AIRSPADE®

PNEUMATIC SOIL EXCAVATION

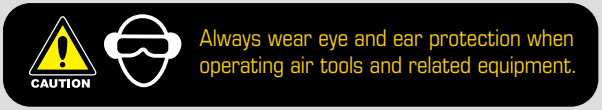
AIRSPADE

OPERATOR'S MANUAL

TABLE OF CONTENTS

AIRSPADE 2000 ARBOR SERIES

• Overall Length	60.8 inches (155 cm)
• Weight	8.2 pounds (3.8 kg)
• Operating Pressure	90 psi (6.2 bar)
• Connector	3/4" Swivel-type Universal Coupler
• Inlet	3/4" FNPT
• Handle	45 Degree grip
• Barrel	4 Ft. Insulated Fiberglass
• Auxiliary Handle	Screw-on, adjustable
• Dirt Shield	Rubber, adjustable
• Nozzle	Supersonic, Extra-hardened stainless steel
• Nozzle Flow Rate	25 cfm (0.7 m^3/min) 60 cfm (1.7 m^3/min) 105 cfm (3.0 m^3/min) 150 cfm (4.2 m^3/min) 225 cfm (6.4 m^3/min)



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AIRSPADE is covered by U.S. Design Patents D408,830, and D435,207.

AIRSPADE 3000 HEAVY-DUTY EXCAVATION SERIES

• Overall Length	68.5 inches (174 cm)
• Weight	15 pounds (6.8 kg)
• Operating Pressure	90 psi (6.2 bar)
• Connector	1" Air-King 4-Lug
• Inlet	1-1/4" NPT (Male)
• Handle	In-line grip
• Barrel	Insulated Fiberglass
• Dirt Shield	Rubber, adjustable
• Nozzle	Supersonic, Extra-hardened stainless steel
• Nozzle Flow Rate	330 cfm (9.4 m^3/min)

Always wear eye and ear protection when operating air tools and related equipment.

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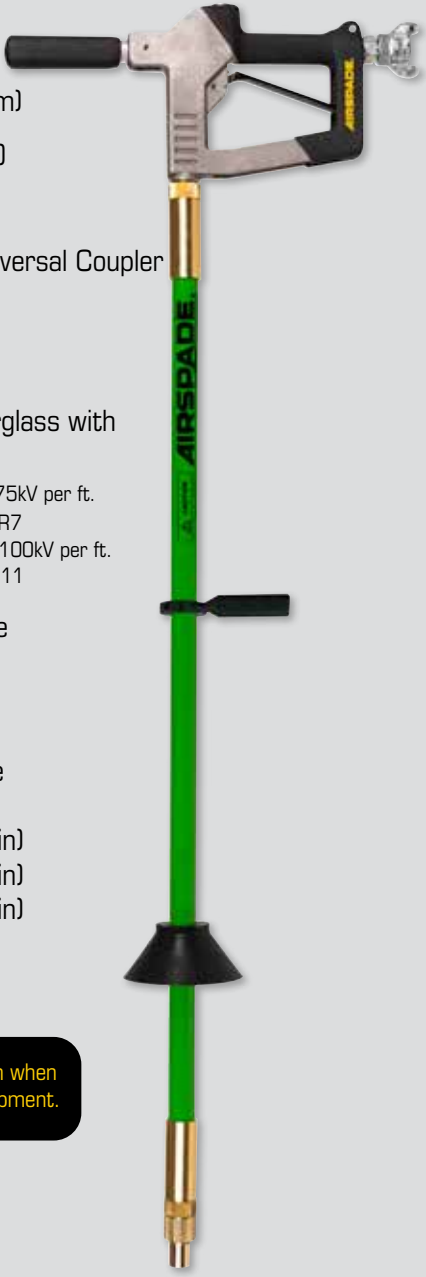
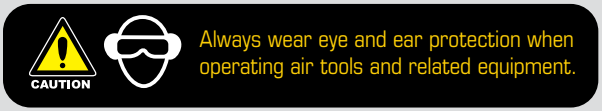
AIRSPADE 4000 UTILITY SERIES

• Overall Length	56.3 inches (143 cm)
• Weight	11.2 pounds (5.1kg)
• Operating Pressure	90 psi (6.2 bar)
• Connector	3/4" Swivel-type Universal Coupler
• Inlet	3/4" FNPT
• Handle	Horizontal grip
• Barrel	4 Ft. Insulated Fiberglass with Internal Hose INNER AIR HOSE rated to 75kV per ft. for 5 minutes per SAE 100R7 OUTER AIR HOSE rated to 100kV per ft. for 5 minutes per ASTM F711
• Auxiliary Handle	Screw-on, adjustable
• Dirt Shield	Rubber, adjustable
• Nozzle	Supersonic, Non-sparking bronze
• Nozzle Flow Rate	105 cfm (3.0 m^3/min) 150 cfm (4.2 m^3/min) 225 cfm (6.4 m^3/min)





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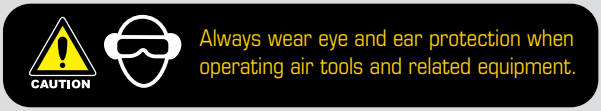
AIRSPADE 5000 ARBOR SERIES

Overall Length	63.5 inches (161 cm)
Weight	9 pounds (4.1 kg)
Operating Pressure	90 psi (6.2 bar)
Connector	3/4" Swivel-type Universal Coupler
Inlet	3/4" FNPT
Handle	In-line grip
Barrel	4 Ft. Insulated Fiberglass
Auxiliary Handle	Screw-on, adjustable
Dirt Shield	Rubber, adjustable
Nozzle	Supersonic, Extra-hardened, stainless steel
Nozzle Flow Rate	25 cfm (0.7 m^3/min) 60 cfm (1.7 m^3/min) 105 cfm (3.0 m^3/min) 150 cfm (4.2 m^3/min) 225 cfm (6.4 m^3/min)



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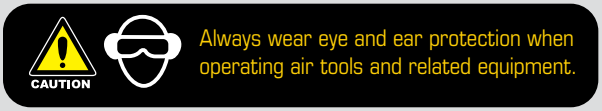
AIRSPADE 5000 UTILITY SERIES

- Overall Length — 62 inches (158 cm)
- Weight — 10 pounds (4.5 kg)
- Operating Pressure — 90 psi (6.2 bar)
- Connector — 3/4" Swivel-type Universal Coupler
- Inlet — 3/4" FNPT
- Handle — In-line grip
- Barrel — 4 Ft. Insulated Fiberglass with Internal Hose
  INNER AIR HOSE rated to 75kV per ft. for 5 minutes per SAE 100R7
  OUTER AIR HOSE rated to 100kV per ft. for 5 minutes per ASTM F711
- Auxiliary Handle — Screw-on, adjustable
- Dirt Shield — Rubber, adjustable
- Nozzle — Supersonic, Non-sparking bronze
- Nozzle Flow Rate — 105 cfm (3.0 m^3/min)
  150 cfm (4.2 m^3/min)
  225 cfm (6.4 m^3/min)



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AirSpade air-excavation tools set a new standard for worker safety and comfort. Typically powered by a portable, truck -mounted or tow-behind compressor, these tools provide a safe, powerful, and efficient method of uncovering underground utility lines, pipes, or sensitive tree roots without harm. Capable of excavation where a shovel or backhoe cannot be used, AirSpade tools feature several handles, that can be equipped with insulated fiberglass barrels of multiple lengths, and a variety of nozzle sizes for optimal job performance.

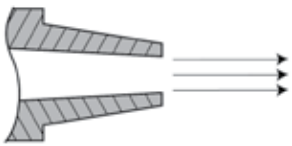
The heart of every AirSpade is the proprietary Supersonic Nozzle which produces a focused "laser-like" jet of air moving at approximately 1,200 mph (1,900 km/hr), or nearly twice the speed of sound. This supersonic air-jet penetrates voids in the soil and expands rapidly, therefore fracturing the soil. Unlike the hard cutting edges of shovels, picks, blades, or buckets, the air-jet is harmless to non-porous items such as tree roots, buried pipes, or cables. Excavating with AirSpade is much easier and many times faster than hand excavation.

AirSpade supersonic air-jet outperforms "homemade tools" featuring a pipe nipple or a crimped orifice. Air flow from these tools expands to atmosphere in an unfocused, complex manner while the supersonic air jet delivers significantly more kinetic energy and more focused momentum. In practical terms the AirSpade does more work by moving more material, and harder material, in a shorter period of time.

AIRSPADE SUPERSONIC NOZZLE

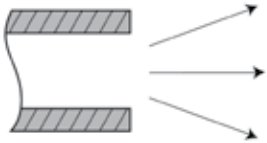
AirSpade Supersonic Nozzle turns compressed air into a high-speed, laser-like jet moving at twice the speed of sound – 1,200 mph. All of the energy and momentum of air moving at approximately Mach 2 is focused into the soil, dislodging it in a fraction of a second. (Fig. A) The result is faster, safer, and more efficient soil excavation.

(Fig. A)



FOCUSED AIR FLOW FROM
AirSpade SUPERSONIC NOZZLE

(Fig. B)



UNFOCUSED AIR FLOW FROM
IMPROPERLY DESIGNED NOZZLE

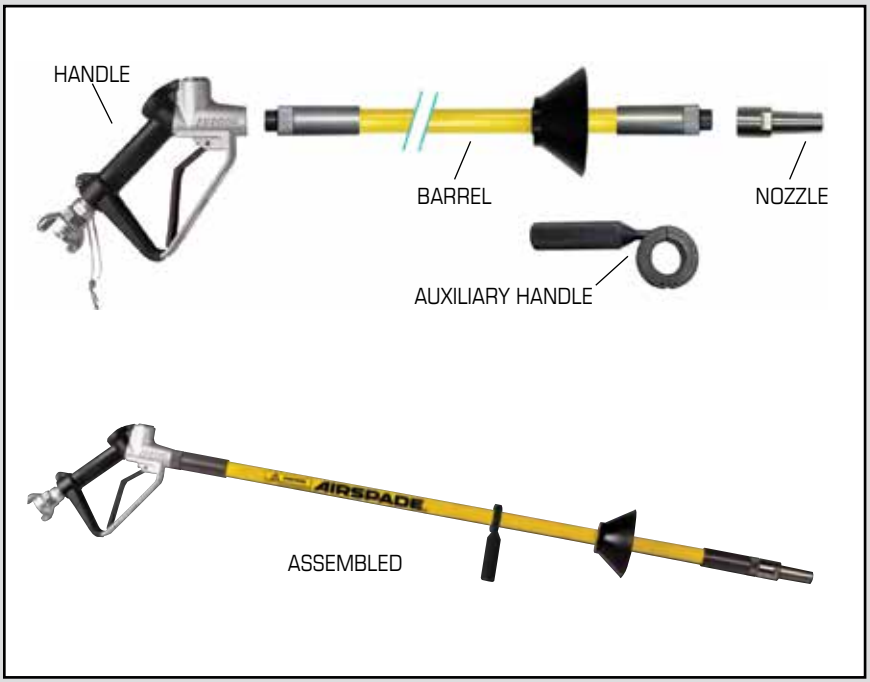
Air exiting from an improperly designed nozzle diffuses outward 3 to 4 times wider than the air-jet from the patented AirSpade supersonic nozzle. (Fig. B).

ALWAYS

- Wear appropriate protective work clothing and equipment. Cut and puncture resistant gloves, approved safety glasses with side shields and/or face protection, and protective earplugs or earmuffs should be worn while operating the AirSpade. Eye protection should comply with ANSI Z87.1-2015. Ear protection should provide a NRR of at least 20 dB.
- Wear approved respiratory protection when working in extremely dusty conditions.
- Wear approved, electrically insulated footwear and gloves if working near underground electrical lines.
- Ensure that all personnel near the area being excavated are aware that AirSpade is being used and that they wear appropriate personal protection as indicated.
- Protect surfaces that could be chipped, or damaged by dislodged soil or rock particles adjacent to the excavation work area by using suitable drop cloths, screens, or other means.
- Check the AirSpade for loose or damaged parts prior to use. Tighten, repair, and/or replace as necessary.
- Inspect hoses for leakage, kinking, abrasion, corrosion, or any other signs of wear or damage. Worn or damaged hose assemblies should be replaced immediately.
- Check that the air compressor is delivering the specified pressure to operate the AirSpade.
- Anticipate that the AirSpade tool will push upwards when using the 45 degree adapter. Brace against the upwards force by holding the tool in accordance with the operating instructions. See page 13.

- Operate the AirSpade until the operating and safety instructions are read and fully understood.
- Make any modifications to the AirSpade.
- Tie, tape, or otherwise lock or fasten the trigger in the “ON” position.
- Point, or aim the AirSpade at any person during operation.
- Allow hands, feet, or any body parts near the AirSpade nozzle tip during operation.
- Use the AirSpade as a pry bar.

- Read and follow directions below to properly assemble the AirSpade.
- Screw nozzle into barrel. Hand-tighten only.
- Screw barrel into handle. Hand-tighten only.
- Install auxiliary handle on barrel approximately mid-way between handle and nozzle.



CAUTION

User assumes full responsibility to read and understand these instructions prior to operation. Failure to adhere to these instructions can result in personal injury. User should also have operating knowledge of the air compressor to which the tool is attached.

BEFORE OPERATION

- Match the air compressor size to the AirSpade nozzle on the tool. To properly size the air compressor, make sure the air compressor flow rate is equal to, or greater than, the nozzle flow rate.
- Check the air compressor for sufficient fuel and oil levels.
- Make sure the air compressor is secure from accidental motion.
- Close the air supply valve on the air compressor.
- Make sure all air supply hose connections are secure and safety clips are installed.
- Use air supply hose with a pressure rating equal to, or greater than, 150 psi.
- Use air supply hose of an appropriate diameter and length. **(See Table A)**

Table A
Maximum Recommended Air Supply Hose Length (Feet)

Nozzle Flow (cfm)	3/4" ID	1" ID	1 1/4" ID
25	1,000	1,000	1,000
60	900	1,000	1,000
105	240	1,000	1,000
150	110	520	1,000
225	40	220	880
330	20	100	470

STARTING

- Start the air compressor according to the manufacturer's instructions.
- The air compressor should build pressure until 100 – 120 psi is shown on the air compressor pressure gauge.
- Make sure that the AirSpade is turned off. Point the nozzle away from all personnel or loose objects that could become airborne. Open the air supply valve on the air compressor.
- Securely hold the AirSpade. Point the nozzle up and away from all personnel and any loose objects, and depress the trigger. Read the air compressor pressure gauge and the pressure gauge on the tool. During operation the air pressure gauge on the tool should read between 80 and 100 psi (5.5 and 6.9 bar). If not, adjust the output pressure of the air compressor.

EXCAVATION PROCEDURES

- For most excavations the best performance is achieved by holding the AirSpade nozzle at approximately a 45 degree angle from horizontal and about 1 inch away from the surface to be excavated.

- Depending on the soil type, the AirSpade should be directed above the surface to be excavated at a rate of approximately 1 to 2 feet per second (0.3 to 0.6 meters per second).

- Except in very hard and compacted clays, dwelling on the same spot tends to reduce the rate at which material is excavated and can increase the amount of material blown away from the excavation site.

- Watering the work area ahead of time can often be helpful. Watering reduces airborne dust if the soil is extremely dry. It also reduces the soil strength making digging easier.

- For small diameter holes, position the AirSpade barrel perpendicular to the ground with the nozzle close to the surface. Depress the trigger, and slowly thrust the tool into the soil. When resistance is met, slowly withdraw the AirSpade and then reinsert. This procedure allows loose soil at the bottom of the hole to exit upwards. Reinsert the nozzle and repeat the above procedure until the desired depth of hole is reached.

- When boring a small diameter hole, or when plunging the AirSpade into loose soil, the tendency to expose the operator to blown back material is increased. The adjustable dirt shield should be positioned close to the ground to deflect airborne material away from the operator.

- For large diameter holes, position the AirSpade at an angle between 30° and 45° from the horizontal. Depress the trigger and move the AirSpade back and forth across the footprint of the excavation to loosen the soil to a depth of several inches. Each layer of loose soil should then be removed with a shovel or vacuum. Repeat the procedure until the desired depth is reached.

- For shallow, wide excavations, position the AirSpade at an angle between 30° and 45° from the horizontal. Depress the trigger, move the nozzle from side to side the desired width, and blow the loosened soil ahead of the nozzle. Continue until the excavation is completed to the required length.

- For deeper excavations or trenches loosen the soil in layers of several inches. Remove the soil with a shovel or vacuum. Repeat the procedure until the desired depth is reached.

- Excavation rates will vary depending upon soil composition, soil compaction, and the air delivered from the AirSpade nozzle. **(See Table B)**

- Use a portable (collapsible) barrier or fence constructed from plywood, or canvas cloth, to keep dislodged soil confined to the working area.

Table B
Typical Soil Excavation Rates

Nozzle Flow (cfm)	Soil Excavation Rate (cubic ft / min)
25	0.4 to 0.9
60	0.7 to 1.1
105	0.9 to 1.5
150	1.2 to 1.8
225	1.7 to 2.3
330	2.4 to 3.0

SHUT DOWN

- Turn off the air compressor air supply valve.

- Shut down the air compressor.

- Securely hold the AirSpade. Point the nozzle up and away from all personnel and any loose objects, and depress the trigger. Continue to depress the trigger until all compressed air from the tool and hose is fully expelled and the air pressure gauge on the AirSpade reads “0”.

- It is now safe to disconnect the air supply hose. Store the AirSpade.

MAINTENANCE

- As with any professional grade tool, the AirSpade requires regular care to ensure proper operation. Prior to each use, inspect the tool for any loose or visibly damaged parts. Tighten or replace worn parts as required. Brush off dirt or other foreign material from around the trigger and valve stem areas. Periodically apply light oil or lubricant (e.g. WD40) to the exposed valve stem to ensure smooth operation.

NOZZLES

- AirSpade Supersonic Nozzles are available in two (2) versions: Stainless steel for arbor/landscaping applications and non-sparking bronze for utility/construction applications. Unscrew nozzle from barrel. In the event of a tighter than normal connection, flats are provided on the nozzle for wrench application. Before re-installing nozzle, remove dirt or foreign material from threads and O-ring. Screw the nozzle into barrel. Hand-tighten only.

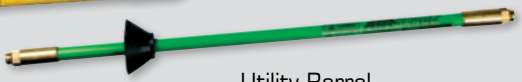
Stainless Steel Supersonic Nozzle

Bronze Non-Sparking Supersonic Nozzle

BARRELS

- Barrels are available in two (2) versions: Insulated fiberglass for arbor/landscaping applications and high-voltage insulated fiberglass with non-sparking brass connectors for utility/construction applications. Unscrew barrel from handle. In the event of tighter than normal connection, spanner wrench may be used on barrel if necessary. Before re-installing barrel into handle, remove dirt or foreign material from threads and O-ring. Screw barrel into handle. Hand-tighten only.

Arbor Barrel



Utility Barrel

EXTENSIONS

- Extensions extend the reach of the AirSpade into deep holes or trenches. Extensions are available in two (2) versions: Insulated fiberglass for arbor/landscaping applications and high-voltage insulated fiberglass with non-sparking brass connectors for utility/construction applications. To install extension, unscrew barrel from handle. Screw extension into handle. Screw barrel into extension. Hand-tighten only.

Arbor Extension

Utility Extension

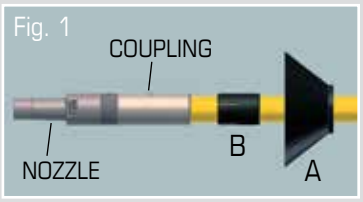
WARNING

AirSpade handles can be outfitted with any of the above interchangeable components and accessories. However, when excavating around underground utilities -- namely high-voltage electric lines or natural gas lines -- utmost care must be taken to ensure the highest possible level of operator safety. Use only high-voltage insulated barrels and/or extensions with non-sparking brass connectors and sleeves, and a non-sparking bronze Supersonic Nozzle.

SLIDING DIRT SHIELD

- The sliding dirt shield is made up of two components: locking sleeve and rubber deflector. One end of locking sleeve has 4 slots; other end is solid.

- To install, slide rubber deflector over nozzle and coupling into position (A) on barrel. Separate locking sleeve and clamp over barrel in position (B). Make sure slots are closest to nozzle. **(Fig.1)**



- Slide rubber deflector so that it is positioned over solid end of locking sleeve. Locking sleeve and rubber deflector assembly can now slide freely up and down barrel shaft. **(Fig.2)**

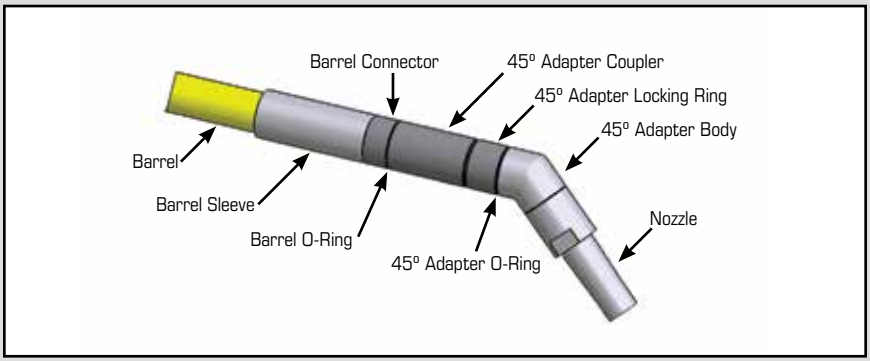
- To lock sliding dirt shield in position,slide entire assembly to desired position on barrel. Then firmly push rubber deflector over slotted end of locking sleeve. **(Fig.3)**

45 DEGREE ANGLED ADAPTER

Arbor 45º Adapter

Utility 45º Adapter

- 45 Degree Angled Adapter enables the AirSpade to operate in tight locations where obstructions do not allow use of a straight barrel. Install adapter in the following manner. Unscrew nozzle from barrel. Ensure adapter locking ring is shouldered against adapter body and adapter coupler is snug against adapter O-ring. Clean barrel O-ring and barrel connector threads. Screw adapter coupler onto barrel connector. Hand-tighten only. Screw nozzle onto adapter body. Hand-tighten only. Lock adapter body into position by tightening adapter locking ring against adapter coupler.



CAUTION: When using 45 Degree Angled Adapter, compressed air exiting nozzle will force tip of the tool away from the direction the nozzle is aimed. To prevent this from occurring, operator should position the adjustable, auxiliary handle approximately mid–way down the barrel. Grip auxiliary handle tightly to brace tool against force produced by exiting compressed air.

Limited Warranty

Guardair Corporation ("Guardair") warrants that, under normal use, our products are free from defects in materials or workmanship for a period of one year from date of shipment. During the warranty period, Guardair will, at our discretion and at no extra cost, repair or replace defective products or parts, or refund the purchase price. This Limited Warranty extends only to products that are purchased either directly from Guardair or from an authorized Guardair Distributor. Furthermore, the Limited Warranty extends only to products which are used for their intended purpose. This Limited Warranty does not extend to any product which has been misused, or that has been damaged from accident or mistreatment, from the use of parts not supplied by Guardair, or from modification or servicing of the product by anyone other than Guardair or its authorized Distributor.

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GUARDAIR®
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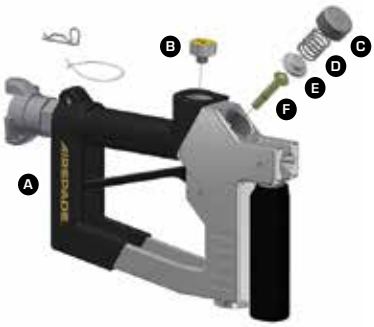
AS2000 HANDLE

Parts List	
A	Handle Assembly
B	Gauge
C	Gauge Seal
D	Valve Cap
E	Valve Spring
F	Valve Washer Assembly
G	Valve Stem



AS4000 HANDLE

Parts List	
A	Handle Assembly
B	Gauge
C	Valve Cap
D	Valve Spring
E	Valve Washer Assembly
F	Valve Stem

AS5000 HANDLE

Parts List	
A	Handle Assembly
B	Gauge
C	Gauge Seal
D	Valve Cap
E	Valve Spring
F	Valve Washer Assembly
G	Valve Stem

INSTRUCTIONS

TOOLS REQUIRED

- 1/2" square drive.
- PTFE thread sealant tape
- Pick or flathead screwdriver
- 15/16", 6-point socket

REPLACING VALVE COMPONENTS

1: Remove valve cap with 1/2" square drive.

2: Remove and discard the spring, valve seal, and valve stem.

3: Clean and inspect valve stem and bronze bushing.

4: Apply lubrication to new valve stem and insert into handle.

5: Insert new seal with black seal face facing downwards.

6: Insert new spring.

7: Apply thread sealant tape to threads of existing valve cap.

8: Use 1/2" square drive to thread valve cap into handle. Firmly tighten.

REPLACING PRESSURE GAUGE

1: Remove gauge seal with pick or small flathead screwdriver.

2: Remove pressure gauge with 15/16" socket and discard.

3: Apply thread sealant tape to threads of new pressure gauge – do not block air inlet of pressure gauge.

4: Thread new pressure gauge into handle and tighten with 15/16" socket. Do not over tighten.

5: Insert new gauge seal. Note that gauge seal included in Handle Repair Kit is not required for AS4000 Handle.

HANDLE REPAIR KIT

Includes all the parts necessary to repair AS2000, AS4000, AS5000 handles.

Part # HT150-2

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