AM Stereo Radio

Description

The CXA1017M is an IC for use with AM stereo radio, with an AM stereo system identification and audio signal processing functions integrated.

Features

- It identifies all AM stereo broadcasting systems (Magnavox, Kahn, Motorola and Harris) and switching the reception mode automatically.
- By employing a PLL (Phase Locked Loop) pilot detection circuit and safety logic circuit, single channel interference or malfunction due to I.P.M. (Incidental Phase Modulation) is eliminated.
- System identification time is minimized to about one second.
- Single adjustment (using a semi-fixed resistor for VCO).
- Few peripheral parts required.
- High S/N ratio and low distortion factor.

Functions

- PLL pilot detection circuit
- PSN (90° Phase Shift Network)
- Matrix circuit
- Malfunction preventive circuit
- Mute control output
- LED driver

Structure

Bipolar silicon monolithic IC

Absolute Maximum Ratings (Ta = 25°C)

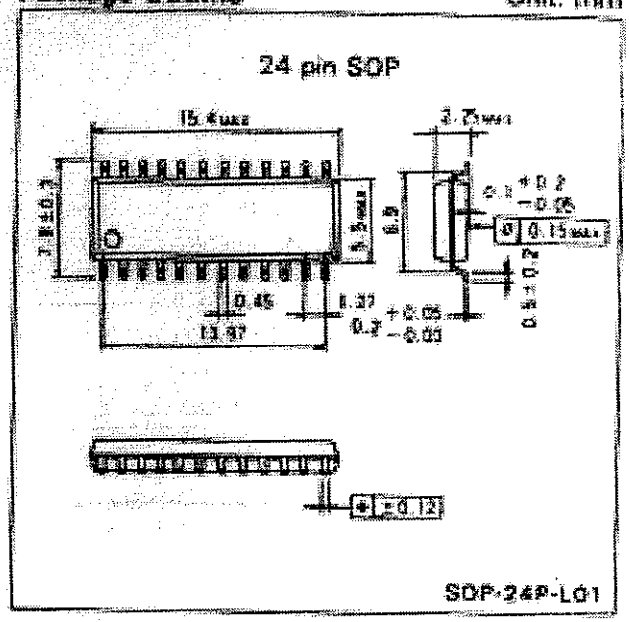
• Supply voltage	Vcc	9	V
• Operating temperature	Topr	−20 to +75	°C
• Storage temperature	Tstg	−55 to +150	°C
• Allowable power dissipation	PD	524	mW

Recommended Operating Condition

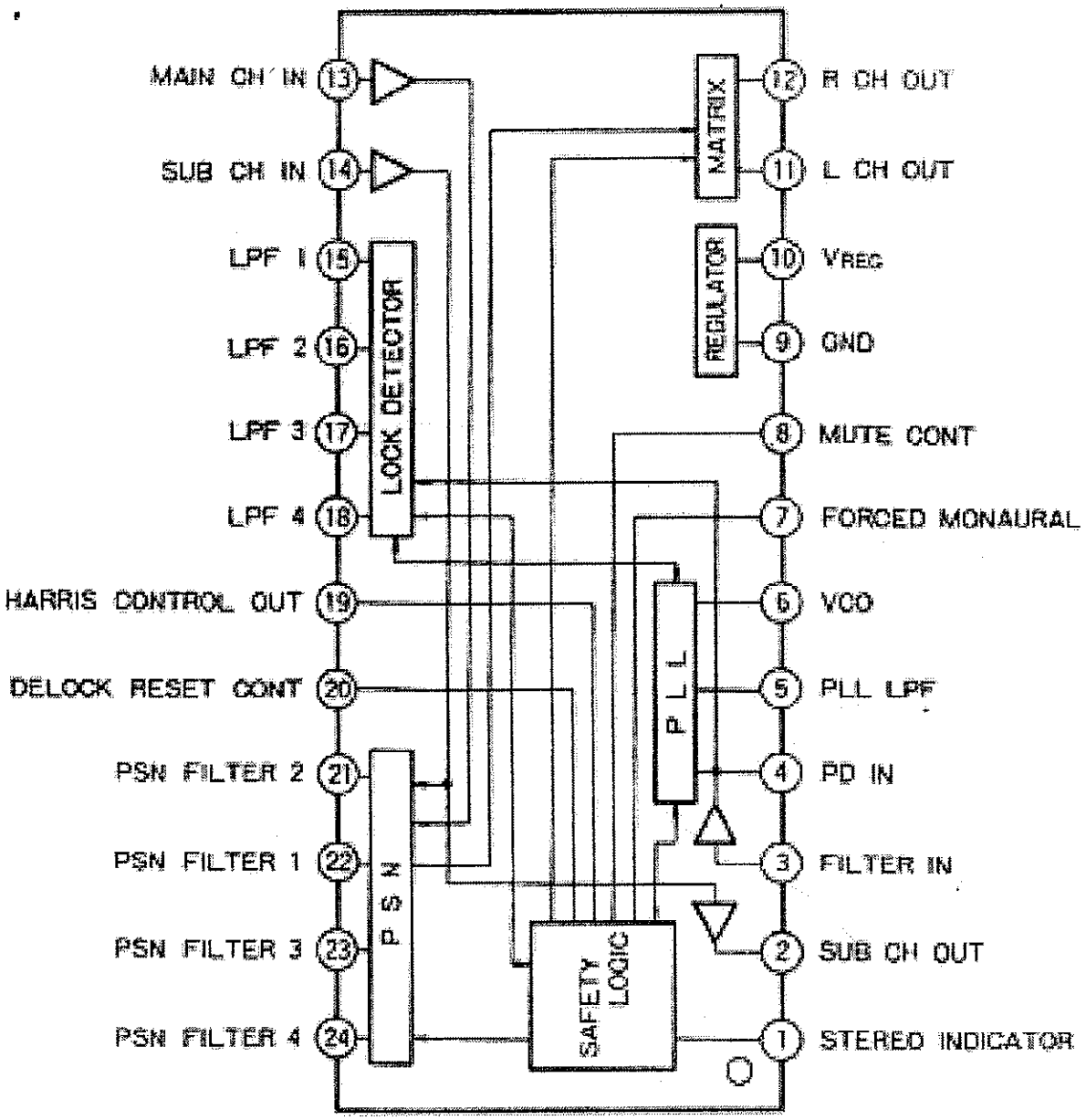
• Supply voltage	Vcc	5 to 8.5	V

Package Outline

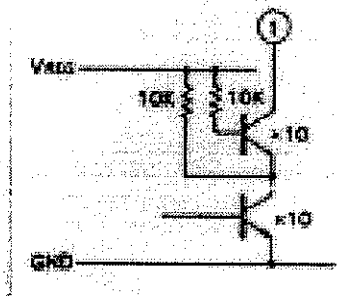
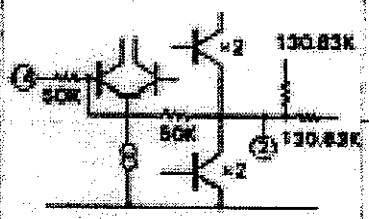
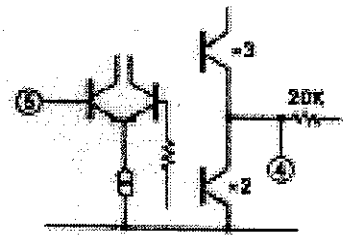
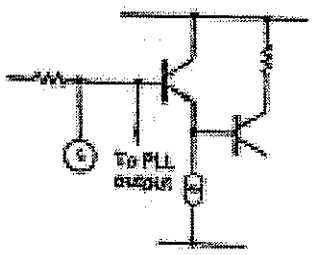
Unit: mm

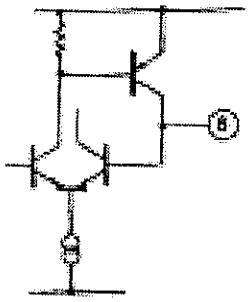
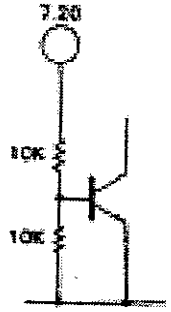
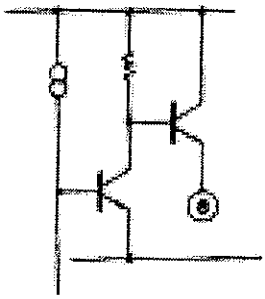
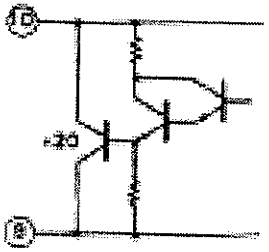
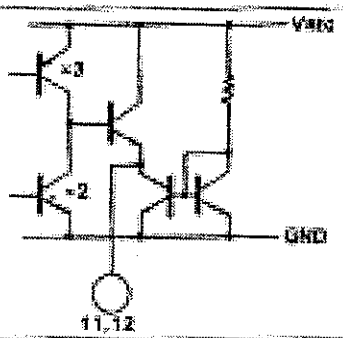


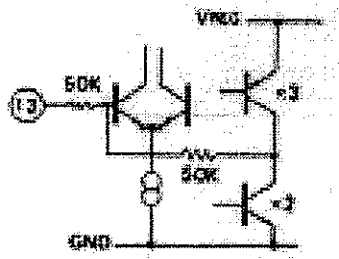
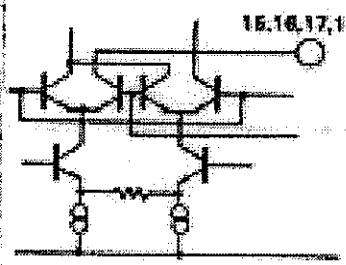
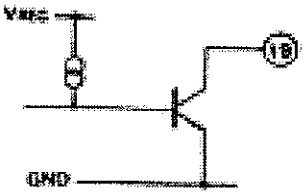
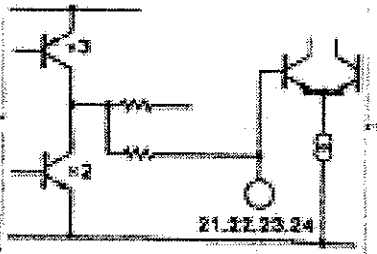
Block Diagram and Pin Configuration (Top View)



Pin Description

No.	Symbol	Equivalent circuit	Voltage (V) (Typ.)	Description
1	STEREO INDICATOR		8.0	LED drive circuit
2	SUB CH OUT		1.5	Buffer (0dB) output from Pin 14 (Sub ch IN)
14	SUB CH IN		1.5	L − R + pilot signal input circuit
3	FILTER IN		1.5	For pilot detection OP amplifier input for LPF
4	PD IN		1.5	OP amplifier output for LPF
5	PLL LPF		2.7	LPF for multi-PLL

No.	Symbol	Equivalent circuit	Voltage (V) (Typ.)	Description
6	VCO		2.8	For time constant of VCO for PLL
7	FORCED MONAURAL		0	Forced monaural reception with Hi-level pin input
20	LOCK OFF RESET CONT		0	Forced monaural reception with Low-level pin input
8	MUTE CONT		0	About ±18 ms 3.3 V pulse is generated mainly the moment matrix and PSN circuits are switched on or off.
9	GND		GND	
10	V_{REG}		4.0	4V (typ.) of a regulator output is obtained from Vcc via R_{REG}
11	Lch OUT		1.5	Lch signal output
12	Rch OUT		1.5	Rch signal output

No.	Symbol	Equivalent circuit	Voltage (V) (Typ.)	Description
13	MAIN CH IN		1.5	L + R signal input circuit
15	LPF 1		3.0	LPF for Harris detection comparator
16	LPF 2		3.0	LPF for Motorola detection comparator
17	LPF 3		3.0	LPF for Kahn detection comparator
18	LPF 4		3.0	LPF for Magnavox detection comparator
19	HARRIS CONT		2.2	Current is drawn for Harris reception
21	PSN FILTER 2		1.5	Capacitor for PSN filter is connected (10000PF)
22	PSN FILTER 1		1.5	Capacitor for PSN filter is connected (10000PF)
23	PSN FILTER 3		1.5	Capacitor for PSN filter is connected (10000PF)
24	PSN FILTER 4		1.5	Capacitor for PSN filter is connected (10000PF)

Electrical Characteristics (Ta = 25°C)

* Input systems MOT: Motorola HAR: Harris
MAG: Magnavox KAH: Kahn

(Vcc = 8V unless otherwise specified)

No.	Item	Symbol	* Input system	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Test	Min.	Typ.	Max.	Unit
1	VREG Voltage (L)	M9			L	H	L	H	H	L	H	Measure with Vcc at [illegible] during no signal	[illegible]	[illegible]	[illegible]	V
2	VREG Voltage (H)	M9			H							Measure with Vcc at [illegible] during no signal	[illegible]	[illegible]	[illegible]	V
3	VREG Voltage (M)	M9			[illegible]							Measure with Vcc at 8V during no signal	[illegible]	[illegible]	[illegible]	V
4	OFF CHECK1 (ST)	M5											[illegible]	8.0	8.1	V
5	OFF CHECK1 [illegible]	M6											[illegible]	[illegible]	[illegible]	V
6	OFF CHECK1 MUTE	M8											[illegible]	0	0.1	V
7	Check VCO operation	M7										Measure with [illegible]	[illegible] / [illegible]		[illegible] / [illegible]	kHz
8	VCO [illegible]	M7										Measure [illegible]	[illegible]	[illegible]	[illegible]	V
9	ST IND CHECK	M5	MOT						L		L	Input [illegible]	[illegible]		[illegible]	V
10	STR output level (R)	M11	MOT			L		L				[illegible]	[illegible]	[illegible]	[illegible]	dBm
11	STR output level (L)	M10	MOT							H		[illegible]	[illegible]	[illegible]	[illegible]	dBm
12	STR separation (R)	M11	MOT							L		[illegible]	[illegible]			dB
13	STR separation (L)	M10	MOT							H		[illegible]	[illegible]			dB
14	STR distortion factor (R)	M11	MOT							L		[illegible]			[illegible]	%
15	STR distortion factor (L)	M10	MOT							H		[illegible]			[illegible]	%
16	F.MONO operation 1 (MOT)	M5	MOT	ON		H		H		L			[illegible]	[illegible]	[illegible]	V
17	F.MONO operation 2 (MOT)	M5	MOT										[illegible]	[illegible]	[illegible]	V
18	MUTE pulse check 1	M8	MOT									Check if M8 outputs pulse more than 3V	[illegible]		[illegible]	ms
19	MUTE pulse check 2	M8	MOT									Check if M8 outputs pulse more than 3V	[illegible]		[illegible]	ms
20	Lock [illegible] operation 1	M5	MOT									Check if M5 becomes [illegible] by making C1 at 3V	[illegible]	[illegible]	[illegible]	V
21	Lock [illegible] operation 2	M5	MOT									Check if M5 becomes [illegible] by making C1 at 3V	[illegible]	[illegible]	[illegible]	V
22	MUTE pulse check 3	M8	MOT									Check if M8 outputs pulse more than 3V	[illegible]		[illegible]	ms
23	ST IND CHECK	M5	MAG									Input [illegible]	[illegible]		[illegible]	V
24	STR output level (R)	M11	MAG			L		L				[illegible]	[illegible]	[illegible]	[illegible]	dBm
25	STR output level (L)	M10	MAG							H		[illegible]	[illegible]	[illegible]	[illegible]	dBm
26	STR separation (R)	M11	MAG							L		[illegible]	[illegible]			dB
27	STR separation (L)	M10	MAG							H		[illegible]	[illegible]			dB
28	STR distortion factor (R)	M11	MAG							L		[illegible]			1.1	%
29	STR distortion factor (L)	M10	MAG							H		[illegible]			1.1	%
30	F.MONO operation 1 (MAG)	M5	MAG	ON		H				L			[illegible]	8.0	8.1	V
31	F.MONO operation 2 (MAG)	M5	MAG										[illegible]	8.0	8.1	V

Electrical Characteristics (Ta = 25°C)

* Input systems MOT: Motorola HAR: Harris
MAG: Magnavox KAH: Kahn

(Vcc = 8V unless otherwise specified)

No.	Item	Symbol	* Input system	Switch 1	2	3	4	5	6	7	8	Test	Min.	Typ.	Max.	Unit
32	MUTE pulse check 1	M6	MAG		C	H	A	A	A	A	A	Check if M6 outputs pulse more than 3V	4		11	ms
33	MUTE pulse check 2	M6	MAG									Check if M6 outputs pulse more than 3V	18		25	ms
34	Lock-R operation 1 (MAG)	M12	MAG									[illegible]	7.9	8.0	8.1	V
35	Lock-R operation 2 (MAG)	M15	MAG					B				[illegible]	7.9	8.0	8.1	V
36	MUTE pulse check 3	M6	MAG									[illegible]	0		11	ms
37	MONO output level (R)	M11				A			B		B	[illegible]	−29	−26	−23	dBm
38	MONO output level (L)	M10										[illegible]	−29	−26	−23	dBm
39	MONO distortion factor (R)	M11										[illegible]			1.1	%
40	MONO distortion factor (L)	M10										[illegible]			1.1	%
41	ST IND CHECK	M5	HAR			B			A		A	[illegible]	0		0.6	V
42	HAR CONT operation	M6	HAR									[illegible]	0		0.6	V
43	STR output level (R)	M11	HAR			A		A				[illegible]	−23	−20	−17	dBm
44	STR output level (L)	M10	HAR							B		[illegible]	−23	−20	−17	dBm
45	STR separation (R)	M11	HAR							A		[illegible]	23			dB
46	STR separation (L)	M10	HAR							B		[illegible]	23			dB
47	STR distortion factor (R)	M11	HAR							A		[illegible]			1.8	%
48	STR distortion factor (L)	M10	HAR							B		[illegible]			1.1	%
49	F-MONO operation 1 (HAR)	M4	HAR			B		B		A		[illegible]	7.9	8.0	8.1	V
50	F-MONO operation 2 (HAR)	M5	HAR									[illegible]	7.9	8.0	8.1	V
51	MUTE pulse check 1	M6	HAR									[illegible]	0		11	ms
52	MUTE pulse check 2	M6	HAR									[illegible]	18		55	ms
53	Lock-R operation 1 (HAR)	M4	HAR									[illegible]	7.9	8.0	8.1	V
54	Lock-R operation 2 (HAR)	M5	HAR									[illegible]	7.9	8.0	8.1	V
55	MUTE pulse check 3	M6	HAR									[illegible]	4		11	ms
56	ST IND CHECK	M5	KAH									[illegible]	0		0.6	V
57	KAH output level (R)	M11	KAH			A	B	A				[illegible]	−23	−20	−17	dBm
58	KAH output level (L)	M10	KAH							B		[illegible]	−23	−20	−17	dBm
59	KAH separation (R)	M11	KAH							A		[illegible]	23			dB
60	KAH separation (L)	M10	KAH							B		[illegible]	23			dB
61	KAH distortion factor (R)	M11	KAH							A		[illegible]			1.8	%
62	KAH distortion factor (L)	M10	KAH							B		[illegible]			1.1	%

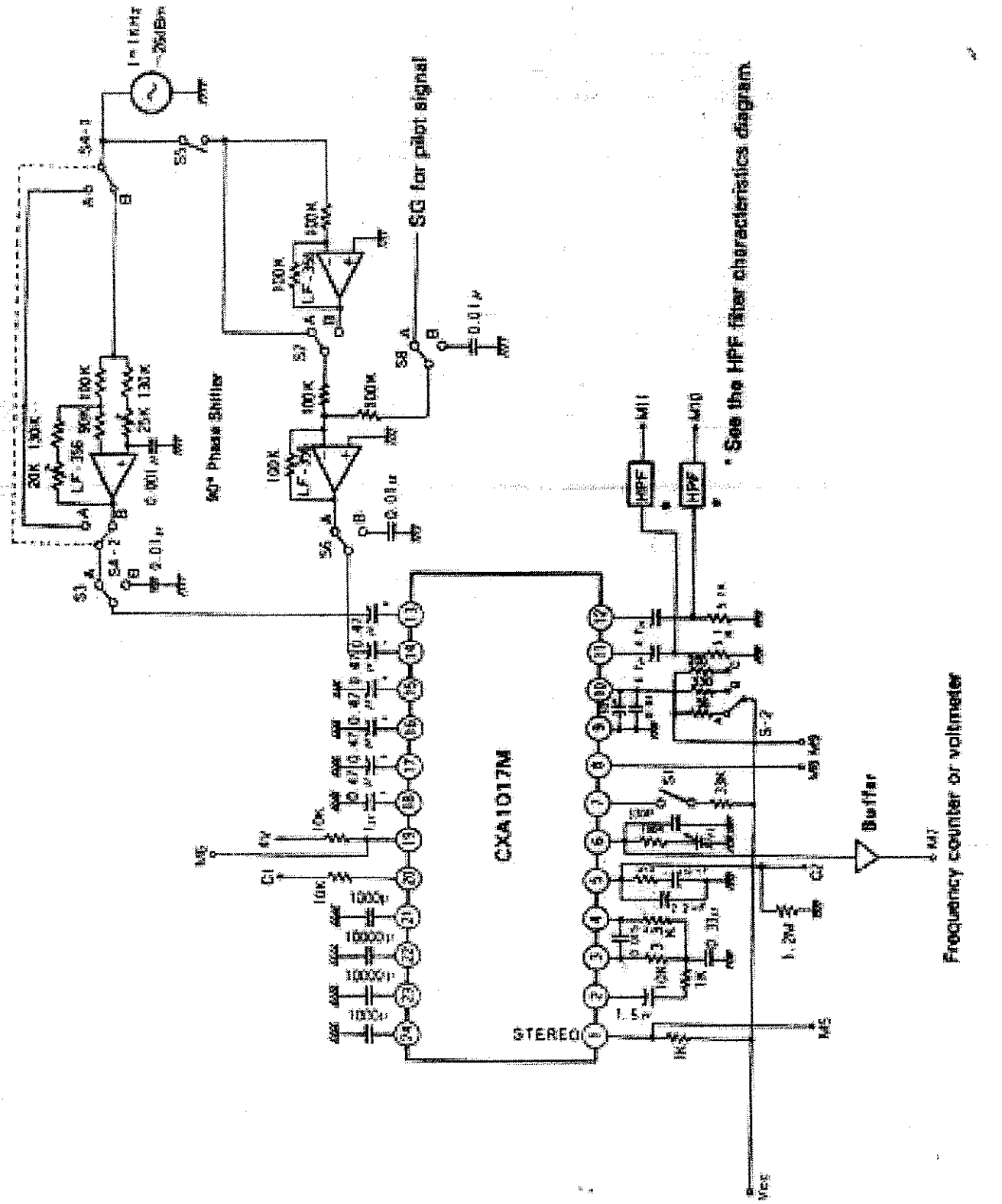
Electrical Characteristics (Ta = 25°C)

* Input systems: MOT: Motorola HAR: Harris MAG: Magnavox KAH: Kahn

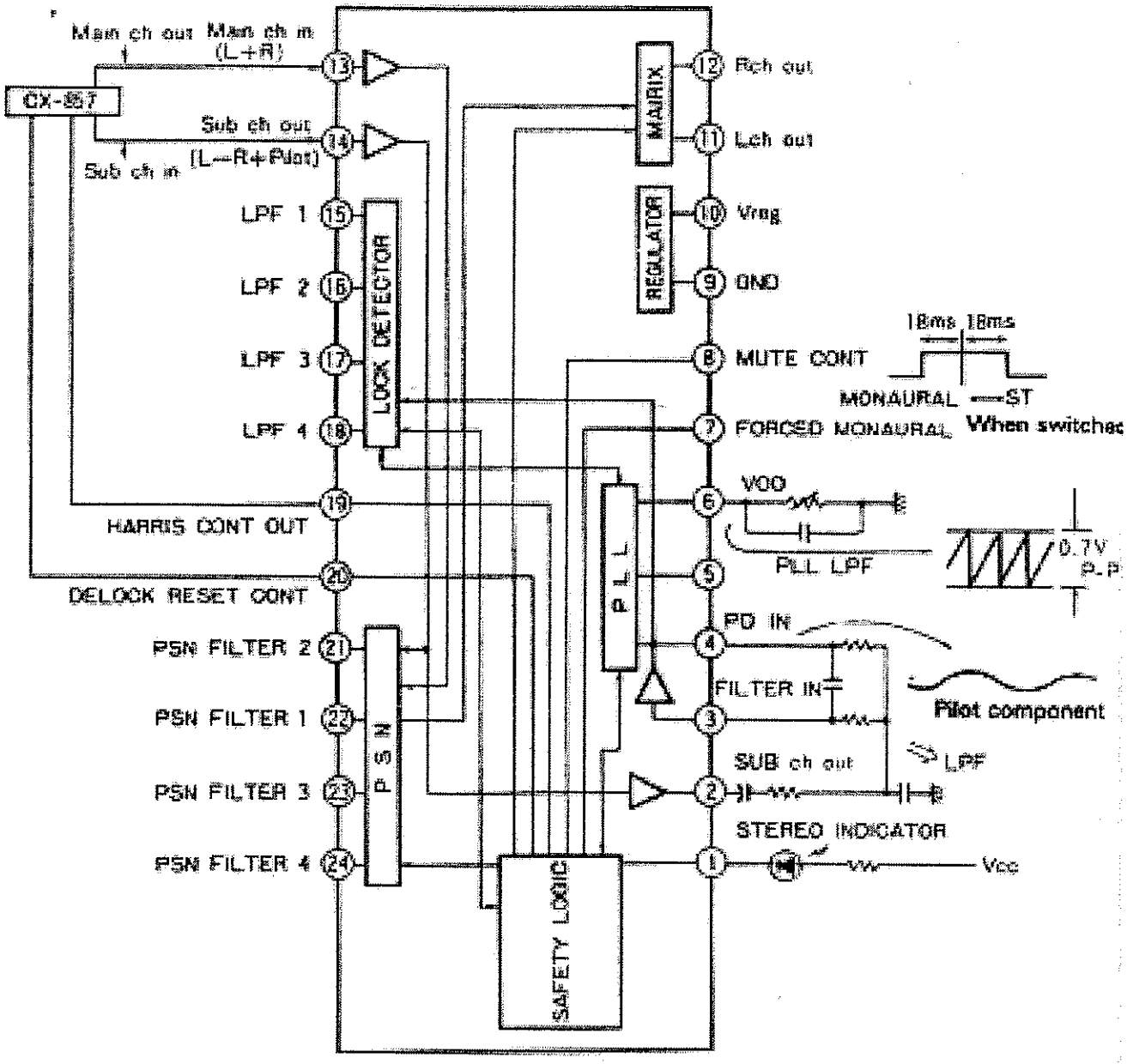
(Vcc = 8V unless otherwise specified)

No.	Item	Symbol	* Input system	Switch conditions (Mark ON for the number)								Test	Min.	Typ.	Max.	Unit
				1	2	3	4	5	6	7	8					
62	S-MONO suppression 1 (KAH)	M1	KAH		C	B	A	B	A	A	A	Check if M1 becomes Hi when S1 is set to ON	7.5	8.0	8.1	V
63	S-MONO suppression 2 (KAH)	M5	KAH									Check if M5 becomes Hi when S1 is set to ON	7.9	8.0	8.1	V
64	MUTE pulse check 1	M6	KAH									Time before pulse rises from DC = 0V is output when S1 is set to ON	0		11	ms
65	MUTE pulse check 2	M6	KAH									Time before pulse rises from DC = 0V is output when S1 is set to OFF	36		55	ms
67	Lock-R suppression 1 (KAH)	M1	KAH									Check if M1 becomes Hi when C1 is set to 0V	7.9	8.0	8.1	V
68	Lock-R suppression 2 (KAH)	M5	KAH									Check if M5 becomes Hi when C1 is set to 0V	7.9	8.0	8.1	V
69	MUTE pulse check 3	M6	KAH		↓	↓	↓	↓	↓	↓	↓	Time before pulse rises from DC = 0V is output right after C1 is set to 0V	0		11	ms

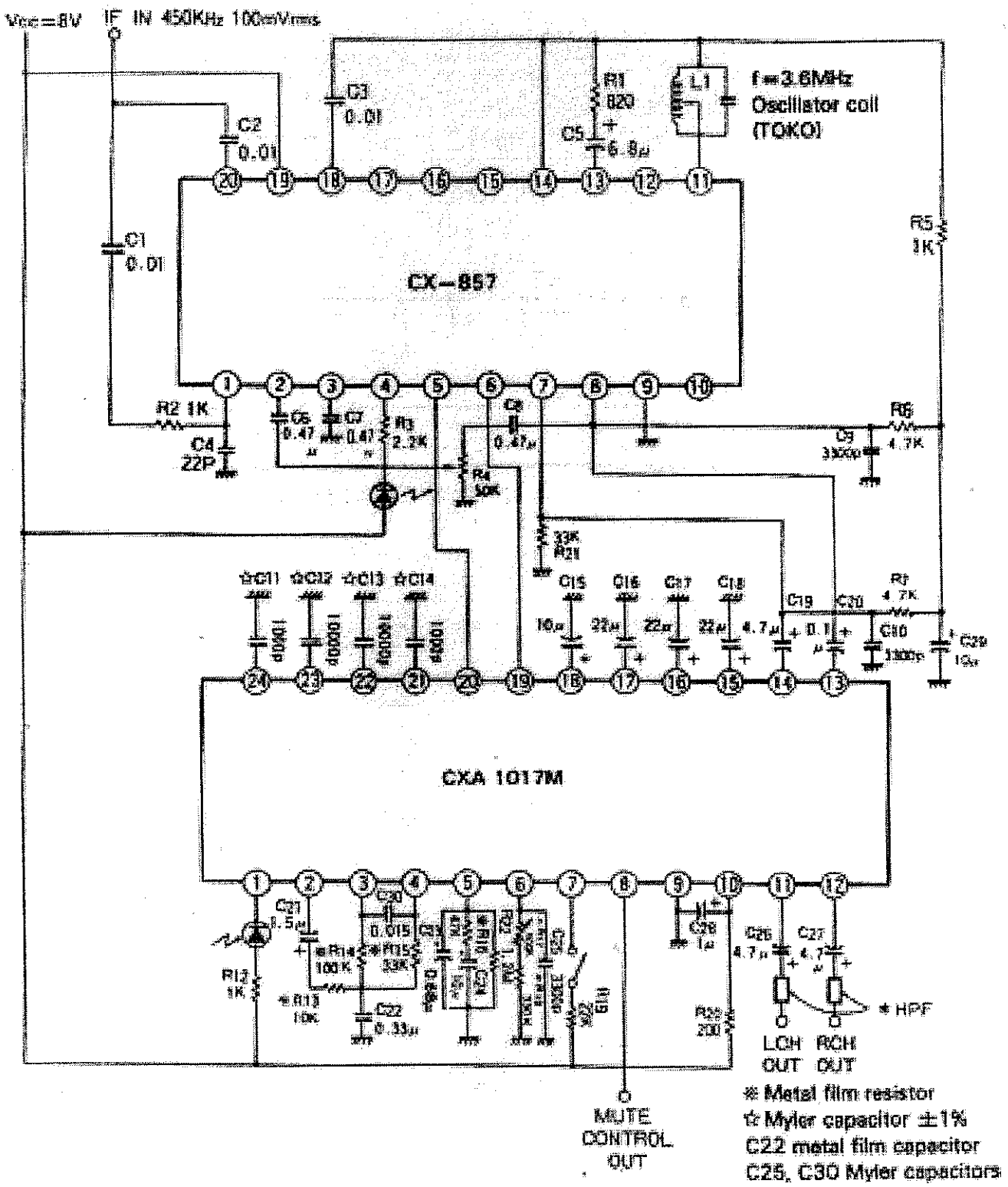
Electrical Characteristics Test Circuit



Application Circuit (1)



Application Circuit (2)



* See the HPF filter characteristics