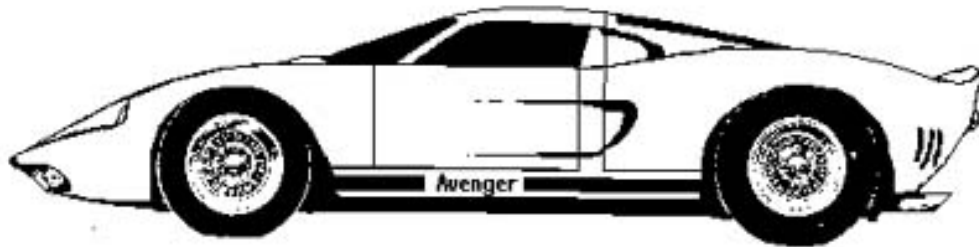




Chassis Preparation

Application:
Valkyrie GT-X,
GT-15, GT-15X - Supplement



FIBERFAB

CONCEPT DESIGN AMERICA, LTD.

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GT-15 Supplemental Section

INTRODUCTION TO THE VALKYRIE KIT

Fiberfab first introduced the Valkyrie concept to the public in the Fall of 1966 in the form of the Valkyrie 500 GT automobile. The 500 GT was a completely finished vehicle incorporating a centrally-located engine, a five speed Z-F transaxle, four wheel independent suspension and disc brakes, a posh all leather interior and a sleek, ultra-contemporary fiberglass GT body. The 500 GT was undoubtedly the fastest automobile ever made available and without a doubt, the most beautiful.

The price of the GT was \$12,500.00. While this may be considered unreasonable, a comparison may be made between this price and the prices of similar vehicles (e.g. Ford GT-40 at \$17,500.00, etc.). Regardless of the rationale for this price, it remains, however, beyond the budgets of all but the most avid car buffs.

It was realized by Fiberfab's staff, that much of the cost of the Valkyrie 500 GT resided in labor and the costs of the specially prepared engine and gearbox - - eliminate these high costs and the price of the Valkyrie is significantly reduced. The low price of the Valkyrie kit is accomplished in this manner, e.g. by trading Fiberfab's personnel and overhead charges for your time and by making provisions in the kit design for the use of standard automotive components supplied by you.

Whereas, the 500 GT was a completed, expensive machine, the Valkyrie kit is completed by you at the expense of your time and for the cost of the kit and standard, readily available engine, running gear and suspension components. It is estimated that the Valkyrie GT-X can be completely built by an individual for as low as \$3000.00.

In particular, the Valkyrie GT-X kit uses the following:

- 1). Corvair front suspension, complete, '65 or newer.
- 2). Corvair steering linkage and box, complete with steering column, '67 or newer preferable.
- 3). Corvair transaxle assembly complete, less yoke, '66 or newer, three or four speed transmission.
- 4). Chevrolet V-8 engine, 283-327-302-350 cu. In. (small block), complete with stock bellhousing.
- 5). Hydraulic slave clutch assembly.
- 6). Corvette aluminum radiator.

THE VALKYRIE GT-X, INTRODUCED IN 1971

The sensational Valkyrie GT-X is the first off-spring of the famous Fiberfab Valkyrie 500 GT. Using the styling of the new Avenger GT-12X series, the Valkyrie GT-X is the ultimate in design and performance. AN UNBEATABLE COMBINATION.

The idea behind the new Valkyrie was to retain and incorporate all the good points of the former Valkyrie, into a moderately restyled body, longer wheelbase, 4" more interior room for driver/passenger comfort, use the proven GT-12 one piece door configuration and a one piece body.

The one piece body construction eliminates matching, hinging, hanging and latching jobs of the previous two piece kits. Engine access will be afforded through the rear window area, eliminating the glass and using a removable louvered panel in place of it (e.g. Lamborghini, Mustang).

ALL IMPROVEMENTS HAVE BEEN DIRECTED TO A FAR EASIER ASSEMBLY.

Running gear components remain the same. However, all hardware used on the GT-12 series, can now be used on the Valkyrie GT-X.

Specifications:	Overall length:	172"	Overall width:	72"
	Hood height:	31"	Cockpit height:	43"
	Wheelbase:	100"	Track, front:	56"
	Average weight:	2100#	Track, rear:	58"
	Road Clearance:	6"		

Note: Above specs. can vary depending on tire size, wheel width, wheel off-set, etc.

The Valkyrie GT-X Deluxe kit includes the following:

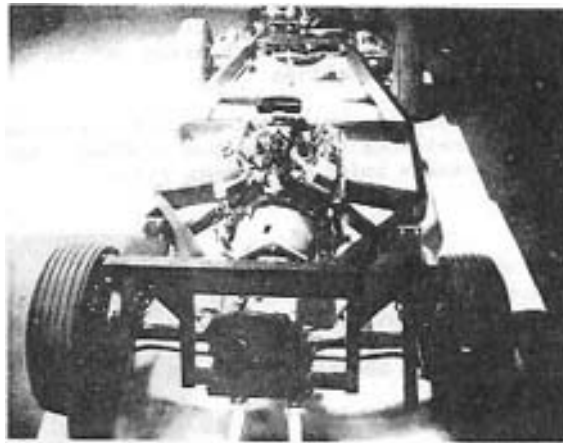
- 1). One piece body with integral seats, front kick panels, floor-panel, flared rear and front wheel openings, inner splash panels.
- 2). Room for installation of a small storage compartment in the tail, with rear access door included in kit.
- 3). Safety glass windshield and side (door) glass.
- 4). Preformed dashboard/console.
- 5). Pre-welded ladder type frame, with mounting points for suspension and engine. Made of 2" x 5" x .120" steel.
- 6). Fiberfab's V-8 to Corvair adapter kit complete.
- 7). Louvered panel for rear window opening.
- 8). Valkyrie GT-X mounting instructions, chassis and body manuals.



Figure 1.

The components of the Valkyrie Adapter kit which enables you To couple a small Chevy V-8 to The Corvair transaxle.

Photo below shows the overall view of a typical Valkyrie frame, ready for the mounting of the body.



CONSTRUCTION MATERIALS

A list of tools and construction materials will be found in the "GT body manual".

The list is a typical inventory of tools found in most home workshops. A foremost criterion in all FIBERFAB designs is that the assembly procedured should not be based on the use of any exotic cutting, fastening, etc. methods not readily available to the home builder.

ACQUIRING COMPONENTS

This section is primarily an annotated parts list of major mechanical components required to complete your Valkyrie GT-X chassis. Generally, there are two sources for each item, a new car dealer's parts department or an auto wrecking yard. The latter represents the most economical source, by far. Arrangements can usually be made with reputable auto wreckers to supply a "package deal" including all the parts you require along with some form of guarantee. The major components of interest are described below.

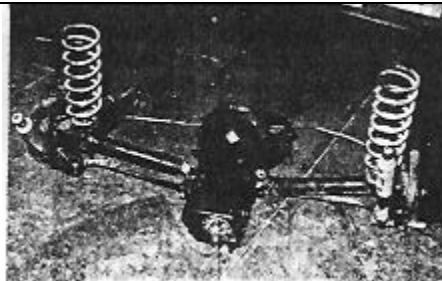
CORVAIR TRANSAXLE/REAR SUSPENSION

This component group as used in the Valkyrie GT-X, is composed of:

- 1). the differential/ring and pinion housing
- 2). the gearbox (transmission)
- 3). two axle half-shaft, four universal joints
- 4). two forged steel suspension links
- 5). two stamped steel suspension link hangers
- 6). two shock absorbers, two coil springs
- 7). two stamped steel radius arms/bearing carriers/hub assemblies
- 8). two wheels/brake assemblies

These components comprise the total Corvaire transaxle/rear suspension unit - less bellhousing and engine cradles. Remember, '66 or newer on the transaxle unit. See photo below.

Note: To be sure you are purchasing a '66 or newer unit, check the bolt pattern that holds the transmission to the center section. THERE SHOULD BE SIX (6) BOLTS.



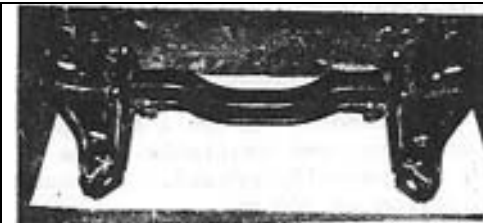
Acquiring components, continued:

If you purchase a used transaxle/rear suspension, be sure to check the rubber bushings for signs of deterioration, the axles and stamped steel components for dents, the differential and gearbox housing for gouges and/or cracks and the shock absorbers for stiffness.

CORVAIR FRONT SUSPENSION/STEERING ASSEMBLY

The Corvair 1965 or newer, front suspension/steering assembly can be removed from the Corvair chassis as a complete unit simply by loosening and removing about a dozen bolts. The basic front suspension cross-member is shown in the photo below - - note that just four bolts retain this entire unit to the frame. To this basic structure are attached:

- 1). Right and left upper A-arms (stamped steel)
- 2). Right and left lower suspension links (stamped steel)
- 3). Two coil springs over shock absorbers
- 4). Two forged trailing arms
- 5). Right and left spindles
- 6). Right and left hubs and bearings
- 7). Right and left backing plates and brakes
- 8). Right and left brake drums



Corvair front suspension.

Up to and including 1964, the hubs and wheels have a four bolt pattern. While these are usable, it is suggested that a '65 or newer front-end be used, as these have a five bolt (same as Chevy) pattern and will match the bolt pattern of the rear wheels.

Also, the 60-61-62 Corvairs have no anti-roll bars. The 1963 have a 5/8" bar, the 1964 has a 3/4" bar and the 1965 and newer front-ends have a 13/16" bar, again making the newer front-ends more desirable.

The steering assembly consists of:

- 1). Steering box and shaft
- 2). Right and left steering arms attached to the spindles
- 3). Idler arm and attachment
- 4). Two adjustable-length draglinks (tie-rods)
- 5). Tie bar

Steering assembly continued

The steering assembly is removed by detaching the idler arm and steering box from the frame.

Note: Throughout this section, we have been speaking of the Corvair steering box. Should you desire an optimum steering ratio, the Corvette Stingray ('63 or newer) steering box can be used. The Corvair steering ratio may be reduced to 2 7/8 turns, lock-to-lock, by installing "Corvair Quick Steering Arms" by EELCO, their part #4430.

If a used front suspension/steering assembly is to be used, check the rubber bushings for deterioration, the stamped parts for dents and the swivels and ball-joints for free, yet snug operation. To verify that the suspension has not been severely damaged, check closely the four crossmember mounting holes - - these holes should be round, not elongated, and they should be separated by 27 1/2" from right side to side, to see that the crossmember is not twisted - shock absorber tops are separated by 34 5/8".

V-8 ENGINE AND BELLHOUSING

The Valkyrie kit is designed to most readily accept a Chevrolet small block engine. These engines have been available since '57 and are quite easy to obtain and economically priced. The maximum horsepower recommended for application is 350 hp.

Note: In the case of the high range of horsepower engine, it is suggested that a heavy duty 4 spider differential unit by "Crown", be installed, especially if any hard starts are anticipated (e.g. drag racing). This unit is available from Fiberfab and their dealers.

A typical Chevrolet V-8 engine with appropriate (stock) bell-housing attached is shown in the photo below. The four bolt pattern at the rear of the bell-housing, is the only pattern suitable for use with the Fiberfab adapter plates - both Chevrolet cast iron and die cast aluminum bell-housings have this pattern.

A "Universal Slave" clutch assembly is available from most speed shops. In conjunction with the hydraulic clutch, a dual universal brake & clutch swing pedal assembly, e.g. "ANSEN" may be used with a Chevrolet truck master cylinder.

One additional hydraulic unit is recommended. A hydraulic throttle assembly, e.g. HYDRA-LINK, flat floor mounting unit. Other types of throttle linkage may be fabricazted, but using the hydraulic unit is the simple way of getting around the mid-mounted V-8. HYDRA-LINK unit is manufactured by "Harvey Designs" and is available from local speed shops.

REMEMBER to include in your engine purchase:

- 1). The starter motor, alternator
- 2). Clutch and clutch cover
- 3). Throw-out bearing and bearing arm
- 4). Throw-out bearing guide, type T89B-6 (make sure the mounting flange for this guide fits snugly in the hole in the rear of the bell-housing).

OTHER COMPONENTS TO COMPLETE DRIVE-TRAIN

Front engine mounts - - The Valkyrie frame is designed to accept the "Hurst" universal engine mount and cushion kit.
Pads for Mount #137-4850, Engine Mount #177-3272

Rear transmission mounts - - The Valkyrie rear cover plate is designed for use with two (2) Buick Dynaflo (1948-'59) Transmission mounts. These can be purchased from your local Buick dealer or ordered through an automotive parts supplier. Have them order "DOAN #31-2070".

The above list is not an exhaustive list of all other components required to complete your Valkyrie. Other components are mentioned throughout the text that follows.

ASSEMBLING THE ENGINE/TRANSAXLE UNIT

The assembly of the engine/transaxle unit is accomplished in several steps:

- 1). Preparation of the engine
- 2). Installation of the "Fiberfab" drive-shaft
- 3). Preparation of the rear hanger plate
- 4). Assembly of the engine/gearbox/differential into a single unit.

INSTALLATION OF THE FIBERFAB DRIVE-SHAFT

This step of the assembly of the engine/transaxle is probably the most tedious step in building the Valkyrie kit. It is in this that the standard Corvaire input gear is replaced by the special input gear/shaft manufactured by FIBERFAB.

The sequence of operations that follows, should be used to complete the gear/shaft installation.

DISASSEMBLY OF THE CORVAIRE TRANSMISSION

- 1). Remove the gearbox and differential housing by removing the six (6) retaining bolts threaded into the differential housing.
- 2). Remove the gearbox front cover palte (4 bolts). The gear, with the splined hub directly under this cover is the gear to be removed.
- 3). Remove the gearbox side cover (7 bolts). The shifting forks and rods are attached to the side cover plate and they are removed with the plate.
- 4). Remove the snap-rings (2) from the hub of the input-gear.
- 5). Remove the input-gear bearing by tapping it out of the case and sliding it over the input-gear hub.
- 6). Remove the out-put shaft bearing in its retainer (retainers are maintained in position with locking tabs). As the retainer leaves the case so will the main shaft - take care to remove the main shaft and input gear a a unit.
- 7). Note the location and orientation of the brass synchromesh cone adjacent to the input-gear. Now withdraw the input gear from the main shaft. Do this over a clean rag because a number of needle bearings will fall out of the input gear hub. NOW:
- 8). Collect all the needle bearings - there are two rows of needles within the input gear hub. Coat the inside of the FIBERFAB gear/shaft hub with a sticky grease (wheel bearing grease suggested). Now place the needles in the hub, using the grease to hold them in position - the two rows should be full, leave no gaps.
- 9). Slide the synchromesh ring on the main shaft into the position shown below. Place the brass synchrocone in the input gear/shaft.



- 10). Next, very carefully insert the main shaft and input gear/shaft into the gearbox case as shown below. Move the gear/shaft carefully to avoid dropping the synchrocone or dislodging the needle bearings. Bring the shafts together and into alignment. Insert the nose of the main shaft into the needle clusters in the gear/shaft hub.

 - 11). Insert the main shaft bearing re-tainer into place in the gearbox. Slip the input gear bearing over the gear/shaft and into the gearbox. If the bearings seat properly, it indicates the main shaft and gear/shaft have been properly mated. Reinstall the bearing retainers, both bearings.

 - 12). Reinstall the side cover, shifting forks, using a new gasket.

 - 13). bolt the gearbox back onto the differential housing.
- This completes the installation of the input gear/shaft.

PREPARATION OF THE REAR HANGER PLATE

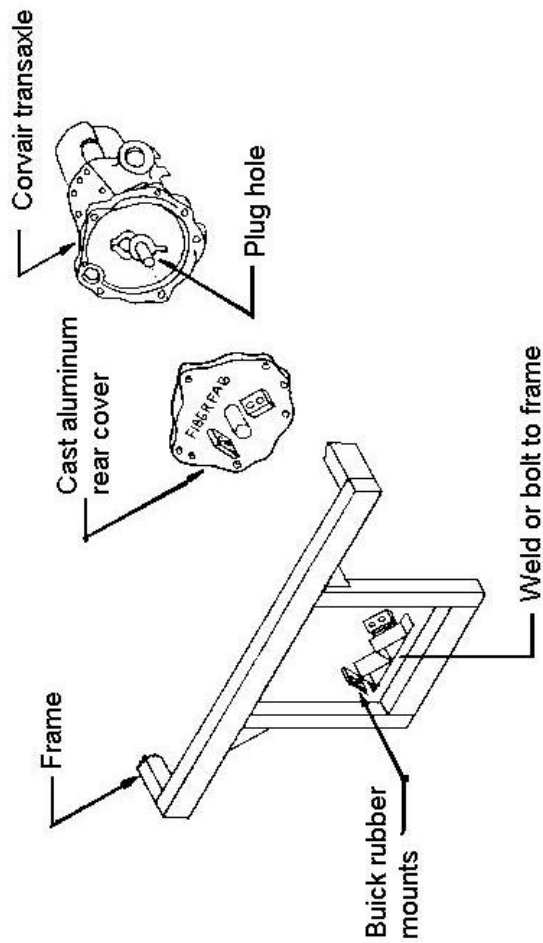
The rear hanger plate comes to you "as cast". It is the casting with the name "FIBERFAB" cast-in. It is transformed into a finished part simply by drilling ten holes.

First, drill and tap the rectangular bases such that the Buick mounts can be affixed to their bottom surfaces. The mounts are attached by bolting through their metal mounting feet - 3/8" bolts are appropriate. Now place the hanger plate over the rear of the transaxle, engaging the 13" lip (OD) of the transaxle in the 13" (ID) recess in the back surface of the plate. Align the contours of the plate with the contours of the transaxle. Drill the hanger plate for attachment to the transaxle using the transaxle as a drilling jig - - again 3/8" bolts are appropriate. Finally, the "M" shaped rear support is bolted to the rubber mounts.

The tasks involved in preparing and mounting the rear hanger plate are summarized pictorially, below.

Note: The "M" bracket is tack-welded to the frame for shipping purposes only. Remove when kit arrives. This will be bolted to frame during installation of drive-train.

FIGURE 10



- 11 -
FINAL DRIVE TRAIN

The drawing on the following page is an exploded view of the engine/bellhousing-to-transaxle interface. Referring to this, the Fiberfab adapter plate is bolted to the front of the gearbox case. This joint requires no gasket but should be coated with a non-hardening gasket cement. Note that the holes labeled 1-2-3-4 are used subsequently for bolts into the bellhousing - hole "1" should have a bolt in it before the adapter is attached permanently to the gearbox because once attachment is complete, access to this hole is impared.

Place the throw-out bearing guide (GM Chevy #3915020) mounting flange in the recess in the adapter plate. Pass four 5/16" x 1 1/2" bolts, through the mounting flange, through the adapter plate and into the gearbox case. Now, pass the remaining bolts through the adapter into the gearbox case and tighten all bolts.

To complete the drive-train assembly, the adapter plate is now bolted to the bellhousing.

Note: If shift "rod" method is to be used, it will be necessary to grind off corner of this plate for clearance of the rod. This should be done before bolting to bell-housing. (see sketch)

Engage the T/O bearing guide into the T/O bearing. Guide the nose of the gear/shaft into the pilot bearing in the end of the engine crankshaft and, simultaneously guide the T/O bearing mounting flange into the hole in the rear of the bellhousing. Pass bolts through holes 2-3-4 in the adapter (hole "1" should already contain a bolt) thread into the bellhousing and tighten.

The assembled drive-train should now consist, from front to rear, of:

- 1). Hurst universal engine mount
- 2). V-8 engine *
- 3). Bellhousing
- 4). Adapter plate, central drive-train hanger
- 5). Gearbox
- 6). Differential
- 7). Rear cover plate/rear drive-train mounts

*It is best to eliminate (block off) the oil filler on the front of the block (as this is quite inaccessible later) and install one (oil filler) on the rear of one of the valve covers.

Also, leave the alternator off the engine until the body is mounted. Later, install alternator below and at an angle to the pulley on the passenger side of the car, or at the "rear" of the engine via a "jack-shaft" method. Be sure the belt is properly aligned, regardless of location.

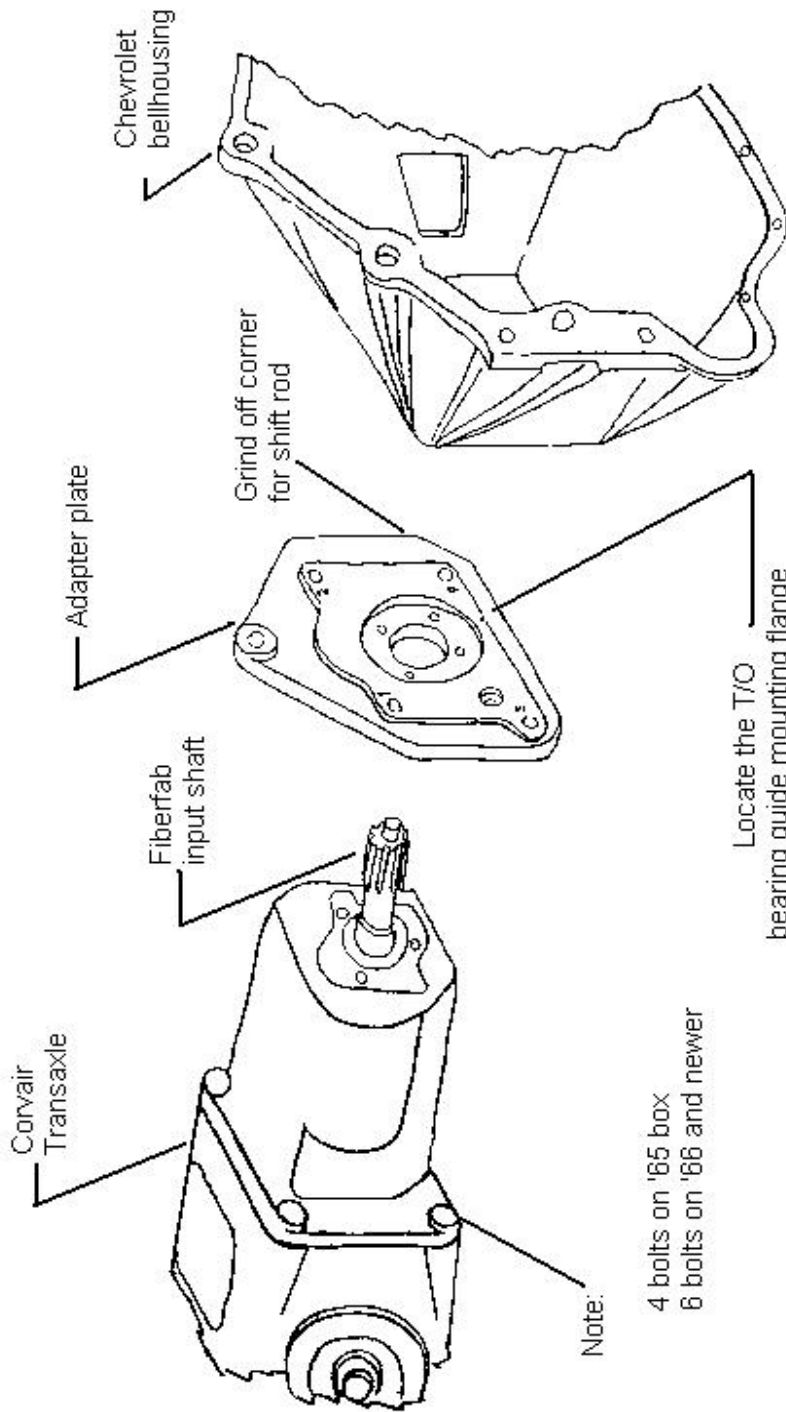


FIGURE 11

Locate the T/O bearing guide mounting flange in this recess

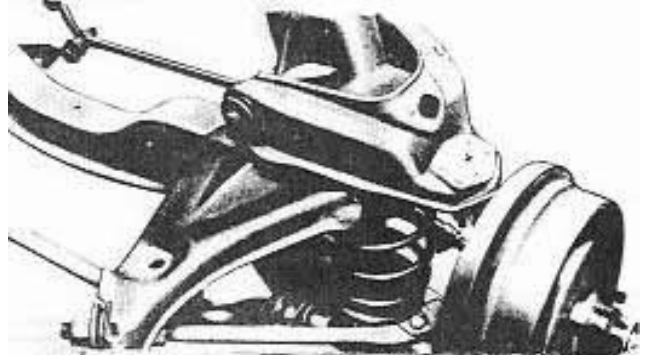
INSTALLING THE FRONT SUSPENSION

Installing the front suspension on your Valkyrie chassis is a very simple operation. Four bolts, 2 on each side (at least 3/8" diameter and 6 1/2" long) are passed down through the suspension mounting holes in the frame forward of the front crossmember. Lock washers and nuts are then placed on the four bolts and the nuts are tightened very securely. It is suggested that a very good grade, e.g. Premier Supertanium, bolts and nuts be used for the front suspension mounting.

If the front suspension was purchased disassembled, it can now be assembled on the ends of the suspension crossmember, as shown. The kingpins should be inclined back, i.e., the top of the kingpin should

be behind its bottom and the steering arms should be attached to the kingpins such that the arm points forward.

STEERING ASSEMBLY

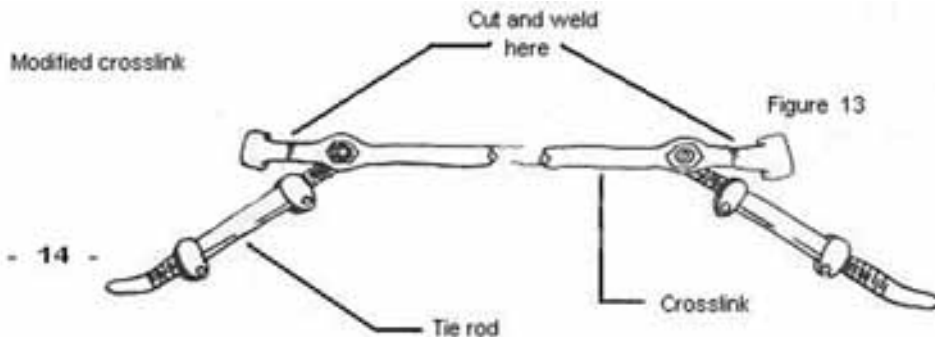


No provision is made on the frame to mount any particular steering box inasmuch as many constructors may wish to use a rack & pinion steering arrangement, such as is available in the MGA, MGB, etc. (see fig. 4-1, 4-2) or they may wish to use some quick-steering, e.g. Corvette, other than corvaire.

WE have found that the most economical steering set-up is the corvaire unit, so we have covered it in the assembly manual. The '67 or newer unit is especially adaptable because it is provided with a flexible-joint input-shaft coupling which allows easy subsequent location of the steering shaft relative to the dashboard in the cockpit.

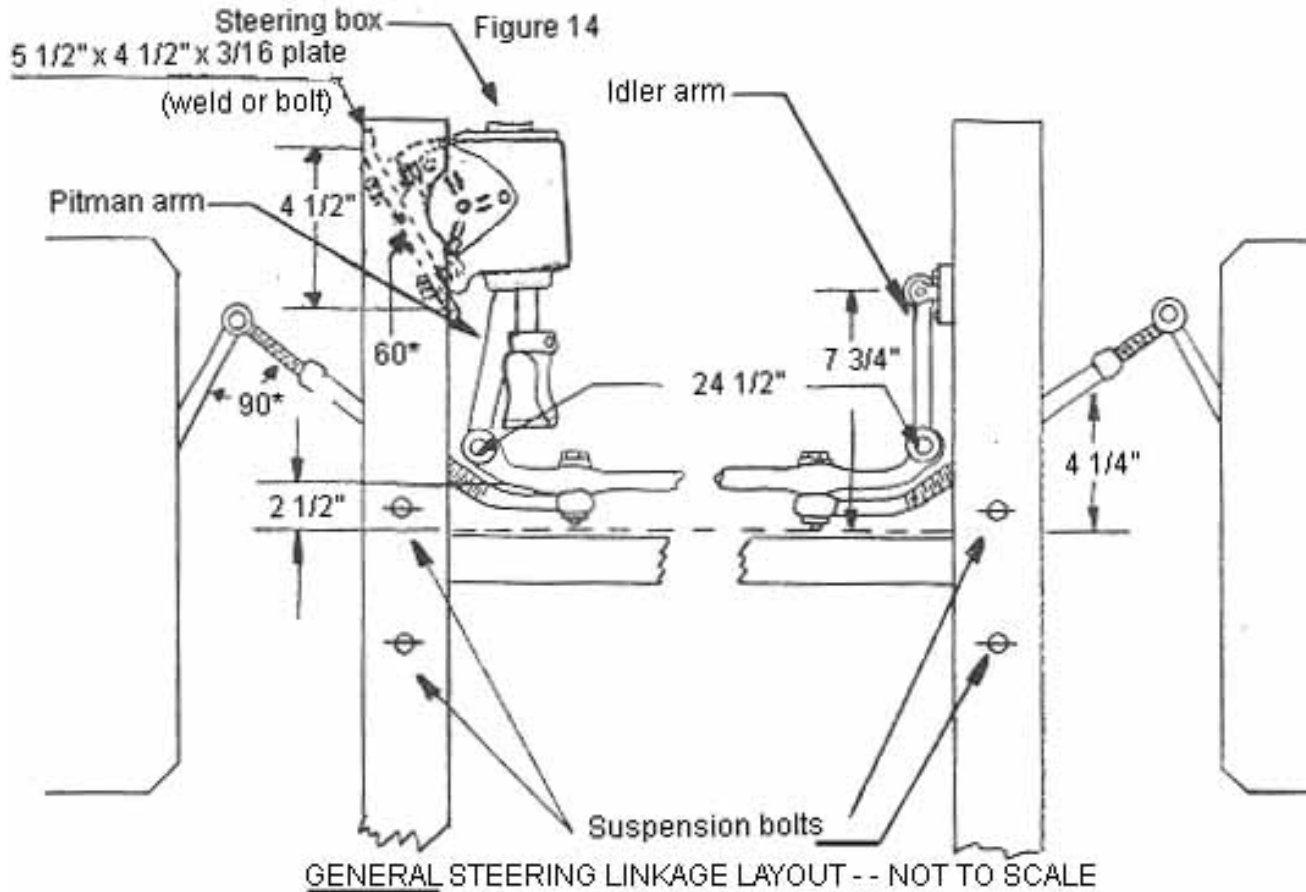
MOUNTING THE CORVAIRE STEERING BOX

To accommodate the valkyrie track and frame dimensions, the Corvaire crosslink must be shortened to 24 1/2" (center-to-center between the idler arm and the pitman arm pickup points, as shown in Fig. 13). Be sure to cut the ends of the crosslink not the center.



The shortening is best accomplished by cutting and rewelding with low-hydrogen rod. When the crosslink is cut and rewelded, perfect alignment is essential.

The steering box is bolted to the inside of the left (driver's) forward side-rail and the idler arm support is bolted to a piece of 1 1/2" x 1 1/2" x 3/16" steel angle which in turn, is bolted to the inside of the right forward side-rail (passenger's side). See figure 14 for location points.



Referring to above:

- 1). Crosslink parallel with front axle, 2" in front of edge of axle.
- 2). Maintain a 90 degree angle between tie rod & steering arm, or slightly greater.
- 3). Idler arm and pitman arm, stock length, as are the tie rods and steering arms.
- 4). Angle iron for idler arm 7 3/4" forward of center of front bolt holding suspension to frame.

Steering, continued:

To locate the mounting positions for the steering box and the idler arm bracket, set the wheels parallel and straight ahead; set the tie-rods to equal lengths (about midway in its turning range). Engage the idler arm, mounted on its mounting bracket, and the pitman arm (on the steering box) with the right and left ends, respectively, of the modified crosslink. Now, the idler arm and steering box are simultaneously positioned on the frame rails (use large "C" clamps to temporarily hold these in place) such that the idler arm and pitman arm are symmetrical to the chassis centerline and the crosslink is perpendicular to the chassis centerline (see fig. 14).

In addition, the pitman arm and idler arm should be parallel in side view and should be both nearly parallel with the "road" surface. When the three conditions mentioned above are satisfied, permanently attach the steering box and idler arm bracket to the frame.

It should be noted that the three conditions placed on the location of the steering linkage can be satisfied using the Corvair or Corvette steering box and modified crosslink.

The Corvair box, however, has one drawback; the axis of rotation of the pitman arm is not parallel with the steering box mounting surface. Hence, the box cannot be mounted directly on the inner surface of the side rail - the rail must be indented to accommodate the angle of the Corvair box. (see fig.14)

This may be accomplished by torching or drilling/sawing through the inner surface of the side-rail, forming a rectangular hole 6" x 5". A 3/8" thick steel plate should then be welded to the frame at an angle, such that the Corvair box can be indented at a proper angle.

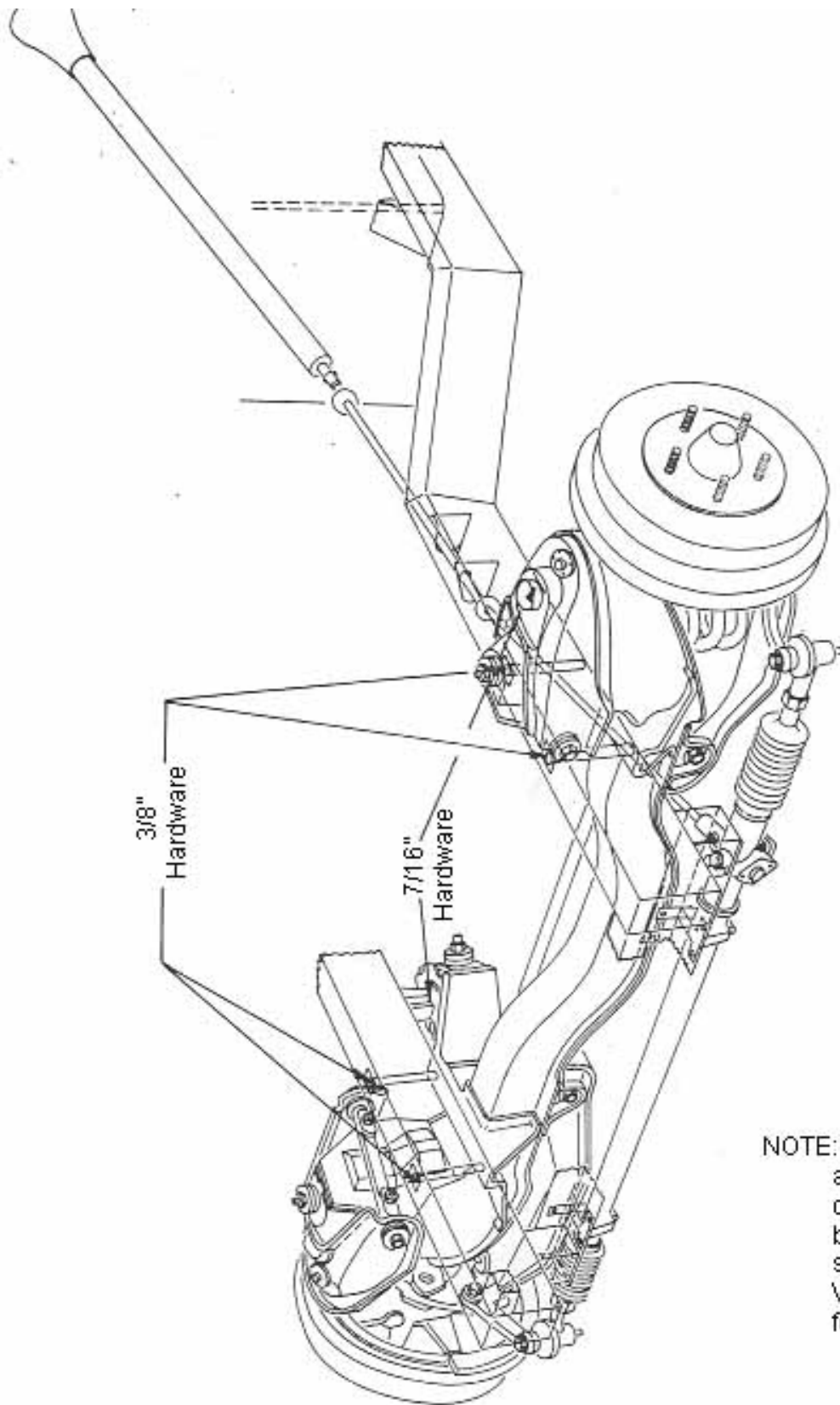


FIGURE 4-1
 LOCATION OF FRONT SUSPENSION
 MOUNTING HARDWARE

NOTE: This layout of rack and pinion is as used on the Jamaican V-8 kit, but can be used in the same manner in the Valkyrie, if you prefer.

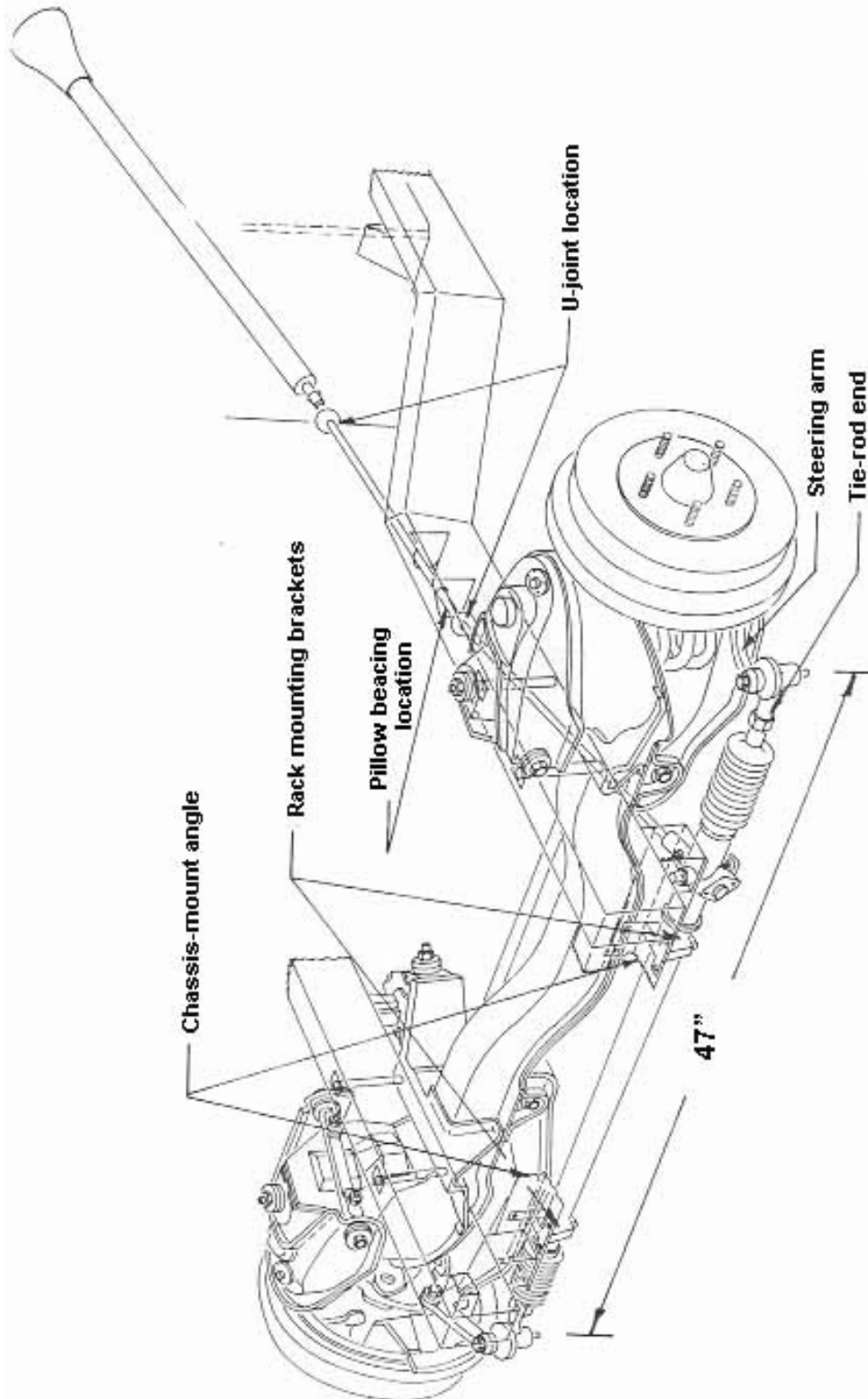


FIGURE 4-2
RACK AND PINION STEERING
DETAIL

Note: This layout of rack & pinion steering is as used on the Fiberfab Jamaican V-8 kit, but can be used in the same manner on the Valkyrie.

INSTALLING THE ENGINE/TRANSAXLE/REAR SUSPENSION:

In an earlier section of the instructions, assembly procedures are given which when completed, yielded a Valkyrie drive-train ready for installation in the frame. This section describes the the installation of the drive-train and the attachment of the rear suspension elements to it (drive-train) and the chassis - - the elements we refer to are all shown in Fig. 3.

Prior to the actual installation of the drive-train, the central drive-train support cross-member is removed from the chassis by breaking the temporary retaining welds. This cross member is then attached to the bellhousing-to-gear box adapter plate via a bolt through a rubber bushing in the plate and through the mounting tab at the center of the crossmember.

Once the crossmember is attached to the adapter, the drive-train can be positioned in the chassis such that the HURST front motor mounts rest on the pedestals provided on the frame and that the rear "ΔΔ" mount rests as shown in Fig. 10. Locate the center of the rear mounting "ΔΔ" plate 1 1/4" to the left of the center-line (this off-center location results from the asymetry of the Corvair ring and pinion--the pinion gear shaft is not centered between the axles, it is 1 1/4" closer to the drivers side). The center-line of the drive-train (eg. the axis of the crankshaft) is inclined slightly with respect to the chassis center line and, in turn, the base of the "ΔΔ" plate is not parallel with the frame member upon which it rests (note, that the inclination does not exceed 15* and its effect on the operation of the axle universal-joints is negligible).

With the HURST motor mount bolted to the frame mounting pedestals and the "ΔΔ" plate bolted or welded in place. The rear of the drive-train should be lifted until the rear rubber mounts show a slight reduction in compression (eg. their "buldge" is slightly reduced) indicating a lessening in the load they are supporting. With the drive-train in this "lifted" position, the central drivetrain support crossmember and the flanges to which it was formerly welded, can be drilled (two 5/16" holes per flange) and the crossmember bolted in place. The drive-train can now be released from its lifted position.

The purpose of the "lifting" procedure described above is to load the central support. If this support were to be installed without lifting the drivetrain, it would carry no load and would have little use as a supporting member. Inasmuch as the drive-train is nearly 50" long and weighs about 500#, it must be supported at its center--hence, the lifting procedure must be performed to guarantee the loading on the central support.

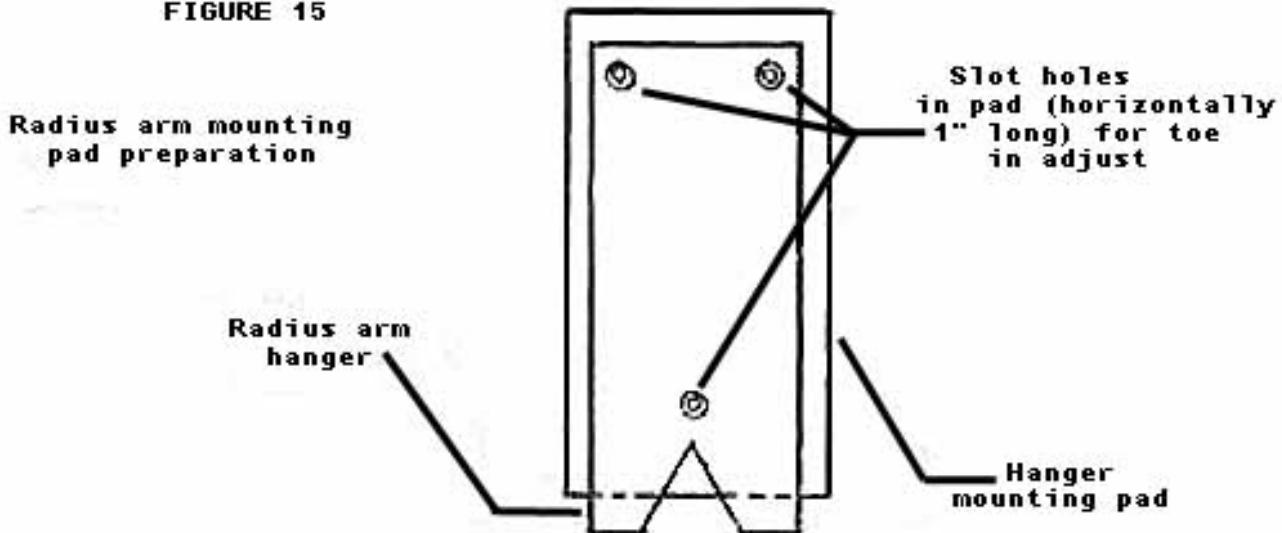
Now the right and left radius-arms, axles, suspension links, brakes and shock absorbers can be assembled into two units. The inner ends of the axles are then engaged with the universal-joint forks projecting from the side of the differential housing and are bolted in place. The lower suspension link pick-up brackets are bolted to the bottom of the differential housing and the inner ends of the suspension links are then bolted in the brackets. The cast aluminum radius arm hangers are bolted to the ends of the radius arms and temporarily clamped to the mounting pads on the side of the frame. The springs are placed on top of the radius arms and their upper ends are placed in the spring retainers bolted to the ends of the rear frame crossmember (the spring retainers should be midway in their adjustment range).

Note: Wheelbase should be 100" (+ or - 1/4"), check both sides.

Wheels and tires should now be bolted to the brake drums-front and rear and the weight of the chassis is supported on the tires through the springs. With the rear springs compressed, the shock absorbers can be attached to their frame mounting pads at the ends of the rear crossmember opposing the spring retainers (once installed, the shock absorbers serve to retain the springs when the weight of the chassis is removed). Suggested tire size: Front, 070x14; Rear F70x14.

Finally, the temporary clamps holding the radius arm hangers in place are removed. The radius arms should seek their "preferred" static orientation. Some pushing and shoving may be required to achieve this orientation if the rubber bushings throughout the suspension took a set during the initial assembly of the suspension elements. When the radius arm hangers are positioned as shown in Fig. 15, drill the mounting pad through the hanger, using it as a drill jig.

FIGURE 15



COMPLETING THE CHASSIS PREPARATION:

When you finish the construction procedures given in the previous section, your Valkyrie kit chassis is complete, the frame, front, rear suspension and drivetrain have all been assembled together. However, the following additional preparation must be made before the Valkyrie body can be mounted to the chassis:

- 1). The hydraulic system,
- 2). The fuel system,
- 3). The cooling system,
- 4). The shifting linkage

Note: A slight forward angle of the axles when installed, is desirable, as long as wheels are parallel.

THE HYDRAULIC SYSTEM:

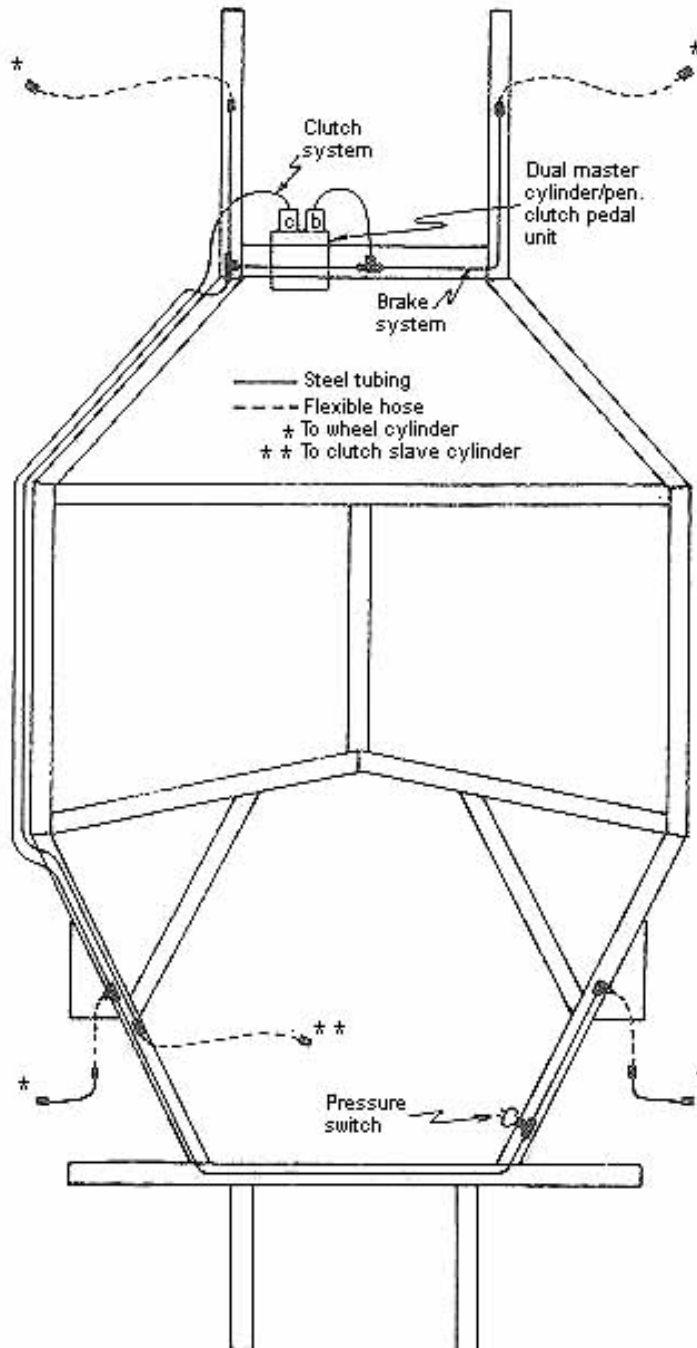
The hydraulic system for the Valkyrie is comprised of:

- 1). Dual master cylinder, pendulum pedal unit
- 2). Wheel cylinders - integral parts of the Corvair brakes
- 3). Clutch slave cylinder
- 4). Five flexible hydraulic hoses
- 5). Ten sections of various lengths of steel tubing (40')
- 6). Five tubing-to-hose adapter fittings
- 7). Four "T" fittings
- 8). Twenty male tubing-terminating fittings (all tubing fittings should be flare-type, not ferrule-type)
- 9). Three dozen plastic tubing hold-down clamps.

See figure 16 for general layout of the hydraulic system.

FIGURE 16

HYDRAULIC SYSTEM LAYOUT



Referring to **Fig. 16**, the master cylinder assembly is mounted, using a steel plate angle bracket, to the top of the front crossmember. From the brake master cylinder, tubing is routed to a "T" fitting mounted near the center of the crossmember. From the "T" fitting tubing is routed as shown in **Fig. 16**.

The flexible hose coupling the front wheel cylinders to the tubing on the frame must be of sufficient length to allow unrestricted turning, bounce and rebound of the front wheels - restrict the motion of the hose only to avoid abrasion of the hose suspension components. The tubing on the rear brakes and clutch slave cylinder is fastened with hold-downs along the outside of the frame. The "hinge", tubing is run along the top of each radius arm to the wheel cylinders to complete the rear brake hydraulic circuits. At some point in the tubing between the rear brakes, a "T" fitting should be inserted to accommodate a brake light pressure-switch - wiring details for this switch are given in wiring section.

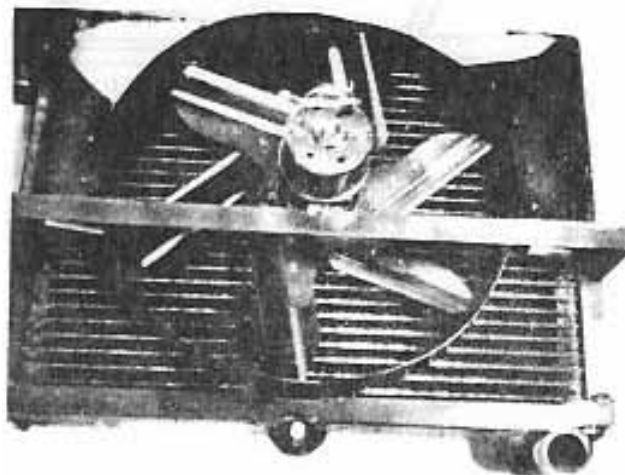
THE FUEL SYSTEM:

Valkyries built by customers have successfully utilized several fuel system configurations. One configuration employs specially prepared gas tanks constructed to exactly fit in the triangular openings in the frame adjacent to the engine bay. These tanks were fabricated of aluminum sheet, heliarced together. The tanks were joined bottom-to-bottom by a balance tube. Gas was delivered from the right hand tank to the mechanical fuel pump on the engine block via flexible hose from the tank bottom.

Another possible location for a fuel tank is: 1). In the space above the gearbox/differential housing just behind the drive-train central support and ahead of the rear crossmember; 2). In the front in the area behind the radiator, in front of the rear crossmember; 3). In the rear-most portion behind the rear cross member just in front of the access floor on the tail of the Valkyrie GT-X.

THE COOLING SYSTEM:

The cooling system for the Valkyrie uses a radiator mounted at the very front of the frame with coolant carried to and from the engine by piping along the sides of the frame. The recommended radiator is the Harrison-DeLco GM 3150916 unit used in Corvettes since 1961. This radiator is mounted in a frame constructed of 1"x 1"x 1/8" steel angle. The frame is attached to the chassis frame rails as shown in **Fig. 17** and to the radiator as shown in **Fig. 18**. Note that the radiator, as used in the Valkyrie is upside-down. In addition, the overflow pipe must be plugged and a stopcock screwed into the "stop-cock" hole. The stop-cock can be used as an air bleed when the cooling system is filled.



- 22 -
COOLING SYSTEM GENERAL LAYOUT

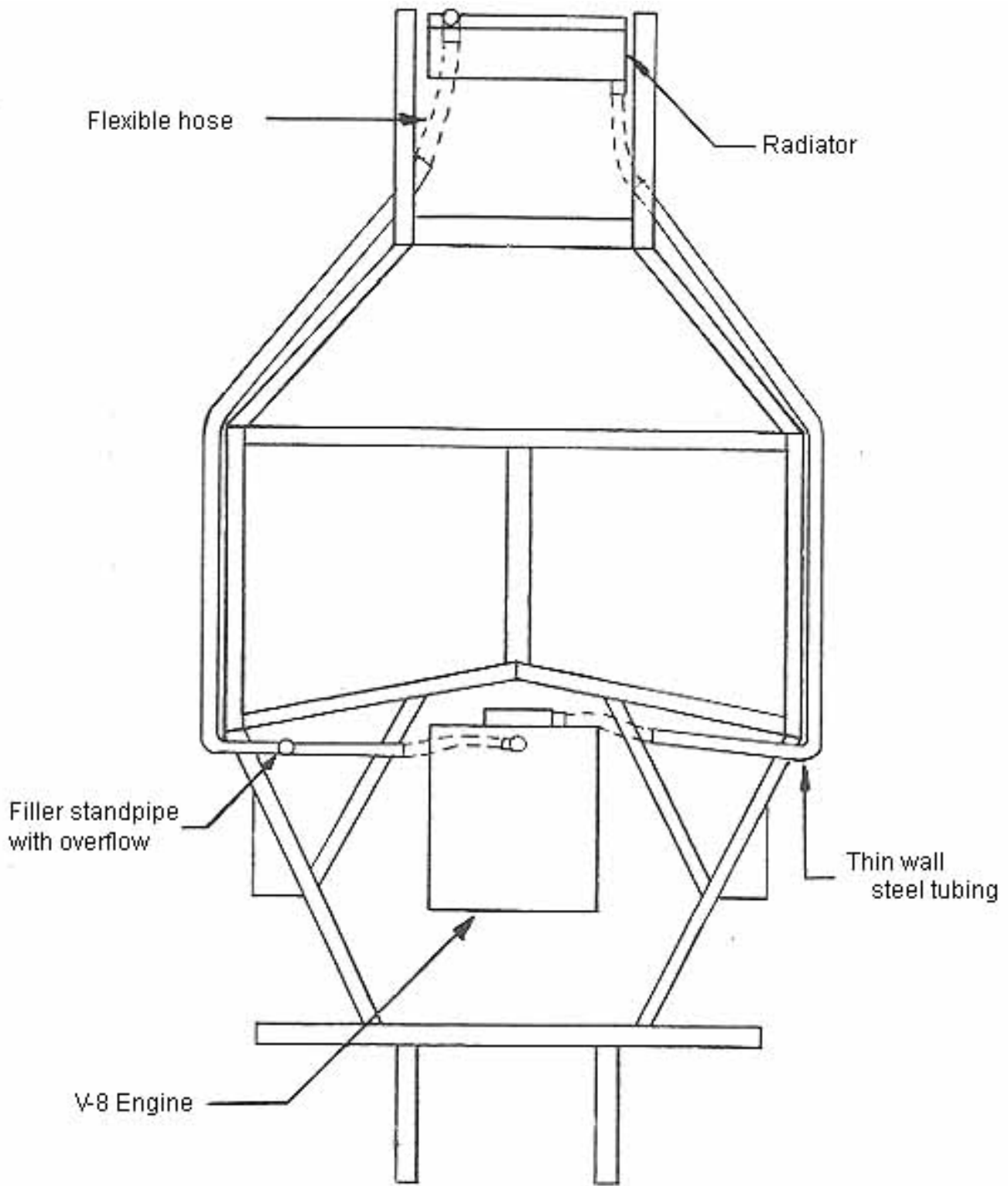


FIGURE 19

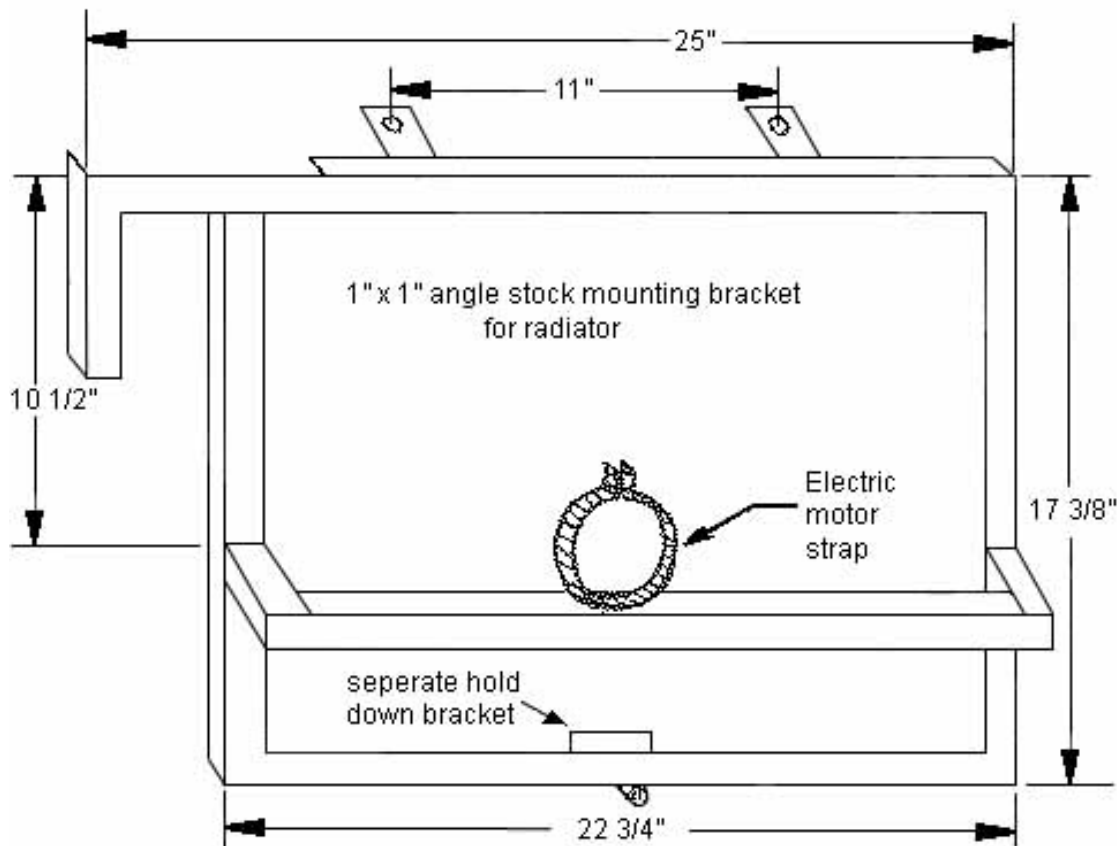
Cooling system continued.

Check with body on temporarily for clearance and angle of radiator. An electric fan (heater motor from car) with a switch on dash should be used for cooling purposes. This should have approximate a 14" aluminum or fiberglass 6 blade fan.

The general routing of the coolant piping is shown in Fig. 19. Basically, the tubing runs along the bottom of the frame. It is shown along-side the frame in the sketch, but only for reference purposes. The system is filled through an expansion tank, capped with a standard radiator pressure cap, over flow is accommodated at this point in the system. The expansion tank is "tapped" into the cooling system in the location shown in Fig. 19. It projects up from the pipe just behind the drivers seat or some other convenient accessible location.

The cooling system is constructed of thin-wall steel tubing (exhaust pipe tubing) or any tubing with an o.d. greater than 1 1/4". The routing of the tubing is accomplished by (a) cutting and welding, (b) careful bending, avoiding collapse of the tubing or (c) connecting straight sections with pieces of pre-formed rubber hose (by "pre-formed" we mean short sections of hose permanently formed at different angles). In any case, paint the outside of the steel tubing with rust inhibiting paint before final assembly and use stainless steel hose clamps for assembly.

Also, in connection with the cooling system, you must saw open the air inlets in the nose of the Valkyrie body and it is recommended that the air outlets in the "hood" be opened, also. If any screening or metal mesh is to be placed in the outlets, now is the time to install it.



To fabricate shift mechanism as on the proto Valkyrie GT-X, you will need the following:

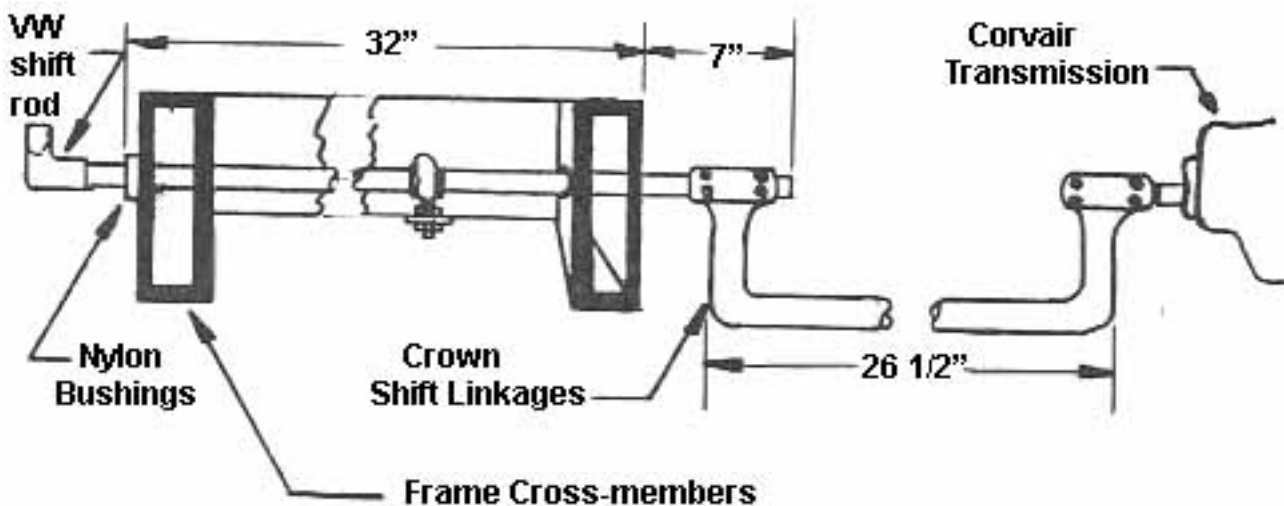
VW Hurst shifter #291-7469, Crown Shift Linkage #4005, About 32" of 1" o.d. thin wall tubing, about 7" of 1" I.d. tubing for a sleeve.

You will also need the forward portion of a VW shift rod and some steel plate to fabricate a mounting bracket, plus 1 VW nylon bushing.

The shift rod passes through the frame in two places. Through the first wide cross-member (place nylon bushing on the side) and then through the rear cross-member (the section of frame that is at a slight angle). It is not necessary to place a nylon bushing here, but it is desirable.

See shift rod configuration below:

Note: The centers of the holes in the frame cross-members are approximately 1 1/2" above the bottom edge of the frame.

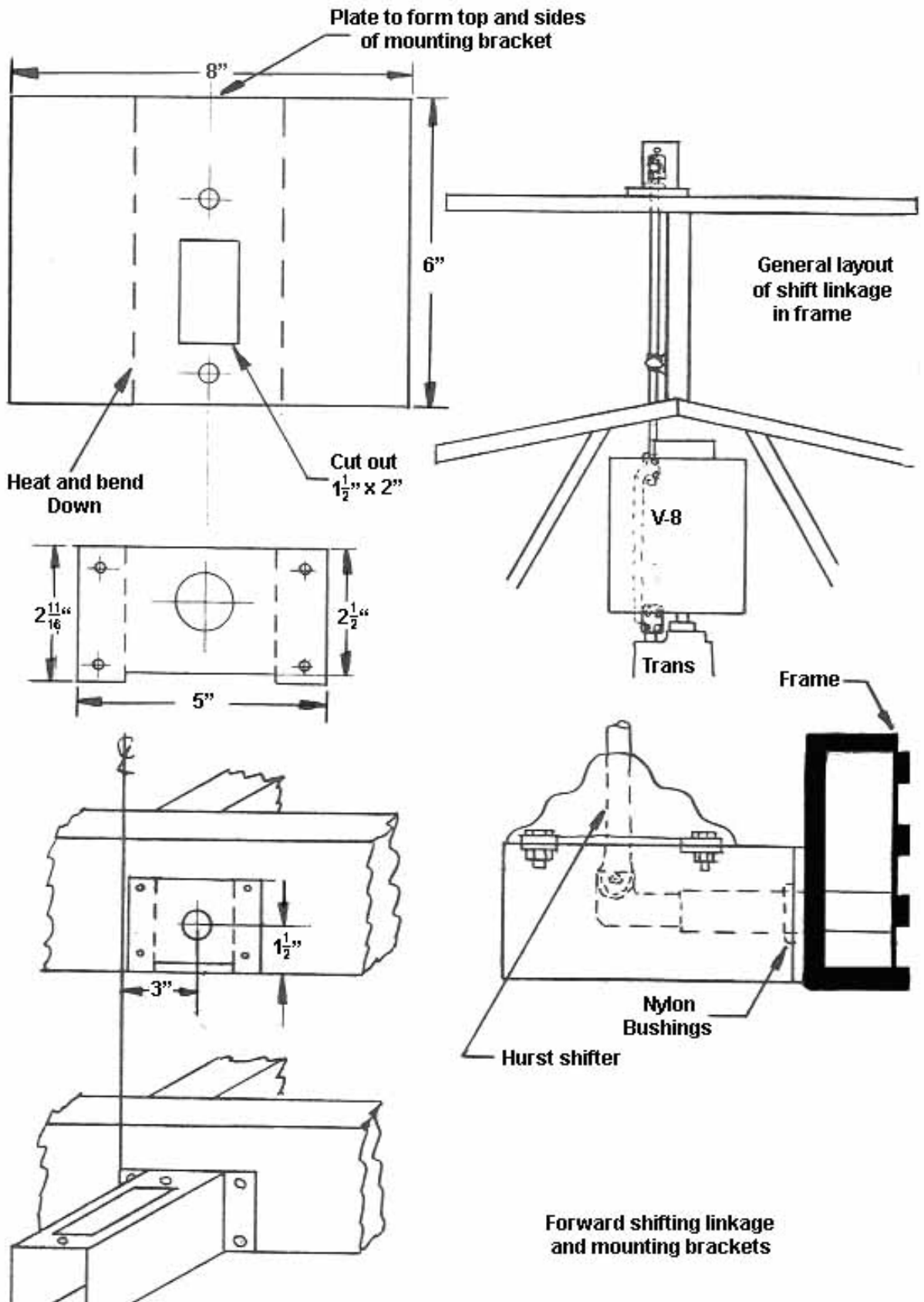


See the following page for suggested fabrication of shift tower bracket and placement on the frame.

The bracket should be placed behind the first cross-member, passing through only the second cross-member. It is best to determine most desirable positioning of shifter from inside cockpit area.

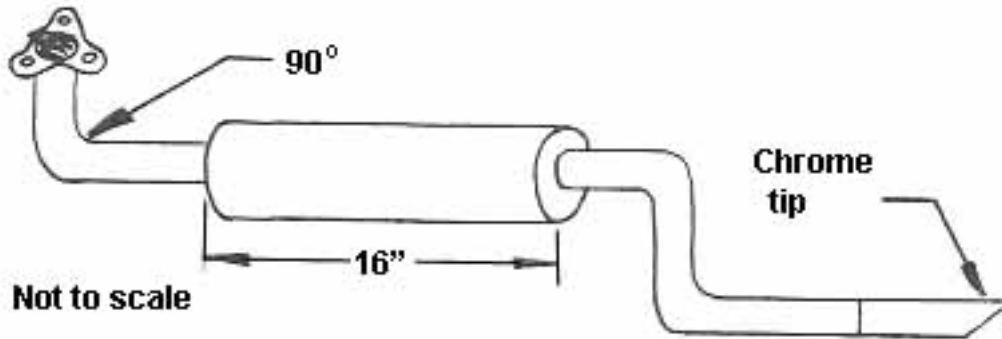
The VW shift rod may be used (instead of the 1" tubing, 32" long), but careful straightening of the bends in the VW shift rod, must be accomplished.

As straight a line as possible, must be maintained between the shift rod pivot point and the rod extending out of the Corvair box. After hook-up of linkage, heating the bends in the Crown unit will relax the bends and take care of any misalignment, making for a smoother shift pattern.



An exhaust system can be installed at any time, even after the body is mounted. Unless you plan to fabricate your own system, we recommend that you use the cast iron stock exhaust manifolds and take your Valkyrie to a local exhaust specialist for the balance of the system.

If you plan to do your own, a dual method may be made from two cylinder type mufflers (e.g. Thrus) about 16" long, 6-90* bends and muffler hangers and clamps to secure the system to the frame.



Several other configurations would be equally suitable.

MOUNTING THE BODY:

Your Valkyrie body is recieved with an integral floorpan already laminated in place in the main body. This floorpan was designed in such a way that it fits exactly into place on the chasis, e.g. with the grooves in the floorpan in front of, between and to the sides of the molded-in seats, firmly engaging the frame. In essence, the frame fits up to the grooves of the floorpan.

Before mounting the body permanently, it is suggested that 1/4" thick rubber be glued to the frame, along the parts where the body will rest. That is, along the top of the frame, to act as a cushion (spacer) between the body and frame.

Several persons should be available to lift the body - carefully jockey back over the frame giving special care as the radiator enters the nose of the body. The tail section should be held slightly higher than the nose as it enters the front part of the frame.

Secure the body to the frame using 1/4" x 1" sheet metal screws through the floorpan into the frame, using large washers.

Secure the nose of the body to the frame, through the inner panels in the nose into the frame extensions supporting the radiator. No less than 16 screws for the body, 4 for the nose.

Braces should be made from the frame to the inner panels in the tail.

Now a hole can be bored through the firewall to accept the steering column. This will be near the corner of the wall, above the cross-member, so that the steering column rests on the top of the frame, passing through the front wall and into the "valley" between the two large guages. It should then be clamped to the valley and the front wall. Before mounting permanently, check to be sure distance between driver and steering wheel is desirable. If necessary, shorten steering column to have done by a local reputable welder.

The balance of this manual covers the electrical system.

MOUNTING THE ELECTRICAL COMPONENTS AND WIRING:

This section of the instructions provides the ground rules for installing the electrical system in your Valkyrie kit. The configuration described below is based on the factory-assembled wiring harness which has proven most adaptable to a variety of engine/lighting/instrumentation combinations. The configuration is also based on our experience regarding the most convenient, practical or serviceable placement of electrical system components.

To begin, an electrical system/wiring harness should provide:

- 1). Engine starting
- 2). Engine ignition
- 3). Engine instrumentation (temperature, oil pressure)
- 4). General instrumentation (fuel level, battery/generator condition)
- 5). Interior lighting
- 6). Exterior lighting
- 7). Power for accessories (switch controlled and/or direct)

At this stage in the construction process, most items to be wired have already been installed with the drive-train or during the assembly of the body.

The following items, however, have not been installed:

Battery, in the triangular opening in the frame on the right or left side of the engine (12 volt)

Voltage regulator, mount to bulkhead (back of seats) to the right of the engine or on the engine surround.

Tail lights, brake lights, Factory uses Doray lights, many other units are quite suitable.

Front parking/turn indicator lights, Factory uses Yankee lights

Headlights, in the recesses provided in the Valkyrie body, 1958 Chevrolet dual headlight units, be sure to position the dual filament lamp to the outside of the body.

Courtesy lights, in the interior, on dash or under dash on either side.

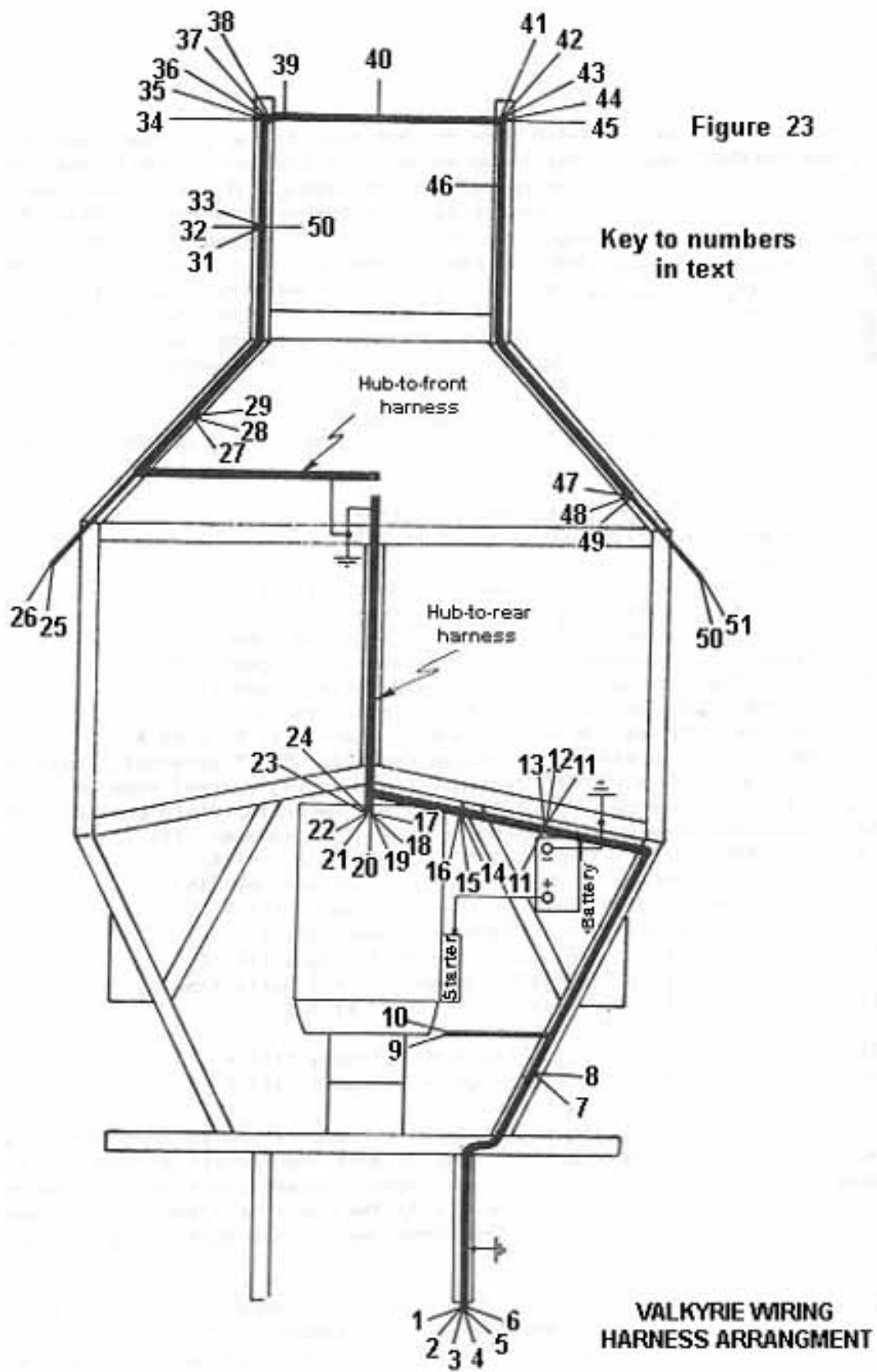
REMEMBER, unlike steel, fiberglass is an insulator. Any electrical component mounted in fiberglass requires a separate ground (return path) wire.

Guages, should be already installed and should be wired as per manufacturers' instructions.

THE WIRING HARNESS:

The harness is divided into three major pieces, the hub or dashboard section, the hub-to-front harness and the hub-to-rear harness.

[Figure 23](#) shows the general routing of these harnesses relative to the Valkyrie frame.



The hub-to-rear harness is routed from the hub down to the floorpan then back through the central longitudinal frame member. As the harness exits the rear of the frame member, eight wires emerge and the balance in the harness are routed right along the central transverse frame member. In the vicinity of the generator three wires emerge. In the area of the voltage regulator, three more wires emerge. When the harness reaches the outside frame-rail, it is routed back along it. At the drive-train central support two wires are routed left and down to the reverse-light switch. At the brake-light switch two wires exit the harness. From the brake-light switch the harness continues back and down the right, rear hanger for the rear body section. At the end of the hanger the harness terminates six wires in a connector.

Referring to the numbers shown in **Fig. 23**, the wires in the hub-to-rear harness terminate as follows:

- 1). Connector - - tail light power (16)*F**
- 2). Connector - - brake light power (16) B
- 3). Connector - - right turn indicator power (16) F
- 4). Connector - - left turn indicator power (16) F
- 5). Connector - - back-up light power (16) R
- 6). Connector - - ground (a short wire from the connector to the frame) (16)
- 7). Brake light pressure switch - - brake light power (16) A
- 8). Brake light pressure switch - - +12 volts, fused (16) B
- 9). Reverse light switch - - back-up light power (16) A
- 10). Reverse light switch - - +12 volts, fused (10) F (16) A
- 11). Battery (+) terminal and voltage regulator "BAT" terminal, charging current (10)
- 12). Voltage regulator "ARM" terminal - - charging current from ammeter (10) F
- 13). Voltage regulator "FIELD" terminal - - generator field control (16) B
- 14). Generator armature - - charging current to ammeter (10) T
- 15). Generator field - - generator field control (16) A
- 16). Starter solenoid - - +12 volts from ignition key (16) F
- 17). Oil temperature sender - - signal to gauge (16) T
- 18). Oil pressure sender - - signal to gauge (16) T
- 19). Water temperature sender - - signal to gauge (16) T
- 20). Ignition coil (+) or "SW" terminal - - +12 volts from ignition key (16) F
- 21). Tach signal (from sender or coil) - - (16) T
- 22). Spare - - (16) T
- 23). Courtesy light - - +12 volts from switches (16) F
- 24). Courtesy light - - 12 volt return (ground) (16) F

Again, referring to **fig. 23**, the hub-to-front harness is routed from the hub up to the cowl. Then to the left under the cowl to exit the cockpit through the firewall, two leads are routed back to the left hand door courtesy light switch; the balance are routed forward atop the side framerail to the radiator frame. Three leads emerge from the harness in the vicinity of the dimmer switch and four emerge at the horn relay.

At the radiator frame, outside the splash panel, five leads are brought out of the harness to the parking and headlights. The harness is then routed right, through the splash panel. Just inside the left splash panel, a single lead to the horn emerges and another lead is brought out at the center of the radiator frame. Just outside the right splash panel five leads exit the harness to the parking and headlights.

From the right side of the radiator frame, the harness is routed back along the side frame-rail to the right hand door hinge area. Near the front of the frame rail a single lead is brought out, if required for the electric fuel pump. Near the hinge area three leads exit it for the windshield wiper motor. Two leads extend into the hinge area to the right hand door courtesy light switch.

In terms of numbers shown in Fig. 23, the circuits carried in the hub-to-front harness are:

- 25). Courtesy light switch (left door) - - courtesy light power (16) T
- 26). Courtesy light switch (left door) - - +12 volts, fused (16) F
- 27). Headlight dimmer switch - - +12 volts from headlight switch (10) F
- 28). Headlight dimmer switch - - low-beam power (10) A
- 29). Headlight dimmer switch - - high-beam power (10) A
- 30). Fuel level sender - - signal to guage (16) T
- 31). Horn relay "signal" terminal - - signal from horn button (16) A
- 32). Horn relay "HOT" terminal - - +12 volts (16) F
- 33). Horn relay "CONTROL" terminal - - power to horn (16) A
- 34). Lamps ground - - (10) F (10) A
- 35). Headlight high-beam - - high-beam power from dimmer switch (10) B (16) A
- 36). Headlight low-beam - - low-beam from dimmer switch (10) b (16) A
- 37). Left-turn indicator lamp - - "flasher" signal (16) F
- 38). Parking lamp - - +12 volts from headlight switch (16) f (16) A
- 39). Horn - - "control" signal from horn relay (16) B
- 40). Cooling fan motor - - +12 volts, switched, fused (16) F
- 41). Parking lamp - - +12 volts from headlight switch (16) B
- 42). Right-turn indicator lamp - - "flasher" signal (16) F
- 43). Headlight low-beam - - low-beam power from dimmer switch (16) F
- 44). Headlight high-beam - - high-beam power from dimmer switch (16) B
- 45). Lamps ground - - (10) B (16) A
- 46). Electric fuel pump - - +12 volts, switched, fused (16) F
- 47). Windshield wiper motor ground - - 12 volt return (16) B
- 48). Windshield wiper motor "run" terminal - - +12 volts, fused (16) F
- 49). Windshield wiper motor "start" terminal - - 12 volt ground switched (16) F
- 50). Courtesy light switch (right door) - - courtesy light power (16) T
- 51). Courtesy light switch (right door) - - +12 volts, fused (16) F

NOTE: Numbers in parenthesis refer to recommended wire size
 F= from hub; T= to hub; A= ahead in harness (away from hub);
 B= back in harness (towards hub)

The factory hub wiring includes a six-fuse block with integral flasher (turn indicator interrupter) unit. A Corvair fuse-block, or equivalent, is appropriate. The fuse-block is mounted on the firewall, at its center, about 10" above the floor. The fuses are used for:

- 1). Headlights
- 2). Parking/courtesy/instruments lights
- 3). Brake/back-up lights
- 4). Windshield wiper motor, cooling fan motor and fuel pump
- 5). Spare for accessories
- 6). Flasher unit

Hub wiring includes the following (#16 wire unless otherwise noted):

- 1). Wire all gauge/instrument grounds together and to ground
- 2). Wire all gauge/instrument lights together and to "dimmer" terminal
- 3). Wire gauge "ignition" terminals together and to "accessory" terminal on ignition switch
- 4). Wire ammeter "charging" (+) terminal to:
 - (a) Lead #14 (see Fig. 23)
 - (b) "BAT" terminal on ignition switch
 - (c) "BAT" #1 terminal on headlight switch through fuse #1
 - (d) "BAT" #2 terminal on headlight switch through fuse #2
 - (e) Lead #10 through fuse #3
- 5). Wire ammeter "discharging" (-) terminal to lead #12
- 6). Wire ignition switch "accessory" terminal to:
 - (a) Fuel pump
 - (b) Windshield wiper motor and cooling fan switch through fuse #4
 - (c) Fuse #5
 - (d) Flasher through fuse #6

The remaining hub to wiring is fairly obvious; e.g. the starter solenoid is wired to the "SOL" terminal on the ignition switch, the ignition coil is wired to the "IGN" terminal on the ignition switch, the headlight dimmer switch is connected to the headlight switch, etc.

To complete the wiring, the rear body section is wired as an independent unit. The tail lights, brake lights, back-up lights and turn-indicators light wires are routed to the right side and terminated in a connector to mate with the hub-to-rear harness (leads 1-6). If a license plate light is incorporated, its power is derived from the tail light circuit.

Be sure to ground all rear lights, in a series and to the frame.

INTRODUCTION TO THR GT-15 KIT

Fiberfab's basic product-line has been; and remains today; sophisticated, fiberglass automobile bodies designed expressly for application to Volkswagen floorpans as elegant replacements for the steel, "Beetle" body. Many purchasers of these bodies have enhanced the "go" of their VW-based vehicles by substituting a Corvair powerplant for the VW engine. Market surveys reveal, however, that many potential customers would like to use a Fiberfab body to cover a chassis using all Corvair components. Unfortunately, the Corvair, unlike the Volkswagen, cannot be reduced to a floorpan simply by unbolting and removing the steel body. In fact, once the Corvair body is removed (by cutting, not unbolting) no usable chassis remains which would be a sufficiently stable base for a fiberglass body.

Recognizing this market among Corvair-philers, and noting the shortcomings to the Corvair "chassis", Fiberfab has developed the GT-15 chassis/body kit based on its world-famous Valkyrie V8 and V8 kit. The GT-15 kit provides a complete, 3 piece, fiberglass body with integral floorpan plus a large-tube, heliarc-welded, ladder-frame designed to accept all Corvair drivr-train and suspension components. The following several pages represent the unique assembly instructions for the GT-15 kit. These special instructions, when combined with the extensive Valkyrie Kit Mounting Instructions, constitute the complete vehicle assembly instructions for the GT-15.

Footnote: As of 1971, the GT-15 kit is available in three forms:

GT-15 (same body style as GT-12, plain front-end) is available as a three piece body kit and is also available as a one-piece body kit.

GT-15X (newer body style, with spoiler on front-end) is available as a onepiece body kit, only.

For ease of assembly, we recommend the one-piece body kits---

GENERAL

To use these GT-15 instructions most effectively you should first read the Valkyrie Kit Mounting Instructions (hereinafter VKMI). The GT-15 kit is assembled in very nearly the same manner as a Valkyrie. The principal differences are:

<u>Valkyrie</u>	<u>GT-15</u>
1) One-piece body	1) one or three piece body
2) V8 engine ahead of transaxle	2) 6-cyl. engine behind transaxle
3) liquid cooling system required	3) no liquid cooling system required
4) seats integral with floorpan	4) bucket seats bolted to floorpan
5) 101" wheelbase	5) 95" wheelbase

CONSTRUCTION MATERIALS

Review the list of parts and materials given in the VKMI.

ACQUIRING COMPONENTS

The ACQUIRING COMPONENTS section of the VKMI is applicable to the construction of your GT-15. In your kit from Fiberfab you will receive:

1. GT-15 three-piece fiberglass body including integral floorpan, doors, doorinner-panels, console/dashboard, and bucket seats.
2. Front windshield (safety glass)
3. Rear window (safety glass, tinted)
4. Large tube (5"x2" rectangular tubing) ladder-frame including:
 - a. pedal-mounting bracket
 - b. radius arm pivots
 - c. pre-drilled and bushed front-suspension mounting holes
 - d. pre-drilled and aligned rear suspension/transaxle mounting pads
 - e. adjustable spring perches
 - f. pre-drilled shock-absorber mounting flanges
 - g. pre-drilled and aligned gear-shift mounting pedestal

You must provide the following major components:

1. Corvair transaxle/rear suspension.
2. Corvair engine.
3. Corvair front suspension.

Items 1 and 3 above are well-described in the VKMI. Item 2, the Corvair engine, can be purchased new from any Chevrolet dealer, used/rebuilt from an engine rebuilder, or used from an automobile dismantler. Before buying any engine from a dismantler have him run it for you. We suggest you avoid any pre-'63 engines and/or any Turbocharged engines.

One other item you should acquire, that is not described in the VKMI, is the pedal/emergency brake assembly. By removing the emergency brake portion of this assembly it can be used in place of the Honest Charlie unit described for use in the Valkyrie.

SG-2

ASSEMBLING THE ENGINE/TRANSAXLE UNIT

The Corvair engine and transaxle are assembled in their "stock" configuration.

INSTALLING THE FRONT SUSPENSION

Use the procedures described in the VKMI.

INSTALLING THE ENGINE/TRANSAXLE/REAR SUSPENSION

The installation of the engine/transaxle/rear suspension in the GT-15 is shown pictorially in Figures 1,2,3 and 4, below.

Figure 1 shows the drive-train in place in the frame. Note that the front is supported by the stock yoke which is bolted at both its ends to mounting pads on the frame--the rear is suspended by a single hanger attached to the bellhousing (it is advisable to place a rubber bushing in the hole in the bellhousing to reduce vibration-conduction to the frame). Figures 2 and 3 show, in detail, the attachment of the radius arms to the radius arm pads via the radius arm pivots. Also illustrated is the position of the shock-absorbers and shock-absorber mounting bracket. Figure 4 shows again the rear drive-train support and it shows the neutral position for the axles.

COMPLETING THE CHASSIS PREPARATION

Again, the procedure in the VKMI should be followed for the preparation of the hydraulic and fuel systems--obviously a cooling (liquid) system is not required and the shifting linkage is considerably less complex than the Valkyrie.

The Hydraulic system- If the stock pedal assembly (with emergency brake removed) is used, hydraulic lines need only be installed for the brake system--the clutch is directly cable operated as in a Corvair automobile. If the Honest Charley pedal assembly (preferred) is used follow the VKMI procedures.

The Fuel System- Follow the VKMI--the tank can be moved forward, however, since interference with a radiator is not a problem in the GT-15.

The Shifting linkage- Simply install the Corvair shift lever assembly on the pre-drilled pedestal provided with the frame. The shifting shaft is located within the 5"x5" central frame tube and connects at its rear to the shifting rod at the gearbox (see Figure 1). The shifting shaft will require shortening.

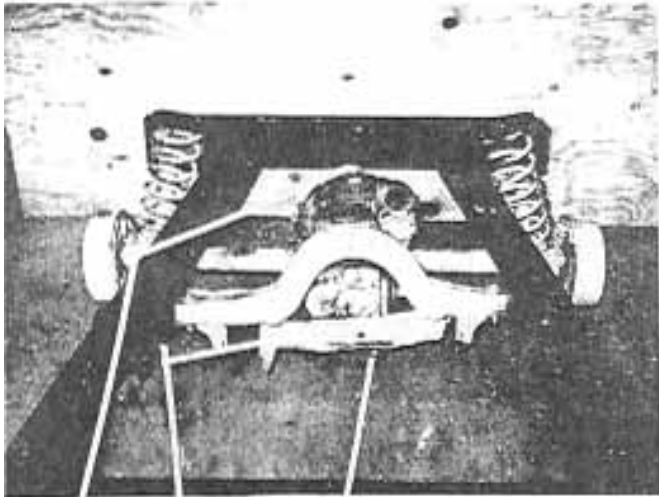
MOUNTING THE BODY

The GT-15 main body section is mounted on the frame via its integral floorpan which is molded to "lock in place". Once the body is on the frame it is affixed thereto using heavy gauge sheet-metal screws through the fiberglass into the upper surfaces of the frame members--use several dozen screws.

The GT-15 tail section is supported by the rear body hanger tubes (see Figure 4). A suitable pivot can be created as shown in Figure 5. Similarly, the front body section is supported, permanently or pivoted by the frame extensions extending forward beyond the front suspension mounting holes.

If the front and/or rear body sections are pivoted a suitable latching arrangement is shown in Figure 6. The latches used are inexpensive, easy-to-install Universal cabinet Latches manufactured by Southco Division, Chester Corporation, Lester, Pennsylvania 19113. The Southco number(s) are 61-10-2-0 (slotted flush type) or 61-99-113-10 (tamper-proof type) plus 61-7-3-14 (trim washer) and 61-0-6649-11 (key for tamperproof type). SG-3

FIGURE 1



Shifting Rod
Yoke Mounting Pads
Rear Hanger

FIGURE 2

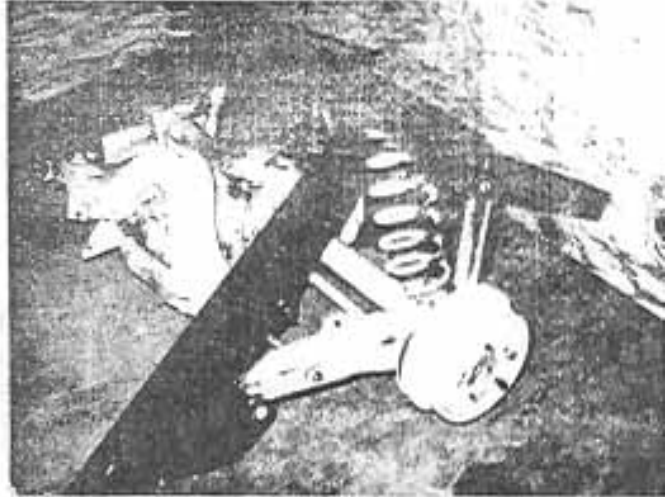
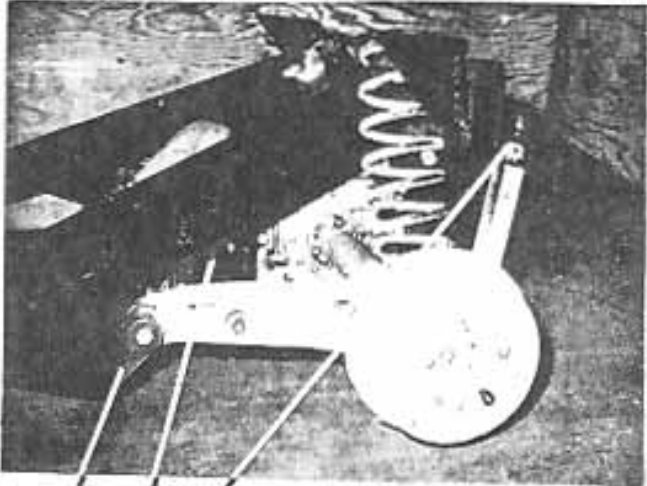
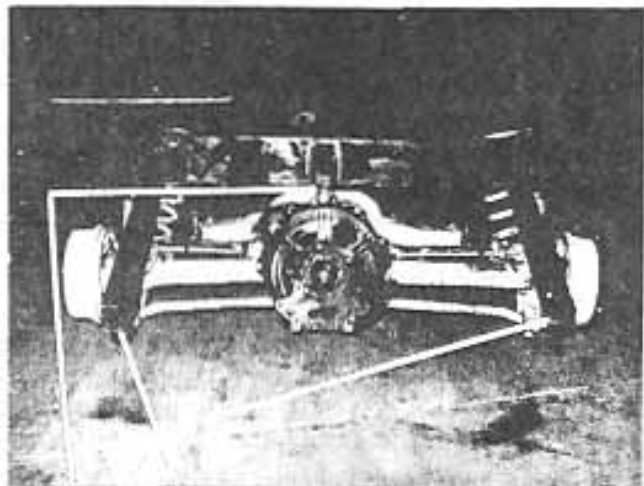


FIGURE 3



Shock Absorber Mounting
Yoke Mounting Pad
Radius Arm Pivot

FIGURE 4



Rear Body Hangers
Rear Hanger

GT-15 REAR STABILIZER BARS

Factory experience with the GT-15 has shown that rear wheel tracking and stability are greatly enhanced with the addition of stabilizer bars to counteract turning side-thrust. These stabilizer bars are bolted to the differential case as shown in Figure 1. The bars are labeled LEFT and RIGHT and should be attached at the left and right side of the case, respectively, looking from the rear (engine side). The bushed ends of the bars are secured under the rear-most frame crossmember with a bolt passed through the stabilizer bar attachment brackets (see Figure 2) and the bushings.

GT-15 chassis' bearing serial numbers 15-900-15 and below (i.e., 15-900-14, 15-900-13, etc.) were not equipped with the bar-brackets welded in place. Special, bolt-on bar-brackets are, however, available for these frames and should be located according to the bracket, clamping it in place, and then drilling (5/16" drill) two bolt holes in the rear frame crossmember using the holes in the bracket mounting flange as drill guides. Once the holes are drilled, pass the 5/16" bolts provided with the bracket through one bracket mounting flange, then through the rear crossmember and finally through the other mounting flange. Secure with nuts and lock washers. Repeat for the other bracket.

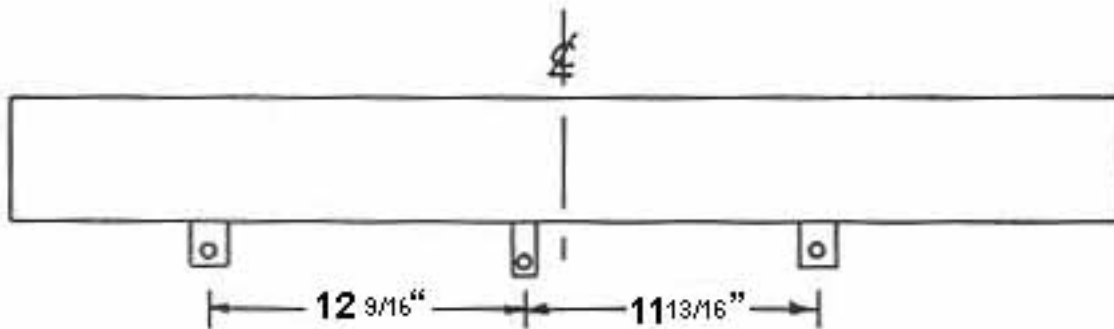
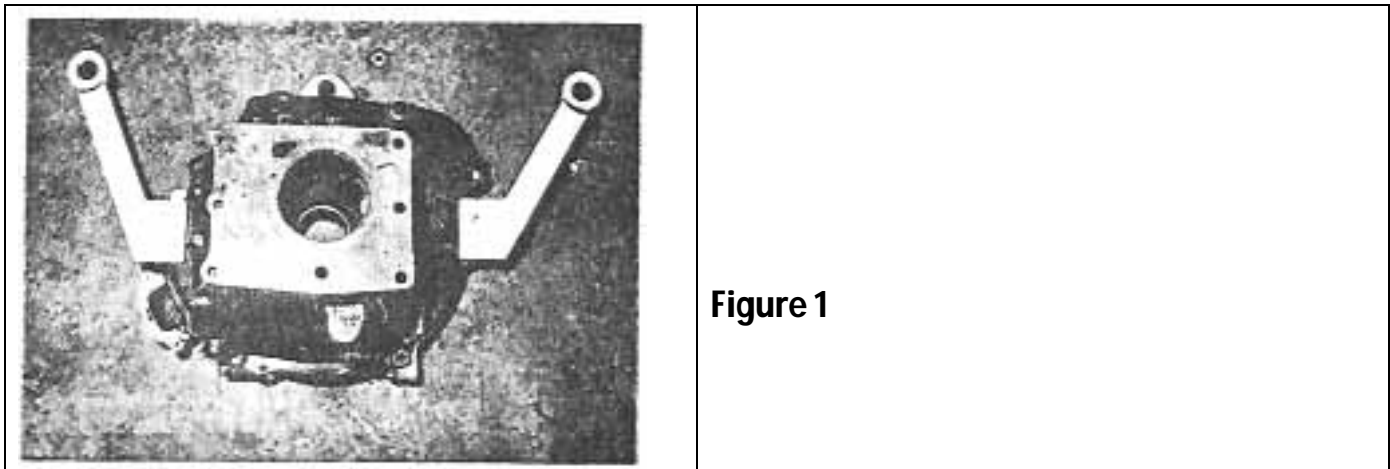


FIGURE 2