INSTALLATION and OPERATION INSTRUCTIONS for Oxweld CM-15-18 & CM-15-36 OXY-ACETYLENE SHAPE-CUTTING MACHINES

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Be Sure this Booklet Reaches the Operator. You Can Get Extra Copies Through Any LINDE Office.
OTHER INSTRUCTION MATERIAL PERTAINING TO THE CM-15 CUTTING MACHINES

F-9115 Maintenance Instructions for OXWELD CM-15-18 and CM-15-36 Cutting Machines

F-9055 Installation Instructions for OXWELD Cutting Machine Table Frame for CM-15-36 Machine

F-6518-A Replacement Parts for OXWELD CM-15-18 (Series 1) Shape-Cutting Machine

F-5878 Replacement Parts for OXWELD CM-15-36 Cutting Machine

F-8060 Installation, Operation and Maintenance of Magnetic Tracers Used on OXWELD Cutting Machines. Includes "How to Make Magnetic Templets."

F-5510 How to Prepare Strip Templets

F-4255 Stack Cutting

F-5918 How to Make Better Machine Cuts

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GENERAL INFORMATION

NOTE

The information contained in this booklet applies to both the CM-15-18 and the CM-15-36 Cutting Machines, unless definitely labeled for a particular machine. The machines are identical in principle and in operation, differing only in size and in minor constructional details.

The OXWELD CM-15 is an oxy-acetylene shape-cutting machine designed for precision cutting of straight lines, circles, and irregular shapes. Its full capabilities can be realized only when properly installed, properly operated, and properly maintained. The instructions outlined in these pages are designed to enable you to obtain top performance from your machine with a minimum of trouble and expense.

The cutting areas of the machines are as follows:

CM-15-18 ............... 18 in. wide x 60 in. long
CM-15-36 ............... 36 in. wide x 100 in. long

The length of the cutting area can be extended indefinitely by increasing the table length. Each additional tracing table used with the CM-15-18 increases the length of the cutting area by 78 in. A standard 72-in. table frame extension is available for use with the CM-15-36 table frame.

The cutting blowpipe can be moved to cut anywhere within the cutting area without restriction. An adjustable holder permits the blowpipe to be raised and lowered through a distance of 12 inches. In addition, the blowpipe can be tilted in two directions for making beveled cuts.

The blowpipe and holder are mounted on a transverse arm which follows the motions of the drive unit and tracer head. The transverse arm is mounted on two parallel arms which are pivoted on the carriage. This provides sidewise motion of the blowpipe. This arrangement, combined with the lengthwise motion of the carriage as it rolls along the table rails, causes the blowpipe to cut an accurate reproduction of the pattern placed on the tracing table.

The pattern may be an aluminum strip tempter, a machined steel pattern, or simply a line drawing of the shape to be cut. The standard machine is equipped with a line-tracer head. An attachment is supplied to permit using strip templates. The magnetic tracer, available as an accessory, uses as a pattern a piece of steel plate (or angle) whose outline is machined (or formed) to the shape to be cut. Standard practice is to use line tracing for individual pieces and short-run items. Strip or plate templates are used when cutting shapes which are used steadily or in large quantity.

The CM-15 machine is powered by a 115 volt AC single-phase motor. An Eddy-Current type governor provides stepless speed regulation through a range of 2 to 30 inches per minute (machine speed). A 252:1 gear reduction unit is used to gear down the machine speed from the motor speed. This provides an ample reserve of power, giving the machine smooth, steady travel even under heavy load.

DOUBLE-BLOWPIPE OPERATION

(CM-15-18 Machine)

The standard machine is supplied with a blowpipe mounting tube, on which the blowpipe and holder are mounted.

Auxiliary equipment is available to provide double blowpipe operation. The items required are as follows:

<table>
<thead>
<tr>
<th>QUAN.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3798</td>
<td>Oxygen (Y) Outlet Connection</td>
</tr>
<tr>
<td>1</td>
<td>3799</td>
<td>Acetylene (Y) Outlet Connection</td>
</tr>
<tr>
<td>1</td>
<td>20V29</td>
<td>Double Blowpipe Arm Assembly</td>
</tr>
<tr>
<td>1</td>
<td>20V61</td>
<td>Blowpipe Holder Assembly</td>
</tr>
<tr>
<td>1</td>
<td>20V62</td>
<td>Double Blowpipe Mounting Bar Clamp Assembly</td>
</tr>
<tr>
<td>1</td>
<td>31V18</td>
<td>Acetylene Hose Assembly</td>
</tr>
<tr>
<td>2</td>
<td>31V19</td>
<td>Oxygen Hose Assembly</td>
</tr>
<tr>
<td>3</td>
<td>91W96</td>
<td>Neoprene 'O'-Ring</td>
</tr>
</tbody>
</table>

MULTIPLE-BLOWPIPE OPERATION

(CM-15-36 Machine)

The standard machine is supplied with one blowpipe extension arm (right-hand), on which the blowpipe and holder are mounted.

A counterweight is supplied for mounting on the opposite end of the transverse arm. This balances the weight of the extension arm and blowpipe, providing smoother machine operation.

Auxiliary equipment is available to permit cutting on either or both sides of the table at the same time. Tracer Arm Assembly 21V03, is designed for this purpose. It consists of a left-hand extension arm, bracket holder and blowpipe holder.

When using this Tracer Arm Assembly, additional equipment is required to supply oxygen and acetylene to the extra blowpipe. Additional parts required are listed below:

<table>
<thead>
<tr>
<th>QUAN.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20X98</td>
<td>Valve Block Assembly</td>
</tr>
<tr>
<td>2</td>
<td>18X55</td>
<td>90-degree &quot;B&quot; to &quot;B&quot; Oxygen Hose Connection Adaptor</td>
</tr>
<tr>
<td>1</td>
<td>18X56</td>
<td>90-degree &quot;B&quot; to &quot;B&quot; Acetylene Hose Connection Adaptor</td>
</tr>
<tr>
<td>2</td>
<td>31V18</td>
<td>Acetylene Hose Assembly</td>
</tr>
<tr>
<td>4</td>
<td>31V19</td>
<td>Oxygen Hose Assembly</td>
</tr>
<tr>
<td>6</td>
<td>91W96</td>
<td>Neoprene 'O'-Ring</td>
</tr>
<tr>
<td>2</td>
<td>38W55</td>
<td>Hose Support</td>
</tr>
<tr>
<td>3</td>
<td>N-H-1f</td>
<td>Hose Support Nut</td>
</tr>
<tr>
<td>3</td>
<td>W-9</td>
<td>Hose Support Plain Washer</td>
</tr>
<tr>
<td>2</td>
<td>W-L-7</td>
<td>Hose Support Lock Washer</td>
</tr>
</tbody>
</table>
In addition, work support of some kind will be needed for the additional cutting area. A standard Work Support, (Part No. 30V93) is available. Three of these supports will usually be sufficient for the standard cutting area. (See pages 6 to 8.)

Auxiliary equipment may also be obtained to provide multiple blowpipe operation. Two blowpipes can be mounted on either or both of the extension arms by using the parts listed below. These are the parts required for mounting two blowpipes on one side only of the machine. (Two sets of these additional parts, as well as one set of the parts listed above, will be necessary for dual mounting on both sides of the machine.)

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>31V28</td>
<td>Blowpipe Holder</td>
</tr>
<tr>
<td>ORS-874</td>
<td>Bracket and Cover Assembly</td>
</tr>
<tr>
<td>44W79</td>
<td>Square Cross Bar (4 ft.)</td>
</tr>
<tr>
<td>3798</td>
<td>Oxygen “Y” Outlet Connection (2 Used)</td>
</tr>
<tr>
<td>3799</td>
<td>Acetylene “Y” Outlet Connection</td>
</tr>
<tr>
<td>31V20 (1)</td>
<td>Acetylene Hose Assembly</td>
</tr>
<tr>
<td>31V21 (2)</td>
<td>Oxygen Hose Assembly</td>
</tr>
<tr>
<td>91W86 (3)</td>
<td>Neoprene “O”-Ring</td>
</tr>
<tr>
<td>---</td>
<td>Necessary Blowpipes and Nozzles</td>
</tr>
</tbody>
</table>

I. INSTALLATION PROCEDURE, CM-15-18 MACHINE

A. Installing the Table Frame

The CM-15-18 can be moved from place to place as the work demands. However, it is recommended that a permanent location be selected where most of the cutting can be done.

A suitable permanent support for the machine can be fabricated by welding lengths of 2-inch angle iron into a sturdy rectangular structure. This would consist of two or three pairs of legs held together by welded-on cross members. The support should be constructed to the dimensions of the standard tracing table which is supplied with the machine -- 23-1/2 inches wide by 6 ft. 6 inches long. The height may be any distance suitable to the user. After installing the support, the tracing table should be bolted down to prevent shifting during operation.

For portable operation the tracing table may be placed on the plate to be cut. An alternate method is to use a pair of iron horses of suitable height, placed alongside the workpiece.

When a permanently installed table is to be used, a stationary type work support is recommended.

This will consist of three 2 foot lengths of angle iron or bars, welded to supporting legs. These legs can be cross-braced for additional rigidity.

B. Installing the Machine

Caution: The machine should never, at any time be lifted with a crane.

1. INSTALLING THE CHASSIS

(a) After installing the table frame and work supports, the machine chassis is placed upon the rails. (See Figure 1.) An arm lock is mounted on the top of the machine carriage for use when moving the machine. This lock should always be engaged in the right hand pivot arm, and the tracing head locked in the raised position, when the machine is to be moved. To lock the tracing head, first rotate the stop assembly knob (see Figure 1) until the shoulder on the knob is aligned with the slot in the retaining nut. Pulling outward on the knob with one hand, grasp the drive barrel with the other hand and lift it as high as it will go. Then re-

Fig. 1 - CM-15-18 Installed on Table Rails

Fig. 2 - Installing Blowpipe Mounting Tube
lease the stop assembly knob. The knob should snap into place, holding the drive barrel in the raised position. If it does not, lower the barrel slightly until the knob is able to seat itself.

(b) Insert the blowpipe mounting tube into the tracer arm, with the rack upward. Then tighten the clamping bolts. (See Figure 2.)

(c) Slide the blowpipe holder onto the mounting tube until the pinion engages the rack. Rotate the knob to position the blowpipe holder on the tube. Caution: The rack on the tube is 24 pitch and the rack on the blowpipe is 32 pitch. Do not confuse the blowpipe clamp with the mounting tube clamp (see Figure 3) or the racks and pinions will be damaged. (The pinion in the

mounting tube clamp is larger than the pinion in the blowpipe clamp.)

2. INSTALLING THE BLOWPIPE

The blowpipe is not supplied with the machine, and must be ordered separately. Types recommended for use with the CM-15-18 machine are the C-37 (for low- or medium-pressure acetylene) and C-39 (for medium-pressure acetylene only) cutting blowpipes.

To install the blowpipe on the machine, simply slide it into the blowpipe holder. Rotate the hand wheel, to engage the pinion in the blowpipe rack (see Figure 4).

The equipment supplied with the machine provides for single blowpipe operation. Refer to page 3 for a list of additional equipment required for twin blowpipe operation.

3. CONNECTING THE GAS LINES

Hose assemblies are supplied with the machine. The shorter hose assemblies connect the valve block to the inlet manifold connections. The longer hose assemblies connect the blowpipe to the valve block. (See Figure 5.) Hose for the machine supply lines is not furnished, since the lengths vary with each installation. Three lengths of 3/8-in. hose are required, two for oxygen and one for acetylene. They should be long enough to allow for the full travel of the machine. It is advisable to band these supply lines together, using the neoprene "O"-rings, Part No. 81W96 supplied, and to suspend them
from a hanger or support. This will protect the hose and also prevent its weight from impeding the free movement of the machine.

4. ELECTRICAL CONNECTION

The machine is built to operate on 110-120 volt, single phase, 60 cycle alternating current. A 3-wire cable is supplied as part of the machine. The cable is equipped with a 3-prong plug. This is for use in plants where a third (ground) wire is permanently installed in the 110-120 volt wiring system. For connecting the cable into 2-wire systems a three-to-two prong adaptor is supplied. The ground connection is brought out as a separate wire at the side of the adaptor. This ground wire should be attached to any suitable ground connection available.

Two fuses, of 2 amperes each, protect the motor and wiring circuits. Figure 6 shows the CM-15-18 machine completely assembled.

II. INSTALLATION PROCEDURE, CM-15-36 MACHINE

A. Installing the Table Frame

Installation procedure for the machine table frame is given in the booklet entitled "Installation Instructions for CM-15-36 Table Frame" (Form No. 9055). A copy of this booklet is packed with the table frame parts. Figures 7 to 14 show recommended methods of supporting workpiece for cutting.

Figure 7 - Recommended method of supporting the workpiece for cutting. This arrangement is suitable for most ordinary types of work. Flat surfaces immediately below the work are avoided. This prevents hot slag from accumulating close to the work where it could contribute to heating and consequent distortion. The cast iron pedestals (see Figure 8 for detail) can be located to suit the size and shape of the work, and to avoid the line of cut. These pedestals are quite durable, since cast iron is resistant to damage by the cutting jet. Refer to Figure 12 for dimension details on the above work support system.
Figure B - Cast iron pedestal for supporting workpiece as shown in Figure 7. This pedestal is manufactured by the United Boiler Heating and Foundry Company, Inc., 4909 Homan Ave., Hammond, Indiana. The pattern number is U.B.-5048, and the casting sells, at this writing, for less than $2.00 apiece, F.O.B. Hammond, Indiana.

Alternate methods for supporting workpiece. 
(See Figures 13 and 14 for Dimensions.)

REFERENCE NOTES, FIGURES 7, 9, AND 10.

Note 1. Standard cast iron work support. Three of these supports will usually be sufficient for one work area.

Note 2. Steel beam. Two 6-inch I-beams 12-feet long would be suitable for most work.

Note 3. Angle iron. For most work, 4-inch angles 5-feet long should be sufficient.

Note 4. Cast iron pedestals to support the workpiece. These can be purchased (see Figure 8), or made by the customer in his own shop.

Note 5. If the work is very heavy, 1/2-inch x 1-1/2-inch long bolts will be used to attach the pedestals to the angle iron. For light work, it is more convenient to leave the pedestals free. They can then be readily shifted as required by the work.

Note 6. Angle iron with strip of steel bar stock tack-welded to it. Consists of 3- or 4-inch angle iron, 5-feet long, with 2-inch x 3/8-inch bar stock.

Note 7. Copper blocks, slotted to fit on bar stock mentioned in Note 6. The blocks can be shifted as required to support the work. These blocks would be made up by the customer. As the points wear down, all blocks should be machined to a common height, so that they continue to provide level support.

Note 8. Tee iron. Tees 2-1/2 to 3-inches by 5-feet long will be suitable.
FIG. 11

RANGE OF BLOWPIPE ADJUSTMENT ABOVE WORK SUPPORTS.

FIG. 12

DIMENSIONS FOR SET UP SHOWN IN FIG. 7

FIG. 13

DIMENSIONS FOR SET UP SHOWN IN FIG. 9

FIG. 14

DIMENSIONS FOR SET UP SHOWN IN FIG. 10
B. Installing the Machine

Caution: The machine should never, at any time, be lifted with a crane.

1. INSTALLING THE CHASSIS

(a) After installing the table frame and work supports, the machine chassis is placed upon the rails. (See Figure 15.) Four men will be needed to lift the machine and set it on its rails. The machine should be lowered on to the rails very carefully in order to avoid damage to the wheels and rail disk scrapers. An arm lock is mounted on the top of the machine carriage for use when moving the machine. This lock should always be engaged in the right hand pivot arm, and the tracing head locked in the raised position, when the machine is to be moved. To lock the tracing head, first rotate the stop assembly knob (see Figure 1) until the shoulder on the knob is aligned with the slot in the retaining nut. Pulling outward on the stop assembly knob with one hand, grasp the drive barrel with the other hand and lift it as far as it will go. The stop assembly knob should snap into place. If it does not, lower the drive barrel until the knob is able to seat itself.

(b) Mount the blowpipe extension arm on the machine transverse arm (see Figure 16). Use the 1/2-in. - 13 x 2-1/8-in. long cap screws, and the washers, lock washers and nuts supplied. The head of the bolt should be outward. Place a plain washer and a lock washer under the bolt head. Use a plain washer under the nut.

(c) Mount the counterweight on the opposite end of the transverse arm, using the same size hardware as above.

(d) Install the hose support by screwing it into the threaded hole in the center of the extension arm. Lock it in place with the locknut.

(e) Mount the blowpipe holder on its bracket as shown in Figure 17.

2. INSTALLING THE BLOWPIPE

The blowpipe is not supplied with the machine, and must be ordered separately. Types recommended for use with the CM-15 machine are the C-37 (for low- or medium-pressure acetylene) and C-39 (for medium-pressure acetylene only) cutting blowpipes.

To install the blowpipe on the machine, simply slide it into the blowpipe holder. Rotate the hand wheel, to engage the pinion in the blowpipe rack (see Figure 18).

Figure 19 shows the CM-15-36 machine completely assembled.

The equipment supplied with the machine provides for single blowpipe operation. Refer to page 3 for a list of additional equipment.
3. CONNECTING THE GAS LINES

Hose assemblies are supplied with the machine. The shorter hose assemblies connect the valve block to the inlet manifold connections. The longer hose assemblies connect the blowpipe to the valve block. Hose for the machine supply lines is not furnished, since the lengths vary with each installation. Three lengths of 3/8-in. hose are required, two for oxygen and one for acetylene. They should be long enough to allow for the full travel of the machine. It is advisable to band these supply lines together, using the neoprene "O" rings, Part No. 91W96 supplied, and to suspend them from a hanger or support. This will protect the hose and also prevent its weight from impeding the free movement of the machine.

4. ELECTRICAL CONNECTION

The machine is built to operate on 110-120 volt, single phase, 60 cycle alternating current. A 3-wire cable is supplied as part of the machine. The cable is equipped with a 3-prong plug. This is for use in plants where a third (ground) wire is permanently installed in the 110-120 volt wiring system. For connecting the cable into 2-wire systems a three-to-two prong adaptor is supplied. The ground connection is brought out as a separate wire at the side of the adaptor. This ground wire should be attached to any suitable ground connection available.

Two fuses, of 2 amperes each, protect the motor and wiring circuits.

III. OPERATING INSTRUCTIONS

Caution: Oil and grease may ignite explosively in the presence of oxygen under pressure. Do not allow oil or grease to come into contact with the hoses, connections or nozzles.

The instructions which follow, are for experienced operators. Operators who are not familiar with the general principles of operation and safe practices for oxy-acetylene equipment should read the OXWELD Instruction Manual in addition to these instructions. The Instruction Manual is obtainable without cost from any LINDE Office.

A. Preliminary Adjustments

Install the correct size nozzle in the blowpipe. (See instructions with the blowpipe or nozzle.) Turn on the motor, and adjust the governor speed control dial until the speedometer indicates the correct cutting speed. (For operation at extreme high or extreme low speeds the adjustable resistor on the Drive Motor should be reset to provide optimum performance. The procedure for doing this is explained in Booklet Form 6115 "Maintenance Instructions for CM-15 Machines" Sec. III, Para. A, Item 4, Page 13.) Check the alignment of the blowpipe templet and workpiece. To do this, slip the layout pointer over the blowpipe nozzle. Turn on the motor, and let the machine make a trial run completely around the templet. Observe the path of the nozzle. Make sure that the cut will be correctly located, and that it stays within the boundaries of the material at all points.

B. Gas Pressure Adjustment

1. ADJUSTING CUTTING OXYGEN PRESSURE
   (a) Single Blowpipe Operation
      (i) Open wide the cutting-oxygen valve on the blowpipe.
(ii) Open the cutting-oxygen valve on the valve block.

(iii) Turn the pressure-adjusting screw of the cutting-oxygen regulator clockwise until the regulator gauge indicates the correct pressure. (The blowpipe instruction book lists the correct pressure to be used for a given thickness of metal.)

(iv) Close the cutting-oxygen valve on the valve block.

The blowpipe valve remains wide open:
The control valve on the valve block is used for all further control of the cutting oxygen stream.

(b) Multiple Blowpipe Operation

The procedure is identical with that above, except that all blowpipe oxygen valves are opened wide before adjusting the regulator.

2. ADJUSTING PREHEAT GAS PRESSURES

(a) Single Blowpipe Operation

(i) Open the preheat gas valve on the valve block.

(ii) Open the blowpipe preheat-oxygen valve one or two full turns.

(iii) Turn the pressure-adjusting screw of the preheat oxygen regulator clockwise until the delivery-pressure gauge indicates the required pressure. (See blowpipe instruction booklet for correct preheat gas pressures.)

(iv) Close the preheat-oxygen valve on the blowpipe.

(v) Open the preheat acetylene valve on the blowpipe one full turn.

(vi) Turn the pressure-adjusting screw of the acetylene regulator clockwise until the delivery-pressure gauge indicates approximately the required pressure.

(vii) Close the blowpipe acetylene valve.

(viii) Light the blowpipe as directed in the instruction pamphlet supplied with the blowpipe.

(ix) Make final adjustments of preheat gas regulators and blowpipe valves. From this point, the dual quick-acting valve on the valve block is used to control the preheat gases.

(b) Multiple Blowpipe Operation

The procedure is identical with that above except that blowpipe valve adjustments in each case must be made to all blowpipes before proceeding to the subsequent step.

3. TEMPORARY SHUTDOWN

When the machine is to be idle for a half hour or longer, the gas pressure in the hose line should be relieved as follows:

(a) Close the supply valves to the regulators.

(b) Release the regulator adjusting screws.

(c) Open, then close, the valves on the valve block.

(d) Close the valves on the blowpipe.

C. Cutting Procedures

Careful planning will save considerable scrap material as well as time. When several different shapes, all of the same thickness, are required, the various designs can be drawn on one sheet of paper. The tracing wheel can then be guided directly from one shape to another without interrupting the cut.

Careful location of each pattern will reduce scrap to a minimum.

Multiple blowpipe operation should always be considered when planning mass-production of single items.

Stack-cutting is another time saving expedient. This consists of stacking a number of sheets of material and cutting through the entire stack at a single pass. For details, see the booklet "Stack-Cutting" (F-4255). This is supplied with the machine.

An adjustable blowpipe holder is fitted to the end of the blowpipe extension arm. This holder permits adjustment in three directions. By loosening the nuts at the pivots, the blowpipe can be tilted in two directions. This arrangement provides for making straight-line bevel cuts. A rack-and-pinion, controlled by the handwheel, permits raising and lowering the blowpipe in its supporting sleeve.

In addition, a horizontal rack-and-pinion drive is provided. It moves the entire blowpipe holder and blowpipe in a horizontal direction at right angles to the rails. This is used for drawing the blowpipe smoothly into the line of cut.

1. HAND GUIDED TRACING

The machine is supplied with a line tracer head mounted on the drive unit. No additional attachments are required for line tracing.

(a) Place a full-scale drawing of the pattern on the tracing table. It is recommended that a sheet of transparent material, such as "Vinylite" plastic sheet (1/32-in. to 1/16-in. thick) be placed over the drawing. This provides traction for the tracing wheel and at the same time protects the drawing.

(b) Make all preliminary adjustments, such as the location of work piece, adjustment of gas pressure, and placement of blowpipe.
Open the preheat valve on the valve block, then light the blowpipe. Make final adjustments to obtain the proper flame.

(c) Adjust the blowpipe vertically until the inner cones of the preheat flames are slightly above the surface of the plate. The location should be in the scrap a short distance away from the line of cut. Usually the work is arranged so that the cut can be started at the edge of the piece or at the edge of a previously-pierced hole. Sometimes it is found expedient to pierce a starting hole with the machine blowpipe at the time of starting the cut. This is not recommended, however, due to the adverse effect on the cutting nozzle. Piercing tends to clog the oriﬁces and burn the nozzle.

Once the cut has been started, the jet is guided smoothly into the line of cut. This is done either by steering the hand tracer, or by operating the adjusting handwheel on the rack-and-pinion drive on the end of the transverse arm.

(d) Lower the tracing head so that the tracer wheel rests on the table.

(e) When the metal has been brought to a red heat, open the cutting-oxygen valve on the valve block.

(f) As soon as the jet penetrates the metal, start the motor and steer the tracer wheel into the line of cut, guiding the tracing head by hand. Continue around the entire pattern.

(g) At the finish of the cut, close the cutting-oxygen and preheat valves on the valve block in that order.

2. STRIP-TEMPLET TRACING

Strip templets offer a convenient means for accurate, mass-production cutting of standardized shapes. Their use will save considerable time and reduce rejections to a minimum in repetitive cutting. Instructions for making aluminum strip templets are given in the booklet "How to Prepare Strip Templets for OXWELD Cutting Machines" (Form No. 5510). This booklet is supplied with the machine. Care in templet-making is essential for accurate cuts. Templets must have smooth sides, uniform bends, and must be held to gauge, particularly at the bends.

Templet-tracing procedure is as follows:

(a) Anchor the strip templet to the tracing table by means of clamps or weights.

(b) Slip the templet tracer guide over the tracing head and secure it by means of the knurled setscrews. Lower the tracing head onto the templet (Figure 20). The tracer wheel rides on top of the templet strip, and the guide rollers straddle the strip. Turn on the motor and make a trial run completely around the templet. Watch the blowpipe to make certain that the line of cut stays within the boundaries of the material.

(c) Make all preliminary adjustments such as relocation of the work piece or templet, and adjust the gas pressure as previously explained. By means of the Adjusting Hand Wheel move the blowpipe a short distance off the line of cut.* Open the preheat valve on the valve block and ignite the blowpipe.

(d) Adjust the blowpipe vertically until the inner cones of the preheat flames are slightly above the surface of the plate.

(e) When the metal has been brought to a red heat, open the cutting-oxygen valve on the valve block.

(f) As soon as the jet penetrates the metal, move the jet steadily into the line of cut, using the Adjusting Hand Wheel.

(g) When the jet reaches the line of cut, turn on the machine motor.

(h) When the cut is completed, close the cutting-oxygen valve, then the preheat gas valve, in that order.

3. STRAIGHT-LINE CUTTING

Three methods are available for making straight-line cuts: one method is to adjust the drive unit assembly so that the two pointers on the upper housing are set for the desired angular position. The drive unit assembly is then locked in this position using the knurled thumb screw on the side of the drive barrel. The work piece must be placed with its side exactly

* A gated templet (templet equipped with an auxiliary piece of strip on a pivot) makes it unnecessary to use the lead-in rack.
parallel with the table rail, so that the cut will be made at the angle selected.

A second method of making straight-line cuts is to use the grooved bar supplied with the machine. The bar is placed on the tracing table and weighted at each end. The tracing head is lowered so that the tracing wheel rides in the groove.

A third method, used for making a cut, or series of cuts, parallel to the table rails, is to use the Straight-Line Cutting Attachment (Figure 21). This Attachment is not supplied with the machine, but is available as an accessory. The Attachment locks the transverse arm in any desired position. The pointer on the drive unit housing is then set to zero position and the drive unit locked by means of the knurled thumb screw. Successive parallel cuts can then be made by unlocking the Straight-Line Cutting Attachment, shifting the blowpipe to the succeeding line of cut, then locking the Attachment.

4. MAGNETIC-TEMPLLET TRACING

Magnetic-templlet tracing is strongly recommended for maximum accuracy with highest production rates on repetitive work. This method uses a machined steel pattern or formed angle iron for a templlet. A magnetic tracing head is mounted on the drive unit in place of the line tracer. (Figure 22.) A knurled trunnion at the bottom of the magnetic tracing head contacts the edge of the steel pattern. The trunnion should be in contact with the pattern before turning on the power. Otherwise the sudden magnetic pull may cause the trunnion to slam against the pattern, and bend the trunnion shaft. The trunnion is kept in strong contact with the steel pattern by means of magnetic attraction. When the machine motor is turned on, the trunnion rolls around the machined edge of the pattern. Shapes cut by this method are accurate reproductions of the original pattern.

The drive barrel in the machine's drive unit is equipped with three holes in its side (one above the other) in which the stop assembly (see Figure 1) can seat itself. This makes it possible to position the drive barrel at three distinct heights above the tracing table. In this way the various templlet heights, as described in the booklet supplied with the magnetic tracer, can be accommodated by the magnetic tracer head.

The magnetic tracer and its power supply are not supplied with the CM-15 Cutting Machine, but are available as accessories. Detailed instructions for installation and operation, as well as templlet construction, are supplied with the Magnetic Tracer.

5. CIRCLE CUTTING

Circles from 3-1/2 to 18 inches in diameter can be cut by the CM-15-18 Cutting Machine. (For the CM-15-36: 1-1/2 to 36 inches in diameter.) A circular templlet can be used to advantage where there is frequent need for a particular size circle. For general use, however, the Circle Cutting Attachment is recommended. (Figure 23.)

The Attachment plate is placed on the tracing table, the pivot assembly stud inserted in the hole in the plate, and the radius bar installed in the slot in the pivot assembly. (Note. Install the radius bar so that the lock screw on the pivot assembly is on the opposite side of the pivot from the tracing head. (See Figure 23.) The outer end of the radius bar is then secured to the line tracer head by means of a knurled-head taper pin. A calibrated scale on the radius
bar permits quick adjustment for any size circle within the limits of the bar graduations. Simply slide the bar until the scribed lines on the pivot assembly are aligned with the desired circle radius. Then tighten the lock screw. Remember that a kerf allowance must be made. If a hole is to be cut out, the kerf allowances must be subtracted from the radius dimension. If a disc is wanted, the kerf allowance must be added to the radius dimension. The Circle-Cutting Attachment is provided with a means for accurately locating the center point location on the work piece for a circular cut. The procedure is as follows:

(a) Slip the Layout Pointer on to the blowpipe nozzle.
(b) Lift out the pivot assembly from the Circle-Cutting Attachment plate.
(c) In the Pivot Stud Bushing will be seen a narrow slot. Swing the tracer head over the bushing and lower the tracer wheel until it rests in the slot in the bushing. The Layout Pointer now indicates on the work the location of the center point of the circle to be cut.
(d) Shift the work piece (or the radius) until the desired location for the center point is directly beneath the Layout Pointer.

Fig. 23 - Circle-Cutting Attachment in Use

Fig. 24 - Adjusting Blowpipe Holder for Bevel-Cutting

(e) Lift the tracing head and swing it aside; then replace the Cutting Attachment Pivot Assembly in its mounting hole in the center of the plate.
(f) Remove the Layout Pointer.

6. BEVEL CUTTING

To make straight-line bevel cuts, simply loosen the nut on the blowpipe holder, tilt the blowpipe to the desired angle of bevel and tighten the nut (see Figure 24). Then follow the procedure for regular straight-line cutting as previously explained. Remember that bevel cuts require cutting through more metal than do regular cuts in the same plate. Gas pressures and cutting speed must be determined by the actual thickness of metal being cut.
### IV. PERIODIC SERVICING SCHEDULE

CAUTION: IMPORTANT! Oil and grease may ignite violently in the presence of oxygen under pressure. Be sure that no oil comes in contact with the oxygen or acetylene connections, hose, or blowpipes. Never lubricate the control valves.

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 hours (daily)</td>
<td>Wipe clean the table rails, using steel wool or a cloth dampened with a non-inflammable cleaning fluid. Apply a generous quantity of clean oil to the rail surfaces. For maximum smoothness of operation, rails should be kept clean and well lubricated at all times. Templets or surfaces over which the tracer assembly operates must be kept clean.</td>
</tr>
<tr>
<td>32 hours (4 days at 8 hours per day; or every day at 24 hours per day operation)</td>
<td>Clean the riding surfaces of the carriage wheels as explained above for rails. Remove the bearing dust caps on the Transverse Arm and wipe the exposed bearing surfaces with a clean, oiled cloth.</td>
</tr>
<tr>
<td>168 hours (Once a month at 8 hours per day; or once a week at 24 hours per day operation)</td>
<td>Remove Drive Unit assembly. Clean all surfaces, including inside of mounting bracket sleeve, using a cloth and cleaning fluid. Lubricate the drive unit parts with light grease before reassembly. Clean tracer head also. Apply a few drops of light oil to the tracer head shafts. Using S.A.E. No. 30 machine oil, put a few drops in each oil hole on the machine (CM-15-36), including those on the blowpipe holder and the tracer head. Oil cups on the motor and upper gear housing should be filled with S.A.E. No. 10 Oil.</td>
</tr>
<tr>
<td>1024 hours (6 months at 8 hours per day; or 8 weeks at 24 hours per day operation)</td>
<td>Inspect the motor brushes and governor contacts. Replace if necessary. Inspect the motor commutator and clean if necessary.</td>
</tr>
</tbody>
</table>
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