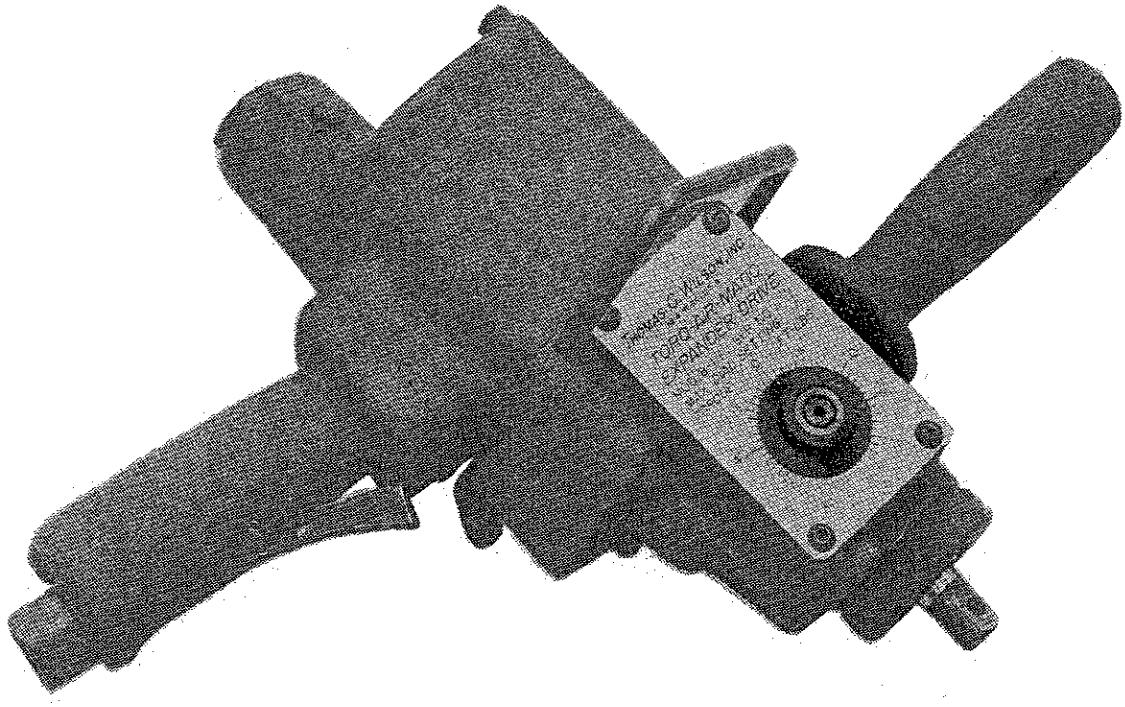
WILSON

TORQ-AIR-MATIC

CONTROLLED TORQUE EXPANDER DRIVE
AIR DRIVEN

MODELS: B-450 (450 R.P.M.)
B-600 (600 R.P.M.)
B-750 (750 R.P.M.)



OPERATING INSTRUCTIONS, CARE & MAINTENANCE, REPLACEMENT PARTS

TO REDUCE THE RISK OF INJURY, USER MUST READ AND UNDERSTAND OPERATOR'S MANUAL.

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WILSON MODEL 'B' TORQ-AIR-MATIC EXPANDER CONTROL

introduction

This instruction manual should under most circumstances accord the user a means of avoiding potentially troublesome conditions and "trouble-shooting" against malfunctions. However, "an ounce of prevention is worth a pound of cure" and operators of Wilson Torq-Air-Matics should ascertain that only clean dry air is admitted to the machine. In addition, lubrication, air pressure at the tool and air compressor capacity should be as prescribed. After use, a liberal amount of oil should be introduced into the machine and distributed completely through air motor and valves before storing. It has been found that most of the machines which were returned to our factory for repairs had developed corrosion within the mechanisms, thus preventing their parts from performing their designed duties. This corrosion could only have come from wet dirty air and improper storage.

However, repairing or rebuilding a machine "to be as good as new" is an objective of a different character. A precision tool, the Wilson Torq-Air-Matic must first be able to sense torque and its magnitude (simultaneously with rotation of a tube expander) and then actuate either a servo valve shut-off mechanism or an uncoupling mechanism. It must then "telegraph" this information to the motive power, which must respond accordingly by stopping and then reversing. Then of course, the cycle of operation must repeat again and again.

This is quite an accomplishment for an air driven tube expander driver with an integral mechanical torque control, an accomplishment that can be done day in and day out by the Wilson Torq-Air-Matic when it is properly used and cared for. Admittedly, pneumatic tools operate under very trying conditions. Notwithstanding, pneumatic tools are very rugged machines and, basically, require very little correct attention and maintenance. When coupled with instrumentation devices, however, they should be accorded their respective extra care. Most repairs are necessitated by the lack of this "little correct attention and maintenance" for air motor and throttle valve and the little "extra care" for the torque sensing and control devices together with their servo and reversing valves.

The "repair to be as good as new" objective would dictate a policy of always returning the Torq-Air-Matics to our factory for repairs. Who else would know the intricate details but the Company who makes this machine? Who else would have a greater stake in its satisfactory performance? Therefore, while we believe that each user can help himself considerably, the "good as new" repair objective is always a factory job. In our factory many checks are made that would not be within the realm of the ordinary user's testing equipment and procedures, such as torque calibration on a mechanical prony brake and over 500 simulated forward and reverse cycles of tube rolling. However, these checks or trips to our factory for repairs can be reduced and kept to an absolute minimum by proper use on the job and adequate care after each job of the Wilson Torq-Air-Matic.

Before proceeding to disassemble any machine, one should obtain particular details concerning the malfunction since much time and unnecessary work may thereby be eliminated. Above all, ascertain whether air was filtered clean and that adequate lubrication prevailed. Also, check that a volume of approximately 60 cubic feet per minute of air at 85 to 90 pounds per square inch pressure was available at the machine and an air hose connection of the maximum size is used, that is a connection which is not choked down with either reducing fittings or nipples. On maximum or high torque settings the inherent designed power output is based on availability of a sufficient volume of air at 90 PSI. At high load settings, low air pressure or volume will cause the machine to visably slow down into an ultimate stall before reaching its preset dial torque. In this event, since the servo valve did not shut off the air to the motor, the tool would not reverse automatically. However, it could be reversed manually or caused to reverse automatically by releasing the trigger and thereby shutting off the air supply to the motor. This system of operation very definitely precludes the possibility of continuous rolling with the impression that all tubes are tight and only finding them not tight when a hydrostatic test is applied. There is an inherent guarantee in that the operator is "tipped off" not to continue rolling under circumstances that will not produce a tight joint.

These machines do not depend upon friction, ratcheting, magnetic or electric devices to trip off or stop rotation at a preset torque. Neither do they rely upon a differential in air pressure at the throttle to cause stalling to stop rotation at a predetermined load. There can be no slipping under the method of drive and control used in the Wilson Torq-Air-Matics. If they are mechanically correct and operable, they will produce as to the torque set or will not produce at all. What better assurance can be had against a potentially false impression of rolling tubes to optimum tightness? The Wilson Torq-Air-Matic is an excellent producer and a time saver. When treated with proper care, trouble-free performance is assured.

WILSON MODEL 'B' TORQ-AIR-MATIC EXPANDER CONTROL

calculating the required expansion

The amount of expansion desired may usually be determined from past experience. Records will indicate that there is quite a variable between installations. This variable may be due to personal preference as well as service conditions. The type and hardness of tube metal and the tube sheet will also have a bearing on the amount of expansion. Depending on tube O.D., sheet thickness, pressure and service, etc., a three percent wall reduction (thinning of the tube wall after expanding) may suffice. In another case a six percent reduction or greater may be required.

The amount of tube wall reduction generally considered most desirable for the average ferrous tube application is approximately seven to ten percent. Extensive experimentation has established that the most reliable method of determining what a joint should be and its effectiveness is to measure displacement of tube metal, after metal to metal contact of tube wall with tube seat has been made.

An example of how to determine the desired expanded diameter for a 1" x 12 gauge (.109) tube is shown.

	1.015	Tube Sheet Hole
minus -	1.000	Tube O.D.
equals	.015	Clearance (Diametral)
plus +	.782	Tube I.D.
equals	.797	Tube I.D. at metal to metal contact.
plus +	.022	Increase in I.D. to obtain 10% tube wall reduction. (10% x .109 wall x 2).
equals	.819	Desired expanded diameter of I.D.

This calculation is a fair first approximation for illustrative purposes but it does not take into account tube wall thinning which accompanies the increase in tube I.D. necessary to reach metal to metal. When tube wall thinning is taken into account, a closer approximation for the increase in tube inner diameter is given by the following:

$$\left.\begin{matrix}\text{increase in tube inner}\\ \text{diameter to reach}\\ \text{metal to metal}\end{matrix}\right\} \approx \frac{\text{Tube O.D.}}{\text{Tube I.D.}} \times \text{clearance}$$

For the above example:

$$\left.\begin{matrix}\text{increase in tube inner}\\ \text{diameter to reach}\\ \text{metal to metal}\end{matrix}\right\} = \frac{1}{.782} \times .015 = .019$$

The tube I.D. at metal to metal contact is increased to .782 + .019 = .801, or .004 more than the approximate calculation. The required 10% tube wall reduction to complete tube expansion is still based on the tube wall thickness prior to thinning and is 10% x .109 x 2 = .022. The required tube I.D. after tube expansion is .801 + .022 = .823 or .004 greater than given by the approximate calculation.

The torque setting of the Torq-Air-Matic can be adjusted to obtain this dimension. For expanding the 1-1/2" x 12 gauge steel tube in a 1" sheet and using 1" effective roll length, the torque setting for trial purposes would be just about 25 foot pounds. If a 10% tube wall reduction is satisfactory, expanding may continue, otherwise the torque may be reset.

The example is based on using Wilson's revolving ball bearing collar type expander, Models 41 or 44. It is the ball bearing collar type which is most suitable for use with the torque control. There is nothing to prevent using other types, such as a flaring expander. Only a very small additional amount of torque will be required with the latter. Even using universal joints, very little additional torque is required.

typical torque settings

TUBE		MATERIAL	TUBE SHEET	TORQUE FT. LBS.
O.D.	GA.			
5/8"	13	Steel	1-1/4"	12
	18		1-1/2"	9
3/4"	16		1"	7
			1-1/4"	9
1"	12		1"	25
	13		1-1/2"	35
1-1/4"	11		3/4"	20
			1-1/4"	36

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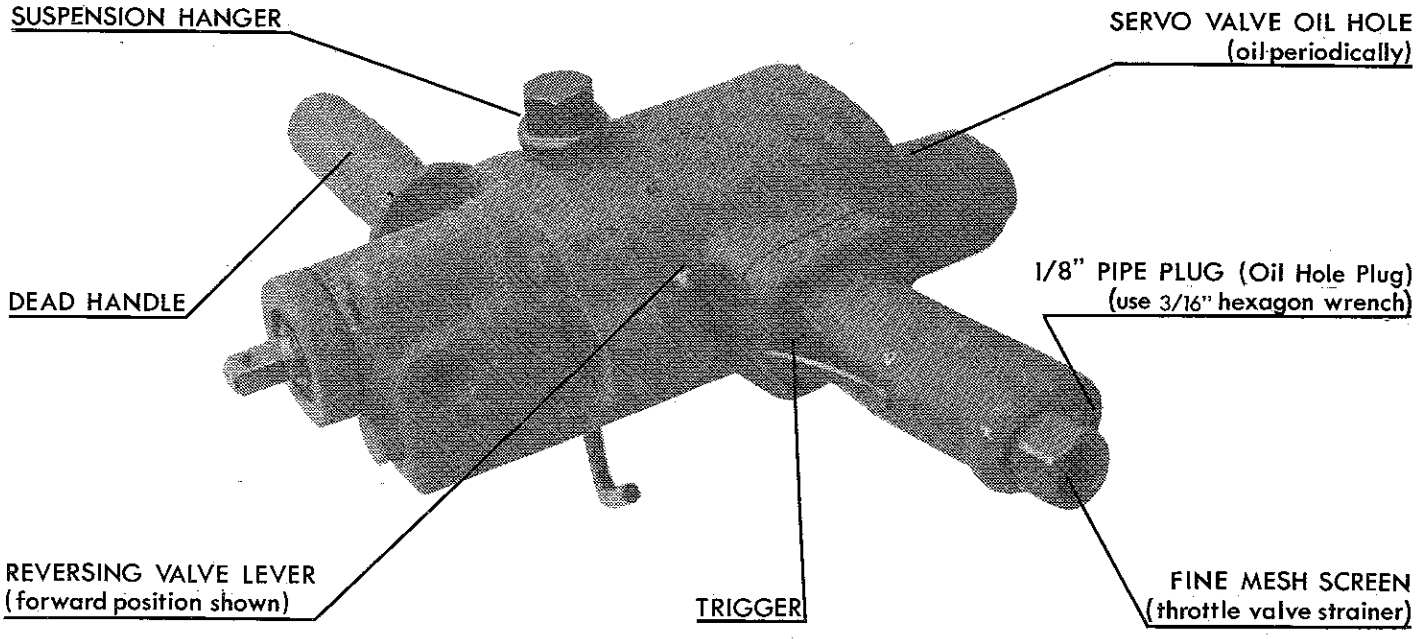
WILSON MODEL 'B' TORQ-AIR-MATIC EXPANDER CONTROL

operating procedure



1. Remove 1/8" pipe plug in air handle base and fill oil reservoir with light machine oil of SAE 10 viscosity or less. (Wilsolube-Catalog No. 9047) This is done before long tube expanding runs and after every four hours of continous use except if an air line lubricator of ample capacity is used, as recommended.

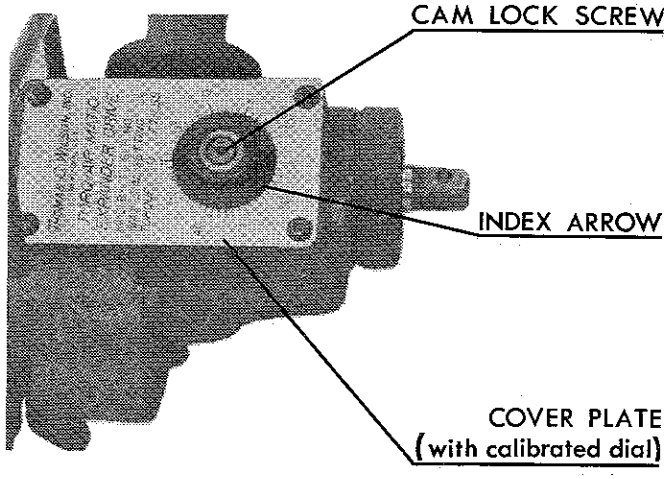
2. Periodically, lubricate servo valve mechanism at the 1/8" diameter hole marked 'oil' on the valve cap underside.

3. An air line strainer or filter is required for maximum power and efficiency. Wilson's vitalizer unit (Cat. No. 28147) consisting of a filter and lubricator for use on a 3/4" I.D. air line is recommended.

4. The fine mesh screen inside the throttle cap should be periodically checked and completely cleaned of all foreign matter as necessary.

5. Always blow out air hose thoroughly before attaching to the throttle cap. Use the hose assembly (1/2" pipe couplings) supplied with the Torq-Air-Matic. Always use a 3/4" I.D. or larger air line for maximum power and be sure that air pressure at the machine is at least 90 psi gauge.

6. Loosen lock screw of indexed control knob assembly with 1/8" hexagon wrench supplied and set control knob index to desired trial setting on cover plate dial, which is calibrated in foot pounds of torque. (See preceding section entitled, "Calculating The Required Expansion"). After setting, lock control knob assembly securely with lock screw.



7. To avoid the possibility of over-rolling, it is best to make the trial setting low and work up to the desired setting, a record of which should be kept for future use.

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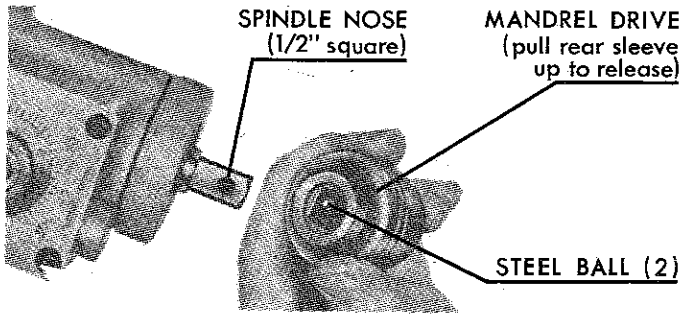
8. Attach dead handle in desired position. An extra long dead handle for high torque rolling can be made by forcing a suitable length of 3/4" I.D. rubber hose over a piece of 3/4-16 NF threaded rod.

9. If suspension of tool is desired, lock suspension hanger in place on transfer plate dead handle boss. Use 3/4-16 NF cap screw, supplied, passing it through the hanger eye.

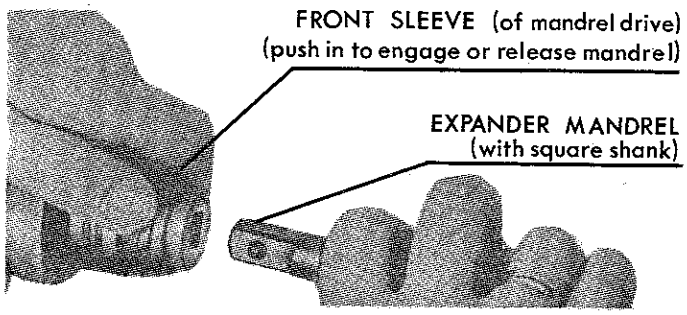
10. Set reversing valve lever in forward position as illustrated. This lever will automatically snap into reverse position whenever the air supply is cut off but it must be manually thrown into forward position when required.

11. Select required snap-on mandrel drive. Insert square spindle nose into it. Be sure to align detents with drilled spots on spindle nose. (Instructions for releasing detents are stamped on mandrel drive sleeves.)



12. Attach mandrel to drive by engaging internal detent with drilled spot on mandrel's square shank.

13. Position expander as required.



14. Squeeze trigger firmly so that machine receives full air.

15. When pre-set torque has been reached, servo valve mechanism will shut off air motor.

16. Release trigger and allow reversing valve to snap into reverse position.

17. Wait for click of servo valve being reset and again squeeze trigger to open throttle valve. The motor will now run in reverse and retract mandrel so that expander can be removed from tube.

18. If, after measurement of tube's inside diameter, the amount of expansion is found to be insufficient, reset control knob to a slightly higher value and roll the next tube.

19. When desired expansion has been attained, maintain the setting and roll the entire lot. Reroll all trial tubes which were not completely expanded.

20. Always record settings used and tube data such as tube O.D., gauge, and tube sheet thickness for future use.

component parts and accessories

TORQ-AIR-MATIC	FREE SPEED	MAX. TORQUE	CATALOG NO.
Model B–450	450 RPM	40 Ft. Lbs.	21400–450
Model B–600	600 RPM	30 Ft. Lbs.	21400–600
Model B–750	750 RPM	24 Ft. Lbs.	21400–750
MANDREL CONNECTORS	(Internal Square Drive)		
3/4" Square			21420
1/2" Square			21418
3/8" Square			21419
1/4" Square			21924
HOSE ASSEMBLY	(3/4" I.D. Hose with short 1/2" I.D. whip for max. power with ease of handling)		21190
ROTOR BLADE	(Set of 6 req'd)		21468

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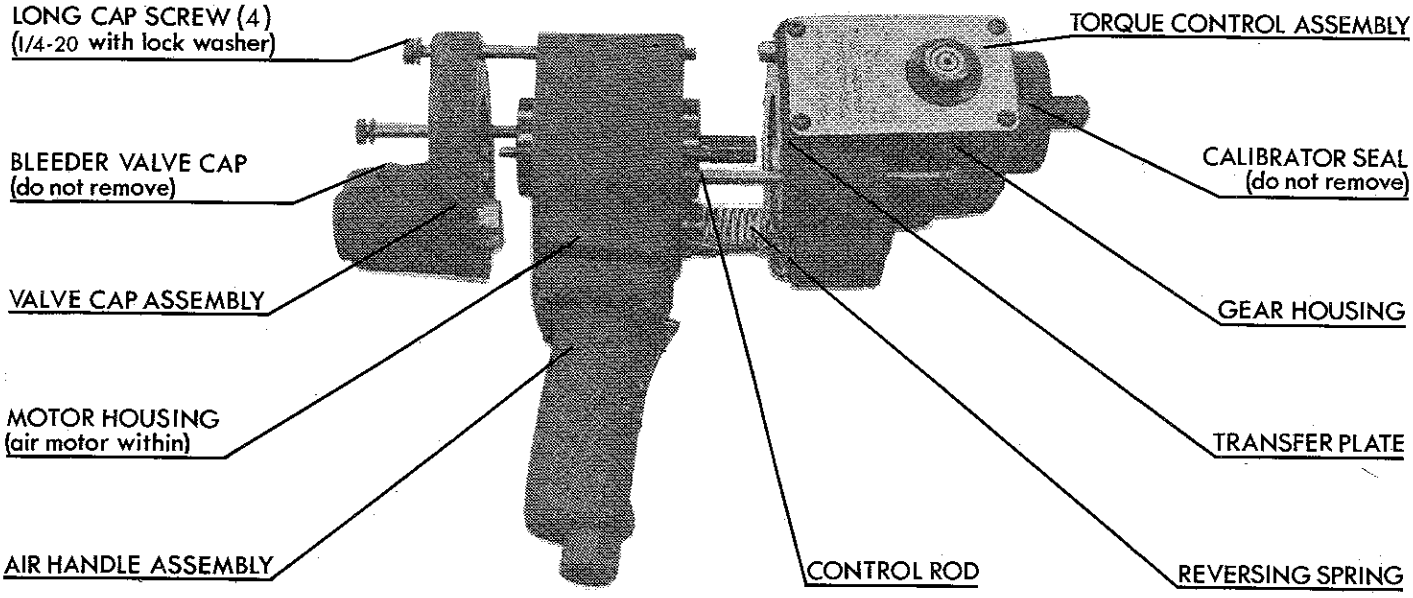
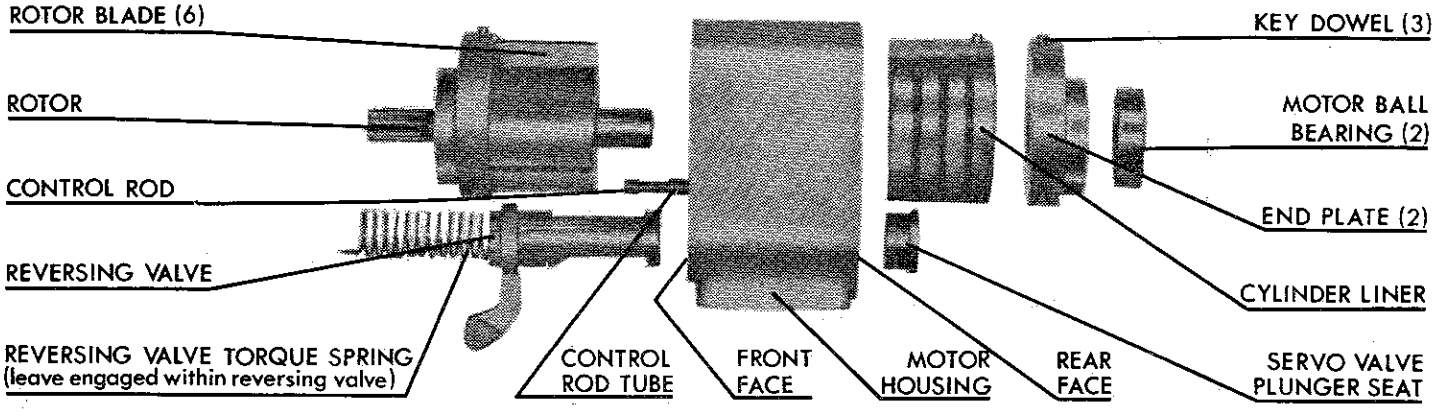
WILSON MODEL 'B' TORQ-AIR-MATIC EXPANDER CONTROL

disassembly procedure



1. Remove the four long screws and lock washers from valve cap and gear housing flanges.
2. Carefully remove valve cap assembly complete with gasket and servo valve plunger seat from reversing valve insert of motor housing.
3. The torque control assembly including transfer plate and gasket should be carefully removed as a unit and kept together. Place suitable plugs over pinion and control rod holes in the transfer plate so that no dirt or foreign matter will enter the gear or control mechanism cavities. CAUTION: Allow reversing valve torque spring and valve to unwind one turn.
4. Remove control rod from its tube.
5. Gently push reversing valve and torque spring out of its insert in motor housing. Leave torque spring engaged inside of reversing valve.
6. The air handle assembly and gasket can be removed by unscrewing the four cap screws in the handle flange.

air motor disassembly procedure



1. Tap drum end of the rotor with a soft-faced mallet and drive out rotor, blades and front end plate assembly, which will slide easily off the rear end plate. (See Step 5).
2. Use mallet handle to gently tap rear end plate out of motor housing. (See Step 5).
3. Normally it should be unnecessary to remove the cylinder liner but it may be removed from the motor housing from either side. This can be accomplished easily by the application of heat to the motor housing.
4. Do not lose any of the press-fitted key dowels from either end plates or cylinder liner.
5. Both air motor disassembly and reassembly are more easily done when heat is applied to the motor housing casting.

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reassembly procedure

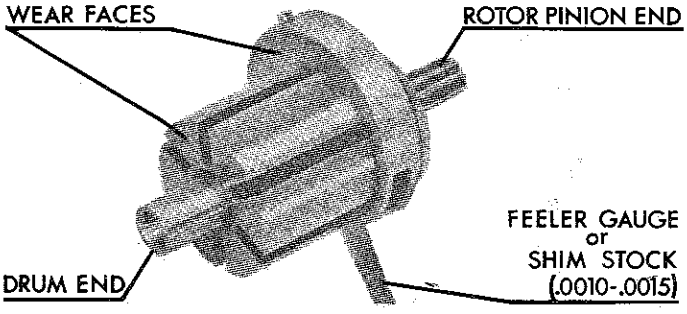
1. Check all six new rotor blades to see that they fit freely in the rotor slots. Soak them in light machine oil of SAE 10 viscosity for awhile before assembly. (Wilsolube - Catalog No. 9047.)

2. Also check ball bearings in their end plates to see that they run freely without excessive play and are properly lubricated. This should not necessitate further disassembly of either ball bearing from its end plate except for replacement.

3. If the press-fitted cylinder liner was removed from the motor housing, it should be replaced. Be sure key dowel is tightly in place so that it will slide easily in the motor housing key way and correctly align cylinder liner. (Apply heat to casting.)

4. Press pinion end of rotor shaft into ball bearing in end plate from wear surface side. This pinion shaft is a tight press fit in either ball bearing bore. Tap rotor with a soft-faced mallet on either end until there is a clearance of from .0010" to .0015 between end plate and rotor drum wear surfaces as illustrated. Check this clearance carefully all around. Be sure key dowel is pressed in place.

rotor and end plate assembly



5. Orient and support motor housing and assembled cylinder liner such that the housing's rear face is approximately 1" above a clean flat surface. (Note: The housing's rear face is the face from which the control rod tube does not protrude.)

6. Lower drum end of rotor and end plate assembly into motor housing and align end plate key dowel with key way. Press end plate into motor housing gently but firmly so that end plate's flange surface is flush with motor housing's front face. Be careful to maintain the preset clearance between the wear surfaces. (Apply heat to casting.)

7. Support this partially assembled air motor 2" above the clean flat surface upon housing's front face where both rotor pinion and control rod tube protrude.

8. Press cylinder liner firmly against the end plate wear surface. The rotor drum wear surface should be just below cylinder liner edge.

9. Insert well oiled rotor blades into the rotor drum slots; straight edge of rotor blades should be toward cylinder liner.

10. Press other end plate, whose bearing will slide on rear rotor shaft easily, into motor housing after aligning press-fitted key dowel to motor housing key way. (Apply heat to casting.)

11. Be sure that both end plate flanges are flush with the motor housing faces and their wear surfaces are tight against the cylinder liner within. Turn rotor by hand to see that it rotates free and easy with no rubbing.

12. If binding or rubbing does occur, rotor is improperly located between the end plates. Disassemble motor completely; reset required clearance between the wear surfaces, and reassemble again.

13. Push control rod through its tube in motor housing so that its head butts up against the tube's protruding end. Tape or tie control rod in the rear so that it cannot fall out.

14. Hold torque control assembly by its square spindle nose between soft jaws of a vise so that unit revolves easily. Remove plugs from pinion and control rod holes and place transfer plate gasket on assembly's face.

15. If necessary, re-engage longer arm of reversing valve torque spring in its hole at bottom of the deeper bore in reversing valve. Put torque spring's short arm in its hole in transfer plate bore. Turn reversing valve clockwise about one turn to preload torque spring. Place a 3/4" diameter rod about a foot long in reversing valve's opposite bore and press reversing valve with lever into the transfer plate recess to compress torque spring.

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16. Maintaining reversing valve's position with a firm grip on the rod in rear bore, assemble motor housing with air motor to torque control assembly by passing rod and then reversing valve through the reversing valve insert. Be sure rotor pinion enters gear cavity freely and meshes with the gears properly.

17. Loosen control rod so that it falls into its tube with only 5/64" projecting above housing's rear face.

18. Place motor housing gasket upon the rear face of motor housing.

19. Insert servo valve plunger seat into reversing valve insert and assemble valve cap assembly on to motor housing's rear face.

20. Insert the four long cap screws with their lockwashers into their respective holes and tighten the assembly evenly and carefully. Check for free movement of the unit around main shaft in vise as assembly is tightened. Also check reversing valve for free movement.

21. Assemble air handle assembly with its two gaskets and spacer to the motor housing boss and draw it up tight with all four cap screws.

22. Put a little light machine oil into the hole marked 'oil' on valve cap underside. After filling oil reservoir, pour about a tablespoon of light machine oil in air hose assembly and allow machine to run for five or ten minutes.

23. Listen for any rubbing or peculiar noises in either air motor or gear housing. When properly assembled, motor housing will become cold after running awhile and gear housing will not develop any hot spots.

24. Set machine for three foot pounds of torque and check servo valve cut off and proper automatic reversing action by grasping a mandrel held firmly in the machine with a gloved or padded hand. This should trip servo valve mechanism and throw reversing valve into reverse position after trigger is released and throttle plug has cut off the air supply.

maintenance and repair tools

QTY.	TOOLS
1	4 Oz. Ball Pein Hammer
1	4 Oz. Soft Faced Hammer (Brass and Plastic Tip)
1	Set of Screwdrivers: 1/8" w. x 4" lg. blade 1/4" w. x 4" lg. blade 3/8" w. x 6" lg. blade
1	7/16" Open End Wrench for close quarter work.
1	9" Smooth Jaw Adj. Wrench (With 2" min. opening)
1	14" Pipe Wrench (With 3" min. opening)
1	8" Pressure Lock Wrench (vise grip)
1	Set of Allen Hex. Wrenches (5/64, 3/32, 1/8, 5/32, and 3/16)
1	9-1/2" Channel Lock Pliers
1	Long Needle Nose Pliers
1	6-1/2" Half Round Needle File for Deburring
1	Set of Machinists long nose punches (1/16, 3/32, 1/8, 5/32, 3/16 and 1/4)
1	Small Hand Scraper for Deburring
2	Sheets fine emery cloth for polishing
1	Stud Removal Wrench for 1/4" studs or 2 (1/4-20) Jam Nuts
1	Bench Arbor Press (1 ton capacity). (This is essential if certain work is to be performed without extreme difficulty, such as pressing motor assembly out of motor housing.)
1	.0015" Feeler Gage (use feeler gage stock)

WILSON MODEL 'B' TORQ-AIR-MATIC EXPANDER CONTROL

trouble shooting chart

TROUBLE	PROBABLE CAUSE	REFER TO PROCEDURE
1. Fails to stop rotating at any preset torque.	Failure of Servo Valve Note: Failure of Servo Valve to automatically stop machine rotation at high torque settings usually indicates lack of power; refer to No. 6. When stalling occurs, machine will not reverse itself automatically.	PROCEDURE A Steps A-1 thru A-6
2. Stops rotating before it develops sufficient torque but does reverse itself automatically.	Premature Servo Valve shutoff.	PROCEDURE B Steps B1 thru B-14
3. Servo Valve trips but motor only slows down and does not stop rotating.	Servo Valve interference. Servo Valve seal surfaces leak.	PROCEDURE C Part 1 Steps C-1 thru C-10 Part 2 Steps C-11 thru C-18 Part 3 Steps C-19 thru C-21 Part 4 Steps C-22 thru C-36 Should only be attempted by trained personnel.
4. Reversing valve fails to move into reverse after releasing trigger.	Motor and torque unit assembly out of alignment. Lock pin interference.	PROCEDURE D Steps D-1 thru D-3 Step D-4
5. Reversing valve moves into reverse before Servo Valve has cut off air to motor.	Broken stop pin. Note: If Servo Valve has already tripped causing the reversing valve to move into reverse position see No. 2.	PROCEDURE E Steps E-1 & E-2
6. Fails to develop sufficient power for high torque tube rolling.	Deficient air supply. Air motor leakage.	PROCEDURE F Part 1 Steps F-1 thru F-4 Part 2 Steps F-5 thru F-16

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repair procedures

procedure A

Reference: Page No. 14

A-1 Unscrew and completely remove Servo Valve seat assembly (Key No. 24 thru No. 29) from end of valve cap assembly (Key No. 30).

A-2 Disassemble Servo Valve seat assembly by unscrewing bronze Servo Valve seat (Key No. 25) from steel Servo Valve plug (Key No. 29) and thoroughly clean or replace air filter (porous bronze cylinder (Key No. 26). When clogged this filter will prevent Servo Valve from automatically shutting machine off. Do not crush cylinder during reassembly.

A-3 Clean Bleed Hole in Servo Valve seat (Key No. 25) but do not enlarge it.

A-4 Oil Servo valve cavity in Steel Insert with light oil (SAE No. 10) and press Servo Valve plunger (Key No. 16) up and down several times to insure free operation.

A-5 Hole marked "oil" on side of valve cap assembly (Key No. 30) must be free and unobstructed.

A-6 Reassemble Servo Valve seat assembly and replace it in rear of valve cap assembly. Test machine under load and it should now function correctly.

procedure B

Reference: Page No. 14

B-1 With machine connected to live air line, loosen Servo Valve seat assembly (Key No. 24 thru No. 29) 7/8 of a turn out of the valve cap assembly, (Key No. 30)

B-2 Then sqeeze air handle trigger on full with a steady and firm grip to operate the tool. Do not feather the throttle or operate trigger slowly or machine may automatically reverse itself.

B-3 If it still stops rotating prematurely, release trigger and listen for a clicking sound which indicates that Servo Valve plunger (Key No. 16) has been reset.

B-4 Tighten Servo Valve seat assembly approximately 1/8 of a turn into valve cap assembly and repeat test of tool as in step No. 2 above.

B-5 Repeat step No. 4 until a point of proper action is found and machine does not stop rotating prematurely.

B-6 Then put tool to use under load and tighten Servo Valve seat in stages periodically during use until machine runs correctly with Servo Valve seat fully tightened.

NOTE:
If the preceding steps do not correct premature Servo Valve shutoff of unit or if the tool has not been used recently and corrosion of parts is a possibility, proceed as follows:

B-7 Unscrew and completely remove Servo Valve seat assembly from valve cap assembly.

B-8 Check Valve Seat surface in bronze Servo Valve seat (Key No. 24) for nicks, scratches or burrs, which would prevent small valve chamfer of Servo Valve plunger (Key No. 16) from seating properly and producing an effective air seal.

B-9 Also check that Bleed Hole above center hole in Servo Valve seat has not become enlarged.

B-10 After oiling Servo Valve cavity in Steel Insert with light oil (SAE No. 10) push Servo Valve plunger up and down a few times and check that it rises easily to the top of Servo Valve Steel Insert within the aluminum valve cap casting.

B-11 Check Bleeder Valve Hole under bleeder valve plunger (Key No. 22) to see that it is clean and clear. Clean if necessary with a hooked wire from inside of steel Servo Valve insert.

B-12 Pull out Servo Valve plunger (Key No. 16) from within Steel Insert cavity with long nosed pliers for inspection of seal rings. Do not damage seal surface of plunger.

B-13 Now check large seal rings (Key No. 15) on Servo Valve plunger and Servo Valve seat for wear or cuts and replace them where necessary. Improper sealing by either of these seals will cause premature shutoff of the Torq-Air-Matic.

NOTE:
When replacing Servo Valve plunger into Steel Insert cavity apply liberal coating

of "O" ring lubricant (i.e. Super-O-Lube, Parker) to seal rings prior to insertion. Exercise caution to prevent damage to seal ring from inside edge of Steel Insert.

B-14 When all above items have been checked and corrected as necessary, reassemble machine complete and first retest unit at about 10 foot pounds of torque. It should now function correctly.

procedure C

Reference: Page No. 14

Part 1

C-1 Unscrew and completely remove Servo Valve seat assembly (Key 24 thru 29) from end of valve cap assembly (Key No. 30)

C-2 Oil Servo Valve cavity in Steel Insert with light oil (SAE No. 10) and press Servo Valve plunger (Key No. 16) up and down several times to insure free operation.

C-3 Pull Servo Valve plunger out from within Steel Insert with long nosed pliers. Do not damage valve seal surface of plunger.

C-4 Remove Servo Valve spring (Key No. 14).

C-5 Replace Servo Valve plunger without Servo Valve spring.

C-6 Replace Servo Valve seat assembly and tighten it up.

C-7 Reset Servo Valve plunger by blowing air in hole marked "oil" with blow gun.

C-8 If reversing lever is in forward position, move it to reverse position manually. This is accomplished by moving lever forward and letting it move automatically into reverse. See illustration under operating procedure, Page 4, Para. No. 10

C-9 Connect tool to air supply and squeeze trigger slowly to feather throttle for very slow machine start up. Do no apply any load on square spindle nose of tool.

C-10 Torq-Air-Matic will start up and Servo Valve will quickly cut off machine.

Part 2

If machine stops completely, failure is due to Servo valve spring interference. That is spring solid height is too great for Servo valve spring cavity not allowing Servo valve plunger to seat itself.

C-11 Grind each spring end down to reduce Servo valve spring's solid height by 1/64" approximately.

C-12 Unscrew and completely remove Servo valve seat assembly and pull out Servo valve plunger from within Steel Insert cavity with long nosed pliers. Do not damage valve seal surface of plunger.

C-13 Reassemble Servo valve spring, plunger and seat assembly in given order. Tighten up Servo valve seat.

C-14 Unscrew bleeder valve cap (Key No. 23) and remove completely.

C-15 Manually return reversing valve lever to forward position. See Step No. 10 under "Operating Procedure", Page No. 4

C-16 Connect tool to live air line and test free of any load on square spindle nose. Squeeze trigger firmly so that machine receives full air.

C-17 Depress bleeder valve plunger (Key No. 22) by hand to trip Servo valve and stop rotation of tool.

C-18 If tool still fails to stop rotating when Servo valve trips, repeat Steps No. 1, 3, 4, 12, 14 and 17.

Part 3

If Torq-Air-Matic did not stop completely but only slowed down when tested according to Steps No. 5 through 10, then failure is due to improper seating and sealing of the Servo valve plunger.

C-19 Repeat Step No. 13 and examine valve chamfer on 7/16" diameter end of Servo valve plunger for nicks, scratches or breaks which would cause imperfect valve sealing. Replace Servo valve plunger if such damage is found.

C-20 Check large and small seal rings on Servo valve plunger (Key No. 13 and No. 15) and replace if they are found defective, that is cut or broken.

C-21 Look down into valve cap assembly through Steel Insert and examine valve seat

surface of bronze Servo valve plunger seat. Replace Valve cap sub-assembly (Key No. 30) if major defects such as breakage of seat or heavy cuts are found, otherwise tap Servo valve plunger and seat together to reform seat and obtain the necessary air seal. Rotate Servo valve plunger a partial turn between taps.

Part 4

CAUTION: The following steps should only be accomplished by trained and experienced personnel, otherwise replace valve cap assembly No. 41423 entirely.

For better examination of Servo valve plunger seat and subsequent lapping, when necessary proceed as follows:

C-22 Hold machine in a vise by 1/2" square nose of drive shaft with valve cap assembly up.

C-23 Remove 4 long hexagon head cap screws Key No. 32) with their lock washers.

C-24 Holding motor housing assembly (Key No. 34) firmly down on transfer plate assembly (Key No. 41) remove valve cap assembly (Key No. 30 - Complete Assembly Part No. 21930) from rear of motor housing assembly by gently tapping valve cap casting sides up with a soft-faced hammer.

C-25 Remove brass servo valve plunger seat (No. 41425) from motor housing assembly, record dimension of valve seat to casting surface for reassembly. It can now be visually inspected closely. This part has been locited in place as part of Assembly No. 41423.

C-26 If necessary Servo valve plunger with both seal rings removed and Servo valve plunger seat can be lapped together to obtain a good seating air seal using the valve cap sub-assembly as a guide (Key No. 30).

C-27 Be careful not to get lapping compound in any other parts of the machine. After lapping, clean out lapping compound and re-examine seat. Re-lap only when necessary.

C-28 To reassemble, replace Servo valve plunger seat (No. 41425) in motor housing assembly, to dimension recorded in Step C-25.

C-29 Place valve cap assembly back on motor housing assembly. Do not forget that motor housing gasket should be in place.

C-30 Insert 4 long hexagon cap screws with their lock washers and draw up on them alternately and evenly. Check that reversing valve lever moves freely as screws are tightened.

C-31 Put Servo Valve spring into Steel Insert of valve cap assembly.

C-32 Replace seal rings on Servo valve plunger if necessary and after liberally oiling assembled Servo valve plunger with light machine oil, assemble it in place in valve cap assembly. (Parker Super - 'O' Lube may be used.)

C-33 Replace Servo valve seat and screw it down tight.

C-34 Connect assembled tool, with bleeder valve cap still off, to an air supply and test by squeezing trigger firmly to deliver full air to machine and manually tripping Servo valve by depressing bleeder valve plunger (Key No. 23) all the way down. Machine should now function correctly.

C-35 Screw bleeder valve cap back into valve cap assembly and tighten it up.

C-36 Retest machine under load.

procedure D

Reference: Page No. 14

D-1 Loosen 4 long hexagon head cap screws about two turns.

D-2 Realign transfer plate assembly (Key No. 41) and motor housing assembly (Key No. 34) so that reversing valve moves freely back and forth. Note that reversing valve must be moved forward so that its lever can pass lock pin (Key No. 57).

D-3 After moving reversing valve back and forth a few times to insure its free movement, pull up on the 4 long cap screws evenly and alternately. Move reversing valve through its cycle intermittently while tightening cap screws to insure that correct casting alignment is maintained.

D-4 If after tightening castings in correct alignment, reversing valve still fails to reverse, check height of lock pin in motor housing for interference and emery the top

WILSON MODEL 'B' TORQ-AIR-MATIC EXPANDER CONTROL

down a bit where necessary so that valve lever can pass easily.

procedure E

Reference: Page No. 14

E-1 Check stop pin (Key No. 60). If stop pin is broken, reversing valve will move forward and into reverse position upon starting of tool.

E-2 Replace and relock stop pin in position with roll pin (Key No. 59) and tool should function satisfactorily.

NOTE:

If air handle trigger is relaxed during operation of tool, so that air through reversing valve is temporarily shut off or air pressure within is considerably reduced, reversing valve will move backwards and into reverse position. This is normal. In use, machine should be turned on full (with air trigger fully depressed) and kept running with full air delivery during its entire cycle, until servo valve has shut off the air through reversing valve to machine.

procedure F

Reference: Page No. 14,; Page No. 3, Para. No. 5

Part 1

F-1 Check air pressure at tool. For maximum power output air pressure at tool should be at least 90 pounds per square inch.

F-2 Check air compressor capacity. Tool must receive approximately 60 cubic feet of air per minute to produce maximum torque.

F-3 Check size of air hose for conformity to manufacturer's recommendations. Hose should have a 3/4" minimum inside diameter and be no more than 25 feet in overall length. However, a 1/2" inside diameter whip 8 feet long can be used as part of the 25 foot long hose. This is the hose presently supplied under our Part No. 21190.

F-4 Check that hose connection does not act as a choke and lower either air pressure or amount of air entering machine. This would be the case if small nipples or reducing fittings were used in place of a direct hose connection.

Part 2

If the above has been checked and found satisfactory but lack of power still persists with machine operating forward and reverse, proceed as follows:

F-5 Disassemble air motor (See procedure and illustration under disassembly procedure Page 5 and check all 6 rotor blades (Part No. 21468) for lateral grooves, nicks, scratches, burrs and excessive wear on edge or either side. Replace if necessary in sets of 6 only.

F-6 Also check both motor ball bearings (Part No. 21469) for wear, dirt, excessive play or insufficient lubrication. Replace both bearings if any of the preceding are present in either one. If excessive wear occurs in ball bearings, rotor drum will drag on and score cylinder liner internal surface and end plate wear surfaces.

F-7 Check each bronze motor end plate (Part No. 21465) for rubbing or scoring on wear surface and replace it when necessary.

F-8 Examine cylinder liner (Part No. 21464) for excessive blade scoring and replace if internal surface is no longer fairly true or is heavily scored.

F-9 Check that rear shaft of rotor (Part No. 21463) slips into ball bearing easily but snugly. There should be no play or looseness here.

F-10 Examine rotor drum surface for scoring, burning or other signs of wear.

F-11 Check fit of rotor blades in rotor slots. They should fit freely with minimum side play and should fall easily and evenly out of their slots. Stone blade slot edges where necessary to insure free fit and movement of rotor blades.

F-12 Check press fit of rotor pinion shaft in ball bearing. It should hold rotor in position securely without making inner bearing race tight on bearing balls, tightness in this respect will slow down rotation of pinion shaft in ball bearing. Emery pinion shaft slightly where necessary to loosen press fit.

F-13 Replace rotor if rear shaft slip fit is

sloppy, pinion shaft press fit is too loose, or excessive wear or damage shows on rotor drum surface.

F-14 Check all three key dowels (Part No. 41467) in cylinder liner and both end plates for damage or loose fit and replace where necessary.

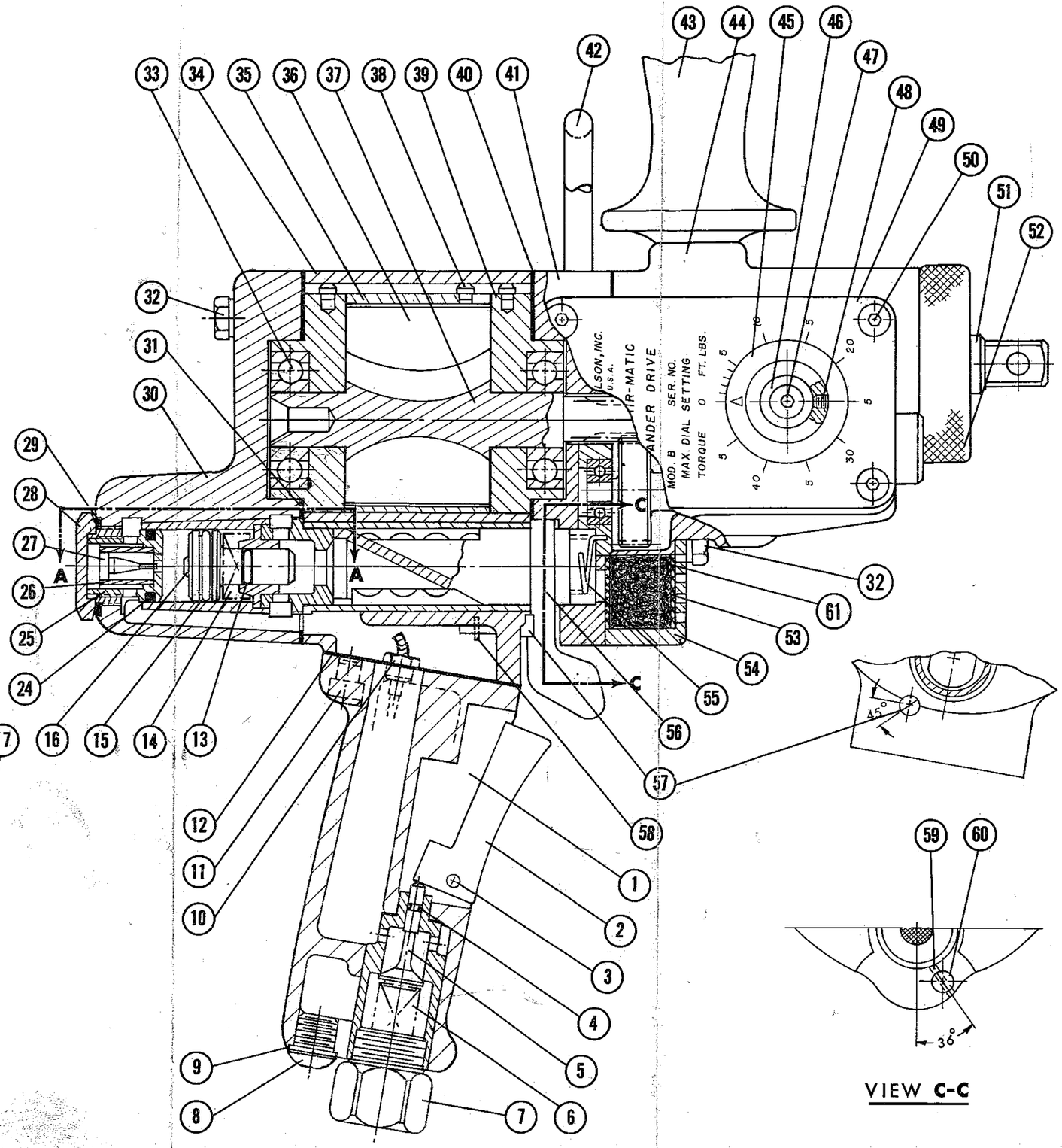
F-15 Reassemble air motor as shown on Page No. 6. Be sure clearance specified between wear surfaces of rotor drum and end plate assembly on rotor pinion shaft is maintained. Check this with a feeler gage.

F-16 Reassemble air motor in motor housing assembly. See reassembly procedure on Page No. 6. Test assembly by turning rotor pinion by hand and it should turn freely. Also it should be possible to turn the 1/2" square spindle nose easily by hand after complete reassembly of tool.

PARTS LIST

KEY NO.	DESCRIPTION	PART NO.
	AIR HANDLE ASS'Y.	21712
1	AIR HANDLE SUB ASS'Y.	21664
2	TRIGGER	41199
3	SPRING PIN	41448
4	SEAL RING	21675
5	THROTTLE VALVE PLUG	21481
6	" " SPRING	21480
7	" CAP ASS'Y.	21678
8	OIL FILLER SCREW	24319
9	COPPER GASKET	50979
10	OIL WICK ASS'Y.	21947
11	SOC. HD. CAP SCREW (4)	31965
12	GASKET, HANDLE	21471
	VALVE CAP ASS'Y.	21930
13	SEAL RING	41350
14	SERVO VALVE SPRING	21644
15	SEAL RING	41583
16	SERVO VALVE PLUNGER	21643
17	SET SCREW	21938
18	BLEEDER VALVE LEVER SHAFT	21687
19	CONTROL ROD	21682
20	BLEEDER VALVE LEVER ASS'Y.	21672
21	" " SPRING	21111
22	" " PLUNGER	40026
23	" " CAP	21928
	SERVO VALVE SEAT ASS'Y. F-94	21647
24	SEAL RING	41583
25	SERVO VALVE SEAT	21648
26	FILTER BEARING	21650
27	CHOKE PIN	21651
28	SERVO VALVE PLUG	21649
29	WASHER	21685
30	VALVE CAP SUB-ASS'Y.	41423

KEY NO.	DESCRIPTION	PART NO.
31	GASKET	21459
32	HEX. CAP SCREW (4)	21690
	LOCK WASHER (4)	21946
33	BALL BEARING (2)	21469
34	MOTOR HS'G SUB-ASS'Y.	21665
35	CYLINDER LINER	21464
36	ROTOR BLADE SET OF (6)	21468
37	ROTOR	21463
38	KEY DOWEL (3)	21467
39	END PLATE (2)	21465
40	TRANSFER PLATE GASKET	21461
41	TRANSFER PLATE ASS'Y.	21455
42	SUSPENSION HANGER	21932
	CAP SCREW	21950
43	DEAD HANDLE	21456
44	GEAR HS'G ASS'Y.	21451
45	CONTROL KNOB	21654
46	" CAM	21655
47	CAM LOCK SCREW	21923
48	SET SCREW (2)	21938
49	COVER PLATE	21652
50	BUTTON HEAD SCREW (5)	21092
51	TORQUE DRIVE SHAFT ASS'Y.	21434
52	BEARING RETAINING CAP	21444
53	AIR MUFFLER SCREEN (2)	40565
54	MUFFLER BODY	40564
	HEX. SOC. CAP SCREW (2)	53272
55	REVERSING VALVE TORQ. SPRING	21929
56	REVERSING VALVE	21945
57	LOCK PIN	21948
58	SPRING PIN	24298
59	ROLL PIN	28210
60	LATCH PIN	53230
61	STEEL WOOL, ONE OUNCE	53232



WILSON

TORQ-AIR-MATIC

MODELS	
	B-450 (450 R.P.M.) CAT. NO. 21400-450
	B-600 (600 R.P.M.) CAT. NO. 21400-600
	B-750 (750 R.P.M.) CAT. NO. 21400-750

SECTION **A-A**

VIEW **B-B**

VIEW **C-C**

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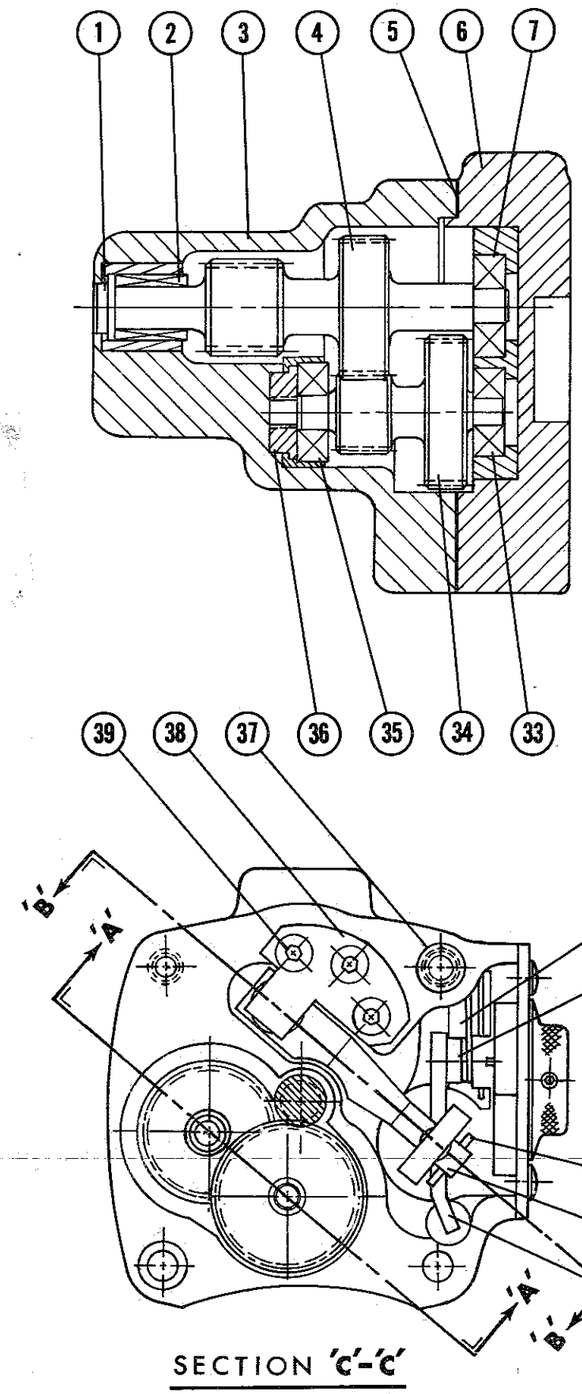
KEY NO.	DESCRIPTION	PART NO.
1	BR'G. KNOCKOUT PLUG	21453
2	NEEDLE BR'G.	21405
3	GEAR HS'G.	21410
4	SECOND INTER. GEAR	SEE TABLE
5	GEAR HS'G. GASKET	21460
6	TRASFER PLATE	21411
7	BALL BR'G.	21402
8	THRUST PIVOT	21446
9	" " SPRING	21676
10	" " PLUNGER	21447
11	TORQUE THRUST PAD	21439
12	" " BR'G.	21404
13	" " COLLAR	*
14	SPINDLE GEAR	*
15	TORQUE DRIVE PIN (8)	*
16	PIN STOP COLLAR	21440
17	BR'G. SAFETY SPACER	21442
19	BALL BR'G. CASE	21443
20	TORQUE DRIVE BR'G. (2)	21403
21	" " SHAFT	*
22	SPIROLOX RING	21406
23	BR'G. SHIM WASHER	21436
24	BR'G. RETAINER CAP	21444
25	CALIBRATOR SEAL	21713
26	SPIROLOX RING	20712
27	CALIBRATOR BUSH. GASKET	39799
28	CALIBRATOR BUSH.	21450
29	CALIBRATOR	21449
30	CONTROL SPRING	21075
31	CAP SCREW (2)	31803
32	TORQUE SPRING	21686
33	BALL BR'G.	21401
34	FIRST INTER. GEAR	SEE TABLE
35	BALL BR'G.	21944
36	BR'G. KNOCKOUT PLATE	21452
37	LOCATING SLEEVE (2)	41349
38	FIXED PIVOT	21657
39	SOC. HD. CAP SCREW (3)	22993
40	GUIDE PLATE	21656
41	CAM CONTROL ARM	21660
42	SPRING RET. SCREW	21077
43	CONTROL SPRING LINK	21659
44	" ROD	21682
45	ROLL PIN	28139
46	MAIN LEVER	21457
47	CONTROL LEVER	21658
48	SOC. SET SCREW	40015

* ORDER # 41112 DRIVE SPINDLE ASS'Y.

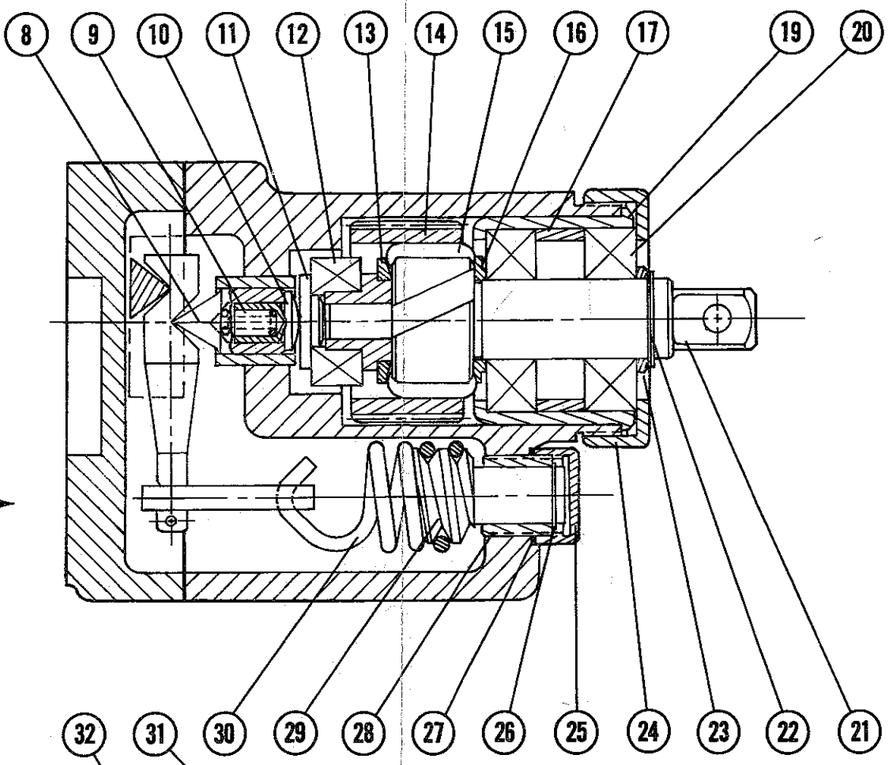
KEY NO.	PART NO.	MOD. NO.
4	21432	B-450
	21715	B-600
	21717	B-750
34	21431	B-450
	21714	B-600
	21716	B-750

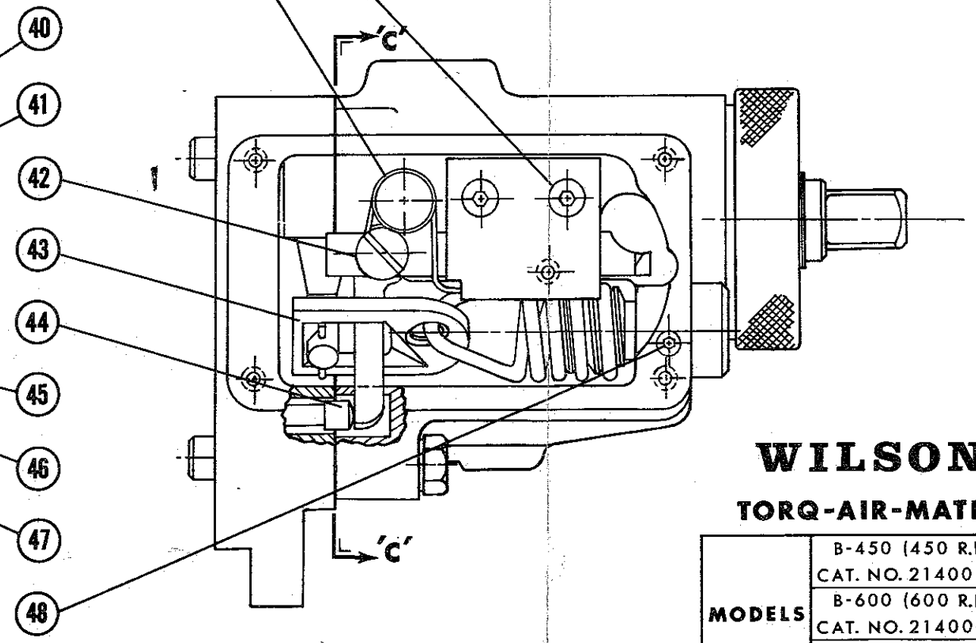


SECTION 'C'-'C'

SECTION 'A'-'A'

SECTION 'B'-'B'





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