens. A number 12 to 14 shade filter lens provides the best protection against arc radiation. When in a confined area, prevent the reflected arc rays from entering around the helmet. Approved shielding curtains and appropriate goggles should be used to provide protection to others in the surrounding area. Skin should be protected from arc rays, heat, and molten metal. Always wear protective gloves and clothing. All pockets should be closed and cuffs sewn shut. Leather aprons, sleeves, leggings, etc. should be worn for out-of-position welding and cutting, or for heavy operations using large electrodes. Hightop work shoes provide adequate protection from foot burns. For added protection, use leather spats. Flammable hair preparations should not be used when welding/cutting. Wear ear plugs to protect ears from sparks. Where work permits, the operator should be enclosed in an individual booth painted with a low reflective material such as zinc oxide. **See safety and operating references 1, 2, and 3.**

WELDING SPARKS CAN CAUSE FIRES AND EXPLOSIONS

Combustibles reached by the arc, flame, flying sparks, hot slag, and heated materials can cause fire and explosions. Remove combustibles from the work area and/or provide a fire watch. Avoid oily or greasy clothing as a spark may ignite them. Have a fire extinguisher nearby, and know how to use it. If welding/cutting is to be done on a metal wall, partition, ceiling, or roof, precautions must be taken to prevent ignition of nearby combustibles on the other side. Do not weld/cut containers that have held combustibles. All hollow spaces, cavities, and containers should be vented prior to welding/cutting to permit the escape of air or gases. Purging with inert gas is recommended. **Never** use oxygen in a welding torch. Use only inert gases or inert gas mixes as required by the process. Use of combustible compressed gases can cause explosions resulting in personal injury or death. Arcing against any compressed gas cylinder can cause cylinder damage or explosion. **See safety and operating references 1, 2, 5, 7, and 8.**

NOISE CAN DAMAGE HEARING

Noise from the air carbon-arc process can damage your hearing. Wear protective hearing devices to ensure protection when noise levels exceed OHSA standards. Adequate hearing protection devices must be worn by operators and surrounding personnel to ensure personal protection against noise. **See safety and operating references 1, 2, and 6.**

SAFETY AND OPERATING REFERENCES

1. Code of Federal Regulations (OSHA) Section 29, Part 1910.95, 132, 133, 134, 139, 251, 252, 253, 254 and 1000. U.S. Government Printing Office, Washington, DC 20402.
2. ANSI Z49.1 “Safety in Welding and Cutting”.
3. ANSI Z87.1 “Practice for Occupational and Educational Eye and Face Protection”.
4. ANSI Z88.2. “Standard Practice for Respiratory Protection”. American National Standards Institute, 1430 Broadway, New York, NY 10018.
5. AWS F4.1. “Recommended Safe Practices for Welding and Cutting Containers”.
6. AWS C5.3. “Recommended Practices for Air Carbon-Arc Gouging and Cutting”. The American Welding Society, 550 NW Lejeune Rd., P.O. Box 351040, Miami, FL 33135.
7. NFPA 51B. “Fire Prevention in Cutting and Welding Processes”.
8. NFPA-7. “National Electrical Code”. National Fire Protection Association, Battery Park, Quincy, MA 02269.
9. CSA W117.2. “Safety in Welding, Cutting and Allied Processes”. Canadian Standards Association, 178 Rexdale Blvd., Rexdale, Ontario, Canada M9W 1R3.

SECTION 2: FEATURES

THE TOTALLY-AUTOMATIC ARCAIR N6000 TORCH CAN BE USED WITH EITHER CONSTANT CURRENT OR CONSTANT POTENTIAL WELDING POWER SOURCES.

The power mode is quickly and easily selected by means of a toggle switch located in the N6000 System's controller. Previous Arcair-Matic Torches operated only with constant current power input.

A SINGLE ELECTRODE CONTACT SHOE ASSEMBLY ACCEPTS THE ENTIRE RANGE OF ARCAIR GOUGING ELECTRODES FROM 5/16" (7.9 mm) THROUGH 3/4" (19.1 mm.

The N6000 torch eliminates the necessity of stocking or changing contact shoe assemblies when changing electrode sizes.

ONE CONTACTOR (1600 AMP) ACCEPTS CURRENT FOR THE ENTIRE AMPERAGE/DIAMETER RANGE OF GOUGING ELECTRODES FROM 5/16" (7.9 mm) THROUGH 3/4" (19.1 mm).

This feature eliminates the need to use two different Contactors, one for high amperage capability for large diameter electrodes and another for lower amperage for the smaller size electrodes. Equipment costs are minimized and important timesavings are realized.

ENSURES CONFORMITY TO PRE-DETERMINED, PRE-SELECTED GROOVE DEPTH AND WIDTH SPECIFICATIONS.

Simply select the proper electrode diameter and other operating parameters and the system does the rest - automatically, from the beginning of the groove to the end.

A UNIQUE "TRAVEL DELAY" FUNCTION ASSURES EXCELLENT GROOVE GEOMETRY AT THE VERY BEGINNING OF THE GROOVE.

This function eliminates a sloped groove at the beginning of the gouge, eliminating the need for a starting pad.

A REMOTE CONTROL PENDANT PUTS INSTANT "START-STOP" CONTROL INTO THE OPERATOR'S HAND.

This permits the operator to move along with the torch and travel system, eliminating the need to return to the control panel of the N6000 system for "Start-Stop" functions.

NO CURRENT DETECT AND LOW VOLTAGE FUNCTIONS SHUT DOWN THE SYSTEM WHEN THESE CONDITIONS ARE SENSED.

These functions ensure optimum groove quality and prevent damage to the equipment and work.

LIGHT WEIGHT TORCH HEAD

Streamlined and loaded with efficiency, yet with all the proven features of ruggedness, dependability and Arcair quality. The lightweight of only 9-3/4 pounds (4.4 kg) allows the head to be used for robotic and controlled manipulated applications.

SECTION 3: INTRODUCTION

The N6000 System adds new dimensions of flexibility and control in modern weld preparation. It's the most advanced air carbon-arc gouging/grooving system in the world. The Arcair-Matic N6000 Metal Removal System assures improved productivity in the following ways:

- Higher yields of optimum quality end product.
- Dramatic reductions of man-hours and process costs.
- Expanded areas of applicability.

This manual has been structured to provide the user with all the information required for assembly, operation and trouble shooting of the N6000 System. Illustrations, charts and other supporting data are provided to bridge the gap between theory and practice.

In addition, this manual illustrates the operation of the Titan Machine Carriage and Climber V-A Travel Systems. These systems manufactured by the Arcair Company, are designed to be used, where appropriate, with the N6000 system or may be applied to other cutting and welding systems, such as GMAW, GTAW, Submerged Arc, Plasma and Oxy-Fuel equipment.

For additional information, contact your local Arcair Distributor or Tweco-Arcair.

SECTION 4:
GENERAL INFORMATION

THE AIR CARBON-ARC METAL REMOVAL PROCESS (CAC-A)

The Arcair Company developed air carbon-arc gouging and cutting in the 1940's and early 50's. Since then, industry has enthusiastically adopted the process. Its many uses in metal fabrication and casting finishing, in chemical and petroleum technology, in construction, mining, general repair, and maintenance have become well known.

Arcair Torches and Electrodes are used throughout the world, anywhere metal must be gouged, grooved, cut, or flushed from a surface. The air carbon-arc process is flexible, efficient and cost effective when applied to nearly all metals: carbon steel, stainless steel and other ferrous alloys; gray, malleable and ductile iron; aluminum; nickel and copper alloys and other nonferrous metals.

Here is how it works:

Electrical power from a welding-power source and compressed air are fed to the air carbon-arc torch, which holds a consumable, copper-coated, carbon-graphite electrode. An arc is struck between the electrode and the grounded workpiece. The intense heat of the arc instantly melts the workpiece surface. A jet of compressed air blasts the molten metal away, leaving a clean, bright, machine-like groove or cut. Heat input to the base metal is minimal because the air blast cools the metal and the molten puddle is removed right away. Proper use of the equipment ensures that no carbon contamination of the metal will occur.

N6000 SYSTEM CONTROL - GENERAL

The N6000 System produces in a single pass uniform "U" or "J" grooves of various depths up to 1-1/8" (28.6 mm). Two or more passes produce grooves of greater depth. Through continuous control of arc voltage or amperage and a constant travel speed, the groove is held within 0.025" (0.635 mm) target depth. Arcair Jointed Jetrod Electrodes, with tapered male and female ends, making it possible to produce grooves of unlimited length.

Control elements and circuitry for the N6000 System are housed in splash-resistant cabinets. For quick access by the operator, all switches, dials and indicators are mounted in logical sequence on the face of the control unit.

Groove depth and width are controlled in two ways:

- By changing the travel carriage's forward speed or by changing the workpiece rotational speed, if the N6000 Torch Head is mounted on a stationary fixture.
- By changing the electrode's diameter and increasing or decreasing amperage.

SECTION 5:
THE N6000 AUTOMATIC SYSTEM COMPONENT DESCRIPTION

N6000 TORCH HEAD

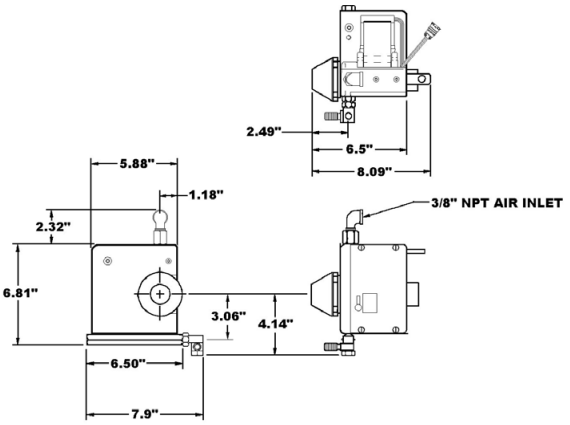


FIGURE 1 - N6000 Torch Head

The N6000 TORCH HEAD feeds the jointed electrodes down to the work surface. The Controller controls and signals the motor on the Torch Head to feed or retract the electrode. This action maintains arc voltage or current set on the Controller. Standard welding cables supply DC current to the Torch Head. Compressed air coming from the Contactor connects at the Torch Head with a 3/8" NPT female pipe elbow.

A Height & Angle Gauge, furnished with the Torch Head, sets the torch angle, electrode stick-out, and correct air nozzle alignment. A protective cable boot (included) covers the power connection on the buss bar.

The mounting bracket that comes with the Torch Head allows the Head to fasten to a travel system or fixture. These brackets allow the head to be adjusted to the proper angle and position for a particular application, then they can be tighten to hold the mounting position (See Figure 1).

AUTOMATIC CONTROLLER

The AUTOMATIC CONTROLLER controls the system's operation before, during and after gouging. The following lists each of the panel's control buttons and switches (left to right), and details the function of each (See Figure 2)

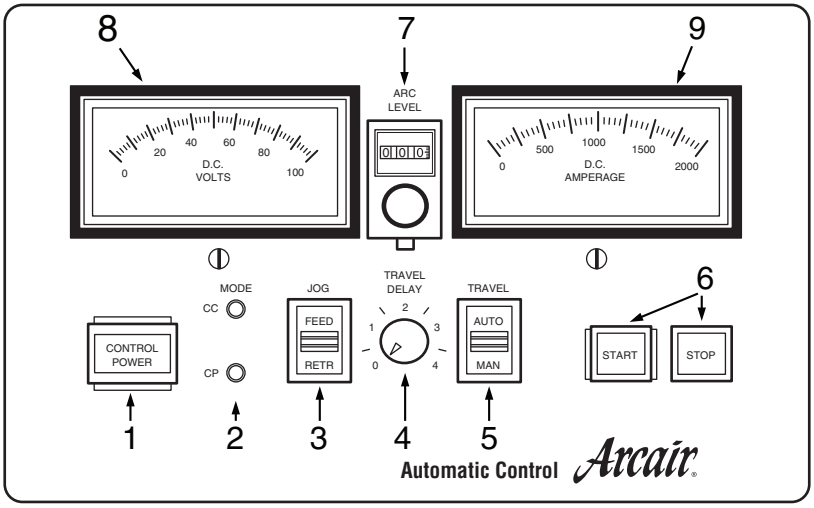


FIGURE 2 - Front of Automatic Controller

1. **CONTROL-POWER SWITCH:** Turns on the power when pushed in. The electrode retracts and the cooling fan in the Contactor starts.

2. **MODE-INDICATOR LIGHT:** Indicates the operating mode (either "CC" constant current or "CP" constant potential) of the Controller. The setting should match the welding power source. If it doesn't, see Section VII, page 7.

3. **JOG SWITCH FOR/REV:** Moves the electrode in the torch head prior to gouging.

4. **TRAVEL-DELAY CONTROL:** Delays the travel system until the arc current flows (for the set period of time). This delay permits the electrode to reach the right depth before moving forward. It works only when the travel system is plugged into the "TRAVEL" receptacle on the Controller and the travel switch is in the "AUTO" position.

5. **TRAVEL SWITCH AUTO/MAN:** Allows the travel system to start automatically or manually. The travel system must be plugged into the "TRAVEL" receptacle on the Controller.

NOTE

This receptacle may be used to run any device that has the same line-voltage requirements and that requires "On-Off" or "Start-Stop" control. However, any such device must be rated with a maximum current draw of 5 amperes.

6. START/STOP BUTTON: Starts or stops the gouging operation. The REMOTE PENDANT will also start or stop gouging.

NOTE

For this system to operate the Pendant Assembly or Jumper Connector must be attached to the Controller.

7. ARC LEVEL CONTROL: Sets arc voltage when the Controller is in the "CC" mode. When the Controller is set in the "CP" mode, this dial sets the amperage.

8. VOLTMETER: Indicates Open-Circuit Voltage of the welding power source before gouging. While gouging, it gives the actual “Arc Voltage”.

9. AMMETER: Shows the amperage during operation

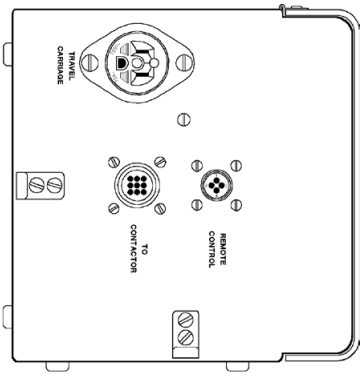


FIGURE 3 – Left Side Automatic Controller

Figures 3 & 4 show the connector plugs and outlets on the Controller cabinet.

Four clips attached to the Controller hold the cabinet in place on the Contactor. The Contactor comes with two latch clamps that hold the Controller. A mounting plate holds the Controller when separated from the Contactor. Use hold-down clamps with the mounting plate to clamp the Controller in place.

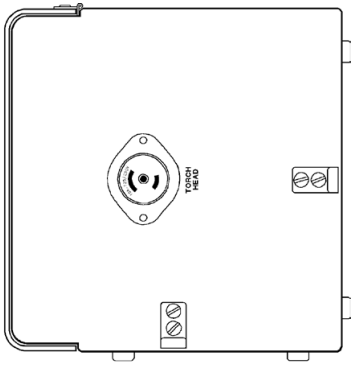


FIGURE 4 – Right Side Automatic Controller

1600 AMP CONTACTOR

The 1600 AMP CONTACTOR under command of the Controller supplies DC power and compressed air to the Torch Head. The unit has internal heat sensors to monitor operating temperatures inside the cabinet. A cooling fan circulates air through the cabinet to cool the internal components. The unit has a power cord for required AC voltage (See Figures 5 & 6)

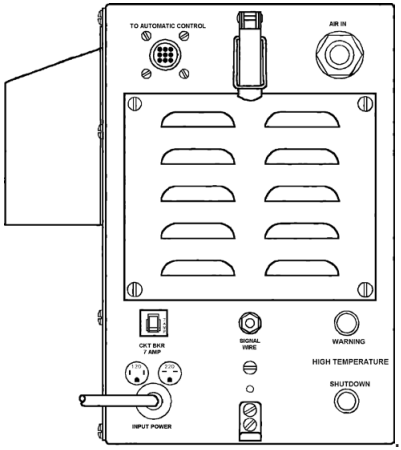


FIGURE 5 - 1600 AMP CONTACTOR, SIDE VIEW

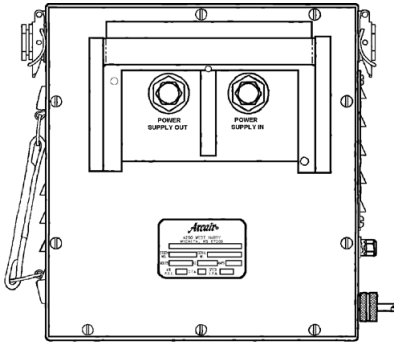


FIGURE 6 1600 AMP CONTACTOR, REAR VIEW

The INTERCONNECT CABLE ASSEMBLY joins the Controller and Contactor. The cable assembly carries both the AC line and the DC signal voltages between the two units. The cable also delivers the arc-voltage signal from the workpiece to the Contactor. This delivery energizes the contacts and the air solenoid.

ELECTRODES

The most important part of the N6000 System is the electrode. Since the N6000 system uses only DC power, the electrodes must be formulated and manufactured for use exclusively with Direct Current.

The use of Arcair Jointed Jetrod Copperclad DC Electrodes is highly recommended. These electrodes are manufactured to Arcair specifications to provide the best electrical conductivity, to maintain proper electrode diameter at the point of the arc, and to minimize carbon sublimation. A male/female joint enables electrodes to be joined together while the gouging operation is taking place.

Electrode Side Diameter		Gouge Width		Amperage	
Inches	mm	Inches	mm	Min	Max
5/16	7,9	7/16	11,1	400	450
3/8	9,5	1/2	12,7	450	600
1/2	12,7	13/16	20,7	800	1000
5/8	15,9	15/16	24,9	1000	1250
3/4	19,1	1-1/16	27,0	1250	1600

TABLE 1 ELECTRODE SELECTION

The formulation and design of the Jetrod electrodes embody numerous laboratory-proven advantages under the user's production conditions. Among these advantages are:

- Cooler operation due to a small incandescent area at the tip and joint.
- Excellent arc stability.
- High metal-removal rates.
- Uniformity of diameter.
- Clean grooves or cuts.

SELECTING THE PROPER ELECTRODE DIAMETER

Your choice should be based on the depth and width of the gouge you need. If you want a gouge 1-1/2 times greater than the diameter of the electrode being used, make the groove in two or more passes.

If you want a gouge wider than what is shown in Table 1, make the groove in two or more passes or oscillate the Torch Head.

KEEPING ELECTRODES DRY

Keep electrodes dry. Damp electrodes should be dried before using. (Ten hours at 300°F [176.7°C]) Wet electrodes may shatter from internal steam pressure when the arc is struck.

POWER SOURCES (SUPPLIED BY USER) FOR THE N6000 SYSTEM

WARNING

Direct current/electrode positive (reverse polarity) is required for the N6000 System. Use direct current/electrode negative (straight polarity) for special applications. Do not use alternating current with the system.

CAUTION

Power sources must be rated for 100% duty cycle at the amperage required for the size (diameter) electrode used. Contact the manufacturer of the power source for paralleling procedures or with questions concerning amperage ratings and duty cycles.

NOTE

Recommendations are based on a 4-volt DC drop per 100 Ft. Length given is one-half the sum of lengths of electrode and ground leads. Inadequate grounding may cause cable overheating. There should be at least 1 square inch of contact per 1000 amps.

DC welding power sources with a minimum O.C.V. of 60 volts and 45 volts at rated load supply the DC current for the N6000 system. Use single power sources rated at 1,000 or 1,500 amperes to get enough amperage for larger diameter electrodes. Power sources may be paralleled in combinations of two or more similar units. Anytime power sources are paralleled Use N6000 Torches with either rectifier or motor-generator power sources.

SECONDARY POWER CABLES (WELDING LEADS)

Recommended Number and Size of Secondary Cables												
Amps	25ft. / 7,5m		50ft. / 15m		100ft. / 30m		150ft. / 46m		200ft. / 61m		250ft. / 76m	
	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size
100		4		4		1	1	1/0	1	2/0	1	4/0
200		3		2	1	1/0	1	3/0	1	3/0	3	3/0
300		2		1	1	3/0	2	2/0	2	4/0	4	4/0
400		2	1	1/0	1	4/0	3	3/0	3	4/0		
500		1	1	2/0	2	2/0	3	4/0	4	4/0		
600		1	1	3/0	2	3/0	3	4/0				
800	1	1/0	2	2/0	2	4/0	5	4/0				
1000	1	2/0	1	4/0	3	3/0						
1200	1	3/0	2	4/0	3	4/0						
1400	1	4/0	2	4/0	4	3/0						
1600	2	3/0	4	3/0	4	4/0						
1800	2	4/0	4	4/0								
2000	3	4/0	5	4/0								

TABLE 2 - POWER CABLE REQUIREMENTS

Choose the number and size of secondary power cables on the basis of the combined length of both the positive (Electrode) and negative (Workpiece/Ground) cables to ensure greatest efficiency and safe operation in terms of 100% duty cycle. Table 2 presents recommended selections.

COMPRESSED AIR

Compressed air flows from an air nozzle in the N6000 Torch Head, travels parallel along the axis of the electrode, and is directed into the molten puddle. The air regulator included in the N6000 Torch Packages accepts ordinary shop compressed air. Use at least 60 psi input of compressed air to the regulator. Table 3 shows recommended pressure and volume inputs:

Compressed Air Requirements			
Air Pressure		**Air Volume**	
psi*	Kg/cm^2	Cfm	$M^3/min.$
60	4.2	46	1.3
80	5.6	63	1.8
100	7.0	81	2.3

TABLE 3 - COMPRESSED AIR INPUT REQUIREMENTS

*To convert psi to kpa (kilopascals), multiply by 6.895

MAIN AIR LINE

Up to the air regulator of the N6000 system, the primary air line may be either rigid or flexible. The inside diameter of the main air line varies with the length of the line between compressor and regulator.

LINE LENGTH UP TO 25' (7.6 m): 1/2" (12.7 mm) INSIDE DIAMETER

LINE LENGTH ABOVE 26' (7.9 m): 5/8" (15.9 mm) INSIDE DIAMETER

SECTION 6:
ASSEMBLY AND INSTALLATION

CAUTION

Be sure to read this manual completely before trying to install or use this equipment. Call your Arcair Representative or Distributor if you have any questions.

RECEIVING AND HANDLING

Remove all components from skids and boxes. Using the packing lists, check to be sure you have all parts. Inspect each part for damage. Buyers may file claims for loss or damage with the carrier.

THE CONTROLLER OF THE N6000 SYSTEM MUST BE HANDLED WITH CARE TO AVOID DAMAGE.

When asking about your equipment, be sure to give its full serial and model numbers that appear on the nameplate of each component.

INSTALLING THE N6000 SYSTEM

Do not force connections. All connectors should fasten easily. Be sure to tighten connections as you go through each step. Avoid crimping hoses or wires.

NOTICE When using the N6000 System with a Climber Tractor or equivalent travel system, the Contactor should be centrally placed.

CONNECTING STEPS

1. Screw the air regulator into the “Air In” receptacle on the Contactor.
2. Connect the shop compressed air supply to the air regulator.
3. Connect one end of the Interconnect Cable to the receptacle labeled “To Automatic Control” on the Contactor and the other end to the connector labeled “To Contactor” on the Controller.
4. Connect the Remote Control Pendant to the connector labeled “Remote Control” on the Controller.

NOTE

If the Remote Control Pendant is not attached to the Controller, a Jumper Connector must be used in its place. This Jumper Connector is included with the Controller.

5. Connect the end(s) of the power cables to the Torch Head and the other end(s) to the buss-bar terminal labeled “Power Supply Out” on the back of the Contactor. Slide the cable boot over the buss bar on the Torch Head.

NOTE

It is recommended to use two Power Cable Assemblies with the N6000 Torch Complete Package. The cables should be paralleled: connected at the same points on the Torch Head and the Contactor.

6. Connect the positive (+) cable(s) of the DC power source to the buss-bar terminal on the back of the Contactor labeled "Power Supply In."
7. Connect one end of the Air-Hose Assembly to the Torch Head and the other end to "Air Out" on the Contactor.
8. Connect the Torch motor cable to the receptacle labeled "Head" on the Controller.
9. Connect the negative (-) cable (s) of the DC power source to the workpiece.
10. Connect the signal wire between the ground post of the Contactor and the workpiece.

NOTICE

Use standard #12 insulated copper wire as your signal wire. It must be long enough to prevent stress on the Contactor connection.

11. Plug the Carriage System's grounded power cord into the receptacle labeled "Travel Carriage Power" on the Controller. Place the Travel Switch on the Controller on "AUTO."

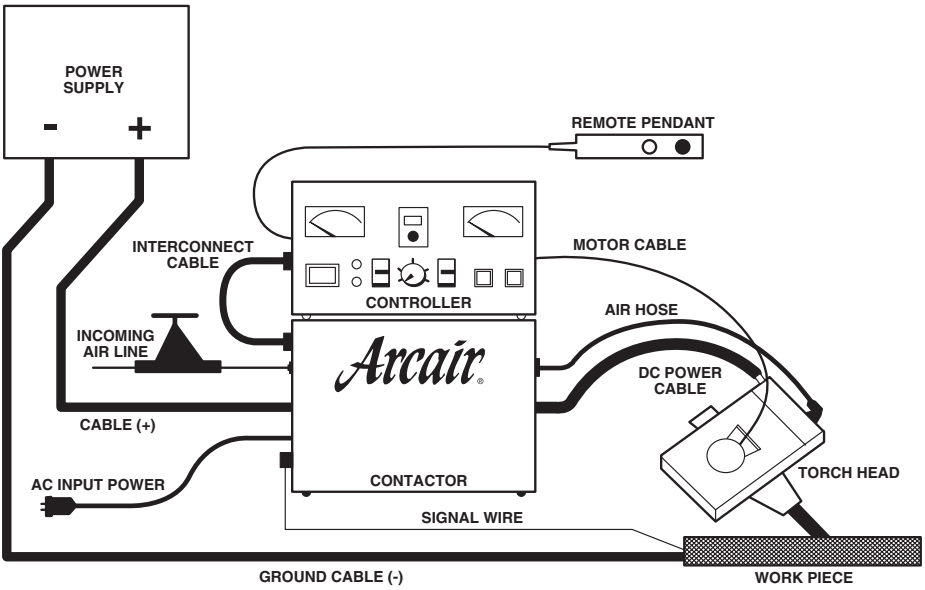


FIGURE 5 - INSTALLING THE N6000 SYSTEM (DCRP)

Table 4 shows recommended parameters (amperage, voltage) by electrode sizes. The travel speeds listed for each size carbon and gouge depth were derived in the laboratory using a 1500 amp power source. Your results may vary depending on the arc current, voltage and other parameters you use.

Automatic Gouging Operating Data						
Electrode Diameter		**Desired Depth**		**DC Current**	**Travel Speed Per Min.**	
Inch	mm	Inch	mm	Amps	Inch	mm
5⁄16	7,9	1⁄8	3,2	400	65	1651
5⁄16	7,9	3⁄16	4,8	400	45	1143
5⁄16	7,9	1⁄4	6,4	450	36	914
5⁄16	7,9	5⁄16	7,9	450	33	838
5⁄16	7,9	7⁄16	11,1	500	22.5	572
3⁄8	9,5	1⁄8	3,2	500	70	1778
3⁄8	9,5	3⁄16	4,8	500	44	1118
3⁄8	9,5	1⁄4	6,4	500	35	889
3⁄8	9,5	3⁄8	9,5	500	20	508
3⁄8	9,5	9⁄16	14,3	500	17.5	445
1⁄2	12,7	1⁄8	3,2	850	96	2438
1⁄2	12,7	1⁄4	6,4	850	57	1448
1⁄2	12,7	3⁄8	9,5	850	35	889
1⁄2	12,7	1⁄2	12,7	850	24	610
1⁄2	12,7	3⁄4	19,1	850	17.5	445
5⁄8	15,9	1⁄4	6,4	1250	72	1829
5⁄8	15,9	3⁄8	9,5	1250	48	1219
5⁄8	15,9	1⁄2	12,7	1250	37	940
5⁄8	15,9	5⁄8	15,9	1250	30	762
5⁄8	15,9	15⁄16	23,8	1250	19.5	495
3⁄4	19,1	1⁄4	6,4	1400	72	1829
3⁄4	19,1	3⁄8	9,5	1400	42	1068
3⁄4	19,1	1⁄2	12,7	1400	34	865
3⁄4	19,1	5⁄8	15,9	1400	27	687
3⁄4	19,1	3⁄4	19,1	1400	22	560
3⁄4	19,1	1-1⁄8	28,6	1400	13	330

TABLE 4 - OPERATING PARAMETERS

NOTE

If you want a groove depth that is greater than 1-1/2 times the diameter of the electrode being used, make the groove in two or more passes.

SECTION 7:
OPERATING THE N6000 SYSTEM

Find out whether you will use a constant current (CC) or constant potential (CP) power source. The Controller must be properly set to match the power source.

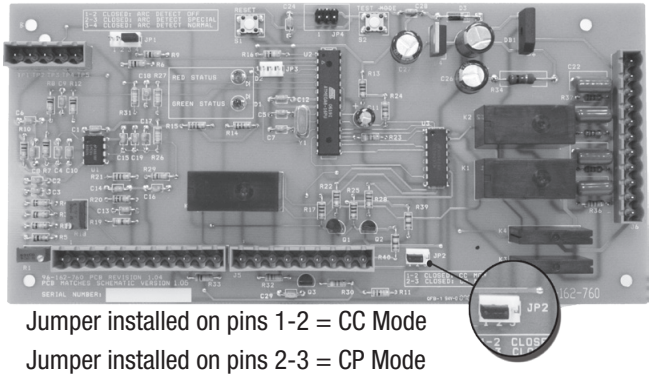
CHANGING MODE OF OPERATION (CC OR CP)

To change the mode of operation do these things:

WARNING

DISCONNECT ALL POWER!

1. Lift the plastic cover on the Controller. Remove the three top screws on the face of the front panel holding the plastic cover. Remove the remaining seven screws around the front panel. (Support the panel so it won't fall free). Carefully move the panel aside to expose the interior of the Controller. (Do not disconnect wires.)



Jumper installed on pins 1-2 = CC Mode

Jumper installed on pins 2-3 = CP Mode

FIGURE 6 - MASTER CONTROL CIRCUIT BOARD "CC" & "CP" JUMPER

2. On the back wall of the Controller is the circuit board. On the bottom edge locate the CC/CP jumper. Place the control in the correct mode by moving the jumper left or right as printed on the circuit board. Later, a front panel indicator will confirm your setting.

3. Replace the front panel and replace the screws.

STARTING CONDITIONS "CC" AND "CP" MODE

WARNING

Do not turn on DC power or compressed air until you are ready to begin gouging.

1. Place the Torch Head above the workpiece you want to start gouging. Using the Angle Gauge supplied with the N6000, adjust the torch head to the workpiece. The angle

gauge sets the correct electrode stickout “3” (7.62 cm) from the torch head, sets the torch angle, and aligns the air nozzle.

Tables, graphs and other data in this manual are based on a 45° electrode angle, but you can use electrode angles from 45° to 60°. Users should develop their own standards based on shop conditions and application.

INSERT THE ELECTRODE

2. Adjust the guide block for the electrode diameter being used. Loosen thumbscrew, adjust, and then tighten the thumbscrew again (See Figure 7).
3. Push the clamping lever and insert the electrode FEMALE END FIRST into the rear of the Torch Head until it protrudes through the air nozzle. The two-legged spring and protective shield should rest squarely on top of the electrode. To check their positions, look down the rear of the torch. If the spring and shield are pushed to either side, withdraw the electrode and insert it again. Release the clamping lever.
4. Plug in the grounded power cord on the Contactor.
5. Press the “Control Power” button to start AC voltage in the N6000 System. If the unit is on a travel carriage system or other workpiece feed device that is controlled through the N6000 System, set the “Travel” switch to “Auto.”

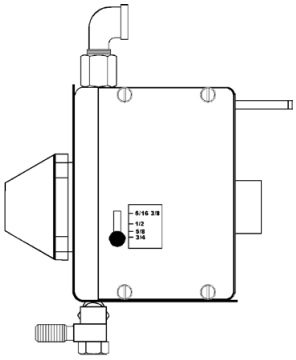


FIGURE 7 - GUIDE BLOCK ON N6000 TORCH HEAD

6. Set the “Travel Delay” (See Table 5).
7. When operating in the “CC” mode, set the “OUTPUT LEVEL” at any point between 400 and 440 (40-44 Volts).
8. Set the amperage at the power source according to the electrode diameter being used (See Table 4).
9. When working in the “CP” mode, set the “OUTPUT LEVEL” at one-half the required amperage for the electrode diameter being used.

EXAMPLE:

- Electrode Diameter = 1/2”.
- Amperage Required, (See Table 2) = 850.

- "OUTPUT LEVEL" setting = 850/2 = 425.

10. Turn on the power source. Set the power source at 40 to 44 volts. In some cases the "drooping curve" effect on CP power sources will produce enough arc volts at the 40-44 volt setting. In such cases, the gouging may be bad or the N6000 system will not operate at all. Raise the voltage setting above 40-44 volts to correct this problem.

The "DC volts" meter will show the open-circuit voltage. The "DC amperes" meter will show "ZERO" or near "ZERO" amperage.

11. Turn on the compressed air.

12. Press the "Start" button. It is on the front panel of the Controller or the red button on the Remote Pendant Assembly. The electrode will feed down to the workpiece. The contacts in the Contactor will close to provide DC power to the torch head/electrode. The air solenoid will open to release compressed air to the torch head/air nozzle. An arc will be struck as soon as the tip of the electrode reaches the workpiece. The proper arc gap will be maintained, even though the electrode feeds downward. Once the electrode reaches the target depth, the travel system will be energized.

WARNING

Wear protective gear and be sure the work area is clear. The system is ready to begin gouging. If the unit is attached to a travel system, be sure the travel system is ready to operate. Stand clear of the Torch Head.

CAUTION

If the unit doesn't respond, turn off the power source and Control Power. Refer to the Troubleshooting Guide.

Figures derived under laboratory conditions using a 1500 amp power source. Figures will vary according to user parameters. Adjust the travel system's speed using Table 4.

Travel Delay Setting			
Approximate Setting	Electrode Size	Target Depth	
		Inches	Mm
0	5⁄16" through 3⁄4"	1⁄8	3,2
0.5	5⁄16" through 3⁄4"	1⁄4	6,4
1.0	5⁄16" through 3⁄4"	5⁄16	7,9
1.5	3⁄8"through 3/4"	3⁄8	9,5
2.0	1⁄2",5⁄8",3⁄4"	1⁄2	12,7
2.5	5⁄8",3⁄4"	5⁄8	15,9
3.0	3⁄4"	11⁄16	17,5
3.5	3⁄4"	3⁄4	19,0
4.0	3⁄4"	7⁄8	22,2

TABLE 5 - TRAVEL DELAY SETTING

NOTE

If a short out interrupts the operation; check the air nozzle and vee block in the torch head for signs of arcing. If arcing is evident make appropriate repairs. If no signs of arcing are present, retry starting the gouge procedure by pressing the "Start" button on the controller or pendant.

13. When the electrode goes off the workpiece or at any time the controller does not sense current flow, the system's "NO-CURRENT DETECT" function is activated and the controller signals the contactor to stop. DC power to the torch head is shut off, the electrode retracts and the compressed air will shut off as soon as the delay timer runs out.

NO-CURRENT DETECT FUNCTION

The N6000 System contains a "No-Current Detect" circuit. This circuit monitors Arc Current. Should the arc stop, this circuit will shut down the gouging sequence.

This circuitry can be set for one of three response levels:

NORMAL - Setting provides 0.2 second shutdown delay.

SPECIAL - Setting provides 0.8 second shutdown delay.

OFF - The N6000 System continues to operate regardless of Arc Current level. System shutdown is manually controlled.

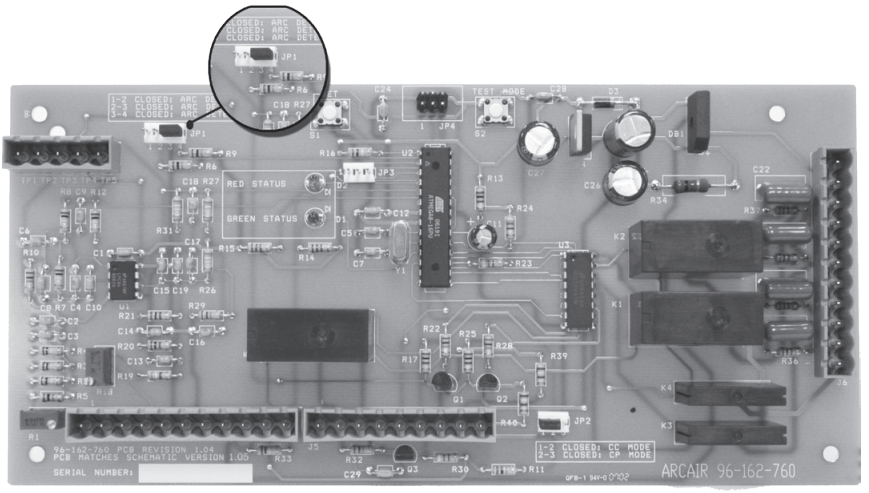


FIGURE 8 - MASTER CONTROL CIRCUIT BOARD NO-CURRENT DETECT JUMPER

SUMMARY

On either "CC"(constant current) or "CP"(constant potential) power sources the cardinal rule is:

Air carbon arc gouging performs best when the dc volt meter on the controller panel reads between 40 and 44 volts and the dc ampere meter on the controller panel reads the correct amperage for the electrode being used. Refer to table 4.

Set the dc volt and dc ampere meters as you adjust the power source and/or the "arc level dial". Always fine tune ampage and voltage reading by watching the meters on the controller.

PREMATURE SHUTDOWN

There are three major reasons why the N6000 System would automatically shutdown:

1. Contactor overheating.
2. Low arc voltage.
3. No current or Low current due to high voltage

CONTACTOR OVERHEATING SHUTDOWN

Inside the contactor are two heat sensors. These sensors monitor the operating temperatures inside the contactor cabinet. A yellow warning light, located on the side of the cabinet, will light if the temperature inside reaches 210°F. If the unit continues to overheat, the red light by the yellow, will light and the system will SHUT DOWN. The system can only be restarted when the internal temperatures drop to a safe level. When this happens both lights will go off and then the unit will restart.

The cause of the overheating should be determined before restarting. Refer to Troubleshooting Section.

LOW VOLTAGE SHUTDOWN

Should the DC voltage supplied to the N6000 System drop below 28 volts, the controller will shutdown the system. This feature protects the system from serious damage. If this occurs determine the cause of the voltage drop, take corrective action and restart the system.

NO CURRENT OR LOW CURRENT/HIGH VOLTAGE SHUTDOWN

At first the system responds to high voltage by feeding the electrode, as happens during normal gouging. If the voltage continues to increase, at some point the ARC CURRENT will drop to less than 200 amperes. When this occurs the NO-CURRENT DETECT circuit will shutdown the system. Determine the cause of the voltage increase, fix the problem and then the system can be restarted.

SECTION 8:
USES OF THE N6000 SYSTEM

The section briefly describes some uses for the N6000 System. If you have any questions concerning a specific application for this system contact Tweco-Arcair Technical Services Department at 800.426.1888 or 940.566.2000

GOUGING NON-FERROUS METALS

The N6000 System can be connected to DC Straight Polarity (DCEN) to gouge non-ferrous metals, such as nickel, copper alloys, etc. Figure 9 shows the proper connections for the system to run on DC Straight Polarity.

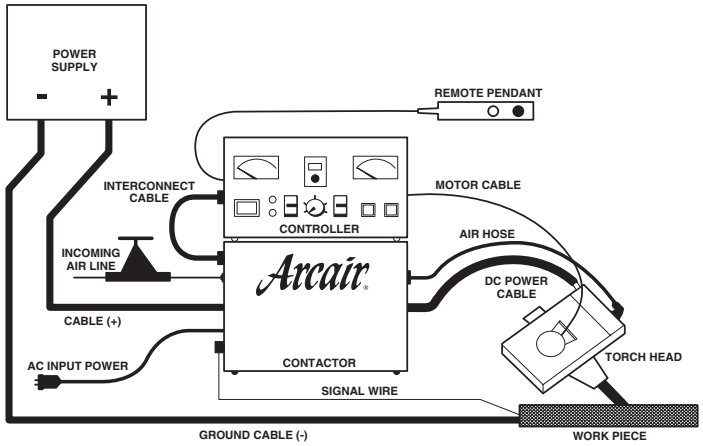


FIGURE 9 - N6000 DC STRAIGHT POLARITY (DCEP)

INSTALLATION STEPS FOR STRAIGHT POLARITY

1. Screw the air regulator into the “Air In” receptacle on the Contactor.
2. Connect the shop compressed air supply to the air regulator.
3. Connect one end of the Interconnect Cable to the receptacle labeled “To Automatic Control” on the Contactor and the other end to the connector labeled “To Contactor” on the Controller.
4. Connect the Remote Control Pendant to the connector labeled “Remote Control” on the Controller.

NOTE

If the Remote Control Pendant is not attached to the Controller, a Jumper Connector must be used in its place. This Jumper Connector is included with the Controller.

5. Connect the positive (+) cable(s) from the DC power source to the buss bar terminal, marked “POWER SUPPLY IN”, on the back of the contactor. Connect the negative (-) cable(s) of the DC power source to the N6000 Torch Head buss bar.

Connect the signal wire to the ground post of the contactor and the buss bar on the torch head. Slide the insulating boot over the buss bar on the torch head.

NOTE

Use standard #12 insulated copper wire as your signal wire. It must be long enough to prevent stress on the Contactor connection.

6. Connect the end(s) of the power cables to the workpiece and the other end(s) to the contactor buss bar terminal labeled “POWER SUPPLY OUT”.

NOTE

It is recommended to use two Power Cable Assemblies with the N6000 Torch Complete Package. The cables should be paralleled: connected at the same points on the Torch Head and the Contactor.

7. Connect one end of the Air-Hose Assembly to the Torch Head and the other end to “Air Out” on the Contactor.
8. Connect the Torch motor cable to the receptacle labeled “Head” on the Controller.
9. Plug the Carriage System’s grounded power cord into the receptacle labeled “Travel Carriage Power” on the Controller. Set the Travel Switch on the Controller to “AUTO.”

OPERATING THE N6000 SYSTEM

The N6000 System works just like the operation described in the Section titled OPERATING THE SYSTEM. Return to that Section to review these instructions.

J-GROOVE EDGE PREPARATION

Use the N6000 system to make an economical J-groove weld preparation on a plate’s single edge or pipe section. The N6000 produces the edge preparation as fast as or faster than an automatic burning torch. (See Table 6.)

Edge preparation success depends on two things:

- Edge tracking on a plate or pipe section.
- Electrode overhang on the plate edge or pipe section.

The tracking of the edge is very critical in getting the right configuration. A tracking device helps keep the electrode in position throughout the gouge.

Electrode overhang determines whether a configuration can be obtained. An electrode placed too far over an edge can result in a bevel. If the electrode doesn’t overhang enough, a gouge will leave an edge. See Figure 10

J-Groove Weld Preparation Data										
Material	Electrode / Torch Data			Electrode Overhang			Travel System Data			
Size	Size	Angle	Stickout	Pass 1	Pass 2	Pass 3	Pass 1	Pass 2	Pass 3	Overall Speed
⅜″	5⁄16″	45	3”	.063”			65			65
½″	5⁄16″	45	3”	.063”			35			35
⅝″	⅜″	45	3”	.063”			49.5	49.5		24.8
¾″	⅜″	45	3”	.063”	.063”		37	37		18.5
1”	⅝″	45	3”	.125”	.125”		40.1	40.1		20.1
1-½”	⅝″	45	3”	.063”	.063”	.063”	46.7	46.7	46.7	15.6
2”	⅝″	45	3”	.125”	.125”	.125”	28.1	28.1	28.1	9.4

TABLE 6 - J-GROOVE WELD PREPARATION DATA SHEET

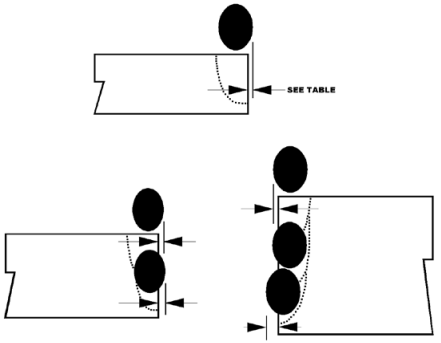
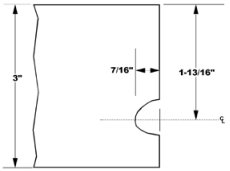


FIGURE 10 - ELECTRODE OVERHANG

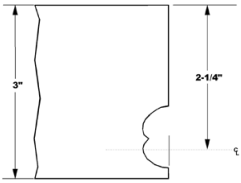
See Table 6 for recommended electrode overhang in a J-groove weld preparation.

Figure 11 shows a second way to prepare a J-groove weld preparation on material over 2” (5.08 cm.

The following information is based on preparing a J-groove weld preparation on 3” (7.62 cm) material.



FIRST STEP: Make a U-groove with a 3/4" electrode, 7/16" (1.11 cm) deep. Location of electrode from the top surface should be 1-13/16" (4.60 cm).



SECOND STEP: Relocate the electrode 2-1/4" (5.72 cm) from the top surface and make the gouge.

THIRD STEP: Flame cut 10° bevel to the bottom of the first gouge.

FIGURE 11 - J-GROOVE WELD PREPARATION FOR MATERIAL THICKNESS OVER 2" (5.08 CM)

ZERO FORCE ROUGH MACHINING

The N6000 system can work with an automated travel system to remove hardsurfacing material from steel mill rolls; kiln rolls and shafts which needs re-working. Remove as much as 1-1/2" of old material from the outside diameter in a single pass and as little as 1/8" for the finish pass.

OSCILLATION GOUGING TO REMOVE MATERIAL UP TO 4" WIDE

The N6000 can be mounted on a welding oscillator to remove material in widths up to 4 inches. Normal uses for an oscillated gouge would be to remove cladded material from plates requiring a beveled edge and to remove backup bars and excessive weld crowns.

REMOVING FILLET WELDS AND OUT-OF-POSITION U-GROOVE WELD PREPARATIONS

The torch head of the N6000 system can be mounted on tractors that do out-of-position work whether the work is overhead, around the outside circumference of a pipe, or on the inside of a large vessel.

BACKGOUGING OF WEB TO FLANGE PLATES ON FABRICATED GIRDERS

Backgouging the web to flange section on fabricated bridge girders is easier when using the Titan Machine Carriage and N6000 System. The outrigger assembly, specifically designed for this application, allows the system to track off the side of the flange plate while gouging.

SECTION 9:
ARCAIR TITAN MACHINE CARRIAGE

GENERAL

The Titan Machine Carriage is portable, rugged, and heavy duty. It is for low - maintenance and high straight-line work. Light carriage weight and easier-to-handle track permit fast, simple setup. The rugged mounting platform carries up to 300 pounds of equipment for automated air carbon-arc gouging, GMAW, FCAW, submerged arc welding, and flame cutting operations.

DRIVE

The carriage is driven by a permanent magnet D.C. motor powered by an electronic speed control. It has a speed range: 6-80 i.p.m. (15.2-203.2 cm/min.). A manually operated clutch permits drive disengagement for free wheeling and manual positioning of the Carriage. The wheels are made of neoprene and rest on the workpiece. Two slotted guide blocks on the carriage keep it on track. Metal brushes mounted in the front of the Carriage sweep away hot metal particles. They protect the wheels.

The track is a single "T" bar and comes in 10 ft. (3.05 m) lengths. One end has a protruding pin, and the other end has a female slot into which the male portion of the next section fits. A Pointer Assembly aligns the track so that the torch can be easily and quickly positioned over the joint.

POWER

The Titan Machine Carriage is for either 120VAC, 60Hz. or 220VAC, 50Hz. line voltage. Specify when ordering. A power cord attached from the side of the Carriage supplies power.

A double accessory auxiliary outlet on the side of the control panel provides line voltage for auxiliary equipment.

CONTROL PANEL

The controls do these things:

1. POWER ON/OFF switch turns the carriage on and off.
2. REV/OFF/FWD switch determines the direction of carriage travel with OFF in the center position.
3. SPEED FAST/SLOW controls the travel speed of the carriage. The variable speed control is not a finite setting. The carriage's speed is established by turning the knob in both directions.

The Control Panel can be removed from the carriage allowing easy operator control of the carriage.

TITAN SETUP AND ASSEMBLY

GENERAL

Before trying to set up, assemble, or run the TITAN MACHINE CARRIAGE, be sure to read and study this instruction manual. Call Tweco-Arcair, Technical Service Department at 800.426.1888 or 940.566.2000 if you have questions.

When asking for information about equipment, be sure to give complete serial and model numbers. These numbers are on the nameplate. To locate the nameplate, remove the control panel by loosening the two thumb screws holding the control panel on the carriage and pulling the panel outward. The nameplate is on the floor.

SETTING UP THE TITAN MACHINE CARRIAGE

Place the track on the workpiece. Join sections by slipping the female end of one track over the male end of another section.

Use pointer to find the track-to-joint relationship. One end of the Pointer Assembly has an inverted "V" shape fitting over the track. Slide the pointer along the rod until it is over the joint and locked in place. Once the track section(s) are properly placed, attach the Magnet & Support Bar Assemblies (3 per track section) in the holes on the track sections.

Set the carriage so that the slotted guides fit over the track. A manually operated clutch on the side of the carriage permits free wheeling and manual positioning of the carriage. Disengage the clutch by pulling the pivoted handle. Engage the clutch by pulling the handle back and moving the carriage either forward or backward until the clutch locks into position.

The clutch mechanism is spring loaded, allowing the handle to spring into engagement.

ATTACHMENT OF HORIZONTAL RACK ASSEMBLY

To attach the Horizontal Rack Assembly (if used) to the base of the carriage, do the following:

1. Move the Rack Bar so its holes align with the screws in the mounting plate (site screws through the holes).
2. Line up the screws with either of the two sets of holes in the tractor base.
3. Insert a screwdriver through the holes in the Rack Bar and tighten the screws to the base of the tractor.

ATTACHMENT OF VERTICAL RACK ASSEMBLY

Mount the Vertical-Adjustment Assembly (if used) to either side of the rack bar Assembly and secure it with the two hex-head machine screws provided.

TITAN OPERATION

WARNING

Read all Precautions in the Safety Section of this Manual!

NOTE

To run Torch Assemblies attached to the Titan Machine Carriage see the manufacturer's instruction manual(s). If the Titan Machine Carriage is running automatically (as when used with an Arcair N6000 Torch), control movement of this carriage by that system.

CAUTION

Manually check the travel system when using it in a particular way for the first time. To do so, disconnect the power cord from an Automatic Controller and plug it into a grounded outlet. Leave the cutting torch off and follow the steps listed below.

INITIAL RUN TEST

1. REV/OFF/FWD switch OFF. Turn POWER ON/OFF switch ON.
2. Turn REV/OFF/FWD switch to set direction of travel.
3. Adjust the SPEED SLOW/FAST potentiometer until you get your desired travel speed.
4. Turn the REV/OFF/FWD switch to change direction.

NOTE

In using the unit manually, you can remove the Control Panel and carry it.

SYSTEM OPERATION

To use the carriage with an automatic controller such as the N6000 System, plug the power cord into the controller's receptacle. Follow torch - use instructions when operating the carriage with a welding or cutting torch.

TITAN PREVENTIVE MAINTENANCE

Every six months or after each 100 hours of use, coat the drive-train gears with Dow Corning Grease #55m.

Check periodically the brushes on the front of the carriage system to ensure they are in good condition.

DISASSEMBLY INSTRUCTIONS FOR THE TITAN MACHINE CARRIAGE

Disassembly permits access to the internal parts of the carriage. To do so:

1. Remove the two thumbscrews that hold the Control Panel in place. Pull the panel away from the carriage housing and disconnect the cord.
2. Turn the carriage over and lay it with the top plate down. Remove the bottom cover by removing seven machine screws. Remove the self-tapping screws holding the small baffle to the bottom cover. The baffle is near the single wheel.

SECTION 10:
ARCAIR CLIMBER V-A TRAVEL SYSTEM

GENERAL

The CLIMBER V-A travel system consists of a tractor and aluminum track available in three lengths. The track is attached to the work by quick release magnetic clamps. The tractor has flat, overhead, vertical and horizontal uses. The tractor carries most cutting, gouging and welding equipment, including CAC-A, GMAW, GTAW, SAW, plasma and oxy-fuel.

Gears drive the tractor on a rack attached to the track. The tractor guide wheels are adjustable for wear and width variations. The tractor has four wheels for better stability, rigidity and ease of adjustment. This rigid design is well suited for heavier or overhanging loads.

SAFETY

CAUTION

Keep hands and clothing clear from Tractor guide wheels. A possible pinch point exists.

WARNING

Protect equipment and operator from falls. When using the travel system in the vertical, horizontal, and overhead positions, fabricate and use safety attachments preventing harm or damage to the operator or equipment. Magnetic clamps can break free due to vibration, shock, etc.

CLIMBER V-A TRACTOR

Model V-A increases rigidity over previous models. Use four-wheel assemblies spaced farther apart for greater stability. Adjustment for track width is easier to perform. This tractor must be attached at the end of the track, then freewheeled into position. When using the tractor out of position, in a particular vertical position, be sure to restrain the tractor when in the freewheel mode.

Specifications	
Length	15-¼" (38,7cm)
Width	11-½" (29.2cm)
Height	7" (17,8cm)
Weight	16.3lbs. (7.4kg)
Motor	Permanent Magnet DC, Parallel Shaft, 1/30 Hp, 55in. lbs. Torque
Speed	0 to 100 in./min.
Load	Flat Position: 100lbs.
	Horizontal Position: 75lbs.
	Vertical Position: 30lbs.
	Overhead Position: 75lbs.
Input	120VAC, 66Hz or 220VAC, 50Hz

TRACK

The track is made of a hard aluminum alloy for lightness and durability. Interlocking ends permit quick joining and alignment. Special bolts and knurled nuts connect sections. Mounting pads supplied with the magnet clamps space the track above the work for necessary tractor clearance.

- Track lengths: 3 ft.(.9 m), 6 ft.(1.8 m), 10 ft.(3.05 m)

MAGNET CLAMP ASSEMBLIES

Magnet Assemblies are shipped with keepers. These should be removed before attaching the magnets to the work. There is a quick release lever on each magnet. When this lever is pushed to the horizontal position it raises one side of the magnet, breaking contact and permitting easy removal. When working with the equipment out-of-position, use safety attachments to prevent accidental falls due to surface or magnet contamination.

APPLICATIONS

The most common is the N6000 System. Used with automatic CAC-A, the tractor can be mounted on a fixed beam track to do girth and longitudinal seams, arc machining and edge preparations. Other uses are with oxy-fuel machine torches, welding torches, arc or flame spraying equipment, and painting equipment. All work can be done in the vertical, horizontal or overhead position. Work can also be done using magnet or vacuum attachments for each track sections.

CLIMBER TRACTOR AND MAGNET INSTALLATION

Attach magnet assemblies to the track. For out-of-position work, the magnets should be spaced 12 inches apart. For flat work, the spacing can be extended to 24 inches. Remove the magnet keepers. Be sure the magnets and the work surface are free of foreign materials. Put the track where you want it. Before fastening the magnets to the workpiece, put the lever on the magnets in the vertical position to achieve full contact between the magnet and work surfaces.

CAUTION

Attach safety clamps to the track when working out of position. (Not supplied by Tweco-Arcair)

MOUNT TRACTOR TO TRACK

Lift the drive-gear lever to the disengage position to raise the motor and gear for freewheeling. Slide the tractor onto the end of the track. Freewheel the tractor to the position you want it and lower the drive-gear lever to engage the motor and gear to the rack (Fine adjustment for track width may be necessary).

FINE ADJUSTMENT FOR TRACK WIDTH

Make fine adjustments by loosening the lock nuts on the two adjustable wheel legs. Rotate the flat head screw for a snug fit on the track. Hold the flat head screw to prevent turning. Tighten the lock nuts.

HORIZONTAL RACK ASSEMBLY

To attach the Horizontal Rack Assembly (if used) to the base of the Climber Tractor, do these things:

1. Move the Rack Bar so its holes align with the screws in the mounting plate.
2. Line up the screws with either of the two sets of holes in the tractor base.
3. Insert a screwdriver through the holes in the Rack Bar and tighten the screws to the base of the tractor.

VERTICAL ADJUSTMENT ASSEMBLY

Mount the Vertical-Adjustment Assembly (if used) to either side of the Rack-Bar Assembly and secure with the two hex - head machine screws provided.

CLIMBER TRACTOR MAINTENANCE

GENERAL MAINTENANCE

The tractor needs little maintenance. To keep the Climber tractor running well, do these things:

- Oil track-roller assemblies once a month with light grade machine oil.
- Twice a year place Moly-Kote “G” on the drive gears.
- Wear may cause the tractor to loosen on the track. Check for looseness periodically and tighten.

CLIMBER WHEEL ADJUSTMENT

Due to track wear, the wheels on the Climber Tractor will require adjustment periodically.

The adjustable wheels are the two with the ones with the large straight bladed screwdriver slot in them. Loosen the locking nut on these wheels located on the underside of the tractor base plate. With a large straight bladed screwdriver rotate each wheel adjustment screw until the wheels are snug against the track and retighten the locking nut.

SECTION 11: TROUBLE SHOOTING GUIDE

N6000 AUTOMATIC SYSTEM

Problem	Possible Cause	Possible Remedy
No power in automatic control panel	Absence of appropriate power	Check power continuity from source to control panel
	Tripped circuit breaker	Reset breaker
	Defective transformer in control panel (T1 or T2)	Check or replace transformer
	Break in interconnect cable which links control panel to contactor	Repair/replace interconnect cable
	Defective “Control Power” switch on control panel	Check replace power switch
No output from “Travel Carriage Power” receptacle on control panel (Control panel “Travel” switch in “MANUAL” Position)	Defective “Travel” (Auto/ Manual) switch	Replace switch
	Defective “Control Power” switch on control panel	Replace switch
No panel light illumination	Absence of 24 volts in MCCB*	Replace MCCB*
	Bulbs burned out. (May be due to excess of 24 volts in MCCB*)	Replace bulbs; if excess of 24 volts in MCCB*, replace MCCB
	Defective “Control Power” switch	Replace switch
Contactor energizes but air solenoid does not	Defective air solenoid	Check/replace
Electrode does not feed at start of sequence	“Arc Level” dial on control panel set higher than open circuit voltage of power supply	Reread Section entitled “ Starting Conditions“
	Constant current (CC) or constant potential (CP) toggle switch on MCCB* improperly set	Reread Section entitled “ Starting Conditions“
	Defective MCCB*	Replace MCCB*

Problem	Possible Cause	Possible Remedy
Electrode will not feed or retract	Electrode not properly inserted physical contact with drive system not optimum.	Check, re-insert electrode
	Defective contact shoe surface due to prior arcing between shoe and electrode, resulting in pitted surface. Check electrode surface for identifying scratch marks	Repair shoe surface by sanding if minor damage, otherwise replace shoe
	Defective “Jog” switch on control panel	Replace “Jog” switch
	Defective “Control Power” switch on control panel	Replace “Control Power” switch
	Defective motor cable Connector(s) J4/J5/J6 improperly or not firmly attached on MCCB*	Check connector (s) for solid, proper fit
	Defective MCCB*	Replace MCCB*
	Defective electrode drive motor	Repair/replace motor
Air solenoid energizes but contactor doesn’t	Open contactor coil	Replace contactor coil assembly
	Defective rectifier bridge in contactor unit	Replace rectifier bridge
Start sequence trips circuit breaker	Short in interconnect cable which links control panel to contactor	Repair/replace interconnect cable
	Defective rectifier bridge in contactor unit	Replace rectifier bridge
	Worn or defective breaker	Replace breaker
Overheat shutdown system keeps shutting down the unit, even “Cold” stages. (Yellow or Red indicators “ON”)	Defective temperature sensor(s) in contactor	Replace sensor(s)

NOTE:

MCCB = MASTER CONTROL CIRCUIT BOARD.*

Problem	Possible Cause	Possible Remedy
Contactor overheating (air not circulating properly). Overheat indicators “ON”	Clogged filter	Clean filter thoroughly (replace if necessary)
	Fan not operating, or not operating efficiently	Replace fan
Cannot initiate a start sequence	No open circuit voltage present	See proceeding problem
	Manual remote control “Start/ Stop” pendant or jumper not connected to “Remote Control” receptacle on control panel	Remote control pendant or jumper connector must be in receptacle
	Break in remote control “Start/ Stop” pendant cable	Repair/replace cable
	Defective “Start/Stop” switch on panel	Replace switch
	Contactor unit in high temperature shutdown	Allow contactor unit to cool/check fan and filter
	Defective MCCB*	Replace MCCB*
Erratic or uncontrollable arc	Constant current (CC) constant potential (CP) toggle switch on MCCB improperly set	Reread Section entitled “ Starting Conditions“
	Using improper torch operating conditions for electrode size (diameter)	See Chart 1 for proper operating conditions
	Insufficient arc voltage due to “drooping curve” characteristics of “CP” power source	Set open circuit voltage higher at power source. (Reread Section entitled “ Starting Conditions“)
Ammeter does not register	Break in interconnect cable which links contactor to controller	Repair/replace interconnect cable
	Loose connections on shunt on contactor unit	Check/repair connection
	Connector(s) J4/J5/J6 improperly or not firmly connected on MCCB	Check connector(s) for solid, proper fit
	Defective ammeter	Replace meter

Problem	Possible Cause	Possible Remedy
Molten metal not being removed from gouge or groove	Insufficient air pressure (PSI) or volume (CFM)	Check air regulator and solenoid for proper operation.
	Air stream from torch head misdirected (air nozzle improperly positioned)	Air stream must be directed between the electrode and the workpiece
	Air nozzle insulator not in place or damaged	Check/replace if necessary
Contactor air solenoid does not energize when “Start” button pushed	Break in interconnect cable contactor/controller	Check/replace
	Defective transformer in contactor unit (220 VAC model only)	Check/replace
	Contactor unit in high temperature shut down	Allow contactor unit to cool/check fan and filter
Fan does not run with control panel “ON”	Break in interconnect cable which links contactor to controller	Check/replace
	Defective fan	Check/replace
	Defective transformer in contactor (220 VAC model only)	Check/replace
Travel does not begin after arc is struck	“Travel” switch on control panel not set in “AUTO” position	Set switch in “Auto” position
	Defective “Travel” switch on control panel	Replace “Travel” switch
	Travel system controls improperly set	Reread Section entitled “ Starting Conditions“
	Loss of current feedback signal	See proceeding problem above
	Defective “Travel Delay” potentiometer on control panel	Replace potentiometer
	Defective carriage system	Check/repair as needed
	Defective MCCB*	Replace MCCB*

Problem	Possible Cause	Possible Remedy
Open circuit voltage not displayed on control panel "DC Volts" meter	DC power source (welding power source) not energized	Turn on power source
	"Signal Wire" between contactor and workpiece unattached or not functioning	Check signal wire continuity between contactor and workpiece. If wire is defective, replace.
	Contactor unit in high temperature shutdown	Allow contactor unit to cool check fan and filter
	DC power cables improperly attached or not functioning (damaged)	Repair/replace cables
	Connector(s) J4/J5/J6 improperly or not firmly connected on MCCB*	Check connector(s) for solid, proper fit
	Break in interconnect cable which links control panel to contactor	Repair/replace interconnect cable
	Defective "DC Volt" meter	Check/replace meter
	Wrong polarity. Straight polarity, the "DC Volt" meter reading will be reversed	Connect power cables to power source and ground for reverse polarity
Start sequence shuts down when arc is struck	Inherent starting characteristics of the DC power source (welding power source)	Use "No Current Detect" toggle switch located on MCCB
	Defective MCCB	Replace MCCB*
	Low arc voltage setting	Increase arc voltage on either power source (CP) or control panel (CC)

CLIMBER V-A TRACTOR

Problem	Possible Cause	Possible Remedy
Tractor will not run with switch in the “ON” position	Engagement lever is not engaged	Place lever in engage position
	Absence of appropriate power	Check power continuity from source to tractor
	Tripped breaker on the tractor	Reset breaker
	Break in the power cable	Repair/replace power cable
	Defective power switch	Replace switch
	Defective motor	Replace motor
	Defective motor speed control	Replace motor speed control
	Defective transformer (220 VAC model only)	Replace transformer
No power to the aux./ convenient outlet	Absence of appropriate power	Check power continuity from source to tractor
	Tripped breaker on the tractor	Reset breaker
	Loose connection on the outlet	Check connections on the inside enclosure and secure
	Defective outlet	Replace outlet
Tractor will not run with the switch in the auto mode	Absence of voltage to receptacle	Check/repair as required
	Tripped breaker on the tractor	Reset breaker
	Defective power switch	Replace switch
	Defective motor	Replace motor
	Defective motor speed control	Replace motor speed control
	Defective transformer (220 VAC model only)	Replace transformer
No control of travel speed	Loose set screw on potentiometer	Tighten set screw
	Defective potentiometer	Replace potentiometer
	Defective motor speed control	Replace motor speed control

Problem	Possible Cause	Possible Remedy
Circuit breaker for the tractor keeps tripping	Defective motor speed control	Replace motor speed control
	Engagement of drive gear to track too tight	Check/reset drive gear to track properly
	Debris edged in between the track teeth	Remove any debris from track
	Defective motor	Replace motor
	Defective circuit breaker	Check/replace circuit breaker
	Excessive load	Reduce the load
	Defective transformer (220 VAC model only)	Replace transformer
Tractor loose on the track	Track section is worn	Reset adjustable wheel legs (See Section Climber Wheel Adjustment) Replace track section
	Adjustable wheel legs are loose	Reset adjustable wheel legs and re-lock

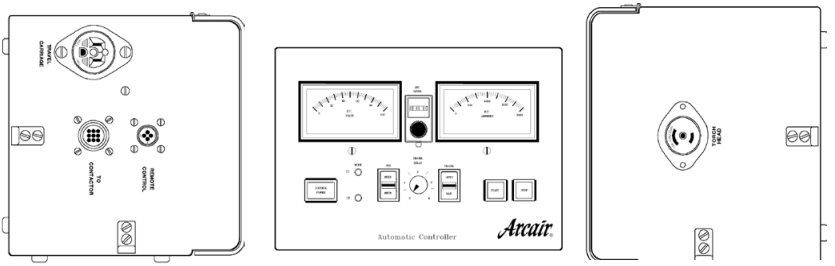
TITAN MACHINE CARRIAGE

Problem	Possible Cause	Possible Remedy
Carriage will not run with switch in the “ON” position	Engagement lever is not engaged	Place lever in engage position
	Absence of appropriate power	Check power continuity from source to tractor
	Blown fuse	Replace fuse
	Break in the power cable	Repair/replace power cable
	Defective power switch	Replace switch
	Defective motor	Replace motor
	Defective motor speed control	Replace motor speed control

Problem	Possible Cause	Possible Remedy
No power to the aux/ convenient outlet	Absence of appropriate power	Check power continuity from the source to tractor
	Blown fuse	Replace fuse
	Loose connection on the outlet	Check connections on the inside enclosure and secure
	Defective outlet	Replace outlet
No control of travel speed	Loose set screw on potentiometer	Tighten set screw
	Defective potentiometer	Replace potentiometer
	Defective motor speed control	Replace motor speed control
Fuse for the carriage keeps blowing	Defective motor speed control	Replace motor speed control
	Defective motor	Replace motor
	Excessive load	Reduce the load

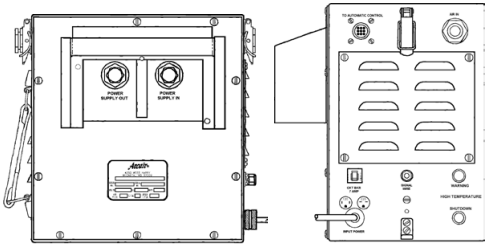
SECTION 12: REPLACEMENT PARTS

N6000 CONTROLLER REPLACEMENT PARTS



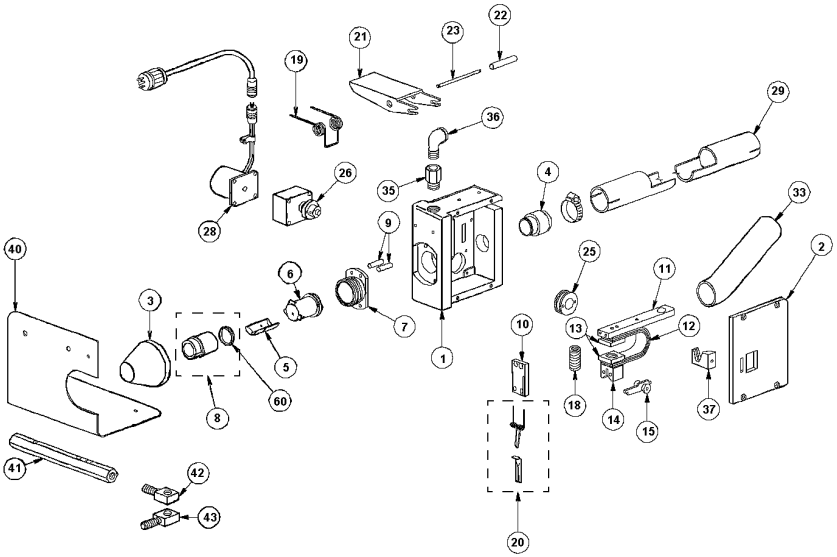
Description	Part no.	Description	Part no.
120 Volt 60 Hz Automatic Controller	72-008-014	“Head Motor Cord” Connector	96-196-002
220 Volt 50 Hz Automatic Controller	72-008-018	Travel Delay Potentiometer	96-645-174
Circuit Board Assembly	96-162-760	Arc Level Potentiometer	96-834-044
“Travel” Connector	96-169-068	Travel Delay Knob	94-465-109
“Remote” Connector	96-169-328	Arc Level Dial	94-225-024
“Interconnect Cable” Connector	96-169-329	“Stop” Switch	96-834-331
Capacitor	96-131-010	“Start” Switch	96-834-332
Resistor	96-696-029	“Travel” Switch	96-834-334
“Electrode Jog” Switch	96-834-333	Volt Meter	96-508-036
“Control Power” Switch	96-834-330	Ampere Meter	96-508-037
Transformer	96-881-084	Plastic Cover Assembly	94-171-270
Front Panel Screws(#1-32 x 3/8”	97-152-072	Jumper Connector Assembly	96-169-352

N6000 CONTACTOR REPLACEMENT PARTS



Description	Part no.	Description	Part no.
120 Volt 60 Hz 1600 Amp Contactor	72-008-019	Air Solenoid Valve	96-921-004
220 Volt 50 Hz 1600 Amp Contactor	72-008-017	Connector	96-169-328
Contactor	96-171-009	Circuit Breaker	96-110-006
Fan	96-290-009	Time Delay Relay	96-697-064

N6000 TORCH REPLACEMENT PARTS



NO	DESCRIPTION	PART NO.	NO	DESCRIPTION	PART NO
	N6000 Torch Head	05-124-000	19	Lever Spring	94-800-183
1	Torch Housing	94-395-105	20	Nozzle Spring	94-800-182
2	Cover	94-171-278	21	Lever	94-476-067
3	Molded Lock Nut	94-565-092	22	Lever Tube	94-893-192
4	Electrode Tube Adapter	94-013-098	23	Lever Hinge Pin	94-632-097
5	Vee Block	94-096-132	25	Drive Wheel	94-949-051
6	Nozzle Sleeve	94-784-075		Gear Housing	95-338-177
7	Air Plenum	94-636-001	26	Insulator	94-433-184
8	Air Nozzle w/Insulator	94-556-071	28	Drive Motor	96-524-095
9	Interconnect Bar	96-070-030	29	Electrode Holder Tube	94-893-082
10	Interconnect Jumper	96-458-021	33	Cable Boot	94-105-016
	Shoe & Buss Bar	96-774-096	35	Adapter	94-013-097
11	Buss Bar	94-070-029	36	Brass Street Elbow	94-306-151
12	Tinned Flat Copper Braid	96-458-025	37	Guide Block	94-096-133
13	Jumper Clamp	96-168-028	40	Shield	94-777-105
14	Shoe	96-774-095	41	Mounting Beam	94-079-013
15	Wheel Assembly	94-949-053	42	Mounting Bracket	94-111-189
	Beam & Pin	94-079-008	43	Threaded Mounting Bracket	94-111-190
	Wheel (2 Req.)	94-949-052	60	Nozzle Insulator	94-433-189
18	Shoe Spring	94-800-184			

SYSTEM CABLES

Remote Pendant Assembly	Part No.
10” Remote Pendant Assembly	96-620-001
25” Remote Pendant Assembly	96-620-003
50” Remote Pendant Assembly	96-620-002
White (Start) Switch	96-834-338
Red)Stop) Switch	96-834-337
Connector Assembly	96-169-357

Power Cable Assembly	Part No.
4’ 4/0 Power Cable	96-130-254
15’ 4/0 Power Cable	96-130-256
25’ 4/0 Power Cable	96-130-300
50’ 4/0 Power Cable	96-130-301

Motor Cable Assembly	Part No.
3’ Head Motor Cable	96-130-257
12’ Head Motor Cable	96-130-253
15’ Head Motor Cable	96-130-303
25’ Head Motor Cable	96-130-282
50” Head Motor Cable	96-130-274

Interconnect Assembly	Part No.
14 Inch Interconnect Cable	96-170-049
30 Inch Interconnect Cable	96-170-055
7’ Interconnect Cable	96-170-057
15’Interconnect Cable	96-170-051
25’Interconnect Cable	96-170-052
50’ Interconnect Cable	96-170-053
Male Connector Assembly	96-169-356
Female Connector Assembly	96-169-358

Air Hose Assembly	Part No.
4’ Air Hose	94-396-051
15’ Air Hose	94-396-049
25’ Air Hose	94-396-048

*NOTE: when distance is greater than 25 ft. air hose inside diameter should be ½” or greater

CLIMBER V-A TRACTOR REPLACEMANT PARTS

Description	Part no.
120 Volt 60 Hz Climber V-A Tractor	71-023-136
220 Volt 50 Hz Climber V-A Tractor	71-023-137
Wheel Assembly	95-949-029
Idler Gear	94-749-136
Speed Control Board	96-174-071
Drive Motor	96-524-093
Drive Gear	95-338-180
Forward/Reverse Switch	96-834-343
Power On/Off Switch	96-834-342
Speed Control Dial	94-225-024

TITAN MACHINE CARRIAGE REPLACEMENT PARTS

Description	Part no.
120 Volt 60 Hz Titan Carriage	71-022-501
Front Wheel Assembly	95-949-022
Speed Control Board	96-174-061
Cleaning Brushes	94-122-055

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