

Operator's Manual



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ARROW™ 2

Pipe Laser

Thank you for purchasing an Apache Technologies product. Your ARROW™ 2 pipe laser is a premium quality tool that has been designed and manufactured to provide years of precise and reliable performance. The ruggedness, versatility, and ease of use of the ARROW 2 are unequaled in the industry. This laser has been specifically designed for use in harsh construction environments.

This manual is an important part of your purchase. It will familiarize you with the unit and explain the numerous features that have been designed into it. Please read this manual thoroughly before using your ARROW 2 pipe laser.

Please contact your Apache dealer or the Apache factory should you have questions regarding specific applications or if you require additional information.

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Please record your product information below. This will assist you if there are any questions regarding warranty or service.

SERIAL NUMBER: _____

DATE OF PURCHASE: _____

PURCHASED FROM: _____

PHONE: _____

CONTENTS

ARROW 2 Pipe Laser

Application	2
Controls and Displays	3
Operation.....	7
Specifications	10
Indications and Troubleshooting.....	11
Safety	13
Maintenance / Safety Labels	14
Warranty	15

APPLICATION

The ARROW 2 pipe laser is an easy-to-use laser instrument for aligning storm, sanitary, or other gravity flow drainage pipe. It can be set inside pipe diameters of 6" (150 mm) or greater. The laser emits a highly visible red beam of laser light. The laser light is intercepted at the opposite end of the pipe by the pipe laser target. To align the pipe, position it so that the laser beam is centered in the target.

The laser may also be used with a trivet or on a tripod.

The unit uses a laser diode as a beam source which is powered by self-contained internal rechargeable batteries. There is no need for a power cable to a heavy external battery. A power cable is supplied for times when the internal batteries are not recharged.

An easy to operate keypad, a large backlit LCD window and an infrared remote control aid in the quick set-up of the laser.

An adjustable universal target and quick exchange base extensions allow the beam to be centered in various diameter pipe.

The compact housing design permits access into cramped and awkward positions. The pipe laser is completely waterproof and is designed to be used in tough pipe laying conditions.

CONTROLS AND DISPLAYS

Laser

1. Liquid Crystal Display (LCD) - Displays grade setting, line position, leveling status, low battery warning and additional indications. A detailed description begins on page 5.

2. Keypad - Power switch, grade and line setting, infrared remote control reception window and LED charge status. A detailed description begins on page 4.

3. Level vial for aligning laser in the cross axis.

4. Self-centering bumpers for 6" pipe. Also used for attaching other size base extensions.

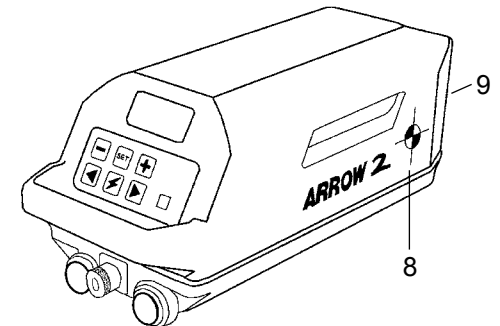
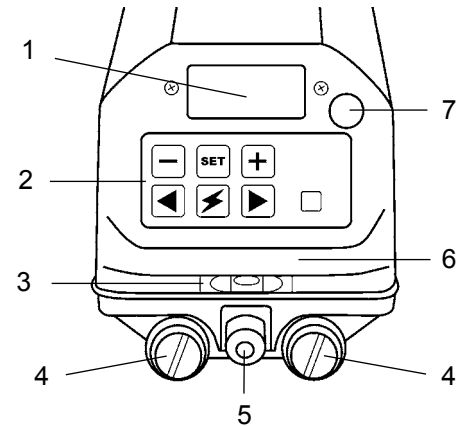
5. Connector socket with protective cap for attaching battery charger or power cord.

6. Integrated carrying handle.

7. Service port.

8. Grade axis pivot point - marks the pivot point for the grade axis.

9. Beam exit window (on front of unit) - provides a clear window for the laser beam to exit.



CONTROLS AND DISPLAYS

KEYPAD

1. Power Key - turns the laser on and off.
- 2a. Left Line Control Key - moves the laser beam to the left.
- 2b. Right Line Control Key - moves the laser beam to the right.

The speed of the line movement increases as the line control key is held. Pressing the left and right line control keys simultaneously will reset the line to the center position.

- 3a. Lower Grade Key - lowers the grade displayed.
- 3b. Raise Grade Key - raises the grade displayed.

The SET Key must first be pressed to allow grade changes. Refer to the operating section for grade setting procedures. Pressing the (+) and (-) keys simultaneously will reset the grade to 0.000%.

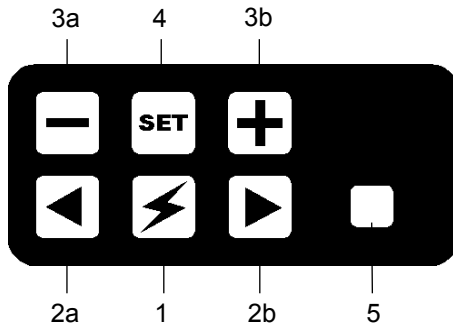
4. SET Key - Enables grade setting changes and sets the grade value displayed in the LCD.
5. Infrared Remote Control / Charge Status Window - receives signals from the remote control and indicates battery recharging status.

Charging Indications:

LED red - charging

LED green - charging complete

LED flashing red and green - charging error



CONTROLS AND DISPLAYS

LIQUID CRYSTAL DISPLAY (LCD)

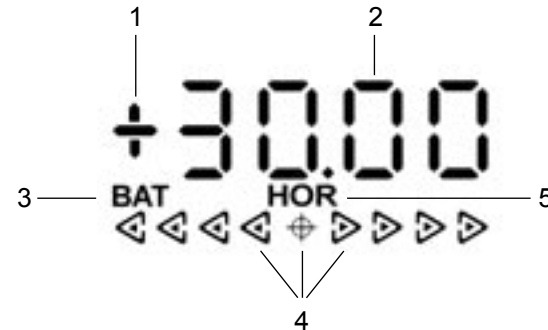
1. Plus or Minus Grade - plus grade is upward from the laser beam exit window; minus is downward from the laser beam exit window.
2. Grade Percentage - displays grade range from +30% to -10% in increments of 0.001% or 0.01%. The decimal point will move according to the percentage selected. For single digit grades, there are three digits to the right of the decimal point. For two digit grades, there are two digits to the right of the decimal point.
3. 'BAT' - Displays when internal battery requires recharging.
4. Line adjustment position indicators - Center, left, right arrows indicate beam line position relative to the laser axis. Line movement is 7% or ± 7 feet at 100 feet.

Additionally, all 4 left or right position indicators will blink at the same time to indicate the cross axis angle is too large.

5. 'HOR' - displays when the beam is self-leveled.
- Continuous display - unit is leveled.

Flashing display - unit is in the process of self-leveling.

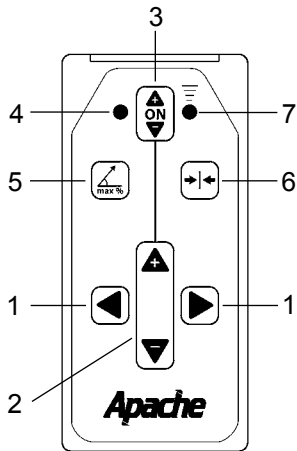
Additional display information can be found in the indication section on page 11.



CONTROLS AND DISPLAYS

REMOTE CONTROL

1. Left / Right Line Control - The arrow keys correspond to the direction of line travel when the remote is in front (target side) of the laser.
2. Raise / Lower Grade Key - NOTE: The ON key (3) must be activated for the grade key to function - (+) raises grade; (-) lowers grade.
3. ON Key (Grade Enable) - ON key must be activated to enable grade adjustment keys to function. Also used with Max Align key to put the laser into sleep or standby mode.
4. ON Key LED - Red LED turns on when the ON key is activated. It will automatically turn off after 30 seconds of inactivity.
5. Max Align Key - Function raises the beam to maximum upper position for alignment above the pipe. The beam flashes fast in this mode. Manual adjustments can then be made with the line control keys. Press the Max Align key again to exit this mode and return to the previously set grade.



6. Line Center Key - pressing this key resets the line adjustment to the center position.
7. Remote emission indicator / remote battery status indicator - LED turns on green when remote function is activated. Flashing red LED indicates remote batteries require replacement.
8. Standby Mode - with the ON key (3) activated, pressing the Max Align key (5) switches the laser into a standby mode. The laser turns off conserving battery life. Activating the keys again turns the laser back on, retaining all the previous settings.

OPERATION

Battery Charging - The laser batteries are internal and sealed. They cannot be removed from the unit. To charge the laser, remove the protective cap from the laser charging socket. Insert the charger plug into a 110V wall outlet. Connect the cannon connector to the connector on the pipe laser. A red LED on the keypad indicates the unit is charging. A green LED indicates charging is complete. Charging time is less than 4 hours. When charging is complete, remove the cable from the laser and replace the protective cap. Remove the charger from the wall outlet and place in the carrying case.



NOTE: Do not charge NiCad batteries when ambient temperature exceeds 113° F (45° C) or is less than 32° F (0° C).

Set-up - Position the laser over the starting point of the pipe run. Align the level vial located behind the carrying handle so it is in the center position. Aim the laser beam to the second control point on the line.

Grade setting - Turn the laser on by pressing the Power key. The laser will blink and move to the last entered grade. Press the SET key first to enable grade changes. The left digit will blink. Press the (+) or (-) keys to set the first digit. Press the right arrow key to select the next digit. Press the (+) or (-) keys to set. Continue until the desired grade is displayed. Press the SET key again and the laser will move to the displayed grade. Pressing the (+) and (-) keys simultaneously will reset the grade to 0.000%.

Alternatively, use the remote control grade setting keys. For large grade adjustments, it is quicker to set the grade at the laser.

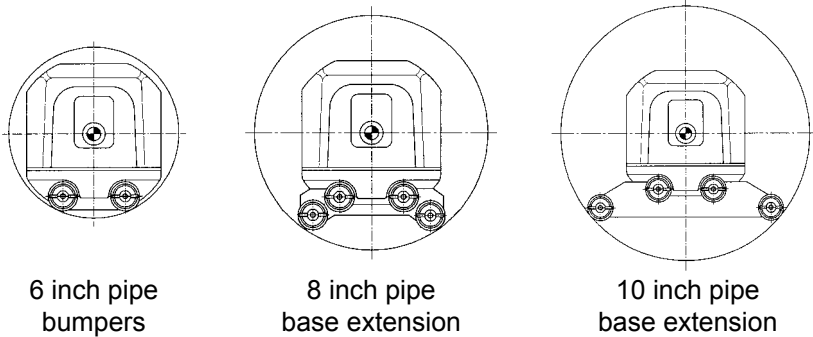
When the laser beam remains on and the 'HOR' is constantly displayed on the LCD, the unit has been self-leveled.

Line adjustment - Line is adjusted by either the left or right line control keys on the laser keypad or the remote control keypad. The longer the arrow key is pressed, the faster the line movement will be. It is advisable to start the set-up with the line adjustment in the center position.

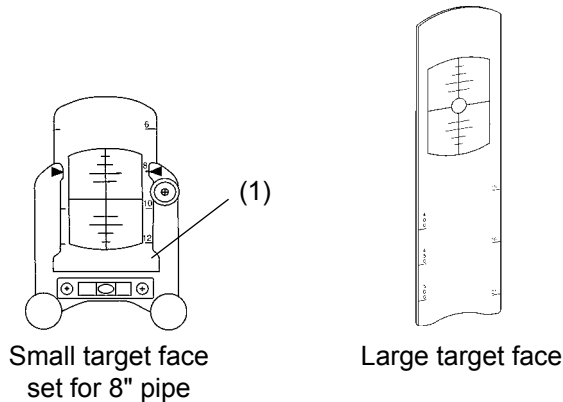
OPERATION

Set-up in various diameter pipe - The pipe laser and target are equipped with base extensions and target faces for centering in various diameter pipe. Standard equipment for the laser include 6" bumpers and laser base extensions for 8" and 10" pipe. Standard equipment also includes an adjustable target face for 6", 8", and 10" pipe.

To attach base extensions, loosen the 2 front and 2 rear 6" bumpers with a coin or screwdriver. Insert the appropriate base extension as illustrated in the following diagrams. Tighten the 6" bumpers and the laser is ready to be used in the appropriate pipe diameter.

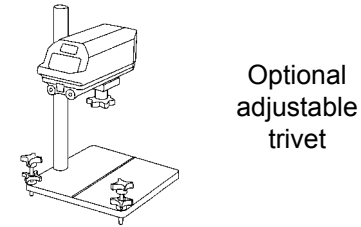


Align the target face mark for the corresponding pipe diameter to the reference arrow of the target stand (1) as illustrated below.

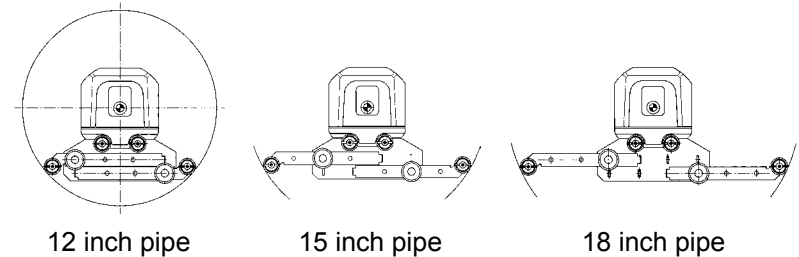


OPERATION

An optional adjustable trivet is available for fast set up in a variety of conditions.



An optional large base extension set is available for 12, 15, and 18 inch pipe diameters.



The large base extension set is designed to center the laser beam in 12, 15, and 18 inch inside diameter (I.D.) pipe. Pipe often has slightly smaller inside diameters. In such pipe, the laser beam will be above the center line of the pipe. For proper alignment and to match the laser beam, raise the target face to center the bull's-eye on the beam. Perform a grade check to ensure proper setting.

SPECIFICATIONS:

ARROW 2 Laser

Grade Range: -10.00% to +30.00%

Self-Leveling Range: -15.00% to +35.00%

Minimum Grade Setting: 0.001%

Leveling Accuracy: Better than ±10 arc seconds

Line Adjustment Range: ± 7% (14 ft at 100 ft)
(4.3 m @ 30 m)

Laser Source: Diode, 635 nm wavelength

Laser Classification: Class IIIa

Power Supply: NiCad Batteries - Internal

Operating Time: 24 hours on full charge

Charge Time: Maximum 4 hours

Operating Voltage: 12 Volts DC only

Reverse Polarity Protected

Waterproofness: Purged, filled with Nitrogen

Operating Temperature: -4° F to +122° F
(-20° C to +50° C)**SPECIFICATIONS:**

Remote Control

Beam Type: Infrared

Operating Range: Front - 300 ft.
Rear - 50 ft.

Power Supply: 3 x "AA" Alkaline Battery

DIMENSIONS AND WEIGHT:

Arrow 2 Laser: LxWxH - 12.4 x 4.7 x 5.1 in.

Weight: 9.3 Lbs.

Carrying Case: LxWxH - 20.1 x 15.2 x 6.7 in.

Weight, with Accessories: 26.5 Lbs.

Specifications subject to change without notice*INDICATIONS AND TROUBLESHOOTING**

Flashing Frequency:

Beam	Meaning	Action Required
Permanently on	Leveling finished	None
Constantly flashing	Laser leveling	Wait until leveled Press set key to exit grade setting mode
2 short flashes	Cross axis warning Angle error too large	Adjust laser position by centering the level vial
2 short flashes	Leveling range exceeded (+/- END)	Change inclination of the laser until within limits.
Fast flashes	Aligning function	Laser switches back to normal after exiting align mode.

Special Indications:

Display	Cause	Action Required
SLP	Laser in 'Sleep' mode	Press 'ON' and 'Max' keys simultaneously.
+ END / - END	Self leveling range exceeded	Change inclination of the laser until within limits.
+ 65°C	Temperature limit ex- ceeded. The operating temperature of the laser diode is too high and the laser shuts down to pro- tect the diode.	Cool or shadow the instrument until a safe operating temperature is obtained.
E0 or E1	Error saving data	Turn laser off and on again. Check calibra- tion. If error messages appear repeatedly, contact an authorized service center.
E2	Error from software	
E3	Error from hardware	

INDICATIONS AND TROUBLESHOOTING

Problem	Possible Cause / Remedy
Laser will not power on	Drained battery; Recharge the laser.
Laser will not recharge	Defective charger, defective power cable; check charger and cable.
Laser beam is unstable	Temperature in pipe is not consistent. Laser beam diffracts. Use blower to circulate the air. See below.
Weak laser beam	Dirty exit window. Use mild soap and water or glass cleaner and soft cloth to clean window.
Remote control does not function	Drained battery. Remove six screws on back of unit and replace 3 "AA" batteries.

REFRACTION

Refraction is the bending of light when it passes through different densities (or temperatures) of air. This can occur on sunny days when a hot pipe is placed in a cool ditch. The bottom cools first and the top warmer air causes the beam to refract down towards the cooler air. Other temperature differences can also cause refraction.

The laser will appear to flame out on the edges of the spot and also be unstable on the target.

To minimize the effects of refraction, a blower should be used to mix the air inside the pipe. Creating a spiral or corkscrew effect with the air flow is usually the most efficient method.

SAFETY



This pipe laser is a Class IIIa laser product in the USA and complies with all applicable portions of Title 21 of the Code of Federal Regulations, Department of Health and Human Services; Food and Drug Administration; Center for Devices; Bureau of Radiological Health.

Do not stare into the laser beam or view directly with optical instruments.

Do not disassemble the instrument or attempt to perform any internal servicing.

Do not remove any warning labels from the laser.



CAUTION - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure.



This product contains a Laser Diode with a maximum radiant power output of less than 5.0 milliwatts that is accessible both in the interior of the product as well as externally.

Use this product only with laser targets such as those supplied with the unit. Do not attempt to stare directly into the beam or eye damage may result. For detailed installation and operating instructions see the appropriate sections of this manual.

A laser safety kit is supplied with every laser. This kit contains an operator qualification card and a laser CAUTION sign that should be posted near the laser whenever it is in use.



NOTE: Do not charge NiCad batteries when ambient temperature exceeds 113° F (45° C) or is less than 32° F (0° C).

MAINTENANCE

This product is designed to require no routine maintenance by the user. The ARROW 2 is not to be disassembled by any one other than an authorized Apache service center, or by Apache Technologies, Inc. The unit is essentially non serviceable except by trained personnel. Opening the laser creates the potential for exposure to high voltage and hazardous radiation.

Periodically inspect the housing to verify that no parts are loose or distorted. Also verify the exit window is clean. Use only good quality glass cleaner and a soft cloth to clean external optical components.

Do not store the laser in a wet carrying case. Ensure the laser and the carrying case are dry prior to storage.

SAFETY LABELS

Labels required for this product:

Danger logotype

(Placed on the top side of the laser)



Certification / Identification Label

(Placed on the underside of the laser)



Aperture Label

(Placed underneath beam output window)



Non-interlocking protective housing label

(Placed on front lower housing)



WARRANTY

Apache Technologies, Inc. ARROW 2 pipe laser is warranted to be free of defects in material and workmanship for a period of two years. This warranty period is twenty-four months from the date the product is delivered from the dealer to the purchaser or is put into service by a dealer as a demonstration unit or rental unit.

A warranty registration card must be filled out properly and on file with Apache Technologies, Inc.

Any evidence of abuse, misuse, alteration, accident or negligent use, or an attempt to repair products by unauthorized personnel, or with use of parts other than those provided by Apache Technologies automatically voids the warranty.

The user of the product is expected to follow all operating instructions, periodically checking the instrument and the work as it progresses. Maintaining the calibration of the product is the responsibility of the user.

Apache Technologies, Inc. liability under this warranty is limited to repairing or replacing any product returned to an authorized service center for that purpose. The foregoing states the entire liability of Apache Technologies, Inc. regarding the purchase and use of its product and they shall not be held responsible for any consequential loss or damage of any kind.

This warranty is in lieu of all other warranties, expressed or implied, and constitutes all of Apache Technologies, Inc. liability with respect to merchandise sold by it.

NOTE: *The user of this equipment is expected to make periodic checks on the proper grade, line, and elevation of the pipe as it is being laid. Apache Technologies or its representatives assumes no responsibility for improperly laid pipe.*