

## Technical Description.

### Universal Module UPP-01

#### Stereo RIAA Compensated Moving Magnet Pick-Up Pre Amplifier

The UPP-01 is a practical module designed to fit into the RUC-01 Universal Casing

##### Features

Stereo RIAA Compensated Pick-Up Pre Amplifier  
Suitable for Moving Magnet type Cartridge  
RCA Phono Connectors on Inputs  
Resistive Cartridge Loading, Link Adjustable 47 K Ohms and 68K Ohms  
Capacitive Cartridge Loading, Link Adjustable, 50, 100, 150, 200 and 250 pF  
Passive Equalisation for minimum TID (Produces less Surface Noise)  
LF Cutoff -3 dB at 20 Hz  
Multiturn Channel Gain Control Trim-Pots  
Mono Link  
Balanced Line Output

##### Technical Description

DC Power, +15V and -15V DC is provided via a 10 Pin Box Header on the PCB

Pins, 1 and 2 +15V DC, 3 and 4 -15V DC, 5 and 6 N/c, 7, 8, 9 and 10 Ground

Audio Input RCA Phono Sockets

Audio Output 9 Pin Male "D" Connector located at one end of the UPP-01 Module

Pins, 1 and 6 Left Output, Pins 2 and 7 Right Output, Pin 3 Ground

The circuit used for Left and Right channel is identical with only the Left channel described here

Input is via an RCA Phono Connector

Input loading resistors R2 47K and R3 22K are provided to give the correct resistive loading to the Pick-Up Cartridge providing and provides a choice of 47K with the Link In and 68K with the Link Out

Most common specified load is 47K with some cartridges specified for 68K

R1 47 Ohms is fitted to provide some RF protection to the input stage

C1, C2 and C3 are provided to give the correct capacitive loading to the Pick-Up Cartridge and can by switching provide 50pF, 100pF, 150pF, 200pF or 250pF s the input

The required input load resistance and load capacitance for a particular Pick-Up Cartridge is normally specified by its manufacturer and are very important for best frequency response performance

The capacitive loading is calculated adding the capacitance of the Pick-Up Arm and connecting cable, if known, and adding the extra required capacitance using the Links and Capacitors provided in the UPP-01 Module

If the Arm and Cable Capacitance is not known, the best method is by using a suitable Test Record such as the CBS BTR-150 Broadcast Test Record or similar

Unlike most RIAA Compensated Pick-Up Pre Amplifiers, the UPP-01 use passive compensation instead of the more common and simpler feedback compensation

The first stage of amplification is by IC-1 providing a flat frequency response and a gain of about 34 dB

The operation of IC-1 without reactive components in the feedback loop, and a very benign 12K loading is largely responsible for a cleaner and more transparent treble, and a notable reduction in record surface noise compared to most feedback compensated RIAA Pre Amplifiers

The required Treble Roll-off is done by the passive RC combination formed by R11 and C9

This is followed by an active High Pass Filter formed by IC-3:A in combination with C11, C12, R13 and R14

The required Bass Boost is done by the passive RC combination formed by R21, R23 and C17

Overall Gain Control is by a 10K Pre-Set Potentiometer connected in the feedback loop of IC-3:B

Left and Right Channels may be combined to Mono by inserting the Mono Link on the Module

The balanced differential output is provided by a SSM-2142 IC IC-5 with the output being protected by a 22 Ohm resistor in each output leg

#### Notes and Comments

The UPP-01 RIAA Compensated Pick-Up Pre Amplifier Module is specifically designed for Professional use with a conventional Moving Magnet Pick Up Cartridge

As factory standard, for cost reasons, It utilises a conventional low cost FET Input TL-071 Operational Amplifier in the first or front end Amplifier Stage

The TLO-071, thanks to the passive RIAA compensation circuit used in the UPP-01 provides entirely acceptable Noise and Distortion performance for Broadcast and other Professional applications

To special order, and at extra cost, the UPP-01 may be supplied with the exotic and very expensive LT 1115 Op-Amp and precision selected components in the compensation circuit

We have serious doubts that the extra cost involved using the LT 1115 is worth while as the improvement in Signal to Noise Ratio will be only about 3 dB and in addition, the more precise RIAA Compensation is probably not noticeable

After all, Tape-Hiss from the Studio Tape Recorders and other noise present on the majority of LP Records far exceeds the noise generated by the TL-071 Pre-Amplifier IC used in the UPP-01

Furthermore, the frequency response of the average LP probably deviates as much as 3 or 4 dB from the standard RIAA curve making compensation circuits of greater precision than + and – 0.5 dB most likely meaningless and a waste of effort

Even Professional Test Records suffer from Frequency Response deviations and in some cases come supplied with correction charts

Furthermore, the High Frequency Response will change and deteriorate after a number of playing's  
 Inherently, the frequency response of the UPP-01 follows the recommended RIAA playback response within 0.5 dB from 30 Hz to 20 KHz and is deliberately rolled of by 1 dB at 25 Hz and 3 dB at 20 Hz

We attained the following playback results from the CBS BTR-150 Broadcast Test Record, using a Technics SP-10 Turntable, SME 2009 Mk II Improved Version Tone Arm, Stanton 680 Mk II Moving Magnet Cartridge, Stanton 680 EL Mk II Stylus Assembly

Load resistance and capacitance correctly matched to the UPP-01 Module

Frequency	Left Channel	Right Channel	Reference 1 KHz
16 KHz	+ 1.0 dB	+ 1.0 dB	
14 KHz	+ 0.5 dB	+ 1.2 dB	
12 KHz	+ 0.2 dB	+ 0.8 dB	
10 KHz	0	+ 0.4 dB	
8 KHz	0	0	
6 KHz	0	0	
5 KHz	0	0	
4 KHz	- 0.5 dB	- 0.5 dB	
3 KHz	0	- 0.2 dB	
2 KHz	0	0	
1.5 KHz	0	0	
1 KHz	0	0	
800 Hz	0	0	
600 Hz	+ 0.3 dB	0	
500 Hz	+ 0.2 dB	0	
400 Hz	+ 0.2 dB	+ 0.2 dB	
300 Hz	+ 0.4 dB	+ 0.1 dB	
200 Hz	0	0	
150 Hz	+ 0.2 dB	+ 0.1 dB	
100 Hz	0	0	
80 Hz	0	0	
60 Hz	0	+ 0.2 dB	
50 Hz	0	0	

Sound Clarity, Imaging and Stereo Separation was perceived as exceptionally good, no doubt caused by a number of factors such as a very good Tone Arm and that the Cartridge was correctly loaded

Record Surface Noise was notably low, probably thanks to the Passive Equalisation

Perceived distortion was low when observed as waveforms on an Oscilloscope with the trace noticeably steady probably caused by the good Tone Arm, Correct Loading and the High Pass (Low Cut) filter in the UPP-01

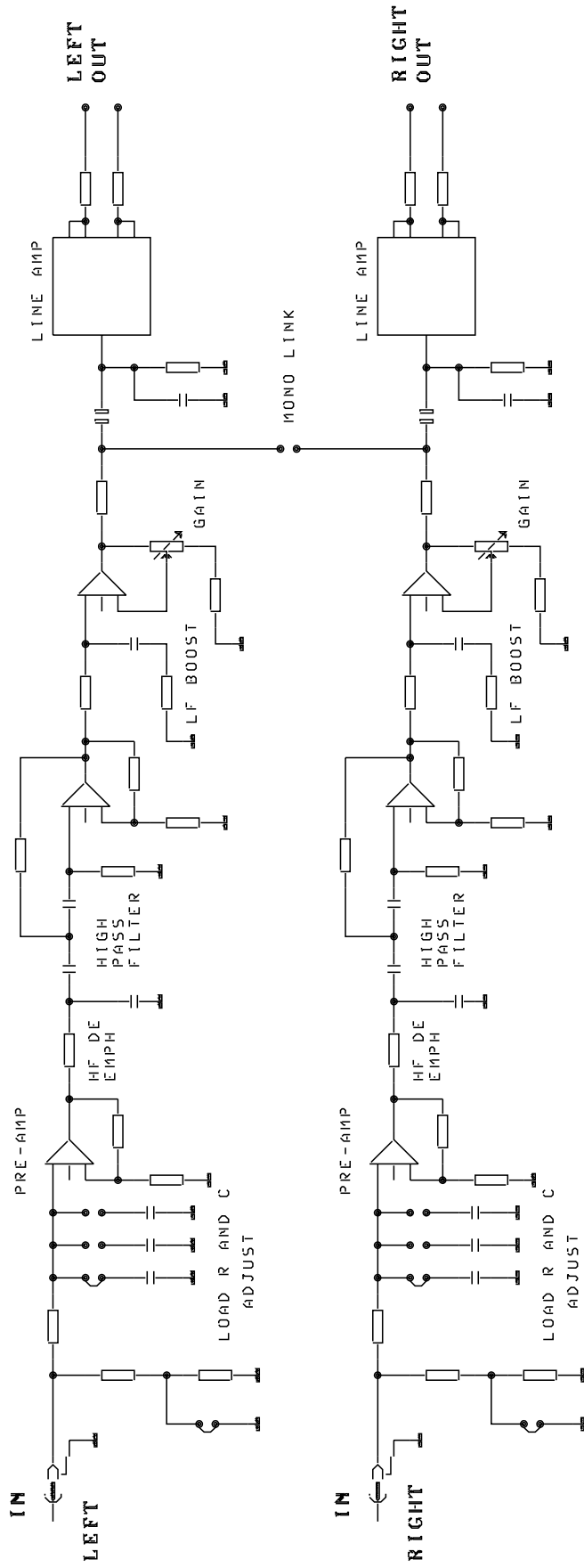
#### Factory Configuration

Links	Input Resistance	Set for 47K Load
	Input Capacitance	All Links Fitted
	Mono Link	Not Fitted

Gain Setting    3.6 mV 1 KHz in + 4 dBmW out

## Technical Specifications

Input	Type Impedance Capacitance Connector	Unbalanced High Impedance Selectable 47K or 68K Selectable 50, 100, 150, 200 or 250 pF RCA Phono
Output	Type Impedance Max Level	Differential Balanced About 50 Ohms + 25 dBmW into 600 Ohms
Performance	Frequency Resp LF Cut THD THD	+ - 0.5 dB 30 Hz to 20 KHz WRT RIAA -1 dB 25 Hz -3 dB 20 Hz 0.03% at +12 dBmW Out 0.03% at +25 dBmW Out
	S/N Ratio	WRT 3.6 mV + 8 dB at 1 KHz 70 dB 20 Hz to 20 KHz 78 dB 400 Hz to 20 KHz
Power	Requirements Current	+ and - 15V DC +- 20% 40 mA each side
Physical	Size	W 70 mm x L 140 mm x H 25 mm



RIAA COMPENSATED  
 PICK UP PRE-AMPLIFIER  
 MODULE TO SUIT  
 RUC-01 CHASSIS

DRAWING UPP01BK

**ELAN AUDIO**  
 AUSTRALIA

Title PICK UP PRE AMPLIFIER MODULE

Size A4	Number UPP-01	Revision
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