



Trans Control

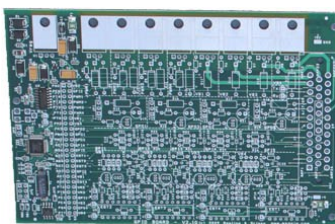
"Microsquirt trans firmware"

Hardware supplement

Dated: 2015-03-25



Microsquirt V1/2



GPIO



MS2

This version of the documentation applies to:

- MicroSquirt V1,2
 - GPIO board
 - MS2 on a V3 or V357 mainboard
- AND
- Running firmware "Trans controller release 1.0" or later (not Mshift)

Does not apply to other Megasquirt products or other firmware versions.

Please report any errors or omissions to contact@megasquirt.co.uk

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1 Introduction

The Transmission control system is primarily targetted at the Microsquirt hardware, but may also be implemented on GPIO or MS2. This supplementary manual is provided for the more do-it-yourself options where the GPIO or MS2 are used.

For transmission wiring and software configuration, refer to the main Trans manual.

For additional help and support, visit the website www.msextra.com

1.1 Emissions and disclaimer

All parts are sold for OFF ROAD RACE-ONLY ground-vehicle use only, or vehicles that pre-date any federal and state emissions control requirements. Aftermarket EFI/EMS systems are not for sale or use on pollution controlled vehicles. Alteration of emission related components constitutes tampering under the US EPA guidelines and can lead to substantial fines and penalties. Your country/state/district may also have specific rules restricting your tampering with your vehicle's emissions system.

Race parts are inherently dangerous and may cause injury or damage if improperly modified or altered before use. The publishers of this manual will not be held liable for and will not pay you for any injuries or damage caused by misuse, modification, redesign, or alternation of any of our products. The publishers of this manual will not be held in any way responsible for any incidental or consequential damages including direct or indirect labor, towing, lodging, garage, repair, medical, or legal expense in any way attributable to the use of any item in our catalog or to the delay or inconvenience caused by the necessity of replacing or repairing any such item.

2 TCU Wiring Tables

Each hardware variant has its own wiring table, be sure to refer to the correct one!

2.1 Microsquirt V1 and V2 wiring scheme

The V1 and V2 Microsquirts used an extruded metal case. They are now superceded by the plastic cased V3 version. The information is provided here for customers wishing to use the older product.

To use the Microsquirt V1 or V2 as a transmission controller, no internal modifications or customisation is required, but some external resistors are required in the wiring.

Pin#	Name	Color	In/Out	Function	Max current
1	+12V In	Red	In	Main power feed	< 1A
2	CANH	Blue/Yellow	Comms	CAN communications	-
3	CANL	Blue/Red	Comms	CAN communications	-
4	VR2+	VR2	In	Engine speed signal. Connect to tacho or crank sensor.	-
5	SPAREADC2 (MAF)	Pink/Black	In	Selector pos D / Spare analog in	-
6	FLEX	Purple/White	In	Brake switch GND signal. Do not apply 12V to this pin.	-
7	FIDLE	Green	Out	Solenoid B	3A
8	FP (pump)	Purple	Out	Solenoid A	3A
9	INJ 1	Thick Green	Out	TCC (LU) Solenoid	5A
10	INJ 2	Thick Blue	Out	EPC solenoid	5A
11	SPK B (IGN2) *1	Thick White/Red	Out	Solenoid C	0.02A
12	SPK A (IGN 1)	Thick White	Out	Solenoid D	0.02A
13	RX	-	Comms	RS232 communications	-
14	TX	-	Comms	RS232 communications	-
15	BOOT LOAD	Purple/Black	In	Bootloader GND enable input	-
16	ALED	Yellow/Black	Out	Not used	3A
17	WLED	Yellow/White	Out	Not used	3A
18	Sensor Ground	-	GND	Not installed	-
19	Serial Ground	-	GND	Serial Ground	-
20	Sensor Ground	White/Black	GND	Sensor GND (temp,TPS)	-
21	Sensor Ground	-	GND	-	-
22	POWER GROUND	Thick Black	GND	POWER GROUND	-
23	POWER GROUND	Thick Black	GND	POWER GROUND	-
24	MAP	Green/Red	In	Trans temp sensor	-
25	CLT	Yellow	In	Selector pos B	-
26	MAT	Orange	In	Selector pos A	-
27	TPS	Blue	In	TP Sensor input	-

Pin#	Name	Color	In/Out	Function	Max current
28	TPS VREF (5V) *2	Gray	Out	5V supply for TPS	0.1A
29	SPAREADC	Orange/Green	In	Engine Temp Sensor	-
30	OPTO+	Grey/Red	In	Do not connect	-
31	OPTO-	Grey/Black	In	Do not connect	-
32	VR1+	VR1	In	VSS (rear/side of trans or transfer case)	-
33	VR1-	VR1	In	VSS (rear/side of trans or transfer case)	-
34	O2	Pink	In	Selector pos C	-
35	TACHO	Green/Yellow	Out	Optional output.	0.3A

Note *1

Microsquirt V1 has high current output as standard

Microsquirt V2 needs to be jumpered for high current output

Note *2

TPSVREF is used to power pullups on sensor inputs

- Connect 2.49k resistor to pin 34
- Connect 2.49k (or 1k) resistor to pin 34
- Connect 2.49k resistor to pin 29 or omit if sharing sensor
- Connect to TPS if using it standalone. Do not connect if sharing TPS.

2.2 Microsquirt V3 trans wiring

The Microsquirt V3 wiring is covered in the main Trans manual.

2.3 MS2/V3.0 trans wiring

(DIYAutoTune.com colors)

To use the MS2/V3.0 as a transmission controller, internal modifications are required.

Pin#	Name	Color	In/Out	Function	Max current
2	VR1-	In shielded wire	In	VSS (rear/side of trans or transfer case)	-
3	CANH	Tan	Comms	CAN communications	-
4	CANL	Tan/Red	Comms	CAN communications	-
5	SPR3		In	Selector pos B	-
6	SPR4		In	Selector pos C	-
7	Sensor Ground	Black/white	GND	Sensor GND (temp,TPS)	-
16,17	POWER GROUND	Black	GND	POWER GROUND	-

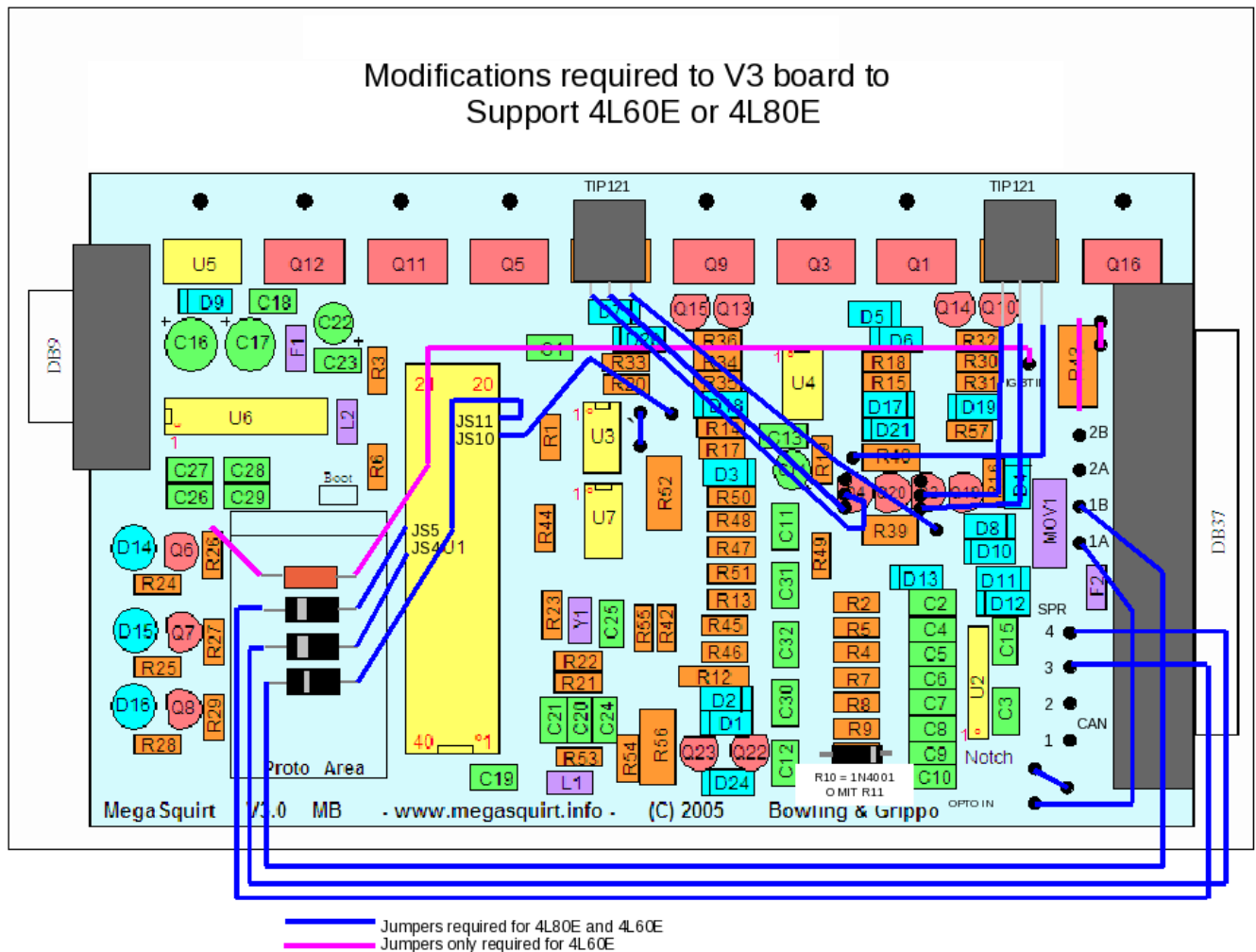
Pin#	Name	Color	In/Out	Function	Max current
18,19	POWER GROUND	Black	GND	POWER GROUND	-
20	MAT	Orange	In	Trans temp sensor	-
21	CLT	Yellow	In	Engine Temp Sensor (if used)	-
23	O2	Pink	In	Selector pos A	-
24	VR1+	In shielded wire	In	VSS (rear/side of trans or transfer case)	-
25	IAC1A	Blue/White	In	Engine speed signal. Connect to tacho or crank sensor.	-
26	TPS VREF (5V) *1	Gray	Out	5V supply for TPS	0.1A
27	IAC1B	Blue/Red	In	Brake switch GND signal. Do not apply 12V to this pin.	-
27	TPS	Blue/Red	In	TP Sensor input (if used)	-
28	+12V In	Red	In	Main power feed	< 1A
30	FIDLE	Light Green	Out	Solenoid B	3A
32	INJ 1	Blue	Out	TCC (LU) Solenoid	5A
34	INJ 2	Green	Out	EPC solenoid	5A
36	IGN	Brown	Out	Solenoid C	3A
37	FP (pump)	Violet	Out	Solenoid A	3A
-	Via D16 + TIP122	-	Out	Solenoid D	3A
-	Via JS7 (PE0)	-	In	Selector pos D / Spare analog in	-

Note *1

TPSVREF is used to power TPS

- Connect to TPS if using it standalone. Do not connect if sharing TPS with another ECU.

The following internal modifications are required.



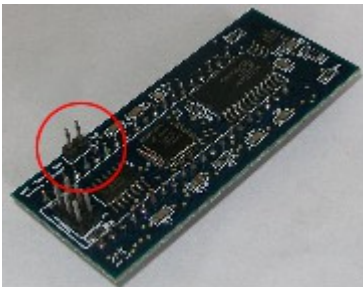
The following internal wiring modifications are required.

1. The trans control application does not require the active flyback circuits or FP, IDL limiting circuits, so the following components can be omitted.
2. Omit transistors: Q9, Q10, Q12, Q13, Q14, Q15, Q19, Q20
3. Omit resistors: R30, R31, R32, R34, R35, R36, R37, R38
4. If omitted, R37 and R38 should be replaced with jumpers.
5. The LEDs are not used by the code, so R24, R25, R26, R27, R28, R29 ; Q6, Q7, Q8 ; D14, D15, D16 can be omitted.
6. Advanced, optionally could omit D5, Q3, R18, D6, D7, Q11, R33, D20 and use 1N4001 to 12V on each output.
7. The FP and IDL output transistors are borderline on the current capacity for the solA and solB solenoids in the transmission, you can jumper R39 and R40 and hope. OR, the safer option is to replace these two transistors with TIP121 mounted on the heatsink bar with a mica insulation kit as shown.
8. Remove R10 and replace with diode 1N4001 (or equivalent) with band to the right.
9. Remove R11, leave the space open.
10. Install three diodes 1N4001 on the proto area.

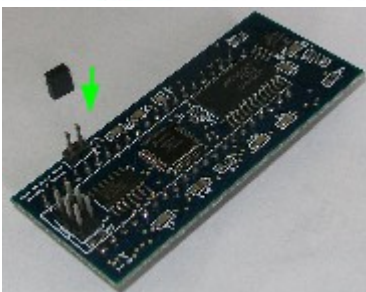
Trans control setting up and hardware

11. Connect the non-band sides of the diodes to JS5, JS4, JS11 as shown.
12. Connect the band sides of the diodes to SPR3, SPR4, IAC1B as shown.
13. Connect VRIN to TACHSELECT
14. Connect VROUT to TSEL
15. Connect OPTOIN to IAC1A
16. Connect OPTOOUT to JS10
17. 4L60E. Install a 330R resistor in the proto area.
18. 4L60E. Connect one end of the resistor to 'top' of R26 as shown.
19. 4L60E. Connect the other end of the resistor to IGBT IN as shown.
20. 4L60E. Install VB921 / BIP373 / TIP121 into Q16.
21. 4L60E. Jumper IGBTOUT to IGN
22. 4L60E. Install R43 or jumper.
23. If sharing engine temp sensor with ECU then remove R7.
24. If using CAN to fetch TPS/RPM/Engine temp from MS2 ECU, then run jumpers from CANH/L at CPU to CANH/L at DB37
25. If using CAN for those inputs, the following components may be omitted : C6, C7, C8, C9, C11, C12, C30; R8, R9, R12, R13; D1, D2
26. The MAP sensor is optional. If not used, the following components can be omitted : C2, C3; U2; R2
27. PE0/JS7 requires a protective circuit if used.

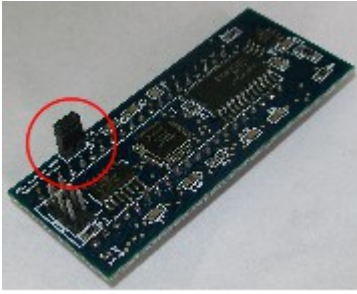
When loading firmware to the MS2, it may be necessary in rare cases to use the "boot jumper".



MS2 in normal condition without boot jumper.



Installing the boot jumper.



MS2 with boot jumper in place.

2.4 GPIO trans wiring

The table below lists the processor names for each connection. A recommended output pin number is shown if known.

To use the GPIO as a transmission controller, internal customisation is required to add the needed circuits.

41TE uses slightly different pins - not shown.

Pin#	Name / CPU pin	Color	In/Out	Function	Max current
1	+12V In		In	Main power feed	< 1A
2	PT0		In	VSS (rear/side of trans or transfer case)	-
3	PAD07		In	Brake switch GND signal. Do not apply 12V to this pin.	-
5	PAD00		In	Selector pos A / Analogue gear pos	-
6	PAD01		In	Selector pos B	-
7	PM3		Out	Solenoid C	3A
10	PM2		Out	Solenoid B	3A
13	CANH		Comms	CAN communications	-
14	PT5		In	Engine speed signal. Connect to tacho or crank sensor.	-
16	CANL		Comms	CAN communications	-
18	POWER GROUND		GND	POWER GROUND	-
19,20	POWER GROUND		GND	POWER GROUND	-
23	PE4		Out	Solenoid A	3A
24	PAD05		In	TP Sensor input	-
25	PAD03		In	Selector pos C	-
28	TPS VREF (5V) *1		Out	5V supply for TPS	0.1A
30	PAD02		In	Trans temp sensor	-
32	PT3		Out	TCC (LU) Solenoid	5A
33	PT2		Out	EPC solenoid	5A
17	Sensor Ground		GND	Sensor GND (temp,TPS)	-
-	No input assigned.		In	Engine Temp Sensor (if used)	-

Trans control setting up and hardware

Pin#	Name / CPU pin	Color	In/Out	Function	Max current
-	PM4		Out	Solenoid D	3A
-	PAD06		In	Selector pos D / Spare analog in	-

Note *1

TPSVREF is used to power TPS

- Connect to TPS if using it standalone. Do not connect if sharing TPS with another ECU.

The required internal customisation is beyond the scope of this document.

3 Revision history

2015-03-11	Split off MS2, GPIO, Microsquirt V1,2 hardware details into this supplement
2015-03-25	Bump rev.