USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.

CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding Cutting, and Gouging," Form 52529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information.

Be sure this information reaches the operator.
You can get extra copies through your supplier.
SAFETY PRECAUTIONS

WARNING: These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.

1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, and goggies are also required.
2. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.
7. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, Battery Yam Park, Quincy, MA 02269.

PROTECT YOURSELF AND OTHERS -- Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

1. Remove all combustible materials well away from the work area or cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal.
3. Do not weld, cut or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. Turn off the power before removing your gloves.
8. Put on dry, hole-free gloves before turning on the power.
9. Be sure the power source frame (chassis) is connected to the ground system of the input power. Connect the workpiece to a good electrical ground.
10. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.

FIRES AND EXPLOSIONS -- Heat from flames and arcs can start fires. Hot sparks or sparks can also cause fires and explosions. Therefore:

1. Be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.
2. Connect the workpiece to a good electrical ground. Do NOT use AC welding current in damp areas.
3. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
4. Put on dry, hole-free gloves before turning on the power.
5. Make sure that all parts of your body are insulated from electrical parts and ground.
6. Electric current flow through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:

1. Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.
3. Welders should use the following procedures to minimize exposure to EMF:
   A. Route the electrode and work cables together. Secure them with tape when possible.
   B. Never coil the torch or work cable around your body.
   C. Do not place your body between the torch and work cable.
   D. Connect the work cable to the workpiece as close as possible to the area being welded.
   E. Avoid welding near open, ungrounded electrical fixtures.

ELECTRIC AND MAGNETIC FIELDS -- May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:

ELECTRICAL SHOCK -- Contact with live electrical parts and ground can cause severe injury or death. DO NOT use AC welding current in damp areas, if movement is confined, or if there is danger of falling.

1. Use well-maintained equipment. Replace worn or damaged cables.
2. Keep everything dry, including clothing, work area, cables, torch/electrode holder, and power source.
3. Make sure that all parts of your body are insulated from work and from ground.
4. Do not weld or cut near flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
5. Do not weld or cut in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
6. Put on dry, hole-free gloves before turning on the power.
7. Turn off the power before removing your gloves.
8. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.

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4. Put on dry, hole-free gloves before turning on the power.
5. Make sure that all parts of your body are insulated from electrical parts and ground.
6. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:
FUMES AND GASES -- Fumes and gases, can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation. Therefore:

1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
2. Do not operate near degreasing and spraying operations. The heat or arc rays can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gases.
3. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
4. Refer to ANSI/ASC Standard Z49.1 (see listing below) for specific ventilation recommendations.
5. WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code §25249.5 et seq.)

CYLINDER HANDLING -- Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer’s operating instructions for mounting regulator to a compressed gas cylinder.
2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
4. Locate cylinders away from heat, sparks, and flames. Never strike an arc on a cylinder.
5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

EQUIPMENT MAINTENANCE -- Faulty or improperly maintained equipment can cause injury or death. Therefore:

1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
3. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
5. Keep all safety devices and cabinet covers in position and in good repair.
6. Use equipment only for its intended purpose. Do not modify it in any manner.

ADDITIONAL SAFETY INFORMATION -- For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:
1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"
5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding"
6. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding"
8. ANSI/AWS F4.1, "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances."

MEANING OF SYMBOLS - As used throughout this manual: Means Attention! Be Alert! Your safety is involved.

- **DANGER** Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.
- **WARNING** Means potential hazards which could result in personal injury or loss of life.
- **CAUTION** Means hazards which could result in minor personal injury.
1.1 SPECIFICATIONS

Current Rating
  Maximum Rating ............................... 250 Amps
  60% Duty Cycle in Ar ......................... 250 Amps
  100% Duty Cycle in Ar ....................... 200 Amps

Voltage Class "L" .................................. 113 VDC Peak

Shield Gas Flow Rate ........................... 35 - 40 CFH
  (16.5 - 18.9 l/min.)

Control Circuit Ratings:
  Voltage ......................................... 115 Vac Max.
  Phase...................................................... Single
  Frequency ........................................... 50/60 Hz
  Power .................................................. 50 Watts

Wire Feed Speed Range ................ 50 - 650 in./min.

Wires Accommodated:
  Hard ........................................... 0.030, 0.035, 0.045-in.
  Soft ............................................. 0.030, 0.035, 3/64 in.

Length ...................................................... 14-1/2-in.

Height ......................................................... 6-1/2-in.

Handle Dia.................................................. 1-3/4-in.

Length of Service Line ........................... 25-ft.

Weight, Approx. (less wire & service line) ..2-3/4 lbs.

Shipping Weight ............................................ 17 lbs.

1.2 DESCRIPTION

- Manually guided torch for MIG/MAG welding.
- Rugged, well-balanced spool-on-gun torch.
- Uses durable threaded contact tip - short for spray arc and long for short arc welding applications. Torch is supplied with components required for spray arc welding with 3/64-in. soft wire. See table 1 for other available contact tips, liners, and feed rolls.
- Uses standard-duty copper nozzles. No. 10, P/N 999472, is supplied with the torch. Light-duty and other size nozzles also available. See Table 2.
- Powerful gearmotor in handle pulls welding wire from 4-in. dia. spool in molded torch case.
- Partial depression of torch trigger controls gas flow for pre-flow and postflow operations. Full depression provides the wire feeding as well as the gas flow.
- Wire feed control potentiometer mounted on torch handle provides precise adjustment of wire feed rate at torch.
- Rugged flame retardant torch case and low voltage control of trigger switch provide complete operator protection.
- 25-ft. long service lines.
- Designed for use with the Migmaster 250/Migmaster 251 and Mig-28A Spool-On-Gun packages.

Table 1.1 - Contact Tips

<table>
<thead>
<tr>
<th>Wire Size &amp; type</th>
<th>**(0.8 mm) Hard/Soft</th>
<th>**(0.9 mm) Hard/Soft</th>
<th>**(1.2 mm) Hard/Soft</th>
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<tbody>
<tr>
<td>Contact Tip (Short) spray Hard</td>
<td>20544</td>
<td>996995</td>
<td>996999</td>
</tr>
<tr>
<td>Contact Tip (Long) short arc</td>
<td>996994</td>
<td>996996</td>
<td>996998</td>
</tr>
<tr>
<td>Notch Contact Tip (Short) spray AL</td>
<td>36884</td>
<td>36885</td>
<td>*36886</td>
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* Supplied with torch (3 each).
** Requires Adapter P/N 17983.

Table 1.2 - Nozzles

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<th>Size No.</th>
<th>**Standard Duty P/N</th>
<th>**Light Duty P/N</th>
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<tr>
<td>6</td>
<td>-</td>
<td>998885</td>
</tr>
<tr>
<td>8</td>
<td>999471</td>
<td>998893</td>
</tr>
<tr>
<td>10</td>
<td>*999472</td>
<td>998894</td>
</tr>
<tr>
<td>12</td>
<td>999473</td>
<td>-</td>
</tr>
<tr>
<td>12 Brass</td>
<td>17350</td>
<td>-</td>
</tr>
<tr>
<td>12 Spotweld</td>
<td>999625</td>
<td>-</td>
</tr>
</tbody>
</table>

* Supplied with torch (1).
** Requires Adapter P/N 999452.

The tip end is notched and offset for maximum electrical transfer. If the wire burns back to the tip, the "ball" formed can be peeled away and generally, the tip can still be used.

Figure 1.1 - Special Features of the Notched End Contact Tips for aluminum electrodes
NOTE:
• Migmaster 251 requires Spool Gun Kit, P/N 36695.
• Migmaster 250 and MIG 28A require Adaptor, P/N 36833.

1.3 REQUIRED EQUIPMENT
The MT-250SG Torch (P/N 36779) is supplied with a feed roll (36866), contact tip (36886), and No. 10 standard-duty nozzle (999472) for feeding 3/64-in soft wire. Refer to Tables 1.1 and 1.2 for complete listing of torch accessories. A 4-in. dia. spool of wire is also required. Check with your ESAB welding equipment distributor for the size and type wire desired.

1.4 OPTIONAL ACCESSORIES
2. Torch Extension Lines
Gas Hose Assembly, 25-ft., .................... P/N 34V38
Coupling, Gas Hose, (5/8” - 18) .............. P/N 11N17
Control Cable Extension, 30-ft. .............. P/N 636968
Power Cable, 1/0 (customer supplied)
Quick Connector, Male #2 - 1/0 .......... P/N 13733936
Quick Connector, Female #2 - 1/0 ...... P/N 13735632

SECTION 2 INSTALLATION

2.1 TORCH CONNECTION
The MT-250SG Torch is equipped with the following 25-ft. service lines:
1. The gas line is equipped with a 5/8” - 18RH fitting. Connect to regulator mounted on cylinder of gas, tighten with wrench to prevent leaks.
2. The control cable is equipped with an 8-pin plug connection. Connect plug to mating socket. Thread the retaining collar and tighten firmly by hand.
3. The power cable is equipped with a twist-lock or “DIN” style plug. Insert plug fully into the mating receptacle and then turn the plug to the right until firmly locked into place.
3.1 TORCH CONTROLS

Wire feed power is provided by the permanent-magnet type D. C. shunt motor in the MT-250SG. Wire feed speed during the welding cycle is controlled by the potentiometer in the torch handle.

Turning the potentiometer in a clockwise direction will increase the welding current (increase wire feed speed); turning counterclockwise will decrease welding current (decrease wire feed speed). An initial setting should be high to reduce the possibility of arcing to the contact tip.

3.2 INCREASING/DECREASING BRAKE TENSION ON THE SPOOL

The specifications for the 4-inch spool allow a variation in the width of the spool of up to 1/16 inch (+1/32 inch tolerance). The spool brake spring will handle most spool width variations. The following adjustments can be made if required.

If the spool brake is not applying enough tension on the spool:

1. Remove the spool brake assembly and the spool of wire.
2. Remove the spool hub nut and the lock washer.
3. Remove the spool hub bolt.
4. Remove shim washer(s) as needed from under the bolt head.
5. Place the removed shim washer(s) under the spool hub nut.
6. Reassemble all components except for the spool cover.
7. See threading wire section.

If the spool brake is applying too much tension on the spool:

1. Remove the spool brake assembly and the spool of wire.
2. Remove the spool hub nut and the lock washer.
3. Remove the spool hub bolt.
4. Remove shim washer(s) as needed from under the bolt head.
5. Place the removed shim washer(s) under the spool hub nut.
6. Reassemble all components except for the spool cover.
7. See threading wire section.

* See “Note” on following page.
1. Make sure the feed roll is properly installed to match the wire size.

   To change the feed roll setting:
   a. Loosen but do not remove the setscrew.
   b. Slide the feed roll off the motor shaft.
   c. Turn the feed roll over and reinstall it on the motor shaft.
   d. Tighten the setscrew securely.

2. Turn the wire feed controlling the spool gun handle clockwise to the maximum setting.

3. Open the rolls on the gun by raising the Drive Roll Release Lever.

4. Thread the wire through the inlet guide, between the drive and idler rolls and into the outlet guide. The wire must be straight when it is threaded.

5. Turn on control power. Lower the drive roll release lever and pull the gun trigger. Wire will be pushed out the front of the gun. Run out approximately 6 inches of wire. Reinstall the contact tip, nozzle assembly, gun cover and spool cover.

6. Cut off the electrode wire even with the front of the nozzle assembly.

7. Turn on the shielding gas to the Spool-On-Gun.

8. Raise the drive roll release lever to open the drive roll and pull the gun trigger to purge the system of contaminants. Purge for two minutes. Release the trigger and lower the drive roll release lever.

   YOU ARE NOW READY TO WELD
3.4 GAS FLOW ADJUSTMENTS

A small setscrew in the trigger (see Figure 3.5) is used to adjust the timing and amount of trigger squeeze between the gas flow and electric switch closure. Turn the screw clockwise to close the switch sooner and open the switch later in the squeeze/release cycle. Turn the screw counter-clockwise to close the switch later and open the switch sooner in the cycle. The gas flow should begin well before the switch is closed and end well after the switch is opened.

CAUTION

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacements parts.

4.1 INSPECT AND SERVICE TORCH REGULARLY

a. Clean accumulated dirt from all areas, particularly electrical parts where metallic particles can cause short circuits. Blow out liner with compressed air when changing wire. Compressed air should NOT exceed 30 psig.
b. Tighten loose hardware including all gas and electrical connections. (Loose power connections overheat during welding).
c. Regularly inspect insulation on equipment for possible damage or wear. Check for frayed and cracked insulation. Before using equipment again, make necessary repairs or replace all worn or damaged insulation, hoses, cables, conduit, and connectors.

WARNING

With any repairs, make sure that metallic parts do not protrude from insulation. Damaged insulation can expose the conductor. If it should touch grounded metal, it would create an arc flash. If it should touch the body, it could cause a fatal shock.
d. Periodically remove any weld spatter or foreign matter which has accumulated around the nozzle orifice and contact tip with a hand reamer or file. To ease spatter removal, apply a thin film of No. 65 anti-spatter compound (08N65) on contact tip and nozzle before welding and reapply the compound after cleaning of tip and nozzle.

IMPORTANT

Do not hammer torch or nozzle to remove spatter.
e. Replace contact tip if worn.
f. Remove any accumulation around trigger that may make it stick, or cause short circuits.

Figure 4.1 - Schematic - MT-250SG Spool-On-Gun
Figure 5.1 - Replacement Parts, MT-250SG Torch, P/N 36779

Figure 5.2 - Replacement Parts, Torch tip
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<th>No.</th>
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<th>Part No.</th>
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<td>36460</td>
<td>TOP COVER KIT</td>
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<td>ROLL BLOCK KIT</td>
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<td>3</td>
<td>1</td>
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<td>PRESSURE ROLL</td>
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<td>4</td>
<td>1</td>
<td>36463</td>
<td>SPOOL COVER KIT</td>
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<td>5</td>
<td>1</td>
<td>36468</td>
<td>SPOOL BRAKE ASSEMBLY</td>
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<td>6</td>
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<td>SPOOL SPINDLE KIT</td>
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<td>SPOOL DISC KIT</td>
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<td>INLET GUIDE TUBE</td>
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<td>INSULATOR &amp; CLAMP KIT</td>
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<td>REEL SUPPORT KIT</td>
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<td>BARREL INSULATION KIT includes:</td>
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<td>4 SPACER/SEAL</td>
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<td>LEVER-ROLL RELEASE KIT</td>
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Not Shown  1  0558002958  MT-250 SG 2PC POWER CABLE

1  36471 CONTROL CABLE ASSEMBLY
1  36472 GAS HOSE ASSEMBLY
1  13733936 PLUG, WELD CABLE (MALE QUICK CONNECT)

26  1 NOZZLE - SEE TABLE 1.2
27  1 CONTACT TIP - SEE TABLE 1.1
28  1 17983 TIP ADAPTOR
29  1 999452 NOZZLE ADAPTOR includes:
     1 646988 O-RING
     2 998875 FRICTION RING
30  1 999474 FRONT INSULATOR
**A. CUSTOMER SERVICE QUESTIONS:** Phone (843) 664-5540/Fax: (800) 634-7548

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<td>(843) 664-4416</td>
<td>(800) 446-5693</td>
<td>8:30 AM to 5:00 PM EST</td>
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<td>Product Availability</td>
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<td>Saleable Goods Returns</td>
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<td>Shipping Information</td>
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**B. ENGINEERING SERVICE:** Phone: (843) 664-4416 / Fax: (800) 446-5693

<table>
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<th>Phone Numbers</th>
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<th>Hours</th>
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<td>Welding Equipment Troubleshooting</td>
<td>(843) 664-4416</td>
<td>(800) 446-5693</td>
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<td>Warranty Returns</td>
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<td>Authorized Repair Stations</td>
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**C. TECHNICAL SERVICE:** Phone: (800) ESAB-123/ Fax: (843) 664-4452

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<td>Technical Specifications</td>
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<td>Equipment Recommendations</td>
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**D. LITERATURE REQUESTS:** Phone: (843) 664-5501 / Fax: (843) 664-5548

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<td>Repair Status</td>
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**E. WELDING EQUIPMENT REPAIRS:** Phone: (843) 664-4469 / Fax: (843) 664-5557

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**F. WELDING EQUIPMENT TRAINING:**

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<td>Telephone: (843) 664-4428</td>
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<td>(843) 664-4476</td>
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<td>Training School Information and Registrations</td>
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**G. WELDING PROCESS ASSISTANCE:**

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<td>Telephone: (843) 664-4248</td>
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<td>(843) 664-4454</td>
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**H. TECHNICAL ASST. CONSUMABLES:**

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**IF YOU DO NOT KNOW WHOM TO CALL**

Phone: (800) ESAB-123/ Fax: (843) 664-4452/Web: http://www.esab.com

Hours: 7:30 AM to 5:00 PM EST