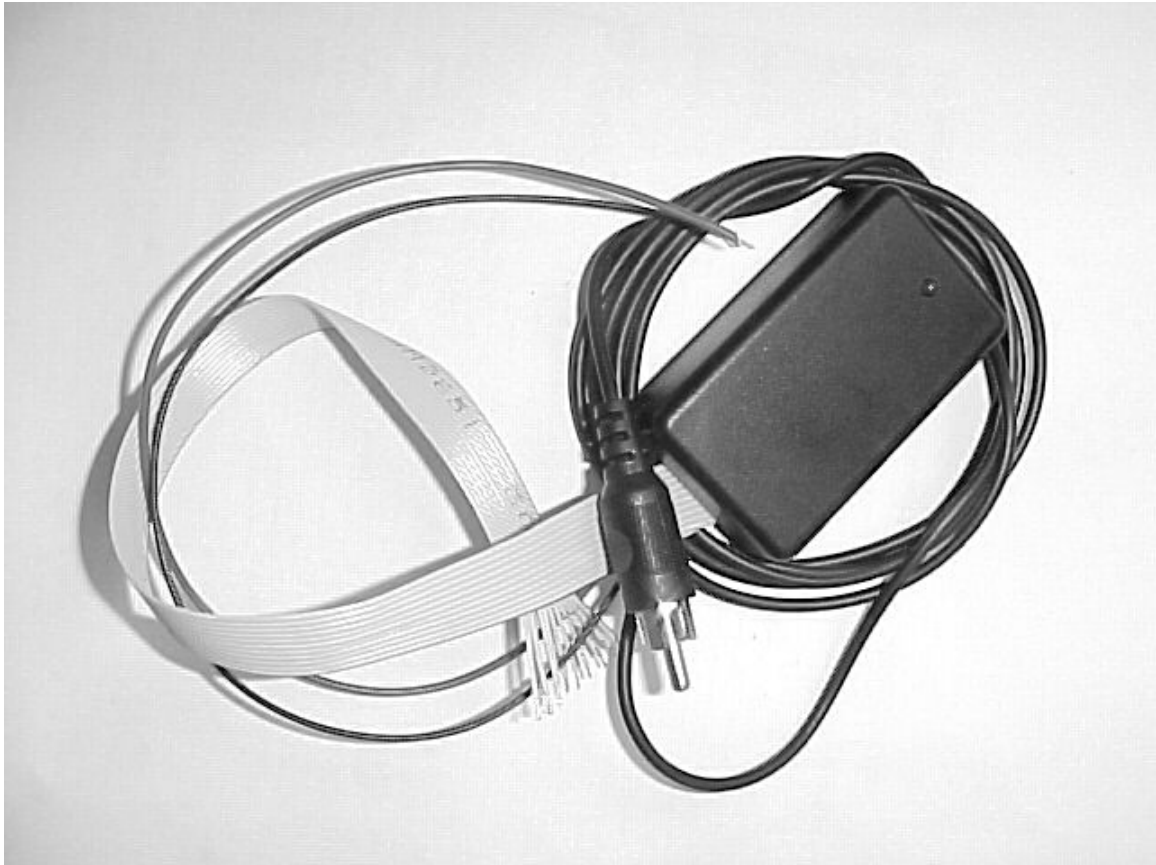# MGL Avionics

Serial to parallel Gillham code converter for Smart Single encoding altimeter ALT-2
CNV-ALT2

The CNV-ALT2 converter accepts the RS232 output of a ALT-2 encoding altimeter and converts the serial altitude information to Gillham code in a format compatible with mode-C transponders.

Installation

Installation of the CNV-ALT2 unit is quite simple. Follow these steps:

Connect the black and red wires to a suitable on-board power source. The voltage may be in the range from 7 to 30 volts DC. Connect the red wire to the positive supply (+) and the black wire to the negative supply (-). You can connect the two wires directly to the power supply terminals of the ALT-2/ALT-4 or XTreme EFIS.

The red LED on the CNV-ALT2 should be flashing rapidly or should be steady on.

Connect the serial cable to the RS232 output connector of the ALT-2/ALT-4 or XTreme EFIS.

Select the protocol in the setup menu of the ALT-2/ALT-4 or XTreme EFIS. The protocol required is the "MGL" protocol. The CNV-ALT2 will not operate with any other protocol selection.

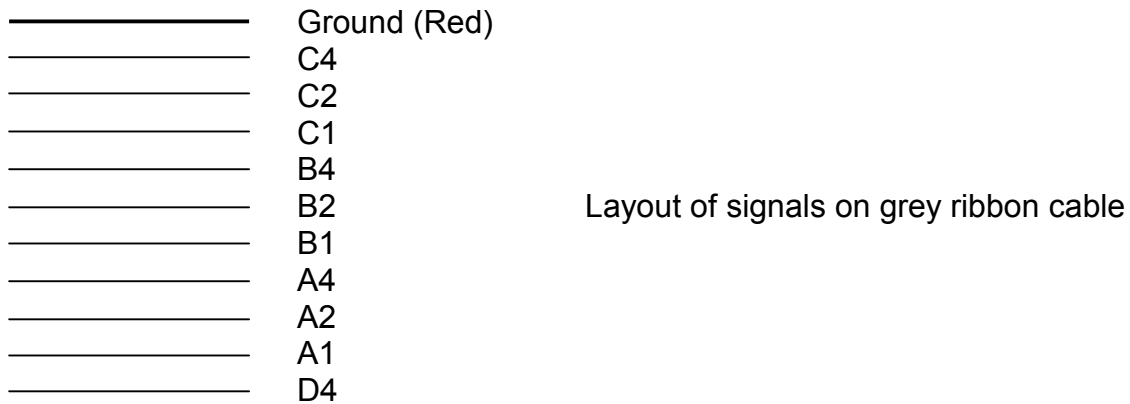With the correct protocol selected, the led on the CNV-ALT2 should flash once per second. If you have achieved this, you can move onto the installation of the parallel output to the transponder.

The connection to the transponder consists of 10 or 11 connections, many transponders accept only codes A1 to C4, in this case you will leave signal D4 unconnected.

Here is a typical wiring diagram, in this case the T2000 from Microair.
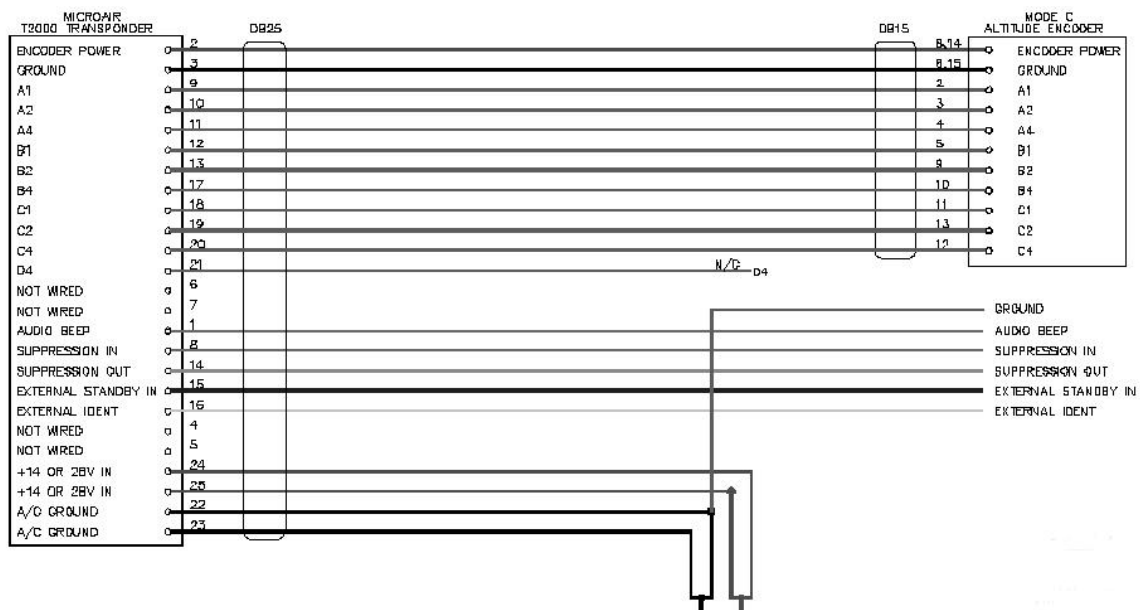
The Gillham code signals are on the grey flat ribbon cable. Note that one side on the cable is marked with a red line. This first connection is the ground connection which in the case of the T2000 is to be wired to pin 3 of the DB25 connector. The wire next to the red one is signal C4 followed by C2, C1, B4, B2, B1, A4, A2, A1 and finally D4.

────────────	Ground (Red)
────────────	C4
────────────	C2
────────────	C1
────────────	B4
────────────	B2
────────────	B1
────────────	A4
────────────	A2
────────────	A1
────────────	D4

Layout of signals on grey ribbon cable

Operation:

The CNV-ALT2 decoder will produce Gillham codes for any altitude that the ALT-2 unit can measure. Negative altitudes will be forwarded as zero feet altitude to prevent problems with older transponders that may not correctly transmit negative altitudes. The ALT-3 altimeter will measure altitudes typically to around 42000 ft, however, this requires a transponder that uses signal D4. Transponders that do not have D4 can only transmit altitudes up to 35000 ft.

The CNV-ALT2 produces inverted Gillham codes as required by virtually all transponders. The outputs are open collector types and will sink currents up to 0.5A but this is not recommended in praxis. Typical sink currents with transponders are only a few mA at the most.

LED states:

Off – no power or unit is faulty.
Steady on – unit is receiving a signal but cannot verify any valid data. This state may also be shown if the serial connector is disconnected.
Fast Flash – No data received. ALT-2 may be switched off or does not transmit.
One second Flash – Unit is receiving correct data and is producing codes.

Following is a table of commonly used transponders and their Gillham code connections.
Please consult your transponders installation manual on the physical position of every contact. Ensure that you wire the Gillham codes correctly and securely.

Function	Bendix TPR2060	Bendix TR641A/B	Cessna RT359T, RT459A, RT859A	Garmin GTX300 Series	Honeywell KT70/71 (Connector JKT701)	Honeywell KT76A/78A	Honeywell KXP	Narco AT50/A, AT150	Narco AT5, AT6/A	UPSAT SL70	Wilcox 1014A
D4	No Connection	N	10	18	8	No Connection	V	No Connection	No Connection	35	C
A1	4	A	14	3	M	M	G	7	2	13	k
A2	6	B	13	5	K	K	H	6	4	31	c
A4	8	C	15	6	J	J	J	8	8	12	W
B1	9	D	19	9	E	E	K	12	9	33	T
Strobe/Enable	Aircraft Ground	Aircraft Ground	11	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	5	12	Aircraft Ground	Aircraft Ground
Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground
Aircraft Power	Note 1	Note 1	9 or per Note 1	Note 1	Note 1	Note 1	Note 1	18 or per Note 1	13 or per Note 1	Note 1	Note 1
B2	10	E	17	11	C	C	L	10	10	14	L
B4	11	F	16	12	B	B	M	9	11	32	D
C1	3	H	21	10	D	D	P	14	1	16	P
C4	7	K	20	7	H	H	S	13	5	15	Z
C2	5	J	18	4	L	L	R	11	3	34	f
Aircraft Power	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground	Aircraft Ground

Codes in case of failed source:

Should the CNV-ALT2 not receive any valid altitude data, the unit will switch all output drivers off. This is the same state as if the unit is not connected to the transponder or if the CNV-ALT2 is not operating due to not having been switched on.

Technical specifications:

Absolute maximum ratings:
Supply voltage: 35V
Maximum current per output: 500mA
Maximum current all outputs: 1A
Maximum voltage output off state: 50V
Output "on" maximum voltage: 0.7V
Input: Serial, asynchronous. RS232. MGL protocol, ALT-2 encoder.
Output type: Open collector using darlington bipolar transistors.

Important information:

Depending on laws and regulations in your country you may not be allowed to install a transponder and associated equipment yourself. This work may have to be done by a certified AMO or instrument technician.
Please check with your relevant authorities.
The ALT-2 encoding altimeter and the CNV-ALT2 are uncertified equipment and may normally only be used in uncertified aircraft, homebuilt aircraft and microlights (ultralights). Special operations permits for other aircraft may be required.

Please be very aware that any wiring mistake related to the application of Gillham codes to your transponder will result in incorrect altitudes broadcast by your transponder.
Any installation involving the CNV-ALT2 must be checked by a suitably equipped aircraft instrument maintenance outfit before operation. Failure to do this may be a criminal offence in your country.