INSTRUCTIONS for

F-15-114-E
January, 2001

PT-20AM

MECHANIZED PLASMA ARC CUTTING TORCH

Without Rack, 50-ft., Unshielded ..... P/N 21360
With Rack, Torch Holder, 50-ft., Shielded ..... P/N 21371
With Rack, 50-ft., Shielded ..... P/N 22057
Without Rack, 50-ft., Shielded ..... P/N 21977
Without Rack, 4-1/2-ft., Shielded.....P/N 21785*
Without Rack, 17-ft., Shielded.....P/N 21786*

* For connecting to plumbing boxes.

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 out booklet, "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529. Do NOT permit untrained persons to install, operate, or maintain the 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 and 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-20AM torch, refer to the safety precautions listed on page 2 of instruction booklet packed with your plasma cutting console.

I. INTRODUCTION

The patented PT-20AM is a 100 amp capacity, pilot-arc mechanized torch (see Fig. 1) available in 6 different versions listed above. The torch uses clean, dry air as the cut gas for cutting carbon steel, aluminum, or stainless steel. DO NOT use oxygen; a hazardous fire may result.

This booklet covers mainly the accessories, maintenance, and parts information for the PT-20AM torch. For installation and operating instructions for your cutting package, refer to appropriate booklet with your console.

II. ACCESSORIES

A. PT-20AM Torch Spare Parts Kits - The following three spare parts kits are available for maintaining the PT-20AM torch with minimum downtime (see Table 1 for contents of each kit):

50 Amps - P/N 21370
70 Amps - P/N 21369
100 Amps - P/N 21376

Table 1 - Contents of PT-20AM Spare Parts Kits

	Quantity		
Description, P/N	50 Amp 21370	70 Amp 21369	100 Amp 21376
Heat Shield (70/100 A), 21326	-	2`	2
Heat Shield (50 A), 21447	2	1	1
Cutting Nozzle (50 A), 21330	5	5	5
Cutting Nozzle (70 A), 21329	-	5	5
Cutting Nozzle (100 A), 21328	-	-	5
Electrode, 21150	5	5	5
Electrode**, 0558001617	5**	5**	5**
Electrode Insulator, 21373	1	1	1
Electrode Holder Assy, 21332	1	1	1
Baffle Tube, 21374	1	1	1
Pilot Arc Adaptor, 19497	1	1	1
O-ring, 488157	5	5	5
Lubricant (1 oz.), 17672	1	1	1
Seat/Baffle Wrench, 21375	1	1	1
1/16: Hex-Key Wrench, 93750006	1	1	1
Tool Box, 950272	1	1	1

**For 50Hz Machines

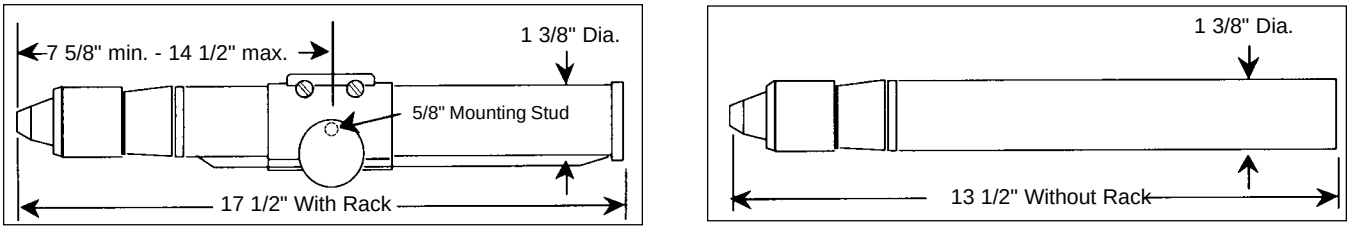

Fig. 1 - Dimensional Data - PT-20AM

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

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III. INSTALLING FRONT END PARTS

WARNING

Make sure power switch on console is in OFF position and primary input power is deenergized.

1. The electrode holder assembly (21332) includes the baffle tube (21374). If the baffle tube becomes damaged, it can be replaced by threading the damaged tube out of the holder and threading in the new one. Use the small hex end of the wrench (21375) in the hex broach on the tube. Tighten the tube securely but do not overtighten.

2. Install the electrode insulator (21373) onto the electrode holder assembly (21332) and then thread the electrode (21150) onto the electrode holder assembly. Assemble the electrode firmly by hand. Do not use wrenches or pliers. These three parts together are the electrode assembly.

3. Install the nozzle onto the electrode assembly by inserting the small shoulder on the electrode insulator into the nozzle's rear opening. Place the nozzle and electrode assembly into the heat shield as shown in Fig 2. If the front end of the torch is facing down as normally in a setup, the nozzle and electrode assembly can be stacked in the heat shield and then assembled to the torch. Be sure to use the proper heat shield and nozzle combination as noted in Fig. 2.

NOTE:
These parts are NOT interchangeable with orignal PT-20M Torch. P/Ns 20598 and 20599 are covered by F-15-021.

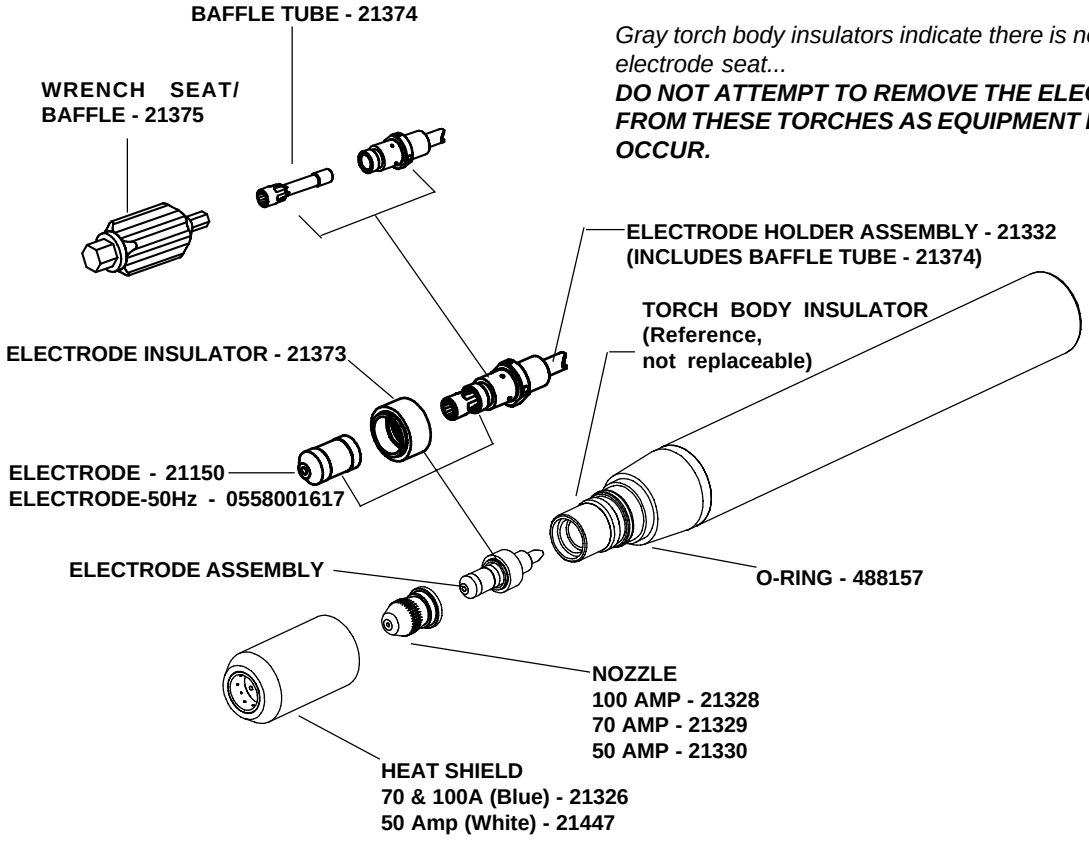


Fig. 2 - Front End Assembly

4. Apply a thin film of lubricant (17672) to O-ring (488157).

5. Tighten heat shield fully to hold the parts in firm contact with each other and to the torch head.

   IMPORTANT: See Maintenance section.

Follow all instructions in the booklet packed with your unit. DO NOT install or attempt to operate this torch without following these instructions.

To connect PT-20AM torch to the console, connect the power cable of the torch to the ''NEG'' terminal and pilot arc cable to the ''POS'' terminal of the unit using pilot arc adaptor (19497 - supplied with spare parts kit). A separate remote control switch cable is required for connecting to the switch receptacle on the console.

The front end of the torch contains a gas flow check valve that acts in conjunction with the circuitry provided in the power supply. This patented system provides a safety interlock preventing the torch from being accidentally energized with high voltage when the heat shield is removed and the torch switch is accidentally closed.

NOTE:
Torch body insulator design was changed to eliminate the need for a replaceable electrode seat. This drawing and parts list reflects that change. The insulator material color was changed for indentification of the part revision level.

Brown torch body insulators were used on torches before 12/99 and do require a separate electrode seat.

Gray torch body insulators indicate there is not a replaceable electrode seat...
DO NOT ATTEMPT TO REMOVE THE ELECTRODE SEAT FROM THESE TORCHES AS EQUIPMENT DAMAGE WILL OCCUR.

CUTTING PARAMETERS FOR THE PT-20AM TORCH

ON CARBON STEEL

Table 2: 100 Amp Data, Nozzle P/N 21328, Heat Shield P/N 21326

Metal Thickness		Air Pressure		Stand-off		Arc Voltage	Pierce Time	Travel Speed					
								Mild Steel		Aluminum		Stainless	
(in.)	(mm)	(psig)	(bar)	(in.)	(mm)	DC Volts	(sec.)	(ipm)	(mm/min)	(ipm)	(mm/min)	(ipm)	(mm/min)
0.250	6	85	6	0.250	6	110	0.1	100	2540	105	2667	80	2032
0.500	13	85	6	0.250	6	120	0.3	45	1143	50	1270	30	762
0.750	19	85	6	0.250	6	125	1.0	27	686	35	889	15	381
1.000	25	85	6	0.250	6	130	2.75	15	381	20	508	10	254
1.250	32	85	6	0.312	8	140	*N.R.	10	254	13	330	7	178
1.500	38	85	6	0.312	8	145	*N.R.	7	178	10	254	5	127

Table 3: 70 Amp Data, Nozzle P/N 21329, Heat Shield P/N 21326

Metal Thickness		Air Pressure		Stand-off		Arc Voltage	Pierce Time	Travel Speed					
								Mild Steel		Aluminum		Stainless	
(in.)	(mm)	(psig)	(bar)	(in.)	(mm)	DC Volts	(sec.)	(ipm)	(mm/min)	(ipm)	(mm/min)	(ipm)	(mm/min)
0.125	3	75	5	0.188	5	105	0.1	190	4826	180	4572	80	2032
0.250	6	75	5	0.188	5	110	0.2	80	2032	85	2159	55	762
0.500	13	85	6	0.250	6	115	0.6	30	762	30	762	20	381
0.750	19	85	6	0.250	6	130	2.3	15	381	25	635	8	254
1.000	25	85	6	0.312	8	140	*NR	7	178	12	305	6	152
1.250	32	85	6	0.312	8	155	*NR	5	127	10	254	3	76

Table 4: 40 & 50 Amp Data, Nozzle P/N 21330, Heat Shield P/N 21447

Metal Thickness		Air Pressure		Stand-off		Arc Voltage	Arc Current	Travel Speed					
								Mild Steel		Aluminum		Stainless	
(in.)	(mm)	(psig)	(bar)	(in.)	(mm)	DC Volts	Amps	(ipm)	(mm/min)	(ipm)	(mm/min)	(ipm)	(mm/min)
0.063	2	75	5	0.125	3	110	40	150	3810	150	3810	130	3302
0.125	3	75	5	0.125	3	110	40	100	2540	105	2667	75	1905
0.188	5	85	6	0.125	3	110	50	100	2540	90	2286	50	1270
0.250	6	85	6	0.188	5	120	50	65	1651	75	1905	30	762
0.375	10	85	6	0.250	6	130	50	40	1016	30	762	8	203
0.500	13	85	6	0.312	8	150	50	18	457	8	2034	6	76

* NR - Indicates piercing is not recommended.

IV. MAINTENANCE

WARNING

Before any maintenance is attempted on this torch, make sure the POWER SWITCH on the console is in the OFF position and the PRIMARY INPUT POWER is DEENERGIZED.

A. General

1. The gas flow check valve is part of the safety interlock and is permanently assembled in the torch head. The head must be replaced if this valve malfunctions.

2. Periodically check the heat shield, electrode holder assembly and electrode insulator. Replace if worn or damaged.

3. Apply a thin film of lubricant P/N 17672 (supplied in spare parts kit) to the O-ring. Check O-ring for damage whenever the shield is removed. Replace if necessary.

4. The power and pilot arc cables should be inspected periodically. If cuts through the protective sheath or if gas leaks are noted, replace the damaged component.

B. Dirt or Contamination

Dirt or other contamination in the torch and loose consumable parts can cause premature failure of the PT-20AM Torch through internal arcing. To avoid this, users are instructed to do the following:

1. Insure that clean, dry, or oil-free air is being used.

2. Avoid excessive use of the silicone o-ring grease used to lubricate the torch o-ring. A thin film is sufficient.

3. Wipe the torch body insulator clean with a cloth before installing each fresh set of consumables. The ability of the insulator to resist arc tracking over its surface is reduced when dirt or other contamination is allowed to collect there.

C. Loose Consumables

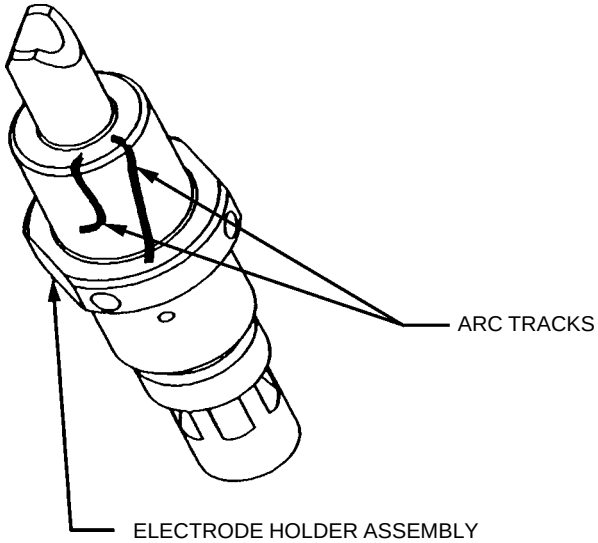
Tests have shown that with proper use of the torch within the rated operating conditions (especially arc current and gas flow rate), the torch consumable parts do not become loose if they are firmly installed in the first place.

1. Tighten the heat shield fully at each consumable change or inspection.

2. Check the consumable tightness at the beginning of each work shift, even if everything was working normally at the end of the previous shift.

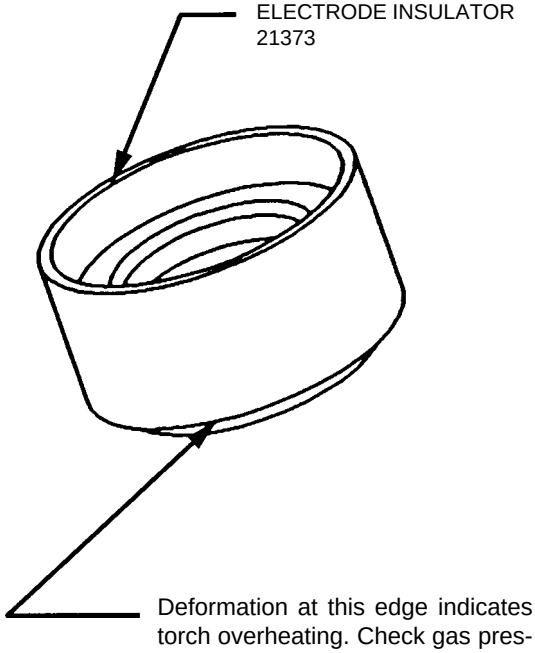
3. Insure that the torch internal cavity and electrode holder are clean and free of dust or dirt which would keep the mating surfaces from having solid contact and that a contact ring is visible along the cavity wall.

The torch requires good electrical contact to the electrode holder. If good contact is not maintained, then the resulting potential difference may cause internal arcing and possible torch damage.



D. Damage Caused by Loose Parts and Torch Overheating.

Arc tracking indicates loose parts. Make sure heat shield is tightened fully. Check tightness again after a few minutes of use. Parts damaged by arcing will cause destruction of torch. Parts damaged by arcing must be replaced.



Deformation at this edge indicates torch overheating. Check gas pressure, gas flow rate and current setting. Deformation leads to loose parts and internal arcing. Do not operate torch with a deformed insulator.

E. Consumables- Remove and Replace

1. Bring the torch to a position where it is easily accessed by the machine operator, in its normal vertical position and at least six (6) inches above the workpiece or the edge of the water table.

WARNING

Make sure that the power source has been turned off and that the power cable has been unplugged at the wall receptacle before proceeding.

2. Unscrew the heat shield and lower it away from the torch, allowing the nozzle and electrode assembly to remain with the shield.

3. Remove the nozzle and electrode assembly from the shield and inspect for wear. The nozzle orifice should be round at both the entrance and the exit. If the nozzle orifice is worn in an oval shape or shows other signs of damage at either end, it should be replaced. The inside of the nozzle may have light grey deposits from the electrode. These may be removed with steel wool but care must be taken to remove all traces of the steel wool afterward.

   If the electrode has a pit which is more than 1/16 inch deep at its center, replace it. This is done by unscrewing the electrode from the electrode holder. Grasp the electrode holder with the fingers using the two flats and grasp the electrode between the thumb and finger of the other hand and twist.

   Inspect the electrode insulator and the electrode holder assembly for signs of damage such as arc tracking or cracking and replace them if any are found. Insure that the baffle tube is securely threaded into the electrode holder, but do not overtighten. Use the small hex end of the plastic wrench in the spare parts kit.

   After installing the electrode insulator onto the electrode holder assembly, install the electrode by reversing the procedure used to remove it. Note that firm tightening of the electrode by hand is sufficient, the use of tools such as wrenches or pliers is not required or recommended.

4. Inspect the heat shield for signs of damage or wear. The gas holes inside the shield should not be blocked by debris, and there should be no signs of arcing anywhere inside the shield. The outer insulating jacket of the shield should not be severely charred or eroded. Replace the heat shield if any of the above damage is found.

5. Inspect the o-ring on the torch. If it shows signs of wear or damage, replace it. If it is dry, lubricate it with a thin film of the lubricant supplied with the spare parts kit.

6. Install the nozzle and the electrode assembly into the heat shield and thread the heat shield onto the torch. The shield should be tightened fully to insure good electrical contact for the electrode and the nozzle.

F. Measuring Torch Gas Flows

If low gas flow is suspected of causing poor cutting performance or short consumable life, the flow can be checked by using Plasma Torch Flow Measuring Kit (P/N 19765). The kit includes a hand held rotameter (flowmeter) which will indicate the gas flow rate exiting the torch. The kit also includes a set of instructions which should be followed exactly to insure safe and accurate use of the rotameter.

The PT-20AM's total air flow rate should be 325 cfh minimum with any nozzle at 75 psig.

G. Removal and Replacement of the Torch Body (Refer to Fig. 3)

1. Cut and remove the shrink wrap at the back end of the torch handle. Unscrew the handle from the torch body and slide it back onto the torch cable assembly in order to expose the torch connections.

2. Remove the electrical tape which secures the short piece of vinyl tubing on the pilot arc cable. Slide the tubing away from the torch and onto the pilot arc cable to expose the pilot arc connector.

3. Use the 1/16" Allen Wrench supplied in the spare parts kit to loosen the pilot arc connector set screw closest to the torch body, being careful not to totally remove the screw. Slip the torch's pilot arc lead out of the connector.

4. Unscrew the power cable fitting from the torch's power lead using a 7/16" open-end wrench and remove the torch body.

5. Connect the pilot arc cable and the power cable to the new torch body's pilot arc lead and power lead by reversing the steps taken to disconnect them. Tighten the pilot arc connector set screw fitting firmly but do not overtighten. Torque the power fitting to 20 lb.-in.

6. Slide the vinyl tubing forward to cover the pilot arc connector and secure in place with electrical tape.

7. Slide the handle forward and thread it firmly onto the torch body.

8. Slide the new piece of shrink tube over the torch handle and shrink in place over the handle's end and the cable sheath.

H. Removal and Replacement of the Torch Cables (Refer to Fig. 3)

1. Disconnect the torch cable assembly from the power source. Refer to your power source instruction booklet for detailed instructions.

2. Remove the torch body and handle from the cable assembly as described in the previous section.

3. Lay the cable assembly on the floor and stretch it out completely. This should be done in an area that is approximately 1-1/2 times as long as the cable assembly.

4. Using a piece of cord or sturdy twine about 1/2 the length of the torch cables, secure one end of the cord around the cables at the torch end and secure the other end of the cord to a stationary object.

5. Remove the tape securing the cable sheath to the cables at both ends.

6. Secure the torch cables at the power source end and pull the sheath completely off the cables and onto the cord used in step 4.

7. Untie the cord from the cables and replace the damaged cable or cables. Be sure to retain the vinyl tube used to insulate the pilot arc connector.

8. Resecure the torch ends of the cables with the cord, and pull the cable sheath back off of the cord and onto the cables.

9. Untie the cord from the cables and temporarily secure the torch body to the cable connections.

10. Secure the sheath to the cables using electrical tape at both ends.

11. Remove the torch body (temporarily installed in step 9) from the cables and slide the handle over the cables and cable sheath. Install the vinyl tube over the pilot arc cable.

12. Reconnect the torch body to the cables as described in the previous section and reinstall the torch handle onto the torch body.

13. Reconnect the torch cables to the power source.

V. REPLACEMENT PARTS

Replacement parts are keyed in Fig. 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.

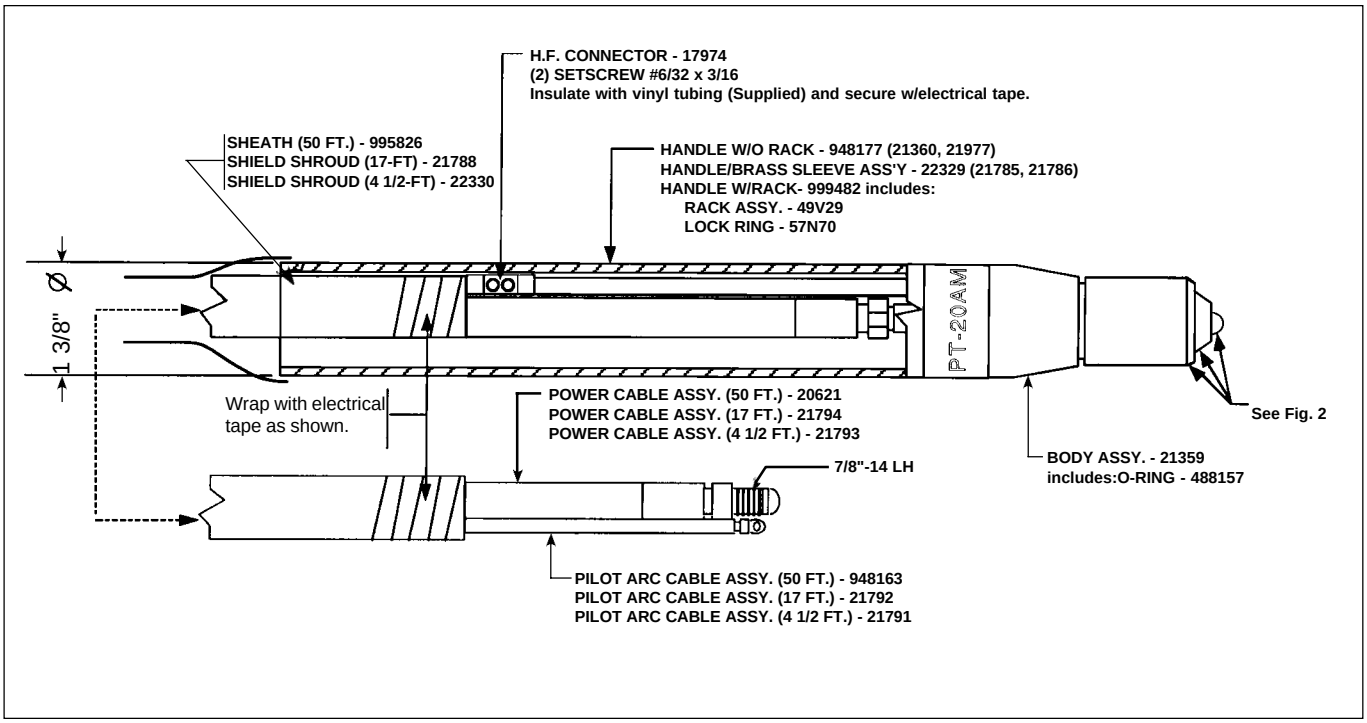


Fig. 3 - PT-20AM Torch Assembly:

Without Rack, 50-ft., Unshielded (illustrated) ..... P/N 21360
With Rack, Torch Holder, 50-ft., Shielded ..... P/N 21371
With Rack, 50-ft., Shielded ..... P/N 22057
Without Rack, 50-ft., Shielded ..... P/N 21977
Without Rack, 4-1/2-ft., Shielded..... P/N 21785*
Without Rack, 17-ft., Shielded..... P/N 21786*
* For connecting to plumbing boxes.

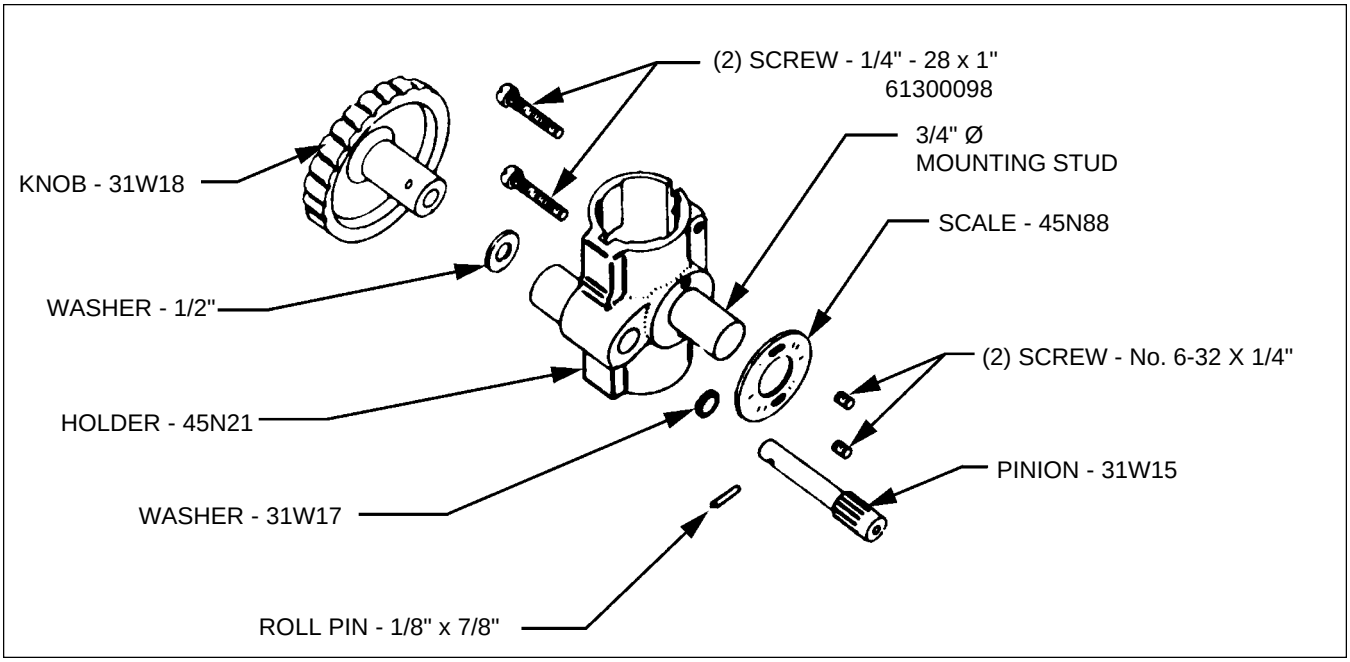


Fig. 4-Torch Holder Assembly - P/N 16V83
(Supplied with PT-20AM Torch Assembly, P/N 21371)

REVISION DATA

Revision B - Added a rubber boot P/N49N83 to the power cable. Reference to new P/N's 22057, 21977,21785 and 21786 were added.

Revision C - Shield shoud P/N 21533 was replaced by P/N 22330 and handle P/N 948177 was replaced by P/N 22329 on P/N's 21785 and 21786.

Revision D - The torch body was modified to no longer need the electrode seat P/N 21372. The cutting parameter charts were updated to include stainless and aluminum.

Revision E - Added 50Hz Electrode P/N 0558001617 to Spareparts list and Parts diagram. Added Note to page 2 explaining differences of the torch body insulator revisions.

ESAB Welding & Cutting Products, Florence, SC Welding Equipment
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