INSTRUCTIONS for the UNIONMELT Trade-Mark

"UE" and "US" WELDING HEADS

INCLUDES REPLACEMENT PARTS INFORMATION

"UE" and "US" WELDING HEADS

FORM 9213-C

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Please be sure this information reaches the operator. You can get extra copies through any Linde office.
The purpose of this booklet is to present the information you need to set up, operate, and maintain the UNIONMELT "UE" or "US" Welding Head in the proper manner. It is not concerned with welding techniques or procedures.

In UNIONMELT welding, the greatest degree of process flexibility and versatility can be gained only through proper selection and use of the many items of available equipment. For your convenience, this booklet describes much of the accessory equipment as well as the Welding Heads. It explains in detail the steps to be followed in assembling the various components. Some of the instructions may not be pertinent to your particular installation, but we have purposely made this booklet all-inclusive, to cover as many types as possible.

SAFETY PRECAUTIONS

As in all electric welding apparatus, there are certain exposed parts of UNIONMELT welding installations at the welding voltage potential. At times even the higher open circuit voltage may be present. Though this is never more than 115 volts, remember that it is the same as ordinary house-lighting voltage, with which the average person avoids all contact. Under conditions of low body resistance, such as when a person is perspiring and is in contact with a grounded steel plate, this voltage may force enough current through the body to be fatal. For this reason and because a shock, even though harmless in itself, may lead to other injuries due to the uncontrolled physical reaction, the operator should be aware of the live parts of the machine and follow safe operating procedures. See "Safety Precautions" on page 20.

FIG. 1 - Standard (45-degree) "Unionmelt" "UE" Welding Head

The terms "Linde," "Dxweld," and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.
I. INTRODUCTION

A. The Welding Head

The function of all UNIONMELT Welding Heads is to feed welding wire to the weld zone at a controlled rate. This is accomplished by an electric motor in the head which operates a feed roll through a gear reduction unit. The rate at which the wire is fed depends on the welding current and wire size used, and is regulated by means of a voltage control which supplies current to the motor. In brief, the voltage control either speeds up or slows down the wire feed motor when necessary to maintain the required constant distance between the end of the welding wire and the workpiece. You will find detailed descriptions of how this is done in booklets F-6622, "Instructions for the "UE" Electronic Voltage Control," and F-9414, "Instructions for the "US" Series Voltage Control."

Two welding heads are described in this booklet. The only difference between the heads is in the wire feed motors and gearing. The "UE" Head is designed for use with the UNIONMELT Electronic Voltage Control and is standard and double speed. The "US" Heads feed wire at approximately the same rate as standard and double speed "UE" Heads.

Figures 1 and 2 show the two heads. The busbar assembly hardware, nozzle assembly, and contact jaws illustrated in Figure 1 are also used with the head shown in Figure 2.

The standard UNIONMELT "UE" or "US" Welding Head consists essentially of five subassemblies. These are: (1) the wire feed motor and gear assembly, (2) the fixed gear housing assembly, (3) the movable gear housing assembly, (4) the busbar assembly, and (5) the unit support assembly. These five components come assembled as a complete unit ready for mounting. They function as follows:

The wire feed motor drives a reduction gear train in the fixed gear housing. This drives a reduction gear train in the movable gear housing. This second gear train connects directly to two shafts in the housing, on which are mounted two feed rolls, one above the other. It is these rolls which feed the welding wire to the welding zone. The force necessary for positive feed is provided by a spring-loaded pressure roll.

A straightening roll removes the bend from the wire and prevents kinking or jamming of the wire in the feed mechanism.

The movable gear housing assembly can be rotated in a vertical plane through an angle of 45 degrees, as indicated in Figures 1 and 2. This increases the flexibility of the welding heads by providing a greater number of possible welding positions.

The copper busbar assembly receives the welding current and transmits it, through a pair of copper contact jaws or a nozzle assembly, to the welding wire.

The support assembly provides a means for mounting the welding head. It also contains a worm and ring gear which permit the operator to rotate the head through 360 degrees about the motor axis by means of a tee wrench. An additional spiral gear assembly (Part No. 07V50) is available as an accessory. This assembly mounts on the unit support assembly and enables the operator to rotate the head while standing at the front or rear of the apparatus. This is a valuable feature when welding in close quarters.

A "90-degree 'UE' or 'US' Head" is identical to the standard heads just described, with the exception of the movable gear housing assembly. This housing assembly is so constructed that it can be rotated upward through 90 degrees, permitting the welding wire to emerge horizontally, when required. Special extensions can be used with this head as shown in Figure 3.

You can use this extension singly or in multiples of eighteen inches up to a maximum of fifteen feet. It permits you to weld in locations which cannot be reached with a standard welding head, such as interior welds in small-diameter pipe. Your standard head can easily be converted to the 90-degree head, when desired, by substitution of the movable gear housing assembly.

![FIG. 2 - Standard (45-degree) "Unionmelt" "US" Welding Head](image1)

![FIG. 3 - Busbar Extension For 90-degree "UE" Head](image2)
B. Where the Head is Used

Your welding head is designed for either stationary or portable mounting. In stationary installations, the head is mounted in a fixed position and the workpiece moves beneath it. LINDE does not make or sell stationary mountings, or the jigs necessary for supporting and moving the workpiece. Your LINDE representative can suggest names of manufacturers who have specialized in providing mounting equipment for welding heads. Figure 4 shows a stationary head setup for production welding of longitudinal seams in tubular sections.

For portable installations, the head may be mounted on the CM-37 UNIONMELT Machine Carriage. The assembly is designated for UE-37 or US-37 Portable Welding Machine. You will find specific instructions for assembling this machine in Section II of this booklet.

The “UE” Head feed motor is a 1/4 hp. motor which is used in conjunction with the “UE” Voltage Control.

The “US” Head feed motor is a 3/8 hp. motor which is used in conjunction with the “US” Voltage Control.

Both voltage controls work from a 115-volt a.c. 50 to 60-cycle line.

For precision shape or contour welding, either head can be mounted on the UNIONMELT WM-6 Contour Welding Carriage (shown in Figure 22). The “UE” or “US” Head may also be mounted on the OM-48 Machine Carriage. Typical OM-48 installations are shown in Figures 20 and 21.

C. Operating Features

The “UE” or “US” Welding Head has a maximum welding current capacity of 2,000 amperes, a.c. or d.c. The amount of welding current you will need for any welding operation is determined primarily by the thickness of the material being welded, but will seldom, if ever, be less than 200 amperes.

Using either head (with the necessary auxiliary equipment), you can do the welding jobs shown below in one pass. (Joints in heavy plate are welded using a multipass technique.) In addition, buildup and hard-surfacing operations can be done on flat, cylindrical, or irregular shaped surfaces.

<table>
<thead>
<tr>
<th>Wire Diameter</th>
<th>Welding Current* - Amperes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches</td>
<td>Standard (12 rpm)</td>
</tr>
<tr>
<td>3/32</td>
<td>250</td>
</tr>
<tr>
<td>1/8</td>
<td>425</td>
</tr>
<tr>
<td>5/32</td>
<td>675</td>
</tr>
<tr>
<td>3/16</td>
<td>950</td>
</tr>
<tr>
<td>1/4</td>
<td>1,400</td>
</tr>
<tr>
<td>5/16</td>
<td>2,000</td>
</tr>
</tbody>
</table>

* Minimum welding currents for each size of wire and gear train are about one-half the maximum indicated in the table. Use of welding voltage other than 32 volts will alter the ranges.

** Not recommended.

With Proper Contact Nozzle

<table>
<thead>
<tr>
<th>Welds</th>
<th>With Jaws</th>
<th>18-gage sheet to 1-1/4-in. plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butt Welds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug Welds</td>
<td>1/4-in. to 1-1/2-in. plate</td>
<td></td>
</tr>
<tr>
<td>Positioned Fillet Welds</td>
<td>1/8-in. to 1-1/2-in. legs</td>
<td></td>
</tr>
<tr>
<td>Non-Positioned Fillet Welds</td>
<td>1/8-in. to 3/8-in. legs</td>
<td></td>
</tr>
</tbody>
</table>

† Contact nozzles must be used.

FIG. 4 — Stationary Head Installation
II. INSTALLATION

NOTE: Installation instructions given in this section do not include special insulating procedures required with high-frequency starting. If you plan to use high-frequency starting, follow the additional instructions given in F-9081, "Installation and Operation of the High-Frequency Starting Unit for the UNIONMELT 'UE' Control." High-Frequency starting cannot be used with the 'US' Head.

A. The Welding Head

1. MOUNTING PROCEDURE

The 'UE' or 'US' Welding Head is generally used in conjunction with the Hinged Support 09V41 shown in Figure 7. This allows you to adjust the position of the welding head over the work without moving or adjusting other components of the installation. The support can be attached horizontally or vertically with respect to the head.

If desired, however, the head may be supported alone by the bolts on the unit support assembly. Insulation must always be used to prevent electrical contact between the welding head assembly and the mounting device which should be grounded to earth. Insulating bushings and plates are supplied with the heads. Critical dimensions of the unit support assembly are shown in Figure 5. If desired, a special bracket can be designed to fit the mounting lug of the unit support assembly. (Dimensions of the 'UE' and 'US' Heads in various installations are given in Figures 78, 79, 98, and 100 at the back of this book.)

The welding head and hinged support are assembled as shown in Figure 6. Make sure that the insulating plates are in the positions indicated in Figure 6, and tighten the assembly securely.

2. INSTALLING THE MOUNTED WELDING HEAD

(a) Stationary Installations

(1) Welding Head and Hinged Support

The assembly as shown in Figure 6 can be mounted on any vertical surface,
using four 1/2-in. cap screws of appropriate length, and four 1/2-in. steel washers (see Figure 7). The hinged support permits the welding head to be swung from side to side through an angle of 122 degrees. A clamp is provided on the support to permit locking the hinge at any desired position.

An auxiliary pair of mounting holes is provided in the support adjacent to the standard holes (see Figure 7). This pair permits mounting the head on the support at right angles to the normal position shown in Figure 6. When the head is mounted in this fashion, the hinged support can be bolted to the underside of a beam or crane arm.

A pair of accessory mounting holes, 6 inches on centers, is also provided. These are for use in mounting a wire reel support, or for mounting other (non-standard) apparatus.

(2) Mounting Bracket Assembly 09V03

An additional support member which can be used in conjunction with the hinged support just described is the bracket assembly shown in Figure 8.

The bracket contains a mounting platen with four tapped holes corresponding to the mounting holes in the hinged support. Four hex head cap screws and washers are supplied with the bracket for mounting the hinged support to it. Worm and spiral gears in the bracket provide adjustment of the platen position through a vertical distance of 4-3/8 inches.

You can fasten the bracket to the underside of a horizontal member, as shown, or on the top side of the member (see Figure 9), as desired. When installed as shown in Figure 8, the eyebolt should be removed from the hinged support assembly so that full traverse of the platen can be used.

For mounting on a vertical surface, a modified version of the bracket (Part No. 38V15) is available. This modified bracket can be seen in use in Figure 20 on the UNICMELT OM-48 Side-Beam Carriage.

A set of cable clamps is supplied with the bracket. These are for use in anchoring the welding cables. A 1/2-in. bolt three inches long, and a washer are supplied for mounting the clamps as shown in Figure 17 on the side of the CM-37 travel carriage. Tapped holes
are provided on both sides of the carriage for this purpose.

The bracket's mounting holes are arranged in a circle 4.562 inches in diameter. The holes are 21/64 inches in diameter, and are spaced around the circle 60 degrees apart. Six 5/16-in.-18 x 1-in. cap screws and six washers are supplied with the bracket. Use these when mounting the bracket on the CM-37 travel carriage or on the rocker hinge described below. (Tapped holes are provided in the carriage and the rocker hinge for this purpose.)

3) Rocker Hinge 19V79

The rocker hinge (shown in Figure 10) is used in conjunction with the bracket assembly just described. The hinge provides a vertical movement of about six inches at the welding head busbar. It is used when the head is provided with a nozzle guide wheel (see page 19) or other device which rides on the workpiece. The guide wheel and hinge permit the welding head to rise and fall with variations in height of the workpiece, helping to maintain a constant gap between the nozzle (or jaws) and workpiece, which is essential to obtaining a good weld. When necessary, the rocker hinge can be locked by means of two built-in adjusting screws.

The top surface of the rocker hinge has six tapped holes for 5/16-in.-18 cap screws. These holes are arranged in a circle 4.562 inches in diameter, and are spaced around the circle 60 degrees apart. Six 1-in. cap screws to fit these holes are supplied.

The bottom surface of the hinge has four drilled holes 11/32 inches in diameter. (These holes match the tapped holes in the top of the CM-37 travel carriage.) Their pattern is shown in Figure 11. Four 5/16-in.-18 x 7/8-in. long cap screws are supplied for use when mounting the hinge on the CM-37 carriage.
The bracket assembly, when desirable, can be bolted directly to the top of the CM-37 carriage as shown in Figure 9.

However, a number of portable installations will also require the rocker hinge, to allow the welding head to follow variations in the surface of the work. Installation is as follows:

1. Position the rocker hinge on the CM-37 carriage. The hinge is normally mounted with its axis transverse to the center line of the carriage. This position is indicated by the dotted line in Figure 10.

2. Bolt the rocker hinge to the carriage with the four hex head screws you will find in the cloth bag tied on the assembly. The mounting holes normally used are indicated by arrows in Figure 11.

3. Mount the bracket assembly on the rocker hinge as shown in Figure 12. Use the six 5/16-in.-18 x 1-in. cap screws and 5/16-in. washers supplied with the bracket assembly. Install the cable clamp on the side of the carriage as shown in Figure 17, using the 1/2-in.-13 x 3-in. bolt supplied. (Tapped holes are provided on both sides of the carriage; remove the threaded plug with a screwdriver.)

Stationary installations often use a customer-built storage and distribution system for UNIONMELT Composition, providing an extra-large composition reservoir to avoid frequent refilling. Some systems are equipped with a suction tube which salvages unfused UNIONMELT Composition and returns it to the reservoir through a strainer which removes fused particles. LINDE does not manufacture UNIONMELT distribution or recovery systems, but can provide suggestions for installing an appropriate distribution system.

(b) Installation on the OXWELD CM-37 Machine Carriage

NOTE: Instructions for the CM-37 travel carriage are contained in the booklet which is packed with the carriage: "Instructions for OXWELD CM-37 Machine Carriage," F-9119.

*NOTE: The "U8" or "US" Head assemblies are normally mounted on the CM-37 carriage with the heads facing in the opposite direction. This is to ensure maximum stability of the carriage through uniform distribution of the component weights. (The carriage handle is removed to provide sufficient clearance for the busbar assembly.)
(4) Mount the hinged support on the platen of the bracket assembly as shown in Figure 13. Use the four 1/2-in.-13 x 1-in. cap screws and four 1/2-in. washers supplied with the bracket assembly.

(5) Mount the wire reel bracket on the hinged support as shown in Figure 15, using the set of bolts, nuts and washers supplied with the bracket.

(6) Mount the wire reel on its bracket as shown in Figure 16. Use the four cap screws and lock washers supplied with it.

(7) Remove from the welding head the two mounting bolts, their nuts and washers, and the two insulating plates. Place a steel washer on each bolt. Insert the bolts in the mounting holes on the hinged support as shown in Figure 14.

(8) Mount the welding head on the hinged support as described in Section II, paragraph A1 on page 5. See Figure 17 for illustration.

(9) The "UE" and "US" Voltage Controls, "UE" High-Frequency Starter, and "US" Wire Retract Starter are installed in accordance with the instructions supplied with these components.

*FIG. 10 – Rocker Hinge Mounted on the CM-37 Travel Carriage

*FIG. 12 – Bracket Assembly Installed on Rocker Hinge

*FIG. 13 – Mounted Hinged Support

*NOTE: The "UE" or "US" Head assemblies are normally mounted on the CM-37 carriage with the heads facing in the opposite direction. This is to ensure maximum stability of the carriage through uniform distribution of the component weights. (The carriage handle is removed to provide sufficient clearance for the busbar assembly.)
(10) Install the hopper as explained on page 8.

A completed UE-37 Assembly is shown in Figure 18. Dimensions for the complete machine and for other applications are given in Figures 78, 79, 99, and 100 at the back of this book.

(c) Installation on the UNIONMELT OM-48 Side-Beam Carriage

NOTE: A primary advantage of the Side-Beam Carriage is the fact that the equipment is close-coupled to the mounting carriage for rigidity. To obtain the most from this feature, the welding heads should be mounted as close to the carriage as possible and the use of long mounting arms or brackets avoided. This will prevent inaccuracies or irregularities in the track being amplified and causing the weld to run off the seam.

When the track assembly has been installed, use the following procedure:

(1) Attach mounting bracket (38V15) to the carriage frame with four 1/2-in. -13 bolts. (See Fig. 19 for location of mounting holes.) The bolts are secured by four 1/2-in. -13 square nuts which are welded to the carriage frame.

(2) Detaching the movable section of mounting bracket (38V15) and reassembling it in an inverted position will permit the entire welding head assembly to be lowered an additional six inches closer to the work, if so desired.

(3) Mount the carriage by sliding it on over one end of the track. Make sure the motor unit is in a raised position so it will not interfere with the track.

(4) Mount hinged support (09V41) on mounting bracket (38V15).

(5) Mount head assembly on hinged support (see Figure 6).

(6) Mount the small wire reel and support (18N44) on hinged support (09V41). If
(d) Installation of the UNIONMELT WM-6 Contour Welding Carriage

Figure 22 shows the "UE" Head installed on the WM-6 carriage. A standard hinged support and a modified version of the bracket assembly are used. The bracket assembly is bolted directly to the transverse arm of the carriage; then the hinged support and welding head are mounted as previously described. The large wire reel is mounted on the far end of the transverse arm by means of a special bracket.

B. Contact Jaws and Contact Nozzles

The welding current can be transferred from the busbar assembly to the welding wire either by a pair of contact jaws, or by a contact nozzle assembly. The majority of applications will use jaws. The curved nozzle assembly and the adaptor (see Figure 27) are used in non-positioned fillet welding and where the wire must be conducted to a joint at some distance from the busbar. The curved nozzle permits "trailing" the wire along the joint — a more

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* FIG. 18 – The "UE-37" Portable Welding Machine

The large wire reel assembly (38V22) is selected, mount it atop the carriage. (See Figure 19.)

The installation in Figure 20 shows the small wire reel and its mounting bracket. Figure 21 gives another view of the installation.

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* FIG. 19 – Equipment Mounting Holes in OM-48 Side Beam Carriage

* NOTE: The "UE" or "US" Head assemblies are normally mounted on the CU-37 carriage with the heads facing in the opposite direction. This is to ensure maximum stability of the carriage through uniform distribution of the component weights. (The carriage handle is removed to provide sufficient clearance for the busbar assembly.)
favorable condition for sheet metal welding. You can build a nozzle assembly of any reasonable length by using multiples of the 2-in. and 5-in. extensions.

1. INSTALLING CONTACT JAWS

Contact jaws are available in six sizes to fit welding wire from 3/32 to 5/16 inches in diameter. They are not supplied with the welding head, since only one or two sizes are normally required by one user.

Contact jaws are used in pairs consisting of a fixed jaw and a movable jaw. (The movable jaw is distinguished by the connection lug for the copper braid mounted in its center — see Figure 23.) Wire grooves are machined on both sides of each jaw. When one groove is worn too deep for further redressing, the jaw can be reversed end-for-end to use the groove on the opposite side.

The following table shows the proper jaws to order for each size welding wire:

<table>
<thead>
<tr>
<th>Welding Wire Size (in.)</th>
<th>Movable Jaw Part No.</th>
<th>Fixed Jaw Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32</td>
<td>0TV11</td>
<td>12W83</td>
</tr>
<tr>
<td>7/64 and 1/8</td>
<td>0TV13</td>
<td>13W31</td>
</tr>
<tr>
<td>5/32</td>
<td>0TV31</td>
<td>25W22</td>
</tr>
<tr>
<td>3/16</td>
<td>0TV14</td>
<td>13W32</td>
</tr>
<tr>
<td>1/4</td>
<td>0TV15</td>
<td>13W33</td>
</tr>
<tr>
<td>5/16</td>
<td>0TV16</td>
<td>13W34</td>
</tr>
</tbody>
</table>

Accessories needed to mount the jaws on the busbar are supplied on order under Part No. 19V92. You will use all the parts with the exception of one spring, which is a spare.

Select the pair of jaws appropriate to the size welding wire you plan to use, and install them as follows:

(a) Remove the two nuts from the pair of threaded studs on the welding head busbar.

(b) Install the movable jaw on the pair of short studs on the welding head busbar, as shown in Figure 23.

(c) Install the fixed jaw on the threaded studs on the busbar.

(d) Install the three plates as shown in Figure 24. Then replace the two nuts removed in step (a), and tighten. Figure 25 shows the parts installed.

(e) Install the spring using the 3/8-24 x 5/8-in. cap screw. Make sure that the spring bears squarely on the side of the movable jaw, then tighten the cap screw into place. This screw can be adjusted to vary the spring tension to compensate for wear, etc. If the screw is too tight, the load on the wire may be excessive. Always loosen the spring before hying the movable jaws apart.

(f) Install the two braids side-by-side as shown in Figure 26. The braids are secured to the busbar using the 5/16-in.-24 x 1-1/4-in. cap screw and nut, and to the movable jaw lug using the 5/16-in.-24 x 3/4-in. cap screw and nut.

(g) Make certain that all joints are tight, for good electrical contact, and that the jaw moves freely.

2. INSTALLING THE NOZZLE ASSEMBLY

Figure 27 shows the various parts used in making up nozzle assemblies, and the order in which they are assembled.

(a) Assembling the Straight Nozzle Assembly

(1) Select the correct size welding wire tip (according to welding wire size) and
(2) Screw a locknut on the other end of the curved nozzle.

(3) If an extension is to be used, screw it into the adaptor, tighten it firmly, and slip on its insulating sleeve. (If additional extensions are needed to reach the weld zone, add them in the same manner.)

(4) Screw the nozzle into the bottom of the extension (or into the adaptor, if no extension is used). Slip on the nozzle insulating sleeve. (If additional extensions are needed to reach the weld zone, add them in the same manner.)

(5) Mount the assembly on the welding head busbar, and secure with the two nuts provided.
(6) After correctly positioning the nozzle, tighten the locknut firmly against the adaptor.

(c) Installing the Horizontal Extension on the "90-Degree" Welding Head

As shipped to you, the 90-degree movable gear housing is in the normal vertical position, as shown in Figure 28. The standard busbar assembly can be installed on the mounting lug and the head used for standard welding operations. The movable housing can be tilted upward to a maximum of 45 degrees from the position shown.

To swing the housing up to horizontal position (or to an angle between 45 degrees and this position), proceed as follows:

(1) Remove the short stud (see Figure 28), the long stud, and the third stud on the side of the fixed gear housing (not visible in the illustration).

(2) Tilt the housing upward to horizontal position.

(3) Install the studs as shown in Figure 29. The third stud is not used in this application.

The adaptor bracket and the horizontal extension are assembled on the welding head as indicated in the exploded view, Figure 30. Crawford Fitting Company's "Blue-Goo" lubricant is applied to the threads of Extension Tube No. 16N72 at the factory to eliminate a thread seizing problem. The tube is suitable wrapped to provide protection during shipment. This wrapping must be removed when the tube is installed. The insulating sleeve is then slipped over the extension, and the locknut and curved nozzle are screwed into the end of the extension. The locknut holds the nozzle in any desired position.

The extension itself is 18 inches long. By using the necessary number of extensions, any required length can be obtained up to a recommended maximum of 15 feet. The extension and nozzle will fit inside a tube with an inside diameter of 3-1/2 inches.

Both 45-degree and 60-degree curved nozzles are available in various sizes to accommodate standard sizes of welding wire.

Applications requiring use of the horizontal extension usually require special means for carrying the UNION-MELT Welding Composition to the point of welding. LINDE engineers can provide suggestions for your application; contact your LINDE district office for details.

![FIG. 27 - Nozzle Assemblies](image)
C. Auxiliary Equipment

1. THE WIRE REEL

In UNIONMELT welding, the wire reel supports the coils of welding wire and provides them with the degree of rotation required as the wire is pulled through the feed roll.

Either a small expansion type wire reel (Figure 31) or the large wire reel (Figure 32) may be used with the "UE" or "US" Head welding installations. The large wire reel, accommodating 150-lb. coils of welding wire, is generally used for stationary installations. Through the use of special equipment, however, this type reel can also be mounted on the standard UNIONMELT CM-37 Carriage for portable installations.

The small expansion-type wire reel is designed to accommodate the standard small (25-lb.) coils of welding wire as well as special 50-lb. and 65-lb. coils. It is used on the CM-37 Carriage as part of the UE-37 Welding Machine, and may also be used on both the WM-6 Contour Welding Carriage and the OM-48 Side-Beam Travel Carriage.

(a) Mounting the Expansion-Type Wire Reel (28V31)

Brackets are available for mounting the wire reel on standard UNIONMELT carriages (see Figures 16 to 20). When used in other installations, the reel must be mounted so that the coil of wire lies in a vertical plane. Four bolts are used to mount the reel. The mounting pattern is shown in Figure 31.

(b) Mounting the Large Wire Reel (07V69)

The large wire reel is equipped with a baseplate designed for bolting directly to a mounting device of your own construction. For proper wire feed, the plate must be mounted in such a manner that the coil of welding wire will lie in a vertical plane. The bolt hole dimensions of the mounting plate are given in the sketch on page 17. The assembly should be insulated from ground, using the insulating pieces supplied with the large wire reel.

For mounting on the WM-6 Contour Welding Carriage, the baseplate of the wire reel is bolted directly to a mounting bracket supplied on order with the carriage. This mounting is illustrated in Figure 22.

For mounting on the CM-37 and OM-48 Side-Beam Travel Carriage, the reel with body casting (38V22), shown in Figure 33, is used. The base is bolted to the top of the side-beam carriage, or a plate attached to the CM-37, as shown in Figure 33.

This reel is insulated at the top of the post for high-frequency use. A clamp permits rotation of the reel to any position around the post.

2. WELDING COMPOSITION DISTRIBUTING DEVICES

(a) Welding Composition Distributing Assembly 07V08

This device is shown in Figure 34. It controls the depth and confines the distribution of UNIONMELT Welding Composition
over the weld. (This assembly can be used only with jaws.)

The device consists essentially of a funnel and a swivel assembly which supports two composition-confining plates. The UNIONMELT Welding Composition feeds from its hopper, through the rubber tube into the funnel, then down around the welding wire to the weld zone. The two plates on the swivel assembly prevent the composition from spreading away from the seam. An adjusting knob on the swivel assembly permits raising or lowering the plates; this controls the height of the composition layer.

The width of the composition burden is controlled by lateral adjustment of the confining plates.

If the weld seam is parallel to the carriage, no swivelling action is necessary; the swivel assembly can be clamped in a fixed position. When desirable, it can be removed entirely, as Figure 22 shows. When the weld seam is irregular, the swivel assembly, in conjunction with the guiding device shown in Figure 40, swivels to follow the seam and maintain uniform composition coverage.

Mounting procedure is as follows:

(1) Insulating plates, bushings, and three cap screws are supplied on the welding head busbar. Remove the rear cap screw and loosen the two front cap screws as shown in Figure 35.

(2) Fit the two slots in the funnel mounting pad on the shanks of the loosened cap screws.

(3) Insert the third cap screw through the hole in the funnel mounting pad, through the busbar and insulating plates, and secure it with the washer and nut. Tighten all three cap screws firmly.
(b) UNIONMELT Welding Composition Gate

The UNIONMELT Manual and Automatic Welding Composition Gates provide a simple and convenient means for controlling the flow of welding composition to the welding zone. The automatic gate is shown in Figure 36. Instructions for installing both the manual and automatic gates will be found in F-9649, Instructions and Parts List for UNIONMELT Automatic and Manual Gates for UNIONMELT Welding Composition.

3. GUIDING DEVICES

(a) Carriage Guide Wheel 09V48

Although the CM-37 Carriage is generally guided along standard OXWELD track, the guide wheel pictured on page 19 has been made available for hand guiding. When mounted, the guide wheel raises the carriage idler wheels off the ground entirely; the resultant three-point suspension makes for easy, accurately controllable manual steering.

As illustrated in Figure 38, the guide wheel mounting bracket is screwed directly to the handle brackets on the carriage with the socket-head screws supplied. The steering handle screws directly into the shank of the wheel fork.
(b) Tube and Pointer Assembly 08V77

This device, shown in Figure 36, is used in conjunction with a contact nozzle assembly. It clamps on the nozzle insulating sleeve and acts as a support for the rubber hose and pointer. The pointer can be fabricated from a length of welding wire.

The assembly is frequently used in conjunction with the carriage guide wheel described in (a). The pointer is mounted so that its tip almost touches the weld seam, ahead of the welding composition. It provides accurate guidance for the operator when steering the carriage.

A composition gate can be installed in place of the usual welding composition hose. Setscrews are provided in the pointer assembly to hold the gate in position.

(c) Nozzle Guide Wheel 08V94

This guide wheel is mounted ahead of the nozzle assembly, and automatically(67,63),(934,774) guides the welding head along the vee of the joint. When this guide wheel is used on the UF-37 or US-37 Welding Machine, the rocker hinge should be left unlocked so that the head is free to follow the seam.

The guide wheel is mounted in the position indicated in Figure 39. Slide the rear clamp on the guide up the contact nozzle until the bottom of the guide wheel is about one inch below the end of the welding tip. Then tighten the clamping screw to hold the assembly in place, and insert the rubber hose through the center hole.

This guide wheel may also be used in conjunction with a welding composition gate. Remove the rubber hose from the center clamp, insert the receiving tube of the gate, then tighten the setscrew in the clamp.

(d) Guiding Device Assembly 07V92

This device can be used only with the welding composition distributing device as shown in Figure 40. It attaches to the swivel assembly with a cap screw, washer, and square nut. The three guide wheels ride in the weld vee, guiding the head and swiveling the composition confining plates along the weld.

A pivot joint and clamp screw are provided to allow the device to be tilted for following girth welds.
FIG. 37 - Nozzle and Pointer Assembly

FIG. 38 - Carriage Guide Wheel

FIG. 39 - Nozzle Guide Wheel

FIG. 40 - Guiding Device Assembly
4. **90-DEG. STUD (BUSBAR) CONNECTORS**

In some welding installations, it is not possible to bring the welding current cables to the machine from overhead and connect them in the normal manner to the busbar. If the #4/0 welding cables are carried to the head horizontally, the cables must be connected to the busbar by means of 90-deg. stud or busbar connectors. These can be seen in use in Figure 20. The shank of each connector is a solid copper casting which is connected to the busbar with a sleeve and jam nut. (This sleeve and jam nut, Part No. 15W35, must be ordered separately for each stud connector.) The other, short leg of the connector receives the welding cable in exactly the same manner.

Four connectors, varying in length from 3-3/4 in. to 7-3/4 in., are available for use with the "UE" or "US" Head. The number of connectors which must be used for any particular welding operation depends on the amount of welding current supplied. (Each 4/0 cable is recommended for use with not more than 500 amps.) The varied lengths of the connectors permit "nesting" (see Figure 20), which prevents the cables from bunching up at the side of the head.

5. **INSTALLATION OF OTHER COMPONENTS**

For complete instructions concerning the following equipment, refer to the indicated booklets:

- **"UE" Electronic Voltage Control, Remote Control and Switch Box** F-6622 - Instructions for the "UE" Electronic Voltage Control
- **"US" Series Voltage Control** F-9414 - Instructions for the "US" Series Voltage Control (Series 4 and 5)†
- **Wire Retract Starter** F-9183 - Instructions for the Wire Retract Starter ("US" Head only)
- **High-Frequency Starter** F-9081 - Instructions for the High-Frequency Starter ("UE")
- **High-Frequency Filter** F-9159 - Instructions for the Flexible Welding Attachment
- **Flexible Attachment** F-9119 - Instructions for the CM-37 Machine Carriage
- **CM-37 Machine Carriage** F-9160 - Instructions for the OM-48 Side-Beam Carriage
- **OM-48 Side-Beam Carriage**

†If series number is not shown separately, it is the first digit of the serial number.

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III. **OPERATION**

A. **Safety Precautions** (Also see page 2.)

1. The busbar, contact jaw or nozzle assembly, welding wire, and all parts of the wire reel and its supports are at welding voltage potential. In addition, the control cables carry various voltages to and from the control box. If any of these cables should fail, one side of the damaged circuit would still be "hot." In view of these conditions, and to prevent possible injury, DO NOT TOUCH THESE PARTS UNLESS THE MAIN CONTACTOR IS "OFF" AND THE VOLT-METER SHOWS ZERO VOLTAGE. The Unit Support Assembly may be adjusted while the main contactor is "ON" by means of the insulated socket wrench provided with the welding heads. Be careful to avoid touching anything but the insulated wrench. Be sure that there are no breaks in the insulated covering on the wrench.

2. Turn off the contactor switch when welding operations are discontinued for any length of time. In a "UE" or "US" Head installation, welding action is generally stopped by turning the wire feed switch to the "STOP WELD" or neutral position. This stops the wire feed, and the current relay turns off the contactor when current flow ceases. The operator must not touch any of the "live" components listed above until the voltmeter indicates zero. Never lift the welding machine by hand or crane with the contactor switch "ON."

3. Be sure all components of the installation are well grounded where required. All necessary ground connections are shown in the wiring diagrams furnished with the equipment. Rough handling or movement can cause failure of a switch or other electrical part, and connect one side of a particular circuit to the control or switch case. If the apparatus is well grounded, however, the control or switch will not give a shock when touched.

4. Care should be taken to prevent accidental striking of open arcs, which may cause extreme eye pain.
   
   (a) Never press the inching button when welding current contactor is turned on. An arc will be struck if the "live" wire accidentally touches the work.
   
   (b) Cover the end of the welding wire where it contacts the workpiece with UNIONMELT Welding Composition before starting to weld.
   
   (c) Make sure the path of travel for the machine is clear. If a "live" part of the machine touches a grounded object, such as a steel building support member, an open arc will be struck.

5. Always wear goggles when chipping or removing solidified UNIONMELT Composition from the finished weld zone.
B. Preparing to Weld

1. MOUNTING THE WIRE COIL

(a) Expansion Reel

The small expanding wire reel is designed to apply constant pressure to the inner diameter of a coil of welding wire. The pressure eliminates slipping between the wire coil and the reel and prevents the coil from unwinding faster than the reel is turning. 

HOW TO INSTALL A COIL OF WIRE

(1) Loosen the thumbscrews on the retaining fingers of the four wire reel arms.

(2) Turn the fingers so that they point toward the hub.

(3) Remove the wrapping paper from the wire coil, but do not remove the binding wires.

(4) Use the outer end of the coil as the starting end. (The inner end of some coils is tagged "Start This End." Discard such instructions.) Slide the wire coil onto the reel with the starting end in the proper feed position.

(5) Secure the inner end of the wire to the quick-acting wire clamp on the reel.

(6) Turn the reel fingers outward and tighten the thumbscrews.

(7) Secure the starting end of the coil between the feed and pressure rolls of the wire feed mechanism. It may be necessary to remove one or two of the coil binding wires, but do not remove all of the binding wires.

(8) Tighten the hub spring retaining bolt to provide some friction drag for the reel. The spring pressure should be sufficient to prevent the wire coil from unwinding. However, it should not be so great as to overload the wire feed motor.

(9) Remove the remaining binding wires from the coil.

BRAKE SPRING SELECTION

The wire reel is assembled with brake spring 28Z64 and a 1/2-in. plain steel washer. (See Figure 86.) This spring and washer are used for most applications. For lighter braking action, replace the spring and washer with spring 92W12 and guide washer 18N26 which are supplied in a cloth bag tied to the reel.

(b) Large (150-lb.) Coils: Large Wire Reel (see Figure 41)

(1) Remove all wrapping paper from the coil and locate the starting end. This end will be designated by an attached tag which reads "Start this End." Do not cut the binding wires or straps until the coil has been placed on the reel.

(2) Loosen the handle on each of the four arms of the reel, rotate the movable fingers in toward the center of the reel, and back off the adjusting wheel (counter-clockwise rotation).

(3) Slide the coil onto the reel, making sure that the starting end is pointed toward the feed rolls. Wire is usually fed from the top side of the reel toward the welding head.

(4) Slide the anchor end of the coil into one of the anchor holes and tighten the thumbnut.

(5) Turn the movable fingers back into position; lock them into place with the handles. Expand the reel against the inner diameter of the coil by turning the adjusting wheel clockwise.

(6) Adjust the drag brake to provide sufficient friction to prevent the wire coil from unwinding itself. Don't use excessive drag, as this will overload the wire-feed motor.

(7) Hold the starting end of the coil firmly and withdraw it until the binding wires prevent further rotation. Cut each binding wire as it comes into this position.

(8) When all binding wires have been cut, insert the welding wire between the pressure and feed rolls and into the nozzle assembly or contact jaws.

FIG. 41 – Large Wire Reel
2. **SPRING-LOADED PRESSURE ROLL ASSEMBLY**

The Spring-Loaded Pressure Roll Assembly automatically adjusts the pressure on its rolls according to the size of welding wire being used. Normally the only adjustment the operator must make is to position the straightening roll correctly. (See Figure 42.) If tube wire is to be used, remove the cover plate. Then remove the two small diameter inner springs and put them in a safe place. Replace the cover plate and retaining screws.

C. **Performance Check and Operating Procedures**

Detailed instructions for operating the head and controls, and for a preliminary performance check, are given in the Voltage Control instruction booklets ("US" and "UE").

When high-frequency starting is used with the "UE" Head, also consult the instruction booklet which accompanies the high-frequency starter. When wire-retract starting is used with a "US" Head, refer to the appropriate booklet.

D. **Trouble-Shooting**

This section describes how to remedy faulty welding conditions that sometimes occur through mere oversight or misadjustment. You can correct a great majority of these conditions by simply checking or adjusting external controls and connections on the installation. Detailed trouble-shooting procedures for electrical equipment are given in the various instruction booklets supplied with LINDE equipment.

1. **NO WELD**

   Probable causes:

   (a) Ground not connected to workpiece.
   
   (b) No welding current being supplied to the head.

   Remedy procedure:

   (1) Check input to welding transformer or motor-generator set.
   
   (2) Check all switches for proper position.
   
   (3) Check all connections.
   
   (4) Check 115-volt circuit through contactor relay and switch.

   (c) Opposed polarity on paralleled generators or transformers.

2. **BUTTON WELD (NO WIRE FEED)**

   Probable causes:

   (a) "UE" control time delay switch not operating. (Pilot light should go on approximately five minutes after main voltage control switch has been turned on. This indicates that the time delay switch has closed and the control is ready for operation.)

   (b) "Feed-Retract" switch set at neutral ("STOP-WELD") position.

   (c) Hi-lo switch set in low instead of high position.

   (d) Welding voltage setting too high.

   (e) Pressure roll too loosely adjusted.

   (f) Faulty connections in wire-feed motor circuit.

   (g) Control box welding voltage leads not connected.

   (h) Welding voltage fuses in control box burned out.

   Remedy procedure:

   To check, turn contactor switch "ON." If there is no voltmeter reading, either the connections or fuses are faulty, or there is a break in the circuit.
(1) Failure of 115-volt source.

If the voltage control circuit is not defective, the carriage will run and the tubes of the "UE" control will light. If the tubes do not light and the carriage runs, the 115-volt fuses or tubes in the voltage control box may be burned out.

(j) If motor-generator set is used, either the a.c.-d.c. switch in "UE" voltage control is out of position, or lead 1W or 2W in the voltage control may be reversed (lead 1W should be positive).

(k) Voltage control not functioning because of open circuit or burned out part. Refer to the Voltage Control instruction booklet.

3. STICKING OF WIRE AT START OF WELD

Probable causes:

(a) Loose welding cable connection to workpiece.
(b) Weld started with wire too close to work because steel wool ball was loosely formed; or wire was forced down too hard and tended to lift the welding head.
(c) Hi-lo switch in high instead of low position.
(d) Excessive dirt or oil in the ball of steel wool.
(e) Loose head mounting.
(f) Welding voltage setting too low.
(g) Current too low for wire diameter being used.
(h) Current relay inoperative, or its contacts dirty.
(i) Control box defective; see the Voltage Control instruction booklet.

4. STICKING OF WIRE DURING WELDING OPERATION

Probable causes:

(a) Hi-lo switch in high instead of low position.
(b) Welding voltage setting too low.
(c) Current too low for wire diameter being used.
(d) Loose welding cable connection on workpiece.
(e) Defective control box; see the Voltage Control instruction booklet.
(f) Travel speed erratic; see F-9119, "Instructions for the OXWELD CM-37 Machine Carriage."

5. VOLTAGE CONTROL ERRATIC AFTER WELDING FOR A PROLONGED PERIOD

Probable cause:

Thyratron tubes are firing continuously, due to high ambient temperature ("UE" control only).

Remedy procedure:

Improve ventilation in and around Voltage Control.

6. STOPPING OF WELDING ACTION WITH ALL CONTROLS PROPERLY SET

Probable causes:

(a) Failure of 115-volt source.
(b) Broken wire or connection. (Travel carriage may have separated a wire at a break, or may have pulled out a connection.)
(c) Welding wire coil binding in reel.

Remedy procedure:

Loosen the coil by slipping the finishing end over or under the other strands until the binding is relieved. Should the binding be too tight to relieve by this method, remove the coil from the reel and rewind it before using again.

(d) Pressure roll too tight.
(e) Fuse burned out.
(f) Voltage control ceases to function; see the Voltage Control instruction booklet.

7. FLUCTUATION OF VOLTOMETER AND AMPEROMETER, AND IRREGULAR WELD DEPOSIT

Probable causes:

(a) Depth of granular material too great or too small. Raise or lower the composition gate or tube.
(b) Contact nozzle or jaws set too high above work.
(c) Welding voltage setting too low.
(d) Hi-lo switch set in wrong position.
(e) Wire size too large for voltage desired.
(f) Contact tip or jaws dirty, worn or loose. Jaws may be loose because of loose or faulty spring.
(g) Wire-feed pressure roll improperly adjusted. (Usually too loose.)
(h) Wire-feed roll broken or in poor condition. (See Section IV for disassembly instructions.)
IV. DISASSEMBLY AND MAINTENANCE

NOTE: Always shut off both the 115-volt current supply to the voltage control, and the welding transformer or generator current supply to the welding cables, before any disassembly or maintenance operations are undertaken.

A. Normal Maintenance Schedule for Welding Head Installations

1. GENERAL

Little maintenance is required to keep the welding head and its auxiliary equipment in top operating condition. Parts subject to wear, or to depletion of lubricant, should be inspected periodically. Important check points are listed below and identified in the illustrations which follow:

(a) Contact Jaws (or nozzles and tips)

Inspect jaws every eight hours for cleanliness and wear. If necessary, clean and dress the jaws with a fine round file. The diameter of the file should never be larger than the wire size for which the jaws were designed. Worn jaws should be replaced.

(b) Wire-Feed Rolls

Under normal operating conditions, check the rolls with each installation of a welding wire coil. Run out a test length of approximately 15 inches of wire and observe impressions made by the knurling. Rolls whose knurling is worn should be replaced.

(c) Pressure Rolls

Inspect pressure rolls and cupped springs when movable gear housing is removed for the replacement of the wire-feed roll.
(d) Cover and Dust Seal Assembly

Check the felt dust seal with each installation of a welding wire coil. Dust seals should be replaced whenever worn.

(e) Movable Gear Housing

Use a good grade of grease which will not churn, channel, stiffen in the cold or liquefy with heat. Texaco Regal Starfak Special grease has proved most suitable for this purpose. You can obtain it in five-pound cans through LINDE (Part No. 82W10).

(f) Stationary Gear Housing

Check the oil level weekly by removing the socket-head plug under the "high oil level" mark on the side of the housing. The oil level should be maintained at this mark. For operation in warm or cold weather, use the following lubricants:

- Summer - SAE No. 50 Oil
- Winter - SAE No. 10W - 20W Oil

(g) Motor Brushes

Inspect motor brushes every six months. (See following pages for instructions on removing brushes.) Brushes less than 1/2 inch long should be replaced with new ones.

(h) Refer to Form 9119, "Instructions for the OXWELD CM-37 Machine Carriage," for maintenance data on the travel carriage.

The following chart is a summary of the above checks:

**Chart for Frequency of Maintenance**

<table>
<thead>
<tr>
<th>Each installation of welding wire coil:</th>
<th>Check felt dust seal - replace when worn. Check condition of wire-feed rolls and replace if worn.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each 8 hours of operation:</td>
<td>Check jaws or nozzles and tips for cleanliness and wear. Clean with round file. Replace worn jaws, or nozzles and tips.</td>
</tr>
<tr>
<td>Weekly:</td>
<td>Check and maintain oil at the high oil level mark.</td>
</tr>
<tr>
<td>Each 6 months or 200 hours of operation: Warm season:</td>
<td>Check motor brushes. Movable gear housing lubricant: Texaco Regal Starfak Special grease. Stationary gear housing lubricant SAE No. 50 oil.</td>
</tr>
<tr>
<td>Cold season:</td>
<td>Movable gear housing lubricant: Texaco Regal Starfak Special grease. Stationary gear housing: As light as SAE No. 10 oil.</td>
</tr>
<tr>
<td>Wire-feed roll replacement:</td>
<td>Inspect condition of pressure rolls and cupped spring.</td>
</tr>
</tbody>
</table>

**B. The Welding Head**

1. **DISASSEMBLY OF THE "UE" DRIVE MOTOR**

   **NOTE:** It is not necessary to dismount or disassemble the motor to inspect the commutator and brushes. Inspection is accomplished as follows:

   Remove the cover plate and gasket from the rear housing, as shown in Figure 43. The brushes are held against the commutator by spring-loaded fingers. Raise the finger as shown, then lift out the carbon brush. Mark each brush with a pencil as it is withdrawn, so that it can be replaced in the original position. If the position of the brushes relative to the armature is changed, sparking will likely occur when the motor is put back into operation.

   Examine the brushes. Make sure that each brush surface in contact with the motor commutator has the bright, polished finish that indicates good contact. The polished area should cover essentially all of the contacting surface of the brush.

   When replacing a brush in the motor, be sure to put it back in the same brush 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 1/2 in. in length, they should be replaced with new ones.
FIG. 44 – Dismounting the Cover Strip

With the 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 rough, disassemble the motor and remove the armature (see disassembly instructions below). Polish the commutator surface with No. 00 sandpaper. For this operation, it is preferable to rotate the armature in a lathe. Be sure there are no copper burs which might short-circuit the commutator segments. If necessary, deburr the segment edges by beveling with a small, fine three-cornered file and undercut the mica segments.

CAUTION: Never use emery cloth or emery stone for this operation. Emery is a conductor of electricity, and any residual loose particles may short-circuit the commutator segments during operation of the motor. Replacement of brushes, and commutator maintenance, should be performed only by an experienced electrician.

The drive motor is held to the Unit Support assembly by four nuts. Two of these are directly accessible, and two, as shown in Figure 44, are in recesses in the Unit Support Assembly. Withdraw the three screws which secure the cover strip over these recesses, and remove the cover strip. Then continue as follows:

(a) Drain the oil from the fixed gear housing by removing the drain plug shown in Figure 44.

(b) Dismount the head from its support.

(c) Remove the four nuts which hold the motor and dismount it by drawing it straight back until its mounting studs are clear of the support. The oil seal gasket can then be withdrawn also; see Figure 45.

(d) Loosen the socket-head setscrew in the spur gear on the motor shaft, as shown in Figure 45. Remove the gear from the shaft, being careful not to lose the key from the shaft keyway.

(e) Remove the motor brushes.

(f) Unscrew the four stud caps from the rear of the motor. The rear housing and motor armature can now be withdrawn, as shown in Figure 47.

(g) To remove the armature, dismount the bearing cap from the rear of the housing and press out the armature shaft and its bearing.

(h) Reassembly

The motor is reassembled by reversing the procedure given above. When attaching the motor to the unit support, make sure the gasket is in place and in good condition. If bent or otherwise damaged, replace it with a new one. Be sure the two units fit up snugly before fastening them together. This will indicate that the motor shaft is interlocked correctly with the gear in the stationary gear housing.
2. INSPECTION OF THE "US" MOTOR ARMATURE AND BRUSHES

Check the wire-feed motor brushes every six months or every 200 hours of operation. **NOTE:** It is not necessary to dismount or disassemble the motor to inspect the commutator and brushes. Inspection is done as follows:

Unscrew both brush plugs as indicated in Figure 48 and lift out the brush and spring assemblies. Mark each brush with a pencil as it is withdrawn, so that it can be replaced in the original position. If the position of the brushes relative to the armature is changed, sparking is likely to occur when the motor is put back into operation.

Examine the brushes. Make sure that each brush surface in contact with the motor commutator has the bright polished finish that indicates good contact. The polished area should cover essentially all of the contacting surface of the brush.

When replacing a brush in the motor, be sure to put it back in the same brush holder, and in its original position. Also be sure that the brush rides freely in its holder. New brushes are approximately 3/4 in. long. When they have worn down to 1/2 in. in length, they should be replaced with new ones.

With the 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 rough, disassemble the motor and remove the armature. Polish the commutator surface with No. 00 sandpaper and wipe clean. For this operation, it is preferable to rotate the armature in a lathe.

**CAUTION:** Never use emery cloth or emery stone for this operation. Emery is a conductor of electricity, and any residual loose particles may short-circuit the commutator segments during operation of the motor.

Be sure that there are no copper burs which might short-circuit the commutator segments. If necessary, deburr the segment edges by beveling with a small, fine three-cornered file and undercut the mica segments.

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

3. DISASSEMBLY OF THE "US" MOTOR AND GEAR HOUSING ASSEMBLY

To remove the "US" Motor and Gear Housing Assembly, loosen the four mounting screws as shown in Figure 49. When the four screws have been loosened, the Motor and Gear Housing Assembly may be separated from the Support Assembly as illustrated in Figure 50.

The motor is secured to the gear housing by three motor retaining nuts as shown in Figure 50. To remove the motor, take the grease out of the housing, take off the three nuts, and separate the motor from the housing as illustrated in Figure 51.

When reassembling the motor and gear housing, reverse the foregoing procedure. Be sure that the two gaskets are in good condition and replaced in their original positions as shown in Figures 50 and 51. Slide the units together until the gears mesh and replace the nuts and bolts. The gear housing must be re-packed with clean grease. The grease may be

![FIG. 47 – Disassembling the "UE" Motor Housing](image)

![FIG. 48 – Removing the "US" Motor Brushes](image)
hand-packed before reassembly or applied with a grease gun after reassembly. To use a grease gun it is necessary to remove the vent assembly shown in Figure 49.

4. DISASSEMBLY OF THE "US" MOTOR

After the motor has been removed from the gear housing as described in the preceding paragraph, the motor may be disassembled for maintenance.

NOTE: An experienced electric motor repairman should do this work.

(a) Unscrew both brush plugs and remove the brush and spring assemblies. (See Figure 48). Note how each brush is withdrawn so that it may be replaced in the same position. Match-mark the brushes and holders.

(b) Unscrew the two motor housing screws as shown in Figure 52.

(c) Withdraw the motor end housing.

(d) Lift out the motor armature and remove the shroud.

5. CHANGING SPEED OF "US" HEAD

As indicated in the "US" Gear Interchangeability Table (see page 29), different wire-feed speeds may be obtained by replacing gears #1 and #2 (shown in Figure 50) with other combinations. To remove either gear, simply loosen the setscrew, take off the retainer ring, and force the gear off the shaft. Be sure to insert the key when installing a replacement gear. Replace the retainer ring and tighten the setscrew.

6. REMOVAL OF "US" SUPPORT ASSEMBLY

The Support Assembly (29V03), part of the "US" Motor and Gear Assembly shown in Figure 74, is held to the Unit Support Assembly (07V49), shown in Figure 76, by four nuts. Two of these...
are directly accessible, and two, as shown in Figure 61, are in recesses in the Unit Support Assembly. Withdraw the three screws which secure the cover strip. Then continue as follows:

(a) Drain the oil from the fixed gear housing by removing the drain plug shown in Figure 55.

(b) Remove the four nuts which hold the support assembly and separate the Support Assembly and oil seal gasket from the Unit Support Assembly as shown in Figure 56. Reassemble by reversing the foregoing procedure.

Note that the edge of the gasket is flattened where it fits over the worm. Be sure that the two units fit snugly before fastening them together. This will indicate that the Support Assembly shaft is correctly interlocked with the gear in the Fixed Gear Housing. Before returning the head to service, be sure to remove the oil cap shown in Figure 55 and replace the Fixed Gear Housing oil.

7. DISASSEMBLY OF THE UNIT SUPPORT
(Refer to Figure 57.)

(a) Dismount the “UE” Drive Motor or “US” Support Assembly. Removal of the “US” Support Assembly automatically dismounts the “US” Motor and Gear Housing Assembly.

(b) Remove the ring gear which is mounted inside the unit support. (The gear is keyed to the rear of the fixed gear housing by two keys—take care that they are not lost while withdrawing the gear.)

---

**“US” GEAR INTERCHANGEABILITY TABLE**

<table>
<thead>
<tr>
<th>&quot;US&quot; Welding Head Assembly Number</th>
<th>Motor and Gear Assembly Number</th>
<th>Gear No. 1 Part No.</th>
<th>Teeth</th>
<th>Gear No. 2 Part No.</th>
<th>Teeth</th>
<th>Wire Feed Ipm</th>
<th>Feed Roll rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>--</td>
<td>19N32</td>
<td>48</td>
<td>19N36</td>
<td>24</td>
<td>300</td>
<td>48</td>
</tr>
<tr>
<td>01E23</td>
<td>29V01</td>
<td>19N36</td>
<td>24</td>
<td>19N32</td>
<td>48</td>
<td>75</td>
<td>12</td>
</tr>
<tr>
<td>01E25</td>
<td>29V05</td>
<td>19N35</td>
<td>36</td>
<td>19N35</td>
<td>36</td>
<td>150</td>
<td>24</td>
</tr>
<tr>
<td>--</td>
<td>--</td>
<td>19N33</td>
<td>42</td>
<td>19N34</td>
<td>30</td>
<td>214</td>
<td>34</td>
</tr>
<tr>
<td>--</td>
<td>--</td>
<td>19N34</td>
<td>30</td>
<td>19N33</td>
<td>42</td>
<td>113</td>
<td>18</td>
</tr>
</tbody>
</table>
(c) Loosen the hex-head clamp screw at the bottom of the unit support. Then withdraw the fixed gear housing from the support.

(d) To remove the handwheel and shaft, first drive out the pin in the retaining collar on the end of the shaft. Then remove the collar and drive out the shaft. The worm will fall free as the shaft is withdrawn. The worm and shaft are keyed together. Do not lose this key during disassembly.

8. DISASSEMBLY OF THE MOVABLE GEAR HOUSING

Where a single size of welding wire is to be used continuously, it may be found desirable to install V-grooved feed rolls which are fitted to the wire size. The table which follows shows the appropriate roll part number:

<table>
<thead>
<tr>
<th>Welding Wire Diameter (inches)</th>
<th>Roll Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32</td>
<td>17N42</td>
</tr>
<tr>
<td>1/8</td>
<td>17N43</td>
</tr>
<tr>
<td>5/32</td>
<td>17N44</td>
</tr>
<tr>
<td>3/16</td>
<td>17N45</td>
</tr>
<tr>
<td>1/4</td>
<td>17N46</td>
</tr>
</tbody>
</table>

The following instructions tell how to disassemble the movable housing assembly for repair and replacement of rolls and other parts.

It is unnecessary to order bushings separately if a replacement housing is to be ordered. Bushings are supplied as part of the housing, and are reamed to proper dimensions. However, if only the bushings are to be replaced, they must be reamed to the dimensions indicated in Figure 81 after they are inserted into the housing.

The following disassembly instructions apply equally to the standard and to the "90-degree" movable gear housing assemblies. (These differ only in that the "90-degree" housing assembly contains an additional idler gear and shaft, as shown in Figure 61.)

(a) Dismount the busbar assembly by withdrawing the three socket-head screws which hold it to the housing mounting lug. (For reassembly, see Figure 58 for correct order of parts and insulators.)
FIG. 60 – Removing the Idler Gear

(b) Dismount the housing from the welding head. This is done by removing the nuts from the three studs which retain it, and drawing the housing away from the side of the fixed gear housing.

(c) Remove the cover and dust seal assembly by withdrawing the four screws which hold it.

(d) Withdraw the five cap screws and remove the roll assembly as shown in Figure 59.

(e) Remove the housing cover by withdrawing its seven cap screws. Take care not to damage the gasket during removal. (If the gasket is torn or split, obtain a new one and shellac it in place when replacing the cover.) Remove the grease from the housing.

FIG. 62 – Removing Feed Roll Shaft

(f) Lift out the idler gear, as shown in Figure 60. Then remove the two feed roll gears and their keys.

(g) Press out the feed roll shafts from the cover side of the housing as shown in Figure 62. This will release the knurled feed roll which is keyed to each shaft, inside the housing (Figure 63). Then remove the outside bearing.

FIG. 61 – Interior of "90"-degree Movable Gear Housing

FIG. 63 – Removing Knurled Feed Roller
(h) To reassemble the parts: Place the keys in the feed roll shaft. Insert the shaft through the outside bearing hole and place the feed roll on it (Figure 63). Align the keys with the keyways of the feed roll and press the shaft in place. Place the outside bearing over the small end of the feed roll shaft, and press the bearing into place in the housing. Then reverse the procedure outlined in steps (e) and (f) on preceding page. Before replacing the housing cover, pack the housing with Texaco Regal Starfak Special grease. (This grease is obtainable from Linde in 5-lb. cans.)

9. DISASSEMBLY OF THE FIXED GEAR HOUSING

The "UE" Welding Hood is available with either single- or double-lead gears. To convert from single- to double-lead gears or vice versa, it is necessary to disassemble the fixed gear housing and replace its worm and worm gear. The following table indicates the parts required. Also listed are the worm and gear required for special applications which call for a triple-speed head.

<table>
<thead>
<tr>
<th>Speed</th>
<th>Worm Part No.</th>
<th>Worm Gear Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single (12 rpm)</td>
<td>12W16</td>
<td>12W17</td>
</tr>
<tr>
<td>Double (24 rpm)</td>
<td>29W84</td>
<td>29W85</td>
</tr>
<tr>
<td>Triple (36 rpm)</td>
<td>18N16</td>
<td>18N17</td>
</tr>
</tbody>
</table>

Disassembly of the fixed gear housing is as follows:

(a) Dismount the movable gear housing assembly. This is done by removing the nuts from the three studs which retain it, and drawing the assembly away from the side of the fixed gear housing.

(b) Dismount the drive motor, then the fixed gear housing assembly as directed on pages 25 and 29.
(c) Remove the gear housing cover by withdrawing the eight cap screws which secure it. Take care not to damage the gasket during removal. If the gasket is torn or split, obtain a new one and shellac it in place before replacing the cover.

(d) Loosen the setscrew in the hub of the worm gear as shown in Figure 64.

(e) Press out the worm gear shaft from the cover side of the housing.

(f) Remove the setscrew which locks the thrust adjustment bushing in place (refer to Figure 65). Unscrew and remove the bushing.

(g) Remove the worm and shaft. To do this, it is necessary to insert a fiber drift between the threads of the worm, and drive the worm and shaft out through the front of the housing. This will also release the spur gear which is keyed to the rear end of the shaft, and the shaft thrust ball bearing. An exploded view of the assembly is shown in Figure 65.

(h) To reassemble the parts, reverse the procedure outlined above. Pack the groove in the shoulder of the thrust-adjusting bushing with wicking. When the thrust-adjusting bushing is fastened in place by its setscrew, the worm should have an end play of 0.007 in. to 0.010 in. If necessary, a new hole should be drilled and tapped for the setscrew to establish the proper tolerance.

As indicated in the parts picture on page 43, it is unnecessary to order bushings separately if a replacement housing is to be ordered. Bushings are supplied as part of the housing and are reamed to proper dimensions. However, if only the bushings are to be replaced, they must be reamed to the dimensions indicated in Figure 77 after they are inserted into the housing. When ordering a replacement housing, it is advisable to also order a new thrust-adjustment bushing and setscrew, instead of attempting to utilize the old ones.

C. Disassembly of the Hinged Support
(Refer to Figure 66.)

1. Loosen the clamp.

2. Loosen, but do not remove, the setscrew in the side of the bracket.

3. Unscrew and remove the bearing cover nut in the top of the bracket.

4. Drive out the two dowel pins.
5. Remove the hex-head cap screw underneath the bracket.

6. Using a brass drift, drive the shaft and bearing out through the top of the bracket. Do not lose the key.

7. To reassemble the support, first place the key in the arm keyway in a bed of grease. (The grease will be sufficiently adhesive to hold the key in place during assembly.) Then reverse the procedure given on the preceding page. When reinstalling the bottom cap screw, engage all its threads in the casting before tightening the locknut; do not, however, screw it in far enough to lift the hinge shaft off the lower bearing.

   If the clamp is to be replaced, the new clamp must be marked, drilled and reamed for pinning in position. Use a 23/64-in. drill and ream to 0.374 in. plus 0.001 minus 0.000, to accommodate the 3/8-in. dowel pins used.

**D. To Disassemble the Mounting Bracket Assembly**

1. To inspect the gears, remove the gear cover as shown in Figure 67 by withdrawing its four screws.

2. To remove the platen, first loosen the four gib-locking screws in its side. (These screws are loosened by means of a hex wrench inserted through the access holes in the side of the bracket.) Then withdraw the two flat-head screws which secure the platen. Remove the platen by lifting it upward until it clears the slide. The gib will fall free as the platen is removed.

3. To remove the adjustment shaft and its spiral gear, first remove the gear cover as directed in step 1. Then drive out the pin in the shaft collar. Drive out the shaft; the spiral gear, which is keyed to the shaft, will then fall free.

4. To further disassemble the unit, the slide must be dismounted from the bracket, as shown in Figure 68. To do this, remove the six screws which secure it. Drive out the pin in the collar at the top of the screw. Then drive out the screw through the bottom of the slide.

5. To reassemble the unit, reverse the procedure given above. After installing the platen and its gib, tighten the gib setscrews sufficiently to take up all sideplay; do not overtighten, since this will make adjustment of the platen height difficult.
V. REPLACEMENT PARTS

HOW TO ORDER REPLACEMENT PARTS

1. All replacement parts are keyed on the drawings which follow. Two types of numbers are used on these drawings:
   A. Standard Part Numbers. These are usually formed by two pairs of digits with a letter between (for example: 01N21, 1BV69). A few parts have straight digit sequence (3389) or one letter followed by several digits (A-694221). Each standard part number is accompanied by a descriptive word or words.
   B. Hardware Symbols. These usually have several letters preceding one or two digits. (For example: M-LO-2, M-PP-S-3.) Hardware symbols are usually accompanied on drawings by a one word description.

2. Order standard parts by part number and part name, as shown on drawings. DO NOT ORDER BY PART NUMBER ALONE.

3. For hardware, look up symbols in hardware list at back of book. You will find there a full description. 'Hardware' items can usually be purchased locally. When ordering hardware from LINDE, be sure to include the complete description given in the hardware list. Do not order hardware by the symbol alone.

4. When ordering, be sure to state quantity of each part needed.

5. 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. The 'series no.' is the first digit of the serial number, wherever the serial number starts with a digit, followed by a letter. When the serial number starts with one or two letters, always give the complete number.

6. Indicate any special shipping instructions.

7. Order replacement parts from the LINDE district office nearest you. (See back cover.)
FIG. 69 - "Unionmelt" "UE" Welding Head Assembly

- 20X91 (Single Lead 12 rpm Gears)
- 21X45 (Double Lead 24 rpm Gears)
FIG. 71 – "Unionmelt" "UE" 90-degree Welding Head Assembly – 20X90
PART NO. 19V52
25° CURVED NOZZLE ASSEMBLY
FOR SHEET METAL OR FILLET WELDING
FOR 3/32" TO 5/32" WIRE

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Qty.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>19V50</td>
<td>1</td>
<td>Curved Nozzle</td>
</tr>
<tr>
<td>41W99</td>
<td>1</td>
<td>Ins. Sleeve</td>
</tr>
<tr>
<td>19N43</td>
<td>1</td>
<td>Tip Nut</td>
</tr>
<tr>
<td>19N47</td>
<td>1</td>
<td>Tip for 3/32&quot; Wire</td>
</tr>
<tr>
<td>19N48</td>
<td>1</td>
<td>Tip for 1/8&quot; Rod</td>
</tr>
<tr>
<td>19N49</td>
<td>1</td>
<td>Tip for 5/32&quot; Wire</td>
</tr>
<tr>
<td>N-HJ-B-21</td>
<td>1</td>
<td>5/8&quot;-11 Hex. Brass Lock Nut</td>
</tr>
</tbody>
</table>

WIRE GUIDE 18N11
(Not incl. in assembly)

7.5/32" 7.5/32"

INSULATING SLEEVE - 41W99

25° CURVED NOZZLE
19V50 1/16" TO 5/32" WIRE
19V51 3/16" TO 1/4" WIRE

TIP NUT - 19N43
TIP (SEE TABLE)

FOR FILLET WELDING
FOR SHEET METAL WELDING
CURVED NOZZLE ASSEMBLIES

HORIZONTAL BUSBAR EXTENSION - Used with UNIONMELT "UE" 90° Welding Head, 20×90°. Must be ordered separately.

NOZZLES AVAILABLE

<table>
<thead>
<tr>
<th>ROD SIZE</th>
<th>45 DEG. CURVATURE PART NO.</th>
<th>60 DEG. CURVATURE PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8&quot;</td>
<td>16N74</td>
<td>16N78</td>
</tr>
<tr>
<td>5/32&quot;</td>
<td>16N75</td>
<td>16N79</td>
</tr>
<tr>
<td>3/16&quot;</td>
<td>16N76</td>
<td>16N80</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>16N77</td>
<td>16N81</td>
</tr>
<tr>
<td>5/16&quot;</td>
<td></td>
<td>16N82</td>
</tr>
</tbody>
</table>

PART NO. 19V53
25° CURVED NOZZLE ASSEMBLY
FOR 3/16" & 1/4" WIRE

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Qty.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>19V51</td>
<td>1</td>
<td>Curved Nozzle</td>
</tr>
<tr>
<td>41W99</td>
<td>1</td>
<td>Ins. Sleeve</td>
</tr>
<tr>
<td>19N43</td>
<td>1</td>
<td>Tip Nut</td>
</tr>
<tr>
<td>19N50</td>
<td>1</td>
<td>Tip for 3/16&quot; Wire</td>
</tr>
<tr>
<td>19N51</td>
<td>1</td>
<td>Tip for 1/4&quot; Wire</td>
</tr>
<tr>
<td>N-HJ-B-21</td>
<td>1</td>
<td>5/8&quot;-11 Hex. Brass Lock Nut</td>
</tr>
</tbody>
</table>

WIRE GUIDE 18N11
(Not incl. in assembly)

29W02
EXTENSION BRACKET

16N72 INSULATING SLEEVE

16N73 INSULATING SLEEVE

The contact jaws, replaceable parts of the busbar assembly, are used to introduce welding current to the wire.

<table>
<thead>
<tr>
<th>Wire Size, In.</th>
<th>Movable Jaw</th>
<th>Stationary Jaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32</td>
<td>Part No. 07V11</td>
<td>Part No. 12W83</td>
</tr>
<tr>
<td>1/8</td>
<td>Part No. 07V13</td>
<td>Part No. 13W31</td>
</tr>
<tr>
<td>3/32</td>
<td>Part No. 09V31</td>
<td>Part No. 25W22</td>
</tr>
<tr>
<td>3/16</td>
<td>Part No. 07V14</td>
<td>Part No. 13W32</td>
</tr>
<tr>
<td>1/4</td>
<td>Part No. 07V15</td>
<td>Part No. 13W33</td>
</tr>
<tr>
<td>5/16</td>
<td>Part No. 07V16</td>
<td>Part No. 13W34</td>
</tr>
</tbody>
</table>

18-IN. EXTENSION TUBE 16N72

Threads of extension tube should be lubricated with Crawford Fitting Company's "Blue Goop" Lubricant.

FIG. 72 – Nozzle Assemblies and Contact Jaws
NOTE: This drawing covers motors with serial numbers above 285421.
To replace field coils or frame, order Assembly No. 51V33.

NOTE FOR REWINDING SPECIFICATIONS REQUEST O/WG 53W81

FIG. 73 – Motor Assembly – 07V48
FIG. 75 — 32-Volt Motor and Plug Assembly — 57V25
FIG. 76 – Unit Support Assembly – 07V49

FIG. 77 – Fixed Gear Housing Assembly – 07V44 (Single Lead 12 rpm Gears)
18V87 (Double Lead 24 rpm Gears)
NOTE: Switch studs when welding wire is desired in vertical position. Place studs in "X" holes for wire in horizontal position and in "Y" holes for vertical position.

FIG. 81 – 90-degree Movable Gear Housing – 09V59
JAWS AVAILABLE FOR USE WITH TYPE "U" WELDING HEAD

<table>
<thead>
<tr>
<th>WIRE SIZE</th>
<th>MOVABLE JAW</th>
<th>STATIONARY JAW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/16</td>
<td>07V11</td>
<td>12W83</td>
</tr>
<tr>
<td>1/8</td>
<td>07V13</td>
<td>13W31</td>
</tr>
<tr>
<td>3/32</td>
<td>07V31</td>
<td>25W22</td>
</tr>
<tr>
<td>1/4</td>
<td>07V44</td>
<td>13W32</td>
</tr>
<tr>
<td>5/32</td>
<td>07V15</td>
<td>13W33</td>
</tr>
<tr>
<td>3/16</td>
<td>07V6</td>
<td>13W34</td>
</tr>
</tbody>
</table>

A ONE SET OF TWO SETS OF THREE AND TWO SETS OF FOUR JAWS FURNISHED WITH WELDING HEAD ASSEMBLY 20X58 & 20X59.

PARTS SHOWN WITH SYMBOL ARE PACKED IN A BAG AND MUST BE PURCHASED SEPARATELY. FOR COMPLETE SETS OF PARTS IN BAG, ORDER PART NO. 19V92.

FIG. 82 - Complete Busbar Assembly - 09V01

FIG. 83 - Hopper Assembly - 09V39
FIG. 84 – Mounting Bracket Assembly – 09V03
FIG. 85 - Hinged Support Assembly - 09V41
FIG. 86 – Expansion Wire Reel Assembly – 29V31

FIG. 87 – Wire Reel Bracket – 19V90

PARTS SUPPLIED

<table>
<thead>
<tr>
<th>QUAN.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-H-299</td>
<td>2 BOLT</td>
</tr>
<tr>
<td>N-H-7</td>
<td>2 NUT</td>
</tr>
<tr>
<td>W-L-19</td>
<td>2 LOCKWASHER</td>
</tr>
</tbody>
</table>
Standard Large Wire Reel Assembly – 07V69

Large Wire Reel Assembly for Mounting on CM-37 Carriage – 38V22 and Mounting Plate Assembly 29V11

Large Wire Reel Assembly for Mounting on OM-48 Carriage – 38V22
FIG. 89 — Guiding Device Assembly — 07V92

FIG. 90 — Wheel and Block Assembly — 07V91

FIG. 91 — Wheel Assembly — 07V95
(2) S-C-71 - SCREW
(2) N-H-I - NUT
(2) W-6 - WASHER

INSERT-25W43
(3) SUPPLIED WITH ASSEMBLIES 20X58 & 20X90

WELDING COMPOSITION RECEIVER AND SWIVEL ARM ASSEMBLY 07V67 FIG. 93

NUT-14W25
SEAT-14W34

PLATE AND LINK ASSEMBLY-07V68 FIG. 94

FIG. 92 - Welding Composition Distributing Assembly - 07V08
FIG. 93 - Welding Composition Receiver and Swivel Arm Assembly - 07V67

FIG. 94 - Plate and Link Assembly - 07V68

FIG. 95 - Rocker Hinge Assembly - 19V79
FIG. 96 – Carriage Guide Wheel Assembly – 09V48

FIG. 97 – Nozzle Guide Wheel Assembly – 08V94
FIG. 98 — Current Relay Assembly — 18V56
FIG. 99 - Dimensional Outline: "UE" Head Mounted on CM-37 Carriage
# HARDWARE LIST

It will save you time and money to purchase these hardware items through local outlets, or directly from the specified manufacturer. If no other source of supply is available, you may order these from us.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-H-299</td>
<td>5/8-in.-11 x 5 Hex Head Bolt</td>
<td>P-G-45</td>
<td>1/8 x 1-1/4-in. Groov-Pin</td>
</tr>
<tr>
<td>K-A-3</td>
<td>3/32-in. Allen Hex Key</td>
<td>P-R-5-2</td>
<td>#59-022-094-0625 ESNA Roll Pin</td>
</tr>
<tr>
<td>K-A-6</td>
<td>3/16-in. Allen Hex Key</td>
<td>P-T-54</td>
<td>No. 0 x 7/8-in. Taper Pin</td>
</tr>
<tr>
<td>K-W-3</td>
<td>#404 (1/8 x 1/2-in.) Woodruff Key</td>
<td>P-T-104</td>
<td>#4 x 2-in. Taper Pin</td>
</tr>
<tr>
<td>K-W-5</td>
<td>Woodruff No. 406</td>
<td>P-T-128</td>
<td>#6 x 2-3/4-in. Taper Pin</td>
</tr>
<tr>
<td>K-W-9</td>
<td>Woodruff No. 606</td>
<td>R-FL-T-B-28</td>
<td>1/8 x 1-1/4-in. Tubular Flat Head</td>
</tr>
<tr>
<td>M-B-SP-1</td>
<td>1/2-13 x 1-1/2-in. J. H. Williams Threaded Plain Eye Bolt</td>
<td>R-R-28</td>
<td>1/8 x 1/4-in. Rivet</td>
</tr>
<tr>
<td>P-M-C-GE-26</td>
<td>Simplex Tirex Cord, Type “SO”, #16 Ga. 1-Conductor</td>
<td>R-R-50</td>
<td>3/16 x 1/2-in. Rivet</td>
</tr>
<tr>
<td>P-M-C-GE-27</td>
<td>Simplex Tirex Cord, Type “SO”, #16 Ga. Two-Conductor</td>
<td>S-B-190</td>
<td>#10-32 x 3/16-in. Binding Head Machine Screw</td>
</tr>
<tr>
<td>P-M-C-GE-29</td>
<td>Simplex Tirex, Type “SO”, #16 Ga. Four-Conductor</td>
<td>S-BH-57</td>
<td>#4-48 x 1/4-in. Button Head Machine Screw</td>
</tr>
<tr>
<td>M-C-P-2</td>
<td>1/4-in. Black Iron Pipe Cap</td>
<td>S-BH-103</td>
<td>#6-32 x 1/4-in. Button Head Machine Screw</td>
</tr>
<tr>
<td>M-CL-2</td>
<td>1/2-in. Galvanized Pipe Clamp</td>
<td>S-C-52-1</td>
<td>#10-32 x 1/4-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>M-GC-1</td>
<td>Grease Cup (Crane Cat. #198, 1/8-in. Pipe Thread, Size #00)</td>
<td>S-C-53</td>
<td>#10-32 x 3/8-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>M-LO-1</td>
<td>3/8-in. Pipe Octagonal Conduit Locknut</td>
<td>S-C-63</td>
<td>1/4-20 x 3/8-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>M-P-C-3</td>
<td>3/8 x 1-in. Clevis Pin</td>
<td>S-C-64</td>
<td>1/4-20 x 1/2-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>M-PP-C-1</td>
<td>1/8-in. Headless Pipe Plug</td>
<td>S-C-68</td>
<td>1/4-20 x 3/4-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>M-WC-30</td>
<td>35/64 x 13/16 x 1/16-in. Annealed Copper Washer</td>
<td>S-C-69</td>
<td>1/4-20 x 1-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-H-1</td>
<td>1/4-in.-20 Hex Nut</td>
<td>S-C-71</td>
<td>1/4-20 x 1-1/4-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-H-3</td>
<td>3/8-in.-16 Hex Nut</td>
<td>S-C-79</td>
<td>1/4-20 x 1-3/4-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-H-5</td>
<td>1/2-in.-13 Hex Nut</td>
<td>S-C-84</td>
<td>1/4-28 x 1-1/2-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-H-7</td>
<td>5/8-in.-11 Hex Nut</td>
<td>S-C-94</td>
<td>5/16-18 x 3/4-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-H-8</td>
<td>3/4-in.-10 Hex Nut</td>
<td>S-C-95</td>
<td>5/16-in.-18 x 7/8-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-H-17</td>
<td>1/4-in.-28 Hex Nut</td>
<td>S-C-98</td>
<td>5/16-in.-18 x 1-1/2-in. Socket Head Cap Screw</td>
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<tr>
<td>N-H-21</td>
<td>1/2-in.-20 Hex Nut</td>
<td>S-C-125</td>
<td>3/8-16 x 3/4-in. Socket Head Cap Screw</td>
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<tr>
<td>N-H-48</td>
<td>#10-32 Hex Nut</td>
<td>S-C-149</td>
<td>3/8-24 x 1-1/4-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-H-49</td>
<td>No. 12-28 Hex Nut</td>
<td>S-C-150</td>
<td>3/8-24 x 1-1/2-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-HJ-2</td>
<td>5/16-in.-24 Hex Jam Nut</td>
<td>S-C-154</td>
<td>3/8-24 x 2-1/2-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-HJ-15</td>
<td>1/4-in.-20 Hex Jam Nut</td>
<td>S-C-219</td>
<td>1/2-13 x 5-in. Socket-Head Cap Screw</td>
</tr>
<tr>
<td>N-HJ-19</td>
<td>1/4-in.-13 Hex Jam Nut</td>
<td>S-C-228</td>
<td>1/2-20 x 1-in. Socket Head Cap Screw</td>
</tr>
<tr>
<td>N-HJ-B-21</td>
<td>5/8-in.-11 Hex Brass Jam Nut</td>
<td>S-C-229</td>
<td>1/2-20 x 1-1/4-in. Socket Head Cap Screw</td>
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<td>SYMBOL</td>
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<td>S-C-232</td>
<td>1/2-20 x 2-in. Socket Head Cap Screw</td>
<td>S-R-B-1</td>
<td>#2-56 x 1/8-in. Round Head Brass Machine Screw</td>
</tr>
<tr>
<td>S-D-PK-U-2</td>
<td>#00 x 3/16-in. Parker-Kalon Drive Screw</td>
<td>S-R-B-104</td>
<td>#6-32 x 5/16-in. Round Head Brass Machine Screw</td>
</tr>
<tr>
<td>S-D-PK-U-8</td>
<td>#2 x 3/16-in. Parker-Kalon Drive Screw</td>
<td>SS-C-90</td>
<td>No. 10-32 x 5/16-in. Socket Headless Cup Point Setscrew</td>
</tr>
<tr>
<td>S-F-179</td>
<td>#10-24 x 7/8-in. Fillister Head Machine Screw</td>
<td>SS-C-91</td>
<td>#10-32 x 3/8-in. Headless Cup Point Setscrew</td>
</tr>
<tr>
<td>S-F-250</td>
<td>1/4-20 x 3/4-in. Fillister Head Machine Screw</td>
<td>SS-C-102</td>
<td>1/4-in.-20 x 3/8-in. Socket Headless Cup Point Setscrew</td>
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<tr>
<td>S-FL-104</td>
<td>No. 6-32 x 5/16-in. Flat Head Machine Screw</td>
<td>SS-C-114</td>
<td>1/4-28 x 1/4-in. Headless Cup Point Setscrew</td>
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<tr>
<td>S-FL-106</td>
<td>#6-32 x 7/16-in. Flat Head Machine Screw</td>
<td>SS-C-116</td>
<td>1/4-in.-28 x 3/8-in. Socket Headless Cup Point Setscrew</td>
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<td>S-FL-108</td>
<td>#6-32 x 5/8-in. Flat Head Machine Screw</td>
<td>SS-C-132</td>
<td>5/16-in.-18 x 5/8-in. Socket Headless Cup Point Setscrew</td>
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<td>S-H-2</td>
<td>1/4-20 x 5/8-in. Hex Head Cap Screw</td>
<td>SS-CO-83</td>
<td>#10-24 x 5/8-in. Headless Cone Point Setscrew</td>
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<td>S-H-4</td>
<td>1/4-20 x 7/8-in. Hex Head Cap Screw</td>
<td>SS-CO-93</td>
<td>#10-32 x 1/2-in. Headless Cone Point Setscrew</td>
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<tr>
<td>S-H-5</td>
<td>1/4-20 x 1-in. Hex Head Cap Screw</td>
<td>SS-CO-106</td>
<td>1/4-in.-20 x 3/4-in. Socket Headless Cone Point Setscrew</td>
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<tr>
<td>S-H-6</td>
<td>1/4-20 x 1-1/4-in. Hex Head Cap Screw</td>
<td>S-T-2</td>
<td>#10-24 x 3/4-in. Type &quot;C&quot; Williams Thumbnut</td>
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<tr>
<td>S-H-34</td>
<td>5/16-18 x 7/8-in. Hex Head Cap Screw</td>
<td>S-T-25</td>
<td>3/8-16 x 1-1/4-in. Type &quot;C&quot; Williams Thumbnut</td>
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<tr>
<td>S-H-35</td>
<td>5/16-18 x 1-in. Hex Head Cap Screw</td>
<td>W-5</td>
<td>#10 S.A.E. Washer</td>
</tr>
<tr>
<td>S-H-48</td>
<td>5/16-24 x 3/4-in. Hex Head Cap Screw</td>
<td>W-6</td>
<td>#12 S.A.E. Washer</td>
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<tr>
<td>S-H-51</td>
<td>5/16-24 x 1-1/4-in. Hex Head Cap Screw</td>
<td>W-7</td>
<td>1/4-in. S.A.E. Washer</td>
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<tr>
<td>S-H-63</td>
<td>3/8-16 x 3/4-in. Hex Head Cap Screw</td>
<td>W-11</td>
<td>1/2-in. S.A.E. Washer</td>
</tr>
<tr>
<td>S-H-224</td>
<td>1/2-in.-20 x 1-1/4-in. Hex Head Cap Screw</td>
<td>W-B-2-1</td>
<td>#5 S.A.E. Brass Washer</td>
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<tr>
<td>S-H-226</td>
<td>1/2-13 x 7/8-in. Hex Head Cap Screw</td>
<td>W-L-1</td>
<td>1/4 x 3/32 x 1/16-in. S.A.E. Lock Washer</td>
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<tr>
<td>S-H-235</td>
<td>1/2-13 x 3-in. Hex Head Cap Screw</td>
<td>W-L-4</td>
<td>5/16 x 1/8 x 1/16-in. S.A.E. Lock Washer</td>
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<tr>
<td>S-H-240</td>
<td>1/2-13 x 4-1/2-in. Hex Head Cap Screw</td>
<td>W-L-19</td>
<td>5/8 x 13/64 x 5/32-in. Steel Lock Washer</td>
</tr>
<tr>
<td>S-H-240-2</td>
<td>1/2-20 x 1/2-in. Hex Head Cap Screw</td>
<td>W-L-20</td>
<td>5/8 x 13/64 x 3/32-in. S.A.E. Lock Washer</td>
</tr>
<tr>
<td>S-H-244</td>
<td>1/2-20 x 1-1/4-in. Hex Head Cap Screw</td>
<td>W-L-27</td>
<td>3/4 x 1/4 x 1/8-in. S.A.E. Lock Washer</td>
</tr>
<tr>
<td>S-H-247</td>
<td>1/2-20 x 2-in. Ig. Hex-Head Cap Screw</td>
<td>W-S-B-7</td>
<td>1/4-in. S.A.E. Small Pattern, Brass Washer</td>
</tr>
<tr>
<td>S-H-322</td>
<td>3/4-10 x 3-in. Hex Head Cap Screw</td>
<td>W-SH-L-5</td>
<td>1/4 x 1/2 x .025 Shakeproof Lock Washer</td>
</tr>
<tr>
<td>S-R-55</td>
<td>#4-48 x 5/16-in. Round Head Machine Screw</td>
<td>W-SL-12</td>
<td>No. 12 x 1/16-in. x 3/64-in. Steel Lock Washer</td>
</tr>
<tr>
<td>S-R-172</td>
<td>No. 10-24 x 1/4-in. Round Head Machine Screw</td>
<td></td>
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</tbody>
</table>
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LINDE Oxygen, Nitrogen, Argon, Neon, Helium, Krypton, Xenon, Hydrogen
PREST-O-LITE Acetylene

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OXWELD Apparatus for Cutting, Joining, Treating, and Forming Metals Acetylene Generators Manifolds, Regulators and Valves Welding Rods and Supplies
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General Office: 30 East 42nd Street, New York 17, N. Y.

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30 East 42nd Street, New York 17, N. Y.

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In Canada
LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited
40 St. Clair Ave., E., Toronto 7, Canada

Outside United States and Canada
Linde Department
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A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y., U. S. A.