

PCB 75043

19.1 Introduction

This PCB contains a noise weighting network corresponding to IEC 651 and BS 5969:1981 standards.

Outputs are provided for A, B, and C weightings. Hardware links allow the customer to choose either one or two of these weightings to be selected by the OPTION A and OPTION B FILTER pushbuttons on the instrument front panel.

Most customers will require only the "A" weighting characteristic. The units are therefore supplied set for "A" weighting for use in either position on the FIL 14 Filter Motherboard Assembly. See below for modification instructions.

The block diagram is shown in Figure 19.1.1 below.

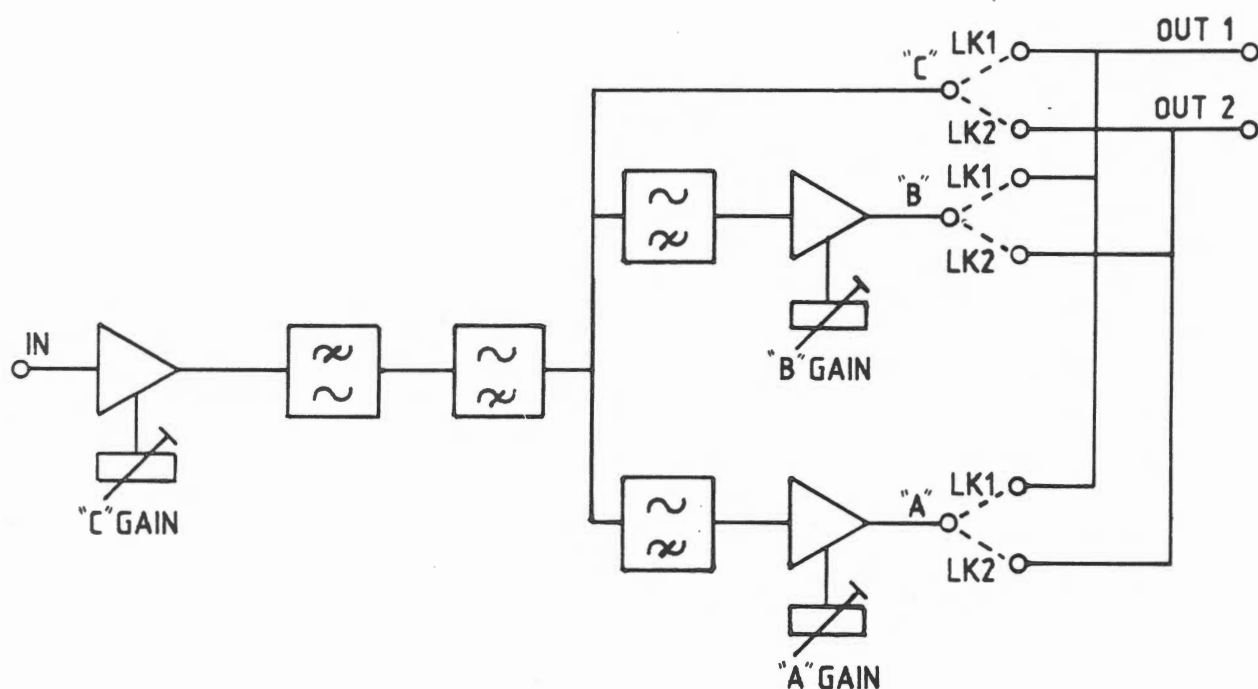


Figure 19.1.1 Block Diagram

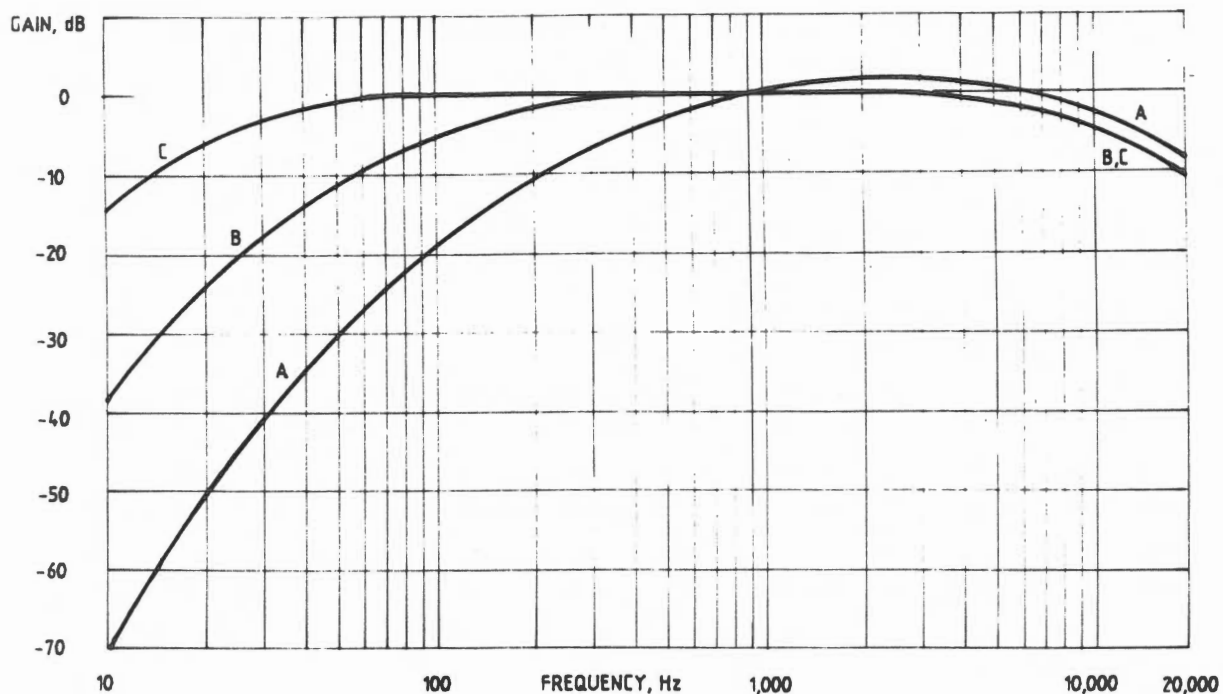


Figure 19.1.2 Frequency Weighting Characteristics

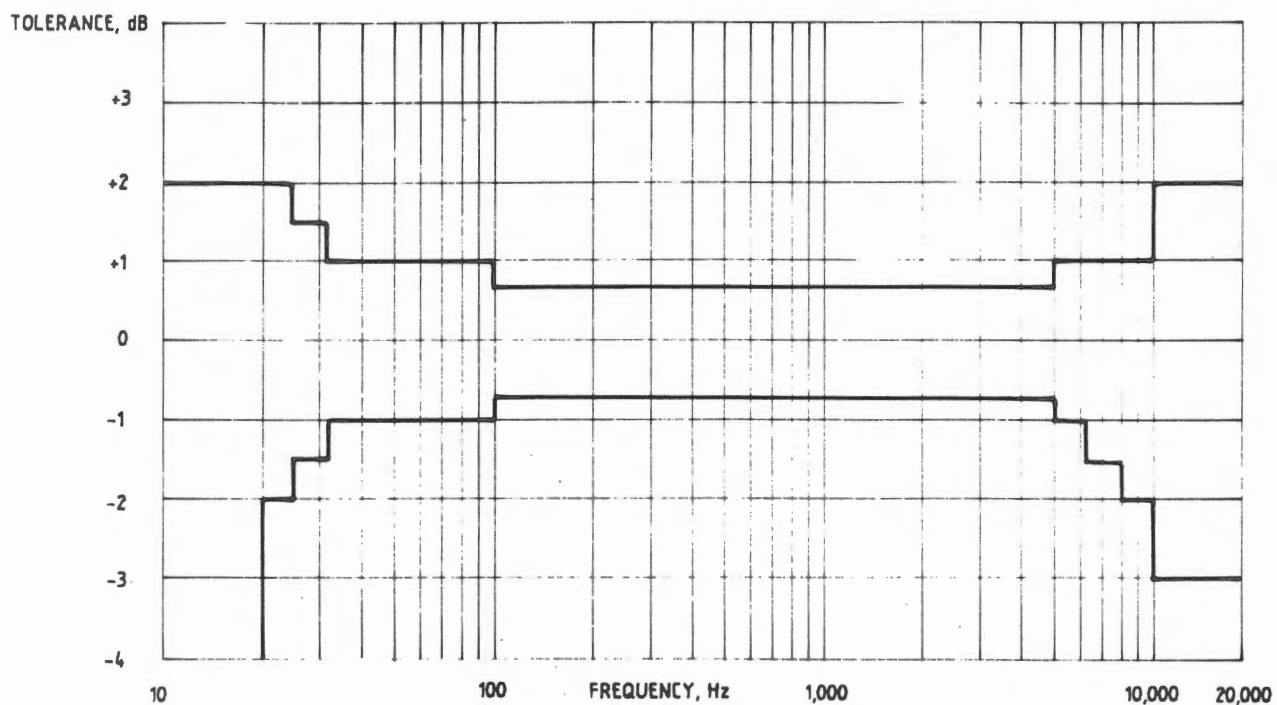


Figure 19.1.3 Tolerances

Frequency, Hz	"A" gain, dB	"B" gain, dB	"C" gain, dB	Tolerance, dB
10	-70.4	-38.2	-14.3	+2; -∞
12.5	-63.4	-33.2	-11.2	+2; -∞
16	-56.7	-28.5	-8.5	+2; -∞
20	-50.5	-24.2	-6.2	±2
25	-44.7	-20.4	-4.4	±1.5
31.5	-39.4	-17.1	-3.0	±1
40	-34.6	-14.2	-2.0	±1
50	-30.2	-11.6	-1.3	±1
63	-26.2	-9.3	-0.8	±1
80	-22.5	-7.4	-0.5	±1
100	-19.1	-5.6	-0.3	±0.7
125	-16.1	-4.2	-0.2	±0.7
160	-13.4	-3.0	-0.1	±0.7
200	-10.9	-2.0	-0.0	±0.7
250	-8.6	-1.3	-0.0	±0.7
315	-6.6	-0.8	-0.0	±0.7
400	-4.8	-0.5	-0.0	±0.7
500	-3.2	-0.3	-0.0	±0.7
630	-1.9	-0.1	-0.0	±0.7
800	-0.8	-0.0	-0.0	±0.7
1000	0	0	0	±0.7
1250	+0.6	-0.0	-0.0	±0.7
1600	+1.0	-0.0	-0.1	±0.7
2000	+1.2	-0.1	-0.2	±0.7
2500	+1.3	-0.2	-0.3	±0.7
3150	+1.2	-0.4	-0.5	±0.7
4000	+1.0	-0.7	-0.8	±0.7
5000	+0.5	-1.2	-1.3	±1
6300	-0.1	-1.9	-2.0	+1; -1.5
8000	-1.1	-2.9	-3.0	+1; -2
10000	-2.5	-4.3	-4.4	+2; -3
12500	-4.3	-6.1	-6.2	+2; -3
16000	-6.6	-8.4	-8.5	+2; -3
20000	-9.3	-11.1	-11.2	+2; -3

Table 19.1.1 Frequency Weighting Characteristics

19.2 Circuit Description

See Section 18, Option Filter Motherboard, for further information.

When the appropriate control line on the filter motherboard is taken high in response to the OPTION FILTER A or B buttons on the MJS401D front panel, the measurement signal is switched through to PL2/1 on the "A,B,C" Filter Sub-board.

19.2.1 Overall and "C" Gain

IC1 provides a high input impedance and gain trim via VR1 to adjust for a 0 dB insertion loss at 1 kHz on the "C" output. VR1 and R1 set the nominal gain to 0 dB and R1 limits the effect of VR1. D1 lessens the effect of common mode input failure under extreme input signal conditions.

19.2.2 "C" Filter

IC2/4 and 2/3 provide the weighting characteristic "C". R2, R3, C5 and C6 form a second order low pass filter with a turnover point of about 7.9 kHz around IC2/4. R4 and 5, C7 and 8 form a second order high pass filter with turnover point at about 31.5 Hz.

The output of IC2/3 is taken to the O/P C terminal, via C9 to the "B" filter section and via C10 to the "A" filter section.

19.2.3 "B" Filter

IC2/2 provides additional filtering to convert the "C" characteristic to the "B" characteristic. C9 and R6 form a passive first order high pass filter with turnover point at about 160 Hz. IC2/2 buffers this filter. The output of IC2/2 is taken to the O/P B terminal.

VR2 and R7 set the nominal gain at 1 kHz to 0 dB.

19.2.4 "A" Filter

IC2/1 provides additional filtering to convert the "C" characteristic to the "A" characteristic. C10 and R8 form a passive first order high pass filter which is cascaded with another first order high pass formed by C11 and R9. IC2/1 buffers these filters. VR3 and R11 set the nominal gain at 1 kHz to 0 dB. The output of IC2/1 is taken to the O/P A terminal.

19.2.5 Filter Selection

The "A,B,C" card is designed to allow the user to choose either one or two weightings to be available under control of the front panel OPTION FILTER A and B buttons. The button labels OPT A and OPT B on the front panel is in no way directly related to the "A and B" weighting designation.

If the A,B,C card is fitted to position "1" on FIL 14 Filter Motherboard then any 2 weightings can be made available. The filter selected on LINK 1 will be controlled by OPT A BUTTON, the filter selected by LINK 2 will be controlled by OPT B BUTTON. Only one filter can be set to LINK 1 and only one to LINK 2. If LINK 2 is in use then no other filter may be fitted to the filter motherboard.

If only one of A,B, or C is required, it should be set on LINK 1. The card may then be installed in either Position 1 or 2 on the motherboard to be activated by OPT A or OPT B respectively.

19.3 Removal/Replacement

The A,B,C filter is fitted to the Option Filter Motherboard. See section 18.

19.4 Fault Finding

Use extender card PCB 75032.

Logic fault finding is covered in section 18.

If the selected weighting characteristic seems out of tolerance perform the following procedure:-

DESELECT ALL OTHER FILTERS EXCEPT THE APPROPRIATE OPTION FILTER.

FIRST CHECK PROPER INSTALLATION OF THE LINKS.

Check the response at IC1 Pin 6. It should be essentially flat. If not check sub-systems upstream from the option filter card.

Check the response at the "C" output. It should conform with Table 19.1.1. If not, suspect R2, R3, C6, C5 or IC2 for an error at the HF end; or R4, R5, C7 or C8 for an error at the LF end. If this filter is correct, continue.

Check the output at "A" or "B" as required for conformity to Table 19.1.1. If there is an error it will be due to the amplifier IC2 or frequency selection components. If no error is found then the fault is downstream from the option filter card.

19.5 Calibration

MJS401D Front Panel Setup

Input	Load	Function	Filters	Rectifier	Scale	Dist'n	Coarse	Fine
A	Off	Level	Off	RMS	dB Exp	---	0	0

Ideally, all three filter characteristics should be calibrated. However, this requires resoldering of links. If it is not envisaged that other characteristics will be used, only those used need be calibrated.

Inject a signal into input A of the MJS401D at exactly 1.00 kHz (use the frequency meter) and exactly 0 dBu (use the dB expanded scale).

Alternately select and deselect the chosen characteristic. If "C" weighting is in use, calibrate it **FIRST**. Adjust the appropriate preset potentiometer for no change in meter reading.

VR1 calibrates "C" weighting, but also affects "B" and "A".

VR2 calibrates "B" weighting.

VR3 calibrates "A" weighting.

19.6 Installation

Requires OPTION FILTER MOTHERBOARD.

Turn off the MJS401D power switch and remove the mains lead.

The "A,B,C" Filter board is provided pre-wired for "A" weighting only on Link 1. This will provide "A" weighting activated by OPTION A when fitted to FIL 14 Motherboard PCB 75046 side 1, or by OPTION B when fitted to FIL 14 Motherboard side 2.

In general any one of "A", "B" or "C" weightings can be used on either OPTION A or OPTION B. However if no other option filter PCB is fitted, this PCB must be fitted in position 1 to be activated by OPTION A button.

If only one weighting is required, fit Link 1 on the "A,B,C" board for the required weighting. Install the sub-board on FIL 14 position 1 to activate by OPTION A button, or in position 2 to activate by OPTION B button. If two option filter PCBs are fitted, cut link 3 on the FIL 14 Motherboard PCB 75046.

If two of the "A,B,C" weighting selections are required, FIL 5 must be fitted to FIL 14 side 1. Then fit Link 1 on the "A,B,C" board for the weighting required on the OPTION A button, and fit Link 2 on the "A,B,C" board for the weighting required on the option B button. NO other option filter card can then be fitted to the FIL 14 motherboard.

Mate the FIL 5 sub-board socket connectors to the filter motherboard FIL 14 pin headers in the required position. Fit shakeproof washers over the screw threads. Apply a drop of low strength thread locking compound, e.g. Bostik T22, and secure using the M3 nuts provided. Tighten using a 5.5 mm A/F nut driver.

Remove the 4 screws securing the test set top cover and remove the cover. Locate the main card frame in the centre of the instrument. With the MJS401D facing you the option filter slot is 9th from the left. Using a sharp pair of wire cutters, clip out the link on the test set main motherboard which is marked "IF NO SPARE FILTER LINK" near the rear connector. Temporarily remove the BP/LP filter card if required. Insert the FIL 14 filter motherboard with the components facing left, and push down until it snaps into place.

Replace the cover and fit the labels supplied over the OPTION A and/or OPTION B legends on the front panel. Clean the panel area first with a degreasing chemical such as ethyl alcohol or methylated spirit. Do not use white spirit as this is greasy by nature. Do not use an aggressive solvent which may damage the paint. If in doubt, try on an area of paint which is rarely seen, such as the inside of one of the front panels or the back panel. Do not touch the adhesive area with your fingers.

19.7 Check-out

Turn on the MJS401D power. Connect a jumper lead between the oscillator output socket (or external oscillator) and the MJS401D "A" input socket.

Select input "A".

Confirm the system response with the filters all OFF and in LEVEL function as essentially flat by sweeping the oscillator through the measuring system.

Select the required filter option(s) and confirm the response according to Table 19.1.1. Start all measurements at the "0" reference on the meter at 1 kHz. Do not raise the oscillator level by more than 20 dB to measure the filter frequency response as this can overload the instrument inputs when the test system is driven more than 23 dB above the "0" reference level.

If the response seems wrong check out the installation procedure again. Make sure that the correct main motherboard link is cut. Also check the sub-board and option filter motherboard links again.

19.8 Operation

Selection of the required OPTION FILTER buttons singly or together will activate the installed filters.

These are not interlocked in any way except that:-

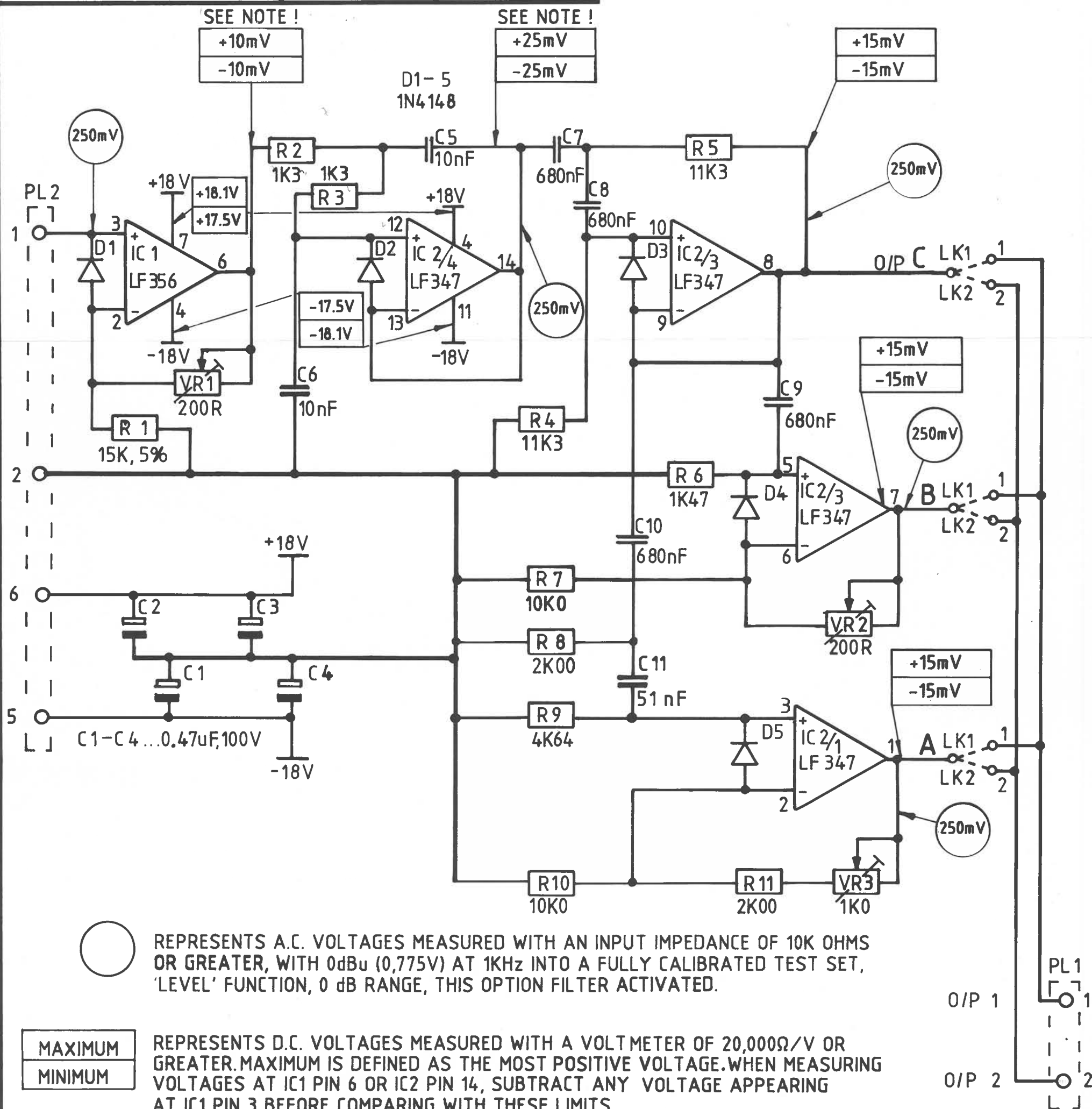
- a) All filters are disabled in "Read Osc" function to prevent accidental oscillator calibration errors.
- b) CCIR 468-2 and CCIR ARM normally disable all other filters.

PROJECTION



DO NOT SCALE

IF IN DOUBT ASK

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TITLE

CIRCUIT DIAGRAM
ABC FILTER
PCB 75043

REVISION

NO	DATE	CHANGE	APPROVED
1	2-9-75	PROTOTYPE	
2	14-10-85	FI AN 0138	J.D. Hign

TOLERANCES - UNLESS OTHERWISE STATED

USE MJS 401D OPTION
FILTER MOTHERBOARD

MATERIAL

ORIGINAL SCALE

DRAWING No.

REV

FINISH

DRAWN *Ameythe*

DATE 21-8-85

CHECKED *Ameythe*

DATE 2-9-85

PROJECT NO

TYPE

SHEET NO

SIZE

750

C

427

3

2