



LA7286

VCR Audio Signal Recording and Playback Processor

Functions

- Equalizer amplifier
- Line amplifier
- Recording amplifier
- Recording bias current automatic adjustment circuit
- Ripple filter
- Mute
- ALC
- Recording/playback switch
- SP, LP, EP switch
- Tape head switch

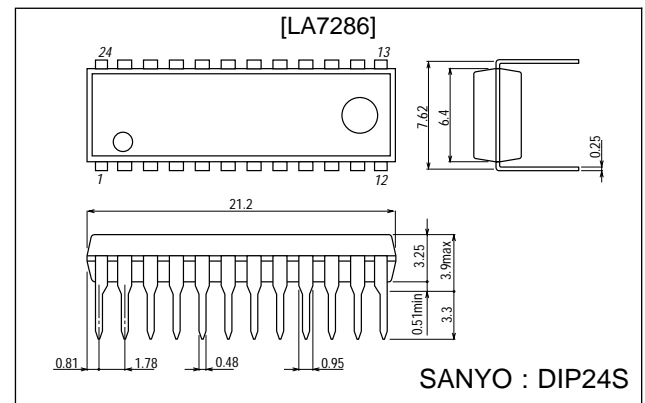
Features

- No adjustment of recording bias current required (due to adoption of automatic adjustment circuit).
- Recording bias oscillation circuit power supply switch on chip.
- Eliminates need for choke coil for recording equalizer.
- Playback amplifier equivalent input noise voltage: 1.0 μ Vrms.

Package Dimensions

unit : mm

3067-DIP24S



- Reduced capacitance (3.3 μ F) of ALC detection capacitor.
- High withstand voltage head switch on chip.
- Supply voltage: 9 V and 12 V operation.

Specifications

Maximum Ratings at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CCmax}		14	V
Pin 2 input voltages	V_{IN2}	DC	± 65	Vp-p
Pin 2 input current	I_{IN2}		± 1.5	mA
Allowable power dissipation	P_{dmax}	$T_a \leq 65$ °C	500	mW
Operating temperature	T_{opr}		-10 to +65	°C
Storage temperature	T_{stg}		-55 to +150	°C

Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		9, 12	V
Operating supply voltage range	V_{CCop}		8.5 to 12.5	V

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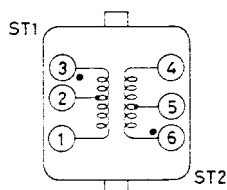
Operating Characteristics at Ta = 25 °C, V_{CC} = 12 V, f = 1 kHz, 0 dBV : 1.0 Vrms

Parameter	Symbol	Conditions	min	typ	max	Unit
Current consumption (EE)	I _{CCE}	No signal	9.5	12.0	14.5	mA
Current consumption (PB)	I _{CCP}	No signal	8.5	11.0	13.5	mA
Current consumption (REC)	I _{CCR}	No signal	8.5	10.5	12.5	mA
[Equalizer amplifier]						
Open-circuit voltage gain	V _{G_{OE}}	V _O = -6 dBV	58.4	64.4		dB
Equivalent input noise voltage	V _{NIE}	R _g = 620 Ω, DIN Audio filter		1.0	1.8	μVrms
[Line amplifier]						
Voltage gain (PB input)	V _{G_{LP}}	V _O = -6 dBV	21.0	21.5	22.0	dB
Voltage gain (LINE input)	V _{G_{LR}}	V _O = -6 dBV	21.0	21.5	22.0	dB
Total harmonic distortion	THD _L	V _O = -6 dBV		0.05	0.3	%
Output noise voltage	V _{NOL}	R _g = 1 kΩ, DIN Audio filter		-80.0	-74.0	dBV
Maximum output voltage	V _{OML}	THD = 1%	1.7	2.5		Vrms
Output voltage when ALC is on	V _{OA}	V _{IN} = -26 dBV	-7.0	-6.0	-5.0	dBV
ALC effect	ALC	V _{IN} = -26 dBV to -6 dBV		1	3	dB
Distortion when ALC is on	THD _A	V _{IN} = -26 dBV		0.05	0.6	%
[Recording amplifier]						
Voltage gain	V _{G_{CR}}	V _O = -6 dBV	13.5	14.0	14.5	dB
Total harmonic distortion	THD _R	V _O = -6 dBV		0.05	0.3	%
Maximum output voltage	V _{OMR}	THD = 1%	1.7	2.5		Vrms
[Mute circuit]						
On voltage	V _{MON}	Pin 22 DC voltage	2.5		6.0	V
Off voltage	V _{MOFF}	Pin 22 DC voltage	0		1.5	V
Mute attenuation (PB, EE)	M _P , M _E		80	90		dB
[EP, LP, SP switch circuit]						
EP mode hold voltage	V _{EE}	Pin 21 DC voltage	3.6		6.0	V
LP mode hold voltage	V _{EL}	Pin 21 DC voltage	1.8		2.6	V
SP mode hold voltage	V _{ES}	Pin 21 DC voltage	0		1	V
[EE, PB switch circuit]						
EE mode hold voltage	V _{LL}	Pin 23 DC voltage	3		6	V
PB mode hold voltage	V _{LP}	Pin 23 DC voltage	0		1	V
[REC, EE switch circuit]						
REC mode hold voltage	V _{RR}	Pin 24 DC voltage	3		6	V
EE mode hold voltage	V _{RE}	Pin 24 DC voltage	0		1	V
[Switch]						
Pin 2 on resistance	R _{ON2}	I ₂ = ±1 mA		10	25	Ω
Pin 2 input voltage	V _{IN2}	Ta = 65 °C, f = 80 kHz (sin), I _{LK} = 10 μA			±45	V
[Recording bias current automatic adjustment circuit]						
Recording bias current	I _B	The conditions for using each head assume the specifications shown below.	220	245	270	μA
Pin 1 output control range	V _{CTL}		2.5	4.0	6.0	V

Head Coil Specifications

(1) Application circuit 1 (erase head series type)

- R/P Head 58 kΩ (typ) +15% (f = 70kHz)
 -15%
- AE Head 34 Ω (typ) +25% (f = 70kHz)
 -25%
- FE Head 80 Ω (typ) +20% (f = 70kHz)
 -10%
- OSC Coil: Model name 7QM3, Prototype No. C-14290, Tokyo Parts Ind. Co., Ltd. Tel = 0270-25-1191

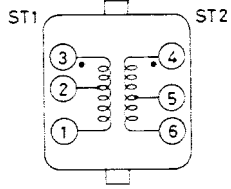


Pin No.	3 to 2	2 to 1	6 to 5	5 to 4
Wire type	2UEW 0.09	←	←	←
Total number of coils	32T	20T	180T	25T

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(2) Application circuit 2 (erase head parallel type)

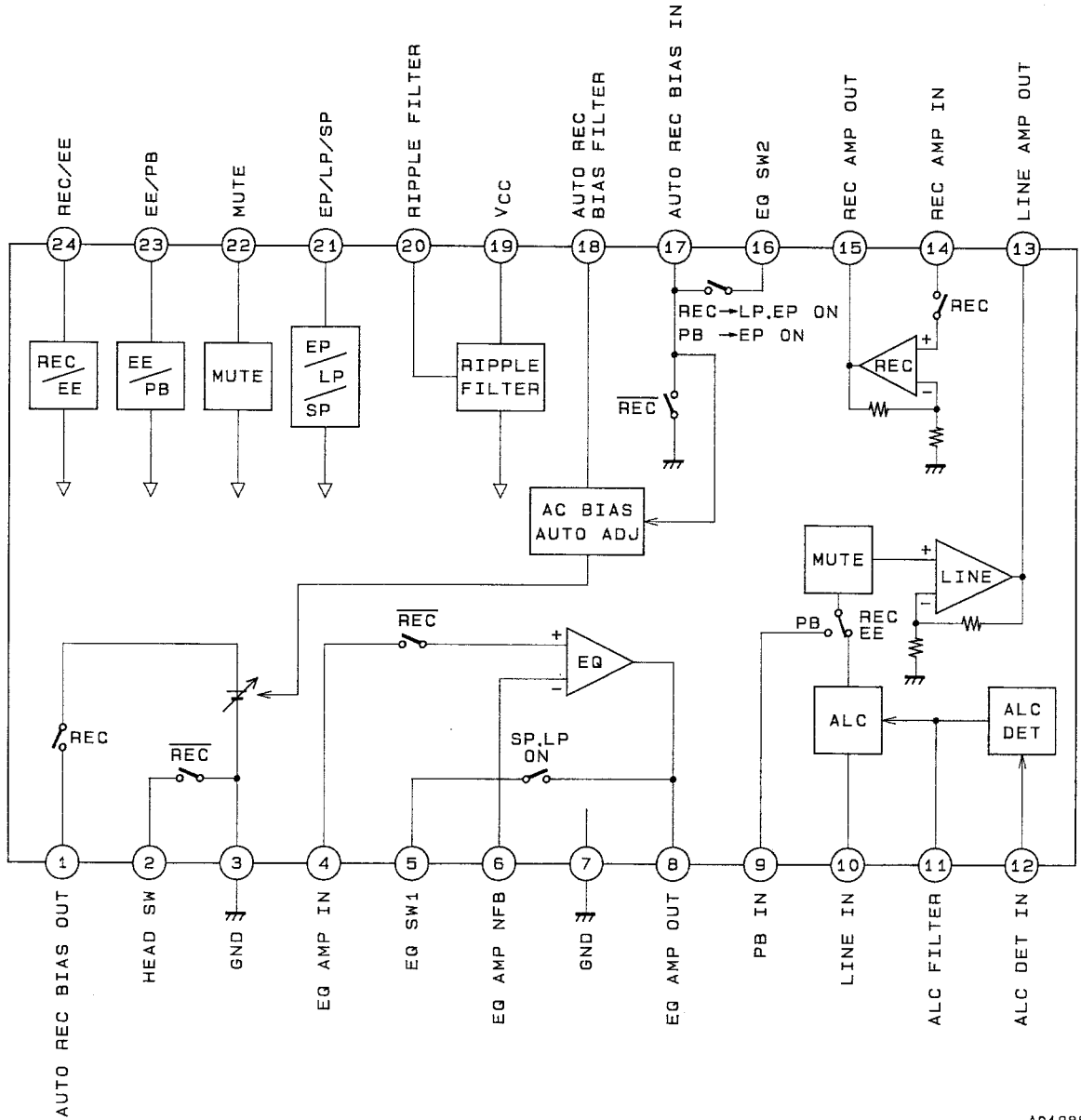
- R/P Head 58 k Ω (typ) +10% (f = 70kHz)
 -20%
- AE Head 180 Ω (typ) +25% (f = 70kHz)
 -5%
- FE Head 80 Ω (typ) +20% (f = 70kHz)
 -20%
- OSC Coil: Model name 7QM3, Prototype No. C-14284, Tokyo Parts Ind. Co., Ltd.



Pin No.	3 to 2	2 to 1	4 to 5	5 to 6
Wire type	2UEW 0.10	←	←	←
Total number of coils	15T	25T	110T	30T

* The head specifications are as agreed upon by Alps Electric and Sanyo.

Block Diagram

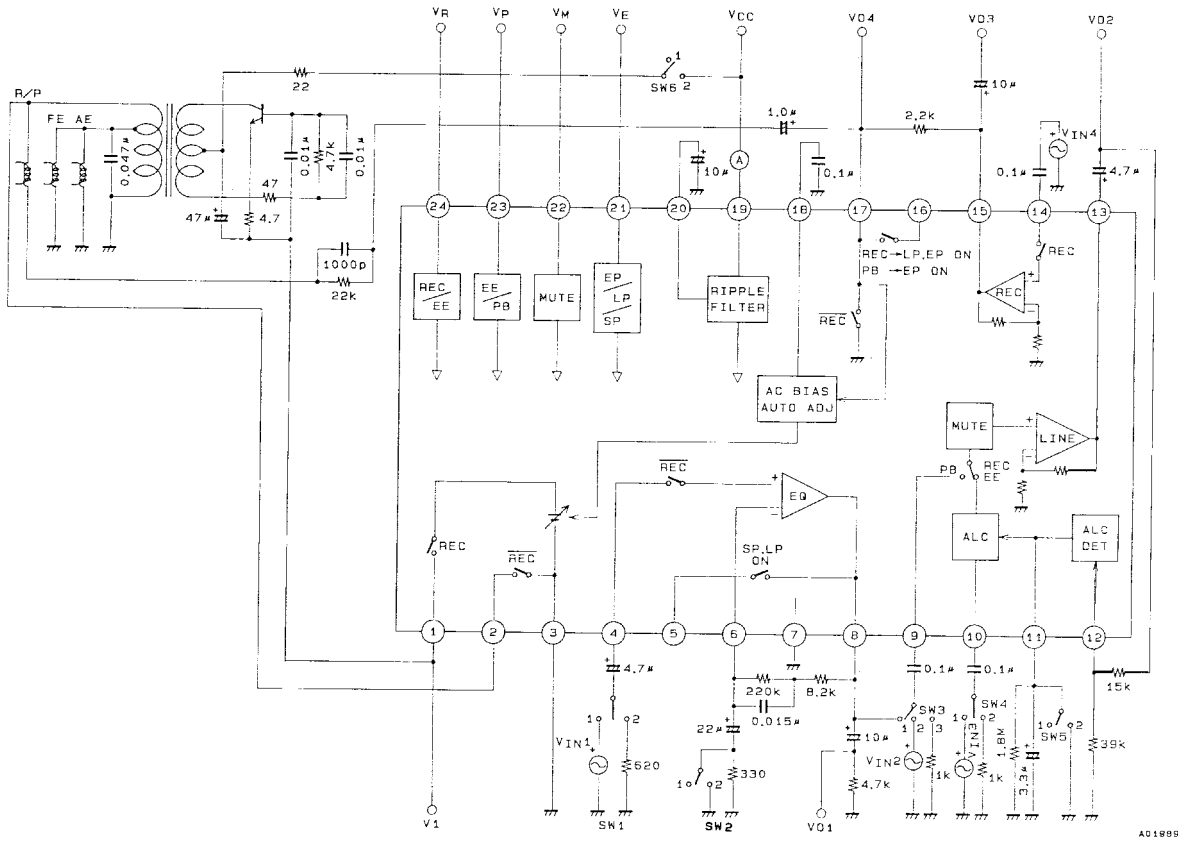


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Test Circuit

Unit (resistance: Ω , capacitance: F)



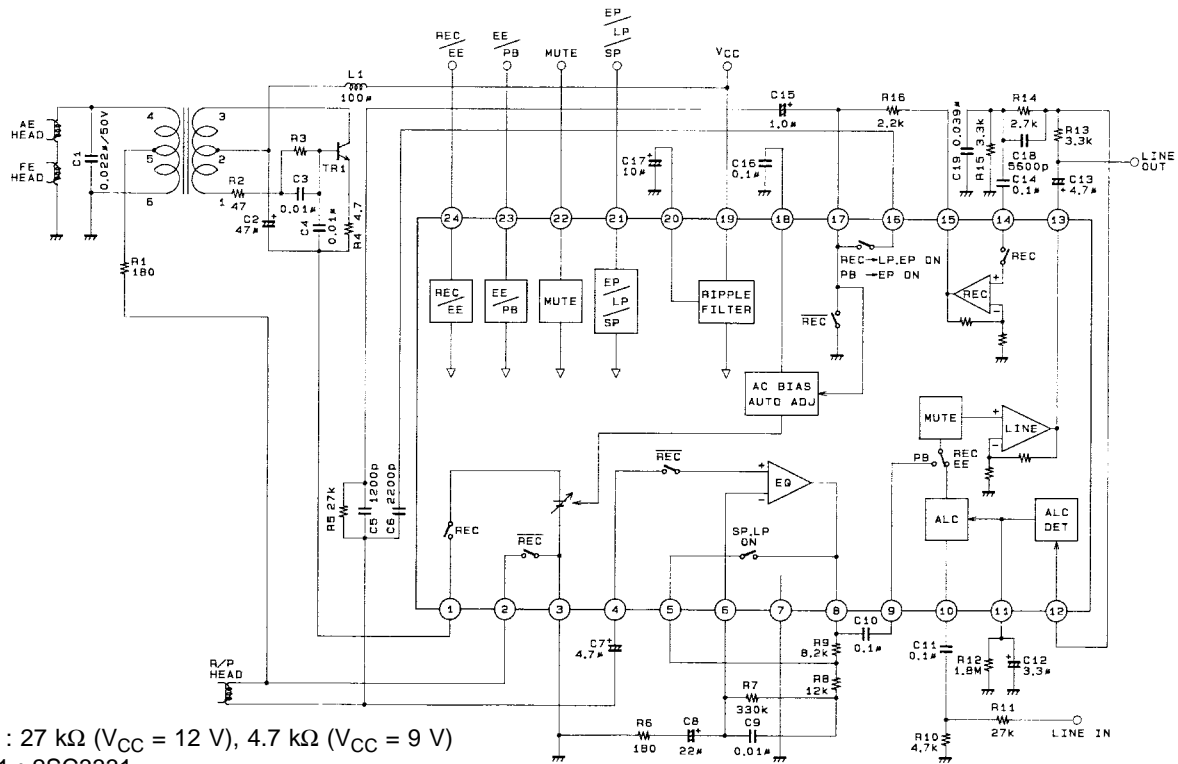
Switch Operation Table

Test item (symbol)	SW1	SW2	SW3	SW4	SW5	SW6	V _M	V _P	V _R	Input	Measure:
I _{CCE}	2	1	3	2	2	1	GND	5 V	GND	—	I _O
I _{CCP}	2	1	3	2	2	1	GND	GND	GND	—	I _O
I _{CCR}	2	1	3	2	2	1	GND	5 V	5 V	—	I _O
V _{GOE}	1	2	3	2	2	1	GND	GND	GND	V _{IN1}	V _{O1}
V _{INE}	2	1	3	2	2	1	GND	GND	GND	—	V _{O1}
V _{GLP} , THD _L , V _{MOL}	2	1	2	2	2	1	GND	GND	GND	V _{IN2}	V _{O2}
V _{GLR}	2	1	3	1	2	1	GND	5 V	GND	V _{IN3}	V _{O2}
V _{ONL}	2	1	3	2	2	1	GND	5 V	GND	—	V _{O2}
V _{OA} , ALC, THD _A	2	1	3	1	1	1	GND	5 V	GND	V _{IN3}	V _{O2}
V _{GR} , THD _R , V _{MOR}	2	1	3	2	2	1	GND	5 V	5 V	V _{IN4}	V _{O3}
M _P	1	1	1	2	2	1	5 V	GND	GND	V _{IN1}	V _{O2}
M _E	2	1	3	1	2	1	5 V	5 V	GND	V _{IN3}	V _{O2}
V _{BIAS}	2	1	3	2	2	2	GND	5 V	5 V	—	V _{O4}
V _{CTL}	2	1	3	2	2	2	GND	5 V	5 V	—	V ₁

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Sample Application Circuit : Erase head series type

Unit (resistance: Ω , capacitance: F)

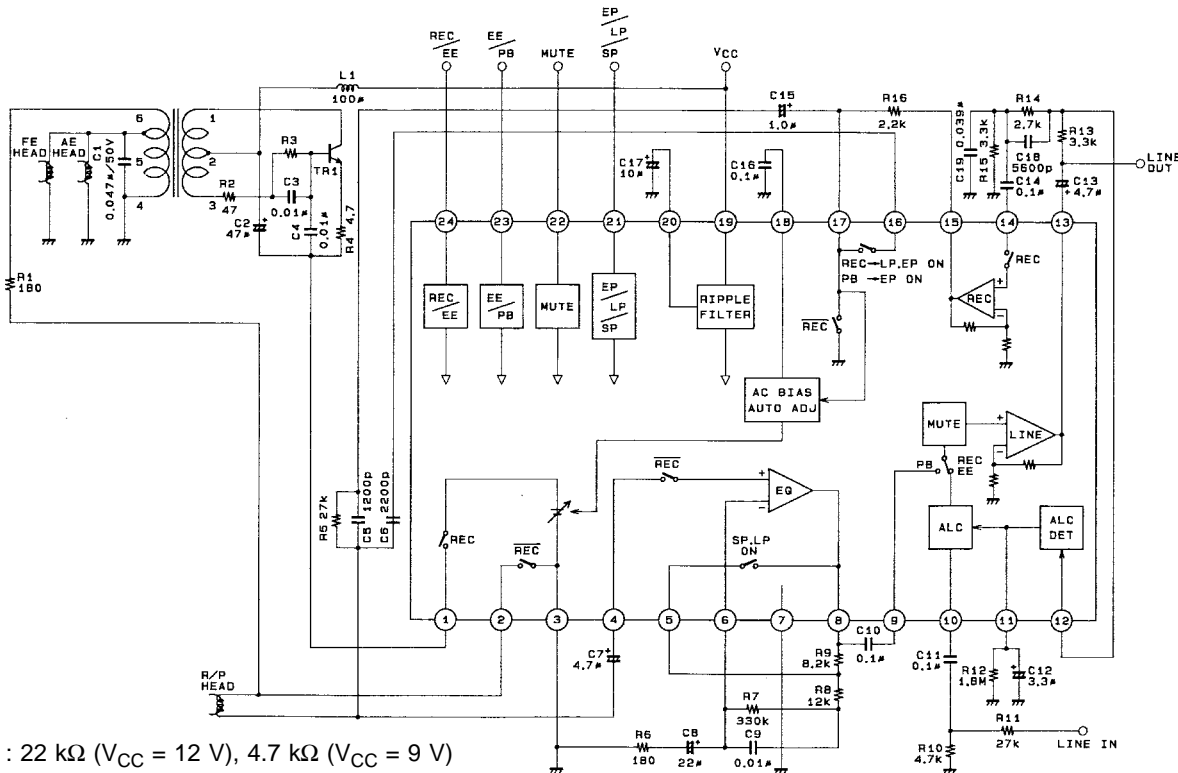


- * R3 : 27 k Ω ($V_{CC} = 12 V$), 4.7 k Ω ($V_{CC} = 9 V$)
- * TR1 : 2SC3331

A01990

Sample Application Circuit : Erase head parallel type

Unit (resistance: Ω , capacitance: F)



- * R3 : 22 k Ω ($V_{CC} = 12 V$), 4.7 k Ω ($V_{CC} = 9 V$)
- * TR1 : 2SC3331

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Pin Functions

Unit (resistance: Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
1	Recording bias automatic control output		EE, PB \rightarrow off REC \rightarrow control voltage
2	Head switch (high withstand voltage)		EE, PB \rightarrow on REC \rightarrow off On resistance \rightarrow 10 Ω (typ) Withstand voltage when off \rightarrow \pm 45 V (f = 80 kHz)
3	GND		GND for pin 2 head switch and Equalizer Amplifier only
4	EQ AMP input		Input impedance for playback signal input from head \rightarrow 120 k Ω (typ)
5	EQ switch 1		Switches the Playback Equalizer Amplifier high-region frequency voltage gain. LP, SP \rightarrow on EP \rightarrow off On resistance \rightarrow 20 Ω (typ)
6	EQ AMP NFB		Equalizer Amplifier negative feedback pin
7	GND		GND for all circuit blocks except the pin 2 head switch and Equalizer Amplifier

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Unit (resistance: Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
8	EQ AMP output	<p style="text-align: right;">A01995</p>	Output impedance \rightarrow 50Ω (typ)
9	LINE AMP PB input	<p style="text-align: right;">A01997</p>	Inputs the playback signal from the Equalizer Amplifier. Because the input impedance is as high as $120\text{ k}\Omega$, a $0.1\ \mu\text{F}$ ceramic capacitor can be used for the coupling capacitor on pin 9.
10	LINE AMP LINE input	<p style="text-align: right;">A01998</p>	Inputs EE and REC signals. The reference input is set by resistors R1 and R2. The amplifier gain is fixed at 21.5 dB. In addition, because the input impedance is as high as $120\text{ k}\Omega$, a $0.1\ \mu\text{F}$ ceramic capacitor can be used for the coupling capacitor on pin 10.
11	ALC FILTER	<p style="text-align: right;">A02000</p>	Wave detection is performed when connected to GND through a capacitor. In addition, the attack and recovery time is set by the C and R time constants.
12	ALC input wave detection	<p style="text-align: right;">A02001</p>	Inputs the Line Amplifier output signal. The ALC level is set by the resistors R1 and R2.

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Unit (resistance: Ω)

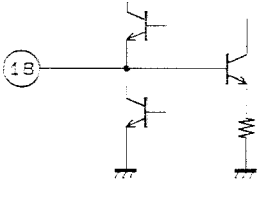
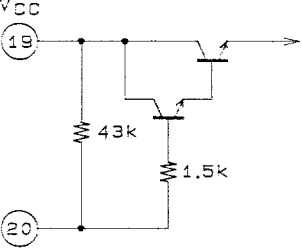
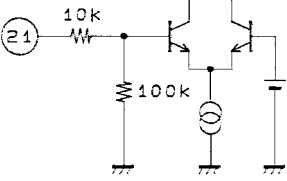
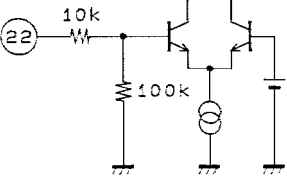
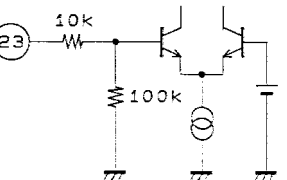
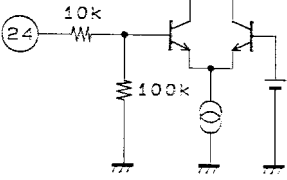
Pin No.	Function name	Internal circuit for pin	Description of function												
13	LINE AMP output		Output impedance \rightarrow 50 Ω (typ)												
14	REC AMP input		<p>Inputs the recording signal from Line Amplifier.</p> <p>The recording current is set by the resistors R1 and R2. In addition, because the input impedance is as high as 120 kΩ, a 0.1 μF ceramic capacitor can be used for the coupling capacitor on pin 14.</p>												
15	REC AMP output		Output impedance \rightarrow 50 Ω (typ)												
16	EQ switch 2		<p>Switches the high-region peaking frequency during recording and playback.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>REC</th> <th>PB</th> </tr> </thead> <tbody> <tr> <td>EP</td> <td>On</td> <td>On</td> </tr> <tr> <td>LP</td> <td>On</td> <td>Off</td> </tr> <tr> <td>SP</td> <td>Off</td> <td>Off</td> </tr> </tbody> </table> <p>On resistance \rightarrow 30 Ω (typ)</p>		REC	PB	EP	On	On	LP	On	Off	SP	Off	Off
	REC	PB													
EP	On	On													
LP	On	Off													
SP	Off	Off													
17	Recording bias automatic control input and PB switch.		<p>EE, PB \rightarrow on REC \rightarrow off On resistance \rightarrow 20 Ω (typ)</p>												

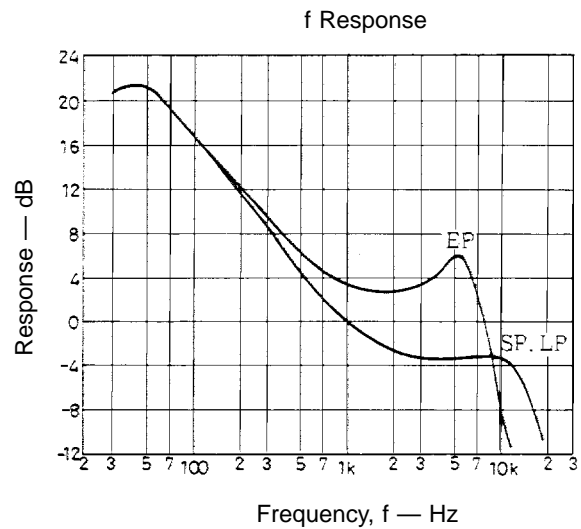
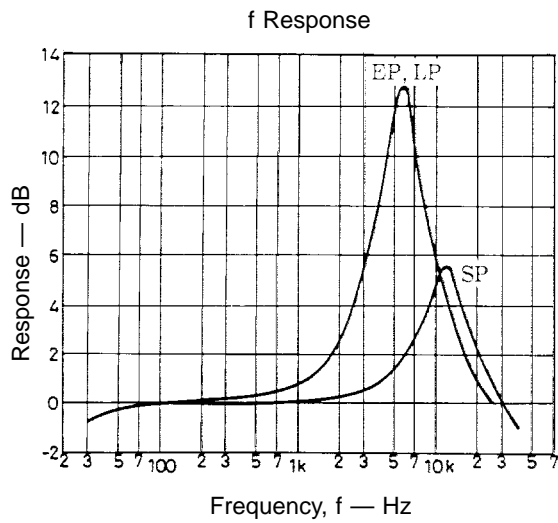
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Unit (resistance: Ω)

Pin No.	Function name	Internal circuit for pin	Description of function												
18	Recording bias automatic control filter	 <p style="text-align: right; font-size: small;">A02009</p>	Wave detection is performed when connected to GND through a capacitor.												
19	Supply voltage (V_{CC})		V_{CC} max = 14 V V_{CC} = 8.5 V to 12.5 V												
20	Ripple filter	 <p style="text-align: right; font-size: small;">A02010</p>	Ripple rejection is performed when connected to GND through an electrolytic capacitor for the filter.												
21	EP/LP/SP Control	 <p style="text-align: right; font-size: small;">A02011</p>	<p>When the voltage on pin 21 is 3.6 V to 6.0 V: EP; when 1.8 V to 2.6 V: LP; when 0 V to 1.0 V: SP</p> <p>Switch On Pin Number</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>REC</th> <th>PB</th> </tr> </thead> <tbody> <tr> <td>EP</td> <td>16</td> <td>16</td> </tr> <tr> <td>LP</td> <td>16, 5</td> <td>5</td> </tr> <tr> <td>SP</td> <td>5</td> <td>5</td> </tr> </tbody> </table>		REC	PB	EP	16	16	LP	16, 5	5	SP	5	5
	REC	PB													
EP	16	16													
LP	16, 5	5													
SP	5	5													
22	MUTE Control	 <p style="text-align: right; font-size: small;">A02012</p>	<p>When the voltage on pin 22 is 2.5 V to 6.0 V: MUTE on; when 0 V to 1.5 V: MUTE off</p>												
23	EE/PB Control	 <p style="text-align: right; font-size: small;">A02013</p>	<p>When the voltage on pin 23 is 3.0 V to 6.0 V: EE; when 0 V to 1.0 V: PB</p>												
24	REC/EE Control	 <p style="text-align: right; font-size: small;">A02014</p>	<p>When the voltage on pin 24 is 3.0 V to 6.0 V: REC; when 0V to 1.0 V: EE</p> <p>However, REC mode is entered only when the voltage on pin 23 is 3.0 V to 6.0 V.</p>												



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