PossumLink

A joint project between Link Electrosystems and Possum Bourne Motor Sport

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1. SYSTEM INSTALLATION

The factory computer is located in the front of the passengers foot well (right hand drive vehicles). To gain access carefully pull the carpet back to expose the kick plate that covers the computer assembly. Remove the bolts holding the kick plate in place and remove the kick plate. The computer will now be visible. The next step is to disconnect the wiring harness. Each of the five cable connectors are removed by depressing the lock tab to remove. Unbolt the computer (ECU) and remove it from the vehicle.

Board Replacement

1. Remove the ECU cover by removing the five screws.

CAUTION
Static Electricity Hazard

2. Lift the circuit board clear of the aluminium case. Insert the PossumLink board.
3. If any tuning / adjustment is required then do not replace the cover at this stage to allow access to the tuning port on the circuit board. Note that there are several other "devices" that may be plugged in for various functions.
4. Once tuning is complete or if tuning is not required then replace the cover and fit the ECU onto the mounting bracket and reconnect cables. Replace kick plate trim and carpet.

2. FUEL

Functions

MASTER FUEL Controls overall fuel injection scheduling and is effective throughout the entire operating range from idle to full power. The scale ranges from 0..255, the higher the value, the greater the overall fuel.

ROWFUEL Allows the ZONE FUEL table to be adjusted a WHOLE ROW at a time. i.e. All values on the current ROW will be adjusted up or down irrespective of the RPM. e.g. current zone = 230 (ROW 2, RPM = 3000..3500), if 4 units were added (UP) to zone 230, then ALL zones along ROW 2 (200..295) will have 4 units added to their current values. ROWFUEL is primarily intended as a coarse adjustment to allow broad shaping of the ZONE FUEL table during initial tuning, and would normally be used after MASTER has been set, but before ZONE FUEL is used.

Careful use of ROWFUEL will eliminate the need to spend large amounts of time in ZONEFUEL trying to make major changes overall by wondering about the table making localised corrections. (It is quite difficult to hold the engine in any one of 200 zones while corrections are made even under the most favourable conditions.) The current ROW is displayed in parenthesis to show the currently active ROW, but the RPM information is suppressed since this feature is not RPM dependent.

ZONEFUEL There are 200 fuel zones arranged in a rectangular grid consisting of 10 ROWS by 20 COLUMNS. The ROWS progress in steps of Manifold Air Pressure to provide the "load" axis, and the COLUMNS progress in steps of RPM. Therefore, each zone represents a unique engine operating condition allowing fuel changes to be made in small, localised areas. The selection of zones is completely automatic, depending on the actual RPM and MAP values at that instant.

The current (active) zone is identified to allow correlation to the zone sheet and to give an indication of where you are in the table. The zone numbering system is not linear, but designed to provide a clearer indication as to effective location. e.g. zone 110 = ROW 1, 1000..1500 RPM zone 255 = ROW 2, 5500..6000 RPM zone 545 = ROW 5, 4500..5000 RPM etc. Adjustments are made by operating the ADJUST buttons as required, and the actual value is displayed on the right hand side of the display. Adjustment scale = 0..255.

3. FUEL AUXILLARY

Functions

CLAMP Clamps the Manifold Air Pressure signal to a minimum value (high Vacuum) to stabilise the RPM at idle. This helps prevent idle surge present in some engines. The value shown in (xxx) is actual MAP and the far right value = the clamp value. Typical settings range from 30..35 for normal engines.

Inlet Air Temperature (IAT) Allows adjustment for compensation of inlet air temperature on air/fuel ratio. Cold air is denser, so for the same throttle position, the volumetric efficiency of the engine will reduce as air temperature increases. As inlet air temperature rises the fuel is reduced to compensate for the lower air density. The number in brackets shows the actual air temperature in degrees Celsius. The fuel correction number is displayed on the right.

ACCEL When the throttle is abruptly opened, the air-mixture is leaned out briefly. To achieve good throttle response acceleration, enrichment is required. There are 4 ACCEL zones, the first 3 covering a 2000-RPM span, the last zone covering a 4000 RPM span. By definition:

ACCEL zone 1 covers 0 - 2000 RPM
ACCEL zone 2 covers 2000 – 4000 RPM
ACCEL zone 3 covers 4000 – 6000 RPM
ACCEL zone 4 covers 6000 – 10000 RPM

By using 4 zones it allows the enrichment to be optimised and set for varying conditions. The amount of enrichment is dependent on rate of change, and engine temperature. Note that ACCEL is only effective during the actual movement of the throttle to cover any brief flat spots occurring at that time. The actual zone is selected automatically, and is shown as Z=x where x = the currently active zone. e.g. Z=2 indicates transient zone 2 (2000..4000 RPM range).

WAKEUP WIDTH Wake-Up Injection will fire a short burst of injector pulses per engine TDC when transient enrichment is required. This will improve the engines throttle response and should be used in conjunction with the 4 existing ACCEL Zones. Adjustment is provided for both the width and number of pulses.

"Wakeup Width" will control the width of each WakeUp pulse. The default value is 150, giving a 1.2ms pulse width. To increase the width, increase this number.

WAKEUP PULSE This controls the number of additional pulses added when transient enrichment is required. The Default value is 4. This means 4 additional closely spaced pulses will be added, each 1.1ms in width.

To switch this function off set the number of pulses to zero.

COLD (POST-START WARM-UP) Controls cold start and warm up enrichment by adding extra fuel to the engine. The adjustment value is shown on the right hand side of the display and will gradually reduce to zero as the engine temperature rises towards 70°C. Note this is the temperature-decayed-value rather than the full cold value. The number shown in parenthesis (xxx) is the actual engine temperature for monitoring purposes.

Note: The far right characters on the Tuning Module will display N/C if the sensor is not connected.

VOLTS Provides a compensation value for fluctuations in battery voltage caused by heavy electrical loads being switched on and off e.g. headlights, heaters, fans etc. These voltage fluctuations cause the injector opening time to vary, resulting in erratic, surging idle speeds.

Initially set the value to "15" (STORE) and tune the engine with minimum electrical loads switched on. Once a satisfactory tune is found, allow engine to idle and switch on maximum electrical loads. Readjust the VOLTS value to restore the "unloaded" idle quality and STORE the result.

The actual battery (PossumLink) voltage is also displayed for monitoring purposes.

Note that the adjustable value does not represent actual voltage but is a trim value with no particular units.

AIR CONDITIONING ENRICHMENT From this menu extra fuel can be added when the Air conditioning is switched on. When the AirCon compressor is engaged the extra load can cause unstable idle, so extra enrichment can be introduced to help stabilise this. The default value is 0 implying no added fuel. The enrichment is only active below 1500 RPM. To change this setting use the adjust buttons.

CRANK ENRICHMENT This is the amount of extra fuel added while the engine is cranked and for a short period after starting. It is a temperature dependent enrichment and only effective when the engine temperature is below 50oC. The actual value used by the PossumLink will provide more crank enrichment with decreasing engine temperature and will decay with time.

The SMALLER the number, the GREATER the enrichment. The base default value is 60.

HOT RESTART When the engine temperature is above 80°C addition fuel can be added to help stabile idle on a hot restart. The extra fuel will remain active for 1 minute after restart allowing time for under bonnet temperatures to reduce and the engines mixture to stabile. The default setting is 5.

Tumbler Generator Valve (TGV) Control (WRX only)

The TGV control works in 2 modes:

Mode 1. TGV ALWAYS returns to the closed position at idle. This always ensures a smooth idle during the post start and warm-up phase. The idle condition is defined as TPS < 13 and RPM < 1500.

Mode 2. Once the TGV has opened it remains in this position until the ignition key is switched off. This prevents cyclic switching of the TGV when the engine is hot.

Note : The TGV is ALWAYS closed under cranking(i.e < 500 RPM). This helps in both cold and hot starting.

The operation of the 2 TGV Modes is temperature dependent and can be divided in to 3 categories.

1. Engine Temperature < 70°C Celsius

   When the engine temperature is < 70 the TGV control uses MODE 1. They will switch open if RPM > 1500 or TPS > 12, but they will always return to the closed position at idle. There are no control options below this temperature.

2. Engine Temperature between 70 and 88°C Celsius

   During this stage the PossumLink offers two TGV control options. This controls the temperature at which the TGV changes from Mode 1 to Mode 2 operation.

   TGV Open > xx°C: The value 'xx' represents to temperature at which the TGV moves from Mode 1 to Mode 2 control. This can be adjusted from 70 to 88°C. The default value is 70°C. This means at temperatures greater than 70°C once the tumbler is open it will remain in this position. This can cause a lean idle surge but has the advantage of preventing cyclic switching of the tumbler valves. To help with the lean idle a "TGV Idle Trim" can be used to introduce a small amount of fuel and stabilise the idle mixture.

   TGV Idle Trim xx: When the TGV control is in Mode 2 this value provides a small Idle fuel trim. The value 'xx' indicates the current value use by the PossumLink. (Note this value may differ from the actual value). This trim is active under the following conditions:

- TGV is open at idle (RPM < 1500 & TPS <13)
- Engine Temperature between 64°C and 88°C

  Outside these parameters "xx" will display NA. This means the trim value is no longer used and defaults to zero.

3. Engine Temperature > 88°C

There is no TGV control options above this temperature. Control Mode 2 is used.

4. IGNITION

ZONE IGN There are 200 ignition advance zones arranged in an identical manner to the fuel zones (see above). The zone identification system is also the same as ZONE FUEL except it applies to the ignition advance table instead. The adjustment value is shown as degrees of advance. NOTE: The ADV LIMIT control has priority over any ZONE IGN value in excess of the limit value. The limiting value does not inhibit entry of ZONE IGN values in excess of the limit, rather it limits the value displayed and actually used at the time.

The ignition values displayed are the value + the static value. i.e. ZONE IGN 27 = 27°+10° static = 37° degrees crank (typically).

5. LIMITS

RPM LIMIT Sets the RPM limit. Limiting is achieved by 100% fuel cut until the RPM drops below the preset value.

ADVANCE LIMIT Sets the absolute maximum ignition advance irrespective of any value programmed into the ZONE IGNITION table. Note that this is a numeric limiter only and does not invoke any actual ignition or fuel cuts.

MAP LIMIT Set Manifold Air Pressure limit to prevent over boost. Values are expressed in absolute pressure so all values above 100 kPa represent boost pressures.

e.g. 150 KPa = 9 psi boost

200 KPa = 15 psi boost

Upper limit = 254 kPa. No limit 255 kPa. (Display = OFF)

6. UTILITIES

Functions

OVERRUN VACUUM This represents the engines MAP when it is running in overrun vacuum. It is a target value used by the PossumLink to aid in idle speed and fuel control. When the engines manifold air pressure drops below this target, various tasks are actioned. As this value is a function of the engine modification state, it will vary and should always be adjusted as described.

Overrun Vacuum Setup: Observe the engines Manifold Air Pressure as the throttle is fully opened. Allow the engine to reach around 4- 5000 RPM then snap the throttle closed to put the engine in overrun vacuum. Now record the LOWEST MAP. Use this number subtract 2 and enter this value as the overrun vacuum number. The units are kPa.

TEMP SWITCH Sets the value at which the radiator fan will switch on. Display in C°. The software features hysteresis on the switch point to prevent short repetitive cycles. The fan will switch off when the temperature drops 2°C below the on temperature.

TPS SPAN The Throttle Position Sensor is used in the control of:

- Idle speed control
- Boost control
- Fuel cuts

The TPS Span allows the Throttle Position Sensor (TPS) span to be set. The ADJUST switches are used to set the "low" (throttle closed) 10 and "high" (throttle fully open) 100, values. These values must always be set unless otherwise specified.

SPEED Displays the vehicle's speed in kph.

CAM MAP (STi only) Sets the map above which the variable cam timing solenoids are energised. The default value = 140kPa.

CAM RPM (STi only) Sets the RPM above which the variable cam timing solenoids are engaged. The default value is 2500RPM.

Note: The cam switching is both Map and RPM dependent. Both conditions must be met before the solenoids are energised.

NEUTRAL Displays when the gearbox is in the neutral position.

Setting TPS Span

With the throttle fully closed, note the displayed value on the Link Tuning Module. Use the ADJUST buttons to set the "low" value of 10, then fully open the throttle and note the new value. The TPS must be spanned 10 to 100. Use the ADJUST buttons again to set the "high" value of 100 and then fully close the throttle and observe the "low" value. This will probably have changed so reset to 10 again. The "low" and "high" interact, so it will be necessary to repeat the procedure until the required values are achieved. Select STORE and store the settings before proceding.

7. KNOCK CONTROL

Knock control uses a block mounted, piezo electric microphone (knock sensors) to "listen" for abnormal engine noise / vibrations which occur when the engine detonates (knocks). Analogue filters inside the ECU reject the majority of unwanted signals but the software processing this signal requires a certain amount of discrimination. Once a knock event has been detected, ignition timing is removed from the current ignition zone (1 of 200). The maximum amount of retard is six degrees from any one zone, although the system will not retard beyond zero degrees electronic advance (base timing).

E.g. If original zone value was 5 degrees, then at maximum retard produced by the LinkPlus would be ZERO, not -1 degrees.

Note: All Corrections are temporary unless stored i.e. they will be lost when the key is turned off.

This arrangement allows the system to be more adaptive to the current conditions. For example, driving one day with poor fuel will cause the system to make corrections where necessary but with no long-term storage. This means when superior fuel is used or climatic conditions change, the ignition map will have a "clean slate" rather than previously compromised values.

The 3 main adjustments for the knock system are:

- Set Base Target
- RPM Target Correction
- RPM Start Point

Functions

The following functions are available from the Knock heading.

1. Knock Count

   A "knock event" occurs when the engine noise, transmitted by the knock sensor exceeds the Knock target. Once detected,

the current ignition zone has one degree of timing removed and the Knock Count is incremented by one. To switch OFF press the ADJUST DOWN button and the menu will display "Knock OFF zzz". Pressing ADJUST UP will reactivate the knock control system displaying "KNOCK (xxx) zzz".

- xxx = Knock Count. This is the total number of "knock events" detected by the system for this current run.

  zzz = Knock Signal. Shows the actual "processed" knock signal fed into the microprocessor. This value should be small at idle (type. less than "10") and increase with RPM and load (boost) as the background noise rises i.e. The signal will always rise with increasing power at a PROGRESSIVE rate if there is no detonation. The amplitude of the Knock Signal will depend on knock sensor position and the engines type/ modification state.

  For example a Knock Count of 5 (xxx = 5) indicates the knock level processed from the engine, has exceeded the Knock target 5 times.

NOTE: Any changes (ON/OFF) are automatically stored.

2. Knock Base Target

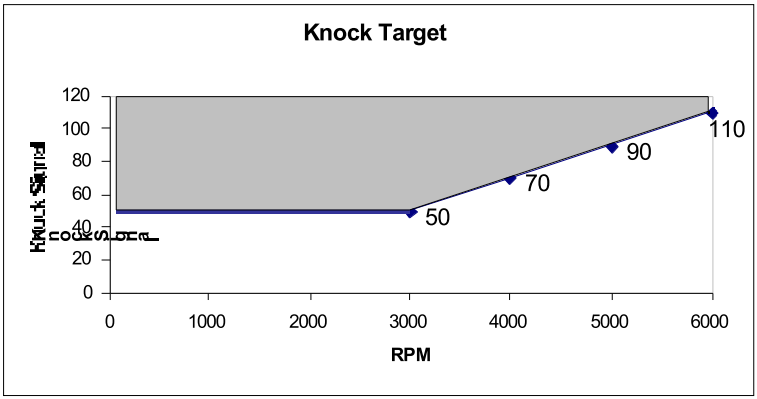
   This allows the knock base target to be set. This is the amplitude of the Knock signal when the engine starts to generate noise. From this point, engine noise will normally rise as the RPM and load increases. To match the Knock target to the engines noise profile the target requires RPM correction.

3. Knock RPM Correction

   The micro-processor uses the base target and RPM correction to produce a knock target that is proportional to RPM i.e. at higher engine RPM more "noise" is generated, hence the knock threshold needs to be increased. For every 1000 RPM the RPM correction value will be added to the Base Target. Intermediate values will also be calculated.

Example 9: Base Target of 50 starting at 3000 RPM.

RPM Correction = 20



RPM	Knock Target
3,000	50
4,000	70
5,000	90
6,000	110

The example illustrates the knock target as it varies with RPM. If the Knock signal enters the gray region a knock event will be generated and timing will be removed. Note: Below 3000 RPM the LinkPlus uses the "base target", having no RPM compensation.

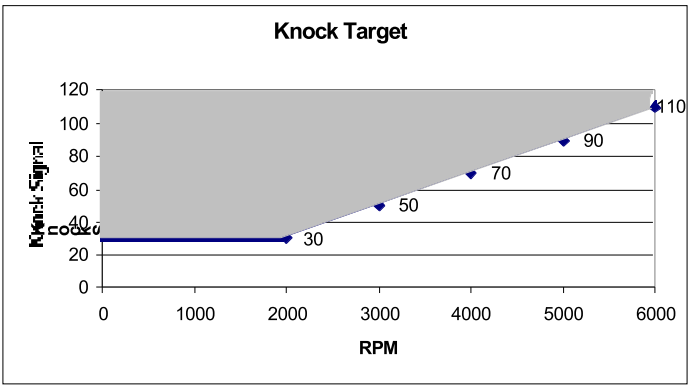
4. Knock RPM Start.

The last adjustable factor that will vary from engine to engine, is the RPM point where the engine begins to generate noise. It can range from 1000 through to 4000. See Example 9.1.

Example 9.1: Base Target of 30

RPM Correction = 20

RPM Start = 2000



RPM	Knock Target
2,000	30
3,000	50
4,000	70
5,000	90
6,000	110

If the knock level enters the "grey" region, ignition will be removed from the engines current ignition zone. Note below 2000 RPM the "base target" is used, having no RPM correction.

8. LAMBDA

Closed loop Operation

Note: The closed loop system will only operate correctly if the oxygen sensor is correctly located and in good condition. If the engine has been significantly modified (especially cams) then the closed loop operation is NOT recommended. The incomplete combustion will cause oxygen to be present in the exhaust gas resulting in false readings from the probe.

Closed loop operation involves the use of an exhaust gas oxygen sensor (Lambda probe) to provide the PossumLink with a feedback signal indicating the actual fuel/air ratio. This signal allows the PossumLink to make instantaneous corrections to the injector fuel flow until the required air/fuel ratio is achieved. This automatically compensates for all the variables that may cause incorrect fuel scheduling, and has two modes of operation;

1. Tuning Mode (Tuning Remote connected): The PossumLink is able to "tune" itself throughout the entire operating range simply by driving the vehicle and allowing the PossumLink to do all the work. The air/fuel ratio "targets" may be set to any required value depending on the application. A software limit of +/- 8% (ZONEFUEL) prevents excessive errors if the oxygen probe is damaged or misreading.

2. Continuous mode (Tuning Remote disconnected): The PossumLink operates in continuous mode after auto or manual tuning is complete and compensates for all the day-to-day variables that cause the air/fuel ratio to drift, resulting in absolutely consistent running and low exhaust emissions. A software limit of +/-3% (ZONEFUEL) prevents excessive errors if the oxygen probe is damaged or misreading.

Note: Only the rear oxygen sensor is used.

8.1 Functions

LAMBDA This control allows the closed-loop oxygen system to be selected on or off. Press ADJUST UP to enable, and ADJUST DOWN to disable the closed loop system. The display will show ON or OFF accordingly, and the change is automatically stored. (No need to select STORE etc.)

CAUTION: Do not select closed loop ON unless lambda probe is correctly installed and wired.

Lambda ON Press the ADJUST UP button to switch ON the Closed Loop Lambda Control. To switch OFF press the ADJUST DOWN button.

PLEASE NOTE: The oxygen sensor (and associated wiring) must be 100% serviceable if the tuning option is to be used. Failure to meet this requirement may result in engine damage if not carefully monitored.

RPM LOCKOUT This will prevent the Closed Loop System operating below this target RPM, independent of manifold air pressure. The default value is 500RPM. To change use the ADJUST button.

LAMBDA TARGET The next 6 menus allow the Lambda Targets to be edited.

8.2 Closed loop Requirements

Hardware for closed loop operation is essentially the same as for open loop with the following exceptions;

1. An exhaust gas oxygen sensor (Lambda probe) mounted in the exhaust pipe after the turbo charger. Ideally the probe works best about 600 mm behind the turbocharger but this is often not practical as it exposes the probe to water and stone damage. The factory location (immediately after the turbocharger) can result in the probe overheating during prolonged high power runs. All tuning should be done in a

series of short bursts at high power followed by a minute or more at low power to allow the exhaust temperatures to fall. Some improvement may be made by spacing the probe so that the probe tip is not in the direct exhaust stream but off to one side.

This helps reduce the tip temperature resulting in improved high power readings.

The probe temperature must exceed 300 degrees Celsius for normal operation, and most types have a built-in electrical heater to assist with this requirement. The heater also allows the system to come on line faster after a cold start and ensures that temperature is always adequate during prolonged idle running.

8.3 Operation and setup.

1. The closed loop mode is enabled by selecting LAMBDA on the Link Tuning Module and switching to "ON".

2. The system should first be tuned in open loop mode (LAMBDA = OFF) until a reasonable state of tune is achieved. This step allows the subsequent AUTO-TUNE system to achieve a faster lock-on since it shouldn't have to make major corrections if the initial tune is about right. Closed loop operation will only occur if the following conditions are met:

Engine temperature above 70 C

Engine been running for 90 seconds after start

Manifold vacuum 26+ kPa (ie not in over-run vacuum)

No acceleration (transient) fuel pending

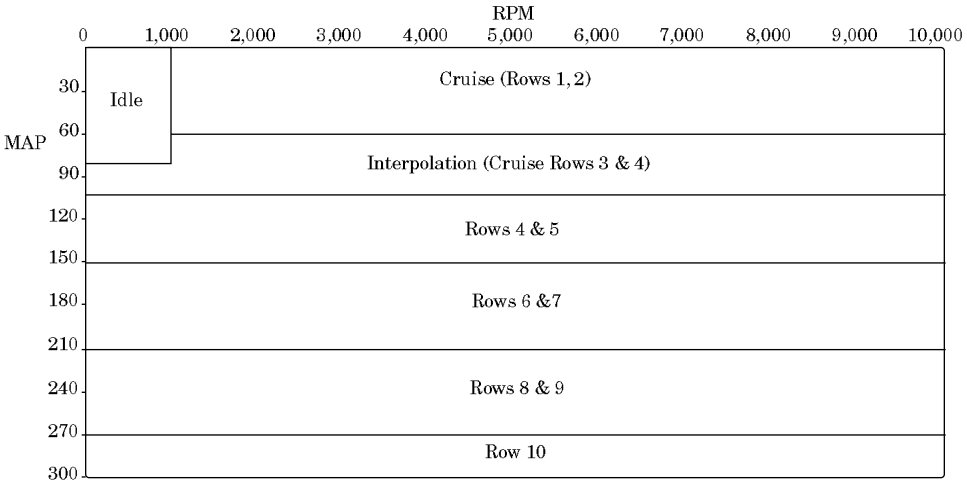
The system samples and corrects at a variable rate depending on engine rpm. At idle the sampling rate is slow due to the low exhaust gas velocity and increases to four samples / second for rpm's above two thousand rpm. (The feedback system is not instantaneous and therefore needs a short stabilising period)

3. Closed loop operation only takes place when the remote is selected to one of the following menus;

   TEST (any mode)
   ZONEFUEL
   INJ/OXY

   All other selections cause the system to suspend operations.

   When active, the system works in a ZONEFUEL mode where corrections are made to the 200 zone fuel table according to the current RPM and MAP values. A status character will also appear in ZONEFUEL selection to show system status as follows:



“T”imer	- 1 minute delay after starting
“E”ngine Temp	- Engine temperature below 70°C
“A”ccel	- Acceleration fuel is currently being added
“V”acuum	- Manifold vacuum is very high (over-run condition)

When any of the above are showing, the system will pause until the condition is cleared.

“+” - System is adding fuel (making richer)

“-” - System is removing fuel (making leaner)

“=” - Probe voltage equals target value

“x” - System has reached maximum allowable correction (+/- 8%). Check for possible errors or system failure before STORING. (A ‘STORE’ function will store all current corrections and allow a further +/- 8% of adjustment to take place.)

NOTE: All corrections made by the AUTO-TUNE system are temporary until a STORE is carried out. All other Tuning Module functions remain unchanged.

8.4 Lambda "target" system.

The actual required fuel/air ratio is dependent on the operating conditions prevailing at the time, and is generally "load" sensitive. During operation at idle and light throttle cruise, the A/F ratio should be fairly lean in the interests of fuel economy and low exhaust emissions. At high power however, the A/F ratio needs to be richer to produce satisfactory horsepower, reduce cylinder head temperature, and control detonation. A separate block of zones are used to store the target values, and may be changed from the “lambda’ heading. The default values loaded on dispatch were determined after much testing and should be correct for the majority of applications. The target values are displayed as a voltage which the software compares to the actual probe voltage and makes the

necessary correction. e.g. 60 = 0.6 volts. Default values are shown below:

Zone	Target Area	Target Value
26	Idle	84
27	Cruise	78
28	Rows 4 & 5	82
29	Rows 6 & 7	83
30	Rows 8 & 9	85
31	Row 10	87

"Idle" block. Normally set slightly rich for good stability

"Cruise" block. Normally set relatively lean for good economy

"Interpolation" between cruise and light boost

Low boost (rows 4 & 5) for turbo engines. Medium rich for detonation & exhaust temp control

Medium boost (rows 6 & 7) for turbo engines. Medium/full rich (see row 4 comments)

High boost (rows 8 - 10). Usually very rich to control temperature & detonation. Actual value depends on engine geometry & fuel quality.

8.5 Probe Voltage vs A/F Ratio

The relationship between Lambda probe voltage and the A/F ratio is not very linear since the Lambda probe shows a steep voltage step at stoichiometric mixtures. This transition voltage indicates that no excess oxygen or fuel is present i.e chemically perfect combustion, and is the desired voltage for minimum exhaust emissions. At low to medium power, the system should be "rocking" back and forth over this transition line so that the catalytic converter can do its job. The actual voltage at which this occurs lies between 0.4 to 0.6 volts. Tests have shown that if the target is set much below 60 (.6 volts) that undesirable idle surging will result in some engines. Some experimentation may be necessary. Above the stoichiometric point the curve flattens out as the A/F ratio

becomes richer. The maximum voltage produced is normally about 0.92 volts which equates to VERY rich A/F ratios. The targets should never be set above 90 (.9 V) for this reason. As a rough guide:

VOLTAGE	%CO	A/F RATIO	(approximately)
< 0.6	< 1.0	> 15:1	(lean)
0.72	1.0	14:1	
0.76	2.0		
0.80	3.0		
0.84	5.0	13:1	
0.86	6.0	12:1	
0.88	8.0 +	11:1	(rich)

Note that the enrichment becomes fairly compressed at higher voltages i.e. small voltage changes = large ratio changes.

9. BOOST CONTROL

Functions

BOOST Boost target values: Twenty zones are used to hold a target boost value for each 500 Rpm interval between 500 and 10,000 Rpm. This allows the boost curve to be tailored for the application eg. the boost may be held at lower levels through the Rpm mid range to suppress detonation and then allowed to rise at higher Rpm where detonation is less likely. The target values may be changed as follows:

1. From the *BOOST CTRL* heading, select "BOOST =" on the remote and use ADJUST keys to set as required. Note that this will affect all 20 zones in a manner similar to row fuel e.g. if 5 kPa is added to zone 750 then 5 kPa is added to zone 750, then 5 kPa will be added to all 20 zones.

2. EDIT mode; select each zone individually and ADJUST to the required value. EDIT mode affects one zone only.

   The values are shown in KPa (absolute) and may be cross referenced using the following table. The values must always be greater than 100 since below 100 represents vacuum.

KPa (Absolute)	PSI (boost)	
100	0	
120	3	
140	6	
160	9	
180	12	
200	15	
220	18	Max for "std" MAP Sensor
240	21	
250	23	

WGATE SENS Sensitivity Control: All closed-loop (feedback) systems require an optimum sensitivity level which is a compromise between fast response time and overall stability.

High sensitivity values produce fast response at the expense of instability (hunting or oscillation around the target value), and low sensitivity may result in slow settling times.

Experience has shown a "WGATE SENS xx" value of about 5 to 10 to be fairly close. (Never set the value to 0). Generally a "soft" waste gate requires higher numbers, especially when operating at high boost levels (>1.0 Bar).

WG BASE This value is used for calculating a base line duty cycle which the software uses to initially guess the final value. This base line is used mainly during the turbo spool up time when the system is unable to control the boost and holds the waste gate setting close to the final (settled) value.

Drive the engine at Mid to high rpm (eg. 5,000 rpm) and snap open the throttle. Watch the boost gauge and as soon as the boost stabilises at the target value read the wastegate duty cycle shown in parenthesis (xxx). Return to 5,000 rpm and again snap open the throttle while watching the duty cycle window (xxx). Use the ADJUST buttons to change the BASE value until the settled duty cycle noted initially is forced into the duty cycle window.

e.g. Settled duty cycle = 75% (at 5,000 rpm).

Adjust WGBASE until a value of 70–75% is forced into the duty cycle window at throttle snap.

If WGBASE is set too high, then the boost will initially overshoot the target value, then decay slowly to the settled value. If set too low, then boost will initially rise short of target, then slowly increase toward the final value.

WG RPM Sets the engine RPM at which the system will start controlling the boost. At low RPM (about 3,000 rpm) there may not be sufficient gas flow to spool the turbo thus limiting the amount of usable boost. Under these conditions the control system would attempt to increase the boost by increasing the duty-cycle without effect, and when the boost does arrive would grossly over-shoot since the waste gate is

fully shut down. Typical rpm lock out values depend somewhat on the turbo size and matching, but a typical value usually falls between 3,300 and 3,800 rpm. If boost overshoots at low RPM when driving in higher gears (4th / 5th etc.) try raising the rpm point.

Note: A throttle position lockout also exists which inhibits the control system when the throttle is less than 60% open. This feature is not adjustable.

TEMP COMPENS Allows boost to be removed as a function of engine temperature. When the engine exceeds 100°C a percentage of boost can be removed for every 2°C above this threshold.

Example: Temp Compens 2% per 2°C above 100°C
Engine Temp = 106°C
Boost = 200 kPa

The engine temp is 6°C above the 100°C threshold. This gives an overall temp compensation of 2% x 3 = 6%. 6% of 200kPa = 12kPa boost reduction.

At these operating conditions the boost will be dropped from the nominal 200kPa to 188 kPa.

Table 9.1 illustrates boost reduction as a function of engine temperature.

Table 9.1
Temp Compens = 2%
Nominal Boost = 200kPa

Engine Temp (°C)	Boost (kPa)
98	200
100	200
102	196
104	192
106	188
108	184
110	180
112	176
114	172
116	168
118	164
120	160

ANTI-LAG = OFF (Group N STI version only) Press the ADJUST UP button to switch anti-lag on.

RETARD = 20° (STI version only) Allows the amount of ignition retard to be adjusted when anti-lag mode is active.

ALS MODE Displays the current mode of the anti-lag system.

ALS OFF System is switched off.

ALS ARMED: STANDBY System is armed & in standby mode.

ALS ARMED: FULL System is armed & in full anti-lag mode.

Anti-lag (Group N)

This anti-lag system is primarily intended to reduce the spool time of a typical turbocharger thus improving throttle response. This is achieved by ensuring that the throttle is never fully closed and employing ignition retard to control engine output during low power operation. Group N regulations prevent the addition of separate devices to hold throttle open, so the factory throttle-stop screw must be used. This, however, prevents the throttle from being closed for normal driving and thus requires a special "cruise" mode in the software which offers reasonable low speed driving despite the amount of open throttle. The system defaults to the "cruise" mode if the engine RPM has been BELOW 4000 RPM for at least 10 SECONDS, otherwise the normal anti-lag mode remains operative. The system may be forced into anti-lag mode by momentarily blipping the throttle over 4000 RPM for start-line arming.

Note The turbo and associated exhaust manifolding will get very hot using anti-lag. Ensure adequate clearance to heat sensitive devices around turbo and associated hardware. **

Arming Anti-lag System (ALS)
There are two requirements to arm the ALS:

- Move to the anti-lag menu under the *BOOST CTRL* heading and switch to ON.

- The TPS MUST read >22 at Keyon. DO NOT immediately start the engine. ALWAYS wait 2-3 seconds, as this will allow the PossumLink time to read and process the TPS signal.

ALS Modes
The ALS has three basic modes:

a. ALS = OFF. If the TPS <22 at Key On or the Anti-lag menu is switched OFF the ALS will be switched off.

b. Full Anti-Lag Mode. Assuming the system has been armed (ie. TPS >22 at key on) the system will go into true anti-lag when the engine RPM is raised above 4000.

c. Standby Mode. If the RPM falls below 4000 for more than 10 seconds the system enters a standy mode. The effects of this are:

   TPS >40:
   - Ignition timing is fixed at 5 degrees BTDC (electronic advance) ie. no ignition retard.

   TPS <40:
   - Ignition timing is fixed at base timing (zero degrees electronic advance).
   - Cyclic fuel limiting is used to control “idle” RPM.

   As soon as the RPM exceeds 4000 the system returns to the “full” anti-lag mode.

Anti- Lag Setup
The anti-lag system may be switched on/off by selecting ANTI-LAG on the remote and pressing ADJ UP or ADJ DOWN as required. The display will show ON or OFF accordingly. (Any changes are automatically stored). The anti-lag is automatically armed if the throttle (TPS) is open in excess of "22" when the ignition key is first switched on. This will be the case when some sort of throttle opening device is being used. The driver must be informed of this as some people have a tendency to rest their foot on the accelerator while turning on the key.

1. Select TPS SPAN from the “Utilities” heading on the remote and set the span "10" (throttle fully closed) and 100 (full throttle) settings. STORE any changes made. (Refer to instruction manual for details on TPS SPAN function)

NOTE: The TPS sensor is used for anti-lag and boost control only and has no effect on the ZONING system.

2. With key on and engine stationary, open throttle with stop-screw until TPS SPAN = 28. This is about the correct amount of throttle opening required for anti-lag, and some sort of lock nut or similar should be used to ensure the setting remains stable. Reset TPS SPAN until display = 30 ("closed" throttle)

IMPORTANT

IF EVER THE STOP-SCREW IS ADJUSTED (IN OR OUT) THE "TPS SPAN" MUST BE RESET TO "30" EACH TIME AN ADJUSTMENT IS MADE. THE SOFTWARE USES THIS "30" FIGURE TO CROSS OVER FROM ANTI-LAG TO NORMAL MODES WHILE DRIVING. THE FULL THROTTLE VALUE SHOULD ALSO BE SET TO "100" BUT THIS IS NOT AS CRITICAL AS THE "CLOSED" VALUE.

(TPS SPAN SHOULD BE RESET TO 10/100 IF THE ANTI-LAG SYSTEM IS REMOVED.)

3. Select Anti-lag = OFF under the *BOOST CTRL* heading. Press the ADJUST UP button to display Anti-lag = ON.

4. Turn ignition switch OFF then ON again. (This will "arm" the system since TPS will be over 22 at this time).

   Assuming engine is at normal operating temperature, start the engine. The engine RPM will initially rise quickly then stabilise at about 2000 RPM and running slighly irregular due to the cyclic fuel limiting used to control the "idle" RPM. If the throttle is opened slightly, the engine RPM will rise very quickly as fuel is restored. Note that in this "standby" mode the car may be driven normally without any fear of

exhaust temperature over-heat since RPM limiting is done by fuel cut rather than ignition retard.

Blip the throttle to briefly raise the RPM above 4000. This will cause the system to go into the full anti-lag mode. The engine RPM should be steady but sounding a little flat with periodic back-firing noises.

5. In the anti-lag mode at idle, the boost gauge should show about "0" I.E. no vacuum, no boost. If the gauge reads high eg 5 PSI, then too much throttle opening is being used so back off stop-screw until "0" on the gauge. Likewise, if too low (showing vacuum) wind the stop-screw in to raise the pressure. (Remeber to reset TPS SPAN to 30 each time.) The RETARD = function sets the amount of retard in the lag mode and shouldn't need to be adjusted. If lag mode idle RPM is too high (to achieve the "0" PSI on gauge) then the retard figure may be increased to lower the RPM. Ideally, a value of about 1900 to 2200 RPM @ 0 PSI is the target and by fiddling with the stop-screw and RETARD =, this should be achievable.

6. Take care during testing with the turbo and exhaust manifold temperature. Things get pretty hot under the bonnet so keep an eye on anything close to the turbo/manifold for signs of overheating.

NOTE Also be aware that on vehicles with vacuum assisted brakes that the lack of vacuum will make the brakes very "heavy". Most rally cars use a pedal box rather than vacuum assist so this may not be of any concern.

10. IDLE SPEED

10.1 Function

IDLE RPM Sets the idle speed in steps of 50 rpm. When the engine is cold, the idle speed is automatically increased and will decay to normal as the engine warms up. The value in paranthesis (xx%) shows the actual duty cycle of the idle speed actuator. This menu also contains an annunciator used to display the system status.

Annunciators

T Throttle open

V Engine in over-run vacuum

A Acceleration fuel pending

= Idle speed equals target value

+ System is increasing idle speed

- System is decreasing idle speed

The default mode is when the annunciator shows T, V, A. In this state the system is using the IDHOT/IDCOLD default duty cycles. No idle speed correction will be performed in this mode.

AIRC STEP When an air conditioning request is generated, the PossumLink will increase the engines idle before engaging the compressor clutch. The default setting is 10, implying a 10% increase in duty cycle before engaging the clutch. This compensates for the extra load preventing idle surge or the engine stalling. Note that extra enrichment can also be added from the * FUEL AUXILIARY * heading.

FAN STEP Allows the idle to be increased before switching the radiator fan. The default value is 5%.

IDLE DUTY CYCLE DEFAULTS There are 2 default values labeled "Idle Hot" and "Idle Cold". These are used by the software to

pre-set the ISC duty cycle to about the correct value during gear shifts, over run vacuum, returning to idle etc.

IDLE HOT When the engine is above 50°C, the "Idle hot" value is the default duty cycle forced into the solenoid. This should provide an idle RPM close to the required value. To change use the ADJUST buttons.

IDLE COLD When the engine is below 20°C the "Idle Cold" value is the default duty cycle. Between this temperature and 50 the software will interpolate to create an intermediate duty cycle. To change use the ADJUST buttons.

10.2 Idle Speed Setup

The Idle speed control system has three main adjustments for correct operation.

1. "IDLE (xx%) yyyz" sets the required idle speed in steps of 50 rpm. The (xx%) value shows the actual duty cycle to assist settings and monitoring. Use the ADJUST buttons to select the idle RPM.

2. Two default values for cold and hot engines.

   Hot Engine

   Select "IDLE (xx%) yyy z" on the remote and set the required idle speed. Once the idle rpm has stabilised note the duty cycle value shown in parentheses (xx%) and record the value. Select the "Idle Hot xx%" menu and enter the recorded value +/- 2%.

   e.g. Duty Cycle = 43%(stable hot idle) then enter a value of 45%

   Cold Engine

   Use the same procedure as above except note the duty cycle shortly after a cold start. Enter this value using the menu " Idle Cold xx%" under the "IDLE SPEED" heading. The engines idle will always be higher when it is cold implying the IDLE COLD value will be larger than IDLE HOT.

Store the new value by moving to a STORE menu and holding both ADJUST buttons until the display shows "********" and then release.

Note that the software also generates an intermediate (warm) value, which is the average of the cold and hot settings but is not independently adjustable. If the target rpm is changed at a later date, the HOT and COLD default values may require adjustment.

3. To aid in the control of the Idle Speed solenoid the software uses TPS to determine throttle position. Always ensure the TPS "low" value is 10. This is the value used to determine closed throttle and MUST be set to ensure the correct operation of the Idle Speed system. See the * UTILITES * Section 6 for TPS setup information.

4. The Idle speed system will perform idle correction under the following conditions

   - TPS < 13 (Throttle Closed)
   - Speed < 6kph
   - Engine MAP > Overrun Vacuum Target

   All other conditions will cause the idle system to enter hold mode, where "Idle Hot" and "Idle Cold" are used to determine duty cycle.

   Note For the correct operation of the Idle Speed System ensure the TPS has been setup as described in section 6.2 and the Overrun Vacuum Target as outlined in section 6.3. Failure to set up these parameters will result in incorrect operation.

11.CONFIGURATION

CRANK/CAM RATIO ERROR Used to detect any inconsistency between signals from the crank and cam angle sensors.

RELOAD This process presets all the zones to typical values to allow a base for subsequent tuning. RELOAD is initiated by pressing BOTH ADJUST buttons together until the display shows "**********" and then released.

CAUTION: RELOAD will over-write all values currently stored in the PossumLink memory and should only be used during initial setup or if you wish to restart the tuning procedure again from scratch.

12. READ ONLY FUNCTIONS

+ Ignition switch (key) must be OFF before installing any device. When the key is switched on, the PossumLink will automatically determine which device is fitted and run the appropriate software to support it.

2.1 Read Only Menu

TEST All functions in this mode are "read only" and have no effect on the operation of the system.

TEST RPM is the default display and shows engine RPM. This reading should be stable and in accordance with the engine tachometer.

EDIT UP switch shows the software ID and date code for diagnostic purposes.

TEST MAP Shows the current Manifold Air Pressure (MAP) in kPa. With the engine stationary, the value should show approximately 101 kPa +/-5 at sea level.

TEST ENGT Shows the current engine coolant temperature in degrees Celsius.

CODE A user entered code allows access to all tuning functions. An unlocked PossumLink will show "****" on the display and all functions will be available. A "locked" PossumLink will show a three digit number which must be changed using the "Adjust" buttons to the correct value and then "STORE" to unlock the PossumLink.

The STORE function is always active although partially hidden among the ACCESS DENIED messages. Use the SELECT buttons to search the menu.

SYSTEM VOLTS This diplays current battery voltage.

INJ / OXY This is a read-only function which displays the actual injector duty-cycle as a percentage of maximum. e.g. 28%

indicates that the injectors are flowing 28% of their maximum volume. The OXY displays shows the output signal of front oxygen sensor. Refer to "Closed Loop" information for the significance of these readings.

REAR OXY This is a read-only function which displays the output from the rear OXY sensor in volts. Refer to “Closed Loop” section for more information.

MAP = Use to select the MAP sensor currently fitted.

STD (020) Standard Subaru MAP sensor (240 kPa max)

"GM" MAP sensor option
The previous "555" MAP sensor option has been replaced with a GM version allowing boost pressures up to 3 bar (absolute). The sensor will require installation into the existing wiring, basically matching the wire colours as follows;

BLACK/WHITE = ground/earth
BLUE/BLACK = +5 volts
YELLOW/BLACK = signal out

(If wire colours are different to these it will be necessary to measure the voltages at the MAP connector and connect accordingly.)

Remember to connect the vacuum hose to the snout of the GM sensor.

Select the "MAP = xxxx " menu and using the ADJUST keys select the required sensor type. (Automatically "STORED").

STORE Used to store corrections into the semi-permanent memory. STORE is initiated by pressing BOTH ADJUST buttons together until the display shows "**********" and then releasing. The process will take from 2..30 seconds depending on the number of corrections to be stored.

Note that the engine may run a bit rough during STORE so it is advisable to do so only at idle. If engine stops running during STORE, allow the process to finish before turning off key or trying to restart the engine.

RELOAD This process presets all the zones to typical values to allow a base for subsequent tuning. RELOAD is initiated by pressing BOTH ADJUST buttons together until the display shows "**********" and then released.

13. TYPICAL SETUP PROCEDURE

The following list shows (in order) a typical set of numbers for the engine at idle. This list is useful for quick reference while becoming familiar with the function locations.

TEST RPM	800	
TEST MAP	38 kPa	(Adjust button up)
TEST ENGT	88C	(Adjust button down)
CODE # =	XXXX	(Unlocked)
TPS SPAN	10	(Throttle closed)
CLAMP (38)	35	
MASTER FUEL	89%	
RPM LIMIT	7300	
MAP LIMIT	210 kPa	
ADV LIMIT	27	
MAP =	STD	
KNOCK (0)	ON	
ACCEL Z = 1	26%	
COLD (88)	0%	
VOLTS V = 13.8	15	
STORE		(Both Adjust together)
RELOAD		(Both Adjust together)
ZONEFUEL 105	94%	(Row 1, 500 - 1,000 rpm)
ZONE IGN 105	11	
ROWFUEL (1)	94%	
INJ=1% OXY=81		(OXY may be varying)
TEMP SWITCH	96	
LAMBDA	OFF	
IDLE	800*	(* V, T, +, –, =)
BOOST	200 kPa	
WGATE SENS	5	
WG BASE	(43)	
WG RPM	3500	
EDIT Z 0	35	(Editor @ zone 0 “CLAMP”)

Do not adjust the PossumLink system unless you are prepared to accept the consequences

i.e. Possible engine damage if you make tuning errors.

See front cover of manual for warranty information.

1. Switch on ignition.
2. If you wish to retune from scratch then - Select RELOAD as per Tuning Module Function instructions in previous section. (Places default table into processor)
3. CLAMP and MASTER will have default values. Do not adjust at this stage.
4. Select RPM LIMIT, and Set Limit as required.
5. Repeat above for MAP LIMIT, ADVANCE LIMIT and KNOCK LIMIT.
6. ACCEL, COLD and VOLTS will have default values. Do not adjust at this stage.
7. Select STORE and press ENTER for one second if you have made any changes (as per Tuning Module Function instructions in previous section).
8. Select MASTER and start engine. Adjust value up or down as necessary to keep engine running smoothly. Allow engine to warm up fully.

   + It is recommended that MASTER is not changed from its default value unless higher flow injectors or some other major change has been made to the engine.

9. Select ADVANCE LIMIT and set advance limit to zero. With engine at idle or low speed, check ignition initial timing is approximately 10^{o} BTDC (this is not adjustable since the trigger pickups are of fixed position).

10. Select MASTER. Drive or dyno. load engine until engine is producing approximately 50% maximum power. Adjust MASTER for best running performance. Engine power should now be increased into the higher power ranges. Again adjust MASTER for best performance at highest practical power output. This setting is most important if zone tuning is to be successful (see note in step 8).

11. Select ROWFUEL. Run the engine in each of the ten main rows (load rows) and adjust for optimum performance. Refer to the Zone Sheet for explanation of "row" values. (This should only be necessary if major changes to the engine or fuel system have been made).

12. Select ZONEFUEL. The engine should now be operated throughout the entire power range and the UP/DOWN switches used to gradually tune the zones as required. (It is advisable that a "STORE" is carried out after this to prevent loss of correction data (if ignition turned off)). Repeat the above as often as necessary until desired result is obtained. Note that the majority of engine tuning will be carried out in ZONEFUEL mode.

13. Select Zone Advance. Repeat step 11 above but this time adjusting ignition advance. Caution should be observed to prevent over-advancing and thus possible detonation action. Use with care! Periodically check the detonation count in the "KNOCK" menu to see if detonation is occurring. Remember that the PossumLink will automatically remove up to 6° advance from any zone if the "KNOCK" system is turned on.

14. Select ACCEL. Run engine at idle and snap open throttle. Adjust for cleanest response. Repeat this at higher RPM (four zones which will change as engine RPM increases). "STORE" after setting.

    NOTE: ACCEL is exclusively used to enrich the mixture while the throttle is actually moving. If the engine is hesitant AFTER the throttle has finished moving then the base fuel

eg ZONEFUEL value is probably too low. DO NOT use ACCEL to cover up lean ZONEFUEL values.

15. Assuming all the above operations are completed successfully, allow the engine to cool down completely. (preferable overnight). Select COLD and start engine. Adjust as required for clean operation with minimum hesitation. Excessive "COLD" will result in poor running and excessive exhaust emissions.

14. ADDITIONAL TUNING TIPS

1. Large steps between zones are permitted since the PossumLink System interpolates (ie. calculates intermediate values) on all tabled data.
2. Always STORE changes before turning off ignition or they will be lost.
3. TAKE NOTES as you go of the various settings and values to enable a logical picture to be built up for future reference. The PossumLink System can produce millions of possible combinations so keep trace.

15.STORING & EDITING VALUES

To Store select STORE. Press both ADJUST buttons together until display shows "**********" and then release.

The default (factory) programme in the PossumLink is the result of extensive testing on a engine dyno meter, on the road and from data gathered from the Possum Bourne Motor Sport rally cars. For vehicles in standard trim additional tuning should not be necessary.

The programme is preset to a performance level offering optimum performance while aiming for engine longevity. The programme is also set for optimum economy while under “cruise” conditions.

Possum Bourne Motor Sport and Link ElectroSystems do not endorse any use of the PossumLink that endangers in any way the vehicle, driver and passengers or any member of the community.

EDIT Enables the zone editor function which allows random access to all zones for viewing and editing. The EDIT function may be used at any time, with or without the engine running. Use the EDIT push buttons to select the appropriate zone(s) and the ADJUST buttons to change the selected zone. The zone is identified by a number which may be correlated to its function by consulting the zone editor sheet. ZONE FUEL and ZONE IGN are identified by an "F" or "I" respectively to discriminate between fuel and ignition values. Storing of edited values may be done by pressing BOTH EDIT buttons together until display shows "**********" and then releasing. Alternatively, STORE may be selected and used as normal.

16. TUNING PORT

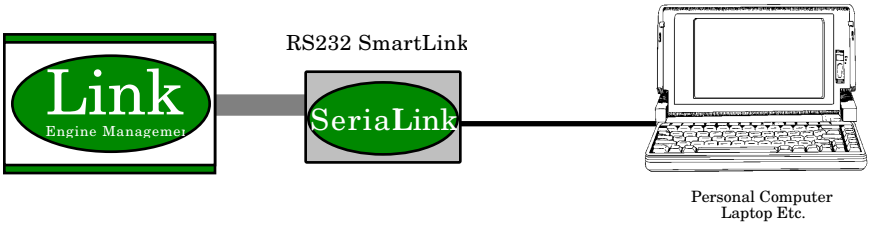
The fourteen pin connector located at one corner of the circuit board allows connection of various tuning and diagnostic tools to the system. All devices use a fourteen line flat ribbon cable, and connectors are keyed to prevent incorrect installation. The following devices are currently available.

> Ignition switch (key) must be OFF before installing any device. When the key is switched on, the PossumLink will automatically determine which device is fitted and run the appropriate software to support it.

Link Tuning Module

The Link Tuning module allows all aspects of fuel, ignition, boost and utility functions to be adjusted, edited and stored. A security code prevents unauthorised tampering on all adjustments except diagnostic (read only) functions. Detailed instructions are included elsewhere in this manual.

SerialLink



The SerialLink allows one way communication between the PossumLink and a personal computer via the PC's RS232 serial port for data-logging and downloading of the PossumLink settings. While the engine is running a data stream sent to the PC shows all major engine parameters such as RPM, pressures, temperatures and flows. The information may be recorded using the PC' s memory / disk drive. Graphs etc. may be created using spread sheets etc.

The Software used to view and store this data is called "Comlink" and can be copied from the CD supplied with the PossumLink (Alternatively it can be downloaded from our web site www.link-electro.co.nz. Place the CD in the CD ROM drive and select the directory "PCLink\PCLink Software Installer\Comlink.exe". Copy comlink.exe to the hard drive where the program can be executed. Connect the 14 way flat ribbon cable between the PossumLink and SerialLink. Next connect the standard serial cable between the SerialLink and an available COM Port on the PC. Now start Comlink. There are 2 setup options

- First select the correct COM Port. Use the keyboard buttons Q & A to change the settings. Once configured press the Enter button on the keyboard
- Next select the correct baud rate using the Q and A Keys.

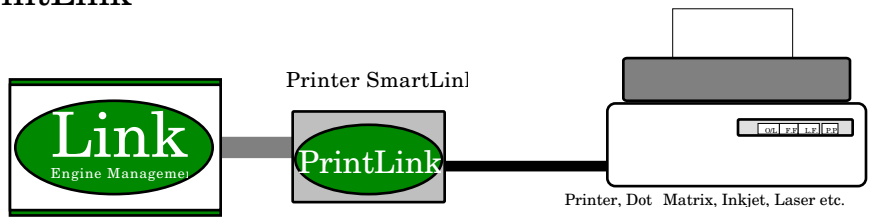
  If the PossumLink has laptop tuning, select 9600 baud. (If the software date stamp is after Sept 01 the software will have PC tuning.)

  If no Laptop tuning select 2400 baud

  Once configured press the Enter key on the keyboard

- Switch the ignition key ON. The initial data dump will be in the same format as the Zone Table shown in Appendix A or B. The first 2 rows are configuration and tuning functions. Next is the Fuel table, followed by the ignition table, and lastly the boost table.
- Now start the engine and observe the runtime data. Follow the onscreen help for storing this data.

PrintLink



The PrintLink is similar to the SerialLink above except that the PrintLink connects directly to any type of printer for instant hard copy data. An alternative option is to use a battery backed "printer buffer" to store information while test driving and then downloading the buffer to a printer. Typical buffers allow in excess of one hours logging time.

PCLink

This allows the PossumLink and PC to perform 2-way communication using the SerialLink. Once the PCLink software has been installed from CD the PossumLink can be tuned from laptop or personal computer. See Section 9 for software installation and hardware setup.

17. WINDOWS LAPTOP TUNING

The PossumLink offers PC/Laptop tuning using PCLink Software. A copy can be found on the CD supplied with the computer or from our web site: www.link-electro.co.nz. It allows real time 2-way communication between the PossumLink and Laptop computer.

Installing PCLink Software from CD

- Insert PCLink CD into the CD ROM drive.
- The software in located in the "PCLink\PCLink Software Installer\Setup.exe" folder.
- Double click on the "setup.exe" file to start the installation process.

  During the installation process a PCLink icon will be generated and place on the desktop. To start, simply double click on this icon.
- For detailed information on the operation of the PCLink software, start the program and read the online Instructions.
- A Tutorial is also available and can be copied from the CD in directory, "PCLink\PCLink Tutorial\PCLink_Tute.pdf". This is PDF document, which requires Acrobat reader. A copy of this software is also available on CD if required.

PCLink hardware connection.

This requires one 14-way flat ribbon cable, one SerialLink, one standard serial cable and a PC.

- Connect one end of the ribbon cable to the Link Tuning Port, the other end should connect to the SerialLink.
- Take a standard serial cable and connect one end to the SerialLink. Connect the other end to an available COM Port on the PC.

- Start the PCLink Software by double clicking on the desktop icon or using the START, programs menu.
- Switch the ignition on which will power up the PossumLink

  NOTE. The SerialLink should ALWAYS be connected before the ignition key is switched ON.
- The PCLink offers both mouse and keyboard control. To start the connection between PC and PossumLink using the mouse, move to the "Link Control" menu and select "Connect Link". Using the keyboard, press and hold the Ctrl, Alt and L keys. This will bring up an "Options" box. Check the following settings
- Make sure the Link Connection shows "ONLINE"
- Select the correct COM Port
- Click the OK button. Once the PC is communicating with the PossumLink, tuning can begin. Remember to STORE any changes before disconnecting the PCLink software from the PossumLink.

PossumLink 44S WRX (01) Engine Management

TPS Wastegate

Clamp	Master	R Lim	M Lim	A Lim	Mode	Code	Volt	Idle	Fan	Low	High	Sens	Knock	Base	RPM	Cold	O'Run	K RPM	WPulse
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Acceleration Lambda Targets

WWth		2,000	4,000	6,000	8,000	Idle	Cruise	Row4,5	Row6,7	Row8,9	Row10	IAT	ID Hot	ID Cld	AC Idle	O² Lock	AC Fuel	K Start	FanStp
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39

	Crank	Retard	Restart	Temp C		ADecay	TGV	TGV T											
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

Zone Fuel

kPa	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
30	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
60	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	185	290	295
90	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395
120	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	185	490	495
150	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595
180	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695
210	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795
240	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895
270	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995
300	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1050	1055	1060	1065	1070	1075	1080	1085	1090	1095

Zone Ignition

kPa	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
30	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
60	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	185	290	295
90	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395
120	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	185	490	495
150	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595
180	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695
210	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795
240	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895
270	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995
300	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1050	1055	1060	1065	1070	1075	1080	1085	1090	1095

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Boost

0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000

100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195

PossumLink 44S STI (01) Engine Management

										TPS		Wastegate							
Clamp	Master	R Lim	M Lim	A Lim	Mode	Code	Volt	Idle	Fan	Low	High	Sens	Knock	Base	RPM	Cold	O'Run	K RPM	WPulse
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

		Acceleration						Lambda Targets											
WWth		2,000	4,000	6,000	8,000	Idle	Cruise	Row4,5	Row6,7	Row8,9	Row10	IAT	ID Hot	ID Cld	AC Idle	O² Lock	AC Fuel	K Start	FanStp
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39

CamMp	Crank	Retard	Restart	Temp C	Camrpm	ADecay													
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

Zone Fuel

kPa	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
30	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
60	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	185	290	295
90	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395
120	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	185	490	495
150	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595
180	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695
210	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795
240	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895
270	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995
300	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1050	1055	1060	1065	1070	1075	1080	1085	1090	1095

Zone Ignition

kPa	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
30	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
60	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	185	290	295
90	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395
120	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	185	490	495
150	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595
180	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695
210	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795
240	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895
270	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995
300	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1050	1055	1060	1065	1070	1075	1080	1085	1090	1095

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Boost

0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195

APPENDIX C Pressure Conversion

kPa (Absolute)	InHg
32	20
35	19
39	18
42	17
45	16
49	15
52	14
55	13
59	12
62	11
66	10
69	9
72	8
76	7
79	6
83	5
86	4
89	3
93	2
96	1
100	0

kPa (Absolute)	Pressure (PSI)
100	0.00
105	0.73
110	1.45
115	2.18
120	2.90
125	3.63
130	4.35
135	5.08
140	5.80
145	6.53
150	7.25
155	7.98
160	8.70
165	9.43
170	10.15
175	10.88
180	11.60
185	12.33
190	13.05
195	13.78
200	14.50
205	15.23
210	15.95
215	16.68
220	17.40
225	18.13
230	18.85
235	19.58
240	20.31
245	21.03
250	21.76
255	22.48
260	23.21
265	23.93
270	24.66
275	25.38
280	26.11
285	26.83
290	27.56
295	28.28
300	29.01