INSTRUCTIONS for

PT-121 & PT-121M
PLASMA ARC CUTTING TORCHES

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 52-529. 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.

WARNING
The plasma arc cutting process employs extremely high voltages. Contact with “live” parts of the torch and machine must be avoided. Also, the improper use of any of the gases employed can present a safety hazard. Before beginning operation with the PT-121 or PT-121M torch, refer to the safety precautions listed in one of the following Plasma Arc Cutting Package instruction booklets: F-14-376 (PCM-70), F-14-471 (PCM-100), or F-14-474 (PCM-150).

1. INTRODUCTION

The PT-121 torches (patented) are designed for use with several dual gas Plasma Arc Cutting Packages. Four manual and two mechanized models of the PT-121 torches are available and listed in Fig. 3 of this booklet. Manual torches are equipped with 75-deg. or 90-deg. head. Torch service lines are either 25 or 50-ft. long. The PT-121 torches are rated for 150 amps DCSP.

This booklet covers only the accessories, maintenance, and parts information on the PT-121 torches. For installation and operating instructions, refer to the appropriate Instruction booklet packed with your plasma cutting console.

II. ACCESSORIES

Torch Spare Parts Kit:
PT-121/PCM-70, P/N 999276
PT-121/PCM-100, P/N 999269
PT-121/PCM-150, P/N 19539
Recommended for maintaining PT-121 or PT-121M torch with minimum downtime. Each kit contains parts and tools listed in Table 1 in a convenient tool box. The kits are supplied with the appropriate outfits.

Circle Cutting Attachment, P/N 999696 - Permits cutting accurate circles from 4-1/2-in. to 22-in. in diameter with a PT-121 manual torch. The attachment includes a head and radius bar assembly, center-point/adaptor, and dual swivel castor assembly. Cuts can be made inside or outside the circle. The torch head is always held vertical during the cutting operation. An accessory extension bar (P/N 163Z23) is also available for cutting larger circles up to 44-in. in diameter. The attachment is also handy for maintaining a constant standoff in other types of cutting.

Drag Type Heat Shield, P/N 999620 (PCM-70); 18419 (PCM-100/150) - Slightly longer than a standard heat shield and slotted permitting the operator to drag a manual PT-121 torch along the plate during a cut. This maintains a fixed

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Fig. 1 - Dimensional Data - PT-121 and PT-121M Torches

Be sure this information reaches the operator. You can get extra copies through your supplier.
drag type heat shields are supplied with each PT-121 Torch Spare Parts Kit.

High-Current Insert, P/N 19690 and Baffle, 19691 - Replaces the insert, baffle, and spacer supplied with the torch to provide the high flow of plasma gas (nitrogen) for cooling the electrode and torch and permit operating the torch up to 150 amps. These parts are supplied with the PCM-150 Torch Spare Parts Kit, P/N 19539 (see Table 1). The high-current insert and baffle may be used at lower currents; however, plasma gas usage will be much greater than needed.

Long Front End Parts — For cutting into corners and crevices, the following long parts are available for use in place of standard parts (see Fig. 3) for N₂ plasma gas up to 115 amps or H-35 plasma gas up to 150 amps:

Electrode (long) - P/N 18362
Heat Shield (long) - P/N 18363
Body Insert (long) - P/N 18364

P/N’s 18362, 18363, and 18364 are supplied with PCM-150 Torch Spare Parts Kit, P/N 19539. These parts must be used together. They cannot be intermixed with standard parts.

Gouging Tip, P/N 19160 and Long Gouging Heat Shield, P/N 31411 — Used in place of cutting tip and heat shield for weld joint preparation, fillet weld or weld defect removal, and for removing risers from castings of any metal. These parts must be used with long electrode (18362) and long insert (18364). Gouging can be performed manually or mechanized. See page 4 for operating data. Either baffle can be used for gouging up to 150 amps.

Heavy-Duty Heat Shield, P/N 19507 — Has greater strength and thermal shock resistance than standard heat shield. It may be used for manual or mechanized operations.

“Plasmit” Torch Head Protector, P/N 20742 (75° Hd.); P/N 20801 (90° Hd.); P/N 20802 (Mech.) — Protects torch head from radiant heat during cutting operations.

Leather Sheath (10-ft. section), P/N 20812 — For greater protection of service lines.

III. INSTALLING FRONT END PARTS & ADJUSTING ELECTRODE

WARNING

Before making any adjustments or performing any maintenance on the torch, make sure the power to the torch is shut off.

parts, the position of the electrode to cutting tip is critical and the electrode must be centered exactly. To assemble these parts and properly adjust the electrode, do the following (refer to Fig. 2):

1. Unscrew and remove torch cap (999257).

![Fig. 2 - Use of Centering Adjustment Tool, P/N 999266](image)

2. Insert either end of the double-pointed electrode into the torch head, and allow it to extend past the front end slightly.

NOTE: Make sure the stem portion of the collet (999259) is down in the torch head as illustrated in Fig. 3 - not in the electrode clearance hole of the torch cap. If collet is installed upside-down, gas flow and electrode centering will be affected which may produce poor quality cuts.

3. Reassemble the torch cap to the torch and tighten only enough to hold the electrode in the torch while still permitting it to slide in the collet.

4. With the electrode extending out slightly at the front end, assemble the electrode center-adjusting tool (999266) finger tight in place of the cutting tip.

5. Referring to Fig. 2, push down on the torch against a smooth surface allowing the electrode to slide into the torch until the face of the center-adjusting tool is butted against the smooth surface.

6. Fully loosen the grip on the electrode by turning the torch cap, at least 1/4 turn counterclockwise to prevent any “springback” effect of the electrode. Then tighten the torch cap to lock the electrode in position.

7. Remove the center-adjusting tool carefully and note whether there is any drag on the electrode. The presence of drag indicates that the electrode is not centered properly.

8. Install the cutting tip, and then tighten it with the tip wrench (995568).

9. Install the insulator (20381).
10. Apply a thin film of silicone lubricant (17672) on the heat shield retaining O-rings (994092), and then carefully slide the heat shield onto the torch.

IV. MAINTENANCE
1. The torch electrode, cutting tip, and heat shield should be checked on a daily basis. Replace if worn or damaged. The electrode can be resharpened. When resharpening an electrode, the point must be concentric and should have a 60-deg. included angle with a 1/64-in. flat on the point as illustrated in Fig. 2A. Either end of the electrode may be used.

2. Gas hose and cables should be inspected periodically. If cuts are noted through the protective sheath, examine further for cuts on a hose or cable. Replace if damaged.

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**Fig. 2A - Proper Electrode Point**

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**Fig. 3 - PT-121 Torch Assembly (75° head) with 25-ft. (8m) lines - P/N 999242**
PT-121 Torch Assembly (75° head) with 50-ft. (15m) lines - P/N 999243
PT-121 Torch Assembly (90° head) with 25-ft. (8m) lines - P/N 999246
PT-121 Torch Assembly (90° head) with 50-ft. (15m) lines - P/N 999247
PT-121M Torch Assembly with 25-ft. (8m) lines - P/N 999244
PT-121M Torch Assembly with 50-ft. (15m) lines - P/N 999245
PT-121M Torch Assembly with 3-ft. (1m) lines - P/N 18903

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**Table:**

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3. Replace the two O-rings (994092) used for retaining heat shield if they appear flattened or damaged, or if the heat shield tends to fall off.

**V. REPLACEMENT PARTS**

Replacement parts are keyed in Figs. 3 and 4. Order replacement parts by part number and part name as shown on the illustrations. DO NOT order by part number alone. Parts may be ordered from your ESAB welding equipment distributor or from ESAB Welding & Cutting Products, Customer Service Department, Florence, SC.

**PLASMA ARC GOUGING OPERATING DATA**

- **Gouging Tip:** P/N 19160
- **Heat Shield:** P/N 31441
- **Speed:** 60-120 ipm
- **Standoff (d):** 5/16 to 3/8-inches Orifice to plate distance
- **Plasma Gas:** H-35 at 15 to 25 psig (100 to 150 cfm)
- **Cooling Gas:** Argon, N₂, or Air @ 50 psig (280 cfm)
- **Delay time on start:** 1 to 2 seconds.

Conditions indicated above produces a smooth V-Groove 0.14-inch deep and 0.34 inch wide on 1/2-in. aluminum using PCM-100 or PCM-150. Control of conditions is more important for mechanized gouging than for manual gouging since an experienced operator can compensate for deviations.

Excessive delay will result in a gouge getting progressively deeper. Higher speeds will make the gouge shallower. Low gas flow will also make the gouge shallower. High gas flows or low speeds will make the gouge deeper cut V-shaped.

Argon cooling gas produces the highest quality gouges with minimum fumes. Nitrogen or air produces acceptable gouges at lower cost but with more fumes.

Plasma arc gouging can be used for welding joint preparation, fillet weld removal, weld defect removal and for removing risers from castings. It produces faster and cleaner finishes with less fumes, sparks, and noise than carbon arc gouging, and it is easier to perform. For more information on plasma arc gouging, refer to Form F-7080, “Plasmarc Gouging Guide” which is available from any ESAB distributor. This booklet is packed with the PCM-100 and PCM-150 consoles.