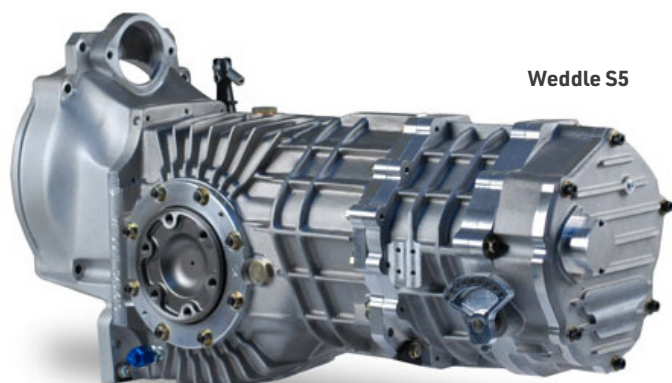


# WEDDLE S4/S5 AND S4D/S5D INSTALLATION



Weddle S5

## INTRODUCTION

**Weddle S4/S5 and S4D/S5D are 4-speed or 5-speed sequentially shifted transaxles.** The S4/S5 units have a 10" diameter ring gear while the S4D/S5D units have an 11.5" diameter ring gear. These units can be run in rear or mid-engine applications and have a variety of options and gear ratios to choose from. The S4/S5 units are recommended for recreational vehicles with up to 600 Hp and approximately 250 Hp in a racing application. The S4D/S5D units are recommended for recreational vehicles up to 900 Hp and racing applications of 500 Hp. **These Hp ratings are suggestions only and will vary greatly by application and use. Please call Weddle Industries to discuss your specific project to get feedback and recommendations.**

**Sequential refers to the shift method and style.** The shifter in these units will only move forward and back to upshift or downshift, there is no side-to-side motion. They are also what are known as a dog-change or dog-engagement, similar to a motorcycle trans. There are no synchronizers to match gear speeds and aid in smooth transfers from gear to gear. There are only "dogs" on the gears and sliders (dog-rings) that engage with each other when shifting from gear to gear. Shift speeds on this type of unit will be faster, the driver does not need to wait for the synchronizer to accelerate or decelerate the gears.

**This style of transmission can be shifted without using the clutch if the driver knows the technique to do so.** Improperly shifting a dog-change transmission WILL cause internal damage. The "dogs" will become worn and the units will start popping out of gear. The loads and forces that go through the drivetrain when popping out of gear are extremely large and unpredictable. Considerable damage will be done with only a few missed shifts. This is discussed in more detail below.

## OIL AND LUBRICATION

**Fluid capacities are measured to the bottom of the fill/level plug on the side of the transmission with the trans level.** This is the plug near the cut out on the side cover. This is NOT the bronze load bolt (gold bolt with jam nut); it is the plug on the opposite side. See exploded view if unsure.

### OIL CAPACITIES

**Weddle S4/S5:** 5 quarts

**Weddle S4D/S5D :** 6.75 quarts

**Weddle Sequential Transaxles rely on splash lubrication.** Oil recommendations will depend on the application, lighter oils for road racing and heavier oils for off road use. The transaxles do have oil ports to add an oil circulation/cooling system. Please note, if an external oil system is added to the transaxle the oil capacity will increase by the volume of the pump, lines, filter, and cooler. Amount will vary depending on components used and line length.

**An oil cooling system is recommended for most racing applications.** This will require a 12V external oil pump (WI part #9-PUMP3), an oil filter (WI part #9-FILTER2), and a cooler (WI part #9-CTC1, 9-CTC1-MOUNT, 9-CTC-AN8). It is highly recommended that a pair of temperature switches be used to control the cooling system. One switch will control the oil pump (WI part #9-SWITCH34) and the second will control the oil cooler fan (WI part #9-CTC-TS). Please see plumbing and wiring instructions on the Weddle Industries website, "Downloads" tab, go to instructions, title "CS-INST".

**Ideal operating temperature is in the 180 to 220 degree range.** Sustained temperatures over 220 degrees may result in increased wear and/or failure. Critical tolerances in the transaxle will be larger than normal resulting in increased movement and gear deflection. Likewise, the transaxle should be at operating temperature prior to hard use. At low temperatures the bearing bores are very tight; hard use prior to warm up can cause premature bearing wear.

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**SHIFTER AND CABLE INFORMATION**

**The Weddle sequential transaxle will require a 2-lever shifter (WI part #8-S45H or 8-S45X) and two shift cables.** These shifters are designed to pull to upshift and push to down shift. One lever will operate the forward gears and one will be for reverse. For a Mid-engine application and additional adapter for the shift arm will be needed (WI part #S45-606-53). This adapter will move the cable attachment below the shift shaft, see Fig. 1. The shift pattern for the forward gears is N-1-2-3-4-5 depending on whether the unit is a 4-speed or 5-speed. An internal reverse lock out prevents shifting into reverse unless the trans is in neutral.

**When looking at the shift lever for the forward gears counter-clockwise will be upshifting and clockwise will be downshifting ( see Figure 1 ).** When looking at the reverse lever straight up and down is neutral and the lever will move in a clockwise direction to engage reverse.

**Shift cables will need to have a 2" throw.** The cable bulkheads on the trans side will need to be welded on the chassis. The distance from the bulkhead to the center of the heim joint needs to be 7". The cable mount on the shifter side can be welded to the chassis or can be purchased with the shifter (WI part #8-S45H-BK). The cable mount is included on shifter 8-S45X.

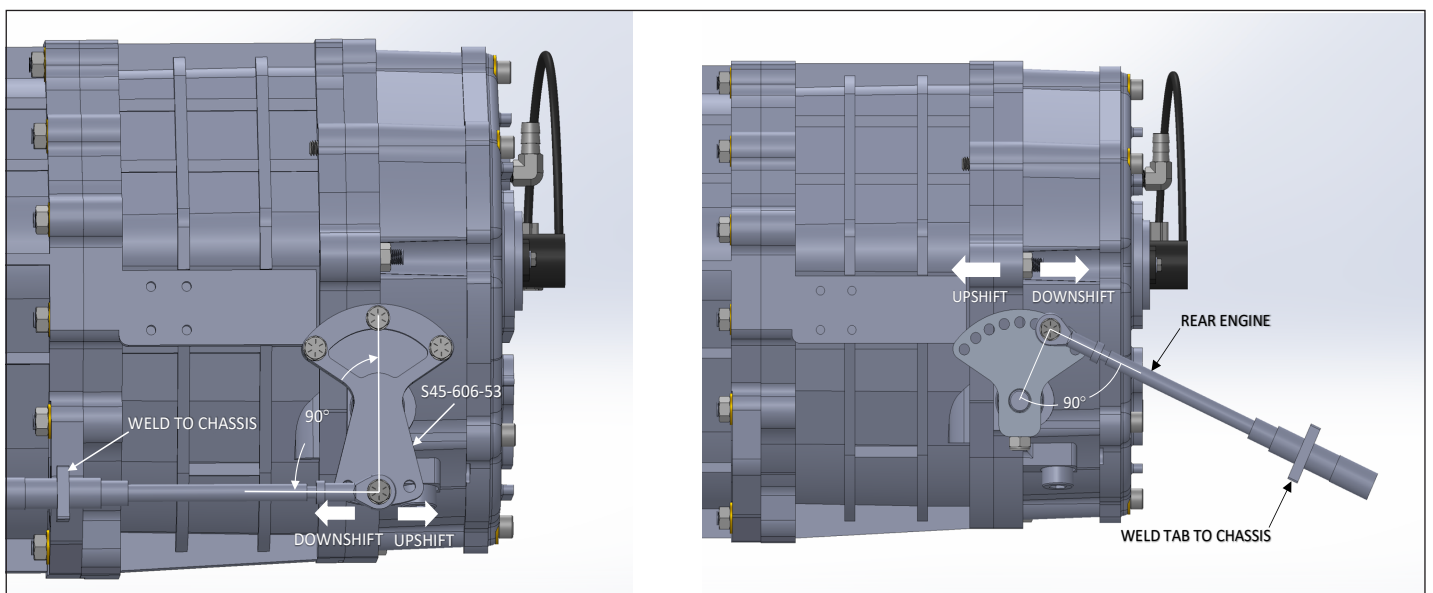
**Shift cable adjustment and set up is critical to operation of the transaxle.** Both the shifter and the transaxle have return springs, meaning the shifter and ratchet mechanism will return to the center position after each shift. These springs must work in unison and not be fighting each other, which is why the adjustment is critical.

**Attach the cables to the shifter side first.** Make sure the shifter is centered and that you have equal movement forward and back. At the transaxle side the bolthole in the heim needs to line up exactly with a hole on the shift arm. There is adjustment on the large nuts on the cable as well as some on the threaded end of the cable/ heim to line up the holes. In addition to the holes lining up, the cable needs to approach the arm at 90 degrees. Meaning if you draw a line from the center of the shift shaft to the bolthole you are using it should make a 90-degree angle with the cable. This insures that the shift shaft will rotate equal distance in each direction (see Figure 1).

**Shift lever stops will need to be adjusted for both shift levers.** The reverse shift shaft at the trans has a detent and will stop in the proper position for neutral and in gear. When the cable is connected, the stop for the neutral direction can be set. Screw the stop bolt in until it just touches the shift lever. Shift the trans into reverse and repeat with the second stop bolt. Make sure the trans shifts all the way into reverse before you set the second stop. It may be necessary to rock the vehicle.

**The shift lever for the forward gears is a little trickier.** The lever at the trans needs to move .740" in either direction to make a shift. Again, you may have to rock the vehicle to make sure the trans falls into gear each way. Make sure the lever moves at least .740" and then set your stop on the shifter. Do this for both the up shifting and down shifting movement of the lever.

**Figure 1**





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S45-S45D-INST

## BELL HOUSINGS

Weddle S4/S5 transaxles come standard with a VW style bell housing while an optional LS bell housing is also available. VW bell housings will need an external slave cylinder and bell housing mounted starter (WI part #9101). Max clutch diameter with the VW bell housing is 228mm (9") and will use a VW style flywheel/ starter ring gear. Clutch spline is a Chrysler Hemi, 18 spline. An adapter plate will be needed to mate the transaxle to the engine being used.

S4D/S5D transaxles come standard with a full size LS bell housing. There is also an optional full size bell housing for the S4/S5 transaxles. These units are supplied with an internal slave cylinder and requires a block-mounted starter (WI part #910-LS). These bell housings will accept Weddle large diameter clutch kits with a 168 tooth flywheel. Input shaft spline is 1-1/8" X 26 spline, the GM fine spline. Again, check the Weddle Industries website for available clutch options. A bell housing adapter (WI part #S45D-615A) is available to run the S45D transaxle with VW (or other) bell housings. The adapter is designed to close off the S45D case and provides a second set of mounting holes. If you have a custom application please contact Weddle Industries, we can provide drawings of the bolt pattern and input shaft/slave cylinder spacing. The adapter will mount the slave cylinder, fittings, and input shaft seals.

There have been several versions of full size bell housings for these sequential transaxles. Earlier versions from PBS or Mendeola transaxles require different parts for service. Please call Weddle Industries if you have questions.

## CLUTCH AND SLAVE CYLINDER SET UP (INTERNAL SLAVE CYLINDER MODELS ONLY)

The S4/S5 and S4D/S5D transaxles can be fitted with a convex or flat face throw out bearing, depending on the type of clutch that will be used. In either case, it is critical that there is proper clearance (air gap) between the throw out bearing and the fingers of the pressure plate. For the clutch to function properly, the air gap must be 4mm-9mm (.160" - .350"). The only way to verify that you have the proper air gap is to carefully measure the distance from the mating surface of the bell housing to the thrust face of the throw out bearing and subtract the distance from the engine block/adapter plate to the fingers of the clutch where it contacts the throw out bearing. This measurement must be taken with the hydraulic slave cylinder fully collapsed (bleed screw open). If the air gap does not fall within the parameters listed above, we can supply you with parts and/or information on how to bring the air gap within the required specification.

Depending on driver preference, we recommend either a 5/8" (16mm) or 3/4" (19mm) diameter clutch master cylinder piston. The smaller diameter piston will result in a longer pedal throw with less effort. The larger diameter piston will have a shorter throw with more effort.

## PEDAL STOP

With a hydraulic slave cylinder, it is absolutely mandatory that you have a positive stop to limit the travel on your clutch pedal. If you don't have a pedal stop, it is possible to over-extend the slave cylinder piston, which will allow hydraulic fluid to spew out into the bell housing. If this happens, you will have to take the engine back out of the car to repair the slave cylinder and/or clutch!

Before adjusting the pedal stop, the air must be bled out of the clutch hydraulic system. IMPORTANT: Make sure to open the bleed screw before depressing the clutch pedal! This will allow excess air to escape from the system without moving the throw out bearing. Do not fully depress the clutch pedal with the bleed screw closed or you may over-extend the piston. This can cause permanent damage to the clutch diaphragm, the slave cylinder, or both.

Once you have performed the initial bleeding of the system, the pedal stop can be adjusted. With the engine turned off and the car in gear, jack up one rear wheel. Slowly depress the clutch pedal until you can just turn the rear wheel by hand. Give the pedal an additional 1/2" (13mm) of travel, measured at the footpad. Once the clutch pedal stop is adjusted correctly, you should bleed the system again to make sure that it is completely free of air. No additional adjustments should be needed, as the hydraulic system will compensate for clutch wear.

## SHIFTING TIPS

**As mentioned above a sequential trans can be shifted without the clutch.** A sequential trans does NOT have to be shifted without the clutch. If you are new to this type of transaxle our recommendation to you is to use the clutch as you would with a normal "H" pattern synchronized transaxle. Shift the trans fast, firm, and positive while using the clutch. Learn the car and trans, learn your rpm drops between the gears, learn what speeds you can go in each gear. Once you are very comfortable with the car you can learn to shift without the clutch. Please read the next paragraph!

**WARNING: missed shifts, poorly timed shifts, and improper technique while shifting without the clutch will cause damage to the dogs and the trans. If the transaxle starts popping out of gear there is internal damage and the transaxle must be serviced immediately. The longer you drive with the trans popping out of gear the more likely you are to get stranded and the more expensive it will be to repair!**

**The dogs in this type of transaxle are cut back at an angle on the sides on both the gears and the sliders.** This cut back holds the trans in gear under acceleration and deceleration. Shifts cannot be forced under acceleration or deceleration, the cut backs prevent this. The driver needs to learn how to "unload" the driveline with the gas pedal and time the shift with this slack moment. Under acceleration a slight lift of the throttle will unload the driveline long enough to make a shift. The driver must not get back on the gas until the shift has been completed. Under deceleration a slight "blip" of the throttle is required. Timing and coordination between the hand and foot is needed and must be learned to make clean, smooth shifts.

**A dog change trans should go into 1st gear and reverse very easily.** It is possible, however, that when the clutch is depressed the gears can stop dog facing dog. In this situation the trans will not fall into gear. Do not force the shift! Internal damage may occur if too much force is applied to the shift lever in this situation.

**When this happens the first option is to let out the clutch and try again.** In most instances the gears will stop in a position where 1st or reverse can be easily selected. The second option is to keep a little force against the shift lever while slightly letting out the clutch. When the clutch starts to engage the trans will rotate slightly and fall into gear.

**Under no circumstances should the trans grind when shifting into 1st or reverse with the clutch pedal depressed. If grinding does occur it means the gears are still spinning even with the clutch disengaged. The reason for this must be investigated before internal damage occurs.**

## CV BOLT LENGTH

**CV bolt length needs to be checked the first time axles are installed.** If the bolts are too long they can damage the side covers and the final drive seals. Seals are located right behind the drive flanges about the same diameter as the CV bolt circle. If the bolts are too long they will hit.

## BREAK IN PROCEDURE

**To obtain the best life from your transaxle a good break in is highly recommended.** This will involve 50-75 miles of easy driving with several heat cycles to "work harden" the gear surfaces. Drive the car smooth and easy, shifting through all the gears, for approximately 25 miles. During this time avoid hard acceleration, wheel spin, and shock loading as much as possible. Stop and let the trans cool off to ambient temperature. Repeat this process two more times.

**Change trans oil after the first 10 hours of use.** Check magnet for any signs of issues whenever draining the trans fluid. There will always be "hairs" on the magnet from fine debris but there should never be any material of significant size.



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S45-S45D-INST

## MAINTENANCE

**Service intervals will vary by use, application and personal preference.** These units are used in too wide a range of vehicles for Weddle Industries to assume one maintenance schedule will be correct for all. This will need to be a judgment call discussed with your trans supplier.

**For racing applications, a full service is recommended after every event, including a Magnaflux check of critical internal components.** At the minimum, change the oil, check the magnet as well as clean and inspect the oil filter after every event. Any visible debris on the magnet or in the filter should be scrutinized and its source investigated, possibly by trans disassembly.

**Recreational users should change their oil every 1500 miles and/or once a season.** Magnets and oil filters (if present) should also be inspected at that time. The most important task is to pay attention to the trans, how it shifts, noises it makes, normal temperature, etc. If any of these things change, that is a sign that something is happening inside the trans and it needs to be investigated and possibly serviced.

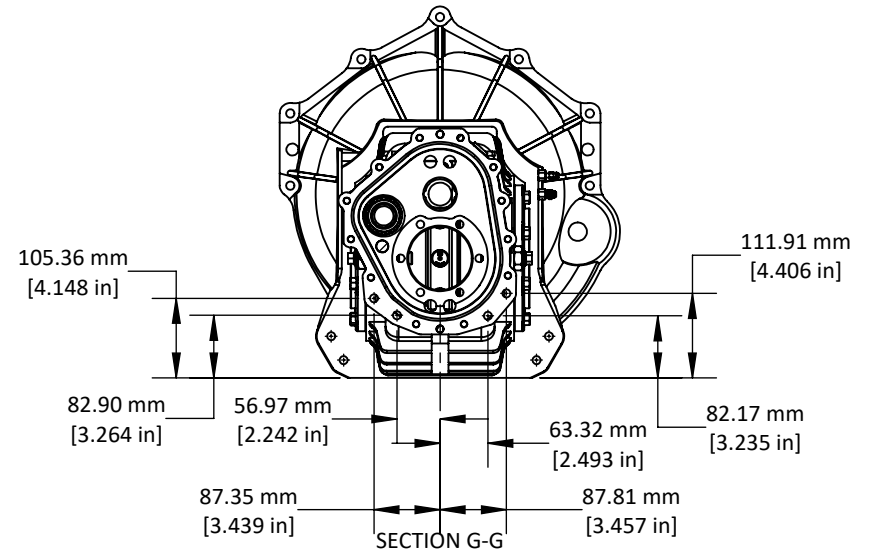
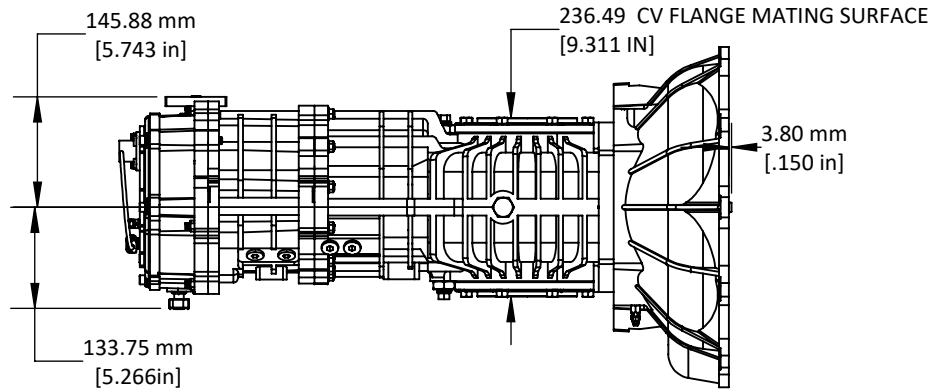
Please remember, it is better to be bummed about a large service bill than bummed because you're broke on the side of the road!

## THANK YOU

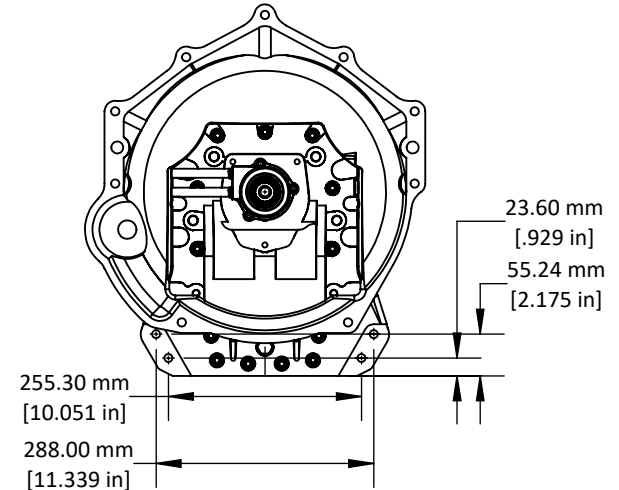
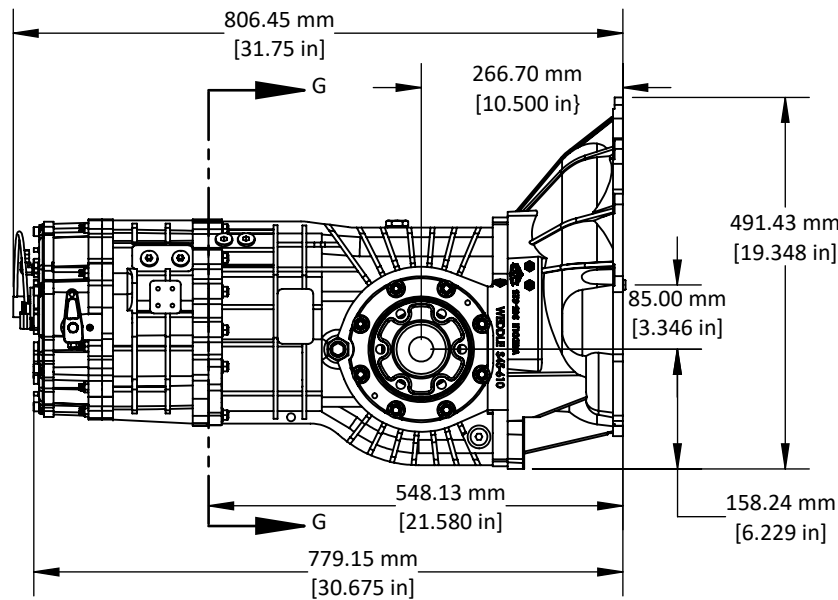
Thank you for purchasing a Weddle Industries product. Countless hours of hard work have gone into its design and manufacture. We sincerely hope it meets your expectations. We are always looking for feedback, both good and bad. Feel something needs to be added to the instructions? Please let us know. Questions? Please fire away! Did something crazy with it? Send video or it didn't happen!

**Please call us at 805 562 1600 if you need any help.**

# WEDDLE GEN 3 S45 CHEVY BELLHOUSING EXTERNAL REFERENCE DIMENSIONS



SECTION G-G  
Main Case Mounting Hole Detail



**Notes:**

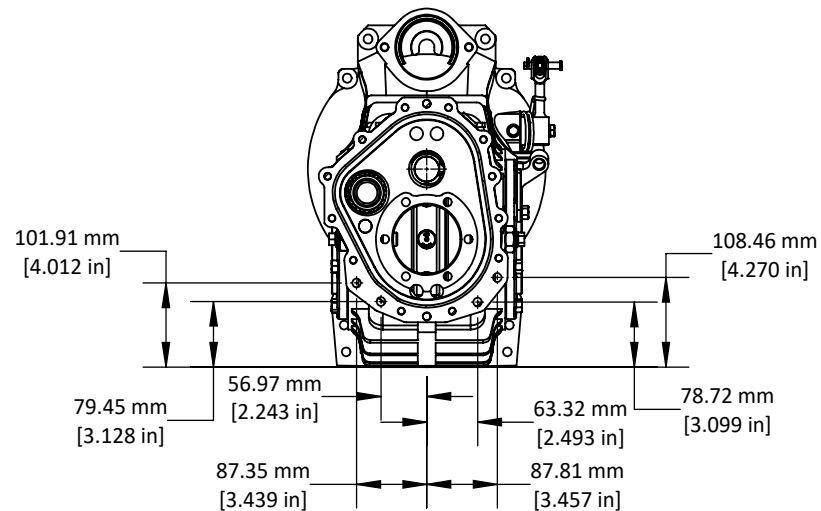
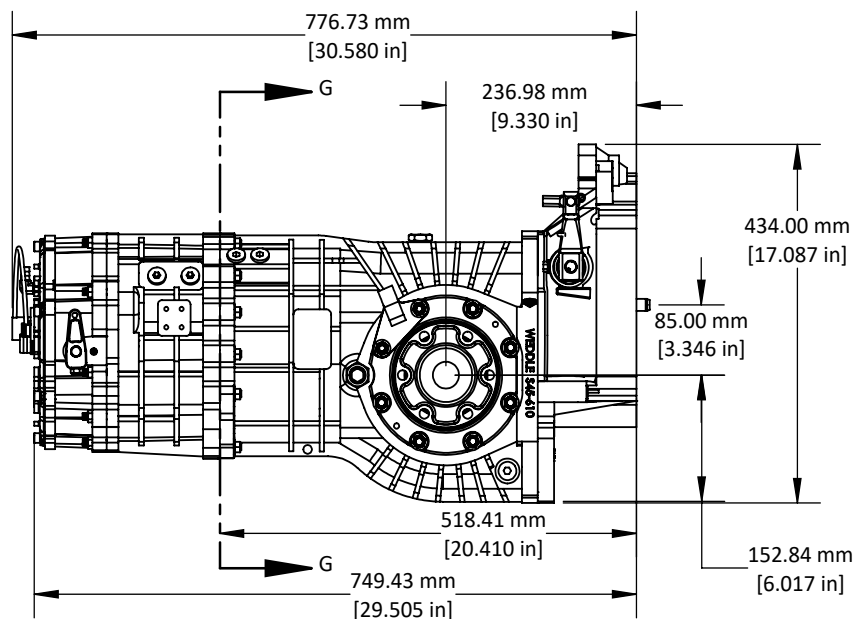
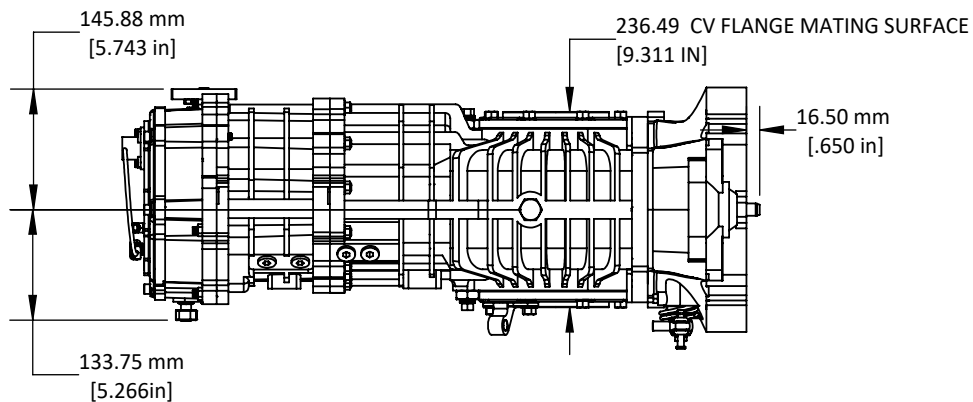
1. Dimensions are approximate.
2. Input splines:  $\varnothing 28.58\text{mm}$ , 26 splines, 30° P.A. (1-1/8" Chevy fine spline).
3. Complete transaxle weight approximately 84 kg (185lb).



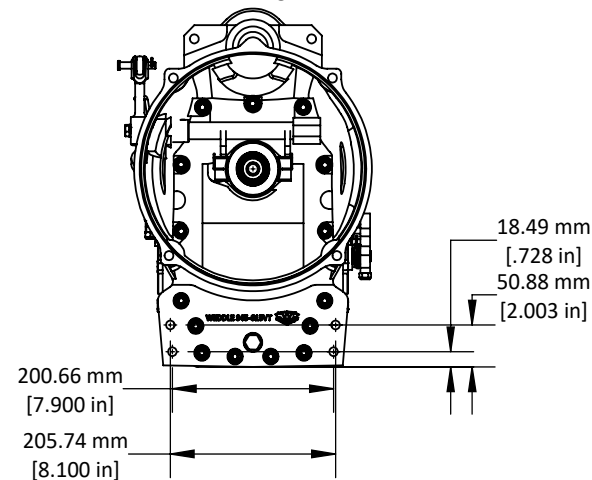
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Drawing No: WS-DIM-S45-CH  
Drawing Name: S45 External Reference Dims  
Drawn By: DL  
Revised: 3/18/2022

# WEDDLE GEN 3 S45 VOLKSWAGEN BELLHOUSING EXTERNAL REFERENCE DIMENSIONS



SECTION G-G  
Main Case Mounting Hole Detail



**Notes:**

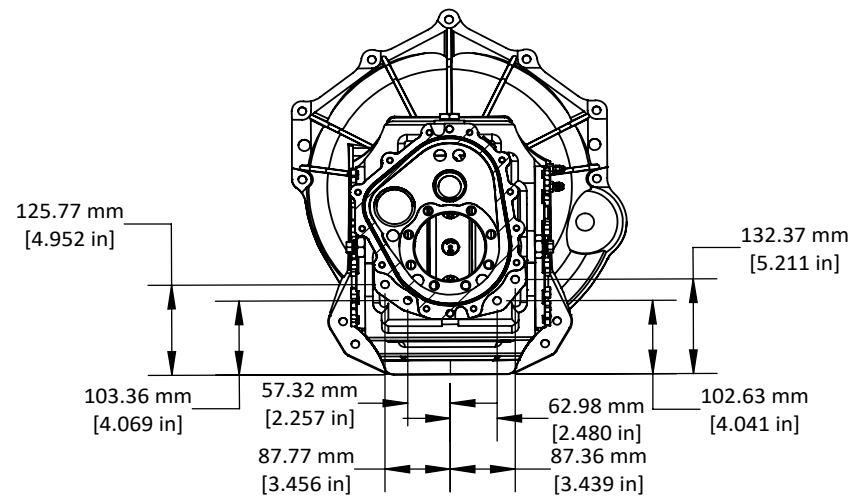
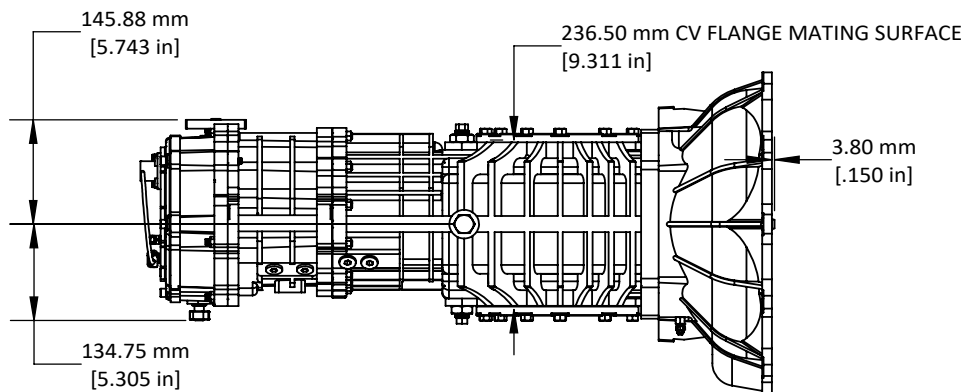
1. Dimensions are approximate.
2. 18T Spline (Chrysler Hemi Spline) 16/32 DP, 30°PA
3. Complete transaxle weight is approximately 84 kg (185lb).



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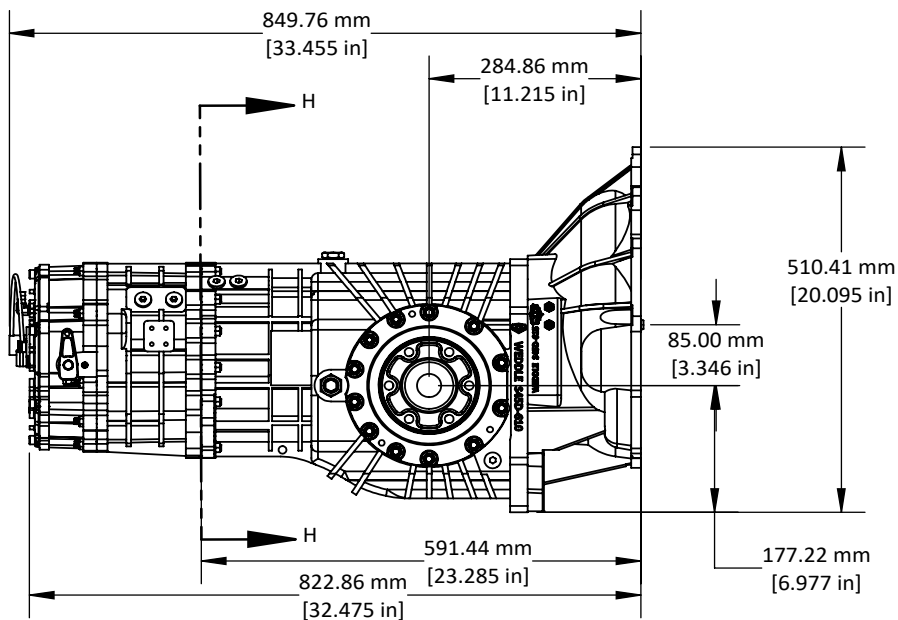
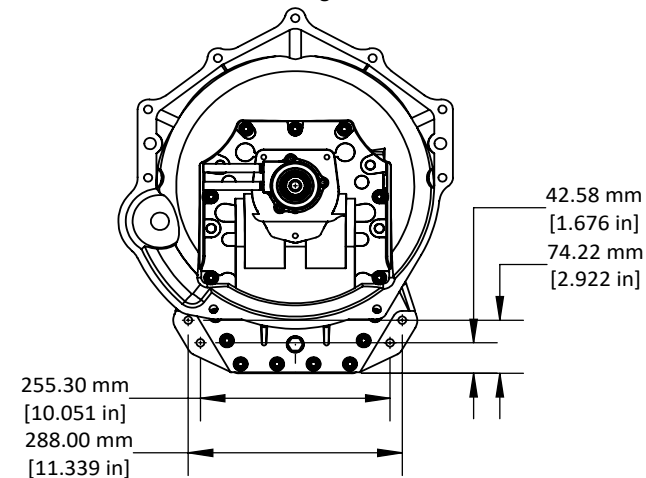
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Drawing Name: S45 External Reference Dims  
Drawn By: DL  
Revised: 3/18/2022

# WEDDLE GEN 3 S45D CHEVY BELLHOUSING EXTERNAL REFERENCE DIMENSIONS



SECTION H-H

Main Case Mounting Hole Detail



Notes:

1. Dimensions are approximate.
2. Input splines:  $\varnothing 28.58\text{mm}$ , 26 splines,  $30^\circ$  P.A. (1-1/8" Chevy fine spline).
3. Complete transaxle weight is approximately 93 kg (205lb.)

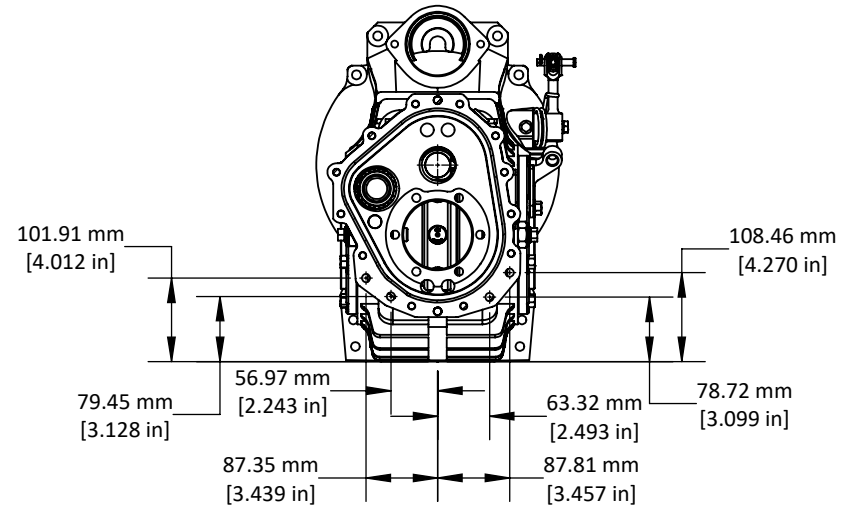
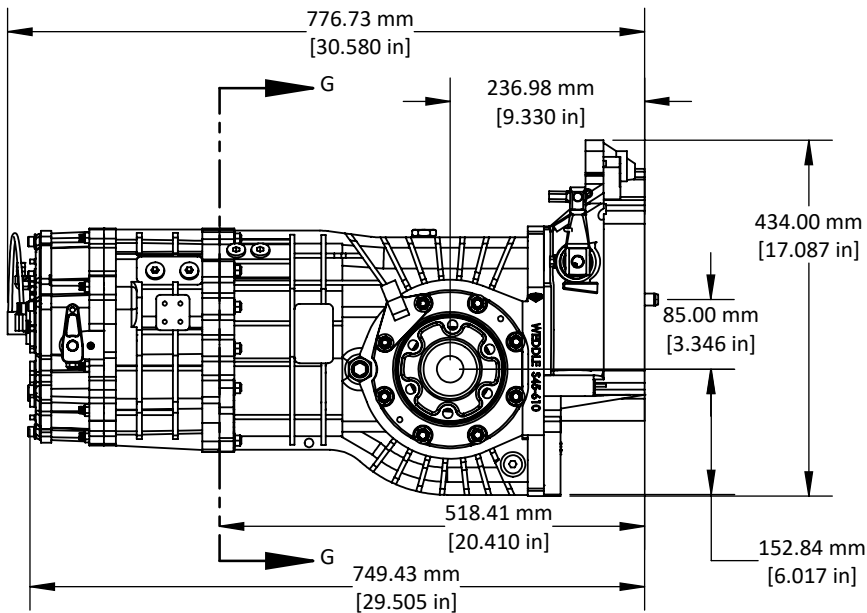
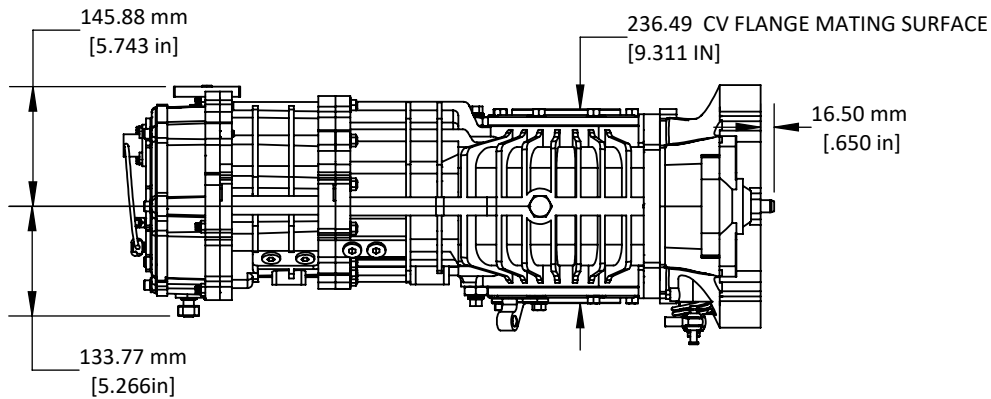


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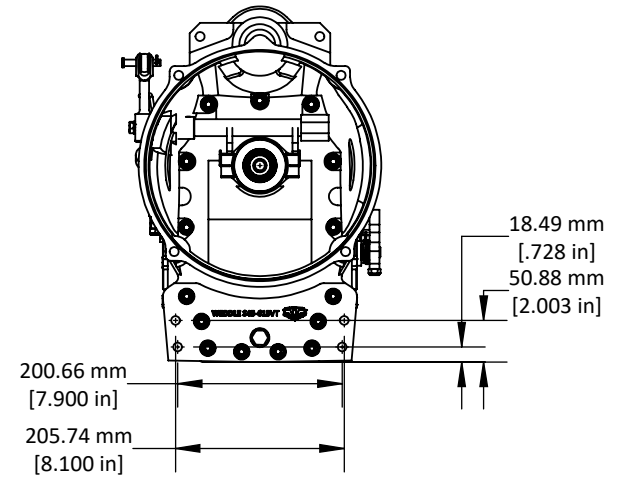
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 Drawn By: DL  
 Revised: 3/21/2022



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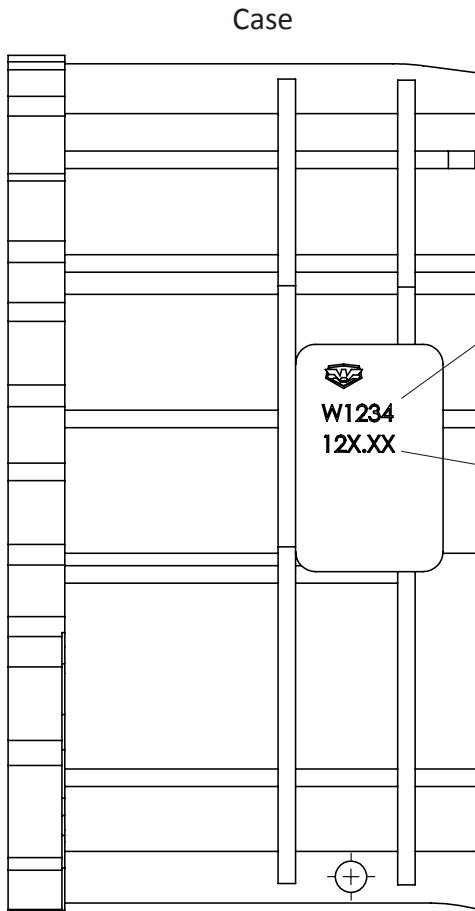


SECTION G-G  
Main Case Mounting Hole Detail



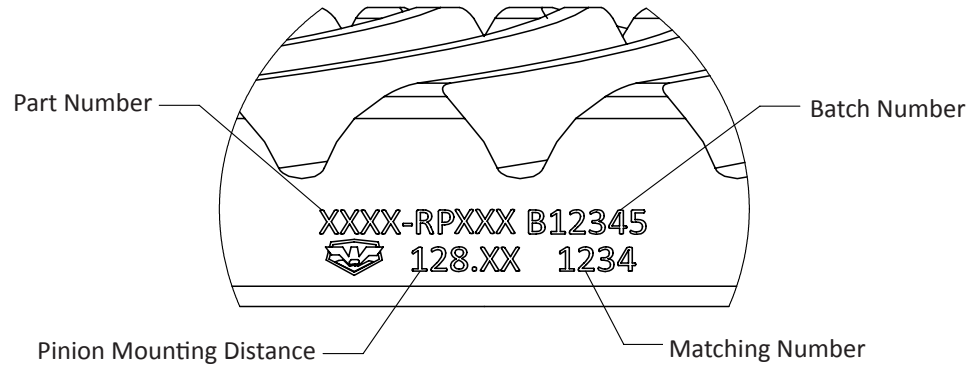
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Drawing No: WS-DIM-S45D-VW  
Drawing Name: S45D External Reference Dims  
Drawn By: DL  
Revised: 7/15/2022



Case Serial Number  
Deviation

### Ring Gear



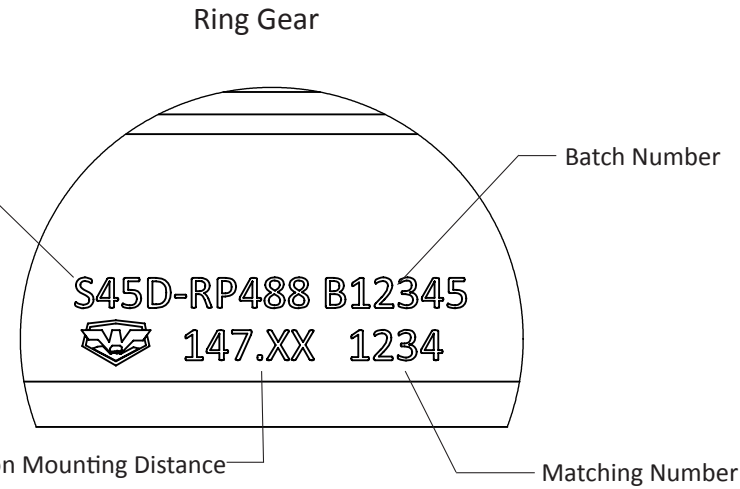
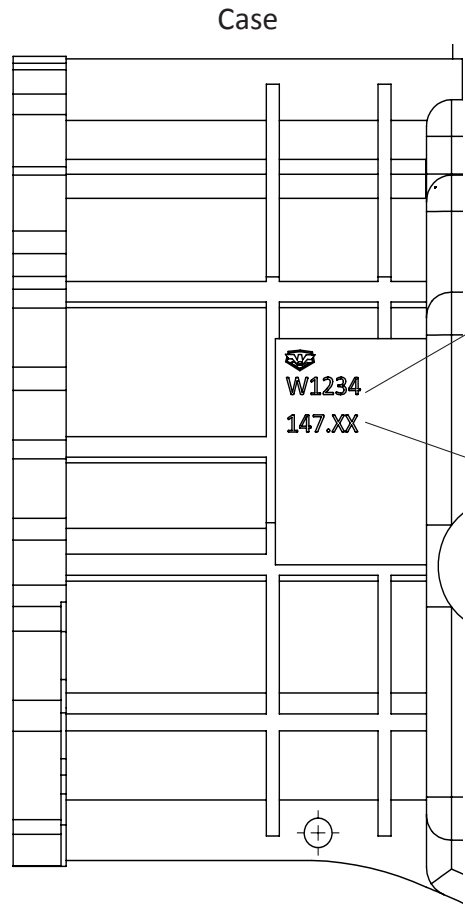
To determine the amount of pinion shim, use the 128.XX number on the Ring Gear and subtract the 12X.XX number on the main case to obtain the amount of shim in millimeters. If your Ring Gear does not have the pinion mounting distance etched onto it, use a pinion mounting distance of 128.30.

$$\text{Pinion Mounting Distance} - \text{Case Deviation} = \text{Shim Thickness (mm)}$$



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Drawing No: S45-INST-SHIM  
Drawing Name: S4/S5 Instructions  
Drawn By: DY  
Revised: 04/22/19



To determine the amount of pinion shim, use the 147.XX number on the Ring Gear and subtract the 147.XX number on the main case to obtain the amount of shim in millimeters. If your Ring Gear does not have the pinion mounting distance etched onto it, use a pinion mounting distance of 147.62.

$$\text{Pinion Mounting Distance} - \text{Case Deviation} = \text{Shim Thickness (mm)}$$



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Drawing No: S45D-INST-SHIM  
Drawing Name: S4D/S5D Instructions  
Drawn By: DY  
Revised: 3/21/2022