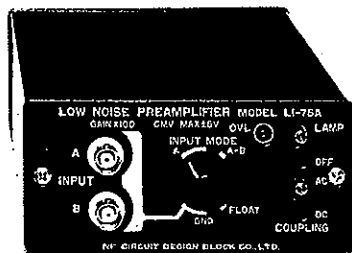
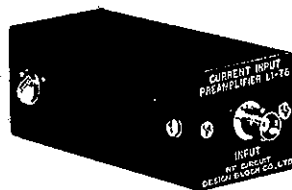


MODEL LI-75A Low-noise Pre amplifier**MODEL LI-76** Current-input Pre amplifier**MODEL PS-70A** DC Power Source

The LI-75A is a pre amplifier designed to increase the sensitivity of the models in the NF Lock-in Amplifier LI Series. It has a gain of 40dB (x100); a differential type input terminal; input impedance of 100M Ω ; maximum output voltage of $\pm 10V$; a wide frequency range from DC to 1MHz; and a noise level (shorted input) down to $1.2nV/\sqrt{Hz}$ (at 1kHz, the typical value converted at the input terminal).

It might be noted that in order to use this model with the LI series lock-in amplifiers other than the LI-570, and LI-575, it is necessary to use the separate DC power source of the PS-70A.

The LI-76 is a current-input pre amplifier which converts signals from photomultipliers, PIN diodes, and similar sources into voltage signals and feeds them to lock-in amplifiers. It has a high sensitivity, low input impedance (refer to Fig. 9); three-step gain selection: 10^4 , 10^6 , and 10^8 (V/A); and a noise level (opened input) down to 1.3×10^{-14} A/ \sqrt{Hz} .

The LI-76 with its completely shielded midget single unit construction can be used in close proximity to photomultipliers, PIN diodes, and other similar sensors. It can also operate on power supplied by a built-in battery.

When using the LI-76 in combination with the LI series lock-in amplifiers other than the LI-570 and LI-575 — while feeding from an AC line — it is

necessary that the PS-70A supply insulated DC.

The PS-70A supplies DC power ($\pm 20V$, 150mA) and can be used with such pre amplifiers as the LI-75A, -76, and similar units — its output terminals are insulated from both the input line and casing.

Features

The LI-75A

- Extremely low noise level: $1.2nV/\sqrt{Hz}$ (Typ)
- Common mode rejection ratio: 120dB
- Wide frequency range: DC to 1MHz
- High input impedance: 100M Ω
- Dynamic range exceeding 150dB (in terms of 1Hz)
- Overload alarm lamp

The LI-76

- Low noise level: 1.3×10^{-14} A/ \sqrt{Hz}
- Low input impedance: less than 10 Ω
- Midget type and operable on battery power

The PS-70A

- Insulated output terminals

SPECIFICATIONS

The LI-75A

(Unless otherwise specified, specifications are when the input coupling is switched over to DC input.) -

1. Input	
Selection of input coupling	AC or DC
Input terminal	Balanced: 2-BNC connectors Unbalanced: BNC connector selected by switch
Input impedance	100M Ω ; paralleled less than 50pF; AC coupling capacity: 0.015 μ F
Common mode input voltage	\pm 5V (DC to 100Hz); refer to Fig. 1
Common mode rejection ratio	120dB (DC to 100Hz); refer to Fig. 2
Noise level referred to input	2nV/ \sqrt Hz (1kHz) with input terminal shorted; refer to Figs. 3 and 4
Offset voltage input terminal	Adjustable to zero; drift referred to 10 μ V/ $^{\circ}$ C (TYP)
Allowable maximum input voltage	DC coupling: \pm 15V AC coupling: \pm 100VDC, \pm 15VAC
2. Output	
Output terminal	Unbalanced BNC connector
Maximum output voltage	\pm 10V (into 2k Ω load, DC to 200kHz) refer to Fig. 5
Output impedance	Approx. 50 Ω (1kHz)
3. Input/Output performances	
Voltage gain	40dB (100-fold) \pm 1% (400Hz); refer to Fig. 6
Voltage gain frequency response	DC coupling : DC to 1MHz (+1, -3) dB AC coupling : 0.2Hz to 1MHz (+1, -3) dB
Harmonic distortion	Less than 0.03% (1kHz, output voltage of 5Vrms); refer to Fig. 7
4. Power requirement input	
\pm 20 to 24VDC, 40mA	
5. Outside dimensions, Net weight	
120(W) x 55(H) x 200(D) mm (4.7 x 1.9 x 7.8 inch) without projections, 1.15kg 2.5lbs	

The LI-76

1. Input		Unbalanced current input; BNC connector		
Maximum allowable input voltage		\pm 50V		
2. Output		Unbalanced BNC connector		
Maximum output voltage		\pm 2V (into 10k Ω load)		
Output impedance		Approx. 600 Ω		
3. Gain (100Hz, and load is more than 10kΩ)		10 ⁸ (V/A) \pm 2%	10 ⁶ (V/A) \pm 1%	10 ⁴ (V/A) \pm 1%
4. Input impedance (1kHz) Typ.		100k Ω	1k Ω	10 Ω
5. Recommended source impedance (paralleled capacity)		Less than 1M Ω More than 220pF	Less than 10k Ω More than 220pF	Less than 1k Ω More than 220pF
6. Gain frequency response (\pm1dB); refer to Fig. 8		DC to 2kHz	DC to 20kHz	DC to 100kHz
7. Noise level referred to input (\sqrtHz with opened input terminal)		1.3 x 10 ⁻¹⁴ Arms	1.3 x 10 ⁻¹³ Arms	2 x 10 ⁻¹² Arms
8. Power requirements				
Built-in battery		One S-006P battery with a life of at least 100 hours		
External power requirements		Insulated DC of 10 to 20V (over 10mA); Use of the PS-70A is recommended.		
9. Dimensions, Net weight		45(W) x 40(H) x 105(D) mm (1.7 x 1.5 x 3.5 inch) without projections, 310g 0.7lb		

The PS-70A

1. Input		100VAC \pm 10%, 50/60Hz, Approx. 15VA
2. Output		
Voltage		\pm 20V \pm 3%
Maximum current		\pm 150mA
Ripple		Less than 10mVp-p
3. Insulation to withstand voltage		
Gathered input cables vs casing		
Insulation		100M Ω /500VDC
Withstand voltage		1,500VAC/1 min.
Gathered output cables vs casing		
Insulation		100M Ω /50VDC
Withstand voltage		100VDC/1 min.

4. Temperature/humidity range	
Operation	0° ~ +40°C, 10 ~ 90% RH
Storage	-10° ~ +60°C, 10 ~ 80% RH
5. Outside dimensions, Net weight	
120(W) x 55(H) x 200(D) mm (4.7 x 1.9 x 7.8 inch) without projections, 1.6kg 3.5lbs	

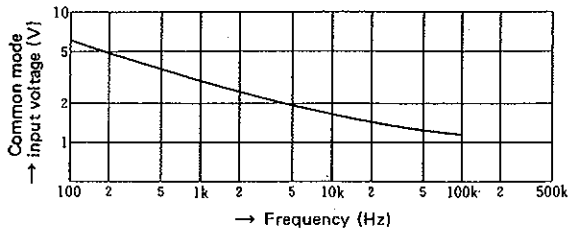


Fig. 1 LI-75A Common Mode Input Voltage Frequency Characteristic

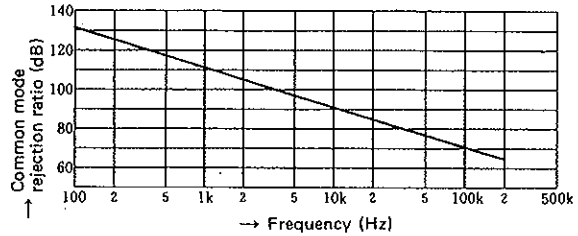


Fig. 2 LI-75A Common Mode Rejection Ratio Frequency Characteristic

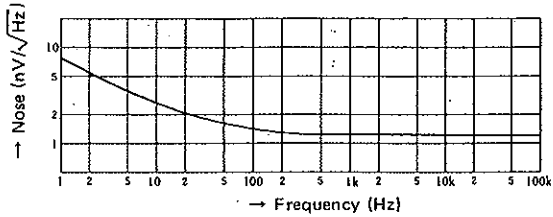


Fig. 3 LI-75A Noise Voltage in Terms of Input Terminal Frequency Characteristic

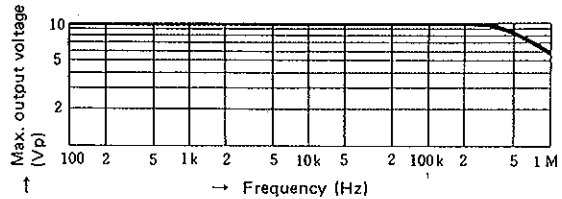


Fig. 5 LI-75A Frequency Characteristic of Max. Output Voltage

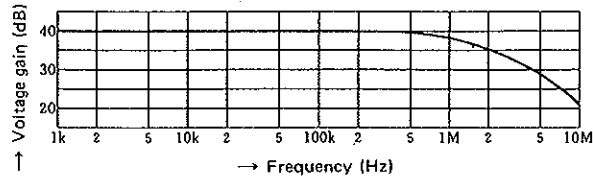


Fig. 6 LI-75A Voltage Gain-Frequency Characteristic

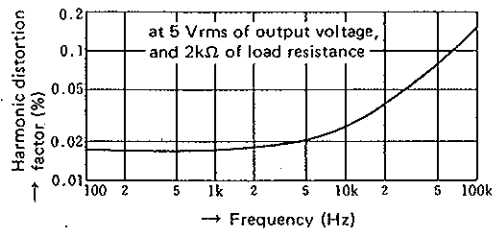


Fig. 7 LI-75A Harmonic Distortion Factor-Frequency Characteristic

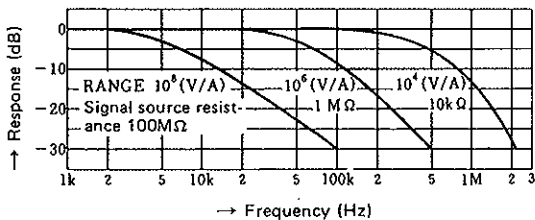


Fig. 8 LI-76 Gain-Frequency Characteristic (Hz)

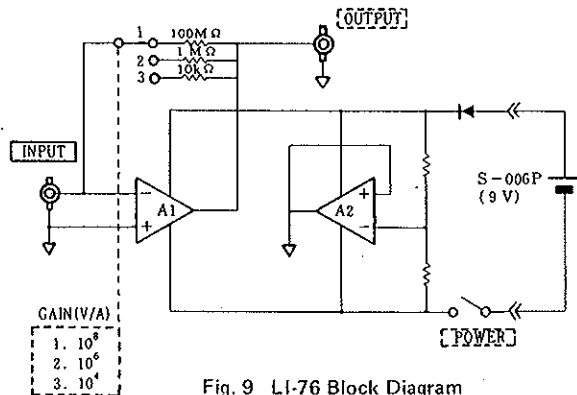


Fig. 9 LI-76 Block Diagram

Fig.4 LI-75A Typical Noise Figure Contours at 290K

