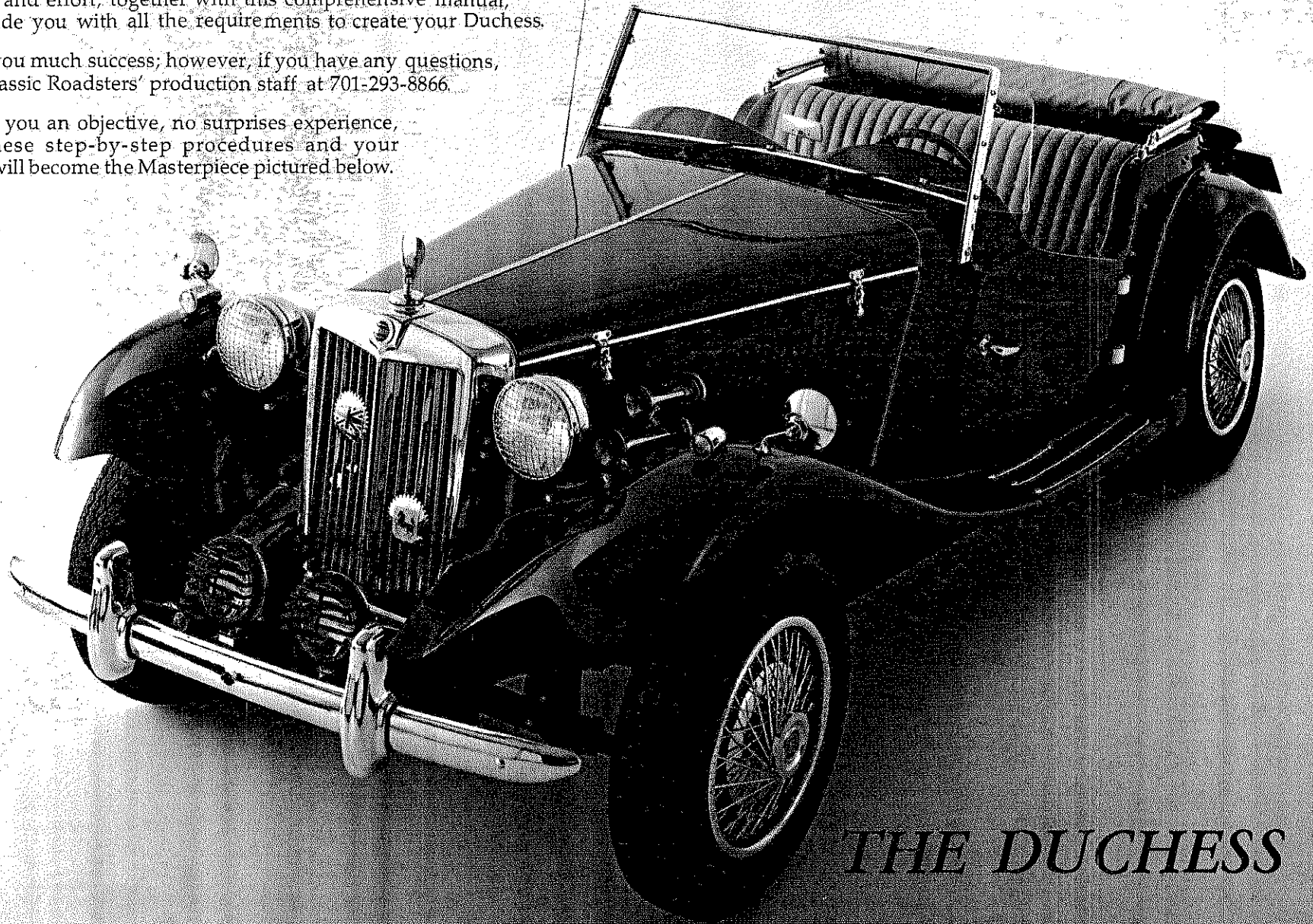


The integral parts of any superior product are excellence of design, quality materials, and skilled craftsmanship. We have supplied the design and materials.

Your care and effort, together with this comprehensive manual, will provide you with all the requirements to create your Duchess.

We wish you much success; however, if you have any questions, call the Classic Roadsters' production staff at 701-293-8866.

To assure you an objective, no surprises experience, follow these step-by-step procedures and your Duchess will become the Masterpiece pictured below.



THE DUCHESS

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Enthusiasm is a common emotion that runs high with everyone who builds a Duchess. We comment on enthusiasm because you will generally find enthusiasm accompanied by impatience.

The foundation of your Duchess is the chassis and we cannot emphasize too strongly the necessity for patience as you begin your search. Patience will not only save you money, it will save a great deal of rebuilding time.

Most chassis are found from the following sources: newspaper ads, weekly green-sheets, bulletin boards at universities, salvage yards, impound lots, insurance adjusters, bank repo's, used car lots, VW repair businesses, and by asking people who are driving a VW.

Many times significant values can be attained by purchasing a damaged VW. However, only by being able to drive the automobile can you test the chassis components. The components that must be of good quality are the engine, the transmission and transaxle, the floor pan, and the front end.

Another possibility is to purchase components and "build up" a chassis.

MINIMUM POINTS TO CHECK WHEN PURCHASING A USED VW

1. If damaged, check measurement from the center of the left front wheel to the center of the left rear wheel. Distances should be equal to the right side.
2. Check for rust on front torsion bar tubes and on floor pan (especially check the battery location under the rear seat). If any spots should be seriously rusted, keep looking.
3. Check front end for wheel bearing wobble, loose ball joints, worn shocks, and worn steering damper.
4. Check steering play.
5. Check for engine and transmission leaks.
6. Check for smoky exhaust.
7. Check for brake pedal play, spongy brakes, leaky wheel cylinders, and master cylinder.
8. If drivable, check for a quiet, easy shifting gearbox with no grinding gears or whine.
9. Make sure you get a title or a bill of sale, and the VW owner's manual.

The car that was given care will be obvious if you check closely.

If your inspection in brief leaves you questioning, but still interested, we recommend you consult a competent VW repairman to give you an itemized repair cost to bring the chassis up to A-1 shape. You will not only eliminate surprises, but you will also be able to budget for the total costs of the chassis.

The joy of driving your Duchess will be greatly enhanced when you have confidence in the mechanical dependability of the chassis. A few dollars on the front end will be paid back in satisfaction and value.

CHASSIS GUIDELINES

Only VW Sedans (no Super Beetles, square-backs, or Karmen Ghias) will work.

The Bug has experienced only minor changes since 1960. Even though these older chassis will work, the lower horsepower and the older style transaxle make them less desirable.

VW. Acquisition

The following guide will enable you to tell for sure what VW you are looking at and what the advantages are. (The serial number is stamped into the tunnel top, under the rear seat, just in front of the transmission access cover. The engine number is stamped on the intake manifold, just below the carburetor.)

1967

Chassis Number: 117000001 to 117844892

Engine: 1500cc Series H, 53 hp.

Note: 12 volt systems, two-speed wipers, and dual braking system added. All transaxles are swing axles. Tail lights changed from oval to oval with flat bottoms.

1968

Chassis Number: 118000001 to 1811016098

Engine: 1500cc Series H, 53 hp.

Note: Automatic stick shift is added option, wheels changed from five-bolt to four-bolt pattern, raised bumper height, brake warning light and telescoping steering column added.

1969

Chassis Number: 119000001 to 1191093704

Engine: 1500cc Series H, 53 hp.

Note: Double jointed rear transaxle and steering column/ignition lock is added.

1970

Chassis Number: 1102000011 to 1103096945

Engine: 1600cc Series B, 57 hp.

1971

Chassis Number: 11120000011 to 1412000001

Engine: 1600cc Series AE, 60 hp.

Note: Engine heads changed to Dual Port heads with external oil cooler.

1972

Chassis Number: 1122000001 to 1123200000

Engine: 1600cc Series AE, less than 60 hp. due to the addition of emission control.

Note: Windshield wiper/washer control incorporated into the steering column. VW diagnostic system incorporated.

1973

Chassis Number: 1132000001 to 1133200000

Engine: 1600cc Series AH, less than 60 hp. due to the addition of emission control. Wiper controls on the column. Round tail lights.

1974

Chassis Number: 1142000001 to 1143200000

Engine: 1600cc Series AH, less than 60 hp.

Note: Energy absorbing bumper incorporated and the alternator replaced the generator.

1975

Chassis Number: 1152000001 to 1362000001

Engine: 1600cc Series AJ, less than 60 hp.

Note: All engines fuel injected. Fuel injection has been a problem in some climates.

RECOMMENDATIONS

The greater horsepower and superior engineering of the 1969 and newer chassis make this vintage quite desirable. In general, purchase a drivable late model chassis with as few miles as you can afford.

Summary of advantages on 1969 chassis and newer:

1. Lockable steering with collapsible column.
2. Two-speed wipers.
3. Fully synchronized transmission with dual CV joints.
4. 12 volt electrical.
5. 50+ horsepower.
6. Ball jointed front end.
7. Electrical fuel gauge.
8. Larger brakes with dual braking system.
9. 4-bolt wheel pattern.
10. Easier adaption as the Duchess was designed around the superior engineering of the new chassis.

General Recommendations and Precautions

1. Do not start the Duchess assembly until you have thoroughly studied this manual and acquired the tools and materials necessary to complete all operations.
2. The optimum space requirement is a double car garage, approximately 22' x 22'. The lighting generally found in an average garage is not adequate. We recommend purchasing several portable clamp-on light fixtures or several fluorescent shop lights to give good illumination to all sides of the project. (Most of our roadsters are built in the space of a single car garage.)
3. Whenever sanding, drilling or cutting, always use acceptable eye protection. Whenever drilling holes larger than 1/4" in steel, start with a 1/8" pilot hole.
4. Whenever working with any part which may be susceptible to scratching, use tape, foam, carpet sections, drop cloths, or any other material which will adequately protect the surface from abrasion.
5. Use a sharp grease pencil or magic marker type pen to mark any operations on the fiberglass pieces. (This is easily removed with acetone.)

General Recommendations and Precautions

6. Whenever drilling or cutting a finished fiberglass surface, cut or drill from the finished side to the unfinished side to avoid gel coat chipping.
7. Read instructions on all adhesives recommended to insure their proper use.
8. Left and right is determined by sitting in the driver's seat.
9. Except for the initial delivery inspection, all parts should be left in their containers until all operations have been completed on your chassis.
10. The heavy-duty steel rivets we supply can be hard on inexpensive type riveters, therefore, if using a hand riveter, buy a good one. You may consider borrowing or renting a compressor and using pneumatic tools for riveting.
11. You will find that a 2' x 8' workbench comes in very handy. In lieu of a workbench, set a 4' x 8' piece of $\frac{3}{4}$ " plywood across a couple of saw horses. Nail securely.
12. Our use of the words Volkswagen or the initials VW are intended for parts identification only and does not indicate involvement or approval by Volkswagen of America.

Tool Requirements

1. Screwdrivers: general assortment of both Phillips and flat head with head sizes ranging from 1 to 3.
2. Drill: $\frac{3}{8}$ " arbor, pneumatic or electric.
3. Drill bits: from $\frac{1}{16}$ " to $\frac{1}{2}$ "
Hole cutters: $2\frac{3}{8}$ " and 1"
Tapered countersink: $\frac{3}{4}$ "
Tapered rotary rasp: $\frac{1}{4}$ " to $\frac{3}{4}$ "
4. Jig or sabre saw.
5. Hacksaw with metal cut blade.
6. Ball-peen and rubber hammer.
7. Grease pencil or magic marker type pen. (Color opposite to glass color.)
8. 10' tape measure and 36" straight edge measure. (Note: Use straight edge whenever possible as it is more accurate than tape measurements.)
9. $\frac{1}{2}$ " cold chisel, center punch.
10. 10 vise grip, style "C" clamps (6 model 7R, 4 model 11R [rent]).
11. Round edged and flat files.
12. 6" pliers.
13. 6" side cutters.

Tool Requirements

14. Terminal crimper.
15. 6" scissors.
16. Razor blade knife.
17. Caulk gun.
18. $\frac{3}{8}$ " drive socket set from $\frac{1}{4}$ " to $\frac{3}{4}$ " plus metric socket 7 mm to 19 mm.
19. Open and box end wrenches from $\frac{1}{4}$ " to $\frac{3}{4}$ " and 7 mm to 19 mm.
20. 8" crescent wrench.
21. 6 mm Allen wrench to remove steering column from the dash on some models.
22. Flat and round sided sanding blocks.
23. Solder gun.
24. Small butane torch kit.
25. Four jack stands or heavy-duty blocks.
26. 12" slide square.
27. Scribe.
28. 36" crowbar.
29. Right hand aviation snips.
30. 3M type 3" disk grinder for electric drill, coarse.
31. 10 mm x 1.25 threads/mm tap.

Material to be Purchased

1. 3' of $\frac{3}{4}$ " banding material.
2. $\frac{1}{8}$ " x $\frac{3}{8}$ " black weather strip for doors.
3. 80 grit standard sandpaper, plus 400-600 grit wet/dry sandpaper.
4. One tube clear silicone caulk, two tubes white butyl caulk.
5. Two cans flat black aerosol paint.
6. Three 16 oz. cans aerosol undercoat.
7. Electrician's tape and masking tape.
8. TV type solder.
9. Pack of wire ties.
10. Two 7" 12-volt headlamps, number 6014. (May use VW lamps.)
11. One quart 3M Fast Tac type adhesive. (With pump can applicator or small stiff bristle applicator.)
12. One tube "Loctite" type liquid thread adhesive.
13. One tube "Permatex" type liquid gasket maker for mounting gas tank sending unit. (Approved for gasoline.)
14. One roll each of 14 gauge and 16 gauge insulated copper wire.
15. Fuses, 20A and 30A.
16. Super Glue, small tube.
17. Mechanic's wire, small roll.
18. 1 lb. Bondo type body filler.
19. Small can penetrating oil.
20. One pint acetone.
21. 2" x 20" x $\frac{1}{4}$ " rubber belting.



VW BODY REMOVAL 4 hrs.

Removing the VW body is an easy process. The most difficult portion is the actual lifting of the body from the chassis. (Approximate time: 4 hours.)

(Note: This manual is based on a 1973 model. You may find minor differences in other models.)

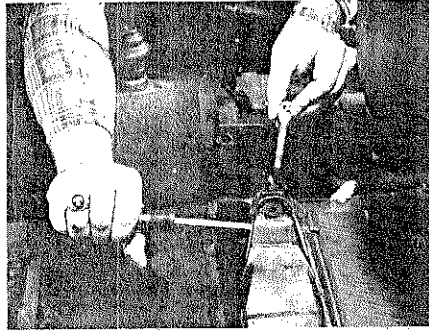
REQUIRED TOOLS

1. Metric sockets and wrenches from 13 mm to 17 mm.
2. Standard and Phillips screwdrivers.
3. Hammer.
4. Pliers.
5. Penetrating oil.
6. Side cutter.
7. Trouble light.
8. Crowbar.

owner's photo

owner's photo

DISASSEMBLY

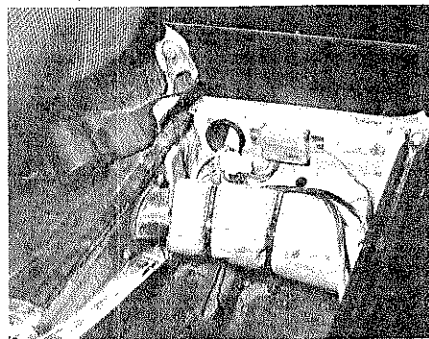


1. REMOVE FRONT SEATS AND REAR SEAT BOTTOMS.

Pull the pin from the front seat mount. Place your screwdriver through the mount depressing the retaining clip and therefore releasing the seat.

On earlier models, release the spring on the back side of the seat. Release the seat adjust lever and slide the seat forward off the track.

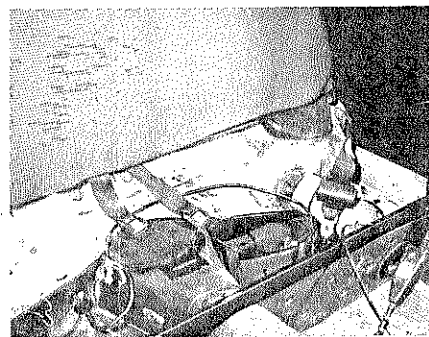
Remove the rear seat by pushing the cushion back, then lift the front of the cushion up and out. Notice the chassis serial number just forward of the transmission access plate on the tunnel top.



2. REMOVE THE BATTERY, BATTERY BRACKET, AND VOLTAGE REGULATOR.

Leave the bottom cables attached to the chassis, save the battery and bracket. Clean and paint battery bracket for reuse after chassis preparation.

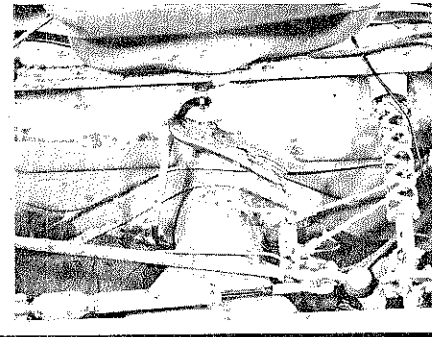
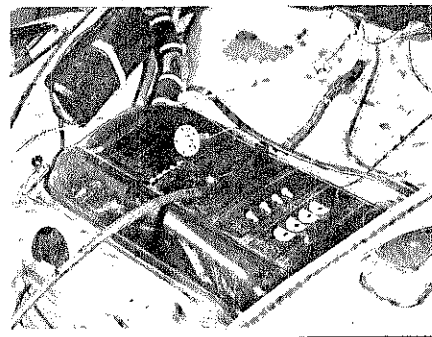
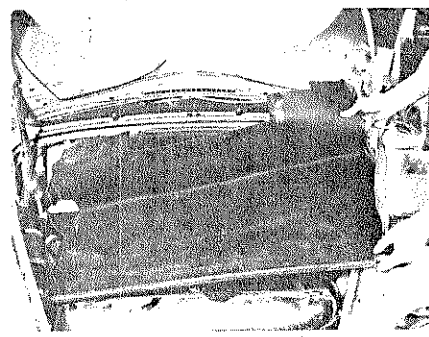
On the driver's side wall, under the back seat, disconnect all wiring from the voltage regulator, remove and save.



3. REMOVE SEAT BELTS. (Optional)

If you intend on installing seat belts in your Duchess, the rear seat belts work nicely. Flip the seat back down for access to remove the latch belt retaining bolt.

Also remove a front seat shoulder strap for eventual use as a retaining strap for the hood.

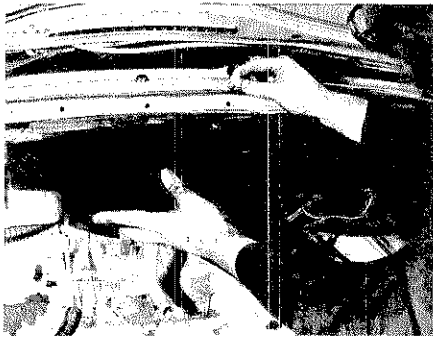


VV. L. assembly

4. REMOVE GAS TANK

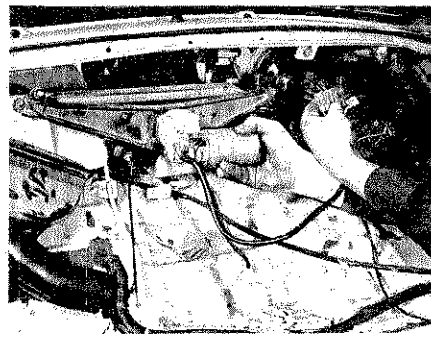
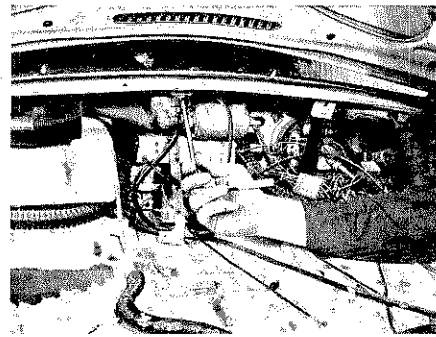
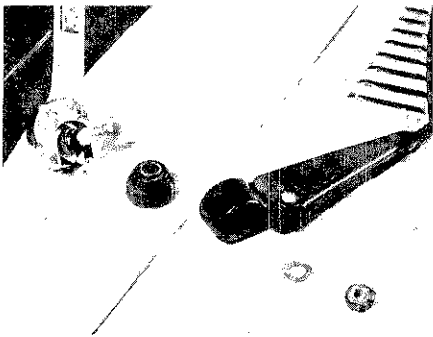
Open the hood and remove the cardboard trunk liner. Disconnect the wiring to the gas gauge sending unit on the tank. Remove the sending unit and syphon the gas out of the tank. Remove the front and rear gas tank mounting brackets and bolts. Disconnect the filler hose and breather pipe from the tank. Pry the tank loose and lift up and to one side. Take a vise grip, and clamp off the fuel line to the engine just above the metal connection tube on the chassis. Disconnect the fuel line from the chassis and lift the tank out.

(Note: No smoking — when finished with tank removal, remove all gas and store in a safety can. Flush the tank with water.)



5. REMOVE VENTILATION PLENUM

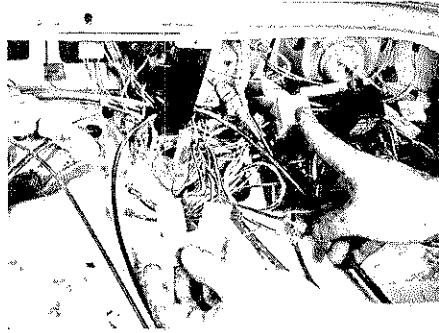
Remove three screws from the top of the ventilation plenum and a retaining clamp below. Attached to the plenum are 1" diameter ducts. Remove and save for later use on defrosters.



6. REMOVE WIPER MOTOR

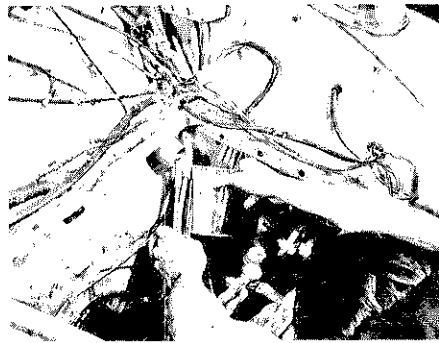
Remove the wiper arms and retaining nuts from the motor drive shafts. Under the hood, remove the motor mounting bolt. Quarters are tight, however, remove the driver's side first, and the left side will pull free.

Some people have removed the radio and glove box for easier disassembly. Save all parts for reuse.



7. REMOVE DIMMER RELAY.

Remove dimmer relay and four prong electrical connectors.

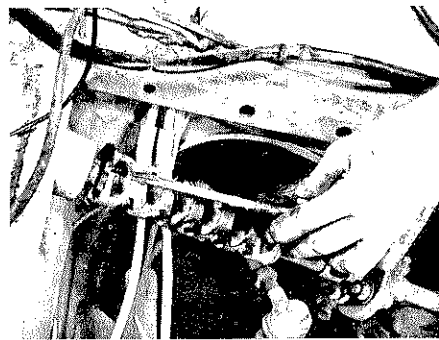


8. REMOVE BRAKE RESERVOIR AND DISCONNECT MASTER CYLINDER

Separate the reservoir from master cylinder line after it passes through the body. Drain the brake fluid into a suitable container.

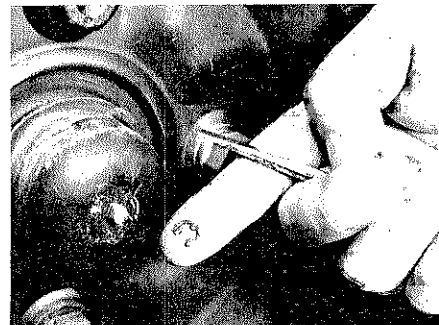
Inside the reservoir mounting frame remove two screws and remove the reservoir.

Plug the remaining supply lines on the master cylinder to avoid cylinder contamination. Remove electrical wires from the master cylinder switches.



9. REMOVE STEERING COLUMN.

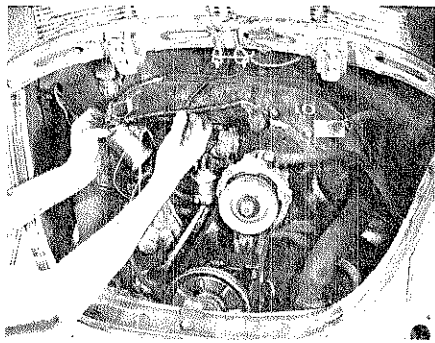
Bend tabs back from the column retaining clip and remove. Just forward of the collapsible section of the column, remove the bolt to loosen the clamp from the shaft. Apply penetrating oil to the slip connection to ease column removal. Disconnect the horn wire from the rubber flex joint bolt. Disconnect the master wiring plug just behind the steering wheel, or on earlier models, cut the wiring harness on the luggage side of the fire wall and pull the remaining cable through to the passenger side of the fire wall. Remove the two cap screws or bolts securing the steering column to the underside of the dash. The column is now free to be pulled into the passenger compartment. Remove and save.



10. DISCONNECT SPEEDOMETER CABLE

Disconnect the cable from the driver's side front wheel by removing the retaining slip from the outside hub, center cap. From the back side of the wheel, pull the cable out of the wheel. Pull the cable free of the chassis. When the body is removed, the cable will remain attached to the body.

VI. I. sassembly



11. DISCONNECT ALL BODY TO ENGINE WIRING.

On the upper left side of the engine compartment, a wiring harness comes through the body. Trace all wire from this point and disconnect from various engine components.

12. DISCONNECT HEATER DUCTS.

On the forward side of the engine you will find a 2" insulated flex duct connecting the heater box to the body. Remove the rear tires and disconnect the ducts from the body for future use on your Duchess.

13. REMOVE BODY MOUNTING BOLTS.

Apply penetrating oil to all of the bolts listed.

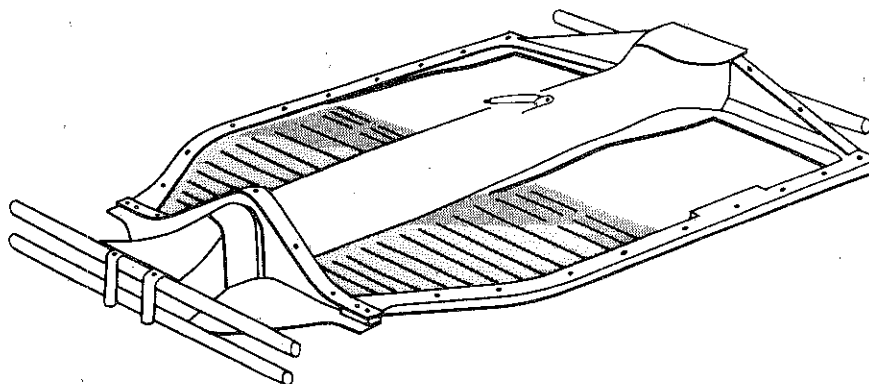
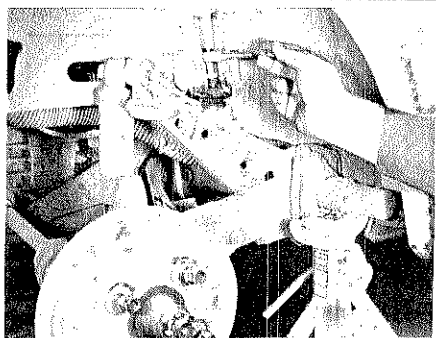
With a 17 mm socket, remove two bolts in front of tie rods on top of torsion tubes. Save for future installation of the front tie-in.

With a 13 mm socket, remove four bolts from below rear seats on rear body mounting flange.

Remove one bolt on each side just in front of the rear shock absorber.

With a 13 mm socket remove 11 bolts on each side of the pan bottom.

Replace rear wheels.

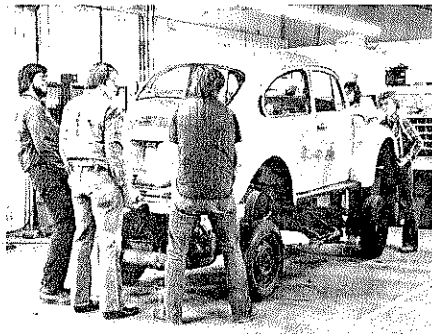


14. FUEL INJECTED MODELS (1975 and newer models only)

Remove electric fuel pump assembly near passenger side front wheel. Save all components including mount boots, clamps, filter, etc. Remove the electronic control unit and relay on the passenger side rear wall. (Mark each wire for correct hookup in the Duchess.) Follow the wiring harness from the control unit in the driver's side of the battery. Cut the harness, then from the engine compartment, pull the cable through the body and leave connected to the engine. Near the engine cover, driver's side hinge, locate the decelera-

tion valve and relocate on the EGR valve bracket. Drill a $\frac{1}{4}$ " hole and mount with existing hardware. You may desire to shorten the hoses for a more professional look.

You should have disconnected the coil, alternator and oil pressure switches by now, all that remains is the wire leading to the diagnostic plug in the upper driver's side area of the engine compartment. No other wires or equipment need to be removed from the engine.

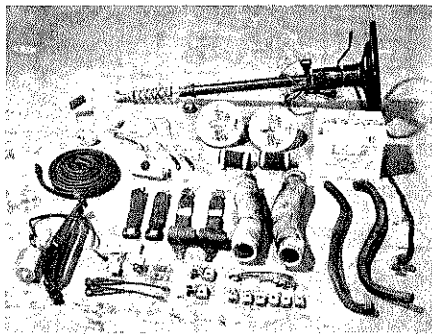


15. BODY REMOVAL.

Two methods of removal are shown. The easier is to open the doors and position a 4" x 4" through the body. (Doors remain undamaged for future sale.) Attach a strong nylon rope or chain to each side of the 4" x 4" and connect to an overhead chain hoist. Raise slowly using a friend to guide the body.

Alternative: Using four to six friends, lift the body straight up and remove to one side (not to the front or rear).

If you do not intend on salvaging body parts, use an open door as a lever, and with the help of your friends, you can roll the body off the chassis.



16. COMPONENTS SAVED.

To insure that you have not forgotten to save any components, turn to page 14 to the section "Components to be Saved" and check off each component.

owner's photo

Components to be Saved from the VW Chassis

1. Five straight and true wheels.
2. Complete steering column. (If keys are lost, the key numbers are stamped on the ignition tumblers. Take the column to a VW garage and they will remove and make a key for you.)
3. Rubber connectors and clamps from gas tank
4. Sending unit from the gas tank.
5. Battery. (optional)
6. Brake fluid reservoir with cap.
7. Wiper motor, arms, and all fastening hardware.
8. Voltage regulator.
9. Dimmer and horn electrical relays.
10. Plastic electrical junction connectors. (For turn signals under dash.)
11. Knobs for heater/defroster levers.
12. Emergency brake rubber boot
13. Rubber pads for clutch, brake and accelerator.
14. Flexible connector from heater boxes to passenger compartment
15. Two body mount bolts on top of front torsion tubes.
16. All body mount washers.
17. Perimeter body to pan gasket.
18. VW pan with all edges straight and true.
19. Transmission that has been thoroughly tested for quality and free from defective synchros, whine or excessive noise, and easy shifting.
20. Sound front suspension free from excessive rust with solid needle bearings supporting all torsion rods.
21. Driver's door handle. (If keys should become lost, key number is stamped on inside of handle.)
22. Seat belts.
23. Both headlights.

Chassis Modification

Approx. 16 hrs.

1. PEDAL ASSEMBLY REMOVAL.

(The position of the pedal stop that is bolted to the floor, just forward of the pedals, should be noted. You will need to locate this stop in the same relative position when you reposition the pedal assembly. Save all parts from this procedure!)

Remove the spring clip that retains the return spring on the base of the brake pedal peg. Lift the return spring off the peg. Remove the short shaft from the peg that inserts into the exposed end of the master cylinder.

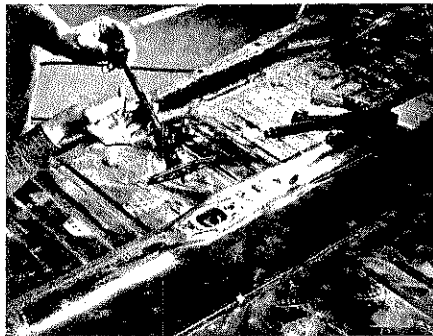
Remove two bolts that fasten the pedal assembly to the tunnel housing.

Rotate the pedal assembly backwards to the floor disconnecting the clutch cable from the hook on the end of the clutch pedal inside the tunnel.

Remove the accelerator cable offset connector from the accelerator pedal. The entire assembly should now pull out of the housing and be free from all connections to the chassis.

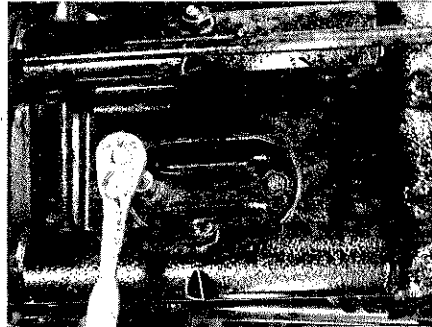
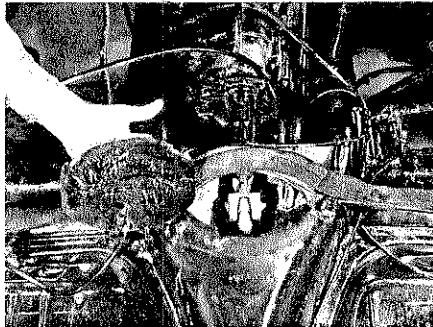
Carefully pull the shaft from the master cylinder. Disconnect the accelerator and clutch cables from the engine/transmission. Pull the accelerator and clutch cables forward and out of the tunnel. Clean and lubricate cables for future use.

Using a 13 mm socket, remove the bolt which secures the pedal stop to the floor, and remove the stop.



2. REMOVE SHIFT LEVER.

Using a 13 mm socket or wrench, remove two bolts holding shift lever to the tunnel. Lift shift lever assembly out of the tunnel and from the transmission linkage arm cup.



3. REMOVE ACCESS COVERS.

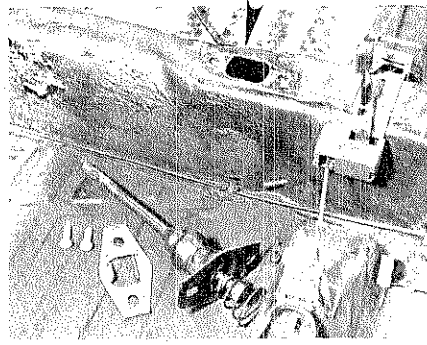
Remove the transmission cover on the rear portion of the tunnel top, and the tunnel access cover in front between the torsion tubes.



4. DISCONNECT THE SHIFT LINKAGE ARM FROM THE TRANSMISSION.

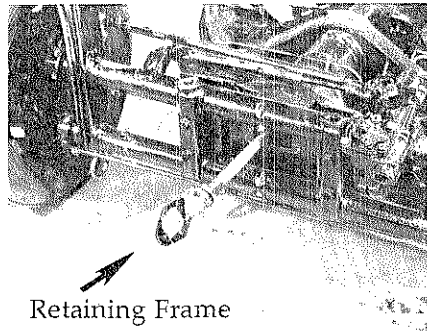
Mark the center line of the linkage cross pin, on the chassis tunnel, just forward of the securement bolt for relocation reference. Loosen the securement bolt and disconnect the linkage arm from the transmission.

Chassis Modification



5. DRILL RETAINING FRAME SPOT WELDS.

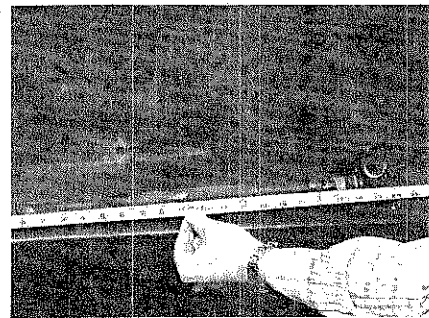
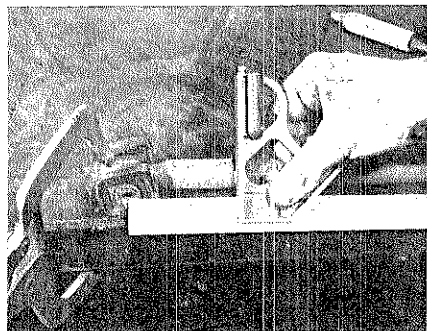
Using sand paper, or a disk sander, in your drill, remove the paint from top of the tunnel in a 2" radius around the hole where the shifter was removed. You should now see the six spot welds that hold the retaining frame in place. Using a $\frac{3}{8}$ " drill, center punch and drill deep enough so that the welds are broken. Then remove retaining frame (keep for future use).



6. REMOVE LINKAGE ARM.

Feed wire through the front tunnel access hole, to the point where the shifter was removed. Use your pliers to hook the wire to the linkage arm retaining frame.

Pull the linkage arm and retaining frame out of the tunnel.

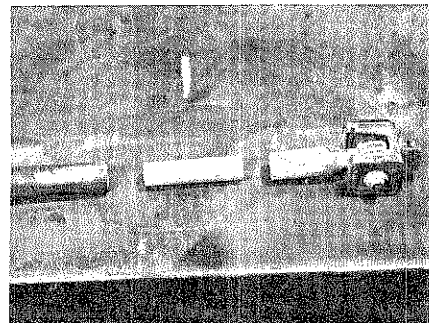
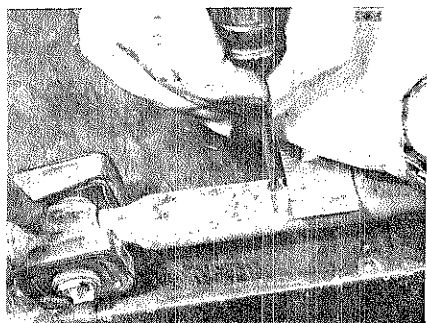


7. SHORTEN THE LINKAGE ARM.

Clamp the transmission end of the linkage arm to the flat surface. The open shifter cup should point up. Note that the cup is approximately 5° off of perpendicular to your surface. The relationship between ends that now exist, must exist after the shortening process is complete.

Shorten the arm to a dimension of 22" from the center of the shifter cup, to the center of the transmission end cross pin.

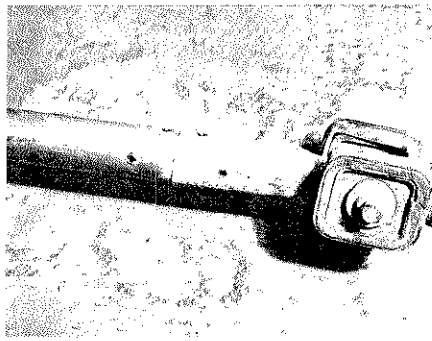
Using your slide square, measure 3" from the cross pin and mark the shaft.



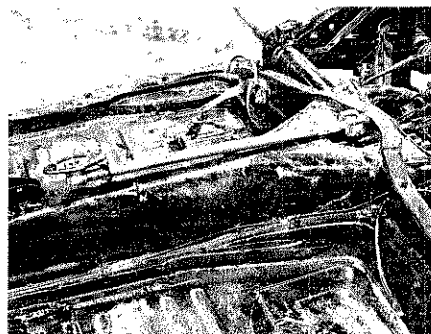
Measure 19" back from the center of the shifter cup and mark the shaft. At each of your marks carefully scribe a line across your mark line at exactly top dead center. When you cut and remove the center section between your marks, the scribe marks will line up giving the end relationship desired.

Locate the pipe plug in your fastener package. Insert this plug halfway into the short end of the shaft. Drill a $\frac{5}{64}$ " hole $\frac{1}{2}$ " back from the cut edge through the shaft and plug. Insert a compression pin. At 90° to the first pin, and back 1" from the cut end of the shaft, drill another hole and insert another compression pin. (Make sure retaining frame is on the linkage arm in its original relationship.)

Chassis Modification

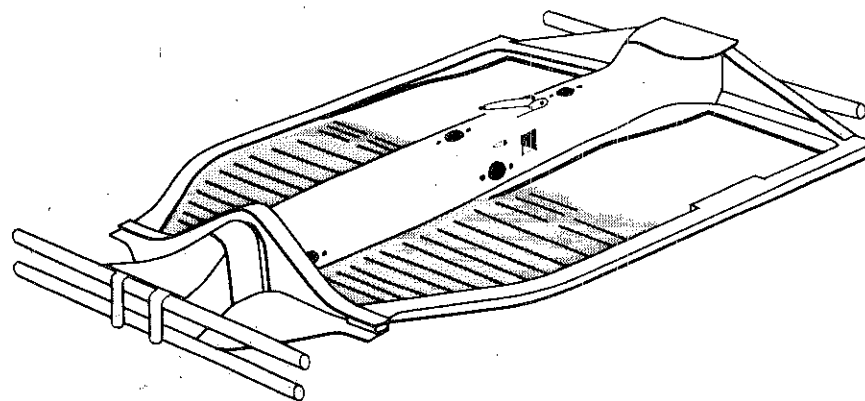
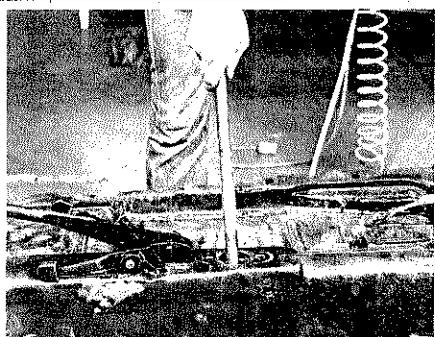


Insert the plug into the remaining shift end.
Repeat the above compression pin process for the other end of the shaft. **Caution:** Make sure your scribe lines, line up precisely or your transmission may not shift properly.



8. INSTALL SHIFT LINKAGE ARM AND SHIFTER

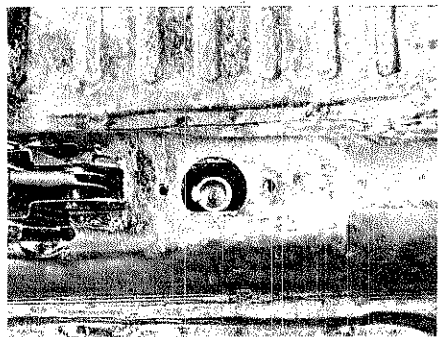
Measure from your reference mark on the tunnel, 22" forward and mark the tunnel. Center template 1 on the tunnel overlaying the center point of the template, on the 22" set back you have made. Drill per template.



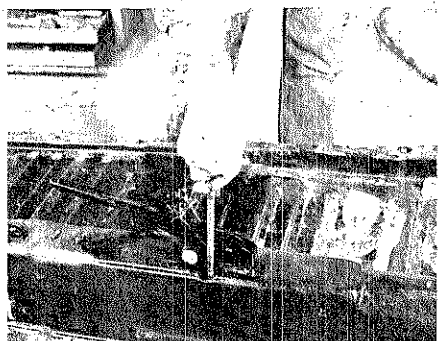
Using a crow bar, bend the cable housing tubes as far out of the way as is possible. On late model chassis you may have to remove the internally welded seat belt securing nuts from the inside of the tunnel to make enough room for the linkage retaining frame.

Feed wire from the transmission access hole towards the front access hole. Connect the wire to the transmission end of the linkage arm and pull the linkage arm with frame through the tunnel. Hook the retaining frame through the new location holes with a short piece of wire and pull it up into position. Slide the transmission end onto the shaft and fasten by tightening the securement bolt.

Chassis Modification



Insert the shift lever into position and secure with the original bolts.



9. DISCONNECT CLUTCH AND ACCELERATOR HOUSING FROM TUNNEL

On the inside of the tunnel, just below the emergency brake, the clutch cable housing, the accelerator cable housing and the gas line are found attached to the tunnel side. The band that secures the three tubes is tack welded at the top and between each tube. With a screwdriver and hammer, break the top two cable housings free of the tunnel side. Be careful not to damage the gas line.



10. PREPARE NEW PEDAL LOCATION

The relocation of the pedal assembly is arbitrary. A comfortable location depends on your inseam, or leg length, and the inseam of other common drivers. Although many locations are possible, we recommend two. Inseams between 28" and 30" should locate the pedal assembly 24" behind the previous position, people with inseams between 31" and 33" should choose a location 22" behind the previous location.

For the very tall or very short, you may position the pedal assembly per your requirements.

Once you have selected the dimension you wish to move the pedal assembly, fasten template number 2 to the side of the tunnel, center punch, and drill holes per the template instructions.



With all holes drilled, use a steel cutting blade in your sabre saw and cut the clutch cable access hole. The tab should be bent back approximately 45°. With a hammer and chisel, dent the tunnel in approximately 1/2" for a distance of approximately 2" forward from the accelerator cable hole you have drilled. The new tunnel position should now have the same basic configuration as the original position.

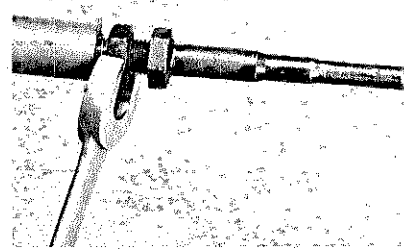
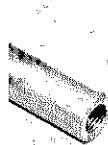
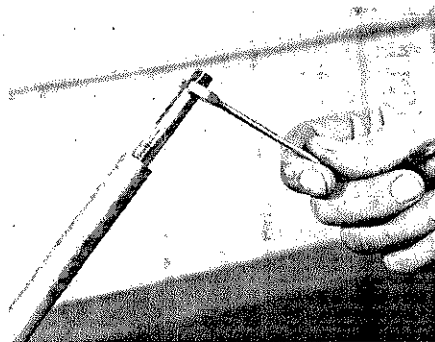
Chassis Modification

Using a hack saw blade, cut the clutch cable tube through the round 2" hole you have cut. The clutch cable should now be free to be lifted on top of the tab in the access window you have made.

Using a cable tube fastener, fasten the tube to the tab. (An alternative is to weld the clutch cable tube to the tab.)

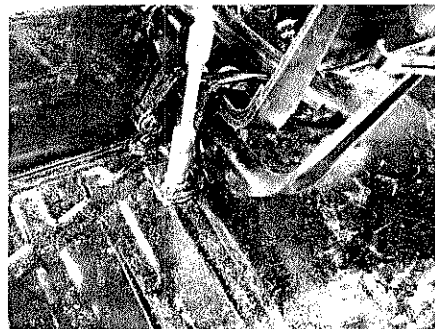
Once fastened, cut the tube in the access window on the far left side. In a later step, the cable may need to be adjusted up or down. Merely bend the tunnel tab the required amount to line the cable housing up with the clutch pedal hook when installed.

The accelerator cable tube should be cut through the front end of the new slot. Secure the cable housing in position with a retainer and screw or tac weld into position. Use a Phillips screwdriver, with the end bent 90° to the shaft, to clean the open end of the cable housing and flair the tube end to protect the cables from abrasion.



11. PREPARE THE BRAKE EXTENSION ROD.

Whatever dimension you have selected for a pedal set back, it is the same dimension you have to extend the brake connection. Locate the steel extension tube in Box and cut the extension per required dimension. Tap each end of the tube with a 10 x 1.25 threads per mm tap. Install both connection ends and secure with the lock nuts and lockite.

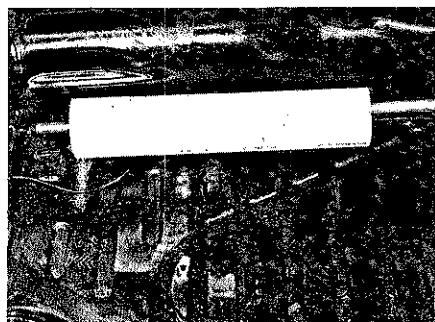


12. INSTALL PEDAL ASSEMBLY.

Place nut clips over each of the 7/16" holes. Insert both accelerator and clutch cables into their respective housings.

Place the pedal assembly into position and attach the clutch cable to the clutch pedal hook. (Keep clutch pedal vertical or the clutch cable will slip off the hook.) Slide the pedal assembly into the tunnel and install the mounting bolts.

Install the pedal stop in the same relative position as before. (Note: In order to use the original pedal stop, you may have to slightly round the pan in the stop location. Most people make a pedal stop with a longer pan leg. 3" or 4" against the pan will give greater strength. The pan is weaker here than its original location therefore we agree and recommend this modification.)



Install the brake extension rod with the 3" PVC around it.

Between the adjustability of the brake rod extension and the possible adjustment in the brake pedal stop, you can adjust the pedal back one inch plus. However, we recommend leaving the pedal geometry the same as the original position. The tip of the brake rod in its neutral position should be about 1/8" off the master cylinder plunger.

Chassis Modification

13. CONNECT CLUTCH CABLE TO THE TRANSMISSION AND THE ACCELERATOR CABLE TO THE CARBURETOR.

Using the cable shortening kits provided, connect the clutch and carburetor cables. Adjust the cables for proper operation and cut off the excess cable. If both pedal assembly and transmission function properly, install and secure both access covers.

(Note: Make sure to tighten lock nut over the clutch cable, not just up to the cable. A "U" clamp is extra precaution against a slipping clutch cable.)

Chassis Preparation

1. CHASSIS COMPONENT QUALITY.

With the entire chassis visible, now is the time to recheck the chassis for damage and wear. Remeasure for squareness and make sure the chassis is as good as you would expect before you put more time and money into this chassis.

2. FLOORING MATERIAL.

Remove all down to the bare pan! If the body-to-pan gasket is not reusable, foam tape or caulking can be used. If the gasket is good, remove and save.

3. SEAT BRACKETS.

Using a heavy hammer and sharp chisel, remove at pan level the seat mounting brackets and tracks. Even though you are careful, you may cause small holes in the pan. The holes should be brazed, filled with fiberglass or filled with other suitable material.

4. REMOVE JACK STAND.

Use cold chisel or a torch. Remember another jack will have to be purchased.

5. CLEAN CHASSIS.

Using elbow grease, drill operated rotary wire brush, scrapers, sandpaper, soap, and water, clean the chassis as well as possible. Many people use a high pressure wash or steam cleaning to avoid some of the manual effort. Future rust resistance depends on this step. Do an excellent job and you will not regret it.

Paint the entire pan top with a rust resistant paint. After the Duchess body has been assembled on the chassis, the entire underside of the body and pan should be well undercoated. The fiberglass fenders need undercoat protection from stones that the wheels may throw against the underside and cause tiny cracks which can be seen in the gel coat surface.

6. CHASSIS REPAIR.

With all unnecessary material removed and the chassis cleaned, now is the time to do all the repairs you or your mechanic have decided necessary. Remember to check the heater box operation. Use your VW owner's manual for reference specifications. The following chassis and engine remanufacture specs should also be helpful as you proceed with your repairs.

Chassis Repair Specifications

ENGINE REMANUFACTURE SPECS

1. Line bore the case.
2. Install case savers when appropriate.
3. Install new pistons and liners.
4. Install new or remanufactured rods.
5. Install all new rod, main, and cam bearings.
6. Install new oil pump.
7. Install new or remanufactured heads including new valves.
8. Install new or remanufactured carburetor.
9. Install new mechanical advance distributor.
10. Install new brushes and bushings in the alternator/generator, or remanufacture if required.
11. Install new plugs and points.
12. Install new plug wires.
13. Install new hoses for all functions on the engine and secure with clamps.
14. Install an inline gas filter.
15. Install new gas line on engine.
16. Replace V belt.
17. Install Classic Roadsters exhaust system.
18. Clean all parts of the engine, thoroughly removing all grease or loose paint. Repaint all parts with high quality, high temperature, high gloss black paint. Use silver where appropriate, and no paint where appropriate to make the engine look like new.
19. Install new decals on engine, coil or wherever appropriate.
20. When installing new 2" flextube, cut lengths long enough to minimize stretch of the flextube. Secure with clamps.
21. Check the quality and working mechanism of the heater boxes and replace with a good quality used box if necessary.
22. Test run the engine for at least one hour.

CHASSIS REPAIR SPECS

FRONT END

- Ball joint within factory specs or replaced.
- Tie rod ends within factory specs or replaced.
- Steering damper replaced.
- Shocks replaced.
- Brake shoes replaced.
- Wheel bearing replaced.
- Wheel cylinders overhauled or replaced.
- Brake lines within factory specs or replaced.
- Brake hoses within factory specs or replaced.
- Brake drums turned, if necessary.
- Brakes bled.
- Brake shoes adjusted.
- Steering gear box within factory specs.
- Steering gear box filled.

Chassis Repair Specifications

Front axle within factory specs or replaced. (Note: Front torsion tubes are prone to rust, if substantial rust is noted, have a mechanic check its structural integrity.)

Check bleeders and drum plugs.

Have front end aligned after Duchess has been assembled.

PAN.

84" pan brake line replaced.

Throttle cable within factory specs or replaced.

Clutch cable within factory specs or replaced.

Hand brake cable within factory specs or replaced, and adjusted.

Heater cable within factory specs or replaced.

Fill pan holes and paint.

Five tires and rims cleaned, painted, tires mounted and balanced.

Pan within factory specs or straighten frame.

Flush gas line.

Install rubber grommets around all tubing when penetrating the chassis.

REAR END

Brake shoes replaced.

Wheel cylinder replaced or overhauled.

Wheel bearings within factory specs or replaced.

Transmission level checked and filled.

Transmission checked for oil leaks.

Rear brakes adjusted.

Shocks replaced.

Heater cables hooked up and adjusted.

Brake lines within factory specs or replaced.

Clutch spring within factory specs or replaced.

Brake drums turned, if necessary.

Check bleeders and drum plugs.

Install new throw out bearing.

Clutch replaced.

Pressure plate within factory specs or replaced.

Have rear end aligned after Duchess has been assembled.