INSTRUCTIONS BOOKLET

for

SUNNEN HONING TOOLS AND STONE SETS

(EXCLUDING PORTABLES)

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*Up to 11.5 in. (299 mm) when used with Sunnen H85, H165, and H200 Hone Head Modules. And up to 15 in. (381 mm) when used with Sunnen JS9X Cage Assembly.

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## References – For Automotive Applications
- Sunnen Engine Rebuilding Equipment Catalog ................................. A-7100
- Sunnen Portable Hones and Accessories for Engine Rebuilding .......... X-AN-5005

## References – For Industrial Applications
- Sunnen Bore Sizing & Finishing Supplies Catalog ............................ X-SP-5500
- Sunnen Portable Hones and Accessories for Industrial Applications X-AN-5020
INSTRUCTIONS
For MPS Series Wide Range Power Honing Tools

Assemble Sunnen MPS Series Wide Range Power Honing Tool as shown.

WARNING
Assemble Honing Tool as illustrated. Failure to include Disassembly Rings or use of more than one Ring fitting could result in personal injury or damage to Honing Tool and Equipment.

1. To obtain necessary length of your Honing Tool, two or more Drive and Feed Extensions may be screwed together (use one Disassembly Ring per fitting).
2. Screw Input Yoke Adapter and Output Flange Adapter with Disassembly Rings, on Drive and Feed Extension.
3. Install Hone Head Module on Output Flange Adapter, using four (4) Socket Head Capscrews (provided with Hone Head Module).
4. Install Honing Tool on machine:
   Slide Input Yoke Adapter onto Hex Shaft on Remote Feed Unit.
   Lock Input Yoke Adapter into Drive Ring on Remote Feed Unit.
5. Pull back Release Ring, tilt Hone Body, and remove Pinion.

WARNING
Failure to tighten all fittings could result in personal injury or damage to Honing Tool and Equipment.

6. Using Hone Body as a lever, tighten Drive and Feed Assembly by turning Hone Body clockwise to ensure all fittings are tight.
7. Install Stone Holders and Guides on Master Holders.  
8. Install Master Holders on Hone Body.  
9. While holding Master Holders in place in Hone Body, reinsert Pinion.  
11. Slide Universal Cover over Input Yoke Adapter.  

DISASSEMBLY  
1. Remove Honing Tool from Machine.  
2. Remove Hone Head Module by removing four (4) Socket Head Capscrews.  

WARNING  
Safety Glasses MUST be worn when removing Disassembly Rings. Use care when removing Rings, to prevent personal injury or damage to Honing Tool and Equipment.  
3. Use a Center Punch (or Chisel) to break Disassembly Rings at notch.  
4. Remove Disassembly Rings by driving out with a Flat Punch (or Chisel). Discard old rings.  
5. Unscrew Adapters from Drive and Feed Extension.  
6. Inspect for signs of wear or damage of parts; replace as necessary.
INSTRUCTIONS
For H70/HY70 Series Stone Holders & Guides

The following instructions cover installation of Sunnen’s H70 and HY70 Series Stone Holders and Guides. H70 and HY70 Series Stone Sets fit all Master Holders for MPS-H70 and MPS-H85 Hone Head Modules.

**NOTE:** For honing bores with no interruptions use H70 Series Stone Set, which includes two Guides. For honing keyway slotted holes use HY70 Series Stone Set, which includes four Guides.

Stone Holders and Guides can be changed WITHOUT removing Stone and Guide Master Holders from Hone Head Module; refer to Stone Holders & Guides Replacement.

1. Remove Stone Holders and Guides from Master Holders.
   Insert Swaging Tool into slots between Stone Holder and Master Holder; rotate tool one half (1/2) turn in slot on holder (this will separate Stone Holder from Master Holder); then pry Stone Holder from Master Holder.
   Repeat for other Stone Holder and Guides.
   Discard old Stone Holders and Guides. Old Stone Holders and Guides CANNOT be remounted.
   Inspect Master Holders for signs of excessive wear or damage; replace if necessary (see Master Holder Removal).

2. Install Stone Holders and Guides on Master Holders:
   **CAUTION**
   Stone Holders and Guides MUST be firmly seated on Master Holders to prevent them from breaking loose during honing operation and damaging workpiece or Honing Tool.
   Wipe Master Holders’ mounting surfaces clean.
   Insert hollow lugs on Stone Holder in corresponding holes in Master Holder. While holding Stone Holder firmly in place on Master Holder, insert Swaging Tool in hollow lugs and rotate tool one half (1/2) turn. (This process expands hollow lugs in Stone Holder, locking Stone Holder securely into Master Holder.)
   Repeat operation for installing other Stone Holder and Guides on remaining Master Holders.
NOTE: Guides MUST be mounted as shown.

1. Pull back Release Ring and tilt Hone Body:
   Pull Pinion all way out of Hone Body. Inspect Pinion for signs of wear and freedom of movement; replace if necessary.

Remove Stone and Guide Master Holders from Hone Body.

2. Remove Stone Holders and Guides from Master Holders.

3. Inspect Master Holders and Pinion for signs of excessive wear or damage, replace if necessary.

4. Install Stone Holders and Guides on Master Holders.

CAUTION

Stone Holders and Guides MUST be firmly seated on Master Holders to prevent them from breaking loose during honing operation and damaging workpiece or Honing Tool.

5. Insert Master Holders as far as they will go into their proper holes, marked with an “X” in Hone Body.

6. While holding Master Holders in place in Hone Body, reinset Pinion.

Retract wedge. Install stone assembly in stone slot with thick end toward front (toward operator), allowing retaining lug on front end to enter first and extend into front tubular pilot of mandrel. Stone assembly should enter mandrel stone slot freely. Lightly press stone assembly down against wedge. When properly installed, stone surface should be parallel to mandrel shoe surface.

**NOTE:** A new stone may not allow a minimum diameter part to slide onto mandrel. In this case, dress off edges of stone with LBN-700 dressing stone, until part will go on mandrel.

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**CAUTION**

Always remove stone from mandrel while mandrel is still assembled in adapter.

Advance wedge until rear of stone assembly lifts out of mandrel slot, approximately 1/16 in. (0.7 mm).

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**CAUTION**

Do not advance wedge to point where it binds retaining lug on stone holder. Retract wedge slightly and remove stone assembly by sliding toward rear to disengage retaining lug on front of stone holder.
GENERAL  Observe the following Hints and Precautions to obtain optimum life and performance from your Honing Stone.

WARNING  Stone must be trued to within .010 in. (0,25 mm) of (piston pin) bore diameter to be honed. If stones are not trued in, mandrel may lock up in oil groove of piston pin bore, causing personal injury, and/or damage to part, mandrel or stone.

COOLANT  For best cutting action and longest stone life, use ONLY Sunnen Industrial Honing Oil (MB-30 or MAN-863). DO NOT dilute or “cut” these oils with other fluids. Avoid accidental dilution with solvents or cleaning fluids.

PRESSURE  Start with a light cutting pressure. Ease pedal down gently to start honing. If cutting action slows after pedal is all way down, increase pressure until cutting action increases. Always use lowest setting that gives good cutting action, with respect to bore diameter, condition of bore, material to be honed, and stones used. DO NOT allow stones to glaze.

SPINDLE SPEEDS  For best cutting action, select spindle speed that gives best cutting action, with respect to bore diameter, condition of bore, material to be honed, and stones used. Refer to Spindle Speed Chart included with your machine’s operating instructions, or posted on your machine.

TRUING  These Stones have been chamfered to fit a wide range of hole sizes, but may have a small amount of interference with Truing Sleeve. Truing MUST be done with a Truing Sleeve that is within .010 in. (0,25 mm) of (piston pin) bore diameter to be honed. If’ Truing Sleeve will not fit over stones, remove high points by saturating stone with honing oil and rubbing away points of interference with a Sunnen LBN-700 Abrasive Dressing Stick. True as follows:

Ensure Motor is turned OFF. Slide Truing Sleeve on mandrel, depress foot pedal & advance Stone until it contacts Sleeve. Advance Stone another .001 to .002 in. (0,03 to 0,05 mm), release foot pedal, turn Motor ON, and begin truing without lubricant. Use Truing Sleeve to indicate “high” spots; then turn Motor OFF and remove Truing Sleeve. Use Sunnen LBN-700 Abrasive Dressing Stick to remove those “high” spots, until approximately 1/2 of width of each Stone is trued into (piston pin’s) bore diameter.

DRESSING  Dress a glazed stone by rubbing with a Sunnen LBN-700 Abrasive Dressing Stick.
INSTRUCTIONS
For Sunnen H50 Series Stone Set

Sunnen H50 Series Stone Sets consist of one (1) pair of Stone Assemblies. Stone Assemblies may be changed WITHOUT removing Master Holders from Hone Head Module.

Remove Stone Assemblies from Master Holders as follows:
1. Insert Swaging Tool into slots between Stone Assembly and Master Holder; rotate tool one half (1/2) turn to separate Stone Assembly from Master Holder; then pry Assembly from Holder.
2. Repeat for remaining Stone Assembly.
4. Inspect Master Holders for signs of excessive wear or damage; replace as required.

Install Stone Assemblies on Master Holders as follows:
1. Wipe Master Holders’ mounting surfaces clean.
2. Insert hollow lugs of Stone Assembly into corresponding holes in Master Holder. Assemblies MUST be firmly seated on Master Holders to prevent them from breaking loose during honing and damaging workpiece or Honing Tool.
3. While holding Stone Assembly firmly in place on Master Holder, insert Swaging Tool in hollow lugs and rotate tool one half (1/2) turn to expand lugs and lock Assembly securely on Holder.
4. Repeat operation for installing remaining Stone Assembly on remaining Holder.
INSTRUCTIONS
For Sunnen H70 Series Stone Set

GENERAL
Sunnen H70 Series Stone Set consists of one (1) pair of Stone Assemblies and one (1) pair of Guides. Stone Assemblies and Guides may be changed WITHOUT removing Master Holders from Hone Head Module.

REMOVAL
Remove Stone Assemblies and Guides from Master Holders as follows:
1. Insert Swaging Tool into slots between Stone Assembly and Master Holder; rotate tool one half (1/2) turn to separate Stone Assembly from Master Holder; then pry Assembly from Holder.
2. Repeat for remaining Stone Assembly and Guides.
4. Inspect Master Holders for signs of excessive wear or damage; replace as required.

INSTALLATION
Install Stone Assemblies and Guides on Master Holders as follows:
1. Wipe Master Holders’ mounting surfaces clean.
2. Insert hollow lugs of Stone Assembly into corresponding holes in Master Holder. Assemblies MUST be firmly seated on Master Holders to prevent them from breaking loose during honing and damaging workpiece or Honing Tool.

CAUTION
Guides MUST be mounted as shown.
3. While holding Stone Assembly firmly in place on Master Holder, insert Swaging Tool in hollow lugs and rotate tool one half (1/2) turn to expand lugs and lock Assembly securely on Holder.
4. Repeat operation for installing remaining Stone Assembly and Guides on remaining Holders.
Three lugs have been added to RY18 Stone Holders and RF-D Shoes to give them greater stability at large end of diameter range. When using these stones and shoes in early model 10RY-1800 and 10RY-2100 Mandrels in bores at lower end of their diameter range, it will be necessary to file off these lugs to reach minimum diameters. We suggest that you do not remove lugs unless you find it necessary to reach minimum diameters.
INSTRUCTIONS
For Sunnen Hydraulic Brake Cylinder Honing

INTRODUCTION
Start honing with light cutting pressure in smallest diameter area of hole. Find tight spot and hone until it is approximately same diameter as rest of hole. Then stroke full length of hole.

NOTE: These stones are spring loaded and will wear rapidly if cutting pressure is heavy enough to collapse spring.

SIZING
To remove stock rapidly, stone must be kept wet with a continuous flow of Sunnen Honing Oil.
If lubricant is flowed on, use SC-7, HB-7, XSC-7 or XHB-7 Stone to remove deep scratches and true up bore. If lubricant is brushed on, use SC-S, HB-5, XSC-5 or XHB-5.

FINISHING
If lubricant is flowed on, use SC-13, HB-13, XSC-13 or XHB-13 Stone. If lubricant is brushed on, use SC-7, HB 7, XSC-7 or XHB-7 Stone as follows:
Remove excess lubricant from cylinder and stone.
Place work on mandrel and hone with light cutting pressure, allowing stone to “load” in order to produce a fine finish.

CLEANING
CAUTION
Cylinders must be thoroughly cleaned with a solvent after honing, to remove all traces of grease or oil.
One of the most significant features of these aluminum die-cast engine blocks is that they do not require steel or cast iron liners in cylinder bores. Pure particles of silicon, averaging about .001 in. (0.03 mm) in diameter, are dispersed in aluminum alloy throughout engine block. Because silicon is very hard, there will be very little wear in cylinder bores. In fact, as far as pistons and rings are concerned, cylinder wall is a silicon wall, and aluminum’s function is merely to HOLD silicon particles.

If cylinder bores become excessively scored or worn, they can be honed to accept oversize pistons. However, usual sizing and finishing operation leaves a cylinder wall of silicon and aluminum; silicon particles do not protrude from aluminum. To achieve proper surface for compatibility of rings and pistons, cylinders should be prepared in such a manner that silicon particles protrude from aluminum, so pistons and rings contact only silicon. Therefore, a special conditioning operation is needed to remove aluminum from between silicon particles. Refer to appropriate machine section under using a Sunnen Portable Cylinder Hone or under using a Sunnen CK/CV Vertical Honing Machine.

When reconditioning using a Sunnen AN-110, AN-111 or AN-112 Portable Cylinder Hone following items are required:

- Electric Drill: 5/8 in, 350 RPM
- Quick-Coupler: AN-80
- Honing Stand: UN-60
- Stone Sets: MM33-J63, MM33-J85, & MM33-C05
- Felt Set: MM33-F05
- Silicon Compound: AN-30
- Storage Box: AN-35
- Dial Bore Gage: Model GA-2125
- Honing Oil: MB-30

NOTE: Figures for Stock Removal Rates, Stone Wear, and Surface Finishes are general information only, and are all approximate.

1. To avoid hitting main bearing webs and damaging stones, place a soft steel or aluminum washer in bottom of each cylinder before honing.

2. Use a continuous flow of Sunnen Honing Oil while honing cylinders. DO NOT use honing oil on final conditioning operation.
ROUGHING

3. Hone to within .003 in. (0,08 mm) of finish diameter using an MM33-J63 Stone Set.

Remove 1 in. (25 mm) from top of stone as illustrated. Cut through abrasive with an old hacksaw blade and break off unwanted section of stone. Remove abrasive only; DO NOT cut into stoneholder.

Stock Removal Rate: .0035 in/min. (0,09 mm/min.)
Surface Finish: 25 - 30 Ra µin. (0,6 - 0,8 Ra µm)

NOTE: Figures for Stock Removal Rate, Stone Wear, and Surface Finish are all approximate.

FINISHING

4. Hone to within .001 in. (0,03 mm) of finish diameter, using an MM33-J85 Stone Set.

Remove 1 in. (25 mm) of top of stone, as illustrated.

Stock Removal Rate: .002 in/min. (0,05 mm/min.)
Surface Finish: 15 - 20 Ra µin. (0,4 - 0,5 Ra µm)

POLISHING

5. Wipe cylinder clean and hone to finish diameter, using an MM33-C05 Stone Set. Tighten Feed Pinion, as required.

Remove 1 in. (25 mm) from top of stone, as illustrated.

Stock Removal Rate: .0007 in/min. (0,02 mm/min.)
Stone Wear/Stock Removal Ratio: 2/1
Surface Finish: 4 - 6 Ra µin. (0,1 - 0,2 Ra µm)

CONSIDERING

6. Do not use a continuous flow of Honing Oil during this operation. Saturate an MM33-F05 Felt Set with Honing Oil. Wipe Cylinder clean.

Thoroughly mix Silicon Compound; then coat Felt Set and entire polished surface of cylinder wall with a heavy coating of compound.

IMPORTANT

To avoid contamination keep lid tightly closed on Compound; use only clean brushes when applying Compound; and DO NOT reuse Compound.

Tighten Feed Pinion, finger tight.
Turn ON power and hone cylinder for 1-1/2 minutes. Use a steady, even stroking motion; overstroke end of cylinder by 1/8 in. (3 mm).

**NOTE:** Long overstroking will tend to cause ends of Felts to wear faster, resulting in an uneven conditioning. A continuous flow of honing oil may wash away the Silicon Compound.

Periodically tighten Feed Pinion.

Cylinder surface will have a dull matte finish, approximately 12-18 µin. (0,3-0,5 µm), with no significant stock removal. Repeat for each cylinder.

**NOTE:** As Felt Set becomes worn, replace to avoid scoring cylinder with stone holders.

7. Carefully wipe cylinders clean.

**NOTE:** To avoid contamination: Store Felt Set(s) in AN-35 Storage Box.

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**WARNING**

Oil-saturated “Felt Sets” contain mineral oil, which is considered a Hazardous Waste. Dispose of according to applicable local, state, and federal regulations.

When reconditioning using a Sunnen CK-10 or CV-616 Vertical Honing Machine, the following items are required:

- Hone Head: CK-3000
- Master Holder Set: CK-3035A for stone sets
- Felt Holder Set: CK-3130A for felt set
- Stone Sets: C30-J54, C30-J84, & C30-C03-81
- Felt Set: C30-F85
- Silicon Compound: AN-30
- Storage Box: AN-35
- Dial Bore Gage: Model GA-2125
- Honing Oil: MB-30

**NOTE:** Using MB-30 Honing Oil reduces possibility of damage to cylinders due to stone loading. If you're presently using CK-50 Honing Oil, use C30-A53 Stones for roughing operation.

1. To avoid hitting main bearing webs and damaging stones, place a soft steel or aluminum washer in bottom of each cylinder before honing.

2. The following settings are for a Block with a standard cylinder bore of 3.501 in. in Dia. by 5.875 in. in length (88,9 x 149,2 mm). Adjust setting as required for particular engine being honed.

   - Stroke Scale: 2 \(\frac{3}{4}\) in. (70 mm)
   - Stroke Length Setting: 6 \(\frac{1}{8}\) in. (158 mm)
   - Top Overstroke: 11\(\frac{1}{16}\) in. (17 mm)
   - RPM: 155
   - SPM: 61

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CK/CV VERTICAL HONING MACHINE
NOTE: Settings for Feed Dial, Stock Removal Rate, and Surface Finish are all approximate.

ROUGHING

3. Hone to within .003 in. (0.08 mm) of finish diameter, using a C30-J54 Stone Set.

NOTE: When using CK-50 Honing Oil, use C30-A53 Stones for roughing operation.

Install Stone Sets on Master Holders and remove 3/4 in. (19 mm) from top of stone as illustrated. Remove abrasive only; DO NOT cut through master holder. Remove Alignment Guides. Alter Main Guide as illustrated.

FINISHING

Set Feed Dial at Number 3.
Advance Feed Dial 1 number per .001 in. (0.03 mm) of stock removed.

Stock Removal Rate is .0029 in/minute (0.07 mm/min.).

4. Hone to within .0005 in. (0.01 mm) of finish diameter, using a C30-J84 Stone Set.

Install Stone Sets on Master Holders and remove 3/4 in. (19 mm) from top of stone as illustrated. Cut through abrasive with an old hacksaw blade and break off unwanted section of stone.

Remove abrasive only; DO NOT cut through master holder. Remove Alignment Guides. Alter Main Guide as illustrated.

Set Feed Dial at Number 2. Advance Feed Dial 1 number per .001 in. (0.03 mm) of stock removed. Stock Removal Rate is .002 in/minute (0.05 mm/min.). Surface Finish is 10-13 Ra µin. (0.2-0.3 Ra µm).

POLISHING

5. Wipe cylinder clean and hone to finish diameter, using a C30-C03-81 Stone Set. Install Stone Sets on Master Holders and remove 3/4 in. (19 mm) from top of stone as illustrated.

Remove abrasive only; DO NOT cut through master holder. Remove Alignment Guides.
Alter Main Guide as illustrated.
Set Feed Dial at Number 1.
Advance Feed Dial very slowly until Load Meter indicates 30%, then hold Feed Wheel while setting Feed Dial to “3”. Machine will automatically shut off after approximately 1 minute and 45 seconds of honing per cylinder. Hone longer to reach finish diameter, as required.

Stock Removal Rate: .0005 - .0007 in/min.  
(0,01 - 0,02 mm/min.).

Surface Finish: 2 - 3 Ra µin. (0,05 - 0,08 Ra µm).

6. Do not use a continuous flow of Oil during Conditioning Operation. Wipe Cylinder clean to prevent dilution of Silicon Compound. Install C30-F85 Felt Set on CK-3130A Felt Holders and then install on Master Holders. Saturate C30-F85 Felt Set with Honing Oil. Thoroughly mix Silicon Compound; then coat Felt Set and entire polished surface of cylinder wall with a heavy coating of compound.

**IMPORTANT**
To avoid contamination keep lid tightly closed on Compound; use only clean brushes when applying Compound; and DO NOT reuse Compound.

Turn OFF Honing Oil Flow Control Valve. Set Feed Dial at Number 1. Advance Feed Dial very slowly until Load Meter indicates 30%; then hold Feed Wheel while setting Feed Dial to “10”. Machine will automatically shut off after approximately 2 minutes of honing per cylinder. Cylinder surface will have a dull matte finish. Repeat for each cylinder.

**NOTE:** As Felt Set becomes worn, replace to avoid scoring cylinder with metal stone holders.

7. Carefully wipe cylinders clean.

**NOTE:** When not in use, store Felt Set(s) in AN-35 Storage Box to avoid contamination.

**WARNING**
Oil-saturated “Felt Sets” contain mineral oil, which is considered a Hazardous Waste. Dispose of according to applicable local, state, and federal regulations.
SAFETY INSTRUCTIONS
READ FIRST

These tools and stone sets, like any equipment, may be dangerous if used improperly. Please read all warnings and instructions before attempting to use these tools and stone sets.

DO NOT remove or defeat any safety device.
Always wear eye protection when operating these tools.
DO NOT attempt any repair or maintenance procedure beyond those described in this booklet. Contact your Sunnen Field Service Engineer for repairs not covered.

Indicates CE version ONLY.