LOW NOISE UNIVERSAL MICROPHONE

AND CONTROL UNIT

Mk II

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HANDBOOK

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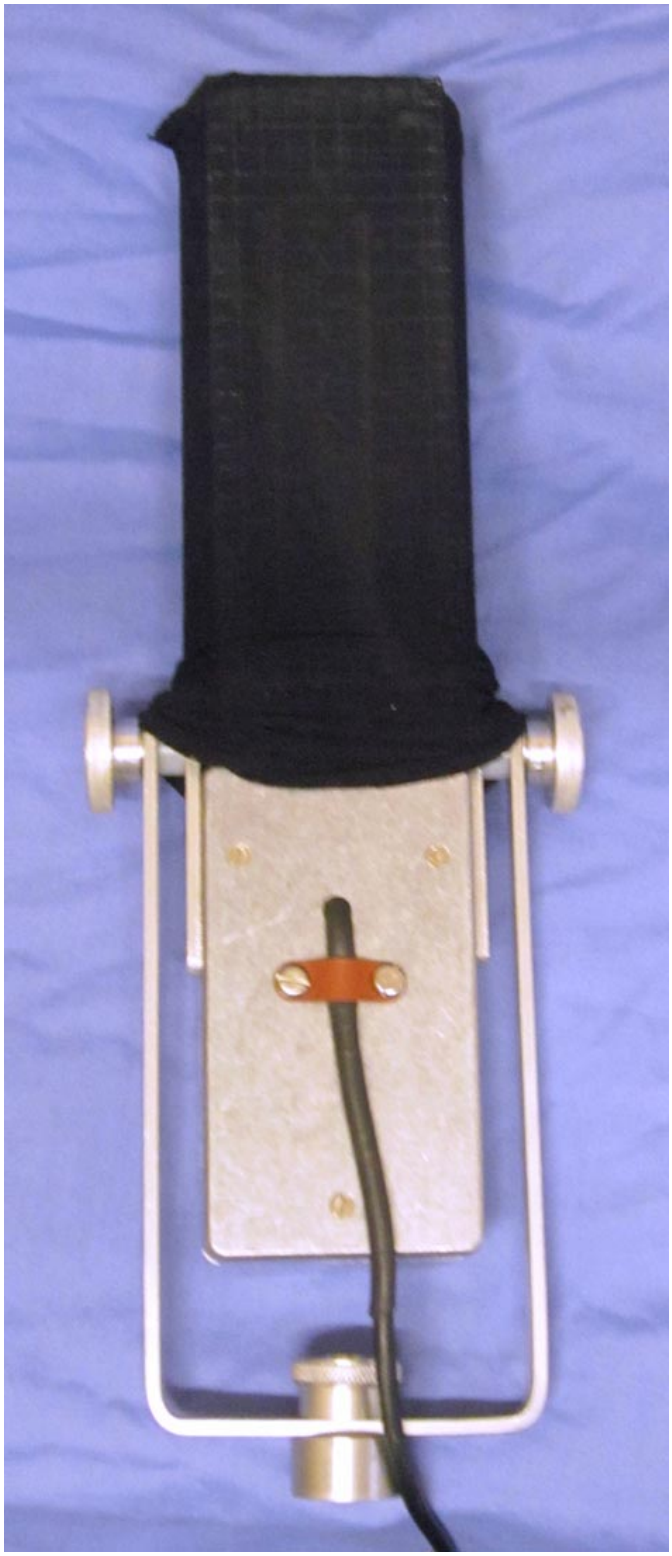
POPPY **RECORDS**

BATH ENGLAND

Front view



Back view

LOW NOISE UNIVERSAL MICROPHONE Mk II
In mounting fork with tripod adaptor.

LOW NOISE UNIVERSAL MICROPHONE AND CONTROL UNIT

This is a momophonic multi-capsule array microphone with an adjustable pickup pattern:

Omnidirectional Cardioid Hypercardioid Bidirectional (ribbon)

This microphone combines the low background noise of a large-diaphragm microphone with the good wide-angle frequency response of a small-diaphragm microphone. The output is at line level, thereby avoiding the need for a pre-amplifier and its associated cabling which might degrade the noise performance.

The complete apparatus comprises a Microphone Unit, a Control Unit and various connecting cables.

MICROPHONE UNIT

The microphone is rectangular in construction with an integral connection box. It would normally be operated with the sound sources facing the wider sides of the mesh cover. It may be mounted in any position.

The microphone is fitted with a minimal wind-shield and internal resilient suspension, which should be adequate for most normal conditions of indoor use. In certain circumstances, additional wind shielding and shock mounting may be necessary.

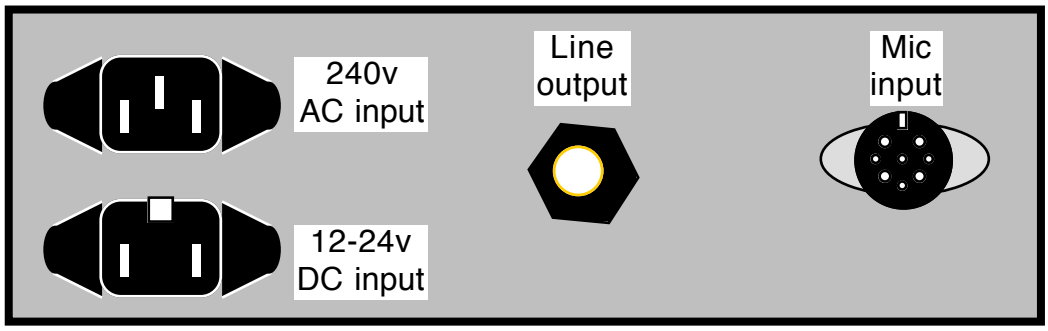
A 2.5-metre cable connects the microphone to the control unit and a 45-metre extension cable is supplied for more remote operation.

CONTROL UNIT

The control unit is rectangular and of robust metal construction. All connectors are grouped on one face of the unit for convenience. The unit may be mounted in any orientation, provided the controls remain accessible.

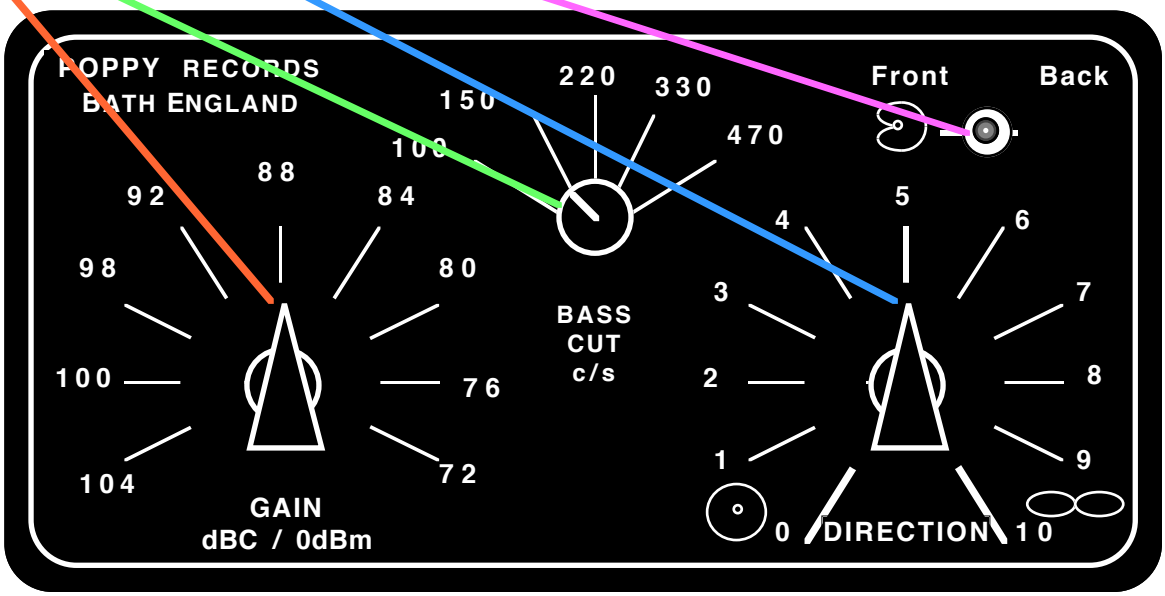
Connections:

- Mains (240v AC) input (IEC connector)
- Low voltage (12 - 24V D.C.) input
- DIN microphone input connector
- P.O. 'B' jack output (600-ohm unbalanced)



CONTROLS

Calibrated Gain control, 4dB steps
Calibrated bass-correction, 25c/s to 470c/s
Variable Direction control
Switching for cardioid direction or Fig-8 polarity.



POWER SUPPLIES

Mains power from 200v to 250v AC may be used, it should be supplied to the Control Unit through a 3-core mains cable equipped with a standard I.E.C. connector with an earthing connection. Alternatively, D.C. power between 12 and 24 volts may be used, giving the convenience of operation from batteries,

Both power sources may be connected at the same time, the unit will take its power from whichever source supplies the higher voltage In the event of one source failing, there will be a seamless changeover to the other source.

When the unit is receiving power, a pilot light is illuminated, red or green depending on the position of the FRONT/BACK switch,. The microphone can be plugged in or unplugged whilst the unit is switched on without risk of damage.

SIGNAL LEVELS

The pre-amplifier is designed to give 'line-level' signals of around 0dBm into a 600-ohm load (0.77v rms). The microphone amplifier can generate output signals up to +18dBm without overloading. This allows signals up to 20dB higher than the estimated levels to be passed on without distortion; to be attenuated, if necessary, by subsequent equipment in the signal chain.

Whilst professional equipment is designed for nominal input levels of 0dBm and can accept signals up to +20 dBm before overloading, there is a large amount of domestic equipment in semi-professional use, which cannot tolerate these levels. If domestic equipment is to be used, the Gain switch should be set three steps anticlockwise (-12dB) from the settings which would otherwise have been used with professional equipment. Alternatively a -12dB attenuator should be inserted in the output signal path.

The Gain control operates in steps of 4dB and is calibrated in units of dBC/0dBm. The logic and convenience of this arrangement will become apparent during use:

1) Smoothly variable control of signal levels is the artistic job of the sound mixer, not of the microphone channel. The microphone channel is provided with a range of gain steps which are accurately repeatable in the event of a retake becoming necessary at a later stage. (For this reason, the settings should be noted on the studio log for each session or individual take).

2) For most professional purposes, a nominal output level of 0dBm is required (equivalent to 1mW into 600ohms). The gain switch setting should be chosen to achieve this.

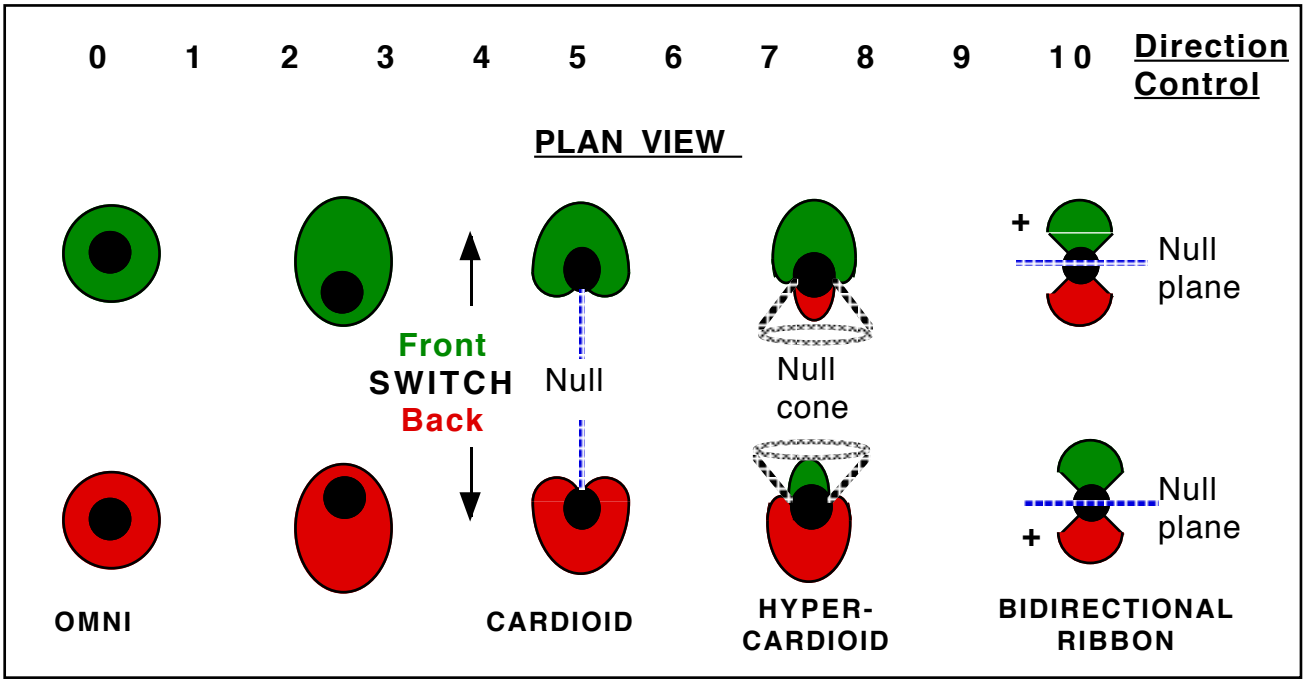
3) Most experienced sound engineers can estimate the probable loudness of the performance in 'Decibels' (An inaccurate description, the actual units are "dBC' — decibels relative to the threshold of hearing weighted for frequency on the 'C' scale).
If the sound engineer knows that, for instance, a single performer at 1 metre from the microphone is unlikely to exceed 88 dBC, the switch can be preset to that level and should be left at that setting for the entire performance. The output will then be about the required 0dBm level.

The calibration of the Gain control is only approximate and should not be relied upon for sound level measurements. Sensitivity will vary, depending on the directional response selected and the position and nature of the sound source.

DIRECTION CONTROL

The cable outlet identifies the back of the microphone.

By means of the Direction Control, the polar diagram of the microphone can be altered smoothly from omnidirectional through cardioid to a bidirectional 'ribbon' response..



The direction of greatest sensitivity is shown as red or green, depending on the position of the direction switch (indicated by the colour of the pilot lamp). The direction of null response is shown as a dotted line

In the **omnidirectional** position ('0'), equal prominence will be given to all sounds, regardless of the direction from which they come; there is no null direction. As the Direction Control is moved towards the **cardioid** position, the microphone will become progressively more responsive to sounds coming from the front and less responsive to sounds from the back. At the cardioid position ('5') there will be a complete null response at the back of the microphone.

As the Direction Control is moved towards the **hypercardioid** condition ('7') the microphone gives a narrower front pickup angle than cardioid and the single null response will become a cone of gradually increasing apex angle. A response will also begin to develop in the backwards direction in the centre of the cone.

At the **bidirectional (ribbon)** position ('10'), the responses in both the forward and reverse direction become equal. The null corresponds to a plane passing through the support frame of the microphone. As well as excluding unwanted sounds at the sides of the microphone, it also excludes sounds coming from directly above or below, which is particularly useful for avoiding unwanted echoes or extraneous noises. The microphone can be slightly tilted or angled to take advantage of this effect

The **Back/Front** switch allows the direction of cardioid and hypercardioid responses to be reversed; the pilot lamp changes colour to remind the operator of the direction which has been selected. On the symmetrical omnidirection response ('0'), this has no effect. With the symmetrical bidirectional response ('10'), there is no change in the directional characteristics, but the polarity of the response is reversed, which may be advantagous when using this microphone in conjunction with others.

The setting of the Direction Control may be altered during the performance if this is artistically justified. It will be found particularly useful for balancing the ratio of direct to reverberant sound or for balancing two groups of performers standing on opposite sides of the microphone

BASS CORRECTION

As a sound source approaches a microphone with a 'velocity' response, the amplitude of the lower frequency signals will increase disproportionately, this is known as 'bass tip-up'. The effect occurs if the wavefront contains a spherical component, but is not generated by purely plane wavefronts. (Thus, the effect will be most prominent with the human voice or the sound from the 'f' holes of a string bass, but almost entirely absent in the case of sound from the back of a string bass or from a large loudspeaker array).

The bidirectional response is entirely a 'velocity' response and exhibits this effect most strongly. The cardioid response also contains a velocity component and is affected, but to a lesser degree. The omnidirectional pressure response is not susceptible to bass tip-up.

To counteract bass tip-up when close-working is unavoidable, a 'Bass Cut' control is incorporated in the Control Unit. Its range of operation is approximately as follows:

Setting	**Speaking distance**			
c/s	**Bidirectional**		**Cardioid**	
25	> 1.5 m	(4'6")	> 0.75 m	(2'3")
100	1 m	(3')	0.5m	(1'6")
150	0.7m	(2')	0.3m	(1')
220	0.5m	(1'6")	0.25m	(9")
330	0.35m	(1')	0.17m	(6")
470	0.25m	(9")	0.15m	(5")

These setting are only intended as a guide and the final settings must be judged by ear. There may be artistic reasons for preferring settings higher or lower than those for natural-sounding results, for instance: to increase the apparent distance of a sound source or, conversely, to produce a more intimate sound.

When making recordings, the settings and the performer's working distance and position should be noted on the studio log for future reference in case a re-take should become necessary. It will be extremely difficult to edit together two performances where these parameters are significantly different; attempts at correction of the response, post-recording, would require very specialised equipment.

SPATIAL RESPONSE

Sounds approaching the diaphragm of a microphone at an oblique angle will suffer partial cancellation which is frequency-dependent, this is because the path-lengths to the various parts of the diaphragm will differ and the sound wave will not arrive at all the parts in the same phase. This effect is particularly noticeable with large-diaphragm microphones, where the diaphragm width is comparable with the wavelength of parts of the sound spectrum, and with 'shotgun' microphones where the sound-gathering ports are spaced apart..

Although the effective diaphragm area of this microphone is large, so as to give the best possible signal-to-noise ratio, the effective width of the diaphragm has been reduced by making the capture area tall and narrow. This gives an excellent off-axis frequency response in the horizontal plane, where it is normally wanted, at the expense of increased phasing effects in the vertical plane, where they are usually of no consequence.

The vertical phasing effect can sometime offer certain advantages in difficult acoustics, where the majority of unwanted reflected sound from the floor and ceiling will be arriving at oblique angles. Also, by tilting the microphone it is often possible to overcome excessive sibilance from a performer or instrument.

GENERAL CONSIDERATIONS

Whilst the microphone is reasonably robust, especially compared with conventional studio ribbon microphones, it is not intended for hard usage and will be damaged by rough handling.

The inside of the microphone should not be allowed to become dirty. If cleaning becomes necessary the microphone will have to be dismantled; this is not a job for the inexperienced or ill-equipped.

The control unit should be protected from spillage of liquids. If it is suspected that any liquid may have entered the unit, immediately disconnect it from all sources of electrical power and do not attempt to use it again until it has been dismantled, thoroughly checked and, if necessary, repaired and safety tested.

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