AIRCO®

No. 42 Camograph

Shape Cutting Machine

INSTRUCTIONS and PARTS

BEFORE INSTALLING, OPERATING, OR SERVICING, READ AND COMPLY WITH THESE INSTRUCTIONS

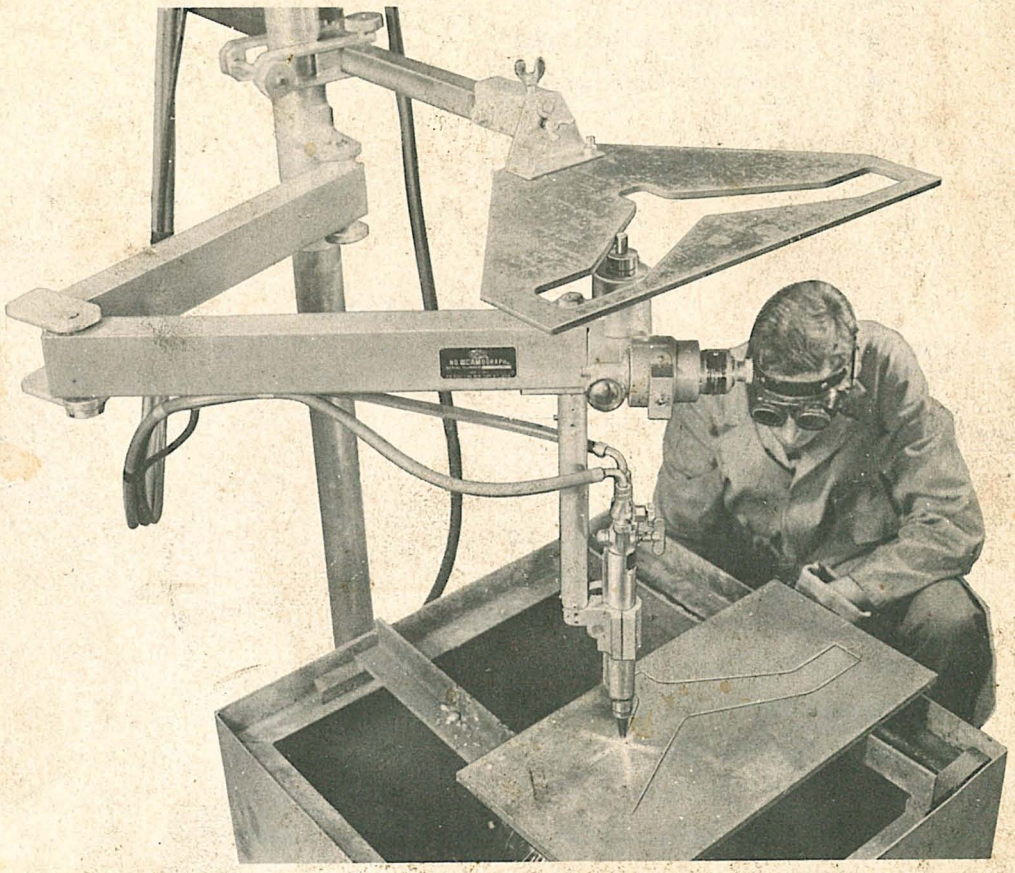
4A140

AIRCO®

ADI 1203C
STOCK NO. 804 4200

No. 42 Camograph®

SHAPE CUTTING MACHINE



INSTRUCTIONS and PARTS

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AUGUST 1975
SUPERSEDES: SEPTEMBER 1969

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LIST OF ILLUSTRATIONS

I. INTRODUCTION

The No. 42 CAMOGRAPH® (Figure 1) is a portable, single-torch, shape-cutting machine designed to cut shapes from steel sheet or plate. It will cut any shape that falls within the cutting area diagram (Fig. 2). The largest circle which can be cut has a diameter of 42 inches and the longest straight line is 92 inches.

The CAMOGRAPH is a swinging-arm type machine which employs a two-section arm assembly pivoted at its support end and at its center. The travel speed is established by the drive motor in conjunction with the diameter of the roller used.

Both the cam support arm and the arm assembly are provided with an adjustable clamping arrangement for mounting at the desired height and location on a tubular steel column.

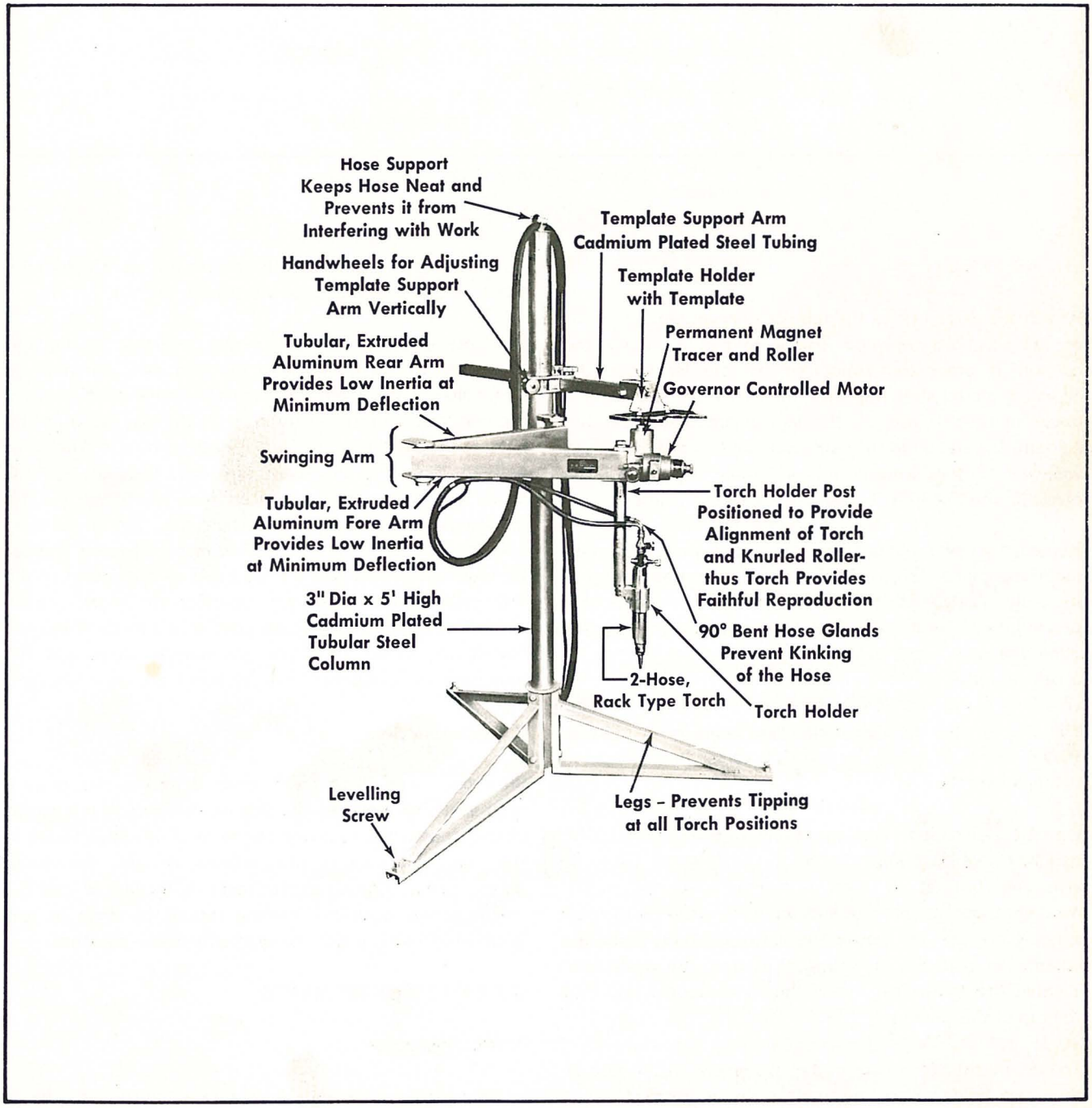


Figure 1. No. 42 CAMOGRAPH®

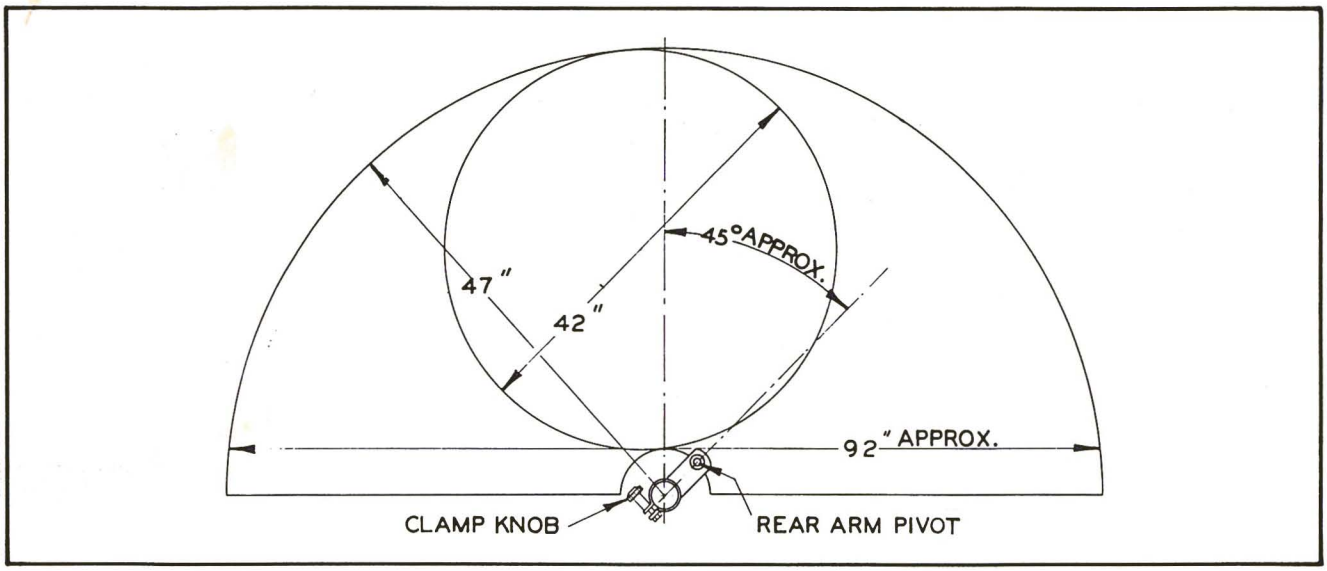


Figure 2. Cutting Area

II. INSTALLATION

2.1 ASSEMBLY

Attach the three legs to the tubular steel column by means of the six bolts provided. (Refer to Fig. 3.) When the column is erect and supported by the legs, put the cadmium-plated steel ring over the upper end and slide it down so that it rests on the legs where they meet the column. In relation to the work area the legs may be placed wherever wanted. However, it is preferable that the work be placed in the free space between any two of the legs.

Loosen the two handwheels on the rear-arm-assembly mounting clamp. Lift the entire swinging arm assembly, in its fully folded position with the torch holder post projecting downward, and fit it over the top of the column. Slide the assembly down to any convenient height. To obtain unrestricted torch mobility over the entire cutting area it is essential that the rear-arm pivot project toward said area at approximately a 45 degree angle to the right, as shown in Fig. 2, rather than straight across it. Tighten the two handwheels.

On the cam-support-arm mounting bracket loosen that handwheel which clamps the bracket to the post. Hold the arm and bracket in such a manner that the paired handwheels on the bracket and the wing screw on the cam support are on top. Lower the entire assembly onto the column so that the cam support is over the work area. Tighten the handwheel. Insert the hose support ring into the top of the column.

To mount the torch, loosen the two screws in the face of the torch holder. Place the torch in the holder, and adjust the screws until the block maintains a firm, but not binding, pressure against the torch.

To mount the tip in the torch, remove the tip nut from the torch, insert the tip, replace and tighten the nut.

Feed the supply hoses through the hose support ring and loop them to the underside of the front arm; one hose on either side of the extension-cord strain-relief bushing. Turn the handwheel until the torch is all the way down in the holder. Fasten the hoses to the bottom of the front arm with the hose clip and screw provided. The hole for this screw is in the bottom of the front arm, just forward of the extension-cord bushing. Be certain that the hoses have enough slack to permit the torch to reach the lower limit of its travel without strain on the hoses or restriction of the free movement of the arms. Connect the hoses, one on either side of the torch holder post, to the torch. It may be found helpful to band the gas supply hoses and the extension cord together with friction tape every few feet.

2.2 ALIGNMENT

With the torch all the way down in the holder, place a machinist's level against the side of the torch. If it is out of plumb, loosen the locknuts on the leveling screws found in the legs and adjust the screws to get the torch perpendicular. Tighten the locknuts on the legs to hold the torch in this position. Trueing should be done in two positions, front and side, 90 degrees between positions.

2.3 BASIC REQUIREMENTS

1. Working Space

The space required will be determined to some degree by the size of the pieces which are generally cut (Fig. 2). Another factor is the method of machine operation; that is

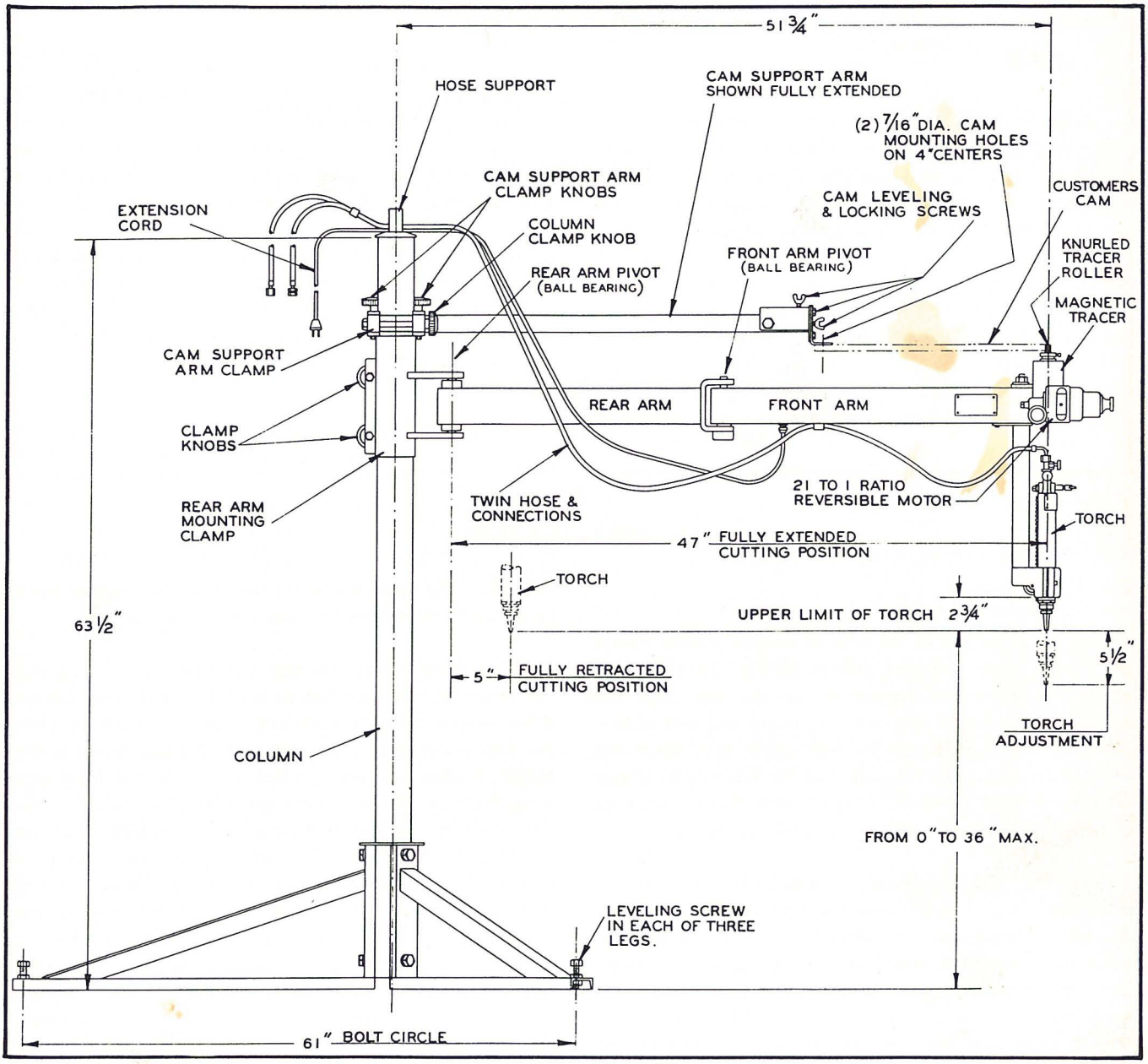


Figure 3. Dimensional Diagram

whether after completing the cut the arms are rotated to begin work on another cutting rack while the first is being cleared off and set up again. However, the maximum floor space which the CAMOGRAPH itself can use is a circle nine and one-half feet in diameter. Enough space should be allowed around the work area to permit freedom of movement.

2. Power

The variable-speed, governor-controlled, reversible drive motor operates at less than 100 watts on 115-volt, 25-, 50-, or 60-cycle, single-phase, alternating current. The plug end of the three-conductor cable is fitted with a two-pronged plug with a ground lead projecting from it. Grounding the machine is standard safe practice.

3. Gases

In addition to oxygen, the proper fuel gas, as determined by the requirements of the job, should be used. For figures on gas pressures and consumption rates consult the cutting tables in the section on Operating Instructions.

Suitable regulators should be used to control the flow of gases, depending upon the source. For regulator information see AIRCO® Catalog 806.

4. Work Table

A suitable work table must be used to support the pieces being cut.

III. OPERATION

3.1 GENERAL PRECAUTIONS

In addition to the standard practices, relative to ventilation, fire prevention, and the safety and comfort of the operator, which are to be observed in any welding or cutting activity, several general precautions which apply specifically to the use of the No. 42 CAMOGRAPH are noted below.

When changing the height or angle of projection of the swinging arm always be certain that its weight is supported adequately before loosening the handwheels.

After making changes in swinging-arm position be sure that both handwheels are tightened.

Do not hang coiled hoses, torches, or other equipment or materials over the arms.

3.2 OPERATING INSTRUCTIONS

Set the swinging arm assembly at the proper height above the work surface and at the correct mounting angle shown in Fig. 2. Use the torch handwheel to make final adjustment of the working height.

Mount the cam on the cam support and by means of the handwheels position the cam support arm at its proper height and location over the work area.

The top wing screw and hexagonal-head bolt located between the two wing screws permit leveling the cam. (See Fig. 4.) The upper wing screw provides for leveling the cam in one direction and the lower wing screw locks the cam in that position. Leveling the cam in the second direction is accomplished by means of the bolt. The entire cam support pivots upward on its mounting bolt to make it possible to place the roller within an inside cam.

Select the required cutting speed with the indexed speed control (Fig. 5). Turning the knob clockwise decreases the travel speed; counterclockwise increases the speed. Adjustments can be made before starting or while motor is running.

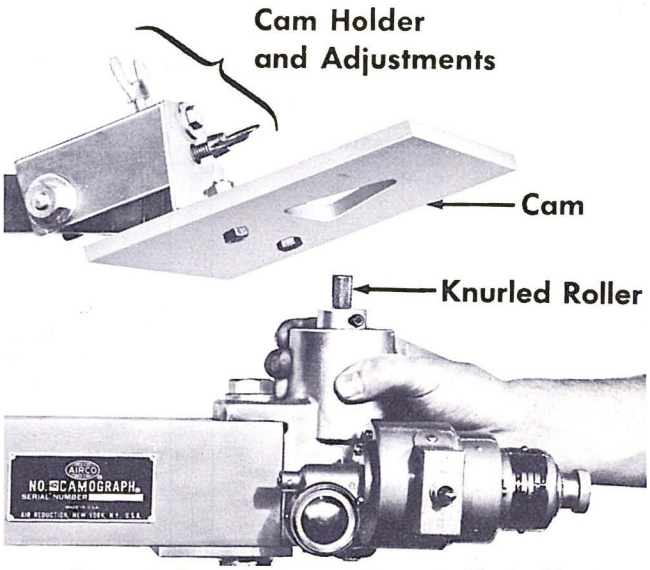


Figure 4. Cam Holder and Magnetic Tracer Head

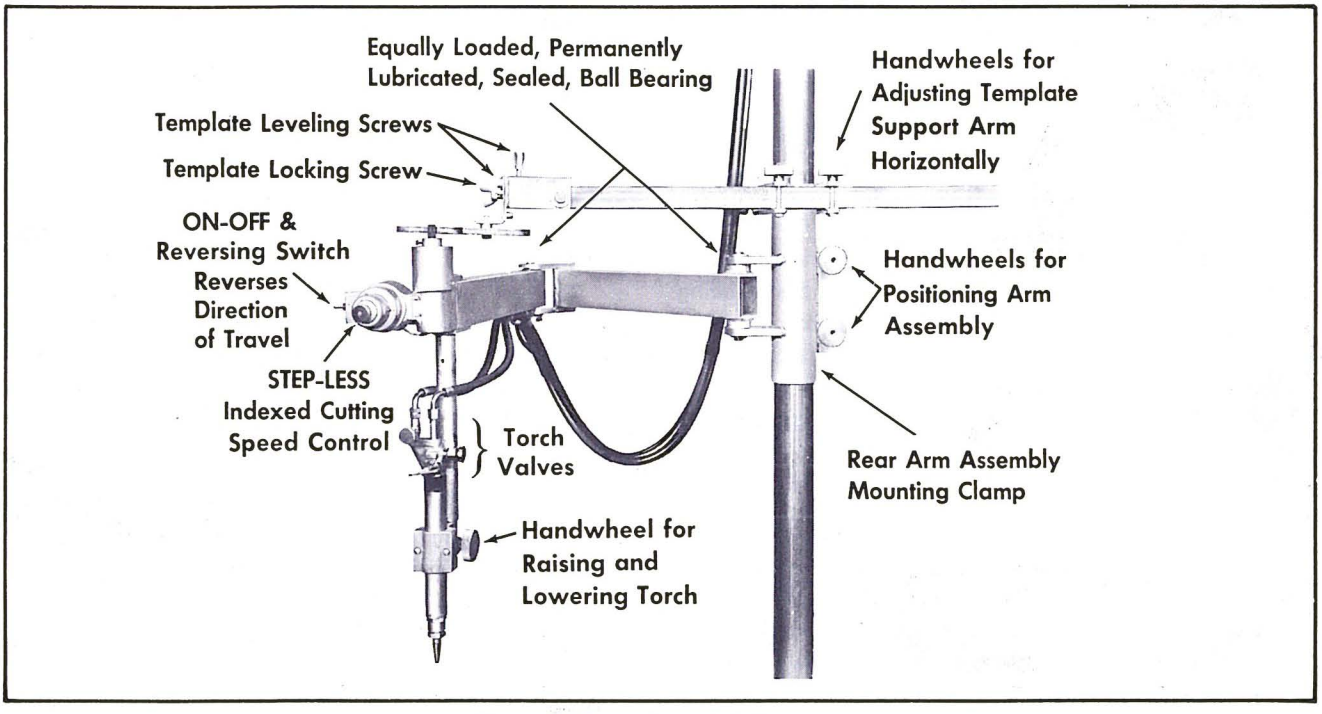


Figure 5. Controls and Adjustments

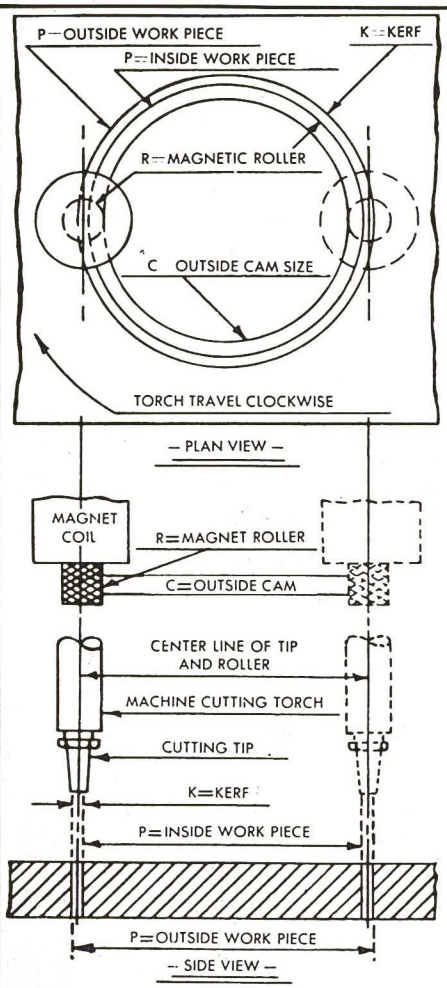
Place the knurled drive roller in contact with the cam. (Refer to Figs. 6 through 10 for directions on the preparation of cams.) The machine is supplied with a roller 1/2 inch in diameter, while other diameters are available as accessories. Be sure that the drive roller used is of the diameter for which the cam was designed. Rollers of various sizes, as indicated in Table I and the section on Accessories and Replacement Parts, are readily interchangeable simply by loosening the single set screw on the rim of the holder, lifting out the roller, and inserting another.

Light the torch, adjust the preheat flame, and move the roller along the lead-in until the flame meets the edge of the material. After preheat turn on the cutting oxygen and, by means of the three-position toggle switch, start the tracing motor. For most accurate results refer to Fig. 11.

TABLE I

Cutting Range and Capacity	
Material Thickness and Capacity	**Area Capacity**
Up to 12''	See Cutting Area diagram, Fig. 2
Cutting Speed Range	
Roller Dia.	**In. per Min.**
1/2''	3 to 30
3/8''*	2 to 22
1/4''*	1½ to 15

* May be obtained separately as accessories. See Replacement Parts section.



FOR INSIDE CAMS

LEGEND

C = Inside Cam Size
P = Piece Wanted to Size
R = Magnetic Roller Diameter
K = Kerf Width
F = Finish Allowance

FOR INSIDE CAMS WHERE INSIDE WORK PIECE IS WANTED

FORMULA

$C = P + \frac{1}{2}R + \frac{1}{2}K + \frac{1}{2}F$
on a side

To arrive at cam size

Lay out piece wanted to size, plus (+) ½ the magnetic roller diameter on a side, plus (+) ½ the kerf width on a side.

Add finish allowance if required.

FOR INSIDE CAMS WHERE OUTSIDE WORK PIECE IS WANTED

FORMULA

$C = P + \frac{1}{2}R - \frac{1}{2}K - \frac{1}{2}F$
on a side

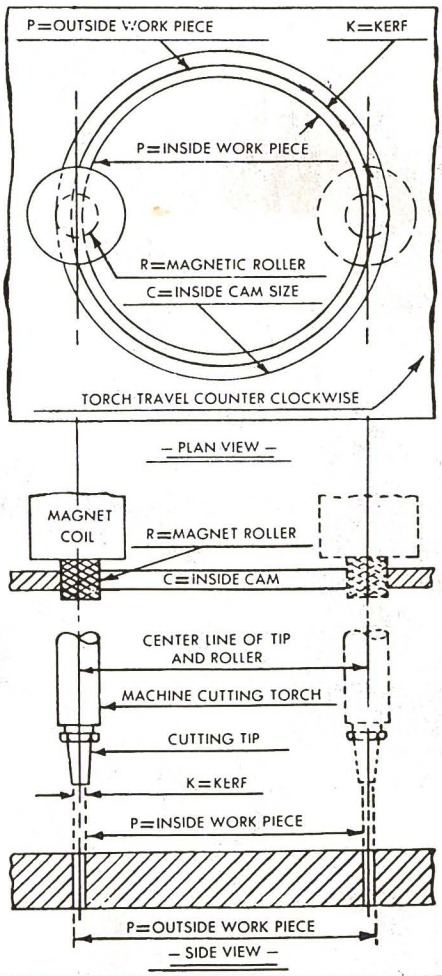
To arrive at cam size

Lay out piece wanted to size, plus (+) ½ the magnetic roller diameter on a side, minus (–) ½ the kerf width on a side.

Subtract finish allowance if required.

Standard magnetic roller is ½ inch in diameter.

Accessory rollers are available in 3/8 – and ¼ – inch diameters.



FOR OUTSIDE CAMS

LEGEND

C = Outside Cam Size
P = Piece Wanted to Size
R = Magnetic Roller Diameter
K = Kerf Width
F = Finish Allowance

FOR OUTSIDE CAMS WHERE INSIDE WORK PIECE IS WANTED

FORMULA

$C = P - \frac{1}{2}R + \frac{1}{2}K + \frac{1}{2}F$
on a side

To arrive at cam size

Lay out piece wanted to size, minus (–) ½ the magnetic roller diameter on a side, plus (+) ½ the kerf width on a side.

Add finish allowance if required.

FOR OUTSIDE CAMS WHERE OUTSIDE WORK PIECE IS WANTED.

FORMULA

$C = P - \frac{1}{2}R - \frac{1}{2}K - \frac{1}{2}F$
on a side

To arrive at cam size

Lay out piece wanted to size, (–) ½ the magnetic roller diameter on a side, minus (–) ½ the kerf width on a side.

Subtract finish allowance if required.

Standard magnetic roller is ½ inch in diameter.

Accessory rollers are available in 3/8 – and ¼ – inch diameters.

Figure 6. Cam Layout Procedures for Magnetic Tracer

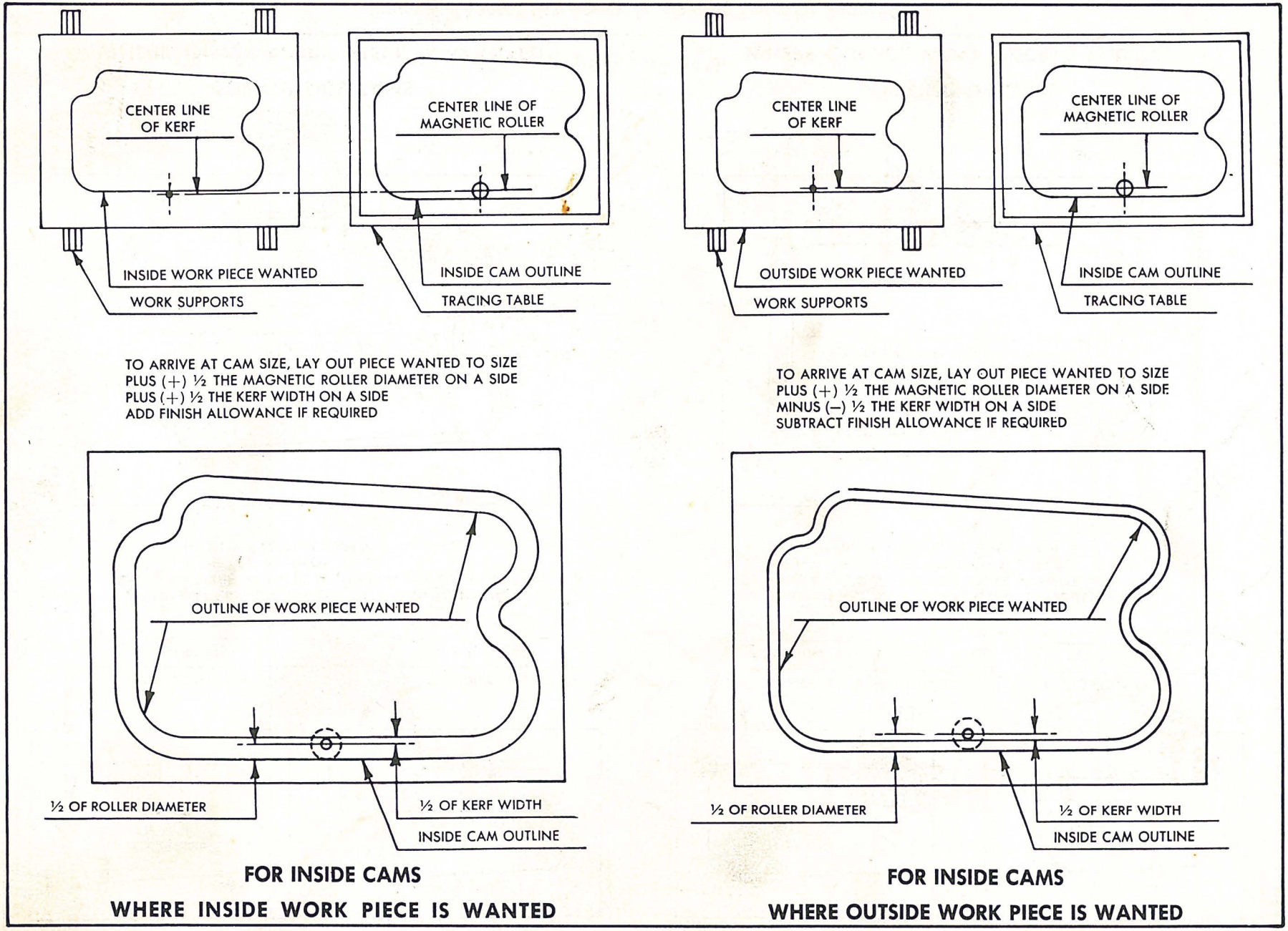


Figure 7. Schematic Cam Layout for Magnetic Tracer for Inside Cams

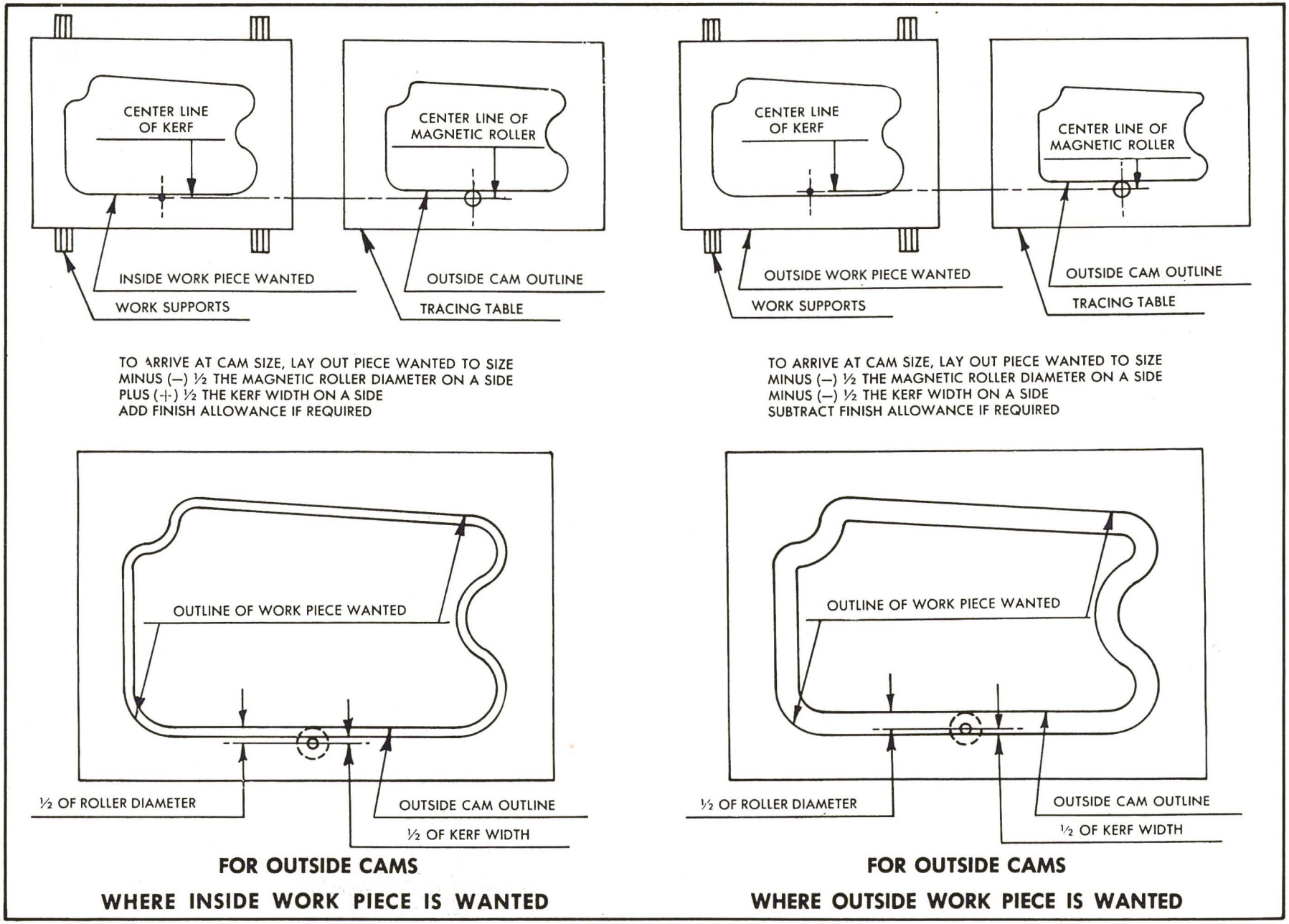


Figure 8. Schematic Cam Layout for Magnetic Tracer for Outside Cams

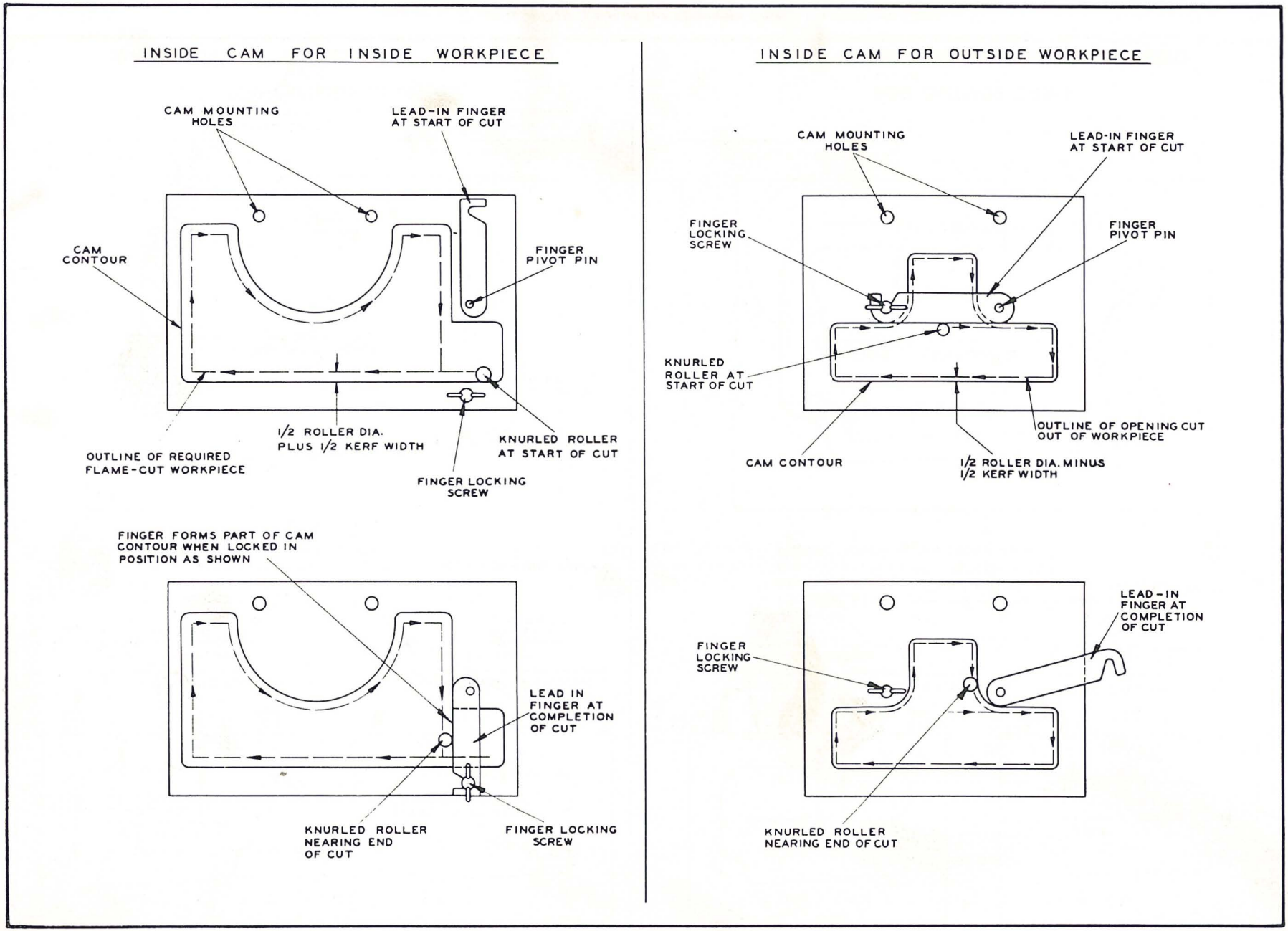


Figure 9. Layouts for Inside Cams

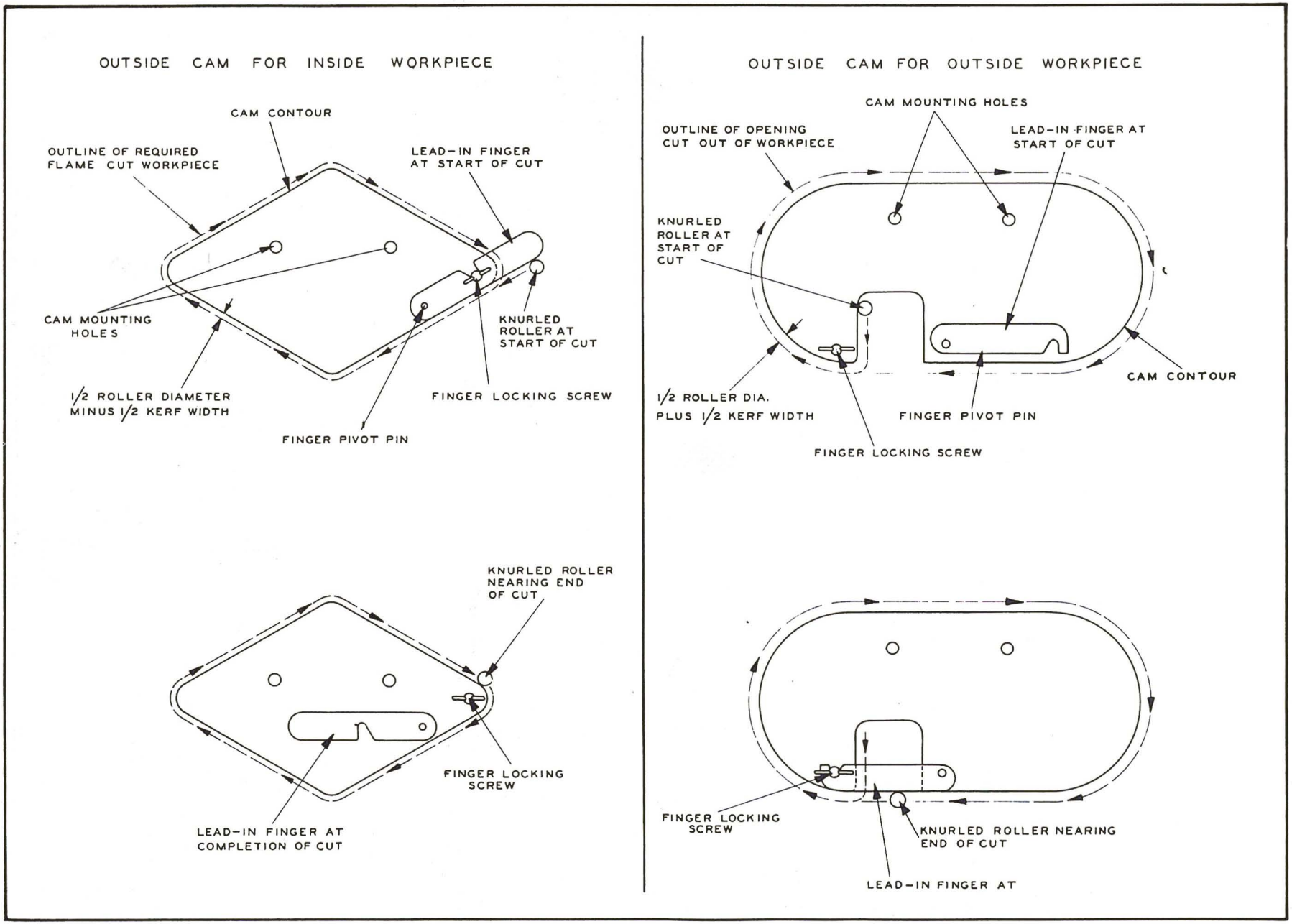


Figure 10. Layouts for Outside Cams

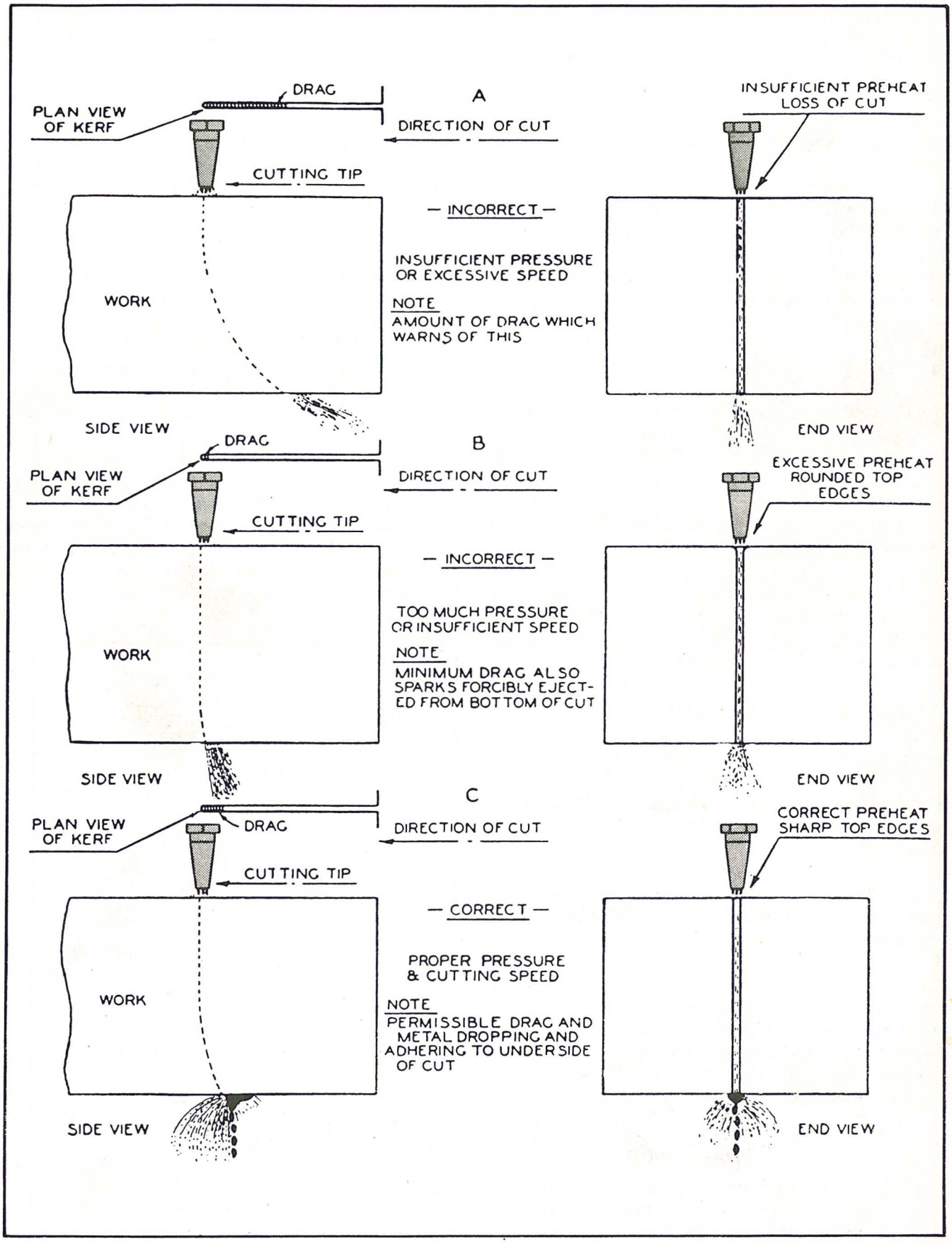


Figure 11. Simple Method of Correcting Oxygen Pressure, Speed and Preheat

IV. MAINTENANCE

4.1 LUBRICATION

All sliding parts of the machine are designed to be operated without lubricant, and the swinging-arm, ball-bearing pivots are of the prelubricated, sealed type which require no attention.

The gear-reduction unit located at the rear of the motor behind the toggle switch is the only point which requires occasional inspection. Access for inspection is gained by removing the snap ring retaining the circular cover and then by lifting out the cover itself. Add AIRCO No. 2 lubricant if required.

4.2 ELECTRICAL AND MECHANICAL

No electrical nor mechanical maintenance is required other than that which should be observed when using any tool or equipment. That is, keep the CAMOGRAPH clean and do not abuse it.

Never attempt to disassemble the magnetic head; loss of 50 per cent or more of the magnetic pull would result.

Do not attempt to adjust the alignment of the pivot pin at the joint of the swinging arm. The set screws at this joint, as well as those in the torch holder post, have been factory-adjusted and must not be tampered with.

4.3 MOTOR AND GOVERNOR REPAIR

4.3.1 General

The machine operator may be warned of motor or governor trouble if the motor runs erratically, intermittently, or if it fails to run.

Unless the operator is fully equipped for repairing motors and governors on AIRCO machines, it is recommended that those parts in need of repair be returned to AIRCO.

Certain minor repairs, however, can be made in the average shop with a minimum of equipment. These, for which the extra parts should be kept on hand, consist of repair and/or replacement of the motor and governor brush assemblies, governor unit and the toggle switch. See the motor diagram for spare parts numbers.

CAUTION

DO NOT ATTEMPT REPAIRS TO THE ELECTRICAL SYSTEM UNLESS THE MACHINE IS DISCONNECTED FROM THE POWER SUPPLY.

4.3.2 Checking the Motor

To expose the motor and governor brushes and the governor, remove the slotted screws ("A" in Fig. 12) and slide the end of the motor housing over the speed-control knob. At this point, action of the governor and brushes may be observed by turning on the drive motor. Trouble is indicated if the governor or motor brushes spark excessively. The following procedure should be followed:

1. Check for proper connection of the motor plug to the power supply.
2. Check the action of the toggle switch. If the toggle does not snap properly, it is defective and may be the cause of motor failure. The switch can be removed from the motor by removing the four screws in the switch mounting plate and pulling out the switch to expose the wires connected to it.
3. If the trouble persists, remove the motor brushes. If they are too short, replace them with the new ones.However, if the brushes are long enough (about 5/16") wipe them clean and replace them the same way, taking care that dirt in the brush socket does not prevent the brush from moving freely up and down. Before replacing a brush, check the brush spring for adequate pressure.

If the motor still fails to function properly, the trouble may be in the governor mechanism.

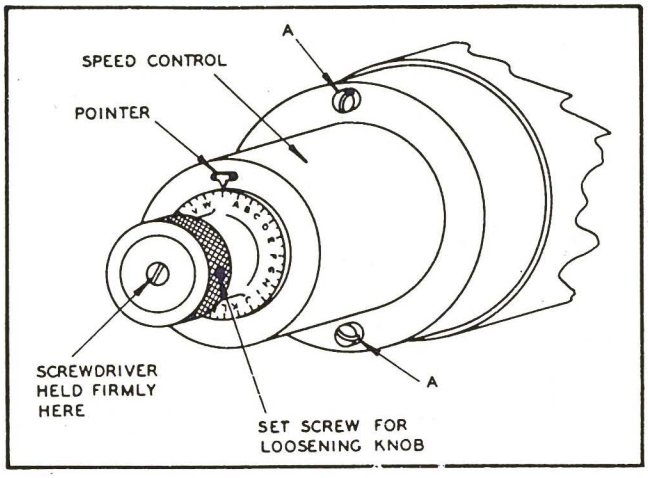


Figure 12. Resetting the Speed Control

4.3.3 Checking the Governor

1. With the end of the motor housing off, turn on the power and watch the governor action. If there is excessive sparking, the governor brushes may be defective.
2. To reach the governor brushes, disconnect the plug from the power source, loosen the set screw in the governor hub and push it off the end of the shaft. Once off the shaft, the governor may be removed through the holes in the governor control body.

3. The governor brushes are now exposed. Use the same checking procedure used for the motor brushes. Check the governor contact points and slip-ring surfaces. If they are pitted and cannot be cleaned with crocus cloth, replace them with new units.

Cleaning the accessible portion of the inside of the motor and the governor housing with a clean, dry cloth always should be done when it is disassembled. The armature commutator also may be cleaned with a dry cloth from the open end of the motor.

After replacing the governor brushes, push the governor back into place on the shaft, and securely tighten the set screw in the governor hub. The governor should never touch the brush holders; see that 1/32" to 1/16" clearance exists at this point.

If these checks fail to disclose the cause of the difficulty it is advisable to send the complete motor to the nearest authorized AIRCO repair station and to replace the defective one with a new unit.

4.3.4 Removing the Motor

1. Remove the plug from the power source. Loosen the knurled cap of the strain-relief bushing which holds the rubber-covered cable leading into the front arm.
2. Remove the large nut on top of the front arm, at the top of the torch holder post.
3. Pull the torch holder post down and out of the front arm, while holding the motor.
4. Slide the magnetic tracer assembly out of the front arm, while pushing the wire through the strain-relief bushing to keep slack in the wires inside the arm.
5. Slide the electrical panel assembly out of the front of the arm.
6. Disconnect the three motor lead wires from the panel and the wire in the arm.
7. Remove the motor from the tracer-head assembly by removing the two screws in the motor base.

4.3.5 Replacing the Motor

1. Place the motor in position on the tracer head and screw the two mounting screws in to where they just start to become tight. Adjust the mesh between the worm on the motor shaft and the worm gear in the tracer head so that backlash of the tracer drive shaft can be just barely felt by turning the tracer drive shaft alternately forward and backward by hand. Tighten the mounting screws completely to hold the motor in this position.
2. Place the black-varnished insulating sleeve over the motor leads, and insert the leads through the hole in the side of the tracer-head casting just above the motor shaft.
3. Reconnect the motor leads to the panel and wire inside the arm, according to the wiring diagram.
4. Slide the panel into the arm.
5. Slide the torch holder post up through the arm, through the hole in the electrical panel, through the hole in the tracer-head casting and up through the top of the arm, to hold the tracer head in place. Replace the nut at the top of the torch holder post, and tighten securely.
6. Pull the excess slack cable out of the arm and tighten the strain-relief bushing.

4.3.6 Resetting the Speed Control

In some cases, repair or replacement of parts in the electrical system may make slight changes in the obtainable speeds in relation to the letters on the dial of the Indexed Speed Control. (Refer to Fig. 12.) In other words, with the control knob on "A" which normally indicates the lowest speed, lowest speed may now be over or under the normal lowest speed of 3 inches per minute. This will, of course, change the entire speed range. If the new range is satisfactory, it need not be changed. However, if the original speed range of 3 to 30 inches per minute is desired, the governor may be adjusted.

1. Place the letter "A" on the control knob under the pointer.
2. Loosen the set screw located in the knurled portion of the speed control knob.
3. Place a screwdriver in the screw slot located in the face of the knob and with the control knob held firmly on "A," turn the screwdriver to increase or decrease the speed to 3 inches per minute. Retighten the set in the knob.

V. REPLACEMENT PARTS

ORDERING

To assure proper operation, use only genuine AIRCO parts and products with this equipment. To order replacement parts, proceed as follows:

a. Give the stock number, part description, and quantity of each part required.
b. Five stock number and description of equipment on which the parts are to be used.
c. Indicate any special shipping instructions.

Numbers in ( ) indicate quantity if more than one
ϕ — Diameter

REPLACEMENT PARTS

The following illustrations of the equipment identify each replacement part by item number as tabulated in the related parts lists. The lists identify each part by stock number, description, and quantity used (in parenthesis, if more than 1). Some assemblies are available as a unit or in individual parts. These parts are listed and indented below such assemblies. When any of the assembly parts is also available as a subassembly its individual parts are listed further indented below it. Attaching hardware items are listed deeply indented below the part they attach. They may not be shown. Order them separately.

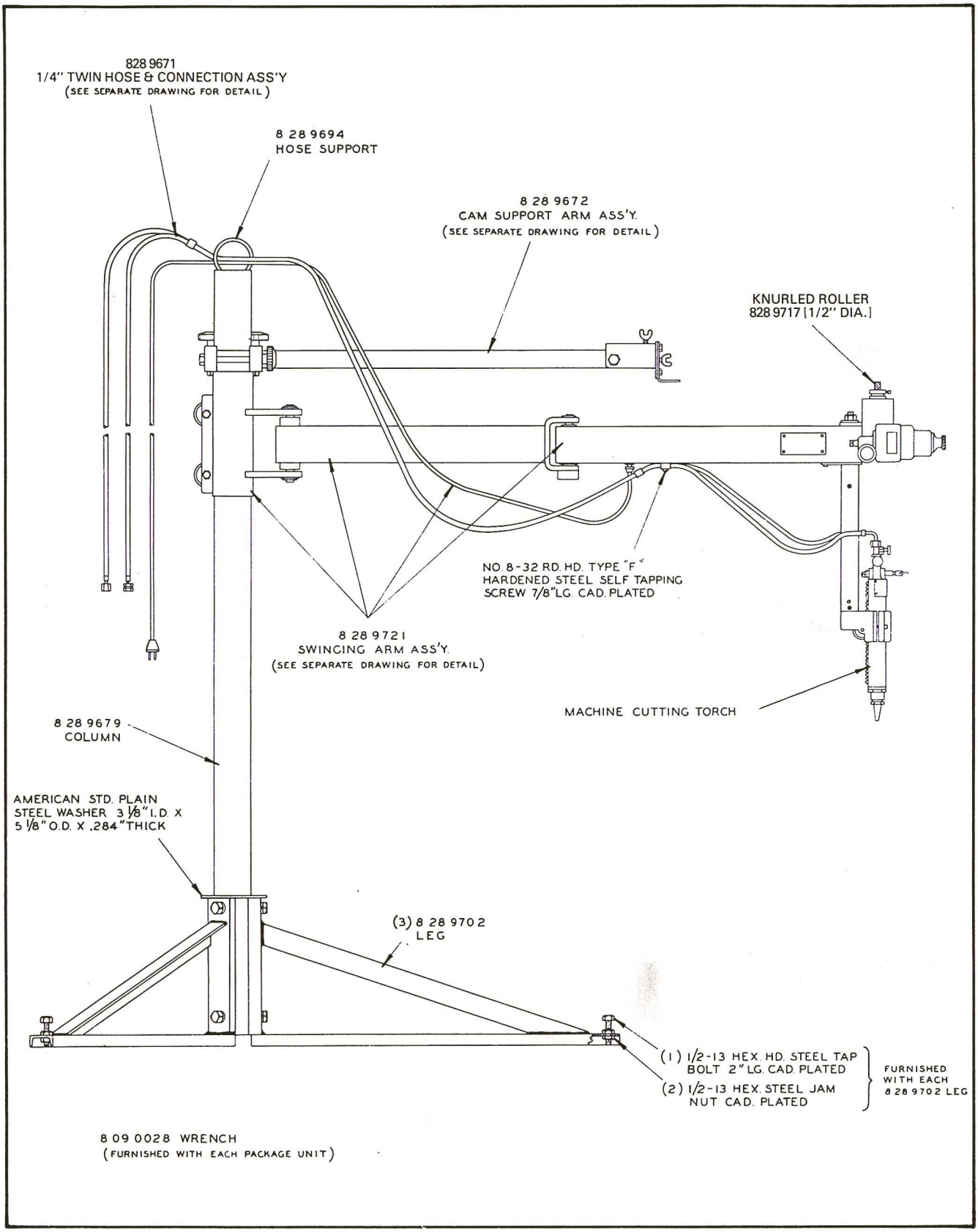


Figure 13. No. 42 CAMOGRAPH® – Parts Drawing

804 4200 No. 42 Camograph Machine Only consisting of

1 – 828 9671 1/4" I.D. Twin Hose & Connection Assembly consisting of: (See Fig. 17)
- 2 – 803 0003 Fuel Gas Hose Connection Nut
- 2 – 803 0004 Oxygen Hose Connection Nut
- 2 – 803 0220 Hose Glands
- 2 – 803 0013 90° Bent Gland
- 2 – 803 9940 Twin Hose Brace
- 4 – 803 9211 Hose Ferrule
- 1 – 828 9696 Twin Hose Brace
- 25' – 908 4108 1/4" I.D. Twin Hose

1 – 828 9672 Cam Support Arm Assembly (See Separate Detail)

1 – 828 9679 Column

1 – 828 9694 Hose Support

3 – 828 9702 Leg complete with
- 1 – 1/2–13 Hex Hd. Steel Tap Bolt 2" long
- 2 – 1/2–13 Hex Steel Jam Nut

1 – 828 9717 1/2" dia. Knurled Roller

1 – 828 9721 Swinging Arm Assembly (See Separate Detail)

1 – 8–32 Rd. Hd. Type "F" Hardened Steel Self-Tapping Screw – 7/8" long

6 – 1/2–13 Hex Hd. Steel Bolt – 2" long

6 – 1/2–Std. Steel Lockwasher

1 – American Std. Steel Washer 3-1/8 I.D. .x 5-1/8 O.D. x .284 Thick

Optional Accessories

1 – 838 9723 3/8" Dia Knurled Roller

1 – 838 9722 1/4" Dia Knurled Roller

1 – Torch, See Catalog Sheet 823

1 – Tip, See Catalog Sheet 813

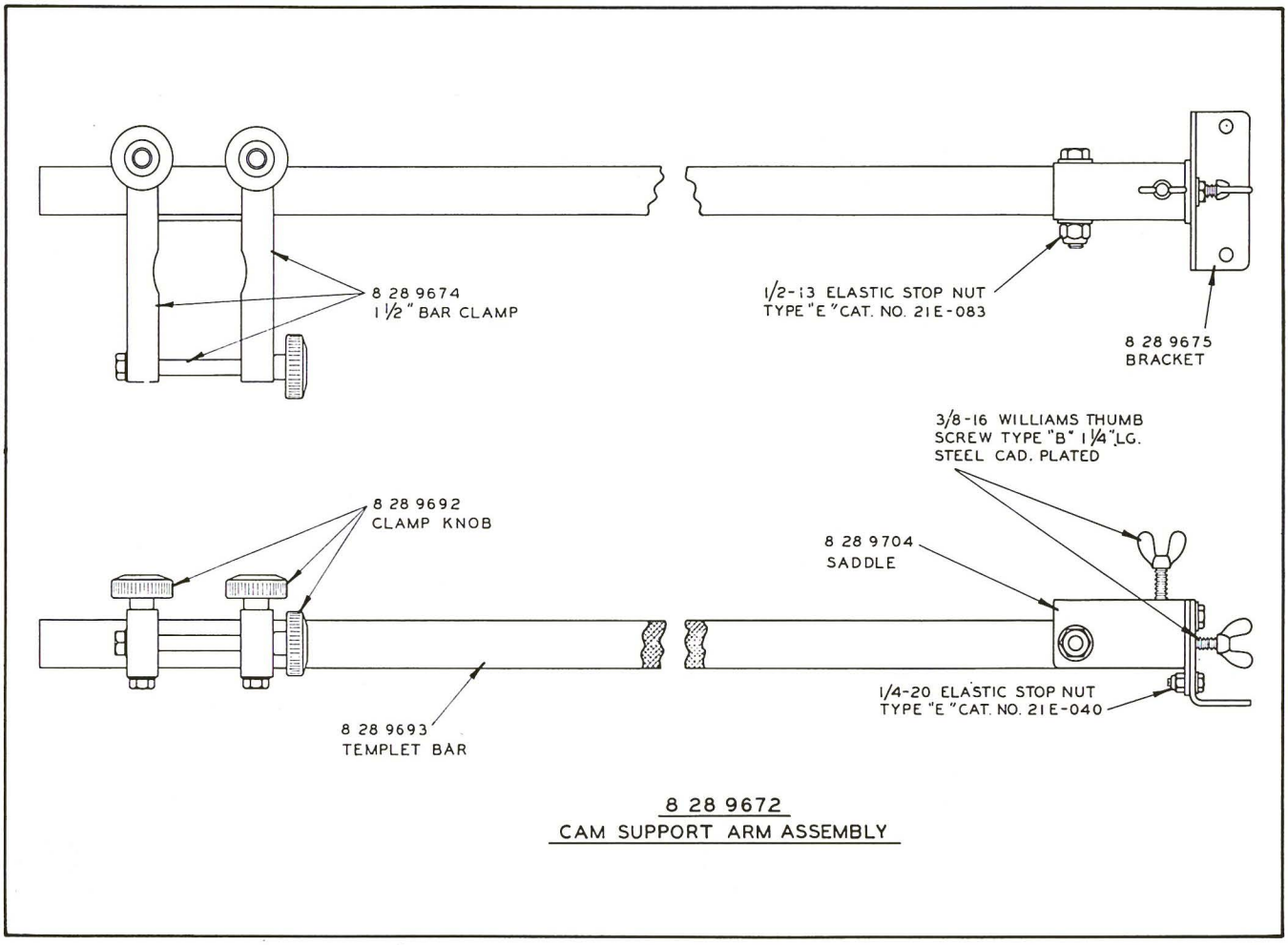


Figure 14. Cam Support Arm Assembly

828 9672 Cam Support Arm Assembly consisting of

- 1 – 828 9674 1-1/2" Bar Clamp
- 1 – 828 9675 Bracket
- 3 – 828 9692 Clamp Knob
- 1 – 828 9693 Template Bar
- 1 – 828 9704 Saddle
- 1 – 1/4–20 Hex Hd. Steel Bolt 3/4" long
- 1 – 1/4–20 Elastic Stop Nut – Type E
- 1 – 3/8–16 Hex Hd. Steel Bolt 5/8" long
- 2 – 3/8–16 Thumb Screw – Type B 1-1/4" long
- 1 – 3/8 Std. Steel Washer
- 1 – 1/2–13 Hex Hd. Steel Bolt 2-3/4" long
- 1 – 1/2–13 Elastic Stop Nut – Type E
- 2 – 1/2 Steel Washer
- 1 – 1/4 Std. Steel Washer

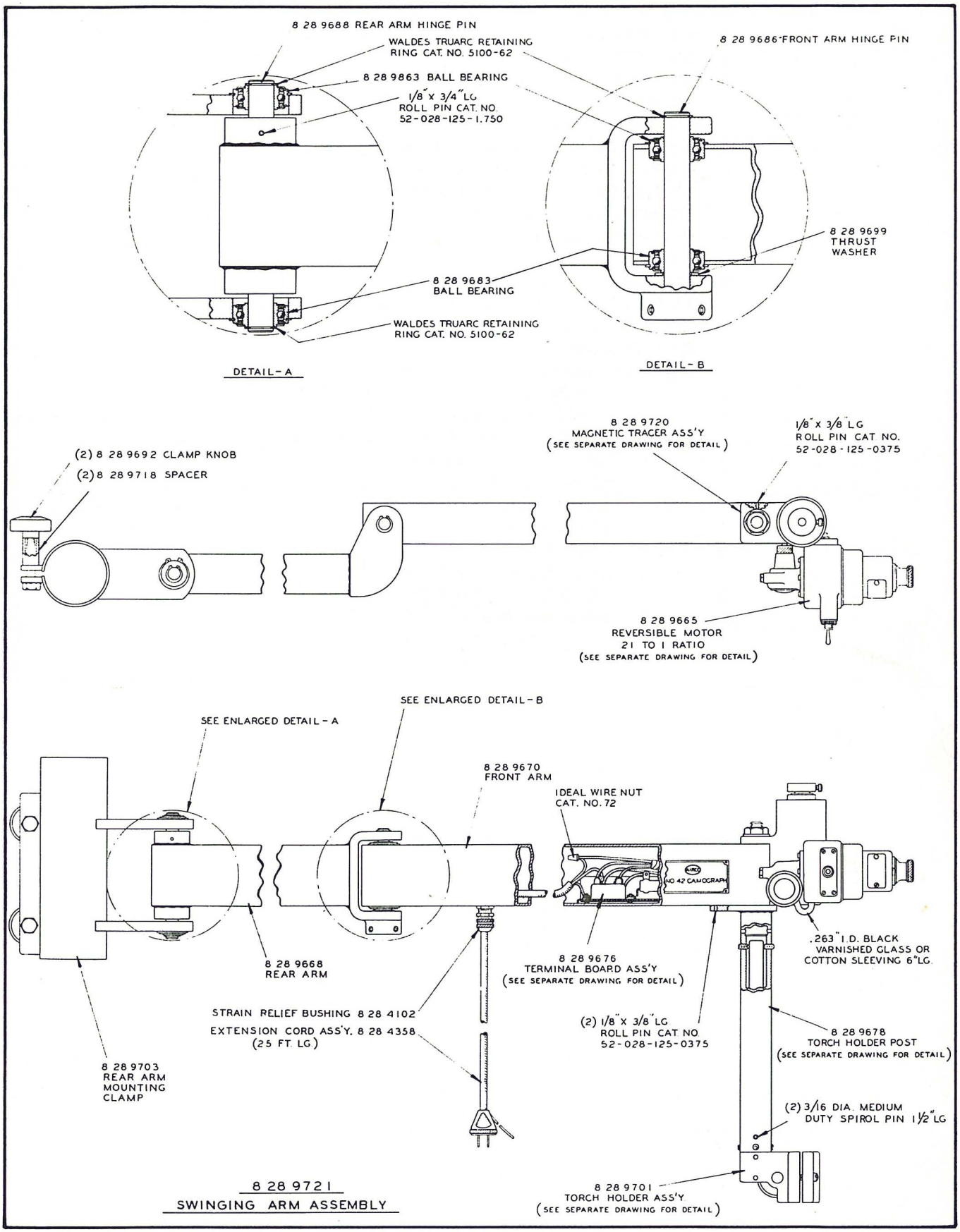


Figure 15. Swinging Arm Assembly

828 9721 Swinging Arm Assembly consisting of

1 – 828 4358 Extension Cord Assembly (25 feet)
1 – 828 4102 Strain Relief Bushing
1 – 828 9665 Reversible Motor 21 to 1 ratio (See Fig. 18)
1 – 828 9668 Rear Arm
1 – 828 9670 Front Arm
1 – 828 9676 Terminal Board Assembly (See Fig. 16)
1 – 828 9678 Torch Holder Post (See Fig. 16)
4 – 828 9683 Ball Bearing – N.D. #488016
1 – 828 9686 Front Arm Hinge Pin
1 – 828 9688 Rear Arm Hinge Pin
2 – 828 9692 Clamp Knob
1 – 828 9699 Thrust Washer
1 – 828 9701 Torch Holder Assembly (See Fig. 16)
1 – 828 9703 Rear Arm Mounting Clamp
2 – 828 9718 Spacer
1 – 828 9720 Magnetic Tracer Assembly (See Fig. 16)
2 – #10–24 Socket Hd. Steel Cap Screw 7/8" long
2 – #10 Steel Lockwasher
4 – 1/4–20 Hex Socket Hd. Flat Point Steel Set Screw 1/2" lg.
1 – 5/8–11 Hex Steel Jam Nut
1 – 5/8 Steel Washer
1 – Ideal Wire Nut
1 – 3/8 Conduct Locknut
3 – Truarc Retaining Ring
1 – 1/8 x 1-3/4 long Roll Pin
2 – 1/8 x 3/8 long Roll Pin
1 – Cotton Sleeving 6" long
2 – 3/16" dia. Spiral Pin 1/2" long

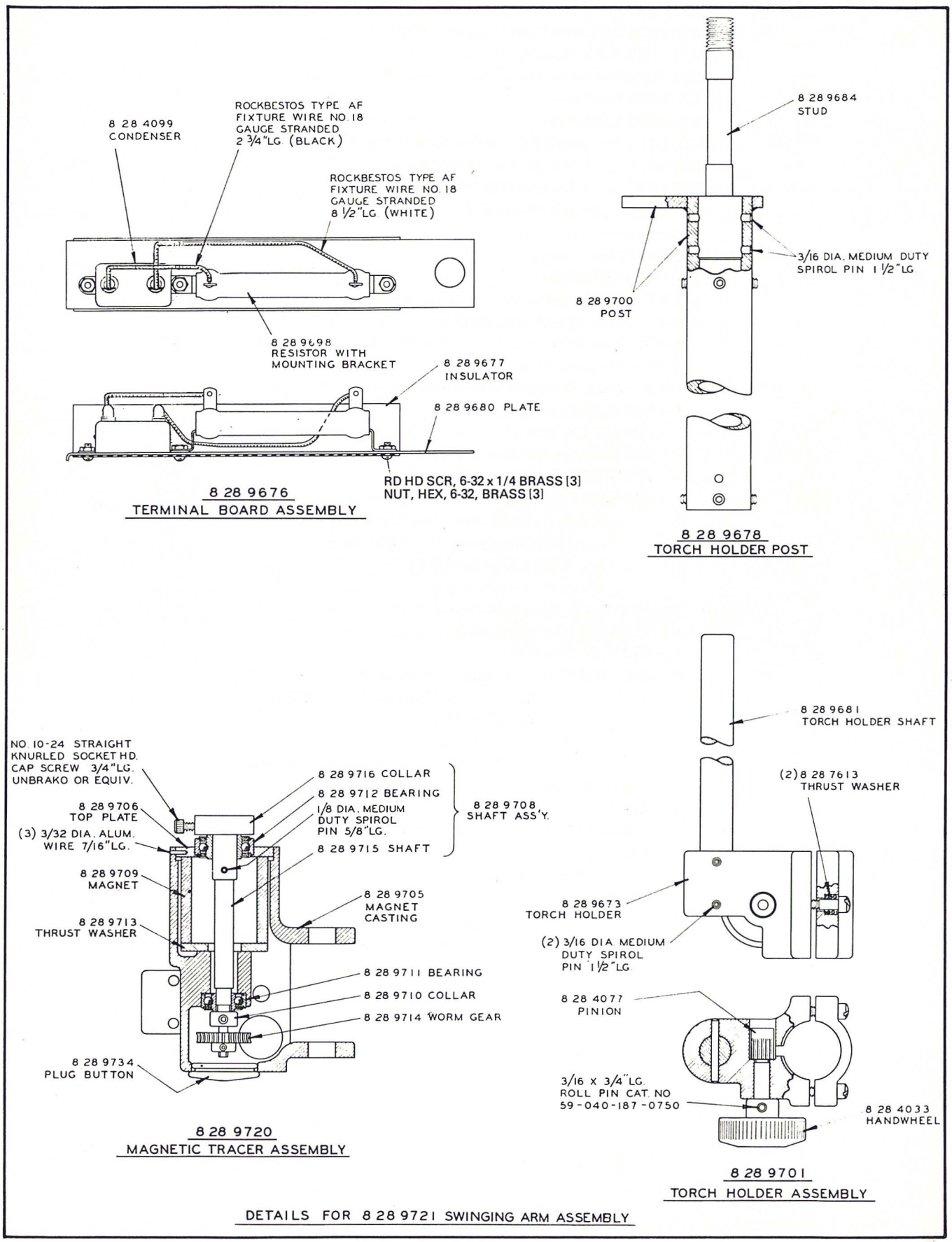


Figure 16. Details of Swinging Arm Assembly

828 9676 Terminal Board Assembly consisting of
- 1 – 828 4099 Condenser
- 1 – 828 9677 Insulator Plate
- 1 – 828 9680 Plate
- 1 – 828 9698 Resistor with Mounting Bracket
- 3 – #6–32 Rd. Hd. Brass Screw 1/4" long
- 3 – #6–32 Hex Brass Nut
- 1 – Wire (Black) 2-3/4" long
- 1 – Wire (White) 8-1/2" long

828 9678 Torch Holder Post consisting of
- 1 – 828 9684 Stud
- 1 – 828 9700 Post
- 2 – 3/16" dia. Spiral Pin 1-1/2" long
- 8 – 1/4–20 Hex Socket Hd. Flat Point Steel Set Screw 1/2" long

828 9701 Torch Holder Assembly consisting of
- 1 – 828 4033 Handwheel
- 1 – 828 4077 Pinion
- 2 – 828 7613 Spring
- 1 – 828 9673 Torch Holder
- 1 – 828 9681 Torch Holder Shaft
- 2 – 1/4–20 Fil. Hd. Steel Cap Screw 7/8" long
- 2 – 3/16" dia. Spiral Pin 1-1/2" long
- 1 – 3/16 x 3/4" long Roll Pin

828 9720 Magnetic Tracer Assembly consisting of
- 1 – 828 9705 Magnet Housing
- 1 – 828 9706 Top Plate
- 1 – 828 9708 Shaft Assembly consisting of
  - 1 – 828 9712 Ball Bearing N.D. #88502
  - 1 – 828 9715 Shaft
  - 1 – 828 9716 Collar
  - 1 – 1/8" dia. Spiral Pin 5/8" long
- 1 – 828 9709 Magnet
- 1 – 828 9710 Collar with Set Screw
- 1 – 828 9711 Ball Bearing N.D. #87039
- 1 – 828 9713 Thrust Washer
- 1 – 828 9714 Worm Gear
- 1 – 828 9734 Plug Button
- 3 – 3/16" dia. Aluminum Wire 7/16" long
- 1 – #10–24 Straight Knurled Socket Hd. Cap Screw 3/4" long

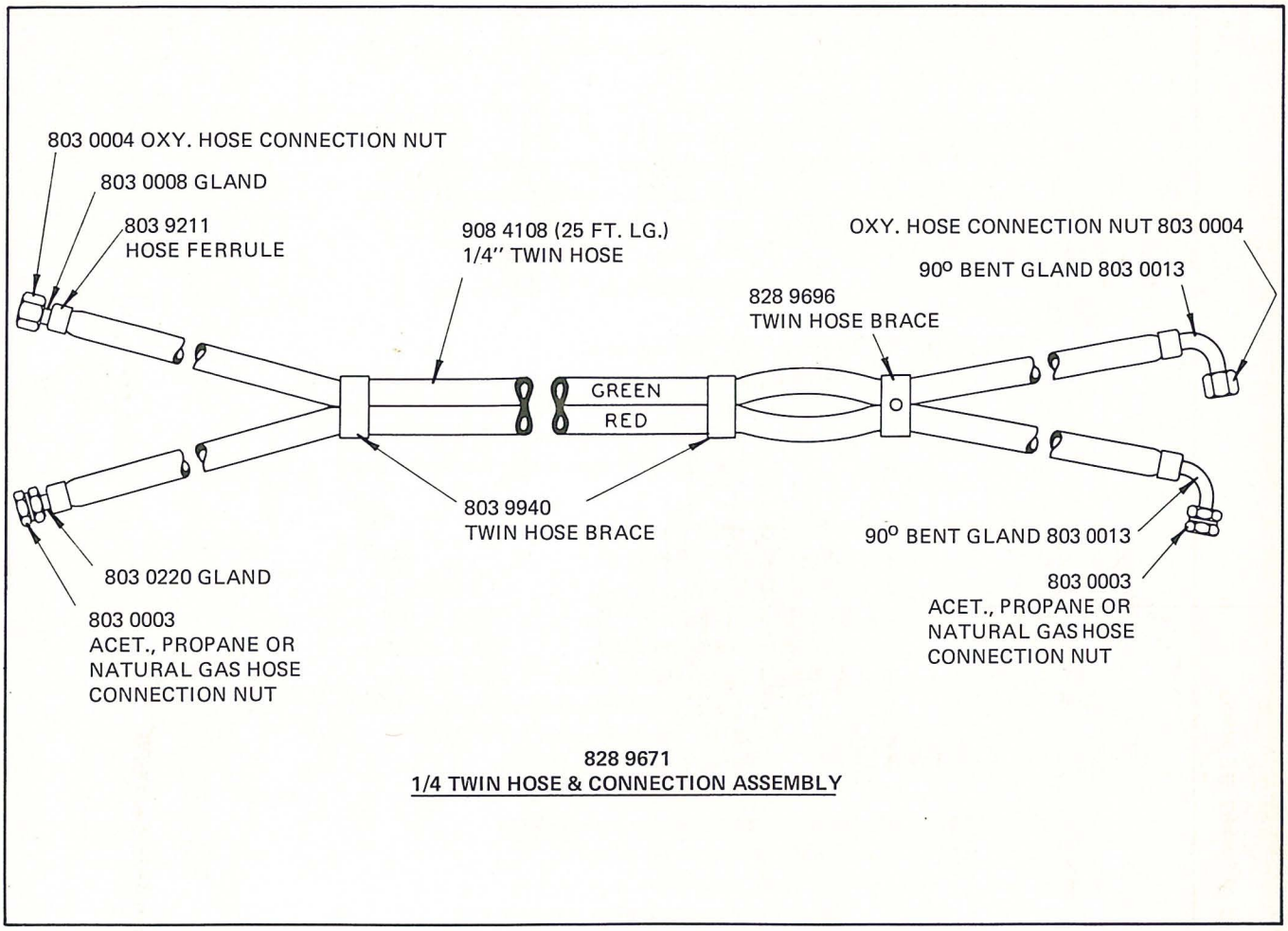


Figure 17. Twin Hose and Connection Assembly

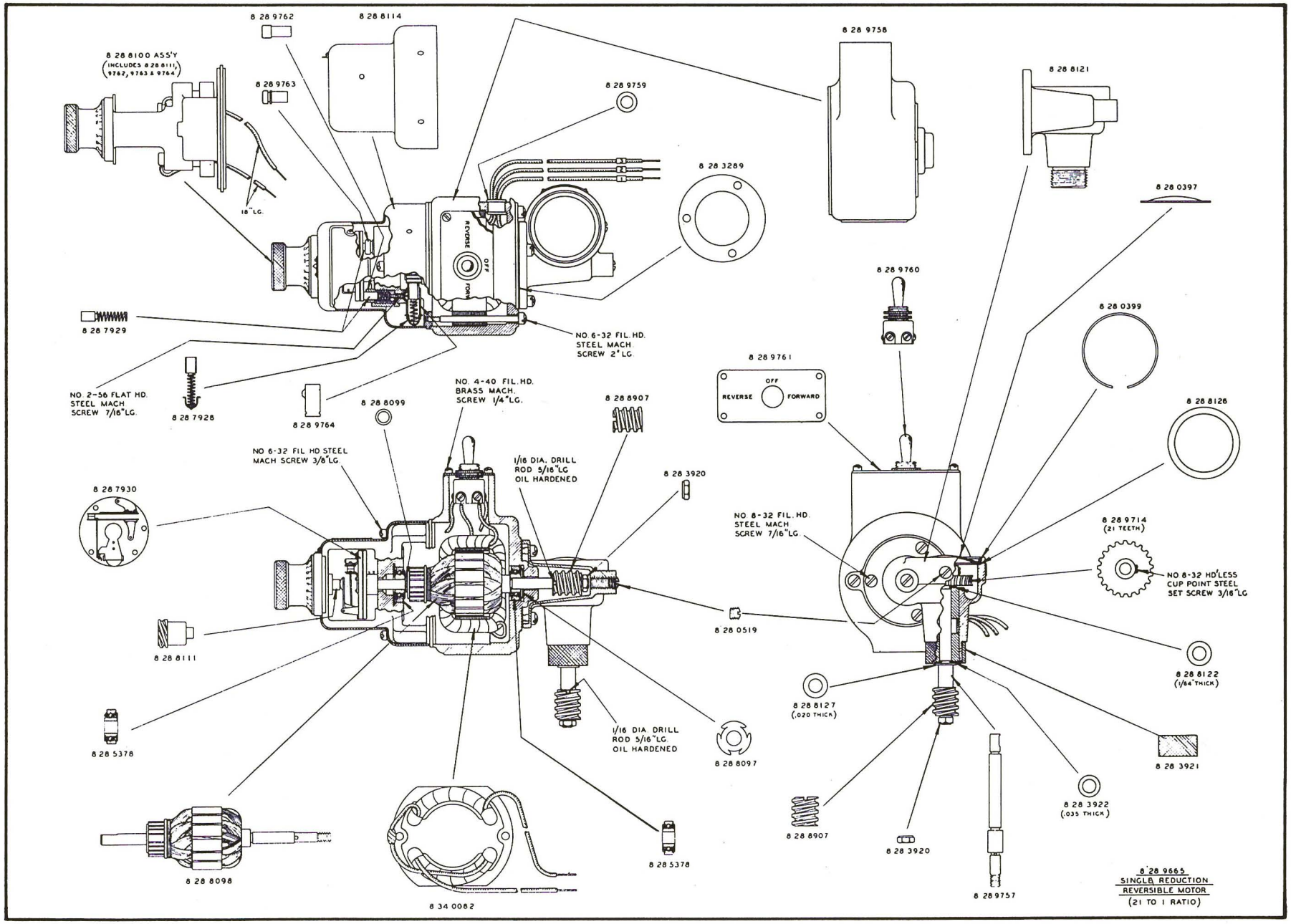


Figure 18. Details of Drive Motor

828 9665 Reversible Motor (21 to 1 ratio) consisting of

1 – 828 0397 Gear Housing Cover
1 – 828 0399 Gear Cover Snap Ring
2 – 828 0519 Grease Plug
1 – 828 3289 Gear Unit Gasket
2 – 828 3920 Worm Lock Nut
1 – 828 3921 Knurled Sleeve
1 – 828 3922 Thrust Washer
2 – 828 5378 Ball Bearing N.D. #77111
1 – 828 5381 Field Unit Assembly
2 – 828 7928 Motor Brush Assembly
2 – 828 7929 Governor Brush Assembly
1 – 828 7930 Governor Unit
1 – 828 8097 Preload Spring
1 – 828 8098 Armature
2 – 828 8099 Spacing Washer
1 – 828 8100 Brush End Assembly
1 – 828 8111 Adjusting Plug (included in 828 8100)
1 – 828 8114 Brush End Cover Assembly
1 – 828 8121 Gear Unit Housing Assembly
1 – 828 8122 Washer
1 – 828 8126 Gear Cover Gasket
1 – 828 8127 Alignment Washer
2 – 828 8907 Worm
1 – 828 9714 Worm Gear
1 – 828 9757 Gear Unit Shaft
1 – 828 9758 Field Unit Housing
1 – 828 9759 Grommet
1 – 828 9760 Switch
1 – 828 9761 Switch Plate
1 – 828 9762 Governor Brush Holder (included in 828 8100)
1 – 828 9763 Governor Brush Holder (included in 828 8100)
2 – 828 9764 Motor Brush Holder (included in 828 8100)
4 – #4–40 Fil. Hd. Brass Screw 1/4" long
2 – #6–32 Fil. Hd. Steel Screw 3/8" long
2 – #6–32 Fil. Hd. Steel Screw 2" long
3 – #8–32 Fil. Hd. Steel Screw 7/16" long
1 – #8–32 Hdless. Oxy. Point Steel Screw 3/16" long
2 – 1/16" dia. Drill Rod 5/16" long
2 – #2–56 Flat Hd. Steel Screw 7/16" long

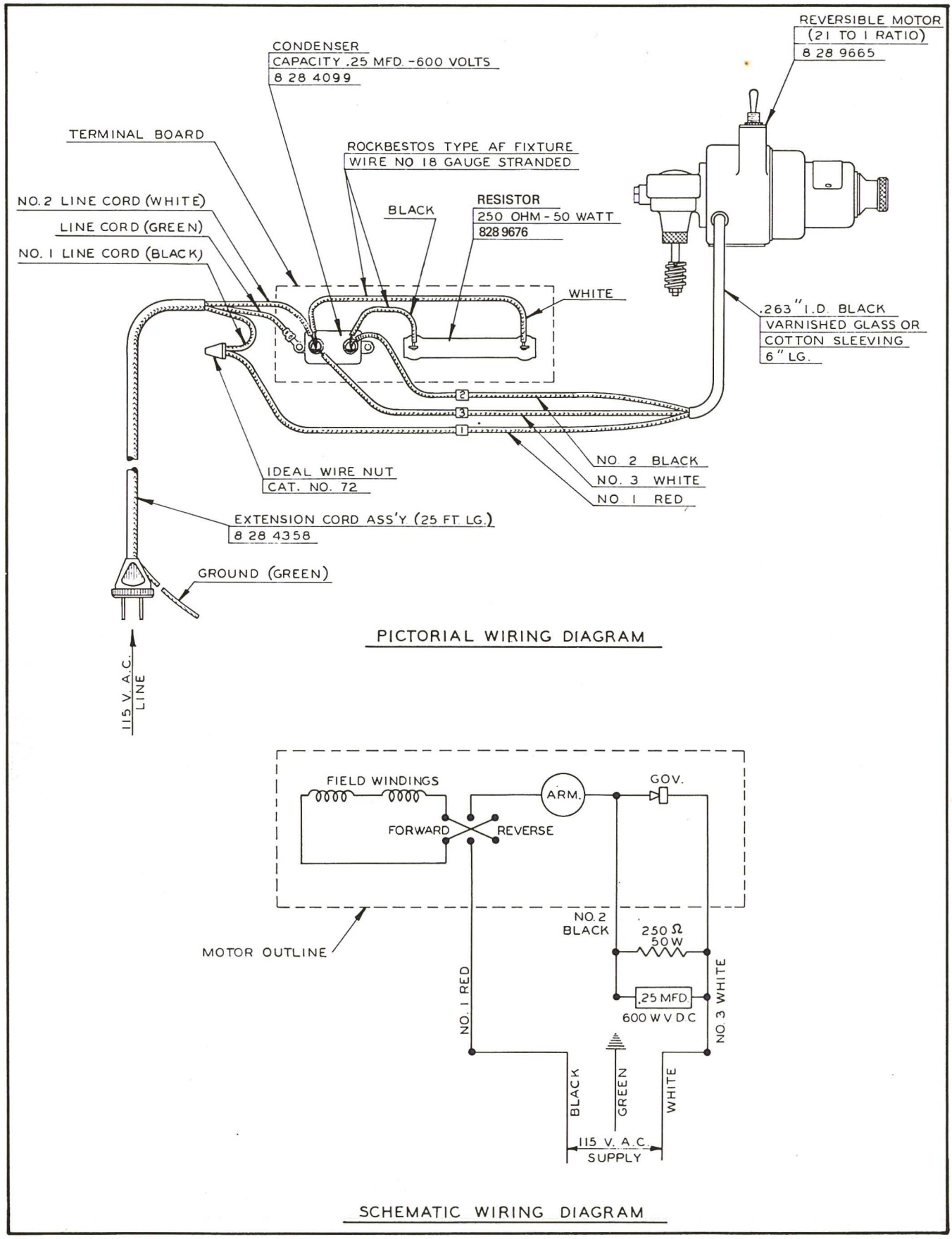


Figure 19. Schematic and Pictorial Wiring Diagrams

WARRANTY

This equipment is sold by AIRCO under the warranty set forth in the following paragraph. Such warranty is extended only to the buyer who purchases the equipment directly from AIRCO or directly from an authorized distributor of AIRCO as new merchandise.

For one year (12 months) after delivery by AIRCO, this equipment, other than its expendable parts, is warranted to be free from manufacturing defects and to conform to the description of this equipment contained in this manual, provided that the same is properly operated under conditions of normal use and that regular periodic maintenance and service is performed and replacements made, in accordance with the instructions provided. Expendable parts of this equipment are warranted to be free from manufacturing defects at the time of delivery by AIRCO and to conform at such time to the description of this equipment contained in this manual. AIRCO's sole obligation under this warranty is limited to replacing equipment or parts which are returned to it at its nearest designated repair location, transportation charges prepaid, and which, upon AIRCO's examination, are found to be defective. AIRCO shall not be liable for consequential damages or special damages.

The foregoing warranty shall not apply if this equipment has been repaired or altered by anyone other than an authorized AIRCO representative, or if the equipment has been subject to abuse, misuse, negligence, or accident. **THERE ARE NO WARRANTIES (OTHER THAN THE WARRANTY OF TITLE AS PROVIDED IN THE UNIFORM COMMERCIAL CODE) WHICH EXTEND BEYOND THE DESCRIPTION OF THIS EQUIPMENT CONTAINED IN THIS MANUAL. AIRCO MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THIS EQUIPMENT.**

USER RESPONSIBILITIES

This equipment will perform safely and reliably when installed, operated, maintained, and repaired in accordance with the instructions provided. Equipment must be checked periodically and repaired, replaced or reset as necessary for continued safe and reliable performance. Defective equipment should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately with parts that are manufactured or sold by AIRCO. The equipment or any of its parts should not be modified without the prior written approval of AIRCO's Equipment Engineering and Development Department. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damaged parts, repair by anyone other than AIRCO, or modification by anyone other than AIRCO.

For further information, call your local AIRCO Distributor listed in the Yellow Pages under "Welding Equipment & Supplies"

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ILLUSTRATIONS

TABLES

NO. 42 CAMOGRAPH 804- 4200(4201)

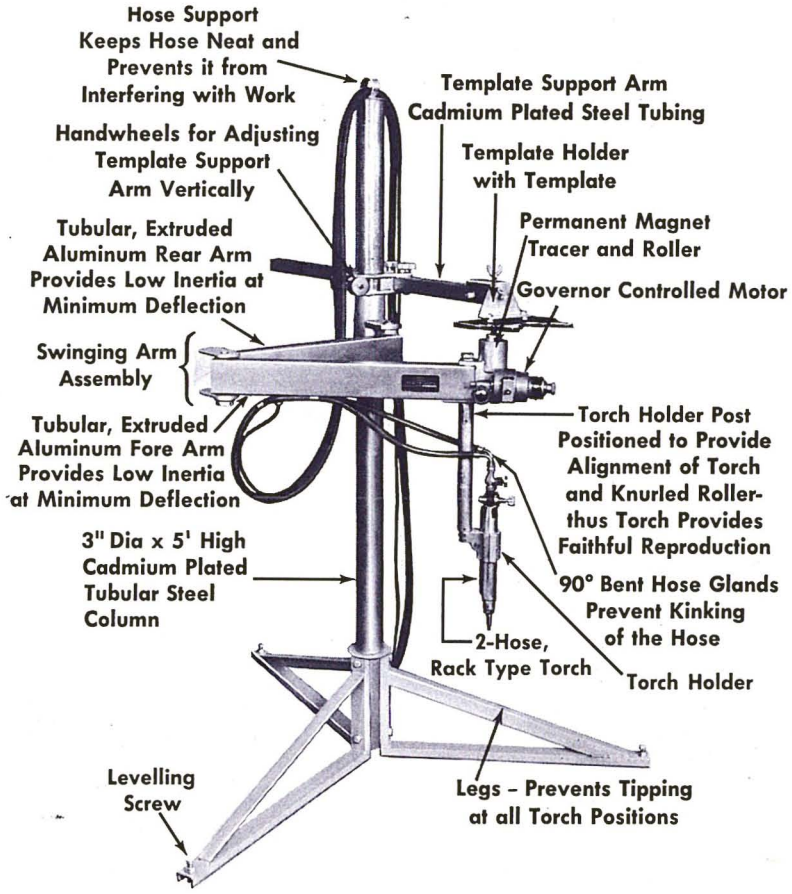


FIG. 1 – THE NO. 42 CAMOGRAPH

INTRODUCTION

The AIRCO ® No. 42 Camograph ® (Figure 1) is a portable, single-torch, shape-cutting machine designed to cut shapes from steel sheet or plate. It will cut any shape that falls within the cutting area diagram (Fig. 2). The largest circle which can be cut has a diameter of 42 inches and the longest straight line is 92 inches.

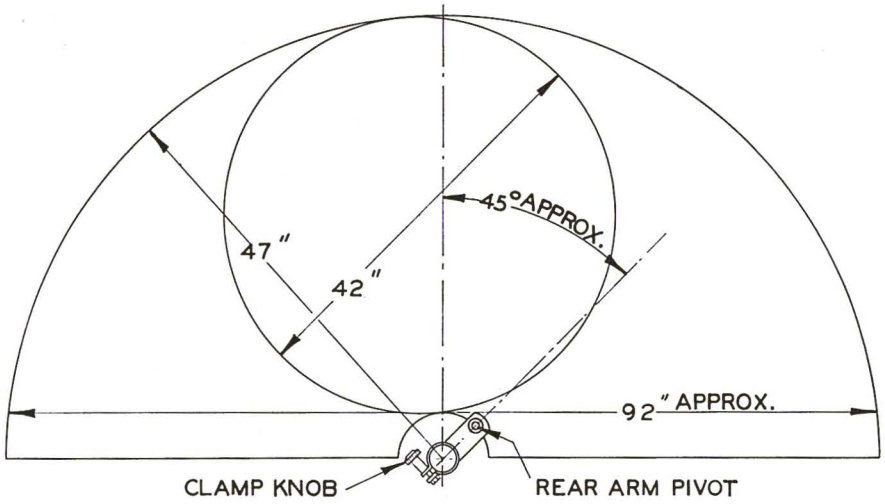


FIG. 2 – CUTTING AREA

The Camograph is a swinging-arm-type machine which employs a two-section arm assembly pivoted at its support end and at its center. The travel speed is established by the drive motor in conjunction with the diameter of the roller used.

Both the cam support arm and the arm assembly are provided with an adjustable clamping arrangement for mounting at the desired height and location on a tubular steel column.

Table I is a check list of the equipment comprising a complete No. 42 Camograph unit, depending upon the fuel gas chosen. For information on other roller sizes which are available as accessories consult the section on Accessories and Replacement Parts.

TABLE I

No. 42 Camograph and Attachments

Quantity	Description	Stock Number For		
			Propane or Natural Gas	
		Acetylene	Positive Pressure Torch	Injector Torch
	No. 42 Camograph Package Unit Consisting of:	804-4200	804-4201	804-4202
1	No. 42 Camograph with ½" roller and 25' of 5/16" Twin Hose with connections (90° bent glands)	804-4220	804-4220	804-4220
1	Two-Hose Machine Cutting Torch	823-4743	823-4743	823-2541
1	Cutting Tip – Size 1	854-3801	813-1521	813-2550
1	Cutting Tip – Size 2	854-3802	813-1522	813-2551
1	Cutting Tip – Size 4	854-3804	813-1524	813-2553
1	Wrench	809-0028	809-0028	809-0028

(Tip Style 138 for acetylene and Style 229 for propane or natural gas.)

Weight – Net Weight: approximately 140 lbs.

INSTALLATION

A. ASSEMBLY

Attach the three legs to the tubular steel column by means of the six bolts provided. (Refer to Fig. 3.) When the column is erect and supported by the legs, put the cadmium-plated steel ring over the upper end and slide it down so that it rests on the legs where they meet the column. In relation to the work area the legs may be placed wherever wanted. However, it is preferable that the work be placed in the free space between any two of the legs.

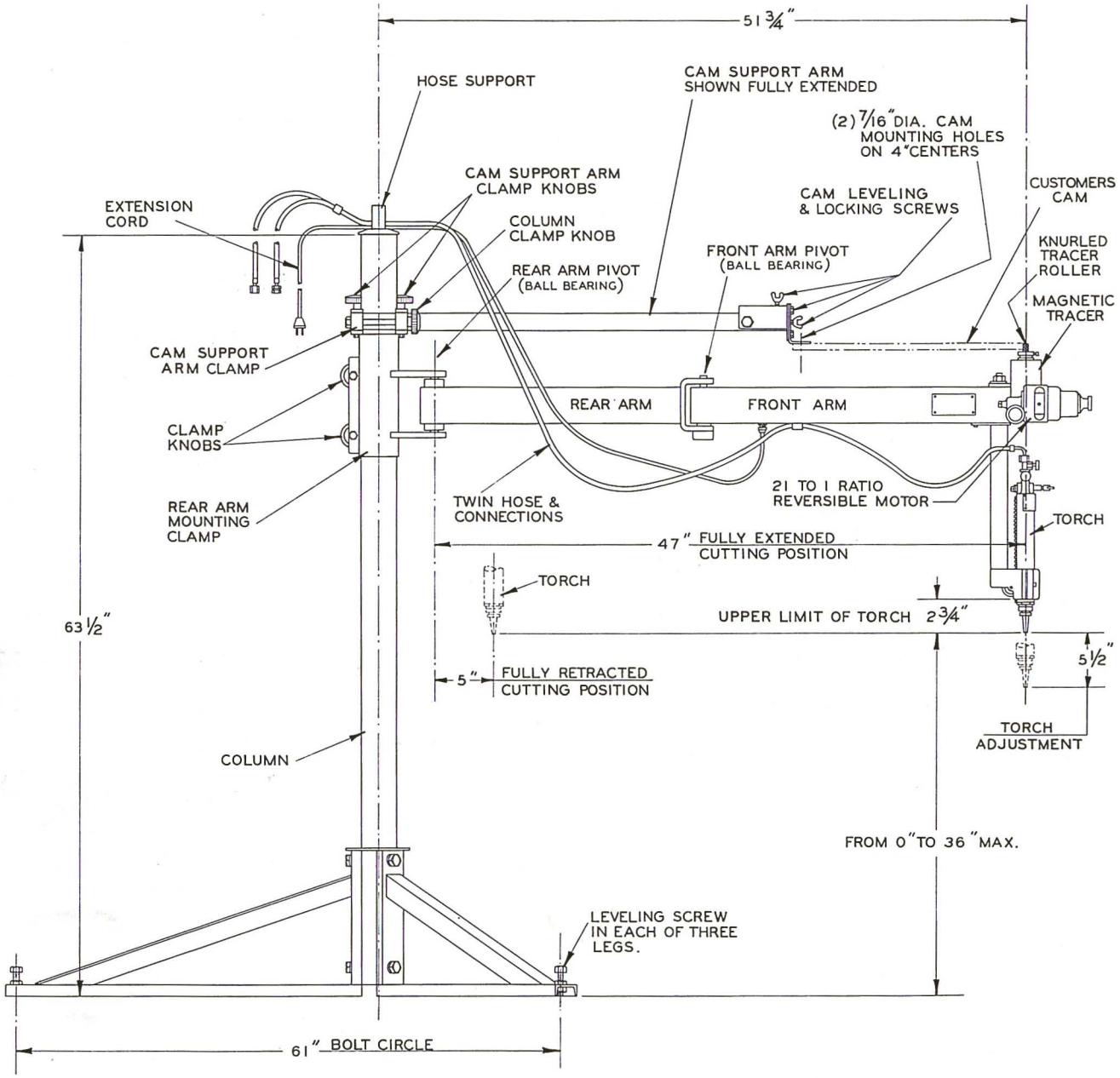


FIG. 3 – DIMENSIONAL DIAGRAM

Loosen the two handwheels on the rear-arm-assembly mounting clamp. Lift the entire swinging arm assembly, in its fully folded position with the torch holder post projecting downward, and fit it over the top of the column. Slide the assembly down to any convenient height. To obtain unrestricted torch mobility over the entire cutting area it is essential that the rear-arm pivot project toward said area at approximately a 45° angle to the right, as shown in Fig. 2, rather than straight across it. Tighten the two handwheels.

On the cam-support-arm mounting bracket loosen that handwheel which clamps the bracket to the post. Hold the arm and bracket in such a manner that the paired handwheels on the bracket and the wing screw on the cam support are on top. Lower the entire assembly onto the column so that the cam support is over the work area. Tighten the handwheel. Insert the hose support ring into the top of the column.

To mount the torch, loosen the two screws in the face of the torch holder. Place the torch in the holder, and adjust the screws until the block maintains a firm, but not binding, pressure against the torch.

To mount the tip in the torch, remove the tip nut from the torch, insert the tip, replace and tighten the nut.

Feed the supply hoses through the hose support ring and loop them to the underside of the front arm; one hose on either side of the extension-cord strain-relief bushing. Turn the handwheel until the torch is all the way down in the holder. Fasten the hoses to the bottom of the front arm with the hose clip and screw provided. The hole for this screw is in the bottom of the front arm, just forward of the extension-cord bushing. Be certain that the hoses have enough slack to permit the torch to reach the lower limit of its travel without strain on the hoses or restriction of the free movement of the arms. Connect the hoses, one on either side of the torch holder post, to the torch. It may be found helpful to band the gas supply hoses and the extension cord together with friction tape every few feet.

B. ALIGNMENT

With the torch all the way down in the holder, place a machinist's level against the side of the torch. If it is out of plumb, loosen the locknuts on the leveling screws found in the legs and adjust the screws to get the torch perpendicular. Tighten the locknuts on the legs to hold the torch in this position. Trueing should be done in two positions, front and side, 90° between positions.

C. BASIC REQUIREMENTS

1. Working Space

The space required will be determined to some degree by the size of the pieces which are generally cut (Fig. 2). Another factor is the method of machine operation; that is whether after completing the cut the arms are rotated to begin work on another cutting rack while the first is being cleared off and set up again. However, the maximum floor space which the Camograph itself can use is a circle nine and one-half feet in diameter. Enough space should be allowed around the work area to permit freedom of movement.

2. Power

The variable-speed, governor-controlled, reversible drive motor operates at less than 100 watts on 115-volt, 25-, 50-, or 60-cycle, single-phase, alternating current. The plug end of the three-conductor cable is fitted with a two-pronged plug with a ground lead projecting from it. Grounding the machine is standard safe practice.

3. Gases

In addition to oxygen, the proper fuel gas, as determined by the stock number of the Camograph, should be used (Table I). For figures on gas pressures and consumption rates consult the cutting tables in the section on Operating Instructions.

Suitable regulators should be used to control the flow of gases, depending upon the sources. For regulator information see AIRCO Catalog 806.

4. Work Table

A suitable work table must be used to support the pieces being cut.

OPERATION

A. GENERAL PRECAUTIONS

In addition to the standard practices, relative to ventilation, fire prevention, and the safety and comfort of the operator, which are to be observed in any welding or cutting activity, several general precautions which apply specifically to the use of the No. 42 Camograph are noted below.

When changing the height or angle of projection of the swinging arm always be certain that its weight is supported adequately before loosening the handwheels.

After making changes in swinging-arm position be sure that both handwheels are tightened.

Do not hang coiled hoses, torches, or other equipment or materials over the arms.

B. OPERATING INSTRUCTIONS

Set the swinging arm assembly at the proper height above the work surface and at the correct mounting angle shown in Fig. 2. Use the torch handwheel to make final adjustment of the working height.

Mount the cam on the cam support and by means of the handwheels position the cam support arm at its proper height and location over the work area.

The top wing screw and hexagonal-head bolt located between the two wing screws permit leveling the cam. (See Fig. 4). The upper wing screw provides for leveling the cam in one direction and the lower wing screw locks the cam in that position. Leveling the cam in the second direction is accomplished by means of the bolt. The entire cam support pivots upward on its mounting bolt to make it possible to place the roller within an inside cam.

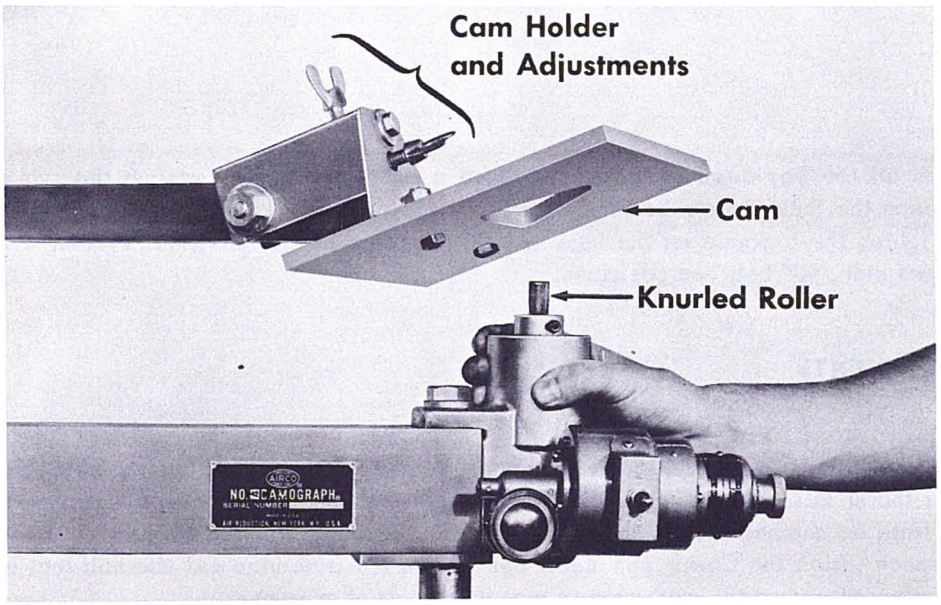


FIG. 4 – CAM HOLDER AND MAGNETIC TRACER HEAD

Select the required cutting speed with the indexed speed control (Fig. 5). Turning the knob clockwise decreases the travel speed; counterclockwise increases the speed. Adjustments can be made before starting or while motor is running.

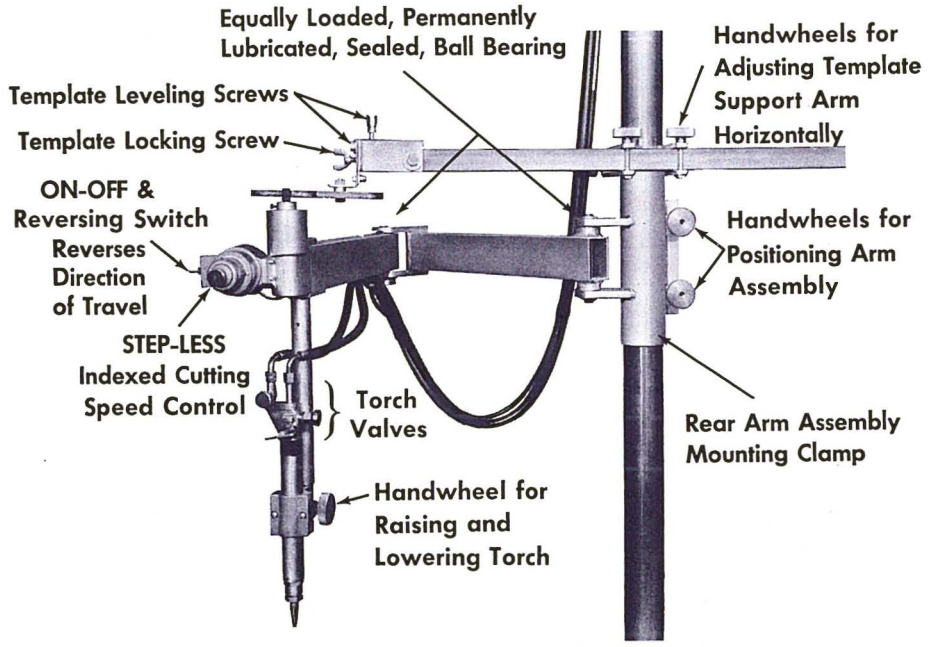


FIG. 5 – CONTROLS AND ADJUSTMENTS

Place the knurled drive roller in contact with the cam. (Refer to Figs. 6 through 10 for directions on the preparation of cams.) The machine is supplied with a roller 1/2 inch in diameter, while other diameters are available as accessories. Be sure that the drive roller used is of the diameter for which the cam was designed. Rollers of various sizes, as indicated in Table II and the section on Accessories and Replacement Parts, are readily interchangeable simply by loosening the single set screw on the rim of the holder, lifting out the roller, and inserting another.

Light the torch, adjust the preheat flame, and move the roller along the lead-in until the flame meets the edge of the material. After preheat turn on the cutting oxygen and, by means of the three-position toggle switch, start the tracing motor.

For the most accurate results refer to Fig. 11 and the machine cutting table as determined by the tip being used (Table III or IV).

TABLE II

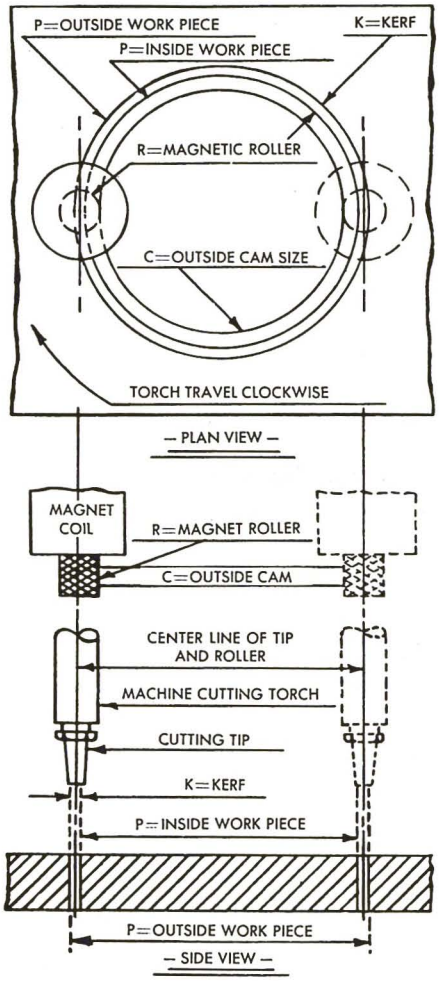
Cutting Range and Capacity

Material Thickness and Capacity	Area Capacity
Up to 12"	See Cutting Area diagram, Fig. 2

Cutting Speed Range

Roller Dia.	In. per Min.
1/2"	3 to 30
3/8"*	2 to 22
1/4"*	1½ to 15

*May be obtained separately as accessories.



FOR INSIDE CAMS

LEGEND

C = Inside Cam Size
P = Piece Wanted to Size
R = Magnetic Roller Diameter
K = Kerf Width
F = Finish Allowance

FOR INSIDE CAMS WHERE INSIDE WORK PIECE IS WANTED

FORMULA

$C = P + \frac{1}{2}R + \frac{1}{2}K + \frac{1}{2}F$
on a side

To arrive at cam size

Lay out piece wanted to size, plus (+) ½ the magnetic roller diameter on a side, plus (+) ½ the kerf width on a side.

Add finish allowance if required.

FOR INSIDE CAMS WHERE OUTSIDE WORK PIECE IS WANTED

FORMULA

$C = P + \frac{1}{2}R - \frac{1}{2}K - \frac{1}{2}F$
on a side

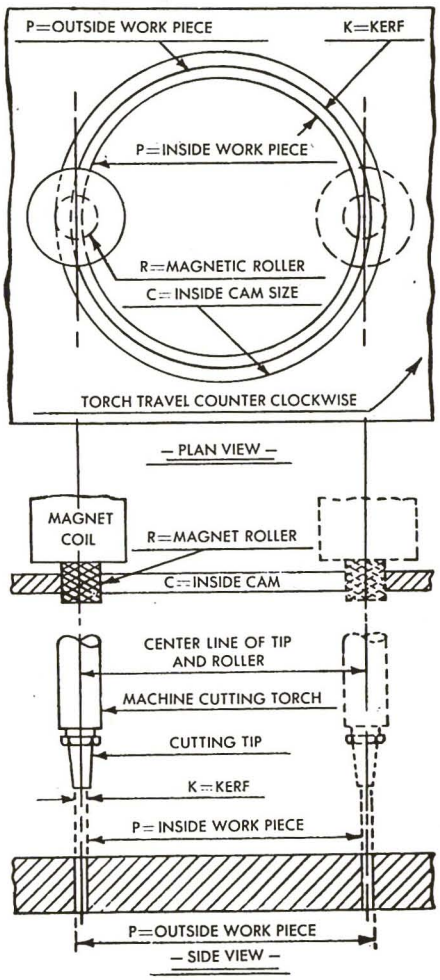
To arrive at cam size

Lay out piece wanted to size, plus (+) ½ the magnetic roller diameter on a side, minus (–) ½ the kerf width on a side.

Subtract finish allowance if required.

Standard magnetic roller is ½ inch in diameter.

Accessory rollers are available in 3/8 – and ¼ – inch diameters.



FOR OUTSIDE CAMS

LEGEND

C = Outside Cam Size
P = Piece Wanted to Size
R = Magnetic Roller Diameter
K = Kerf Width
F = Finish Allowance

FOR OUTSIDE CAMS WHERE INSIDE WORK PIECE IS WANTED

FORMULA

$C = P - \frac{1}{2}R + \frac{1}{2}K + \frac{1}{2}F$
on a side

To arrive at cam size

Lay out piece wanted to size, minus (–) ½ the magnetic roller diameter on a side, plus (+) ½ the kerf width on a side.

Add finish allowance if required.

FOR OUTSIDE CAMS WHERE OUTSIDE WORK PIECE IS WANTED.

FORMULA

$C = P - \frac{1}{2}R - \frac{1}{2}K - \frac{1}{2}F$
on a side

To arrive at cam size

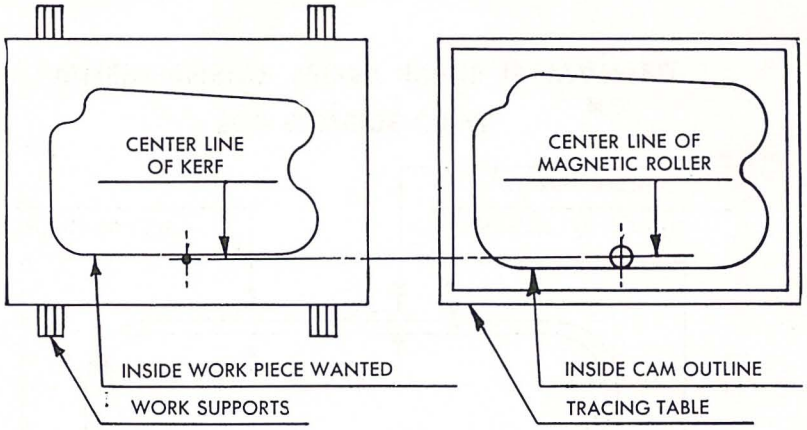
Lay out piece wanted to size, (–) ½ the magnetic roller diameter on a side, minus (–) ½ the kerf width on a side.

Subtract finish allowance if required.

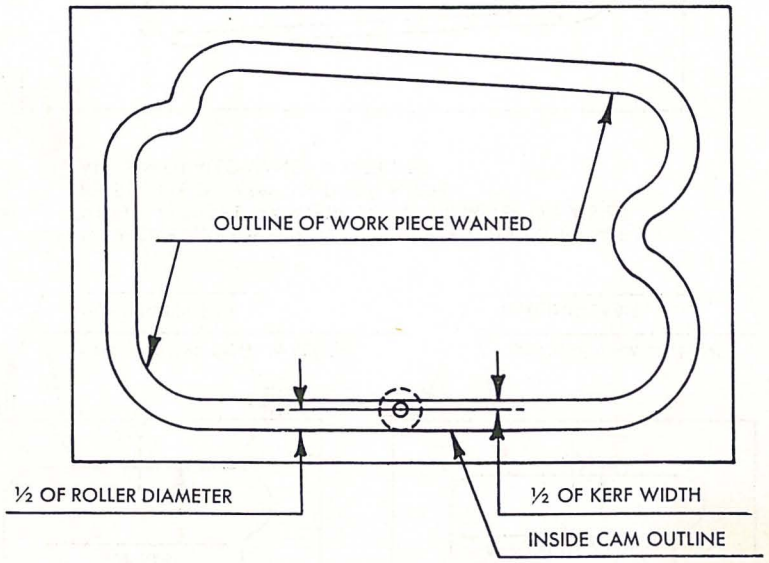
Standard magnetic roller is ½ inch in diameter.

Accessory rollers are available in 3/8 – and ¼ – inch diameters.

FIGURE 6

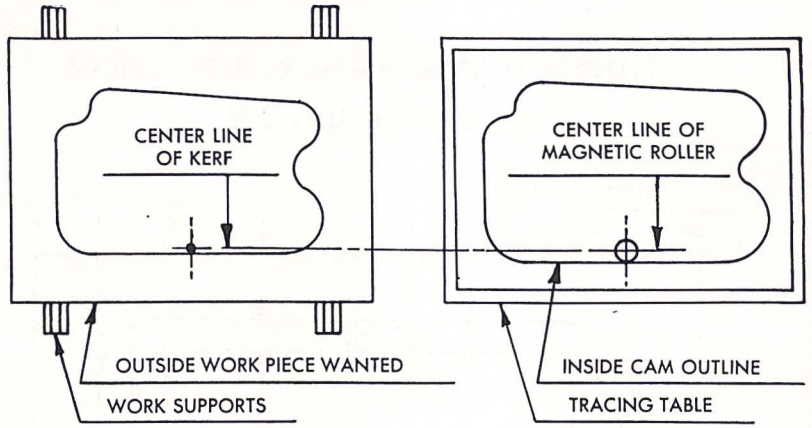


TO ARRIVE AT CAM SIZE, LAY OUT PIECE WANTED TO SIZE
PLUS (+) ½ THE MAGNETIC ROLLER DIAMETER ON A SIDE
PLUS (+) ½ THE KERF WIDTH ON A SIDE
ADD FINISH ALLOWANCE IF REQUIRED

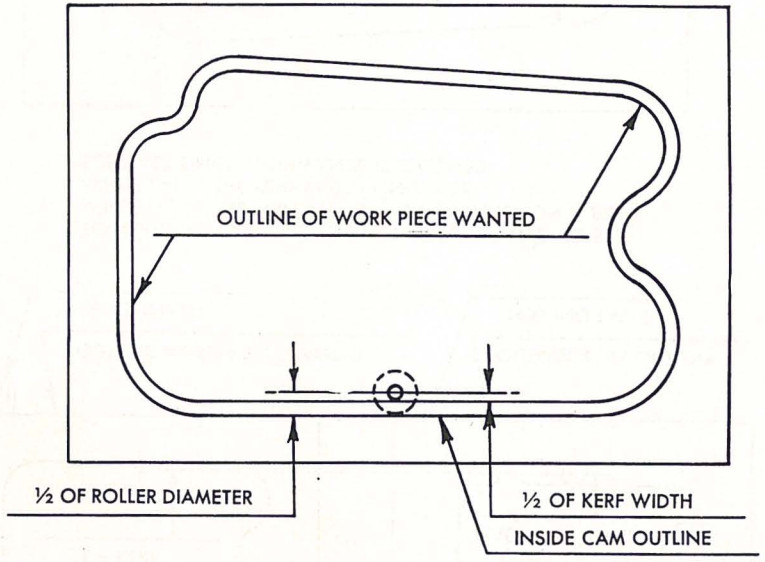


FOR INSIDE CAMS

WHERE INSIDE WORK PIECE IS WANTED



TO ARRIVE AT CAM SIZE, LAY OUT PIECE WANTED TO SIZE
PLUS (+) ½ THE MAGNETIC ROLLER DIAMETER ON A SIDE
MINUS (–) ½ THE KERF WIDTH ON A SIDE
SUBTRACT FINISH ALLOWANCE IF REQUIRED

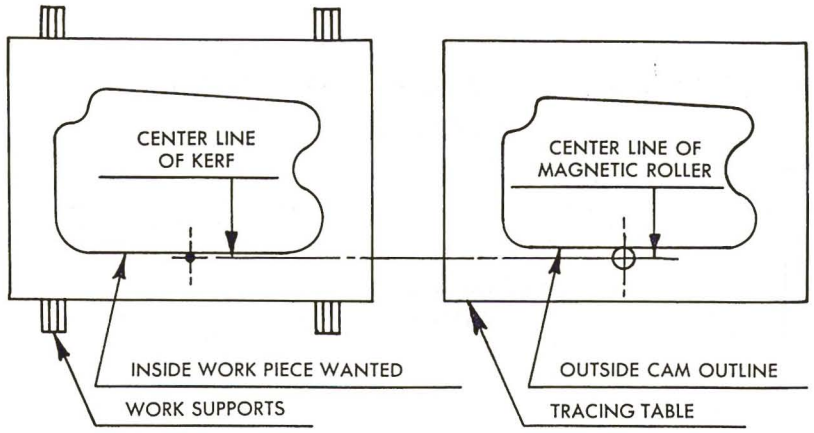


FOR INSIDE CAMS

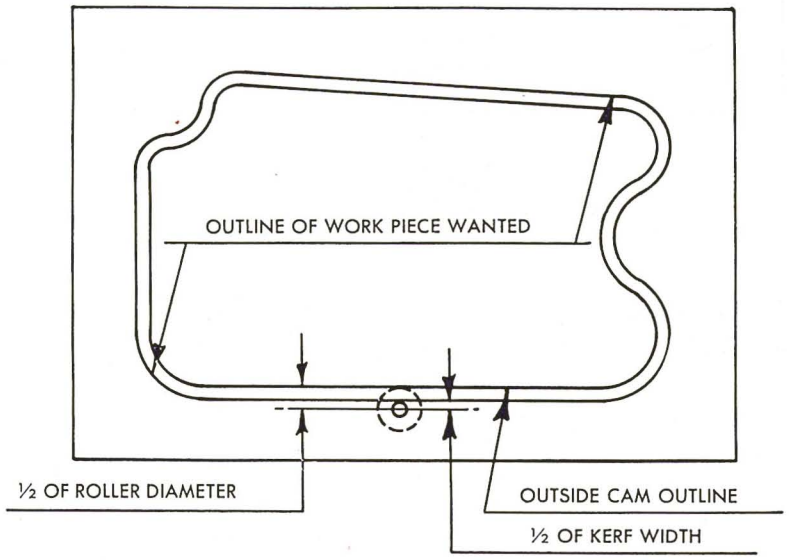
WHERE OUTSIDE WORK PIECE IS WANTED

FIGURE 7

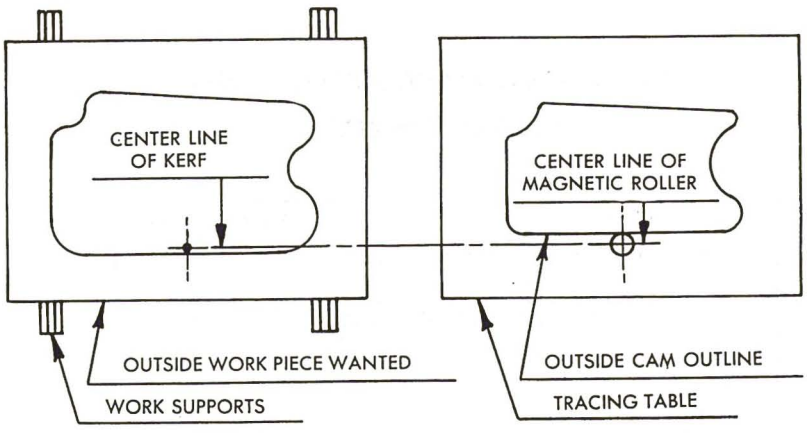
SCHEMATIC CAM LAYOUT FOR MAGNETIC TRACER FOR INSIDE CAMS



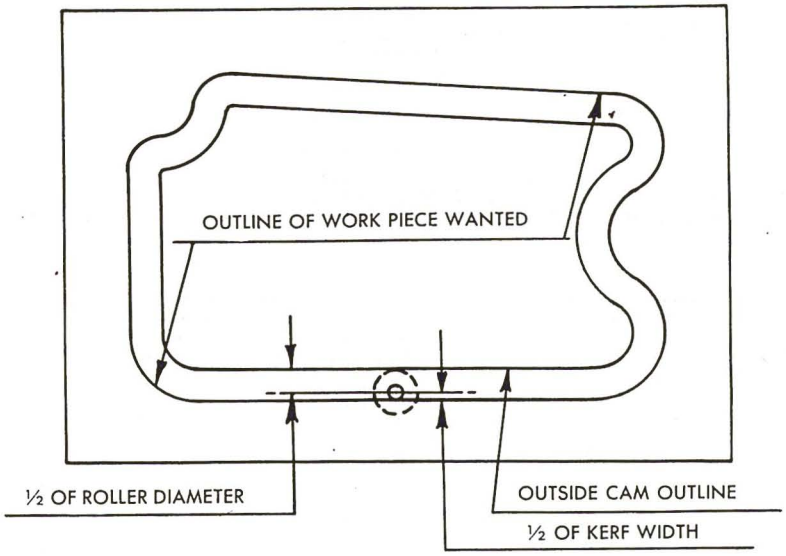
TO ARRIVE AT CAM SIZE, LAY OUT PIECE WANTED TO SIZE
MINUS (—) ½ THE MAGNETIC ROLLER DIAMETER ON A SIDE
PLUS (+) ½ THE KERF WIDTH ON A SIDE
ADD FINISH ALLOWANCE IF REQUIRED



FOR OUTSIDE CAMS
WHERE INSIDE WORK PIECE IS WANTED

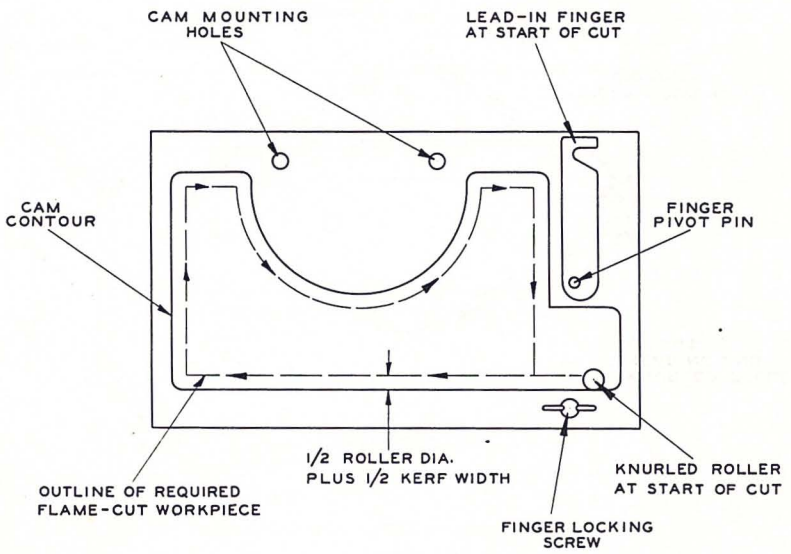


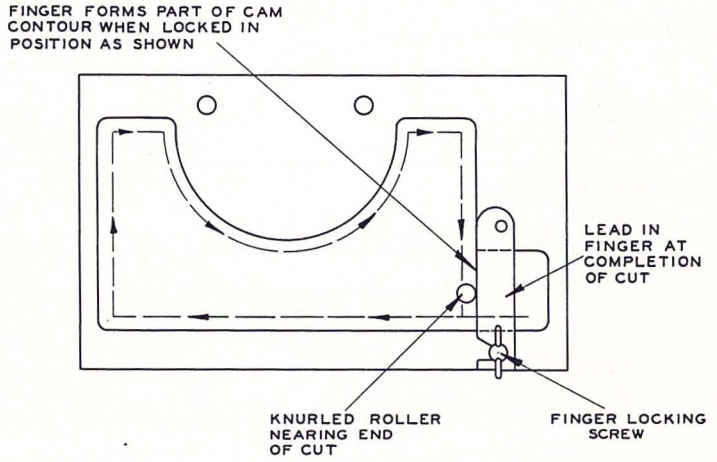
TO ARRIVE AT CAM SIZE, LAY OUT PIECE WANTED TO SIZE
MINUS (—) ½ THE MAGNETIC ROLLER DIAMETER ON A SIDE
MINUS (—) ½ THE KERF WIDTH ON A SIDE
SUBTRACT FINISH ALLOWANCE IF REQUIRED



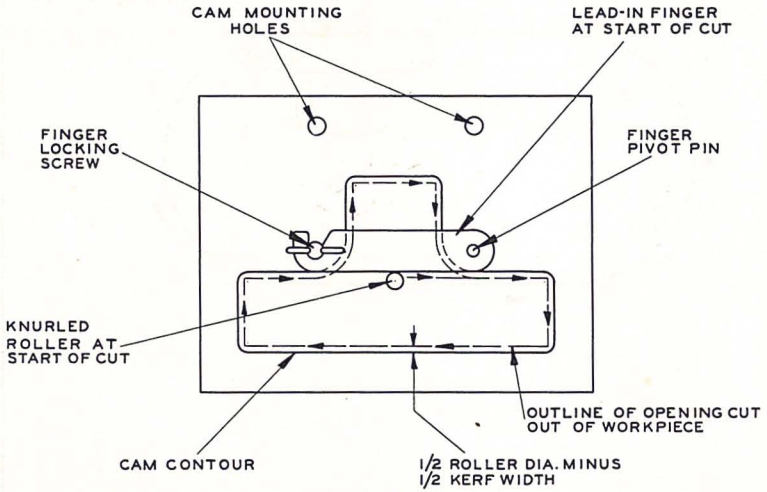
FOR OUTSIDE CAMS
WHERE OUTSIDE WORK PIECE IS WANTED

INSIDE CAM FOR INSIDE WORKPIECE





INSIDE CAM FOR OUTSIDE WORKPIECE



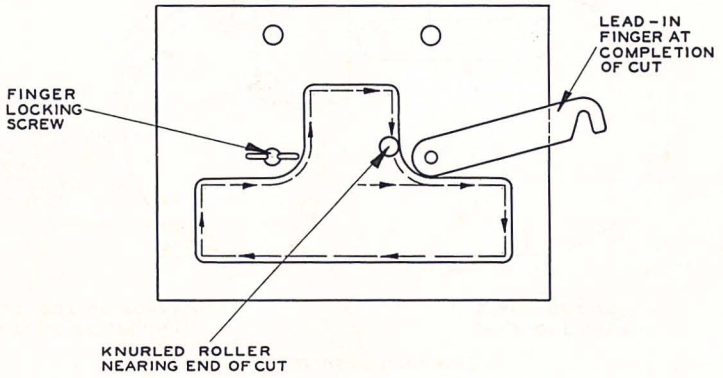


FIG. 9 – CAM LAYOUTS FOR USE WITH MAGNETIC TRACERS

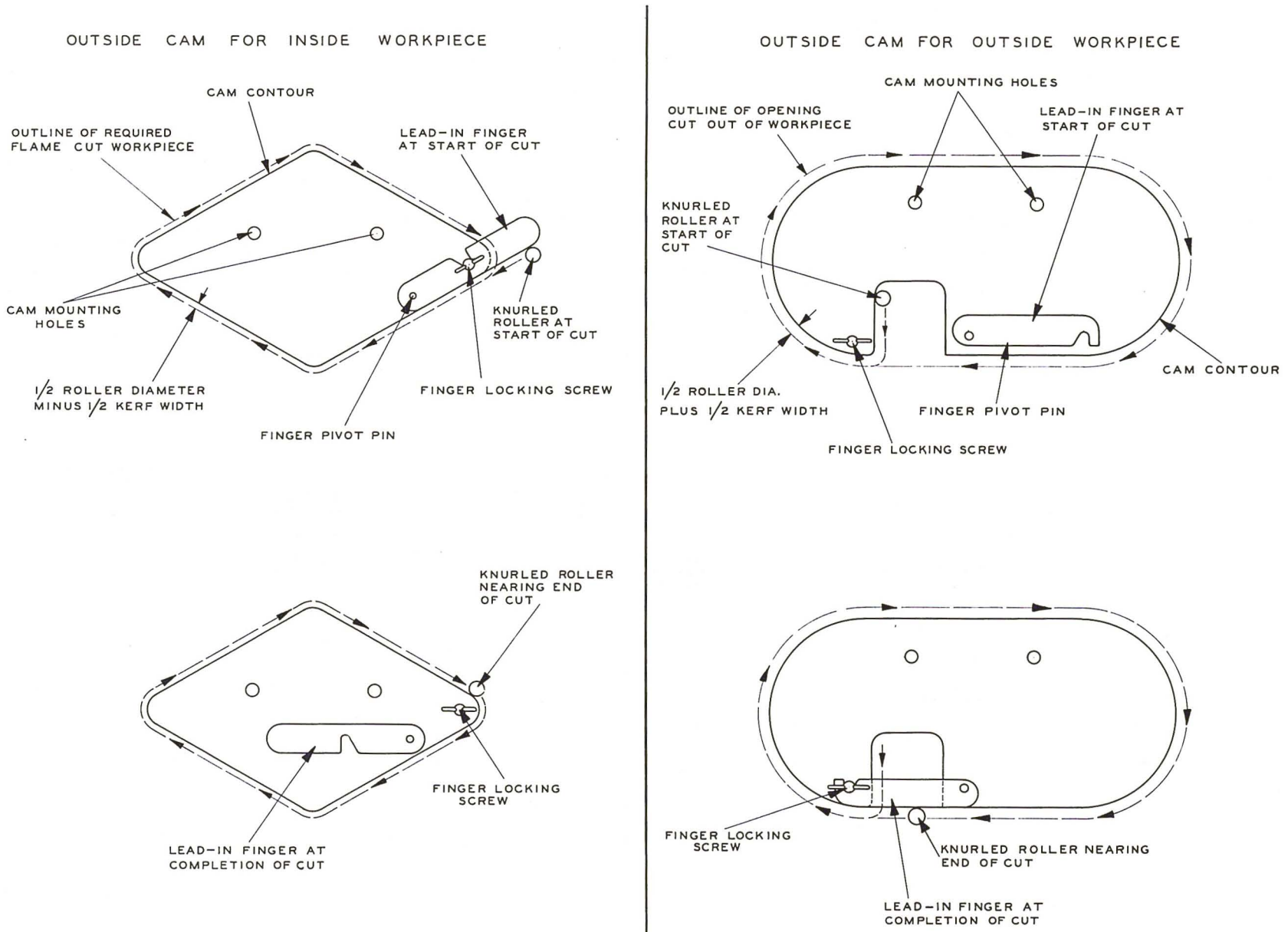
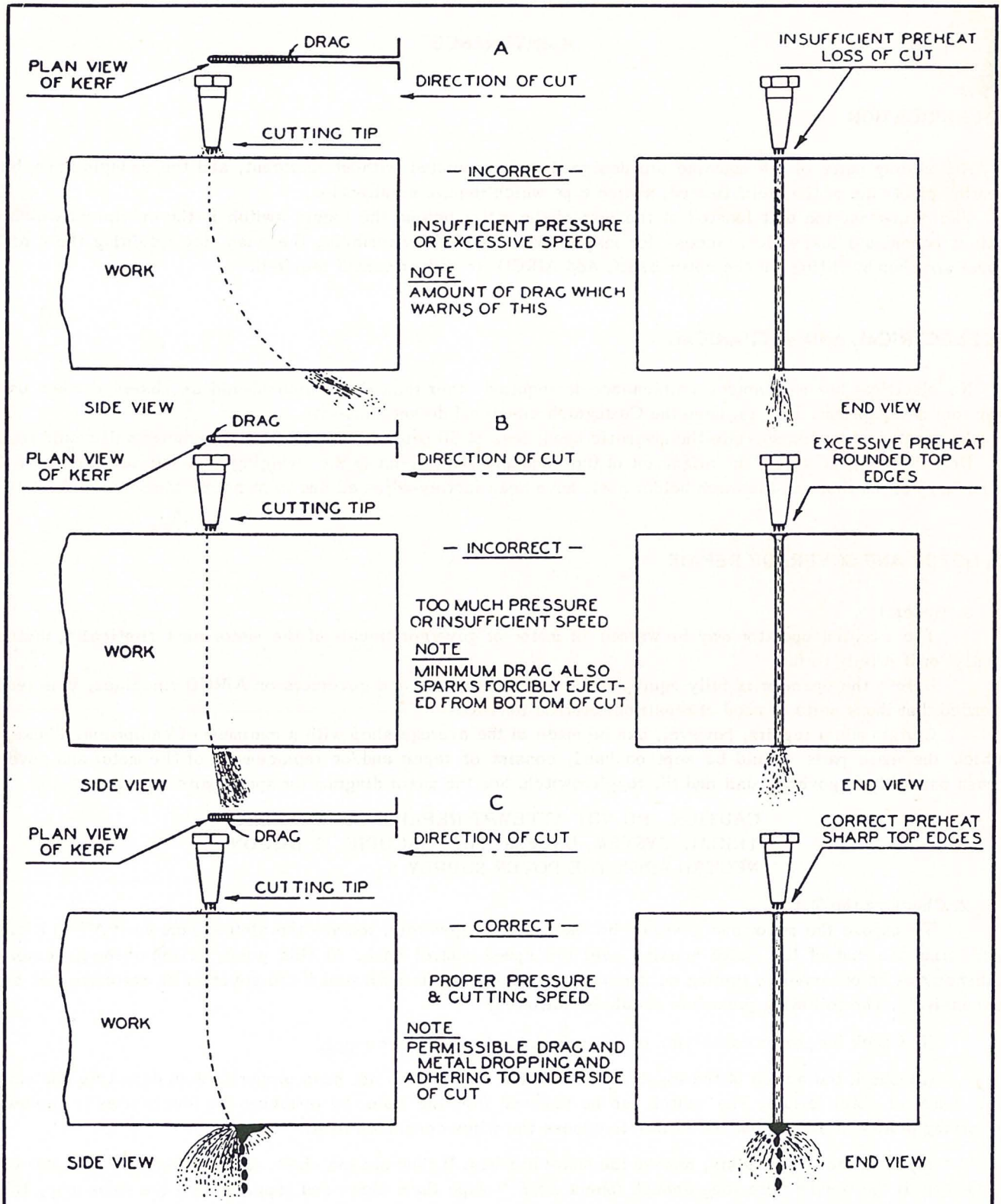


FIG. 10 – CAM LAYOUTS FOR USE WITH MAGNETIC TRACERS



SIMPLE METHOD OF CORRECTING
OXYGEN PRESSURE
SPEED AND PREHEAT

FIGURE 11

MAINTENANCE

A. LUBRICATION

All sliding parts of the machine are designed to be operated without lubricant, and the swinging-arm, ball-bearing pivots are of the prelubricated, sealed type which require no attention.

The gear-reduction unit located at the rear of the motor behind the toggle switch is the only point which requires occasional inspection. Access for inspection is gained by removing the snap ring retaining the circular cover and then by lifting out the cover itself. Add AIRCO No. 2 lubricant if required.

B. ELECTRICAL AND MECHANICAL

No electrical nor mechanical maintenance is required other than that which should be observed when using any tool or equipment. That is, keep the Camograph clean and do not abuse it.

Never attempt to disassemble the magnetic head; loss of 50 per cent or more of the magnetic pull would result.

Do not attempt to adjust the alignment of the pivot pin at the joint of the swinging arm. The set screws at this joint, as well as those in the torch holder post, have been factory-adjusted and must not be tampered with.

C. MOTOR AND GOVERNOR REPAIR

1. General

The machine operator may be warned of motor or governor trouble if the motor runs erratically, intermittently, or if it fails to run.

Unless the operator is fully equipped for repairing motors and governors on AIRCO machines, it is recommended that those parts in need of repair be returned to AIRCO.

Certain minor repairs, however, can be made in the average shop with a minimum of equipment. These, for which the extra parts should be kept on hand, consist of repair and/or replacement of the motor and governor brush assemblies, governor unit and the toggle switch. See the motor diagram for spare parts numbers.

CAUTION: DO NOT ATTEMPT REPAIRS TO THE ELECTRICAL SYSTEM UNLESS THE MACHINE IS DISCONNECTED FROM THE POWER SUPPLY.

2. Checking the Motor

To expose the motor and governor brushes and the governor, remove the slotted screws ("A" in Fig. 12) and slide the end of the motor housing over the speed-control knob. At this point, action of the governor and brushes may be observed by turning on the drive motor. Trouble is indicated if the governor or motor brushes spark excessively. The following procedure should be followed:

(1) Check for proper connection of the motor plug to the power supply.

(2) Check the action of the toggle switch. If the toggle does not snap properly, it is defective and may be the cause of motor failure. The switch can be removed from the motor by removing the four screws in the switch mounting plate and pulling out the switch to expose the wires connected to it.

(3) If the trouble persists, remove the motor brushes. If they are too short, replace them with the new ones. However, if the brushes are long enough (about 5/16") wipe them clean and replace them the same way, taking care that dirt in the brush socket does not prevent the brush from moving freely up and down. Before replacing a brush, check the brush spring for adequate pressure.

If the motor still fails to function properly, the trouble may be in the governor mechanism.

3. Checking the Governor

(1) With the end of the motor housing off, turn on the power and watch the governor action. If there is excessive sparking, the governor brushes may be defective.

(2) To reach the governor brushes, disconnect the plug from the power source, loosen the set screw in the governor hub and push it off the end of the shaft. Once off the shaft, the governor may be removed through the holes in the governor control body.

(3) The governor brushes are now exposed. Use the same checking procedure used for the motor brushes. Check the governor contact points and slip-ring surfaces. If they are pitted and cannot be cleaned with crocus cloth, replace them with new units.

Cleaning the accessible portion of the inside of the motor and the governor housing with a clean, dry cloth always should be done when it is disassembled. The armature commutator also may be cleaned with a dry cloth from the open end of the motor.

After replacing the governor brushes, push the governor back into place on the shaft, and securely tighten the set screw in the governor hub. The governor should never touch the brush holders; see that 1/32" to 1/16" clearance exists at this point.

If these checks fail to disclose the cause of the difficulty it is advisable to send the complete motor to the nearest authorized AIRCO repair station and to replace the defective one with a new unit.

4. Removing the Motor

(1) Remove the plug from the power source. Loosen the knurled cap of the strain-relief bushing which holds the rubber-covered cable leading into the front arm.

(2) Remove the large nut on top of the front arm, at the top of the torch holder post.

(3) Pull the torch holder post down and out of the front arm, while holding the motor.

(4) Slide the magnetic tracer assembly out of the front arm, while pushing the wire through the strain-relief bushing to keep slack in the wires inside the arm.

(5) Slide the electrical panel assembly out of the front of the arm.

(6) Disconnect the three motor lead wires from the panel and the wire in the arm.

(7) Remove the motor from the tracer-head assembly by removing the two screws in the motor base.

5. Replacing the Motor

(1) Place the motor in position on the tracer head and screw the two mounting screws in to where they just start to become tight. Adjust the mesh between the worm on the motor shaft and the worm gear in the tracer head so that backlash of the tracer drive shaft can be just barely felt by turning the tracer drive shaft alternately forward and backward by hand. Tighten the mounting screws completely to hold the motor in this position.

(2) Place the black-varnished insulating sleeve over the motor leads, and insert the leads through the hole in the side of the tracer-head casting just above the motor shaft.

(3) Reconnect the motor leads to the panel and wire inside the arm, according to the wiring diagram.

(4) Slide the panel into the arm.

(5) Slide the torch holder post up through the arm, through the hole in the electrical panel, through the hole in the tracer-head casting and up through the top of the arm, to hold the tracer head in place. Replace the nut at the top of the torch holder post, and tighten securely.

(6) Pull the excess slack cable out of the arm and tighten the strain-relief bushing.

6. Resetting the Speed Control

In some cases, repair or replacement of parts in the electrical system may make slight changes in the obtainable speeds in relation to the letters on the dial of the Indexed Speed Control. (Refer to Fig. 12.) In other words, with the control knob on "A" which normally indicates the lowest speed, lowest speed may now be over or under the normal lowest speed of 3 inches per minute. This will, of course, change the entire speed range. If the new range is satisfactory, it need not be changed. However, if the original speed range of 3 to 30 inches per minute is desired, the governor may be adjusted.

(1) Place the letter "A" on the control knob under the pointer.

(2) Loosen the set screw located in the knurled portion of the speed control knob.

(3) Place a screwdriver in the screw slot located in the face of the knob and with the control knob held firmly on "A", turn the screwdriver to increase or decrease the speed to 3 inches per minute. Retighten the set in the knob.

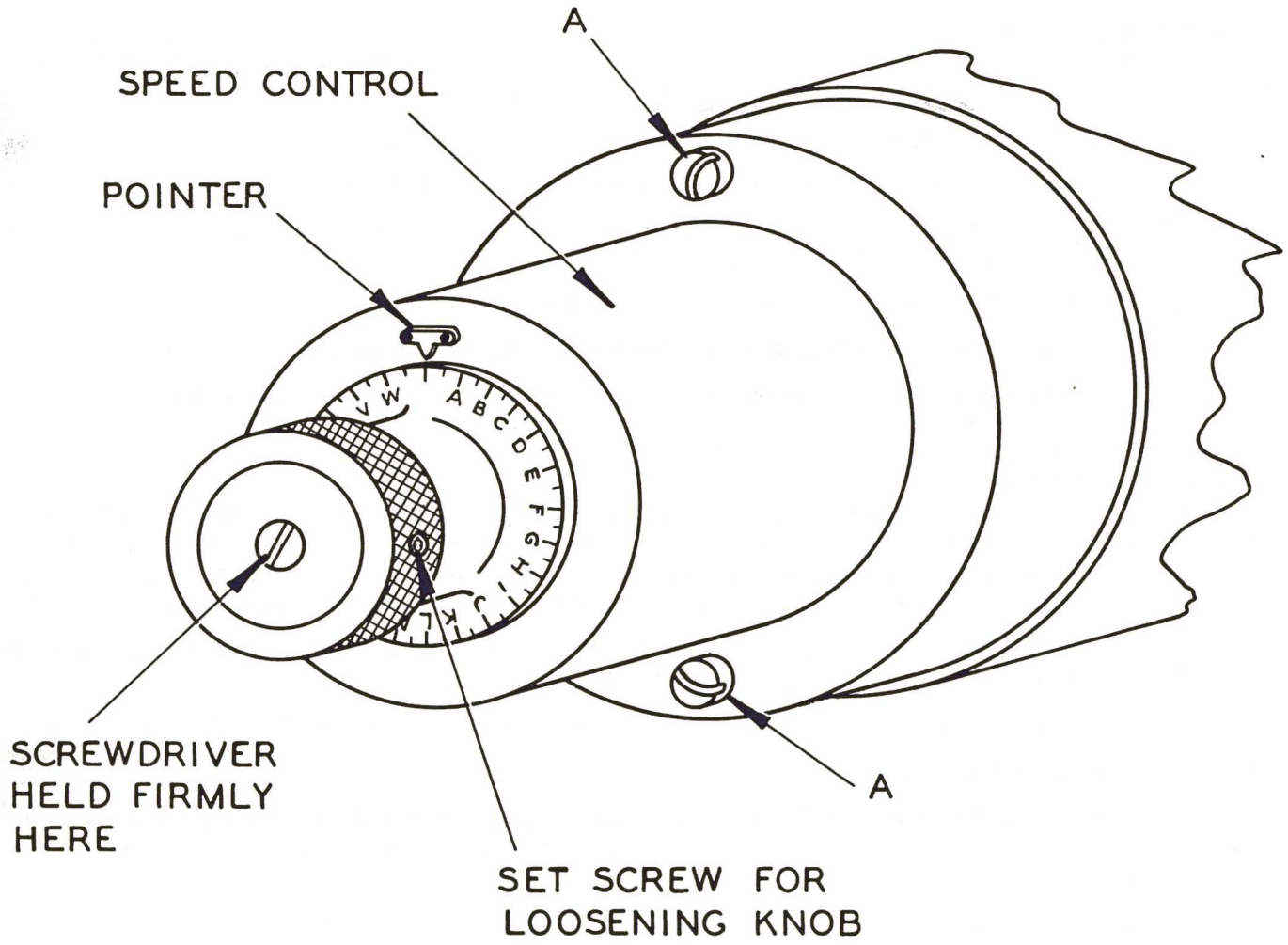


FIG. 12 – FOR USE WITH THE NO. 42 CAMOGRAPH

REPLACEMENT PARTS

804 4220 No. 42 Camograph Machine Only consisting of

1 – 828 9671 5/16" I.D. Twin Hose & Connection Assembly consisting of
- 2 – 803 0003 Fuel Gas Hose Connection Nut
- 2 – 803 0004 Oxygen Hose Connection Nut
- 2 – 803 0008 Hose Glands
- 2 – 803 0013 90° Bent Gland
- 2 – 803 8337 Twin Hose Brace
- 4 – 803 9208 Hose Ferrule
- 1 – 828 9696 Twin Hose Brace
- 25' – 904 4110 5/16" I.D. Twin Hose

1 – 828 9672 Cam Support Arm Assembly
(See Separate Detail)

1 – 828 9679 Column

1 – 828 9694 Hose Support

3 – 828 9702 Leg complete with
- 1 – 1/2–13 Hex Hd. Steel Tap Bolt 2" long
- 2 – 1/2–13 Hex Steel Jam Nut

1 – 828 9717 1/2" dia. Knurled Roller

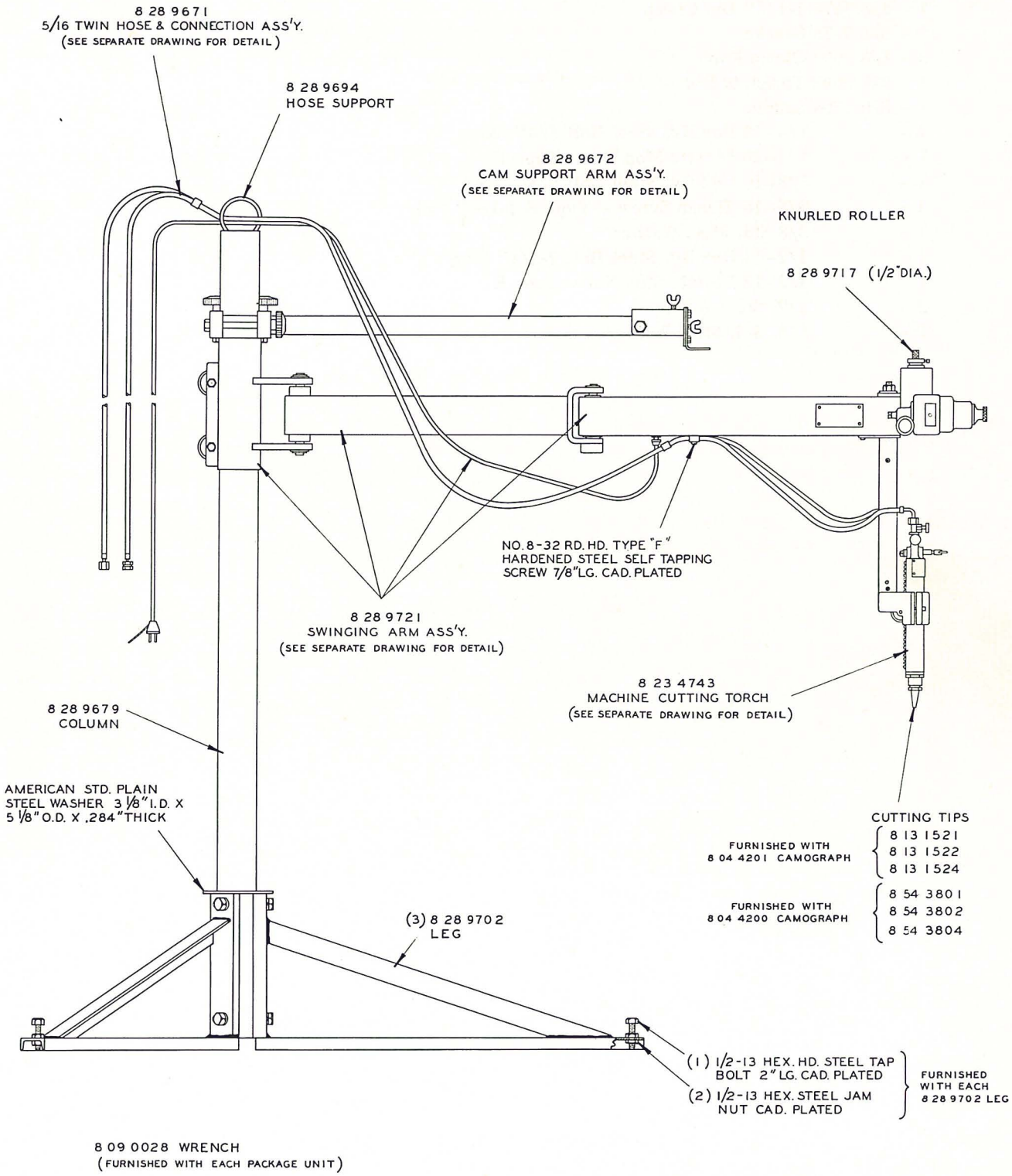
1 – 828 9721 Swinging Arm Assembly (See Separate Detail)

1 – 8–32 Rd. Hd. Type "F" Hardened Steel Self-Tapping Screw – 7/8" long

6 – 1/2–13 Hex Hd. Steel Bolt – 2" long

6 – 1/2–Std. Steel Lockwasher

1 – American Std. Steel Washer 3-1/8 I.D .x 5-1/8 O.D. x .284 Thick



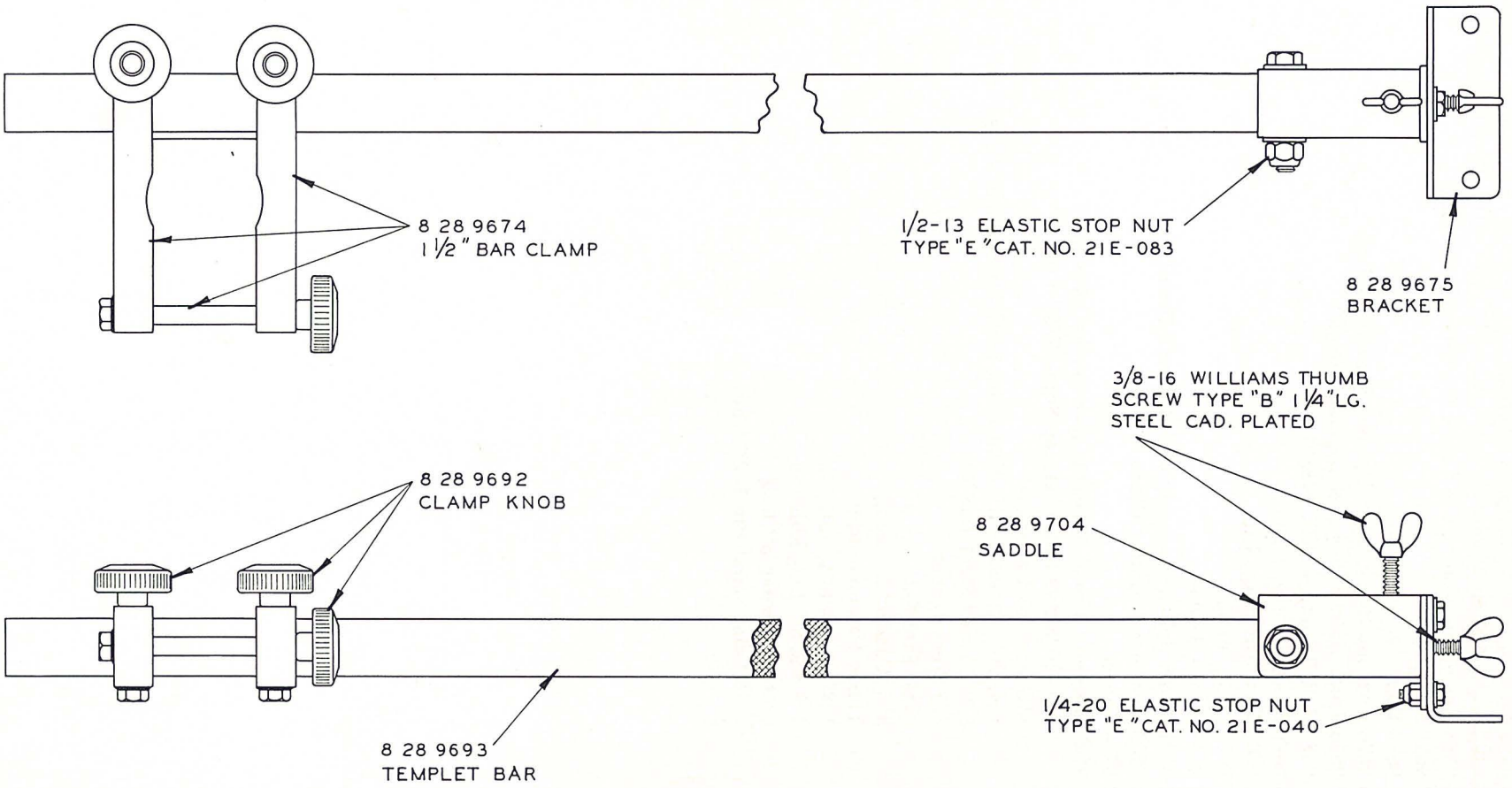
8 04 4200 NO. 42 CAMOGRAPH (FOR ACETYLENE)
8 04 4201 NO. 42 CAMOGRAPH (FOR PROPANE OR NATURAL GAS)

FIG. 13 – NO. 42 CAMOGRAPH PARTS

(See Fig. 14)

828 9672 Cam Support Arm Assembly consisting of

- 1 – 828 9674 1-1/2" Bar Clamp
- 1 – 828 9675 Bracket
- 3 – 828 9692 Clamp Knob
- 1 – 828 9693 Template Bar
- 1 – 828 9704 Saddle
- 1 – 1/4–20 Hex Hd. Steel Bolt 3/4" long
- 1 – 1/4–20 Elastic Stop Nut – Type E
- 1 – 3/8–16 Hex Hd. Steel Bolt 5/8" long
- 2 – 3/8–16 Thumb Screw – Type B 1-1/4" long
- 1 – 3/8 Std. Steel Washer
- 1 – 1/2–13 Hex Hd. Steel Bolt 2-3/4" long
- 1 – 1/2–13 Elastic Stop Nut – Type E
- 2 – 1/2 Steel Washer
- 1 – 1/4 Std. Steel Washer



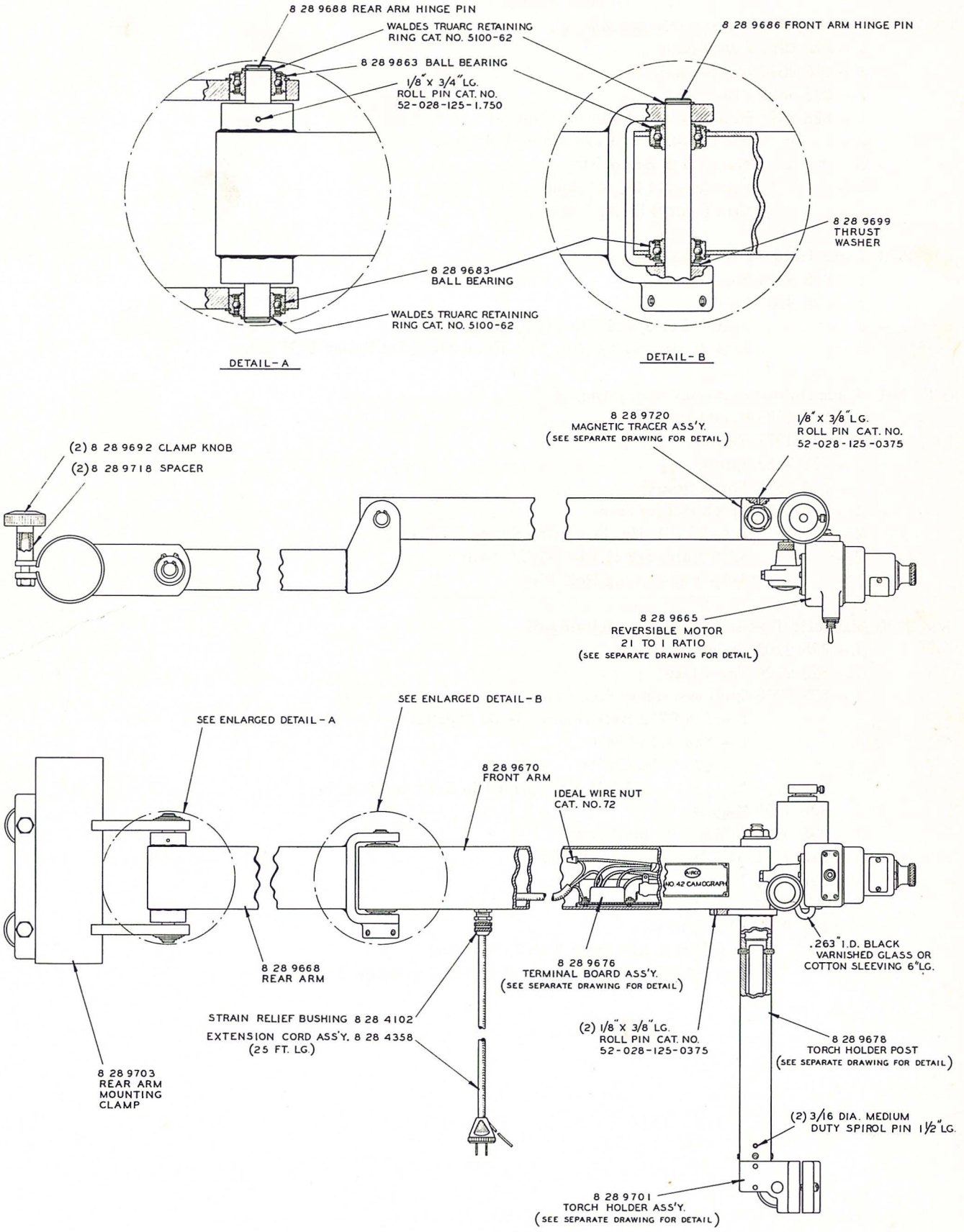
8 28 9672
CAM SUPPORT ARM ASSEMBLY

FIG. 14 – CAM SUPPORT ARM ASSEMBLY (SEE P. 22)

(See Fig. 15)

828 9721 Swinging Arm Assembly consisting of

1 – 828 4358 Extension Cord Assembly (25 feet)
1 – 828 4102 Strain Relief Bushing
1 – 828 9665 Reversible Motor 21 to 1 ratio (See Separate Detail)
1 – 828 9668 Rear Arm
1 – 828 9670 Front Arm
1 – 828 9676 Terminal Board Assembly (See Separate Detail)
1 – 828 9678 Torch Holder Post (See Separate Detail)
4 – 828 9683 Ball Bearing – N.D. #488016
1 – 828 9686 Front Arm Hinge Pin
1 – 828 9688 Rear Arm Hinge Pin
2 – 828 9692 Clamp Knob
1 – 828 9699 Thrust Washer
1 – 828 9701 Torch Holder Assembly (See Separate Detail)
1 – 828 9703 Rear Arm Mounting Clamp
2 – 828 9718 Spacer
1 – 828 9720 Magnetic Tracer Assembly (See Separate Detail)
2 – #10–24 Socket Hd. Steel Cap Screw 7/8" long
2 – #10 Steel Lockwasher
4 – 1/4–20 Hex Socket Hd. Flat Point Steel Set Screw 1/2" lg.
1 – 5/8–11 Hex Steel Jam Nut
1 – 5/8 Steel Washer
1 – Ideal Wire Nut
1 – 3/8 Conduct Locknut
3 – Truarc Retaining Ring
1 – 1/8 x 1-3/4 long Roll Pin
2 – 1/8 x 3/8 long Roll Pin
1 – Cotton Sleeving 6" long
2 – 3/16" dia. Spiral Pin 1/2" long



8 28 9721
SWINGING ARM ASSEMBLY

FIGURE 15

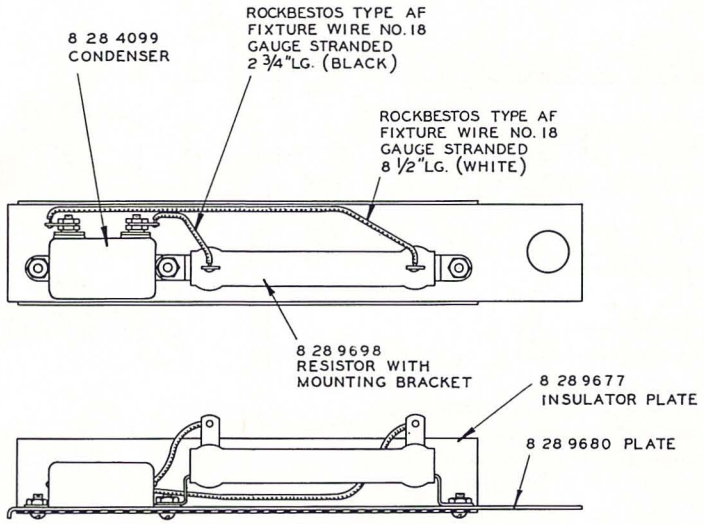
(See Fig. 16)

828 9676 Terminal Board Assembly consisting of
- 1 – 828 4099 Condenser
- 1 – 828 9677 Insulator Plate
- 1 – 828 9680 Plate
- 1 – 828 9698 Resistor with Mounting Bracket
- 3 – #6–32 Rd. Hd. Brass Screw 1/4" long
- 3 – #6–32 Hex Brass Nut
- 1 – Wire (Black) 2-3/4" long
- 1 – Wire (White) 8-1/2" long

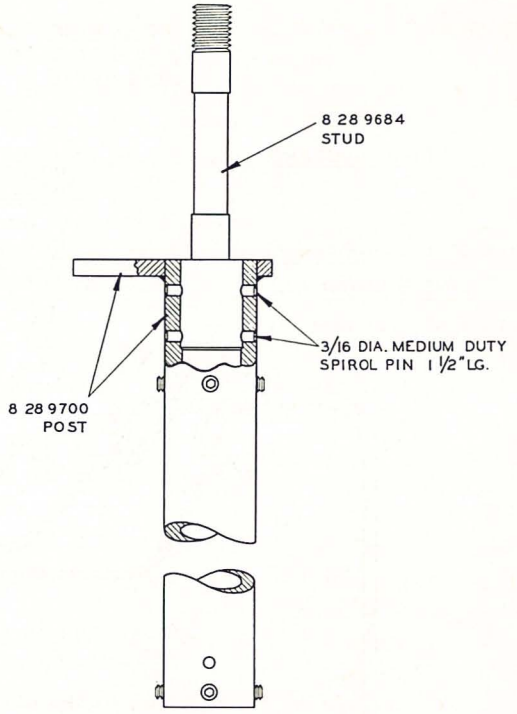
828 9678 Torch Holder Post consisting of
- 1 – 828 9684 Stud
- 1 – 828 9700 Post
- 2 – 3/16" dia. Spiral Pin 1-1/2" long
- 8 – 1/4–20 Hex Socket Hd. Flat Point Steel Set Screw 1/2" long

828 9701 Torch Holder Assembly consisting of
- 1 – 828 4033 Handwheel
- 1 – 828 4077 Pinion
- 2 – 828 7613 Spring
- 1 – 828 9673 Torch Holder
- 1 – 828 9681 Torch Holder Shaft
- 2 – 1/4–20 Fil. Hd. Steel Cap Screw 7/8" long
- 2 – 3/16" dia. Spiral Pin 1-1/2" long
- 1 – 3/16 x 3/4" long Roll Pin

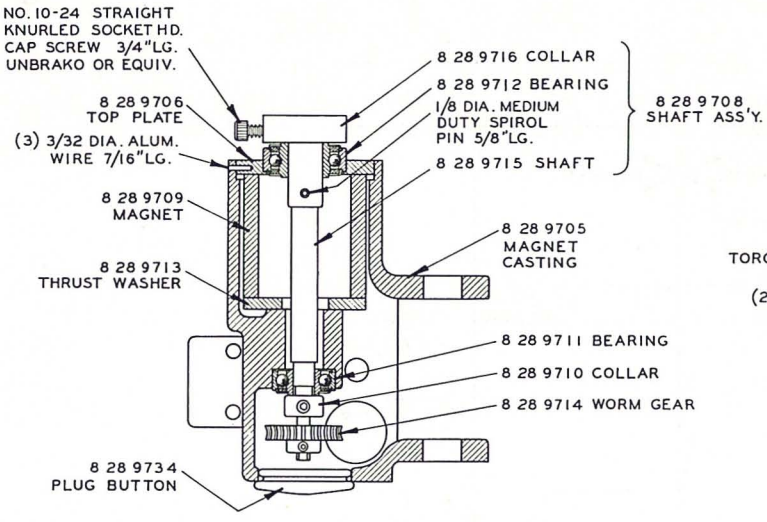
828 9720 Magnetic Tracer Assembly consisting of
- 1 – 828 9705 Magnet Housing
- 1 – 828 9706 Top Plate
- 1 – 828 9708 Shaft Assembly consisting of
  - 1 – 828 9712 Ball Bearing N.D. #88502
  - 1 – 828 9715 Shaft
  - 1 – 828 9716 Collar
  - 1 – 1/8" dia. Spiral Pin 5/8" long
- 1 – 828 9709 Magnet
- 1 – 828 9710 Collar with Set Screw
- 1 – 828 9711 Ball Bearing N.D. #87039
- 1 – 828 9713 Thrust Washer
- 1 – 828 9714 Worm Gear
- 1 – 828 9734 Plug Button
- 3 – 3/16" dia. Aluminum Wire 7/16" long
- 1 – #10–24 Straight Knurled Socket Hd. Cap Screw 3/4" long



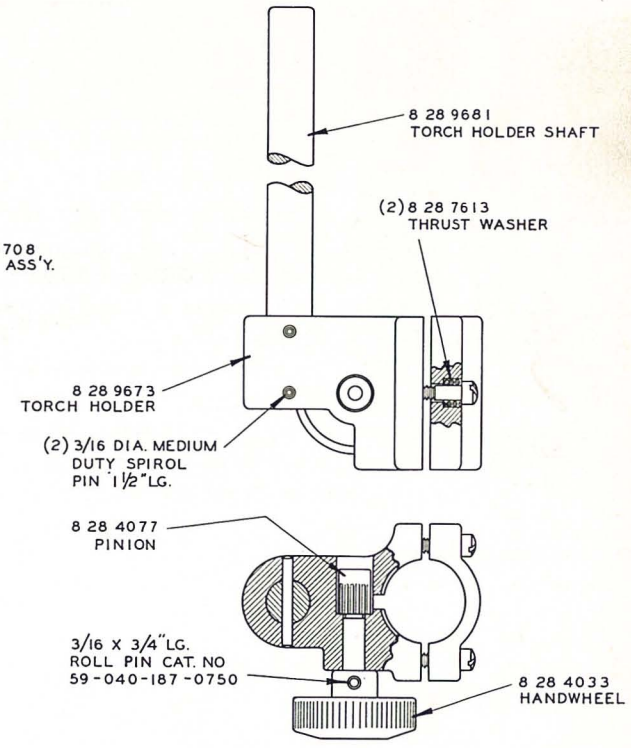
8 28 9676
TERMINAL BOARD ASSEMBLY



8 28 9678
TORCH HOLDER POST



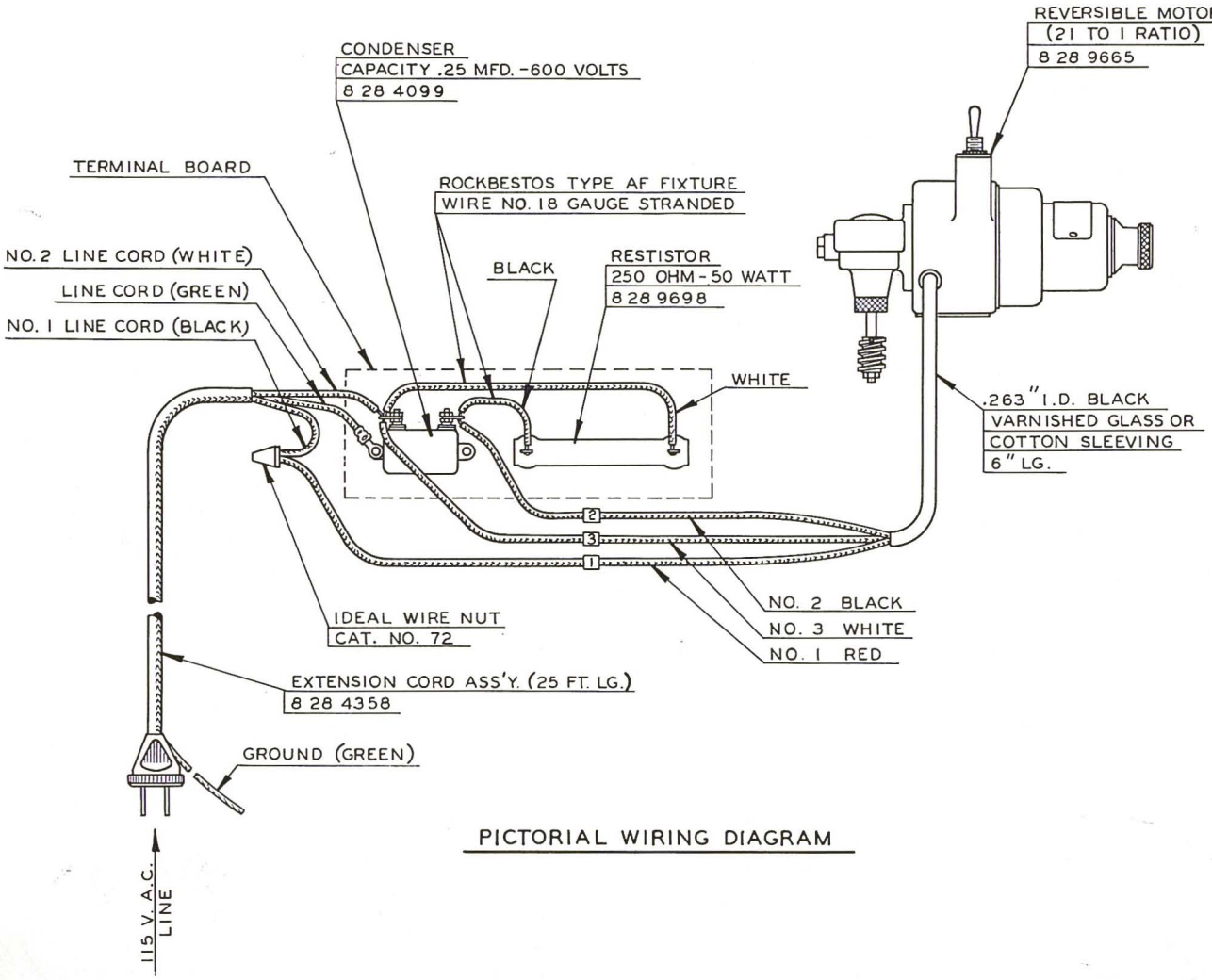
8 28 9720
MAGNETIC TRACER ASSEMBLY



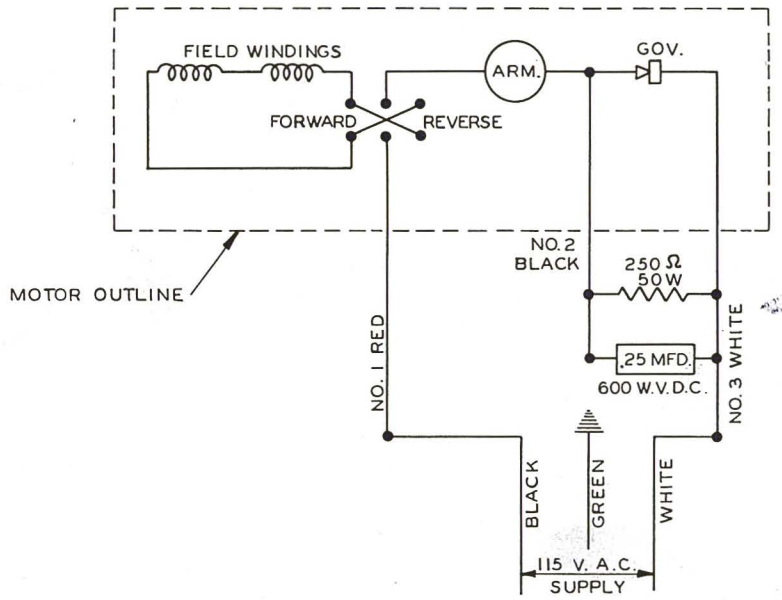
8 28 9701
TORCH HOLDER ASSEMBLY

DETAILS FOR 8 28 9721 SWINGING ARM ASSEMBLY

FIGURE 16



PICTORIAL WIRING DIAGRAM



SCHEMATIC WIRING DIAGRAM

FIGURE 17

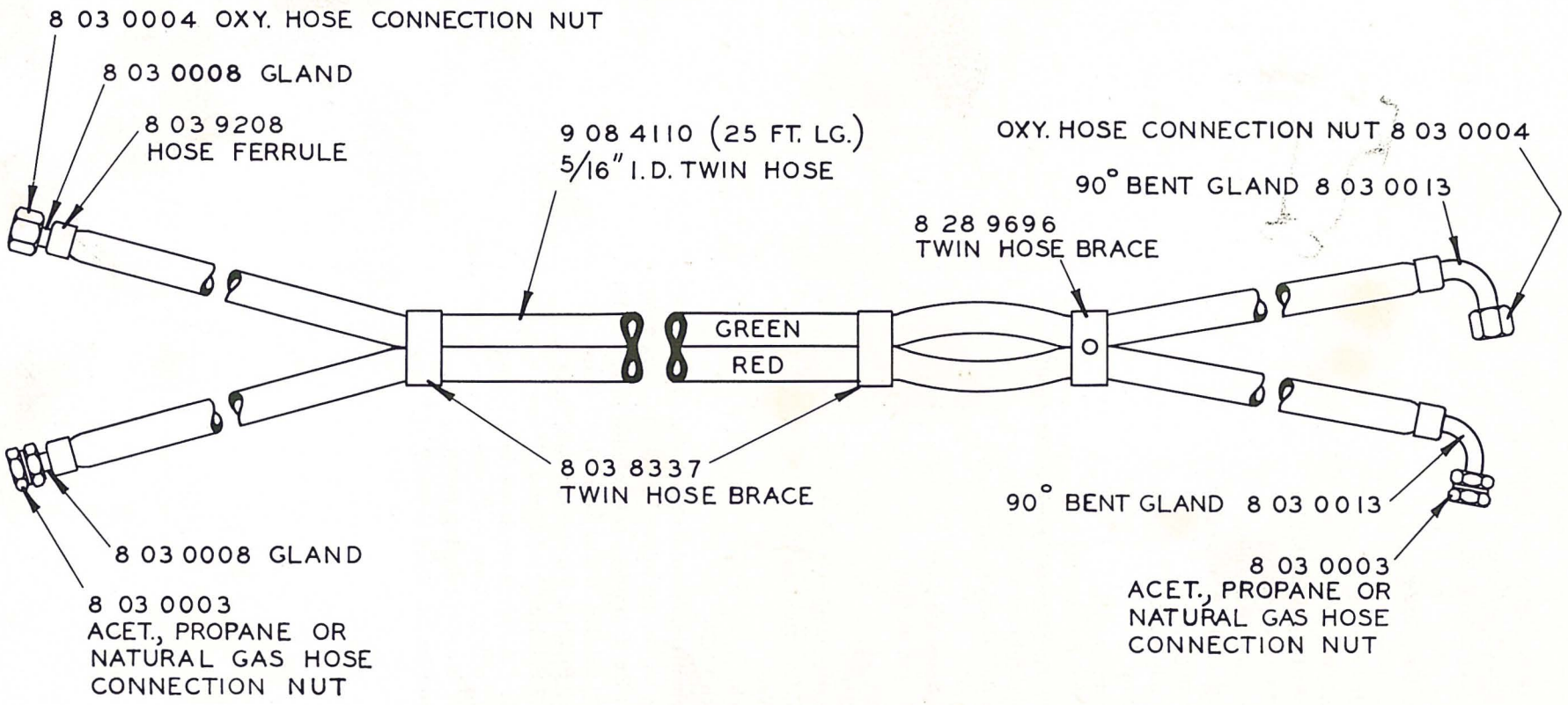


FIG. 18 – TWIN HOSE & CONNECTION ASS'Y

8 28 9671

5/16 TWIN HOSE & CONNECTION ASSEMBLY

(See Fig. 19)

828 9665 Reversible Motor (21 to 1 ratio) consisting of

1 – 828 0397 Gear Housing Cover
1 – 828 0399 Gear Cover Snap Ring
2 – 828 0519 Grease Plug
1 – 828 3289 Gear Unit Gasket
2 – 828 3920 Worm Lock Nut
1 – 828 3921 Knurled Sleeve
1 – 828 3922 Thrust Washer
2 – 828 5378 Ball Bearing N.D. #77111
1 – 828 5381 Field Unit Assembly
2 – 828 7928 Motor Brush Assembly
2 – 828 7929 Governor Brush Assembly
1 – 828 7930 Governor Unit
1 – 828 8097 Preload Spring
1 – 828 8098 Armature
2 – 828 8099 Spacing Washer
1 – 828 8100 Brush End Assembly
1 – 828 8111 Adjusting Plug (included in 828 8100)
1 – 828 8114 Brush End Cover Assembly
1 – 828 8121 Gear Unit Housing Assembly
1 – 828 8122 Washer
1 – 828 8126 Gear Cover Gasket
1 – 828 8127 Alignment Washer
2 – 828 8907 Worm
1 – 828 9714 Worm Gear
1 – 828 9757 Gear Unit Shaft
1 – 828 9758 Field Unit Housing
1 – 828 9759 Grommet
1 – 828 9760 Switch
1 – 828 9761 Switch Plate
1 – 828 9762 Governor Brush Holder (included in 828 8100)
1 – 828 9763 Governor Brush Holder (included in 828 8100)
2 – 828 9764 Motor Brush Holder (included in 828 8100)
4 – #4–40 Fil. Hd. Brass Screw 1/4" long
2 – #6–32 Fil. Hd. Steel Screw 3/8" long
2 – #6–32 Fil. Hd. Steel Screw 2" long
3 – #8–32 Fil. Hd. Steel Screw 7/16" long
1 – #8–32 Hdless. Oxy. Point Steel Screw 3/16" long
2 – 1/16" dia. Drill Rod 5/16" long
2 – #2–56 Flat Hd. Steel Screw 7/16" long

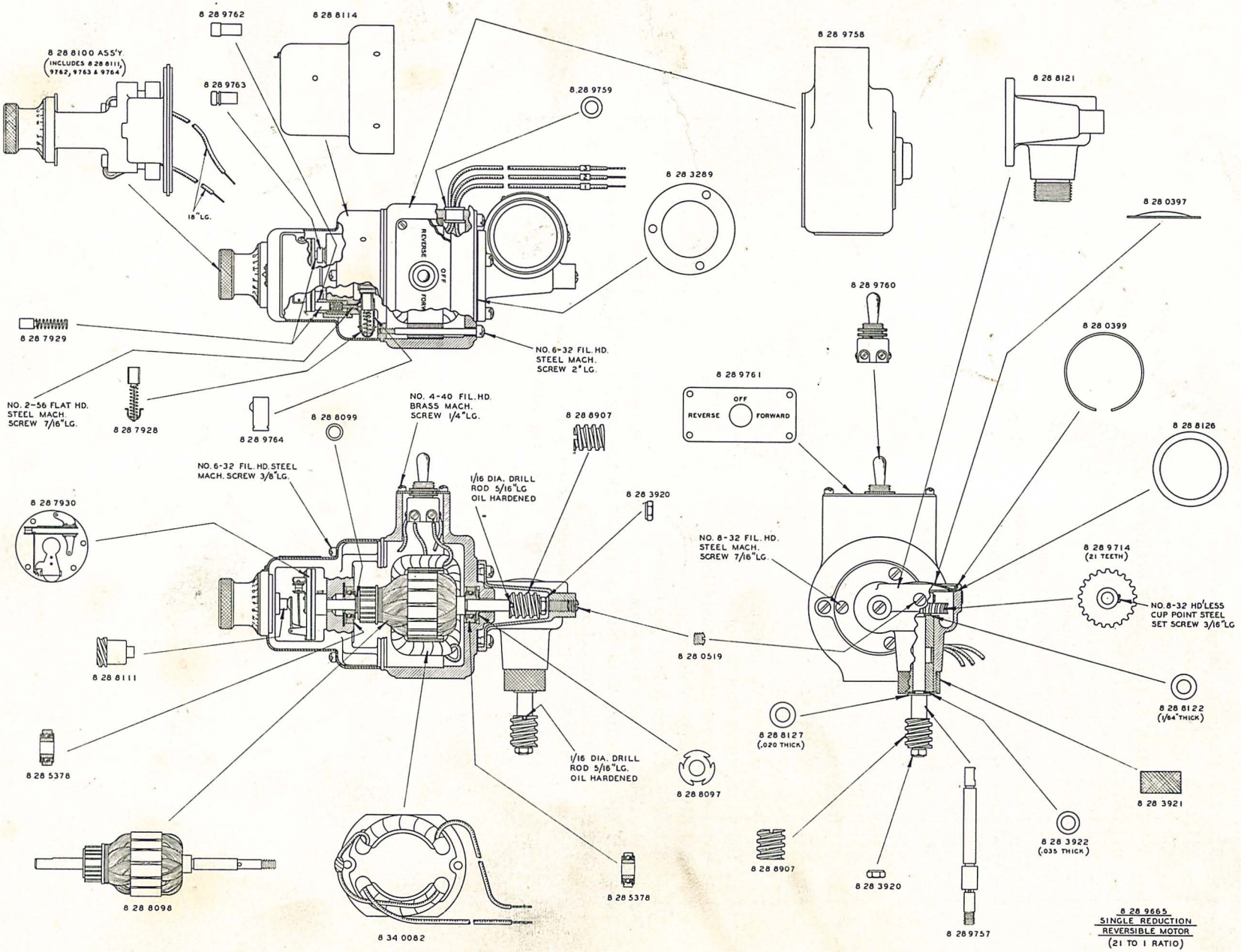


FIG. 19 – DETAILS OF DRIVE MOTOR

(See Fig. 20)

823 4740) Two Hose Machine Cutting Torch consisting of:
4743)

1 –	831 2234	Fuel Gas Valve Ass'y consisting of:
1 –	831 2242	Fuel Gas Valve Body
	831 2124	Fuel Gas Valve Stem Ass'y (With Packing Washer 831 2147)
1 –	831 4713	Head & Tubes Ass'y consisting of:
1 –	831 0638	Fuel Gas Tube
1 –	831 0638	Preheat Oxygen Tube
1 –	831 4849	Straight Head
1 –	831 5465	Cutting Oxygen Tube
1 –	*803 0003	Fuel Gas Hose Connection Nut
1 –	*803 0004	Oxygen Hose Connection Nut
2 –	*803 0008	Hose Connection Gland
1 –	831 0153	Oxygen Valve Spring
1 –	831 0158	Oxygen Valve Handle Ass'y
1 –	831 0180	Handle & Rack Ass'y
	831 2259	Tip Nut
3 –	831 0367	Packing
1 –	031 0368	Oxygen Valve Packing Nut
1 –	831 0451	Lift Pin
1 –	831 2469	Rear End
1 –	831 0676	Oxygen Valve Cam
1 –	831 0850	Valve Seat & Holder
1 –	831 1294	Oxygen Connection Nipple
1 –	831 8193	Oxygen Valve Cap
1 –	831 8255	Oxygen Valve Cap Gasket
1 –	831 2124	Preheat Valve Steam Ass'y (With Packing Washers 831 2147)
2 –	831 2147	Packing Washers (Furnished With Each 831 2124 Valve Stem Ass'y)
1 –	831 0253	Preheat Valve Lock Nut
2 –		#8-32 Fil. Hd. Brass Machine Screw 5/16'' Lg.
1 –		Type 5 Groov-Pin 5/32 Dia. x 1/2'' Lg. Hardened Steel

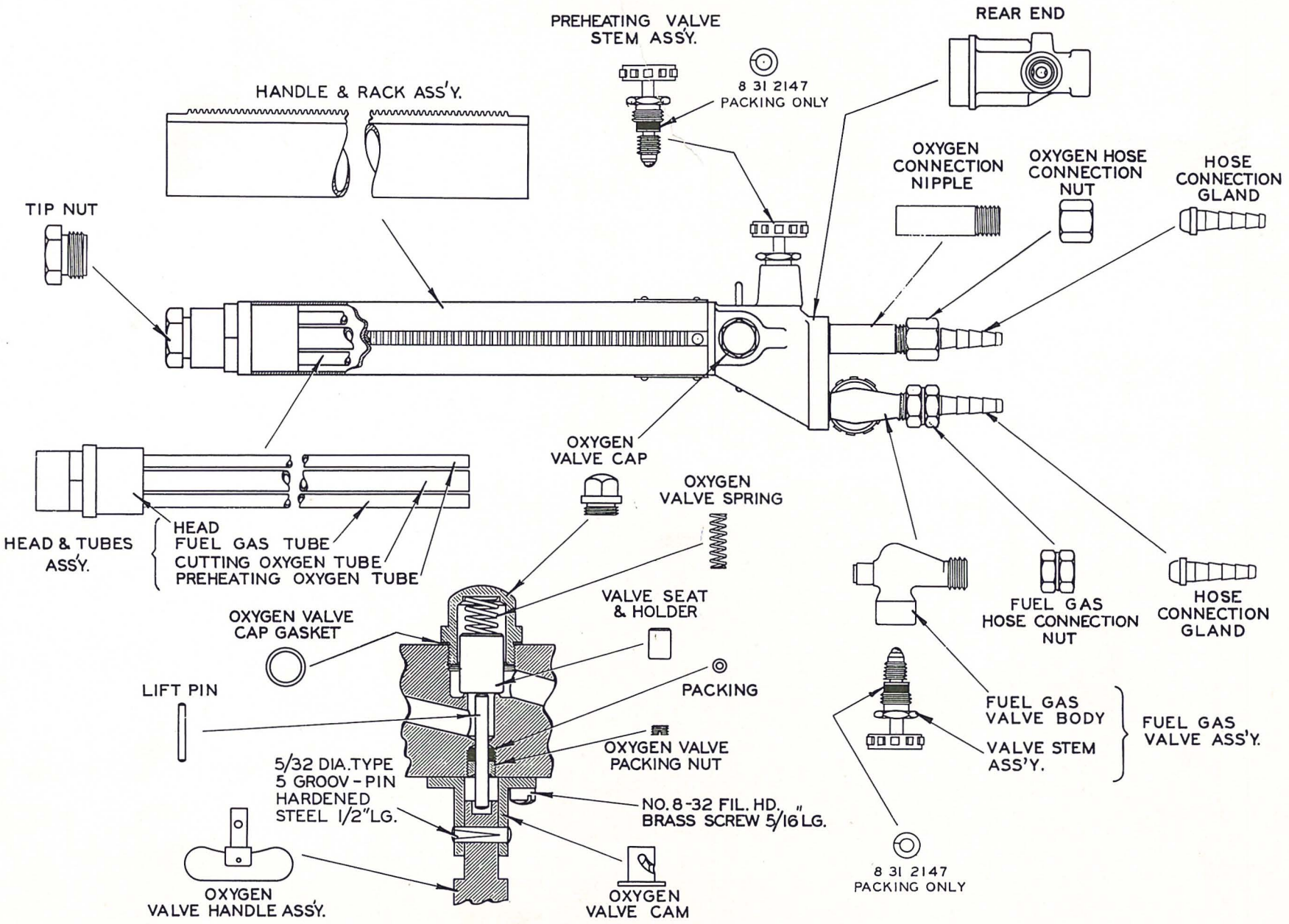


FIG. 20 – TWO HOSE MACHINE CUTTING TORCH