

### General Description

The Shure FP23 is a portable, battery-powered microphone preamplifier with phantom power. Designed for high bandwidth 96k/24 digital production, this studio-quality mic preamp is ideal for critical radio, television, and film production applications.

With its rugged mechanical and electrical construction, compact size, and high-quality components, the FP23 is extremely durable and easy to use. This highly reliable mic preamp will provide years of superb audio performance under the most punishing field conditions.

### Features

#### Audio performance

- Maximum of 66 dB of gain, adjustable in eleven discrete steps for accurate, repeatable gain settings.
- Dynamic range exceeding 120 dB.
- 20 Hz to 50 kHz audio bandwidth.
- High immunity to RF interference due to transformers, RF filtering, and all-metal construction.
- High current line output driver capable of driving very long cable runs.

#### Transformer balanced

- Premium-quality input transformer provides superior sonic quality and freedom from interference problems.
- Custom-designed output transformer provides line driving ability with freedom from interference problems.

#### Limiter

- Extended range peak limiter uses dual opto-isolators, making the unit virtually "unclippable."

#### Battery power

- Internal battery power (two AA) for convenient, low cost power.
- Battery life greater than 24 hours.

#### Durable mechanical construction

- High strength extruded aluminum chassis with protective metal end rails to withstand punishing field conditions.
- Easy access battery compartment for quick battery changes.

#### Phantom power

- Selectable 48-volt and 12-volt phantom power for condenser microphones.

#### High pass filter

- Two corner frequency settings.

### Specifications

#### Gain

0 dB to 66 dB input to output, switch selectable

#### Gain Accuracy

+0.6, -0.1 dB with reference to front panel gain markings (150  $\Omega$  source, 100k  $\Omega$  load impedances)

#### Frequency Response (see graph below)

20 Hz - 22 kHz, +0.1, -0.5 dB  
-1 dB at 50 kHz  
(relative to 1 kHz level with 150  $\Omega$  source)

#### Equivalent Input Noise

-126 dBu (-128 dBV) maximum  
(150  $\Omega$  source, flat weighting, 22 Hz - 22 kHz bandwidth for gain settings of 36 dB or greater)

#### Output Clipping Level

+22 dBu minimum with 100 k $\Omega$  load  
+20 dBu minimum with 600  $\Omega$  load

#### Input Clipping Level

+4 dBu minimum at the 0 or +18 dB gain setting

#### Dynamic Range

122 dB minimum at the +18 dB gain setting

#### THD + Noise

0.05% maximum  
(from 50 Hz to 22 kHz @ +4 dBu output level,  
22 Hz - 22 kHz filter bandwidth, +46 dB gain setting)

#### Common Mode Rejection Ratio:

100 dB minimum at 80 Hz  
60 dB minimum at 10 kHz

#### Input

Transformer-balanced, 2000  $\Omega$  input impedance

#### Output

Transformer-balanced, 130  $\Omega$  output impedance

#### Low Cut

80 Hz or 160 Hz (switch selectable), 6 dB per octave

#### Phantom Power

12V or 48V (switch selectable) per DIN 45 596

#### Limiter

Limits to +17 dBu output level  
10:1 limiting ratio  
5 ms attack time, 100 ms release time  
Amber/Red LED indicates limiting/clipping

#### Internal Voltage Rails

+15 V and -15 V, regulated

#### Power

2 AA batteries, 24 hours life typical with +4 dBu signal into 600  $\Omega$ , no phantom power

#### Power LED

Green indicates power and good battery.  
Red indicates power and low battery. LED turns red when approximately 4 hours of battery life remain.

#### Polarity

Mic input to line output is non-inverting

#### Operating Temperature Range

-18 to 57 degrees C  
0 to 135 degrees F

### Dimensions

43 mm x 94 mm x 140 mm (H x W x D)  
(1.7" x 3.7" x 5.5")

### Weight (unit only)

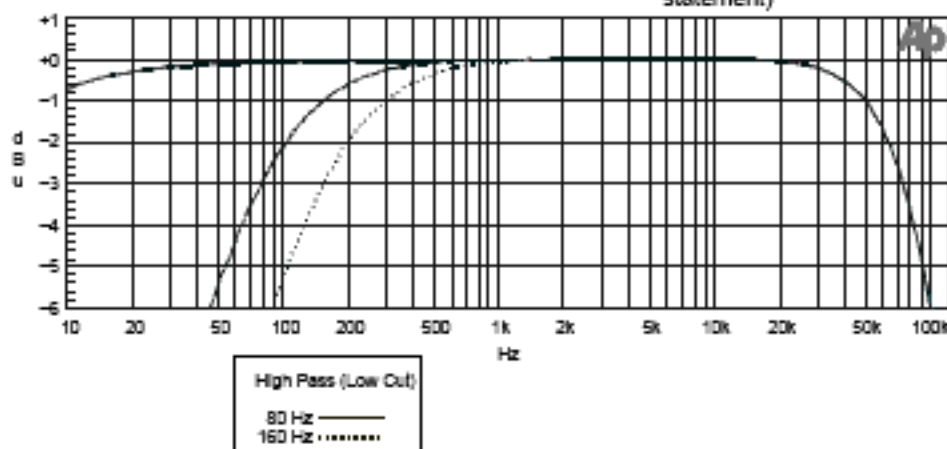
0.56 kg  
1.24 lbs.

### Weight (packaged)

0.86 kg  
1.90 lbs.

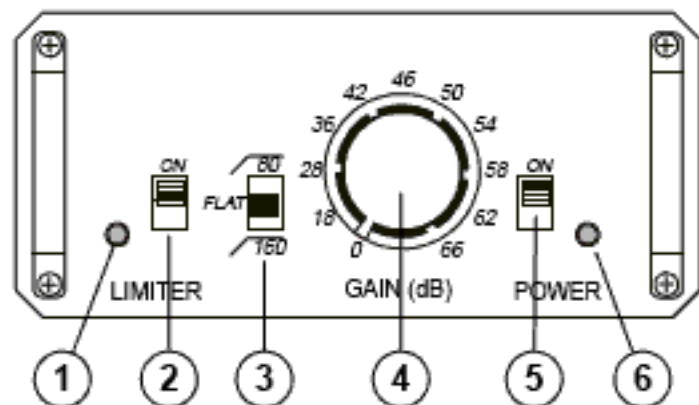
### Certification

Meets FCC Part 15 Class B, Eligible to bear CE mark (see conformance statement)



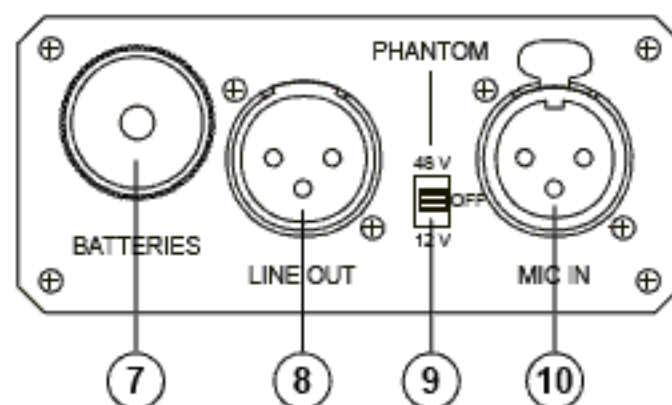
FREQUENCY RESPONSE

Figure 1



FREQUENCY RESPONSE

Figure 2



## Front Panel Controls and Indicators

- LIMITER/Peak LED**  
Bi-color LED illuminates amber to indicate limiter activity; illuminates red at 3 dB below clipping.
- LIMITER Switch**  
Activates the peak limiter. Limits to +17 dBu output.
- High Pass Filter Switch**  
Three-position switch inserts an 80 Hz or 160 Hz corner frequency filter, 6 dB per octave. Center position of switch removes the filter from the signal path.
- Rotary GAIN Switch**  
Selects the amount of gain from input to output, adjustable in 11 increments.
- POWER Switch**  
Powers the unit when switch is in the up position.
- POWER LED**  
Bi-color LED illuminates green when the unit is powered and changes to red when approximately four hours of battery life remain.

## Back Panel Connectors and Controls

- Battery Compartment**  
Requires two AA batteries for operation. Insert positive (+) end of battery first.
- LINE OUT**  
Transformer balanced XLR line-level output. +22 dBu peak output level.
- PHANTOM Power Switch**  
Three-position switch selects either 48-volt or 12-volt phantom power. Center position turns phantom power off.
- MIC IN**  
Transformer-balanced XLR input accepts microphone level signals.

## Operational Notes

### Transformers

The FP23 uses input and output transformers with premium magnetic core material to achieve high signal handling capability, especially at low frequencies. This keeps distortion to a minimum.

Transformers offer superior isolation from the adverse and uncontrolled environments of field production. Unlike other balancing techniques, transformers “transform” signals magnetically without any direct electrical connection, providing complete galvanic isolation from the driving source. And their inherently high common mode impedance provides exceptional common-mode noise rejection.

### Balanced and Unbalanced Connections

Both the input and output of the FP23 accept balanced or unbalanced connections. You can convert either the input or output to unbalanced operation by grounding pin 3 to pin 1. No change in gain will occur.

### Phantom Power

Use one of the two phantom power settings on the FP23 for microphones that require it. Some microphones need the 48-volt setting, or they will suffer a loss of headroom and an increase in distortion. The 12-volt setting, however, lengthens battery life, and electret-condenser microphones rated for operation at 12 V or less generally receive no performance benefit from the 48-volt setting. Consult your microphone documentation.

Dynamic microphones do not require phantom power. A properly connected balanced, dynamic microphone is not affected by the presence of phantom power and does not draw any current. However, poorly or incorrectly wired microphone cable can cause audible artifacts in the microphone signal (phantom power can be an excellent cable tester). It is good practice to turn phantom power off when not needed.

### High Pass Filter

Use either of the two high pass (low cut) filter settings on the FP23 to remove excess low frequency energy in the audio signal. Use the 80 Hz position for most applications, such as recording speech, music, and ambient sound. The 160 Hz position is useful for enhancing speech clarity. The high pass filter is a single pole design, 6 dB per octave.

When possible, equalize at the sound source with microphone selection, placement, use of a windscreen, and onboard microphone filtering. A high pass filter on the microphone and a high pass filter on the FP23 gives an additive effect, increasing the slope of the filter.

### Limiters

The limiter switch on the front panel activates two peak-responding limiters within the FP23. The first acts on the input signal, while the second one limits the output to +17 dBu. This enables the FP23 to limit in excess of 50 dB, making it very difficult to clip the unit, regardless of the gain setting. The limiter LED on the front panel illuminates in proportion to the amount of limiting.

### Batteries

Two AA alkaline cells can power the FP23 for approximately 26 hours (with typical signals, phantom power OFF). The audio performance of the FP23 does not vary throughout the life of the batteries.

Many factors affect battery life, including battery chemistry, ambient temperature of operation, phantom voltage, microphone current draw, and output drive level. Use the chart below to estimate battery life. Experimentation can help determine the battery life for each individual setup.

**NOTE:** Nickel-Cadmium batteries are not recommended. These batteries have lower energy per cell than other types and result in very short service.

<i>Battery Type</i>	<i>Microphone Type</i>	<i>Battery Life</i>
Duracell AA MN 1500	Dynamic handheld	26 hrs.
Duracell AA MN 1500	Electret condenser, 12-volt phantom	18 hrs.
Duracell AA MN 1500	Studio condenser, 48-volt phantom	5 hrs.
(Test conditions: 70 degrees F, 42 dB of gain with an acoustic music source, 600 Ω load, +4 dBu output)		

# Certification

Authorized under the DECLARATION OF CONFORMITY provision of FCC part 15 as a Class B digital device. Tested to comply with FCC standards. FOR HOME OR OFFICE USE. This product complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by Shure Incorporated could void your authority to operate this equipment.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

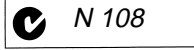
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

This class B digital apparatus complies with Canadian ICES-003.

Eligible to bear CE marking.

Conforms to European EMC directive 89/336/EEC: Professional Audio Products Standard EN 55103 (1996); Part 1 (emissions) and Part 2 (immunity). The FP23 is intended for use in environments E1 (residential) and E2 (light industrial) as defined in European EMC standard EN 55103. It meets the applicable tests and performance criteria found in the standard for these environments. EMC conformance is based on the use of shielded interconnecting cables.



# Limited One-year Warranty

Shure Incorporated ("Shure") hereby warrants that this product will be free from defects in materials and workmanship for a period of one year from the date of purchase. At its option Shure will repair or replace the defective product and promptly return it to you, or refund the purchase price. You should retain proof of purchase to validate the purchase date and return it with any warranty claim.

If you believe this product is defective within the warranty period, carefully repack the unit, insure it, and return it postage prepaid to:

Shure Incorporated  
Attention: Service Department  
222 Hartrey Avenue  
Evanston, Illinois 60202-3696 U.S.A.

Outside the United States, return the product to your dealer or Authorized Service Center.

This warranty does not apply in cases of abuse or misuse of the product, use contrary to Shure's instruction, or unauthorized repair. All implied WARRANTIES OF MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE are hereby disclaimed and Shure hereby disclaims liability for incidental, special, or consequential damages resulting from the use or unavailability of this product.

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

# FCC Declaration of Conformity

We of

Shure Incorporated  
222 Hartrey Ave.  
Evanston IL 60202-3696 U.S.A.  
847-866-2200

declare under our sole responsibility that the following product,

Model: FP23      Name: FP23 Microphone Preamplifier

was tested and found to comply with Part 15 of the FCC rules.

Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Testing was completed by the following NVLAP or A2LA accredited laboratory:

L.S. Compliance, Inc.  
W66 N220 Commerce Court  
Cedarburg, Wisconsin 53012  
Telephone 262-375-4400  
Fax 262-375-4248

Shure Incorporated, Manufacturer.

Signed:  Date: May 15, 2000

Name, Title: Craig Kozokar, Project Engineer, EMC



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