

AN7348K, AN7348S

Dual Record/Playback Pre-amplifier IC for Double Cassette

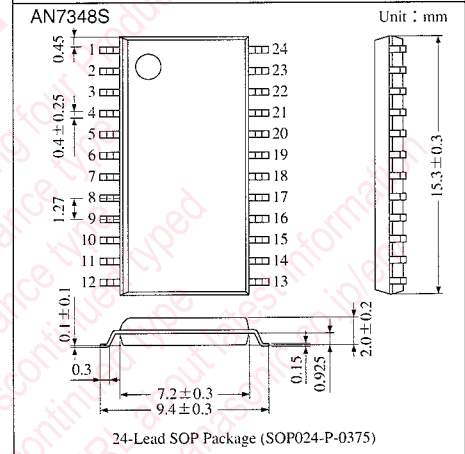
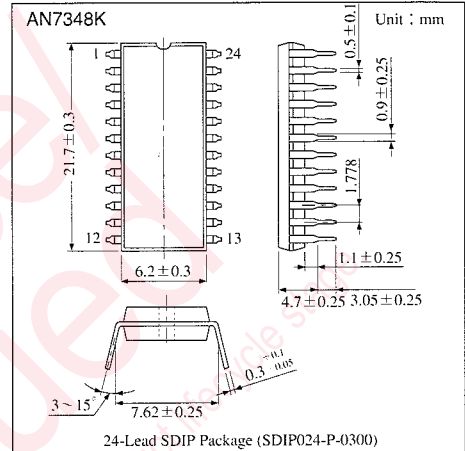
Overview

The AN7348K and AN7348S are dual channel record/playback pre-amplifiers including ALC function developed for double cassette recorder.

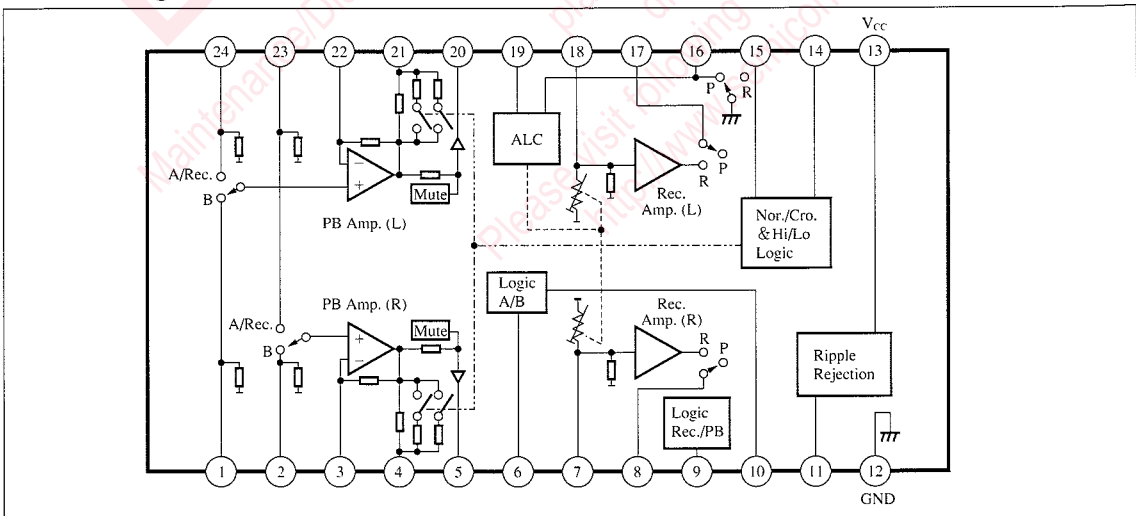
By four pins, Tape A/B, Normal/Chro, Normal/High speed and Record/Playback can be switched.

Features

- PB pre-amplifier supporting Normal/Chrome switching and Normal/High speed switching
- Tape A/B switching, Rec./PB switching supported
- Record pre-amplifier with ALC
- Wide operating supply voltage range : $V_{CC}=3.6$ to $12V$
- FET for head switching not required
- Minimum switching noise
- Protection from EMI



Block Diagram



Pin Description

Pin No.	Pin Name	Pin No.	Pin Name
1	L-ch. PB Amp. Input (B)	13	V _{CC}
2	R-ch. PB Amp. Input (B)	14	Normal/Cro2 Selection
3	R-ch. PB Negative Feedback	15	Hi/Lo Dubbing Selection
4	R-ch. PB Equalizer	16	ALC Time Constant
5	R-ch. PB Output	17	L-ch. REC. Output
6	AB Switching Time Constant	18	L-ch. REC. Input
7	R-ch. REC. Input	19	ALC Low Cut
8	R-ch. REC. Output	20	L-ch. PB Amp. Output
9	REC./PB Selection	21	L-ch. PB Equalizer
10	Tape A/B Selection	22	L-ch. PB Negative Feedback Input
11	Ripple Filter	23	R-ch. PB Amp. Input (A)
12	GND	24	L-ch. PB Amp. Input (A)

Absolute Maximum Ratings (T_a = 25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V _{CC}	13	V
Supply Current	I _{CC}	50	mA
Power Dissipation	P _D	562	mW
Operating Ambient Temperature	T _{opr}	-20 ~ +75	°C
Storage Temperature	T _{stg}	-55 ~ +150	°C

Recommended Operating Range (T_a = 25°C)

Parameter	Symbol	Range
Operating Supply voltage Range	V _{CC}	3.6V ~ 12V

Electrical Characteristics (V_{CC} = 6V, f_{req.} = 1kHz, R_g = 0Ω, BPF = 400Hz to 30kHz, T_a = 25°C ± 2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Consumption Current	I _{CQcc}	V _{in} = 0mV	14	20	28	mA
Playback Amp.						
Closed Loop Gain	G _{VC}	V _O = 0dBV	41	43	45	dB
Total Harmonics Distortion	THD	BPF, V _O = 0dBV	—	0.05	0.1	%
Maximum Output Voltage	V _{Omax.}	THD = 3%, BPF	1.4	1.7	—	V _{rms}
Input Noise	V _{ni}	R _g = 2.2kΩ, Din Audio V _{ni} = V _{no} /G _{VC}	—	1.8	2.5	μV
Open Loop Gain	G _{VO}	V _{in} = 89μV _{rms}	75	81	—	dB
Source Crosstalk	CT _S	R _g = 2.2kΩ on 1 source Din Audio V _{in} = 5.6mV _{rms}	—	-65	-55	dB
Channel Crosstalk	CT _C	R _g = 2.2kΩ on 1 source Din Audio V _{in} = 5.6mV _{rms}	—	-65	-55	dB
Channel Balance	CB	V _{in} = 5.6mV _{rms}	-1.5	0	1.5	dB
Playback EQ						
120μF/70μF Relative Gain	ΔG _{VC1}	V _{in} = 10mV _{rms} , f _{req.} = 10kHz ΔG _{VC} = G _{VC120} - G _{VC70}	4	4.6	5.2	dB
1x/2x Dubbing Relative Gain	ΔG _{VC2}	V _{in} = 22mV _{rms} , f _{req.} = 10kHz ΔG _{VC} = G _{VC1x} - G _{VC2x}	4	4.6	5.2	dB

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■ Electrical Characteristics (Cont.) ($V_{CC}=6V$, $f_{req.}=1kHz$, $R_g=0\Omega$, $BPF=400Hz$ to $30kHz$, $T_a=25^\circ C \pm 2^\circ C$)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Record Amplifier						
Closed Loop Gain	G_{VC3}	$V_{in}=12mV_{rms}$	37	39	42.5	dB
Total Harmonics Distortion	THD	$BPF, V_o=0dBV$	—	0.05	0.17	%
Maximum Output Voltage	$V_{Omax.}$	THD=3%, BPF	1.4	1.8	—	Vrms
Output Noise	V_{no}	$R_g=1.0k\Omega$, Din Audio	—	220	550	μV
Channel Crosstalk	CT_C	$R_g=1.0k\Omega$, Din Audio $V_{in}=8mV_{rms}$	—	-66	-55	dB

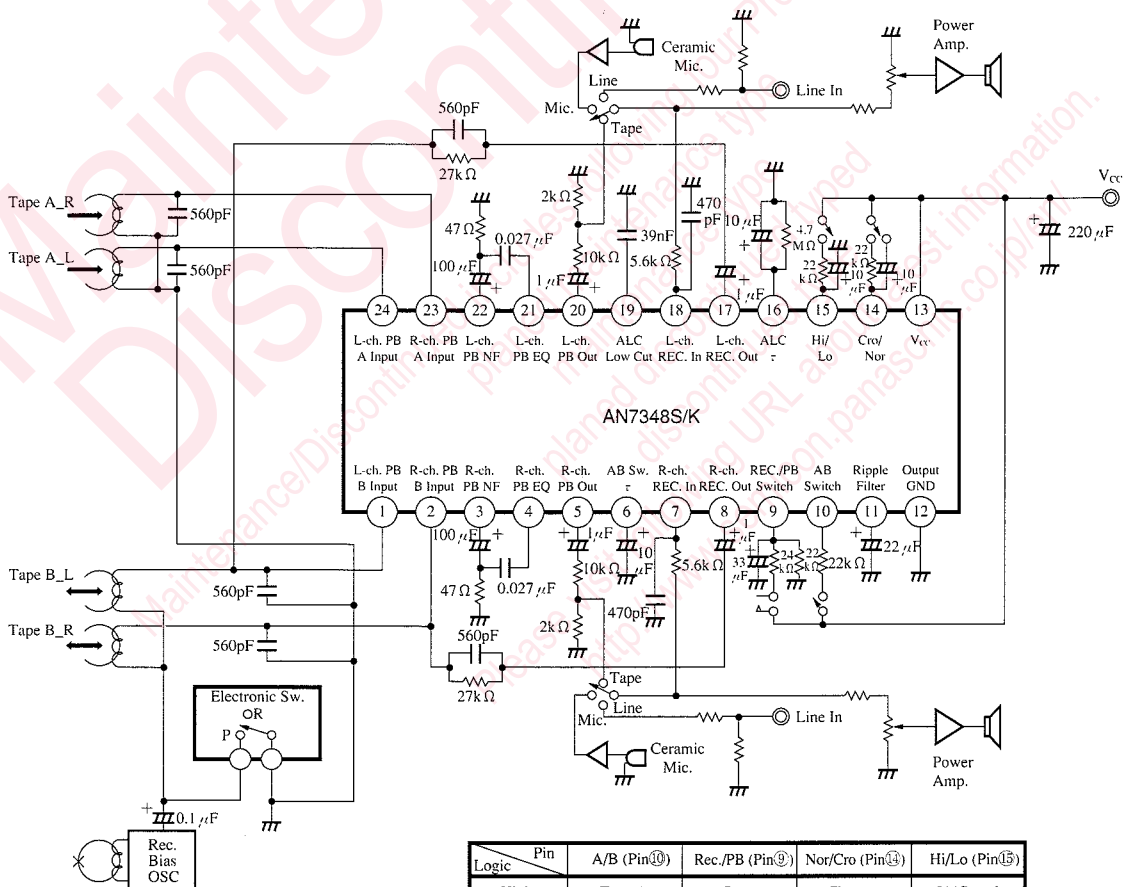
ALC

ALC Voltage	V_{ALC}	$R_{ext}=5.6k\Omega$, Dual i/p $V_{in}=12mV_{rms}$	0.75	1.0	1.37	Vrms
ALC Range	W_{ALC}	$R_{ext}=5.6k\Omega$, from $V_{in}=10mV_{rms}$ to $V_o=+3dB$	35	51	—	dB
ALC Channel Balance	CB_{ALC}	$R_{ext}=5.6k\Omega$, $V_{in}=12mV_{rms}$	-2	0	2	dB

Playback Mode

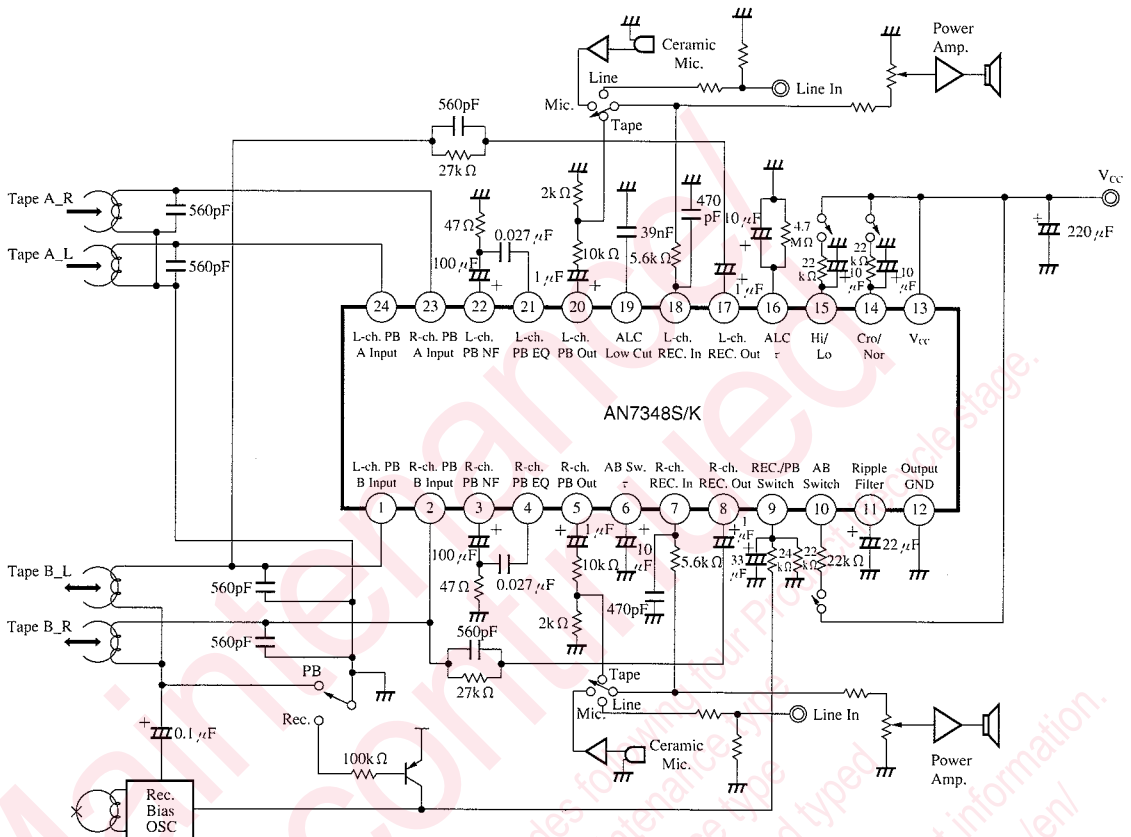
PB to Rec. Crosstalk	CT_{RP}	$V_{in}=12mV_{rms}$ at Rec. i/p ($20\log V_{OPB}/V_{ORec.}$) BPF	—	-88	-70	dB
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■ Application Circuit (1)



Logic	Pin	A/B (Pin⑩)	Rec./PB (Pin⑨)	Nor/Cro (Pin⑬)	Hi/Lo (Pin⑮)
High		Tape A	Rec.	Chrome	2×Speed
Open		Tape B	Playback	Normal	1×Speed
Low		Tape B	Playback	Normal	1×Speed

■ Application Circuit (2)



Logic	Pin	A/B (Pin⑩)	Rec./PB (Pin⑨)	Nor/Cro (Pin⑬)	Hi/Lo (Pin⑮)
High		Tape A	Rec.	Chrome	2× Speed
Open		Tape B	Playback	Normal	1× Speed
Low		Tape B	Playback	Normal	1× Speed

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■ Pin Description

Pin No.	Pin Name	Description	Equivalent Circuit
1, 2, 23, 24	Tape B Input, Tape A Input	Playback Amplifier Input, Input Impedance = 61kΩ, Pin ①, ②, ②③ & ②④ = 0V (PB Mode), Pin ①, ② = 2.1V (Rec. Mode), Pin ②③, ②④ = 0V (Rec. Mode)	
3, 22	PB Amp. NF	Playback Amp. Feedback Loop DC = 0.7V	
4, 21	PB Amp. EQ	PB Equalizer of Nor./Cro. and Hi/Lo Dubbing	
5, 20	PB Amp. Output	Low Output Impedance	
6	AB Sw	Tape A/B switching time constant determined externally DC = 2.8V (Pin ⑩ High) DC = 0.0V (Pin ⑩ Open)	
7, 18	Rec. In	Rec. Amp. Input Pin Input Impedance = 30kΩ	
8, 17	Rec. Out	Rec. Amp. Output Pin DC = 2.6V, Zout = Low (Pin ⑨ High) DC = 0V, Zout = High (Pin ⑨ Open)	
9	Rec. /PB Sw	Select Rec. or PB Mode Sw open /0V PB Mode REC Mode	

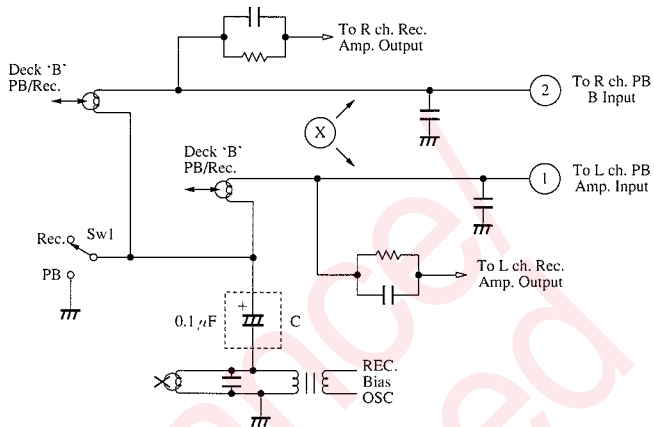
Pin Description

Pin No.	Pin Name	Description	Equivalent Circuit
10	AB Sw	<p>Select Tape A or Tape B</p>	
11	Ripple Filter	<p>Connect it with a capacitor to minimize ripple : DC=4.4V (V_{CC}=6V)</p>	
12	Output GND	_____	_____
13	V _{CC}	Typical 6V, Range : 3.5V to 12V	_____
14	Cro./Nor.	Input to control PB EQ for Chrome or Normal tape	
15	Hi/Lo	<p>Input to control PB EQ for High or Low dubbing</p>	
16	ALC τ	<p>Controls the attack and release time of ALC. DC=1.4V→Rec. mode DC=0V→PB mode</p>	
19	ALC Low Cut	ALC comparator circuit reference voltage	

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Operational Description

1) Dubbing mode



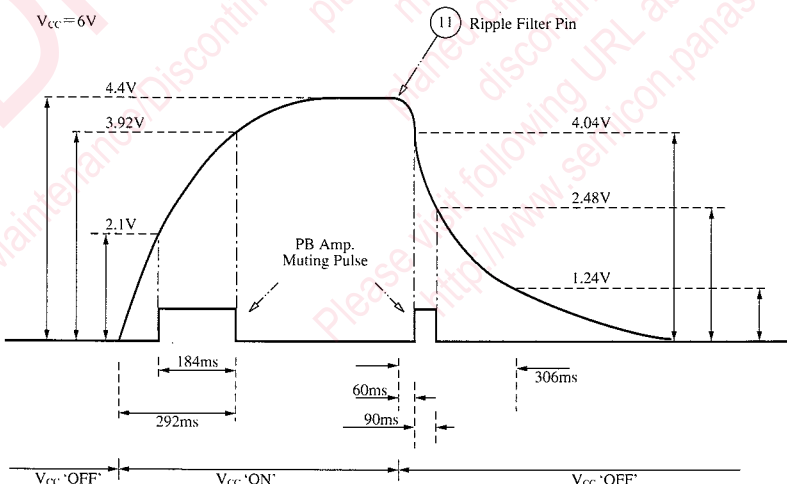
During the dubbing mode, SW1 will be in Rec. position and Point X will be bias at 2.1V internally ($V_{CC}=6V$). This is to ensure enough dynamic swing for the recording signal. Capacitor C is therefore necessary to couple the DC bias at Point X to Rec. bias oscillator. When in playback mode, point X will return to 0V and SW1 is switched to PB position. Capacitor C should be chosen carefully to avoid degradation of the Rec. bias oscillator signal. The recommended value is 0.1 μF .

2) ALC Detector

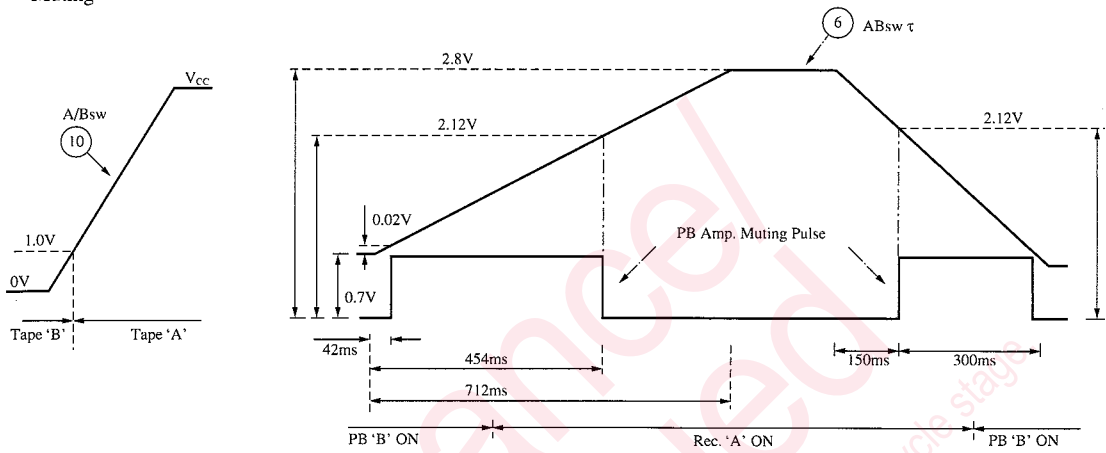
The ALC circuit will be cut off during playback mode. This is achieved internally in the IC by shorting Pin 16 to ground. By choosing various combinations of R and C at Pin 16, the ALC attack and release time can be varied.

3) Muting Time for Playback Amplifier

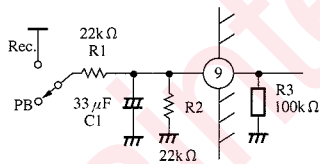
a) Power ON/OFF



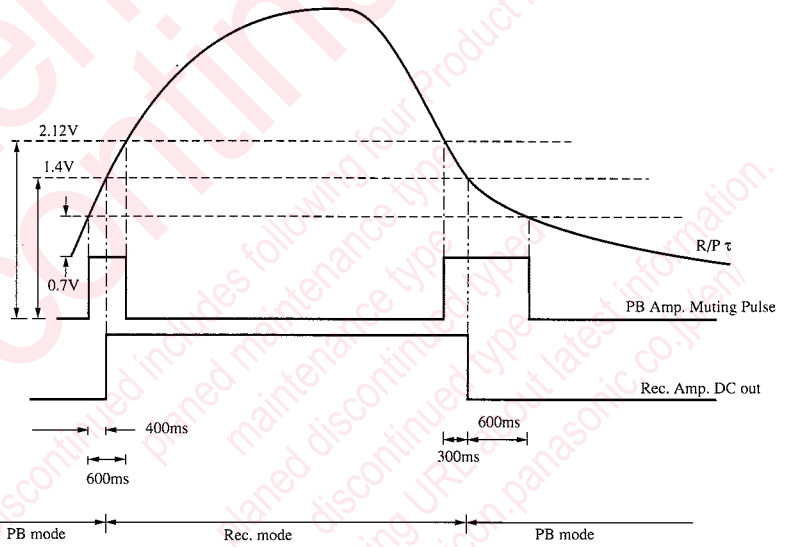
b) A/B Switching Muting



c) R/PB Switching Muting (A/Bsw = 'B' mode)

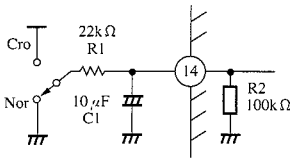


Charging Time $\approx R1 * C1$
 Discharging Time $\approx (R2/R3) * C1$

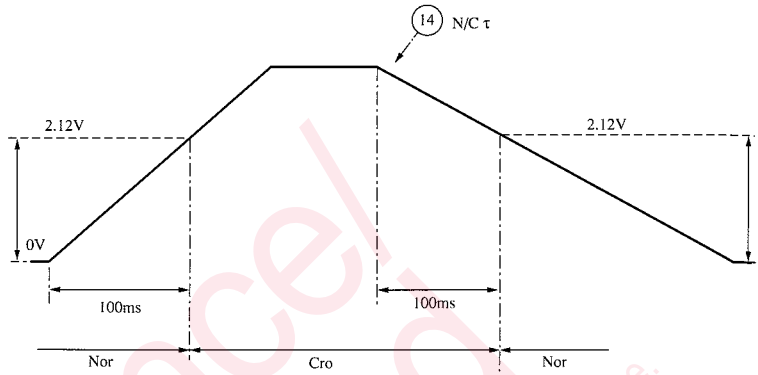


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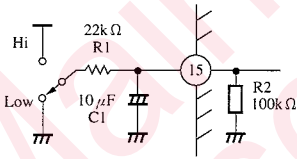
d) Nor/Cro Switching



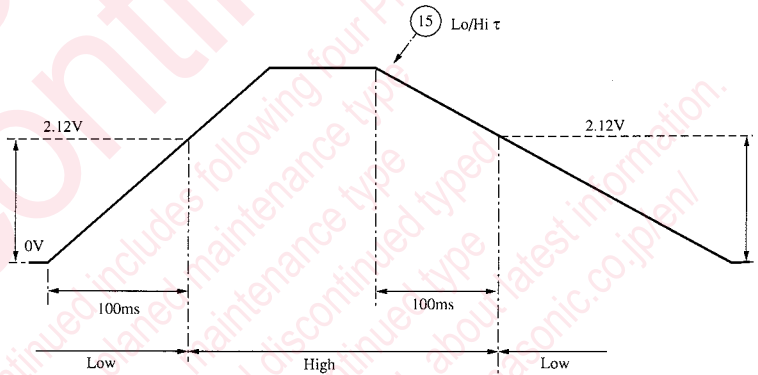
Charging Time $\approx R1 * C1$
 Discharging Time $\approx (R1/R2) * C1$



e) Lo/Hi Dubbing Switching



Charging Time $\approx R1 * C1$
 Discharging Time $\approx (R1/R2) * C1$



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