



APS ENGINEERING PTY LTD

APS Intercooled Twin Turbo for the Nissan 350Z

Installation Guide

Release IIIa

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Before Commencing

Installation

VERIFY WITH YOUR SUPPLYING DEALER THAT YOU HAVE THE CORRECT APS COMPUTER PROGRAM FOR YOUR PARTICULAR COMBINATION OF GASOLINE OCTANE AND EXHAUST COMPONENTS

Verify that you have all necessary tools as listed.

CLEAN ALL AIR DUCTING PRIOR TO COMMENCING INSTALLATION.

The sequence of installation of each part is very important. It needs to be carried out **exactly** as outlined in the instructions. Failure to do this will result in an unnecessary level of frustration.

Choose a NGK spark plug, per the following application outline and ensure you have a set on hand.

PLFR5A-11 - *Stock* - Should only be used with totally stock exhaust system. Boost below 8 PSI, ambient temperature below 60°F.

PLFR6A-11 - *Service Option* - Should be used for general street operation work with cat-back exhaust system. Boost 8-9 PSI, ambient temperature 60°-100°F.

PLFR7A-11 - *Service Option* - Drag racing in an ambient temperature range of 60°-100°F.

PLFR8A-11 - *Service Option* - Road racing or any other forms of competition in an ambient temperature over 100°F.

Always use fuel with a minimum octane rating of 91 (R+M)/2. (Equivalent to 96 RON).

Always use an oil graded for use with gasoline turbocharged engines.

Depending on your chosen application, an engine oil cooler and/or larger capacity radiator may be required.

The APS turbosystem is primarily intended for installation by qualified technicians in fully equipped workshops. **If** this installation is attempted in a non-professional environment, all personal safety obligations rest with the individuals(s) concerned.

The minimum requirements (and by no means an exhaustive list) are:

- Well ventilated environment.
- Clean flat and level floor.
- High quality vehicle stands.

Required Tools

(1) *Metric*

- 1/4" drive socket set c/w universal coupling – 6 to 16 mm.
- 3/8" drive socket set c/w universal coupling – 10 to 20 mm.
- Wrench – open end/box combination – 8 to 22 mm.
- Hex key – 4 and 5 mm.

(2) *Imperial*

- Wrench – open end/box combination – 1/2" to 3/4".

(3) *General*

1. Screw driver set.
2. Pliers – flat, point, side cutter, multigrip.

(4) *Sealants*

- Permatex ultra copper – P/N 101BR.
- Permatex ultra grey – P/N 599 BR.
- Loctite thread sealer – P/N 567.

350Z Disassembly

NOTE IT IS RECOMMENDED THAT THE FACTORY SERVICE MANUAL BE FOLLOWED WITH STOCK COMPONENT REMOVAL AND REPLACEMENT.

- (1) Remove the retaining clips and screws and remove the front bumper. (If unsure of this procedure, you should use the factory service manual or have qualified personnel undertake the work).

This is suggested as the first step since the vehicle is still mobile at this stage and the work can therefore be undertaken away from the actual turbosystem installation location. In addition, it reduces the likelihood of body damage to the vehicle while undertaking the mechanical work.

- (2) Remove the battery shroud and RHS false firewall cover. Disconnect the earth cable from the battery.

RAISE VEHICLE

- (3) Remove the plastic undertray from beneath the engine, along with the plastic vertical side panels, which run from the undertray to the frame rails. Retain for later use.
- (4) Remove plastic vertical front panels from aluminum bumper beam and discard.
- (5) Remove aluminum impact beam and retain.
- (6) Remove washer bottle and retain.
- (7) Drain all the engine coolant, (retain for later re-use). The drain plug is in the bottom of the radiator.
- (8) Drain all the engine oil, (replace with new oil after installation completion).
- (9) Remove the front 'Y' pipe of the stock exhaust system.

- (10) Remove the catalytic converter support bracket from the bottom of the transmission. Remove the rear O2 sensors.
- (11) Remove both catalytic converters.
- (12) Remove the front O2 sensors from the exhaust manifolds.
- (13) Mark the upper/lower steering shafts with a straight alignment line made with a straight edge and marker pen. Loosen the clamp bolts on either end of the universal joint and remove that component.

NOTE DO NOT ROTATE STEERING WHEEL OR FRONT WHEELS AFTER DISCONNECTING THE SHAFTS.

- (14) Remove the bolts retaining the steel oil pan and remove same, avoiding damage to the gasket sealing surface. Remove the two retaining bolts and stock oil pickup. Discard the pan, all bolts. Retain the pickup.
- (15) Remove the stock oil pressure sensor from lower front RHS of the engine. (Beside oil filter). Retain the sensor for re-use.

LOWER VEHICLE

- (16) Drain power steering pump oil, (retain for later re-use).
- (17) Remove the stock power steering cooler, mounting brackets and cooler lines back to the stock connection immediately behind the radiator, adjacent to the RHS frame rail. Retain only the power steering cooler for re-use.
- (18) Remove the air ducting between throttle body and MAF meter and discard.
- (19) Remove the complete air cleaner/MAF meter assembly and discard.
- (20) Remove the MAF sensor and screws from the MAF housing and retain for later use.
- (21) Remove the fuel cap in order to vent the fuel tank.
- (22) Remove the front strut tower brace and the cosmetic engine cover.

- (23) Unplug all the electrical wiring, coolant hose (below throttle body) and vacuum hose connections to components attached to the plenum chamber – upper.
- (24) Remove the plenum chamber – upper.
- (25) Remove the plenum chamber – lower.
- (26) Remove the fuel rail assembly retaining bolts and isolators.
- (27) Unplug the stock injector wiring loom from the injectors. Remove complete fuel rail assembly, together with all six injectors.
- (28) Remove the injector retaining clips and remove the stock injectors from the fuel rail assembly. Discard the injectors.
- (29) Cover the six open ports in the intake manifold lower, in order to prevent foreign object entry.
- (30) Remove the stock fuel injector wiring loom. This unplugs from the main loom at the rear of the intake manifold and will usually require the cutting of a band of electrical tape around the main loom. Discard the stock fuel injector loom.
- (31) Remove the stock spark plugs and discard.
- (32) Remove the top radiator hose and disconnect thermostat by-pass hose, from the RHS steel water tube and retain.
- (33) Disconnect the upper heater hose and rear by-pass hose, from the RHS steel water tube. Remove the stock plastic air bleed Tee piece from the upper heater hose. Retain the clamps, discard the Tee.
- (34) Disconnect the large wiring loom from the bracket on the RHS steel water tube.
- (35) Unbolt the RHS side steel water tube and remove carefully in order to avoid damaging the sealing 'O' ring where it connects to the cast water tube at the RHS rear of engine.
- (36) Remove the coolant recovery bottle and mounting bracket and discard.

- (37) Release the belt tensioner and unbolt the air conditioning compressor from its mounting position on the side of the engine. Do **not** disconnect any air conditioning lines.
- (38) Remove LHS coolant pipe above exhaust manifold and retain.
- (39) Remove the 3/8" BSP tapered seal water drain plug from the side of the block immediately adjacent to the upper rear point of the air conditioning compressor and discard the plug.
- (40) Remove the exhaust manifold heat shields and discard.
- (41) Remove the exhaust manifolds, gaskets and all twelve manifold retaining studs. Discard the manifolds / studs. Retain the gaskets for re-use.
- (42) Remove both stock horns, the ambient temperature sensor and frontal impact sensor. Retain all parts for re-use.
- (43) Remove the access trim in the cover panel behind the RHS seat. Remove the access panel in the floor covering the fuel/pump sender unit and disconnect the wiring harness.
- (44) Disconnect the hard plastic line from the discharge port of the pump/sender unit. Cut the hard plastic line from both the stock quick connect hose end and the hard metal line running forward to the engine. Retain the stock quick connect hose end for re-use. Discard the hard plastic line.
- (45) Remove the bolts retaining the pump / sender unit and remove same without damaging the fuel level sender float. Disassemble the unit and remove the stock fuel pump and stock fuel pressure regulator and discard.

NOTE IF NOT PROCEEDING WITH THE FUEL PUMP MODIFICATIONS STRAIGHT AWAY, IT IS SUGGESTED THAT THE OPENING IN THE TANK BE COVERED WITH STRIPS OF TAPE, IN ORDER TO PREVENT GASOLINE FUMES ESCAPING INTO THE WORK ENVIRONMENT.

350Z Assembly

(1) Lower Turbocharger Water Connection – DIAGRAM TFA/01

Install a straight adaptor, 3/8" BSP x 9/16" JIC (Item 160) in the left hand side front of block coolant drain port, sealing with Loctite thread sealer. (Detail 10 of diagram – TFA/01 – water).

Connect the water hose assembly – LHS outer (Item 161) to the adaptor (Item 160), with the 45° hose end pointing forwards and slightly upwards. Do not tighten nut on 45° hose end. Hold the air conditioning compressor in position. Tighten the nut on the 45° hose end of the water hose assembly (Item 161), at the connection to the adaptor (Item 160), to clear the compressor. Do not re-install the compressor at this stage.

(2) Exhaust Manifold Mounting Studs – DIAGRAM – EMA/01

Install the short threaded end of the stud (Item 74) in the indicated (diagram EMA/01) hole in the LHS cylinder head. Check the correct fitment location by temporarily holding the LHS exhaust manifold in position. The stud (Item 74) should protrude through the extended mounting boss on the exhaust manifold, immediately ahead of the turbocharger mounting flange.

Remove the manifold and install the short threaded end of the remaining five studs (Item 73) in the LHS head and the short threaded end of the other six studs (Item 73) in the RHS cylinder head. All twelve studs should be torqued to 10 ft/lbs.

(3) **Forward Fuel Line Re-Routing – DIAGRAM – TOA/01**

The stock fuel line routing is too close to the RHS turbocharger, where it passes up the inside face of the RHS frame rail. The fuel line must be bent (detail 3 on TOA/01) above the stock bracket which mounts the fuel line to the inner face of the frame rail, so as to be parallel to the adjacent vapour return line. The stock fuel line will accommodate the bending of the tube, so long as it is done carefully and slowly, by hand.

(4) **Engine Mount Heat Shield Modification**

The RHS engine mount stock heat shield must be bent downwards towards the isolator 5mm for clearance from the compressor housing (aluminium) of the RHS turbocharger.

(5) **Turbocharger Mounting Studs – DIAGRAM – EMA/01**

Install four studs (Item 76) in each exhaust manifold's turbocharger mounting flange. Torque to 10ft/lbs. (Diagram – EMA/01).

(6) **Exhaust Manifold Heat Shield Forming – DIAGRAM – EMA/01**

The exhaust manifold heat shields (Items 78 and 79) must be hand formed around the APS exhaust manifolds (Items 71 and 72). The most straightforward way to do this is to bolt the flat sheets to each respective exhaust manifold's heat shield mounting bosses.

Carefully by hand, using a soft hammer shape each heat shield to conform to the outside of the exhaust manifolds. Remove the shaped heat shields in order to install the exhaust manifolds.

(7) **Exhaust Manifold Installation – DIAGRAM – EMA/01**

Re-using the stock exhaust manifold gaskets, both manifolds (Items 71 and 72) can now be installed. Due to the space limitations involved, each nut (Item 75), should be started and then tightened

simultaneously, one thread at a time! Although this is time consuming, it is the only practical approach. All nuts should be torqued to 20 ft/lbs. After tightening all nuts, the previously formed heat shields (Items 78 and 79) can now be installed on the exhaust manifolds (Items 71 and 72), using two hex head bolts (Item 80) and flat washers (Item 82), on each manifold. Refit LHS water pipe above exhaust manifold.

Re-install the air conditioning compressor, carefully routing the water hose assembly (Item 161) in front of the two air conditioning hoses coming off the compressor. The water hose assembly (Item 161) is then routed in a 180° bend back towards the firewall, outboard of the two air conditioning hoses. Re-install the stock air conditioning drive belts and re-tension to factory specification.

(8) **Turbocharger Pre-Assembly – DIAGRAM – TPA/01**

Both turbochargers are supplied correctly indexed, with wastegate actuators installed and set for pre-load. However, installation in the motor vehicle is made much easier if the following items are installed on each turbocharger, prior to fitment to the exhaust manifolds. All components should be installed and oriented in accordance with diagram TPA/01.

LHS Turbocharger Assembly (Item 31) – Diagram – TPA/01 (This assembly has the actuator bracket bolted directly to the compressor housing)

- | | | |
|-----|--|---------|
| (a) | Oil Supply Hose (Item 153) | : Qty 1 |
| (b) | Bolt – Banjo – Oil Supply (Item 150) | : Qty 1 |
| (c) | Copper Washer 12mm – Banjo Bolt Upper (Item 151) | : Qty 1 |
| (d) | Copper Washer 11mm – Banjo Bolt Lower (Item 151) | : Qty 1 |
| (e) | Oil Drain – Upper (Item 131) | : Qty 1 |
| (f) | Gasket – Oil Return (Item 133) | : Qty 1 |
| (g) | Bolt – Hex – 8mm (Item 134) | : Qty 2 |
| (h) | Adaptor – St. (Item 162) | : Qty 2 |
| (i) | Washer – Copper (Item 144) | : Qty 2 |

- (j) Stud – 8mm (Item 58) : Qty 5
 - (k) Hose – Silicon (Item 7) : Qty 1
 - (l) Clamp – Hose (Item 11) : Qty 1
- (Worm drive outboard, pointing down)

RHS Turbocharger Assembly (Item 32) – Diagram – TPA/01 (This assembly has spacers between the actuator bracket and compressor housing)

- (a) Oil Supply Hose (Item 153) : Qty 1
 - (b) Bolt – Banjo – Oil Supply (Item 154) : Qty 1
 - (c) Copper Washer 12mm – Banjo Bolt Upper (Item 151) : Qty 1
 - (d) Copper Washer 11mm – Banjo Bolt Lower (Item 151) : Qty 1
 - (e) Oil Drain (Item 132) : Qty 1
 - (f) Gasket – Oil Return (Item 133) : Qty 1
 - (g) Bolt – Hex – 8mm (Item 134) : Qty 2
 - (h) Banjo Fitting – 14mm (Item 164) : Qty 2
 - (i) Bolt – Banjo – 14mm (Item 165) : Qty 2
 - (j) Washer – Copper (Item 144) : Qty 4
 - (k) Stud – 8mm (Item 58) : Qty 5
 - (l) Hose – Silicon (Item 7) : Qty 1
 - (m) Clamp – Hose (Item 11) : Qty 1
- (Worm drive outboard, pointing up)

(9) **Turbocharger Installation**

(a) LHS Turbocharger

Apply Permatex ultra copper sealer to exhaust manifold turbine mounting flange surface.

Place the turbocharger assembly over the studs and carefully install the four copper coated self locking nuts (Item 77). No washer is

used. These nuts are tightened using the 12mm box wrench supplied with the kit (Item 81).

NOTE ENSURE THE TURBOCHARGER IS HELD SQUARE ON THE MOUNTING STUDS, PUSHED TOWARDS THE ENGINE. FAILURE TO DO THIS CORRECTLY WILL CREATE EXHAUST SYSTEM COMPONENTS MISALIGNMENT AND POSSIBLE BODY INTERFERENCE.

(b) RHS Turbocharger

Before applying sealer, place the turbocharger assembly over the mounting studs in the exhaust manifold and verify that the compressor housing (aluminium) has 3-5mm clearance from the heat shield covering the RHS engine mounting isolator. If not, further bend the heat shield.

Then apply the Permatex sealer and install RHS turbocharger, as previously done on the LHS.

NOTE ENSURE THE TURBOCHARGER IS HELD SQUARE ON THE MOUNTING STUDS, PUSHED TOWARDS THE ENGINE. FAILURE TO DO THIS CORRECTLY WILL CREATE EXHAUST SYSTEM COMPONENTS MISALIGNMENT AND POSSIBLE BODY INTERFERENCE.

(10) **Turbocharger Oil Supply Takeoff – DIAGRAM – TFA/01-OIL**

Install the oil supply tee piece (Item 155) in the 1/8" BSP oil pressure sender port in lower front right hand side of block, oriented with one female port facing upwards, the other female port forwards and sealing the 1/8" BSP male thread with Loctite thread sealer, ensuring none can enter the internal oil gallery. Likewise, install the stock oil pressure sender unit in the upwards facing female port of the tee piece (Item 155) and the adaptor (Item 156) in the forward facing port (diagram – TFA/01-oil).

(11) Oil Pan Assembly – DIAGRAM – TFA-01 - OIL

Install the two 'O' rings (Item 146) in the grooves either side of oil pump pickup spacer (Item 145). Using two hex head bolts (Item 147), flat washers (Item 148) and star washers (Item 149), install stock oil pump pickup and spacer. Tighten to 15 ft/lbs. (Detail 11 of diagram – TFA/01 – oil).

Install straight oil drain lower (Item 138) into top facing oil pan flanges, sealing with Loctite thread sealer. Install oil pan drain plug (Item 143) and copper washer (Item 144) into the drain port of the oil pan. Run a bead of Permatex Ultra Grey sealer around the flange face of the oil pan (Item 139).

Using the four long socket head bolts (Item 141) and four flat washer (Item 142), loosely mount oil pan to engine by the four through bolt positions. Install all six socket head bolts (Item 140) and six flat washers (Item 142), through the outer flange holes. All bolts, except the two rear flange ones, should be torqued to 10 ft/lbs (the two un-torqued bolts are tightened after centre water hose installation). (Diagram – TFA/01 –oil).

(12) Water Hose Assemblies – DIAGRAM – TFA/01 - WATER

The LHS water hose assembly (Item 161) can now have its 90° hose end connected to the adaptor (Item 162), previously installed in the outboard water port of the LHS turbocharger. The centre water hose (Item 163) can now be connected, from the inboard adaptor (Item 162) of the LHS turbocharger to the downwards facing inboard banjo fitting (Item 164) of the RHS turbocharger. The 90° hose end connects to LHS turbocharger adaptor (Item 162), the 45° hose end to the RHS turbocharger banjo fitting (Item 164). The hose is routed between the rear face of the cast oil pan and front edge of main cross-member and supported in the centre by two

cushion clamps (Item 157), attached to the two rear centre flange bolts (Item 140), which retain the cast oil pan. Torque these bolts to 10 ft/lbs.

Install the tee piece-water (Item 167) in the heater hose, using the stock hose clamps, replacing the stock heater hose plastic bleed port connector, previously removed. Ensure the 9/16" JIC tee takeoff points straight up.

The RHS water hose assembly (Item 166) can now be installed with the straight hose end connected to the upwards facing outboard banjo fitting (Item 164) of the RHS turbocharger (diagram – TFA/01-water).

The water hose assembly is routed straight up from the banjo fitting on the RHS turbocharger and curves back towards the tee piece (Item 167), connecting to it with the 90° hose end.

All hose end nuts can now be tightened, while holding the water hose assemblies in order to prevent twisting of the Teflon braided line.

(13) **Turbocharger Oil Supply Assemblies – DIAGRAM-TFA/01-OIL**

The LHS oil supply hose assembly (Item 153), previously installed on the LHS turbocharger, can now be routed forwards, above the LHS engine mount isolator, arcing around the front of the engine to the forwards facing adaptor (Item 156) and connecting to it with the 45° hose end, which is positioned upwards to clear the small water hose which leads to the engine oil cooler, above the filter. The LHS oil supply hose assembly (Item 153) is supported by back to back cushion clamps (Item 157), bolted together by a hex head bolt (Item 158), washer (Item 142) and Nyloc nut (Item 159). The double clamps are positioned in the centre of the arc, at the lower front left of the engine, by placing one clamp around the adjacent stock metal water line which supplies the oil cooler, the other around the oil supply hose assembly (Item 153).

The RHS oil supply hose assembly (Item 154) previously installed on the RHS turbocharger runs forwards of the water line and arcs forward around the compressor housing, above the RHS engine mount isolator and down towards the outwards facing end connection of the tee piece (Item 155).

While hose end nuts are tightened, hold the oil supply hose assemblies in order to prevent twisting of the braided teflon line.

(14) Turbocharger Oil Drains – DIAGRAM – TFA/01-OIL

The LHS molded oil drain hose (Item 135) can now be installed with flow directional arrow pointing to oil pan, with hose clamp (Item 137) used at both ends. Ensure the hose is not in contact with any other components.

The RHS moulded oil drain hose (Item 136) can be similarly installed from the RHS turbocharger to the oil pan turbocharger drain fitting (Item 138). Again, please note flow directional arrow.

Ensure the moulded hoses cannot kink anywhere and that they have a continuous downward fall – only trim the turbocharger end to length, if necessary. Do not shorten the pan end.

(15) Compressor Discharge Duct – LHS – DIAGRAM – FMI/01

Bend the air conditioning hose from the compressor vertically towards the engine, so that the rubber hose has 3/8" clearance from the air conditioning compressor pulley.

Install the LHS compressor discharge duct (Item 91) and a gasket (Item 94), to the three bolt flange of the discharge port of the LHS turbocharger, using three hex head bolts (Item 96). Taking advantage of the clearance in the three bolt holes, ensure the leg of the duct dropping down the front of the engine is positioned vertical before tightening bolts.

(16) **Compressor Inlet Duct – LHS – DIAGRAM – HFA/01**

Place a hose clamp (Item 11) worm drive outboard, pointing down, loosely over the silicon hose joiner (Item 7), previously installed on the turbocharger compressor inlet. Install the compressor inlet duct (Item 8) by sliding it down over the air conditioning compressor, rotating as necessary, until the duct is fully inside the silicon hose joiner (Item 7). Position the duct so as to have maximum clearance from the inner fender, then tighten the hose clamp (Item 11) over the silicon hose joiner.

(17) **LHS Air Filter – DIAGRAM – HFA/01**

Install air cleaner hose (Item 10), with hose clamp (Item 11), onto compressor inlet duct (Item 8). Route the air cleaner hose down between the inner fender and frame rail, ahead of inner wheel arch. Install the air filter assembly (Item 1) in the end of the air cleaner hose, clamping with hose clamp (Item 11) and hose clamp (Item 21) on the filter element. The air cleaner is supported by a bracket (Item 2), which is mounted to the lower left corner of the radiator support panel, using a hex head bolt (Item 3), washer (Item 4) and Nyloc nut (Item 5). The bracket is attached to the filter by the hose clamp (Item 21) immediately behind the element (not Item 11).

Install the 5/8" breather hose joiner (Item 18), in the forward end of the stock breather hose which connects to the rear of the LHS camshaft cover, using the stock hose clamp. Install moulded breather hose (Item 19) between joiner (Item 18) and 5/8" barb on side of front end of the LHS compressor inlet duct (Item 8). Retain the hose (Item 19) at both ends using spring clamps (Item 20).

(18) **Stock Power Steering Fluid Reservoir Mounting Bracket**

In order to provide additional clearance for the RHS compressor discharge duct, install two button head bolts (Item 93) in the inner face of the shock

tower, power steering fluid reservoir mounting bracket, replacing the stock hex head bolts. (Detail 8 of diagram – FMI/01).

(19) Fuel Line Heat Shield – DIAGRAM – TOA/01

Install the fuel line heat shield (Item 61) on the inner face of the lower front frame rail. The spacer (Item 62) is installed between the heat shield and the stock fuel line clip, by installing a hex head bolt (Item 63) and a body washer (Item 64) through the lower hole in the heat shield, through the spacer, through the fuel line clip and into the stock tapped mounting hole in the frame rail. At the top of the heat shield, the metal tie strap (Item 65) is looped through the hole in the heat shield and around the back of the lines and pulled just tight enough to offer support.

(20) Power Steering Cooler – Detail 4/5 - DIAGRAM – FMI/01

Install power steering hoses only. Install the hose joiners (Item 119), in the stock power steering lines, on top of the RHS frame rail, immediately behind the radiator using the stock hose clamps. Install new power steering hoses (Item 120) and clamps (Item 121). Route the new hoses around the end of the frontal impact beam as illustrated.

(21) Compressor Inlet Duct – RHS – DIAGRAM – HFA/01

Place a hose clamp (Item 11), worm drive outboard, pointing upwards, loosely over the silicon hose joiner (Item 7), previously installed on the turbocharger compressor inlet. Install the RHS compressor inlet duct (Item 9), tightening the hose clamp (Item 11), while holding the duct so that it has maximum clearance from the inner fender.

(22) Compressor Discharge Duct – RHS – DIAGRAM – FMI/01

Carefully bend the 180° metal tube power steering line to a 2.0", centre to centre dimension. At the same time, bend the tube 1.0" towards the centerline of the vehicle, in order to provide room for the compressor

discharge duct (Item 9) to pass between the power steering line and inner face of the RHS frame rail.

Install the RHS compressor discharge duct (Item 92) and the gasket (Item 94), to the three bolt flange of the discharge port of the RHS turbocharger, using two hex head bolts (Item 96) and one socket head bolt (Item 95). The latter is installed in the position closest to the engine.

Ensure the large stock wiring loom, previously attached to the tab on the stock metal upper radiator water pipe, is *relocated* outboard of the compressor discharge duct (Item 92) and as far rearwards as the loom length will allow. Taking advantage of the clearance in the three bolt holes, ensure the leg of the duct dropping down the front of the engine is positioned vertically, before tightening the bolts (Items 95 and 96).

(23) **RHS Air Filter – DIAGRAM - HFA/01**

Install air cleaner hose (Item 10), with hose clamp (Item 11), onto RHS compressor inlet duct (Item 9). Route the air cleaner hose down between the inner fender and frame rail, ahead of inner wheel arch. Install the air filter assembly (Item 1) in the end of the air cleaner hose, clamping with hose clamp (Item 11) and hose clamp (Item 21) on the filter element. The air cleaner is supported by the bracket (Item 6), which is mounted to the top of the RHS inner fender, as shown and attached to the filter by the hose clamp (Item 21) immediately behind the element (not Item 11).

(24) **Stock Radiator Upper Pipe**

Re-install the stock RHS metal upper radiator water pipe, being careful not to damage the 'O' ring on the firewall end. Using the stock bolt which originally attached the large wiring loom (since relocated in step 23), attach the mounting tab on the RHS compressor discharge duct (Item 92) to the tab on the stock water pipe. Re-install the stock radiator and small bypass rubber hoses, ensuring the stock clamps are correctly installed.

(25) **Turbine Outlet Casting – DIAGRAM – TOA/01**

Install LHS and RHS turbine outlet castings (Items 66 and 67) onto the rear of the turbo chargers, using five self locking nuts (Item 60) and five flat washers (Item 59), on each outlet. The special box wrench provided (Item 81), will be of assistance in some positions. The stock O2 sensors can then be re-installed in the ports provided.

Install one stud (Item 68) in each of the outlets (Item 66 and 67), in the threaded holes provided. Using the stock gaskets, re-install either the stock cats, high performance cats or test pipes, as desired. Re-install stock support bracket beneath transmission and tighten all fasteners progressively, using three new nuts (Item 69) at each outlet flange. Re-install remainder of exhaust.

(26) **Re-Installation Of Steering Shaft Universal Joint.**

Modify the upper edge of the universal joint (Detail 12 of diagram TOA/01). Re-install universal joint, ensuring all markings previously applied are correctly aligned.

(27) **Re-Location Of Stock Components, Ahead Of Radiator**

In order to make room for the installation of the intercooler, a number of OE components normally mounted in the area of the hood catch support must be relocated. These are:

(a) Wiring Loom

Disconnect the horn wiring loom plug from the flat panel at the upper front of the radiator. Unclip the female loom plug and re-mount **behind** the flat panel, using the stock holes. In addition, prior to their relocation, the hood catch support itself, must be modified as follows:

Detail 7, diagram - FMI/01.

- (i) the edge of round hole immediately below the four rivet bracket must be ground flat;
 - (ii) the LHS forward facing leg of the four rivet bracket must be removed and ground flat.
- (b) Horns
- Both horns are removed from their stock position. The RHS horn is re-mounted in its stock mounting, after chamfering the ends of its bracket to allow it to be rotated upwards, as far as possible. The LHS horn is re-mounted entirely and will be re-mounted under one of the hex head bolts (Item 96) of the central upper intercooler mounting bracket, following the intercooler's installation. (Detail 9 of diagram – FMI/01).
- (c) Air Bag Sensor
- The air bag sensor, originally mounted on the riveted bracket attached to the hood latch support, which has now been cut, is re-mounted at the LHS horn mounting position, orientated vertically.
- (d) Ambient Air Temperature Sensor
- The air temperature sensor can then be installed in the square hole above the RH horn bracket.

(28) **Intercooler Mounting – DIAGRAM – FMI/01**

Loosely install the LHS intercooler mounting bracket (Item 105) and RHS intercooler mounting bracket (Item 106), using hex head bolts (Item 107), star washer (Item 108), flat washer (Item 109) in the position usually occupied by the lower pair of stock bolts entering the front flange of each frame rail. Sit the intercooler (Item 103) in place on both brackets and loosely install two hex head bolts (Item 96) from beneath each mounting

bracket, up into the tapped flanges welded to each end of the intercooler core. Loosely install upper mounting bracket (Item 104) using the stock hex head bolt, below the latch assembly. Before installing the two hex head bolts (Item 110), install the stock LHS horn bracket, on top of the mounting bracket (Item 104), under the rear most of the two bolts (Item 100).

All bolts can now be carefully tightened, ensuring no stress is placed on any bracket, or the intercooler assembly, itself.

Re-install the aluminum impact beam, verifying that it does not touch the intercooler. Grind clearance if necessary.

(29) **Intercooler Inlet Ducting – DIAGRAM FMI/01**

The LHS intercooler inlet duct (Item 99) is installed using silicon hose joiner (Item 97) and hose clamps (Item 98), at the engine end. Silicon hose joiner (Item 101) and hose clamps (item 102) at the intercooler end. Likewise the RHS intercooler duct (Item 100) can be installed. Trimming of the stock vertical plastic panels (removed in step 26), is required to clear the intercooler ducting, prior to re-installation. Take care to ensure there is adequate clearance between all ducting and any body components.

(30) **Spark Plug Installation**

Install the new spark plugs, gapped to 0.035", as previously selected and purchased.

(31) **Fuel Injector Installation**

Install all six fuel injectors (Item 172), after lightly greasing the upper/lower 'O' rings with rubber grease or Vaseline. Replace the stock fuel rails. Install injector loom (Item 173), carefully plugging in all six injectors and the multi-pin plug into the main loom. Re-install the plenum chamber lower/upper, in accordance with Nissan procedures.

(32) **Intercooler Outlet Ducting – DIAGRAM FMI/01**

Place a hose clamp (Item 112) loosely over intercooler outlet, worm drive up facing forwards. Install the silicon intercooler outlet duct (Item 111), through the radiator support panel and slide the hose clamp over the hose end, but do not tighten.

Install the silicon hose joiner (Item 115) onto the throttle body. Install two hose clamps (Item 114) over the silicon hose, only tightening the one clamping the throttle body. Install the stock MAF sensor into the throttle body duct (Item 113), using stock retaining screws. Be careful handling the sensor as this is a delicate component.

Install rubber vacuum hose (Item 57) on the small barb adjacent to the MAF sensor mounting boss. Install a spring hose clamp (Item 49), over the hose, in order to retain it on the barb.

Place a hose clamp (Item 114) over the silicon intercooler outlet duct (Item 111) and install the throttle body duct (Item 113) between that and the silicon joiner (Item 115) on the throttle body. Do not tighten any clamps.

The throttle body duct (Item 113) is mounted to a boss on the front of the cylinder head, using a hex head bolt (Item 117). The teflon washers (Item 116) are placed either side of the bracket. Body washers (Item 118) are placed between the head of the bolt and outer teflon washer and between the inner teflon washer and mounting boss on cylinder head.

The two hose clamps (Item 114), at either end of the throttle body duct can now be tightened. The stock wiring loom plug on the MAF sensor can now be re-installed.

(33) Blow-Off Valve Installation – DIAGRAM – HFA/01

Install blow-off valve outlet hose (Item 14) onto 1¼” barb coming off the side of the front of the LHS compressor inlet duct (Item 8). Slide two hose clamps (Item 15) over the hose. Install the blow-off valve inlet hose (Item 13) on the 1¼” barb on the side of throttle body duct (Item 113), using hose clamp (Item 15). Slide a second clamp onto the hose, leaving it loose. Install rubber hose (Item 16) onto the hose barb on the end of the blow-off valve assembly (Item 12) retaining with spring clamp (Item 17). Install the blow-off valve assembly (Item 12) between the two hoses and tighten all clamps with the secondary discharge port pointing horizontally straight back.

(34) Boost Control Kit – DIAGRAM BCK/01

Install wastegate control solenoid (Item 50), to mounting bracket (Item 52). Install the bracket (Item 52), to the forward side of the blow-off valve, using hex head bolts (Item 53), star washer (Item 54) and flat washer (Item 55). Ensure the correct bolts are used, as otherwise damage will occur to the blow-off valve. Install restrictor (Item 56) inside vacuum hose (Item 57). Install rubber hose (Item 57) (previously connected to the throttle body duct) to the hose barb in the end of the wastegate control solenoid. Retain with spring clamp (Item 49).

Install vacuum hose (Item 44) to hose barb in the side of the wastegate control solenoid and retain with spring claim (Item 45).

Install tee piece (Item 46) branch into other end of vacuum hose (Item 44) and retain with spring clamp (Item 45). Install vacuum hose (Item 47) and vacuum hose (Item 48) onto run barbs of tee piece (Item 46) and retain with spring clamps (Item 49).

Place the tee piece down beside the LHS frame rail, run vacuum hose (Item 47) to the left hand side turbocharger’s actuator. Likewise, run vacuum hose (Item 48) around front of engine and back to the RHS

turbocharger's actuator. Retain both hoses to their respective actuators with spring clamps (Item 49).

Install the wiring loom (Item 51) by routing it back from the solenoid, through the upper grommet in the false firewall, immediately adjacent to the LHS inner fender. Then around to the RHS of the vehicle between the two firewalls. The red power wire attaches to the battery terminal, with the fuse mounted to the rear battery hold down stud. The remainder of the loom is routed through the large loom grommet in the RHS lower face of the firewall, finally plugging into the engine one empty port in the rear of the loom plug which is installed in the smaller of the two boxes which comprise the APS engine management (Item 171), beneath the dashboard.

(35) **Power Steering Cooler – Detail 4/5 - DIAGRAM – FMI/01**

Install the new power steering brackets, (Item 122), by drilling two 0.25" diameter holes in the lower face of the frontal impact beam, positioned as dimensioned. Place two hex bolts (Item 96) down from the inside surface of the beam, through the new brackets and retain by Nyloc nuts (Item 125) and flat washers (Item 124).

Place a hose support clamp (Item 123) over a flow tube at each end of the oil cooler. Using two hex head bolts (Item 96), flat washers (Item 124) and Nyloc nuts (Item 125), install the hose support clamps to the brackets (Item 122). Tighten all fasteners.

Connect the new power steering hoses (Item 120) to the oil cooler, using the stock hose clamps.

(36) **Re-install Washer Bottle**

Separate the filler tube from the bottle. Re-install the bottle from below. Re-install the filler tube from above.

(37) Coolant Recovery Reservoir – DIAGRAM – FMI/01

Install 90° hose elbow (Item 128) in the lower boss of the coolant recovery reservoir (Item 126), sealing with Loctite thread sealer. Connect the stock coolant recovery hose to the elbow and mount the reservoir (Item 126) to the top of the radiator support panel, between plastic and steel radiator support panel to the right of the radiator, using stock hex head bolts, already in that location.

(38) Fuel Pump/Sender Unit Modifications – DIAGRAM – FSS/01

Install fuel pump (Item 174) in place of the original unit. In early production vehicles, the stock pump mounting is a little short for the new pump. It may be necessary to trim the lower rubber noise isolator pad and/or lengthen the slots that engage the clips retaining the two halves of the sender unit. The stock fuel pump inlet filter and electrical wiring plug should re-install without modification.

The stock large diameter plastic spacer and 'O' ring, from the stock regulator are transferred to the plug (Item 193). The small 'O' ring (Item 194) is placed over the small diameter of the plug (Item 193). The completed component is then re-installed in place of the stock regulator and retained in the stock housing by the stock spring clip. Install 90° hose barb (Item 195) in threaded end of stock regulator replacement plug (Item 193). Install fuel hose (Item 196) onto 90° hose barb (Item 195) and retain with spring clamp (Item 197).

A 31/64" hole must be positioned as illustrated and carefully drilled through the top of the sender unit flange. Ensure the dimensions are referenced from the flat face of the plug connector, not the support rib. Carefully de-burr and grease the edge of the hole. Place the Dowty washer (in-built 'O' ring) (Item 190), over the threaded section of the 90° bulkhead fuel return adaptor (Item 189). Insert the adaptor (Item 189)

through the hole, orientating as illustrated. Place the flat washer (Item 191) over the threaded section of the adaptor (Item 189), beneath the sender unit flange. This will bear on the edges of some reinforcement ribs, however this is not a problem. Install self-locking nut and tighten until minimal crush is applied to the Dowty washer on the top of the sender unit flange. Extreme pressure is **not** required!

Gently pry out the small plastic restrictor from the bottom of the pump/sender unit as detailed in Diagram FSS/01. This is a tight press fit component – do not use excessive force. Using small drill bits, progressively drill restrictor orifice to 1/8". Reinstall restrictor back into pump/sender unit.

Place the two halves of the stock pump/sender unit together and insert the lower tube of the bulkhead fuel return adaptor (Item 189) inside fuel hose (Item 196) and retain with spring clamp (Item 197). Ensure the fuel hose is routed so as not to restrict the re-assembly of the two halves of the pump/sender unit. Complete the re-assembly of the two halves of the stock pump/sender unit and re-install into the fuel tank, in the stock configuration.

(39) **Vacuum/Pressure Sensing Line – DIAGRAM – WLI/01**

Install a tee piece (Item 184) to the small barb at the front of the stock plenum chamber, as illustrated, using a short cut piece of vacuum line (Item 183) and three spring clamps (Item 185). Connect the vacuum line from the blow-off valve to the left pointing tee and retain with spring clamp (Item 185). Connect the balance of vacuum line (Item 183) to the right pointing tee and route the line down the RHS of the plenum chamber.

Make a small hole in the large loom grommet in the false firewall, immediately adjacent to the RHS rear corner of the engine. The line then runs through the large grommet wiring loom in the RHS lower face of the

firewall, behind the RHS kick panel, under the RHS door scuff plate, up under the rear structure behind the seat to the regulator (Item 175), where it is retained by a spring clamp (Item 185).

- Ensure the vacuum line is not kinked or crushed!

(40) **Fuel Pressure Regulator – DIAGRAM – FSS/01**

Attach the bracket (Item 179) to the end of the housing (Item 176), using two hex head bolts (Item 182). Install the three hose barbs (Item 177) into the regulator housing (Item 176), using Loctite thread sealer. Apply rubber grease or Vaseline to the 'O' ring on the regulator and install the fuel pressure regulator (Item 175) into the housing (Item 176) and retain with the circlip (Item 178). Attach the bracket (Item 179) to the side of the housing (Item 176), using two hex head bolts (Item 182).

The fuel hose (Item 187) connects the barb (Item 177) in the end of the regulator housing (Item 176) to the bulkhead fuel return adaptor (Item 189) and is retained by hose clamps (Item 188). The fuel hose (Item 186) connects the stock hose quick connect fitting end at the outlet of the pump/sender unit, with either barb (Item 177) in the side of the regulator housing (Item 176) and is retained by the hose clamps (Item 188). Fuel hose (Item 186) is also used to connect the other barb in the other side of the regulator housing to the hard fuel line running forwards to the engine and is retained by two hose clamps (Item 188). Attach the previously installed vacuum line (item 183) to the regulator (item 175).

Mount the regulator housing/bracket assembly, using two hex head bolts (Item 180) and flat washers (Item 181) into two of the stock sender unit flange retaining holes, as illustrated.

(41) **Auxiliary Computer –FSS/01**

The stock computer is located behind the dashboard on the RHS of the vehicle. The stock loom must be unplugged from the stock computer and

plugged into the loom adaptor. The loom adaptor is then plugged into the stock computer.

The vacuum line (Item 183), passing by this area, must be cut and a tee piece (Item 184) inserted and retained with three spring clamps (Item 185). A short length of vacuum line (Item 183) is then run from the branch of the tee to the barb on the small box, (supplied as part of Item 171), retained with spring clamps (Item 185).

The long length of shielded cable is routed back out through the large, main loom grommet, in the firewall. It then continues out through the false firewall via the loom grommet at the top, beside the RHS inner fender. From here it routes back and around the firewall, being careful to avoid any hot components. Then down to the stock crankshaft signal sensor which is located in the lower LHS of the engine block's bell housing mounting face. Unplug factory wiring loom plug from crankshaft signal sensor and connect new shielded cable loom.

Completion Of Installation

(1) Engine Oil

Re-fill engine with oil. Due to the enlarged oil pan capacity, this will take 5.0 quarts, without oil filter. Check level on dip stick. This should be at the low level line. This is correct, as the pan floor/pump pickup has been lowered 12.0 mm. Do **not** over **or** under fill! Below 0°F ambient temperature, use SAE 5W-40 or 5W-50. Over 0°F ambient temperature use SAE 10W-40 or SAE 10W-50. Ensure the oil grade utilized is suitable for use with gasoline turbocharged engines.

(2) Power Steering Oil

Re-fill power steering system with its previously drained oil.

(3) Engine Coolant

NOTE IT IS CRITICAL THAT THE FOLLOWING PROCEDURE BE FOLLOWED EXACTLY! IT IS TIME CONSUMING, HOWEVER, ESSENTIAL!

- 3.1 Remove water return line (Item 166) from Tee piece (Item 167) in stock upper heater hose.
- 3.2 Fill radiator and coolant recovery reservoir (Item 126), with anti freeze coolant. It should take 10 quarts, including reservoir. It is important that the coolant is poured through the radiator filler neck at less than 1.5 quarts per minute, in order to allow air in the system to escape.

- 3.3 When the engine coolant overflows the connection at the Tee piece (Item 167), re-install water hose (Item 166) and tighten the connection.
- 3.4 Warm the engine to the normal operating temperature with the radiator cap installed.
- 3.5 Run the engine at 3,000 RPM for 10 seconds and then allow it to return to idle speed.
 - *Repeat this action three times.*
- 3.6 Stop engine and allow coolant temperature to drop below 120°F.
 - *Use a remote electric fan to assist in this process.*
 - *If necessary, refill the radiator and reservoir up to the filler neck.*
- 3.7 Repeat steps 3.3 to 3.6 at least two more times (it may take more) with the radiator cap installed, until the engine coolant level no longer drops.
- 3.8 Check the cooling system for leaks with the engine running. Remember, water now runs through both turbochargers.
- 3.9 Fully warm the engine and listen for the sound of coolant flow through the heater unit, inside the car; while running the engine from idle to 3,000 RPM, with the heater control set at several positions between cool and warm.
 - *Repeat this action three times*

- 3.10 If any sound is heard, continue to bleed excess air from the cooling system, by repeating steps 3.3 to 3.6, until the coolant level no longer drops.

NOTE THIS PROCEDURE CAN BE MOST FRUSTRATING; HOWEVER IT IS A FUNCTION OF THE STOCK COOLING SYSTEM DESIGN AND HAS NOTHING TO DO WITH THE APS TURBOSYSTEM. IT MUST BE CARRIED OUT IDENTICALLY WITH A TOTALLY STOCK VEHICLE!

(4) **Accelerator Pedal Released Position/Butterfly Valve Closed Position Learning**

This must be performed whenever the harness connector to the “Drive By Wire” butterfly assembly or stock computer has been unplugged. This is a standard Nissan requirement

- 4.1 Make sure that the accelerator pedal is fully released
- 4.2 Turn the ignition switch to the “ON” position and wait at least two seconds.
- 4.3 Turn the ignition switch to the “OFF” position and wait at least ten seconds.
- 4.4 Turn the ignition switch to the “ON” position and wait at least two seconds.
- 4.5 Turn the ignition switch to the “OFF” position and wait at least 10 seconds.

(5) **Hoses Clamps**

Verify all hose clamps are tightened.

(6) **Clearances**

Verify all components which are affected by engine movement have sufficient clearance to adjacent body panels.

(7) **Fluid Leakage**

Verify there are no oil, water or most importantly fuel leaks in either the engine compartment or on top of the fuel pump / sender unit. Replace the trim cover.

(8) **Steering System Check**

Verify the universal joint in the steering shaft has been correctly re-installed. Spin the steering wheel left / right enough times to bleed the air from the power steering system.

(9) **Completion Of Assembly**

After a final check for fluid leaks, replace the cosmetic engine cover, strut tower brace and front bumper. Then replace the plastic undertray.

NOTE ENSURE THE CORRECT PROGRAM IS LOADED INTO YOUR APS COMPUTER FOR YOUR PARTICULAR COMBINATION OF FUEL OCTANE AND EXHAUST SYSTEM COMPONENTS.