

LOW-PASS FILTERS FL4/48A-G

Introduction

The FL4/48 series of low-pass filters contain an input amplifier that gives each unit a high input impedance (balanced) so that it can be bridged across a circuit of lower impedance such as a 600-ohm programme circuit with negligible effect. The units FL4/48A to FL4/48G incorporate passive filters FL4/47A to FL4/47G respectively and were designed for use with sound automatic monitors MN2M/3A and MN2M/5A. Their cut-off frequencies are shown in Table 1.

Each unit is constructed on a CH1/18C chassis fitted with a 15-pin Painton plug and has index pegs at positions 5 and 30.

TABLE 1

FL4/48 Suffix	Cut-off Freq. (kHz)
A	9.25
B	10.25
C	11.25
D	12.25
E	14.25
F	7.25
G	8.25

General Specification

Filter Characteristic	See that of the incorporated passive filter.
Input Impedance	30 kilohms, balanced.
Output Impedance	600 ohms, balanced.
Voltage Gain	0 dB \pm 0.5 dB, at 1 kHz, when the output is loaded with 600 ohms.
Input Level	+14 dB maximum.
Harmonic Distortion	At 1 kHz the harmonic content is better than 50 dB down.
Noise Output	Less than -65 dB volume (unweighted).
Power Requirement	15 mA at 24 volts d.c.

Circuit Description (Fig. 1)

At the input connectors PLA4 and PLA5, transformer T1 presents a high input impedance, about 30 kilohms, largely determined by R1 and R2 in its secondary circuit. Signals are fed from the junction of R1 and R2, via C1, to the linear integrated circuit IC1. This circuit, in conjunction with its externally connected auxiliary components, gives the unit an

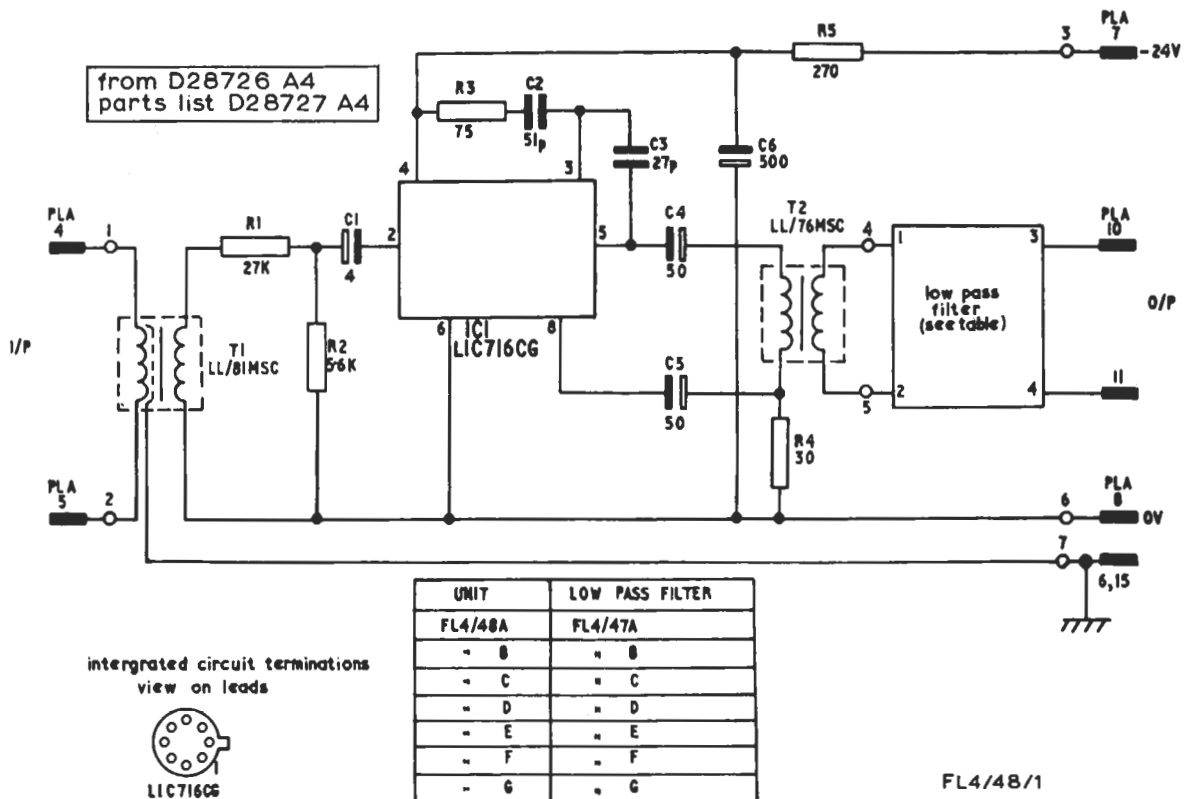


Fig. 1. Circuit of FL4/48A-G

overall voltage gain of 0 dB when the output load at PLA10 and PLA11 is 600 ohms. IC1 is coupled by T2 to whatever passive 600-ohm filter (on its own circuit board) is incorporated.

Testing

Note: For adjustments and tests on the incorporated FL4/47 filter, see Instruction FL4/47.

Apparatus

Tone source TS/10
A.C. test meter ATM/1
Harmonic routine tester FHP/3
Oscilloscope
Frequency counter
600-ohm terminating resistors

Procedure

1. Disconnect the filter from the amplifier in the unit by freeing the straps linking the two circuit boards.
2. Strap PLA8 to PLA15 (chassis). Connect a supply of 24 volts d.c. to PLA7 (negative) and PLA8 (positive). Check that the current drawn from the supply is 15 ± 2 mA.
3. Connect the high impedance input of an ATM/1 to pins 4 and 5 on the amplifier board. From a tone source TS/10, loaded with 600 ohms, apply a 1-kHz signal at 0 dB to PLA4 and PLA5. The output at pins 4 and 5 should be $+6.3 \pm 0.5$ dB. Check that this falls to 0 dB ± 0.5 dB if the ATM/1 input impedance is changed to 600 ohms.
4. Connect the tone source to the ATM/1, using the 600-ohm input if available or providing an external 600-ohm load. Now connect the amplifier input (PLA4 and PLA5) in parallel with the ATM/1, and check that the 1-kHz output level of the tone source does not fall more than 0.1 dB.
5. Connect a 600-ohm termination and an oscilloscope to the output of the amplifier (board pins 4 and 5). From the tone source, loaded with 600 ohms, apply a 1-kHz signal at 0 dB, and then +14 dB, to PLA4 and PLA5. Check that the amplifier output is sinusoidal and free of spurious oscillation.
6. Connect the ATM/1, presenting 600 ohms input impedance, to the output of the amplifier (board pins 4 and 5). Connect the tone source, loaded with 600 ohms, to PLA4 and PLA5. Check that the amplifier response conforms to Table 2, using a constant input at the level which produces 0 dB output at 1 kHz.
7. Connect an FHP/3, followed by the ATM/1 (using its high impedance input), to the amplifier output pins, 4 and 5. Set the tone source to deliver +14 dB at 1 kHz to PLA4 and PLA5 and check that the harmonic content in the amplifier output is better than 50 dB down. Alter the tone source signal to +14 dB at 100 Hz and check that the harmonic content in the amplifier output is better than 40 dB down.
8. Remove the tone source and substitute a 600-ohm termination at PLA4 and PLA5. Connect the ATM/1, presenting 600 ohms input impedance and set to TPM, to the amplifier output. Check that the noise volume measured on the ATM/1 (peaking to '6') does not exceed -65 dB.
9. Reconnect the filter board to the amplifier board in the FL4/48 unit. Connect the tone source, loaded with 600 ohms, to PLA4 and PLA5. Connect the ATM/1, presenting 600 ohms input impedance, to PLA10 and PLA11. Check that the overall gain of the FL4/48 at 1 kHz is 0 dB ± 0.5 dB. Confirm, briefly that the overall response of the FL4/48 conforms to that of the filter incorporated.

TABLE 2

Amplifier Response

Frequency	Response rel. to 1 kHz
40 Hz	-0.3 \pm 0.2 dB
110 Hz	-0.1 \pm 0.1 dB
5 kHz	+0.1 \pm 0.1 dB
15 kHz	+0.25 \pm 0.15 dB

References

1. Designs Department Specification No. 11.119 (71), Low-pass Filters FL4/48A-G.
2. Low-pass Filters FL4/47A-G.
3. Sound Automatic Monitors MN2M/3A and MN2M/5A.