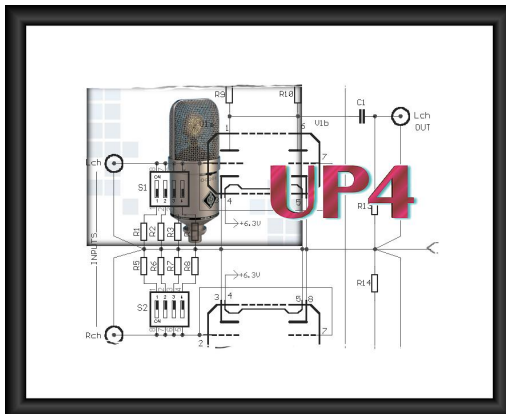




# Fairlight UP-4 Mic Preamp

## Service Manual

23 October 2009  
Issue 001  
Rev A



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# UP4 Mic Preamp

The UP4 is a four channel, one rack unit remote controlled universal preamplifier designed by Smart Research.

If used in conjunction with the DREAM family both gain and phantom power functions are accessible directly from the surface controls or via the Softmix GUI. The remote connection to the DREAM family is accomplished via a simple Ethernet connection. The design whilst allowing for remote control maintains the best achievable performance for any form of available audio circuitry. Input and output levels of up-to +28dBu are accepted and with an EIN figure of -133dBu the system defines the "state of the art" for a universal input stage.

Providing the ability to locate the preamplifier at the nearest available point to the signal source, the UP4 can reduce many forms of signal degradation that may appear when driving cables directly with un-buffered low level signals. These may manifest themselves as, radiated noise pickup, microphone cable noise, capacitive ringing effects, slew rate degradation, loss of high frequencies and increased distortion.

## UP4 key Specifications

- EIN50Ohm source, +64dB gain, referenced to +4dBu133dBu
- Frequency Response - Between 10 and 100kHz +/- 0.1dB
- THD100-20KHz, 1KHz/0dBu signal @12dB gain setting 0.0003%
- THD100-20KHz, 1KHz/-64dBu signal @64dB gain setting 0.02%
- CMRR At 0dB gain setting, 1kHz-70dBu
- CMRR At +64dB gain setting, 1kHz-80dBu
- Input Headroom All gain settings +28dBu
- Output Headroom All gain settings +28dBu
- Crosstalk Measured at +64 Gain, clip second channel > -100dBu
- Input Impedance Optimised at low/high gains. Ohms. 6K8/1K6
- Power consumption Selectable 100-230 volts 40 Watts

## Remote Control:

Two options have been provided. Ethernet allows for control from devices such as Fairlight's Dream; or Apple and IBM computers (software is provided). Also, various PUP units can interface using an audio XLR data cable. This long range signal can be patched through normal audio tie lines, such as a multicore between a stage and mixing position.

## Technical discussion

PUP represents many years of development by Alan Smart. Noise, CMRR, Distortion, Headroom, Crosstalk, Dynamic Range are exemplary, and outperform all other tested units evaluated so far (Focusrite Blue, Massenburg); and also beating all published specs so far examined (Amek 9098, DACS, APHEX - though one DACS unit however has a better published CMRR spec at 1KHz).

The circuit is a unique variant of instrumentation amplifier topology, starting with the good CMRR performance typical of this format. All internal audio circuitry is fully balanced, maintaining symmetry from input to output, which helps further reject noise, crosstalk, and distortion products.

Gain adjustment is achieved with only 5 relays, while offsets are nulled to typically 25microvolts by DC-servo circuits in all stages, resulting in the need for only one Polycarbonate capacitor in the audio path. No electrolytics are used.

Headroom at all points of the circuit is maintained to the power rails, at +28dBu, and at all gain settings. Many other designs suffer from degraded input headroom as a result of using a 'long tailed pair' configuration; while the output performance is variously compromised from op-amp-only; pseudo-balanced; or transformer circuits falling prey to real-world situations not fully defined or tested in the lab. For example the 'pseudo-balanced' opamp circuit favored by 80% of manufacturers induces around 9dB of noise as a result of the positive feedback employed. As this is a dynamic problem, it measures well without signal present, and only manifests when excited by low level signals, resulting in worse noise performance in use. Driving outputs from op-amps directly brings other drawbacks such as far higher distortion under load and long cables, instability, and degraded slew rate performance. Again, often problems that manifest in 'system' use, and so slip through the design stage, and don't show up on a specification sheet.

To optimize these output drive issues we have developed a discrete transistor output circuit, capable of driving into long cables and difficult loads, and switch-select between balanced or unbalanced configuration. (This circuit is also in use in the C2 and other products).

Discrete FET's are used for break-before-make switching of phase reverse and muting functions; and with balanced, proprietary drive circuitry, outperform the charge introduction, off isolation, and rdson performance of the commonly used SSM2402 family of i.c. switches.

OP275 amplifiers are used for the audio signal path. These were chosen in listening tests for their sound and hybrid FET/Transistor inputs, together with their overall performance.

Large-geometry transistors bypass the first stage input transistors to provide an EIN figure of 133dB (see specifications). NPN or PNP input transistors can be fitted, so that should any advantageous new devices become available we have the best chance for their inclusion.

As a result of both remote control and the surface mounting of components, a compact physical layout has been possible. Cables to and from front panel controls become unnecessary, and pcb layout problems are reduced such as crosstalk, noise pickup and stability. This was an advantage in producing the 01/7 SSL Channel card, reducing wiring and installation.

## UP4 INSTALLATION NOTES

### POWER SUPPLY

The unit is rated at 50 watts, and can be set to work from 90-250v supplies, at 50 or 60Hz.

#### **Operation in USA or CANADA, 110-120v supply:**

A north American 'NEMA' type 3-pin power cable is supplied; the external voltage selector switch will be set to 115v (see below); and a T500mA; 250volt rated 20mm long slow-blow fuse fitted.

#### **Operation in the UK, AUSTRALIA or EUROPE, 220-250v supply:**

A power cable with the proper attachment plug for the country will be required; the external voltage selector switch will be set to 230v (see below); and a T250mA; 250volt rated 20mm long slow-blow fuse fitted.

**Operation in JAPAN, 95-105v supply:**

A 100v transformer is fitted, and a USA power cable is supplied. The external voltage selector switch will be set to 100v (see below); and a T500mA; 250volt rated 20mm long slow-blow fuse fitted.

**Checking or changing the supply voltage setting:**

Locate the power input connector on the left of the unit as you face the rear panel. The bottom of this connector is a voltage selector switch and fuse drawer. The supply voltage setting is marked at the top of this drawer, nearest the connector pins. (115v is shown on the diagram below).

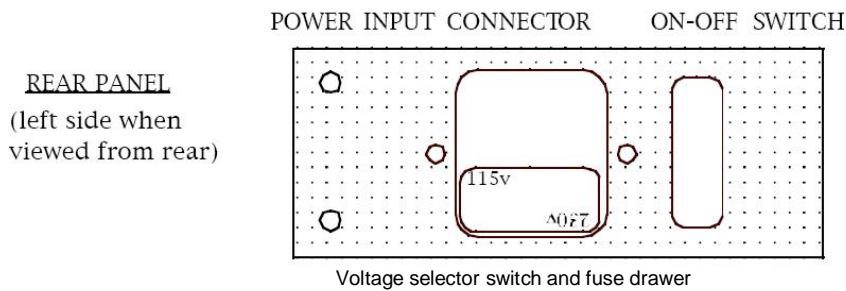
To change the voltage setting, turn the power off and disconnect the power cable from the compressor.

Slide the fuse drawer out with a flat screwdriver, and rotate it through 180 degrees, so that the new voltage marking is upmost, and push it back in.

**Checking or changing the fuse:**

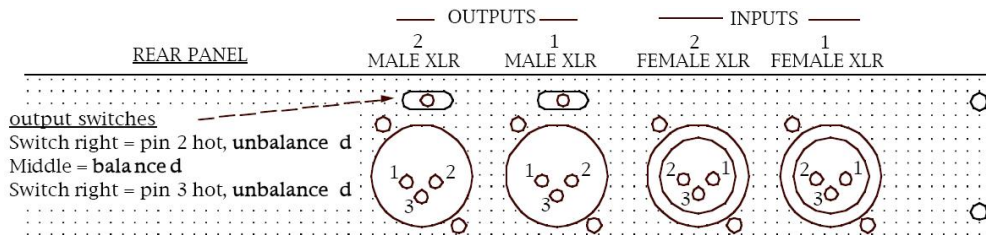
Turn the power off and disconnect the power cable. Slide the fuse drawer out with a flat screwdriver. The fuse fits nearest the inside, and there is space for a spare fuse nearest the outside. For 115v or 100v operation use T500mA, and for 230v use T250mA. (T indicates a slow-blow type fuse, 20mm long, and all fuses should be 250v rated types). If the fuse fails in use, and fails when replaced, there is a fault condition, and you must contact the factory to arrange servicing. Do not attempt repairs or change the fuse value.

**WARNING :** for continued protection against fire you must ensure that the correct value of fuse is fitted.



**AUDIO CONNECTIONS**

All inputs and outputs are balanced. We have developed a custom output stage capable of high output currents. This is a non-floating circuit, that has a better noise performance than possible with the commonly used electronically 'floated' circuit, and better square wave performance than using a transformer. This means that you must set the output switch located near the output connectors to match the equipment you are connecting to: pin 2 hot /unbalanced (right position); balanced (middle position), or pin 3 hot /unbalanced (left position). The input connectors can be wired as normal, and because the main signal path is fully symmetrical, you can choose to wire either as pin 2 or pin 3 hot with no difference.



## GROUNDING

Pin 1 on all XLR connectors is audio 'signal' ground, which is connected to power and chassis ground via a 10ohm resistor. This means that both grounds can be connected in an installation without hum loops, and both should always be connected for safe operation.

Please contact Smart Research if you have any questions or problems:  
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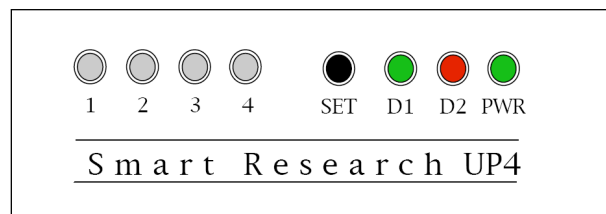
## UP4 Operation Software revision 05C

Front panel LED's and Switch

The UP4 has four bi-colour LED's for level indication; one for each audio channel. Green indicates an output level of -16dBu, and red +24dBu. Clipping does not occur until the output exceeds +28dBu, at any gain settings, and so in practice a red indication should give adequate warning of overload. These four LED's are also used to display the network (or IP) address of the UP4.

The switch marked SET is used to change (and display) the IP address, and also to reset the memory. Please see page two for the instructions on how to change the address.

The last two LED's are used to display network status. D1 shows that there is a valid connection to the control software and D2 shows that a control message has been received.



### Resetting the UP4 to the factory default

This is achieved by turning the unit on while pressing the SET switch with a small screwdriver, etc.

The switch can be released after ten seconds. The IP address will be reset to 10.1.1.15, and the RAM memory cleared. This may be useful also in the case of clearing network errors, etc.

## Network Installation, and Controllers

Currently, Fairlight's Dream Station or Smart Research's Soft Front Panel software running on a PC or Mac can be used to control the UP4. The UP4 detects the first valid controller's IP address on power up, and subsequently talks to that address. Therefore if a controller's IP address is changed, the UP4 will need to be turned off and on to adjust to the new address.

In some circumstances, the preamplifier might be co-resident on a network with another device that may 'poll' its address, such as in the case of Fairlight's Media Server. If this is the case, messages from another source other than a valid controller addressed to the UP4 may possibly interrupt its control functions. We suggest you ensure the UP4's IP address is excluded from the range set to be 'polled' by Media Server, and take care with other similar devices you may wish to connect. Alternatively, you can move the UP4's address away from any conflicting devices.

### To setup UP4 operation on Dream II

Navigate to

C:\Program Files\Fairlight\FMC



And open the file "FMC.ini" for editing

4 – Ensure FMC.ini has the following line included

Syntax:

UP4, UP4 IP address, Channel start #, # of UP4 units connected to this system

Actual Setting example:

```
UP4,192.168.3.250,8,1
```

IE

- UP4 has IP address 192.168.3.1,
- Matches up with the first desired Input channel,
- And the system has only 1(ONE) UP4 connected

# -- UP4, UP4 IP Address, Number of the first analogue input that the UP4 is

# -- connected to (8 in this example [numbering starts at 0], or MAD1 Input 1),

# -- Number of UP4 Preamps installed

# -----

```
#UP4,192.168.3.222,8,1
```

