Race Head Developments Pty. Ltd.
ABN: 35672952448
www.racehead.com.au
sales@racehead.com.au

Porsche 911 ITB Kit

Assembly Instructions

Supplementary Youtube Videos

Balanced Throttles

Rain Hats install

sales@racehead.com.au
Revesby NSW, Australia +61 408 608 318

Assembly Notes:

Thank you for choosing an RHD ITB Kit. All RHD parts and products are designed for performance and racing purposes, what you do with your vehicle is your responsibility and no liability will be taken by RHD Engineering for your actions.

This kit is designed to work with the standalone ECU configured with Alpha-N style fuelling strategy. Do NOT try to use Speed/ Density or MAP as the only load signal for tuning ITB systems. Most quality ECU brands will have no problem running pure Alpha-N. However, some brands may struggle with resolution so a combination of TPS and MAP is needed at the very least. We recommend Ecumaster as an affordable high quality ecu brand and we can offer support and tune files for all our ITB kits.

All throttle bodies are made to very tight tolerances and have been carefully assembled. Do NOT try to dismantle or adjust them. If you are having any difficulties please contact our customer support.

To install and set up this kit you will need a good understanding of mechanical devices and the appropriate mechanics tools. A weber/ITB synchronizing tool, 6mm and 8mm ring open spanners for synchronizing are essential.

Parts needed that are not included with the ITB kit:
8mm vacuum hose
e36 BMW TPS P/N 13631726591 (must be OEM quality)
Injectors, long series Bosch (recommended 0-280-155-931 or similar)
ECU, wiring harness, external fuel regulator and fuel lines
Crank position sensor kit, wideband sensor, surface temp and air temp sensors
BMW m44 4cyl Idle control valve (or similar)
2 x K&N filter elements P/N E-1450 (only needed with rain hats option)

Assembly Procedure:

ITB systems are extremely sensitive so study the following instructions, pictures and diagrams carefully. Every small detail is essential for correct trouble-free operation.

Make sure the throttles with the master lever is fully closed with the idle stop screw is just touching the little round stop.

Adjust the balance adjuster screws so they protrude about 2mm towards the J spring, leave the balance adjusters only slightly tight on the shafts for the moment.

Fit all the little brass pipe fittings and T fitting to the bases. Next install the throttles on the bases.

Attach the linkage brackets making sure RH side is in the forward position and LH side is in the rear position. Install injectors and fuel rails. Make sure the little tabs on the balancing coupling tabs between the throttle bodies are wedged firmly between the adjuster screw and the J spring (NOT sitting loose in the centre of the J spring loop)

You should now have 2 complete assemblies that can be bolted to the engine. Make sure to fit the supplied heat gaskets and you can use a LITTLE smear of gasket sealer on them. Loosen all the bolts holding the linkage brackets and fuel rails so they all settle in correctly then bolt the bases to the heads. Tighten all the fuel rails and linkage brackets again after the bases are tight.

Next loosen the little couplings that are clamped to the throttle shafts and press all the butterflies closed and tighten the clamps again.

The side bearings on the linkage brackets are self aligning so use the long linkage shaft to set them at the right position and install the shaft making sure the springs, bosses and little lever are all installed between the brackets. Now fit the side levers and drop links. Fit the springs and bosses so that the LH lever is hard against the bearing and the RH lever is sitting about 6-8mm away from the bearing. Adjust the drop links so that the top levers are standing up quite tall and the throttles on both sides are fully closed. Adjusting the links longer will give more progressive throttle action but will also increase the pedal travel. Shortening them will make it more sensitive to drive at low throttle but also shorten the travel. Ideal is to have them as long as possible but still making sure that full throttle is reached when the pedal is fully pressed.

Install the idle circuit parts with some 8mm hoses and little accumulator block. If you have a brake booster that needs a vacuum signal install the small Tee fitting at the base of one of the runners using the little barrel nipple. On the branch of the Tee fit the 10mm hose tail for the booster and on the top of the Tee fit the little 1/8 tail for the vacuum and idle circuit. You MUST have a 1-way check valve installed on the brake booster line close to the runner.

Install fuel system Ecu and wiring harness.

Now you can start the engine and synchronization the throttles, you might need to fully or partially block the inlet of the ICV for it to run and idle initially. Allow the engine to warm up to normal running temperature before synchronizing.

Adjusting the balance is EXTREMELY sensitive and near perfect synchronization is essential for smooth idle and good light throttle driving. For this you MUST use a FLOW synchronizer such as the one pictured. Measuring vacuum is not a good indication of flow.

Use one of the trumpets with the flange clamped to the base, insert the synchronizer and press it onto each throttle body to measure the flow. Start with the 2 centre throttles on each bank. Adjust the screw on the lever so that the reading is about 2.5Kg then move to the forward throttles and rear throttles and match them to the same 2.5Kg reading by adjusting the little screws on the adjusters. You can disconnect one of the top levers from the drop links to make sure one side is not fighting the other. Spend as long as you need to get this as perfect as possible!

Attach the drop link again and check the centre throttles side to side to make sure they still match. Now using a small vice-grip, clamp it to the cross bar so the handle is about 2-3mm away from the shroud when you press the handle down so it touches the shroud it will open the throttles ever slightly. When It's pressed the reading on the flow meter should go up to about 4-5Kg. Make sure that the centre throttle on each side perfectly matches when the grips are pressed against the shroud. Adjust the drop links as required. Once again these are very sensitive and very small adjustment makes a big difference. Again take as long as you need to get this as perfect as possible. After you have finished you MUST re calibrate the TPS in the ECU software. Scan the QR code for a demonstration.

Final Assembly

This completes all the technical parts of the installation. Trumpets and rain hats can now be installed, this is reasonably straight forward. Build an assembly of the backing plates, trumpets and posts with the female thread at the top and
nut and washer at the bottom. Leave the trumpets loose on the backing plate for now. Install all the base clamps to the throttles and only tighten ONE of the screws that holds them on. Slip the trumpets into the clamps and tighten the clamps, followed by the second screw holding it on. Tighten the screws holding thew trumpets to the backing plate. Fit the filters top plate and hats securing them with the stainless steel washers and button head cap screws

Summary:

Study the following drawings very closely they show the exact placement of all the fittings and linkage parts The small return springs on the master throttle body is only intended as a secondary spring to ensure the throttles close should any linkage part become loose or disconnected. Primary return springs on the cross shaft can be preloaded up to a maximum of 180 degrees to add the desired amount of pedal resistance. Make sure these springs are pulled away from the brackets slightly to allow room for them to wind up as the throttles open. Again, the LH lever should be hard against the bearing and the RH lever should sit about 6-8mm away from the bearing. Use the springs to keep everything in position.

For nice progressive throttle action keep the drop link as long as possible. However, if your ITB does not reach full throttle when the pedal is fully depressed then adjusting the drop link to a shorter length will alter the mechanism gain and will enable the throttle to reach full open.

Make sure the linkage moves freely and smoothly without any binding. Light lubricant such as WD40 on moving parts is good. It is important the ITB linkage doesn't reach full throttle when there is still lots of extra travel on the pedal this will over load the linkage resulting in possible damage or premature failure.

You can drill a hole in the backing plate for the Air Temperature Sensor. For open trumpets simply mount the sensor near the base of the trumpets. The sensor does not need to be directly in the airstream its simply measuring the general engine bay temperature.

Brakes:

For correct brake booster operation, you will need to attach the vacuum hose to the T fitting provided. The booster will work exactly as it does with the OEM intake running from just 1 cylinder. **DO NOT connect the booster line to the vacuum/ ICV block!** … I know its counterintuitive and im happy to explain the reasons in detail to you but for now just trust me on this one. The vacuum from 1 cylinder is much stronger than what's inside vacuum accumulator block. It is essential that a small 1-way valve is fitted to the booster line to capture all the peak vacuum pulses from the runner.

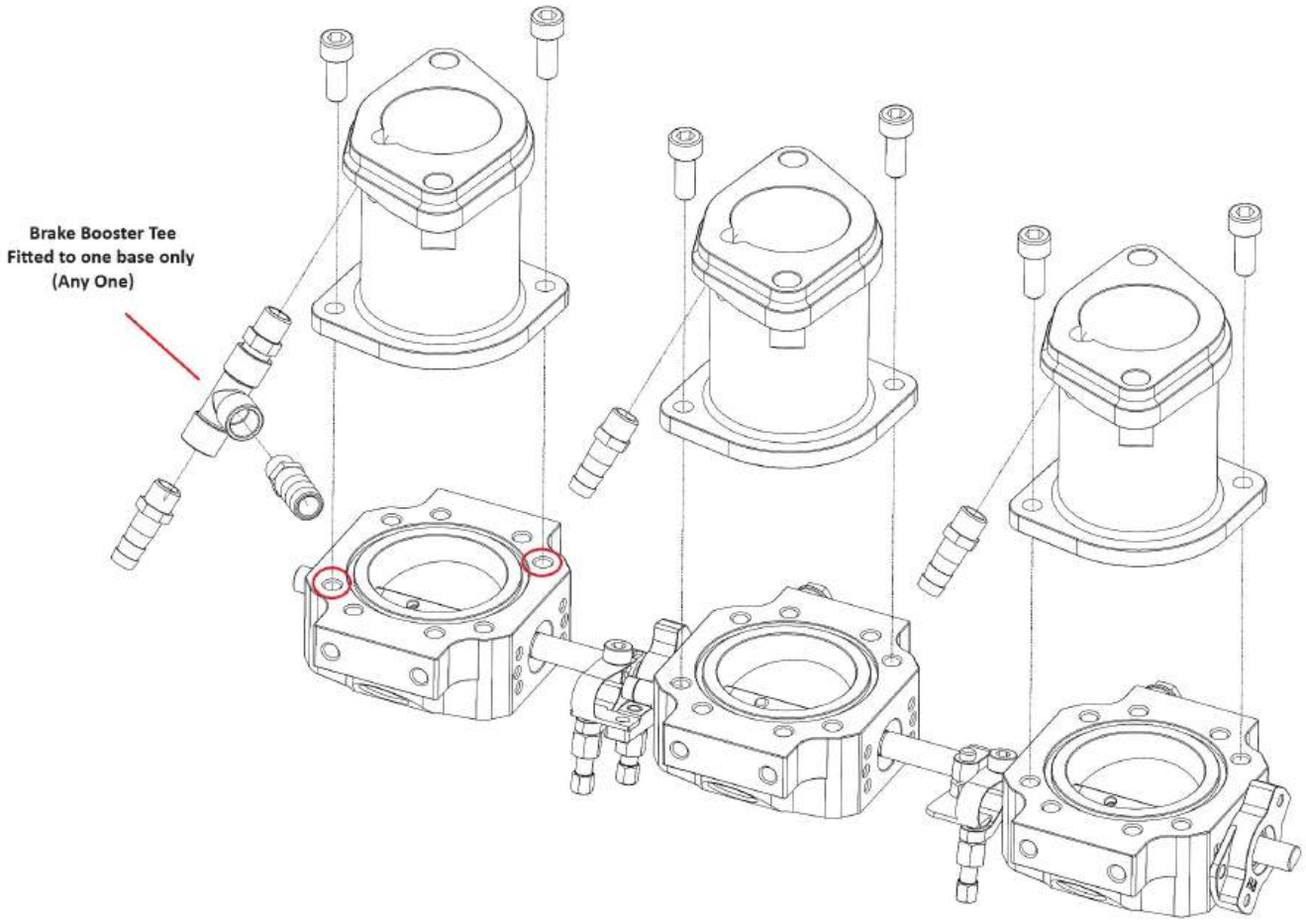
Fuel lines:

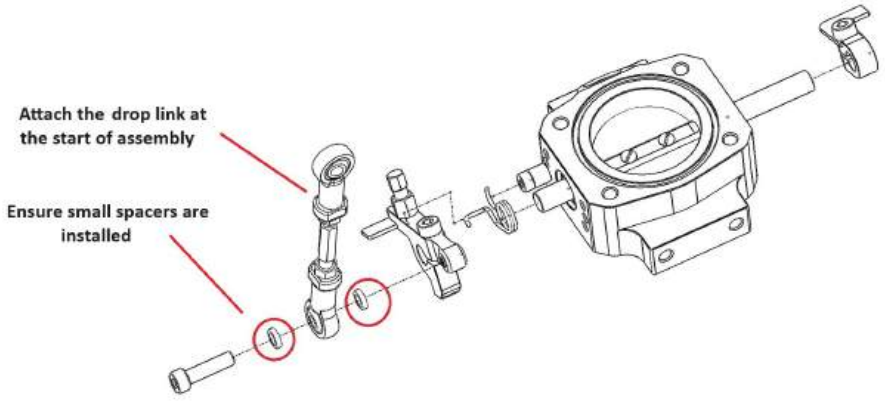
Best configuration for the fuel lines is to have the rear ends of both rails capped off and then run two Tee pieces at the front of the rails to feed both rails and continue back to the regulator. This will provide perfectly even pressure to all injectors. Running the full flow of fuel through the rails in a big loop as you may have seen does actually have the potential to create uneven pockets of lower pressure above some injectors due to the fuel velocity changing from small diameter lines into to large diameter rails, so this is not recommended. Acts like the venturi affect in a carburettor.

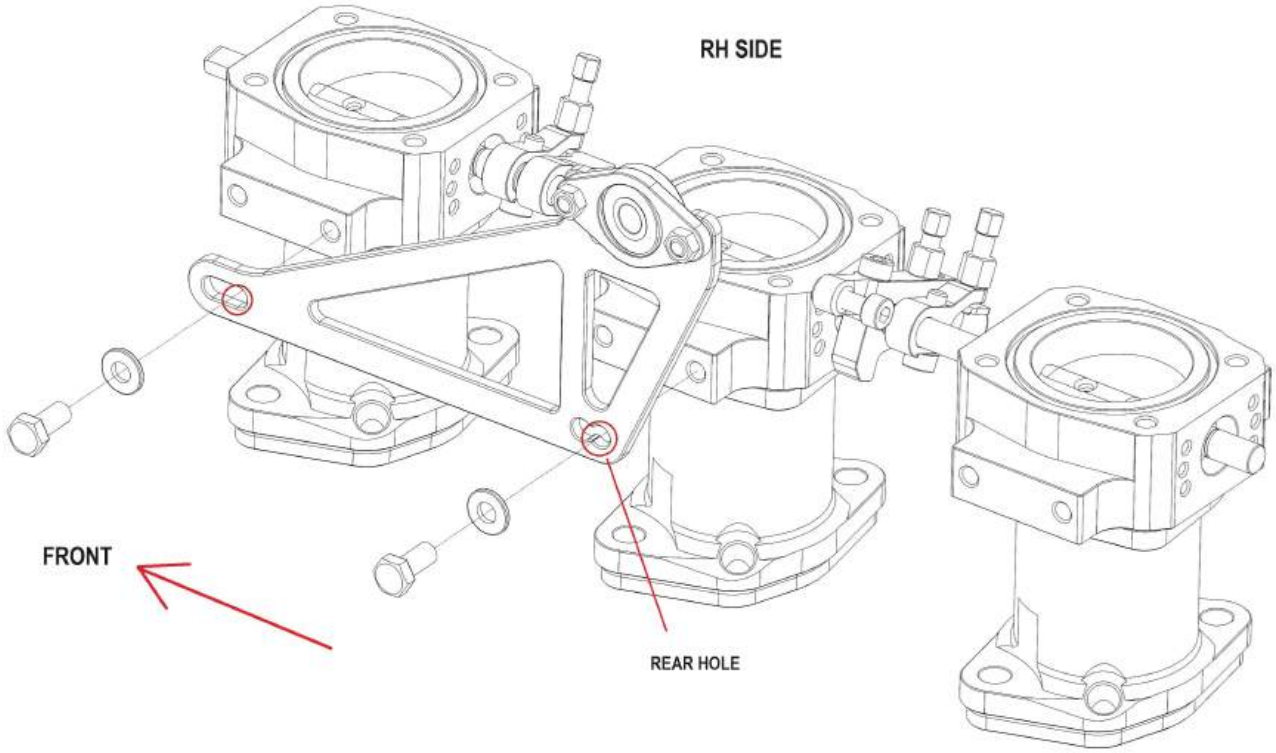
Happy motoring ☺

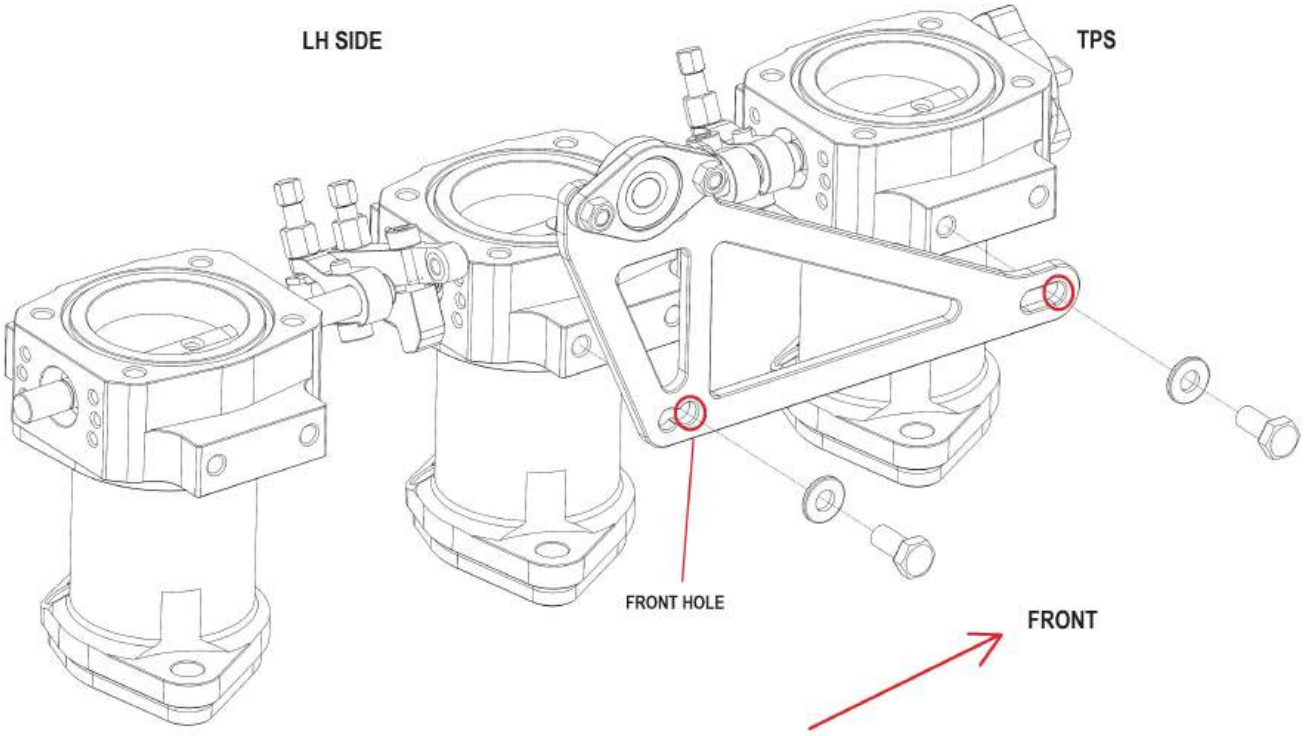
Porsche 911 ITB Set Packing List

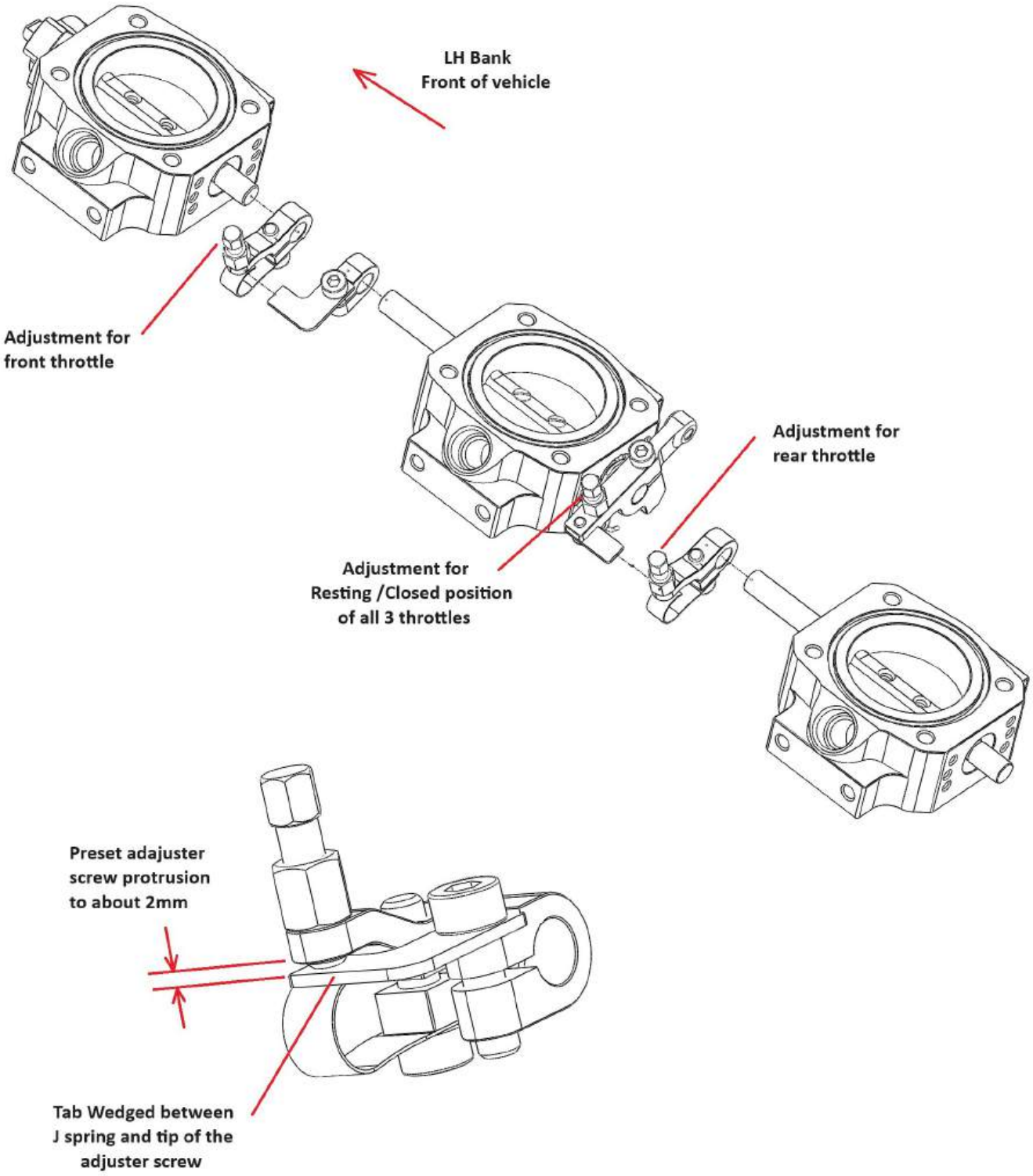
2	TB with levers and coupling tab
2	TB with long shaft
1	TB with short shaft
1	TB with TPS mount
6	Base adapters
6	Trumpets
6	Trumpet flange
2	Fuel rails
2	Linkage brackets with bearings
2	Drop link set
1	Cross shaft
2	Main top lever
1	Linkage spring set (2 boss, 2 springs, 1 lever, 1 rod end)
6	Fuel rail mounts with m6 bolts & washers
4	Spring adjuster couplings
4	Fuel rail fittings
12	Throttle body O-rings
6	Heat insulation gaskets
12	M6 x16 cap screw
12	M6 x20 cap screw
4	M6 x12 bolt & washer
6	M5 x20 cap screw
1	ICV VAC block
1	1/8 BSP Tee
1	1/8 BSP bung
12	1/8 BSP x8mm tail
1	1/8 BSP barrel nipple
1	1/8 BSP x4mm tail
1	1/8 BSP x10mm tail
1	1/4 BSP x12mm tail
2	Hats (option)
2	Base plates
2	Top plates
8	Posts
8	M6 x 16 dome SS cap screws & washers
8	M6 nuts & washers
16	M6 x 12 cap screws

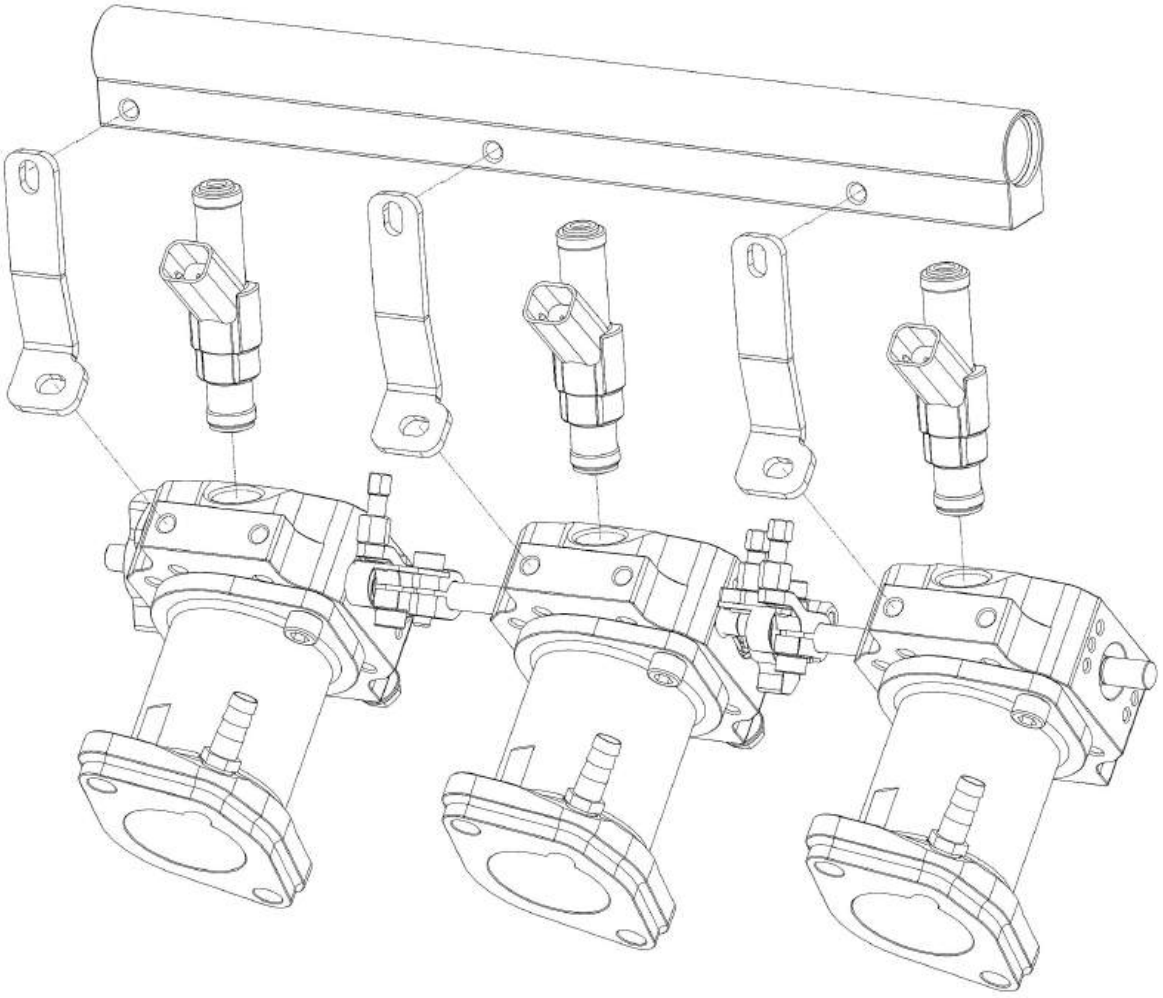

Brake Booster Tee
Fitted to one base only
(Any One)

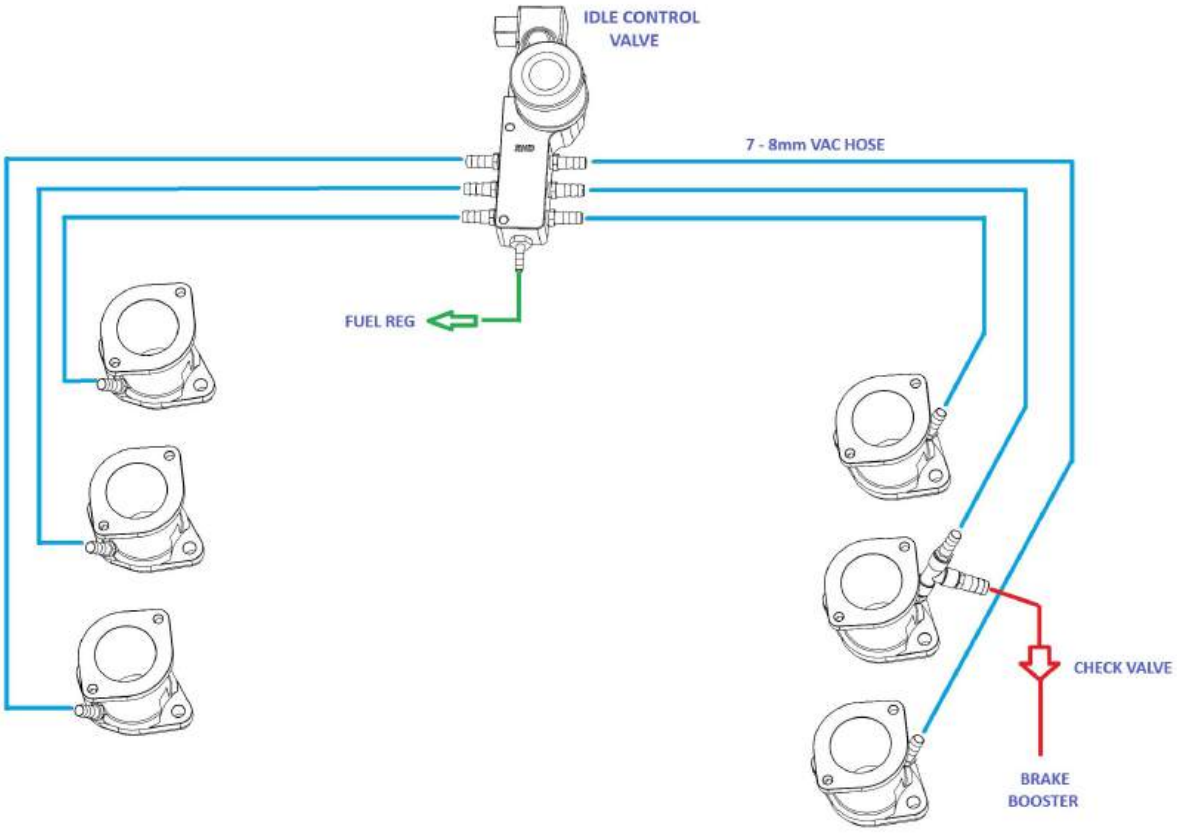

Attach the drop link at
the start of assembly
Ensure small spacers are
installed

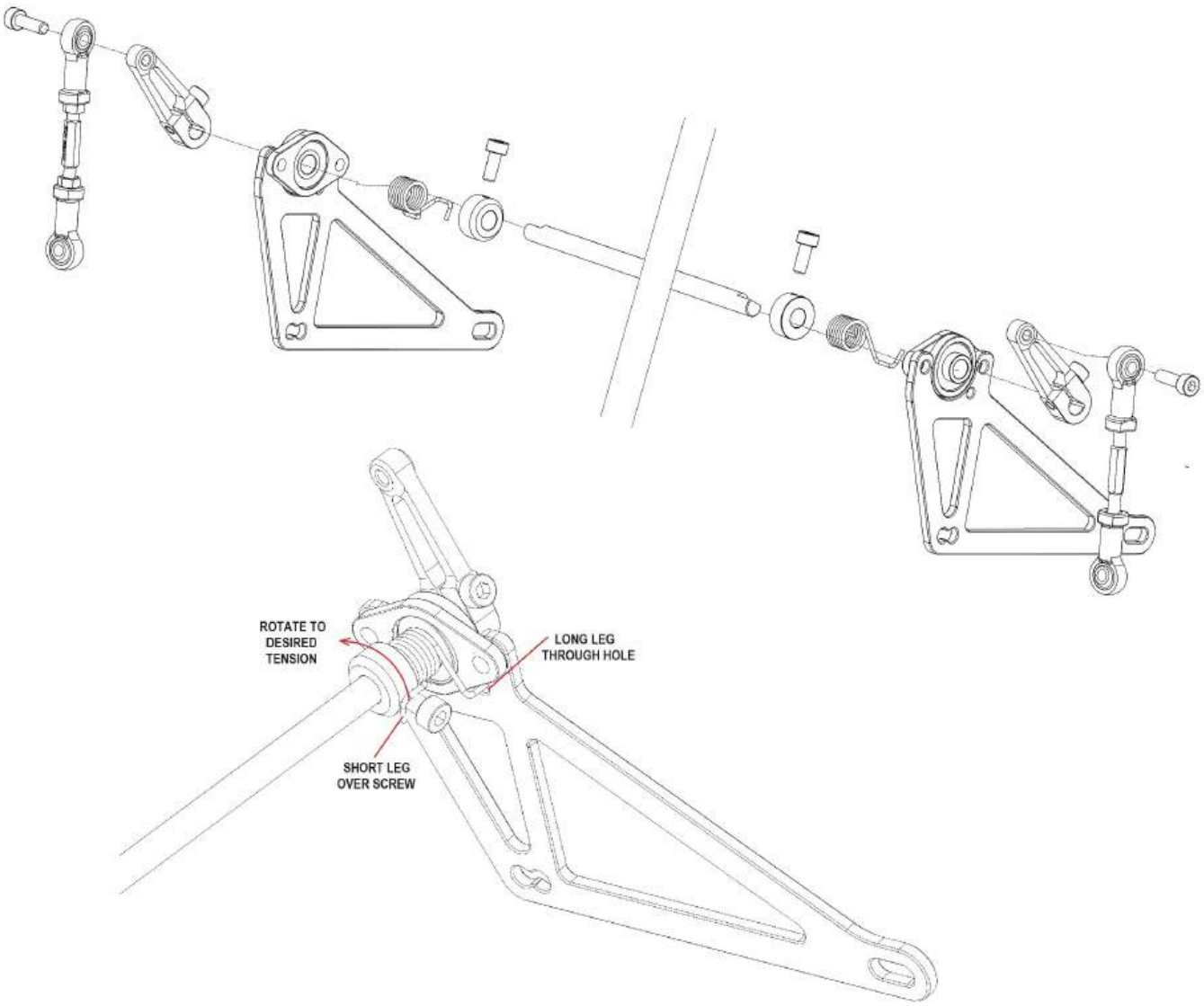

RH SIDE
FRONT
REAR HOLE

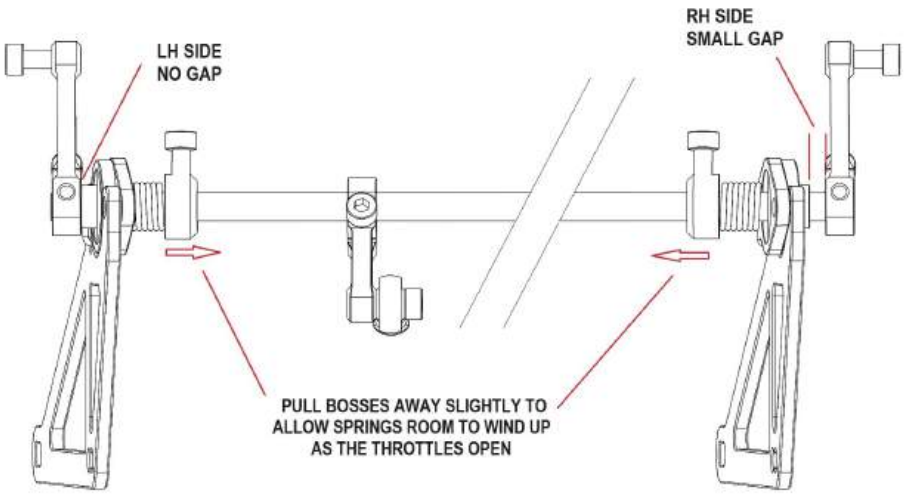

LH SIDE
TPS
FRONT HOLE
FRONT


LH Bank
Front of vehicle
Adjustment for
front throttle
Adjustment for
rear throttle
Adjustment for
Resting /Closed position
of all 3 throttles
Preset adajuster
screw protrusion
to about 2mm
Tab Wedged between
J spring and tip of the
adjuster screw




IDLE CONTROL
VALVE
7 - 8mm VAC HOSE
FUEL REG
CHECK VALVE
BRAKE
BOOSTER


ROTATE TO
DESIRED
TENSION
LONG LEG
THROUGH HOLE
SHORT LEG
OVER SCREW


LH SIDE
NO GAP
RH SIDE
SMALL GAP
PULL BOSSES AWAY SLIGHTLY TO
ALLOW SPRINGS ROOM TO WIND UP
AS THE THROTTLES OPEN