SPEARCO
RACING INTERCOOLERS
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"Keeping You Cool Under Pressure"

Installation Instruction for '84-'89 Nissan 300ZX High Performance Intercooler System (Part No. 2-124)

SPEARCO 84-87 300ZX INTERCOOLER PIPE LAYOUT

(NUMBERS ARE AT TUBE INLETS)

Routing of the Intercooler Pipe

It is necessary to follow the exact sequence of the installation of the tubing, otherwise it may increase the difficulty and installation time.
Proceed as follows:

- To provide clearance for installing the pipes, it is necessary to remove the top heat shield and the bottom heat shield which are situated to the outside of and behind the turbocharger.

A. Slide number **#6 tube** in from the bottom, hooking it up over the top of the radiator. The straight end goes toward the intercooler, the curved end goes topside.

B. Connect **#6 tube** to **#5 tube** with hose and clamps and mount to the bottom of the intercooler with reducing hose and clamps.

C. Assemble **#4 tube** to **AE** (aluminum elbow) and slide them up from the bottom and hook over the top of the radiator. Connect **AE** to the intercooler with reducing hose and clamps. Orient the hose clamps so that they are pointing forward so that they can be tightened with a small ratchet. (Do not fully tighten at this time).

D. Install **#7 tube** by slipping it down beside the radiator shroud, and pushing it toward the rear beneath the air flow meter and connect it to the **#6 tube** with the hose and clamps provided.

E. Install **#8 tube** by sliding it down into the engine compartment between the shock tower and the engine and behind the air conditioning compressor. Connect it to **#7 tube** with the hose and clamps provided.

F. Install **#1 tube** into position and connect it to the turbocharger outlet using the clamps and reducer hose provided.

G. Connect **#2 tube** to **#1 tube.**

H. Install the **#3 tube** over the radiator shroud and connect it between the **#2 and #4 tubes**. Position clamps with screws on top so they can be easily tightened.

I. Now connect **#8 tube** to **#7 tube** and install the remaining **#9 tube** between the **#8 tube** and the **throttle body**.

J. Connect the existing PCV and Idle by-pass hoses.

K. Adjust the tubes for proper clearance; make certain there is sufficient clearance between the air conditioning pulley and the #2 tube. Tighten all clamps and inspect your work.

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1. TOOLS REQUIRED

1.) Standard mechanic hand tools
2.) Wrenches (SAE and Metric)
3.) Sockets and Ratchets (SAE and Metric)
4.) Floor jack and jack stands

IMPORTANT NOTE:

Due to the design of this vehicle, and the intercooler system, it necessitates ten separate intercooler pipes and an equal number of hoses and clamps. All tubes are beaded for hose retention and high quality clamps are provided. However, extra care should be given to see that the hoses are equal distant on each end of the tube, and that the clamp is properly positioned behind the hose bead on the tube.

2. Installation Preparation

2.1 Removal of Stock Components

Remove the following stock components:

a.) Compressor discharge pipe from the turbocharger to the throttle body
b.) Complete air cleaner assembly.
c.) Injection blower mounted on the left front fender well.
d.) Ignition coil solenoid valve in left inner fender well.
e.) Pressure transducer in left inner fender well.
f.) Headlight washer tank assembly.
g.) Plastic tray on the bottom of the vehicle.
h.) 3" I. D. convoluted, curved rubber tube at the air meter end

NOTE: The solenoid valve, ignition coil and pressure transducer will be remounted, utilizing brackets provided.

2.2 Removal and or Repositioning of the Front Mounted Cooling Fan

IMPORTANT NOTE:
Since this fan occupies that space which will be utilized by the intercooler, it is necessary to relocated it to the back side of the radiator, inside the radiator shroud.
These vehicles are equipped with two styles of fan assemblies and brackets and details are provided for the relocation of both types.

However, this relocation procedure is some what tedious and time consuming and, unless you live in a geographical area where ambient temperatures exceed 85°F during the summer, or you are going to be pulling a trailer with your vehicle, it may not be necessary to utilize the fan, it can simply be removed.

This fan only operates when coolant temperature is above 212°F, which generally can only be obtained when the vehicle is shut down in hot weather, and during the resultant heat sock period, when the temperature may reach 212°F. In this event, the fan will not run until the engine is started and generally runs only for a minute or so and then shuts off.

Under our test conditions, in ambient temperature as high as 98°F, we have been unable to get the fan to come on in stop and go traffic or any type of normal driving situations. Therefore make the decision to install the fan or not, and if you decide to install the fan, proceed as follows.

2.2.1 Reinstallation of fan motor

First, identify which model of fan you have in your vehicle. The small or early style fan, is identified with a sticker IHON Radiator Company, LTD. Japan, number A995140000. It has white colored plastic fan blades. The late style is identified as being manufactured in Japan by Mitsuba, and has black plastic fan blades.

2.2.1.1 For the early style model

a) Remove the nut holding the white plastic fan blades in place, and reverse the fan blades, as the motor is going to be operated in the opposite direction.

b) Unbolt the fan assembly from the cross brace mounts, install the four 1"X1" foam rubber pads on the four flat mounting areas of the fan, and slide it down between the shroud and the radiator fan. Push forward and up and orient so that the wire is on the bottom side of the fan.

c) Before installing the nylon retaining devices, preload the fan downward against the radiator and make certain that there is sufficient space between the fan blades and the radiator. If not, it will be necessary to add washers between the sponge rubber material and the fan frame.

d) Glue in place as required.

e) Re-insert the fan between the shroud and the engine fan and hold in place by pushing the nylon attaching devices through the sponge, the radiator and the condenser core and retaining with the locks provided. Note that these locks are one time type of installation, and you must be sure that the fan is correctly positioned before the locks are slid into place.

f) Drill a small hole in the bottom of the fan shroud and, with a small tie strap, retain the fan wire so that it cannot come in contact with the engine fan.

2.2.1.2 For the late style model

a) If you have the large type, or later fan manufactured by Mitsuba, with the black plastic blades, remove the blade retaining nut, and not it will be necessary to grind off some small ribs on the back of the fan blade and some small protrusion on the motor so that when the fan is lifted off and reversed, an held down with a nut, it will freely turn.

b) Cut the four round mounting rods shown in the photo and mount the fan to the brackets, using four small hose clamps.

c) The fan is installed into position using the same procedure as used on the early style fan shown above. Be sure and retain the fan motor wire so that it cannot come in contact with the engine fan.

2.2.2 Fan Rewiring

Since the above fans will now have to rotate in the opposite direction, to suck air rather than blow air, it is necessary to reverse the polarity of the current going to the fan motor, and it is necessary to extend the wires.

a.) This is done by cutting the wires of the chassis end of the connector approximately three inches (3") from the connector.

b.) Extend them with the two pieces of 22" long wire provided, and re-route the wire back underneath the radiator cross member and plug into the fan connector.

c.) Make absolutely certain that you have reversed the wires, or the fan will run in the opposite direction.

d.) When you are confident that the fan is installed correctly, reinstall the radiator shroud and re-attach with the three spring clips and top bolt.

3. Top Radiator Baffle Modification

Before the intercooler can be mounted and the intercooler piping routed, check your vehicle to see if it has a sheet metal and rubber baffle between the top edge of the radiator and the body.

a.) This is done by getting beneath the vehicle and viewing upward to the top edge of the condenser and the radiator. If you find a formed, sheet metal shield, approximately 2" wide, which goes completely across the top of the radiator, with a rubber flap stapled to it, it will be necessary to remove this to secure space for routing of the pipes. Unfortunately, Nissan has made this an extremely difficult thing to remove, as the manual indicated the radiator must be removed. However, it can be removed and modified without removing the radiator, if patience is utilized.

b.) Another solution is to take tin snips and cut it out of the way so that an area measuring from the left side of the condenser toward the center of the car is left clear approximately 7" wide. If you elect to cut it out of the way while on the vehicle, be extremely careful when installing the tubes.

c.) If you elect to remove it and modify it, drain the water from the vehicle using the petcock in the bottom of the radiator. Remove the top radiator hose, remove the two top radiator retaining bolts. These bolts are small 6mm with a 10mm head and are extremely difficult 'to get to. However, by utilizing patience and a small Snap-On type ¼” drive universal ratchet, end wrench etc, they can be removed.

d.) Once they have been removed, work the shield out from the bottom of the vehicle and modify as shown in the photograph. Installation is a bit simpler, as we have provided two 10/32 X 3/4" bolts and lock nuts, which can be inserted through the threaded holes and the bolts tightened from the bottom.

e.) Reinstall the top radiator hose and re-fill with water.

4. Installation of Intercooler

In order to provide clearance for the intercooler on vehicles so equipped, it will be necessary to remove the ambient temperature sensor, which is mounted on the left bottom part of the bumper.

a.) Remove the bracket and disconnect the sensor bracket from the large bracket. This can be mounted by drilling a hole in the plastic spoiler, or held in place with a plastic tie strap.

b.) Located the proper brackets, which are attached to the bottom of the front bumper, by removing the four existing Phillips head screws and attaching the brackets with 4 larger hex head sheet metal screws. (Do not fully tighten at this time).

c.) Slide the intercooler into position and insert the two top 7/16-18 X 3/4" long bolts to hold the intercooler into position. Move the brackets around until you secure correct alignment.

d.) Mount the bottom tab bracket to the intercooler up so that the edge of the bracket is approximately level with the bottom of the radiator cross-member.

e.) Mark and drill and attach with a 1/4" bolt and locknut. Tighten all brackets.

5. Routing of the Intercooler Pipe

To provide clearance for installing the pipes, it is necessary to remove the top heat shield and the bottom heat shield which are situated to the outside of and behind the turbocharger.

To secure simple installation, it is necessary to follow the exact sequence of the installation of the piping, otherwise it may be difficult.

5.1 Proceed as follows:

a.) Slide number 6 tube in from the bottom, hooking up over the top of the radiator. The straight end goes toward the intercooler. The curved end goes topside.

b.) Connect #6 tube to #5 tube with hose and clamps and mount to the bottom of the intercooler with reducing hose and clamps.

c.) Now assemble pipe number 4 to the cast aluminum elbow, with the short end of the elbow toward the intercooler. Slide this up from the bottom and hook over the top of the radiator. Connect to the intercooler with reducing hose and clamps. Orient the hose clamps so that they are pointing forward so that they can be tightened with a small ratchet. (Do not fully tighten at this time).

d.) Now, locate number 7 pipe and install by slipping down beside the radiator shroud, and pushing toward the rear beneath the air flow meter. Connect to pipe number 6 with hose and clamps provided.

e.) Install pipe number 8 by sliding down in the engine compartment between the spring tower and the engine and behind the air conditioning compressor. Negotiate forward and connect with hose and clamps to pipe number 7.

f.) Slide pipe number 1 into position by inserting down and up behind the air-conditioning compressor, and attach with clamps and reducer hose provided.

g.) Attach number 2 tube to number 1 tube and join number 2 to number 4 by installing number 3 tube over the radiator shroud. Position clamps with screws on top so they can be easily tightened.

h.) Now slide number 8 pipe into number 7 pipe and install the remaining number 9 pipe, which is the curved 2 1/2" pipe into the throttle body and connect to number 8 with reducing hose provided.

i.) Connect the existing PCV and Idle by-pass hoses.

j.) Check all pipes for proper clearance, and make certain there is sufficient clearance between the air conditioning pulley and the number 2 pipe. Orient pipes as required, and then go through system and tighten and check all clamps.

k.) After the pipes are all properly installed, positioned, and tightened modify the heat shields as shown in the photograph and re-install.

l.) Re-install the 3" diameter curved and convoluted hose to the air meter and install 3" diameter curved pipe and air cleaner assembly.

6. Remounting of Ignition Coil

a.) Locate the special bracket, dismount the ignition coil from the existing bracket and remount the solenoid valve, power transistor, and the ignition coil to the new bracket (See Photograph).

b.) Mount the transducer to the mounting tab and remount in engine compartment in the position shown in the photo.

7. Installation of Boost Pressure Maximizer

a.) From beneath the car locate the hose that connects at two points into the turbocharger compressor housing, and routes to the boost pressure actuator. Remove it at the boost pressure actuator end, and plug this hose.

b.) Attach a 17" long piece of the 1/4" hose provided to the boost pressure actuator and route up to the topside of the engine compartment.

c.) With a tie strap provided, retain the hose that it will not come in contact with the hot exhaust housing.

d.) Install the special plastic restrictor tee provided in the end of this hose, and connect the other end of the tee to the fitting on the number 9 pipe, the pipe that attaches to the throttle body, see drawing which illustrates this hook-up.

With the restrictor installed as shown, boost pressure will go up to approximately 9 psi maximum, and then, as engine speed increases, drop down to approximately 6 psi maximum.

8. Boost Pressure Enrichment

a.) Mount the pressure switch and solenoid valve assembly on the firewall, as shown in the photograph.

b.) Connect one terminal of the solenoid valve to the red and white striped wire in the side of the windshield washer motor nearest to the engine.

c.) Utilize a piggyback terminal provided.

d.) Connect the other terminal of the solenoid valve to the pressure switch. Remove the plug located approximately 5" behind the throttle valve assembly in the top of the intake manifold and install the fittings provided for this installation.

e.) The 5/32" hose connections to the solenoid valve should be as indicated in the photo. This device applies charge pressure to the fuel pressure regulator, during boost pressure operation for the denser charge created by the intercooler. For optimum performance, it is essential that the boost pressure enrichment and boost pressure maximum operate properly.

f.) To check the Boost Pressure Enrichment System, start the engine and let it idle. Remove the small vacuum hose that goes to the fitting on the top of the fuel pressure regulator (round object in front of the intake manifold). Hold your finger over the hose and check to see that vacuum is present. With a screwdriver short the switch out or trigger the switch with a hand air pressure source. Whenever the switch is triggered and the solenoid valve switches, the vacuum signal should go away.

Under road boost pressure conditions, higher boost pressure at the turbo is diverted to the pressure regulator. Since there is a pressure loss through the intercooler, the normal pressure pick up signal reduces through the intercooler, the normal pressure pick up signal reduces the injector fuel pressure, therefore, by diverting pressure from directly at the turbocharger, fuel flow is increased approximately 15%.

9. Operation and Performance Tuning Tips

When operating properly, this system will yield reductions in charge temperature of up to 135°F. This alone increases performance, and when coupled with increased boost pressure, created by the Boost Pressure Maximizer System and the Boost Pressure Enrichment, performance is greatly enhanced.

In the event your vehicle is not equipped with a boost gauge, Spearco offers a 2 1/16" diameter Turbo Boost gauge, which will allow you to monitor boost pressure operation.

For drag racing applications, if you choose to operate the boost at higher than 9 psi, it will be necessary to remove the pop off valve installed in the right front side of the intake manifold, as it will relieve boost pressure at over 9 psi. In conjunction with additional boost pressure, for off road or drag racing applications, advance the timing 5° to optimize performance.

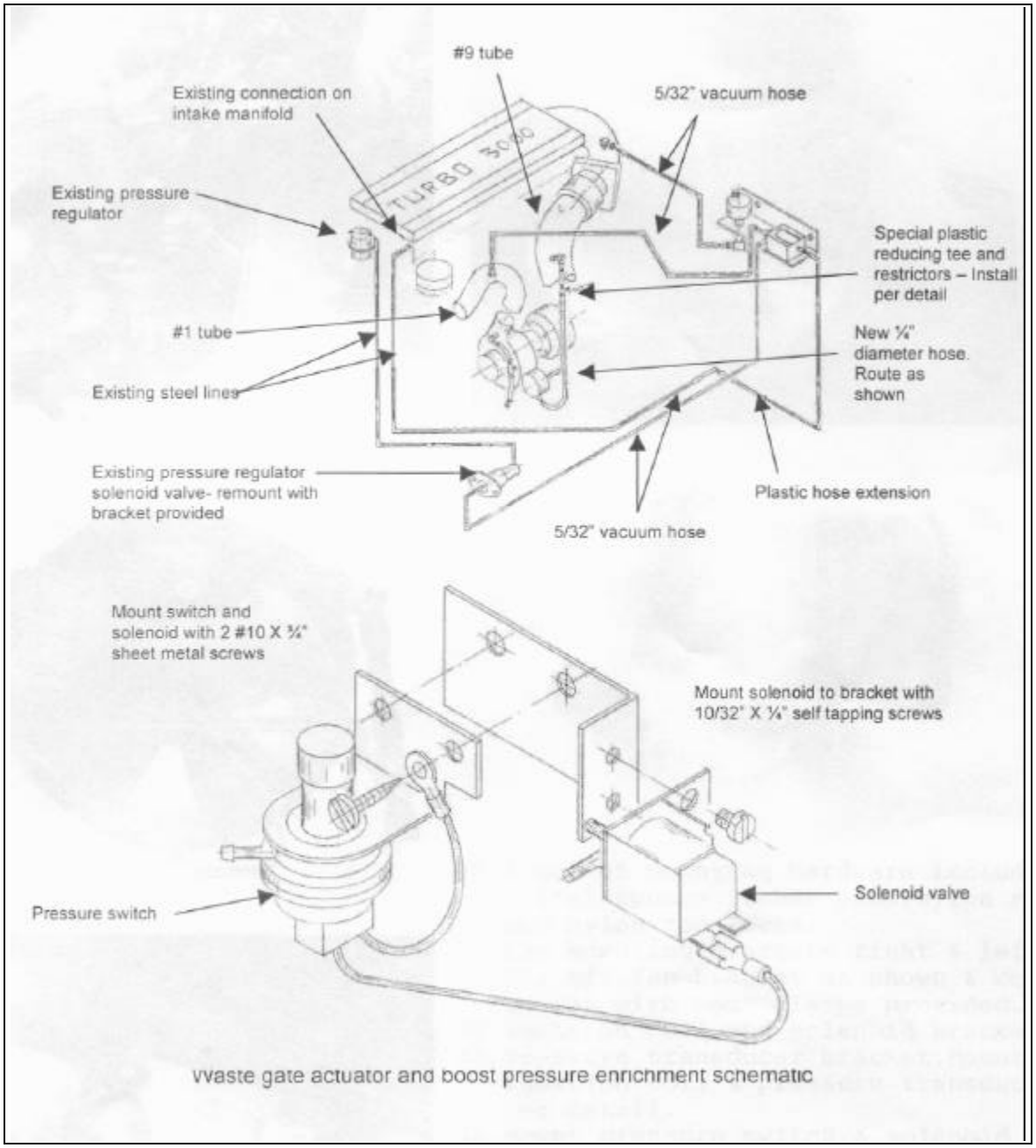

Figure 1 Wastegate actuator and boost pressure enrichment schematic

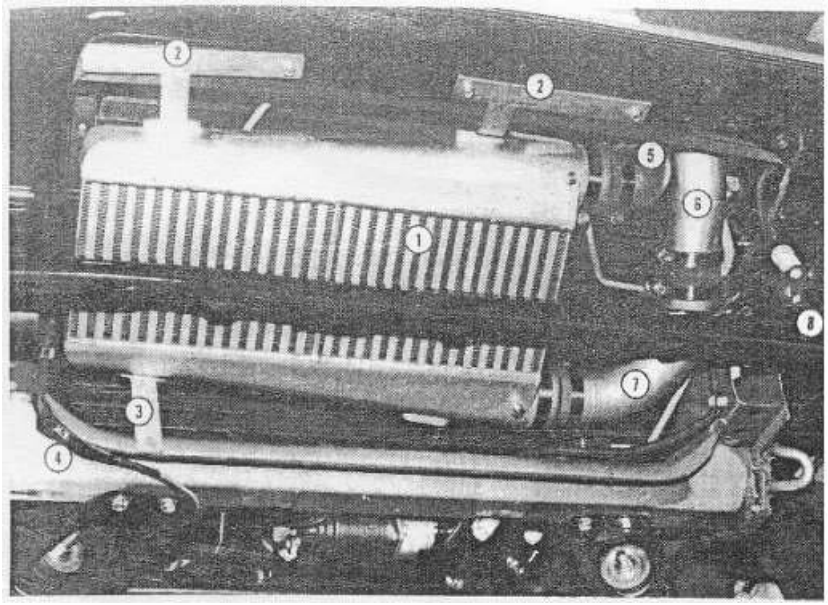

Figure 2 Intercooler Parts 1 thru 8

1. Intercooler Assembly
2. Top mounting brackets, right and left hand.
3. Bottom mounting bracket
4. Existing fan motor wire, which is extended to back of radiator.
5. 90 deg cast aluminum elbow
6. Tube #6
7. Tube #5
8. Remount temp.sensor as shown

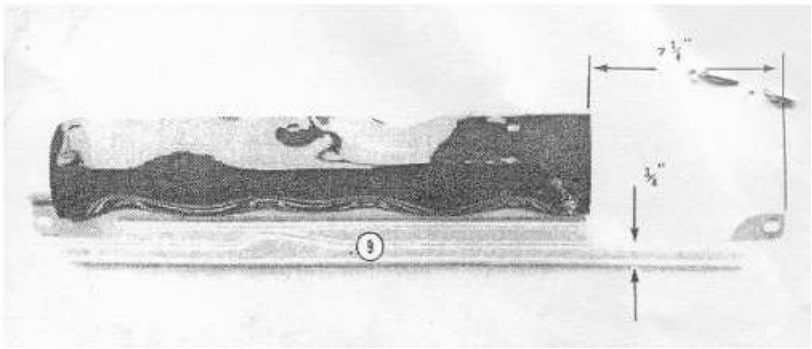

Figure 3 Intercooler Parts 9

9. Top radiator baffle remove from vehicle, modify as shown

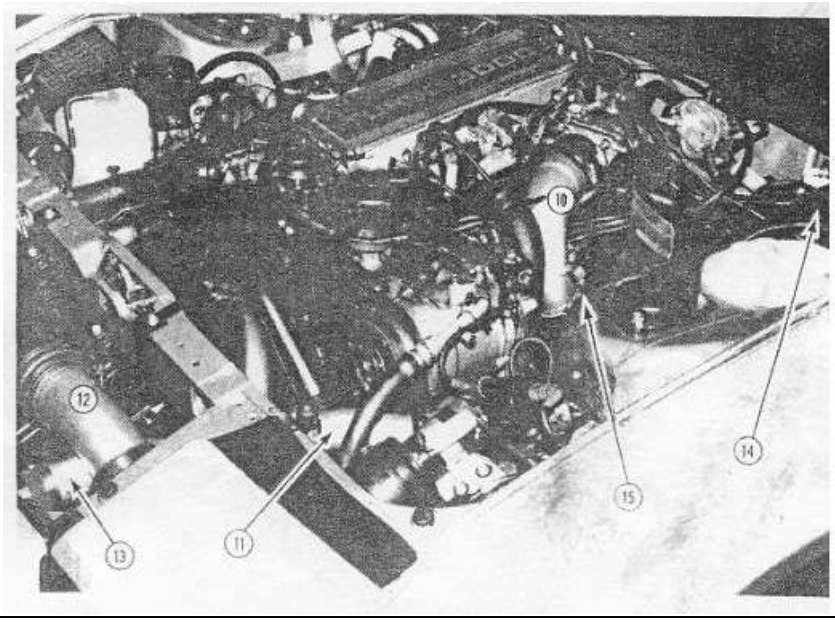

Figure 4 Intercooler Parts 10 – 15

10. Tube #9 2-1/2" O.D.
11. Tube #2
12. 3" O.D. Air Cleaner Tube
13. Tube #3
14. Solenoid valve/pressure switch assembly. See detail photo.
15. 1/8"street ell & 1/4"hose barb for wastegate connection. See detail

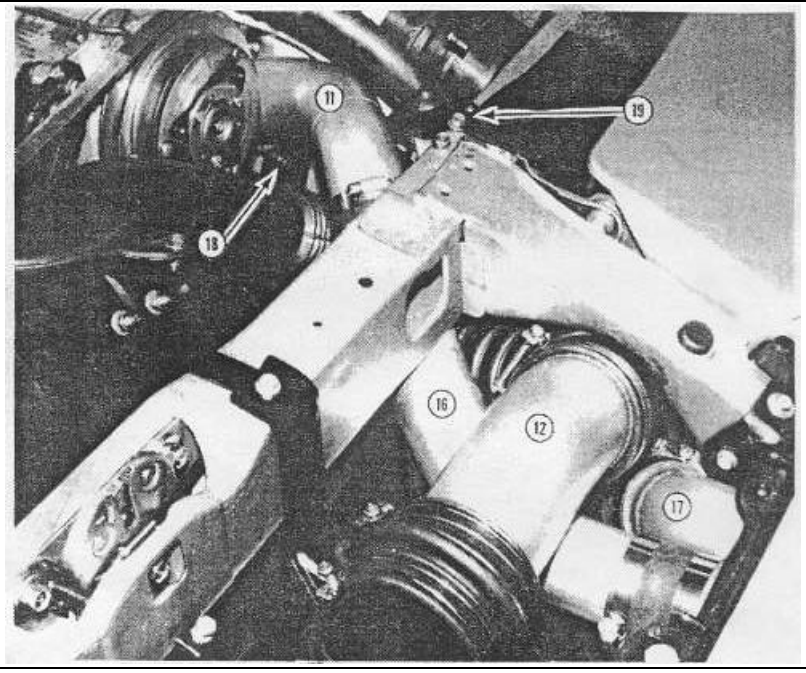

Figure 5 Intercooler Parts 16 -19

16. Tube #3
17. Tube #6
18. Position of remounted pressure transducer.
19. Relocate burglar alarm switch and hold with outboard screw only

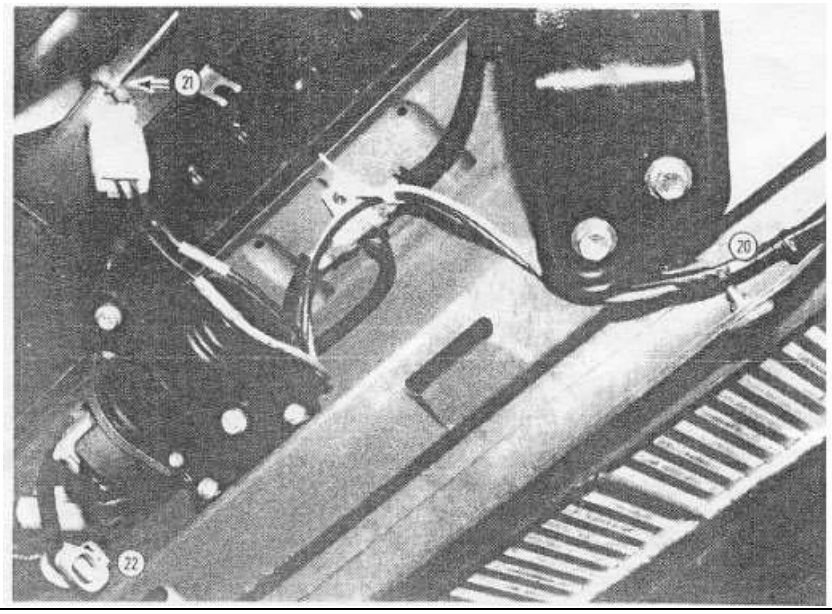

Figure 6 Intercooler Parts 20 – 22

20. Extend existing fan wires, change polarity and route to reposition fan connector as shown.

21. Drill hole in bottom of fan shroud and secure fan wire as shown.

22. Disconnect headlight washer pump wiring harness.

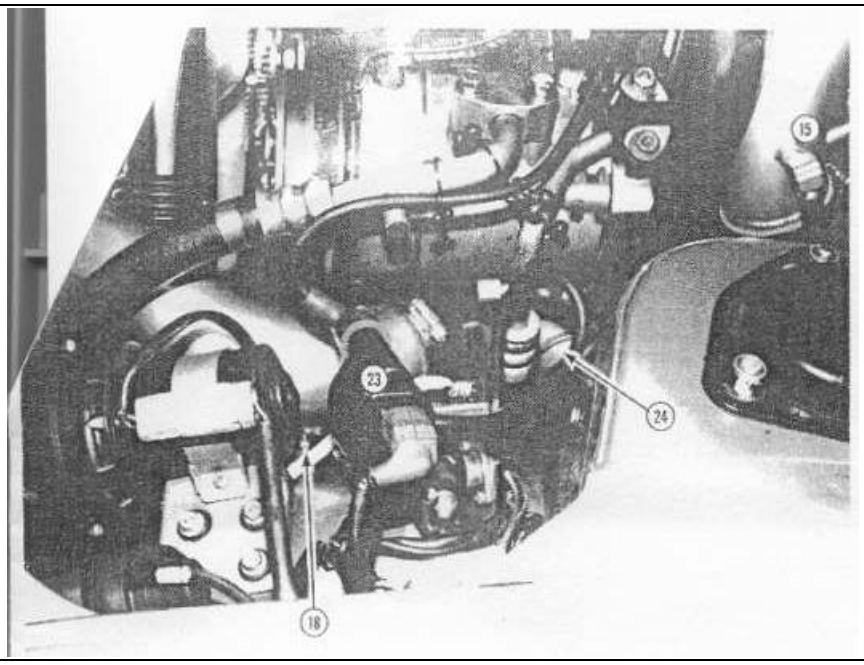

Figure 7 Parts 23 – 24

23. Remount ignition coil, solenoid & power transistor as shown. See detail photo
24. Tube #1

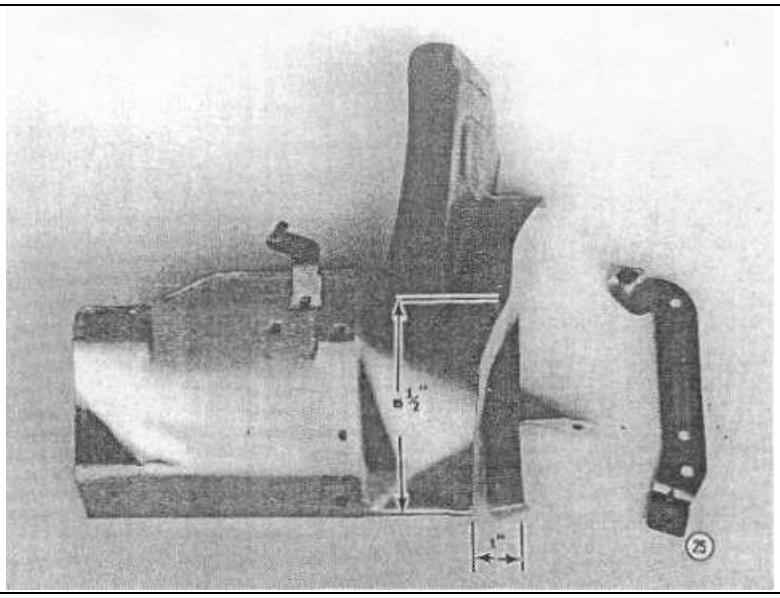

Figure 8 Part 25

25. Cut off tab or bend down as shown

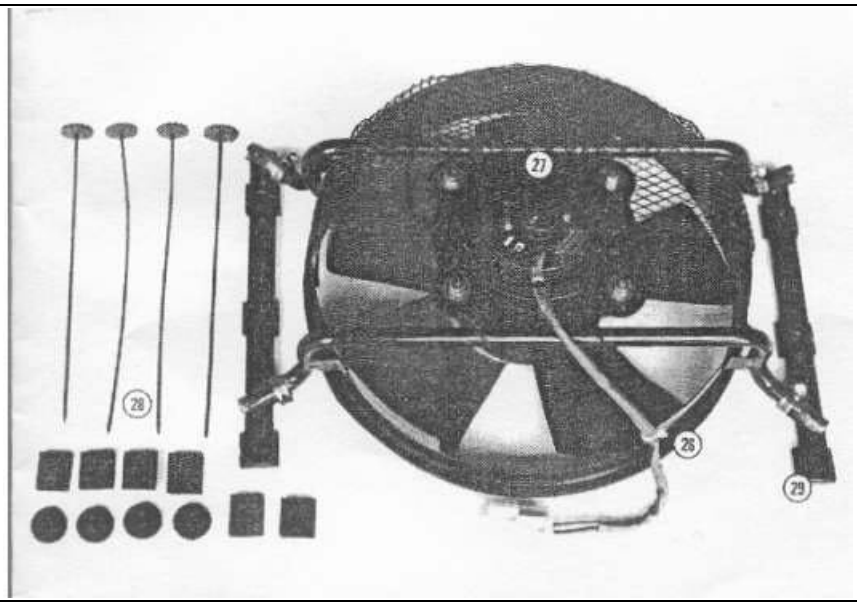

Figure 9 Parts 26 - 29

26. Secure fan wire to fan shroud. Drill a hole & install tie strap.

27. Mitsuba (late type) fan motor assembly.

28. 1 set of mounting hardware including 6 1" x 1" sponge rubber pads, nylon rods and nylon rod locks.

29. Fan mounting brackets right & left Cut off fan bracket as shown & mount to fan with hose clamps provided.

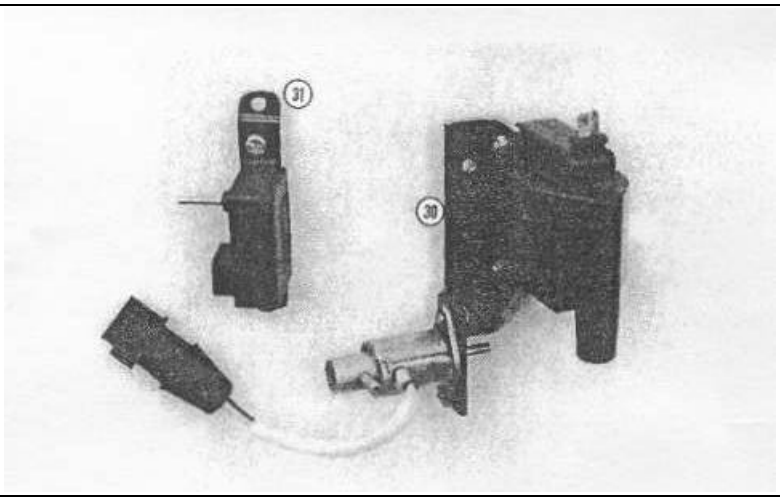

Figure 10 Parts 30 - 31

30. Ignition coil and solenoid bracket.

31. Pressure transducer bracket. Mount ignition coil & pressure transducer per detail.

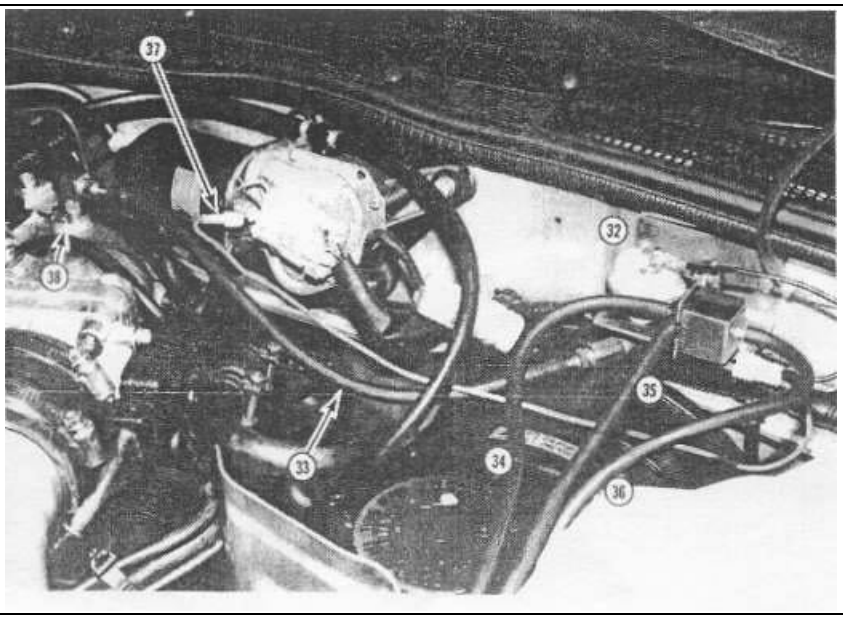

Figure 11 Parts 32 – 38

32. Mount pressure switch & solenoid to firewall as shown by drilling & mounting with sheet metal screws. See drawing for alternate style.

33. Pressure hose - throttle body to switch.

34. To connection on #1 Tube.

35. To fuel pressure regulator via solenoid

36. Intake manifold downstream of throttle (stock, original pressure tap for pressure regulator). See schematic.

37. Connect to bottom wire on windshield wiper connector as shown. Connection is 12 volt/hot on run only.

38. Pressure connection for pressure switch 1/8"street ell, 1/4" bushing and 5/32" hose barb