ATS BIGMOUTH CHUCK

Models BP and BT Installation, Operation and Maintenance Manual

Complete Your Investment

- **Self-contained Pneumatic Power Chucks**
- **Big Through-hole**
- **Easy-mount Design**

WARNING

Do not attempt to install, operate or perform maintenance on this product until you have read and completely understood the contents of this manual.

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SUMMARY OF SAFETY INSTRUCTIONS – BP & BT

1. Always follow all safety and maintenance instructions in this manual and all other standard safe shop practices.

2. Ensure the yellow ATS Systems Operation, Lubrication and Maintenance decal is attached to the front of the lathe and all personnel have been trained on each point.

3. All operating and maintenance personnel must be properly trained and qualified before operating, servicing or repairing the power chucking equipment.

4. Compared to other types of power chucks, self contained pneumatic chucks require extensive preventive maintenance, care and precautions. The advantage is the large through hole and other unique benefits of the design. By carefully following the rules and maintenance schedule, safe reliable operation will result.

5. Chuck and workpiece must be protected by an adequate guard at all times when it is rotating.

6. Do not exceed the rated RPM of the chuck, or the safe speed for the top jaw configuration or for the application whichever is less. The rated speed is only valid for air pressure of 90 PSI or higher using standard GSB roughing jaws gripping a diameter equal to or smaller than the through hole of the chuck. For all other conditions speed must be reduced. Maximum rated speeds are:

Chuck – RPM		Chuck – RPM		Chuck – RPM		Chuck - RPM	
200	- 3800	480	- 1500	800	- 750	10.8 ES	- 1100
250	- 3500	500	- 1300	4.1 ES	- 2000	12.8 ES	- 900
315	- 2500	640	- 1000	7.3 ES	- 1300	14.8 ES	- 750

7. Do not use top jaws of excessive weight, height, or extended beyond the outside diameter of the chuck.

8. For BP standard model chucks, position top jaws to grip the part in the first half of the jaw stroke, especially when chucking irregular castings, forgings, etc. **For BT_ ES (Extended Stroke) models, grip in the last .20" of total jaw stroke only!** For BT_ ES models, the first 75% of the jaw closing stroke is rapid advance and must never be used for clamping. Only the final 25% of jaw stroke is the clamping stroke and you want to grip in the middle of this final 25%.

   As you chuck each part, observe that adequate jaw stroke remains to grip the part.

9. Ensure top jaw mounting bolts are grade 12.9, in new condition and the proper length for a minimum thread engagement of 1 ½ times the thread diameter, and do not extend past the bottom of the tee-nut.

10. Self contained chucks rely on pressure retention. For safe operation it is essential to pressure test every 160 hours using the special SMW pressure sensor device following the instructions in this manual and observing the gauge in the pressurized chuck for 20 minutes.

11. Set actuation air control timers to 2 -3 seconds longer than the time required to fill the chuck. To do this, set air pressure to a low setting of about 50 PSI. Actuate chuck and watch gauge on filter-regulator assembly - pressure drops, back to line pressure plus 2-3 seconds. Check at least three actuations.

12. Do not use chuck to grip fixtures or for other applications that don't actuate the chuck at least once per hour. If a workpiece is gripped for more than one hour the chuck should be actuated to recharge the air cylinder. Either open and close the chuck or manually activate the air valve. (Bolt fixtures to chuck using T-nuts in master jaws or drill and tap chuck face.)

13. Self contained chucks have no stroke monitoring system and are not recommended for use in fully automatic systems such as with barfeeds or robotic loaders.

14. Use only ATS Systems' KO5 grease (PN 11139101). Grease chuck every 8 hours of operation, two shots of KO5 per grease fitting.

15. At the start of each shift and after every 50 clamping cycles, actuate the chuck full stroke 5 times without gripping a workpiece to internally redistribute grease throughout the chuck.

17. Test and record grip force at least once per month. If baseline grip force decreases more than 15%, the chuck should be disassembled, cleaned and lubricated.

18. Before disassembling chuck, remove the two .6" dia. plugs (5 mm wrench) in the face of the chuck (or the non-return valve on older models) to relieve internal pressure. (One plug for OD grip pressure and one for ID grip pressure.) Failure to relieve the trapped air before beginning disassembly could allow the trapped air to "explode" as the chuck backplate is removed and could result in serious injury.

19. All chuck models BT__ES are intended for use only in tandem installations with both chucks gripping tubular workpieces extending through both chuck bores.

20. Take careful note of the sections of this manual marked with the following symbols:

WARNING

Danger of injury to personnel if instructions are not followed.

ATTENTION

Danger of damage to the machine or the power chuck if instructions are not followed.

The following maintenance and safety warning label must be attached and prominently displayed on the lathe to which the BigMouth chuck is installed.

Big-Mouth ™ Pneumatic Chuck

By ATS Systems, Inc. (800) 321-1833

Recommended Operation, Lubrication & Maintenance

1. **Read the Installation, Operation and Maintenance Manual.**
2. **Do not exceed the rated RPM of the chuck, or the safe speed for the top jaw configuration or for the application whichever is less. The rated speed is only valid for air pressure of 85 PSI or higher using standard GSB roughing jaws gripping a diameter equal to or smaller than the through hole of the chuck. For all other conditions speed must be reduced. Maximum rated speeds are:**

Chuck – RPM	Chuck – RPM	Chuck – RPM	Chuck - RPM
200 - 3800	480 - 1500	800 - 750	10.8ES - 1100
265 - 3500	500 - 1300	4.1ES - 2000	12.8ES - 900
315 - 2500	640 - 1000	7.3ES - 1300	14.8ES - 750

3. **Do not use top jaws of excessive weight, height; or extended beyond the diameter of the master jaws. For standard model chucks, position top jaws to grip the part in the first half of the jaw stroke, especially when chucking irregular castings, forgings, etc. For ES (Extended Stroke) models, grip in the last 0.20" of total jaw stroke only! For ES models the first 75% of the jaw closing stroke is rapid advance and must never be used for clamping. Only the final 25% of jaw stroke is the clamping stroke and you want to grip in the middle of this final 25%. As you chuck each part, observe that adequate jaw stroke remains to grip the part.**
4. **Ensure top jaw mounting bolts are grade 12.9, in new condition and the proper length for a minimum thread engagement of 1-1/2 times the thread diameter, and do not extend past the bottom of the tee-nut.**
5. **Self-contained chucks rely on pressure retention for safe operation. It is essential to pressure test every 160 hours using the special SMW pressure sensor device.**
6. **Do not use chuck to grip fixtures or for other applications that don't actuate the chuck at least once per hour. If a workpiece is gripped for more than one hour the chuck should be actuated to recharge the air cylinder. Either open and close the chuck or manually activate the air valve.**
7. **Self contained chucks have no stroke monitoring system and are not recommended for use in fully automatic systems such as with barfeeds.**
8. **Use only ATS Systems' KO5 grease. Grease chuck every 24 hours of operation, one shot per grease fitting. Set air lubricator for 3-4 drops per actuation. Fill the reservoir only with Mobil DTE Light. Other oils can damage seals.**
9. **At the start of each shift and after every 50 clamping cycles, actuate the chuck full stroke 4-5 times without gripping a workpiece to internally redistribute grease throughout the chuck.**
10. **Before disassembling chuck, remove the two .6" dia. plugs (5 mm wrench) in the face of the chuck (or the non-return valve on older models) to relieve internal pressure.**
11. **Test and record grip force at least once per month. If baseline grip force decreases more than 15%, the chuck should be disassembled, cleaned and lubricated.**
12. **ES chuck models are for use only in tandem installations with both chucks gripping the O.D. of tubular workpieces extending through both chuck bores.**

PRECAUTIONS:

SAFETY

Many sections in this manual deal with the issue of safety. Safe operation of CNC lathes and workholding is the responsibility of the user. The manufacturer of the BigMouth chuck has used the latest technology in the design and manufacturing of this product. Careful consideration has been given to safety, and the authors of this manual make many recommendations regarding safe operation and safe chucking practices. The user of the lathe and chuck are responsible to understand these safe practices and precautions and to implement them into the operation and maintenance of the equipment.

All who use or maintain this equipment must have read, understand, and follow all instructions in this manual and other normal safe shop practices.

Maintenance and repair work must be done only by personnel who have been properly trained. It is the responsibility of the buyer/user of this equipment to ensure all appropriate training is received.

1.1 Safety Precautions

This power operated chuck complies with all specific and general safety regulations valid at the time of delivery. Safe operation requires it be used only in proper applications with all necessary user precautions including but not limited to those specified below.

WARNING

1.1.1 Unique safety points relative to self-contained pneumatic chucks

Self-contained pneumatic chucks like the BigMouth have unique characteristics and benefits and also have some unique maintenance requirements and safety precautions that must be understood by the user. The principles of operation of self-contained chucks are described later in this manual section 4.1. Understanding how the chuck operates will help you understand the special requirements and precautions. The unique maintenance and safety points are also described later in this manual but are previewed here because they are quite different from most power chucks.

- Self contained chucks rely on pressure retention Pressure test the chuck every 160 hours of operation.
- Set air control timers 2-3 seconds longer than the time required to fill the chuck to ensure a full charge of pressure.
- Do not use the chuck to grip fixtures or for other applications that don't actuate the chuck at least once per hour.
- Self-contained chucks have no stroke monitoring system and are not recommended for use in fully automatic systems such as with barfeeds or robot loaders.
- Before disassembling the chuck, remove the two small plugs (.60" diameter, 5 mm allen wrench) in the chuck face to bleed off all air pressure. Failure to do this would allow the trapped air to "explode" as the chuck backplate is removed and could result in serious injury.
- All BT__ES chucks are intended for use only in tandem installations with both chucks gripping tubular workpieces extending through both chuck bores.
- All BT__ES models - the first 75% of the jaw closing stroke is rapid advance and must never be used for clamping. Only the final 25% of jaw stroke is the clamping stroke and you want to grip in the middle of this final 25%.

1.1.2 Use for Intended Purpose

The safe function of the power chuck is, as far as can be foreseen, guaranteed when being used for its intended purpose in accordance with appropriate safety regulations.

Improper use of the power chuck can result in

- Danger to life and limb of the operator
- Danger to the power chuck and to the machine tool

Unintended and improper use of the power chuck includes, for example:

- Workpieces that are not clamped properly
- Safety regulations that are disregarded

- A chuck being used for machines or applications for which it is not intended
- Too large of a jaw being used especially if the speed is excessive for the size of the jaw.
- Any use of a chuck that has not been properly installed, maintained, and lubricated.

WARNING

Improper or unintended use of the power chuck, and disregard of safety standards and safety regulations

can threaten life and limb of the operator!

1.1.3 Technical Conditions

The power chuck should only be used if it is in perfect condition, for its intended purpose, with total awareness of safety and hazards, and in accordance with all appropriate regulations.

In the event any faults are recognized, they must be eliminated immediately !

1.1.4 Use

The power chuck is intended solely for the use as agreed in the contract between the manufacturer/supplier and the user. Any other or further use is regarded as unintended. The manufacturer/supplier is not liable for any damage resulting from mis-application and unintended use. All risk is borne entirely by the user.

Intended use includes due regard of the appropriate operating and maintenance instructions and compliance with the inspection and maintenance requirements.

1.2 Users Organizational Requirements

1.2.1 Compliance with Regulations

The user must ensure that suitable actions in organization and instruction are taken to ensure that all appropriate safety rules and regulations are complied with by the persons entrusted with operation, maintenance and repair of the power chuck.

1.2.2 Supervision of Chuck Operators

The user is required to routinely check their personnel's conduct regarding awareness of safety and hazards, and the safe and proper use of the chuck.

1.2.3 Hazard Notices

The user must ensure that the warning labels regarding safety and hazards for the machine to which the power chuck is mounted are observed and that the warning labels are clearly legible.

1.2.4 Defects, faults, hazardous conditions

If faults occur at the chuck which affect safety, or production indicates that faults are in existence, then the machine to which the power chuck is mounted must be brought to a complete and immediate stop for as long as is required to locate and eliminate the fault.

Faults may only be eliminated by trained and authorized personnel.

1.2.5 Modifications

Do not make any alterations, add any fixtures or carry out any modifications to the power chuck which could affect safety without the prior agreement of the supplier.

1.2.6 Spare Parts

Only use spare parts which meet the requirements of the manufacturer. This is guaranteed only if original spare parts are used.

Improper repair or use of incorrect spare parts will result in the manufacturers and suppliers exclusion from product liability.

1.2.7 Periodic Inspection

Follow the instructions in this manual and carry out the required routine inspections and service at the time intervals specified.

1.2.8 Choice of Personnel, Personnel qualifications

- Work on/with the power chuck may only be done by qualified personnel.
- Allow only personnel that have been properly trained to operate the power chuck. ATS offers training programs.
- Clearly define the areas of responsibility for all personnel for operation, maintenance and repair.
- Allow only personnel that are well informed of the safety requirements to carry out maintenance and repair work on the power chuck.
- Make it clear to the operator his responsibility for safety conscious conduct. Enable him to refuse instructions by third parties which are irresponsible with regard to safety.

1.3 Product Safety Notes

1.3.1 Important !

These operating instructions are only valid for the model BP and BT power chucks.

The recommended maximum speed given is only valid at 90 PSI or higher, using the standard hard jaws model GSB designed for the chuck, gripping a diameter no larger than the through hole of the chuck, and only for a chuck that has been properly maintained and lubricated.

WARNING

During machining, testing, set up or whenever the chuck is rotating, the chuck and the clamped workpiece must be protected by an adequate guard at all times

Excessive top jaw weight must be avoided! Pay careful attention when designing or using soft jaws or special jaws. Jaw weight, their distance from centerline and the RPM of the lathe dramatically effect remaining chuck grip force during chuck rotation. In extreme cases of unsafe use it may even be possible for the top jaws themselves to fly off the chuck. See this manual section 1.3.6 for more information.

WARNING

Avoid standing directly in line with a rotating chuck! It is good safety practice to assume the lathe's guard may not prevent a thrown workpiece or broken top jaw fragment from penetrating the guard.

1.3.2 Safety when installing the Chuck

When installing a chuck to a lathe, the following technical safety requirements must be observed:

- The lathe should be equipped with safety systems so that unclamping is only possible when the machine spindle has come to a complete stop.
- The lathe should be equipped with safety systems so that in the case of a power failure and re-supply, the lathe will not restart without new commands from the lathe operator.

1.3.3 Inspecting chuck function and performance

After installing the power chuck, its function and performance should be checked.

- **Clamping Force!** The clamping force of the chuck should be checked with a grip force gauge. If it does not match the chuck specification within 10%, do not use the system until the cause is determined and corrected.
  Important: When using other then standard factory hard jaws, the grip force should be checked with a dynamic grip force gauge at the planned operating speed (RPM) to insure there

is adequate grip force remaining to hold the workpiece. Start the inspection at a low speed and build up to the operating speed while observing the gauge. (Note:

Jaws should never be positioned to extend beyond the outside diameter of the chuck.

1.3.4 Chuck Rotational Speed (RPM)

WARNING

If the maximum speed of the lathe is greater than the maximum recommended speed of the chuck the machine must be equipped with a speed limiting device.

The centrifugal force acting on the clamping jaws must be considered when determining the required clamping force to machine a workpiece. See section 1.3.3 and 1.3.6.

1.3.5 Maintenance Instructions

The reliability of the chuck can only be guaranteed if the maintenance requirements in these operating instructions are followed exactly. In particular, attention must be paid to:

- Lubrication: Only ATS K05 grease should be used. (Unsuitable lubricants can reduce the clamping force by more than 50%). The chuck should be greased each eight hours of operation under normal conditions. (See 5.2)
- All surfaces that require lubrication must be reached. (The close fits of mating parts require a high injecting pressure. For this reason a high pressure grease gun should be used).
- To ensure good grease distribution, inject one shot of grease into each of the grease fittings, actuate the chuck full stroke several times, and then inject a second shot of grease into each of the fittings. Check the clamping force with a grip force gauge.
- After each **50** clamping strokes it is advisable to actuate the chuck several times without gripping a workpiece so that the chuck is stroked to its extreme limits. When this is done, lubricant that has been displaced is returned to the pressure surfaces and the clamping force is retained for a longer period of time without re-lubrication.
- Depending on the application and the workpiece materials being machined, the chuck will periodically need to be disassembled and cleaned. After cleaning, all internal parts must be coated with a film of KO5 grease.
- It is recommended that the clamping force be checked using a grip force gauge before beginning a new production batch and between maintenance checks. Only regular checks can guarantee safety.

1.3.6 Use of Special Design jaws

When using special design jaws the following rules must be observed:

- The jaws should be designed to be as light and as low as possible. The clamping point should be located as close to the chuck face as possible. (Clamping points with greater distances cause increased surface pressure in the jaw guides and can reduce clamping force substantially).
- If the design of the special jaws requires them to be wider and/or higher than the standard factory hard jaws designated for the chuck, then it is important to consider the higher centrifugal forces involved when calculating the resulting clamping force and maximum speed allowed with these jaws.
  Caution: Jaws should never be positioned to extend beyond the outside diameter of the chuck.
  Caution: Jaws should never extend from the face of the chuck a distance more then 30% of the diameter measurement of the chuck up to 16" chucks, or 20% for larger chucks.

Excessively tall jaws that are operated with either high grip force or high speed or a combination of speed and grip force can over stress the bolts that hold the top jaw to the master jaw.

- Do not use welded jaws.
- The mounting bolts must be arranged in such a way as to ensure that greatest possible strength is achieved.
- The maximum recommended speed may only be used in conjunction with 90 PSI or higher, only with chucks that are in perfect working order, and only with standard hard jaws positioned to grip a diameter equal to or smaller than the through hole of the chuck.
- After a crash, the chuck and especially the master jaws must be examined for cracks and other damage, and grip performance inspected before being put back into operation. Damaged parts must be replaced with original ATS spare parts.
- Top jaw mounting bolts must be replaced if they show signs of wear or damage. Only use grade 12.9 metric or grade 8 UN bolts of sufficient length to engage at least a thread length equal to at least 1 ½ times the screw diameter. Bolt should not extend past the bottom of the tee-nut.

1.3.7 Safety during Maintenance

Follow all normal safety precautions when performing maintenance on the chuck or any portion of the machine tool, such as turning off the electrical power and locking out electrical service, wearing safety equipment, etc.

Only operate power chucks when all safety guards have been installed and are in full working order.

Check the power chuck at least once per shift for externally visible damage and faults.

Report any changes including changes in operational behavior to the responsible persons immediately. If necessary bring the spindle to an immediate stop and lock out the electrical supply.

Only restart the machine to which the power chuck is installed when the cause of the problem has been eliminated.

1.3.8 Notes on Instruction of Operating Personnel

We recommend that the user of our power chucks make the operating instructions, in particular the “Precautions” section, available to all persons who will be operating, maintaining or repairing the chuck or the machine tool to which it is installed. We further recommend that the owner issue “operating instructions” which consider the qualifications of the operating personnel known to him.

Participation in training programs and courses etc. with the aim of gaining knowledge in operation, maintenance and repair of the power chuck should be confirmed in writing for the business operator. For this purpose we recommend duplicating and using the following form.

Declaration of knowledge by Personnel (Operator)

It is confirmed herewith that the person of

_____

Mr./Mrs./Miss

being charged by the business operator with responsibility to operate chucking equipment has read and understands the operating instructions, in particular the section on “Precautions”, for the ATS power chuck.

_____

Operator Date

_____

Business Operator/ Authorized person Date

SPECIFICATIONS:

2.1 Specifications and dimension

Standard Models for General Chucking Applications

Chuck Model		BP 200-52	BP 265-80	BP 315-105	BP 480-185	BP 500-230	BP 640-275	BP 800-375
Nominal Size		8"	10"	13"	19"	22"	25"	31"
Through Hole		2.05	3.15	4.13	7.28	9.06	10.83	14.76
Face Diameter		8.1	11.0	13.2	18.9	22.4	25.2	31.5
Rear Diameter		11.8	14.6	14.6	20.9	22.4	27.0	33.5
Length		5.3	5.8	6.2	8.8	8.8	10.3	12.0
Jaw Stroke/Jaw	In.	.165	.197	.197	.315	.315	.394	.472
Jaw Serration		1/16 x 90°	1/16 x 90°	1/16 x 90°	3/32 x 90°	3/32 x 90°	3/32 x 90°	3/32 x 90°
Maximum Speed	RPM	3800	3500	2500	1500	1300	1000	750
Max. Operating Pressure	PSI	120	120	120	120	120	120	120
Grip Force @ 90 PSI	Lbs. Total	12000	18000	17000	33000	34000	51000	85000
Grip Force @ 50 PSI	Lbs. Total	5600	8400	7900	15400	15800	23800	39700
Weight	Lbs.	75	120	170	395	440	960	1545

BT Series – Extended Jaw Stroke Models for Tubular Product Applications

Chuck Model		BT 4.1 ES	BT 7.3 ES	BT 10.8 ES	BT 12.8 ES	BT 14.8 ES	BT 22 ES
Through Hole	In.	4.13	7.28	10.82	12.80	14.76	22.04
Chuck Length	In.	7.9	11.1	11.1	12.1	12.1	13.3
Jaw Stroke/Jaw	In.	0.6	1.0	1.0	1.0	1.0	1.0
Jaw Serration		1/16 x 90°	3/32 x 90°	3/32 x 90°	3/32 x 90°	3/32 x 90°	3/32 x 90°
Swing Clearance	In.	14.9	21.7	26.7	29.4	31.4	39.4
Maximum Speed	RPM	2000	1300	1100	900	750	450
Grip Force @ 90 PSI	Lbs. Total	16000	31000	36000	42000	47000	38000
Grip Force @ 50 PSI	Lbs. Total	7400	14400	16800	19600	21900	17700
Weight	Lbs.	220	500	700	1200	1300	2100

Specifications subject to change without notice.

INSTALLATION:

3.1 Installing the chuck to the machine.
First, read section 4.1- Principles of operation.

3.1.1 Distributor Ring mounting options.

The most common and preferred installation requires the Distributor Ring to be rigidly mounted to the lathe headstock by means of a custom rigid mounting bracket. With this type of mounting there is absolutely no contact between the non-rotating Distributor Ring and the rotating chuck body. This installation is preferred for all CNC lathes and other production lathes running at higher spindle speeds. The custom rigid mounting bracket can either be the full 360° type, or two or three separate stand-off brackets. The full 360° type is much preferred and the most commonly used.

As an alternate, for chucks on rotary tables and other low speed applications, a PVC centering ring bearing that rides on the OD of the rotating chuck precludes the need for the custom mounting bracket. Chuck RPM will be limited.

3.1.1 Checking the chuck and machine spindle

- Check the machine's spindle nose and flange. Maximum allowable runouts are 0.0002" TIR.
- Remove the chuck, adapter plate and other hardware from the package, check for damage and that it is complete.
- All mating surfaces must be clean and free of nicks, dents, chips, dirt, etc.

3.1.2 Check the design and fit of the Distributor Ring mounting bracket (DRMB).

- Separate DRMB and fit one half around lathe bearing cap to confirm correct diameter.

3.1.3 Install chuck adapter plate onto lathe spindle.

- Check mating surfaces again and stone as required to remove blemishes.
- Check drive button hole in back of adapter plate and confirm it is bored deeper than the drive button on the lathe spindle. Check if the chuck pilot register diameter on the adapter plate has been pre-turned to fit the register in the chuck backplate or if finish turning of the adapter after it is mounted to the lathe spindle will be required.
- Put adapter plate in position. Check that mounting bolts are long enough to provide 1 ½ x thread diameter engagement. Use only grade 12.9 metric or grade 8 UN bolts. *Note: Some spindle flanges have thru tapped holes and bolts too long could damage seals and bearings in the lathe headstock.* Coat bolt threads with Never-Seize or grease to retard corrosion.

  Tighten the adapter plate mounting bolts in a crosswise pattern. Torque bolts to specification.

M12	85 ft-lb	1/2-13	90 ft-lb
M16	190 ft-lb	5/8-11	190 ft-lb
M20	365 ft-lb	3/4-10	365 ft-lb
M22	520 ft-lb	7/8-9	560 ft-lb
M24	660 ft-lb	1"-8	800 ft-lb

- Inspect adapter plate face and pilot register runout. Chuck sizes 315 and smaller should runout less than .0007" TIR. For larger chucks .0015" TIR is acceptable for typical applications.

3.1.4 Install chuck to adapter plate and DRMB.

- Bolt the chuck, with the distributor ring (but not with the DRMB) in place on the chuck, to adapter plate. Use only grade 12.9 or grade 8 UN bolts. Tighten chuck mounting bolts in a crosswise pattern. Torque bolts to specification above. (Turn chuck pilot diameter on adapter plate if required before mounting chuck!)
- Check that the DRMB has a coolant drain hole or notch at the bottom and if the lathe bearing cap has a drain hole that the DRMB doesn't block the drain.

- Bolt both halves of the DRMB to the distributor ring. It is preferable to have the splits at 9:00 and 3:00, and make sure the drain hole is at 6:00.

- Snug the clamping bolts on the DRMB and adjust the DRMB to provide a .060" - .065" gap between the distributor ring front and the chuck back. Check the gap 360° with a .060" - .065" shim. To be sure the distributor ring is aligned radially, mount a magnetic base indicator on the O.D. of the chuck and indicate the O.D. of the distributor ring. Align within .010" TIR and .060" -.065" gap. Tighten DRMB clamping bolts and recheck alignment.

ATTENTION

3.1.5 Install solenoid valve operated air control system.

Since self-contained pneumatic chucks require external air pressure supply only during actuation (opening or closing), a four-way three position, spring centered valve that vents to atmosphere in the center position is required. **Under no circumstances should you attempt to use a valve or control interface that would allow pressurized air to flow to the distributor ring while the spindle is rotating, or a valve that doesn't vent the air lines to the distributor ring when the chuck is not being actuated.**

- Install control system and interface to lathe according to diagram 6.1 in the OTHER INFO section of this manual.

- It is very important that the open-close pushbuttons or foot pedal are inhibited while the spindle is turning. Attempting to actuate the chuck while the spindle is turning will collapse the non-rotating air seals in the distributor ring against the rotating chuck body. The resulting friction will damage and destroy the air seals and the chuck could attempt to actuate and a workpiece could be released. The lathe spindle must be at a full dead stop before any air flows to the distributor ring.

- With the air pressure set at a low 50 PSI, when the pushbutton is actuated the timers for the pneumatic solenoid valve system must be set to provide air flow for 2-3 seconds longer than the time it takes to fully charge the full stroking chuck. To determine the proper timer setting, watch the gauge on the oiler-filter-regulator. When you actuate the open-close button the gauge reading will drop. When the gauge reading returns to full pressure the chuck is fully charged. (You can hear the air flow and stop flowing.) Set the timers for 2-3 seconds longer than this. Test several actuations of full chuck stroke.

- Fill oiler reservoir with Mobil DTE Light oil only. Other oils can damage the air seal rings.

- Set the lubricator for 1 drop every 3 actuations.

3.1.6 Run test chuck installation and interface.

- Actuate the chuck several times and confirm the timers are set to fully charge the chuck plus 2-3 seconds.

- Rotate the chuck slowly for several minutes and continuously check the aluminum distributor ring for any build up of heat.

    - If the Distributor Ring is not properly aligned, the air seals can rub on the OD of the chuck and generate heat.
    - If the solenoid valve doesn't vent the air lines to the Distributor Ring, the Air Seals can remain collapsed and will rub on the OD of the chuck and generate heat.

OPERATION:

4.1 Principles of operation

All chucks covered by this manual are front-mounted and self-contained design. Self-contained design means that the actuator has been built into the power chuck. The primary advantage offered by this design is that the through hole of the lathe is completely unobstructed since no drawbar or drawtube is required. In exchange for the benefits of this design are the unique operating characteristics, special operating requirements and some additional maintenance requirements not necessary with more conventional designs. These differences are associated with the requirement to get pressurized air into the chuck and to maintain the air pressure in the rotating chuck after the pressure source is disconnected.

Distributor Ring, Air Seal Rings and how the chuck works – Refer to the cross-section drawing 6.2 in the OTHER INFO section of this manual.

Self-contained chucks hold pressurized air in one of two chambers on either side of the Piston that moves the Actuating Sleeve with a wedge that moves the Master Jaws in or out to close or open the chuck jaws. Pressurized air is transmitted from the non rotating Distributor Ring to the chuck through the Air Seal Rings. This must only happen when the chuck is not rotating. Assume the chuck is open, jaws out. Air coming into the Distributor Ring collapses one of two special Air Seal Rings to grip the outside diameter of the chuck forming an airtight seal between the Distributor Ring and the chuck. Air then flows through small holes in the Air Seal Rings into holes in the chuck that ports the air to two pilot-operated Check Valves. The pressurized air opens the one pilot-operated valve to allow the trapped pressurized air out of the chamber that opens the chuck. Simultaneously, pressurized air flows into the chamber that closes the chuck. The air control system must maintain a flow of air until the "chuck close" chamber is fully pressurized. When the air control system stops the flow of pressurized air the check valves both close, the air seals expand and no longer touch the outside of the chuck, and the chuck is free to rotate. The integrity of all seals inside the chuck is very important to ensure the chuck stays pressurized. The chuck must be pressure tested regularly as described in this manual.

WARNING

During machining, testing, set up or whenever the chuck is rotating, the chuck and the clamped workpiece must be protected by an adequate guard at all times

WARNING

If the maximum speed of the lathe is greater than the maximum recommended speed of the chuck the machine must be equipped with a speed limiting device.

ATTENTION

The air control system should be interfaced to only allow air to flow to the Distributor Ring when the spindle is stopped. If air flows when the chuck is rotating the Air Seal Rings will be damaged and the chuck could open.

WARNING

Pressure test the chuck every 160 hours of operation. Do not chuck fixtures or use in other applications that don't actuate the chuck at least once per hour. If chucked parts are gripped for more than an hour, manually recharge the chuck with pressurized air.

4.2 Positioning top jaws

For standard model chucks, position top jaws to grip the workpiece in the first half of the jaw stroke, especially when chucking irregular castings, forgings, etc.

For ES (Extended Stroke) models, grip in the last .20" of total jaw stroke only! For ES models, the first 75% of the jaw closing stroke is rapid advance and must never be used for clamping. Only the final 25% of jaw stroke is the clamping stroke and you want to grip in the middle of this final 25%.

As you grip each part, observe that adequate jaw stroke remains to grip the part.

Ensure top jaw mounting bolts are grade 12.9, in new condition and the proper length for a minimum thread engagement of 1 ½ times the screw diameter, and do not extend past the bottom of the tee-nut.

4.3 Inspect your chuck and air control system

Self contained chucks rely on pressure retention. For safe operation it is essential to pressure test every 160 hours using the special ATS pressure sensor device following the instructions in this manual and observing the gauge in the pressurized chuck for 20 minutes.

Periodically check that your actuation air control timers are set to 2 -3 seconds longer than the time required to fill the chuck. To do this, set air pressure to a low setting of about 50 PSI. Actuate chuck and watch gauge on filter/regulator assembly - pressure drops, back to line pressure plus 2-3 seconds. Check at least three actuations.

4.4 Lubrication

Use only ATS Systems' KO5 grease. Grease chuck every 8 hours of operation, two shots of KO5 per grease fitting. (See section 5.2)

At the start of each shift and after every 50 clamping cycles, actuate the chuck full stroke 5 times without gripping a workpiece to internally redistribute grease throughout the chuck.

4.5 Maximum speed (RPM) and use of special jaws.

The maximum rated speed of the chuck is valid only for air pressure of 90 PSI of higher using standard GSB roughing jaws gripping a diameter equal to or smaller than the through hole of the chuck. For all other conditions speed must be reduced.

When using special design jaws the following rules must be observed:

- The jaws should be designed to be as light and as low as possible. The clamping point should be located as close to the chuck face as possible. (Clamping points with greater distances cause increased surface pressure in the jaw guides and can reduce clamping force substantially).

- If the design of the special jaws requires them to be wider and/or higher than the standard factory hard jaws designated for the chuck, then it is important to consider the higher centrifugal forces involved when calculating the resulting clamping force and maximum speed allowed with these jaws.
  Caution: Jaws should never be positioned to extend beyond the outside diameter of the chuck.
  Caution: Jaws should never extend from the face of the chuck a distance more then 30% of the diameter measurement of the chuck up to 16" chucks, or 20% for larger chucks. Excessively tall jaws that are operated with either high grip force or high speed or a combination of speed and grip force can over stress the bolts that hold the top jaw to the base jaw.

- Do not use welded jaws.

- The mounting bolts must be arranged in such a way as to ensure that greatest possible strength is achieved.

- Top jaw mounting bolts must be replaced if they show signs of wear or damage.

MAINTENANCE

5.1 Disassembly and assembly of chuck.

Refer to drawing 6.2 in the OTHER INFO section of this manual.

- First remove aluminum distributor ring containing the two air seals.
- Small chucks (BP 315 and smaller) can be set on their side on a bench. Larger chucks can be suspended from a crane providing access to both the face and the back of the chuck.
- Bleed air pressure from both chambers (chuck open, chuck close) by removing the two .6" diameter pressure release plugs in the face of the chuck using a 5 mm allen wrench. The two plugs are found right next to the two check valves located beneath the two 1.25" plugs.

WARNING

Failure to release all air pressure before starting to remove backplate from chuck could result in the backplate "exploding" off of the chuck as the retaining bolts are removed.

- Remove cap screws holding the guide bushing in place.
- Tap on the rear of the guide bushing and pull it out from the front of the chuck.
- Lay chuck on it's face on three blocks of wood positioned between the master jaws so that the master jaws are free to move in and out.
- Remove cap screws securing backplate to chuck body. You will find jack screw holes to help separate the backplate from the chuck body and to install lifting rings to lift backplates off of large chucks.
- Remove screws holding Piston to Actuator. Use jack screw holes to separate and lift Piston plate. Note: Some smaller models have a large snap ring instead of cap screws holding the piston cover to the actuator .
- Remove cap screws holding Sealing Ring to chuck body. Remove Sealing Ring separately or in the next step the Sealing Ring and the Actuator can be removed together at one time.
- Pull Actuator straight up moving the Master Jaws in. Remove Actuator, remove Master Jaws. (Rig a crane to lift the actuator of larger chucks.)
- Reassemble the chuck in the reverse order. Note that Master Jaws and jaw guideways are marked 1, 2, 3 or marked with one, two or three small notches ground into them. Be sure to get the proper jaw in each guideway.

5.1.1 Tips for disassembly and reassembly.

- Use a crane or other lifting device whenever possible. Parts for larger chucks are very heavy.
- To remove air seal rings from the distributor ring, use an air hose with a pressure reducing nozzle to blow into the ports on the distributor ring and the seals will pop out so you can grab and remove them.
- To install air seal rings, coat them lightly with Mobil DTE Light oil. When installing the seals, care must be taken to insure that the air passage holes in the seals do not line up with the air inlet ports in the distributor ring. This can best be done by splitting the distance between the air passage holes of the seal and lining up this "half-way" point with the air inlet port of the distributor ring.
- If bolts need to be replaced use only grade 12.9 (8.8 for low head cap screws) metric bolts.

5.1.2 Removing check valve cartridge

To remove the two check valve cartridges, first be sure relieve all air pressure by removing the two .6" air release plugs using a 5 mm allen wrench. Use an 8 mm allen wrench to unscrew the 1.3" diameter exposed end of the cartridge a half dozen

turns. Once the threads are cleared the entire cartridge can be carefully pulled straight out using enough force to overcome the drag of the O-rings on the bore.
To disassemble the check valve cartridge see drawing 6.4 in the OTHER INFO section of this manual. The left end of the assembly has a snap ring, a disc and a second snap ring. The right end is threaded together but it should not be necessary to ever separate the right end. If the valve becomes contaminated and needs to be cleaned, remove the snap rings and discs from the left end and flush the cartridge while stroking the small piston on the right end by putting your finger into the left end. If it's necessary to unscrew the right end, remove the O-rings from the OD and grip the cartridge carefully in a vise with aluminum jaws.

5.2 Lubrication

Use only ATS K05 grease. Unsuitable lubricants can reduce the clamping force by more than 50%. The chuck should be greased each eight hours of operation under normal conditions.

- All surfaces that require lubrication must be reached. The close fits of mating parts require a high injecting pressure. For this reason a high pressure grease gun should be used.

- To ensure good grease distribution, inject one shot of grease into each of the grease fittings, actuate the chuck full stroke several times, and then inject a second shot of grease into each of the fittings. Check the clamping force with a grip force gauge.

- After each **50** clamping strokes it is advisable to actuate the chuck several times without gripping a workpiece so that the chuck is stroked to its extreme limits. When this is done, lubricant that has been displaced is returned to the pressure surfaces and the clamping force is retained for a longer period of time without re-lubrication.

- Depending on the application and the workpiece materials being machined, the chuck will periodically need to be disassembled and cleaned (every 2000 – 3000 hours of operation). After cleaning, all internal parts must be coated with a film of KO5 grease.

5.3 Air control system maintenance

- Set air lubricator for 3-4 drops per actuation, fill reservoir only with Mobil DTE Light. Other oils can damage seals

- Drain accumulated water from the water trap regularly. If you routinely find excessive water in the air system, an additional water trap or air drying system should be installed in the line ahead of the oiler-filter-regulator. Air entering the chuck should be free of water and contain a slight oil mist. Water in your air system will eventually corrode and rust the inside of the chuck doing significant damage.

- Set actuation air control timers to 2 -3 seconds longer than the time required to fill the chuck. To do this, set air pressure to a low setting of about 50 PSI. Actuate chuck and watch gauge on filter-regulator assembly - pressure drops, back to line pressure plus 2-3 seconds. Check at least three actuations.

5.4 Pressure testing

Self contained chucks rely on pressure retention. For safe operation it is essential to pressure test every 160 hours of operation using the special ATS pressure testing device provided with the chuck. If the original testing device is lost or damaged a new one can be purchased from ATS Systems.

- Open the chuck. Slowly unscrew one of the two .6" diameter pressure release plugs on the face of the chuck. If pressure is found, this is the "chuck open" pressure chamber. Close this screw. If no pressure is found, this is the "chuck close" chamber. Remove the plug for the "chuck close" chamber and screw in the special testing device with gauge.

- Actuate the chuck closing the jaws. Note that the air control is set for 2-3 seconds longer than it takes for air to stop flowing.

The pressure reading on the testing gauge should read 10-15 psi less than the pressure gauge on the oiler-filter-regulator. If your chuck has special pressure reducing valves to yield lighter grip forces the pressure inside the chuck measured by the testing device might be even less. Note the pressure reading on the testing gauge and let the chuck sit for 15-20 minutes. Any drop on the testing gauge reading indicates a leak somewhere in the chuck (assuming it's not leaking at your testing gauge or where the testing gauge is screwed into the face of the chuck.

- Repeat the testing process on the "chuck open" pressure chamber.

- Replace the Pressure Release Plugs and check for leaks around the plugs by putting soapy water on them and actuating the chuck to pressurize the chamber for that plug.

5.5 Ordering spare parts

See drawing 6.3 in the OTHER INFO section of this manual for spare parts identification. Order spare parts by specifying the chuck model and serial number, and the part item number and description.

6.1 ATS SOLENOID OPERATED CONTROL SYSTEM

Wire machine control to achieve the following ATS chucking cycle:

1. Inhibit open and close pushbuttons while spindle is turning. This
   This is necessary to avoid accidental unchucking and damage to the chuck's air seal rings.

2. When a pushbutton is actuated, the pneumatic solenoid valve is energized for approximately 5 seconds (adjustable timer) and then shuts off.

   Incoming air is used only during chucking and unchucking.

   NOTE: Gripping force is sustained by trapped air inside the chuck body and the self locking mechanical wedge between the piston and master jaw.

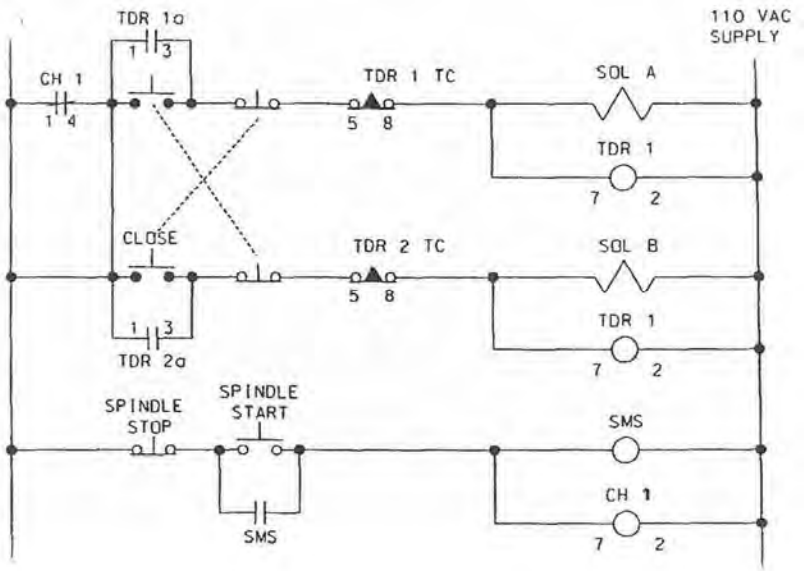
   NOTE: The time to chuck and unchuck may vary with chuck size, friction, lubrication, air pressure, etc. Adjust timer to ensure complete chucking has occurred before starting machining cycle.

3. After workpiece has been completely chucked, the spindle can be started.

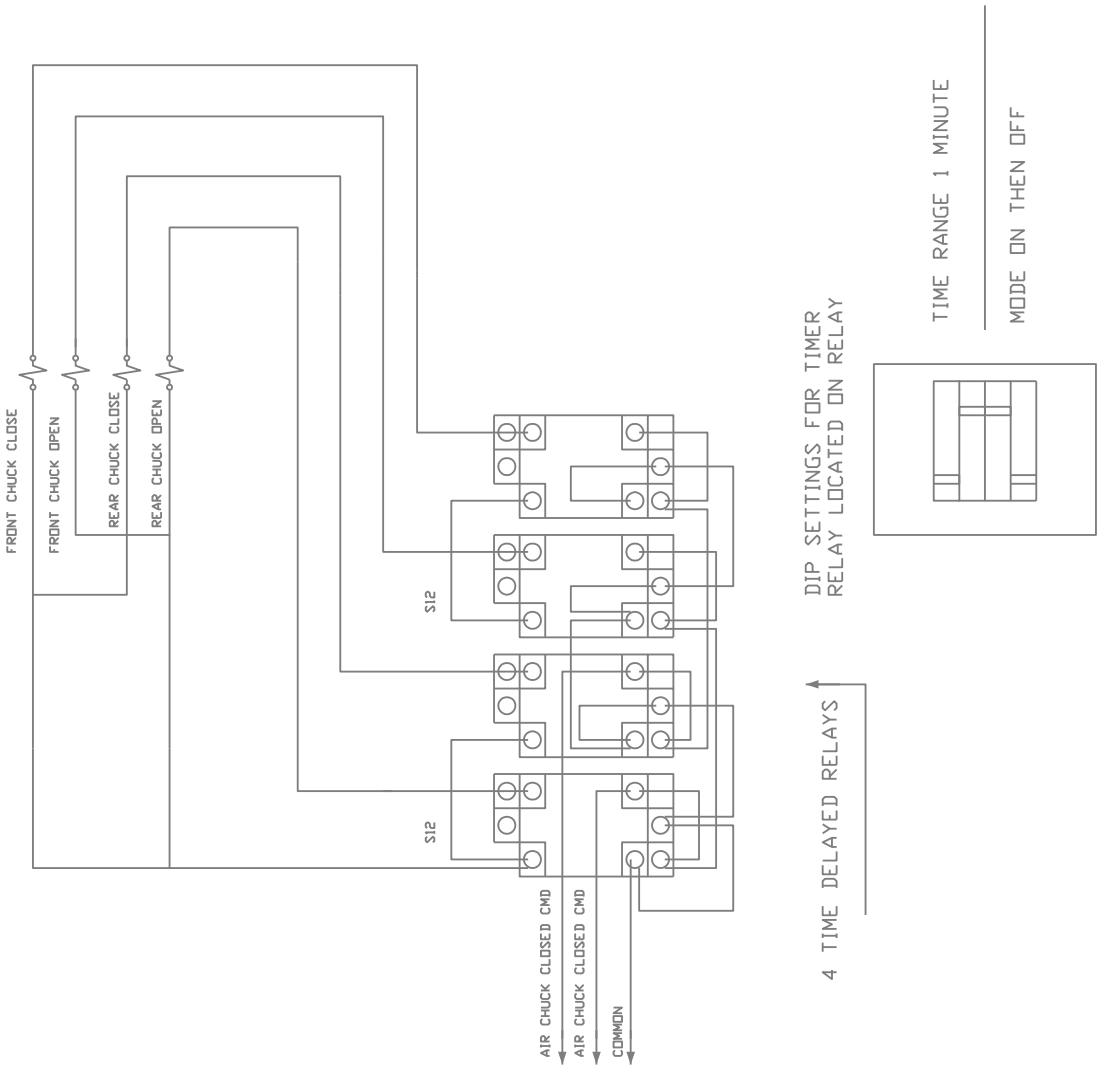
TDR = Adjustable Time Delay Relay (Approx. 5 seconds)
Qty. 2 – Omron model STP-MNH-A-A

SMS = Spindle Motor Starter

CH 1 = Chuck Inhibit Relay

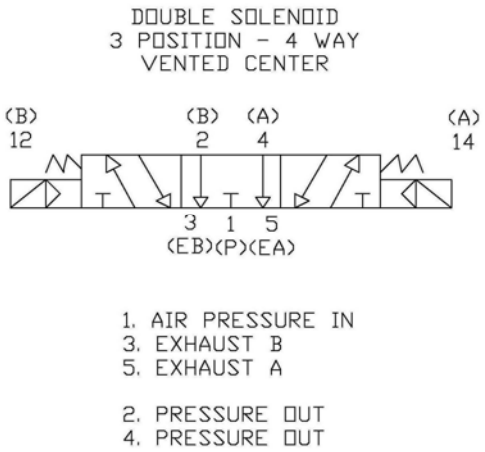


6.2 TIMER RELAY WIRING DIAGRAM



6.3 PNEUMATIC CIRCUIT

DOUBLE SOLENOID
3 POSITION – 4 WAY
VENTED CENTER



While solenoid (A) is energized –

Air pressure flows from 1 (P) to 4 (A):
And cylinder side B is exhausted to atmosphere

While solenoid (B) is energized –

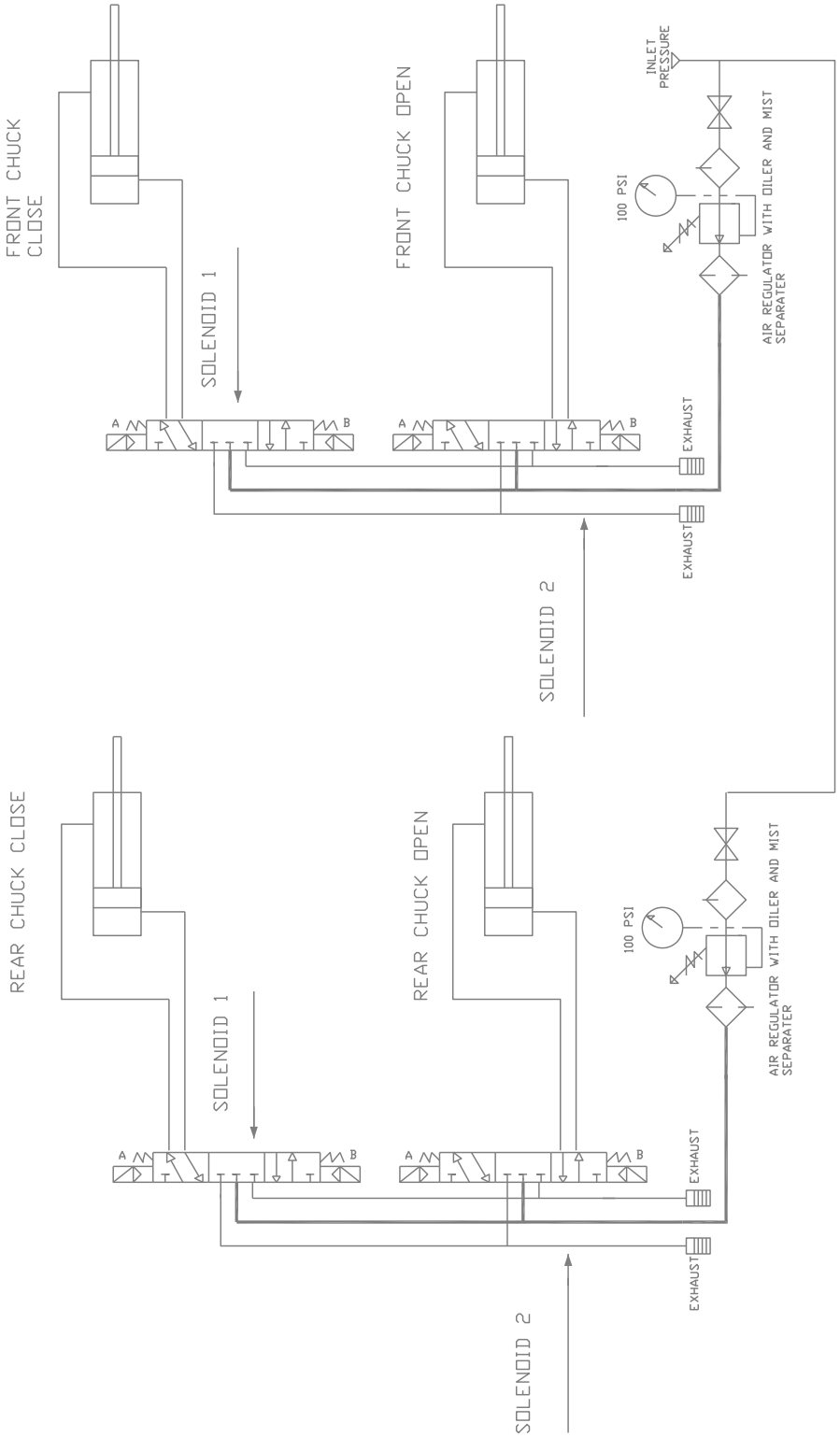
Air pressure flows from 1 (P) to 2 (B):
And cylinder side A is exhausted to atmosphere

When the solenoids are de-energized-

The spring returns valve spool to center position so that both pressure ports are VENTED to the atmosphere.

The internal CHECK VALVES in the ATS BP and BT chucks then maintain air pressure inside the chuck sustaining grip force.

6.4 PNEUMATIC SCHEMATIC



6.5 JAW JOGGING

Jaw Jogging is an optional feature that allows jaws to be incrementally moved towards the open or closed position. This special feature is particularly useful in oil field applications where pipe needs to be shimmed. Included in this option is a recharge features that allows for air pressure to be reapplied to the chuck without first un-chucking. For parts with long machining times it is suggested that the chuck be recharged at least once every hour of operation.

Controls:

The jaw jogging control is a handheld pendant that includes buttons for:

Recharge- reapplies air pressure to chuck
Open- jog jaws towards open position
Close- jog jaws towards closed position

All of these buttons work for both ID or OD Clamping.

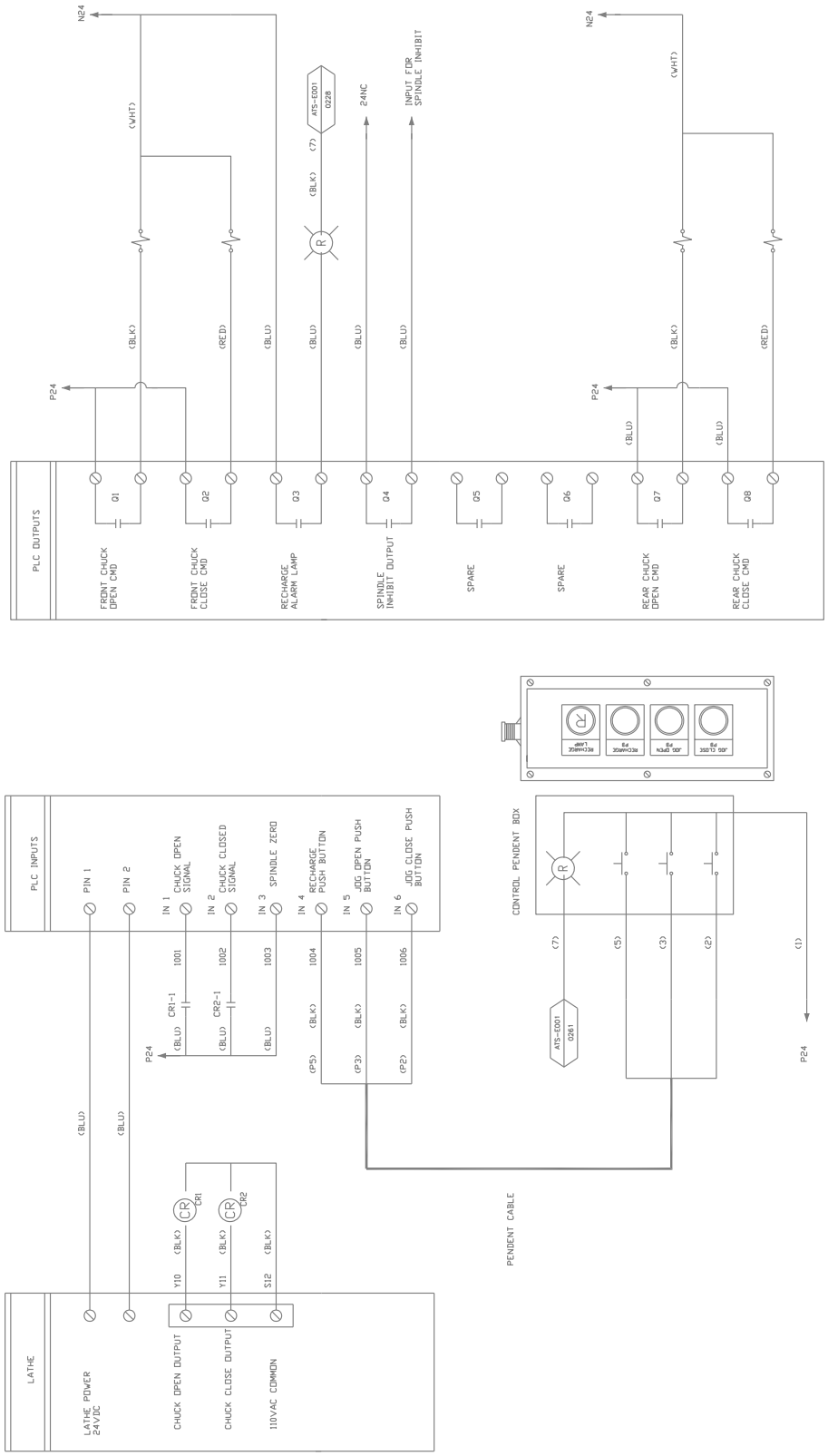
At the top of the pendant is the alarm light which will turn on when the chuck needs to be recharged and will stay on until a recharge has been performed, this will also send out a spindle inhibit or alarm to your machine until it has been completed.

The Jaw Jogging option is PLC controlled and does to use the relay timers which are found on the standard air chuck install. Ideally the machine includes a Spindle Zero (see section (1.3.2) and Spindle Inhibit signal (3.1.5). Below is a list of the PLC's inputs and outputs for machines that have these signals. Due to the fact that manufactures may not include these, the inputs and outputs for the PLC may vary. Please consult an ATS service technician before any service is performed.

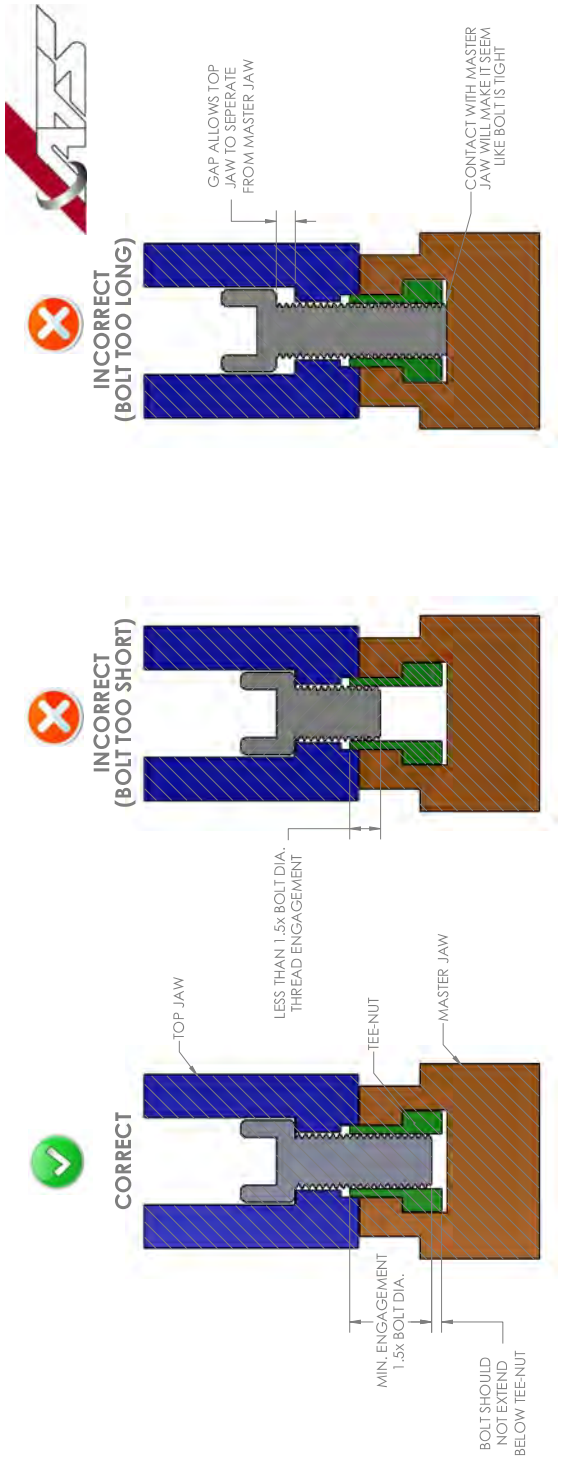
Input #	**Function**
I1	Chuck Open Input
I2	Chuck Closed Input
I3	Spindle Zero Input
I4	Recharge Input
I5	Jog Open Input
I6	Jog Close Input

Output #	**Function**
Q1	Open Solenoid Chuck 1
Q2	Closed Solenoid Chuck 1
Q3	Recharge Light
Q4	Spindle Inhibit
Q7	Open Solenoid Chuck 2
Q8	Closed Solenoid Chuck 2

6.6 JAW JOGGING PLC SCHEMATIC



6.7 JAW MOUNTING BOLT DIAGRAM



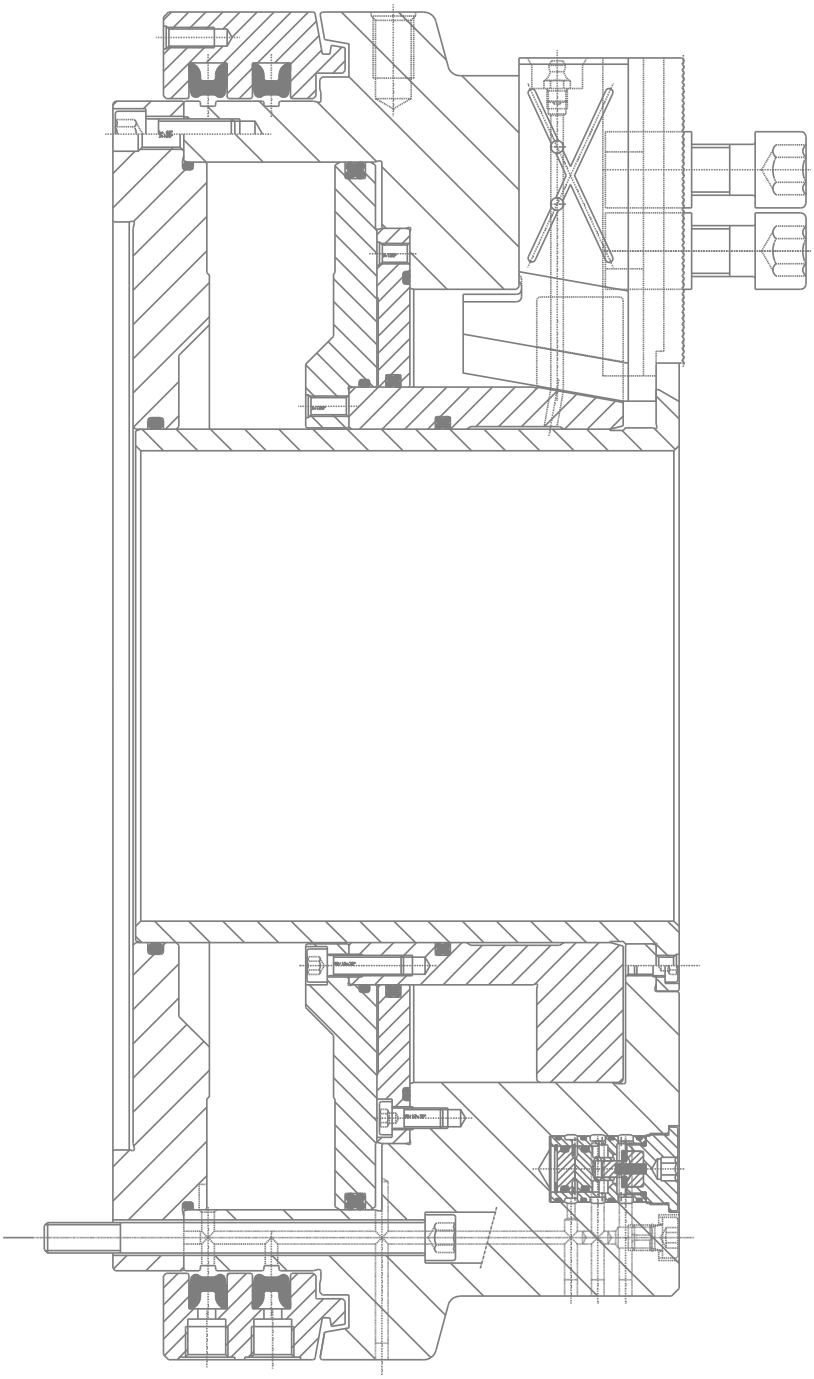
CORRECT BOLT LENGTH IS NECESSARY TO ENSURE SAFE OPERATION.
BOLT LENGTH MAY VARY WITH USE OF DIFFERENET JAWS.

BOLT	M12	M16	M20	M24
MAX TORQUE (ft lb)	50	110	160	330
CHUCK SIZE	BP 200	BP 265	BP 480	BP 640
		BP 315	BP 500	BP 685
		BP 350	BP 600	BP 800
		BP 4.1	BT 7.3	BT 12.8
		BP 4.5	BT 10.8	BT 14.8

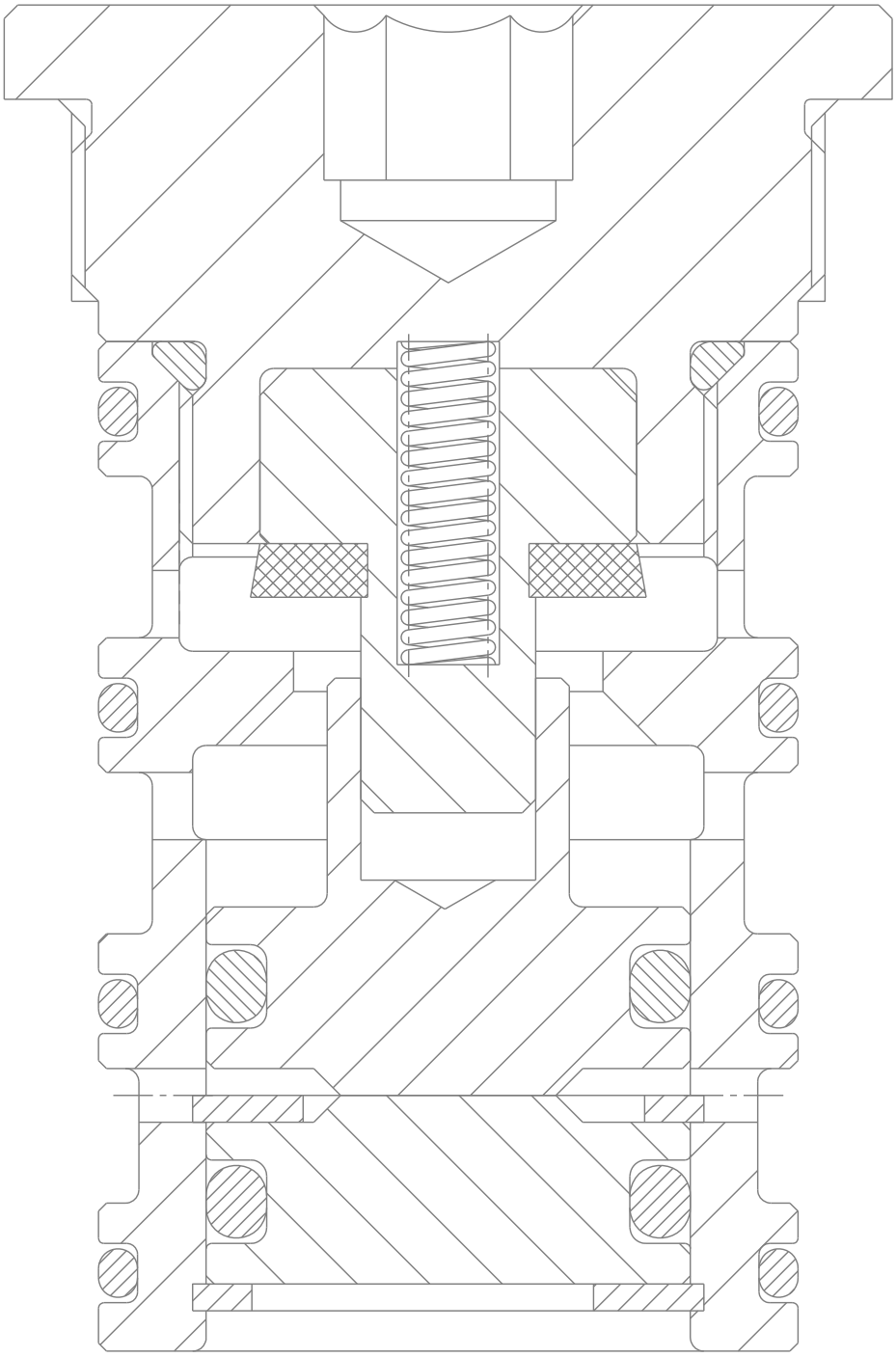
WARNINGS:

- Only use grade 12.9 bolts
- Use two bolts to attach jaws
- Apply proper torque when tightening bolts
- Bolts must be replaced if they show signs or wear or damage
- Do not modify bolts
- Do not cut bolts when boring soft jaws
- Do not weld jaws

6.8 CHUCK CROSS SECTION



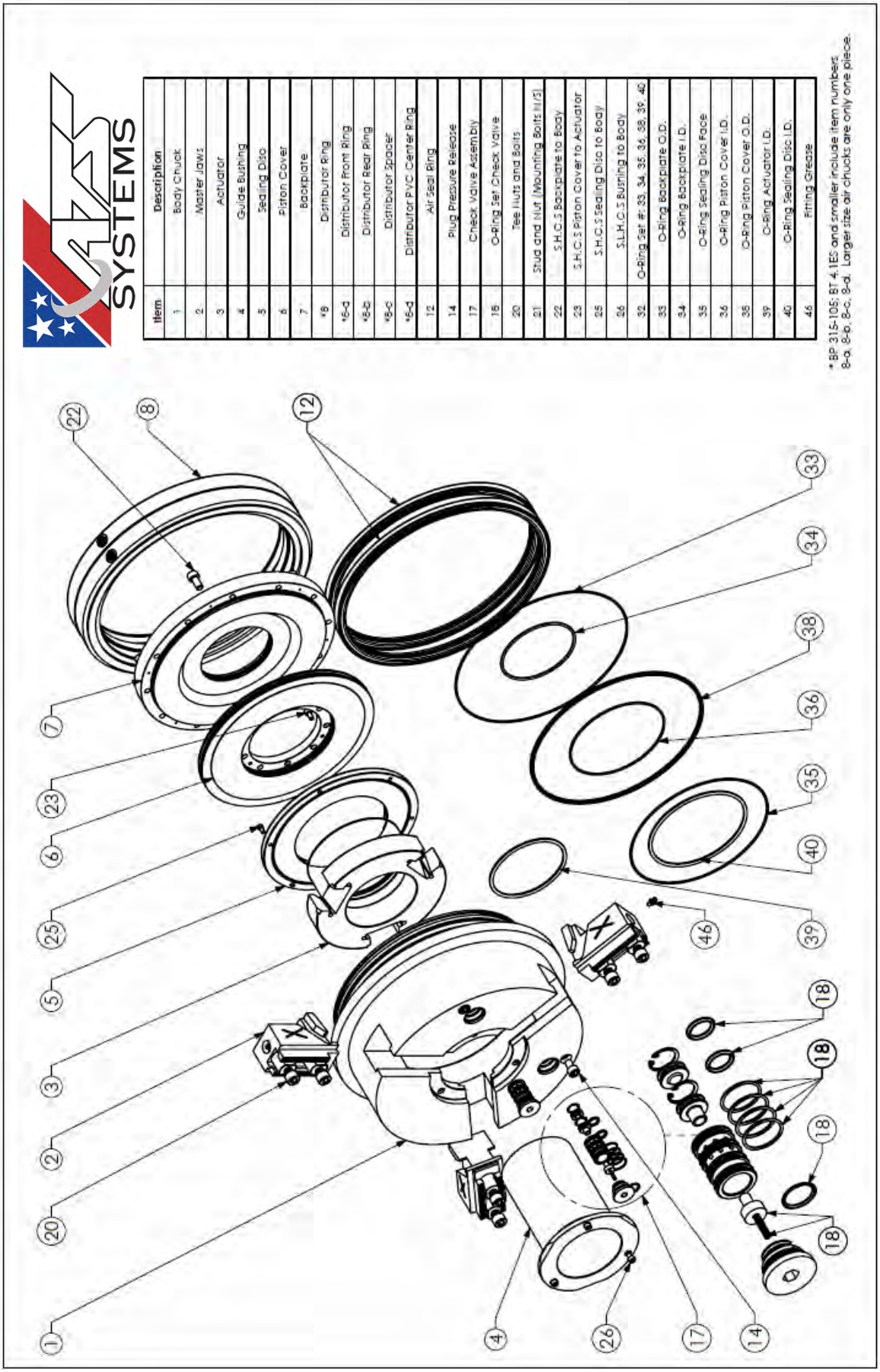
6.9 CHECK VALVE CROSS SECTION



6.10 SPARE PARTS IDENTIFICATION DRAWING

Item	Description
1	Body Chuck
2	Master Jaws
3	Actuator
4	Guide Bushing
5	Sealing Disc
6	Piston Cover
7	Backplate
*8	Distributor Ring
*8-A	Distributor Front Ring
*8-B	Distributor Rear Ring
*8-C	Distributor Spacer
*8-D	Distributor PVC Center Ring
12	Air Seal Ring
14	Plug Pressure Release
17	Check Valve Assembly
18	O-Ring Set Check Valve
20	Tee Nuts and Bolts
21	Stud and Nut (Mounting Bolts M/S)
22	S.H.C.S Backplate to Body
23	S.H.C.S Piston Cover to Actuator
25	S.H.C.S Sealing Disc to Body
26	S.L.H.C.S Bushing to Body
32	O-Ring Set #: 33, 34, 35, 36, 38, 39, 40
33	O-Ring Backplate O.D.
34	O-Ring Backplate I.D.
35	O-Ring Sealing Disc Face
36	O-Ring Piston Cover I.D.
38	O-Ring Piston Cover O.D.
39	O-Ring Actuator I.D.
40	O-Ring Sealing Disc I.D.
46	Fitting Grease

* BP 315-105: BT 4.1ES and smaller include item numbers 8-A, 8-B, 8-C, 8-D. Larger size air chucks are only one piece.



6.10 Operator Training on BigMouth Self-Contained Chuck

The following is taken from the Installation & Training checklist used by ATS Systems Service Engineers when installing BigMouth chucks and training operators. We recommend that shop supervisors use this doccument to assist them to train new operators when they are first assigned to use the BigMouth chuck. Most of what is presented here applies to all types of power chucks. Certain points are unique to self-contained chucks.

High speed lathes and chucks are perhaps the most hazardous equipment in most machine shops. Lathes and chucks have been designed and built with your safety in mind and have many safety features, guards and interfaces. But, the only way to prevent accidents and possible injury is to understand the hazards and to follow all the proper rules, recommendations, and general and specific safe shop practices. People are regularly injured and even killed as a result of "accidents" involving chucks. 99% of the time the accident is the result of operator error or lack of experience and training, not as a result of any failure of the equipment. Please listen carefully, ask questions and refuse to operate this equipment if you are unsure how to operate it safely. The life you save may be your own.

☐ **The bad things that can happen and the most common causes.**

1. If a jaw were to come off of a spinning chuck it will become a projectile traveling in a straight line and could penetrate the heaviest guard. There is a high likelihood of serious injury here and fatalities are not uncommon.

   Possible causes:
   - Bolts too short, inadequate thread engagement, threads strip off.
   - Bolts not properly torqued tight and come loose.
   - Wrong grade of bolts and they break. Use only grade 12.9 metric or grade 8 UN bolts.
   - Excessively tall jaws and even moderate grip forces can put severe tension on bolts and cause them to break.
   - RPM way too high for an oversize jaw and the bolts actually shear. (Watch out when using constant surface feet programming!)
   - Poor quality or poor design jaw actually breaks and a portion of the jaw becomes a projectile. An example would be some types of welded jaws, cast jaws that can break, or a hard jaw that is improperly hardened (through hardened) and becomes brittle.

2. If a part is not securely clamped it can be thrown from the chuck. Unless it is struck by a spinning jaw as it exits it will not be traveling in a straight line and there is a good chance a heavy guard will stop it but it may not. Fatal accidents have happened.

   Possible causes:
   - RPM too high for the jaw selected, loss of grip force due to centrifugal force, part is released.
   - Part inadequately gripped due to lack of proper chuck lubrication and resulting low grip force.
   - Part inadequately gripped and pulled from jaw by an aggressive cutting tool.

- Part inadequately gripped due to poor choice of top jaw and pulled from jaw by even light cutting tool force. (Such as soft jaws gripping an irregular rough casting.)
- Jaws positioned incorrectly or workpiece gripped diameter variation (castings) causes jaw stroke to reach bottom before properly gripping the workpiece.
- Part inadequately gripped because the pneumatic pressure and resulting grip force is too low for the application.

Possible causes unique to self-contained air chucks:
- The chuck has an internal leak and has lost it's air pressure.
- Jaws on a BT_ES chuck positioned incorrectly causing gripping with the 45º rapid advance stroke instead of the 10º clamping stroke (the first 75% of stroke instead of the last 25%)

Now that I have your attention, we will go step by step through the safe operating practices of the BigMouth chuck. Note that most of what I've just said about the hazards and what I will now say about how to deal with them applies to all jaw chucks, not just the BigMouth chuck.

☐ I have attached this maintenance and safety decal to your lathe. It summarizes the points I will now cover and I encourage you to review it regularly.

☐ This is the Installation, Operation and Maintenance Manual. It contains all the information I am going to present and more. Please read it carefully and pay special attention to all safety points.

My training will now cover the following topics:
1. Safe chuck speed.
2. Changing, positioning and mounting jaws for safe operation.
3. Proper chuck lubrication.
4. Unique characteristics of self-contained air chucks and the hazards.
5. Chuck inspection and some miscellaneous safety instructions.

☐ Safe chuck speed (RPM) is greatly influenced by the top jaws used. The maximum rated speed of this chuck is ____ and applies only for normal chucking applications using 90 PSI air pressure or higher, and only for standard stepped roughing jaws gripping a diameter equal to the through hole of the chuck or smaller. For any other top jaws or conditions, speed must be reduced.

Always use the smallest, lightest, shortest jaw possible, and position it as close to centerline as possible. Centrifugal force pulls on all jaws and reduces actual grip force. The further out from centerline and the heavier the jaw, the higher the centrifugal force. When you do use oversize jaws or even standard jaws if they are positioned very far out from centerline, you need to determine a safe operating speed. To do this easily you need a dynamic grip force gauge, mount the jaws, grip the gage and slowly raise the RPM until 50% of the initial grip force remains. Now you know the safe speed. It's possible to calculate an approximate safe speed by weighing and measuring the jaws, master jaws, T-nuts and bolts and doing some calculations. But because the master jaws are assembled into the chuck it not so convenient to do. And, if you don't include the master jaw you'll calculate a speed that's way too high.

Are there any questions?

☐ Now I want to talk about changing jaws, positioning jaws and bolting on jaws for safe operation.
- Only use jaw mounting bolts that are marked grade 12.9 if metric, grade 8 if inch, with threads in new condition, and long enough to engage a thread length at least1 ½ times the

diameter, and do not extend past the bottom of the tee-nut. Torque the bolts to the specification as shown in the manual.

- Don't ever position any top jaw beyond the OD of the chuck. *(If you have to extend it beyond the OD it shouldn't be more than a little bit; like 1" on a 20" chuck, and speed must be reduced.)*
- Finally on the subject of positioning jaws, on standard model chucks, position top jaws to grip the part in the first half of the jaw stroke, especially when chucking irregular castings, forgings, etc. For ES (Extended Stroke) models, grip in the last .20" of total jaw stroke only! Note the markings on the face of the chuck for the gripping portion of the total jaw stroke. For ES models, the first 75% of the jaw closing stroke is rapid advance and must never be used for clamping. Only the final 25% of jaw stroke is the clamping stroke and you want to grip in the middle of this final 25%.

As you chuck each part, observe that adequate jaw stroke remains to grip the part. It is very important that each time you chuck a part you note if you are near the end of the jaw stroke and risk not properly holding the part. If this happens, adjust all three jaws in.

- **Are there any questions?**

☐ Lubrication is important on any chuck.

- Unless the chuck is properly lubricated your grip force might only be 50% of what it would be with proper lubrication. You could throw parts.
- Use only ATS Systems' KO5 grease.
- Lubricate every 8 hours of operation with two shots of KO5 grease per fitting.
- Fully stroke chuck (5) times after lubricating to distribute grease to internal components.
- At the start of each shift and after every 50 clamping cycles, actuate the chuck full stroke 5 times without gripping a workpiece to internally redistribute grease throughout the chuck.

Any questions?

Now I want to discuss some of the unique issues with self contained air chucks.

☐ Self Contained Air Chucks *(SCAC)* require more preventive maintenance, care and precautions than do standard power chucks. The advantage is the large through hole and other unique benefits of the design. By carefully following the rules and maintenance schedule, reliable operation will result.

☐ Let me explain how the chuck works. (*Explain how the chuck works using the cross section drawing and "Principles of Operation" section of the manual.)*

☐ Old style self contained chucks have a valve in the face of the chuck that needs to be cleaned and lubricated regularly. These new models have a different valve design and need no regular maintenance unless you have an unusual amount of contaminants in your air system. If you need to clean or check the two valves they are located here. See our manual section to remove the valves. First remove these plugs to release the air pressure before doing any work on the chuck.

☐ This is our new style pressure sensor and it's provided standard with each chuck. It is necessary to pressure test the chuck every 160 hours of operation (monthly if used only one shift) to ensure there are no internal leaks. Test "close" and "open" sides of cylinder. Let the pressurized chuck and sensor set for 15-20 minutes and if any loss of pressure (even 1 PSI) is

noted, further investigation and maintenance is required before using the chuck. *(Actually remove one plug, install the gauge and pressurize the chuck to demonstrate.)*

- ☐ Self contained air chucks are not recommended when the machining cycle exceeds one hour. If a small air leak develops before the next pressure test, loss of grip force could result if the chuck is not re-actuated at least once per hour to recharge air pressure.
- ☐ Never use a SCAC to grip a fixture that is used to hold a workpiece. If the chuck were actuated at least every hour to recharge the air pressure this would be OK, but this is not practical and there is risk you might fail to remember to actuate and recharge the chuck. Bolt fixtures to the chuck using T-nuts in master jaws or drill and tap the face the of the chuck. Contact ATS for a drill and tap location drawing.
- ☐ Remove any workpiece from the chuck if the machine will not be operated for an extended period of time such as over night. Otherwise, if the chuck has a leak, the workpiece might be released and drop.
- ☐ If a workpiece is left in the chuck for an extended period of time, actuate the chuck to recharge the air pressure before starting the lathe spindle. I will demonstrate manual operation of the solenoid valve to recharge the chuck without opening it, and I'll mark the valve “Jaws Out” and “Jaws In”.
- ☐ SCAC are not intended for use in fully automatic systems such as with barfeeds and robotic loaders. SCAC have no stroke monitoring system and a safety hazard exists if used in an automatic system. If the jaws do open and close, full grip force will result, assuming the air pressure is properly set and flowing, the timers are set to allow full charge plus 3 seconds, and the chuck is properly lubricated and functioning. However, since there is no stroke control, the only confirmation that the chuck did open and close is the visual check of the lathe operator who manually initiates the open and close cycles and observes the jaws stroking.
- ☐ ES chuck models are special with lower clamping force than standard models and are intended for tubular workpieces going completely through the chuck bore and only when installed and used in tandem with two chucks on a single lathe.
- ☐ Never actuate the chuck unless the lathe spindle is completely stopped. To do so will severely damage the profile seals.
- ☐ **Caution! When it is necessary to do any work on the chuck such as disassemble it, be sure to first remove the plugs where we install the pressure testing gauge to relieve all air pressure inside the chuck. Failure to do so could result in serious injury.**

Finally, some miscellaneous points.

- ☐ Never stand in line with a rotating chuck. Always stand off to one side so that if anything bad happens it's less likely to hit you.
- ___ I recommend you purchase a dynamic grip force gauge and inspect the grip force of the chuck weekly and record it. If you note a decrease in grip force it's time to disassemble, clean and inspect the chuck. Under normal operating conditions it's wise to clean the chuck every 1000-1500 hours of operation.
- ☐ **So, for a quick review:**
- ___ Avoid standing directly in line with a rotating chuck or workpiece.
- ___ Don't forget the hazard of using non-standard large jaws and even full wide soft jaws. Resulting centrifugal force may require RPM to be limited.
- ___ Use only grade 12.9 bolts in new condition for jaw mounting with a minimum of 1 ½ times diameter thread engagement, and do not extend past the bottom of the tee-nut.

___ Don't position jaws out beyond the diameter of the chuck.

___ Set jaw adjustment to grip the part in the correct portion of the jaw stroke depending on whether you are using a standard chuck model or an ES model. Be especially careful when chucking irregular castings, forgings, etc. where the blank diameters can vary. As you chuck each part, observe that adequate jaw stroke remains to grip the part.

___ Chuck lubrication
Lubricate every 8 hours of operation with two shots of KO5 grease per fitting.
Fully stroke chuck (5) times after lubricating to distribute grease to internal components.

___ **When it is necessary to do any work on the chuck such as disassemble it, be sure to first remove the plugs where we install the pressure testing gauge to relieve all air pressure inside the chuck. Failure to do so could result in serious injury.**

___ Finally, never grip fixtures. And if you run parts that have cycles over an hour, or if you leave a part in the chuck over an hour always recharge the chuck with air.