Drawing Number	Drawing Title
	Cover Sheet
AAR01	Drawing Index & Notes
AAR02	M101
AAR03	B08 & M102
AAR04	RS101
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AAR06	FS102
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AAR09	FS15 & FS17
Date:	**11/27/2021**

Part Number	Part Description
B08	Bracket - A-arm - Sway bar attachment
FS15	Front suspension - Lower A-arm - Ball joint cap - Original style
FS16	Front suspension - 289 R&P and 427 chassis - Lower A-arm - Ball joint housing
FS17	Front Suspension - Ball joint - Original style - One piece design
FS101	Front suspension - 289 Chassis - A-arm - Adjustable
FS102	Front suspension - 289 R&P Chassis - Ball joint housing - Replacement style
FS103	Front Suspension - 289 Chassis - Ball joint cap - Replacement style
FS104	Front Suspension - 289 Chassis - Ball joint - Replacement style - Two piece design
M101	Misc Part - Adjustable A-arm adapter - Rod end style
M102	Misc Part - Adjustable A-arm - Attachment bolt
RS101	Rear suspension - 289 Chassis - A-arm - Adjustable
Date:	**11/27/2021**

Notes:

1. To my knowledge, the parts detailed in these drawings were not available 'over the counter Shelby American components'. However, they are consistent with parts that were used on some of the factory and independent Cobra reace cars. These drawings detail custom A-arms which allow easy adjustment of the suspension camber setting on the original 289 chassis Cobra. The basic concept is to replace the stock Cobra A-arm to chassis connection component (the Metalastic bushings) with an adjustable Rod end (Heim joint).

2 Camber adjustment adapters of this basic design, have been retrofit on both original 289 Cobras as well as being incorporated by some replica Cobra manufacturers.

3. The original 289 Cobras with rack and pinion steering had the following factory stock suspension specifications (per the 289 Cobra Owners Manual):
   a. Camber front: +1°
   b. Camber rear: -2°
   c. Toe in front: 1/16"
   d. Caster front: 7°
   e. Spring length front: 30-1/4"
   f. Spring length rear: 41"
   g. Spring free arch front: 3-1/4"
   h. Spring free arch rear: 5-5/16"
   i. Number of spring leafs front: 10
   j. Number of spring leafs rear: 8

4. Modern practce is to use negative camber on both the front and rear suspension of leaf spring chassis Cobras. The negative geometry improves handling with current tires as well as allowing more precise camber adjustment. Separate adjustment of left and right sides also allows compensation for a non-centered spring and / or inaccuratedly located (or damaged) A-arm chassis mountng brackets. The following features are included:
   a. The stock Cobra front A-arm provided positive geometry. These revised A-arms provide adjustability in the negitive camber range.
   b. The stock Cobra rear A-arm provided negative camber geometry. These revised A-arms provide a range of adustment around the original negative camber setting.
   c. The stock Cobra had no provisions for adjusting camber on either front or rear suspension. These revised A-arms allows independent adjustment of each wheel over a total range of approximately 4.4° Front and 4.7° Rear.

5. It is recommended that prior to final A-arm welding, the adjustable A-arm is test fit on the chassis to ensure the minimum to maximum range of adjustment is suitable for the specific car. If necessary, the minimum to maximum adjustment range can be altered by moving the position of the adjusting sleeve (part M101) on the A-arm.

6. These drawings provide full details for construction of completely new A-arms with the adjustable feature. Although the A-arms appear to be stock (other than the added adjustment sleeves and rod ends), several dimensions of the original A-arm tubes need to be modified to allow the addition of the adjusting components. To take best advantage of the adjusting components, it is recommended that completely new A-arms be fabricated.

Date: 12/3/2021

The adjustable A-arms shown in the photos above were not fabricated from details presented in this set of drawings. The photos are provided to show a completed set of adjustable A-arms utilizing the basic adjustment concept and A-arm modifications that are required.

These drawings provide full details for all parts of the modifications including the A-arm itself as well as the new adjusters. Parts fabricated in accordance with these drawings will be virtually identical to those shown.

Date: 12/3/2021

Ball joint component machining thoughts:

Although the basic A-arm itself is a relatively straightforward fabrication project, sourcing the ball joint, it's housing and related parts makes the front A-arms the more difficult part of this project.

There are two basic approaches for the ball joint; use the original 1960's Cobra style or use a newer 2 piece replacement style. Both the ball joint and the ball joint housing are slightly different depending on the approach taken.

The original Cobra style ball joint was a single piece, machined steel component with separate bronze hemispherical bearings. The ball joint (and bearings) are mounted in a cast steel housing which is welded to the outboard end of the A-arm. Although the original style ball joint and hemispherical bearings are available from speciality Cobra suppliers, the original style cast end mounting parts is becoming more difficult and costly.

The new replacement ball joint is a two piece design comprised of a machined steel tappered pin and a separate spherical bearing. The spherical bearing is a readily available part from most bearing suppliers. Additionall, the newer two piece design utilizes a mounting housing with external dimensionser virtually identical to the original. .

For a hobbyist builder, the newer two piece ball joint approach is easier to fabricate, arguably a superior design and is virtually indistinguishable from the oritinal one piece design once installed. More importantly the end housing is a machined steel component rather than a casting.

The new two piece ball joint with it's companion machined steel mount design is the approach recommended in these drawings. (However, these drawings provide details for original style one piece ball joint and cast mounting for those who want to tackle that approach.)

There are two basic approaches for fabricating the all joint components; machine your own or employ a CNC shop to make them.

Additional details will be added to my web site about these the DIY approach and the job shop approach as time permits.

Date: 12/28/2021

Introduction:

The original 289 Cobras chassis had no provisions for adjusting the suspension camber geometry for either the front or rear of the car. What you got from the factory was the way it was. Although not ideal, in the vintage days of "skinny" tires and for simply driving around the back roads of England this approach was probably more acceptable.

The 289 Cobra chassis design utilized a transverse leaf spring to locate the top of a vertical upright and a fabricated tubular steel A-arm to locate the bottom of the upright. The inboard mounting points of both the spring and the A-arm were fixed points on the chassis. The vertical upright were castings and similarily fixed by design with no adjustability to move the mounting connection point of either the spring end or the A-arm end. Because of this design, adjusting the camber requires either modifying the length of the spring or the A-arms.

I assume most of the street Cobras left the suspension geometry as it was set from the factory since adjusting the length of either the stock spring or the A-arm would have been a difficult and relaively expensive task.

Cobras more actively raced sometimes modified the A-arms to allow the gemotery to be easily adjusted for improved performance on the racetrack. Several variations of "adjustment" modifications were used. I suspect that Shelby American probably experimented with different spring lengths, however this approach would not allow for last minute adjustments at the racetrack. The more frequently used modification was a mechanism to effectively lengthen the lower A-arm.

These drawings document a design often used to add camber adjustability to the lower A-arms by simply turning two nuts on a rod end to icrease or decrease the effective length of the A-arm.

These drawings have been prepared with the best information available, however they are provided with no written or implied guarantee of accuracy or suitability of purpose and they are intended to be used solely for entertainment purposes.

Date 11/17/2021

Rev.	Description	Date							
			Adjustable A-Arm Retrofit Drawing Registration No. xxx Name: Sample Date: December 2021	FOR PRIVATE USE ONLY Copying any part of this document without the written consent of the Developer is prohibited.	Drawings developed by: CAL COBRAS Danville,CA.	289 COBRA ADJUSTABLE A-ARM RETROFIT	Line is 1 inch at full scale (if not 1" scale accordingly)	Scale NA	Title DRAWING INDEX & NOTES	Drawing Number AAR01