

# L-705 Laser Borescope Alignment System for Extruders

Fast, Easy and Highly  
Accurate Extruder  
Alignment



**HAMAR  
LASER®**  
ALIGN WITH THE BEST



# L-705 Laser Borescope Alignment System for Extruders

## The Leader in Extruder Alignment Technology

Hamar Laser manufactures the most accurate, versatile and portable extruder alignment laser systems available. The L-705 Laser Borescope system is unparalleled for ease of use and fast, accurate extruder alignments. The system features 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.

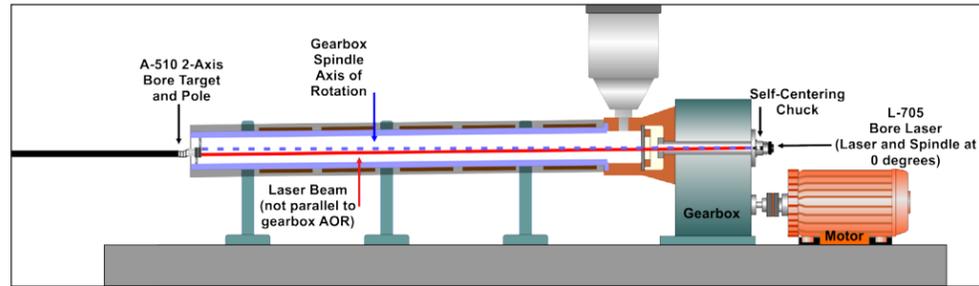
## Barrel and Screw Life Increases by 200%

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-705 can save even more money by reducing the electrical consumption of the motor. We've 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-705 can significantly reduce the amps required to drive the screw and reduce electrical costs. Multiply this saving by the number of machines and the L-705 can pay for itself in less than a year.



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

Hamar Laser has developed the world's first 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" (0.005 mm) and there is no need to rotate the target/adaptor to remove mounting errors, unlike competing laser or optical systems.

## 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-705 Laser Borescope System can bring extruders back on line and producing parts in record time!

## Wide Range of Bore Diameters

Any bore from 1" (25 mm) to 14" (356 mm) can easily be measured with our L-705 Laser Borescope. The heart of the system is our patented A-510 2-Axis

Target and A-510STA Self-Centering Bore Adapters that automatically find the center of the bore with no moving parts. This allows nearly instantaneous bore measurements for alignment or straightness.

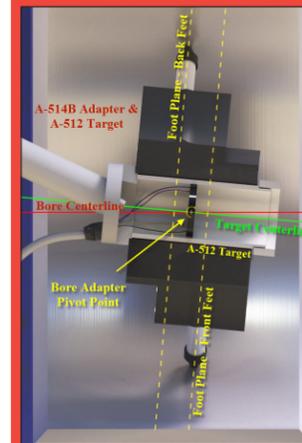
## Key Features:

- Typical 10-15 minute setup time and alignment in 1 hour.
- 2-Axis bore target, accurate to .0002" (0.005 mm)
- Target uses lightweight, customized self-centering bore adapters
- Wide range of bore diameters from 1.5" -14"+ (38 mm – 356 mm)
- Self-Centering Chuck to position L-705 on Gearbox centerline.
- 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 30 feet (10 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 A-510 target is inserted into the A-510STA 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 decreased (a problem for most competing bore targets), then it changes the angle of the adapter, but it does not change the PSD centering in the bore since it is on the adapter's pivot point and thus it self-centers.



The target/adaptor 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-705 Laser has micrometer-controlled angular adjustments to tilt the laser beam to .001" 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.



A-510 Self-Centering Target

## Customized Adapter Legs for Each Barrel ID

Our self-centering laser and target adapter hubs have replaceable "legs" that allow hubs to be used for diameters ranging from 2.25" (57 mm) to 16" (405 mm). The legs insert into the A-510STA or A510LTA Bore Adapter Hubs to self-center the target in the barrel. Tell us the diameter you need, and we'll supply a set of custom "legs" to match.

## System Also Measures Barrel Wear

The A-510STA (or LTA) Bore Adapter can be placed on the A-510 Target in two ways. With the adapter placed on the target in Self-Centering Mode, it will center itself into the barrel. By inserting the A-510STA (or LTA) in Measuring Mode, the adapter will measure diameter changes in the bore.

## 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-700 System for Twin-Barrel Extruders

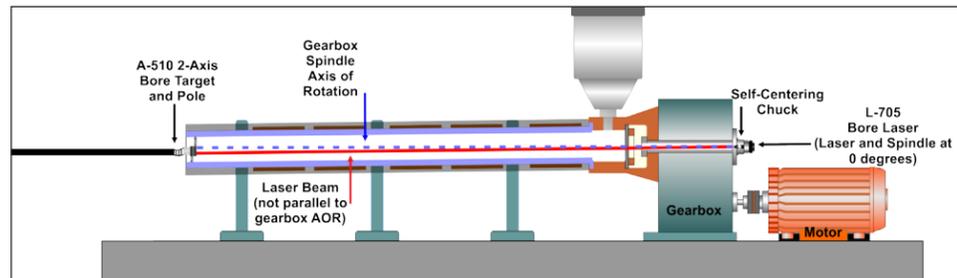
Switching lasers to our L-700 Spindle Laser, our extruder alignment system can be converted to align twin-barrel extruders up to 70% faster than conventional or optical borescope methods. The L-700 laser is attached the gearbox spline with the A-705 Chuck, then aligned to the rotation axis and we use our A-510/A-510STA target and adapter to check the alignment.



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

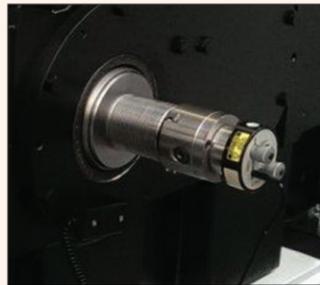
# How the L-705 Borescope Alignment System Works

A self-centering chuck is used to center the L-705 Laser on the gearbox rotation axis. The A-510 Target and self-centering adapter are inserted into the end of the barrel and a simple 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 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 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.



A-512/A-514 Moved to Inner Bore

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.

Laser at 0 degrees (NORMAL)

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

Laser at 180 degrees (INverted)

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

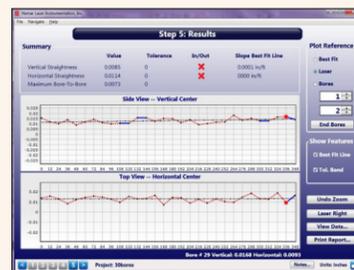
Setpoint =

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

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

5. Turn the angular adjustment micrometers until the Set Points display 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. If there is more than one adjustment point for the barrel, then the target can be inserted into the barrel at the point just above the second support and the barrel can be shimmed or moved until it is aligned.
9. Use options Bore9 Software to document the barrel straightness and barrel wear.



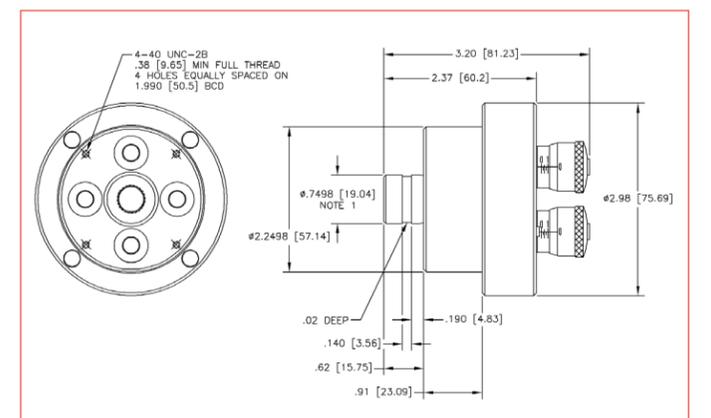
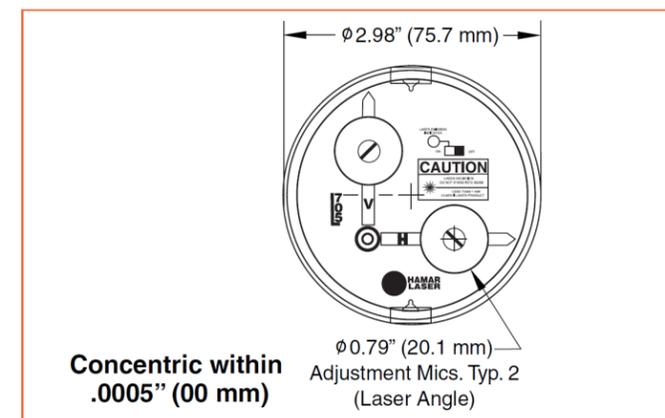
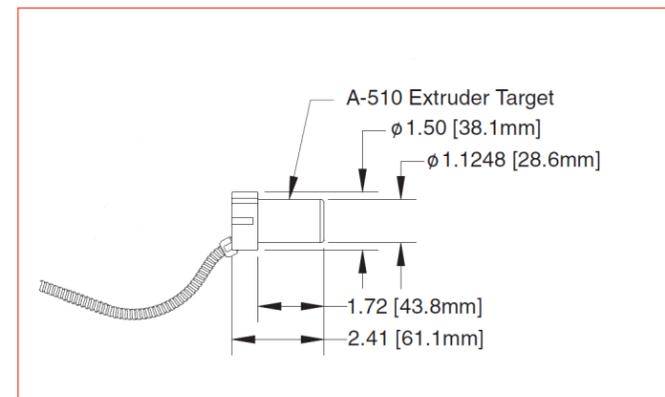
# Specifications

## Target and Bore Adapters

A-510 Target	1.1248 (28.56 mm)OD Target sensor concentric to OD to within .0005" (0.013 mm). 440 SS hardened.
A-510STA Small Bore Target Adapter Hub	For bores from 2.25" (57 mm) to 6" (152 mm). Centering of adapter is controlled by the M-705CL measuring legs which contact A-510 housing.
A-510LTA Large Bore Target Adapter Hub	For bores from 5" (127 mm) to 16" (406.4 mm). Centering of adapter is controlled by the M-705CL measuring legs which contact A-510 housing.
A-705 Self Centering Chuck	Counter bore IDs: .755" to 3.250" (19 mm to 82.5 mm)
A-705L Large Self Centering Chuck	Counter bore IDs: 3.1" to 5.2" (79 mm to 131 mm)
M-705CL Adapter Legs	Customized to bore diameter. Leg length held to .0001" (0.0025 mm). Each set of legs can handle approximately ± .040" (1 mm) of bore diameter change.

## L-705 Laser

Size	(See line drawings)
Weight	1.2 lbs. (0.5 kilograms)
Power	9V external battery pack/AC adapter
Center	Laser aperture ground concentric within .0003" (0.0075 mm) No adjustment
Angle	Controlled by two micrometers. L-705 (.001" on micrometer = .010" tilt @ 33 ft. or 0.25 mm in 10 m)
Angular Adj. Range	±0.18° or ±.0375"/ft. (± 3.13 mm/m)
Operating Distance	up to 50 ft. (15 m) Recommended
Beam Straightness	.00001"/ft. (.0008 mm/M)
Beam Stability	.0001"/hr./°F (0.004 mm/hr./°C) .0001"/ft./hr./°F (0.01 mm/M/hr./°C)
Laser Type	Laser < 1 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).



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