LINK
ENGINE MANAGEMENT

TERMINATED LS ENGINE HARNESS

Manual

Version 1.0 *(20 Oct 2023)*

Introduction

This harness was designed to cover a wide range of GM LS engine variations, therefore may require some user configuration and/or minor adaptions for some applications. Read these instructions carefully.

Conventions

Connectors and pin numbers in this document are referenced using the convention Connector Name. Pin Number. For example “Chassis.7” means Chassis connector, pin 7. Wire colours are referenced using Primary Colour-Stripe Colour. For example “Red-Green” would be a Red wire with green stripe.

Product and software manuals are available at:
linkecu.com/software-support/

ECU Setup

There are 4 basic variations of LS base maps provided in the PC Link base maps folder. The main variations are Gen 3 or Gen 4 and DBW or cable throttle. These maps have all the basic and essential IO setup to match the wiring configuration of this loom and should get most engines running with little fuss. Optional IO for the “Spares” connector and other free IO is not set up as it will vary with application. There is an IO assignment table in the appendix at the end of this document to refer if required. The basic adjustments and checks required before attempting to start the engine would be as follows:

- Check the engine capacity, fuel pressure, fuel density, stoich ratio, injector flow and injector deadtime settings match your hardware.
- For DBW engines, perform a TPS and APS calibration. For cable throttle engines (drive-by-wire), perform a TPS calibration.
- Check MAP, ECT and IAT are reading realistic values.
- Temporarily set the RPM limit to 3000RPM for first start up.

Main Chassis Connections if using Link relay/fuse box (optional accessory):

There are 4 un-terminated labelled “flying leads” that need to be connected to the chassis:

1. Large Red “Batt+” wire. Connect this directly to the +12V terminal of the battery. This wire provides all current to the fuel pump, fan, Ignition coils, and all other devices connected to the ECU. This should be fused with an appropriate fuse, 50A would be suitable for most applications.
2. Red-Green “Fan” wire. This is an ECU-controlled +12V supply for the cooling fan. Connect to the 12V side of the fan motor. Capable of 20A continuous.
3. Red-Blue “Fuel Pump” wire. This is an ECU-controlled +12V supply for the fuel pump. Connect to the 12V side of the fuel pump. Capable of 20A continuous.
4. Grey-Black “Ign Sw” wire. Connect this to the ignition switch. ON = +12V.

There are also 4 terminals in the chassis connector for other chassis related connections. The connector uses common sealed male JPT terminals:

- Chassis.7. Reverse switch. This wire comes from the “Trans” plug, it is intended to be used to connect reverse lights to the reverse switch, but it can be used for other purposes such as a neutral lockout or speed signal to the dash.
- Chassis.8. Starter solenoid. This terminal is the trigger for the starter solenoid, this would typically be connected to the starter button or ignition switch. Note this is a direct connection, the button/switch must be capable of taking the full starter solenoid current.
- Chassis.15. Alternator light. This is the excitor wire to pin B on the Alternator, connect to alternator lamp or can be connected direct to switched +12V if a lamp is not required.
- Chassis.16. Tacho. This is the signal to the tacho. If a CAN dash/display is used then this aux output can be used for other functions.

Important: The spare “Aux” relay is controlled by Aux 5, this can only be used in applications that don’t have the 4 wire stepper IAC. If your engine has the 4 wire stepper IAC you must remove the Aux relay.

Main Chassis Connections if not using the Link relay/fuse box:

If the user wishes to interface with his own custom fuse box, PDM or other power supply solution, the following info is provided as a guide.

If the engine is fitted with a stepper motor IAC, the main power circuit will need to be as per the "ECU Hold Power" circuit described in PC Link help file. This means the ecu has control over the main power relay so it can keep itself alive for a short time after ignition is switched off to re-home the stepper motor. A schematic of the Link fuse box is provided at the end of this document in appendix 1 for reference.

The Chassis connector on the loom is a 16 pos sealed male JPT, the TE Connectivity part number is 1-964449-1. The mating part number is 1-967242-1 and this uses common SWS JPT terminals and seals.

A "JPT extraction tool" is helpful if you ever need to extract terminals from this connector. Aptiv 10714843 or Rennsteig 680-10714843 are good quality examples of this.

Pinout of the chassis connector:

Chassis	Wire Colour	Connects to
Chassis.1	Orange-Brown	Aux 2. F.Pump
Chassis.2	Orange	Aux 4. ECU Hold power
Chassis.3	Red	ECUB.5. Aux 9/10 supply
Chassis.4	Red	Switched 12V. ECUA.5, CAN2.1, Injectors, Trans.4.
Chassis.5		
Chassis.6	White	CAN2 H
Chassis.7	White	Reverse Sw. Trans.2
Chassis.8	White	Starter Solenoid and DI4
Chassis.9	Orange-Red	Aux 3. Fan
Chassis.10	Gray-Black	DI1 Ign Sw
Chassis.11	Red	Coil Switched 12V
Chassis.12	Orange-Yellow	Aux 5. Spare
Chassis.13		
Chassis.14	Green	CAN2 L
Chassis.15	White	Alt Light. Alt.B
Chassis.16	Orange-Black	Aux 1. Tacho

Spares Connector:

This contains spare IO to connect extra switches or sensors.

Mating connector DTM04-12PA

Spares	Wire Colour	Connects to
Spares.1	Gray-Brown	DI2
Spares.2	Gray-Yellow	DI5
Spares.3	Gray-Green	DI6
Spares.4	Gray-Blue	DI7
Spares.5	Gray	DI8
Spares.6	Green	Sensor Ground
Spares.7	Red-Green	5V
Spares.8	White-Yellow	AN Volt 8
Spares.9	White-Green	AN Volt 9
Spares.10	White-Blue	AN Volt 10
Spares.11	White	AN Volt 11
Spares.12	Yellow-Orange	AN Temp 4

Cam Connector:

For a Gen 3 engine with the 24X/1X cam sensor at the rear of the engine, the loom will plug in to the cam sensor directly. For a Gen 4 engine with the 58X/4X trigger system with the cam sensor in the front cover, an "LS1 to LS2 cam sensor extension adapter" will be required (available from Link or 3rd parties).

Crank connector:

For a Gen 3 engine with the 24X crank wheel sensor (black plastic), the loom will plug in to the crank sensor directly. For a Gen 4 engine with the 58X crank sensor (grey plastic), the connector key needs to be cut out of the sensor housing as indicated below using a box cutter or similar tool.

Alternatively, the plug body on the loom can be swapped with an Aptiv 12129946 that will fit the Gen 4 crank sensor without removal of the key.

Cut this key out:

Pedal Connector:

Provided to allow easy connection of a DBW pedal inside the cabin. It contains 5V, Sensor ground and 2 AN Volt inputs.

Mating Connector DTM04—4P

Pedal	Wire Colour	Connects to
Pedal.1	Green	Sensor Ground
Pedal.2	Yellow-Black	AN3 APSsub
Pedal.3	White-Black	AN4 APSmain
Pedal.4	Red-Green	5V

CAN2 Connector:

Provided to allow easy connection of CAN devices such as CAN lambdas, gauges, keypads, etc. This connector is compatible with the pre-existing range of Link CAN cables.

Mating Connector DTM04—4P

CAN2	Wire Colour	Connects to
CAN2.1	Red	Ign Switched +12V
CAN2.2	Black	Ground
CAN2.3	Green	CAN2 L
CAN2.4	White	CAN2 H

MAP Connector:

For the MAP sensor. Connector and pinout compatible with Link MAP sensors. Link can supply an adapter to mate with the factor LS MAP sensor.

MAP	Wire Colour	Connects to
MAP.1	Green	Sensor Ground
MAP.2	Yellow-Blue	AN Volt 1
MAP.3	Red_Green	5V

Knock Connector:

Provides connection for up to 2 knock sensors. Link can provide an adaptor to mate with the factory Gen 3 knock sensor loom, or an adapter to connect directly to Gen 4 sensors on each side of the engine.

Mating Connector DTM06—3S

Knock	Wire Colour	Connects to
Knock.1	Braid	Sensor Ground/Shield
Knock.2	White	Knock 1
Knock.3	Red	Knock 2

Alternator Connector:

Intended for use with the common "F Body" alternator only, such as AC Delco 335-1075. Provides a single excitor/lamp connection to terminal B only.

Alternator	Wire Colour	Connects to
Alternator.A	Not connected	Ign Switched +12V
Alternator.B	White	Alternator Lamp. Chassis.15
Alternator.C	Not Connected	CAN2 L
Alternator.D	Not Connected	CAN2 H

Trans Connector:

A general purpose connector, intended for common trans functions but may instead be used for other DI functions such as a flex fuel sensor or the reverse switch wire can be used for other functions that need a connection back to inside the cabin.

Mating Connector DTM06—4S

Trans	Wire Colour	Connects to
Trans.1	Green	Sensor Ground
Trans.2	White	Reverse switch. Chassis.7
Trans.3	Gray-Red	DI3
Trans.4	Red	Ign switched +12V

IAC Connector:

For connection to the 4 wire stepper motor IAC. If no IAC is fitted then these Auxes may be used for other functions such as boost valves or NOS solenoids. Aux 5 is also available on the chassis connector and may be used for the spare Aux relay in the Link fuse box. Link can supply an adapter to mate with the common LS IAC.

IAC	Wire Colour	Connects to
IAC.1	Orange-Yellow	Aux 5
IAC.2	Orange-Green	Aux 6
IAC.3	Orange-Blue	Aux 7
IAC.4	Orange-Violet	Aux 8

TPS Connector:

For engines with a cable operated throttle, plugs directly on to the common LS TP sensor. For DBW engines this connector is not used and maybe repurposed for other AN Volt functions. *Bonus - this plugs directly on to common pressure sensors so is great for a fuel pressure sensor.

TPS	Wire Colour	Connects to
TPS.1	Green	Sensor Ground
TPS.2	Red-Green	5V
TPS.3	White-Brown	AN Volt 2

DBW (E–throttle) Connector:

For connection of the electronic throttle body, provides 2 AN volt inputs, 5V and sensor ground. Link can supply an adapter to mate with the common LS DBW throttle bodies. These inputs and outputs can be used for other functions on cable throttle engines.

Mating Connector DTM04—6P

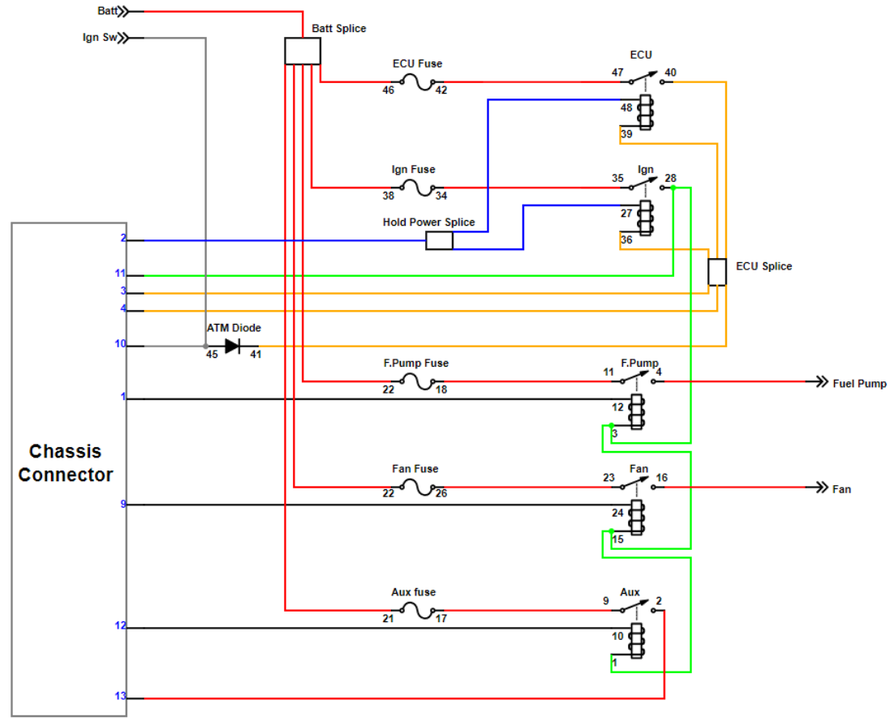
DBW	Wire Colour	Connects to
DBW.1	Violet	Aux 9
DBW.2	Violet-White	Aux 10
DBW.3	Red-Green	5V
DBW.4	Green	Sensor Ground
DBW.5	Yellow-Green	AN Volt 5
DBW.6	White-Red	AN Volt 6

APPENDIX:

1. Link Fuse/Relay box schematic:

Blue Numbers = Connector Positions

Black Numbers = Fuse Box Positions



2. IO Assignments:

ECU IO Assignments	
AN Volt 1	MAP sensor
AN Volt 2	TPS (cable throttle)
AN Volt 3	APS Sub
AN Volt 4	APS Main
AN Volt 5	TPS Sub (DBW)
AN Volt 6	TPS Main (DBW)
AN Volt 7	Oil Pressure
AN Volt 8	Spares connector
AN Volt 9	Spares connector
AN Volt 10	Spares connector
AN Volt 11	Spares connector
AN Temp 1	ECT
AN Temp 2	IAT
AN Temp 3	Temp 3 connector
AN Temp 4	Spares Connector

ECU IO Assignments	
Aux 1	Tacho
Aux 2	Fuel Pump
Aux 3	Fan
Aux 4	ECU Hold power
Aux 5	IAC *Also in fuse box
Aux 6	IAC
Aux 7	IAC
Aux 8	IAC
Aux 9	DBW/E-throttle motor+
Aux 10	DBW/E-throttle motor -
DI 1	Igniton Switch
DI 2	Spares connector
DI 3	Trans connector/VSS
DI 4	Starter signal
DI 5	Spares connector
DI 6	Spares connector
DI 7	Spares connector
DI 8	Spares connector