

# HA12088ANT, HA12090NT, HA12091AMP

T-77-21

Dolby™ B-C Type Noise Reduction System

## Description

The HA12088ANT/HA12090NT/HA12091AMP silicon monolithic bipolar integrated circuit provides dual channel Dolby B-C Type noise reduction within one package. ('Dolby' is a trademark of Dolby Laboratories Licensing Corporation).

The HA12088ANT/HA12090NT/HA12091AMP reduces the level of background noise produced during recording and playback of audio signals on magnetic tape.

The HA12088ANT/HA12090NT/HA12091AMP is available only to licensees of Dolby Laboratories Licensing Corporation. Licensing and application information may be obtained from Dolby Laboratories Licensing Corporation.

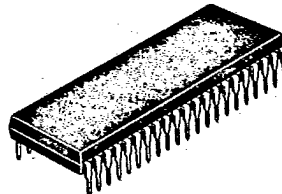
## Functions

- Dual Dolby B-C Type NR processors
- Programmable line out level
- MPX filter drive circuit

## Features

- Few external components required
- Two package types (DP-42SA, MP-44)
- Wide supply voltage range: 7.5 V to 16 V

HA12088NT, HA12090NT



(DP-42SA)

HA12091MP



(MP-44)

## Pin Configuration

HA12088ANT	HA12090NT	(DP-42SA)	HA12088ANT	HA12090NT
REC IN (R)	←	1	42	Vcc
GND	←	2	41	REC IN (L)
PB IN (R)	OPEN FIX	3	40	BIAS I
REF	REF (R)	4	39	PB IN (L)
B/C-OFF	←	5	38	R/P
IA OUT (R)	←	6	37	IA OUT (L)
N.R IN (R)	←	7	36	N.R IN (L)
PB IN (R)	MON IN (R)	8	35	PB IN (L)
PB OUT (R)	MON OUT (R)	9	34	PB OUT (L)
SS IN (R)	←	10	33	SS IN (L)
SS OUT (R)	←	11	32	SS OUT (L)
HLS CCR (R)	←	12	31	HLS CCR (L)
HLS HPF (R)	←	13	30	HLS HPF (L)
HLS Det1 (R)	←	14	29	HLS Det1 (L)
HLS Det2 (R)	←	15	28	HLS Det2 (L)
AS (R)	←	16	27	AS (L)
LLS CCR (R)	←	17	26	LLS CCR (L)
LLS HPF (R)	←	18	25	LLS HPF (L)
LLS Det1 (R)	←	19	24	LLS Det1 (L)
LLS Det2 (R)	←	20	23	LLS Det2 (L)
REC OUT (R)	←	21	22	REC OUT (L)

MP-44	
REF (L)	5
REF (R)	4
PB IN (R)	3
GND	2
REC IN (R)	1
Vcc	43
REC IN (L)	42
BIAS I	41
PB IN (L)	40
R.P.	39
B.C.OFF	6
IA OUT (R)	7
NR IN (R)	8
PB IN (R)	9
PB OUT (R)	10
SS IN (R)	11
SS OUT (R)	12
HLS CCR (R)	13
HLS HPF (R)	14
HLS Det1 (R)	15
HLS Det2 (R)	16
AS (R)	17
R.P. (L)	38
IA OUT (L)	37
NR IN (L)	36
PB IN (L)	35
PB OUT (L)	34
SS IN (L)	33
SS OUT (L)	32
HLS CCR (L)	31
HLS HPF (L)	30
HLS Det1 (L)	29
HLS Det2 (L)	28
AS (L)	27
LS CCR (R)	18
LS HPF (R)	19
LS Det1 (R)	20
LS Det2 (R)	21
EC OUT (R)	22
EC OUT (L)	23
LS Det1 (L)	24
LS HPF (L)	25
LS CCR (L)	26
LS Det2 (L)	27



HA12088ANT/HA12090NT/HA12091AMP

T-77-21

Block Diagrams

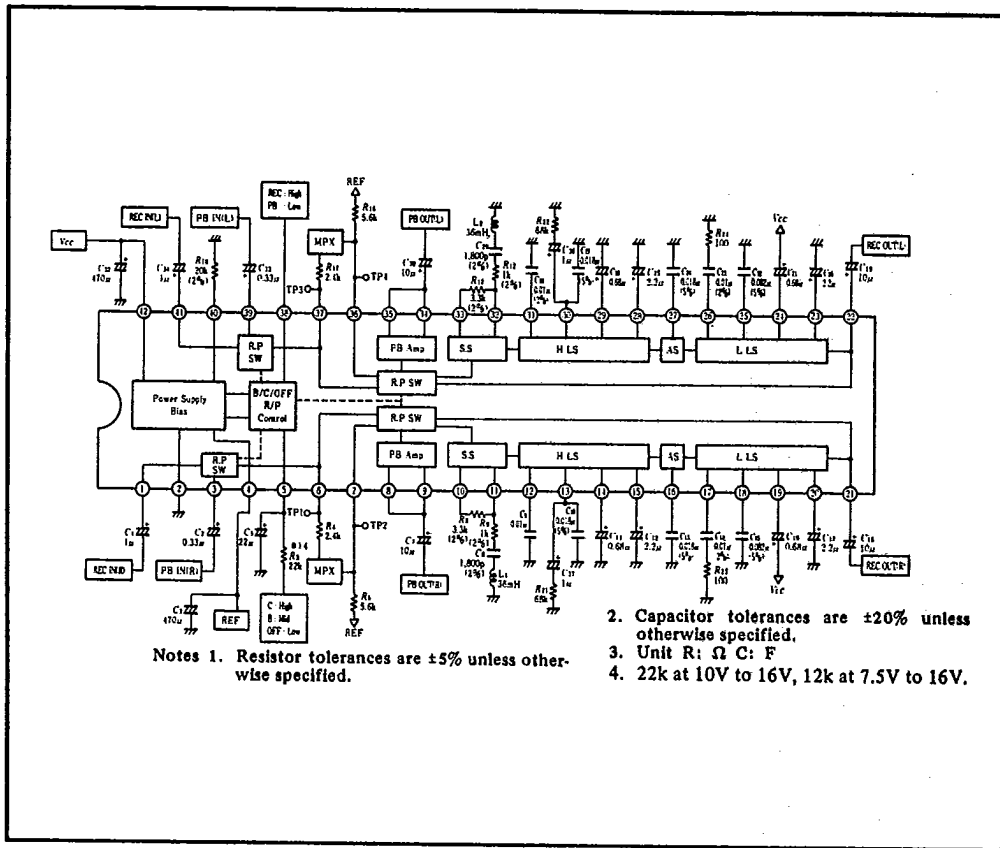
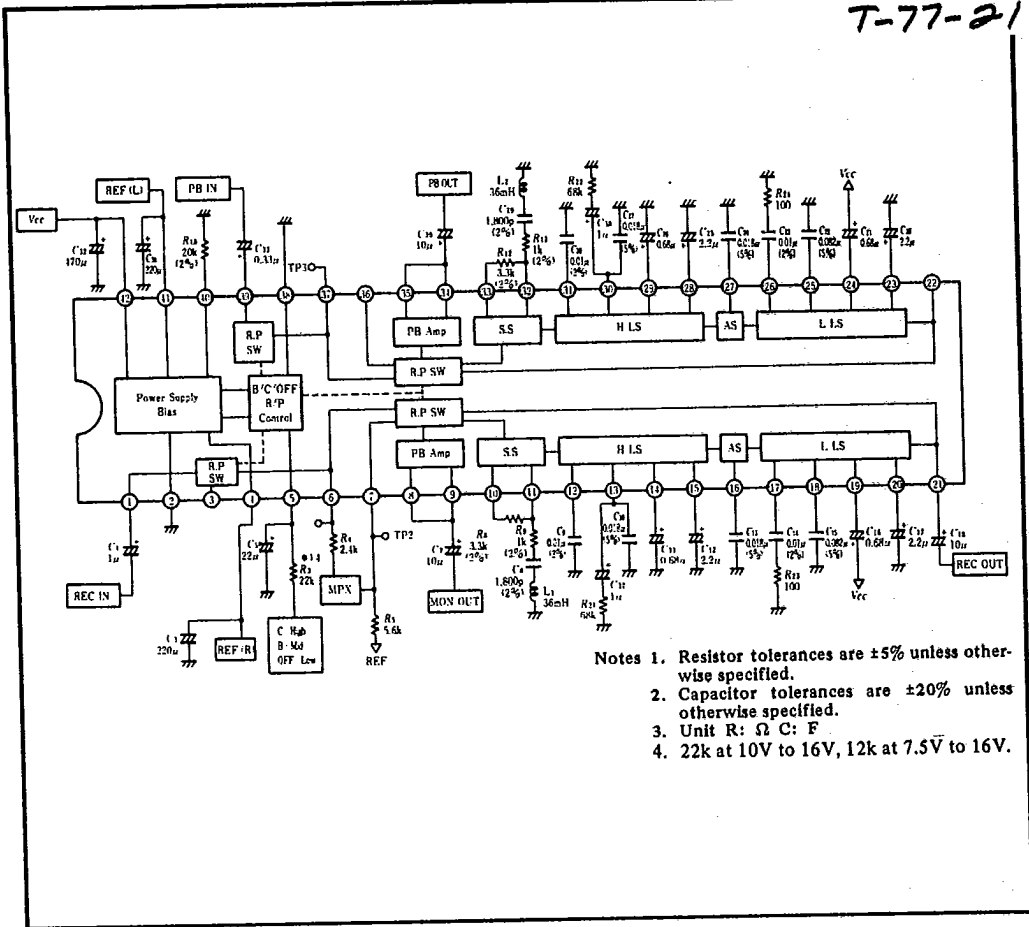


Figure 1 HA12088ANT Block Diagram with External Components (Normal Use)



HA12088ANT/HA12090NT/HA12091AMP

T-77-21



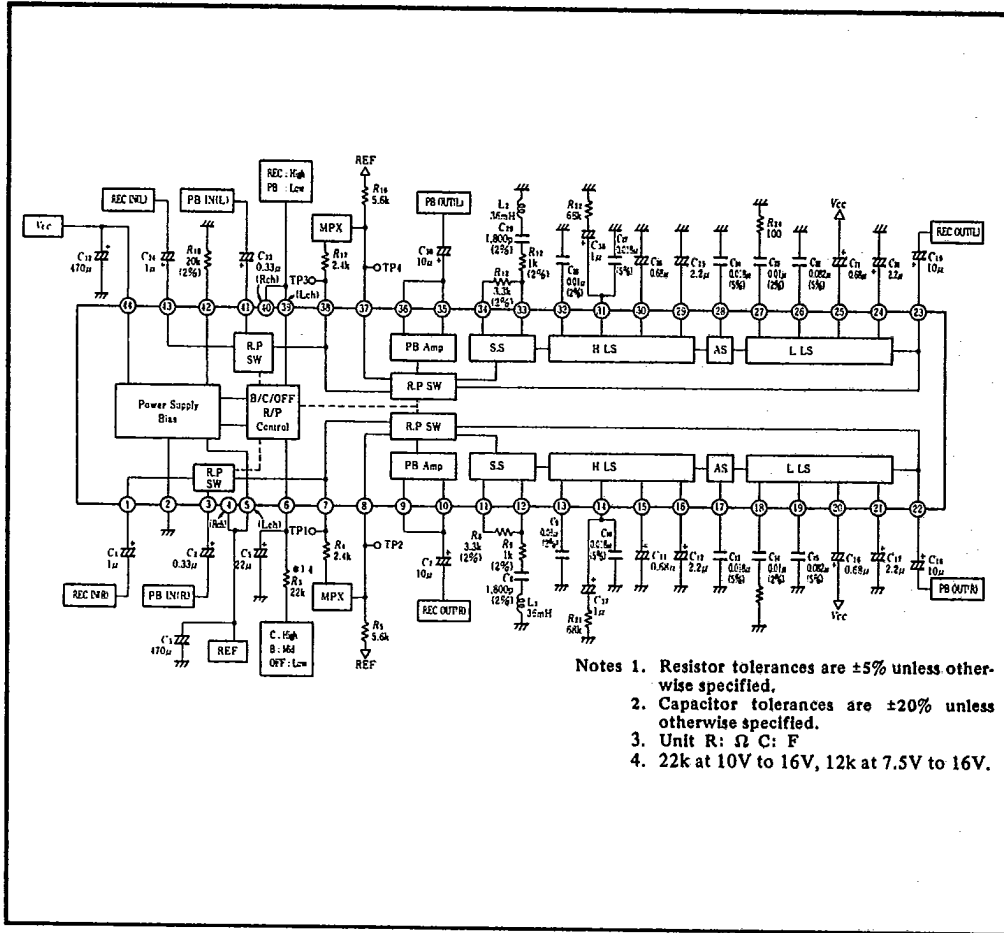
- Notes
1. Resistor tolerances are  $\pm 5\%$  unless otherwise specified.
  2. Capacitor tolerances are  $\pm 20\%$  unless otherwise specified.
  3. Unit R:  $\Omega$  C: F
  4. 22k at 10V to 16V, 12k at 7.5V to 16V.

Figure 2 HA12090NT Block Diagram with External Components



HA12088ANT/HA12090NT/HA12091AMP

T-77-21



- Notes 1. Resistor tolerances are ±5% unless otherwise specified.
- 2. Capacitor tolerances are ±20% unless otherwise specified.
- 3. Unit R: Ω C: F
- 4. 22k at 10V to 16V, 12k at 7.5V to 16V.

Figure 3 HA12091AMP Block Diagram with External Components



**HA12088ANT/HA12090NT/HA12091AMP**

**Table 1 HA12088ANT/HA12090NT/HA12091AMP Functions**

*T-77-21*

Functions	HA12088ANT	HA12090NT	HA12091AMP
Applications	For normal use	For 3 head-type use	For normal and 3 head-type use
Package	DP-42S	DP-42S	MP-44
Channels	2-ch	L-ch PB FIX R-ch Rec FIX	2-ch
Encode/decode switch	L-ch common R-ch	L-ch PB FIX R-ch Rec FIX	L-ch separate R-ch
Reference	L-ch common R-ch	L-ch separate R-ch	L-ch separate R-ch
B NR/C NR/NR off switch	L-ch common R-ch	L-ch common R-ch	L-ch common R-ch
Input (Rec/PB) switch	L-ch common R-ch	L-ch PB FIX R-ch Rec FIX	L-ch separate R-ch
MPX drive	Built-in	Built-in	Built-in
Programmable output (see note)	Built-in	Built-in	Built-in

Note: The circuit shown in the block diagram gives a reference output level of 300 mV. By using the circuit configurations shown in figure 4, it is possible to select a higher line of output levels.



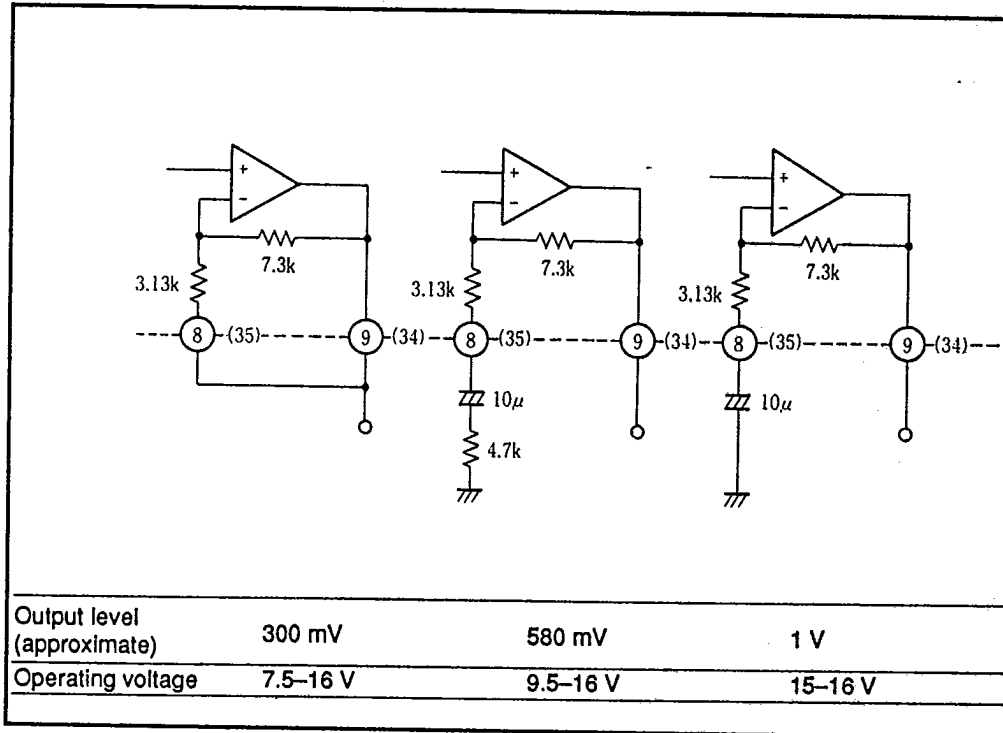


Figure 4 Circuit Configuration Diagrams



HA12088ANT/HA12090NT/HA12091AMP

Absolute Maximum Ratings (Ta = 25°C, unless otherwise specified)

T-77-21

Item	Symbol	Rating	Unit
Supply voltage	V <sub>CC(max)</sub>	16	V
Lead temperature (10 s soldering)	T <sub>l</sub>	260	°C
Power dissipation (DP-42S)	P <sub>T</sub>	1111	mW
(T <sub>a</sub> ≤ 70°C) (MP-44) (see note)		940	
Operating temperature	T <sub>opr</sub>	-20 to +70	°C
Storage temperature	T <sub>stg</sub>	-55 to +125	°C

Note: On a 40 mm square ceramic board

Electrical Characteristics Ta = 25°C, V<sub>CC</sub> = 14 V, unless otherwise specified  
 Dolby level = 300 mV<sub>rms</sub> at TP (Rec: TP2, TP4, PB: TP1, TP3)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions			
						R/P	NR	f(Hz)	other
Operating voltage	V <sub>opr</sub>	7.5	—	16	V	—	—	—	
Quiescent current	I <sub>CC</sub>	—	22	—	mA	R	off	—	No signal
Input amp gain	G <sub>v</sub> (IA Rec)	—	18.6	—	dB	R	off	1 k	
	G <sub>v</sub> (IA PB)	—	20.0	—		P	off	1 k	
B-type NR encode boost	B-ENC-2K	2.8	4.3	5.8		R	B	2 k	V <sub>in</sub> = -20 dB
	B-ENC-5K	1.7	3.2	4.7		R	B	5 k	V <sub>in</sub> = -20 dB
C-type NR encode boost	C-ENC-1K(1)	3.9	5.9	7.9		R	C	1 k	V <sub>in</sub> = -20 dB
	C-ENC-1K(2)	18.1	19.6	21.6		R	C	1 k	V <sub>in</sub> = -60 dB
	C-ENC-700	9.8	11.8	13.8		R	C	700	V <sub>in</sub> = -30 dB
B-type NR decode cut	B-DEC-2K	-5.8	-4.3	-2.8		P	B	2 k	V <sub>out</sub> = -20 dB
	B-DEC-5K	-4.7	-3.2	-1.7		P	B	5 k	V <sub>out</sub> = -20 dB
C-type NR decode cut	C-DEC-1K(1)	-7.9	-5.9	-3.9		P	C	1 k	V <sub>out</sub> = -20 dB
	C-DEC-1K(2)	-21.6	-19.6	-18.1		P	C	1 k	V <sub>out</sub> = -60 dB
Signal handling	V <sub>O(max)</sub>	12	13	—		R	off	1 k	THD = 1%, V <sub>CC</sub> = 7.5 V
Signal-to-noise ratio at encode (C-type)	S/N(ENC)	61	65	—		R	C	—	R <sub>g</sub> = 10 kΩ, CCIR/ARM



HA12088ANT/HA12090NT/HA12091AMP

T-77-21

Electrical Characteristics (cont)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions			
						R/P	NR	f(Hz)	other
Total	THD (off)	—	0.03	0.15	%	R	off	1 k	$V_{in} = 0$ dB
harmonic distortion	THD(C)	—	0.09	0.3		R	CF	1 k	$V_{in} = 0$ dB
NR off frequency response	Off-FR	—	-0.4	—	dB	R	off	20 k	$V_{in} = 0$ dB
Crosstalk between Rec-PB	CT(R ⇒ P)	—	72	—		P	off	1 k	$V_{in} = 0$ dB
	CT(P ⇒ R)	—	80	—		R	off	1 k	$V_{in} = 0$ dB
Crosstalk between channels	CT(L ⇔ R)	—	70	—		R	off	1 k	$V_{in} = 0$ dB
Control voltage for Rec-PB	$V_{cont}(Rec)$	6.7	—	7.3	V	—	—	—	—
	$V_{cont}(PB)$	0	—	1.0					
Control voltage for B-C and NR OFF	$V_{cont}(C)$	9.0	—	14					
	$V_{cont}(B)$	6.0	—	6.8					
	$V_{cont}(Off)$	0.5	—	4.0					
Ripple rejection ratio	R.R.R.	—	32	—	dB	R	C	100	—







Typical Performance Curves

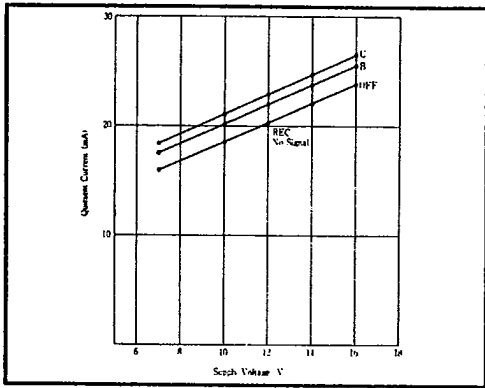


Figure 6 Quiescent Current vs Supply Voltage

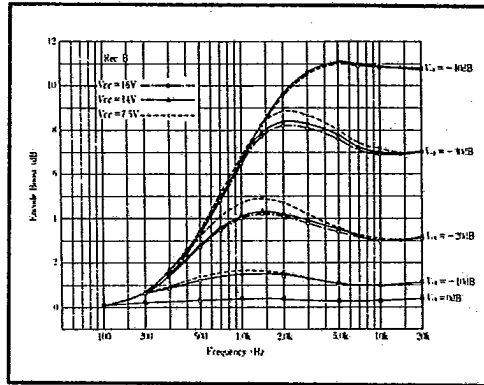


Figure 7 B-Type NR Encode Boost vs Frequency

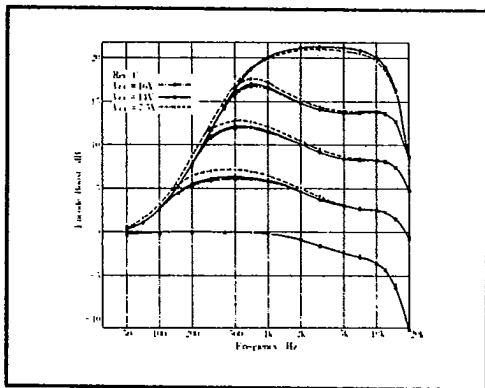


Figure 8 C-Type NR Encode Boost vs Frequency

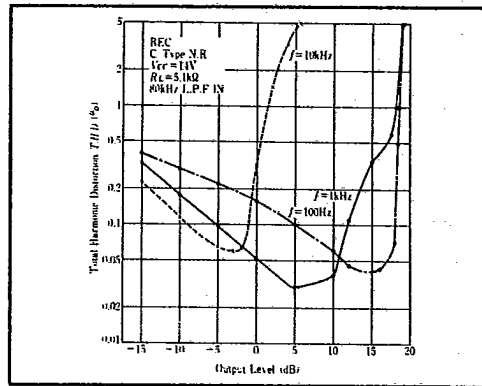


Figure 9 REC (Recording) C-Type NR Total Harmonic Distortion vs Output Level

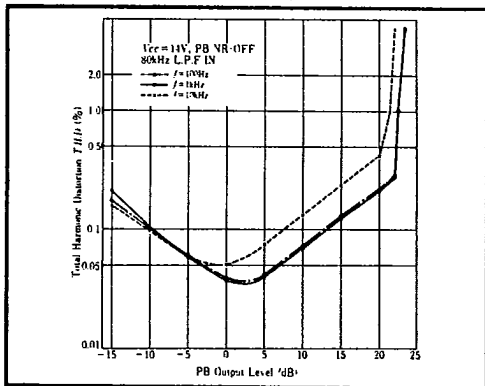


Figure 10 REC NR Off Total Harmonic Distortion vs Output Level

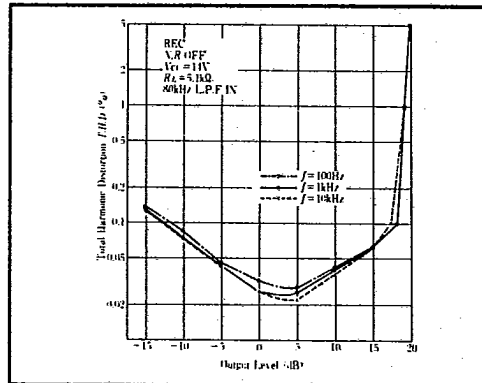


Figure 11 PB (Playback) NR Off Total Harmonic Distortion vs Output Level



HA12088ANT/HA12090NT/HA12091AMP

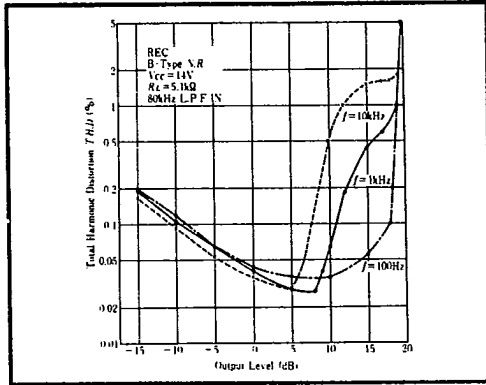


Figure 12 REC B-Type NR Total Harmonic Distortion vs Output Level

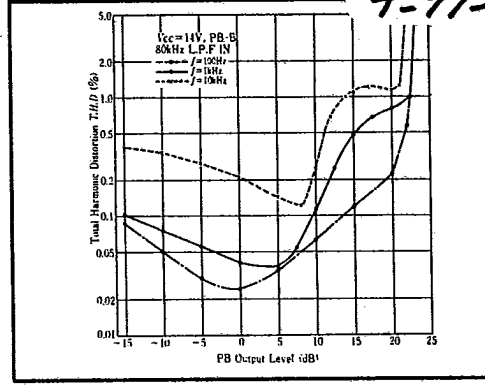


Figure 13 PB B-Type NR Total Harmonic Distortion vs Output Level

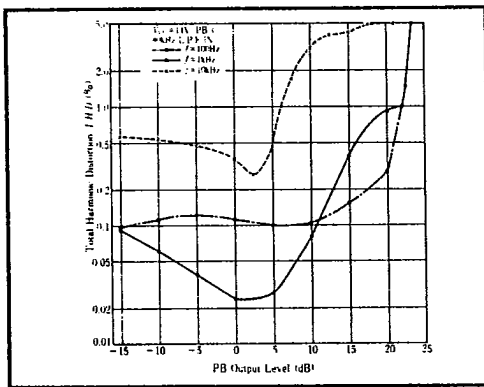


Figure 14 PB C-Type NR Total Harmonic Distortion vs Output Level

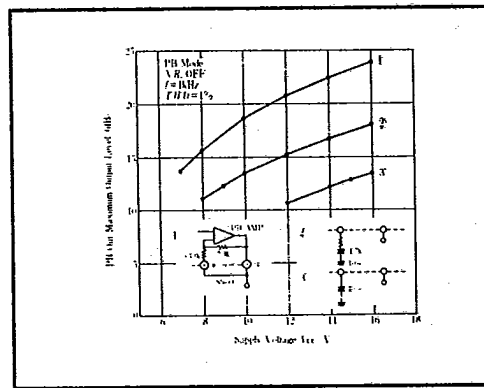


Figure 15 PB Out Maximum Output Level vs Supply Voltage for Variable Output Level

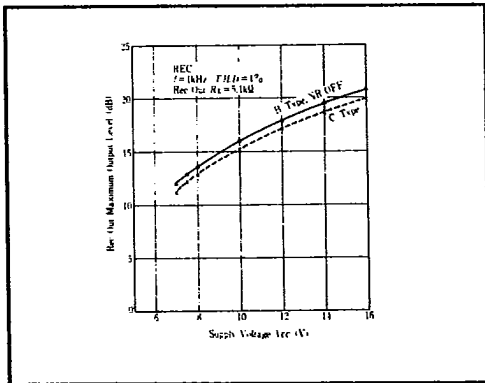


Figure 16 REC Out Maximum Output Level vs Supply Voltage

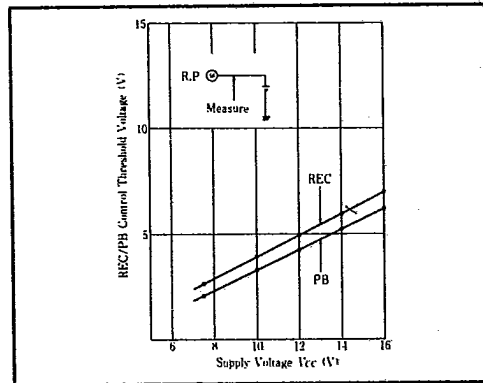


Figure 17 REC/PB Control Threshold Voltage vs Supply Voltage



HA12088ANT/HA12090NT/HA12091AMP

T-77-21

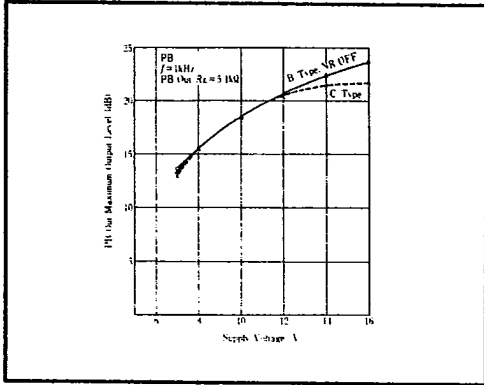


Figure 18 PB Out Maximum Output Level vs Supply Voltage

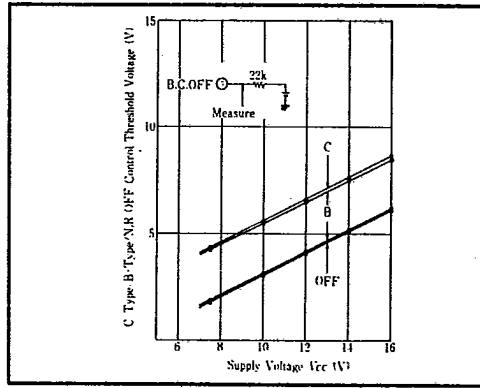


Figure 19 NR Off/B-Type/C-Type Control Threshold Voltage vs Supply Voltage

