1 FE-MM40 System

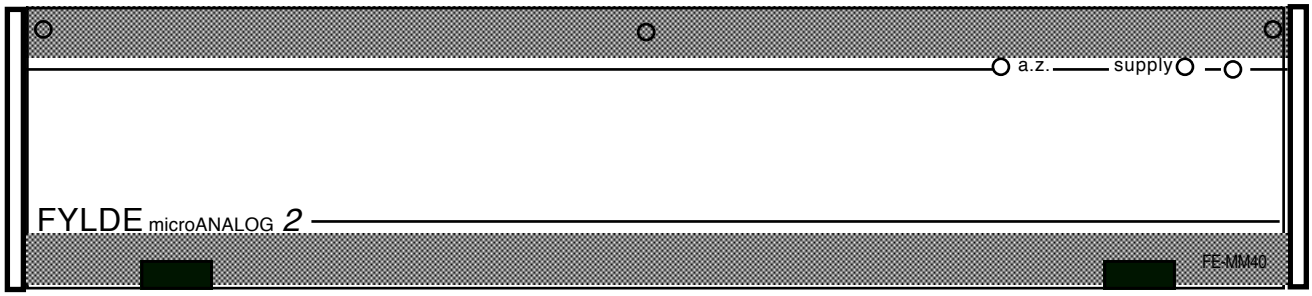
1.1 General Description

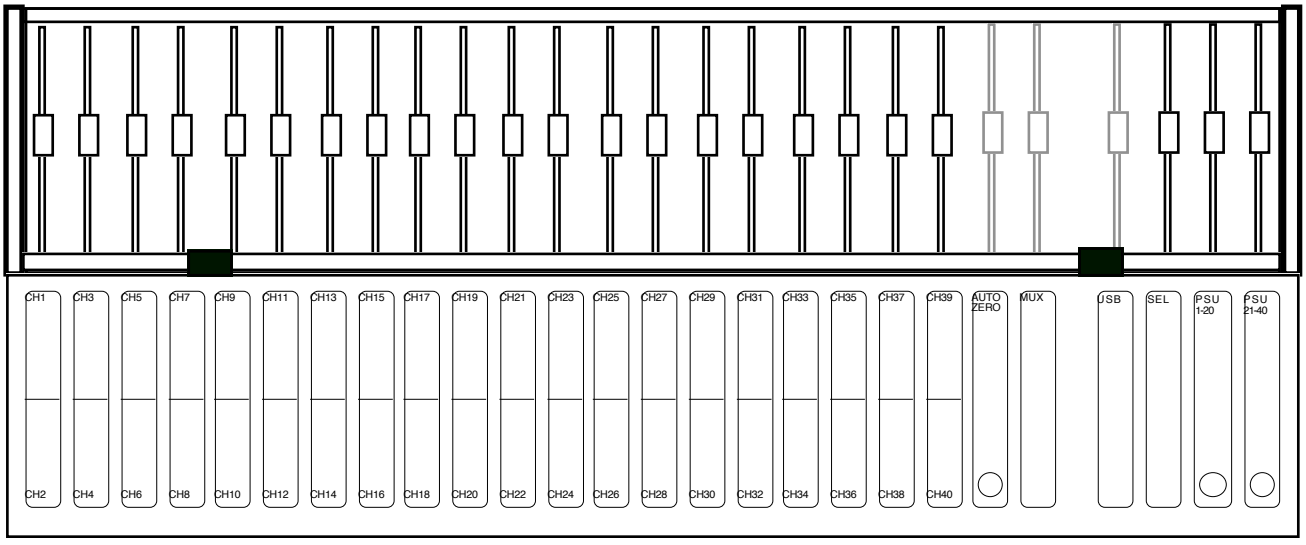
The MM40 is a nominally 40 channel system able to accept up to 20 Micro-Analog dual channel signal conditioning modules. The system is D.C. powered at any voltage between 10 and 36 V.

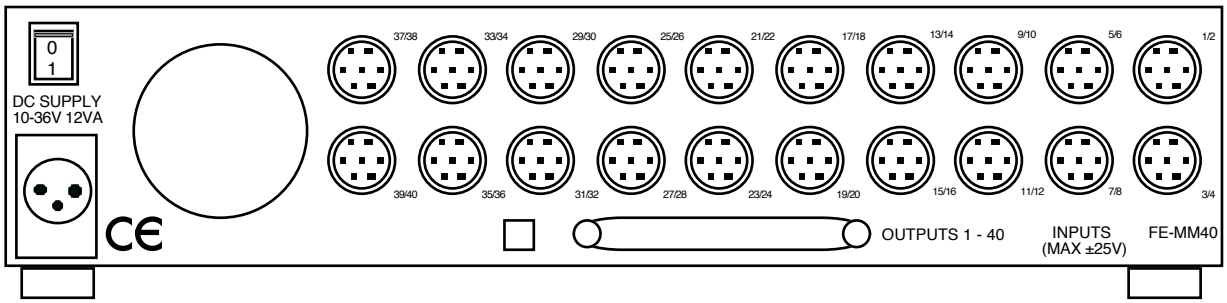
Before using the system for the first time it is necessary to follow the information provided in this manual regarding configuration and operation of the signal conditioning modules and the connection of transducers or other signal sources to the input connectors.

For access to the modules, the front panel is released by unscrewing the three knurled fastenings.

Be sure to isolate the system from the power source before removing or replacing any module. Modules are withdrawn from the racking by means of the centre mounted handles. The signal conditioning modules may be interchanged in any of the left hand 10 card positions and a power supply module always occupies the second slot from the right. In systems with more than 20 channels, a second power supply module is fitted in the right hand slot. With the second power supply fitted, the left hand 20 slots may be used for signal conditioning modules.







Inside the front panel is an ident guide. This surface may be labelled as required by the user with notes of individual channel information such as gain setting etc.

1.2 Power Supply FE-810-BPSDC

The FE-810-BPSDC power supply is fitted in “DC Micro-analog 2” systems to energise a number of transducers from a stable low noise source, and to provide stable power to the amplifier modules. In the FE-MM40 one FE-810-BPSDC is fitted to supply the channels 1 to 20 and a second supply is fitted to supply channel 21 to 40. Systems supplied with 10 or fewer signal conditioning cards will have only one FE-810-BPSDC fitted. The FE-810-BPSDC for channels 1 to 20 must always be fitted since it also supplies the multiplexer / USB modules and Auto Zero modules.

The FE-810-BPSDC has two transducer supply outputs, one being the +5.00 V/+2.50 V capable of up to 800 mA, and the other a +10.00 V supply capable of up to 600 mA.

Note that although the supply is designated +5 V/+2.5 V , 0 V and -5 V on the backplane, this is intended to show that the +10.00 V supply is balanced rather than to imply that an independent -5 V transducer supply is available. Using the -5 V supply independently of the +5 V supply is not recommended.

The selection of +5 V or +2.5 V is by use of a jumper (J2) which is situated at the rear of the power supply module. The jumper in its upper position selects +5 V, and in its lower position selects +2.5 V. (See user drawing appended to this section of the handbook).

A feature of this module is its overload protection. When the power supply module’s DC/DC converter detects that the current being drawn exceeds the specified maximum, the output power is switched off. The module continuously attempts to restart the output, but it will only restart if the current drawn is not excessive. When the output current is within specification the green indicator is illuminated continuously, and while the overload is present the indicator flashes. The module operates in this way with the jumpers in the factory set position.

In general the overload protection is useful, since most faults will be indicated and can be traced without difficulty. For example, a short circuit can easily be traced by withdrawing modules one at a time (with the power off of course), and then switching on to see if the fault persists.

It should be recognised that the overload protection will remove the power from every transducer in the event of an overload anywhere in the transducer amplifier system. This should be borne in mind if vital measurements in a multichannel system are jeopardised by a single wiring failure.

To solve this potential problem modules have positions for fuses which can be fitted to allow uninterrupted operation in the presence of individual channel faults. (Standard modules have links in these positions; fuses are an option.)

Fine controls are provided to adjust the output voltages. This facility may be utilised to allow for volt drops which can occur in long input cables. Note that the power supply will have been set to exactly 5 V, 2.5 V and 10 V at the factory and in practice the user may wish to leave these controls undisturbed.

1.3 Output Connections

The output connections are on a 50 way socket.

FYLDE offer a BNC expander box to fit these connectors (Type FE-MAC-40C) - Additionally, each FE-MAC-40C carries a connector for Digital control lines for Calibration and Auto Zero (see “Notes”'.

Pin	Signal	Description
1	Output 1	A nominally ±10 V output from channel 'a' of card 1
2	Output 2	A nominally ±10 V output from channel 'b' of card 1
3	Output 3	A nominally ±10 V output from channel 'a' of card 2
4	Output 4	A nominally ±10 V output from channel 'b' of card 2
5	Output 5	A nominally ±10 V output from channel 'a' of card 3
6	Output 6	A nominally ±10 V output from channel 'b' of card 3
7	Output 7	A nominally ±10 V output from channel 'a' of card 4
8	Output 8	A nominally ±10 V output from channel 'b' of card 4
9	Output 9	A nominally ±10 V output from channel 'a' of card 5
10	Output 10	A nominally ±10 V output from channel 'b' of card 5
11	Output 11	A nominally ±10 V output from channel 'a' of card 6
12	Output 12	A nominally ±10 V output from channel 'b' of card 6
13	Output 13	A nominally ±10 V output from channel 'a' of card 7
14	Output 14	A nominally ±10 V output from channel 'b' of card 7
15	Output 15	A nominally ±10 V output from channel 'a' of card 8
16	Output 16	A nominally ±10 V output from channel 'b' of card 8
17	Output 17	A nominally ±10 V output from channel 'a' of card 9
18	Output 18	A nominally ±10 V output from channel 'b' of card 9
19	Output 19	A nominally ±10 V output from channel 'a' of card 10
20	Output 20	A nominally ±10 V output from channel 'b' of card 10
21	Output 21	A nominally ±10 V output from channel 'a' of card 11
22	Output 22	A nominally ±10 V output from channel 'b' of card 11
23	Output 23	A nominally ±10 V output from channel 'a' of card 12
24	Output 24	A nominally ±10 V output from channel 'b' of card 12
25	Output 25	A nominally ±10 V output from channel 'a' of card 13
26	Output 26	A nominally ±10 V output from channel 'b' of card 13
27	Output 27	A nominally ±10 V output from channel 'a' of card 14
28	Output 28	A nominally ±10 V output from channel 'b' of card 14
29	Output 29	A nominally ±10 V output from channel 'a' of card 15
30	Output 30	A nominally ±10 V output from channel 'b' of card 15
31	Output 31	A nominally ±10 V output from channel 'a' of card 16
32	Output 32	A nominally ±10 V output from channel 'b' of card 16
33	Output 33	A nominally ±10 V output from channel 'a' of card 17
34	Output 34	A nominally ±10 V output from channel 'b' of card 17
35	Output 35	A nominally ±10 V output from channel 'a' of card 18
36	Output 36	A nominally ±10 V output from channel 'b' of card 18
37	Output 37	A nominally ±10 V output from channel 'a' of card 19
38	Output 38	A nominally ±10 V output from channel 'b' of card 19
39	Output 39	A nominally ±10 V output from channel 'a' of card 20
40	Output 40	A nominally ±10 V output from channel 'b' of card 20
41	Digital Input 0	TTL compatible opto-isolated digital input
42	Digital Input 1	TTL compatible opto-isolated digital input
43	Digital Input 2	TTL compatible opto-isolated digital input
44	Digital Input 3	TTL compatible opto-isolated digital input
45	Digital Output 0	Internally connected to Auto Zero. Do not use if FE-366-AZ fitted
46	Digital Output 1	Internally connected to Shunt Cal(odd). Do not use if FE-366-TA fitted
47	Digital Output 2	Internally connected to Shunt Cal(even). Do not use if FE-366-TA fitted
48	Digital Output 3	Open collector digital output.
49	Analogue 0 V	Common for analogue outputs 1 to 40
50	Digital 0V	Internally connected to analogue 0V by selector module (3rd from right)

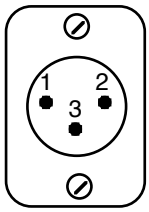
Notes :
All analogue outputs may be used as single ended ±10V analogue inputs if no signal conditioning module is fitted in the associated card slot.

There are 4 digital outputs in total. In systems with FE-366-TA modules, two of these outputs (1 and 2) are connected internally to the shunt calibration controls of the FE-366-TA modules. In systems with an FE-366-AZ auto-zero module, the output 0 is connected internally to the auto-zero control of the FE-366-AZ module. These internally connected outputs are pulled up to the internal +12 V by resistors fitted to the 'SEL' module. (This is the third module from the right.) The 'SEL' module also links digital 0V to analogue 0V.

If no USB interface is fitted, pins 45,46,47 with pin 50 as common may be used to remotely control shunt calibration or auto-zero by applying an external +5V signal.

1.4 Power Connections

The Power input connector is a 3 pin XCON plug with latching mechanism.



1. +V
2. 0V
3. N.C.

Power requirement is 10V to 36V DC at 12VA typical (24 VA max). A low noise mains adaptor is available as an optional extra.

1.5 USB Modules

There are a pair of modules interlinked by a thin ribbon cable which together comprise the FE-357-USBM module set. These modules should not be removed and there are no user controls or jumpers on these modules. A third 'SEL' module provides internal pull ups for the USB digital outputs which control the shunt calibration and auto-zero and is used when either FE-366-AZ or FE-366-TA (or both) are in use and controlled via USB. (The 'SEL' module is not required if you don't have FE-366-AZ or FE-366-TA modules fitted). If the 'SEL' module is not fitted, the USB digital inputs and outputs are fully isolated. (Outputs are open collector from opto-isolator outputs, and inputs are opto-isolator inputs in series with 2.2 kohm resistors).

If you have purchased the modules as an upgrade to an existing system, carefully connect the two modules together using the ribbon provided before inserting them into the appropriate slots. Ensure that power is off and the USB cable is disconnected before inserting the modules. Insert the 'SEL' module in the third slot from the right. (The inside of the front panel shows where modules should be located).

1.5.1 Using the USB interface

The disc in the front of your handbook contains a software which allows the USB device to be used by software in your computer. The USB device is plug and play, so it only needs to be plugged into your computer and the device drivers will automatically install. There is documentation on the disc is in the form of Windows help files which can be used to assist with installation and use of the USB device.

1.5.2 FE-810-SEL Module

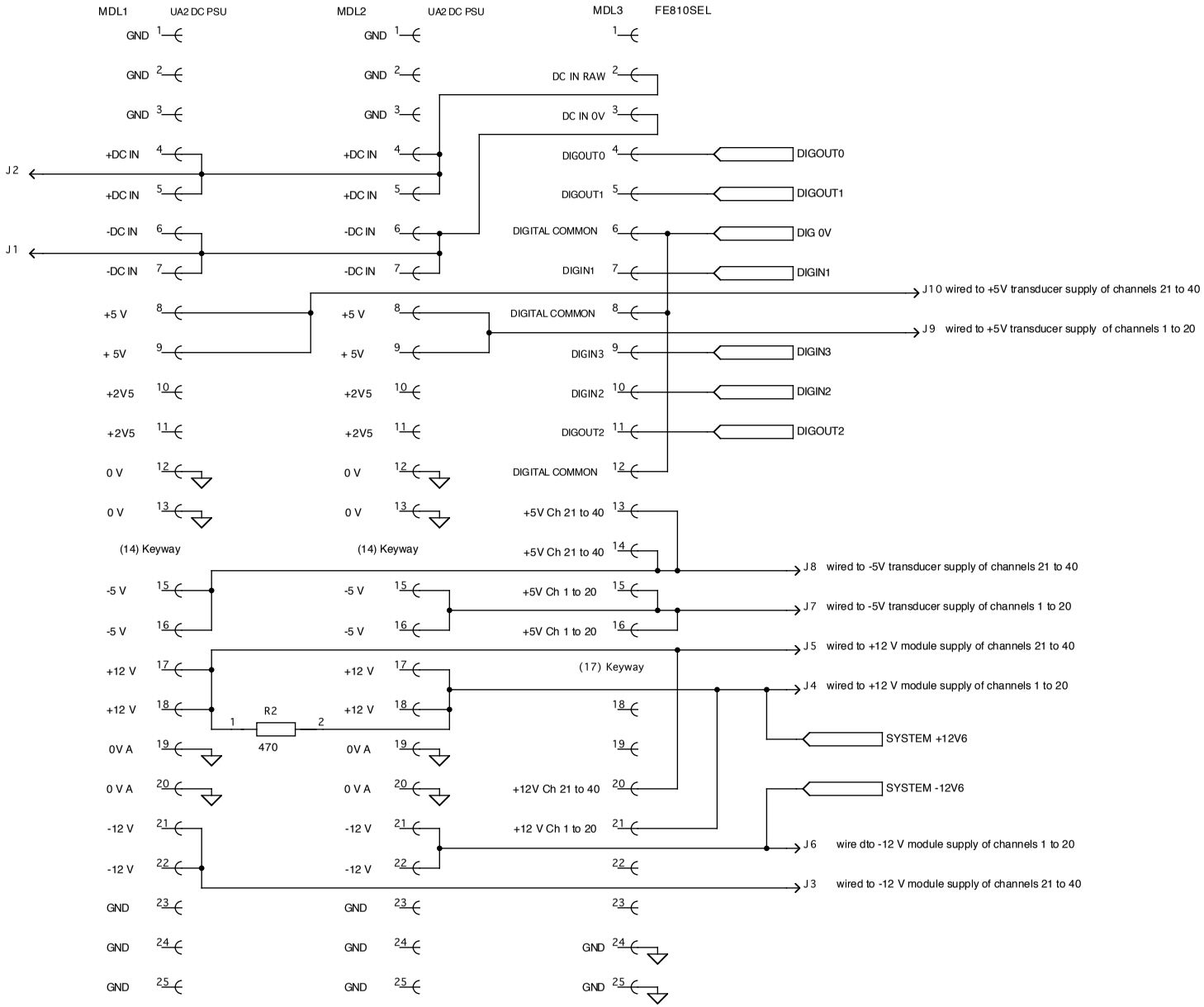
The 'SEL' module has front edge switches which are set in the 'up' position when the system is operated with a USB connection to a host computer. In the 'up' position the USB has control of the digital signals for Auto Zero and Shunt Calibration. The green LEDs indicate the state of the signals and are ON when the digital signals are inactive. They are turned OFF when AZ or Cal is selected. Note that the AZ push button is still operational when using USB.

When turning off the system, if it is important to prevent an unwanted AZ cycle, for example if the existing AZ condition must be stored until next use, the USB should NOT be disconnected until the system has been turned off at the rear panel switch.

Without a USB connection, the 'SEL' card switches must be set 'down' to make the digital signals inactive (LEDs ON).
The top switch must remain down for correct operation of AZ. Use the pushbutton to activate an AZ cycle.
Set the centre switch 'up' to activate Shunt Calibration of channels 1, 3, 5 etc. Return to the 'down' position after use.
Set the bottom switch 'up' to activate Shunt Calibration of channels 2, 4, 6 etc. Return to the 'down' position after use.
LEDs will be OFF for Shunt Calibration active.

Appendix

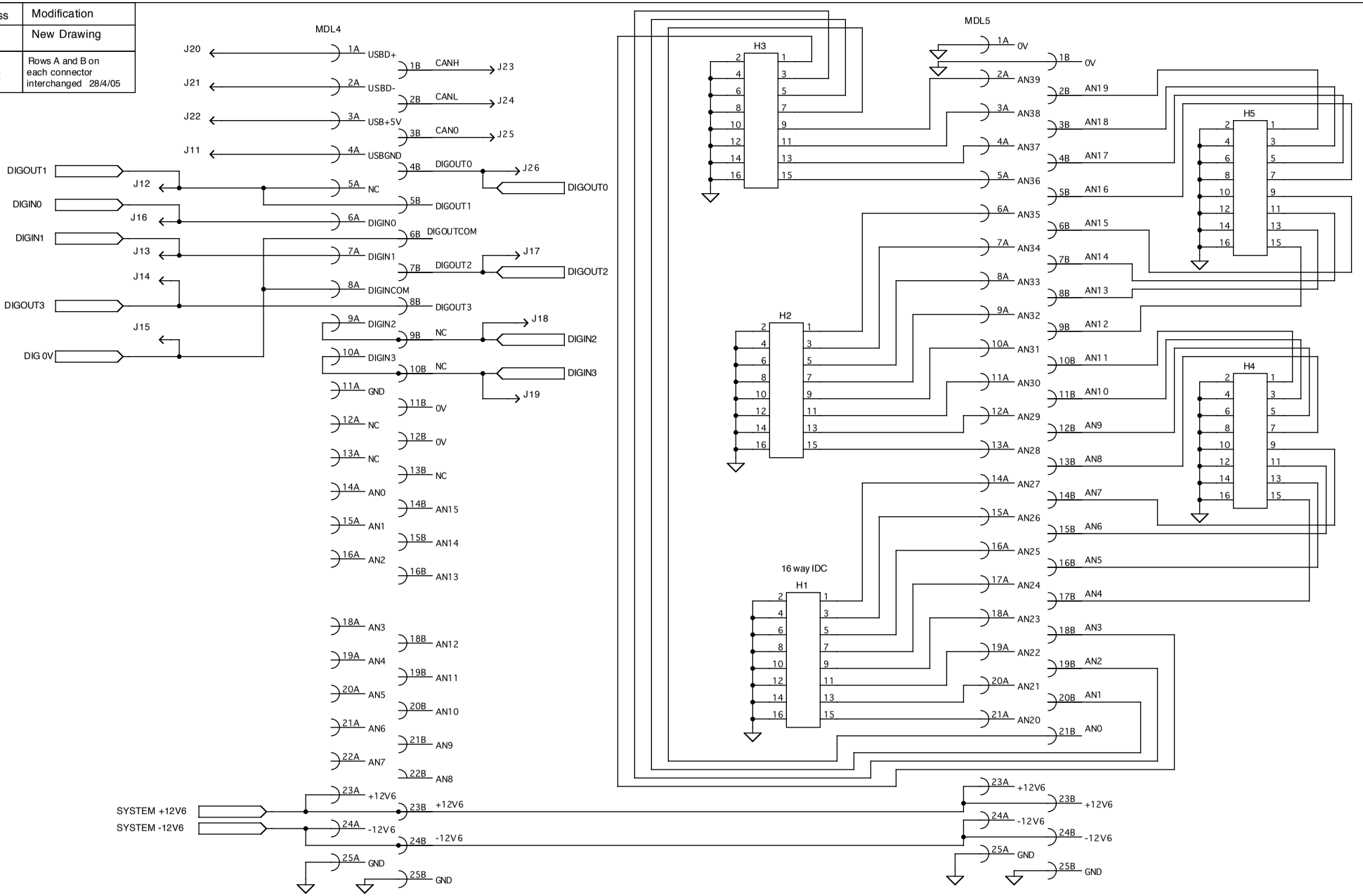
Iss	Modification
1	New Drawing
2	Desciption of pins on FE810SEL were w.w.r. for Ch 1 to 20 and 21 to 40 6/9/06



FE-MM40 USB Backplane , USB Edge Connector	Ref	Dwg No. 1401C	Issue 2	Date 6/9/06	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

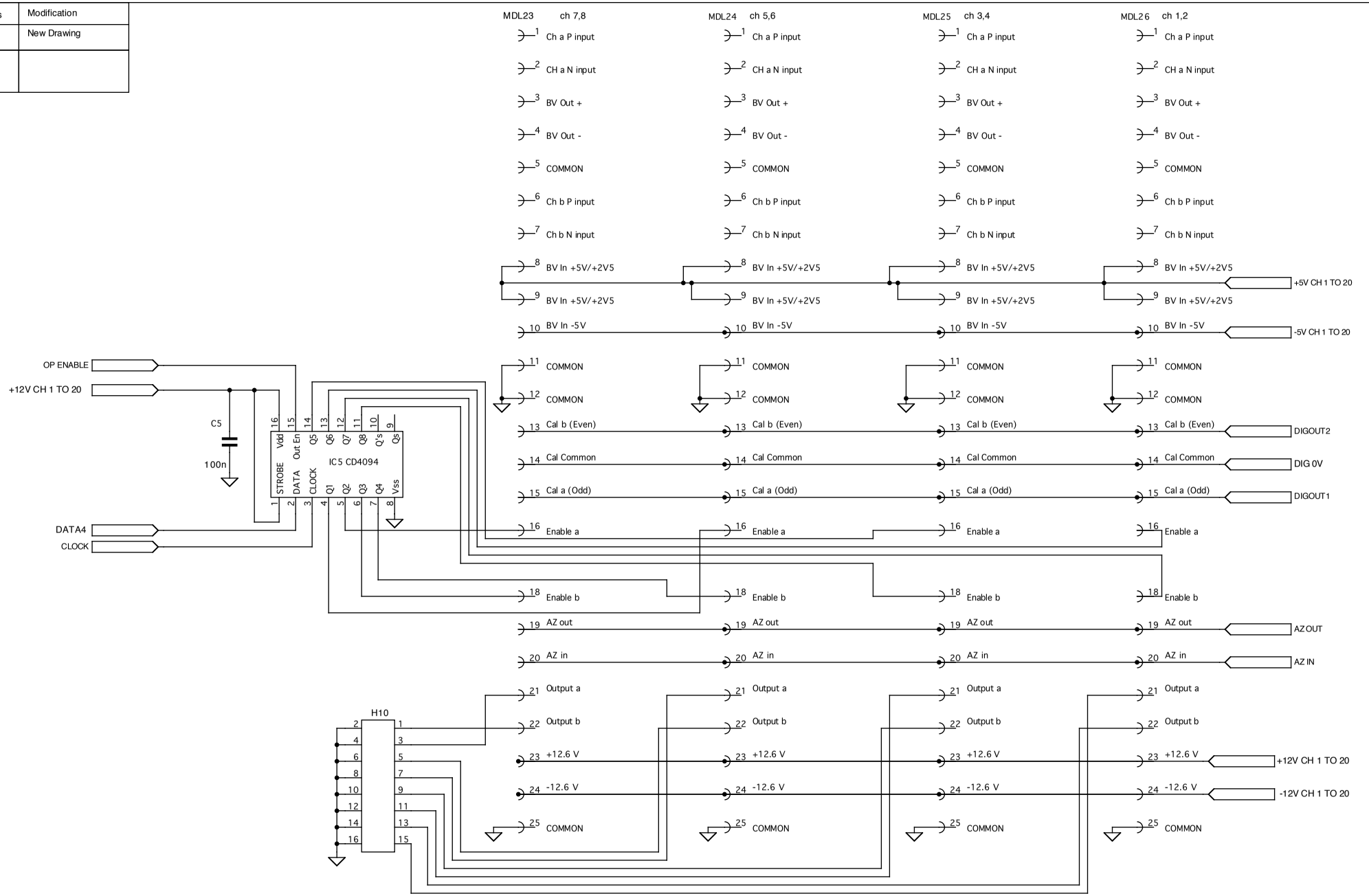
Iss	Modification
1	New Drawing
2	Rows A and B on each connector interchanged 28/4/05



FE-MM40 USB Backplane , USB and Mux modules	Ref	Dwg No. 1402C	Issue 2	Date 28/4/05	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

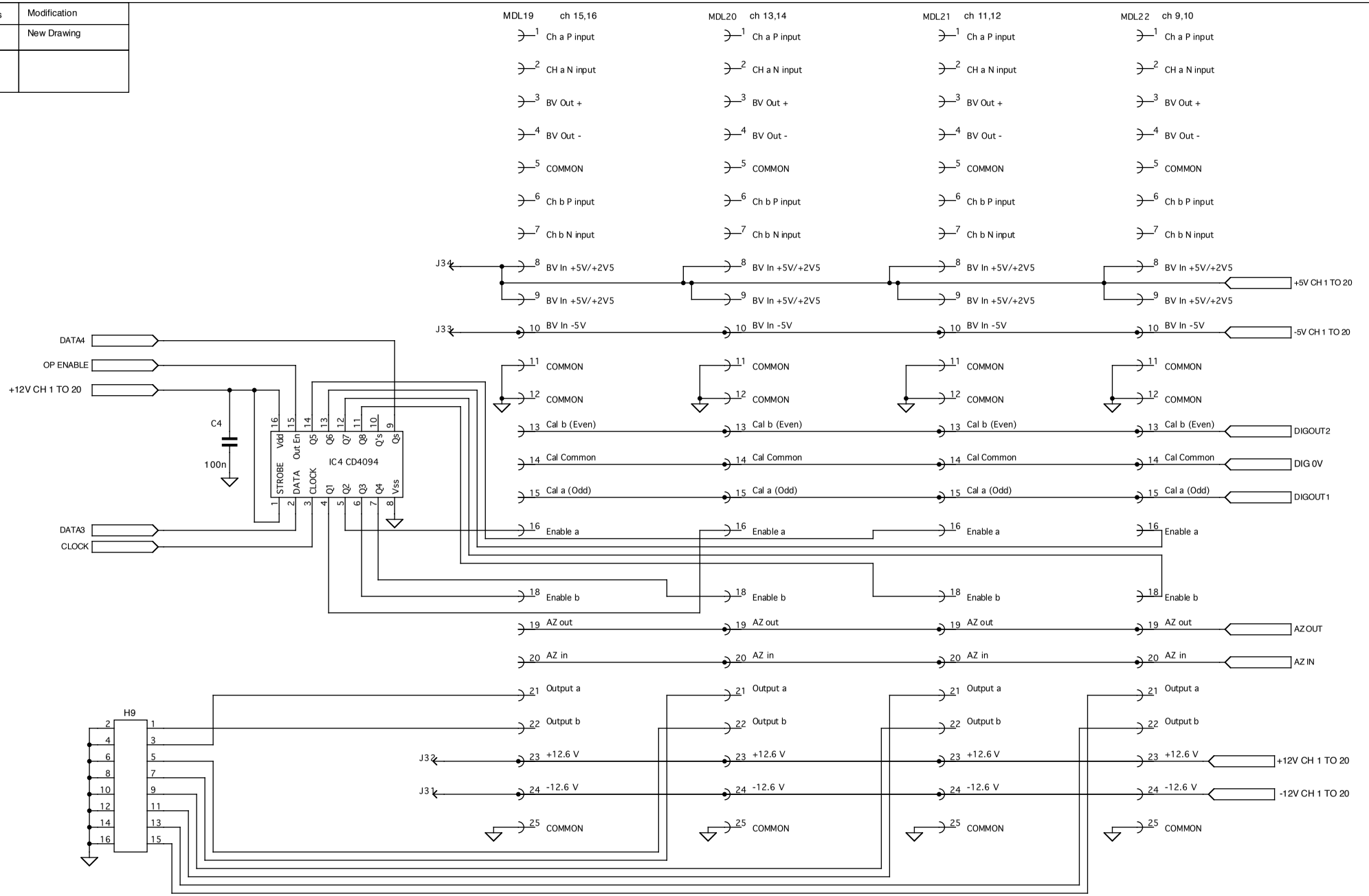
Iss	Modification
1	New Drawing



FE-MM40 USB Backplane Chs 1 to 8	Ref	Dwg No. 1407C	Issue 1	Date 31/3/05	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

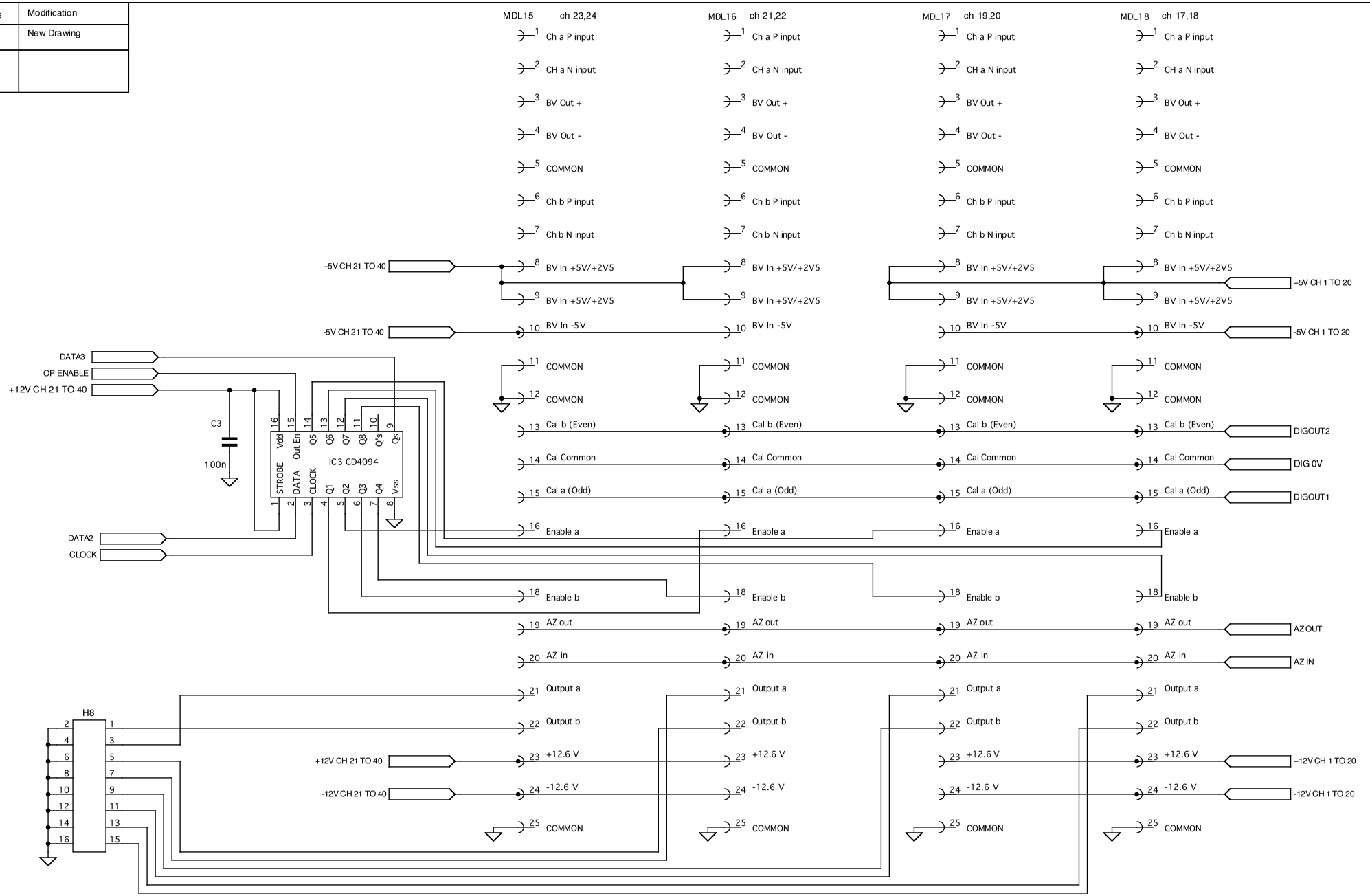
Iss	Modification
1	New Drawing



FE-MM40 USB Backplane Chs 9 to 16	Ref	Dwg No. 1406C	Issue 1	Date 31/3/05	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

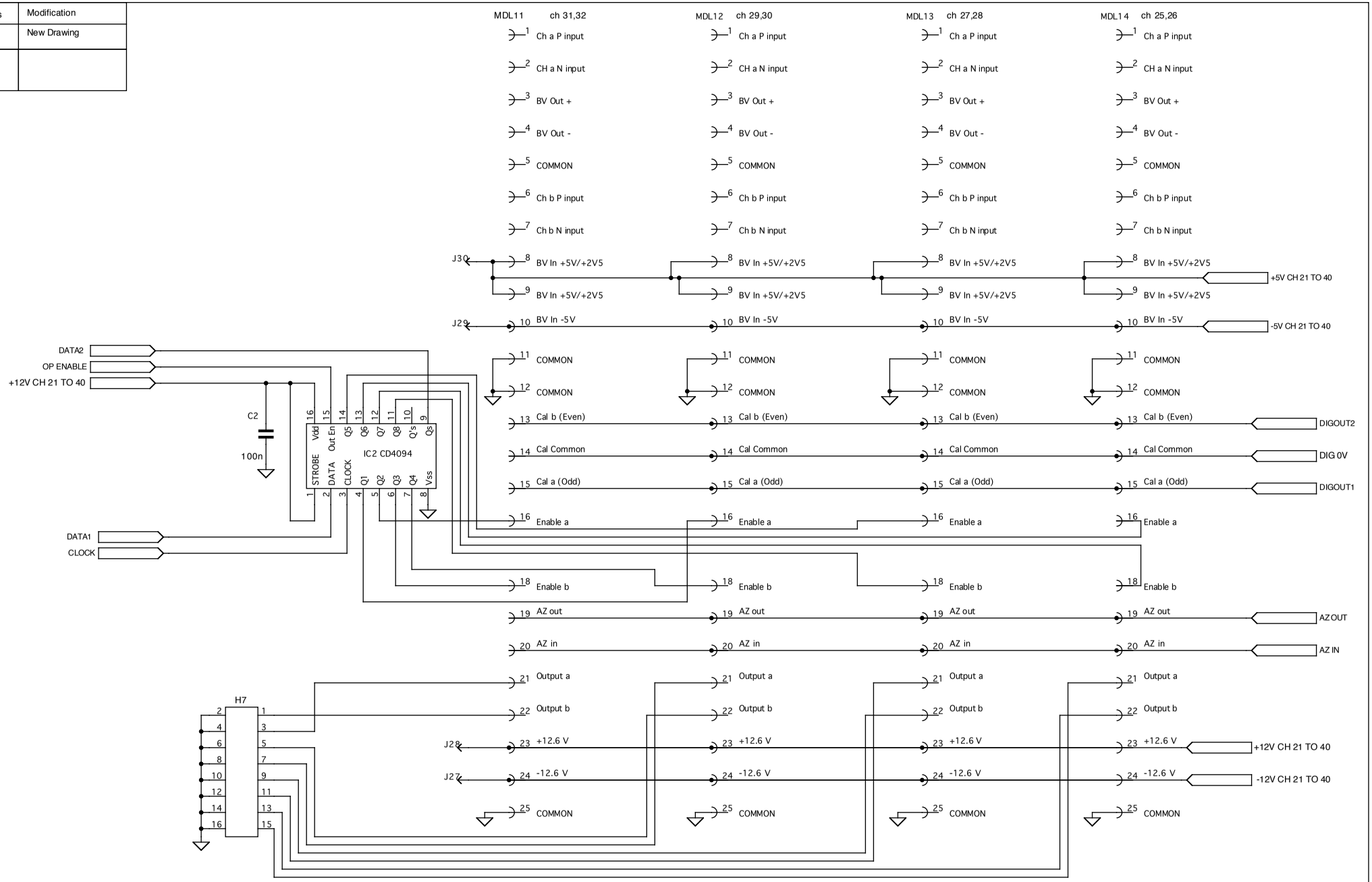
Iss	Modification
1	New Drawing



FE-MM40 USB Backplane Chs 17 to 24	Ref	Dwg No. 1405C	Issue 1	Date 31/3/05	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

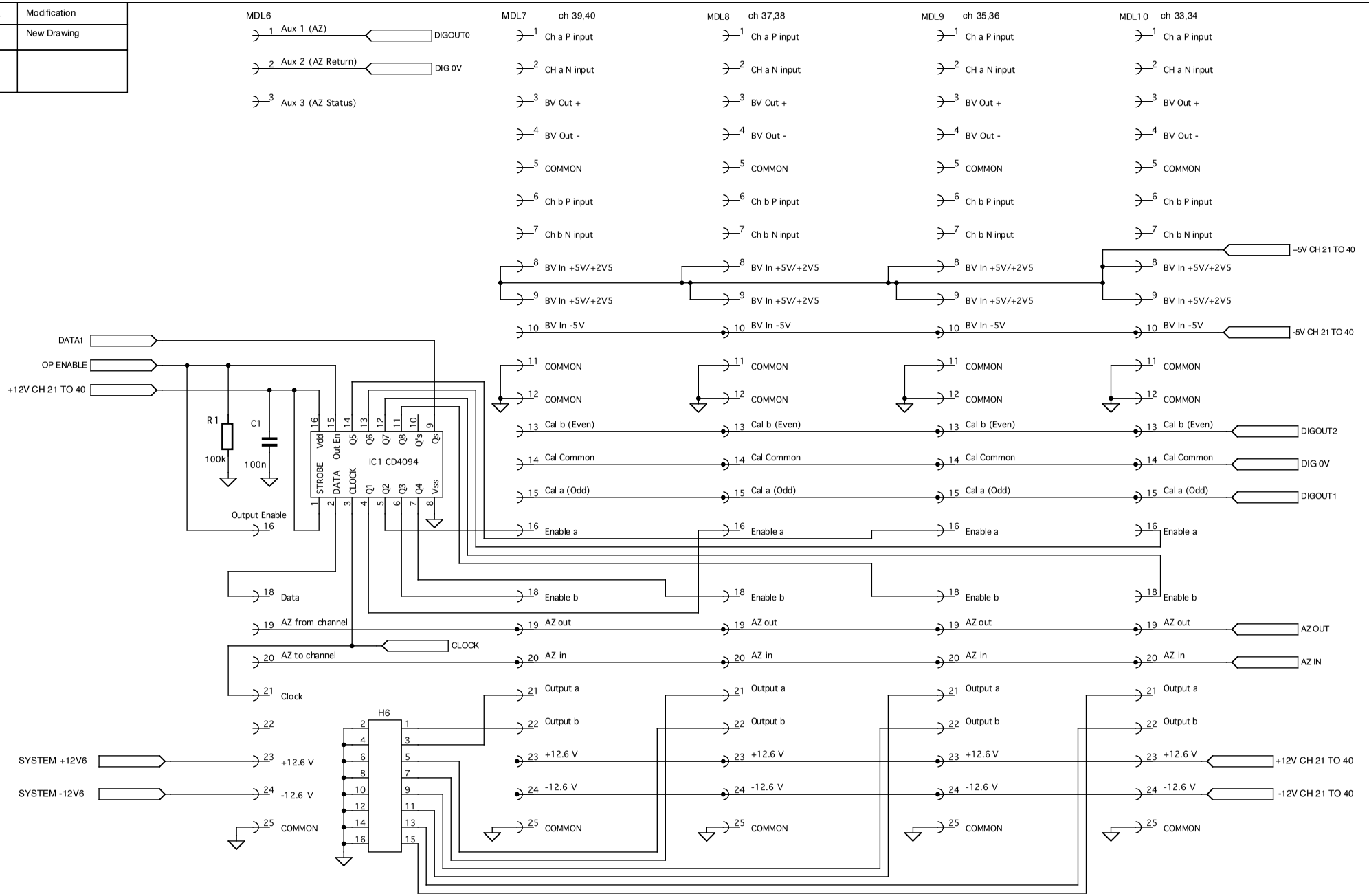
Iss	Modification
1	New Drawing



FE-MM40 USB Backplane Channels 25 to 32	Ref	Dwg No. 1404C	Issue 1	Date 31/3/05	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

Iss	Modification
1	New Drawing



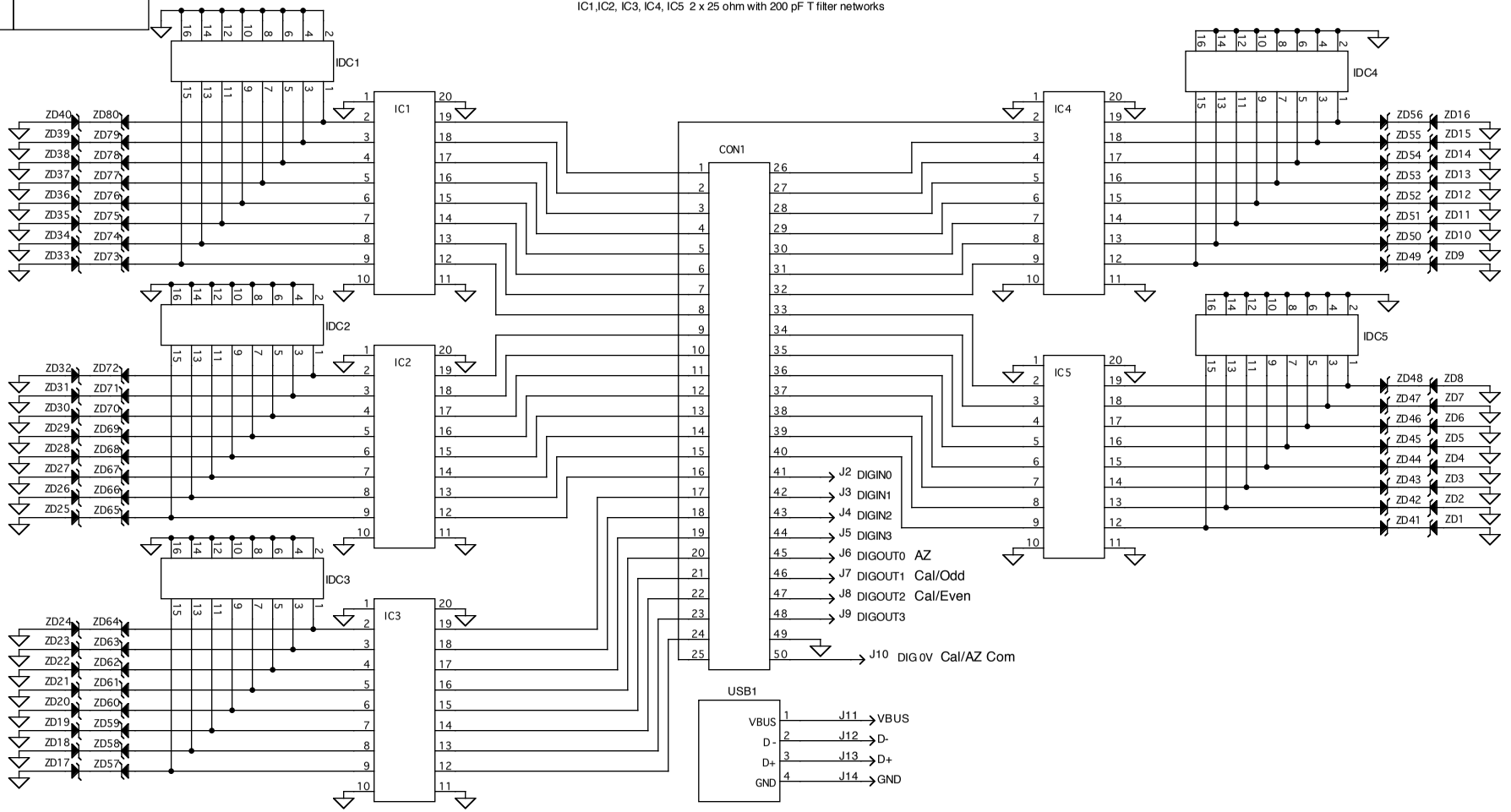
FE-MM40 USB Backplane Chs 33 to 40 and AZ	Ref	Dwg No. 1403C	Issue 1	Date 31/3/05	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

Iss	Modification
1	New Drawing

All zener diodes BZXC55-C12 12V Zener

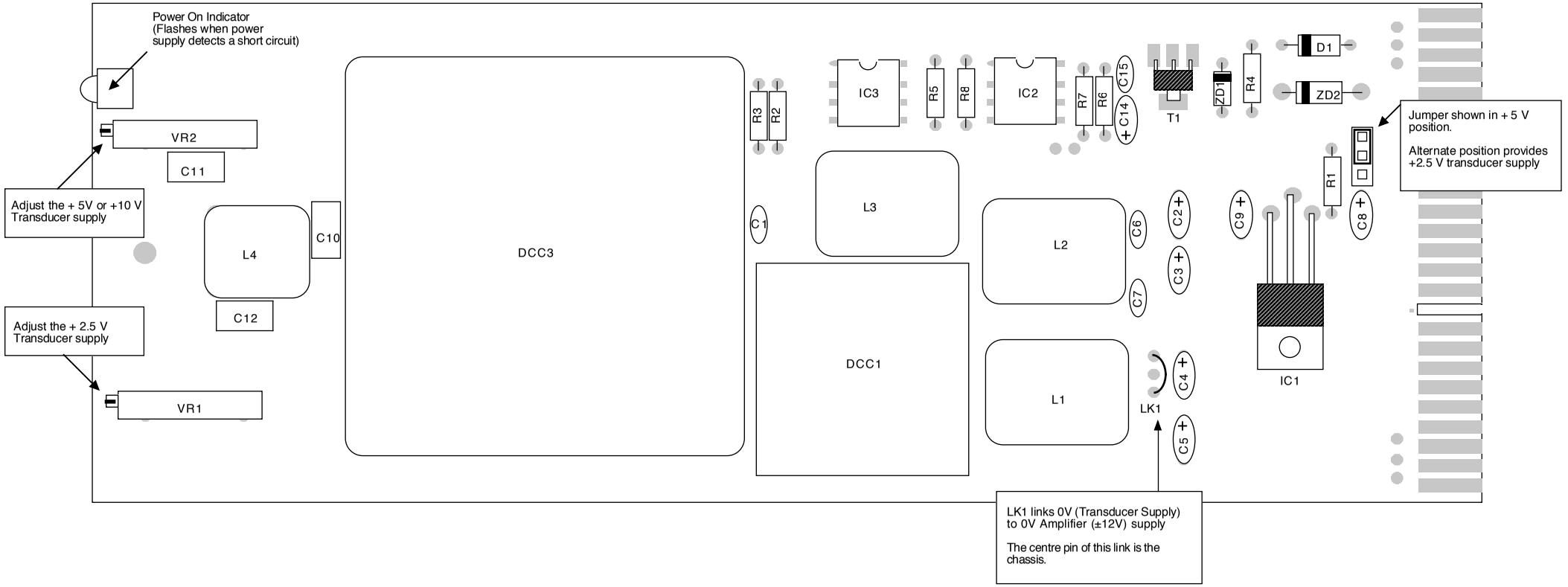
IC1,IC2, IC3, IC4, IC5 2 x 25 ohm with 200 pF T filter networks



FE-MM40 Rear Panel Connector PCB	Ref	Dwg No. 1408C	Issue 1	Date 24/3/05	Checked

FYLDE Electronic Laboratories Ltd. 49-51 Fylde Road Preston, Lancs, PR1 2XQ England. Telephone 01772 257560 Fax 01772 821530, http://www.fylde.com

Iss	Modification
1	New Drawing (10/7/00)
2	See NCR 776 (20/1/10)



FE-810-BPSDC μA2 DC PSU	Ref	Drg No. 898PC	Issue 2	Date 20/1/10	Checked

FYLDE Electronic Laboratories Limited. 49-51 Fylde Road. Preston Lancs. PR1 9LQ England Phone 01772 257560 Fax 01772 821530