

PCB 75044

20.1 Introduction

This PCB contains a third order low pass filter with a maximally flat (Butterworth) response, nominally -3 dB at 80 kHz. It is intended for use in conjunction with the Option Filter Motherboard, PCB 75046.

This filter is useful for measuring total harmonic distortion of fundamental frequencies up to about 21 kHz, since the second and third harmonics, which usually dominate, pass unattenuated, but noise is removed above 80 kHz.

Table 20.1.1 below shows the frequency response.

Nominal Frequency (Hz)	Exact Frequency (Hz)	Nominal Response (dB)
10	10.00	0.0
12.5	12.59	0.0
16	15.85	0.0
20	19.95	0.0
25	25.12	0.0
31.5	31.62	0.0
40	39.81	0.0
50	50.12	0.0
63	63.10	0.0
80	79.43	0.0
100	100.0	0.0
125	125.9	0.0
160	158.5	0.0
200	199.5	0.0
250	251.2	0.0
315	316.2	0.0
400	398.1	0.0
500	501.2	0.0
630	631.0	0.0
800	794.3	0.0
1000	1000	0
1250	1259	0.0
1600	1585	0.0
2000	1995	0.0
2500	2512	0.0
3150	3162	0.0
4000	3981	0.0
5000	5012	0.0
6300	6310	0.0
8000	7943	0.0
10000	10000	0.0
12500	12590	0.0
16000	15850	0.0
20000	19950	0.0
25000	25120	0.0
31500	31620	0.0
40000	39810	0.0
50000	50120	0.0
63000	63100	- 0.8
80000	79430	- 3.1
100000	100000	- 8.0
125000	125900	-13.0
160000	158500	-19.0
200000	199500	-24.0

Table 20.1.1 Frequency Response Characteristics, 80 kHz Low Pass Filter

20.2 Circuit Description

IC1 forms a non-inverting unity gain buffer with almost infinite input impedance. D1 reduces the effect of common-mode failure in the input stage of IC1.

IC2, R2-R4 and C3-C6 form a third order low pass filter with unity gain in the pass band. D2 reduces the effect of common-mode failure of the input stage of IC2, which can be subject to peak voltages above those in IC1 if square waves are passed, due to overshoot inherent in the maximally flat characteristic.

20.3 Removal/Replacement

The 80 kHz low pass filter is fitted to the Option Filter Motherboard. See section 18.

20.4 Fault Finding

Use extender card PCB 75032.

Logic fault finding is covered in Section 18.

If the 80 kHz low pass filter characteristic seems out of tolerance, perform the following procedure:

DESELECT ALL OTHER FILTERS EXCEPT THE 80 KHZ LOW PASS 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 IC2 pin 6 for conformity to Table 20.1.1. If there is an error it will be due to IC2, R2-R4 or C3-C6.

If no error is found, the fault is downstream from the 80 kHz low pass filter.

20.5 Calibration

There are no calibration adjustments to be made on the 80 kHz low pass filter.

20.6 Installation

Requires OPTION FILTER MOTHERBOARD.

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

In general the 80 kHz low pass filter can be used on either OPTION A or OPTION B. Install the sub-board on the Option Filter Motherboard in position 1 to activate by the "OPTION A" button, or in position 2 to activate by the "OPTION B" button. 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 an "A, B, C" filter is also installed, remember that only one weighting should be active. Check that only link 1 is fitted ON THE "A, B, C" CARD.

If two option filter PCBs are fitted, cut link 3 on the Option Filter Motherboard.

Mate the 80 kHz low pass filter sub-board socket connectors to the Option Filter Motherboard 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 Option 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 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.

20.7 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 and confirm the response according to Table 20.1.1. 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.

20.8 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:-

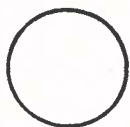
- a) All filters are disabled in "Read Osc" function to prevent accidental oscillator calibration errors.
- b) CCIR 468-2 and CCIR ARM normally disable all other filters.

PROJECTION



DO NOT SCALE

IF IN DOUBT ASK



REPRESENTS A.C. VOLTAGES MEASURED WITH AN INPUT IMPEDANCE OF 10K OHMS OR GREATER, WITH 0dBu (0,775V) AT 1KHz INTO A FULLY CALIBRATED TEST SET, 'LEVEL' FUNCTION, 0dB RANGE, THIS OPTION FILTER ACTIVATED.

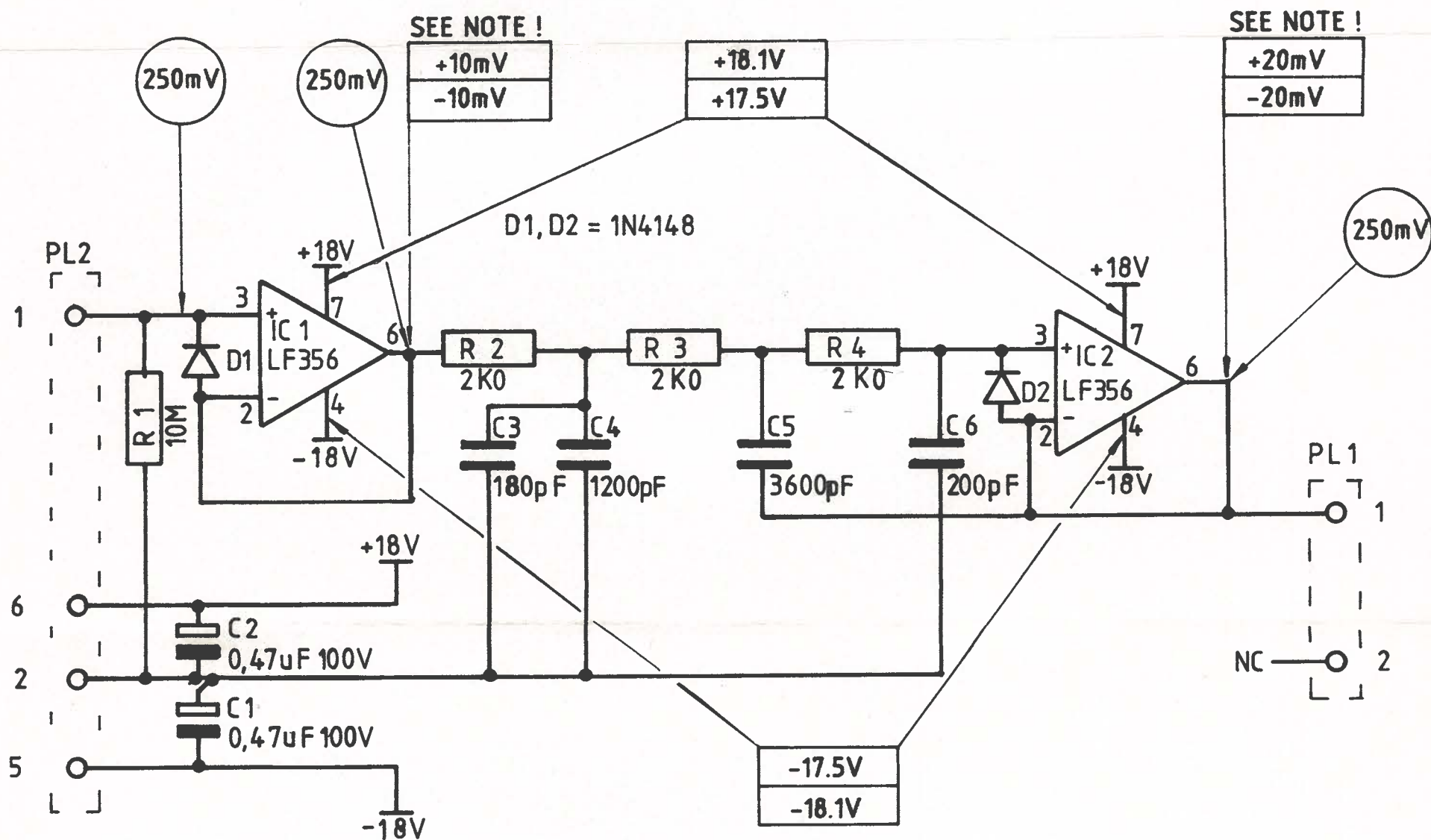
MAXIMUM

MINIMUM

REPRESENTS D.C. VOLTAGES MEASURED WITH A VOLTMETER OF 20,000Ω/V OR GREATER. MAXIMUM IS DEFINED AS THE MOST POSITIVE VOLTAGE.

WHEN MEASURING VOLTAGES AT IC1 PIN 6 OR IC2 PIN 6, SUBTRACT ANY VOLTAGE APPEARING AT IC1 PIN 3 BEFORE COMPARING WITH THESE LIMITS.

THIS CARD FITTED TO OPTION FILTER MOTHERBOARD, PCB 75046.
USE EXTENDER CARD PCB 75032.



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TITLE

CIRCUIT DIAGRAM
80KHz LOW PASS FILTER
PC B 75044

REVISION

NO	DATE	CHANGE	APPROVED
1	2-9-85	PROTOTYPE	
2	14-10-85	F1 AN 0139	J.D. Hignam

TOLERANCES - UNLESS OTHERWISE STATED

USE MJS 401D OPTION
FILTER MOTHERBOARD

MATERIAL

750/M/434/4

ORIGINAL SCALE

DRAWN *adunthe*

DATE 20-8-85

DRAWING No.

REV

FINISH

CHECKED *adunthe*

DATE 28-8-85

PROJECT NO

TYPE

SHEET NO

SIZE

750

C

433

3

2