

# L-703B/L-705 Laser Borescope Alignment Systems for Extruders

Fast, Easy and Highly  
Accurate Extruder  
Alignment



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## The Leader in Extruder Alignment Technology

Hamar Laser manufactures the most accurate, versatile and portable extruder alignment laser systems available. The L-703B/L-705 Laser Borescope systems are unparalleled for ease of use and fast, accurate extruder alignments. The systems feature a self-centering target and bore adapters, hand-held readout, and our optional Bore9 Windows® based software to display and analyze alignment data in real time.

## Barrel and Screw Life Increases by 200%

Misaligned extruder bores cause screws and barrels to wear out faster, requiring frequent replacement, more downtime, and higher maintenance costs. Regular measurement checks of the extruder alignment can prevent big problems before they occur, which can double the life of extruder barrels and screws.

With barrels costing up to \$5,000 and screws even higher, the L-705 Laser Borescope alignment system can pay for itself very quickly.

## Reduced Electrical Costs Can Pay for System

The L-703B/L-705 also saves money by reducing the electrical consumption of the motor. We had one customer use a forklift to pull out the screw from one extruder and after laser alignment, slide it back in by hand. Imagine the amps needed to drive that screw! So it follows that alignment with the L-703B/L-705 can significantly reduce the amps required to drive the screw and therefore reduce electrical costs. Multiply this saving by the number of machines and the L-703B/L-705 can pay for itself very quickly!

## Patented, Self-Centering Target and Bore Adapters Reduce Setup Time by 90%

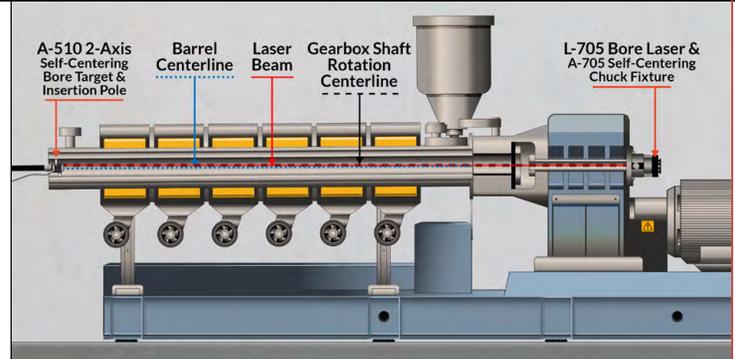
The L-703B/L-705 alignment systems feature a patented self-centering target (A-510) and bore adapters (A-510STA/A-510LTA) that use no moving parts. It takes just seconds to position the target in the barrel for an accurate measurement down to .0002 in. (0.005 mm) and there is no need to rotate the target/adaptor to remove mounting errors, unlike competing laser or optical systems.



*A-510LTA and A-510STA Self-Centering Bore Adapters and M-705CLS Measuring Legs*

## Results 3X Faster Than Optical Bore Scopes

In most cases, an extruder can be completely aligned in less than 1½ hours, including setup! Setup takes 10 to 15 minutes, and overall alignments are done up to 3 times faster than with optical bore scopes. In most cases, bore straightness data can be taken and analyzed in 15 minutes or less using our Bore9 software. Compared with optics that can take 2 hours just to set up, the L-703B/L-705 Laser Borescope Systems can bring extruders back on line and producing parts in record time!



## Wide Range of Bore Diameters

Our targets offer the largest range of bore diameters of any laser in the industry. The system can accommodate barrel ID's from .70 – 16.0 in. (18 – 406.4 mm). The kit uses a bore adapter hub and customized measuring “legs” to adapt the target to the bore. We offer 3 different 2-axis bore targets depending on the bore sizes.

## Key Features:

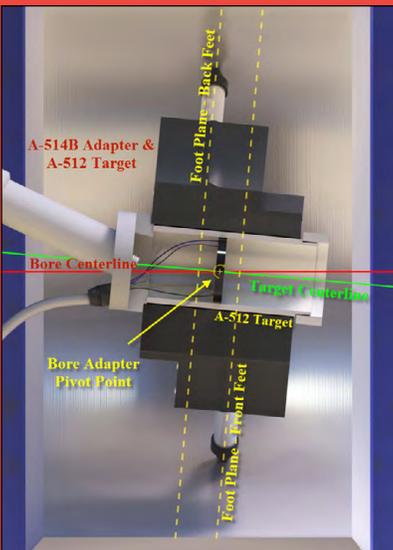
- Typical 10-15 minute setup time and alignment in 1 ½ hour.
- 2-Axis bore target, accurate to .0002 in. (0.005 mm)
- Target uses lightweight, customized self-centering bore adapters
- Wide range of bore diameters from .70 – 16.0 in. (18 – 406.4 mm)
- Self-Centering Chuck to position L-705 on Gearbox centerline.
- Customized twin-barrel spline-shaft fixture for L-703B Laser
- Built-in H & V laser angular adjustments for quick laser setup
- Simple-to-use, rugged, 2-axis readout does not require software
- Does not require complicated, expensive display box
- Portable and light weight - entire system weighs less than 15 lbs. (6.8 kg)
- Align barrels up to 25 feet (7.6 m) long
- Wireless transmission of alignment data to optional Bore9 software
- Battery operated with long battery life

# Features Designed With Versatility in Mind

## How the Self-Centering Adapters Work

The self-centering adapter has 4 fixed-length measuring legs with a set of 2 legs offset axially from the second set. When the target is inserted into the self-centering bore adapter, the PSD sensor is centered axially between the 2 sets of legs, which puts it on the pivot of the adapter. If the bore diameter increases or decreases (a common problem), then it changes the angle of the adapter, but it does not change the PSD concentricity to the bore since PSC sensor is on the adapter's pivot point and thus it always stays on center.

The target/adapter are inserted into the barrel with a spring-loaded pole and when the cord is pulled, the target tips forward, allowing it to easily slide into the barrel. When released, the target and adapter "jam" into the bore and the weight of the pole keeps the target seated in the barrel.



## Built-In Angular Adjustments Speeds Setup

The L-703B/L-705 Lasers have angular adjustments to tilt the laser beam to .001 in. in 50 feet (0.025 mm in 15 m). The low-power, visible-light laser beam makes "rough" alignment easy. No viewing devices are required for operation.

## Customized Adapter Legs for Each Barrel ID

Our standard A-510 2-Axis Bore Target uses the A-510STA or A510LTA Self-Centering Bore Adapter hubs and customized, replaceable measuring "legs" to position the target in the center of the barrel. These adapters accommodate diameters ranging from 2.25 in. to 16 in. (57-405 mm). For smaller bores down to .70 in. (18 mm), we also offer the A-221 2-Axis Small-Bore Target and A-220 2-Axis Micro-Bore Target with customized bore adapters.



L-705 Bore Laser

## System Also Measures Barrel Wear

The A-510STA (or LTA) Bore Adapter can be placed on the A-510 Target in two ways: in Self-Centering Mode, where it will self-center into the barrel; and Measuring Mode, where the adapter can be used to measure bore-diameter changes.

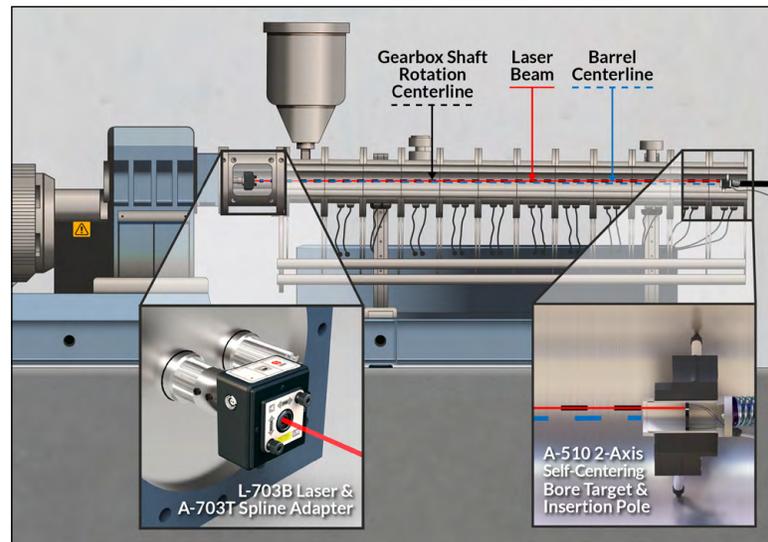


## Optional Bore9 Software Upgrade

Hamar Laser's Bore9 software supports all of Hamar's past and present bore alignment equipment to create a powerful tool for measuring and aligning up to 50 bores. This comprehensive and easy-to-use program measures bore straightness (axis centering) and diameter change when using our targets in measuring mode.

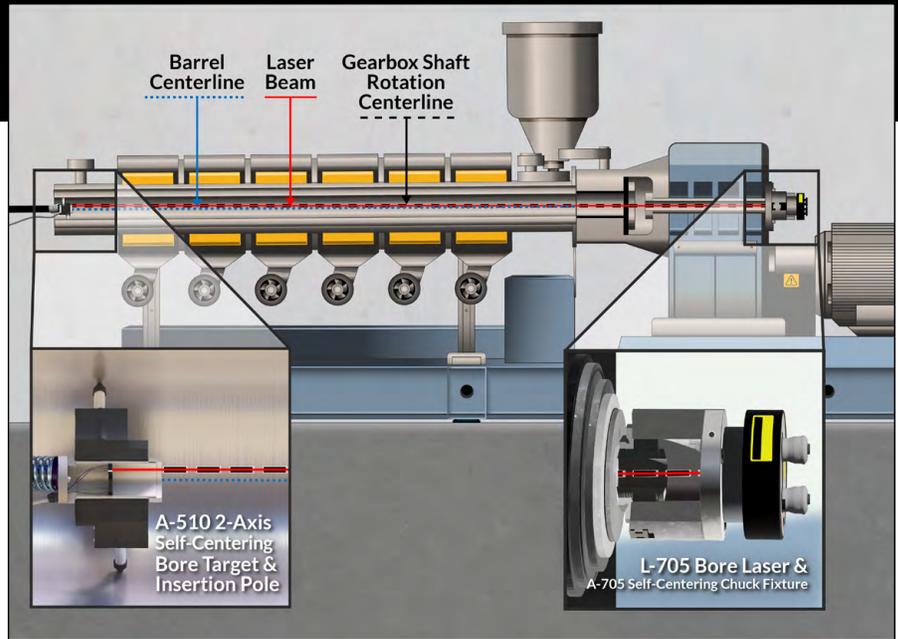
## L-703B Laser for Twin-Barrel Extruders

Switching lasers to our L-703B Bore & Spindle Laser, our extruder alignment system can be converted to align twin-barrel extruders up to 70% faster than conventional or optical borescope methods. The L-703B laser is attached the gearbox spline with the A-703T Spline Adapter, then aligned to the gearbox rotation axis. We then use our A-510/A-510STA target and adapter to check the alignment.



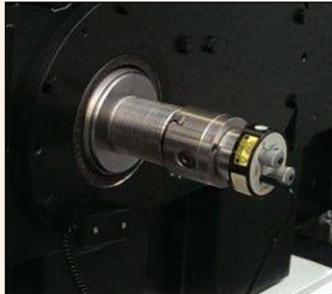
# How the L-705 Borescope Alignment System Works

For single-barrel extruders, our A-705 Self-Centering Chuck is used to mount the L-705 Laser and center it to the counter-bore. The A-510 2-Axis Bore Target and A-510STA/LTA Self-Centering Bore Adapter are inserted into the far end of the barrel and a simple 5-10 minute procedure is used to align the laser to the gearbox rotation axis. When the laser is aligned to the gearbox axis, the setup is done and the alignment results are immediately shown.



## Here is how it works:

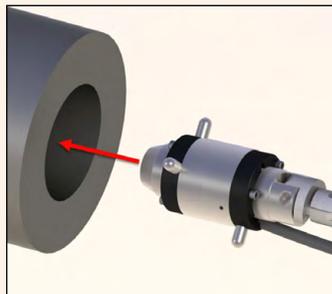
1. Insert the L-705 Laser into the A-705 Self-Centering Chuck and insert these into the gearbox counter bore. Since the laser is



A-512/A-514 Moved to Inner Bore

centered to the housing and the chuck self-centers, the laser is centered to the bore.

2. Insert the M-705CLS Measuring Legs into the A-510STA Adapter and then insert the A-510



A-221 2-Axis Bore Target Inserting into Barrel

Target. Now insert the whole assembly into the free end of the barrel. Plug in the R-1307 Readout, turn on the laser and write down the H (horizontal) and V (vertical) readings.

3. Rotate the gearbox by hand until the laser is inverted, using the built-in levels to determine the inverted position. Write down the second set of readings.

*Laser at 0 degrees (NORMAL)*

V Reading +.015"  
H Reading -.030"

*Laser at 180 degrees (INverted)*

V Reading +.005"  
H Reading +.002"

Setpoint =

$$\frac{V_N + V_I}{2} = \frac{.015 + .005}{2} = +.010"$$

$$\frac{H_N + H_I}{2} = \frac{-.030 + .002}{2} = -.014"$$

4. Average the horizontal values for NORMAL and INverted, and then average the vertical values. The results determine the Set Points for the horizontal and vertical axes of the laser.

5. Adjust the L-705's angular micrometers to tilt the laser beam until the Set Points are displayed on the R-1307 Readout. Repeat Steps 3 and 4 to verify the laser is aligned to the gearbox rotation axis.
6. With the laser aligned to the rotation axis, the V & H readings are actually a measure of the alignment of the free end of the barrel to the gearbox axis.
7. To align the barrel, it is best to move the target into the barrel just above the first support. Now the barrel can then be shimmed or moved until the readout values are within tolerance in both axes. If there are no other supports, then the barrel is aligned!
8. Use options Bore9 Software to document the barrel straightness and barrel wear.

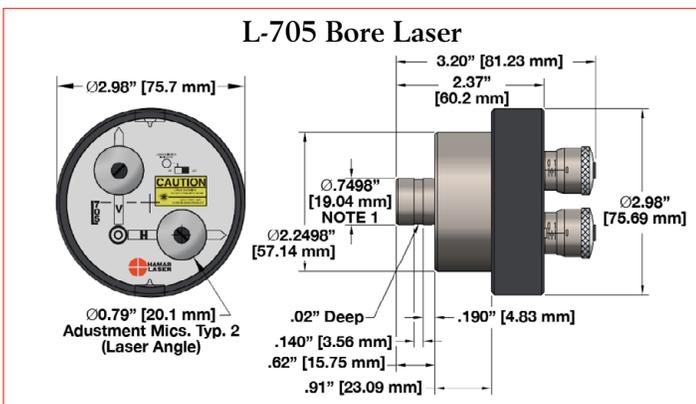
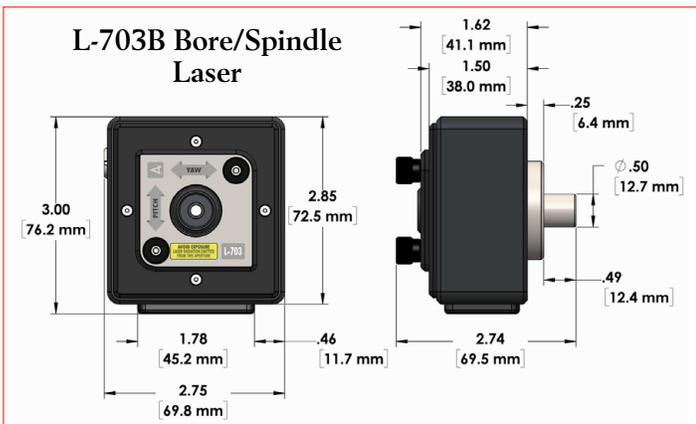


## L-703B Bore/Spindle Laser

|                                      |   |
|--------------------------------------|---|
| Size                                 | (See line drawings)   |
| Weight                               | 1.2 lbs. (0.5 kilograms)  |
| Battery                              | 3.6v LiPo rechargeable  |
| Battery Life                         | 11+ hours continuous use  |
| Laser Concentricity to Mounting Stud | <.0005 (0.012 mm) - no adjustment   |
| Angular Adj. Resolution              | .00002 in/ft (0.0016 mm/m)  |
| Angular Adj. Range                   | ±0.36° (±.075 in/ft. or ± 6.26 mm/m)  |
| Operating Distance                   | up to 50 ft. (15 m)   |
| Laser Type                           | Laser < 0.9 mW, BRH Class II  |
| Wavelength                           | 650 nanometers  |
| Materials                            | Plastic housing, aluminum frame and 440 SS steel mounting stud with hardness of RC 54-60.   |
| Laser Beam Modes                     | Continuous and single-blink mode (for ambient light correction). Supports 2-axis bore cabled targets when used with R-1307, such as the A-220, A-221, A-510, A-512, T-212 and T-271 |

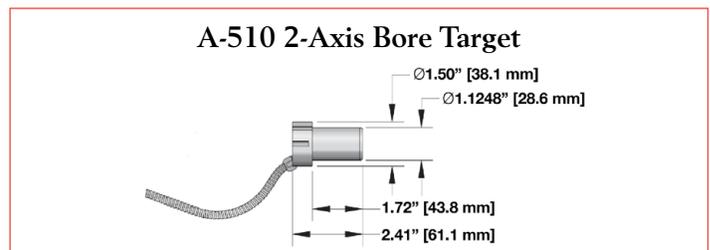
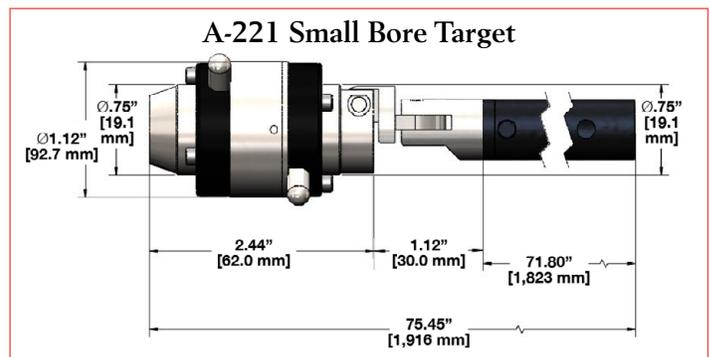
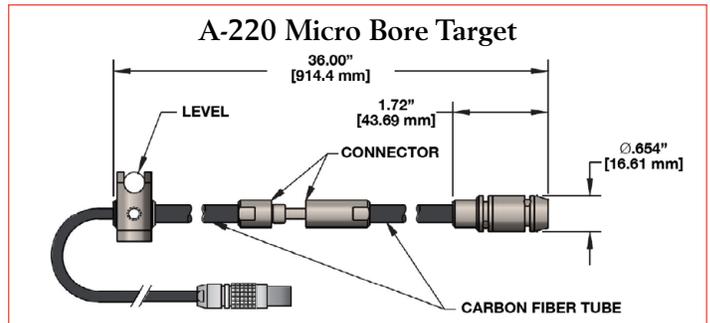
## L-705 Bore Laser

|                         |  |
|-------------------------|--|
| Size                    | (See line drawings)  |
| Weight                  | 1.2 lbs. (0.5 kilograms)   |
| Power                   | 9V external battery pack/AC adapter. Up to 16 hours battery life.                                      |
| Laser Concentricity     | Laser aperture ground concentric within .0003" (0.005 mm) No adjustment                                |
| Angular Adj. Resolution | .00003 in/ft (0.0025 mm/m)   |
| Angular Adj. Range      | ±0.18° or ± .0375 in/ft. (± 3.13 mm/m)   |
| Operating Distance      | up to 50 ft. (15 m) Recommended  |
| Laser Type              | Laser < 0.9 mW, Cw, BRH Class II   |
| Laser Wavelength        | 650 nanometers   |
| Materials               | Aluminum Flange. All mounting surfaces: 440 SS. Aperture: Hardened and ground in one setup (RC 54-60). |



## Self-Centering Target and Bore Adapters

| Targets                 | Barrel ID Range   |
|-------------------------|---|
| A-220 Micro Bore Target | .70 – 1.50 in. (18 – 38.1 mm). Each target is customized to bore ID   |
| A-221 Small Bore Target | Total: 1.18 – 16.00 in. (30.0 – 406.4 mm)<br>Small: 1.18 – 2.00 in. (30.0 – 50.8 mm) use M-221CLS-A adapter<br>Medium: 2.00 – 4.00 in. (50.8 – 101.6 mm) use M-221CLS-B adapter<br>Large: 4.00 – 16.00 (101.6 – 406.4 mm) use M-221CLS-B adapter + M-221CLL Customized Legs |
| A-510                   | Total: 2.25 – 16.00 in. (57.2 – 406.0 mm)<br>Medium: 2.25 – 9.00 in. (50.8 – 228.6 mm) use A-510STA adapter + M-705CLS Customized Legs<br>Large: 5.00 – 16.00 in. (127.0 – 406.4 mm) use A-510LTA adapter + M-705CLL Customized Legs  |
| A-512                   | Total: 3.75 – 40.00 in. (95.3 – 1,000.0 mm)<br>A-514 Adjustable Self-Centering Bore Adapters. See L-706 Engine Block Brochure for more details.   |



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