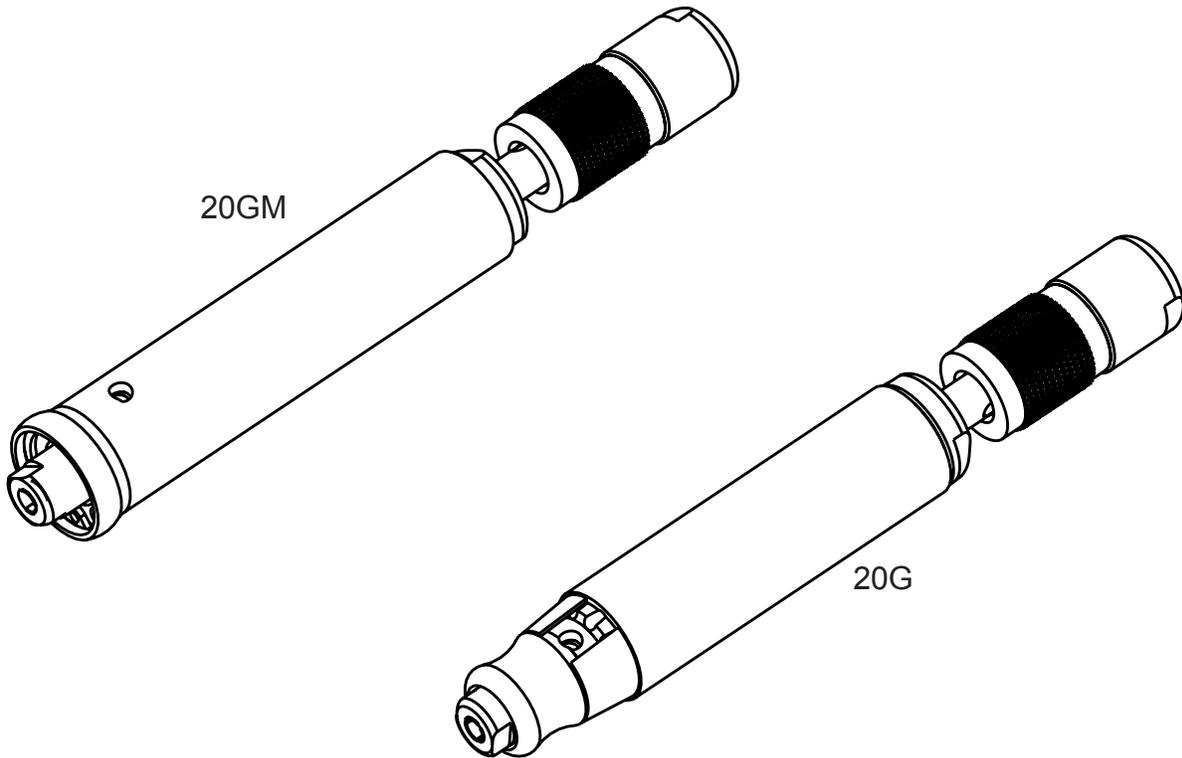




General Operators Instructions and Maintenance Manual



Read Safety Recommendations Before Operating Tool

20G/20GM Series Die Grinders

Model Number	Exhaust Direction	Throttle Type	Rated Speed	Power Output	Case Material	Weight	Overall Length	Diameter	Working Air Consumption	Collet Size	Capacity
20G	Side	Slide Valve	60000 R.P.M.	0.1 H.P. (75 W)	Steel	0.3 lb (0.1 Kg)	4.9 inch (117 mm)	0.7 inches (18 mm)	10 cfm (4.7 L/S)	1/8 inch	Burrs of shank size 1/8 inch, 3/32 inch, or 3 mm
20GM	Front										

Top Cat ® Air Tools, Manufactured by T.C. Service Co.

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Operators Instructions and Safety Precautions

This is meant to highlight sections of safety standards published by the American National Standards Institute and the Occupational Safety and Health Administration. This is not meant to replace those standards but only highlight certain areas.

When care is taken to ensure that the right tool is operated properly, and safety and maintenance procedures are followed, accidents can be avoided. Read and follow all instructions and directions. Comply with all rules governing the use of power tools, personal protective equipment and equipment guards.

Remember - machines, attachments and accessories must be used only for the purpose for which they were designed. Safety reasons and product liability prohibit any modifications to tools. Any attachments or accessories must be agreed to in advance with an authorized technical representative of T.C. Service Co.



The grinding equipment must be approved for the rated speed of the machine. The rated speed, marked on the machine, should not be exceeded. Be sure to learn the proper handling and storage of abrasive wheels and inserted tooling.

Inspect the collet for any signs of wear and that it is properly mounted to the tool. Any collet showing signs of wear such as bends, chips, nicks, or cracks should be replaced.



Always wear eye and hearing protection, and when necessary, other personal protective equipment such as gloves, an apron, and helmet. Properly fitted protective clothing cushions the operator from vibration exposure and help prevent minor scrapes that might occur as a result of guiding the tool along the workpiece.

Additional information on eye protection is available in the following national regulatory standards.

- 1) Federal OSHA Regulations 29 CFR, Section 1910.133 (Eye and Face Protection)
- 2) ANSI Z87.1 (Occupational and Educational Eye and Face Protection)



Check hose size and air pressure. The air pressure at the tool shall not exceed 90 psi (6.2 bar). All hoses should be inspected regularly and kept away from heat, oil and sharp edges. Be sure the tool is secured to the air hose.

Measure the speed of grinders every 20 hours of actual use or once per week, whichever comes first.

Tachometers must be checked and calibrated on a regular basis according to the manufacturers recommendations

Measure speed of all types of grinders after maintenance or repair, whenever a grinder is issued from the tool crib and at each wheel change. Several readings should be taken.

This form of inspection should be made with the grinding wheel or tooling removed.



Proper mounting of grinding wheels and inserted tooling is crucial to safe operation and efficient working conditions.

Ensure the exhaust air is directed away from bystanders.



Disconnect the tool from the air supply before doing any service. This prevents accidental start-ups.



Airborne particulate resulting from the grinding process can cause hazards. Wear appropriate protective equipment.

Safety in Operation

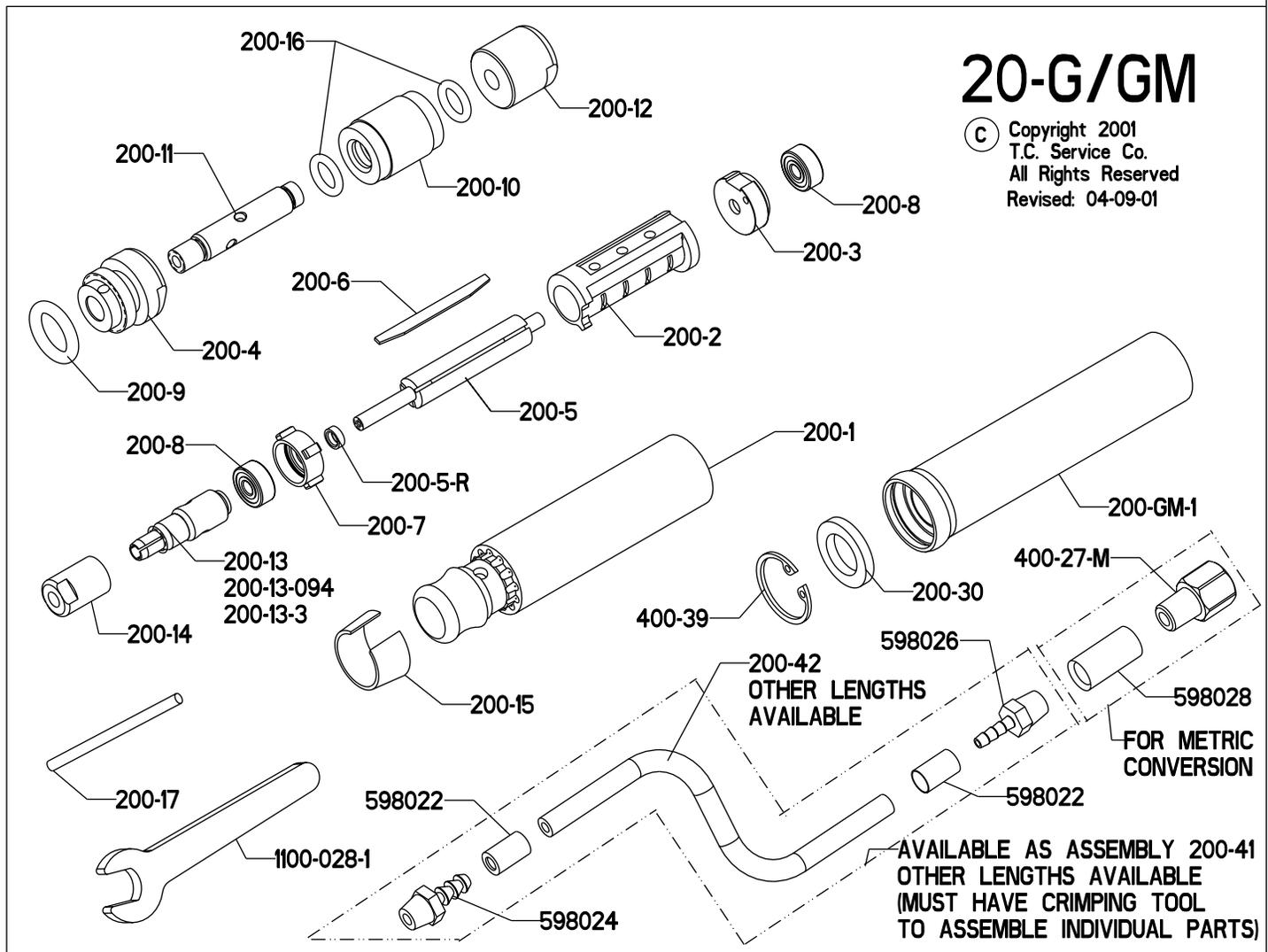
The safety procedures for operating air tools are everyone's responsibility. The following lists several aspects of air tool safety that should be considered during operation. Please be aware of these aspects and report any unsafe practice you see to a supervisor or safety officer immediately.

- 1) Start any new inserted tooling under a bench and away from bystanders. (Run for a minimum of one minute.)
- 2) When starting a cold/new mounted stone, apply to the work slowly, allowing the mounted stone to warm gradually.
- 3) Support the work piece properly.
- 4) When grinding, support the work piece so that a jamming of the mounted stone or burr does not occur. (A slot shall remain constant or become wider during operation.)
- 5) If a jamming of the inserted tooling does occur during a grinding operation, shut the air supply off to the tool and ease the mounted stone or burr free. (Inspect the mounted stone or burr for damage before continuing operation.)
- 6) Ensure that sparks from the process do not create a hazard to the eyes or will ignite the environment.
- 7) Grinders shall not be used in potentially explosive atmospheres.
- 8) Pneumatically driven tools are not generally insulated from coming in contact with electrical sources. Be sure to avoid contact with wires or other possible current carrying sources.
- 9) The operator must check that no bystanders are in the vicinity.
- 10) Remember that there is a running on after the throttle has been released.
- 11) If a grinder fitted with a mounted stone or burr is dropped, the mounted stone or burr must be thoroughly examined before re-use.
- 12) Disconnect the tool from the air source before servicing and changing mounted stones/burrs.
- 13) Release the control device in case of interruption of air supply.
- 14) Always keep the tool in a clean, dry place when not in use.
- 15) Beware of loose hair and clothing so as not to become tangled or trapped during operation.
- 16) Unexpected tool movement or breakage of inserted tooling may cause injury.
- 17) Unsuitable postures may not allow counteracting of normal or unexpected movement of a power tool. (A working position shall be adopted which remains stable in the event of a break up of inserted tooling.)
- 18) Do not hold the tool near the body when operating.
- 19) Keep a firm grip on the tool body during operation.
- 20) Immediately shut off the tool if unusual vibration or sound is detected. Remove and inspect the wheel and check the tool speed (RPM) with an accurate tachometer. Use of over-speeding grinder or unbalanced wheels may result in serious injury.
- 21) Stay alert. Do not use the tool while under the influence of alcohol, drugs or medication.

Maintenance

20-G/GM

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Revised: 04-09-01



Disassemble

1. Disconnect air and remove all burrs, mounted points or stones, and accessories.
2. Remove collet nut (200-14), using collet pin (200-17) and 9/32 inch wrench (1100-028-1).
3. Place tool, throttle side sticking out about 1 inch, into a 21/32" collet fixture. Unscrew coupling (200-4) (right hand thread) from motor housing (200-1 or 200-GM-1). Remove from collet fixture.
4. Place a 3/32 inch punch into the end of the collet body (200-13-xx). Gently push the motor assembly from the case.
5. Place brass jaws in vise. Secure motor assembly into vise with output downward. Clamp lightly the outside diameter of the cylinder (200-2) and endplate (200-3).
6. Use a fine pointed punch or the collet pin to gently tap rotor out of rear bearing (200-8). Be careful not to drop the motor assembly when it is free. Remove from vise.
7. Use a 3/32 inch punch to push the rear bearing from the rear endplate.
8. Remove 3 blades (200-6).
9. Clamp rotor into brass jaws of vise, with collet upward. Place collet lock pin (200-17) through the hole at base of collet. Unscrew the collet from rotor. Remove from vise.
10. Support the rotor assembly vertically on a suitable drill block. Gently tap rotor through front bearing (200-8) with a plastic hammer. (Take care to not damage threads on end of rotor.)
11. Remove front endplate (200-7). Remove spacer (200-5-R).
12. Use a 3/32 inch punch to push the front bearing from the front endplate.

To Disassemble Throttle Valve

13. Use two 1/2 inch wrenches (1100-050) to unscrew coupling (200-4) from valve stem (200-11) (Right hand thread.) Remove o-ring (200-9) from coupling (200-4).
14. Slide valve sleeve (200-10) from stem. Remove 2 o-rings (200-16) using an o-ring tool.
15. Place brass jaws in vise. Place valve stem in vise with coupling (200-12) upward. Unscrew rear coupling (200-12) from stem. Remove from vise. Be sure to clean all valve parts completely.

Assembly

1. Be sure that all parts are clean and free of any abrasive. Keep bearings wrapped until ready to use. Check all parts carefully for dents, vice jaw marks, dirt, loose abrasives and absence of lubrication. To extend the life of this tool we recommend using an in-line oiler and screen bushing.

To Assemble Throttle Valve

2. Place o-rings (200-16) into grooves at each end of valve sleeve (200-10). Oil o-rings.
3. Slide valve sleeve (200-10) onto valve stem (200-11).
4. Place o-ring (200-9) into groove of coupling (200-4)
5. Use two 1/2 inch wrenches (1100-050) to screw couplings (200-4 and 200-12) to valve stem (200-11) (Right hand thread.) Tighten assembly gently.

Motor assembly

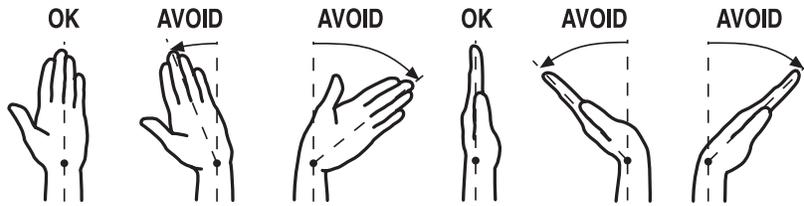
6. Place spacer (200-5-R) onto threaded end of rotor (200-5), chamfered side towards rotor. Make sure spacer is flush against rotor.
7. Place brass jaws in vise. Clamp rotor into vise, with threaded end upward.
8. Place bearing (200-9) into front endplate (200-7). Place over threaded end of rotor. Tap into place with bearing driver (1100-800).
9. Using collet pin (200-17), thread on and tighten collet body (200-13-xx). Remove from vise. Clean any brass or dirt from slots of rotor using an old rotor blade.
10. Clamp rotor assembly into brass jaws of vise, with collet end down. Clamp gently onto the collet body. Place 3 blades (200-6) into slots of rotor.
11. Slip cylinder (200-2) over rotor. (Be sure the alignment pin is oriented away from the front for the motor assembly.
12. Install rear endplate (200-3) locating cylinder pin in smaller hole of the rear endplate.
13. Place bearing (200-9) in rear endplate. Tap in place with bearing driver (1100-800).
14. Slide motor assembly into motor housing (200-1 or 200-GM-1) collet end towards front of case.
15. Place housing, throttle side sticking out about 1 inch, into a 21/32" collet fixture. Screw throttle valve assembly (right hand thread) into motor housing and gently tighten. Remove from collet fixture.
16. On side exhaust case: Reinstall exhaust sleeve (200-15) if removed. Take care to leave one of the holes available for the collet lock pin. On front exhaust cases: Install muffler (200-30) into front of case, then install snap ring (400-39) into slot on case.
17. Place a few drops of oil into air inlet. Run tool slowly for a minute or 2 to allow blades and bearings to seat properly.
- 18. Check the operating speed with a reliable tachometer. The speed must be at or below the stamped speed on the tool.**
- 19. Reinstall all accessories and safety devices.**

Tool Parts Listing

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>ACCESSORIES</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
200-GM-1	MUFFLED CASE			
200-1	SIDE EXHAUST CASE	1100-311		3/8 NPT STRAINER CAP
200-2	CYLINDER	1100-313		1/4 NPT STRAINER BODY
200-3	REAR ENDPLATE	1100-315-A		FINE SCREEN
200-4	COUPLING	1100-315-B		COURSE SCREEN
200-5	ROTOR	541050		IN-LINE OILER
200-5-R	ROTOR SPACER	530206		KIT BOX
200-6	BLADES (3 REQ.)	541324		FOAM LINER FOR BOX
200-7	FRONT ENDPLATE	530198		1/8" TAPER BURR
200-8	BEARING	530200		1/8" FLAME BURR
200-9	O-RING	530202		1/8" BALL BURR
200-10	VALVE SLEEVE	530204		1/8" CYLINDRICAL BURR
200-11	VALVE STEM			OTHER SIZES AVAILABLE
200-12	VALVE COUPLING			
200-13	1/8" COLLET BODY		HOSE COMPONENTS	
200-13-094	3/32" COLLET BODY		<u>PART NUMBER</u>	<u>DESCRIPTION</u>
200-13-3	3 MM COLLET BODY		200-42	3' LENGTH OF HOSE (OTHER LENGTHS AVAILABLE)
200-14	COLLET NUT			1/4 NPT TO 1/4 NPT BUSHING
200-15	SIDE EXHAUST SLEEVE	400-27	400-27-M	1/4 NPT TO 1/4 BSP BUSHING
200-16	O-RING (2 REQ.)		598022	3/16" HOSE FERRULE (MUST HAVE CRIMPING TOOL)
200-30	MUFFLER			1/8" HOSE FITTING
400-39	LOCK RING		598024	1/4" HOSE FITTING
			598026	1/4" NPT BUSHING ADAPTER
			598028	
TOOLS				
<u>PART NUMBER</u>	<u>DESCRIPTION</u>			
200-17	COLLET LOCK PIN			
1100-028-1	9/32" WRENCH			
1100-050	1/2" WRENCH			
ASSEMBLIES				
<u>PART NUMBER</u>	<u>DESCRIPTION</u>			
AA-200-13&14	1/8" COLLET BODY ASSY.			
AA-530206	20G KIT BOX ASSY.			
200-41	3' HOSE ASSY.			
200-41-6	6' HOSE ASSY			
510234	REPAIR KIT			

Note: Use of any parts other than genuine Top Cat® parts voids any and all warranties, and may result in a hazardous situation and a decrease in operating efficiency.

Ergonomics - Work Healthy



The following suggestions will help reduce or moderate the effects of repetitive work motion and/or extended vibration exposure:

- 1) Do not over-grip the machine/tool. Use only the force required to maintain control.
- 2) Keep hands and body dry and warm. (Blood flow is important - exercise hands and arms as often as necessary.)
- 3) Keep wrists as straight as possible. (Avoid hand positions that require the wrist to be flexed, hyper extended or turned side-to-side.)
- 4) Avoid anything that may inhibit blood circulation such as smoking tobacco or cold temperatures.
- 5) Do not support body-weight on the tool during operation.
- 6) Maintain a stress-free posture for the entire body.

Prolonged exposure to vibrations created by vibrating sources may cause health hazards. There are gloves, handle wraps and other forms of protective measures available to help reduce the hazard. The fit and condition of any vibration abatement measure must be monitored.



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Installation and Maintenance Tips

Following the guidelines will help you to ensure the pneumatic tools your company uses are operating and are maintained in the very best of condition.

Initial Inspection of a New Tool

When a new tool is delivered to your facility, it is important to inspect the tool for any signs of damage that may have occurred during shipping. Here is a list of things to inspect:

- With the tool disconnected from the air supply, slide the throttle valve sleeve. The device should move freely and not become caught.
- Inspect the guard of the tool, if so equipped. The guard should be free of any chips, nicks or dents.
- Inspect the collet of the tool. The collet should show no signs of bends or chips. Grasp the collet by hand and spin. The collet should turn freely with no resistance.

Plumbing Installation

The tool must have fittings and connectors installed into the air inlet in order to connect with your company's air system. Your choice of fittings can greatly affect the performance of the tool.

Fitting Size

The size of the air inlet of the tool is the minimum size of fitting that will allow for proper airflow into the tool. Should a smaller fitting size be used such as reducers or adapters, this will constrict the airflow into the tool and reduce the overall performance.

Coupling Size and Installation

The coupling size should be equal to or larger than the inlet size of the tool. If a smaller size coupling is used then the air supply volume may be reduced which may lead to reduced performance from the tool. The coupling should be installed near to the tool. It is important that the tool receive internal lubrication on a regular basis. Having the connection closer to the tool will promote regular lubrication, as the connection is easily accessible. Hose whips are often used between the tool and the coupling. Use thread sealant on all pipe threads and ensure a tight fit.

Operating Speed Test

After your initial inspection and installation of the plumbing connections, it is important to test for the operating speed of the tool. This test should be performed before you install any abrasive or tooling. Each tool is stamped with a maximum operating speed. This speed determines the highest rotational speed in R.P.M.'s that the tool will turn when it is functioning properly. This speed was set from the factory and is closely related to the operating speed of the abrasive used with the tool. This relationship will be discussed in the "mounting abrasives" section.

Find the maximum operating speed stamped onto the tool. Connect the tool to an air supply that provides 90 psi and secure the tool in a vise. A lower or higher air pressure will result in a false speed test and may create a hazardous situation. Depress the throttle lever or trigger and run the tool. Use a properly calibrated tachometer to determine the actual operating speed of the tool. The actual operating speed on the tachometer should be no more than 95% of the maximum free speed stamped on the tool. If this is not the case then contact the distributor or tool manufacturer immediately. The tool must not be put into service if the actual speed is over 95% of the stamped maximum speed.

Example:

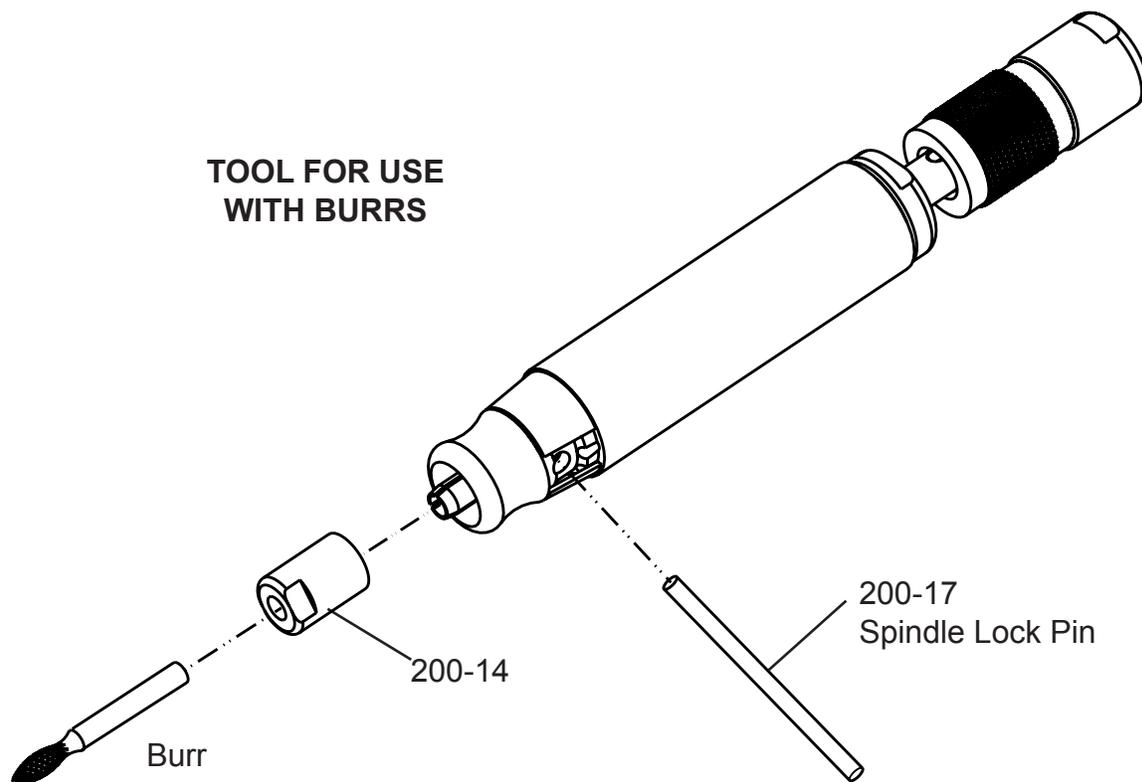
Tool rated at 60,000 R.P.M.

95% of 60,000 (.95 x 60,000) = 57,000

The tool should run no faster than 57,000 R.P.M.'s when tested with a tachometer. Tachometers must be checked and calibrated on a regular basis according to the manufacturers recommendations

Mounting Tooling

The mounting of the burr or abrasive used with the tool is very important to ensure safety for the operator and proper functioning of the tool. There are strict rules for mounting that are outlined in ANSI B7.1-2000. The following diagrams briefly describe the methods and equipment for mounting most abrasives.



Each burr, wheel or mounted stone is labeled with a maximum operating speed. It is extremely important to compare this rating with the maximum operating speed of the tool. Never mount a burr, wheel or stone on a tool where the maximum operating speed of the tool is higher than the maximum operating speed of the tooling. This can cause an over speed situation and can result in injury.

The following list details specific items one should inspect and be aware of when mounting abrasives.

- The maximum operating speed marked on the burr, wheel or stone must be equal to or higher than the rated spindle speed (free speed) of the tool.
- Do not use any burr, wheel or stone that shows cracks, chips or evidence it has been soaked in fluids.
- Immediately shut off the tool if unusual sound or vibration is detected. Remove and inspect the inserted tooling or wheel and check the tool speed (RPM). Use of over-speeding grinder, or unbalanced bits or wheels, may result in serious injury.

Testing a Mounted Burr or Wheel

Start any new grinder with a new wheel, stone, or burr under a bench and away from any bystanders. Run at full speed for one minute.

Ensure Proper Pressure, Filtration & Lubrication

Properly lubricated pneumatic tools work better, last longer between maintenance intervals and are safer in general use. The maintenance costs are reduced dramatically when a little time is taken to regularly lubricate the tools. There are several ways to ensure proper lubrication.

1) Filters, Regulators & Lubricators

These devices should be installed in the air system at each grinding station and inspected regularly to ensure proper operation. Each device in this set performs a vital task that greatly affects the performance of the tool and overall longevity of the component parts.

Filters

A filter is a device used to trap/contain particulate and liquid contaminants in the compressed air system. They generally have a cartridge or screen that requires cleaning or replacement regularly. Without this maintenance, the filtering device can become clogged and reduce the flow of air to the tool. A loss in performance can result.

Regulators

A regulator adjusts the operating pressure supplied to the tool. This device generally is used with a pressure gauge that will indicate the current pressure setting. All Top Cat ® pneumatic tools are designed to operate at 90 PSI (6.2 bar) while the tool is running. The tool should never be run if the pressure should exceed 90 PSI (6.2 bar).

Lubricators

Lubricators are devices that induce a controlled amount of oil into the air supply for pneumatically driven tools. They generally contain a reservoir that one must keep filled with oil. A light grade oil such as Mobil DTE light or equivalent is recommended. There is a variable setting on the lubricator that will determine the amount of oil induced into the air supply. It is important to inspect both the setting and amount of oil in the lubricator regularly to determine proper functioning of the device. The lack of oil in the air system will greatly reduce the performance and longevity of the pneumatically driven tool.

2) Direct injection of oil into the tool

A simple and easy way to ensure proper lubrication is to inject the oil directly into the tool air inlet. This should be performed prior to storage of the tool. To perform this task one must have a small container of the proper lubricating oil.

- Disconnect the tool from the air supply at the air coupling.
- Place a few drops of oil from the container into the air inlet of the tool directly.
- Reconnect the tool to the air supply.
- Direct the exhaust of the tool away from any bystanders or cover the exhaust with a shop rag.
- Run the tool until the oil has completely passed through the unit.

The best lubrication techniques include both methods.

What Conditions Indicate the Need for Maintenance?.

Pneumatic tools will exhibit several distinct signs that maintenance is required. Higher costs can be avoided if maintenance is performed when the first signs are evident. The following list details conditions that may indicate the necessity for service.

- 1) With the tool disconnected from the air supply, grasp the collet and spin in the direction of operation. The collet should spin freely with no resistance.
- 2) With the tool disconnected from the air supply, grasp the collet by hand. Attempt to move the collet from side to side and back and forth. Excess play can be a sign that service is required.
- 3) A reduction in power may indicate the necessity for maintenance.
- 4) Should the tool not maintain a uniform operating speed, servicing may be required.

The Common Wear Items:

The Blades (200-6) are subjected to contaminants within the air system. It is common for grit or sand to enter the tool through the air system and become lodged onto the blades. This can cause the blades to delaminate where pieces of blade material will flake off. Any blade exhibiting this characteristic should be replaced. The blades will see the most wear on the longest edge along their height. This is the surface that makes contact with the cylinder wall and creates an air seal. The overall width of the blade will reduce as this surface wears. When any one-end width of the blade wears to the minimum width, (.053 inches) then one should consider replacement.



The bearings (200-8). There is no means of measurement that can determine the condition of a bearing. The only test that can be performed is to manually turn either the outer or inner race with respect to each other. The movement should feel free with no resistance. If resistance is felt, either continuously or repetitively, then the bearing should be replaced.

The Front Endplate (200-7). The front endplate is essentially a flat steel disc in the front of the motor assembly. The rotor makes occasional contact with the front endplate. Over time, this contact will wear away the surface of the endplate and result in a circular depression in the middle of the part. When this depression becomes 0.003 inches deep from the original surface, then the efficiency of the motor is reduced to the point where one should replace the endplate.

The Cylinder (200-2). The only wear seen on the cylinder is going to occur on the inner surface. This surface is always in contact with the blades. Over time, the blades will remove material from this surface that will reduce the overall performance of the tool. Consecutive high and low spots will become evident on the internal surface. They will appear as ridges along the axis of the cylinder. When these ridges vary 0.016 inches from high to low, the cylinder should be replaced.

The Rear Endplate (200-3). The rear endplate is located toward the rear of the motor assembly. The most wear this part is exposed to is from occasional contact with the rotor. Over time, this contact will wear away the surface of the endplate and result in a circular depression in the middle of the part. When this depression becomes 0.003 inches deep from the original surface, then the efficiency of the motor is reduced to the point where one should replace the endplate.

This covers all of the predictable wear that can occur within the tool. Other factors due to environment, level of treatment/care and air supply quality can cause other forms of wear that are unpredictable.

For More Information:

1) General Industry Safety & Health Regulations 29 CFR, Part 1910 and where applicable Construction Industry Safety & Health Regulations 29 CFR, Part 1926 available from Superintendent of Documents, Gov't. Printing Office, Washington, D.C. 20402.

2) Safety Code For Portable Air Tools, ANSI B186.1, B7.1 and Z87.1, available from American National Standards Institute, Inc. 1430 Broadway, New York, NY 10018

Grinders

- Vertical Grinders
- Horizontal Grinders
- Right Angle Grinders
- Die Grinders
- Extended Grinders
- Bench Grinders

Polishers

- Vertical Polishers
- Horizontal Polishers
- Right Angle Polishers

Saws

Air Motors

Drills

Percussion Tools

- Scalers
- Needle Scalers
- Chipping Hammers
- Rammers

