MFJ-721 Audio Filter

User Manual

Janurary-2016 – AG4RC

INTRODUCTION

This six page PDF document contains information from the original MFJ-721 user manual, an enhanced schematic with component numbers, and a full-color board layout picture.

I decided to redo the original documentation obtained for the internet after my MFJ-721 took a mild lightning hit which gave me the opportunity to troubleshoot the problem. In doing so I went through the original schematic line-by-line to verify physical board continuity, component values, and physical component orientation.

I'm happy to say after replacing C3, C15, U1, U3, S2, and S3 my MFJ-721 is once again 100% operational!

In the interim I replaced all Electrolytic capacitors, and all Mylar film capacitors to give the audio filer an overhaul.

Keep in mind the full-color board layout picture, at the time it was taken, may not include all replacement components previously mentioned.

Please note:

- The board layout picture was taken while troubleshooting and C3 shows a temporary non-axial electrolytic replacement capacitor; however component polarity is correctly depicted in reference to the corresponding circuit board mounting holes.
- C4 was mistakenly omitted in the original MFJ schematic; however it does exist on the PC board connected as shown in the new version of the schematic and orientation correctly depicted on the circuit board layout picture.

DISCLAIMER

MFJ-721 INSTRUCTIONS

Thank you very much for purchasing the MFJ-721 Super Selector CW/SSB Filter. You will find that the MFJ-721 offers a great deal of versatility.

INSTALLATION

1. A 9 to 18VDC power supply is needed to power the MFJ-721. For the full 2W output power, 18VDC @ 300mA is required. Use a 2.5mm miniature plug with the tip positive.

2. Connect the speaker to the ¼" mono (2 conductor) jack marked SPEAKER on the back panel. The speaker impedance should be 4 to 16 ohms.

3. Connect 1 or 2 receivers to the RCA phone jacks marked INPUT on the back panel. Output from the receiver may come from either the speaker or headphone connection. Receiver selection is accomplished with the INPUT switch above the INPUT jacks.

4. For simulated stereo, plug a stereo headphone into the ¼" PHONE jack on the front panel. The tip of the plug is the filtered output and the ring is connected to the output of the 2.5 KHz filter. The speaker is disconnected when the PHONE jack is used.

5. When using the PHONE jack for mono headphone listening, a stereo (3 conductor) plug must be used with the tip connected to the headphones and the ring left unconnected. A mono plug may be used for the headphones by using the SPEAKER jack on the back panel.

OPERATION

FUNCTION SWITCH

OFF The filter is turned off and the input signal is connected directly to the speaker jack. The SELECTIVITY switch does not function.

ON The filter is turned on and the output is now determined by the SELECTIVITY switch.

NL Two types of noise limiting may be selected:

1. SSB - A peak clipper is selected to help reduce pulse noise, suitable for SSB or CW operation. The input signal must be above .2V peak for the most effective operation of the circuit.

2. CW - A peak clipper and a valley muter is selected to help reduce pulse noise and eliminate background noise between CW pulses. Input volume should be adjusted so that the CW pulse comes through but the noise between pulses does not. Too low of an input level will eliminate the background noise and the CW signal. Too high of an input level will not eliminate all of the background noise. It is not recommended that this position be used for SSB operation as the voice signal is distorted.

SELECTIVITY SWITCH

AMP All noise limiter circuits and filter circuits are bypassed and the MFJ-721 becomes a 2W amplifier with a gain of approximately 20dB.

SSB MODE:

HP All frequencies above 375 Hz are passed while frequencies below 375 Hz are rejected at the rate of 12dB/octave, greatly reducing 60 Hz and 120 Hz hum.

2.5KHz The HP filter is followed by a low-pass filter that rejects frequencies above 2.5KHz.

2.0KHz The 2.5KHz filter is followed by another low-pass filter to give a cutoff frequency of 2.0KHz.

1.5KHz The 2.0KHz filter is followed by another low-pass filter to give a cutoff frequency of 1.5KHz. The ultimate roll-off in this position is 36dB/octave.

CW MODE:

The center frequency of the CW filters is approximately 750Hz. The signal level peaks when you tune the signal to this tone. Low Q stages are used for minimum ringing.

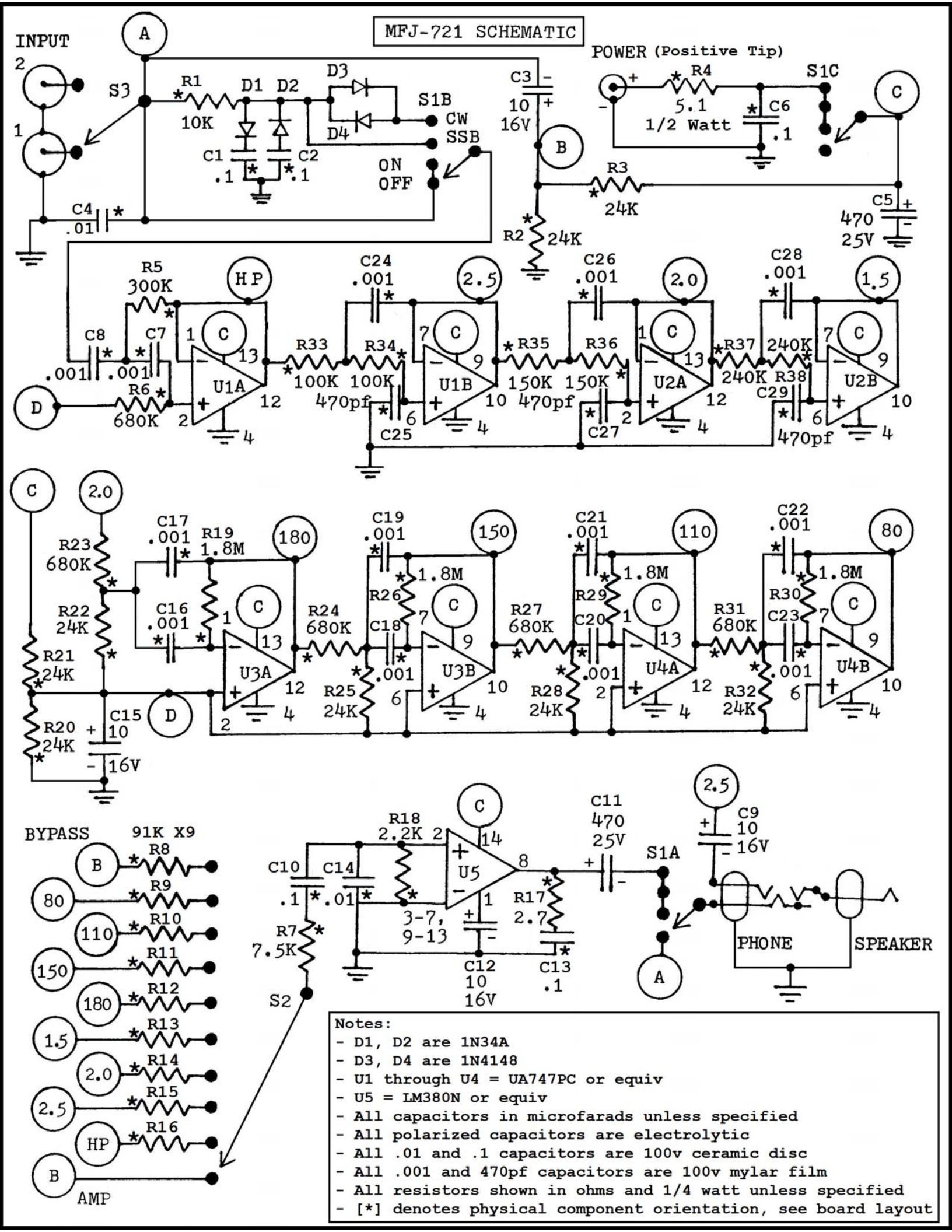
180Hz A single-stage, 2-pole active band-pass filter is selected with a 3dB bandwidth of approximately 180Hz. This filter is useful for light QRM levels.

150Hz A two-stage active filter is selected which is useful for light to moderate QRM levels.

110Hz The steeper skirts of three active band-pass filter stages are selected which is useful for moderate to heavy QRM levels.

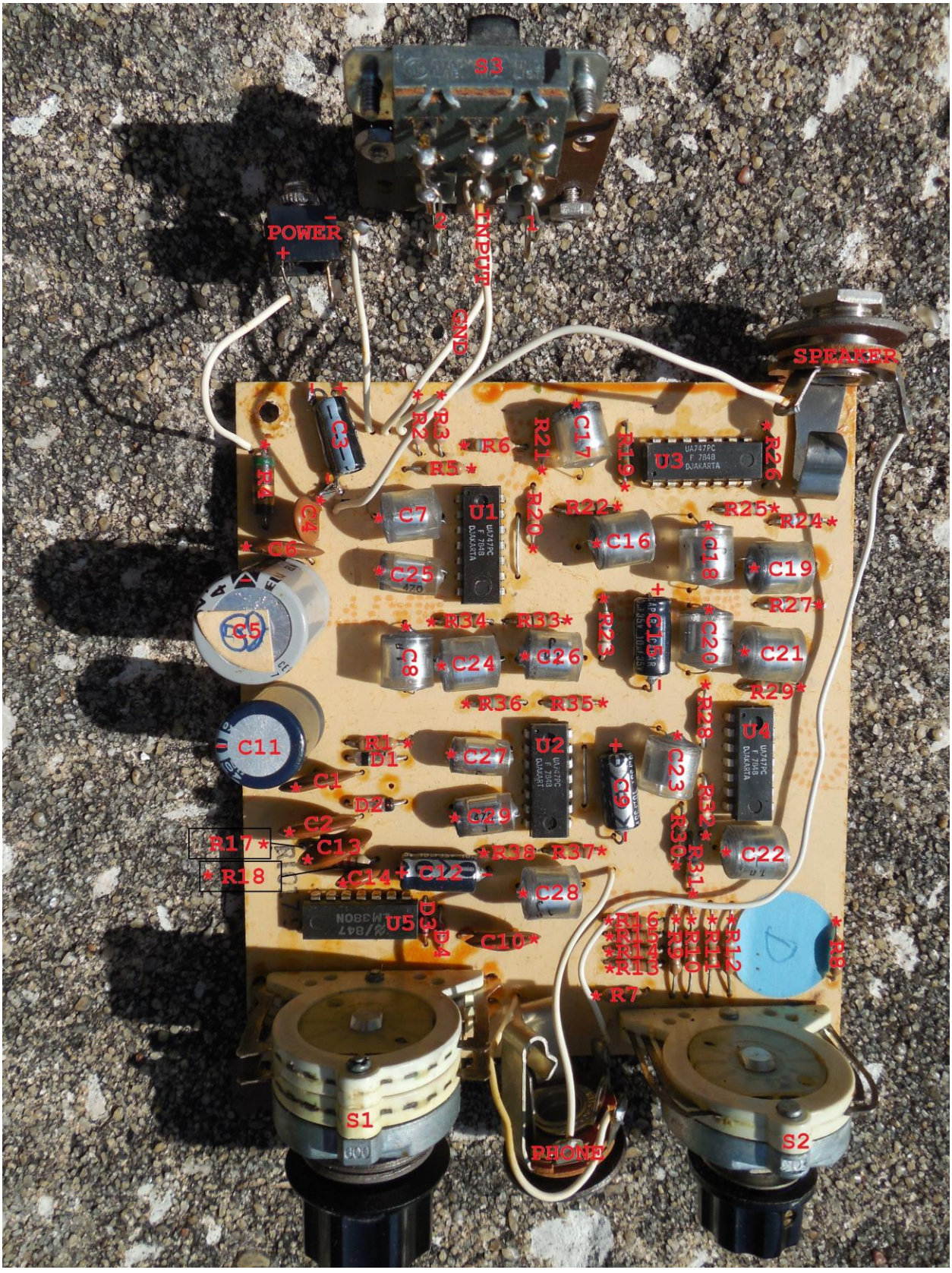
80Hz Four active filter stages are selected for a very narrow bandwidth and very steep skirts. The response is down approximately 60dB one octave away from the center frequency. You must be careful to tune very, very slowly. Slight retuning may be needed due to drifting of your receiver and/or the transmitting station. This position is useful for heavy QRM levels. Please note that with this much selectivity you may notice a “talking in a barrel” or slight ringing effect. This is normal.

BYPASS All noise limiter circuits and filter circuits are bypassed and the input signal is fed directly to the amplifier with a gain comparable with the filters.



Notes:

- D1, D2 are 1N34A
- D3, D4 are 1N4148
- U1 through U4 = UA747PC or equiv
- U5 = LM380N or equiv
- All capacitors in microfarads unless specified
- All polarized capacitors are electrolytic
- All .01 and .1 capacitors are 100v ceramic disc
- All .001 and 470pf capacitors are 100v mylar film
- All resistors shown in ohms and 1/4 watt unless specified
- [*] denotes physical component orientation, see board layout


S3
POWER
INPUT
GND
SPEAKER
C3
R4
C4
C6
C5
C11
C1
D1
D2
C2
R17
C13
R18
C14
C12
U5
C10
R3
R2
R6
R5
C7
U1
R21
C17
R19
U3
R26
R20
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C16
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C25
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R34
R33
R23
C15
C20
C21
C8
C24
C26
R29
R36
R35
R28
U4
C27
U2
C9
C23
C29
R32
R30
R31
C22
R38
R37
C28
R16
R15
R14
R13
R12
R11
R10
R9
R8
R7
S1
PHONE
S2