



# C362 Operating Instructions



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## INTRODUCTION

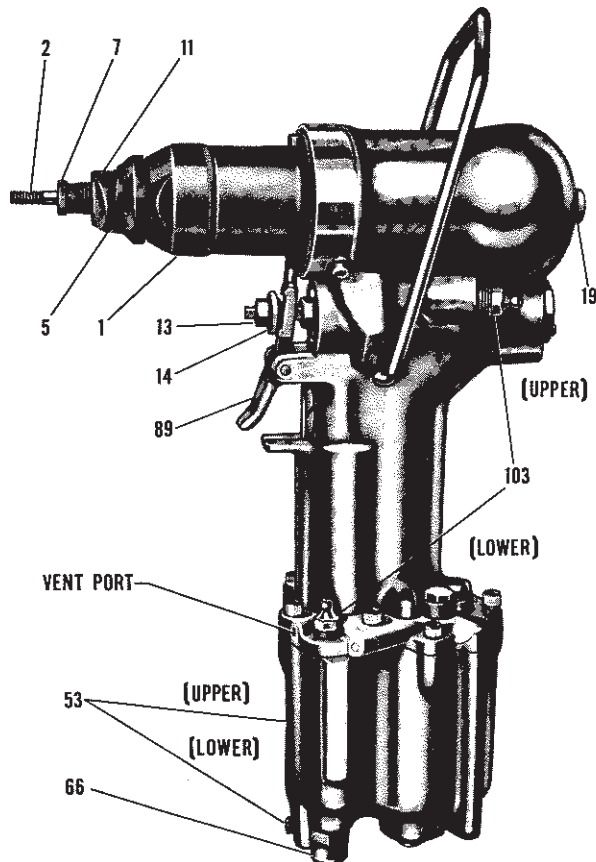
This publication describes the use, maintenance and repair necessary for correct operation of the C-362 pneumatic-hydraulic Rivnut Header.

The Table of Contents shows the basic arrangement of the book with the page numbers of the various sections. Paragraphs referenced in the text are section - main paragraph - subparagraph as listed in the Table of Contents; i.e. II-D-1 refers to Section II, paragraph D and subparagraph 1.

The Parts List is a complete listing of all components of the Model C-362 Rivnut Header. Each subassembly component is indented under the proper

assembly to show its relationship to the assembly. Component parts which are not included in any subassembly are listed in line with the subassembly listing in their logical order of removal. The first column of the Parts List contains the figure number where the part appears and the index number assigned to each part. An index number is only assigned once to a part in this book. Wherever it appears, it always refers to the same part.

The second column of the Parts List contains the part number and is used to order replacement parts. The third column gives the description of the part and the fourth column gives the quantity used in each subassembly.



1. Nose piece
2. Pull-up stud
5. Set screw
7. Anvil
11. Anvil sleeve
13. Adjusting nut locknut
14. Adjusting nut
19. Bleeder plug
53. Throttle rod arms
66. Air inlet bushing
89. Throttle lever
103. Zerk oiler fittings

Weight 11.1 Lbs

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## SECTION I

### GENERAL

#### A. RIVNUT HEADER.

The Header is a strongly built unit especially designed to install B F Goodrich Rivnuts of No. 10 screw thread size and larger. It will give long service with minimum care when kept clean, lubricated, and in proper adjustment according to the instructions which follow. Failure to follow instructions can result in rejected work and/or damage to the Rivnut Header.

The Model C-362 is used to install B F Goodrich Rivnuts in materials of constant thickness. An easily made external adjustment modifies the Header stroke length to accommodate a change in material thickness.

#### B. AIR SUPPLY REQUIREMENTS.

1. Install an air filter-lubricator unit in air supply line to the Header. If lubricator is not used, Header must be oiled daily (refer to paragraph I-C).

2. It is recommended that a pressure regulator be used in the Header line to hold pressures to specified range without pressure build-up. Supply clean, dry air at 80-90 psi to the Header inlet (66, figure 1). Use a minimum hose size of 3/8 inch. Couple the hose and Header with a straight through fitting of maximum internal diameter. Try to avoid a system which gives large pressure surges with changing demand. Use a surge tank, if necessary, to control these large pressure fluctuations.

#### C. LUBRICATION.

1. Fill the Header oiler daily by pumping clean SAE 10 oil into the lower zerk oiler fitting (103, figure 1). Never use grease.

2. If Header is disassembled, pack air motor bearings and reduction gear assembly with grease, National Lubrication Institute No. 1 or 2, or equivalent.

#### D. HYDRAULIC SYSTEM.

Some oil loss is to be expected during normal usage. Fill the system per steps below at least once weekly.

1. To fill the system. (See figure 1.)

a. Hold Header with the stud (2) pointing down and with bleeder plug (19) on top. Take out the bleeder plug and pump SAE 10 oil into the upper zerk fitting (103) until oil free of air bubbles starts flowing from the bleeder hole. Install the bleeder plug, and continue pumping in oil until the anvil (7) starts to move forward. Depress the throttle lever (89) and allow the Header to cycle completely. Repeat this operating cycle several times.

b. Exercising care to avoid being sprayed by oil under pressure, loosen bleeder plug two or three turns. Allow anvil to return to most rearward position and tighten bleeder plug. Pump in additional oil until the anvil (7) just starts to move forward.

2. Excessive oil loss. This is an unusual condition but it can occur. Refer to Section IV, Trouble Shooting.

## SECTION II

### OPERATION AND ADJUSTMENTS

The operating procedures and adjustments given in this section are vital to the correct, trouble-free performance of the Header. The operator should be thoroughly familiar with the Header and its adjustments before placing tool in use.

#### A. OPERATING THE HEADER

The Header is operated by a single throttle lever. The Header is simple and requires no lengthy training period to familiarize the operator with the operating sequence. A few practice cycles without using a Rivnut are generally sufficient to master the operation of the throttle control.

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1. Pull the throttle lever (89, figure 1) to the first stop, about half way down. This rotates the pull-up stud (2) clockwise and threads it into the Rivnut. When the Rivnut head touches the anvil, pull-up stud rotation automatically stops and the Rivnut can be inserted in the work piece.

2. Pull the throttle lever all the way down. This moves the anvil forward progressively, upsetting the Rivnut. The pull-up stud then automatically rotates counterclockwise, unthreading itself from the Rivnut.

## CAUTION

In actual operation, the throttle lever must be held all the way down and the Header must be held at right angles to the work until the entire upset-retract cycle is completed. Failure to do this results in excessive pull-up stud breakage and/or damaged Rivnut threads.

3. Release the throttle lever. The tool automatically stops pull-up stud rotation and returns to the starting position.

### B. PULL-UP STUD SIZE.

Check that the correct size pull-up stud (2) is installed in the Header. If the pull-up stud is the wrong size or if it is desired to change to a different Rivnut size, proceed as follows:

1. Refer to Table II, Section V, and select the correct nose piece assembly (see figure 5) and pull-up stud for the desired Rivnut size. Check pull-up stud holder if two-piece pull-up stud is used.

2. Assemble the stud thrust washer (4) and retaining washer (3) over the square end of pull-up stud or stud holder as in figure 5. Install pull-up stud assembly in nose piece assembly and screw nose piece firmly on handle sleeve (21).

3. Check anvil adjustment as in paragraph II-E and make necessary pull-up adjustment as in paragraphs II-F, II-G and II-H.

### C. PULL-UP STUD REPLACEMENT.

If the pull-up stud is damaged, proceed as follows:

1. One-piece. Unscrew the nose piece assembly (see figure 5). Work the pull-up stud assembly free of the push pins and springs. Remove the thrust washer retaining washer (3) and thrust washer (4). Discard damaged pull-up stud. Install thrust washer (4) and retaining washer (3) over square end of pull-up stud. Install in nose piece assembly and screw nose piece firmly on handle sleeve (21).

2. Two-piece. Unscrew the nose piece assembly (see figure 5). Work the pull-up stud assembly free of the push pins and springs. Loosen the pull-up holder set screws and remove damaged pull-up stud. It is not necessary to disturb the thrust washer in the two-piece assembly. Insert new pull-up stud

in holder and tighten set screws. Install pull-up stud in nose piece assembly, and screw nose piece firmly on handle sleeve (21).

## WARNING

The pull-up stud thrust washer (4, figure 5) and its retaining washer (3) must always be installed over the square end of the pull-up stud (2) and pushed down against the shoulder. Failure to observe this order of assembly (see figure 5) may cause damage to the air motor!

### D. THROTTLE LEVER ADJUSTMENT. (Reference figures 1 and 7.)

To obtain correct motor valve and pump valve operation, adjust throttle rod arms (53) as follows:

1. Hold end of throttle lever (89) flush with end of throttle guard. Loosen set screws (52) and slide the upper throttle rod arm (53) up until it touches the end of the motor throttle valve (72). Tighten set screw (52).

2. Still holding the end of the throttle lever flush with end of guard, slide the lower throttle rod arm (53) to within 1/32-inch of end of pump throttle valve (72). Use a feeler gage to set correct gap. Tighten set screw (52) and recheck setting of both throttle arms (53).

### E. ANVIL ADJUSTMENT. (See figure 1.)

Before using a new Header, or after changing Rivnut sizes, always check the anvil adjustment before operating.

1. Depress throttle lever and run Header through a complete operating cycle to insure the tool being in starting position.

2. Thread Rivnut on pull-up stud (2) until the head is seated against the face of the anvil (7). The chamfer on the end of the pull-up stud threads should protrude beyond the end of the Rivnut. (For closed-end Rivnuts, the pull-up stud should be approximately one-half turn from bottoming in the end of the Rivnut.) If the anvil (7) requires adjustment, loosen anvil sleeve set screw (5) and turn anvil (7) in or out as necessary to have the anvil face and Rivnut head together when the pull-up stud is the correct distance from the end of the Rivnut. Tighten set screw (5). Make necessary Rivnut pull-up adjustment as in paragraphs II-F, II-G and II-H.

### F. MEASURING RIVNUT PULL-UP.

1. After the anvil adjustment is completed, measure and record over-all length of correct size Rivnut (A, figure 2).

2. Connect Header to air line.

3. Loosen locknut (13) and turn adjusting nut (14) in INCREASE PULL-UP direction (see figure 3) until

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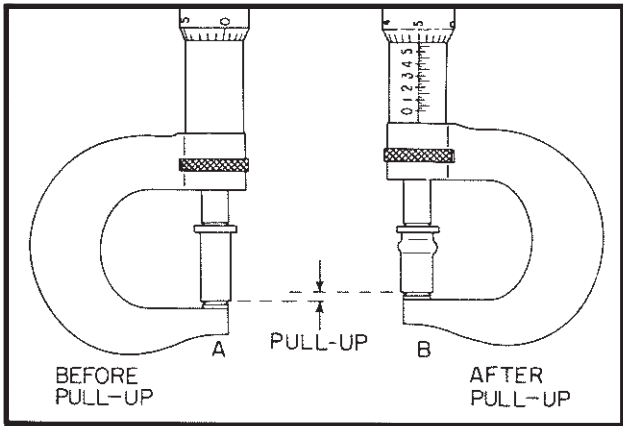


Figure 2. Measuring Rivnut Pull-Up

a slight upset of the Rivnut occurs.

4. Measure and record over-all length of the pulled-up Rivnut (B, figure 2). Record difference between measurement of Rivnut before pull-up (A, figure 2) and after pull-up (B, figure 2). This is the amount of pull-up for which the header is now adjusted. This information is essential to the next step of determining the amount of pull-up required.

## G. DETERMINING THE AMOUNT OF PULL-UP REQUIRED.

1. Each Rivnut will accommodate thicknesses of materials between the minimum and maximum grip limits (explained in detail in Rivnut Data Book).

### WARNING

Excessive pull-up may break pull-up stud, strip Rivnut threads, or both. Inadequate pull-up may result in loose installations.

2. Refer to Table I to determine correct pull-up factor needed as explained below.

Table I

| Fastener Thread Size | Pull-Up Factor—Inches |                       |                     |
|----------------------|-----------------------|-----------------------|---------------------|
|                      | Round Rivnut          | Heavy Duty Hex Rivnut | Standard Hex Rivnut |
| No. 10               | .080                  | —                     | .060                |
| 1/4                  | .095                  | .080                  | .075                |
| 5/16                 | .120                  | .120                  | .085                |
| 3/8                  | .155                  | .120                  | .110                |
| 1/2                  | .185                  | —                     | .120                |
|                      | Round Rivnut          | Hex Shank Rivnut      |                     |
| M5                   | .095                  | .065                  |                     |
| M6                   | .115                  | .070                  |                     |
| M7                   | .115                  | —                     |                     |
| M8                   | .125                  | .120                  |                     |
| M10                  | .155                  | .120                  |                     |
| M12                  | .180                  | —                     |                     |

a. Measure with micrometer over-all thicknesses of materials in which Rivnut will be installed. (For dimpled or countersunk holes, measure from top surface of metal to underside of dimpled hole.) Always include air gaps, paint, or any burrs which cannot be removed.

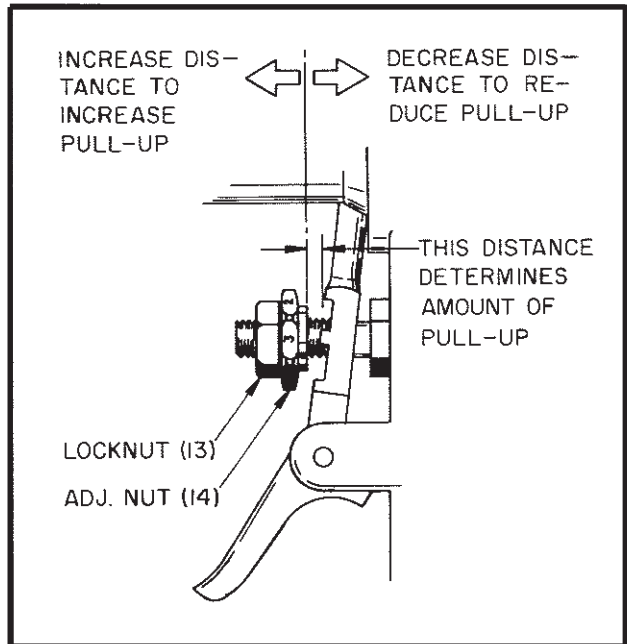


Figure 3. Pull-Up Adjustment on Header

b. Determine recommended maximum grip of Rivnut (stamped on Rivnut box label, or refer to Rivnut Data Book).

c. Subtract material thickness (a) from recommended maximum grip (b).

d. Add difference to applicable pull-up factor from Table I. This sum is a close approximation of the pull-up required to attain a proper bulge. (See figure 4, "A" and "B".)

### EXAMPLE:

|  |       |
|--|-------|
| S10-80 Rivnut, to be installed in 0.060 inch material. |       |
| Material thickness                                     | 0.060 |
| Maximum grip of Rivnut                                 | 0.080 |
| Difference (0.080-0.060)                               | 0.020 |
| Sum (0.020 + 0.080 pull-up factor)                     | 0.100 |
| Pull-up required                                       | 0.100 |

e. Compare pull-up recorded under paragraph II-F, with amount required as determined in paragraph II-G-d. Difference indicates amount of pull-up increase or decrease necessary.

f. Slight differences ( $\pm 0.005$  inch) may require no further adjustment. Install several Rivnuts in sample material for checking.

### CAUTION

Never attempt to upset a Rivnut a second time if the bulge is not sufficient. Push trip button (140) and depress trigger completely to reverse pull-up stud from Rivnut. Always cycle the Header several times and make several trial installations after changing the pull-up adjustment.

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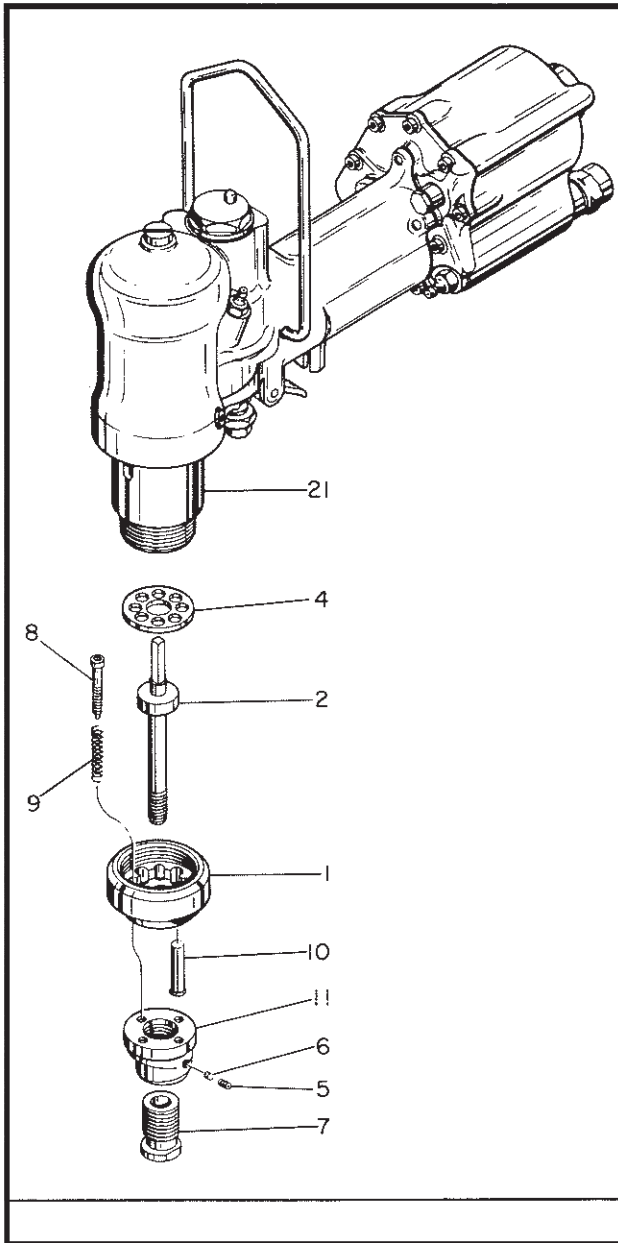


Figure 5. Nose Piece Assembly

### 3. Pump Cylinder Group. (See figure 7.)

If trouble is encountered in the pump, motor or throttle valves, take out attaching parts (49 thru 51) and loosen both throttle rod arms (53). Pull the cylinder assembly (85) straight back and down to prevent dropping loose parts out of ports in front of cylinder. Remove rear trip valve (55 thru 59), pump (62 thru 65), oiler (66 thru 70), forward motor throttle (71 thru 73), pump throttle (75 thru 77) and reverse motor valve (78 thru 82), in the sequence shown on exploded view, as necessary to effect repair. It is recommended that the oiler felt (70) be cleaned each time the pump cylinder assembly is removed. Do not remove bushings shown in phantom (61, 74, 83, 84) except for replacement due to excessive wear

or scoring that affects the operation of the Header. Refer to following paragraph III-B for instructions on bushing replacement.

### 4. Cylinder Adaptor Group. (See figure 8.)

Remove pump cylinder group as in preceding step 3 but do not disassemble. Remove three screws (86) and pull adaptor group free of handle assembly. The seals and bushings in the adaptor (102) are disassembled only if replacement is necessary. The oil reservoir bag (110) is replaced by loosening lock screw (106) and bolting assembling tool (Special Tools, figure 10) to clamp (107) and pulling straight out. Work remaining reservoir parts free of handle.

### 5. Handle and Valve Group. (See figure 9.)

To gain access to the low pressure check valve (112 thru 117), high pressure check valve (118 thru 123), and pressure relief valve (124 thru 128) assemblies, first free throttle lever (89) by drifting out pin (12). Take off holding piston nuts (13, 14) and lever (15). Then spring the throttle rod sufficiently to clear the trigger guard and slip the rod out of the way. Remove necessary parts in order of index numbers shown in exploded view. Remove holding piston (129 thru 133) only if necessary. Do not remove stop pin (117); restake it if it is loose.

## B. BUSHING REPLACEMENT.

1. Do not remove the bushings, shown in phantom on the exploded views, (figures 7, 8, and 9), except when inspection reveals extensive damage or wear. To remove a particular bushing, select the thread tap and extractor, or drift, from the special tools listed in figure 10. Thread the bushing if in a blind hole. Note the alignment of all internal ports and passage ways. New bushing must match this alignment when installed. Remove all O-rings and heat the forging to 240° - 270°F. Pull out the bushing with the appropriate extractor or push out with a drift. Note that the holding piston bushing (135, figure 9) must be removed before adequate space is available for a drift to press out the pressure relief valve bushing (136).

2. Clean up any metal pick-up and burrs resulting from removal of bushing. Flush out all cavities and passage ways in the affected forging. A small chip of metal can cause a tool malfunction when tool is placed back in production.

3. To install new bushing inspect forging for cleanliness and freedom from burrs. Heat forging to 240° - 270°F and position under press ram with centerline of bushing bore in line with centerline of ram. Insert drift from figure 10 in end of bushing. Do not press directly on bushing. Use sufficient blocking to prevent damage to the affected piece and press new bushing into position. Be sure that internal passageways are in alignment before and after the bushing is installed.

4. Ream ID of bushing to size using reamer or reamers shown in figure 10. Be sure centerline of

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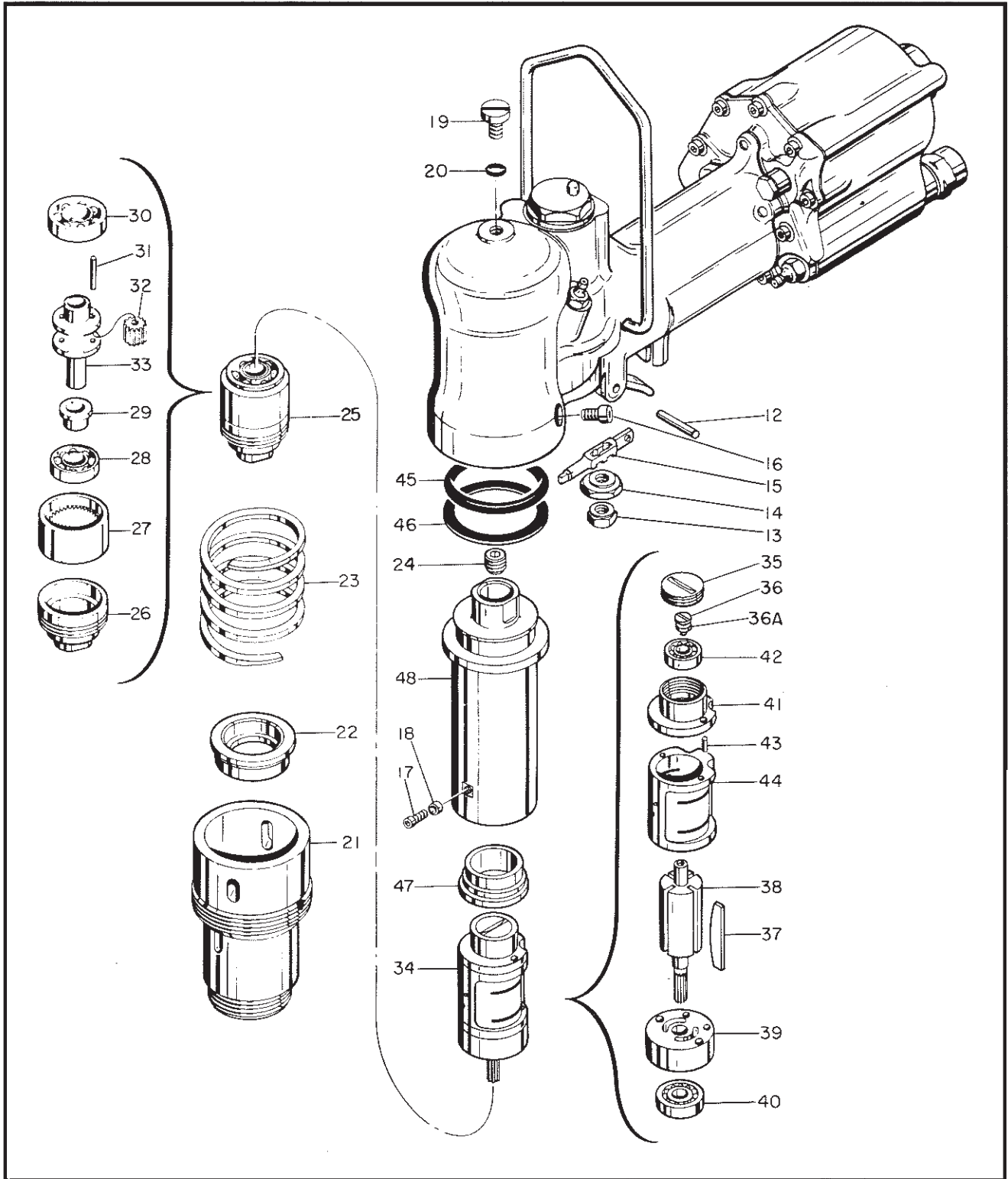


Figure 6. Air Motor and Drive Group

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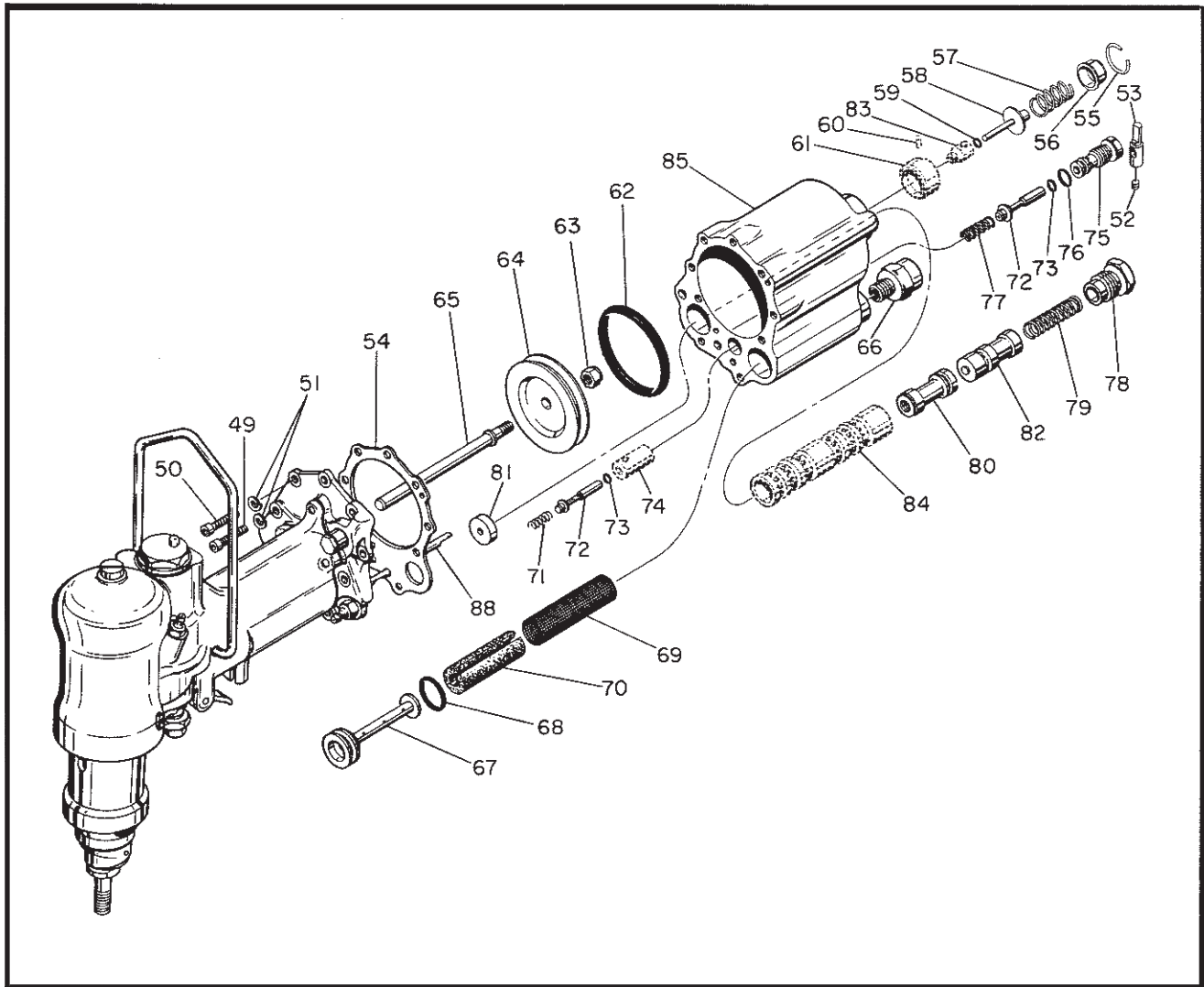


Figure 7. Pump Cylinder Group

reamer is square and parallel with mating surfaces. Use facing reamers to reface valve seats in both old and replacement bushings. The finished bores and seats must be as square, concentric and true to adjacent finished surfaces as is possible to obtain with normal machine shop practices. Flush out as in step 2 above.

### C. CLEANING.

Clean parts with stiff fiber brushes and any good non-inflammable hydrocarbon cleaning solvent. DO NOT use any caustic solutions to clean any of the parts. Flush out all internal passages.

### D. INSPECTION.

Inspect all parts for burrs, scoring, metal pick-up and signs of excessive wear. Any damaged part which affects serviceability of Header should be replaced. Stone off burrs and minor defects and clean parts

thoroughly before installing. Inspect all O-rings for cuts, nicks and signs of flat spots that would affect sealing action.

### E. REASSEMBLY.

The reassembly of the Header is discussed in the same manner as the disassembly. It is presumed personnel experienced in the repair of precision tools will have the responsibility of repairing the Header, and only the specific instructions necessary to insure proper assembly are given.

#### 1. Handle and Valve Group. (See figure 9.)

Apply a light coat of petrolatum or oil to O-rings and work them into their respective glands. Seat high pressure check valve (121) by dropping in place in handle, inserting a 1/4-inch brass rod in end of valve, and striking the rod several sharp blows

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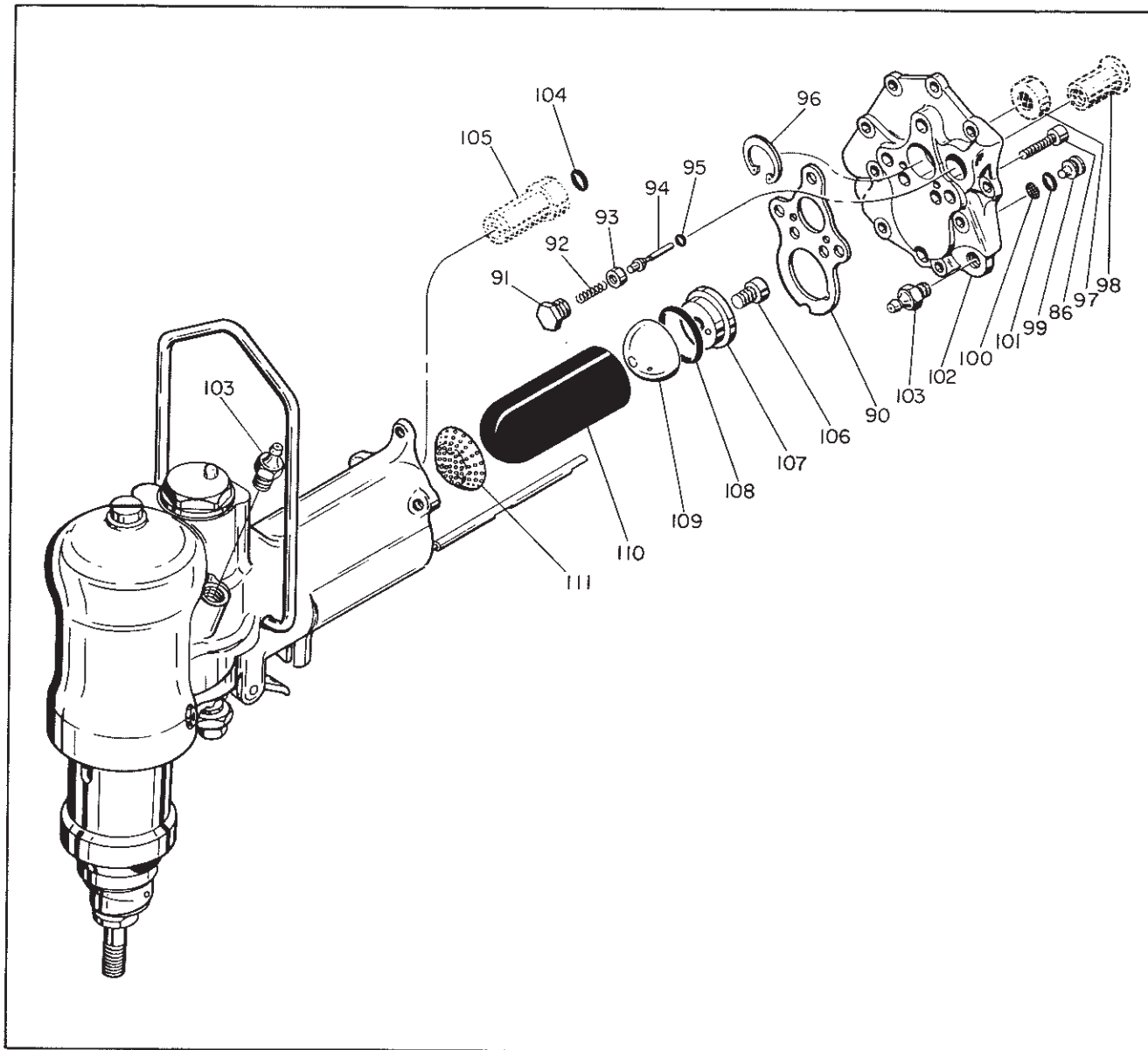


Figure 8. Cylinder Adaptor Group

with a light weight hammer. Seat the low pressure check valve (113) by inserting inbushing (112), placing bushing on a metal plate, and striking the end of the check valve sharply and squarely with a light weight hammer. Install parts in the reverse order of index numbers assigned to the exploded view. If this was the only subassembly disturbed, proceed to Lubrication in paragraph I-C, Hydraulic System, paragraph I-D, and Adjustments, paragraphs II-B, C, D, E, F, G and H.

## 2. Cylinder Adaptor Group. (See figure 8.)

Insert the oil reservoir baffle (111) and bag (110) in the cavity in the handle. Install O-ring (108) in groove in top bag clamp (109) and assemble loosely to bottom bag clamp (107) with clamp screw (106).

Insert in reservoir bag in handle and work end of bag and clamp approximately flush with handle. Fasten assembling tool shown in figure 10 to clamp and tighten clamp screw (106). Check that O-ring (104) is installed in pump ram bushing (105). Replace removed parts in adaptor in reverse order of index numbers. Install pump ram air seal (97) with lip of seal facing pump cylinder assembly. Place gasket (90) so that cut-out is in line with 0.040 inch vent hole in adaptor. Slip adaptor over throttle rod and install on handle with three screws (86).

## 3. Pump Cylinder Group. (See figure 7.)

If removed, apply a light coat of petrolatum or oil to O-rings and work them into their respective

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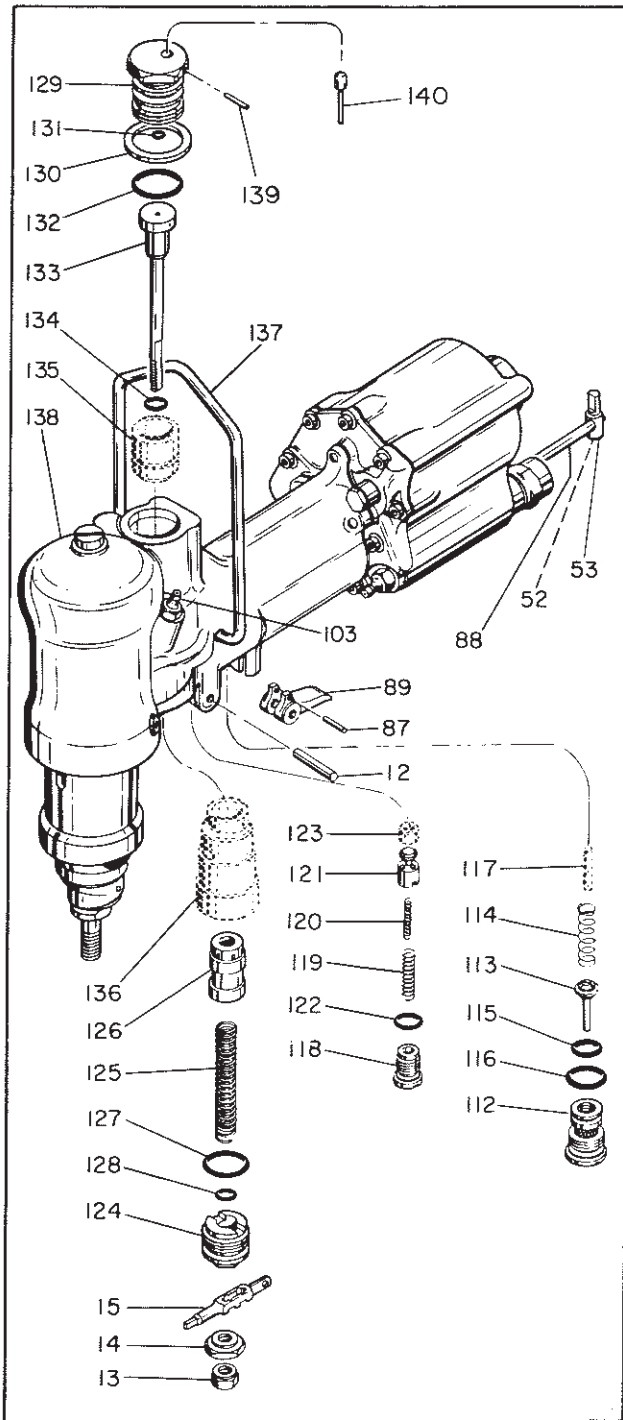


Figure 9. Handle and Valve Group

glands. The trip valve O-ring (59) is simply slipped up the valve (58) stem to seat against the flange. Assemble the valves and oiler in reverse order of index numbers shown. Push the air piston assembly partly in cylinder. Install gasket (54) and place bumper (81) in recess in adaptor. Check that front throttle valve spring (71) is in place and start cylinder assembly over throttle rod. Install upper rod arm (53)

as end of rod goes thru cylinder opening. Use short screws (50) in thin flange sections and long screws (49) in thick flange sections of adaptor. Adjust throttle lever per paragraph II-D. If this was the only sub-assembly removed, lubricate per paragraph I-C and I-D and adjust per Section II.

#### 4. Air Motor and Drive Group. (See figure 6.)

Assemble air motor (34) and gear unit (25) in reverse order of index numbers shown. Apply a light film of oil to rotor blades (37). Pack ball bearings and motor gear unit parts with grease, National Lubrication Institute Specification No. 1 or 2. If the air motor was previously assembled without the rotor screw lockwasher (36A), dope the threads of rotor screw (36) to prevent its spinning out during operation. If the air motor was previously assembled with a rotor screw lockwasher (36A) install one now under the rotor screw (36). Do not dope the rotor screw threads when a lockwasher is used. In either case, check that the air motor assembly (34) spins freely and does not rub or bind on either end plate (39 or 41). Insert or remove the lockwasher (36A) as required if binding should occur between the motor rotor and motor end plates. Be sure gear assembly (25) rotates freely. Install spacer (47), air motor (34) and gear unit (25) in work piston (48). Dope pipe plug (24) and install in top of work piston. Place unit in vise and shoot air in either port while tightening motor housing nut (26) to obtain maximum motor speed.

Place return spring (23) and sleeve (21) over outside of work piston. Compress spring enough to insert work piston key (18) and screw (17) thru slot in sleeve. Screw assembly into handle with spanner wrench shown in figure 10. Align lock screw hole and slot in sleeve threads and install lock screw (16). Assemble holding piston lever (15), nuts (13, 14) and pin (12). Fill hydraulic system per instructions in paragraph I-D-1. Adjust Header per Section II.

#### 5. Nose Piece Assembly. (See figure 5.)

Assemble the nose piece and pull-up stud as shown in the exploded view but do not tighten set screw (5) until anvil adjustment is made per instructions in paragraph II-E. Check Table II, Section V, to insure the correct parts are assembled for the particular size Rivnut. Screw the assembled nose piece firmly on the sleeve (21).

## WARNING

Observe the order of assembly shown in figure 5; first the thrust washer (4), then the retaining washer (3) over the square end of the pull-up stud. Failure to assemble in order could cause an air motor failure.

#### F. PRE-OPERATION CHECK.

Before the Header is placed in service, perform the following checks:

1. Lubricate per instructions in paragraph I-C.
2. Fill hydraulic system per instructions in paragraph I-D.
3. Check all operating adjustments per instructions in Section II.

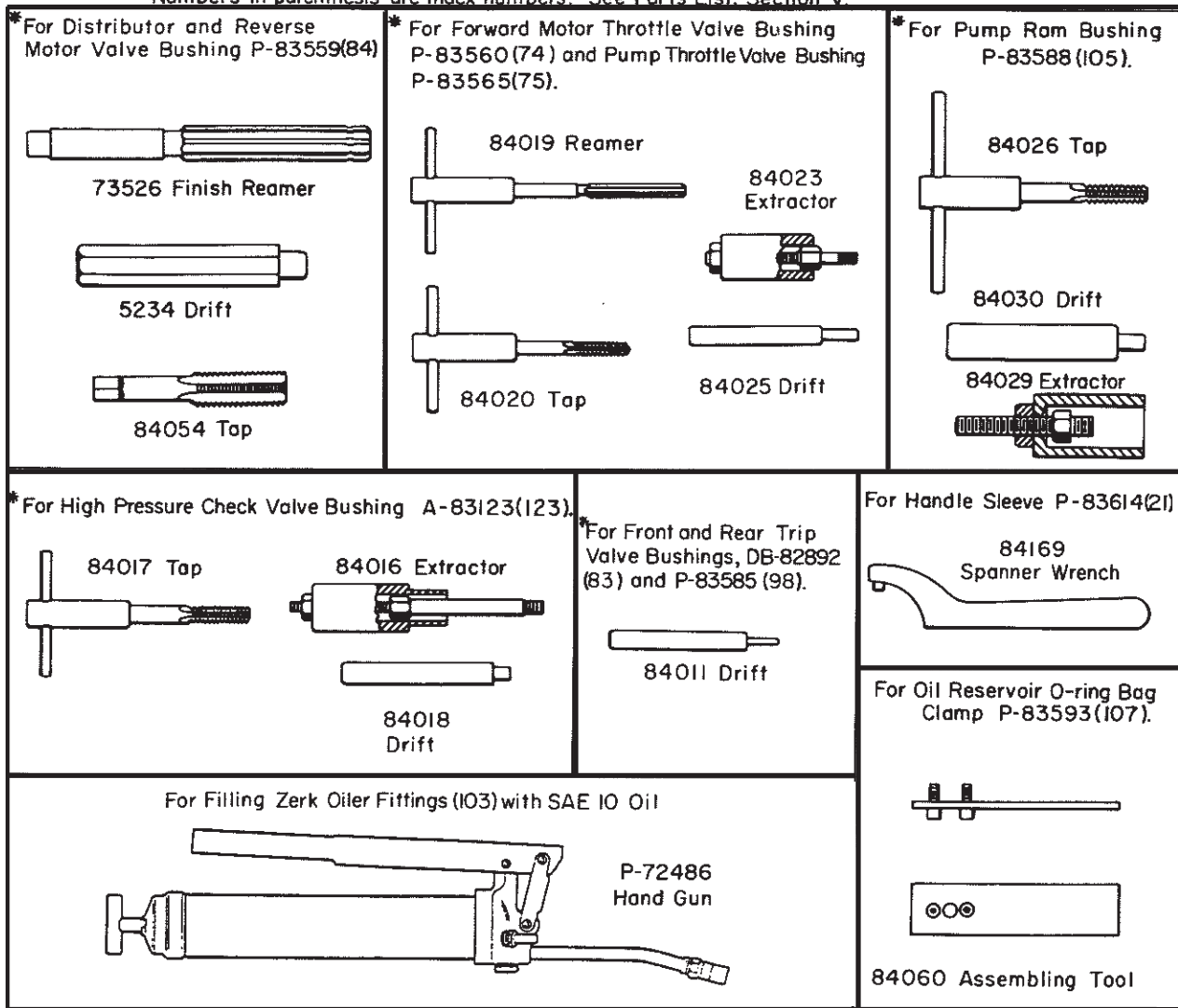
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Numbers in parenthesis are index numbers. See Parts List, Section V.



\* NOTE: Flush entire system after using tools; check for presence of chips and/or other contamination.

Figure 10. Special Tools for B F Goodrich Rivnut Header

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## SECTION IV

### TROUBLE SHOOTING

#### NOTE

In the following table, the index numbers shown in parenthesis, for example (2), are the index numbers assigned to the parts in the Parts List, Section V, and on the exploded views. When ordering parts, order by part number shown in second column of Parts List, NOT by index number. Paragraph references are easily located because all paragraphs are numbered alphabetically within each section.

| Malfunction                          | Probable Cause   | Corrective Action  |
|--------------------------------------|--|--|
| Excessive pull-up stud (2) breakage. | <p>Too much upset of Rivnut.</p> <p>Incorrect or inconsistent material thickness.</p> <p>Attempting second upset of Rivnut.</p> <p>Improper positioning of Header.</p> <p>Improper Rivnut.</p> | <p>Refer to "Pull-Up Adjustment," paragraphs II-F, G and H.</p> <p>Check material thickness.</p> <p>Replace defective Rivnuts after first upset.</p> <p>Hold Header at right angles to work. Do not allow pull-up stud (2) to support weight of Header.</p> <p>Check Rivnut Specification for proper grip range.</p> |
| Stripping Rivnut threads.            | <p>Pull-up stud (2) threads worn or damaged.</p> <p>Incorrect anvil (7) adjustment.</p> <p>Too much upset of Rivnut.</p> <p>Incorrect or inconsistent material thickness.</p>                  | <p>Replace pull-up stud (2). Refer to "Pull-Up Stud Replacement," paragraph II-C.</p> <p>Refer to "Anvil Adjustment," paragraph II-E.</p> <p>Refer to "Rivnut Pull-Up Adjustment," paragraphs II-F, G and H.</p> <p>Check material thickness.</p>  |
| Limited or no pumping action.        | <p>Not enough air available at Header.</p> <p>Inadequate lubrication.</p> <p>Throttle lever (89) adjustment incorrect.</p>   | <p>Check Air Supply system against "Requirements," paragraph I-B.</p> <p>Refer to "Lubrication," paragraph I-C.</p> <p>Set throttle rod arms (53) as in "Throttle Lever Adjustment," paragraph II-D.</p>   |

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| Malfunction   | Probable Cause   | Corrective Action  |
|---|--|--|
| Limited or no pumping action.<br>(Cont.)                    | <p>Holding piston adjusting nut (14) too close.</p> <p>Pump distributor (82) and reverse motor (80) valves and/or bushing (84) are worn, dirty or nicked.</p> <p>Front trip valve (94) sticking; broken spring (92).</p>   | <p>Refer to "Rivnut Pull-Up Adjustments," paragraphs II-F, G and H.</p> <p>Clean, replace damaged part(s). Refer to paragraphs III-A-3, III-B and III-E-3.</p> <p>Clean, remove burrs; replace broken spring by removing cap (91).</p>   |
| Loose Rivnuts.  | <p>Improper upset of Rivnut.</p> <p>Incorrect or inconsistent material thickness.</p>  | <p>Refer to "Rivnut Pull-Up Adjustment," paragraphs II-F, G and H.</p> <p>Check material thickness to be within the Rivnut grip range. Refer to specification on Rivnut box.</p>   |
| Limited or no rotation of pull-up stud (2).                 | <p>Not enough air available at Header.</p> <p>Inadequate lubrication.</p> <p>Throttle (89) adjustment incorrect.</p> <p>Work piston key (18) and screw (17) missing.</p> <p>Motor housing nut too tight or too loose.</p> <p>Motor rotor screw (36) loose.</p> <p>Pump distributor (82) and reverse motor (80) valves and/or bushing (84) are worn, dirty or nicked.</p> | <p>Check air supply system against "Air Supply Requirements," paragraph I-B.</p> <p>Refer to "Lubrication," paragraph I-C.</p> <p>Set throttle rod arms (53) per "Throttle Lever Adjustment," paragraph II-D.</p> <p>Install new key and screw. Refer to paragraph III-E-5.</p> <p>Check adjustment of motor housing nut (26) per paragraph III-E-5.</p> <p>Replace if loose per paragraph III-E-5.</p> <p>Clean. Replace defective part(s). Refer to paragraphs III-A-3, III-B and III-E-3.</p> |
| Holding piston (133) sticks in "out" position.              | <p>Dirt or chips in valve (126) or bushing (136).</p> <p>Pump distributor (82) and reverse valves (80) or bushing (84) are dirty or nicked.</p>  | <p>Clean, flush holding piston cavity and pressure relief cavity.</p> <p>Clean, replace damaged part(s). Refer to paragraphs III-A-3, III-B and III-E-3.</p>   |
| Holding piston (133) "pops" out prematurely.                | <p>Holding piston valve O-ring seat worn or damaged.</p> <p>Front trip valve (94) sticking.</p> <p>Pressure relief valve (126) sticking.</p>   | <p>Replace O-ring (131).</p> <p>Clean, remove burrs, replace O-ring (95).</p> <p>Clean, flush cavity.</p>  |
| Pumping action but pressure not sufficient to upset Rivnut. | <p>Air supply pressure low.</p> <p>Hydraulic level low or air in hydraulic system.</p>   | <p>Check against "Air Supply Requirements," paragraph I-B.</p> <p>Refer to "Hydraulic System," paragraph I-D.</p>  |

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| Malfunction   | Probable Cause  | Corrective Action  |
|---|---|--|
| Pumping action but pressure not sufficient to upset Rivnut. (Cont.) | <p>Pump piston (64) loose on pump ram (65) or piston O-ring (62) is worn or damaged.</p> <p>High (121) or low (113) pressure check valves not seating properly.</p> <p>Pump ram bushing (105) worn.</p> <p>Pressure relief valve (126) or bushing (136) worn.</p> | <p>Check for looseness; replace damaged O-ring (62).</p> <p>Clean, flush out cavity. Reseat valves per paragraph III-E-1. If still not operating properly, reface valve seats with applicable facing reamers shown in figure 10; flush cavities and reseat valves. Replace seats (112 and 123) if damaged. Refer to paragraph III-E-1.</p> <p>Replace bushing (105). Refer to paragraphs III-A-4, III-B and III-E-2.</p> <p>Replace defective part(s). Refer to paragraphs III-A-5, III-B and III-E-1.</p> |
| Air leaking into hydraulic system.                                  | <p>Work piston and motor housing pipe plug (24) loose or not sealed.</p> <p>Pump ram air seal (97) worn or damaged.</p> <p>Pump ram bushing O-ring (104) worn or damaged.</p> <p>Holding piston bushing O-ring (134) worn or damaged.</p>                         | <p>Dope plug and reinstall. Refer to paragraphs III-A-2 and III-E-4.</p> <p>Replace air seal (97). Refer to paragraphs III-A-4 and III-E-2.</p> <p>Replace O-ring (104). Refer to paragraphs III-A-4 and III-E-2.</p> <p>Replace O-ring (134). Refer to paragraphs III-A-5 and III-E-1.</p>  |
| Pumping action but no movement of anvil.                            | <p>High pressure check valve (121) not seating.</p> <p>Excessive oil leakage from vent port (figure 1).</p>   | <p>Reseat per paragraph III-E-1.</p> <p>Replace damaged oil reservoir bag (110). Refer to paragraphs III-A-4 and III-E-2.</p>  |

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## SECTION V

### PARTS LIST AND SPARE PARTS RECOMMENDATIONS

TABLE II. Stud and Nose Piece Part Number Configurations Required

For Various B F Goodrich Rivnut Sizes

| Rivnut Thread Size | Pull-Up Stud (2) | Pull-Up Stud Holder (not shown) | Anvil (7) | Anvil For Std. Hex Rivnuts * | Anvil Sleeve (11) | Nose Piece (1) | Nose Piece Assembly (Figure 5) (See Note) |
|--------------------|------------------|---------------------------------|-----------|------------------------------|-------------------|----------------|---|
| 10-24              | P-146-1024       | P-83633                         | P-83627   | P-182-10                     | P-83622           | P-83617        | 87666                                     |
| 10-32              | P-146-1032       | P-83633                         | P-83627   | P-182-10                     | P-83622           | P-83617        | 87666                                     |
| 12-24              | P-146-1224       | P-83632                         | P-83628   |                              | P-83623           | P-83617        | 87665                                     |
| 1/4-20             | P-146-2520       | P-83632                         | P-83629   | P-182-25                     | P-83623           | P-83617        | 87664                                     |
| 1/4-28             | P-146-2528       | P-83632                         | P-83629   | P-182-25                     | P-83623           | P-83617        | 87664                                     |
| 5/16-18            | P-147-3118       | Not Required                    | P-83630   | P-182-31                     | P-83624           | P-83617        | 87662                                     |
| 5/16-24            | P-147-3124       | Not Required                    | P-83630   | P-182-31                     | P-83624           | P-83617        | 87662                                     |
| 3/8-16             | P-147-3716       | Not Required                    | 83631     | P-182-37                     | P-83624           | P-83617        | 87660                                     |
| 3/8-24             | P-147-3724       | Not Required                    | 83631     | P-182-37                     | P-83624           | P-83617        | 87660                                     |
| 1/2-13             | P-147-5013       | Not Required                    | P-132-50  |                              | P-83624           | P-124          | P-160                                     |
| 1/2-20             | P-147-5020       | Not Required                    | P-132-50  |                              | P-83624           | P-124          | P-160                                     |

\*Formerly Midget Hex Rivnuts

#### METRIC THREAD SYSTEM

| Thread Size | Pull-Up Stud | Pull-Up Stud Holder | Anvils    |           | Anvil Sleeve | Nose Piece | Nose Piece Assembly |
|-------------|--------------|---------------------|-----------|-----------|--------------|------------|---------------------|
|             |              |                     | Round     | Hex       |              |            |                     |
| M5X0.8      | P-194-M5     | P-83632             | P-196-M5  | P-249-M5  | P-83622      | P-83617    | P-197-M5            |
| M6X1.0      | P-194-M6     | P-83632             | P-196-M6  | P-249-M6  | P-83622      | P-83617    | P-197-M6            |
| M7X1.0      | P-195-M7     | Not Required        | P-196-M7  | —         | P-83623      | P-83617    | P-197-M7            |
| M8X1.25     | P-195-M8     | Not Required        | P-196-M8  | P-249-M8  | P-83624      | P-83617    | P-197-M8            |
| M10X1.50    | P-195-M10    | Not Required        | P-196-M10 | P-249-M10 | P-83624      | P-124      | P-197-M10           |
| M12X1.75    | P-195-M12    | Not Required        | P-196-M12 | —         | P-83624      | P-124      | P-197-M12           |

#### NOTE

The Nose Piece Assemblies are packaged complete less the pull-up stud (2) for each specified Rivnut. The assembly consists of the nose piece (1), anvil (7), anvil sleeve (11), anvil sleeve set screw (5) and set screw plug (6), nose piece screws (8), push pins (10) and springs (9), stud thrust washer (4) and stud holder with set screws, where applicable.

P-182 Anvils must be specified to be included as part of a Nose Piece Assembly.

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## PARTS LIST

REFERENCE FIGURES 5, 6, 7, 8 & 9 FOR CORRECT RELATIONSHIP

| FIGURE and Index No. | Part No.     | Part Name   | Quantity |
|----------------------|--------------|---|----------|
| 5-1                  | See Table II | Nose Piece  | 1        |
| 5-2                  | See Table II | Pull-Up Stud                                      | 1        |
|                      | See Table II | Stud Holder (when 2 pc. pull-up stud is required) | 1        |
|                      | 80445        | Set Screw (use with stud holder only)             | 2        |
| 5-4                  | P-83616      | Stud Thrust Washer                                | 1        |
| 5-5                  | 74780        | Anvil Sleeve Set Screw                            | 1        |
| 5-6                  | P-83621      | Anvil Sleeve Set Screw Plug                       | 1        |
| 5-7                  | See Table II | Anvil   | 1        |
| 5-8                  | P-83618      | Nose Piece Screw                                  | 4        |
| 5-9                  | P-83619      | Nose Piece Spring                                 | 4        |
| 5-10                 | P-83620      | Nose Piece Push Pin                               | 4        |
| 5-11                 | See Table II | Anvil Sleeve                                      | 1        |
| 6-12                 | P-72105      | Throttle Lever Pivot Pin                          | 1        |
| 6-13                 | P-6087       | Holding Piston Adjusting Nut Locknut              | 1        |
| 6-14                 | P-83602      | Holding Piston Adjusting Nut                      | 1        |
| 6-15                 | P-83603      | Holding Piston Lever                              | 1        |
| 6-16                 | P-70492      | Handle Sleeve Lock Screw                          | 1        |
| 6-17                 | P-83612      | Work Piston Key Screw                             | 1        |
| 6-18                 | P-83611      | Work Piston Key                                   | 1        |
| 6-19                 | P-83605      | Bleeder Plug                                      | 1        |
| 6-20                 | P-83071      | Bleeder Plug O-Ring                               | 1        |
| 6-21                 | P-83614      | Handle Sleeve                                     | 1        |
| 6-22                 | P-83613      | Push Pin Collar                                   | 1        |
| 6-23                 | P-83610      | Work Piston Return Spring                         | 1        |
| 6-24                 | P-9876       | Work Piston and Motor Housing Pipe Plug           | 1        |
| 6-25                 | P-79556      | Air Motor Gear Assembly (consists of 26 thru 33)  | 1        |
| 6-26                 | P-83609      | Motor Housing Nut                                 | 1        |
| 6-27                 | C-77902      | Internal Gear (includes C-78066 key)              | 1        |
| 6-28                 | C-66397      | Motor Spindle Front Ball Bearing                  | 1        |
| 6-29                 | C-68479      | Motor Spindle Idler Gear Pin Retainer             | 1        |
| 6-30                 | A-83459      | Motor Spindle Rear Ball Bearing                   | 1        |
| 6-31                 | C-66334      | Motor Spindle Idler Gear Pin                      | 2        |
| 6-32                 | C-68477      | Motor Spindle Idler Gear Assembly                 | 2        |
| 6-33                 | P-83608      | Motor Spindle                                     | 1        |
| 6-34                 | P-79555      | Air Motor Assembly (consists of 35 thru 44)       | 1        |
| 6-35                 | C-67861      | Motor Rear End Plate Clamp Nut                    | 1        |
| 6-36                 | C-68454      | Motor Rotor Screw                                 | 1        |
| 6-36A                | C-80512      | Motor Rotor Screw Lockwasher (as required)        | 1        |
| 6-37                 | C-66327      | Motor Rotor Blade                                 | 4        |
| 6-38                 | C-68476      | Motor Rotor                                       | 1        |
| 6-39                 | C-67849      | Motor Front End Plate (includes C-79343 pin)      | 1        |
| 6-40                 | A-83543      | Motor Front End Plate Ball Bearing                | 1        |
| 6-41                 | C-67848      | Motor Rear End Plate                              | 1        |
| 6-42                 | S-25101      | Motor Rear End Ball Bearing                       | 1        |
| 6-43                 | A-83476      | Motor End Plate Dowel                             | 4        |
| 6-44                 | C-67875      | Motor Cylinder Liner                              | 1        |
| 6-45                 | P-83072      | Work Piston O-Ring                                | 1        |
| 6-46                 | P-83090      | Work Piston O-Ring Non-Extrusion Ring             | 1        |
| 6-47                 | P-83607      | Motor Spacer                                      | 1        |
| 6-48                 | P-83606      | Work Piston and Motor Housing                     | 1        |
| 7-49                 | DB-83736     | Cylinder Adaptor Screw (long)                     | 5        |
| 7-50                 | P-81094      | Cylinder Adaptor Screw (short)                    | 4        |
| 7-51                 | P-2227       | Cylinder Adaptor Screw Lockwasher                 | 9        |
| 7-52                 | P-81254      | Throttle Rod Arm Set Screw                        | 2        |
| 7-53                 | P-83576      | Throttle Rod Arm                                  | 2        |
| 7-54                 | P-83581      | Cylinder Adaptor Gasket                           | 1        |

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| FIGURE and Index No. | Part No. | Part Name   | Quantity |
|----------------------|----------|---|----------|
| 7-55                 | DB-82893 | Rear Trip Valve Cover Retainer  | 1        |
| 7-56                 | P-82891  | Rear Trip Valve Cover   | 1        |
| 7-57                 | P-82889  | Rear Trip Valve Spring  | 1        |
| 7-58                 | DB-82888 | Rear Trip Valve Disc and Stem   | 1        |
| 7-59                 | P-83074  | Rear Trip Valve O-Ring  | 1        |
| 7-60                 | P-2315   | Rear Trip Valve Outer Bushing Dowel Pin                                   | 1        |
| 7-61                 | DB-82890 | Rear Trip Valve Outer Bushing   | 1        |
| 7-62                 | A-82779  | Pump Piston O-Ring  | 1        |
| 7-63                 | P-80912  | Pump Ram Nut  | 1        |
| 7-64                 | P-89718  | Pump Piston   | 1        |
| 7-65                 | P-83577  | Pump Ram  | 1        |
| 7-66                 | DB-82822 | Air Inlet Bushing   | 1        |
| 7-67                 | P-78956  | Oiler Head, Tube and Disc   | 1        |
| 7-68                 | H-82651  | Oiler O-Ring  | 1        |
| 7-69                 | P-83573  | Oiler Screen  | 1        |
| 7-70                 | P-83572  | Oiler Wick  | 1        |
| 7-71                 | P-83567  | Forward Motor Throttle Valve Spring (light)                               | 1        |
| 7-72                 | P-83566  | Forward Motor and Pump Throttle Valve                                     | 2        |
| 7-73                 | P-83074  | Forward Motor and Pump Throttle Valve O-Ring                              | 2        |
| 7-74                 | P-83560  | Forward Motor Throttle Valve Bushing                                      | 1        |
| 7-75                 | P-83565  | Pump Throttle Valve Bushing   | 1        |
| 7-76                 | P-83071  | Pump Throttle Valve Bushing O-Ring  | 1        |
| 7-77                 | P-83568  | Pump Throttle Valve Spring (heavy)  | 1        |
| 7-78                 | P-83564  | Distributor and Reverse Motor Valve Bushing Cap                           | 1        |
| 7-79                 | P-83563  | Pump Distributor Valve Spring   | 1        |
| 7-80                 | P-83561  | Reverse Motor Valve   | 1        |
| 7-81                 | P-96711  | Reverse Motor Valve Bumper  | 1        |
| 7-82                 | P-83562  | Pump Distributor Valve  | 1        |
| 7-83                 | DB-82892 | Rear Trip Valve Inner Bushing   | 1        |
| 7-84                 | P-83559  | Distributor and Reverse Motor Valve Bushing                               | 1        |
| 7-85                 | P-158    | Pump Cylinder Assembly (includes 60, 61, 74, 83, 84 and cylinder P-83151) | 1        |
| 8-86                 | P-9855   | Handle Screw  | 3        |
| 9-87                 | P-70938  | Throttle Rod Wire Pivot Pin   | 1        |
| 9-88                 | P-78957  | Throttle Rod and Wire   | 1        |
| 9-89                 | P-83615  | Throttle Lever  | 1        |
| 8-90                 | P-83587  | Handle Gasket   | 1        |
| 8-91                 | P-83586  | Front Trip Valve Bushing Cap  | 1        |
| 8-92                 | P-71195  | Front Trip Valve Spring   | 1        |
| 8-93                 | P-89079  | Front Trip Valve O-Ring Cap   | 1        |
| 8-94                 | P-89078  | Front Trip Valve  | 1        |
| 8-95                 | P-83074  | Front Trip Valve O-Ring   | 1        |
| 8-96                 | P-83584  | Pump Ram Bushing Retaining Ring   | 1        |
| 8-97                 | P-83583  | Pump Ram Air Seal   | 1        |
| 8-98                 | P-83585  | Front Trip Valve Bushing  | 1        |
| 8-99                 | P-83655  | Metering Port Screen Retainer   | 1        |
| 8-100                | P-74458  | Metering Port Screen  | 1        |
| 8-101                | A-82776  | Metering Port Screen Retainer O-Ring                                      | 1        |
| 8-102                | P-83152  | Cylinder Adaptor  | 1        |
| 8-103                | P-80606  | Zerk Oiler Fitting  | 2        |
| 8-104                | P-83071  | Pump Ram Bushing O-Ring   | 1        |
| 8-105                | P-83588  | Pump Ram Bushing  | 1        |
| 8-106                | P-70447  | Oil Reservoir O-Ring Bottom Clamp Screw                                   | 1        |
| 8-107                | P-83593  | Oil Reservoir O-Ring Bottom Clamp   | 1        |
| 8-108                | A-82759  | Oil Reservoir O-Ring  | 1        |
| 8-109                | P-83592  | Oil Reservoir O-Ring Top Clamp  | 1        |
| 8-110                | P-83178  | Oil Reservoir Bag   | 1        |
| 8-111                | P-83591  | Oil Reservoir Baffle  | 1        |
| 9-112                | P-87669  | Low Pressure Check Valve Bushing Assembly                                 | 1        |
| 9-113                | P-83594  | Low Pressure Check Valve  | 1        |
| 9-114                | P-1845   | Low Pressure Check Valve Spring   | 1        |
| 9-115                | A-82770  | Low Pressure Check Valve Bushing O-Ring (small)                           | 1        |
| 9-116                | P-83073  | Low Pressure Check Valve Bushing O-Ring (large)                           | 1        |

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| FIGURE<br>and<br>Index No. | Part No. | Part Name   | Quantity |
|----------------------------|----------|---|----------|
| 9-117                      | P-72105  | Low Pressure Check Valve Stop Pin   | 1        |
| 9-118                      | P-83597  | High Pressure Check Valve Plug  | 1        |
| 9-119                      | P-83399  | High Pressure Check Valve Spring (outer)  | 1        |
| 9-120                      | P-83398  | High Pressure Check Valve Spring (inner)  | 1        |
| 9-121                      | P-83596  | High Pressure Check Valve   | 1        |
| 9-122                      | A-82777  | High Pressure Check Valve Plug O-Ring   | 1        |
| 9-123                      | A-83123  | High Pressure Check Valve Bushing   | 1        |
| 9-124                      | P-83600  | Pressure Relief Valve Stop Plug   | 1        |
| 9-125                      | P-83599  | Pressure Relief Valve Spring  | 1        |
| 9-126                      | P-56705  | Pressure Relief Valve   | 1        |
| 9-127                      | H-82651  | Pressure Relief Valve Stop Plug O-Ring (large)  | 1        |
| 9-128                      | A-82776  | Pressure Relief Valve Stop Plug O-Ring (small)  | 1        |
| 9-129                      | P-104518 | Holding Piston Valve Nut (includes 139 and 140)   | 1        |
| 9-130                      | P-96712  | Holding Piston Valve Nut Gasket   | 1        |
| 9-131                      | P-83074  | Holding Piston Valve Seat O-Ring  | 1        |
| 9-132                      | P-83075  | Holding Piston Valve Nut O-Ring   | 1        |
| 9-133                      | P-83601  | Pressure Relief Valve Holding Piston  | 1        |
| 9-134                      | A-82770  | Holding Piston Bushing O-Ring   | 1        |
| 9-135                      | P-83590  | Pressure Relief Valve Holding Piston Bushing  | 1        |
| 9-136                      | P-56706  | Pressure Relief Valve Bushing   | 1        |
| 9-137                      | P-88842  | Bail  | 1        |
| 9-138                      | P-159    | Handle Assembly (includes 103, 104, 105, 117, 123,<br>134, 135, 136 and handle P-83555) | 1        |
| 9-139                      | G-71737  | Roll Pin  | 1        |
| 9-140                      | P-102933 | Trip Button   | 1        |

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# C362 TOOL

## RECOMMENDED SPARE PARTS LIST FOR B F GOODRICH MODEL C-362 RIVNUT HEADERS

The suggested quantities listed below are for two tools  
over a period of approximately one year.

| Quantity | Index No.       | Part No.     | Part Name   |
|----------|-----------------|--------------|---|
| X        | 2               | See Table II | Pull-Up Stud  |
| 10       | -               | 80445        | Stud Holder Set Screw (See Table II if used)  |
| X        | -               | P-83632      | Stud Holder - See Table II for size if used   |
| X        | -               | P-83633      | Stud Holder - See Table II for size if used   |
| 2        | 4               | P-83616      | Stud Thrust Washer  |
| 6        | 5               | 74780        | Anvil Sleeve Set Screw  |
| 3        | 6               | P-83621      | Anvil Sleeve Set Screw Plug   |
| 4        | 13              | P-6087       | Holding Piston Adjusting Nut Locknut  |
| 6        | 14              | P-83602      | Holding Piston Adjusting Nut  |
| 4        | 16              | P-70492      | Handle Sleeve Lock Screw  |
| 6        | 17              | P-83612      | Work Piston Key Screw   |
| 6        | 18              | P-83611      | Work Piston Key   |
| 8        | 19              | P-83605      | Bleeder Plug  |
| 20       | 20, 76, 104     | P-83071      | O-Ring for Bleeder Plug, Pump Ram Bushing and Pump Throttle Valve Bushing                           |
| 2        | 36              | C-68454      | Motor Rotor Screw   |
| 2        | 36A             | C-80512      | Motor Rotor Screw Lockwasher  |
| 8        | 37              | C-66327      | Motor Rotor Blade   |
| 2        | 45              | P-83072      | Work Piston O-Ring  |
| 1        | 46              | P-83090      | Work Piston Non-Extrusion Ring  |
| 5        | 49              | DB-83736     | Cylinder Adaptor Screw (long)   |
| 4        | 50              | P-81094      | Cylinder Adaptor Screw (short)  |
| 9        | 51              | P-2227       | Cylinder Adaptor Screw Lockwasher   |
| 10       | 52              | P-81254      | Throttle Rod Arm Set Screw  |
| 8        | 53              | P-83576      | Throttle Rod Arms   |
| 10       | 59, 73, 95, 131 | P-83074      | O-Ring for Holding Piston Valve, Front and Rear Trip Valves, Forward Motor and Pump Throttle Valves |
| 1        | 79              | P-83563      | Pump Distributor Valve Spring   |
| 2        | 80              | P-83561      | Reverse Motor Valve   |
| 2        | 82              | P-83562      | Pump Distributor Valve  |
| 4        | 90              | P-83587      | Handle Gasket   |
| 4        | 97              | P-83583      | Pump Ram Air Seal   |
| 10       | 103             | P-80606      | Zerk Oiler Fitting  |
| 4        | 110             | P-83178      | Oil Reservoir Bag   |
| 2        | 113             | P-83594      | Low Pressure Check Valve  |
| 2        | 121             | P-83596      | High Pressure Check Valve   |
| 2        | 126             | P-56705      | Pressure Relief Valve   |
| 1        | 127             | H-82651      | Pressure Relief Valve Stop Plug O-Ring (large)  |
| 2        | 128             | A-82776      | Pressure Relief Valve Stop Plug O-Ring (small)  |
| 4        | 134             | A-82770      | Holding Piston Bushing O-Ring   |

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