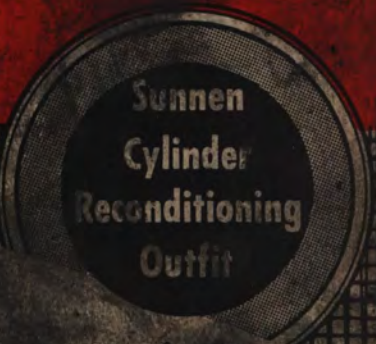


INSTRUCTIONS

for



Sunnen Cylinder Reconditioning Outfit



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Index

Page Nos.

GRINDER

Adjustment To Size	5
Operation	6, 7
Parts List	18
Service Information	9, 12, 13, 14
Stroking Procedure	6

STONES

Assembly to Grinder	4
Chart	10, 11
How To Use	

For Best Results

Thoroughly wash out cylinders with gasoline and remove all carbon and oil, then dry with a clean rag before grinding.

Roughing and finishing stones must be used dry; polishing stones must be used with lubricant.

If you are not using a Sunnen Grit Remover, stop all oil holes with soap before grinding; on pressure fed motors, tape all crank bearings.

To speed up your grinding job we recommend the Sunnen Grit Remover and Universal Grinding Stand. (See illustrations on pages 16 and 17.)



- | | |
|-----------------------------------|--------------------|
| 1 Standard Cylinder Grinder | 1 Drive Shank |
| 1 Set Roughing Stones and Guides | 1 Metal Box |
| 1 Set Finishing Stones and Guides | 1 Instruction Book |
| 1 Set Polishing Stones and Guides | 1 Guarantee Tag |

Assembly of Stones to Grinder



Remove center pinion adjustment from grinder body

Insert stones and guide blocks in their proper holes — **Marked "X" on Grinder Body** — with their numbered ends up. Chatter and locking will result from installation of stones and guide blocks in unmarked holes.

Hold stones and guide blocks tight against grinder body and re-install the center pinion adjustment.

IMPORTANT—Stones and guide blocks must be kept together and used as sets. Never use the same pair of guide blocks with several sets of stones.

Adjustment to Cylinder Size



Raise the center pinion assembly $\frac{1}{4}$ " and turn it counter-clockwise to set the stones roughly to the diameter of the cylinder. Then depress the center pinion assembly until its internal gear engages the external gear on the grinder body.

Final setting is made by turning the winged collar clockwise. With this adjustment turn the stones out until they are in firm contact with the cylinder. Stones should not protrude more than $\frac{1}{2}$ " from the cylinder when making this adjustment.

Operation of Grinder

For best results we recommend a $\frac{5}{8}$ " (or larger) slow speed — 250 to 450 r.p.m. — drill to drive the grinder.

The fast-cutting roughing stones must always be used for sizing. Removal of excess stock with finishing stones will increase the grinding time appreciably while polishing stones will practically stop cutting when base metal is reached.

Always maintain firm stone tension to achieve rapid stock removal and accurate results.



The UNIVERSAL GRINDING STAND and SUNNEN GRIT REMOVER should be used to eliminate operator fatigue, and to insure positive grit removal.

Stroking Procedure

Maintain a constant, steady, stroke. Start stroking at the lower end of the cylinder, and with short strokes allow the stones to go through the lower end of the bore approximately 1". Gradually lengthen the stroke as the stones

contact higher on the cylinder walls. Stroke to the top of the bore occasionally to remove the ring ridge as the bore is enlarged. Make frequent adjustments to compensate for stock removal.

An excellent indication of the condition of the cylinder bore is the speed of the drill. An appreciable reduction in drill speed while grinding indicates a somewhat smaller diameter. Localize stroking until constant drill speed throughout indicates a straight bore.

When the bore is approximately 75% straight, stroke the full length of the cylinder. Do not let the stones project more than 1" out of the bore on top or bottom.

Using the Roughing Stones

Roughing stones must be used dry. These stones are designed for rapid stock removal and accurate sizing. Remove all stock except approximately .0025" stock which should be left for finishing and polishing operations.

Using the Finishing Stones

Finishing stones must be used dry.

The roughing operation should always be followed with finishing stones. Remove approximately .002" stock with these stones and leave about .0005" stock for the polishing operation.

Using the Polishing Stones

Polishing stones must always be used with lubrication. The polishing operation removes the last .0005" of stock, brings the cylinder up to size, and produces a satin finish of 15-20 micro-inches R.M.S., as recommended by automobile manufacturers.

Maintain a firm honing pressure, and keep stones well lubricated with honing oil, vegetable shortening (Crisco), or lard. Lubrication prevents stone glazing and keeps the stones free-cutting. Time: 20 to 30 seconds per cylinder.

Caution

Watch clearances — cylinders ground by the Sunnen method have a "base metal" finish and need no "wearing-in" allowance. Therefore, maximum piston to cylinder clearances are recommended for Sunnen ground cylinders.

Special Stones

When grinding chilled cast iron sleeves special stones are required. (See stone selection table on pages 10 and 11 for proper stone numbers.) Follow the foregoing operating instructions when using these special stones.

Grinding After Using Carboloy Fly Cutter Boring Bar

Allow approximately .0025" for stock removal and follow the same procedure as that outlined under finishing and polishing operations in the preceding section.

Sunnen Stones for Standard Cylinder Grinder

DIAMETER RANGE	FOR USE IN	60 GRIT	150 GRIT	220 GRIT	280 GRIT
		ROUGHING STONE	FINISHING STONES	USE DRY TO FINISH UP FOLLOWING BORING BAR OR ROUGH HONING	POLISHING STONES
2½" to 2¾"	Cylinder Blocks	AN 115	AN 215	AN 300	AN 515
2½" to 4¼"	Cylinder Blocks	AN 100	AN 200		AN 500
	Hardened Cylinder Sleeves	AN 130	AN 230	AN 530	
3¾" to 5½"	Cylinder Blocks	AN 101	AN 201	AN 301	AN 501
	Hardened Cylinder Sleeves	AN 131	AN 231	AN 531	
4¾" to 14½"	Cylinder Blocks	AN 106	AN 206	AN 306	AN 506
	Hardened Cylinder Sleeves	AN 136	AN 236	AN 536	

These Stones Must be Used with Master Holder Sets

MASTER HOLDER SETS

Stones for diameters from 4¾" to 14½" require Master Holder Sets. Only ONE set is required for each size range.

DIAMETER RANGE	SINGLE LENGTH MASTER HOLDER SET NUMBER	DOUBLE LENGTH MASTER HOLDER SET NUMBER
4¾" to 7"	AN 355	AN 855
6" to 9"	AN 365	AN 865
8" to 11½"	AN 375	AN 875
11" to 14½"	AN 385	AN 885

STONE SUPPORTS

To be sure that chatter is prevented Stone Supports should be used in diameters greater than 6 inches.

USE STONE SUPPORT NUMBER	WITH THESE MASTER HOLDER SETS
AN 260	AN 365, AN 865
AN 280	AN 375, AN 875
	AN 385, AN 885

Cleaning Motor After Grinding

The Motor should be cleaned thoroughly and all soap removed from oil holes after grinding.

If Your Grinder Should Chatter

Grinder chatter is usually induced by tight guide blocks. Under certain conditions, the stones will wear more rapidly than the spring mounted guide blocks, resulting in solid compression of the block spring washers. File or grind not more than $\frac{1}{32}$ " from the wearing surface of each guide block to relieve the guide block pressure.

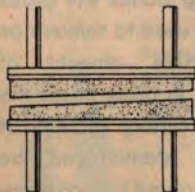
Another possible cause of chatter is a damaged drive mechanism.

Damaged Drive Mechanism

Bent universal joints or broken drive shanks are the result of hitting an obstruction by stroking too far through the cylinder.

In the event of a broken shank, the threaded piece remaining in the universal joint can be easily removed so that a new shank can be installed. Satisfactory repairs cannot be made by welding damaged parts.

Tapered Stones and Guide Blocks



This condition results from grinding with too little stone tension. To remedy, keep stones cutting by frequent adjustment in order to maintain firm stone tension.

Stones Not Cutting

Roughing and finishing stones must always be used dry.

Any grease, oil, or carbon on the stones will cause them to load and cease cutting. If stones are not saturated they can be cleaned with a wire brush. Stones saturated with oil cannot be cleaned and must be replaced.

Tight guide blocks will cause finishing and polishing stones to cut more slowly. For remedy see section on chatter.

In some unusual cases finishing stones will glaze when used to remove an excessive amount of stock. In these cases the free cutting action of these stones can be maintained by occasionally filing down the stone backing.



Sunnen Stone Supports

For honing cylinders 6 inches or more in diameter, stone supports are recommended to prevent chatter. They are easy to install and hold the grinder rigid.



Ridge Removing Stones

Quickly and accurately remove the top cylinder ridge without marring or gouging the cylinder. Remove the ridges from a six cylinder motor in 12 to 15 minutes, and leave a smooth surface "feathered" into the cylinder wall.



Set AN-700, Range $2\frac{1}{8}$ " to $4\frac{1}{4}$ "
Set AN-701, Range $3\frac{3}{4}$ " to $5\frac{1}{2}$ "
Reloads for either set No. AN-610

GN-80 GRIT REMOVER



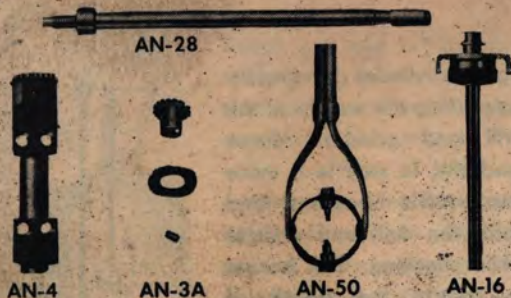
Keeps grit and cuttings out of motor — Saves 1½ hours cleaning time. Powerful vacuum sweeper motor lifts every particle of grit and cuttings and deposits them in the bag. Grit collector housing is assembled to the grinder at the start of the job and moves from cylinder to cylinder with the grinder. It handles any cylinder from 2 $\frac{11}{16}$ to 4 $\frac{1}{4}$ " in diameter. Can be used with any model Sunnen Cylinder Grinder.

UN-60 GRINDING STAND

Lightens cylinder grinding by supporting the weight of the drill and grinder. Allows mechanic to stay in a more comfortable position and holds the drill and grinder while checking. Can be set to control the depth of stroke — prevents grinder from going too far through cylinder. Can be put together, or collapsed for storing in 30 seconds.



Parts for Standard Cylinder Hone



- AN-4 Hone Body
AN-50 Universal Joint Complete
AN-16 Center-Pinion Adjustment
AN-28 Drive Shank
AN-3A Body Gear Set

AN-812 LARGE-CYLINDER HONE—Recommended for holes 4-3/4" to 14-1/2" diameter. Equipped with heavy duty universal joint and 3/4" drive shanks 12" and 24" long.

Guarantee on Grinder

The Sunnen Cylinder Grinder is unconditionally guaranteed to give satisfactory performance, when properly handled according to instructions. If you are not absolutely satisfied after using it for 30 days, you may return it and the full purchase price will be refunded.

Stones are not Guaranteed

Stones are made of best materials and manufactured with every possible care; however, it is impossible to guarantee them for any definite period of time because of variance in operating conditions. Chipped or cracked stones will not interfere with the operation or accuracy of grinder, and it is not necessary to replace them.

Do not let your stones get caked with carbon or grease. It destroys their cutting quality. Always keep them clean.