INSTRUCTIONS for

TIG COLD WIRE FEEDER

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for electric welding and cutting equipment, we urge you to read Linde’s free booklet, “Precautions and Safe Practices for Electric Welding and Cutting,” 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.

INTRODUCTION

Purpose

A cold wire feeder consists of the components required to supply filler metal to the welding zone in a mechanized TIG welding installation. They can be used on stationary or motor-driven mountings, for straightline or circumferential welding.

The wire feeder components can be mounted in a number of positions with respect to each other. This flexible design provides easy adaptability to the job site or type of mounting selected. The components can also be mounted for use in the Mig welding process, to feed auxiliary cold wire into the welding zone.

Accessories such as relays, travel limit switches, and push buttons can be added for automatic control of various phases of the welding operation.

As used throughout the balance of these instructions, the designation “Wire Feeder” is intended to include all components required for the cold wire feeding installation.

Description

The basic components of the Wire Feeder are:

A. A wire feed unit to feed the wire.
B. A solid state governor to control rate of wire feed.
C. A wire guide attachment to guide the wire into the welding zone.
D. A wire reel or spindle assembly.
E. A Rack and Tube Assembly, and Torch Adjustment Assembly to provide adjustment of the Tig torch.

The wire feed unit delivers wire at a selected rate from the wire reel into a flexible conduit. The rate of wire feed is held constant within very narrow limits by the ‘J’ governor. The wire passes through the flexible conduit and a wire guide tip to the welding zone. (See Figs. 1, 2, or 3.) The conduit and guice tip are attached to the water-cooled block of the wire guide attachment. The wire guide attachment and the torch are supported by the rack and tube assembly and the torch adjustment assembly.

The wire feed unit is shipped with a 1.33:1 gear ratio installed. Gears are also available as optional accessories for a 2.5:1 gear ratio. Table 1 shows the relationship between gear ratios and speed ranges for the various wire sizes.

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Gears, No. of Teeth &amp; Part No.</th>
<th>Wire Speed Range Available, ipm</th>
<th>Recommended Wire Size, In.</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1.33</td>
<td>24 12N60 04N85</td>
<td>50 785</td>
<td>3/64</td>
<td>Soft</td>
</tr>
<tr>
<td>1.33:1</td>
<td>18 04N85 24 12N60</td>
<td>30 450</td>
<td>3/64 1/16</td>
<td>Hard All</td>
</tr>
<tr>
<td>2.5:1</td>
<td>12 04N29† 30 05N23†</td>
<td>15 235</td>
<td>.035 1/16</td>
<td>Hard All</td>
</tr>
<tr>
<td>1:2.5</td>
<td>30 05N23† 12 04N29†</td>
<td>750 1475</td>
<td>Special Applications</td>
<td></td>
</tr>
</tbody>
</table>

*This ratio installed in unit as shipped from factory.
† Optional accessories.
WARNING: These Safety Precautions are for your protection. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below. Failure to observe these Safety Precautions can result in personal injury or death.

1. PERSONAL PROTECTION - Skin and eye burns resulting from body exposure to the electric-arc welding rays or hot metal can be more severe than sunburn. Therefore:
   a. Use a proper face shield fitted with the correct filter and cover plate to protect your eyes, face, neck and ears from sparks and rays of the welding arc when welding or observing welding. WARN bystanders not to watch the arc and not expose themselves to the welding-arc rays or to hot metal.
   b. 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 the skin from arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
   c. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs or pockets. Sleeves and collars should be kept buttoned, and pockets eliminated from the front of clothing.
   d. Protect other nearby personnel from arc rays and hot sparks with a suitable non-flammable partition.
   e. Always wear safety glasses or goggles when in a welding area. Use safety glasses with side shields or goggles when chipping slag or grinding. Chipped slag is hot and may travel considerable distances. Bystanders should also wear safety glasses or goggles.

2. FIRE PREVENTION - Hot slag, or sparks, can cause serious fires when in contact with combustible solids, liquids or gases. Therefore:
   a. Remove all combustible materials well away from the welding area or completely cover the materials with a non-flammable covering. Such combustible materials include wood, clothing, sawdust, gasoline, kerosene, paints, solvents, natural gas, acetylene, propane and similar combustible articles.
   b. Hot sparks or hot metal can fall into cracks in floors or wall openings and cause a hidden smouldering fire. Make certain that such openings are protected from hot sparks and metal.
   c. Do not weld, cut or perform other hot work on used barrels, drums, tank or other containers until they have been completely cleaned so that there are no substances in the container which might produce flammable or toxic vapors.
   d. For fire protection, have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket or portable fire extinguisher.
   e. After completion of welding, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire.

3. ELECTRICAL SHOCK - Voltages of 110 volts or less can cause severe burns to the body or fatal shock. Severity of electrical shock is determined by the path and amount of current through the body. Therefore:
   a. Never allow live metal parts to touch bare skin or any wet clothing. Be sure gloves are dry.
   b. When standing on metal or welding in a damp area, make certain that you are well insulated by wearing dry gloves and rubber-soled shoes and standing on a dry board or platform.
   c. Always ground the welding machine by connecting a ground wire between the machine and a good electrical ground.
   d. Do not use worn or damaged welding cables. Do not overload the cable. Use well maintained equipment.
   e. When not welding, turn off the equipment. Accidental ground-
I. SETTING UP THE WIRE FEEDER

A. Types of Mounting

The Wire Feeder is made up of a number of separately-mounted subassemblies. Three recommended mounting arrangements for them are shown in Figures 1, 2, and 3.

The Wire Feeder components can be installed on a traveling or stationary mounting. The type selected will depend upon the nature of the job site and the application. For straight-line work, the components can be mounted on a traveling carriage, or placed on a stationary mounting with the workpiece traveling beneath it. For circumferential welding, a stationary mounting is used. The workpiece is revolved beneath the torch as shown in Figure 3. To obtain satisfactory feeding when welding soft metal such as aluminum, the wire should be fed to the wire guide attachment in as straight a line as possible. Figure 4 illustrates a typical installation for welding aluminum. The mounting bracket for the wire reel and wire feed unit can be easily fabricated by the customer.

The equipment mounting brackets used in Figures 1, 2, and 3 are easily fabricated from steel plate. Complete material requirements and construction details are given in Figures 8 and 9 and Table 3. The brackets also may be obtained from Linde on special order. We strongly recommend, however, that you fabricate your own.

B. Equipment Required

Before attempting to set up the Wire Feeder, check to be sure you have all the necessary equipment. This equipment includes the following items:

1. A Wire Feed Unit (40V25), and a Solid State Governor (996446)*. Refer to Table 4 in Section V for a listing of required accessories.

*Governor requires 115V, 50-60 cycle a.c. power supply. Power supply may fluctuate 5 volts high or low, but governors will not operate properly if supply falls below 110 volts.
2. Wire Guide Attachment (40V71) or Wire Guide Attachment (39V38) plus accessory equipment (see Table 5) for the type and size of wire to be used. Attachment (40V71) has a greater number and wider range of adjustments than Attachment (39V38). For complete information on Wire Guide Attachment (40V71), refer to Instruction Booklet F-9932.

3. An HW-27 Tig Welding Torch, (46V31) and accessory equipment. For full details concerning this equipment, its installation and operation, refer to Instruction Booklet F-I-1332, "Instructions for LINDE HW-27 Tig Welding Torch."

4. A Rack and Tube Assembly. This assembly is available in three lengths: 8 in. (39V34), 12 in. (39V35), and 16 in. (39V36).

5. A Clamp Assembly (39V37) or Bracket (40V73) to hold the Rack and Tube Assembly, HW-27 Torch, and Wire Guide Attachment together as an integral unit. See Figures 1, 2, and 3.

6. A Torch Adjustment Assembly (40V26).

7. A Wire Reel (19V89) or Spindle Assembly (38V66).

8. A means of producing relative motion between the torch and workpiece. A CM-37 Machine Carriage, or an OM-48 Side-Beam Carriage with appropriate brackets, is recommended. If the Wire Feeder is to be stationary, a means of moving the work underneath the torch is required.

9. Two 1/4-in. Water Hose Assemblies for connecting the water-cooled block on the wire guide attachment to the water supply line and to the water drain. Order the length desired as follows:

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>40V83</td>
<td>12-1/2 ft.</td>
</tr>
<tr>
<td>41V08</td>
<td>25 ft.</td>
</tr>
</tbody>
</table>

C. Optional Accessories

1. A Water Flow Switch, Torch Saver II (40V51) is recommended. This switch shuts off the welding power automatically in the event of failure or fluctuation of the cooling water supply.

2. A 12-tooth gear (04N29) and a 30-tooth gear (05N23). See Table 1 for speed ranges.

D. How to Mount the Components

The following instructions apply when one of the suggested mounting arrangements is used. General mounting requirements for individual equipment items, however, will apply to any arrangement selected.
1. **Wire Feed Unit and Wire Reel.** The wire reel must be mounted so that the wire feeds into the inlet wire guide from the coil, in a straight line from the outside diameter of the coil. See Figures 1, 2, and 3. This will prevent the feeding wire from bending and placing unnecessary strain on the feed motor, or slipping between the feed rolls. If one of the suggested mounting arrangements and brackets are used, this positioning already is provided for by the mounting hole positions. **NOTE:** The mounting brackets suggested in this booklet cannot be used with 9-inch disposable spools. When these spools are used, a special mounting bracket must be provided so that wire will feed in a straight line from the outside diameter of the spool. The arrangement shown in Fig. 4 is recommended for welding aluminum.

2. **‘J’ Governor.** The governor can be mounted in a variety of ways to suit the operator. A suitable mounting bracket can be fabricated as discussed in Section I-A. The governor cabinet also can be made self-supporting by drilling proper holes and attaching it directly to the apparatus or other support with standard hardware.

The governor should be installed in a position which provides sufficient clearance at its front to permit easy removal of the chassis for servicing. The front panel and chassis are removable as a unit. Withdrawing the seven panel mounting screws permits the unit to be lifted upward, then pulled forward out of the cabinet. The required clearance for this should be available, and the power cable which supplies the governor should have sufficient extra length to permit complete withdrawal of the unit. Do not install the governor in a position where it will be subjected to excessive heat or moisture.

Mounting brackets obtained on special order from Linde include mounting hardware.

For further information about care and handling of the governor, refer to Instruction Booklet, F-12-557 entitled “Instructions for ‘J’ Governor.”

3. **Torch Adjustment Assembly.** Mount the torch adjustment assembly on the bracket as shown in Figures 1, 2, or 3.

4. **Clamp Assembly** (see Fig. 5) used with Attachment (39V38). Slide the plug on the rack and tube assembly into the rack clamp provided on the upper end of the clamp assembly. Tighten the clamp.

5. **Bracket Assembly** (see Fig. 6) used with Wire Guide Attachment (40V71). Slide the plug on the rack and tube assembly into the rack clamp provided on the upper end of the bracket and then tighten the clamp.

6. **Rack and Tube Assembly.** Slide the rack into the torch adjustment assembly until it meshes with the pinion. Adjust to the desired position with the vertical adjustment knob.

7. **HW-27 Machine Torch** (see Figs. 5 and 6). Fasten the torch in the clamp or bracket assembly with the torch clamp. For complete directions on how to set up the torch for operation, refer to Instruction Booklet, F-11-332, “Instructions for HW-27 Tig Welding Torch.”

8. **Wire Guide Attachment, 39V38** (see Fig. 5). Slide the shank of the wire guide attachment into the wire guide clamp provided on the lower end of the clamp assembly. Tighten the clamp.

9. **Wire Guide Attachment, 40V71** (see Fig. 6). For complete installation and operating instructions, refer to F-9932 “Instructions for Wire Guide Attachment, Part No. 40V71.”

10. **Flow Switch.** For complete installation and operating instructions, refer to Instruction Booklet, F-9748, “Instructions for Torch Savers I and II.”

**E. Installing Wire Feeder Parts**

An outlet guide, conduit, liner, guide tip, and feed roll are required for a given wire size and type. Always be sure that the size on the guide and feed roll matches that of the wire to be used. (See Table 4.)

1. **To install the outlet guide.** (See Figure 13). Loosen the wing screw and press the guide into the feed roll assembly until the notch in the guide is over the retaining bar. Then tighten the wing screw. When using a 3-piece outlet guide, install the proper size insert and tip to the guide.

2. **To install the feed roll.** (See Figure 13). Place the key 04N09 in the key slot of the shaft and slide the feed roll onto the shaft so that it engages the key. Then slide the spacer 04N14 on the shaft. Screw on the elastic stop nut last and tighten it.

3. **To install the conduit and liner.** A nylon liner is used with the flexible conduit for most wire sizes and types. Accordingly, follow the proper installation procedure below.

When Using a Lined Conduit:

a. Check the location of the locking nut on the liner’s threaded end. The unit should be 1/8-in. from the threaded end.

b. Feed the liner, unthreaded end first, through the conduit stopping when the locking nut is recessed within the conduit end fitting.

c. Assemble the appropriate outlet guide into the conduit end fitting.

d. If wire guide attachment 39V38 is used, cut the plain end of the liner flush with the conduit fitting.

If wire guide attachment 40V71 is used, the conduit liner extends through the wire guide on the attachment. Thread the exposed end of the liner through the wire guide and cut the liner flush with the end of the guide.

When Using an Unlined Conduit:

a. Screw the outlet guide into the conduit and fitting.

b. Attach the conduit and outlet guide to the wire feed unit. Then connect the conduit attaching nut to the wire guide attachment.
Fig. 4 - Recommended Mounting for Welding Aluminum

Fig. 5 - Clamp Assembly, Showing Torch and Wire Guide Attachment (39V38) Mountings

Fig. 6 - Bracket Assembly, Showing Torch and Wire Guide Attachment (40V71) Mountings
4. Screw the appropriate size wire guide tip into the block on the wire guide attachment.

F. Hose Arrangements

1. Connect the water and argon hose to the HW-27 Torch as directed in Instruction Booklet, F-11-332.

2. Connect one of the accessory 1/4-in. water hose assemblies (40V83 or 41V08) to the water-cooled block on the wire guide attachment. Connect the other end of the hose assembly to the water supply line, using one of the adaptors (11N16), if necessary.

3. Connect the second accessory water hose assembly to the water-cooled block on the wire guide attachment. Connect the other end of the hose assembly to the water drain, using one of the adaptors (11N16), if necessary.

G. Electrical Connections

Two electrical connections must be made to furnish power to the Wire Feeder. (1) The wire feed motor must be connected to the ‘J’ governor from which it obtains its power supply. (2) The ‘J’ governor must be connected to a 115 volt 50-60 cycle a.c. power source of good regulation. A 3-cond. cable is required (such as Linde Part No. 300089) for this connection except if an external start switch is used in which case a 4-cond. cable is required.

The two electrical connections are made to a terminal strip located inside the governor cabinet. The cables enter the cabinet through the strain relief bushings. Refer to the schematic diagram, F-12-557, to make these connections.

H. Installing Welding Wire

As supplied, the wire reel is assembled with brake spring (28Z64) and 1/2-inch plain steel washer. For the majority of Tig welding operations, it will be found desirable to replace this spring and washer with the lighter spring (92W12) and its companion guide washer (18N26) which are supplied in a cloth bag tied to the reel.

To install a coil of wire on a reel, follow this procedure:

1. Loosen the four thumbnuts which hold the fingers on the studs. As illustrated in Figure 14, each of these fingers actually consists of two fingers offset by 120-degrees and approximately 1-inch apart. This finger design permits quick and easy accommodation of different coil widths by simply rotating from one finger to the other. As supplied, the fingers are assembled on the reel with their pins in position No. 1 for use with standard coils 3, 3-1/4, and 4-inches wide, as well as out-of-tolerance coil widths up to 4-5/8 inches. If coils 2 inches wide are to be used, remove the pin from position No. 1 and install it in position No. 2.

2. Turn the fingers toward the center hub of the reel and adjust the thumbnuts so as not to interfere with the mounting of the coil.

3. Remove the coil of wire from its package, but do not remove the binding wires.

4. If one of the recommended mounting arrangements is used (Figure 1, 2, or 3), mount the coil so that the wire will be pulled by the feed roll from the low side of the reel.

5. Turn the reel fingers outward so that the proper finger holds the coil in place and then tighten the thumbnuts.

6. Cut off the tie-wires and any kinked wire. Round off the end of the wire with a file to prevent damage to the wire feeding equipment.

7. Loosen the brake screw in the center of the reel hub, then tighten it just enough to prevent coasting of the reel when wire is drawn from it. Too much pressure will load the wire feed motor unnecessarily. Too little pressure will permit the reel to over-run, causing the wire to kink and tangle.

8. Insert the free end of the wire through the inlet wire guide and feed roll, and through the outlet wire guide.

NOTE: The cotter pin, which fits into one of the group of three holes in the face of the feed block (under the pressure adjusting screw) should be inserted into the correct hole for the size and type of wire to be used (see Section III-B and Figure 13).

9. With the pin inserted in the proper hole, turn the pressure-adjusting screw in until it stops against the pin. The wire is now ready to be fed into the flexible conduit. (See Section II-A for “Wire Feed into the Wire Guide Tip.”)

II. OPERATING INSTRUCTIONS

A. Preparing to Weld

1. ‘J’ Governor Settings

The following instructions apply only when no control devices, except an external start switch, have been added to those already present on the basic Wire Feeder components described under “Equipment Required.” If control devices are added, the instructions must be revised to include them.

a. Turn the Forward/Reverse switch to the center “OFF” position.

b. Turn the speed control knob to midscale. (This is only an arbitrary wire speed setting and will be changed to suit welding conditions when welding begins.)

c. Set the Start/Stop switch in the “Stop/Auto” position.

d. Turn the main power switch to the “ON” position. The pilot light will come on if power is reaching the governor.

e. If an external remote start switch is used to energize the wire feed motor, connect it between TB2-8 and
TB2-10 as shown in the schematic diagram, 'J' Gov.
Book F-12-557.

2. Travel Carriage
Refer to the appropriate Instruction Booklet for complete operating instructions:
CM-45 Machine Carriage ............... F-9253
OM-48 Side-Beam Carriage ............... F-12-520
CM-37 Machine Carriage ............... F-9119

3. HW-27 Torch
Refer to Instruction Booklet, F-11-332, for instructions on how to set up the torch for operation.

4. Feeding Wire into the Wire Guide Tip
With welding wire in the feed roll and the switches set for operation, wire can be fed through the flexible conduit into the wire guide tip by using the Start/Stop switch. Turn the Start/Stop switch to the "OFF" position when the wire extends about 1/2-in. beyond the end of the guide tip.

If the wire does not feed readily into the conduit when the Start/Stop switch is turned to the "Start" position, (check Fwd/Rev switch; be sure it is set in the "Fwd" position) disconnect the conduit from the wire feed mechanism, run a few inches of wire through the feed roll, then slide the conduit over the wire and reconnect it. WARNING: Make sure the welding current is turned off during this procedure.

5. Argon and Water Flow
For the recommended argon and water flows, refer to the Instruction Booklet, F-11-332, supplied with the torch.

B. The Welding Operation
The following operating instructions are general in nature. They are intended to assist in setting up trial welding conditions in a new installation, or in one being changed over to a new operation. Final welding conditions will be established by experience with individual job factors such as material thickness, how well the weld joint is fitted, type of weld back-up, efficiency of the work-holding fixture in maintaining joint alignment, etc.

1. Initial Welding Conditions
Plate thicknesses within the operating capacity of the Wire Feeder require no plate edge preparation. Only simple square-groove, butt joints are used.

Sample operating data for welding of 1/16-, .040- and .037-inch thick plate are given in Table 2. In general, the filler wire diameter should be approximately equal to the plate thickness. Rate of wire feed* should not be less than 10 ipm. If wire diameter is approximately equal to plate thickness and wire feed speed is equal approximately to welding speed, then weld reinforcement proportions will be approximately as shown in sketch in Table 2. An initial welding speed of 35-40 ipm is recommended.

Table 3 gives preliminary equipment adjustments and discusses operating factors.

Make a few sample welds on scrap plate to establish final welding condition values before proceeding to production work. Specific job consumption of filler wire metal will be determined by welding speed, joint opening, reinforcement desired, etc.

III. MAINTENANCE

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

A. "J"-Governor
WARNING: Before removing front panel, make sure that all primary power is de-energized (OFF).

1. Removal of Governor Chassis:
To remove the governor, remove the seven screws from the front panel of the governor. Withdraw the panel, to which the chassis is attached. There should be enough slack in the connecting leads to permit removal for servicing without disconnecting them.

2. Fuse:
A 3.2 Amp. Slo-Blo fuse is used in the "J" governor, with fuse holder mounted in the front panel. Under no circumstances should a larger fuse, or fuse of different type, be used. Repeated blowing of fuse is usually caused by overloading of motor.

![Diagram of Gear Reduction Unit]

*The governor speed indicator dial is divided into even divisions from 0 to 10. This is only an arbitrary scale and does not indicate wire feed speed in inches per minute. If readings in ipm are desired, measure the length of wire delivered in 15 seconds for several speed control knob settings. Multiply the length by four to obtain a reading in ipm. Record the meter reading for each setting for future reference.
B. Wire Feed Unit

1. Motor and Gear Unit Assembly
   a. Lubrication

   The gear reduction housing used in the wire feeder should be packed with approximately seven ounces of well-stirred Texaco Regal Starfak grease as indicated by the cross-hatched areas in the drawing on page 8. The level of the grease should be even with the center of the output shaft when viewed from the motor end of the housing.

   The vent plug must be placed at the highest point on the housing to prevent grease leakage. A free air passage must extend through the body of the grease to the vent plug. When the vent plug is at position A, no supplemental air passage is required. When the gear unit requires special mounting, it may be necessary to relocate the vent plug to prevent grease leakage.

b. Motor Brush Replacement (see Fig. 11)

   Unscrew the brush plugs. Withdraw the metal disc and the brush and spring assembly, noting the position of each brush in its holder so that it can be replaced in its original position. Examine the brushes. Make sure that each brush surface in contact with the motor commutator has the polished finish that

---

Table 2 - Sample Welding Conditions

<table>
<thead>
<tr>
<th>Plate Thickness (T), in.</th>
<th>Weld Speed, ipm</th>
<th>Weld Wire Diameter, in.</th>
<th>Approximate Welding Current, amps</th>
<th>Tungsten Electrode Diameter, in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.037 Carbon Steel, DCSP</td>
<td>30</td>
<td>1/16</td>
<td>170-190</td>
<td>3/32</td>
</tr>
<tr>
<td>1/16 Carbon Steel, DCSP</td>
<td>35</td>
<td>1/16</td>
<td>190-215</td>
<td>3/32</td>
</tr>
<tr>
<td>0.040 Aluminum, ACHF</td>
<td>44</td>
<td>1/16</td>
<td>205-220</td>
<td>3/32</td>
</tr>
</tbody>
</table>

Fig. 7 - Filler Wire Height Adjustments

---

WELD REINFORCEMENT PROPORTIONS
indicates good contact. The polished area should cover essentially all of the contacting surface of the brush. With brushes removed, inspect the surface of the commutator. It should appear clean and smooth, with a polished brown color where the brushes ride it. If the surface appears to be rough, disassemble the motor and remove the armature (see Disassembly section). Polish the commutator surface with No. 00 sandpaper. Preferably the armature should be rotated in a lathe for this operation.

**CAUTION:** Never use emery cloth or an emery stone for this operation. Emery is a conductor of electricity,

<table>
<thead>
<tr>
<th>Operating Factor</th>
<th>How to Adjust</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Height of wire above weld.</td>
<td>Just touching plate. (Refer to Fig. 7b.)</td>
<td>To adjust wire only, loosen the clamp and slide shank of wire guide attachment up or down to desired adjustment. If too high, wire melts in arc, welding action is erratic. “Stitching” occurs. If too low, wire touches plate, bends, and lays flat a short distance before puddle. “Freezes” to work at end of weld or when current is interrupted.</td>
</tr>
<tr>
<td>2. Angle between wire and electrode.</td>
<td>75-deg. for starting conditions. (See Fig. 7b.)</td>
<td>Turn adjusting screw on wire guide attachment clockwise to increase angle, counter-clockwise to decrease angle. Can be varied slightly depending on arc length and wire height adjustment.</td>
</tr>
<tr>
<td>3. Lateral position of wire</td>
<td>Directly over joint, in line with electrode.</td>
<td>Pivot adjustment knob on torch adjustment assembly. Max. adjustment: 1/2-in. to either side. On attachment 40V71, use horizontal adjustment knob for up to 1/8 in. If too far off line of joint, fused filler wire piled up to one side of joint. Poor penetration and low weld strength.</td>
</tr>
<tr>
<td>4. Length of arc.</td>
<td>For starting conditions, use distance of one filler wire diameter between electrode and wire tip, 1/2 dia. (Wire previously positioned as in Steps 1, 2, 3.) See Fig. 7b.</td>
<td>Torch Adjustment Assembly vertically adjustment knob. On Attachment 40V71, use vertical adj. knob. Arc length too long, unstable arc, weld not continuous. Arc length too short, electrode fouling with metal at start and finish of weld, where puddle builds up.</td>
</tr>
<tr>
<td>5. Welding speed.</td>
<td>36-40 ipm for starting conditions.</td>
<td>Wire Feeder Machine Carriage control or work carriage control. Speed too high, low reinforcement or concave weld surface, low penetration. Speed too low, reinforcement too high.</td>
</tr>
<tr>
<td>6. Rate of wire feed.</td>
<td>For starting conditions, use wire feed rate equal to carriage speed (ipm).</td>
<td>Speed control knob on governor panel. Feed rate too high, spattering, fouling of electrode, filler wire piling up. Correct feed rate, smooth welding action, free of spattering, smooth weld surface. Feed rate too low, uneven weld contour, spattering, filler wire melting back in drops.</td>
</tr>
</tbody>
</table>
and any residual loose particles may short-circuit the commutator segments during operation of the motor.

See that the mica strips between the commutator segments do not extend above the segments. If this condition exists, the excess mica must be removed by slightly undercutting the strips.

When replacing a brush in the motor, be sure to put it back in the same bush holder, and in its original position. Be sure also that the brush rides freely in its holder.

New brushes are approximately 3/4-in. long. When they have worn down to about 1/2-in. in length, they should be replaced with new ones.

Replacement of brushes and commutator maintenance should be performed only by an experienced electrician.

2. Feed Roll Assembly
   a. Pressure Roll Adjustment
      (See Figure 13.) A spring-loaded arm applies pressure to the pressure roll. The pressure is adjusted turning the pressure-adjusting screw (38V04).

      A cotter pin is inserted into one of three holes in the side of the feed block under the pressure-adjusting screw to serve as a stop for the pressure-adjusting screw. The top hole is marked “A”, the center hole “C,” and the lower hole “S.” For operation with 1/16-in. diameter aluminum wire, or for wires of 1/32-in. diameter regardless of the composition, insert the pin in hole “A.” For 3/64-in. and 1/16-in. diameter wires of compositions other than aluminum, insert the pin into hole “C.” After inserting the pin into the proper hole turn the adjusting screw down until it stops against the pin.

   b. Feed Roll
      (i) Make certain that the feed roll is the correct size (stamped on the roll) for the wire being used.
      (ii) See that the groove is clean. Scrape out any accumulation of wire metal in the groove, and be careful not to deform the groove itself.
      (iii) Make sure that the groove is lined up with the wire guide so that the wire will feed properly through the guides.

   c. Wire Straightening Assembly (Optional)
      Hard drawn steel and other hard types of wire which come out of the drive unit in less than a 6-ft. arc can be straightened by use of the Wire Straightening Assembly (Part No. 34V74). This assembly is not required for aluminum, soft steel, or other soft wires. It straightens wire in one plane only, and is not intended to remove kinks. The use of this assembly will reduce wear in the flexible conduit and reduce the load on the motor.

C. Wire Reel
   If wire at the edges of the coil binds against the fingers and does not unwind freely, the wire may become kinked. The kinks will cause undue friction when they pass through the flexible conduit.

To prevent this trouble, reduce the brake spring pressure at the reel hub. The brake pressure, however, must be sufficient to prevent loosening of the wire coils due to coasting of the reel. The reel fingers should be set to hold the coil as lightly as possible without undue loosening of the wire coils.

IV. DISASSEMBLY AND TROUBLE-SHOOTING

A. Disassembly of Wire Feed Unit
(See Fig. 10.)

Do the disassembly work on a clean workbench away from dirt or moisture. First dismount the entire wire feed unit from the welding installation mounting. Remove the cover assembly (38V57). It is held on by 5 screws (6130-0902). Then dismount the motor-gear unit from the assembly mounting plate. It is held on by four screws (6134-0462) entering through the bottom of the mounting plate.

1. Gear Reduction Unit (See Fig. 12.)
   a. Withdraw the four screws which hold the gear reduction unit to the motor housing. The unit then can be lifted off. If the gasket seal (53W31) between the unit and the motor housing does not release easily, tapping the unit on several sides with a rawhide mallet will usually release it.
   b. Clean out the grease that fills the gear unit.
   c. Remove the gear (04N85) from the output shaft. See Figure 10. It is held on by a snap ring and is keyed to the shaft.
   d. Remove the gear backup ring (93W98).
   e. Loosen the two socket-head setscrews (6133-0908) in the hub of the worm gear.
   f. Unscrew the bearing cap (994200) from the housing. Remove the end thrust bearing.
   g. Slide the shaft (05N73) out through the bearing opening, removing the worm gear (52W68) and washer (93W95) as the shaft leaves the housing. Be careful not to damage the two shaft bushings or the seal. (These are press-fitted and remain in the housing.)
   h. To reassemble, slide the shaft back into the bearing opening. Slide the worm gear and washer on over the end as the shaft enters the housing. (The gear hub faces away from the output end of the shaft.) Tighten the gear hub setscrews into the drilled spots on the shaft.
   i. Replace the end-bearing parts. If they have become separated, proceed as follows: Place the flat spring (994201), then the thrust bearing (994202) in the cap (994200) and the gasket (53W73) over the threads against the cap head. Then screw the cap into the housing.
   j. Replace the backup ring (93W98) and drive gear on the output end of the shaft.
   k. Fill the gear unit with Texaco Regal Starfak grease. See Section III-B.
   l. Assemble the gear reduction unit to the motor in its original position.
m. Mount the unit on the base plate using the four screws previously removed. Replace the cover assembly (38V57).

2. Electric Motor
   a. Remove the gear reduction unit as previously described.
   b. Remove the motor brush plugs and brushes. (Replace with new brushes if required.)
   c. Unscrew the two motor housing screws (56W24) as shown in Figure 11.
   d. Withdraw the motor end housing.
   e. Withdraw the armature.
   f. Further disassembly of the motor is as shown in Figure 11.

B. Troubleshooting

The following is intended to help locate causes of trouble by examination or simple mechanical tests. Where further search is required, a simple method is to check the motor armature current under various conditions. This method is particularly valuable in cases where fuses blow frequently, where it appears the motor is not delivering proper power or is overloaded, or where it is suspected that something is electrically wrong with the motor or ‘J’ governor. When difficulty is encountered with the torch, refer to the Instruction Booklet supplied with the torch (F-11-332) for possible causes.

A. SYMPTOM: Governor fuse blows frequently.
   CAUTION: Do not use oversized fuse to overcome tendency for fuse to blow; instead trace out and correct the cause of overloading.
   1. Fuse may be incorrect type. Use only Littelfuse “Slo-Blo” Type, 3.2-ampere, Catalog No. 313032. (See Section II-A.)
   2. Wire may be binding, or not feeding freely from the wire reel.

B. SYMPTOM: Wire does not feed or feeds intermittently.
   1. Feed roll may not be gripping properly (see Item C).
   2. Wire may not be feeding freely from the reel (see Item D).
   3. Wire may be binding in the flexible conduit or torch (see Item E).
   4. Feed roll may not be rotating or may be rotating intermittently (see Item F).

C. SYMPTOM: Feed roll rotates steadily but wire does not feed, or feeds intermittently.
   1. Pressure roll pressure may be insufficient (see Section III-B, paragraph 2a).
   2. Wire may not be feeding freely (see Item D).
   3. Wire may be binding in the flexible conduit (see Item E).
   4. Wire guide or feed roll may be too large a size for the wire being used.

D. SYMPTOM: Wire does not feed freely from the reel.
   1. The adjusting screw at the reel hub may be too tight. Adjust for moderate friction.
   2. The fingers may be drawn too tightly against the spool, causing binding on the outside coils. Loosen the thumbnails to relieve pressure on the side of the coil.

E. SYMPTOM: Wire is binding in the flexible conduit or outlet guide block.
   1. Determine if binding is in the outlet guide block or conduit by feeding wire through the conduit with the conduit disconnected from the outlet guide block. Be sure that welding current is off.
   2. Flexible conduit may be bent too sharply.
   3. Wire may be kinked as it leaves the reel (see Item D).
   4. Wire may be deformed as it leaves feedroll.
   5. See that correct size guides and feed rolls are installed for the wire size being used.
   6. Inner surfaces of flexible conduit may be excessively worn.

F. SYMPTOM: Feed roll does not rotate or rotates intermittently.
   1. Gearing in motor head may be worn or binding.
   2. There may be a blown fuse in the governor cabinet.
   3. There may not be power to the ‘J’ governor cabinet.
   5. The motor brushes may need replacing.
   6. The motor armature may be burned out.
   7. The ‘J’ governor may require service.

G. SYMPTOM: Welding wire buckles at the second guide.
   1. 3/32-in. guides may have been used for 1/16-in. welding wire.
   2. End of wire may be welded to end of wire guide tip.

H. SYMPTOM: Aluminum wire metal builds up in feed roll groove.
   1. Feed roll is slipping on the wire because of stoppage or binding of the wire, or because of insufficient pressure on the pressure roll. See Section III-B, Para. 2.

I. SYMPTOM: 1/16-in. aluminum wire winds around the feed roll, filling the vee groove.
   1. Pressure of the pressure roll is excessive for the 1/16-in. size aluminum wire. See Section III-B.


LIST OF MOUNTING HARDWARE FOR SUGGESTED TIG COLD WIRE FEEDER SETUP

A. For Wire Feeder Mounted on CM-37 Carriage (See Fig. 8)

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>No. Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold Main Bracket on CM-37</td>
<td>5/16-in. -18 x 3/4-in. Hex Socket-Head Cap Screws, Stl.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>5/16-in. x 1/8-in. x 1/16-in. Lock Washers, Stl.</td>
<td>5</td>
</tr>
<tr>
<td>Hold Governor on Main Bracket</td>
<td>5/16-in. -18 x 1-in. Hex Socket-Head Cap Screws, Stl.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5/16-in. S.A.E. Washers, Plain, Stl.</td>
<td>4</td>
</tr>
<tr>
<td>Hold Wire Feeder on Main Bracket</td>
<td>5/16-in. -18 x 3/4-in. Flat-Head Machine Screws, Stl.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5/16-in. -18 x 1-in. Hex-Head Cap Screws, Stl.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5/16-in. S.A.E. Washer Plain, Stl.</td>
<td>2</td>
</tr>
</tbody>
</table>

B. For Wire Feeder Mounted on OM-48 Carriage (See Fig. 9)

**BRACKET MATERIALS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>No. Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torch Adj. Assem. Bracket (Item 2)</td>
<td>3/8-in. x 4-in. x 4-in. Steel Plate</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3-in. x 3-in. Structural Tee, 4-3/4-in. Long</td>
<td>1</td>
</tr>
<tr>
<td>Governor Brackets (Item 3)</td>
<td>1/4-in. x 1-in. x 16-1/2-in. Steel Strip</td>
<td>2</td>
</tr>
<tr>
<td>Main Mounting Plate (Item 1)</td>
<td>5/16-in. x 17-in. x 24-in. Steel Plate</td>
<td>1</td>
</tr>
</tbody>
</table>

**HARDWARE REQUIRED**

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>No. Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold Main Plate to OM-48 Carriage</td>
<td>1/2-in. -13 x 1-1/2-in. Hex Socket-Head Cap Screws, Stl.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1/2-in. -13 Hex Nuts, Stl.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1/2-in. x 1/8-in. x 1/16-in. Lock Washers, Stl.</td>
<td>4</td>
</tr>
<tr>
<td>Hold Torch Holder Bracket to Main Plate</td>
<td>5/16-in. -18 x 3/4-in. Hex-Head Cap Screws</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5/16-in. Steel S.A.E. Washers, Plain</td>
<td>4</td>
</tr>
<tr>
<td>Hold Wire Feeder to Main Plate</td>
<td>5/16-in. -18 x 3/4-in. Flat-Head Machine Screws</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5/16-in. Steel S.A.E. Washers, Plain</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5/16-in. -18 x 1-in. Hex-Head Cap Screws, Stl.</td>
<td>2</td>
</tr>
<tr>
<td>Hold Governor and Brackets to Main Plate</td>
<td>5/16-in. -18 x 7/8-in. Hex Socket-Head Cap Screws, Stl.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5/16-in. -18 Hex Nuts</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5/16-in. Steel S.A.E. Washers</td>
<td>4</td>
</tr>
</tbody>
</table>
Fig. 8a - Construction Details of Mounting Bracket
Fig. 8b - Details of Equipment Positioning

NOTE:—
TORCH ADJ. ASSEM.
MAY BE LOWERED 4".
BY USING ALTERNATE
MOUNTING HOLES.

Table:

<table>
<thead>
<tr>
<th>RACK LENGTH</th>
<th>LOWEST POINT OF TORCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot;</td>
<td>16 1/2&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>19 25/64&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
<td>24 1/4&quot;</td>
</tr>
</tbody>
</table>

Fig. 8 - Wire Feeder Mounted on CM-37 Machine Carriage — Details of Mounting Brackets and Equipment Installation
ITEM #1 MAIN MOUNTING PLATE
519507 (1 REQ.)

DRILL 4 HOLES 11/32" DIAM.
ITEM #2 TORCH ADJ. ASSEMBLY
BRACKET-519508
(1 REQ.)

FOR WIRE REEL
5/16-18 UNC-2B TAP THRU
(14 HOLES)

FOR GOVERNOR
3/8" DRILL THRU
& 11/16" DIA. CSINK
(FAR SIDE) (2 HOLES)

WELD 1/4" HDG. TEE

FOR TORCH ADJ.
ASSEMBLY
DRILL 4 HOLES &
TAP 3/8-16 UNC-2B
(SCREWS SUPPLIED
WITH TORCH ADJ.
ASSEMBLY) FINISH BRKT.
ENDS AFTER WELDING.

FOR WIRE FEEDER
2 25/32

FOR TORCH ADJ.
ASSEMB. BRACKET
9/16" DRILL THRU & 1" DIA. CSUNK
(NEAR SIDE) (4 HOLES)

ITEM #3 BRACKET
493424 (2 REQ.)

5/16-18 UNC-2B TAP THRU
(2 HOLES)

11/32" DRILL THRU
(2 HOLES)

ITEM #4 SPACER
38NO3 (4 REQ.)

630" DIA.
625"

1/4"
1/8" 0.125

9.362"
16.175"
6"

6"
3/4" 0.75"

1/4" 0.25"

Fig. 9a - Construction Details of Mounting Plate and Brackets
V. REPLACEMENT PARTS DATA

1. Replacement parts are keyed on the illustrations which follow. Order replacement parts by part number and part name, as shown on illustrations. DO NOT ORDER BY PART NUMBER ALONE.

2. Many of the parts on the illustrations, particularly electronic parts, are 'vendor items'. This means that they are standard commercial parts made by and purchased from other manufacturers. If you order from these outside sources, use the manufacturer's part number.

3. Always state the series or serial number of the machine on which the parts are to be used. The serial number is stamped on the unit nameplate.

4. Indicate any special shipping instructions.

5. Order replacement parts from the Linde office or distributor nearest you.

<table>
<thead>
<tr>
<th>Wire Size, in.</th>
<th>Wire Type</th>
<th>.035</th>
<th>.045</th>
<th>1/16</th>
<th>1/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Type</td>
<td></td>
<td>3/64</td>
<td>II, III, IV, V</td>
<td>II, III, IV, V</td>
<td>II, III, IV, V</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>I</td>
<td></td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>V-Groove Feed Roll</td>
<td>49N30</td>
<td>08N07</td>
<td>49N32</td>
<td>04N12</td>
<td>04N12</td>
</tr>
<tr>
<td>Outlet Guide</td>
<td>12N21</td>
<td>05N56</td>
<td>05N56</td>
<td>04N21</td>
<td>04N19</td>
</tr>
<tr>
<td>Outlet Guide Insert</td>
<td>55N14</td>
<td>05N57</td>
<td>05N57</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Outlet Guide Tip</td>
<td>47N05</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Conduit, 44-in.</td>
<td>38V89</td>
<td>38V89</td>
<td>38V89</td>
<td>39V80</td>
<td>38V86</td>
</tr>
<tr>
<td>Conduit, 6-ft. †</td>
<td>40V01</td>
<td>40V01</td>
<td>40V01</td>
<td>39V83</td>
<td>39V99</td>
</tr>
<tr>
<td>Conduit Liner, 44-in.</td>
<td>12N72</td>
<td>12N72</td>
<td>12N72</td>
<td>12N73</td>
<td>--</td>
</tr>
<tr>
<td>Conduit Liner, 6-ft.</td>
<td>38V83</td>
<td>38V83</td>
<td>38V83</td>
<td>39V85</td>
<td>--</td>
</tr>
</tbody>
</table>

† When using 6-ft. conduits (39V99, 40V01, and 39V83) it is advisable to brace or support the conduit to reduce tension in the attachment.

Table 5 - Wire Guides and Tips

<table>
<thead>
<tr>
<th>Wire Size-in.</th>
<th>Wire Group†</th>
<th>For Wire Guide Attachment 40V71 Only</th>
<th>Wire Guide Tips for 39V38 Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>.035</td>
<td>II, III, IV, V</td>
<td>Wire Guide</td>
<td>Wire Guide Tip</td>
</tr>
<tr>
<td>3/64 (.045)</td>
<td>All</td>
<td>10N96</td>
<td>54N88</td>
</tr>
<tr>
<td>1/16</td>
<td>I</td>
<td>10N96</td>
<td>54N89</td>
</tr>
<tr>
<td>1/16</td>
<td>II, III, IV, V</td>
<td>10N95</td>
<td>54N90</td>
</tr>
</tbody>
</table>

† Group I - Aluminum & Magnesium wires.
Group II - Copper-base alloys.
Group III - Heat and corrosion resistant alloys.
Group IV - Copper-coated carbon steel.
Group V - Bare low alloy steel.
Fig. 10 - Wire Feed Unit — Part No. 40V25
Fig. 11 - EH-9 Permanent Magnet Motor Assembly – Part No. 995411

Fig. 12 - Gear Reduction Unit – Part No. 994178
Fig. 13 - Feed Roll Assembly – 40V97

Fig. 14 - Wire Reel Assembly (Spoke-Type) – 19V89
Fig. 15 - Torch Holder Assembly – 40V26

Fig. 16 - Dimensional Drawing of Wire Guide Attachment – 39V38
Fig. 17 - Wire Guide Attachment – 39V38

Fig. 18 - Rack and Tube Assembly – 39V34 (8’’)
39V35 (12’’)
39V36 (16’’)

Fig. 19 - Clamp Assembly – 39V37
### VENDOR ITEMS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>26N14</td>
<td>Switch — Cutler Hammer Cat. No. 8906-K650 (WD7717144)</td>
<td>97W48</td>
<td>Relay — Potter and Brumfield Cat. No. PR-11AY, 115 v AC Coil</td>
</tr>
<tr>
<td>82W43</td>
<td>Fuse — Littelfuse Inc. 3 A.G. Rating 1 Amp. — Glass Tube Type</td>
<td>98W66</td>
<td>Switch — Hetherington Inc., 24 Volts D.C. 17 Amps. Single Pole-Double Throw Type — C41006</td>
</tr>
<tr>
<td>84W80</td>
<td>Ring — Ramsey Corp. “Spirolox” No. RS-50 External</td>
<td>17135316</td>
<td>Resistor — I.R.C. Type GBT-1 16,000 Ohms, 5% Tol., 1 Watt</td>
</tr>
<tr>
<td>84W81</td>
<td>Ring — Waldes Tru Arc Cat. No. N.A.S. 5100-62</td>
<td>17135324</td>
<td>Resistor — I.R.C. Type GBT-1 24,000 Ohms, 1 Watt, 5% Tol.</td>
</tr>
<tr>
<td>92W16</td>
<td>Bearing — New Departure Cat. No. 88501, Type 8000</td>
<td>17135351</td>
<td>Resistor — I.R.C. Type GBT-1 51,000 Ohms, 5% Tol., 1 Watt</td>
</tr>
<tr>
<td>92W22</td>
<td>Ring — Waldes Tru Arc Snap Ring</td>
<td>17135375</td>
<td>Resistor — I.R.C. Type GBT-1 75,000 Ohms, 1 Watt, 5% Tol.</td>
</tr>
<tr>
<td>92W77</td>
<td>Speed Meter Indicator — Weston Electrical Model 1301 D.C. MA BAKELITE Case, Flushed Mtd.</td>
<td>17450005</td>
<td>Resistor — Ohmite, 5 OHM, 25 Watt, Cat. No. 0362</td>
</tr>
<tr>
<td>93W30</td>
<td>Switch — Cutler Hammer Cat. No. 8906K131 with built-in dust seal</td>
<td>181W85</td>
<td>Potentiometer — Clarostat Mfg. Co., Inc., Control No. 62 JA-100K, 100,000 Ohms, +/- 5%</td>
</tr>
<tr>
<td>93W98</td>
<td>Ring — Waldes Tru Arc No. 5100-50 Retaining Ring</td>
<td>181W87</td>
<td>Dial — Spectrol Electronics Corp., Spectrol Multidial Model 30</td>
</tr>
<tr>
<td>93W99</td>
<td>Oil Seal — Dumore Co. No. R700-0011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96W70</td>
<td>Hex Nut — Esna Corp. 5/16-18 Cat. No. 21E-058 (Lightweight)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HARDWARE

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6110-1848</td>
<td>No. 6-32 x 3/16 in. Lg. Round Head Brass Machine Screw</td>
<td>6134-0361</td>
<td>5/16” x 3/4” Lg. Hex Socket Head Steel Cap Screw</td>
</tr>
<tr>
<td>6130-0880</td>
<td>No. 8-32 x 1/2-in. Lg. Fillister Head Machine Screw</td>
<td>6134-0462</td>
<td>1/4-in. -28 x 3/4-in. Lg. Socket Head Cap Screw</td>
</tr>
<tr>
<td>6130-0932</td>
<td>No. 10-24 x 5/8-in. Lg. Round-Head Machine Screw</td>
<td>6134-1182</td>
<td>1/2-in. -20 x 2-in. Lg. Hex Head Cap Screw</td>
</tr>
<tr>
<td>6130-3851</td>
<td>No. 6-32 x 3/8-in. Lg. Flat Head Machine Screw</td>
<td>6134-4088</td>
<td>1/4-in. -20 x 5/8-in. Lg. Socket Flat Head Cap Screw</td>
</tr>
<tr>
<td>6130-3876</td>
<td>No. 8-32 x 3/8-in. Lg. Flat Head Machine Screw</td>
<td>6134-4418</td>
<td>3/8-in. -16 x 2-1/4-in. Lg. Socket Flat Head Cap Screw</td>
</tr>
<tr>
<td>6133-0908</td>
<td>No. 10-32 x 1/4-in. Lg. Socket Headless Cup Point Setscrew</td>
<td>6135-3903</td>
<td>No. 10-24 x 5/8-in. Lg. Parker-Kalon (Type S) Steel Screw</td>
</tr>
<tr>
<td>6133-4960</td>
<td>No. 4-40 x 3/16-in. Lg. Flat Point Socket Head Setscrew</td>
<td>6235-0081</td>
<td>.250” Dia. x 2” Lg. Steel Roll Pin</td>
</tr>
<tr>
<td>6134-0113</td>
<td>5/32” x 1” Lg. Socket Head Steel Cap Screw</td>
<td>6235-0824</td>
<td>3/16” Dia. x 5/8-in” Lg. ESNA Roll Pin No. 52-040-187-0625</td>
</tr>
<tr>
<td>6134-0166</td>
<td>5/16-in. -18 x 1-3/4-in. Socket Head Cap Screw</td>
<td>6330-0121</td>
<td>Nut — 5/16-in.-18 Hex Steel Nut</td>
</tr>
<tr>
<td>6134-0174</td>
<td>5/16-in. -18 x 1/4-in. Lg. Socket Head Cap Screw</td>
<td>6339-8072</td>
<td>Wing Nut, Parker Kalon 1/2”-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6430-2110</td>
<td>5/16” A.S.A. Steel Lock Washer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6430-4125</td>
<td>3/8-in. Steel Washer (Black)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6430-4175</td>
<td>1/2” S.A.E. Plain Steel Washer</td>
</tr>
</tbody>
</table>
IMPORTANT CHANGE
TO
EH-9 MOTOR ASSEMBLY

The EH-9 Motor Assembly, P/N 995411, previously used in these units has been replaced (in May 1984) by an updated version identified by P/N 18340 and shown below. The new EH-9 is easily recognized by its square-end motor housing and its specifications are the same as the old version.

REPLACEMENT PARTS
Carbon Brush P/N 999708
Brush Holder P/N 679355
Brush Plug P/N 999707

SINGLE TOOTH
24 PITCH
20° PRESS ANGLE
84° - 2° HELIX ANGLE
RH SPIRAL

EH-9 Motor Assy. P/N 18340