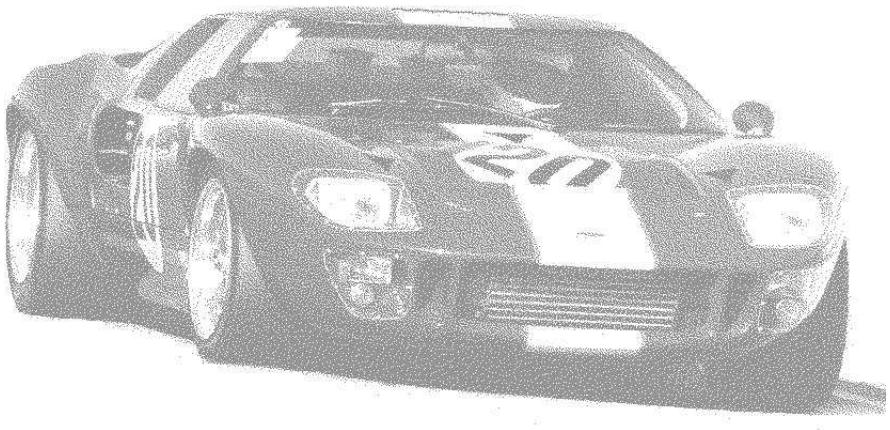
ASSEMBLY
and
SERVICE MANUAL

FOR THE

ERA GT



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Revision 4A

1/05

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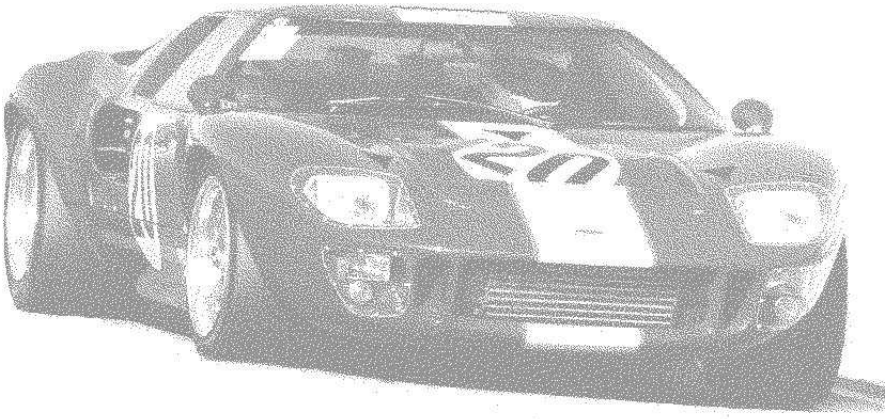


PARTS NEEDED/ASSEMBLY SEQUENCE

WELCOME!

Congratulations on your purchase of the ERA GT kit!

O ur goal, when we started on the design and construction of this kit, was to create an accurate and buildable Ford GT 40 replica with minimum compromises. You are free to make your own "improvements", but be aware that the ERA GT is a complex and integrated design. Changes that you make in one place will probably effect several other systems. If you wish to retain the essence of a true replica, it's best to be conservative. Also, it is usually the case that the more complex things get, the less reliable is the result.

While this is certainly not a small project, it can be one that is straightforward and very rewarding. Read the manual well. We have tried to include all the information necessary for you to complete this project.

*The manual is arranged according to **subject**, not the **direct order** that the kit should be put together. This was done to enable the manual to be a reference manual, and to give you some flexibility in your work sequence*

But...Sometimes things should have a definite order.

The recommended plan of attack is on the next page. *Please use!*

Good luck, and above all, have fun!

ASSEMBLY SEQUENCE OVERVIEW:

If there is an addendum with this manual, please make notes or changes to the manual as soon as possible.

Preparation of many parts can be done before the kit arrives by following the instructions beginning on page 5.

If you wish to paint your chassis, you must remove the body and some components from the chassis for paint preparation and undercoating. This is detailed on page 21.

On the basic kit, all the bodywork is located in its proper position, secured by temporary fasteners (unless we have been asked to take some optional actions).

When you remove the body from the chassis, make note of the positions of hinge, latches and shims by marking and tagging. If any bodywork must be done, it may be best to complete the rough work before disassembly.

The **parts that are not included** in the kit but are necessary for the car's completion are listed in the latter part of this section. Also provided is a list of sources where quality components can be found.

If you cannot out-source an item listed*: Sometimes the part numbers listed here have been superseded or deleted. Call us before you panic. We usually have new information or we can find out for you. E.R.A. also stocks many parts for our turnkey projects. We may be able to supply you what you want.*

When your kit arrives, check it for completeness of parts. You will find packing lists for each box. Check each box carefully for accuracy. If you think there is a mistake, please call us immediately.

FOLLOW THE SEQUENCE OF ASSEMBLY ON THE NEXT PAGE!

IT WILL SAVE YOU TIME AND PREVENT HEADACHES.

GENERAL SEQUENCE OF ASSEMBLY

FOR COMPLETE INFORMATION ON INDIVIDUAL SYSTEMS, CHECK THE INDEX ON PAGE 117.

The sequence below is not cast in stone. There are, however, some things on the list where order is **critical**. **They are marked with an asterisk**.(*). If at all possible, use the priorities below. It will reduce your effort, save time and result in a better finished product.

*Disassemble the kit as necessary, using the instructions on page 21.

*Clean and paint the chassis and suspension components, Section 76.

*If your chassis is not stainless steel, rust proof the inside the rockers and through the access holes provided. See page 76.

Install the front inner and bottom splash panels,and the rear subframe splach panel. Page 87.

*Install the brake lines, page 14.

*Install the internal aluminum water lines with rear hoses, page 70.

Install the brake pedal assembly, page 49.

Install the throttle cable and front linkage, page 98.

Install the speedometer cable, page 99.

Install the emergency brake cable and handle, page 53.

Install the radiator, AC condenser, with fans, page 70.

Install the air conditioning lines, Section H.

*Install the roof. Check the fit of the front and rear body, and doors, Section G.

Paint all sections of the body. See stripe info.

*Install the wiper motor and linkage. See the separate wiring instructions

*Install the fuel tanks, fillers and lines, page 66.

Install the dash access panel (passenger compartment) electrical accessories. See separate wiring instructions.

Install the voltage regulator and starter solenoin. See the separate wiring instructions

Install battery cables. See the separate wiring instructions

*Install wiring harnesses D, E and L if applicable. See the separate wiring instructions

*Install the suspension, front and rear Pages **Error! Bookmark not defined.** and 43.

Install the air conditioning main box and/or heater, and the cowl hoses for the fresh air vents, page 104.

Install the air conditioning hoses from main box to rear bulkhead, page 103.

*Install the shift linkage on the tunnel with "Z" Bar, page 56.

Fit the air conditioning compressor and alternator onto the engine, page 24.

Wire the engine. See the separate wiring instructions.

Install the engine/transaxle, page 63.

Install the rear axles, page 60.

*Install the rear shift linkage, page 56.

Install the front body, Section page 87.

Install the front body sealing hardware and gaskets, page 81.

Install the rear body, page .

Install sound deadening panels if required, page 98.

Install the dashboard, page 101.

Install the steering column/housing, page 100 .

Install interior, page 97.

PARTS REQUIRED

AN OVERVIEW, WITH *SPECIAL NOTES*

The **ERA GT chassis and body** follow the dimensions of the original GT40 very closely. Therefore, your mechanical components must conform to **similar space limitations** as the original car. Some configurations will fit together better than others, and some are simply not possible.

Be careful when selecting and building your components. The information on the following pages shows the recommended parts for many possible drivetrain combinations.

ENGINE:

Because of **space considerations** and transaxle compatibility, the following engine parts are **especially critical**. All are covered in detail in thelatter part of this section.

Block: Don't use a pre-1965 model. The bolt pattern won't match the bell housing.

Front Cover (only one is acceptable, see parts list)

Front crankshaft and damper: See page 6 for dimensional limitations

Water Pump: A Ford Motorsport shorty pump or Snow-White pump is highly recommended. Alternately, you can use an externally mounted electric pump made by Davies-Craig of Australia. Inquire.

Flywheel (must match the bell housing, clutch and crankshaft)

Clutch (must fit the transaxle, flywheel and bell housing)

As of 1/99, the several exhaust systems are available for 289/302 engines with various head designs. Please inquire.

TRANSAXLE:

Both the **ZF** 5DS 25/1 and 5DS 25/2 will fit, but each requires a different flywheel and bell housing. The BMW M1 transaxle doesn't require inverting, but the shift linkage must be moved from the left to the right side, requiring some new parts.

REAR BRAKES:

Standard brakes use a 12" rotor with emergency brake built into the caliper. Clearance for wheel balancing weights is severely restricted if 15" pin drive wheels are used (about .180"). You must use special weights that are very thin, or that clip onto the edge of the wheel

Remember! The more exotic you get, the more likely you are to have problems. There is a maxim in engineering practice:

Keep It Simple, Stupid!

Please! Read the information that follows in its entirety before you purchase parts that you might be unable to use.

ENGINE AND ACCESSORIES

E.R.A. has developed our ERA GT around parts and accessories from the **1965-on small Ford block**. The earlier 1961-1964 221, 260 CID engine/bell housing bolt pattern is different from the later models, and fits neither Pantera nor ERA bell housing.

While many variations of the 289 CID through 351 engines have been used in the E.R.A. GT, some are more difficult to adapt than others. With the help of its customers, E.R.A. will try to accommodate all reasonable engine alternatives.

As can be seen above, the length of the engine is limited by the engine bay. The 26.3" length is typical of a 302 with a stock front crankshaft damper. Since changing the alternator belt requires a minimum of ¾" clearance, your total length (measured from the rear face of the block to the face of the front pulley) must be less than 27". If you must use the maximum length, we recommend using an electric water pump so that the hump between the seats can be kept reasonable.

Also note the clearance above the carburetors. As a general rule, 302 engines with stock deck height can use standard velocity stacks, but the 351 may require shorter ones.

Flywheel Considerations: The flywheel is the first engine part that merits attention. If the flywheel must be changed, remember that the crankshaft and flywheel (and sometimes clutch) are normally balanced as a unit.

If you have the late ZF transaxle (5 DS-25-2), you must use a small diameter Ford flywheel and ring gear that fit the ERA bell housing's starter placement. Certain series engines have flywheels that may not have to be modified for a new ring gear. Look for an engine with a flywheel that is approximately 13.3" in diameter measured on the outside of the teeth (157 or 160 teeth).

As you can see from the diagram above, the water pump extends into the rear bulkhead (and has a fiberglass cover.) All engines must use a **short water pump**, either Snow White or a Ford Motorsport shorty pump – or an electric pump from **Davies Craig** (http://www.daviescraig.com.au). If you use the electric pump, also we also recommend that you use the control unit so that you can eliminate the thermostat. ERA can supply a water neck with the proper fitting for the temperature pickup.

The clutch , flywheel and bell housing must fit and work together. Because of the low drive-train height, you cannot use just any pieces.

The original GT40 used a twin disk clutch. Fortunately, there are now standard single disc clutches that work very well within the restricted space.

Your choice of parts depends on your power requirements, budget and reliability desired.

Alternator: Ford, 1965-78, w/single V-groove pulley and external regulator. Fits most Mustangs w/o AC.
A heavy duty unit (100 Amp) is recommended with air conditioning: Delco-Remy (rebuilt) #321-159 (Fits 1978-1984 Ford with HD alternator option.) Some single-wire alternators can also be substituted. Call for special wiring hints.

Carburetor Cold Air Box: A cold air box (for Weber carbs) duplicating the original one is available from E.R.A. Others can be custom fabricated.

Distributor: Because of space limitations, your distributor must be of approximately the same diameter and height as the original points-type ford distributor. You may use a Mallory Unilite or other pointless distributors within those space parameters. If you choose to use a MSD system, a tachometer adapter is necessary. The car is wired for a **12 volt ignition system**. If your system requires less voltage, **a ballast resistor** must be installed in the ignition circuit.

Exhaust system: The "bundle of snakes" exhaust system for standard 289/302 heads is in production, with others for Boss and 351 Windsor and Cleveland in development. These 180 degree systems are functionally and visually the same as the original and make a wonderful sound.
For street use, you may also wish to insulate your exhaust pipes. Insulating kits and materials are available from major catalogs or from manufacturers such as Thermo-Tec.

Engine Front Cover: When using the Snow White water pump, Ford front cover D00Z-8508-A or the equivalent must be used. The casting number on the cover may not correspond to the Ford part number. The cover is 2.1" thick, measured from engine face to water pump mounting. See the instructions with the Snow-White water pump on page 71 for other particulars.

Crankshaft damper: See the length notes on the previous page.

Engine Mounts: E.R.A. has special reproductions of the original GT40 design to fit our chassis. Specify chassis number when ordering

Oil pan and pump: To prevent the sump from hanging below the chassis, the maximum oil pan depth is 7 $^{1}/_{4}$". There must also be clearance for the starter when using the ERA bell housing. Because of this limited depth, proper baffling in the sump is mandatory. Call us about special pans and pumps. The best bet is the “Road-race GT40” - 55360 Aviaid pan which can be used with the starters listed below. The **capacity** is 7 qts. plus whatever is used in the oil cooling system.
If you have a LHD car, the dip stick should be mounted on the front cover or the left side of the pan. A dipstick tube on the right will interfere with the shift linkage.

Oil Filter: Because of clearance necessary for the alternator, it is necessary to use a remote filter or a small diameter filter such as Fram PH966B (3.7" long), PH2825 (5.6" long), PH2870A(5" long), or equivalent. When using an oil cooler, care must be taken to select the proper fittings on the engine adapter. It is best to have the major components installed in the chassis before buying parts.

Starter: We recommend using a Ford Motorsport “Mini-starter” (M11000-A50) or the heavy duty equivalent (M11000-A60) as used in post ’87 cars, although most other starters will fit if they are matched to the ring gear depth of the flywheel and the oil pan configuration.

LHD cars: Because of the nearness of the shift linkage, limit the length from mounting face to starter end to 7”

Some aftermarket gear-drive starters may require that you rotate the starter clockwise on the starter housing. See page 31.

Valve Covers: if you intend to do track work, standard breathers may not be adequate. Oil will be pushed out the vent during continuous high speed cornering. Covers with more sofisticated venting systems are available.

Water manifold, for Weber carburetor manifold with dual water outlets: Call us.

Water manifold, for standard intake 4 bbl. manifold and Weber single outlet manifold: It is necessary for the water to take an immediate right turn after leaving the thermostat housing. This adapter is available from E.R.A.

Water pump: A "shorty" water pump is recommended for all cars and mandatory with air conditioning. The Snow White unit is 1/2" shorter than the Ford Motorsport, but some have had high-speed (track) cooling problems with it. The Ford unit works well but requires custom made pulleys. You must tell us which pump you are going to use so that we can supply the correct connecting tube and rear bulkhead bulge. We also have sucessfully tested a **Davies-Craig electric pump**. It eliminates the engine-driven pump and thermostat, and offer full water flow at any speed. Call or e-mail us for the installation details.

Snow White LTD shortie pump:
The front cover on pre 1968 engines must be changed to the later cover. See the information below. The (3 or 4) bolt pattern on the crankshaft damper must be specified when ordering the Snow White water pump. Some modifications to the Snow White unit are necessary when using a Weber carburetor manifold with dual water outlet. Most aftermarket manifolds use only a single outlet. See section L for details.

Ford Motorsport: M-8509-E351 Short pump
Buy the 3 piece (2 groove) pulley kit M-8509-N from Ford Motorsport. The front groove on the water pump pulley must be machined off for adequate firewall clearance. Final pulley details are being worked out. Inquire.

CLUTCH AND FLYWHEEL

Ford has used several combinations with the 289-302 Engine. The clutch must be properly matched to your engine's flywheel, and also to the transaxle you use. If you haven't selected your engine yet, read the information that follows with the purpose of keeping your special machine work to a minimum. Take note that some crankshafts are externally balanced with the flywheel. Your crankshaft must be balanced in unit with it.

When examining your potential or existing engine, measure the flywheel ring gear diameter to the outside of the gear teeth. The 157 and 160 tooth flywheel will measure approximately 13.3". The 164 tooth flywheel will measure approximately 14.2". Also measure the pressure plate bolt circle (shown below) and the diameter of the driven disk, if you have one. This information can be used to find your stock clutch configuration. If you are installing an aluminum flywheel, have it drilled to the 82-on Ford clutch pattern, and use the 157 Tooth Ford ring gear. This is a good combination for clearance, reliability and compatibility.

a\Clutch

Ford Motorsport makes a 10.5" combination that is rated for 750 BHP, and is still streetable. The disc is a combination metallic one side/organic other side design.

Clutch disc: M-7550-X302

Pressure Plate: M-7563-A302 or M-7563-B302 with centrifugal assist.

THROW-OUT BEARING

The ERA bell housing is supplied with the engine plate, throw-out bearing (Nissan 30502-21000), adapter sleeve, and pilot bushing. Spacer rings included will adapt the mechanism to most configurations.

If you use the inverted Pantera bell housing and Pantera clutch, use the standard Pantera throw-out bearing.

TRANSAXLE - BELL HOUSING

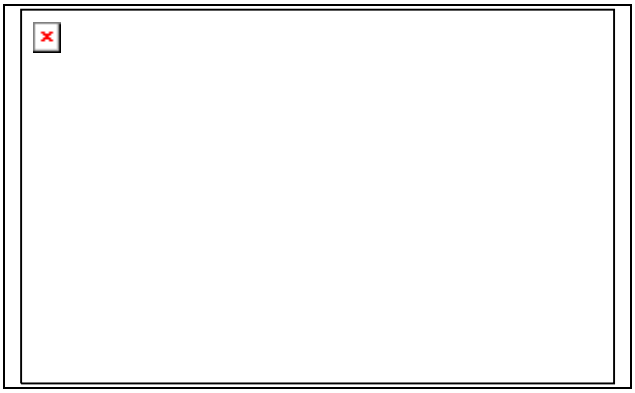
OVERVIEW

The original GT40 used the German **ZF 5DS-25** transaxle. Fortunately, the basic design is good for both competition and street use, having constant mesh helical gears with excellent synchromesh.

Successors to the original transaxle unit were commonly used in the **Pantera**(upside down) and less commonly in the **DeTomasso Mangusta** ("right" side up). A third variation on the transaxle is used on the BMW M1. This unit is similar to the Mangusta, but the gear change is on the left side rather than the "correct" right. Consequently, conversions for the ERA must include moving the transaxle shift mechanism to the other side – something that is best done by a professional. See page 18 for ZF specialists.

The **Pantera** used two variations: Early cars used the 5DS-25/1 with a 4 bolt bell housing. Later Panteras used the 5DS-25/2 with a 7 bolt bell housing. The /2 models are somewhat stronger and must be used with the special ERA bell housing. Both transaxles are nominally rated at about 325 lb.ft. capacity. The rating is probable conservative: there are twin turbo'd Panteras with more than 450 lb.ft. out there, presumably not trashing their transaxles at every stoplight.

The Pantera transaxle must be converted to run in an **inverted position**. See page 26 for modifications. (The Mangusta and BMW M1 ran with the correct GT40 orientation.) In addition, the top cover must be changed to one with mounting bosses like the Mangusta. Covers are available from ERA or RBT Transmissions.



f/topmount

The Pantera bell housing for the 25/1 can be **re-drilled** to enable transaxle inversion. Unfortunately, the bell housing depth must also be reduced $^1/_4$" and the bottom edge must be removed for ground clearance. Even with the bottom edge modified, ground clearance is limited by the ring gear diameter, which must be kept compatible with the starter location on the bell housing. An **original** GT40 bell housing might fit on a 25/1 transaxle. Unfortunately, it may impossible to actually find one!

The **later transaxle (25/2) must be used with the E.R.A. bell housing**. Our custom bell housing solves the ground clearance problem (it uses the smaller Ford flywheel), and the depth is correct. The bolt pattern will accept the inverted transaxle.

SPEEDOMETER GEAR

The speedometer cable ratio is usually on a tag on the shift box, listed together with the other gear ratios. If your box has been rebuilt, etc., it's a good idea to check your ratio by marking the output flanges and case with tape and counting the number of times the speedometer cable drive turns with each turn of the flanges (in the same direction). The ratio will be approximately 2 turns of the cable for each one of the flanges. There is a gear reduction in the speedometer cable to compensate for the different requirements of the various speedometers.

TRANSAXLE-CLUTCH-FLYWHEEL SELECTION TABLE

	and this TRANSAXLE	
with this ENGINE ⇓	Early (5 DS-25/1)	Late (5DS-25/2)
1965-1966 289 CID w/157/160T ring gear	Note A	Note B
1968-1981? 289, 302 CID w/164T ring gear	Note C	Note D
1982 on 302 CID w/ 157/160T ring gear	Note E	Note F

*The **Ford ring gear** (157 or 160 tooth is on most engines with 10" or 10.5" pressure plates. The replacement Ford part number is C20Z 6384B*

Note A: You must use an inverted and modified Pantera 4 bolt bell housing. Use a Long type pressure plate with a 10" or 10.5" disk. The lower starter mounting hole in the bell housing must be changed to move the starter centerline to 9.838" from the crankshaft center. Change the engine plate to match the new starter location. The disk must have splines that are 1 1/8" x 10 (Not of Ford origin, so you will have to check flywheel and pressure plate clearance). Use a Pantera throw-out bearing and pilot bushing. For proper ground clearance the bottom of the bell housing can be machined 1/2".

Note B: ERA bell housing with an ERA intermediate plate. Use a Long type pressure plate with a 10" or 10.5" disk, or redrill for the recommended Ford Motorsports combination. See below for recommended part numbers. The throw-out bearing and sleeve come with the bell housing. See also Note G, below.

Note C: (Inverted Pantera bell housing) Use stock Pantera pressure plate, driven disc, pilot bushing and throwout bearing. The bottom of the bell housing can be trimmed 1/2" but the large ring gear is the limiting ground clearance factor .

Note D: ERA bell housing with an ERA intermediate plate. The flywheel must be machined to the small Chevy or Ford ring gear, or changed to a new unit similar to the 157 tooth Ford flywheel described above. New holes for mounting the pressure plate may have to be drilled and tapped also. Preferred clutch is from a 1987-on Ford Mustang and is 10.5" in diameter. See below for special Ford Motorsport parts.

Note E: Retain the stock pressure plate and disc, but use the Pantera or Era throwout bearing. A Pantera pilot bushing must be used. The bell housing must be redrilled for a new starter location. See note A.

Note F: Retain the stock pressure plate and disc. Use the throw-out bearing and pilot bearing supplied with the ERA bell housing. See below and page 62 for other details. See also note G.

Note G: Temporarily install the bell housing and starter onto the engine. When using the 157-160T ring gear, there may be interference between the nosepiece of the starter and the ring gear teeth. A small amount of material may be removed from the starter nosepiece at the appropriate point.

SPRINGS AND DAMPERS

OVERVIEW:

Several combinations of springs and dampers are available, depending on your driving intentions and your pocketbook. For economical street and limited competition work, we have worked with **Spax** (UK) to develop custom units. For greater adjustability and performance, **Koni** units are available with steel or aluminum bodies.

Springs may come from many sources, but we have found that only certain brands are reliable for long term use. Inquire.

Dimensions given below are subject to final adjustment for your preferred ride height. We recommend 5 inches front, 5.25" back for street ground clearance (tub to ground). The original GT40's had 4.8" street, 4.1" track clearance. At 5", there will be approximately 3.5" jounce travel, 3" rebound travel available in the suspension. Because of component interference limitations, do not try to increase the available travel beyond stock.

RECOMMENDED SPRING RATES AND LENGTHS:

STREET/TRACK USE

Spax	Front	300x10"
	Rear	350 x 12"
Koni	Front	300x12"
	Rear	350x14"

Approximate spring preload *

Front	.75"
Rear	1.0"

***Preload** is the amount of spring compression when installed on a fully extended damper of standard extended length. To calculate the installed spring length on a damper in its extended position, subtract the preload from the free spring length. Always measure the uninstalled spring length. Frequently the actual (measured) length of the spring will differ from the nominal length.

If the extended length differs from the specifications listed on page 11, the preload length will have to modified accordingly.

COIL-OVER DAMPERS (SHOCK ABSORBERS)

The following dampers fit the chassis well and have adjustable height and adjustable damping. Koni dampers are quite expensive (except for the 82Z) and are more race oriented. The Spax pieces listed are made especially for E.R.A. and are available only from us. If you wish to experiment with other brands, dimensions are given below.

FRONT:

Koni 8211-1121 (Double external adjustable)
Koni 8212-1422 (Alum. body as above)
Koni 8216-1906 (disassemble to adjust)
Spax 297-PAS200 Special(externl adjustable)

REAR:

Koni 8211-1123 (double external adjustable)
Koni 8212-1430 (Alum. body as above)
Koni 8216-1907 (disassemble to adjust)
Spax G135 PAS200 (externally adjustable)

FITTING DIMENSIONS FOR DAMPERS NOT LISTED ABOVE

All ends have eyes that are 1/2" ID.

FRONT DAMPER - STANDARD SPRING RATES

Max. length 16.0"
Compressed length 11.5"
(with any rubber bumper fully compressed)

REAR DAMPER - STANDARD SPRING RATES:

Max. length 17.5"
Compressed length 12.0
(with any rubber bumper fully compressed)

If you are using springs with rates greater than 350 lb./inch, reduce the maximum extended length of the dampers by 1". Otherwise, the spring will come off the seat in rebound. Obviously, the listed preloads for stock springs are not accurate for non-standard length dampers.

If you are thinking of using very stiff damper settings and springs for the street, consider that low speed handling, especially over less than perfect roads, will be adversely effected. Long term chassis fatigue may also be a problem with extremely stiff springs and dampers. Don't do it if you don't have to.

COMPETITION:

Properly set up with good street tires at normal pressures, the street suspension should generate more than 1G, and is very well balanced. Handling should be adequate for occasional high speed work if the tire pressures are increased by approximately 10 psi. Also, damper stiffness can be temporarily increased for crisper response.

For the most precise handling, get a **wheel load measuring device** and balance the chassis from side to side. This will compensate for variations in spring stiffness and other factors. You may also increase the negative camber in the front and rear suspensions up to -1.5 degrees, and reduce toe-in at the front to zero. This will severely shorten tire life and make the car hunt a bit while going straight, and is not recommended for street driving. **Final** camber and tire pressures are best set by an expert with a tire pyrometer.

The front and rear suspension may be **bump steered** by a shop specializing in road racing suspension. The steering gear may be raised or lowered on its mounts by increasing or decreasing the shim thickness. Rear geometry may be changed by varying the castor angle of the hub carrier.

For **serious competition,** the spring rates should be increased by 50% to 100% for optimum high speed handling. Customers have used 500lb/in (F) and 65lb/in (R) with success. Spring length must be shorter if the rate is increased. When the damper is fully extended, the spring may be loose with the standard dampers Shorter dampers may be fit. For instance, the front damper may be used at the rear, and the E.R.A. 289FIA damper may be used at the front.

STEERING GEAR

1965-1975 MGB: The early unit (pre 1969) has gearing that results in 2.5 turns, lock to lock, and is recognized by a bulge in the pinion end cap. The post 1969 unit is 2.9 turns lock to lock, and has a flat pinion end cap. See the illustrations on page 32 for the early and late steering gear and the modifications necessary for each. You must tell us which unit you are using because of a choice of tie rod adapters supplied with the kit. The steering gear for a right hand drive car must be from a RHD MG donor. See M.C. Griffiths in the source listings at the end of this section for RHD steering gears. For those in a hurry, E.R.A. has bolt-in steering gears assemblies in stock.

ANTI-ROLL BARS

Anti-Roll Bars are not required but strongly recommended. See the option list. For track tuning, keep the standard size bars but use an adjustable rear bar. Increase only the spring rates.

BRAKES, CALIPERS, EMERGENCY BRAKE ASSEMBLY:

Part numbers for both styles are included in the Suspension and Brake parts list starting on page 14.

OVERVIEW AND RESTRICTIONS:

With certain restrictions, you may use 11.5" or 12" Corvette brakes. Also, at the time of this writing, special racing pieces are being developed.

FRONT:

12” front rotors will **NOT** fit into 15” wheels. The pin-drive kit includes rotor that are already sized correctly (11.5”). Front uprights drilled for the 12” brakes are available on special order for those with **16" or 17" wheels**.

For **bolt-on wheels in 15" wheels**, the standard Corvette 11.5" rotors must have their OD reduced to 11.5" and the anchor plates must be slightly modified by E.R.A. You also must use **spacers** between the anchor plate and the upright mounting ears.

REAR:

1988-94 Corvettes (with 12" rotors) have their emergency brake built into the caliper. The 12" rear rotors are **very tight** with 15" pin drive wheels: Normal wheel weights that stick to the inside of the wheel will not clear the caliper. Balancing weights must be very thin, or clip onto the rim edge.

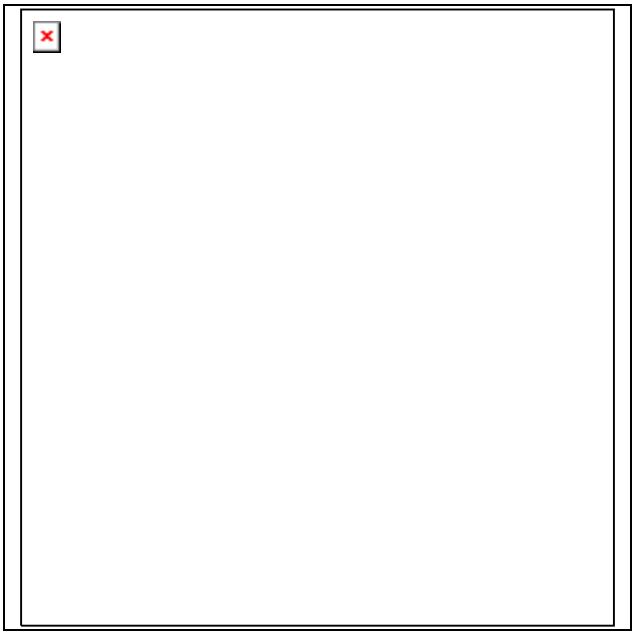
SUSPENSION AND BRAKE PARTS, BOLT-ON WHEELS:

REQUIRED PARTS

(optional or supplied by the customer)

FRONT, BOLT-ON

Ill	Qt	Description	GM Part
		ALL BOLT-ON APPLICATIONS:	
	2	Hub bearing	7466902
		Two piston floating caliper:	
		(11.5" rotor, 12" on special order)	
	2	11.5" Rotor or special order 12”	14084142
	4	Spacers, anchor plate for 12" rotors	E.R.A.
23	1	Caliper housing and piston, LH	10104471
23	1	Caliper housing and piston, RH	10104472
31	1	Anchor plate, LH	10181205
31	1	Anchor plate, RH	10181206
	2	Rotor	10097654
24	1	Pad kit	10104485
28	2	Pin, caliper guide	10140586
29	4	Clip, caliper damping	10104481

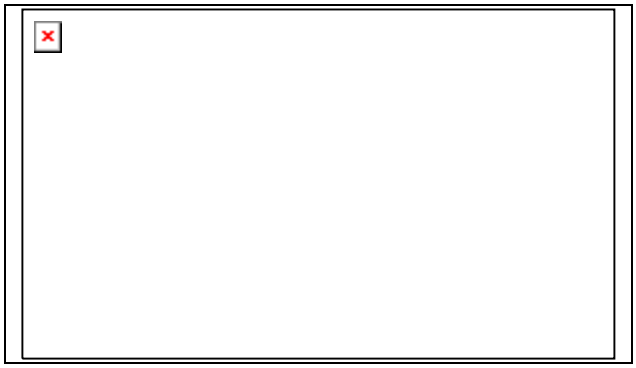


a\fcalips

REAR, BOLT-ON

The components are late (87-94) Corvette with **12" rotors**. The emergency brake built into the caliper.

Because of **tight clearance** between the caliper and the wheel, very thin wheel weights must be used. Complete **caliper assemblies** are available from ERA or Baer Racing. Hub bearings and caliper bridges are illustrated on page 38.



a\rcalip2.gif

Ill	Qt	Description	GM part
	1	Mounting plate, LH	10052211
	1	Mounting plate, RH	10052212
	2	Rotor	10097655
	2	Spindle, w/o ABS	14055941
	2	Nut, spindle	562247
	2	Washer	562249
	2	Retainer	562248
	4	U-joint clamp	14046907
	8	Clamp bolt	14046904
1	1	Caliper, LH	10132839
	1	Caliper, RH	10132840
		Each caliper also includes the following:	
2		Nut, lever arm	22521550
4		Lever arm	10132841
7		Cap, lever pin	10112647
6		Pin, lever pivot	10132833
2		Cap, bleeder screw	14089150
2		Bleeder screw	14071826
	2	Repair kit, includes parts below:	10112656
15		Pushrod	
17		Retainer	
18		Boot	
19		Actuating Collar	
20		Boot	
21		Bushing	
22		Clamp rod	
24	2	Bracket, parking brake, L or R	E.R.A. special
11	4	Spring, EB collar retainer	10112650
	2	Bolt, anchor plate	10112649

	4	Washer, cal. mt.	E.R.A.
	4	Bolt, caliper plate	supplied
3	2	Spring, levr arm ret.	10112651
28	2	Plate, caliper mounting	10112652
13	4	Guide pin	14067560*
14	4	Boot, guide pin	14067552*
27	1	Pad Set with (4)guide pins bolts below	10132836
10		Bolt, guide pin	14067559

* Also used on front brakes. See above.

HUB AND BRAKE PARTS, PIN DRIVE WHEELS:

E.R.A. supplies pin drive conversion parts in various combinations. The following list shows the stock parts not normally supplied with our Basic conversion kit.

BRAKE CALIPER:

1	Caliper housing and piston, LH	10104471
1	Caliper housing and piston, RH	10104472
1	Anchor plate, LH	10181205
1	Anchor plate, RH	10181206
1	Pad kit	10104485
2	Pin, caliper guide	10140586
4	Clip, caliper damping	10104481

PARTS SUPPLIED WITH THE ERA PIN DRIVE KIT:

Qua.	Description
2	Front spindle assbly
2	Front hub
12	Pin, wheel locating, w/nut, washers
2	Wing nut
2	Hat, rotor
20	Bolt, hat to rotor, w/nut and washer
2	Rotor, Wilwood 160-0790, cut to 11.5" or 12" diam.
2	Nut, Castle, 3/4"-16
2	"D" Washer
2	Cotter pin, 7/64" x 1 1/4"

Bearings, Seals (fits both Calipers above)

2	Wheel bearing, inner	A-12 Bower/BCA
2	Wheel bearing, outer	A-13 Bower/BCA
2	Seal, inner	19753 CR

REAR - PIN DRIVE

Uses 1989-92 Corvette pieces with the emergency brake built into the caliper.

Except for the pin drive hub, parts are the same as the Bolt-on. See caliper parts diagram on page 47.

YOU MUST SUPPLY:

Qua.	Description	GM Part
1	Mounting plate, LH	10052211
1	Mounting plate, RH	10052212
1	Caliper, LH	10132839
1	Caliper, RH	10132840
	Each caliper includes:	
	Nut, lever arm	22521550
	Lever arm	10132841
	Clip, lever arm	10112646
	Pin, lever pivot	10132833
1	Cap, lever pivot pin	10112647
2	Repair kit, includes:	10112656
	Pushrod	
	Retainer	
	Boot	
	Actuating Collar	
	Boot	
	Bushing	
	Clamp rod	
2	Bracket, parking brake, L and R	E.R.A. special
4	Spring, EB collar retainer	10112650
2	Bolt, anchor plate	10112649
2	Anchor plate, caliper mounting	10112652
4	Guide pin	14067560
4	Boot, guide pin	14067552
1	Pad set, includes 4 guide pins, bolts	10132836
	Bolt, guide pin	14067559
2	Spring, lever return	10112651

ERA SUPPLIED PARTS WITH KIT

Qua.	Description	
2	Hub bearing (Federal Mogul 513020 or GM 7466920 or 7466924 is modified for use with Type II and III pin drive adapters, and is supplied with pin drivekit.	
2	Spindle, w/o ABS (used or NOS only)	14055941
	Spindle w/ ABS	10052216
2	Nut, spindle	562247
2	Washer	562249

2	Retainer	562248
2	Cotter pin	
2	Rotor, 12" from GM 10097655	
2	Pin Drive Hub	
12	Drive pins	
2	Hub, left and right hand thread	
2	Wing nut, left and right hand thread	
4	Washer, cal. mt.	12mm lock
4	Bolt, caliper plate	M12 x 30

WHEELS AND TIRES:

BOLT-ON:

With the standard fender openings, we recommend **bolt-on wheels** that follow the following specifications:
Front: 8 1/2" x 15", 4 7/8" backspacing, 5 x 4 3/4" bolt circle
Rear: 10" x 15", 4 7/8" backspacing, 5 x 4 3/4" bolt circle.

With the "1075" option, wheels up to 10" wide (front) and 12.5" wide (rear) may be fit. Inquire as to the recommended offset for your rim and tire width.

PIN DRIVE:

Several **Pin Drive wheels** designs in 15", 16, and 17" diameter are available or in development. See the sources list on page 18 and/or call us for the latest information.

TIRES:

The suspension is designed to maintain **street ground clearance** (5.0") with tire diameter of 25", front, 26.5" rear. You must keep your front tire diameter under 25.5", rear under 27.0" to avoid interference with the bodywork.

Small diameter tires will reduce ground clearance and change suspension geometry.

Wheel width is contingent on the wheel offset. The 15" wheels that we supply (both bolt-on and pin drive) will allow maximum sections of 245 in front and 295 in back with standard fenders. Using 8.5" and 10" wheels, there is enough clearance for 225-60-15 or 245-50-15 in the front and 255-60-15 or 295-50-15 in the rear.

***Optional* "1075" flares** with 16" x 9.5" and 12.5" wheels allow 245-50-16 tires in front, 315-40-16 in back. 12" brake rotors will also fit easily in the 16" wheels.

Some increase in the maximum sizes listed above may be effected by increasing the wheel backspacing (moving the wheel *toward the centerline* of the car). Remember; Suspension harshness increases with very large tires, and since the car is very light, smaller sizes are more than adequate for spirited driving. Racing tires are not recommended for street use, and are illegal in most states.

AUXILIARY SYSTEMS:

Axle half-shafts: Available from ERA or can be made to the specifications in section on page 60.

Battery: Group 42 or equivalent. HD: Douglas Omni 7000

Belt, alternator: 7320, 7325, or 7330 Gates or equivalent depending on application

Belt, AC compressor: 8448 or 8455 Gates or equivalent depending on application

Cable, battery to starter solenoid: 18" long, w/clamp, eye.

Cable, LHD, starter solenoid to starter: 20", w/2 eyes.

Cable, RHD, starter solenoid to starter: 72" x 2 gage, w/2 eyes. This must be fabricated from pieces. See an automotive electrical shop if necessary.

Cable, battery (-) to bracket: 18", w/clamp, eye.

Cable, bracket to cylinder head: 12", w/2 eyes.

Cable, speedometer: Custom unit. See us.

Cooling system **header tank**: E.R.A. offers a reproduction of the original tank that is mounted on the rear bulkhead.

Fuel pump(s): One fuel pump on each side, or you may use a single pump and a tank crossover valve actuated by the power line from the other tank. Minimum capacity for each is 30 gallons per hour, more if your engine is modified. If your fuel pump does not have an integral check valve, you must add one in each line between the pump and the fuel junction to prevent flow from one tank to the other. See section E for more details.

Handbrake lever: Pontiac Fiero (10046473 GM). [A special modified lever is supplied with the RHD option.] See page for necessary modifications.

Hoses, water: See page **Error! Bookmark not defined.** for details.

Starter solenoid: SX 581X Blue Streak or equivalent

Voltage regulator: VR 118 (Standard) or equivalent

Wiper motor, cable, hardware, and one wheelbox from 1971- 1978 Triumph Spitfire. Preferred wheelbox numbers: 72859, 72861, 72902 or 72906. The motor linkage must be modified. See page 34.

-PARTS PREPARATION-

Wiper arm:(15" pivot to end) Wiper blade:(18"). Assemblies are available from E.R.A.

SOURCES

(800 Tel. Nos.do not apply in State being called)

Aviad Metal Products	7570 Woodman Place, Van Nuys, CA, 91405. Tel. 818-786-4025	Oil pan
CFI Motorsports	5-B Hamilton Bus. Pk., Dover, NJ 07801, Tel. 973-9260	AVO Dampers
Clark Bros. Instruments	Shelby Township, MI, (810-781-7000	Speedo cables, gears
Danhard, Inc.	3839 Dilido Rd., Dallas, TX 75228. Tel. 214-328-8541	Air conditioning parts
Davies, Craig	3847 Exchange Avenue, Aurora, Illinois 60504, (877) 964 6305, Fax: (630) 851 7744.)	Electric water pump
Earls Performance Products	189 W. Victoria St, Long Beach, CA 90805. Tel 310-609-1602	Brake and oil cooler parts
Eibach North America	17817 Gillette Ave., Irvine, CA 92714	Springs
Ford Motorsport:	Catalog available at the dealer. Special technical assistance Hot Line: 313-337-1356	Ford engine parts
Hall Pantera	9210½ Alondra, Bellflower, CA 90706. Tel. 310-867-3319 (Tues. through Sat. only)	ZF gearbox parts
Jongbloed Modular Wheels	C/O Johnson Motorsports Tel. 952-445-7276	Wheels
Koni America Inc	Div. ITT Automotive, Parts Supply Div., 8085 Production Ave., Florence, KY 41042 , Tel. 606-586-4100	Coil-over damper
M.C.Griffiths, LTD	Grifco House, Smeaton Rd., West Portway Industrial Estate, Andover, Hants, England. Tel. Andover (0264) 23650 Telex: 477675 Grifco G	RHD steering gear
McLeod Industries	1125 N.Armand, Anaheim, CA 92806. Tel. 714-630-2764	Clutches, flywheels
RBT Transmissions	Tel. 714-250-1798, Fax 714-660-0288 (rbttransmissions.com)	ZF transaxle/parts
Panteras East	7165 30th Ave North, St. Petersburg, FL 33710, 727-381-113	ZF transaxle
Pantera Performance Center	13749-A E. Smith Dr., Aurora, CO 80011 Tel. 303-360-9848	ZF transaxle parts
PI Motorsports	Orange, CA, Tel.714-744-1398	Pantera parts
PS Engineering	2675 Skypark Dr., #112, Torrance, CA 90505, Tel. 3110-534-4477	Wheels
Snow White LTD	4743 E.Lamona, Fresno, Ca. Tel. 209-255-0527	Shortie water pump
Team III Wheels	San Leandro, CA, Tel. 510-895-8880	Wheels, bolt-on
Thermo-Tec	PO Box 946, Berea, OH 44017. Tel 800-274-8438	Exhaust insulation
Wilwood Engineering	4580 Calle Alto, Camarillo, CA 93012. Tel. 805-388-1188	Brake parts

TOOLS REQUIRED

Standard combination wrenches from $^{5}/_{16}$" to $^{15}/_{16}$". You may need two of each.

Socket sets in $^{1}/_{4}$", $^{3}/_{8}$" and $^{1}/_{2}$" with extensions and universal joints.

Torque wrench.

Screwdrivers in various sizes.

Small jack

Jack stands (4)

Patience

(YOU MAY NOT HAVE)

8 mm. Allen wrench for use with a $^{1}/_{2}$" socket driver (rear brake calipers)

10 mm. Allen wrench, for front brake calipers, rear hub bearings

$^{7}/_{32}$" Allen wrench, $^{3}/_{8}$" drive (pin drive only)

$^{3}/_{8}$" Allen wrench, $^{3}/_{8}$" drive for Upper Control Arm

$^{3}/_{4}$" flex socket, $^{3}/_{8}$" drive (Frt damper, top mt.)

$^{3}/_{4}$" Crowfoot, $^{3}/_{8}$" drive (Trailing arm jam nuts)

Servicing the transaxle requires metric wrenches from 10mm to 32mm, and several allen wrenches.

YOU WILL ALSO NEED A GREASE GUN, SILICONE SEALANT, THREAD LOCKING COMPOUND AND SAFETY WIRE.

PARTS PREPARATION

KIT DISASSEMBLY

Unless E.R.A. has already painted and/or undercoated your chassis, it for you, it is necessary to partially disassemble the kit to prepare some pieces for final assembly. This section will give you the best sequence and/or hints for removal of the more difficult parts.

BODY REMOVAL/INSTALLATION

FRONT

"DeDzus" and remove front hood by rotating the wing on each fastener 90 degrees Counter-Clockwise. Note that the facia plates are not fastened to the body yet. Don't lose them! They won't be permantly attached until after paint.

Loosen the 2 Dzus's in front of the windshield and unlatch the sides of the front body by pushing in at the top of the latch.

From underneath the car, remove the retaining screws in the front body pivot retaining block. See page 87 for details.

Disconnect the body limiting cable from the left side of the subframe to the body.

Disconnect the electrical connection at the right front (if the wiring harness has already been installed).

Disconnect the fresh air vent hoses at the left and right side of the front trunk.

With a helper, tilt the nose up about 30 degrees and slide forward, disengaging the brackets from the pivot bushing. Note the position of the brackets on the body and the position of the pivot bushings.

Installation is accomplished in the reverse order.

REAR

Release the side latches (p. 89) and from inside the car, release the top latches (p. 90) with the lever high on the engine firewall, in back of the seats.

Disconnect the electrical plug at the right rear corner of the rear subframe.

Remove the tilt limiting strap where it attaches to the rear body. With a helper, tilt the body up 90 degrees and lift up out of the pivot bushings.

DOOR REMOVAL:

Record the number and placement of shims during the removal of the door so that the alignment can be restored upon installation. See page 82 for door details.

Remove the limit strap from the door.

Remove the 4 bolts securing each door hinge assembly from the chassis.

Remove the hinge assembly irom the door: Loosen the jam nuts adjascent to the sockets each end of the threaded shaft and screw each ball pivot as far onto the thread as possible. This will allow the ball pivots to be disengaged from the sockets on the hinge frame.

Installation is done in the reverse order.

ROOF:

Remove steering wheel and dashboard (page 101).

Remove the rear bulkhead interior panels.

The roof is secured to the cowl with screws along its front lip, and to the roll bar at the rain gutter flange.

ROLL BAR REMOVAL:

Measure and record the dimensions shown on page 77.

ENGINE PREPARATION

Because the engine is the equivalent of "a quart in a pint pot", clearance in the engine compartment is limited. Many engine accessories must follow the guidelines in Section A.

OIL PAN SPECIFICATIONS AND NOTES:

b\oilpan

- Because of interference with the shift linkage, LHD cars require that the **oil dipstick** be in **the front cover,** not in the right front corner of the oil pan.

- Maximum pan depth without hanging below chassis: 7.3"
- Maximum width at widest point ahead of starter: 14"

The Smiths and Stewart Warner **oil temperature gages** require a ½"NPT female fitting welded into the pan, preferably on the left side toward the front of the engine.

CARBURETORS / INTAKE MANIFOLD:

The water temperature sender requires a hole in the water section of the intake manifold tapped ½"NPT (about ⅞" to the outside of the threads) or a fitting in the water outlet. Check the thread in your manifold. You may want to drill and retap before the engine's final assembly.

If you are using an Inglese Induction Weber manifold, you must remove the spacers underneath the carburetors, or replace them with thinner ones. The replica cold air box (Weber Carburetor only) available from E.R.A. must mount just below the carburetor mounting flange.

This air box prevents use of the tapped hole in the intake manifold for the water temperature sender. You must make or purchase from us a special thermostat housing/manifold incorporating a fitting for the temperature sender.

WATER PUMP:

Changing to a **shorter water pump** is highly recommended. Note that the alternator and AC adjusting brackets etc. are mounted on the flange of the pump, and the lower right water pump bolt must be exchanged for a longer one included in the AC kit..

Measure from the front of the block face to the front face of the crankshaft damper. Do not measure from the front cover. The early damper will measure about 4 ⅜". When using any engine with the long crankshaft damper, the crankshaft damper must be replaced with an earlier one or the Snow White pulley must be machined on the rear surface so that it lines up with the water pump pulley.

CARBURETOR LINKAGE:

The kit is supplied with cable and linkage for a single 4BBL carburetor. Bolt the bracket supplied to the front bolts on the carburetor mounting plate. The cable passes through the hole at the front, to the carburetor bell crank on the throttle shaft.

You must remove the ball joint that some carburetors come with, replacing it with a HM-3 (Heim) rod end and #10 screw.

Weber conversion manifolds generally have linkage systems that are adaptable to our cable without problems. You may connect the throttle cable directly to the left front carburetor and use the rod end that is normally supplied with the carburetor setup.

BLOCK OIL PRESSURE FITTING:

Use a short 45 degree, ¼NPT "street elbow" (Weatherhead 3350x4)and a reducer (WH 3220x4x2) to attach the flexible pipe to the block. If you have air conditioning, this should be done when you are mounting the alternator bracket and before you 1install the alternator on the left side of the engine.

DISTRIBUTOR:

Because of limited room at the front of the engine, late model Ford electronic distributors will not fit. The earlier point type Ford distributor or Mallory Unilite type distributors are your best bet for fit and tachometer compatibility. Later model engines must be converted to these distributors.

The distributor cap used with the taller engines(351C and 351W) must have a short profile, with the wires extending to the side. Such caps are available in the aftermarket from Echlin or Mallory, etc.

Remember! It is difficult to service (or even to see) the distributor without removing the panel behind the seats. Make maintenance as easy as possible.

You must use **90 degree nipples** on the wires as they enter the cap. See Spark Plug Wires, below.

SPARK PLUG WIRES 289, 302W, 351W:

If you are using a 180° exhaust system, must be run along the front of the engine and down, underneath the exhaust system. 90° ends must be used at the distributor cap. 45° or 90° ends must be used at each spark plug.

Standard wire sets for the small block are usually too short. It may be necessary to use the longer wires from two sets, or cut your wires from bulk rolls. Universal sets that "Fit everything" may have the necessary lengths also, but check that the ends are appropriate or can be changed to ones that are.

Standard Ford convention: Number one cylinder is at the left front of the engine, number 5 at the right front.

The following lengths will fit the **289/302** engine with stock heads (measured from the corner of the angle connectors on both ends):

Cyl. length	1 23.5”	2 26.5"	3 31"	4 35"
Cyl. length	5 27”	6 29.2"	7 33.5"	8 38.5".

The above lengths are measured with #1 cylinder on the distributor pointed approximately toward the rear of the engine.

On the right side of the engine, cylinders 1-4, run the wires down along the front of the engine and under the air conditioning bracket to the rear.

On cylinders 5-8, run the wires under the coil and the alternator bracket and to the rear.

351W: Add $^1/_2$" to each of the dimensions above.

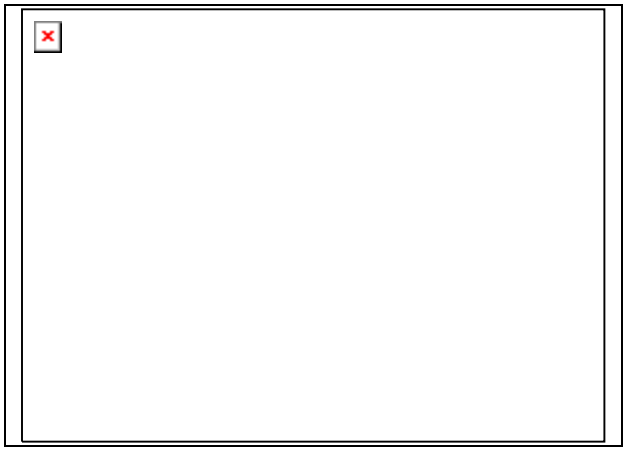
Boss 302, 351C: Spark plug wires can be run in a more conventional manner, but because of the proximity of the exhaust, they must be especially resistant to high temperatures (i.e., silicone.) Use separators on all systems to prevent cross firing between wires.

AC AND ALTERNATOR MOUNTING

AIR CONDITIONING COMPRESSOR MOUNTING

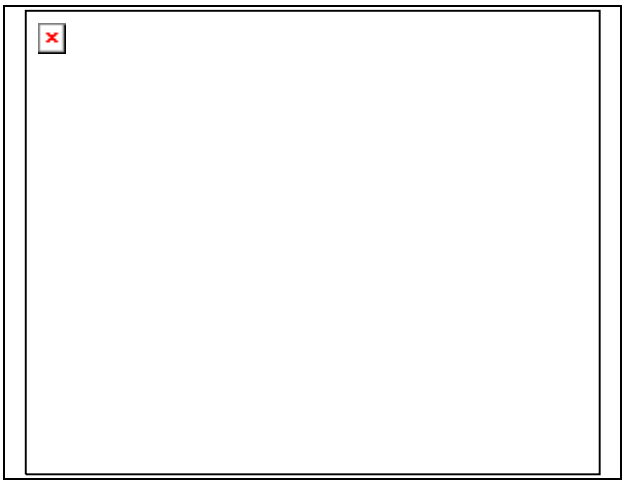
SPECIAL NOTES

*The **Ford Motorsport 302 Windsor**, **351C and 351W** engines use different mounting brackets, so **you must specify the engine before you pick up the alternator and AC mounting pieces.**
*If you use Dart II cylinder heads, one of the holes in the cylinder head to mount the AC bracket is pre-tapped to $^9/_{16}$". You must use an insert to reduce the hole to $^7/_{16}$" USS thread.
*****Fit and spacers depend on the crankshaft damper and other factors. The following are general instructions which will work most of the time. For other combinations some changes may be necessary.



engfront

Bolt the air conditioning bracket onto the right cylinder head as illustrated. The **351 engine requires** 3 $^1/_2$" spacers between the bracket and the cylinder head. On the front face of the head, two holes are tapped $^3/_8$"-16 and one $^7/_{16}$"-14.



acmount

Install the brace from the water pump right-most bolt to the compressor bracket. The $^{5}/_{16}$" rod end of the compressor tensioner goes on top of the brace, using the $^{5}/_{16}$" x 4" bolt in the ERA AC kit. The tensioner has one left hand thread and one right hand thread so it may be adjusted without disassembly.

Attach the lower end of the link to the front of the boss on the AC compressor using a $^{5}/_{16}$" x 1-$^{1}/_{2}$" screw.

Depending on the crankshaft damper, the front groove of the crankshaft pulley may drive the alternator or the AC compressor. With a standard Ford alternator, we usually start with a 8448 or 8455 Gates belt or equivalent.

ALTERNATOR MOUNTING:

See the diagram below for the bracket-to-head attachment points. All three bolts are $^{3}/_{8}$"NC x 1". You may also wish to mount the coil on one of the bolts.

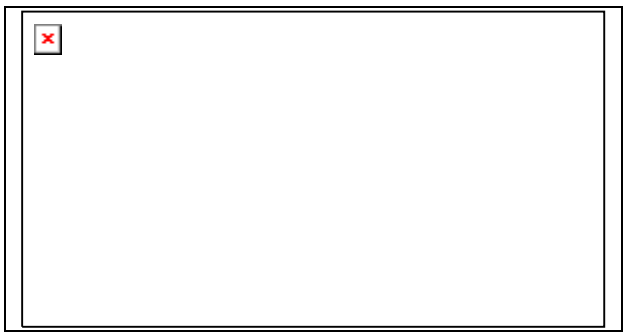
altmt

289/302 Engine: Use the $^{7}/_{16}$" x 5" bolt with the shorter spacer through the outer hole in the bracket.

351 Engine: Use the $^{7}/_{16}$" x 6" bolt with the longer spacer through the inner hole in the bracket.

BELT ALIGNMENT

Check **alignment** with a straight edge across the crankshaft pulley. The rear crankshaft pulley groove will usually line up with the alternator and water pump grooves.



engtop

289/302 Engine: Use one or more of the washers provided to correct any misalignment.

351 Engine: We recommend that you machine the backside of the crankshaft pulley if there is misalignment of the rear groove with the water pump pulley. $^{1}/_{8}$" is typically removed from the center of the rear face of the pulley.

Install the **reinforcing strap** between the water pump and the outside of the alternator, and secure with a lock nut. The belt is installed directly from the crank pulley to the alternator, without looping over the water pump.

The **adjusting bracket** is mounted on the lower left bolt on the front cover, and the slotted end is offset toward the front of the car. If you are using a **351 engine**, you may have to increase the offset of the adjusting bracket to line up on the backside of the alternator boss. Just make each bend slightly more acute. Use a $^{3}/_{8}$" x 1" bolt into the alternator boss.

Belt length: Try a Gates 7320 or 7325 (or equivalent)to start.

OIL FILTER:

Don't forget that the **oil filter** must be changed to one of a smaller diameter, or a remote unit. See page 7 for details. See page 64 for details if you are using an oil cooler

TRANSMISSION DESCRIPTION AND SELECTION OPTIONS

Pantera 4 bolt – see below
Pantera 7 bolt – see next column
BMW M1 – see page 29

Also see the bell housing notes on page 30.

EARLY TRANSAXLE (5 DS-25/1) AND 4 BOLT PANTERA BELL HOUSING

This transaxle can be recognized by the 4 bolts securing the bell housing to the transmission. While the torque capacity is slightly less than the 5DS 25/2, this is essentially the same transaxle as used in the original GT40.

The Pantera bell housing (transmission end) must be redrilled to permit rotating it 180° relative to the transaxle. The transaxle itself already has passages for proper internal lubrication, but must be drilled for drain and level indicator holes.

This bell housing/transaxle combination uses a full size (164 tooth) starter ring gear. Consequently, **the bell housing hangs about 1.5" below the chassis** and is also about $^{1}/_{2}$" deeper than the E.R.A. bellhousing.

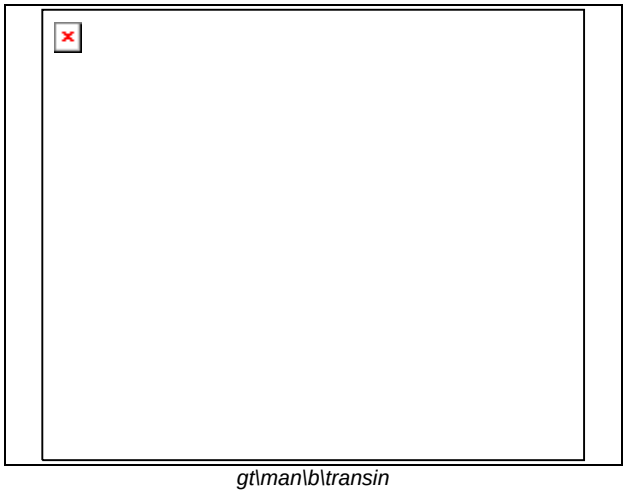
For extra ground clearance, it is possible to machine a flat section on the bell housing bottom edge. Unfortunately, the starter ring gear will now be exposed and will fall slightly below the chassis.

The depth of the bell housing as measured from engine side to transmission side must be reduced a total of 4" by machining about .25" from the engine end and .15" from the transmission side.

As with the later transaxle, the ring gear must be flipped to the other side of the pinion gear so that you don't end up with 5 speeds in reverse.

LATE TRANSMISSION - 5 DS-25/2

Check this distance when you buy! Some rare transaxles use a much longer input shaft. Many transaxles must have the end trimmed approximately ¼" anyway. Final finish is not critical, so the operation can safely be done by hand.



gt\man\b\transin

The late ZF transmission uses 7 bolts to secure the stock Pantera bell housing to the transmission rather than the early version's 4. Unfortunately, re-drilling this bell housing is impractical. The E.R.A. bell housing is designed for a smaller starter ring gear, eliminating ground clearance problems, and is less deep, allowing easier use of the air conditioning components.

The transmission must be partially disassembled to drill new internal oil drainback holes and to drill new drain and oil level holes. As with the early transmission, the ring gear must be transposed to the other side of the pinion gear.

You must use a standard Ford flywheel with 164 teeth. This was used on some earlier engines and most post 1980 ones.

You must specify your flywheel when ordering the bell housing. The location of the starter is different for each. See the diagram for specific machining dimensions. McLeod Industries of Anaheim California can produce a flywheel to our specifications for about $300.

A 10.5" Long type clutch from various 260, 289, 302, and 351W Ford engines must be used, so it is sometimes necessary to redrill the flywheel for the new pressure plate. The recommended clutch parts are listed in Section A.

The bell housing to pressure plate clearance is limited, so check it as early as possible. The 9.5" clutch set from the late (81>) Mustang may fit but is not recommended because of its small torque capacity.

If you wish to use a special clutch, see the diagram on page 8 for clearance considerations.

The starter necessary is from a 1967-74 289/302, 351 manual transmission Ford, all models.

ZF TRANSAXLE INVERSION PROCESS - PANTERA

GENERAL HINTS

We strongly recommend that you purchase a **ZF factory service manual** for overhauling the transmission (see page 18 for information). Those companies can also do servicing, and have parts for the ZF.

You will need the normal complement of metric wrenches and sockets, plus 5 and 6mm allen wrenches.

Special attention should be given to synchronizer rings, bearings, and the speedometer driving and driven gear. It is also recommended that the bolts securing the ring gear to the differential unit be drilled and safety wired.

If you are going to do any major service, the special tools (or equivalents) listed in the manual are very important to some operations - especially removing the ring gear from the case and disassembling and assembling the gear clusters onto the back plate. While it is possible to remove the ring gear bearings without the factory tool or its equivalent, it is a difficult and time consuming process. *Not recommended*.

When disassembling the transaxle, keep multiple containers for each sub-assembly and its associated parts. Label them with notes for assembly.

Buy a full **gasket set** for the transaxle.

Get a new **locking nut** for the shift rod cross shaft.

The ring gear bearings may be damaged during disassembly, and it is good practice to replace them anyway. Replacement bearings (SKF 25590 (cone) and SKF 25520(cup) can be purchased from most bearing supply stores. You will probably also need different shims to set the ring gear backlash. These are available from the Pantera specialists mentioned in the sources list in increments of .004" (.1mm).

Do not use standard gasket sealant (like Permatex 300) or silicone! Use only aircraft type non-hardening stuff. Many critical transmission clearances are based on the use of this material.

MODEL 25/1

Have a machine shop redrill the bell housing so that the unit can be inverted. See the 25/2 instructions for reversing the ring gear, installing a new filler and new drain hole.

MODEL 25/2 (EX PANTERA)

DISASSEMBLY

Clean the exterior case before disassembly.

Drain the oil.

It may be helpful to make a rig to support the transaxle from the bell housing side for the following operations.

Invert the transmission so that the differential access cover is at the top. This is the way the transaxle will be installed in the car, so from now on any reference to top and bottom will refer to this position.

Remove the long cross-bolts going from side cover to side cover. **Save the shims** between the side plates and the top cover. Note their location and number for assembly later.

Remove the differential top access plate bolts.

Remove the nuts securing the side cover plates. Carefully and evenly pry the plates straight out from the main case. If there is resistance, check that all the bolts have been removed. Take your time! Don't damage the gasket surfaces. Save what is left of the gaskets. They will be useful when you set the ring gear backlash.

Remove the **differential side bearings** from the differential. This requires a special tool, or a lot of cursing. *The ring gear assembly will not come out of the case with the bearings on it.* Remove the differential/ring gear assembly, noting the side of the pinion gear it was mounted on. Don't install it on the same side unless you want 5 speeds reverse!

SHIFTER BOX

Remove the **shifter cover** and the rubber plugs at the top of the shifter box.

Using a small chisel or punch, release the **locking** portion of the **nut** on the end of the shifter cross-shaft. Jam something between the arm and the box to prevent rotation and remove the nut. Rotate the cross-shaft back to the neutral position.

Use a 5mm allen wrench (through the small holes in the top of the shifter box) to remove **the set screws** securing the socket arm to the longitudinal shifter shaft. Remove the shaft.

Pull the **ball/lever arm** out and disengage the socket arm.

Remove the arm from the cross-shaft, using a puller if necessary. Remove the half-moon key from the cross-shaft.

Remove the 3 hex cap screws and 1 socket screw securing the shift box to the case. *Note* that there is a ***thick shim*** between the box and the case at the front socket screw position. Don't lose it, and don't forget it on assembly.

Remove the **shift box** by gently tapping and rotating it.

GEARSET

Remove the **speedometer drive adapter** from the side of the case by removing the securing screw. Gently pry the adapter out.

Remove the end cover and intermediate gear plate by removing all the outside nuts and 4 allen screws at the top and bottom.

At this point you may want to inspect the gears and synchronizer rings for wear.

INPUT SHAFT

See the diagram on page 25 for input shaft dimensions.

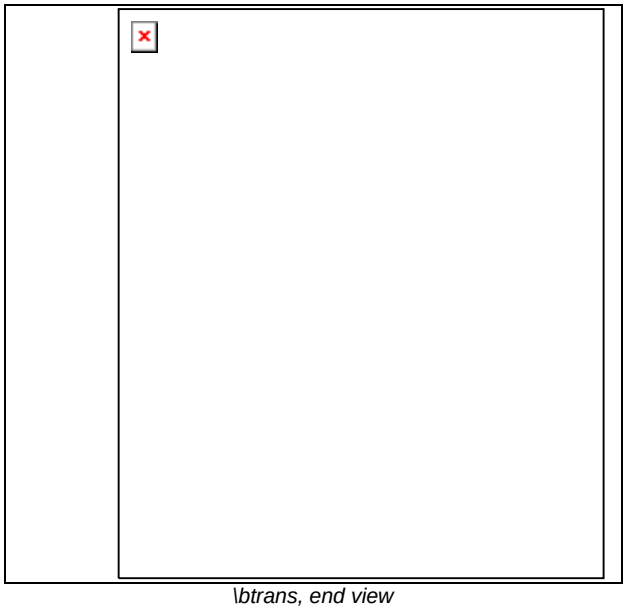
CASE MODIFICATIONS

Check the internal clearance for running the ring gear on the opposite side of the case. Later castings may have heavier walls adjacent to the ring gear. Look for machining on the inside face of the case for clearance for the ring gear bolts.

Measure from each side plate mounting surface to the opposite inside face. The measurements should be within .06" of each other. If not, the inside surface will have to be relieved. It can be carefully done with a simple hand grinder. Note that the case tapers from top to bottom, so only the bottom must be ground.

See the diagram on the following page for dimensions for the following modifications:

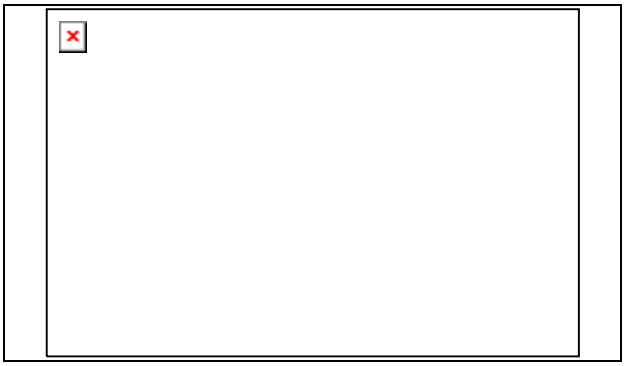
Drill 2 holes between the differential section and the gearbox as indicated. In my experience, this is only necessary on the 25/2 gearboxes. The 25/1 series already has the holes. Try to have the holes as close to the bottom of the case as possible. They allow oil to flow freely between the two sections.



\btrans, end view

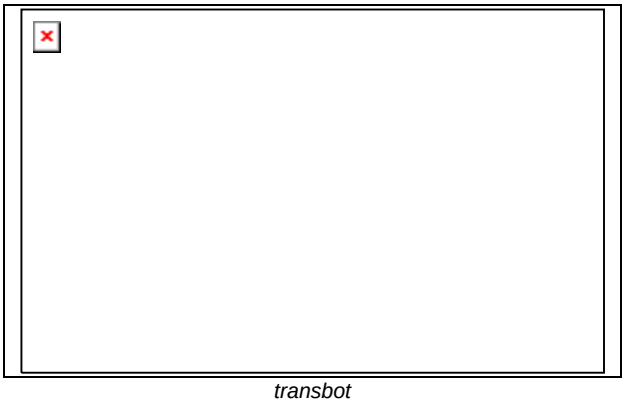
Remove the vent tubes from the inside and outside of the (now) bottom of the differential section of the case. They are a press fit into the case. You must drive the internal tube out through the outside hole with a punch. Tap the case ($^{5}/_{16}$-18) from the outside and use a cap screw to plug the hole. Use gasket sealer or silicone on the threads to prevent leakage.

Drill and tap an oil level hole in the right side of the case in the position shown. The hole should be drilled to $1^{5}/_{32}$" and tapped $^{1}/_{4}$" NPT, and a pipe plug installed. When filling the transmission from the top, the oil level should reach the bottom of the hole.



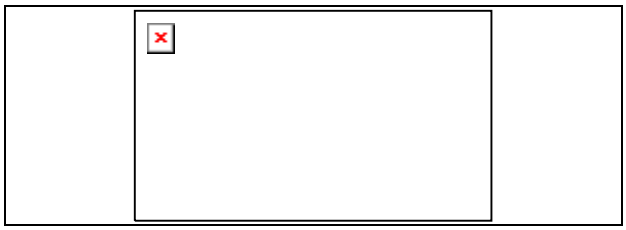
transide

Drill and tap two $^{1}/_{4}$"NPT drain holes in the bottom of case as illustrated. If the transfer holes between the differential and the gearcase are low enough, the oil can be drained exclusively from the rear hole.



transbot

Install a baffle and vent fitting in the (now) top access plate. The baffle will prevent oil from being thrown out of the fitting by the rotating ring gear. E.R.A. makes a plate for this purpose that must be welded or screwed to the inside of the cover. *If you make your own*: The baffle plate must allow clearance for the ring gear on the left. Therefore the plate must be biased toward the right side of the gearbox access plate.



man\b\trnsbafl

Stuff brass wool from a scouring pad through the vent hole into the baffle area. Even so, a dump tank may be necessary to prevent excessive oil loss at race speed. ERA offers an optional breather conversion kit with dump tank that can be installed by the customer. Do not overfill the gearbox. The initial fill should be 2.7 qts. Refilling after draining will be 2.5 qts. You may want to check the accuracy of the fill level hole the first time you fill the gearbox.

ASSEMBLY

Clean the case of drilling chips.

Install 3 longer studs (10mm. diameter x 40mm.) into the left side plate for the slave cylinder bracket. See the diagram.

Insert the ring gear/differential spool assembly into transaxle case so that it is on the left side of the pinion (as the transaxle will be mounted in the car) without the side bearings installed. Remember the breather tube that was removed from the inside bottom of the case? That's the side that the ring gear goes on!

Install the ring gear bearings onto the spool. *Make sure that they are fully seated on the spool.*

Assemble gear cluster plate into case. Use non-hardening aircraft gasket sealer between the cases. Torque all bolts to 16 lb.ft.

Rotate the axles in the side plates, feeling for irregularities. If the bearings feel worn, now is the time to install new ones (FAG 6207 C2 is OEM, we replace with a slot-filled bearing Fafnir 207W) and also the seals.

Install new bearing cups in the side plates, noting the shims underneath the cups on each side. Don't mix them up. Install the side plates with the old gaskets onto the case, temporarily torqueing the 6 inner fasteners to about 25 lb.-ft.

Measure the backlash between the pinion and ring gear. It is easier to do this on the edge of the pinion gear. The ring gear bearings are preloaded and prevent the gear from rotating freely.

The **proper backlash** is etched on the outside edge of the ring gear, with some other numbers. Look for "0,20" or "0,25" or a similar number. This is the backlash in millimeters. Multiply by .0394 for the inch equivalent.

Adjust the ring gear backlash by changing the shims behind the cups of the differential bearings in each side plate. Removing the bearings requires a puller. See the transmission service manual for details. If the ring gear bearing preload was correct before disassembly, the total thickness of shims behind the *right plus the left* bearings should remain the same. It will only be necessary to redistribute the total thickness of the shims.

The **lash will change about 90%** of the amount of change of the shim thickness underneath the bearing cup. i.e. If you need to reduce the lash by .009", increase the thickness of the shim pack on the ring gear side by .010" and decrease the shim thickness on the opposite side by .010".

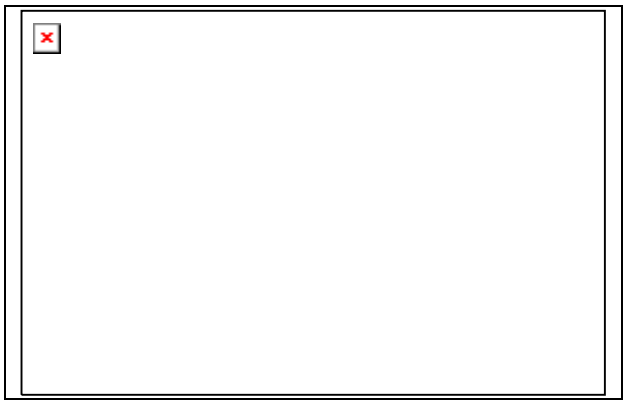
After the shims have been changed and the bearings re-installed, install the side plates. If the clearance change was small, you might want to "go for it" and use the new side gaskets now. Otherwise, check the clearance again with the old gaskets. Torque the side plate bolts/nuts to 45 lb.ft., in two steps, using a criss-cross pattern.

Install the **top access plate** with the baffle installed. Torque the bolts to 15 lb.ft.

Install the **transmission mounting bracket** on the top cover using the $^{3}/_{8}$" x 10" USS threaded rod supplied. Don't forget to replace the shims between the top cover and the side covers. The face bar with the $^{5}/_{8}$" holes faces forward toward the engine. Torque the cross-shaft nuts to 45 lb.ft.

Slide the E.R.A. supplied adapter on the nose of the original throw-out bearing mounting sleeve. Rotate the cross-shaft forward and engage the retaining clips onto the adapter. The correct shims behind the throw-out bearing will have to be determined. See the Flywheel and Clutch section for details.

Install the slave cylinder bracket onto the left side plate. See below for slave cylinder installation.



Transid2

Install the speedometer drive and shift box. Don't forget the shim washer at the front, between the box and the case. Coat the shifter parts with grease before closing it up.

MODEL 25/2 (EX BMW M1)

The BMW transaxle doesn't require inverting like the Pantera-derived ZF. However, the gearchange position must be changed from the left side to the right. This requires new or used parts and some degree of experience. We recommend that you go to one of the Pantera or ZF specialists listed on page 18. Also, check the input shaft length as shown on page 25. There is very little clearance for a shaft that is longer than illustrated.

FLYWHEEL AND CLUTCH

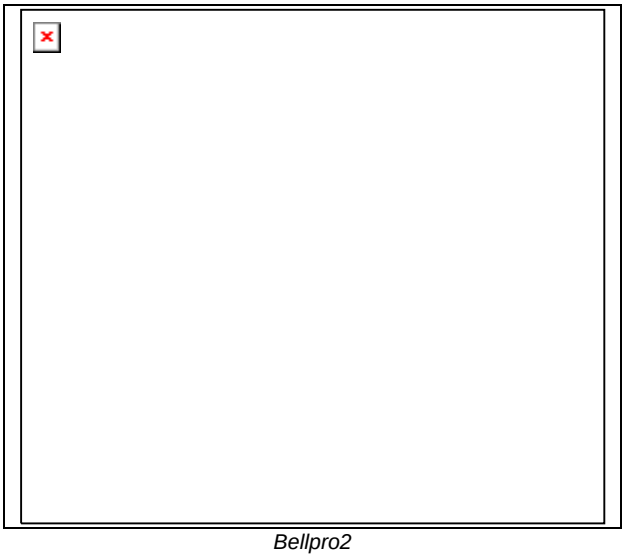
PANTERA BELL HOUSING:

While the clutch and flywheel components can remain stock Pantera (164 tooth flywheel), the bell housing **must** be redrilled so that the transmission may be inverted. This operation must be done by a machine shop. Remember, if you choose to use the Pantera bell housing, ground clearance will be reduced.

The standard Pantera throwout bearing and pilot bushing should be used with this combination.

ERA BELL HOUSING:

No matter which flywheel you use, the hole pattern must match the clutch you are going to use. See the clutch section below.



Bellpro2

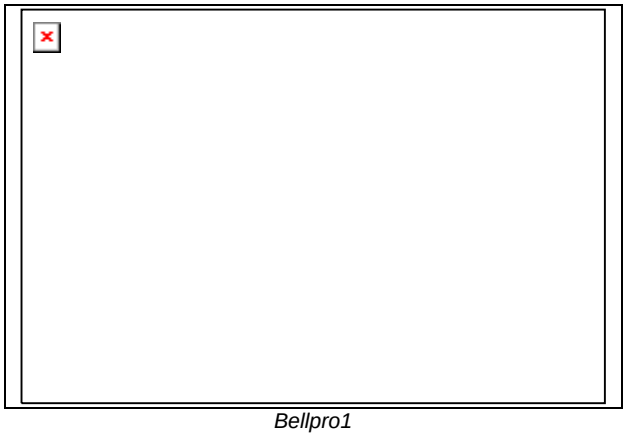
Flywheel: You must use a small Ford flywheel with a 157 or 160 tooth ring gear (13.3" OD). If you have the 164 tooth flywheel, the small Ford ring gear may be installed on the flywheel after machining the O.D. of the flywheel for an .008" interference fit. If you replace the flywheel, note that some crankshafts are externally balanced and require an "out-of-balance" flywheel to match.

The ring gear must then be heated in an oil bath to about 160 deg. above ambient temperature and quickly slipped onto the flywheel. If the clutch bolt pattern is different from what you have, now is the time for the machine shop to modify the flywheel.

See page 8 for clutch/flywheel bolt pattern.

Clutch: You must use a 10.5" clutch as listed on page 8 for a guaranteed fit. For other clutches, we have also included an illustration (page 30) showing the approximate clearance available within the bell housing. <u>You must always check the fit before permanent installation</u>. Throw at the clutch fingers is limited to about .65". We cannot be responsible for compatibility of your parts.

CHECKING BELL HOUSING TO CLUTCH CLEARANCE:



Bellpro1

Assemble the flywheel, pressure plate and driven disk onto the engine. Bolt the bell housing only onto the engine and rotate the crankshaft a full 360 degrees, checking the clearance between pressure plate and bell housing through the transmission flange hole. If there is minor interference, you may grind the bell housing. If there are major interferences, replacement of the pressure plate with one of different manufacturer may be necessary.

THROWOUT BEARING ADJUSTMENT

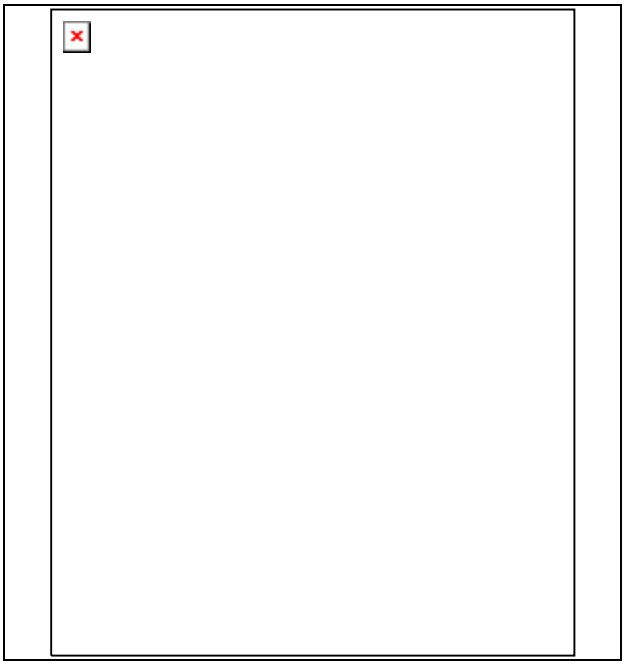
Install the special pilot bearing supplied with the ERA bell housing into the crankshaft.

A throwout bearing and adapter sleeve is supplied with the ERA bell housing.

Because of different clutch finger heights, the adapter sleeve is supplied with spacers to adjust the height of the throwout bearing relative to the bell housing face.

With the clutch installed, use a straight edge across the pressure plate to measure the height of the fingers relative to the engine plate. See page 31. Temporarily install the throwout bearing onto the adapter sleeve, and engage the unit onto the transmission throwout guide sleeve.

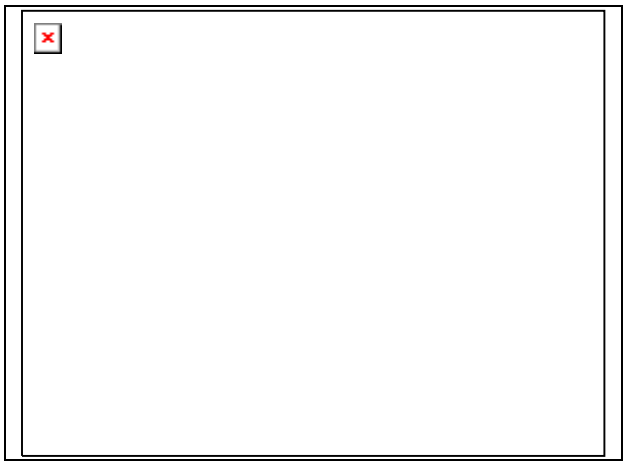
Rotate the transmission throwout arm forward so that the fingers engage the retaining springs on the adapter. It may be necessary to remove the outside arm to rotate the throwout fork forward enough.



Cltch_ht

With the throwout bearing assembly in its rearmost position, measure the distance from the throwout bearing face to the face of the bell housing. This dimension should be between $^{1}/_{8}$" and ¼" more than the height of the fingers. If not, install one or both of the spacers behind the bearing. When properly set up, the throwout bearing should be capable of depressing the clutch fingers at least $^{3}/_{4}$" without rocking on the guide sleeve.

When the proper fit is confirmed, use Locktite Bearing Mount to secure the bearing to the adapter.



Throwbr

Use a light **grease** when installing the bearing/adapter assembly onto the transmission guide tube.

STARTER:

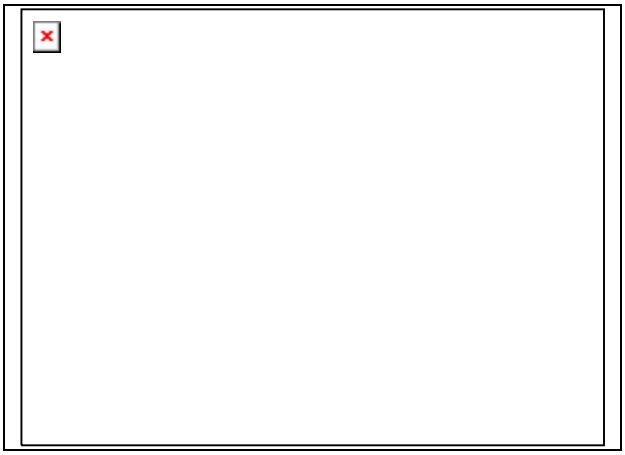
If you are using the ZF 5DS-25/1 with the stock ZF bell housing(inverted), you may use the Ford or Tilton starter listed without modification.

If you are using the ERA bell housing on the ZF 5DS-25/2, and using the recommended Tilton starter, you must rotate the motor of the starter clockwise about 45 degrees.

If you are using the Ford starter with the ERA bell housing, you may use it without modification, provided you have an oil pan that is notched for clearance.

STEERING GEAR

There are two original **MGB** steering gears available (Type 1 and 2 shown below) that require some tie-rod modifications, and one new **ERA replacement (see page 33)** that does not. To determine which (MGB) one you have, remove the inner boot clamp nearest the pinion end of the housing and pull back the boot to reveal the rack.



mgsteer

The earlier "**Type 1**" steering box has the gear teeth cut at 90 degrees to the rack centerline.

The "**Type 2**" steering box has the teeth cut at about 60° to the rack centerline. In order for us to supply you with the correct tie rod end adapters, you must tell us which one you have. The difference in adapters is subtle but significant. (All the information below can be applied to RHD steering gears, which are the mirror image of LHD steering gears.)

REMOVING THE TIE-ROD ENDS AND BOOTS

"*Type 1*" gear assembly: Use a suitable tool such as a punch to uncrimp the retaining ring indents of the inner joint.
"*Type 2*" gear assembly: Locate an indentation on the edge of the inner jam nut, near the original tie rod socket. This spot is actually the top of a locking pin. Use a $^{1}/_{8}$" bit to drill through the pin to the depth of the rack itself.

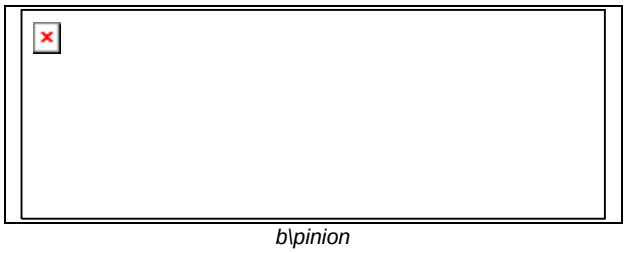
Use a large wrench and a vise (or pipe wrench) to loosen the retaining ring from the inner pivot socket nut. Be careful not to scratch the round surface of the rack or damage the gear teeth. Unscrew the inner socket from the rack. Discard all the old tie rod parts except for the inner locking ring (jam nut).

Center the rack by equalizing the distance each end extends from the housing (+/- $^{1}/_{16}$").

With the steering gear assembly oriented with the mounting faces down, mark the pinion shaft on its uppermost surface. Be as accurate as possible. This is to indicate where a flat surface is to be ground. The shaft is hardened! It is not easily marked with a punch. Use a stone, grinding wheel or permanent marker.

Remove the flat preload cap, spring, and sleeve from the top of the housing. Do not lose the inner spring, etc. Note the shims, if any.

Remove the pinion end cap and retaining pieces. Note the shims (if any) between the cap and the housing. Remove the pinion shaft with the bearing from the housing by driving from the splined end.



b\pinion

The shaft must be machined (ground) to the dimensions shown.

After the machining is completed, install the pinion shaft back into the housing as it was when it was marked. With the rack centered, the flat on the pinion shaft should be at the top (as it was before disassembly). The pinion shaft may rotate as the teeth are engaged, so compensate for this effect.

Use an EP grease to lubricate the gears and bearings. Fit the pinion retaining pieces and the end cap.

Reassemble the rack ends: Install the spacer provided next to the rack housing. This spacer limits the steering motion. The spacer for the early rack has an internal indentation that fits over the retaining ring extension. The spacer for the late steering box has no groove. Fit the inner retaining ring,(locktab- Type 2 only) and the aluminum clevis for the inner "heim" joint.

With the flat in the pinion shaft straight up, adjust the outer clevises so that they are 26.5" +/- 1/8" (see page 32) from the clevis hole center-line to hole center-line, and equally spaced from the rack housing. Rotate the slots about 20 degrees back from vertical relative to the mounting stands so that they will be approximately vertical when installed in the car. Tighten the retaining ring against the clevis.

Secure the "Type 1" retaining ring by using a punch to indent the ring into the grooves in the rack and the clevis.

Secure the "Type 2" retaining ring by folding the lock tab over the flats in the retaining ring and the clevis. I also recommend that a hole be drilled through each clevis into the rack, and a 1/8" Diameter x 5/8" Long roll pin be inserted as illustrated, preventing rotation on the rack.

Install the left hand thread rod end joint(HMRL-8) in the clevis using a 1/2"USS x 1-1/2" HC Bolt with a star washer. Torque the bolt to 50 ft.lbs. Grease the joint and the outside of the steering gear generously, working the gear back and forth to distribute the lubricant.

Reinstall the boot over the rod end stud, and clamp or tie wrap the inner end over the housing. Install a jam nut (1/2"-20 LH) on the stud. The thread is left hand.

ERA STEERING GEAR

This gear includes the inner tie rods as integral with the rack. General installation is the same as the two steering gears described above. Tie rods are screwed directly into the inner tie-rod sleeve.

WIPER MOTOR

When purchasing the wiper motor and linkage, be sure the following items are included:
Motor with ***cable*** and ***intermediate tube***, one good ***wheelbox***, the chrome ***retaining nut***, plastic ***spacer*** on the wheelbox threaded section, and the short **cable guide *tube*** on the furthest wheelbox. The latter may be cut from the old intermediate tube because a new tube is supplied with the kit.

For testing and trouble-shooting the wiper see the Electrical testing and troubleshooting supplement.

The chrome bezel must be modified by machining, so that it is no longer beveled on one side. The bezel is also available from ERA on an exchange basis.

Chrome Bezel

The connecting rod and crankshaft inside the wiper motor gearbox must be modified to yield the proper sweep of the wiper on the windshield. If you are sure that the wiper motor functions correctly and do not wish to disassemble the wiper motor for inspection at this time, skip steps 4 through 8. Conversion wiper crankshaft and connecting rod are also available from ERA on an exchange basis.

Remove the 4 screws holding the **cover** to the gearbox, and remove the cover.

Remove the **circlip** and **washer** from the connecting rod big end, and remove the connecting rod. Note the bottom washer.

Remove the circlip and washer from the back side of the crankshaft, and push out the crankshaft from the housing. Retain all the parts! Note the **thrust washer** on the inside of the crankpin.

Mark the relative position of the round motor housing to the aluminum gear reduction housing. Remove the two long screws holding the motor housing to the frame. Separate the two (with gentle soft hammer taps if necessary). Do not lose the felt washer and thrust washer in the bearing cup at the bottom of the housing.

Inspect the **brushes** for wear or sticking, the commutator for excess wear and arcing, and the lower bearing. Clean the parts with a solvent if necessary. Work the brushes in and out to insure free motion.

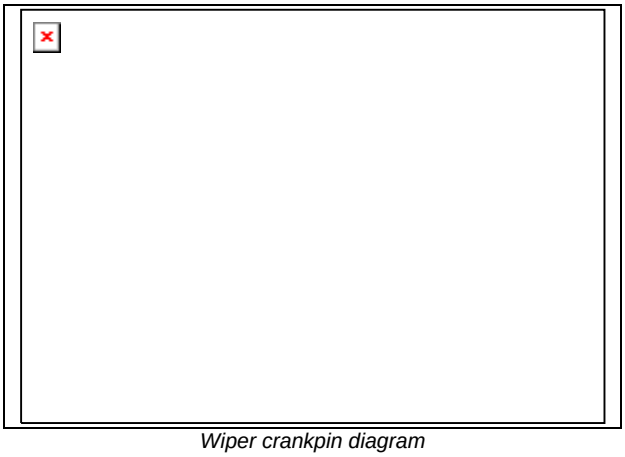
Install the **armature** carefully into the gear housing until it contacts the sides of the brushes. Using a hook shaped wire or other appropriate tool, retract each brush in turn so that the commutator can slide past the edges of both brushes and continue into the gear case

Put 1 or 2 drops of oil in the lower bearing of the armature housing. *Excess* oil will contaminate the brushes later on.

Install the **armature housing**, aligning the marks on the housing and the frame. Reinstall the long retaining screws.

Remove the plastic gear from the crankshaft by supporting the gear edge and tapping the shaft with a soft hammer. Be careful not to damage the circlip groove. Note the position of the crankpin relative to the raised section on the backside of the plastic gear.

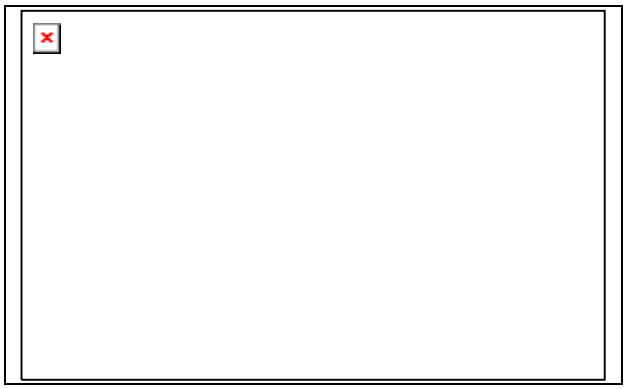
The position of the crankpin must be changed in order to increase the stroke of the cable. See page 34. Punch the underside of the crank plate exactly opposite the center of the crankpin. Use a $^{3}/_{8}$" Blair spotweld cutter to cut the pin from the plate, drilling from the back side at the punch mark.



Wiper crankpin diagram

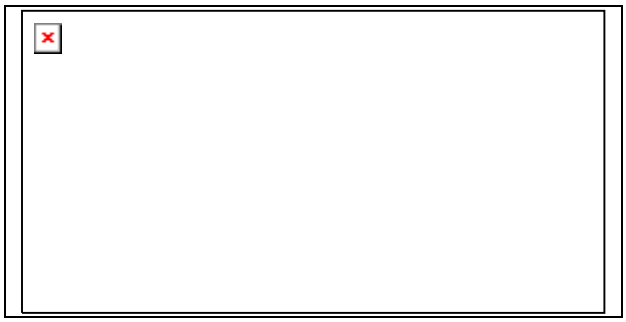
Drill a $^{17}/_{64}$" hole in the opposite side of the crankplate at the position indicated in the illustration. Countersink from the crankpin side just enough that the crankpin will be flat on the plate after insertion into the hole.

Weld or braze the pin in the new hole from the back.



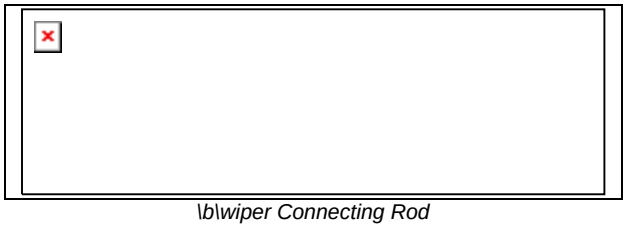
wipgear

Install the plastic gear onto the crankshaft, engaging the tangs of the gear into the crankshaft notches. Keep the same relative orientation between the new crankpin and the gear as before disassembly. (The raised section on the plastic gear is about 150 degrees offset from the new crankpin position.)



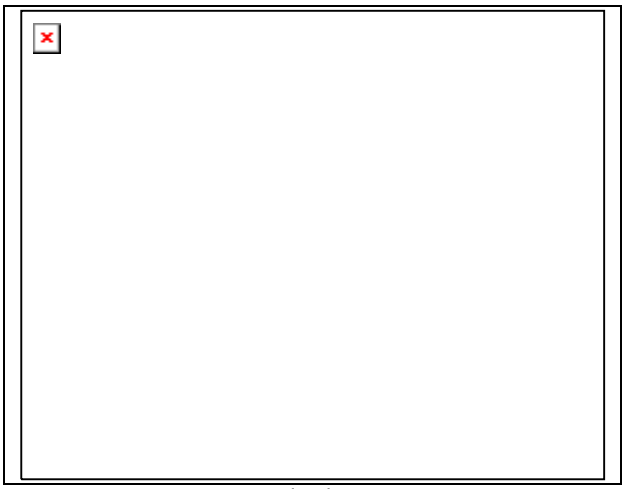
b\Wiper/cowl

Clean and deburr the crankshaft. Grease the shaft lightly, install the conical thrust washer, and insert it into the housing. Install the outer thrust washer and circlip.



\b\wiper Connecting Rod

Modify the connecting rod shape by removing the shaded area. Cut the drive cable to 21" inches, measured from end to end, with a grinder or other suitable tool.



wiperlay

Partially fill the gear housing with grease, and place the cable into the guide. Some guides have cast-in liners while others have separate plastic pieces. Install the connecting rod with its thrust washers, and the connecting rod circlip. If possible, test the clearance between the connecting rod and the lower part of the housing by rotating the crankshaft.

Install the cover **plate** with 4 screws.

SUSPENSION AND BRAKES

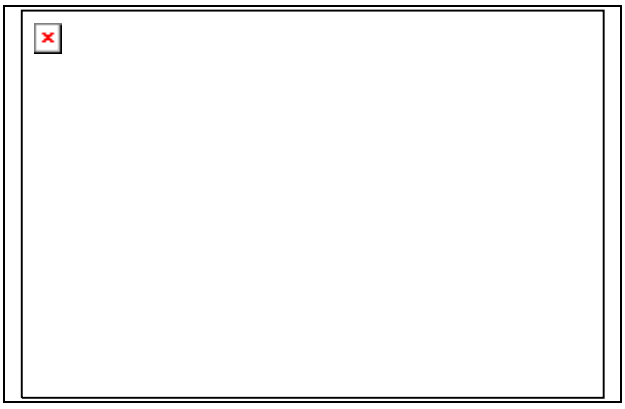
FRONT UPRIGHT ASSEMBLY

THE FOLLOWING PIECES ARE INCLUDED IN THE KIT:

(2) Hub carrier center casting
1 each left and right steering arms, with top boss installed
(2) Bottom boss
(8) 3/8" x 1" Socket cap screw, stainless steel
(8) 3/8" x 1 1/4" Socket cap screw, stainless steel
(16) Washers

ASSEMBLY:

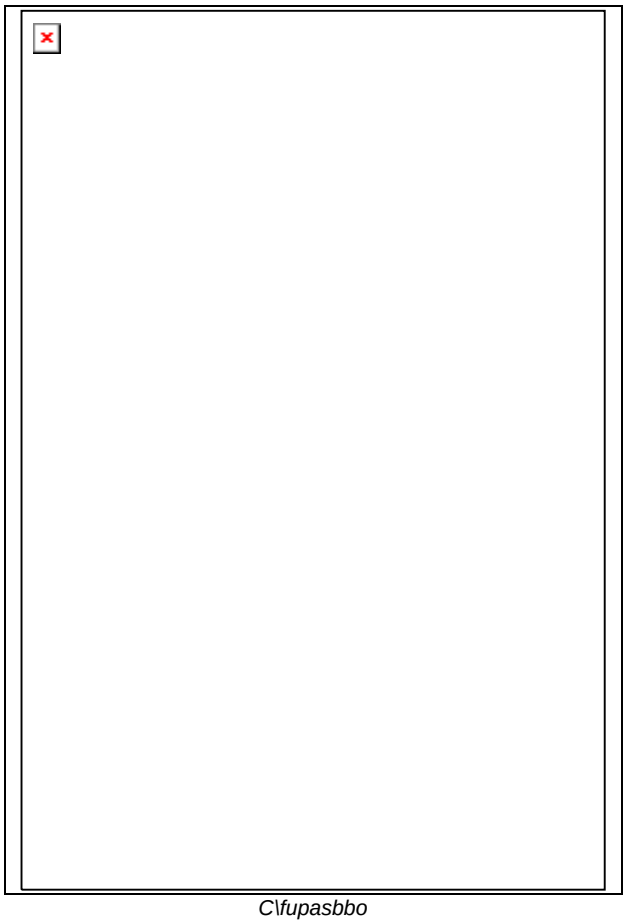
Drill a 5/32" hole for the 5/16" brake flex line clamp.



Drill (carefully) 1/16" holes through the head of all socket head screws for safety wire. The center of the hole must be within .120" of the top surface of the socket.

Install the upper ball joints into the left and right steering arms (with steel boss installed) using the special washer (9/16" ID x 1-9/16" OD) and the castle nut and cotter pin supplied. Tighten the nut to 40 lb.-ft..

Install the steering arm onto the hub carrier. Note that the offset of the steering arm is *toward the outside* of the car. That is, toward the flange of the carrier. Use ribbed washers under each 1-1/4" long socket cap screw. Safety wire the 4 screws together so that the screws will be held in tightening tension.



C\fupasbbo

The bottom boss will be installed onto the lower ball joint before installing onto the hub carrier. See "Control Arm Installation".

PIN DRIVE WHEEL NOTES:

FRONT HUBS/ROTORS:

Note: If the rotor hat and rotor have not been installed on the front hub already, please do so now. Note the orientation of the screws on the diagram.

Torque the 5/16" x 1-1/4" screws to 18 lb.ft. and the drive pins to 24 lb.ft. Mark the rotor, hat and hub so that if they are disassembled, they may be reassembled with the same orientation.

Install the stub axle onto the hub carrier with (4) 7/16" x 1.5" hex cap screws. Torque to 50 lb.ft.

Clean the inside of the bearing hub and remove any machining burrs. Closely inspect the area where the bearing races are installed.

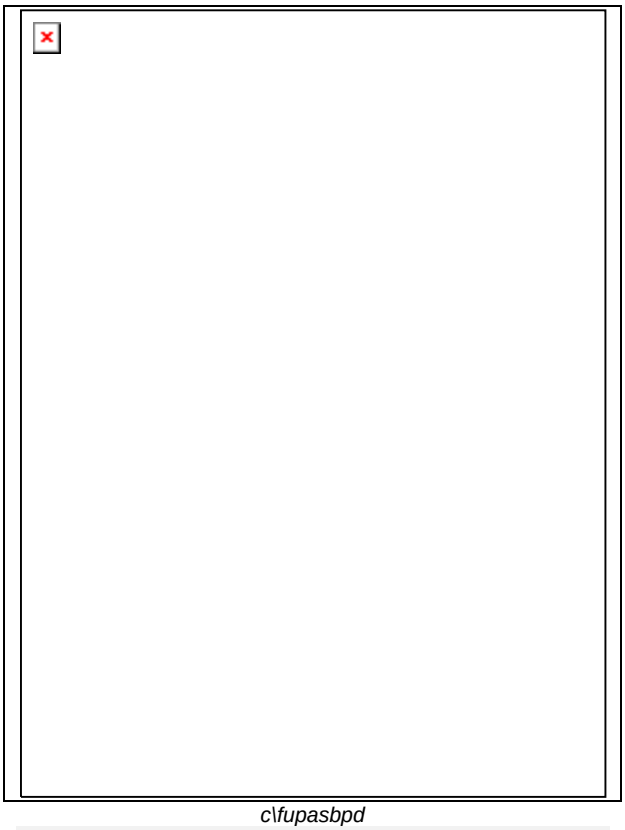
Install bearing races in hub:
Inner: LM12710
Outer: L68110
At this point we recommend that the hub/rotor combination be sent out to an automotive machine shop to have the rotor resurfaced. This will insure that the rotor rotates with a maximum runout of .003".
When the assembly is returned, be sure the grinding effluent is thoroughly cleaned out of the bearing cavity.

Fill the about 50% of the volume between the bearings with high temperature wheel bearing grease. Force grease into each bearing cone assembly so that it is well lubricated.

Install inner bearing (LM12749) and inner seal (19753 CR) into hub.

Install hub onto axle with the outer bearing (L68149). Note that the left side hub has right hand threads and vice-versa.

Install and nut onto axle. Torque to 150 lb.in. (12 lb.ft). Back off the nut to allow for a maximum of .002" end play. Secure with a cotter pin ($^1/_8$"x1.5") through the hole in the side of the hub.



c\fupasbpd

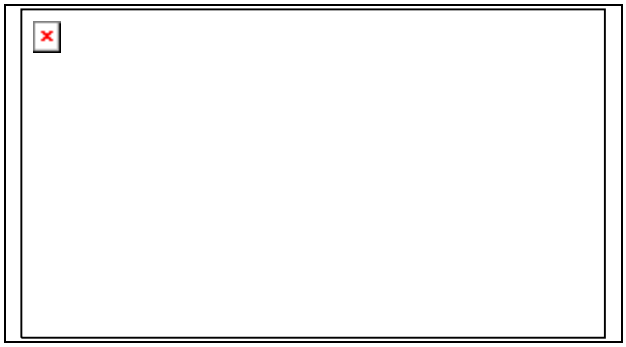
REAR HUB CARRIER ASSEMBLY:

Set the hub carrier outside face up, and place the appropriate caliper mounting plate (Left: GM 10052211, Right: GM 10052212) on top, lining up the holes so that the caliper will be mounted toward the front of the car. Note that the small inside diameter is toward the outside of the car and the vent hole is down.

Install the hub/bearing onto the mounting plate using allen screws (M12x70) and star washers. Torque to 75 lb.ft. through the access hole in the bearing flange.

Install the stub axle (GM 14055941) from the back.

Install the washer (GM 562249) and nut (GM 562247). Torque the nut to 125 lb.ft. Install the retainer (GM 562248) over the nut so that a slot lines up with the cotter pin hole and install the cotter pin (GM 11509457).



c\rhubexp

Install rotor onto hub, lining up the 6 pin drive stud holes. If the emergency brake shoes (drum EB only) prevent smooth installation, check that the shoes are centered and the adjustment screw is fully home. It may be necessary to file any high spots on the shoes.

Install the pin drive hub, holding the assembly together with the pins. The left hub is threaded right hand, and the right hub threaded left hand. Use a high strength thread locker on the threads, and torque each pin to 65 lb.ft. in several stages. *Disassembly can be accomplished only by heating the pins enough to weaken the thread locker.*

Rear control arm and hub installation is shown on page 43.

BOLT-ON WHEEL HUB CARRIERS

FRONT HUBS:

Install the hub bearing (GM 14084142) to the aluminum hub carrier with 7/16" x 1.5" bolts and star washers. Torque to 50 lb.ft.

Install front rotor over studs.

REAR HUBS:

See the diagram of page 38. Follow the steps described for pin drive rear hubs **except**: the rotors will be installed directly over the 5 wheel studs of the bearing flange. There is no pin drive hub, obviously!

STEERING GEAR AND TIE ROD INSTALLATION

The ERA gear needs no preparation.

MGB gear only: Prepare the steering gear as described on page 32. Install the tie rods with the tie rod ends onto the threaded ends of the rod ends (with jam nuts) extending from the rack boots. They are left hand thread. Screw the tie rods on about 3/4". Set the distance between the inner end of the tie rod sleeve and the centerline of the outer tie rod end to 9 1/8" as a preliminary adjustment.

Since there is limited (+/- 1/4") adjustment on the inner end of the tie rod assembly, any major adjustment must occur on the outer end. When adjusting toe-in, it might be necessary to remove the tapered end from the steering (pitman) arm of the front upright to make major changes.

You may check that there are adequate rod end threads in the tie rod by running the jam nuts lightly against the tie rod, then unscrewing the tie rod to expose the threads. There should be 5/8" minimum thread in the inner tie rod and 3/4" minimum in the outer.

INSTALLATION

Remove the side splash/access panels.

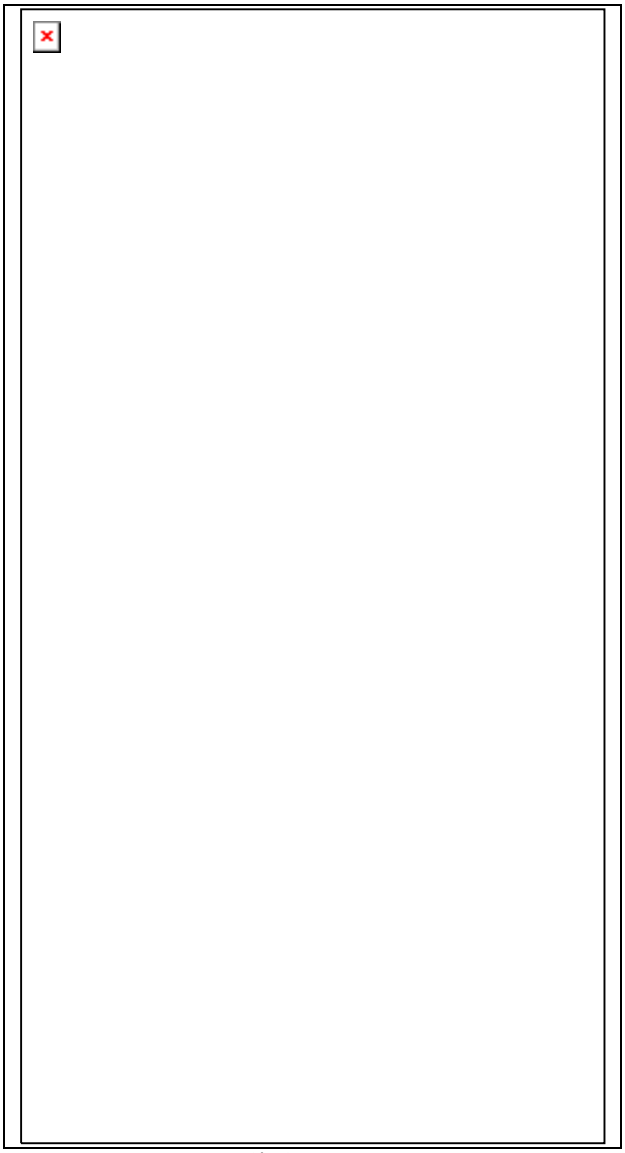
Turn the pinion all the way to the right. With the left side of the rack assembly pointing 45 degrees forward, place the right side tie rod through the open section on the right. Rotate the left tie rod toward the rear and rotate the entire rack to the rear, simultaneously inserting the pinion shaft through the hole in the footbox.

Using the four 5/16" x 2 1/4" hex cap screws provided, bolt the steering gear to the chassis brackets with a shim under each mount. The shims allow exact bump steer adjustment for those who demand competition tolerances. Adjusting the bump steer of your street car is not necessary. Standard factory settings are very accurate.

Slide the foam gasket provided onto the pinion housing to seal against the front footwell panel. It will normally be a tight fit, but if you wish, use a little contact cement to secure it to the footwell.

FRONT CONTROL ARM AND UPRIGHT INSTALLATION

Fuel tanks should be installed before the uprights are installed onto the control arms. See Section E.



C\FCTRLARM

LOWER CONTROL ARM:

The anti-sway bar tabs are located on the upper rear part of the arm as installed in the car. Install the control arm into the brackets as illustrated using $^{7}/_{16}$" x 2 $^{3}/_{4}$" bolts and stover lock nuts supplied. Torque to 35 lb.ft. See also page 37 for hub carrier details.

UPPER CONTROL ARM:

See the exploded view for proper orientation of the arm and related pieces. Install the arms with a retaining tab on either side of each bushing (or thrust washer, then the retaining tab, when using the competition bushings). Use the $^{7}/_{16}$" X 2 $^{3}/_{4}$" 12-point cap screws and internally splined lock washers supplied. Do not tighten the bolts at this time. Slide an equal number of shims on either side of each inner pivot so that a single cotter pin can be slid through the shims and the retaining tabs. They will be used to adjust caster and camber. The cotter pin fits below the plane of the control arm. This initial setting may be changed when the final alignment is done.

INCLUDED IN THE KIT ARE:

(8) $^{1}/_{32}$" shims
(8) $^{1}/_{16}$" shims
(14) $^{1}/_{8}$" shims

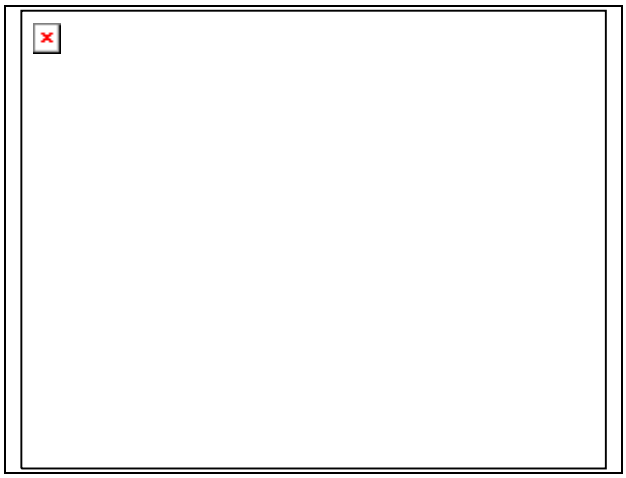
This is more than enough to fill the gaps.

FRONT ANTI-SWAY BAR

FRONT:

The bar is fit in the channel under the front floor, mounted in the special plastic bushing sandwiched by a steel strap.

The bar extends forward to the front side of the damper bolt. Use the $^{5}/_{16}$" x 1" bolts with lock washers to secure the bushing and brackets to the chassis.



Install the rod-end links to the anti-sway bar with the 3/8" x 1 1/4" screws and stover nuts. The long 3/8" bolt slides in from the front through the rod end, the lower control arm sleeve and then through the reduced-diameter bushings in the lower damper mount.

UPRIGHT:

Install the bottom hub carrier boss onto the lower control arm ball joint stud. Use the 1/2"ID x 7/8"OD washer, nut and cotter pin . Torque to 50 lb.-ft.

See the exploded view on page 37. Bolt the hub carrier to the bottom boss assembly, using the 1" long socket cap screws and ribbed washers. Safety wire the 4 screws together so that the screws will be held in tightening tension.

Install a tapered nut onto the upper ball joint threads and insert through the upper control arm. Install another tapered nut. The tapers on the nuts point toward each other and allow camber adjustment. After final camber adjustment, safety wire the nuts so that they are in constant tension.

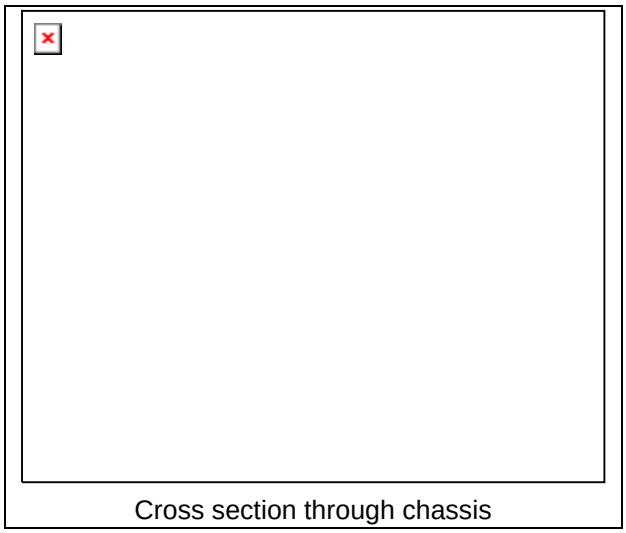
Insert the steering tie rod stud into the steering arm (from the bottom), and secure with a flat washer and castle nut. It is best to check toe-in before the final tightening in case the outer tie rod must be adjusted. Torque to 20 lb. ft. and secure with a cotter pin.

REAR TRAILING ARM INSTALLATION

The upper and lower trailing arms and rear upper control arms are threaded left on one end and right on the other. Preferred orientation is with the left hand thread at the outside end of each arm although this is not critical. Install the appropriately threaded rod ends with their jam nuts onto the ends on each trailing arm.

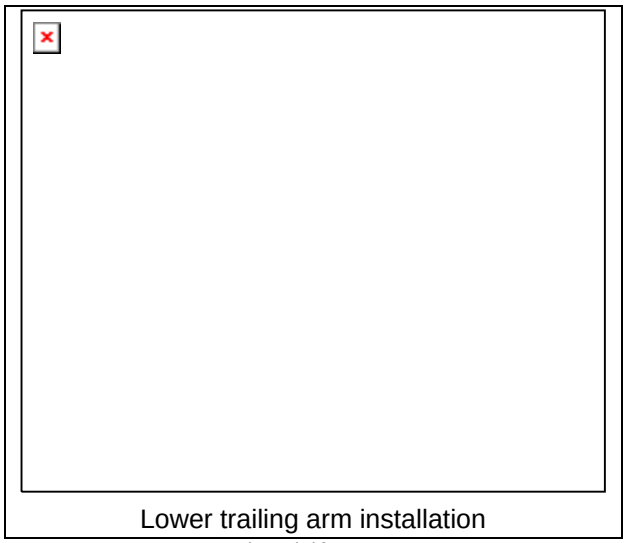
Adjust the longer arms to 32-1/8" between rod end centerlines and the shorter ones to 30" between centerlines. These dimensions are starting points, and must be readjusted for exact wheel alignment. Leave the jam nuts loose.

LOWER TRAILING ARMS



Cross section through chassis

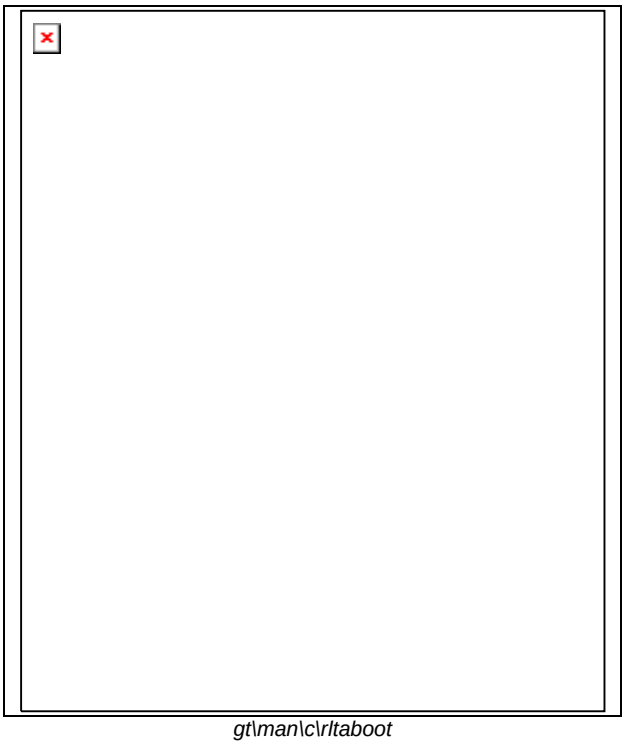
Install the bushings, sleeves and lower trailing arms as shown below. Insert the bolt from the *inside*. Install the left-hand threaded end of the shorter trailing arm into the bracket inside the chassis using the 1/2" x 4" bolts. Access for installation is through the hole in the bottom of the chassis. Torque to 60 lbft.



Lower trailing arm installation

gt\man\c\ftrarmmt

Slide the boots over each trailing arm, together with the emergency brake cables.



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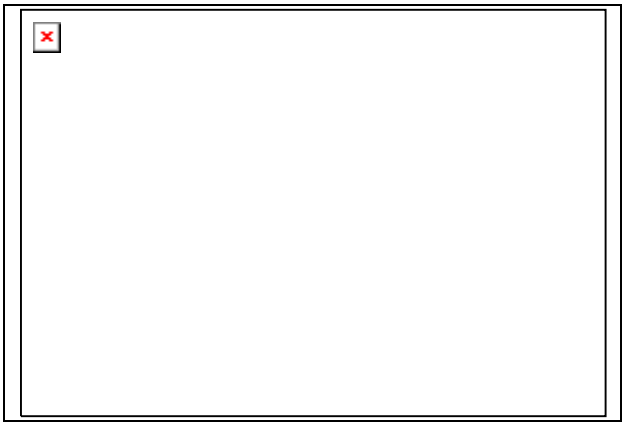
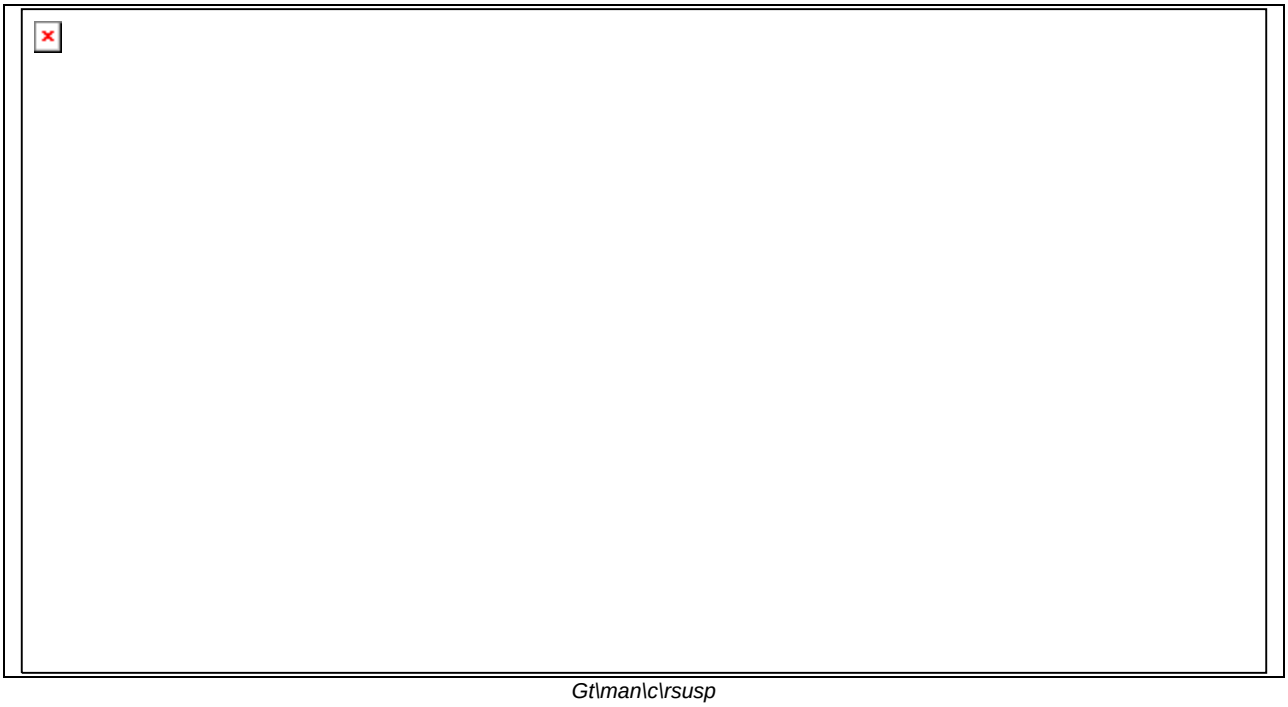
UPPER TRAILING ARMS

Attach the longer trailing arms to the upper chassis mounts using 1/2" x 4" bolts and stover nuts. The bushings and sleeves are assembled in the same manner as the bottom mount. Torque to 60 lbft.





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REAR UPPER AND LOWER CONTROL ARM INSTALLATION

Install the rod ends on the upper radius rod the same way described for the trailing arms. Install the upper radius arms' right hand threaded end on the rear hub carrier as illustrated. Use a flat washer between the rod end and the hub carrier. *Note that both the upper and lower fulcrum pin brackets are offset.* Orient the offset of the upper pin bracket 45 degrees down and in. This will keep the line of force as close as possible to the junction of the end of the pin and the "U" bracket welded to it.

Install the $^{5}/_{8}$" rod end and jam nut onto the outer end of the lower control arm. See the illustration for the correct fitting dimensions. If you are also installing the front bearing, press it into the arm and secure with the snap rings on both sides. Lubricate the ball with a small amount of chassis grease.

Install the rear lower control arm onto the hub carrier. Slide the lower fulcrum pin through the front bearing, .282" spacer, and the hub carrier. There are shims provided to fit between the hub carrier and the rod end. Install a washer and lock nut, and tighten to 35 lb.ft. Orient the offset of the fulcrum pin bracket toward the inside of the car and up 45 deg. As with the upper bracket, the line of force from the trailing arm should pass through the base of the bracket where the "U" section is welded to the shaft.

Install a $^{5}/_{8}$" x 5" bolt into the outer sleeve of the rear hoop from the engine bay side. Slide the lower control arm inner pivot onto the bolt. The .375" spacer goes between the inner bearing and the rear subframe tie bar. Finish with a flat washer and lock nut torqued to 80 lb.ft.

Slide the upper radius rod over the stud in the upper hoop. Install the tie bar between the outside of the rod end and the stud on the top cross member. The tie bar end with the slot goes over the stud in the crossmember. See the diagram of the rear subframe on page 87.

Secure each end with a flat washer and locknut. Install the upper and lower trailing arms onto the hub carrier pins with $^{1}/_{2}$" x 1 $^{3}/_{4}$" bolts, flat washers and locknuts. Do not tighten the lower bolts.

FRONT ANTI-SWAY BAR

FRONT:

The bar is fit in the channel under the front floor, mounted in the special plastic bushing sandwiched by a steel strap.

The bar extends forward to the front side of the damper bolt. Use the 5/16" x 1" bolts with lock washers to secure the bushing and brackets to the chassis.

Install the rod-end links to the anti-sway bar with the 3/8" x 1 1/4" screws and stover nuts. The long 3/8" bolt slides in from the front through the rod end, the lower control arm sleeve and then through the reduced-diameter bushings in the lower damper mount.

REAR:

See page 43. Place the rubber bushings and metal clamps over the center part of the bar, at the inside of the bends. Hold the bar in place over the studs in the removable rear transmission crossmember, with the ends toward the rear of the car. Secure the assembly with the washers and locknuts provided. Install a spacer and the vertical link on the bottom stud of each lower control arm. Secure with a high collar lock washer and locknut. Secure the top of each link with a 3/8" x 1" screw and a high collar lock washer. Adjust the lengths of the links so that there is no preload in either one. Tighten all jam nuts.

COIL-OVER INSTALLATION

For specifications see page 11.

FRONT

If you haven't installed the anti-sway bar yet, see the previous section.

Install the upper mount with a 1/2" x 2 1/4" Bolt and flat washer. If you get the dampers from ERA, spacers on either side of the bearing ends will be included. Tightening of the upper bolt is easier with a 3/4" flex socket.

Install the lower end of the damper on the lower control arm using the spacers provided. The bolt is 1/2" x 6".

REAR

Install the upper end of the coil-over into the bracket on the chassis, using spacers on either side of the top bearing if necessary. Face the top adjustment slot (Koni double adjustable only) out. Insert the 1/2" x 2 1/4" bolt through all the pieces from the rear. The bottom damping adjustment faces either toward the inside (Spax) or the front (Koni).

To mount the lower end of the damper in the control arm, it may be necessary to disconnect the lower trailing arm from the bracket. Use a 1 3/4" bolt and appropriate spacers. Reconnect the trailing arm.

DAMPER ADJUSTMENT

For optimum ride and safe handling, there are specific characteristics that can be adjusted into the suspension by way of the damping. Control over rough surfaces is important as is transitional behavior, i.e. the way a car reacts when it suddenly changes direction. Within limits, you may customize those characteristics to your preference..

KONI

Bump control:

The control knob is located at the bottom of the damper. Turning the wheel clockwise increases the bump control damping.

Set all four dampers on minimum bump and rebound settings. Drive the car to get the feel of the car over uneven surfaces. Disregard body roll, just notice the behavior over bumps. Notice if the car walks or side-hops in a rough turn.

Increase bump adjustment 3 clicks at a time on all four dampers until the car starts to feel hard over bumps. Back off each adjustment 2 clicks. The back-off point will probably be reached sooner on one end of the vehicle than the other. If this occurs, keep increasing the bump adjustment on the soft end until it, too, feels too hard. Then back it off.

Final micro-adjustments can be made after you get used to the feel of the car.

Rebound control: The adjustment is made by inserting a $^1/_8$" pin in the wheel at the top of the damper. Turning the toothed control wheel from left to right will increase the rebound damping.

With rebound control set on full soft and the bump control set from your previous testing, drive the car, paying attention to how the car rolls when entering a turn.

Increase the rebound damping three sweeps on all four dampers and test drive the car. Continue increasing the damper setting until the car enters the turns smoothly, with no drastic attitude changes, and without leaning excessively. Any increase beyond this point is may be detrimental to good control.

Final adjustments can be made to effect the "turn-in" of the car. That is, whether the car has initial understeer (pushes) or oversteer (loose in the back). By increasing the rebound control at one end it will decrease the initial adhesion at that end. Conversely, decreasing the rebound control increases the initial adhesion. In general, neutral or slight initial understeer is most desirable.

There shouldn't be a large difference between transient and final balance, although slightly less initial understeer will increase responsiveness.

SPAX

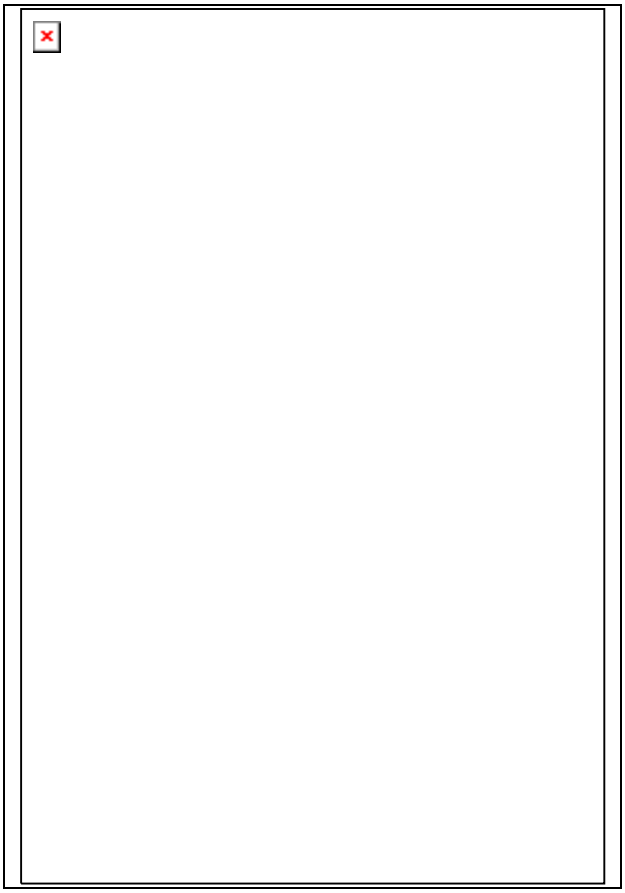
While the Spax damper does not have separate bump and rebound control, a reasonable compromise can be made using patience and common sense. The bump/rebound ratio is designed for the ERA GT and only detail changes need be made for optimum handling.

Initially set all four dampers 4 clockwise clicks from dead soft. Drive the car over uneven surfaces to determine whether the car bounces from bump to bump or control is maintained adequately. Increase the damping until side hopping begins, then decrease the setting until control is regained. Read the instructions given above for Koni rebound damping adjustments for transition understeer/oversteer adjustment.

WHEEL ALIGNMENT

All alignment operations should be done with the ride height set to your preference. See the section on springs (page 10) for further information.

Fuel tanks should be full (or the car ballasted appropriately), and the car on a level surface. Tire pressures should be set to: **Front 22 PSI, Rear 25 PSI**



CAMBER

Caster is the inclination of the front upright axis (through the upper and lower ball joint centers) toward the rear. More caster increases straight line stability, but also increases steering effort. The car tends to turn away from the side of the car with the most caster.

Camber is the vertical tilt of the tire toward the outside. Camber controls the contact patch of the tire. Negative camber tends to give higher cornering force limits, but wears the inside of the tire rapidly. Excess negative camber can traction, especially during braking and acceleration.

King pin inclination is the position of the front upright axis, inward at the top, toward the center of the car. Its primary purpose is to decrease the offset of the center of the tire patch from where the front upright axis meets the ground. This lessens steering effort and unwanted gyroscopic reactions from the spinning tire as it travels up and down. It is not adjustable.

FRONT

ALIGNMENT SPECIFICATIONS:

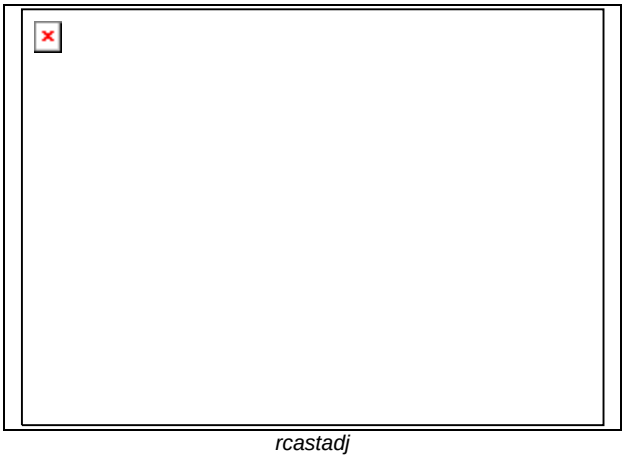
Caster: +6 degrees +/- $^1/_2$ deg. (The right side caster should always exceed the left, if there is a variation)
Camber: 0 degrees +/- $^1/_4$ deg.
Toe-in: $^1/_8$" +/- $^1/_{32}$" (0.5 deg. +/- 0.1 deg.)
King pin inclination: 7 $^1/_4$ deg.+/- $^1/_2$ deg.(not adjustable)

First, adjust **caster** by shifting shims from in front of each inner pivot bushing of the upper control arm to the back, or vice versa. Moving the arm $^1/_8$" will result in a change of approximately $^1/_2$ degree. Be sure that there is minimal or no gap at each side of the inner pivots when the bolt is still slightly loose. Don't forget the internal star washer under the head of each upper control arm inner pivot bolt. Tighten the bolts to 40 lb.ft. and check that all the shim packs are tight. If they can be moved, insert more shims as necessary.

Because of the plan angle of the arm, changing the caster will simultaneously change the camber, although to a lesser degree. Therefore, after caster adjustment, the camber must always be checked.

Camber is adjusted by threading the nuts securing the upper ball joint to the upper control arm in or out. Hold the ball joint so that it is in line with the king pin axis while adjusting and tightening the nuts. After the adjustment is completed, tighten the inner nut to approximately 60 lb.ft. and safety wire the inner and outer nuts together so that they are always in tension.
Each full turn of the adjusting nutschange the camber by approximately .3 degrees.

REAR



rcastadj

ALIGNMENT SPECIFICATIONS:

Inclination of the hub carrier toward the rear: 7 $^{1}/_{2}$ deg, $^{+}/_{-}$ 1 deg.

Camber: - 1 deg., $^{+}/_{-}$ $^{1}/_{8}$ deg.

Toe-in: $^{3}/_{32}$" +/- $^{1}/_{32}$" (0.4 deg. +/-0.1 deg.)

TO SET REAR ALIGNMENT

Set the **caster** inclination of the rear hub carrier to +7 $^{1}/_{2}$ degrees(+/- 1 deg.). This can be measured by the angle of the outside horizontal tube of the lower control arm. Only the upper trailing arm need be adjusted if the specification can be met. If not, adjust the lower trailing arm also.

Set the **camber** by adjusting the upper radius rod.

Set the **toe-in** by lengthening or shortening the upper and lower trailing arms equally.

Check and reset the inclination if necessary.

Reset the camber if necessary.

Reset the toe-in if necessary.

TIRE PRESSURES

Try initial settings(cold) of 22psi front, 25psi rear. Depending upon tire brand and size, these pressures will be a reasonable compromise between ride and responsiveness. Remember, this a a light car with very large tires. High tire pressures are neither necessary or desirable. Track tire pressures should be determined with a tire pyrometer.

Over-inflation will actually decrease the amount of rubber on the road by crowning normally flat tires, and tire noise and harshness become serious above 25 PSI.

Steady state under/oversteer may be adjusted significantly by working with the tire pressures. If your balance is incorrect, raise the pressures on the axle your want to stick better by about 2 PSI and road test the car. You may, alternately, reduce the pressures on the opposite axle for a better ride.

Generally, it is the tire pressure differential that determines handling balance.

If the steady state behavior of the car is not the same cornering right and left, check that the anti-sway bar links are not preloaded, and that the spring preload is equal from side to side.

BRAKES

TECHNICAL OVERVIEW

Hydraulic pressure is created by two **Girling-Lockheed Master Cylinders** actuated by an adjustable **balance bar**. The brake and clutch cylinders are mounted on a adjustable pedal frame which also carries the throttle pedal.

The front cylinder is $^{3}/_{4}$" bore, the rear cylinder is $^{5}/_{8}$" bore unless other than the standard Corvette calipers are used.

The clutch master cylinder is identical to the front brake master cylinder.

From chassis 2055, 2 psi residual pressure valves were added to the system to alleviate some soft pedal problems associated with the '88-on Corvette calipers.

All Fittings, Lines, and Hoses for input and output are factory installed.

1	Front master cylinder, 3/4"	14	Banjo Bolt w/washers, 977517	30	Rod end, 3/8" female
2	Rear master cylinder, 5/8"	15	Steel line, 76.5"L	31	Washer, 3/8"ID, 177003
3	Clutch master cylinder, 3/4"	16	Steel line, 59.5"L	32	Junction, 3/16"IF x 1/8"P, WH 652 x3
4	Hose, 13", 3AN/3AN, 61010112	17	Steel line, 53.5"L	33	Switch, stop light
5	Bulkhead fitting, 3AN x 3/16"IV	18	Banjo, 7/16", 977640	34	Banjo bolt, 3/8"-24, 997503
6	5/16" barb x 4AN (mod'd from 961504*	19	Banjo, 10mm, 997641	35	Steel line, 1/4"
7A	5/16" hose	20	Hose, 4AN, 64191914	36	Flare nut, 3/16"
7B	5/16" hose	21	Bulkhead fitting, 4AN x 90d, 983304	37	Clip, clutch hose
7C	5/16" hose	22	Tube sleeve, #4, 561904	38	Reservoir, clutch and brake
8	#3 Bulkhead T, 983403	23	Tube nut, #4, 561804	39	Banjo bolt, 7/16"-20, 977504
9	#3 Bulkhead nut, 561803	24	Steel line, 1/4" diam.	40	Adapter, 3AN swivel to 1/8"npt
10	#3 Tube sleeve, 561803	25	Flare nut, 1/4" (included w #24)	41	RPV, 2 psi, Wil 20-1874
11	3/16" Steel line	26	Bulkhead fitting, 4AN, 983204	42	Elbow, 3/8 x 3AN, 962203
12	3AN Bulkhead fitting,, 94191913	27	Washer, 7/16"ID, 177004	43	Banjo, 3/8 x 3AN, 997603
13	18" Hose assbly, 3AN/Banjo, 610618	28	Slave cylinder, clutch, BMW 2152 1104 269	44	Adapter, 3AN x 1/8"npt
		29	Clutch actuating rod		

CALIPERS/ROTORS

Part numbers are listed on page 14

FRONT:

Calipers: 1984 through 1987 Chevy Corvette calipers cand be used at the front and rear when using the 11.5" rotors. 1988-90 Corvette calipers are used with the 11.5” or 12” rotors in front, 12" rotors in the rear. Note the restrictions mentioned in Section C regarding wheel diameter and balance weight clearance.

Rotors: Stock Corvette 11.5" or 12" rotors are used with bolt-on wheels. Front rotors used with pin drive wheels are made by Wilwood or JFZ.

REAR:

Corvette rotors are used at the rear hub carriers. The rotors are furnished with the pin-drive option and are redrilled for the pin drive hubs.

Emergency brake controls are modified from the Pontiac Fiero. A custom E.R.A. cable is supplied with the kit.

The 12" rotors (88-94) have the emergency brake integral with the caliper.

BRAKE LINES

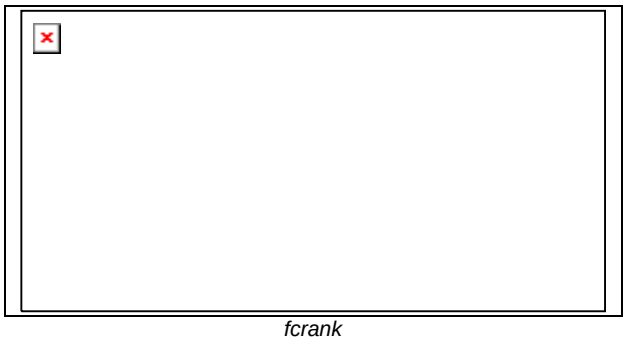
As delivered, the ERA GT kit has all the steel lines, fittings, adapters, flex hoses, etc. fitted to the chassis. Do not assume that any connection is tight. Tighten each fitting, using proper wrenches on both sides of the junction.

Use DOT 3 or 4 brake fluid only. During brake and clutch bleeding, and after final assembly, check for leaks at all junctions.

If there are any component questions, refer to the diagram and parts list on page 48. Assemble components exactly as shown.

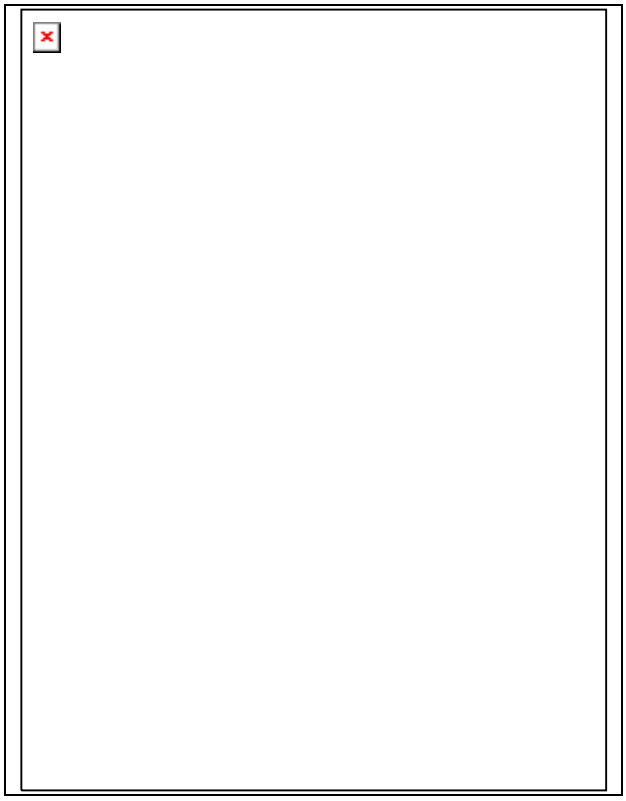
THROTTLE LINKAGE

The left hand drive throttle linkage uses a bell-crank mounted on the tunnel as shown. When assembling, use a light grease on the shaft. Match the length of the link to the pedal with the position you’re going to mount the pedal assembly at.



fcrank

PEDAL ASSEMBLY

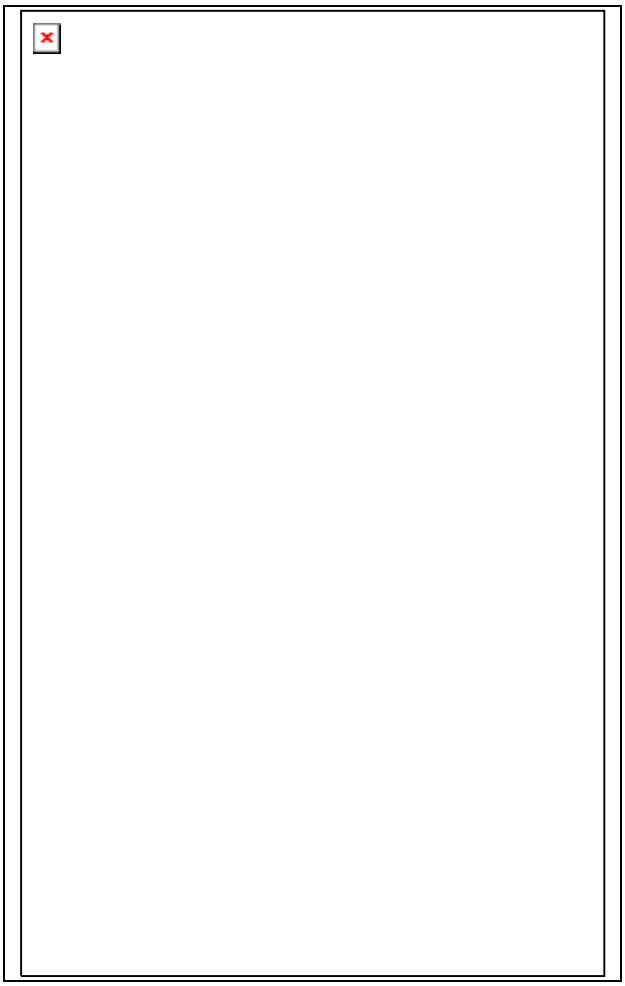


The pedal assembly consists of pedals, pedal box, linkage and master cylinders. .

DISASSEMBLY:

The pedal box can be removed as an **assembly**, with all master cylinders attached. If you wish to avoid bleeding the brakes and/or clutch, the master cylinders can be detached from the box and left in place.

Remove the 2 side bolts securing the pedal box to the chassis. Shift the box rearward to remove the master cylinders from the frame.



Remove the set screw securing the **pivot shaft**, lift the pedal box up and drive the shaft out. **Note** the position of the shims and thrust washers.

When reassembling after paint or plating, lightly grease the pivot shaft and the sideways thrust surfaces on the pedals, washers and bushings.

The $^{3}/_{4}$ " ID brake master cylinder is toward the right side of the pedal box, the $^{5}/_{8}$" cylinder in the center. Take care on installation. The bushings in the pedal sleeves are reamed to fit, and cannot be replaced without reaming. On the RHD unit the transverse link for the throttle linkage must also be removed.

The fittings are different on each cylinder, so mark their position for proper installation.

Secure the assembly with the $^{5}/_{16}$" x $^{3}/_{4}$" bolts supplied, inserting any shims between the left side of the box and the chassis bracket.

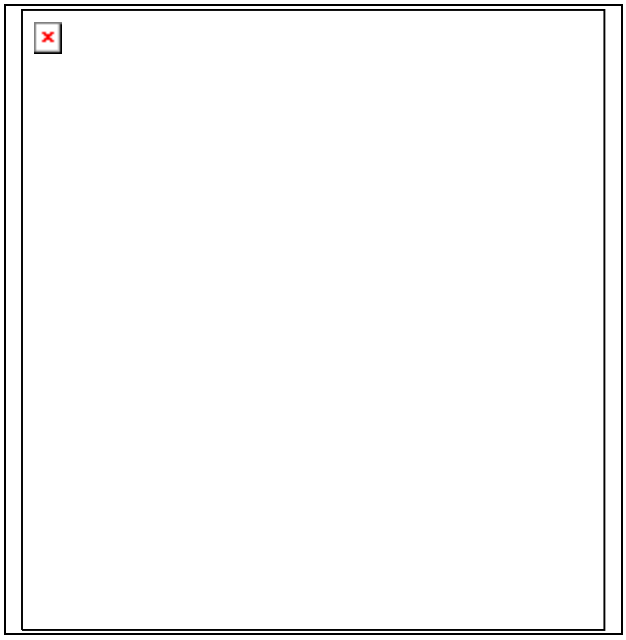
Generally, for those over 5'11" tall, the assembly will be most comfortable in the forward-most position, in the rearward-most position for those under 5'6", somewhere in between for the rest of you.

Within limits, you may adjust the links between the pedals and the master cylinders. Be careful however, that there is at least $^{1}/_{2}$ " of thread in the rod ends and clevis joints involved. Check for binding and interference after adjusting the length of the rods. Tighten the jam nuts when adjustment is finished.

BALANCE BAR ADJUSTMENT

As shipped, the standard balance bar has equal length shims on both sides of the central bearing. Drive the car, thoroughly breaking in the brake pads. With the pads warm but not hot, do several "panic" stops on good pavement. Generally, the preferred action is to have the front and rear lock simultaneously, or to have the front slightly early. *The rear brakes should not lock first.*

If the front-to-rear balance seems off, it can be adjusted as follows:



Remove the bolt securing the balance bar assembly together. Do not lose the shims! Note that there are narrow lock washers at each end of the bolt.

To decrease the braking at one end of the car, use more spacers on the side of the balance bar going to that end's master cylinder. Transfer a spacer from the opposite side of the bar. *Total spacer length must remain the same.* Each spacer changes the balance approximately 10%.

CALIPERS

Front and rear calipers are illustrated on page 14. Hub carriers are shown on page 37 and 38.

FRONT CALIPER

Attach the caliper bridge with the M14 x 40 mm bolts.

The flex hose to each caliper is secured to the top of the upright with a nylon clamp. See page 37.

The cable should be positioned so that there is no binding and no interference with any suspension or steering piece through the full range of wheel travel.

REAR CALIPER

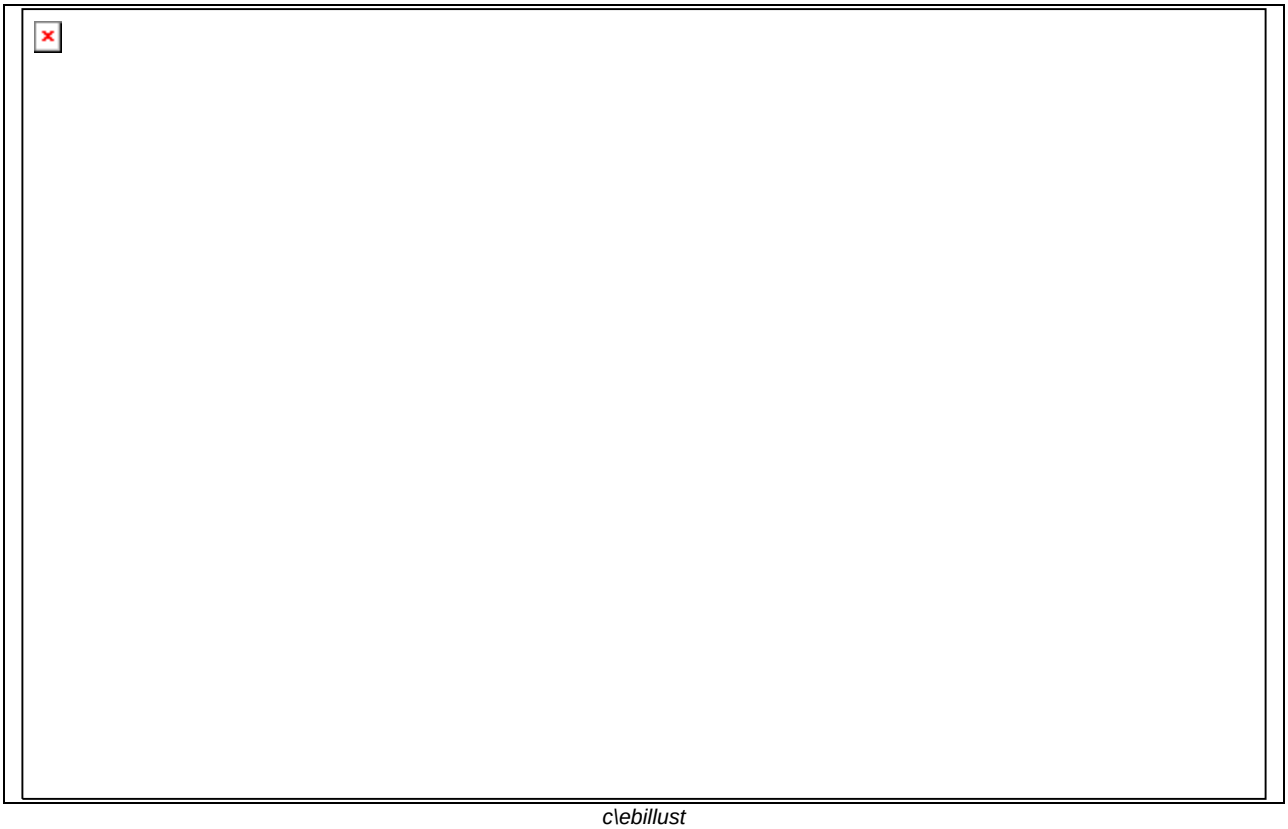
Mount the bracket (ears toward the front of the car as shown on page 38) and bearing assembly to the hub. GM bracket 10052211 is used on the left side, 10052212 on the right. Secure with M12 x 70 Allen screws and lock washers. Torque to 80 lb.ft.

An **exploded view** of the caliper parts is on **page 14**. Note that the emergency brake cable bracket is a special E.R.A. piece. Installation is shown on page 53.

After assembly of the parts, orient the caliper so that the cable enters from the bottom. Use the M12 x 30 screws and lock washers to secure the calipers to the bracket. Torque the screws to 55 lb.ft.

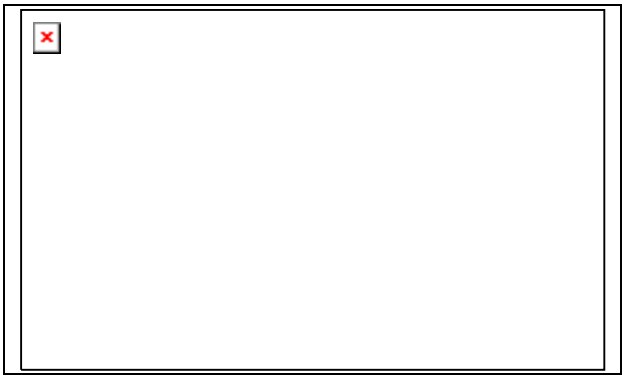
Secure the brake hose with the clamp on the upper inside of the hub carrier. tie-wrap the emergency brake cable so that there is no binding or interference with any suspension piece through the full range of wheel travel.

EMERGENCY BRAKE HANDLE AND CABLE



c\ebillust

Trim the LHD emergency brake handle (part number is on page as shown on page 16). The RHD handle comes with the kit.



ebhandle

Install the handle on the chassis bracket at the left side of the drivers footwell with a $^{5}/_{16}$"USS x 1" screw at the rear and a $^{5}/_{16}$"x $^{3}/_{4}$" screw at the front. Bolts longer than those will drill into the fuel tank.

The emergency brake system is a single **continuous cable**, pulled by a balance wheel on the brake handle. It connects at each rear wheel with a screw-on clevis that engages each actuating lever. The lever then acts on the bottom of the emergency brake shoes or at each caliper.

Feed both (clevis) ends of the cable through the slot on the left bottom side of the diagonal panel behind the seats. The loop remains at the handle.

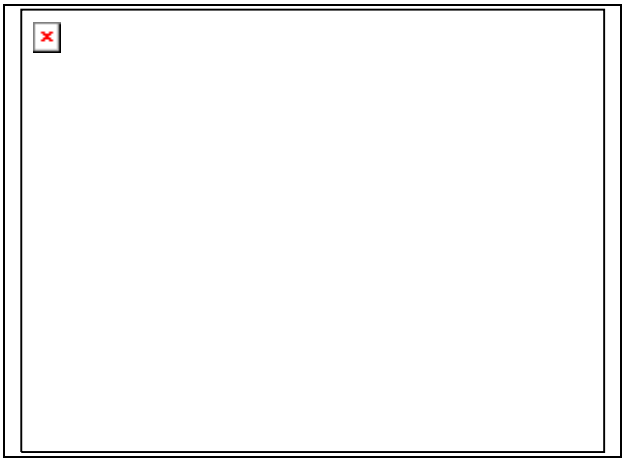
The longer cable half is fed over the water hoses but under the throttle cable, and goes through the grommet on the right side of the inner bulkhead. The cable runs inside the chassis structure.

Tightly tie-wrap the cable housing to the top side of the trailing arm about 1 foot back from the front pivot and again about 8 inches from the rear end.

The short cable half passes through the left grommet in the intermediate bulkhead and is attached to the trailing arm in the same manner as the other half. Feed the cable ends through the lower trailing arm boots.

CALIPER-TYPE EMERGENCY BRAKE

Install the special cable clamp bracket onto each caliper with a single bolt. See below.



ADJUSTMENT

Adjust the nuts on the cable housing at the front chassis bracket. The lever arms must be free to *fully* return. The caliper will self-adjust with each use of the emergency brake. Remember! If you don't use it, you will slowly lose the adjustment.

BLEEDING THE HYDRAULIC BRAKES

This dual master cylinder system requires no special techniques, just common sense.

USE DOT 3 OR DOT 4 FLUID ONLY!

Be sure to keep adequate fluid in the brake reservoirs when bleeding. If you run out, you must start over again.

The brakes may be pressure bled, with care to avoid so much pressure that the feed hoses are blown off the fittings.

Use a hose on each bleeder, immersed in a container of fluid. This will prevent air from being drawn back into the caliper.

Start at the caliper furthest from the master cylinder. Open the bleeder about $^{1}/_{2}$ turn and slowly pump the brake pedal until the fluid is clear. Repeat the process at the opposite wheels in turn.

Lightly tap each caliper to dislodge any trapped air bubbles. Wait for several minutes and repeat bleeding at each corner to remove the last of the air.

SHIFT LINKAGE AND REAR AXLES

SHIFT LINKAGE AND SHIFTER BOX

LEFT HAND DRIVE

THE SHIFT LINKAGE CONSISTS OF:

Shift box with handle, extension and reverse lockout mechanism.

"Z" link (with support bearing) from handle extension through firewall.

Front universal joint/clamp.

Rear rod

Connecting universal joint/clamp to transmission.

Caution! If you decide to plate any rod components, clearances through the bearings may become too small.

INSTALLATION

The shift box comes preassembled and plated, and the lockout is hard chromed for wear already. Note the configuration, including washers, screw directions, etc. for assembly.

SHIFT BOX ADJUSTMENT:

Temporarily secure the assembled shift box to the tunnel with four $^{1}/_{4}$-20 screws.

Hold the slotted rod on the shift lever parallel to the tunnel and check the vertical clearance between the bottom end of the shift lever and the bottom of the slot in the shift box. The clearance should be about $^{1}/_{8}$". If the height needs adjusting, remove the shift lever and shaft, and screw the the rod end up or down.

"Z" ROD:

Remove the shift box temporarily. A spherical bearing is taped onto the "Z" link. Remove the bearing and remove any burrs from the short end of the link. The bearing can only be installed **after** the link is fed through the hole in the engine bulkhead.

Feed the "Z" rod through the slot above the tunnel, snaking the end through the support bearing housing on the rear firewall. The fit is tight, so a little "encouragement" may be necessary.

Grease the support bearing and install over the shaft and into the bearing sleeve while lining up the dimple in the bearing with the set screw. Secure in the sleeve by tightening the (10-32 x 3/8") setscrew. Do not overtighten.

Install the shift box onto the tunnel while sliding the front shaft into the "Z" link clamp/sleeve. Don't tighten the clamp yet.

REAR ROD/UNIVERSAL JOINT:

If there is still a spline adapter on the end of the transmission shifter input shaft, remove it and deburr the shaft if necessary.

Install the long end of the universal joint/double clamp onto the rear end of the rear rod. The short end will extend forward to meet the "Z" bar. Install the rear rod by passing the rod through the rear hoop surrounding the transmission from underneath the car.

The air conditioning belt goes around the shift linkage. If this is the final installation of the linkage, you may want to install the belt before connecting the clamp onto the "Z" rod. When replacing the belt, this clamp must be disconnected. For ease of fitting a new AC belt, you may want to pin this connection so that this adjustment won't have do be done every time.

Engage the front clamp fully onto the "Z" shaft and slightly tighten the clamping screw.

Adjust the transmission shift rod into one of the rearmost positions. By pushing the front rods forward, the sleeve connection at the transmission can be engaged. Slide the rear universal joint onto the transmission rod about 1" and tighten the clamp with the slot oriented up.

ADJUSTMENT (LHD)

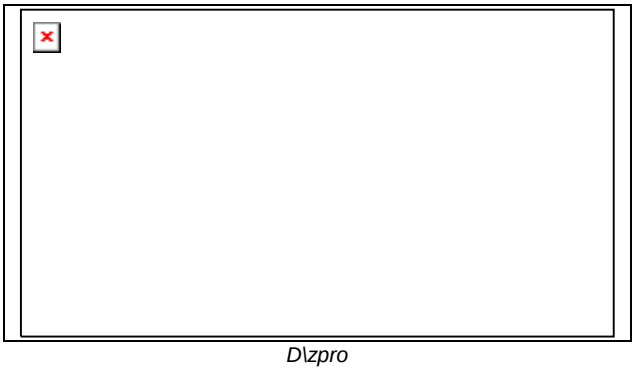
See the illustration on page 56.

Proper adjustment of the linkage is critical to the function of the shift linkage. Take your time.

Find the neutral position of the transmission gear selector rod by locating the central position of the forward and aft available travel. The input shaft is spring loaded in the 2nd-3rd plane.

With the shift lever vertical, rotate the "Z" bar so that it is centered in the slot in back of the seats, adjust so that there is potential equal travel up and down and front to rear as the shift lever is moved.

The fore-and-aft travel of the "Z" bar is very critical: The rod will tend to jam in the support bearing if it is too far back, or will hit the diagonal panel if it is too far forward. Tighten the clamp on the front rod only after checking for interference.



D\zpro

Rotate the rear rod to about the 1:30 position (with a Ford starter, the starter cable bolt will point directly at it). With the rod engaged about 1", tighten the clamp connecting the rear end of the "Z" bar with the forward end of the rear rod.

Tighten the clamp at the transaxle input but leave the clamp to the rear end of the rear rod a little loose. Check to see that there is no interference when the rear rod is rotated and extended fore and aft to select all the gears.

Adjust the long connection at the rear rod so that all gears are available and the shift lever is oriented correctly. If necessary re-adust any other connections to perfect the fit.

Check to see that the transmission is still in the neutral, 2nd-3rd plane position. Loosen the front clamp. Hold the shift lever about 5 degrees to the right of vertical and centered fore and aft, and tighten the clamp between the "Z" bar and the front rod.

At this point the spring detents in the shift lever should be in retracted positions and not rubbing against anything. Lower the reverse lockout lever.

Adjust the rear spring detent so that it just contacts the lower part of the lockout lever.

Adjust the front spring detent to just touch the left inside of the shift box.

At this point you should be able to select 1st through 5th gears and the lever should return naturally to the neutral position in the second/third plane. Readjust if necessary. Raise the reverse lockout lever to check selection of reverse.

Grease the rubbing areas of the shift box generously.

RIGHT HAND DRIVE SHIFT LINKAGE

The RHD shift linkage consists of a rear rod with offset, double coupling sleeve, front rod with a flat plate, shift lever pivot box, and shift lever.

ASSEMBLY:

Assemble the shift box onto the right rocker, with the shift lever already attached. Check the fit of the rod in the chassis bearing behind the seat. The rod is going through a spherical bearing, so you may have to fiddle a bit to insert it. If the rod is tight, do not force. Use a fine abrasive paper to clearance the rod. Lightly grease the front rod and slide the rod through the chassis bearing.

Bolt the tab on the front rod onto the shift lever with the shoulder bolt supplied. The offset of the tab should be toward the right side of the lever.

Install the rear rod by inserting it from the rear, next to the transaxle through the hole in the engine bay right side. Pass it forward through the holes in the inner panels, so that it slides over the front shaft about 1". Access for this operation is from underneath the car, through the rear trailing arm access hole.

With the shift lever oriented vertically, twist the rear rod so that the offset gives maximum clearance through the hole in the chassis. Tighten the front clamp.

Slide the long end of the double clamp onto the rear rod as far as it will go, with the clamp slot oriented up. Push the transmission rod toward the rear without rotating it. Slide the short clamping end onto the transmission rod and tighten the clamp slightly.

Place the transmission in neutral by finding the midpoint in the front to rear travel. The internal springing will automatically rotate the rod to the 2nd-3rd plane. Have someone hold the shift lever straight up and down. Tighten both clamps on the rear coupling.

From the drivers seat, check that all gears are available and appropriately placed. Small changes can be made at the front clamp on the rear coupling.

REAR AXLES

OVERVIEW

We're working on an adapter that will fit the BMW M1 transaxle. Inquire.

Each drive axle assembly consists of a Hooks type joint on each end and a sliding spline between them to take up length variations occuring as the suspension moves up and down.

The inner end has a flange to mate with the ZF transaxle output flange,. The outer end mates to the stub axle cross assembly.

The axle assemblies can be made by most driveshaft fabricating facilities or purchased from E.R.A. Dimensions and part numbers are included in the drawings provided. There is some variation in "equivalent" parts. Critical dimensions are open and closed length and minimum angle of the flange.

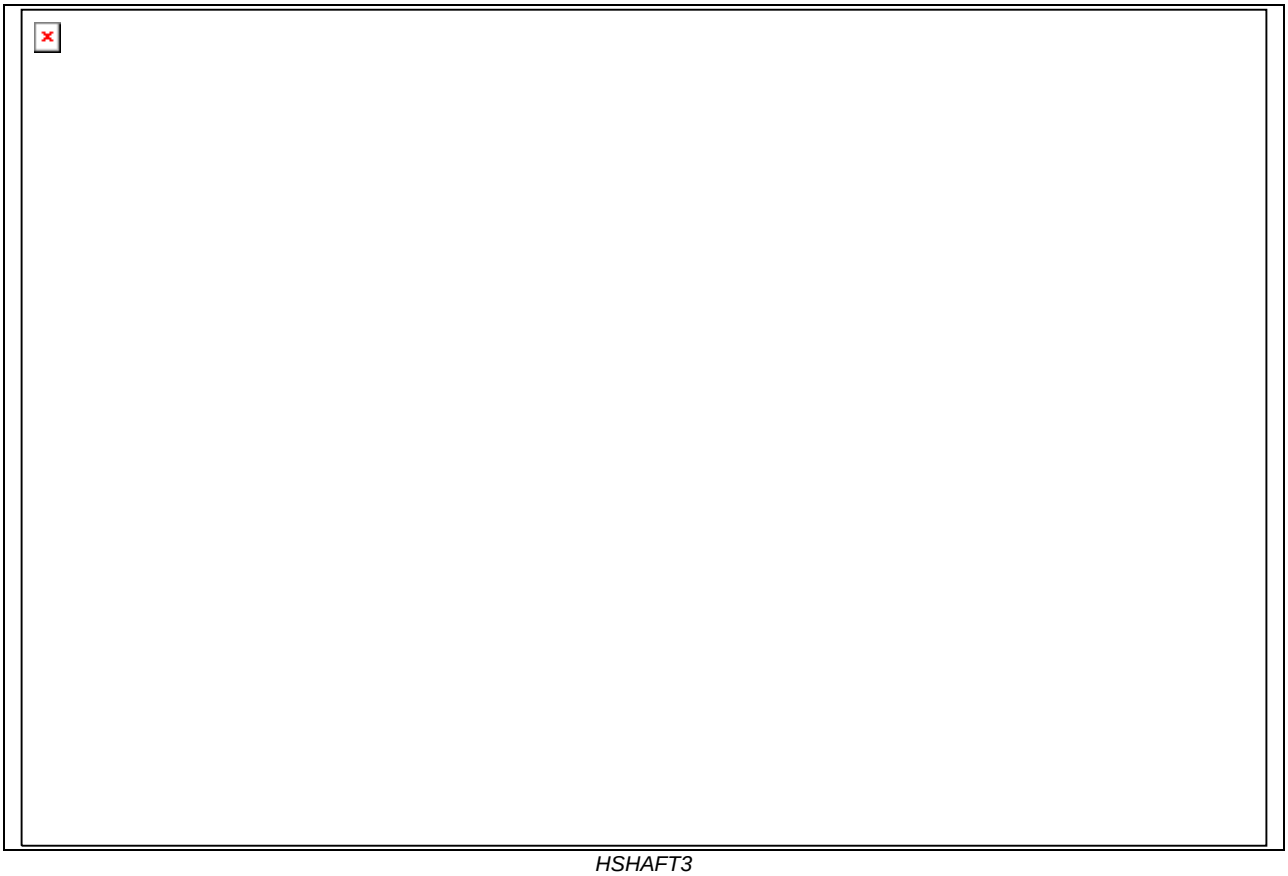
Check that there is clearance in the appropriate areas to allow 23 degrees rotation of the flange from perpendicular, especially at the outside end of the shaft where it mates with the hub carrier. Inadequate clearance will result in binding of the shaft at full suspension droop, followed by strange noises.

INSTALLATION

Use grade 8 ($^{7}/_{16}$" x 1-$^{1}/_{4}$") Hex cap screws, flat washers and stover lock nuts to secure the inner ends to the gearbox flanges. The outer cross is held in place by the "U" bolts of the GM stub axle.

Do not overgrease the sliding splines, but grease sparingly every 2000 miles.

If you separate the sliding spline sections, mark the male and female so that they are assembled with the same orientation. Otherwise, the balance and phase will be disturbed. Always line up the inner and outer "T" on each axle.



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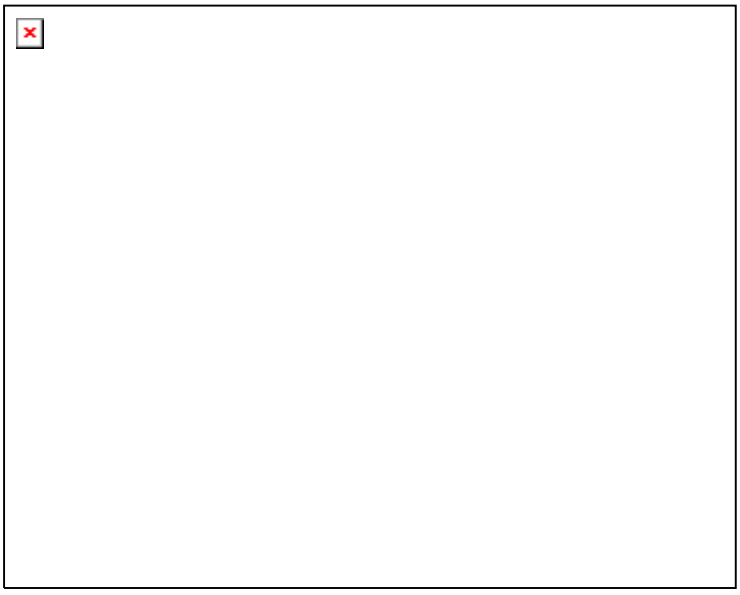
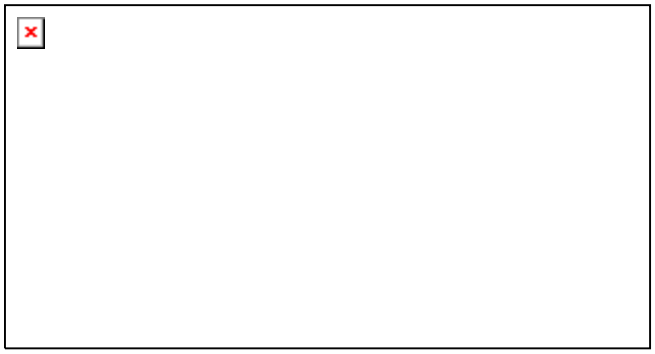
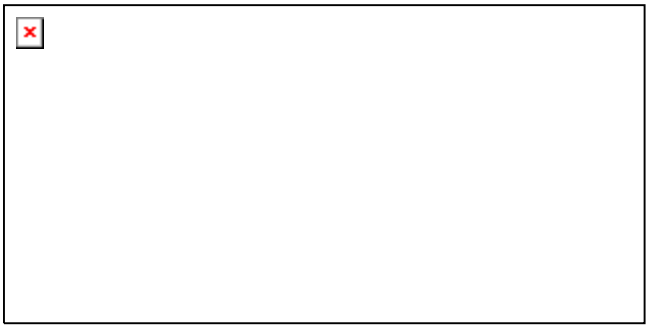


ENGINE AND TRANSAXLE





JOINING THE ENGINE AND TRANSAXLE

Before you attempt to install the engine and transmission, check the preparation outlined on page 9 and 28.

INSTALL THE BELL HOUSING ONTO THE TRANSMISSION:

See the clutch installation notes on page 30.

DS-25/1 (EARLY) TRANSAXLE/PANTERA BELL HOUSING

The modified Pantera bell housing is held to the transaxle with the 4 special fasteners that were originally used in the Pantera.

DS-25/2 (LATE) TRANSAXLE/ERA BELL HOUSING

The bell housing is held to the ZF transaxle with the 7 allen screws supplied: (5) M10 x 40 on the upper section and (2) M10 x 30 on the lower section with a low head for clearance.

Remove the external clutch linkage arm from the cross-shaft splines. Rotate the shaft so that the throwout bearing is in its fully retracted position, and reinstall the arm in the position indicated in the drawing of the slave cylinder in section E.

Bolt the engine to the transmission with the engine plate, flywheel, clutch and throwout bearing installed. You should have already checked for clearance between the bell housing and the clutch (see page 31), but rotate the engine one revolution to check again.

Rotate the external throwout arm forward until the throwout bearing hits the fingers of the clutch. (If your transaxle has the clutch shaft return springs, this takes a fair amount of pressure).

If there is not room between the arm and the transaxle case for 1" travel, remove the arm from the spined shaft and rotate to correct the position. Too much potential travel disturbs the geometry of the linkage, too little risks improper clutch disengagement.

Check that the snap rings securing the slave cylinder onto the bracket are secure and *slightly* tighten the 1/4" locating bolt into the slot of the slave cylinder. Bolt the bracket onto the side of the transaxle as shown in Section E. Note that the studs are metric thread (M10 x 1.5).

Push the pushrod into the slave cylinder so that it is fully bottomed out. Install the $^{3}/_{8}$" clevis pin through the throwout arm and the rod end, and secure the clevis with the retaining clip. It may be necessary to shorten the length of the rod so that the clevis can be installed.

WITHOUT CLUTCH RETURN SPRING:

If you do not have a return spring built into the ZF clutch throwout shaft (so that the throwout bearing doesn't automatically retract), the internal spring in the slave cylinder will automatically take up the clearance between the throwout bearing and the clutch. The initial position should be adjusted as follows:

Measure the approximate distance the pushrod can be pushed into the slave cylinder from the rest position. (If it cannot be moved forward, shorten the pushrod adjustment.)

Adjust the length of the pushrod so that the play is $^{1}/_{8}$" - $^{1}/_{4}$". This distance will allow the slave cylinder to automatically compensate for wear in the clutch. If, at any time, the clutch seems to be too high or starts to slip, check this clearance and adjust, if necessary.

WITH A RETURN SPRING BUILT IN:

After installing the pushrod as described above, adjust the length so that there is $^{1}/_{16}$" to $^{1}/_{8}$" clearance at the slave cylinder. You will have to push the lever arm forward against the internal springs to measure the clearance.
Note: *The rod will have to be adjusted every 3000 miles to maintain this clearance.*

Install the starter using two $^{3}/_{8}$" x 1-$^{1}/_{4}$" bolts.

Install the water manifold on the intake manifold. See page 70.

INSTALLATION INTO CHASSIS

The engine and transmission must be installed as a unit, sliding in from the rear of the car. Because of tight front clearances a direct approach from the top is impossible

Don't install the **engine mounts** onto the block until the engine is approximately in place.

WITH AN ADUSTABLE ENGINE HANGER AND CARBURETOR PLATE:

Attach one end to a carburetor plate and the other end to a sling around the transaxle. Lift the assembly so that it tilts down at the front slightly. Slide forward with the engine pan just above the bottom of the rear hoop.

WITH A SLING OR CHAIN

Hang the engine from the front of the left cylinder head and a loop around the right transmission axle flange so that the assembly tilts slightly forward. If you have Weber carburetors, use a straight spreader between each end. Keep the spreader distance above the carburetors to a minimum.

Remove the transmission support crossmember from between the rear damper brackets on the rear chassis hoop.

Raise the engine so that the oil pan will clear the bottom of the rear hoop. Either move the car backward or the engine forward until the engine mounts line up.

Loosely install the mounts on the block. The E.R.A. mounts are stamped L and R on the top.

Lower the engine until the mounts are slightly above the chassis pedestals. Install a bolt through each upper plate, and through the mount bushing. Engage the bolt into the threaded boss in the chassis while carefully lowering the engine into the chassis. Snug the bolts slightly, then install the bolts securing the upper plates. While lowering the engine into place, tighten the bolts on the block, then all the bolts on the chassis brackets.

Install the crossmember onto the rear hoop, using only the 2 upper bolts. Insert each $^{9}/_{16}$" x 4-$^{1}/_{2}$" bolt from the back of the car while holding the lighter washer against the transmission bracket. The heavy washer is used against the bushing at the front. Tighten the nut to 45 lb.ft.

REMOVING THE TRANSAXLE, LEAVING ENGINE IN PLACE

Possible, but difficult.

Remove rear body, anti-sway bar, slave cylinder bracket from the transaxle side plate.

Remove the distributor cap and starter..

The primary pipes of the exhaust system may be left in place, but it does make things pretty difficult. If you have any reason to remove the primaries, do it!

Remove the mufflers and transaxle bracket as a unit, if possible.

Remove the collectors from the primary pipes.

Support the engine and transaxle with an adustable engine sling. Remove the bolts securing the engine mounts to the engine block.

Remove the 4 upper bolts of the hoop crossmember and the bolts holding the transmission bracket to it. If the primary pipes are in place, raise the engine/transmission a couple of inches while tapping the crossmember up.

Remove the crossmember, one end at a time, snaking it out from under the primary pipes.

Tilt the engine/transaxle forward and support the engine at its rear edge with a small jack. Release the transaxle support gently. *The transaxle must be high enough to clear the subframe and its sheetmetal.*

Remove the bolts securing the bellhousing to the engine and slide the transmission to the rear.

Installation is done in the reverse order.

SPECIFICATIONS, ZF (TYPICAL)

GEAR RATIOS

Differential: 4.22:1

Speedo: 2.0:1

Gear	Ratios:
First	2.23:
Second	1.47:1
Third	1.04:1
Fourth	.846:1
Fifth	.705:1
Rev.	2.86:1

LUBRICATION

Capacity: Initial fill, 2.7 qts, 2.5 qts. after drain/ing in the car. Fill to the overflow level of the hole that was made in the right side of the case.

Recommended Lubrication: Mild EP Oil, SAE 80

Oil change intervals: After first 500 miles. Each 15,000 miles thereafter.

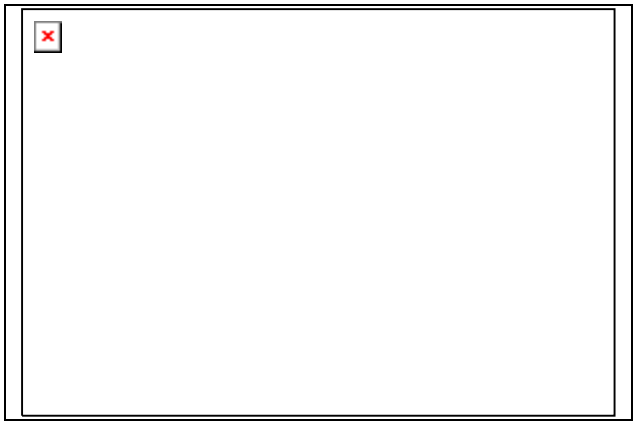
OVERFLOWS AND BREATHERS

For continuous high speed driving, an overflow system should be used. The top cover plug can be drilled for a fitting, and connected to a 1-2 quart capacity container. E.R.A. has an optional tank designed specifically for the GT or you can use a Canton breather tank (23-030). By putting a nipple on the filler hole in the side of the transmission and a nipple on the drain of the tank, you can automatically return oil back to the transaxle sump.

Also desirable is a system for venting the engine valve covers. Continuous high cornering loads will force oil out a normal breather. Special breathers are available.

OIL COOLER

ERA offers an oil cooler kit that mounts one or two coolers on either side of the transaxle. A full size oil filter can be used on the remote filter mount.



oilcool

FUEL AND COOLING SYSTEMS

FUEL SYSTEM

GENERAL DESCRIPTION:

Two independent tanks of approximately 8 gallons capacity each are in the chassis pontoons. Each impact resisting plastic tank is carried in an aluminum cradle and filled with anti-slosh/anti-flame propagating foam.

Separate fuel level sender in each tank control independant gages placed on the left and right end of the instrument cluster.

Filling is done through separate caps, one on each side of the front cowl. There is an air bleed at the top of each tank to compensate for expansion and allow for complete filling of the system. It is vented to the filler neck just below the filler cap. Each of the caps is also vented through a tube exiting the bottom of the pontoon.

For prolonged street driving, where there is low fuel flow in hot conditions, you might want to install a return fuel line from the carburetors (or fuel injection system) to the tank. There is a third hole in the top of each tank cover for the line. It is normally closed with a $^1/_8$"NPT plug.

When you have a fuel return line, a solenoid valve must be put in the circuit to direct the overflow back to the correct tank. It may be triggered by the same wire as one of the fuel pumps.

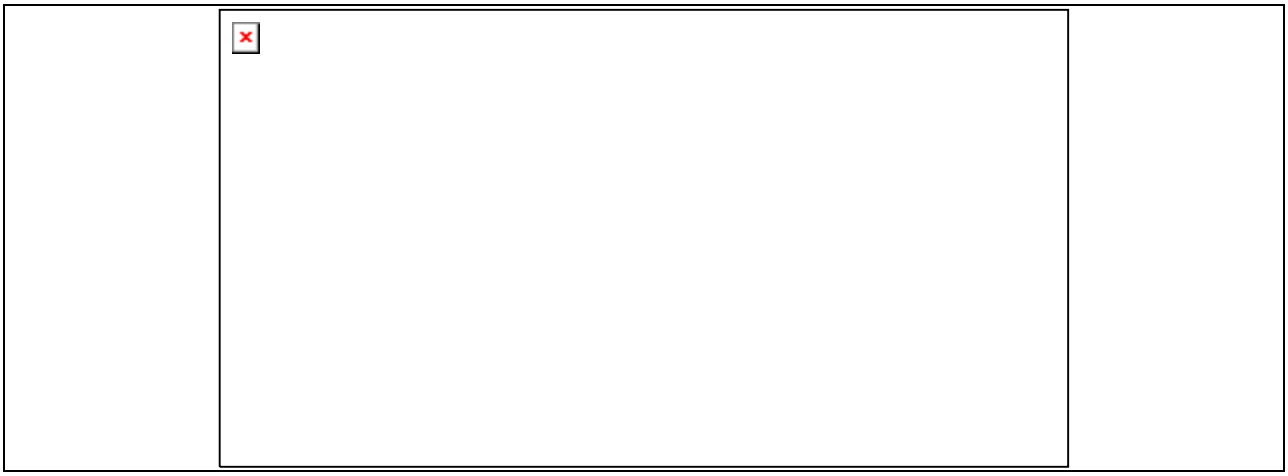
LEFT/RIGHT FUEL BALANCE

The level of the left and right tanks is dependent on their use: *There is no automatic balance.* For ideal suspension balance the driver can maintain the left to right weight in the tanks commensurate with the passenger payload. i.e. With only the driver aboard, empty the left tank first. With the driver and a passenger, empty the tanks alternately so that the left and right levels remain within about 4 gallons of each other.

FUEL FEED TO THE CARBURETOR(S)

USING 2 FUEL PUMPS

Each pump draws fuel from a fitting in the top access plate of a tank. The feed line runs along the top of each tank to the rear. Each pump is controlled by a separate switch on the dashboard. The fuel pumps are most appropriately mounted on the left and right upright section of the roll bar just above a fuel filter. A "T" fitting then joins the output of each fuel pump and directs the fuel to the carburetor. Some fuel pumps require a check valve between the "T" and each fuel pump so that fuel will not simply be pumped from one tank to another. Check valves are available from Earls or Russell.



FIREWALL

SINGLE PUMP DESIGN

The pump draws fuel from a crossover valve actuated by the power line from the uninstalled fuel pump. If you wish, you may use a manual crossover valve in place of the electric one, leaving the dashboard switch inoperative. The fuel pump and filter may be located in the rocker panel storage area on the car side opposite the battery. This setup has the advantage of being quieter and less heat sensitive than the exposed fuel pumps, although we recommend that the fuel crossover line be insulated.

INSULATION

For street use, insulate all the engine compartment fuel lines. This will prevent heat-soak induced vapor-lock.

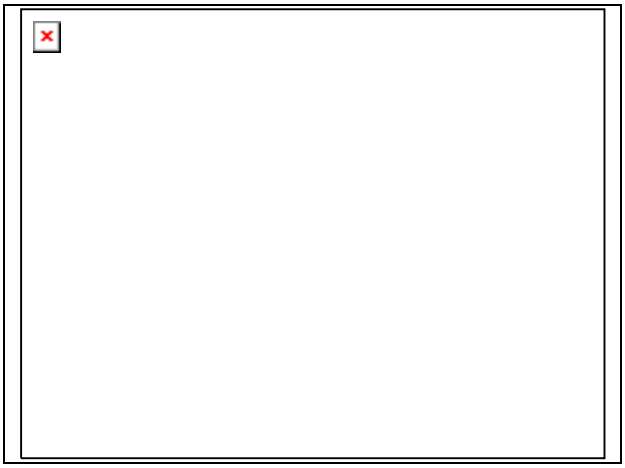
TANK INSTALLATION/REMOVAL:

For **fuel injection**, see the note on page **Error! Bookmark not defined.**.

As the kit is delivered, the fuel tanks are already installed in the chassis, secured in their aluminum cradles with high strength tape. The following procedure duplicates the factory installation process.

PREPARATION

Secure the plastic tank into the cradle with reinforced tape. Note that the front end plate of the cradle has two tapped holes.

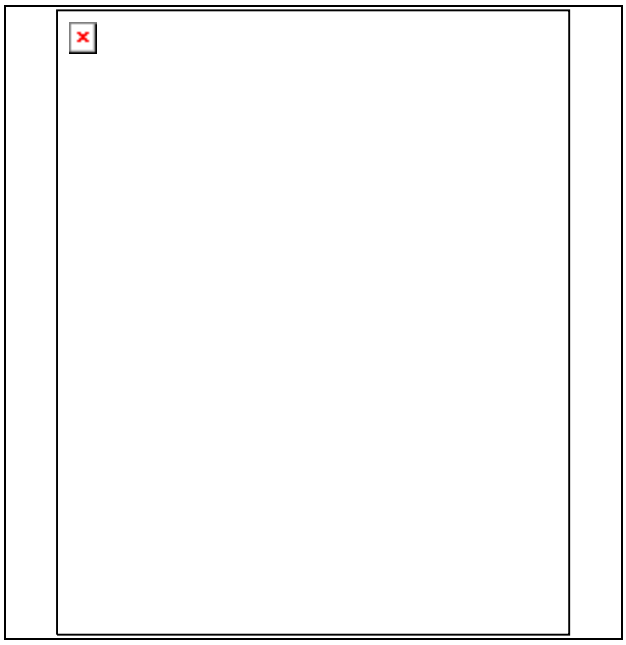


Secure the line(s) going to the fuel pump (and the return line if you are using one) along the crease of the inside corner of the fuel tank before you slide it into the pontoon. Also tape the vent line to the filler in the same way. Leave just enough length to connect to the fittings on the tank cover.

The fittings on the top of the tank cover must be installed or removed through the door sill access hole (at either side of the dash) after the tank is in place.

INSTALLATION

If the front suspension is in place, the upper and lower control arm and tie rod must be separated from the upright, and the upright swung out of the way. See page **Error! Bookmark not defined.**.



Slide the tank/cradle into the rocker, gently guiding it past the rocker ribs on the way. *If you are using a fuel return line the fitting must be installed on the tank cover before the tank is fully in.*

Remove the top access plate (A) in back of the front wheel and remove the access plug below. (When reinstalling, use a thin coat of silicone . Install the lower flange onto the tank with the rubber gasket supplied, using aviation gasket cement to coat both sides of the gasket and the bolt threads. You can pre-assemble the tank breather tube (C) onto the flange too. The fuel filler well drain tube (D) is pre-installed onto the filler flange.

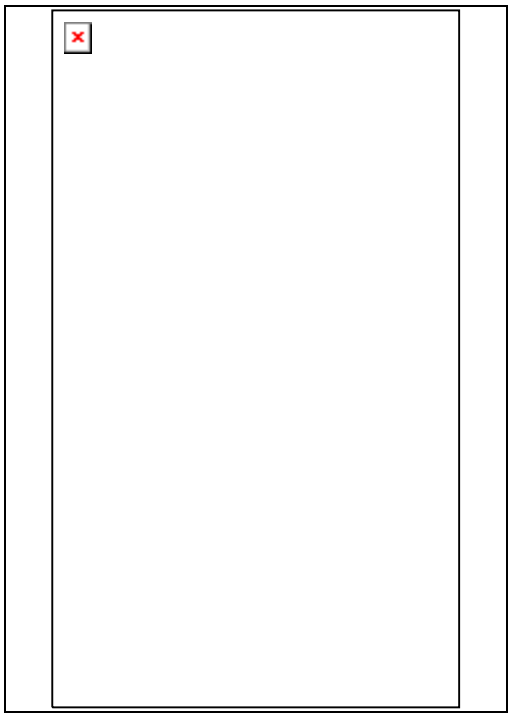
Assemble the intermediate connector assembly (E) (lower hose and aluminum connector tube) outside the car – and then install the assembly, leaving the lower clamp slightly loose.

Install the upper hose (F) onto the filler cap flange, with the lower clamp installed on the hose but not tight. Lower the filler flange/hose assembly onto the cowl, checking how well the upper and lower sections match up. Make any changes and tighten the lower clamps (B).

Install the upper assembly onto the intermediate pipe and tighten the upper clamps.

Removal Note: If you loosen the lower clamp (B), you can remove the entire filler as a unit. Then remove the filler flange and the fittings installed Loosen the lower hose clamp (B) and one of the upper clamps. Loosen the fuel filler cap from the cowl and raise the cap and filler pipe about an inch to clear the tank.

After feeding the drain tube through the grommet, install the access plate (A) with a small amount of silicone sealer.



Install the front access plate to the tank cradle (1/4-20 bolts) and use screws around the plate perimeter to hold the assembly firm in the chassis pontoon. Use the clamps provided to secure the drain tube as shown.

From the access hole in the battery box and the corresponding box in the other side of the chassis, install the fittings and fuel level sender into the top plate.

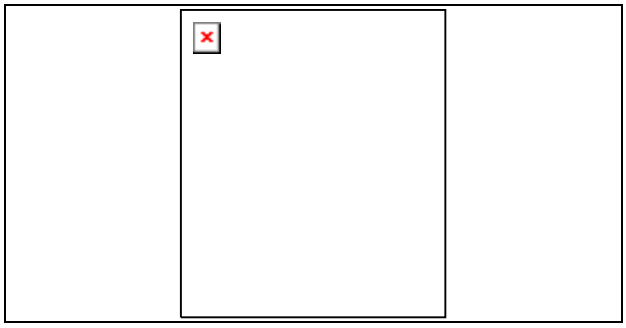
Both the filter and the pump must be run as low as possible. Use a 1 1/4" long hose from the filter to the pump. If you use the recommended pump (AC EP12S) you must cut off the mounting bracket as illustrated. The right pump can then be mounted on the same hole as the header tank. Run each fuel line on top of the transverse tube. Connect the front filler hose and the breather to the tank. Use clamps at all connections.

If at all possible, mount each fuel pump on rubber insulators to decrease the vibration transmitted to the chassis. This is especially important with reciprocating type pumps such as Stewart Warner.

FUEL FILLER

INSTALLATION

See the instructions and diagram on page 67. Insert the fuel filler fitting into the hole at the top of the cowl, with the intermediate hose and bottom hose clamped and tightened. Check that the bottom of the hose lines up properly with the fitting on the tank. Adjust if necessary. Tighten the screws securing the flange to the cowl.



From the access hole in the front of the sill (in back of the front wheel), connect the breather hose to the fitting on the top of the tank. Connect the large hose to the large tank fitting. Install and tighten clamps.

RECOMMENDED (DUAL)FUEL PUMP:

AC EP12S or equivalent (5.25" O.A.L. x 2.5" O.D.). Minimum flow should exceed 30 G.P.H. You may use both pumps simultaneously for very high (long term) fuel demand.

*Note: If you are using a fuel pump different from the one above, it must be equipped with a check valve preventing reverse flow, or you must add one in the line between the tank and the junction block to the carburetor(s). Otherwise, excess fuel will flow to the fuel tank on the opposite side of the car, possibly over-filling it.

*Carburetor(s) with fuel overflow plumbing must utilize an electrically operated fuel control valve that diverts the fuel to the same side as the fuel is being drawn from. See the fuel flow schematic for the proper hook-ups.

FUEL FILTER:

Recommendedfilter: Wix 33033 or equivalent (3.5" O.A.L. x 1.75" O.D.)

It's tight in there! Check that the rear body will fit over any variation from the above specifications.

ENGINE COOLING AND HEATER

PARTS INCLUDED IN KIT:

(2) Pipesfrom front to back, installed in chassis.
"S" tube from water pump to firewall.
"L" tube from firewall to header tank.
"T" tube, between intake manifold, header tank and "L" tube.
Radiator with fans and fan thermo-switch
Optional: Front intermediate pipes, from the radiator to the longitudinal pipes.

PARTS NEEDED

Clamps: No. 24 clamps (with Weber intake manifold and optional front tubes, 21 clamps)should be used on the 1 1/2" ID hose and No. 32 clamps(3) on the 2" ID hose.
A straight length of hose(Gates 24224) can be cut up for many of the short sections of 1 1/2" ID hose listed below.
Hose, Radiator to left(top) longitudinal tube: 1 1/2"ID x 18" long, flex type *
Hose, Radiator to right(bottom) longitudinal tube: 1 1/2"ID x 18" long, flex type *
* When using the optional aluminum front pipes, the above flex hoses are not needed. Instead, 4 hoses, each 1 1/2" ID x 3 1/2" (approx.) long from straight material are needed. See above for material.
Hose, longitudinal tube to "S" connector:
Snow White Pump: Gates 20837 - cut to specifications in diagram.
Ford Motorsport: Gates 20887 - cut to spec's.
Hose, bottom longitudinal tube to "L": 20594 Gates-cut to specifications. in diagram.
Hose, "S" connector to water pump: 2" ID x 2" long, straight
Hose, "L" connector to "T": 1 1/2" ID x 2 1/2" long
Hose, "T" to intake manifold: 1 1/2" ID x 10" long, (flex type)
Hose, "T" connector to header tank, 1 1/2" ID x 2"
Water pump, Snow White shortie
Expansion tank, with 12psi cap, capacity 2 quarts minimum, available from E.R.A.
Water manifold, for Weber intake manifold, or 90 degree gooseneck (see page 72) for 4 bbl. manifold. Weber water manifold also needs (2) 1 1/2" x 2" hose connectors.

WITH HEATER:

Hose, heater to left longitudinal tube: 5/8"ID
Hose, heater to right longitudinal tube: 5/8"ID

SEE THE COOLING SCHEMATIC ON THE FOLLOWING PAGE FOR THE GENERAL LAYOUT OF COMPONENTS.

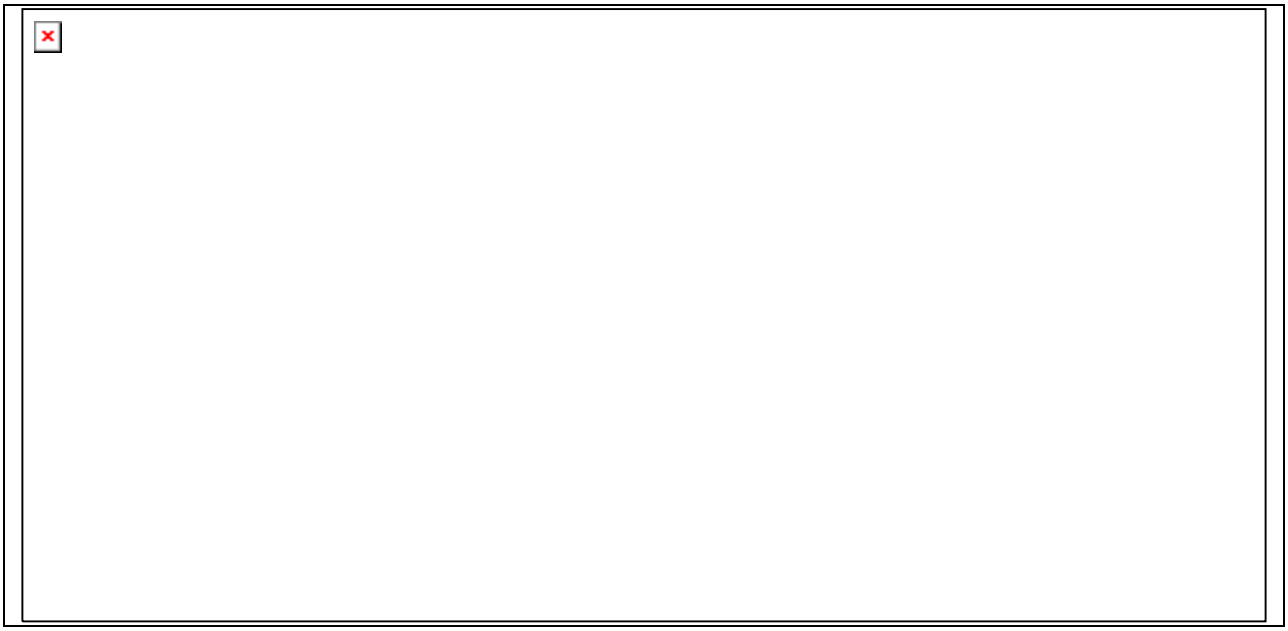
MODIFYING THE SNOW-WHITE WATER PUMP

Plug the heater outlet. This can be done by tapping the casting and installing a $^{1}/_{4}$"NTP pipe plug, or using a short length of hose and a plug. Use teflon or thread sealing compound on the threass.

If you are using a Weber carburetor manifold with dual water outlets, the upper $^{3}/_{4}$" of the water pump base plate must be removed to clear the water manifold. See the cooling schematic diagram for details.

When installing the water pump on the engine, the right-most bolt must be replaced with the $^{5}/_{16}$" x 4" one supplied with the AC system.

SETTING UP THE SYSTEM



There are many connections in this system, some of them relatively inaccessible, so it is very important that each one is leak free and secure. Do it right the first time! For backup, use a system lubricant and sealer, such as Bars Leak. Before you make any permanent connections, assemble all the pieces of the system for fit.

FREEZING POINTS FOR SOLUTIONS OF ETHYLENE GLYCOL

Make sure that the antifreeze you use is formulated for aluminum components - almost all are now. We recommend that the coolant mixture be changed each year to maintain anti-corrosion properties.

GLYCOL % BY VOLUME	°F	°C
12.5	25	-4
17	20	-7
25	10	-12
32.5	0	-18
38.5	-10	-23
44	-20	-29
49	-30	-34
52.5	-40	-40

For optimum cooling, it's best to use the smallest proportion of anti-freeze commensurate with your local temperatures. Pure water has the best heat transfer rate of all. We've had good results by adding **Red Line Water Wetter** too.

Follow the cooling system schematic for placement of individual components.

"S" TUBE:

This piece is shaped to go outside of the shifting rod (Snow White pump only- the Ford pump is on the other side). If the air conditioning compressor is installed on the engine, the tube will come very close to it, with the tube outlet pointing forward and to the inside about 45 degrees.

"L" TUBE:

Insert this into the hole on the lower right of the engine firewall with a grommet insulator. It should extend only about 3/4" inside, just enough to get the inside (20594 Gates) hose on. If you use the ERA header tank, the other end of the tube will fall about 1" below the connection on the header tank. Use a short length of hose (3" x 1 1/2" ID) to make the connection.

"T" CONNECTOR:

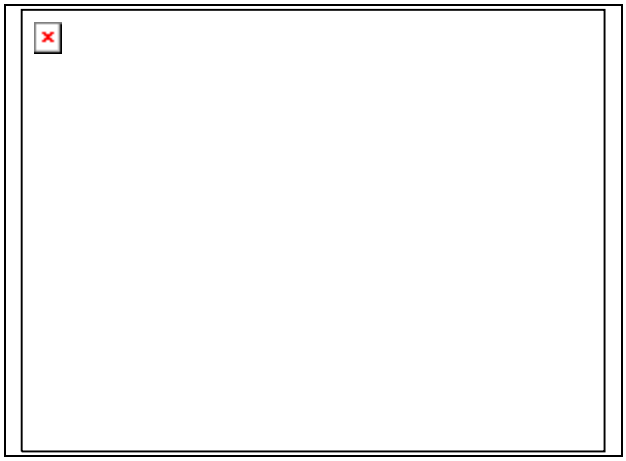
This tube is an intermediate between the header tank, "L" tube and the intake manifold hose. It should be installed so that the "L" tube is very close to the chassis panel.

Longitudinal tubes: The lower tube can be recognized by having a 45 degree bend with a boss on the front end, and a 90 degree bend on the back. Install the lower tube into the tunnel corridor first. Slide the tube in until there is only the angled section visible, and then rotate the tube so that the welded boss is up.

Install the upper tube the same way, rotating the boss up. The lower tube should point toward the right side of the radiator, the upper toward the left.

THERMOSTAT DETAILS

Use a thermostat of about 170 deg.F to maintain reasonable engine temperature. Running without some type of restriction in the system will result in high speed cavitation and the resulting overheating. Do follow the steps in the Snow White instructions to drill a 3/16" hole in the thermostat for air bleeding and smoother transition opening. Some thermostats already come through with a small bleed hole.



An **optional** intake manifold water outlet with a boss for the water temperature sender is available from us for use with the Weber intake manifold or a normal 4bbl manifold.

FILLING THE SYSTEM

Once you are sure that all the connections are tight and secure, check that the engine drain cock is closed. Open the bleeder on the radiator top. It may be helpful to raise the front(only) of the car, so that air will not be trapped in the longitudinal tubes.

Fill the header tank with antifreeze/water mixture and allow to drain down, refilling when necessary. This is a somewhat slow process, so have patience. Monitor the vent on the radiator, and when only liquid comes out, close the valve.

Find a water fitting on the engine intake manifold at the highest point. This can be either a plug or the temperature sender. Vacuum fittings look similar, so take care that the fitting is in the cooling system! When the header tank seems to maintain its liquid level, loosen the fitting to vent any remaining air from the system.

If you have a heater, loosen the upper hose and allow air to bleed from the heater. Reinstall the hose when only water is expelled.

Run the engine at fast idle for several minutes, monitoring the temperature. As the temperature rises, check that there is flow in the system by feeling the tubes and hoses in the front of the car. Until the thermostat opens, there will only be a small temperature rise, but it should be noticeable if you have drilled a $^1/_4$" hole bleed hole as recommended. Open the bleeder in the radiator to expel any remaining air.

Allow the system to rise to operating temperature. As the temperature continues to rise, pressure will rise also, so it is now a good time to shut down the engine and check the hose connections. Tighten as necessary.

Restart the engine and continue to run until an indicated 200 deg. F. If the fans have not automatically started at this time, use the manual fan switch to start the fans. The fan thermostat is set for about 165 deg.F, but because of the distance from the engine, the fans will not start until the engine temperature gage reads over 200 deg.F.

Remember- with 50/50 antifreeze and a 12 psi. cap, the system will not boil until 230+ deg. If the fan functions automatically in a satisfactory manner, do not use the manual override to keep the fans on constantly. It is a waste of alternator power and reduces the life of the fans. If you have air conditioning, the fans will come on whenever the compressor cycles.

The fan warning light on the dashboard allows you to monitor the fan functioning. If you have the air conditioning on, the fans may start before the water temperature becomes high, because of a pressure demand switch in the air conditioning system.

BODY

CHASSIS PAINTING:

If you have an early non-stainless steel chassis, painting and rust proofing are the most important operations you will do to ensure the long term integrity of the monocoque chassis. We recommend that the chassis be painted with 2 part polyurethane, semi-gloss black, or be powder coated. When painting, use an epoxy primer, or one that is recommended by the paint manufacturer as appropriate for the paint used.

PROCEDURE

Remove all attached items from the chassis.

Inspect the chassis for pin holes in the welds, and for spot weld flashing and sheet metal burrs. Fill all holes and grind off flashing and burrs.

Check all welded seams and lap joints. Use a body hammer or spoon to flatten puffed-out or separated flanges to achieve tight fitting seams and lap joints.

PREPARE AND PRIME THE CHASSIS

Thoroughly degrease the chassis and all attachments to be painted (rollbar, subframe, brackets, etc.). Use a metal conditioner to chemically etch the metal to ensure good primer adhesion, following the manufacturers instructions. Spray the primer carefully into all areas, including, as much as possible, the areas inside. *Epoxy and other primers and paints are toxic. Be sure to follow the necessary health and safety precautions indicated on the labels while using these materials.*

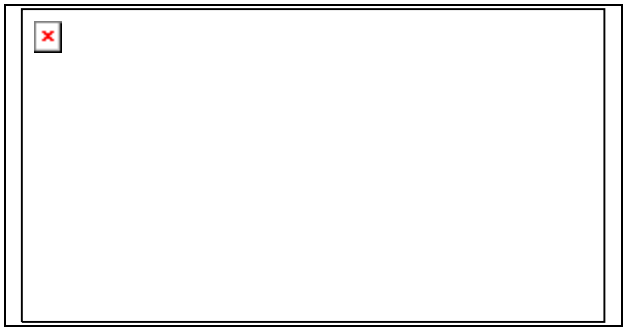
After the primer has cured, caulk all the welds and seams with a paintable autobody seam sealer. Use a squeegee, or heavy rubber gloves if applying caulk with your fingers. The gloves are used to avoid being cut by any burrs that may have been missed.

Paint the chassis, being careful to get into the hidden areas as much as possible.

Follow the same preparation procedures for all the chassis attachments that are to be painted the same color as the chassis; rollbar, door hinges, door latch striker mounting plates, rear body latch mounts, battery/storage bin covers, rear sub-frame, spare tire mount, etc.

RUST PROOFING & UNDERCOATING:

Rustproofing is not absolutely necessary with a stainless steel chassis, but can be applied as a sound deadener and security for very long-term structural integrity. No matter what, some sealant is desirable at the areas between the pinch welds.



G\undcoat

Rust proofing and undercoating are different processes, using dissimilar materials which are applied to unique areas of the chassis.
When rust proofing, a thin waxy material is applied to the hidden areas of the chassis, allowing it to seep into the narrow seams and joints formed at the junction of panels. Rust proofing material should be non-hardening to eliminate the possibility of cracking and subsequent moisture invasion. Access holes have been provided in the chassis (see the diagram on the next page) along with push-in plastic plugs to seal the areas afterward. **Undercoating**: The underside of the chassis may be coated with one of the rubberized undercoatings or gravel/chip guard materials available to prevent chipping of the paint, and also to act as a sound deadener. Depending upon your local weather conditions, it is recommended that you inspect your undercoating and rust proofing at regular intervals, and retouch if necessary.

ROLL BAR:

Fit the painted bar to the chassis *in it exactly the same position as it was when shipped*, replacing any shims to their former location. Use the flat bar washers under the nuts and lock washers (see figure below). Assemble the upper rear body latches and release levers to their mounting brackets and attach these units to the bar. Fit the latch release actuating rod onto the bar between the latches.

Use 1/8" (1/4" minimum grip range) pop rivets and bonding material to attach the roll bar to the roof section. Make special note of how the rear roof flange is riveted to the flange on the rollbar (also shown in the view of the rear bulkhead).

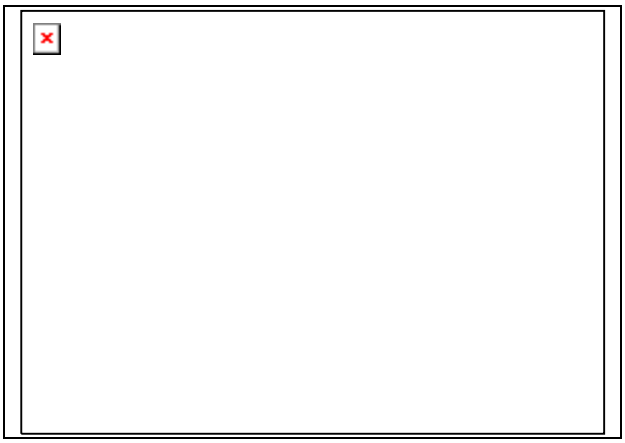
Install the ID plate and voltage regulator as shown. Note the location of the starter solenoid.

G\ROLLBAR

ROOF / BULKHEAD ASSEMBLY

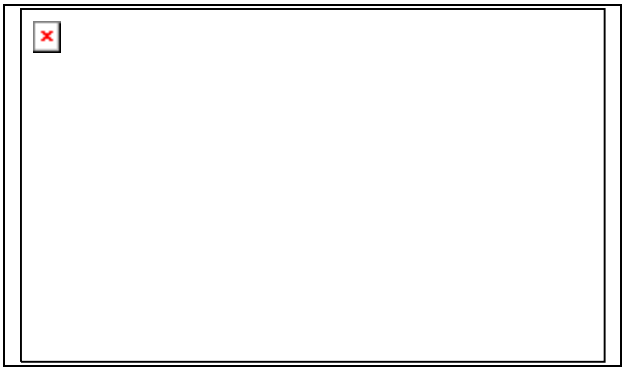
The roof assembly is bolted, riveted, and bonded to the chassis. This multiple attachment achieves a unitized type construction that adds some stiffness to the chassis tub.

The roof/door relationship should have been verified before initial disassembly and any adjustments and notes of shims, etc. made at that time.



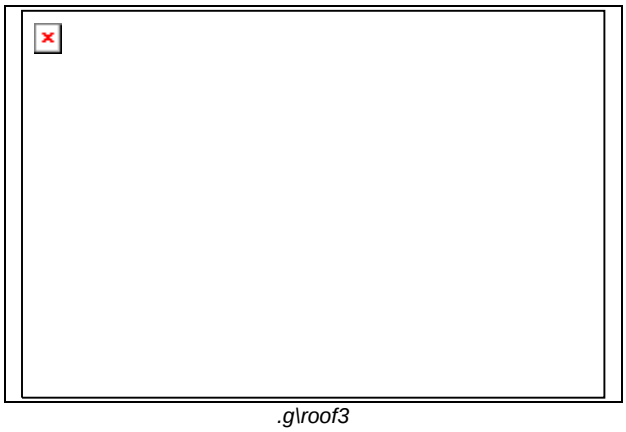
G\roof1

Use urethane windshield adhesive for bonding the roof to the cowl. It creates a stronger bond than silicone, and creates a more rigid structure.



G\roof2

On the cowl, use $^{3}/_{16}$" x $^{1}/_{2}$"L sealing rivets with aluminum body and steel mandrel. Countersink each one into the fiberglass and space them 2" to 3" apart. On the rear edge of the roof where it fastens to the roll bar, use $^{1}/_{8}$" x $^{1}/_{4}$"L aluminum dome head rivets with aluminum body and steel mandrel.



.g\roof3

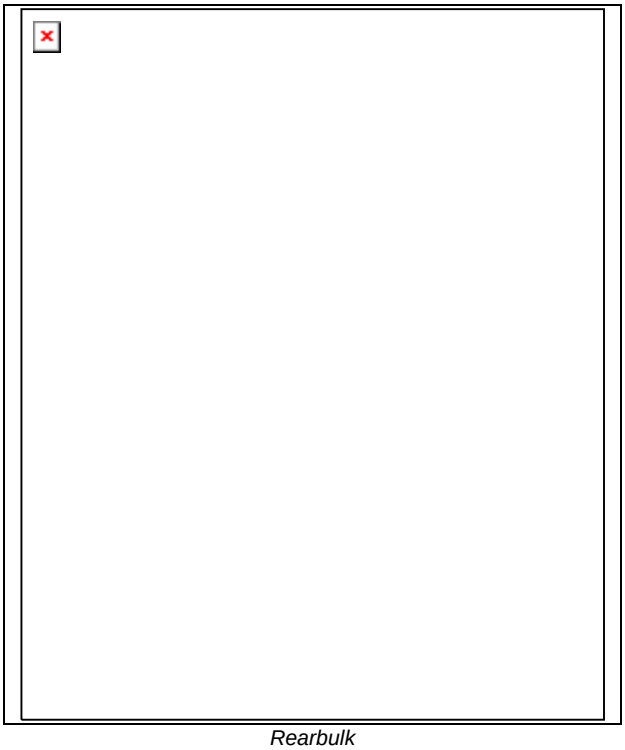
Replace the NACA duct opening screen at the base of the windshield after the car is painted

ENGINE BULKHEAD PANELS:

Rivet and bond all the bulkhead panels in place (except for the center access panel.) Use silicone or urethane sealant/caulking material between the panel and the rollbar. Locate the panels in place with the existing holes and screws.

Drill $^{9}/_{64}$" holes into the steel tube using the holes in the aluminum panel. Add the bonding agent and attach the panels in place with $^{1}/_{8}$" aluminum rivits, $^{1}/_{8}$" x $^{1}/_{4}$" grip range.

Don't attach the steel latch panels until the door latches are in place and adjusted.



Rearbulk

FRONT COMPARTMENT / WHEELHOUSE PANELS

See illustration on page 80. The aluminum panels enclosing the front compartment and wheel housings are normally fastened in place with screws when you received the kit. With the panels in place, drill through the holes in the aluminum into the subframe tubes with a $^{9}/_{64}$" bit. Use $^{1}/_{8}$" ($^{1}/_{4}$" grip range) aluminum countersunk rivets along the upper subframe tubes so that when the weather seals are put on later they will be flat against the panel. Apply silicone or similar sealant/adhesive caulking between the areas to be riveted together to prevent buzzing later on. Rivet the panels in place. Check that there are two drain holes in the floor panel under the radiator , and if you have air conditioning, the case drain hole has been drilled in the panel.

ATTACHMENTS

Use the illustrations below to install the following brackets: floor reinforcement, spare tire mount, horn bracket, and if ordered, the jack mounting bracket and A/C drier bracket.

Note: Install the water pipes through the chassis before the removable spare tire stop and radiator.

G\frntbay1

Frntbay2

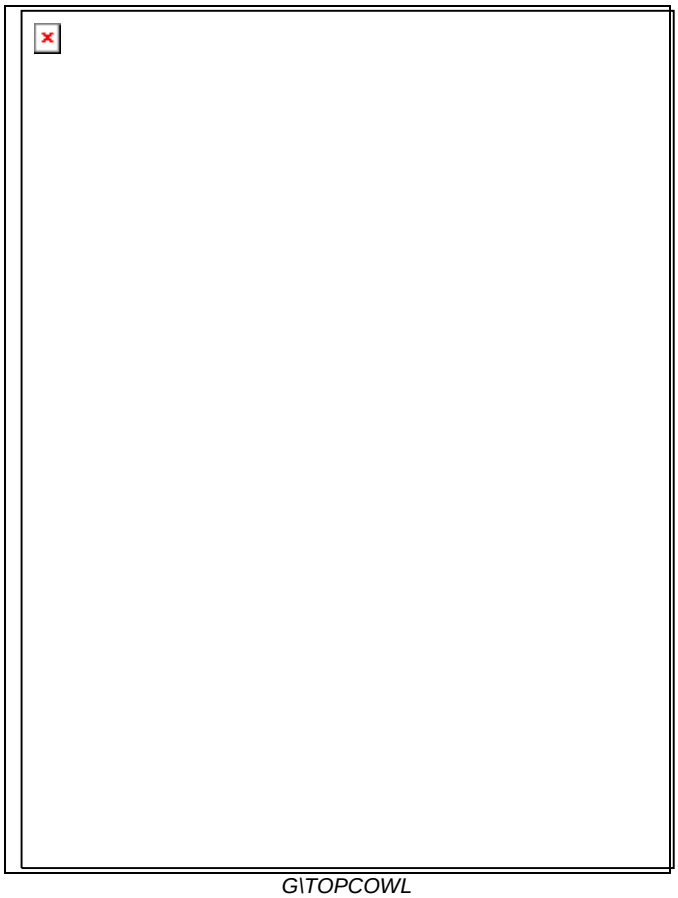
FRONT COMPARTMENT

WEATHERSTRIPPING

Install the aluminum weather-strip rails onto the cowl. These units were fitted at the factory and held in place by 2 or 3 screws for shipping. Replace them to their original locations and screw them in place with # 6 screws. Use a sealant caulk under the rails.

COWL TO FRONT BODY:

Fit the weather seals to the rails. Also install the small dams between the w/s rails and the pinch weld flange at the front of the cowl.



G\TOPCOWL

COWL TO NACA DUCT:

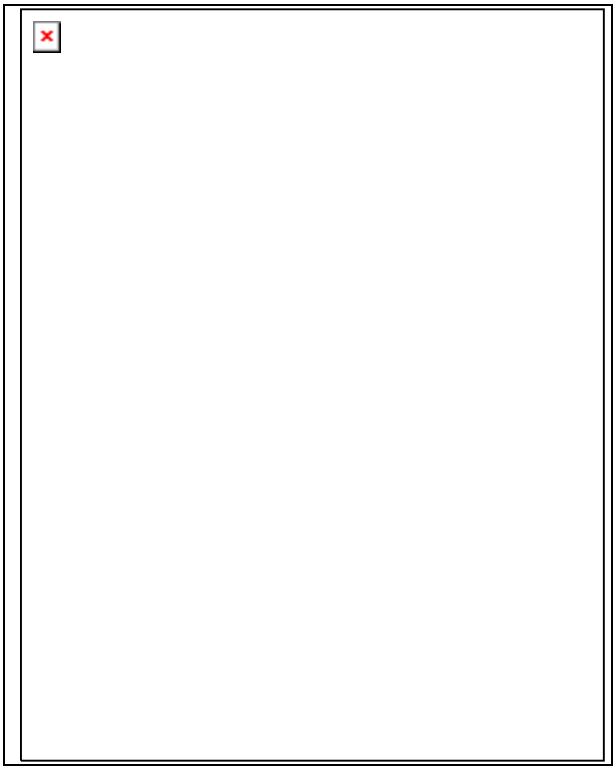
To minimize water seepage into the cowl area, seals of closed cell foam should be placed as shown.

FRONT BODY TO CHASSIS SEALS

There are 5 rail pieces and 2 weather seal sections per side. The front body must be adjusted, closed and latched before fitting the seals. Remove the front wheels and raise the car high enough to allow working in the wheel wells.

Install rail 2 with support bracket 3: Temporarily install one end of the style A weather seal to part 2. Hold #3 against the vertical chassis reinforcement and place #2 on top, fitting around the reinforcing channel (make sure #2 is facing in the right direction.) Slide both parts up until the sealing bulb makes contact with the flange on the inner panel crushing the bulb slightly. Clamp #3 in place on the reinforcing channel with vise grips. Mark the chassis where the bracket is positioned.

Temporarily fasten part #2 to #3 with two screws or Cleco fasteners. Remove the weather seal from #2 and fit onto rail #1 with its end flush with the end of the rail.



G\FSEALS

The upper end of #1 is attached to #2 as shown. Temporarily fit this part, fitting the weather seal back onto part # 2 at the same time. Again, slightly crush the rubber seal up against the flange. It's important that the seal <u>is not too tight</u>, especially at the front. The fit and alignment of the body maybe effected. Again use 2 or 3 screws to hold it in place.

Attach part #4 to the front of the cowl with its inner end overlapping part #3. Follow the same procedures in temporarily fitting this part.

Arrange rail #5 and weather seal "B" to seal the vertical space between the cowl and the inner face of the body panel: Attach the weather seal to the rail and place them in position, bending the rail to fit if necessary. Overlap the front upper portion of the rail #5 with rail #4 so that they can be attached to one another. If the rail is too long, trim it back even with rail #4.

To enable the two weather seals to fit together effectively the end of rail #5 must also have a portion removed. See the illustration. With the seal refitted to the rail, move the rail to the outside until the seal lightly contacts the body.

Drill holes and use sheet metal screws to hold rail #5 in place. Trim back weather seal B even with the longest end of the rail and remove 1/2" of the clip-on portion. Peel back the bulb from the clip-on portion and cut off the desired amount. See the illustration. Trim seal A similarly.

The clip-on portion of A must be shortened so it butts against the sealing bulb of B with the sealing bulb of "A" overlapping bulb B. After the pieces have been fit together, open and close the hood to make sure the weather seals have not disturbed its fit, and there is no binding. Re-adjust the seals if necessary.
Once the placement of all the rails have been determined, drill the balance of the rivet and/or screw holes. Remove the rails and deburr the holes afterward. Apply a light coat of caulking/sealant to the mating surfaces and fasten them in place.

Refit the seals to the rails. At the joining of seals A and B glue the bulb end of seal A to the top of seal B with urethane sealant/adhesive, contact cement or other compatible adhesive. Seal any remaining gaps between the two with the urethane or other caulking.

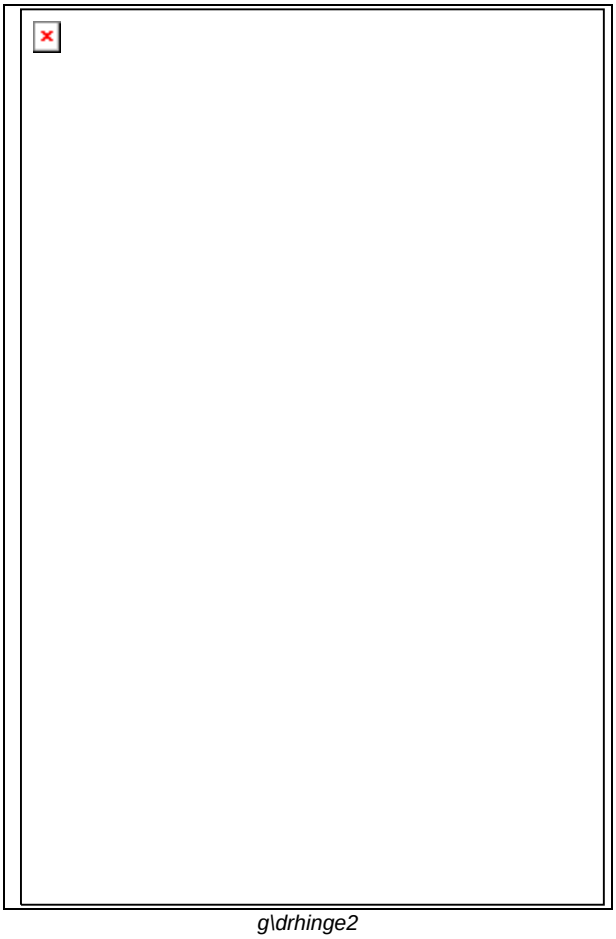
DOORS

INSTALLATION:

Bolt the mounting plate to the chassis with the shims that were installed on the chassis on delivery

g\drhinge1

With the hinge pivot rod fitted to the door and the ball pivots screwed all the way on to the pivot rod, lower the bottom hinge pivot of the door into the lower socket on the hinge.



g\drhinge2

Raise the door into place and screw the upper ball pivot up into the top receptacle on the hinge plate. Unscrew each upper and lower ball pivot equally, bottoming them out in their receptacles. Unscrew each ball pivot another half turn to preload the sockets and ighten the jam nuts against the pivots. This will prevent rattles and keep the door tight.

HEIGHT ADJUSTMENT:

Loosen both bevel nuts and turn equally to change the door height. Remember: There must be no play at any of the hinge points to achieve proper final fit.

DOOR HANDLES (OUTSIDE)

While the pictures here will help when reassembling the car, it can't hurt to take some pictures while taking your car apart for paint prep.

Remove the handles before painting the car. The illustration below shows the right door handle assembly. The left side is similar, except that the pivot pin goes in from the bottom.

HANDLE REMOVAL

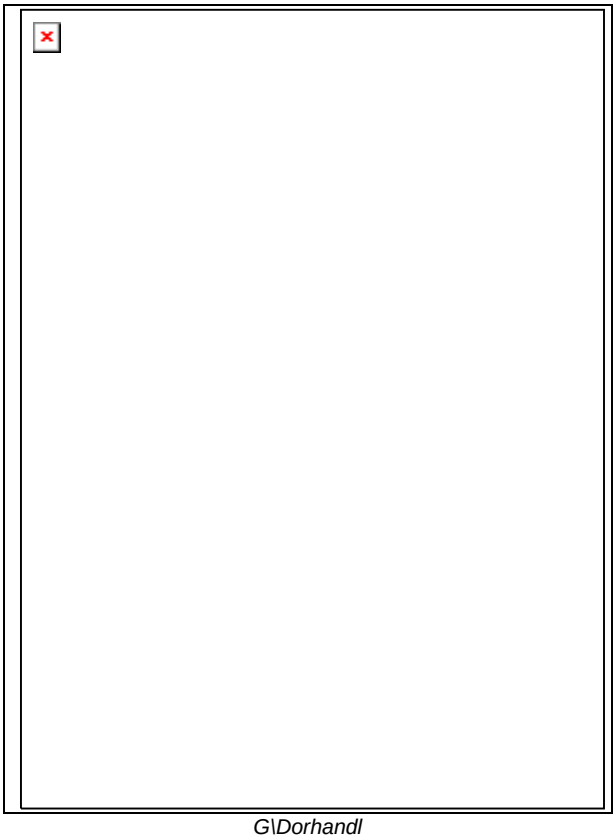
Remove the door trim panel. The standard access panel has the inside latch release attached to it. Remove the screws holding the panel in place and lift it away. Loosen the wire clamp holding the latch pull cable and pull the panel free. The release handle will fall free.

Remove the latch/latch plate combination from the end of the door.

Remove the spring from the notch in handle tang.

Remove the screw securing the cover plate and slide it to the end of the tang.

Remove the clevis pin and pull pin and spring out of the handle.

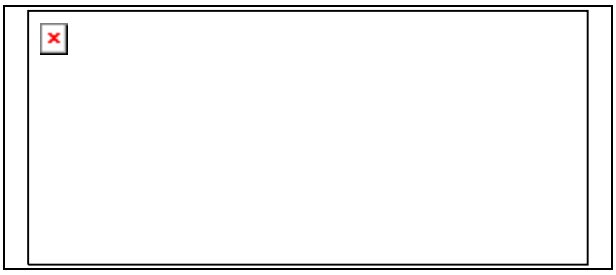


G\Dorhandl

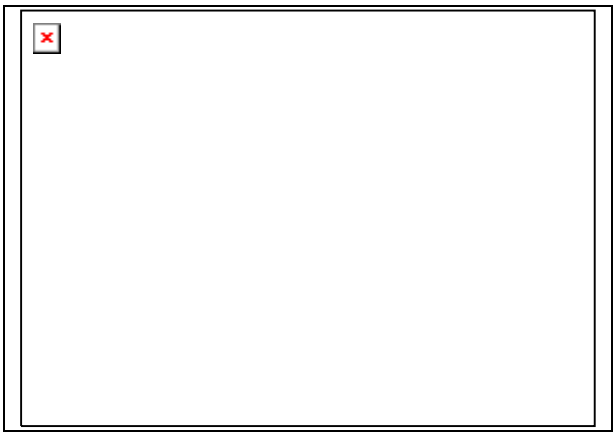
Reposition the handle so that it may be slipped out through the opening inside the door. Don't try to remove the handle through the outside opening.

The handle is refit in the reverse order.

LOCKS



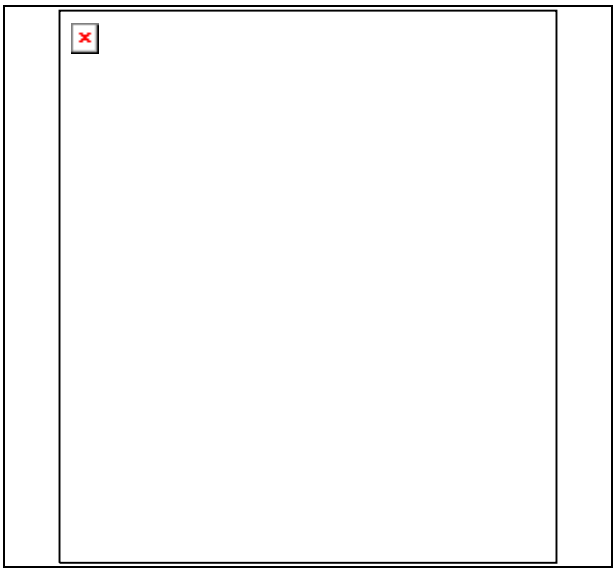
The door locks, if ordered with the kit, were fitted at the factory and it is a simple matter to re-install them as shown below.



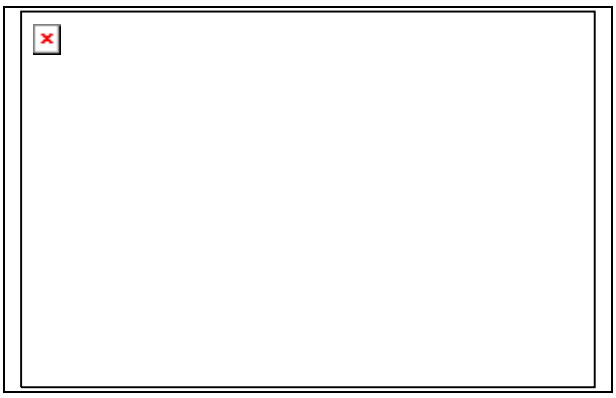
Install the lock bar carefully. There is a 90 degree swing to the lock barrel. The lock bar must be either horizontal, pointing to the rear of the car (unlocked) or vertical, pointing straight down over the back of the handle (locked).

DOOR LATCH

The latch assembly is cable actuated, either directly or through a lever mounted on the top of the door. The latch body is fastened to an intermediate aluminum latch plate that is attached to the end face of the door.



The **striker** is attached to the door jamb with an aluminum spacer block, (and possible shims) on the outside, and a movable nut plate on the backside of the door jam. See page 79.



Final installation of these pieces cannot be done until after the interior trim panels are in place.

INSTALLATION:

The actuator and cable must be attached before attaching the latch body to the latch plate.

Install the latch onto the latch plate.

Fit the body of the latch through the opening in the end of the door, making sure the plate on the actuator goes around the adjustable actuator rod on the outside door handle. Screw the latch plate to the door.

Move the latch fork to the closed position and pull open the outer door handle. The latch fork should snap to the open position. If it does not, adjust either the actuator rod by unscrewing it, or by bending the striker plate of the actuator until the latch releases freely.

Bolt the striker to the door jamb. Because there is added thickness from the door panel, some shims may not have to be used. Leave the screws loose enough that striker can be easily moved.

Reach through the window opening with one hand and grasp the striker while closing and latching the door with the other. Move the door in until it is lined up with the outer body.

While holding the striker in place, carefully unlatch the door and pull it open. Tighten the striker retaining screws.

While holding the door handle in the open position, close and open the door several times. Listen for metal to metal contact. (Not just the light sound of the latch fork contacting the striker pin as it moves to the closed position). The door should not be pulled up or down when it contacts the striker, but go straight into its closed position. With the door held in the closed position and the handle released, it should latch without having to move the door.

If door readjustment is necessary, repeat the process. Remember, the striker will not be perpendicular to the chassis when properly adjusted. The striker is oriented 90 degrees to the swing of the door.

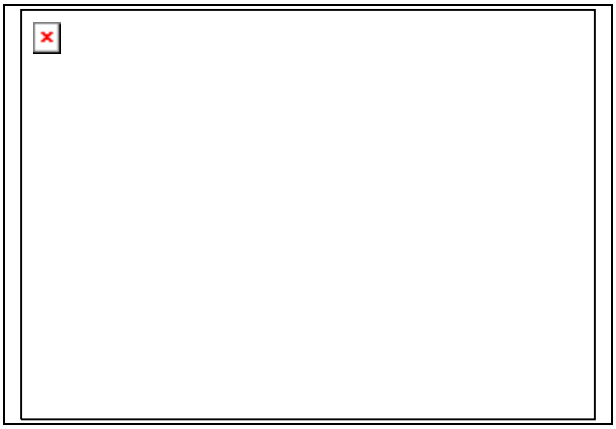
When adjusted properly and with the weather-stripping in place, the door should close with a solid "thunk" when given a moderate push. "Hard" noise indicates contact between fiberglass and fiberglass or fiberglass and metal. Soft resistance indicates that there is binding because of the weather-stripping.

INSIDE DOOR LATCH RELEASE

Three types of inside releases are available for the GT:

1. Standard pull cable release.

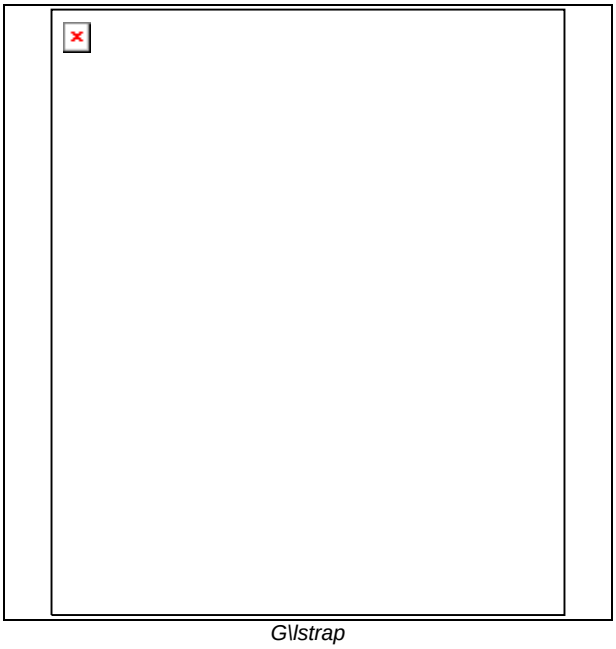
2. Window sill mounted release handle - road car option I.



3. Flush mounted release handle - road car option II. As noted earlier, all inside releases are connected to the latch by cable.

LIMIT STRAP

Install with 4 screws.



G\lstrap

WEATHER-STRIPPING:

The door weather seals were initially fitted at the factory and should have been checked for proper fit earlier upon disassembly (page 21). With final installation special concern should be given to the joint areas where the upper and lower seals meet. Use sealing caulk or putty to prevent water seepage between the sill flange and the door opening flanges where they do not butt together.

TOP BUTTONS

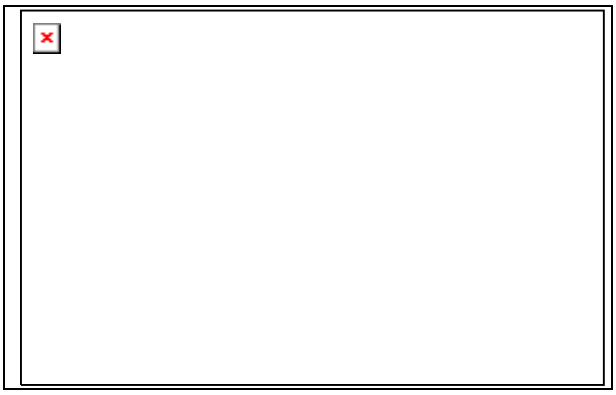
You may install plastic buttons to keep the top edge of the doors from raising at speed from air pressure. One or two plastic screws may be installed so that they contact the aero-fairing when the door is closed.

Mark the profile of the aero-fairing on the top of the door for reference.

Drill and tap the fiberglass for the plastic screws.

Trim the bottom of the screws flush with the inside body.

File the top of the screw to the proper height.

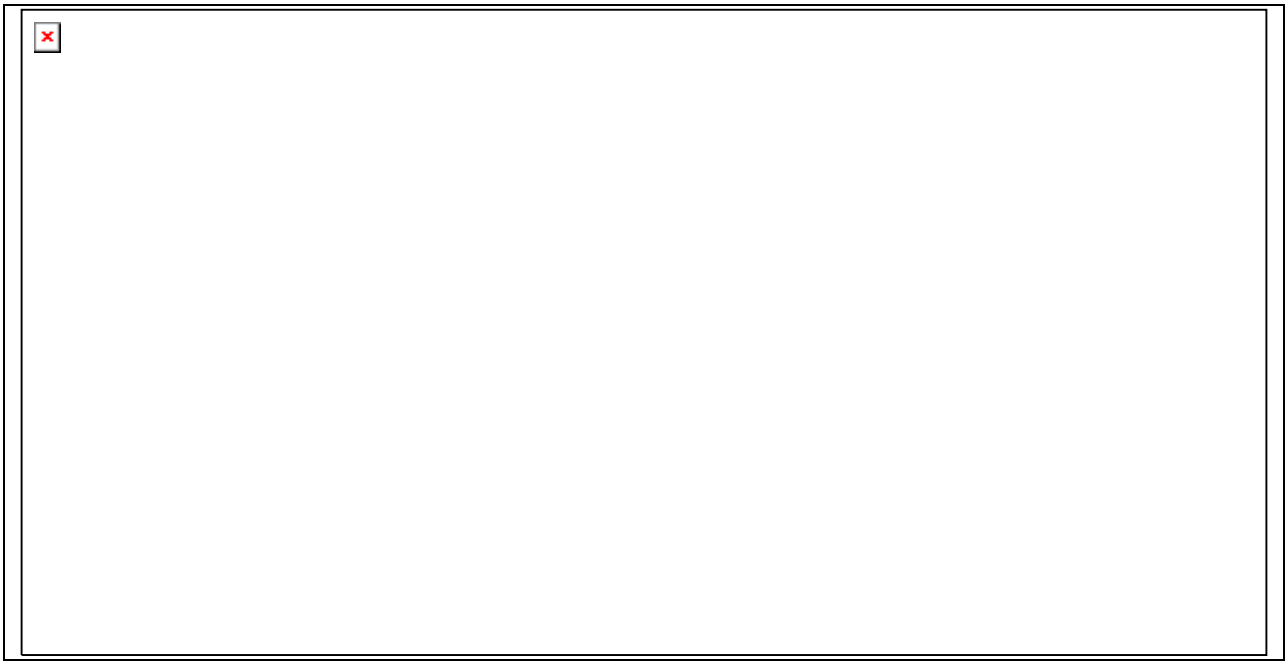


Doortop

REAR SUBFRAME:

The subframe serves as the rear body mounting frame and supports the lower rear suspension arm pick-ups. The splash panel is actually part of the structural strength of the system and must be securely fastened to the subframe with $^{1}/_{8}$" steel mandrel pop rivets.

Install the subframe with (2) $^{3}/_{8}$" x 5" bolts at the top and $^{1}/_{2}$" x 5" bolts at the bottom, noting the orientation of insertion shown below.

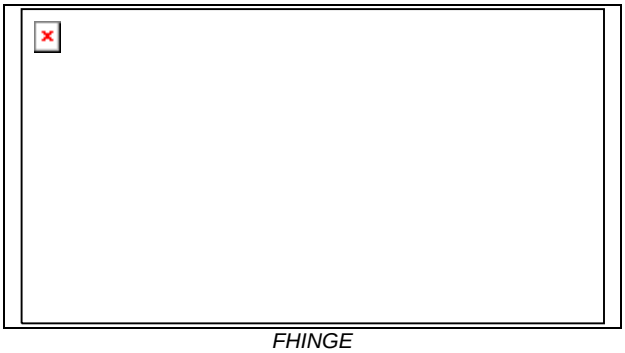


RSUBFRM

FRONT AND REAR BODY

INSTALLATION

The front and rear body sections are mounted to the chassis on aluminum mounting plates bolted to body flanges. These plates fit onto plastic bushings on studs on the front of the chassis subframe.



FHINGE

The front rub strips and alignment blocks must be in place on chassis before installing the body.

Thread the pivot bushings on the studs on the front and rear subframes as they were when the kit was delivered. If you have notes from the disassembly, duplicate the shim pack underneath the mounting plates.

Loosely bolt the mounting plates to body . The front plates have bolt-on locking blocks to hold them in place on the pivot bushings, the rear plates are open slots.

Tilt the front body forward about 30 degrees, (rear body 90 degrees back) and slip the pivot plates onto the chassis pivot bushings. Carefully lower the body to the closed position. The fiberglass rocker panel or an equivalent shim must be in place.

ALIGNMENT

If the mounting plates have not been moved since delivery, changing the alignment should not be necessary.

Use jack stands or blocks to support the body under the pivot points. Do not place jack stands etc. under flexible lower panels of front or rear body. See the diagram for areas to use. With the latch plates loose the body may easily be shifted vertically and front to rear. Change the body into position by raising and/or shimming each stand to achieve the proper line along the door and rocker panel for the front body, and the rear of the roof section and rocker panel for the rear body. Final adjustment should be done with the latches installed.

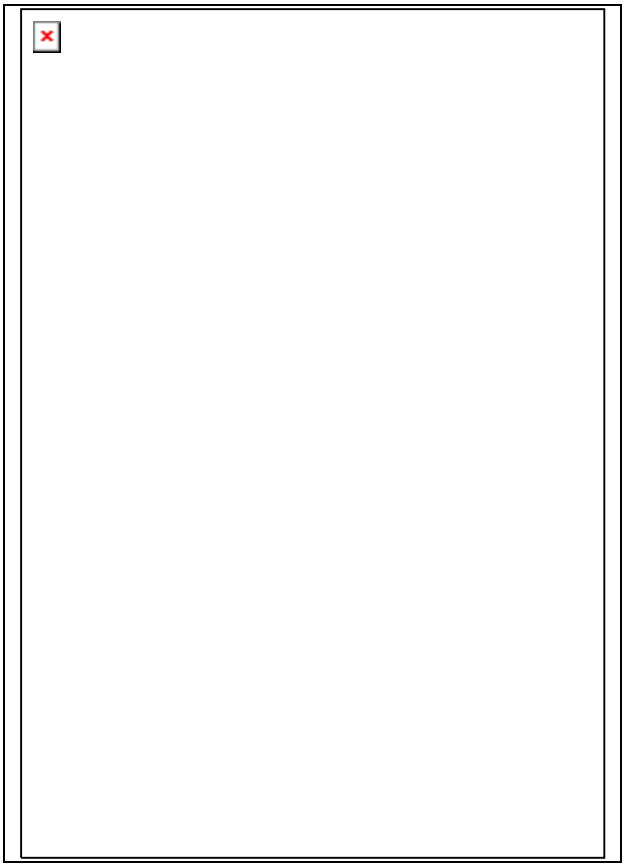
To adjust the body side-to-side alignment, thread the pivot bushings in or out. With body positioned in proper alignment carefully tighten bolts.

Bodaline

BODY LATCHING AND FASTENING:

The side latches were fit at the factory and should have been left in place when doing the bodywork. When refitting be sure to replace any original shims.

Adjust the latch by lengthening or shortening the adjustable pivot link. If the latch is too loose, but one turn of the adjuster makes releasing the latch too hard, add a shim under the base plate to halve the difference.

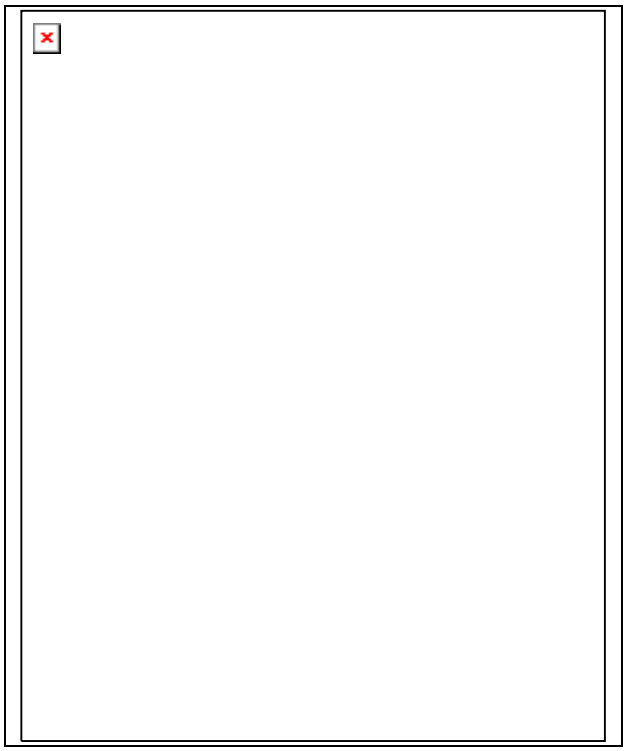


BLATCH

FRONT TILT SECTION

The front body is held in place by both Dzus fasteners and cast side body latches.

The Dzus fasteners are located at the factory, but you must drill the rivet holes (with $^{9}/_{64}$" bit) before the body is painted. Final riveting must wait until after the body is painted. The Dzus plates should be aligned as shown. Note that the cowl Dzus's are slightly longer than the hood's.



HOOD2

Note: when attaching the plates to the body, use only aluminum rivets with aluminum mandrels. Steel rivets and mandrels may cause stress cracks in the paint or fiberglass. The rivets should be long enough to allow to use of back-up washers.

HOOD PANEL

The hood panel (front compartment access panel) is held in place by Dzus fasteners. Because there is a gap between the outer surface of the hood panel and the body when they are latched together, the spring tension of the Dzus tends to pull down the panel. We have provided closed-cell foam cushions to counteract this. Glue the cushions to the underside of the hood panel as shown on page 89 after the body has been painted.

REAR BODY LATCHING (TOP)

The rear body is held down with lever latches on either side of the engine compartment and pin latches (released from inside the car) at the top front. Details of the side latches are covered in the Front Body section.

Access to the top bolt securing the rear latches is through the plugged hole on the inside of the rear body inner panel.

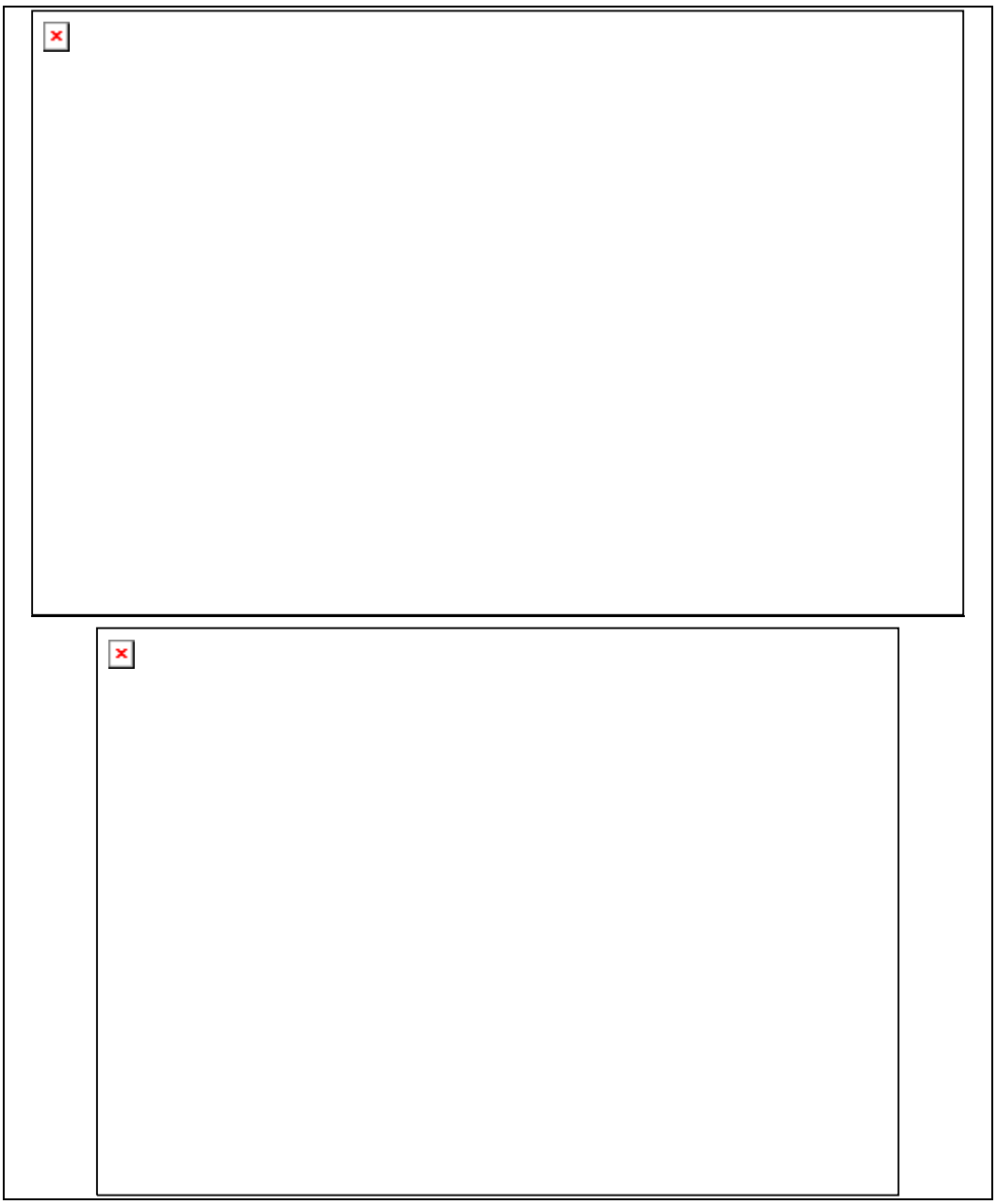
The top latch, latch mount and release mechanism is factory mounted to the rollbar. See the diagrams on page 91 and 91. To adjust the striker pins: Leave the bolts loose enough so that the pins can be moved if light force is applied.

Lower the body and carefully push the body down to its closed position.

Before closing the rear body, make sure the latch releases are working properly. If the rear body is closed and the windows are installed, the engine compartment is the only way to access the latches.

The latch pins will self-align while going into their receptacles. Release the latches from inside the car and carefully raise the body without disturbing the pin positions. Tighten the pin bracket bolts.

Relatch to recheck adjustment. If the body fails to latch or latches too high, it may be adjusted by loosening the jam nut (metric) and threading the pin in or out to achieve the desired height. When the body is properly adjusted it will latch freely if dropped 6 to 8 inches. It should also pop-up freely when the release lever is pulled.



Release

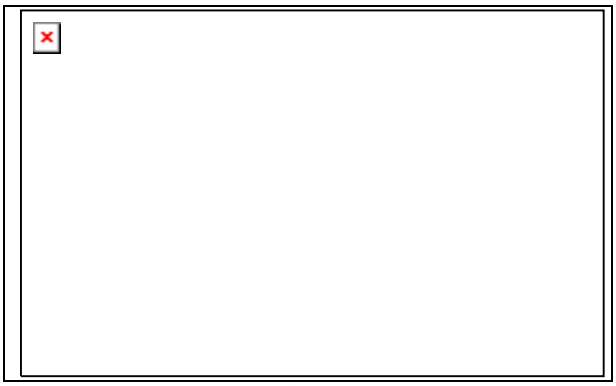
FRONT BODY ATTACHMENTS:

RADIATOR STONE GUARD;

Paint the screen and frame semi-gloss black.

Fit the screen to the frame by tightly wrapping the edges around the frame and secure with black plastic tie-wraps through the holes provided.

Attach to the backside of the body radiator opening with 4 screws as shown.



FGRILL

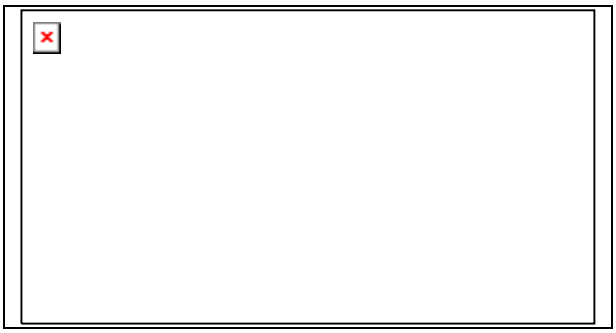
MIRRORS

If fitted to original cars, mirrors were located anywhere from the front of the doors to mid-way to the front on the fenders of the competition cars. Road cars had mirrors fitted to the rear of the fenders by the doors. If you are going to drive on the street, the mirrors should be placed where they can give the best view to the rear.

REAR BODY ATTACHMENTS

DRILLING ACRYLIC

The headlight and driving light covers, side windows and rear window are made from coated acrylic plastic (Plexiglas™). This material is quite brittle and requires special care when you drill it. Drills are available from plastic supply houses or one can be modified as shown below.



REAR WINDOW

The rear window is supplied with a plastic covering for protection. Leave the covering on until after trimming and drilling, and the window is ready to install.

The acrylic may require trimming for an exact fit. Leave $^{1}/_{16}$" minimum clearance between the window edge and the body contour for thermal expansion.

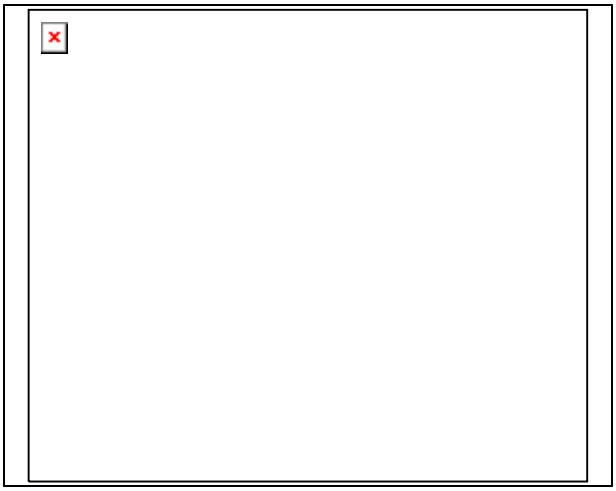
We paint a $^{7}/_{8}$" strip of flat black on the perifery of the acrylic (underside) to hide the edge where it overlaps the body. Tape the window in place and apply masking tape around the perifery to mark on. Use a $^{1}/_{16}$" – $^{3}/_{32}$" drill to pilot all of the holes through the window and into the body. The dimensions shown below are approximate and may have to be adjusted slightly.

LOUVERED VENT PANELS

The rear body vent panels are factory located by two screws. Use each panel as a template to carefully drill the rest of the holes with a $^{7}/_{64}$"bit. Do not over-torque the screws. If they are tight going in, wiggle the drill a bit when redrilling.

LICENSE PLATE BRACKET

The bracket mounts to the lower panel on the body and is held in place by 4 screws. Connect the license plate lights wiring to the rear harness through the grommet hole.



G\license

ROCKER PANELS:

Fasten the fiberglass to the rocker panels with the supplied screws. A weather seal may be added to the front rocker access panels and at the rear of the rocker panel.if desired.

The subframe is directly connected to the installation of the rear cross member and the lower rear control arms. Neither can be permanently bolted in place without the subframe.

LIGHTS

INSTALLATION:

All the lights are pre-fit. Fit them to the body using your notes from section A.

WIRING:

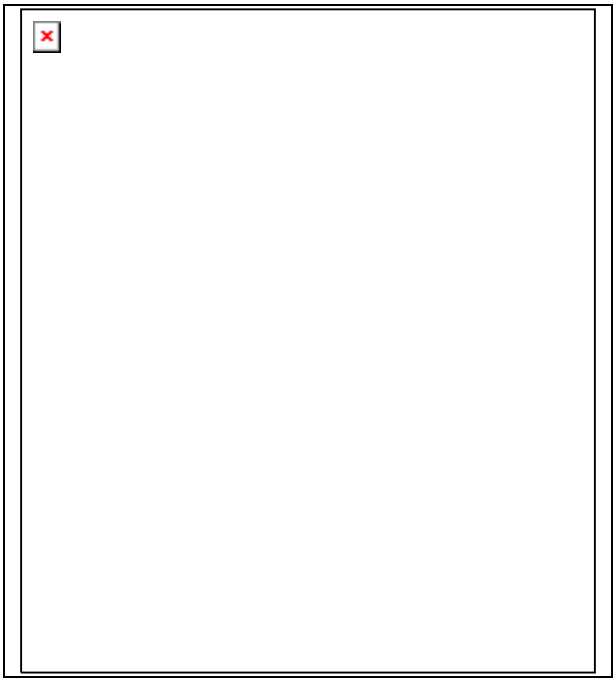
Connections are detailed in the wiring connections supplement.

PAINTING DETAILS:

After carefull fitting and matching the panel contours with the body sections mounted (also headlight covers, page 95), all panels (front and rear body sections, doors) should be removed for final preparation and painting of the edges. Metallic colors should be painted with all the panels in place to avoid metallic mis-matches.

STRIPES:

See below for the original competition stripe dimensions.



G\stripe

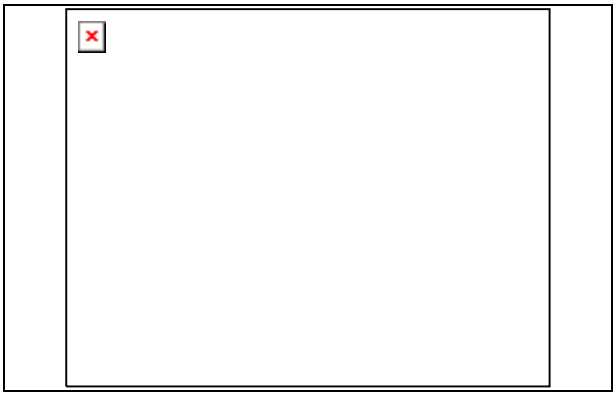
GLAZING

You may wish to have a glass specialist install the windshield and rear window. You can do it at home, but it is delicate operation. The following directions apply to home or professional installation.

WINDSHIELD:

When bonded in place the windshield is a stress bearing part of the roof. W*hen the car is driven, the glass will probably crack if it comes in direct contact with the body anywhere*. Be very careful when centering the glass.

Glue the rubber windshield molding in place on the edge of the windshield.



G\fwindow2

Use rubber spacer blocks $^{1}/_{8}$" high and no wider than the width of the body flange to hold the glass away from the body and smaller ones placed around the perifery of the glass to center the windshield in the opening. A rubber squeegee available from auto body supply stores can be cut up to make spacer blocks.

G\fwindow

Once the windshield is laid in place, trace the inside body edge onto the glass with a grease pencil.

Remove the glass and spacers, and lay flat, convex side up.

Sand the body flange with 80 grit paper.

Mask the body about ¼" from the edge to prevent the sealant from adhering to the visible paint.

Lay a bead of urethane auto glass sealant along the edge of the glass, using the pencil marks to demarcate the inside edge. Lay another bead on corresponding the body flange.

With a friend, carefully lay the windshield in place. Press down so that the molding is level and even all around. It may be helpful to use masking tape to hold the windshield in place while it cures. Excess urethane can be cleaned up while still uncured with kerosene or special cleaners sold by auto glass supply stores.

CAUTION: This operation should be completed before the car is painted. The urethane adhesive may stain lighter colored finishes.

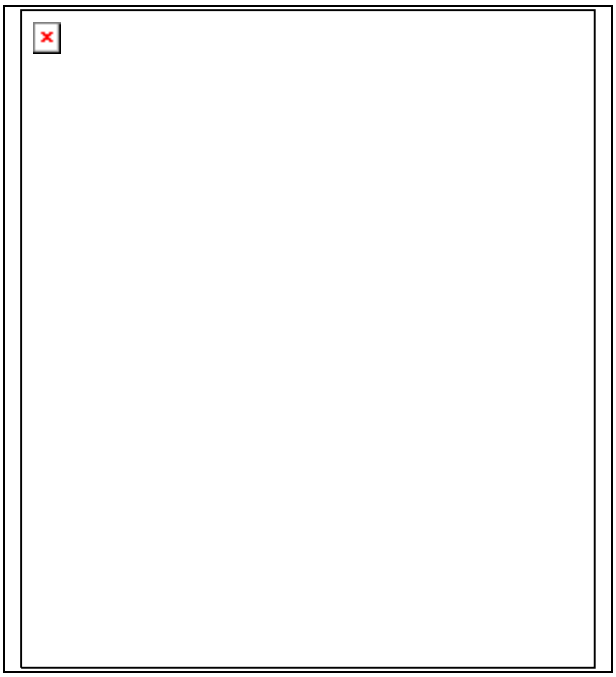
Urethane windshield sealant comes in a cartridge for use in a caulking gun. A **special primer** is sometimes required. Inquire when purchasing. Be sure to follow manufacturers instructions. Cure time is usually between 6 to 24 hours.

COCKPIT (INSIDE) REAR WINDOW

Starting at the top middle, fit the rubber gasket to the opening in the bulkhead panel. The side of the gasket with the locking flap goes to the rear (engine side).

Carefully work the gasket onto the edge of the bulkhead panel. Push it tightly into the corners. **Don't** stretch the gasket during installation - the gasket will shrink slightly with age. Instead, push the gasket back onto itself as you fit it.

When the gasket has been almost completely installed, trim the end leaving about ½" more than you think necessary. Refit the gasket, again forcing it back on itself, trying to get the ends to butt one another. Trim if necessary.

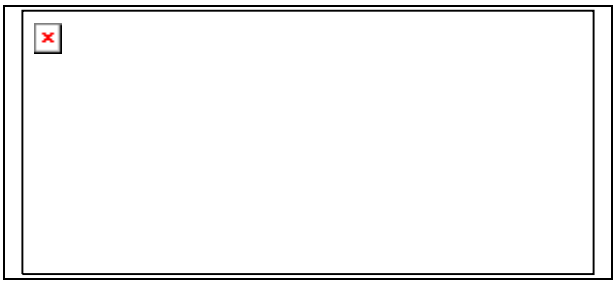


cockpitwind

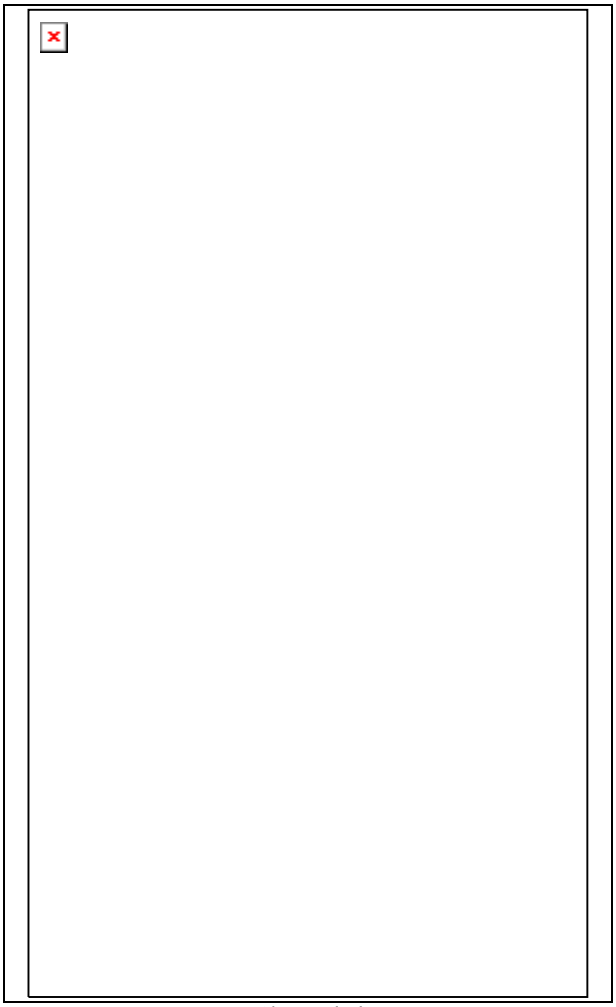
Lubricate the glass channel using waterless hand cleaner. Fit the bottom of the window into the rubber using a windshield setting tool ("bone"). Work the lip of the gasket over the glass from the bottom, up the sides and across the top to the middle. Work the locking flap into its channel to secure the window in place.

SIDE WINDOWS

Each door window is made from a special hard surfaced acrylic material and is held in place by 21 stainless steel screws.



The main window, along with the smaller vent windows, are not pre-drilled, and have protective plastic wrapping on them for shipping protection. The windows may need final trimming and beveling for a perfect fit. Leave at least $^{1}/_{16}$" clearance around the perifery of the acrylic for thermal expansion.



G\ventwind

See the Body Finishing supplement for hints in the working of Plexiglas.

Refer to the illustrations when assembling the hinges and adjusting bracket. Note the small O-ring which acts as a rattle eliminator. A little grease makes assembly of the pieces easier.

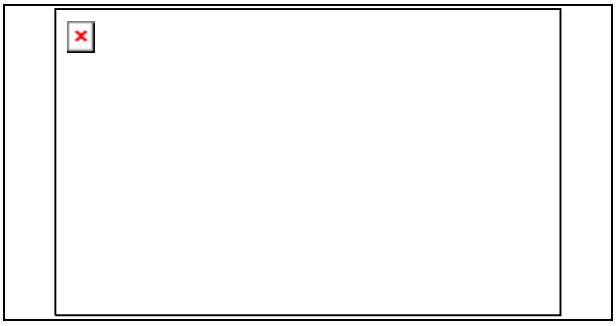
You may wish to paint the outer $^{3}/_{4}$" of the window border with semi-gloss black paint before final installation.

HEADLIGHT COVERS/REAR WINDOW

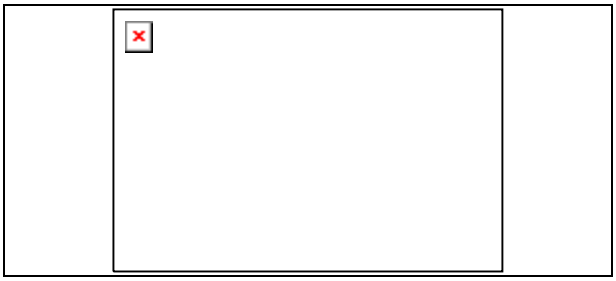
Leave the protective covering on the acrylic until final assembly.

HEADLIGHT COVERS

Trial fit the covers onto the front body before the body is painted. Some sanding of the mounting surfaces of the body may be necessary for the cover to properly follow the outer body contour.



The covers are held in place by stainless steel screws. The covers are not pre-drilled and have the protective plastic wrap on them. The covers may need final trimming for a perfect fit.



Cover screw locations have been pre-marked on the body. After trimming the covers, hold them in position on the body with tape. Drill through the cover into the body marks underneath. Size the bit for the screws to be threaded into the body. Once the holes in the body have been drilled, enlarge the holes in the cover at least 50% larger than the screws for expansion tolerance.

When attaching the covers do not over tighten the screws.

IF YOU USE RUBBER GASKETS: The added thickness of the gasket will effect the trimming size and the location of the holes. Drill the holes in the cover first. Use the pattern to transfer the holes to the gasket. Finally, drill through the covers (with gasket in place) into the body. Remove the covers and enlarge the holes for the screws as described above.

Alternately, you can black out the edge of the cover by painting with flat black paint, rather than using gaskets.

REAR WINDOW

Use similar techniques to drill and secure the window.

WIPER DRIVE POST

Also see page 33 and 34 for wiper drive details.

Assembly the drive through the cowl after modifying the bezel as indicated on page 33. Note that the motor is always mounted on the passenger's side of the car: On the right on LHD cars, on the left on RHD cars.

Wiper

INTERIOR/VENTILATION

WIRING THE DASH AND FRONT FIREWALL

See the wiring supplement for details.

SOUND DEADENING AND HEAT INSULATION:

Before the carpets are installed, you may want to place sound deadening material on the floor and the footbox sides. Material is available from most body shop supply stores. Apply the pieces on the flat areas of the floor, alonge the sides of the footboxes and rocker panels and on the diagonal panel behind the seats.

Since the tunnel houses the water hoses, it is strongly recommended that the tunnel be insulated as much as possible. Foil/adhesive backed foam such as used for hot water heaters, works well in this application. If you cannot find it at your local hardware store, it is available from E.R.A. in bulk. If you have air conditioning, wrap the lines along the tunnel with the same material, using tie-wraps at regular intervals for security.

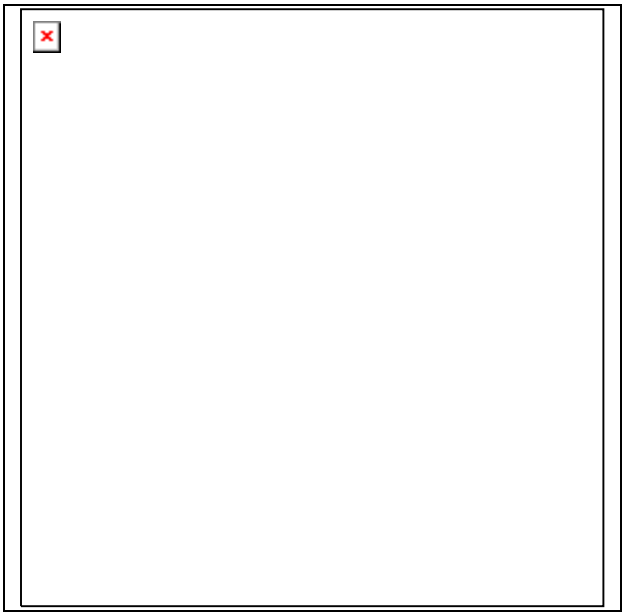
You may also pack the bulkhead behind the seats with simple foil-backed fiberglass insulation. Don't allow the insulation to interfere with the LHD shift linkage, however. Close off the holes in the lower bulkhead behind the seats with thin film plastic held in place with contact cement. Leave only a small slot for the shift linkage if possible.

THROTTLE LINKAGE AND CABLE:

OVERVIEW

LEFT HAND DRIVE

The throttle pedal acts on a bellcrank mounted on the forward end of the tunnel which, in turn, pulls the cable that attaches on to the carburetor(s). The bellcrank translates the linear motion of the pedal into a progressive action at the carburetor so that low speed control is enhanced. The progressivity may be changed by altering the various linkage relationships.



INSTALLATION:

Slide the small housing end of the throttle cable into the tube on the drivers side of the tunnel from the rear. The other end of the cable goes through the oval hole above the tunnel and toward the left side of the car.

Pass the cable rearward, through the grommet on the left side of the firewall. See page . The wire for the fuel pump is fed through the same hole.

Install the small rod end and jam nut on the cable end, and slide over the $^{3}/_{16}$" stud on the bellcrank. Secure with the lock nut provided.

When assembling the bellcrank into the bushing on the tunnel, use light oil, not grease.

There are 3 threaded rods provided in the kit. Which one you use will depend on the forward and aft location of the brake box. Determine where you want the brake box first, and then find the most appropriate rod length.

The stop on the bell crank should rest on the tunnel. The welded nut on the throttle pedal is threaded 1/4"-20. Use the hex cap screw 1" long to go through the 1/4" rod end and into this nut.

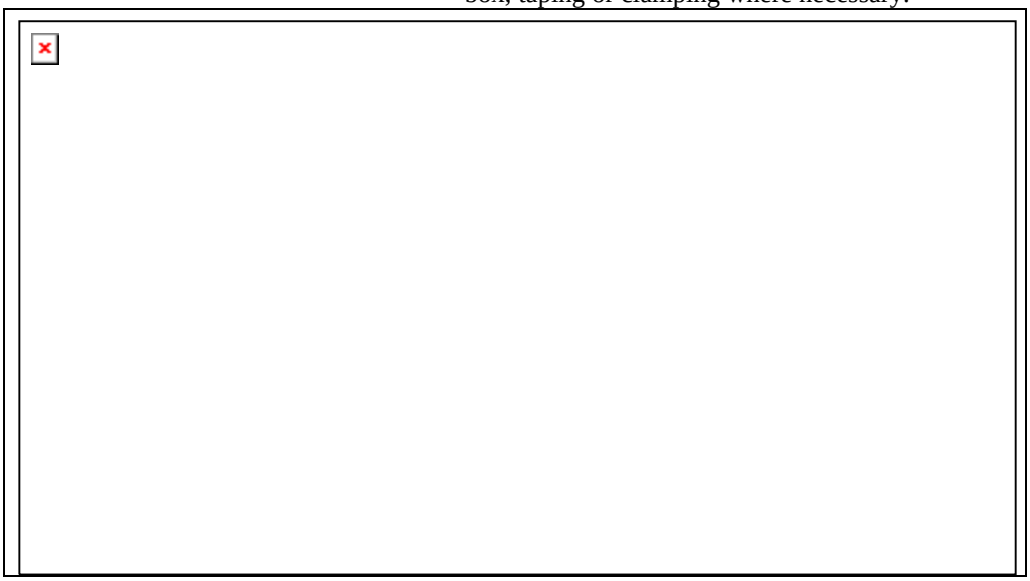
RHD

See the illustration of the brake box on page 49 for an assembly breakdown of the front linkage. The bellcrank on the tunnel is not used. The cable is connected directly to the transverse link mounted on the brake box.

SPEEDOMETER CABLE:

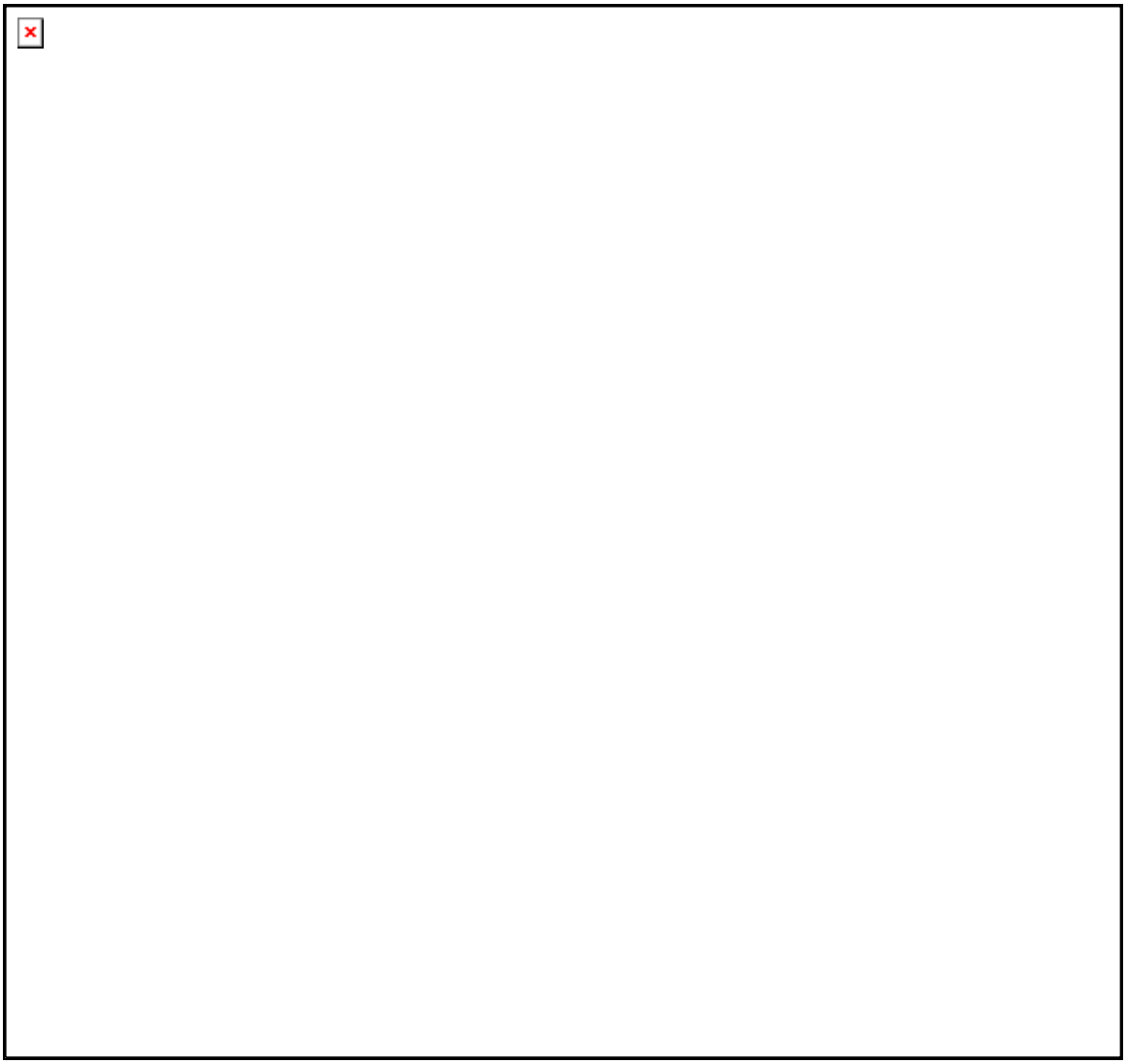
Note: Because of the variations in speedometer and transmission drive gearing, there is a gear reduction unit in the cable about two feet from the transmission end. It should be correct for your application but if you find that your speedometer is highly inaccurate, the reduction unit may be exchanged for a more appropriate one.

Installation: Pass the cable forward, through the engine firewall (see Illustration on page 66 for the correct hole), and through the hole above the rear end of the tunnel. Fasten or tape the cable to the passenger's side of the tunnel, allowing enough length (about 56") on the transmission end to reach the speedometer drive. If you have air conditioning, the cable may be routed with the hoses alongside the tunnel. Loop the cable behind the passenger's footrest and along the top of the footbox, taping or clamping where necessary.



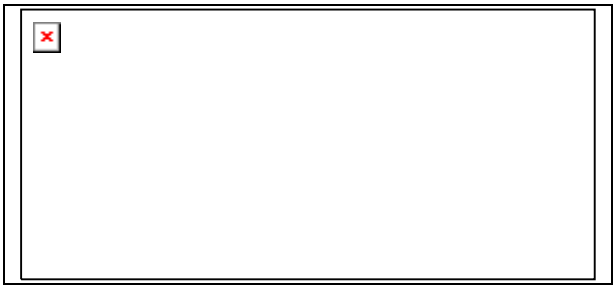
CARPETS

Follow the diagram below for the proper placement of each piece. #15 is glued to the removable passenger floorboard mounted on the three chassis brackets. The rocker sill carpets are fastened with **snaps** at the top for access to the fuel senders. Do not glue on the top.



STEERING COLUMN/SUPPORT

Install the transverse member between the chassis brackets, replacing any shims that were installed at the factory. The column housing and column (without the steering wheel) can be installed as shown.



DASHBOARD

Competition Layout

Road Car with stalk

Competition Car – RHD

REMOVAL, PREPARATION AND INSTALLATION

If necessary, remove the steering wheel and hub by loosening the clamp under the hub shield and pulling the steering wheel rearward. Remove the screws at the base of the windshield and above each rocker sill. Remove the screws securing the dashboard to the steering column cross brace. Disconnect any hoses to the face level vents and/or the defroster vents. Open up both doors and slide the dashboard rearward and out.

The dashboard may be covered in cloth or vinyl, or painted flat black.

Installation is done in the reverse order.

REAR ACCESS PANEL

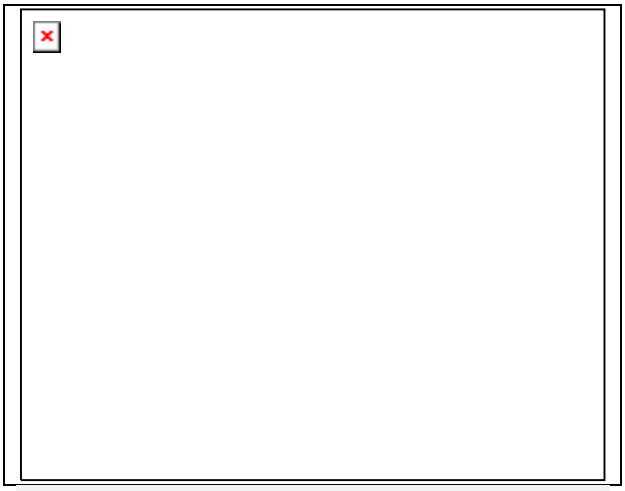
Thecenter access panel behind the seats may be removed to allow engine servicing by sliding the seats forward and unscrewing the trim screws around the periphery. See the diagram on page 79 for placement on the rear bulkhead.

SEAT BELTS

There are standard threaded inserts ($^{7}/_{16}$-20 thread) for the lap and shoulder harnesses welded into the chassis.

The lap belt inserts are in the diagonal bulkhead behind the seats, just above the floor and to the left and right of each seat.

Shoulder harnesses are secured to brackets on the bottom of the roll bar cross-brace. Two inserts for each shoulder harness are provided. You may use either a single diagonal belt or competition belts with separate left and right belts.



TUNNEL COVER

The tunnel cover is secured on either side at the front and rear. If you have seat tracks, sliding the seat forward makes it easier to remove the rear screws. Otherwise, an extra long screwdriver is best.

SEATS:

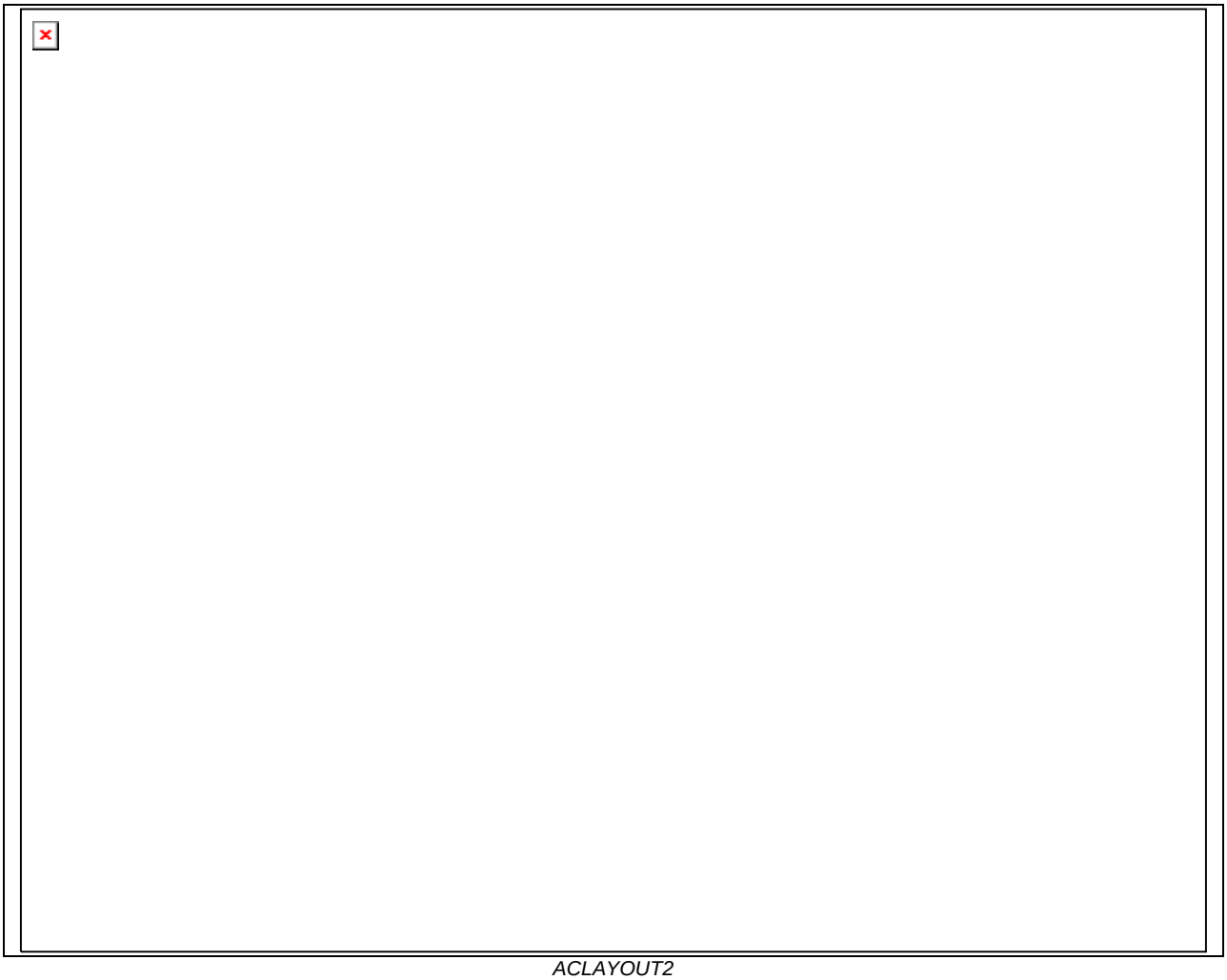
Note: The drivers seat may be wider than the passenger's.

Each seat is secured with bolts and large flat washers from underneath the floor into the seat frame or seat adjusting track. Because the seat is a very tight fit, it is recommended that the tunnel cover be removed first.

AIR CONDITIONING/HEATER

GENERAL CONFIGURATION

The ERA Air Conditioning System is an integrated heater/air-conditioning system utilizing a combination core, with blower, valves and thermostat mounted in a single box over the footwell. This housing is very similar to the one originally found in the street version of the GT40 which contained only the heater.



ACLAYOUT2

The compressor is engine driven, with the lines running the full length of the car to the condenser core mounted in the front of the radiator. See the schematics for airflow and coolant at the end of this section for layout details.

Fresh air is drawn from the NACA ducts on the front fenders and at the base of the windshield into a common plenum in the box. At your option, you may use this fresh air, or air that is recirculated by the fan from the footwell for cooling or heating. Air can then be directed to the face level vents at the left and right of the dash, and/or to the vents at knee level under the dash, and/or to the vent directed at the feet.

The defroster vent at the top of the dashboard is continually open but air flow may be maximized by closing one or more of the other sources.

Flow-through ventilation is controlled by the roof vent and the side windows. A complete air flow schematic is on page 106.

FUNCTION AND CONTROLS:

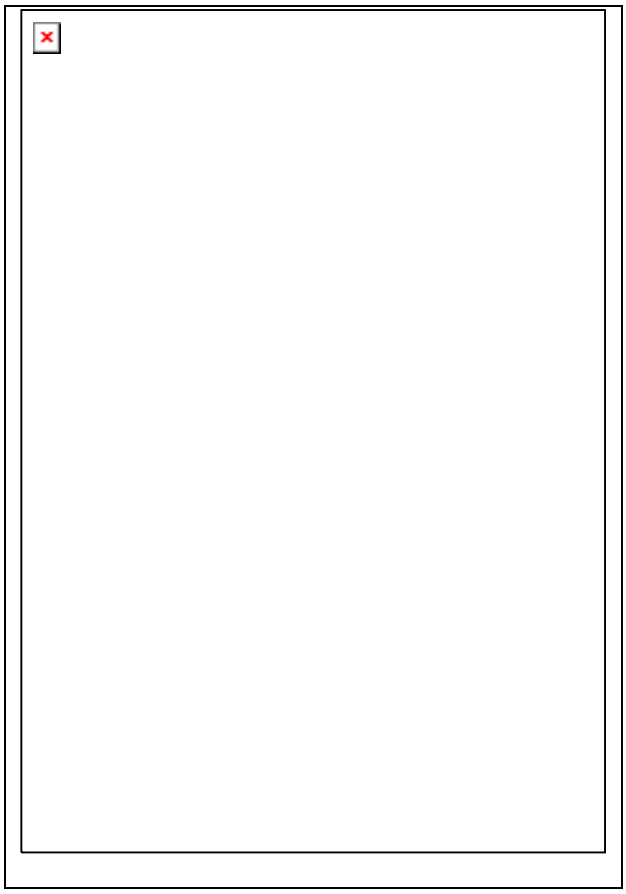
The **AC control panel** consists of a three speed fan switch, AC temperature control rheostat, three sliding controls controlling the source of the air, direction of forced air, and the temperature of the heated air.

At either side of the dashboard, **face level vents** at the may be opened or closed by rotating the central knob. **Under-dash vents** may be closed by rotating down 90 degrees. The foot level vent is controlled by the slider. If no air at all is needed, set the controls to recirculate and defrost, without the fan. At speed, the fan may not be needed because of the ram-air effect with "fresh air" on. For maximum cooling, however, set the controls to "recirculate" and fan speed on "high". Be sure that the heater temperature control is off when the air conditioning is on. The radiator fan and compressor clutch are automatically actuated only when necessary.

COMPONENT INSTALLATION

EVAPORATOR/HEATER/BLOWER BOX

See the diagram below.



Glue the weatherseals onto the chassis opening as shown.

Fasten the unit with two bolts through the front of the foot-box and two clamps at the rear edge of the foot-box opening.

CONTROL BOX AND CABLES

CONDENSER

Attach to the radiator with the brackets provided. See page 103.

RECEIVER/DRIER

The receiver/drier is mounted on the right side of the front compartment in the bracket provided. See page 80

FREON HOSES:

If air conditioning was delivered with the kit, hoses are laid out in the chassis properly, with their ends installed. Once the hoses' positions are determined, isolate and **insulate** each hose along its entire length, including the engine and front bay.

IF THE AIR CONDITIONING KIT IS BEING RETROFITTED:

Each hose assembly can be identified by its length and end fitting.

Loosely install the hoses in the car. Before attaching everything permanently ,adjust the layout for the neatest installation. .

1. Compressor discharge to condenser(top)
   Length (LHD): 132"
   Length (RHD): 164"
   Install through the right hole (see page 66) in the engine firewall, leaving 17" of hose exposed, along the passenger side of the tunnel. Pass through the right hole in the right hole in the footbox to the right diagonal subframe rail. Go behind the aluminum radiator ductwork and attach to the upper fitting on the condenser.
2. Compressor suction to evaporator
   Total hose length including "T" fitting
   LHD: 99"
   RHD: 122"
   Install from the front. Pass the end with the longer hose through the left hole in the footbox and back along the passenger side of the tunnel on top of hose (1). Go through the large inside hole in the bulkhead behind the seats and the left hole in the firewall, leaving 16" of hose (not including fittings) exposed in the engine compartment.
3. Condenser (bottom) to receiver/drier with "T" fitting and pressure switch ($^{5}/_{16}$"ID)
   Length: 26"
   Attach to the right subframe tube parallel with hose (1). The 90 deg. fitting attaches to the bottom of the condenser.

4. Receiver/drier to expansion valve on evaporator (5/16"ID)
Length: 5.5"

After installing and securing the lines, we recommend that all lines be insulated, especially in the passenger compartment and engine bay. E.R.A. uses water heater insulation with aluminum foil on one side, adhesive on the other for wrapping.

AIR DUCT HOSES

Because it's tight in the cowl section, the configuration must be followed carefully. Install a 2 ½" ID hose onto the left side of the cowl manifold. Install the cowl manifold through the access hole just forward of the dashboard, fastening it to the brackets at the bottom. As you tighten the screws, keep upward pressure upward to seal the manifold to the cowl. Install the drain hose to the manifold, running it out through the hole in the left side of the cowl.

SEE PAGE 24 FOR INSTALLATION OF THE COMPRESSOR AND BRACKET ONTO ENGINE BLOCK.

CHARGING

Charge with 29-33 ounces of Freon R134 with approximately 4 fl oz. of compatible refrigerant oil. Charge through the T-fitting at the front compartment after removing the pressure switch.

WIRING, A.C.

Also see the instructions in the wiring supplement for specific connections. There is also an AC electrical schematic that will accompany the main wiring diagram. Mount the control box on the access panel in front of the dash panel.

The AC harness goes through the panel, parallel to harness D. Connections to the blower motor are made inside the box, using the 4 wire harness (with one end unmarked, the other L22, 23, 24, 25). Use the terminals on the molded connector.

Harness wire: Molded connector→ wire:

Yellow→Yellow
Blue →Red
Green→Orange
Black→Yellow
(Separate)

Connections for the other end of the harness and also the temperature probe(L30) are made at the lower right corner of the housing. The temperature probe (13-2214) goes through the hole in the housing with the fluid lines, and is inserted into the core from the back about an inch.

There is also a probe from the expansion valve tie wrapped to the water tubes. Because of the proximity of the probe to the heater tubes, it is important that the heater valve be fully closed while the AC is being used.

Wire #L21 connects to the pressure switch mounted between the condenser and the drier. The other pressure switch wire(L28) should be grounded to the chassis tube.

Ground #L2 to the dash access panel screw. Wire #31(from the control box) connects to the #32 from the control panel.

Remove C19 from the 6 way connector between harness C and harness D by inserting a pin or jewelers screwdriver into the small slot on the side of the connector. Insert C19 into the two way connector supplied with L3.

Once all the components are in place and the connections made and tested, use the supplied insulation and tie wraps to wrap as much hose as possible:

Engine compartment: Include insulation around the fittings at the compressor.

Front bay: All exposed hoses and fittings

Tunnel run: Separate and insulate the hoses. Include the short runs inside the panel behind the seats.

Charging the system with Freon: Caution!! Charging must be done through the fitting on the compressor only, not at the "T" fitting near the drier in front.

HEATER

ERA offers a heater/blower for the GT that is similar to the original setup, using some parts from our air conditioning assembly. It, therefore, looks virtually identical to the original setup, but its function is somewhat more sophisticated. Water is bypassed from the front radiator through fittings on the aluminum longitudinal tubes, and is regulated by a cable controlled in-line valve. Not much water will flow naturally through the bypass, so if you need more than defroster heat, we recommend that you use a separate electric water pump in the heater water circuit, electrically powered by the heater blower circuit. Inquire.

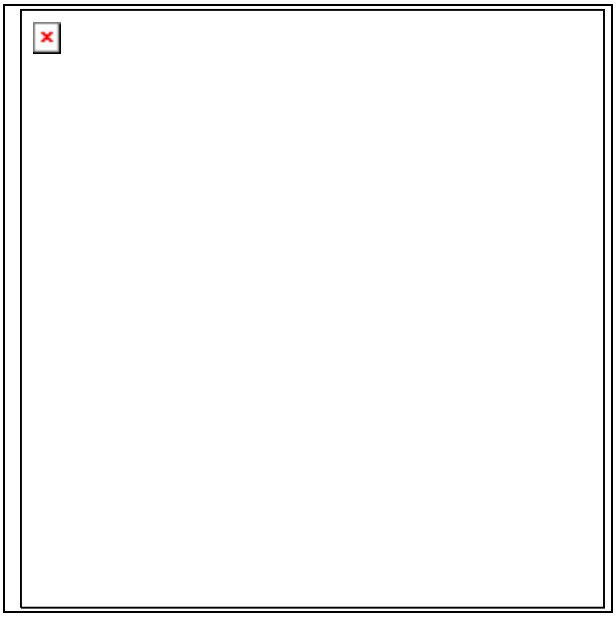
The blower is 3 speed and controlled by an under- dash panel similar to the A.C. panel on page 104.

ROOF VENT

Air is exhausted through the inside louvers in the cab ceiling and out the louver on the roof. A water drain runs along the roll bar and down the left side of the car, by the forward trailing arm mount.

When washing the car, don't direct water into the roof vent. It will overload the drainage system.

The system may be cleaned by removing the 4 screws holding the box to the roof and removing the drain tube.



UPKEEP - REFERENCE - REGISTRATION

RECOMMENDED SERVICE

EVERY GASOLINE FILLUP:

Check engine oil and water

EVERY 3000 MILES

Change engine oil and filter

Check engine drive belts for wear and tension

Grease rear axle sliding splines

EVERY 6000 MILES

Inspect front and rear brake linings

Spray Lubriplate or equiv. on rear suspension rod ends and spherical joints

EVERY 12,000 MILES

Change transaxle oil

Grease rear axle universal joints

Grease front upper and lower ball joints and outer tie rod end

EVERY YEAR

Change antifreeze

LUBRICATION

ZF TRANSAXLE

Initial fill, 3 qts, 2.7 qts. after drain/ing in the car. Fill to the overflow level of the hole that was made in the right side of the case.

Recommended Lubrication: Mild EP Oil, SAE 80 or 75-90 Synthetic

Oil change intervals: After first 500 miles. Each 15,000 miles thereafter.

MAINTENANCE PARTS

All pieces listed below are included in the kit but are listed here for reference and long term service.

Part numbers listed are typical, but equivalent brands may be substituted unless otherwise stated.

BRAKES, MASTER CYLINDERS, LINES, FITTINGS:

Master cylinder, front*	Girling 3/4" bore
or	Tilton 260-0412
or	Neal NP-141-NR
Master cylinder, rear*	Girling 5/8" bore
or	Tilton 260-0426
or	Neal NP-140-NR
*Sizes noted are for standard Corvette calipers.	
Pedal pivot shaft bushing:	NF810-5 Boston
Thrust washer	18824 Boston
Balance bar bearing:	LSS-8 Heim
Master cylinder rod ends	HF-5
Clutch slave cylinder:	BMW 2152 1104 269
Clutch throwout bearing for ERA bell housing:	Nissan 30502-21000
	(fits 81-84 Maxima, Pickups)

SUSPENSION, FRONT:

Ball joint, lower:	Republic BJ 10324, MOOG K6273
Ball joint, upper:	Republic/Moog ES 383R (Alternate: ES314R)
Tie rod end, outer:	Republic/Moog ES 381R
Tie rod end, inner:	Heim HMRL-8
Sway bar link ends: bottom:	Heim HMR-6
top:	HFR-6
Sway bar bushings:	Nissan 54617-21002
Bearing, hub, for bolt-on wheel:	GM 7466902
Bearing, hub,, pin drive, inner:	A-13 Bower/BCA (Cup L88110, cone L88149)
Outer:	A-12 Bower/BCA (Cup LM12710, cone LM12749)
Seal, inner, pin drive	19753 CR
Inner pivot bushing/sleeve	
Inner pivot thrust washer	

SUSPENSION, REAR:

Inner pivot bearing, lower wishbone	Heim NRR-10
Outer front bearing, lower wishbone	Heim NRR-10
Outer rear pivot rod end, lower wishbone	Heim HMR-10

Trailing arm ends, upper, lower forward end	Heim HMRL-8
rearward end	Heim HMR-8
Bushing, isolator, upper and lower	Energy Suspension 2191G
Upper radius arm ends, inner	Heim HMRL-8
outer	Heim HMR-8
Sway bar link ends	Heim HMR-6
bushings	Nissan 54617-21002

Drive axles - see Section D

STEERING COLUMN:

Bushing, upper column housing	Boston: NS1012-6
Joint, universal	Borgeson U15N 5/8 x 5/8
(Joint may be rebuilt using cross kit)	

SHIFTER:

Shift rod support, front	Heim HM-10
Universal joint, front and rear	Borgeson U10-HS
Shift rod support, firewall	Alinabal NBA 10A

ENGINE MOUNTS:

Bushing only	MOOG 9170 or TRW 12336

FASTENERS INCLUDED IN KIT OR WITH OPTIONS

T=top F=front R=rear U=upper L=lower HC=Hex cap screw SCS=Socket cap screw TR=Threaded rod

Quant	Size	Type	Application(s)
8	1/4" x 1/2"	HC	Shift box to tunnel, col.mt.
8	1/4" x 1 1/4"	HC	Fuel tanks
1	5/16" x 1/2"	HC	Steering col., front
1	5/16" x 1"	HC	Ground bolt, right engine mt.
4			F Sway bar bracket
10			F Pin Dr. hat to rotor
1	5/16" x 1 1/4"	HC	Clutch master link
2	5/16" x 1 1/2"	HC	Steering column/dash support
4	5/16" x 2 1/4"	HC	Steering gear mount
1	5/16" x 2 1/2"	HC	Column support/column
1	5/16" x 3 1/2"	HC	Balance bar
1	5/16" x 4"	HC	AC tensioner to water pump
4	3/8" x 1"	HC	Alt. bracket, Alt adjuster
2		HC	AC mounting bracket
4		HC	sway bar top link
8		SCS	FLCA Ball Joint boss to hub carrier
3	3/8" x 1 1/4"	HC	Starter to bellhousing
8		SCS	Front Steering Arm to Hub carrier
1	3/8" x 1 1/2"	HC	AC tensioner
2		HC	Front sway bar L link
2	3/8" x 2 3/4"	HC	Crossmember to R hoop
1	3/8" x 4 1/2"	HC	AC compressor to bracket
2	3/8" x 5"	A	R subframe to R hoop
2	3/8" x 10"	TR	Trans. to trans.mt.
1	7/16" x 1"	HC	AC bracket
8	7/16" x 1 1/2"	HC	F axle/bearing to hub carrier
4	7/16" x 2 1/2"	HC	FL control arm inner pivot
4	7/16" x 2 3/4"	SCS	FU control arm inner pivot
4	1/2" x 1 3/4"	HC	R susp. trailing arms to hub, inner tie rods
2	1/2" x 2"	HC	R damper, L end
2	1/2" x 2 1/4"	HC	R damper, U end
2	1/2" x 2 1/2"	HC	F damper, U end
2	1/2" x 3"	HC	R L trailing arm, forward end
2	1/2" x 4"	HC	R U trailing arm, forward end
2	1/2" x 5"	HC	R subframe L tie bar
2	1/2" x 6"	HC	F damper, L end
2	9/16" x 2 3/4"	HC	Engine mounts
2	9/16" x 4"	HC	Transmission mount to chassis
2	1/2" x 5 1/4"	HC	R L control arm, inner
4	M10 x 30	SCS, DIN 912-12	R cal'ps, early
5	M10 x 40	SCS, DIN 912	Bell housing
2	M10 x 30	SCS, DIN 912	Bell housing to trans.
4	M12 x 30	SCS, DIN 912-12	R cal'ps, late

4	M14 x 40	SCS, DIN 912-12	F caliper (anchor plate), two piston w/11.5" rotor
	M14 x 50		F caliper (anchor plate), two piston w/12" rotor
	M12 x 40		F caliper (anchor plate), single piston
6	M14 x 70	SCS, DIN 912-12	R hub carrier bearing(housing)
3	M10 x 40	Stud, DIN 935	Slave cyl. bracket to trans.

SPECIAL WASHERS

6	M12	Star	R Hub carrier/bearing
2	DIN 9021 M12	Flat	U ball joint(1/2"x 1 9/16")
2	1/2"USS	Flat	L ball joint(1/2"x 1 3/8")
2	9/16"USS	Flat	Trans. mt.(11/16"x 1 3/4") Bowman 36771
7	M10	rib	Bell housing to trans.
12	7/16"	int'l star	F U C A, inner
4	7/16" SAE	flat	L C A inner pivots
16	1/2" SAE	flat	R trailing arms, damper mts, etc.
2	1/2"	int'l star	F U damper
4	1/2"	wave	U and L ball joint
6	5/8" SAE	flat	Rear subframe, trans. mt.
2	M24 DIN 463	Lock tab	Rack end clevis

FRONT SUSPENSION CASTER SHIMS

Quant	Thickness	Style
(20)	.070"	slotted
(8)	.035"	slotted
(8)	.060"	hole

TORQUE SPECIFICATIONS FOR FASTENERS

Use figures below only if unspecified in appropriate instructions. Torques are for lubricated threads or threads with liquid thread locker. All stover nut threads should be lubricated with a light oil.

Bolt size	Grade 5	Grade 8
1/4"	9 lb.ft.	13 lb.ft.
5/16"	18	28
3/8"	31	46
7/16"	50	75
1/2"	75	115
5/8"	150	225

Metric	Grade 10.9	Grade 12.9
M8	25 lb.ft.	29 lb.ft.
M10	47	58
M12	83	100
M14	100	120

INSPECTION AND REGISTRATION

Without researching and writing an entire book on the subject, it is impossible to give up-to-date information on the process of inspection and registration in every state. You must call your state Department of Motor Vehicles or its equivalent to get local procedures and restrictions. Most states have a pamphlet outlining the requirements for composite cars.

GENERALLY, STATES FALL INTO 4 INSPECTION CATEGORIES:

1. Inspections are done only by central or regional motor vehicle inspection stations.
2. Inspections may be done by a local state inspection station. That is, a branch of the state Motor Vehicle Department.
3. Inspections may be done by authorized (private) inspection stations.
4. No direct inspection is necessary.

Study your local laws carefully. Because the GT40 was originally a race car, some of its equipment may not be in compliance. You must use your ingenuity to meet the letter of the law.

It is also possible to register your car in Alabama, by mail. This registration is only valid for 3 months, but it may allow you to drive and sort out your car before your state inspection. Some states may allow you to transfer the registration with only an out-of-state vehicle inspection.

Titles Unlimited Tel. 1-800-325-8136
PO Box 590136
Birmingham, AL 35259

Int'l Title Service Tel. 1-800-543-8626
Joe Holmes
Las Vegas, NV 89121

World Title Services Tel. 1-800-325-2050
P.O. Box 9816
Birmingham, AL 35220

US Auto and Title Serv. Tel. 1-716-342-5769
P.O. Box 17325
Rochester, NY 14617

EZ Auto Registration Tel. 1-562-982-1342
California specialists
"Martinia"

POSSIBLE PROBLEM AREAS

Glazing: Some states require that all windows be laminated or tempered glass . This would make the optical quality Plexiglas side windows out of compliance. The solution? Take the side windows out.

Headlight covers: In some states there are restrictions as to material or even whether they are allowed at all. Take them off.

Headlight height: It may be necessary to raise the car on the suspension to get the minimum headlight height required in your state.

BE PREPARED!

Don't go to an inspection station ignorant of the laws.

Don't expect special favors from motor vehicle inspectors, and treat them with respect. They are just doing their job. If you have a problem, ask the inspector how it might be fixed. They can be very helpful. If you have to return for a follow-up, try to get the same inspector.

Do have everything working, properly adjusted, neat and clean. The better your car looks, the easier it is to pass inspection.

Most states require thorough documentation of the origin of your parts. Be sure that you have bills of sale for your engine, transmission, wheels etc. You will get a Certificate of Origin for the kit from E.R.A. at the time of delivery.

INSURANCE

Many insurance companies will allow you to add the E.R.A. GT to your present policy. If not, there are a number of insurance agencies specializing in composite cars. Look in issues of Kit Car Illustrated, Specialty Cars and related magazines, and Cobracountry.com for the latest offerings. Below is a short, but not necessarily current, list. If you use a specialty insurer, there may be some restrictions to your use and the yearly mileage allowed. The cost, however, is usually quite reasonable.

Aidukas Insurance Agency, Palm Springs, CA, Tel. 619-327-3889 **(California Only)**

American Collectors Insurance, Cherry Hill, NJ, Tel. 800-360-2277

Apollo Insuranc*e*, Sonoma CA, Tel. 800-624-5829

Cardiff (Insurance), Rich Dunham. Tel. 818-980-8941

Classic Automobile Insurance, Div. Modern Home Ins., Tel. 800-397-0765. 44 states, limited mileage.

CollectorGuard (Heacock Ins. Grp), Lakeland, FL, Tel. 800-678-5173

Condon and Skelly, Maple Shade, NJ, Tel 800-257-9496 (in NJ , 800-624-4688)Only some **mid-west** states.

Grundy Insurance, Horsham, PA. Tel 800-338-4005 (grundy.com)

Insurance Alternatives Agency, Bridget Scherb, Forked River, NJ. 609-693-3943

John Young, 310-254-7355

K & K Insurance, Fort Wayne, IN, Tel. 800-540-0858

Northeast Classic Auto Insurance(Div. Steeves, Smith & Assoc.), Monroe, CT, Tel. 203-261-8474 ext. 20

Parrish Insurance, Nashville, TN, Tel.800-274-1804

State Farm Insurance has been known to insure replicas as a "Classic Car".

The Specialty Constructed Vehicle Association (310-422-1967) offers insurance through Condon and Skelly

TransNational General Insurance, Dallas TX (Dave Gobel). Tel. 214-980-8941

Tri-State Insurance Co., Luverne, MN, Tel. 800-533-0303 (MN 800-722-9365) **Mid-west only**.

Also see the article on insurance in Peterson's Kit Car.

SHIPPING COMPANIES

Typically, companies charge about $.50/mile with a minimum charge to ship of about $400.

Bats Motorsports
Phone: 541)739-2597

Horseless Carriage
Phone: (800)631-7796

Road Show
Phone: (415)861-3111

Intercity Lines
Phone: (800)343-0802

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