

### Overview

The LA7680 and LA7681 signal processors provide all the components required to decode PAL or NTSC Color television signals. On-chip circuits include VIF, SIF, a video processor, a chroma demodulator, and deflection drivers.

The self-adjusting signal processors support vertical field scanning rates of both 50 and 60Hz, allowing the LA7837 and LA7838 vertical output drivers to maintain a constant picture height.

The LA7681 replaces the LA7680's G-Y output at pin 22 with a color contrast signal for input to a SECAM chroma demodulator. This contrast signal is fixed at the maximum.

The LA7680/7681 is available in 48-pin shrink DIPs.

### Features

- Minimized external components

- 48-pin shrink DIP

VIF/SIF

- High-gain VIF amplifier

- Fast-response automatic gain control (AGC)

- No delay between audio input and output

- Muting for both audio and video signals or for audio alone

Video processor

- On-chip two-dimensional differential circuit

- Variable current transfer

- 7MHz bandwidth

Chroma demodulator

- PAL and NTSC system compatible

- Optimized demodulation angles and ratios

- High performance burst cleaning filter and ACC/killer detector

- On-chip tint circuit (NTSC only)

Deflection drivers

- Adjustment-free vertical or horizontal synchronization

- Two-stage automatic frequency control

- Adjustable separation sensitivity for vertical synchronization

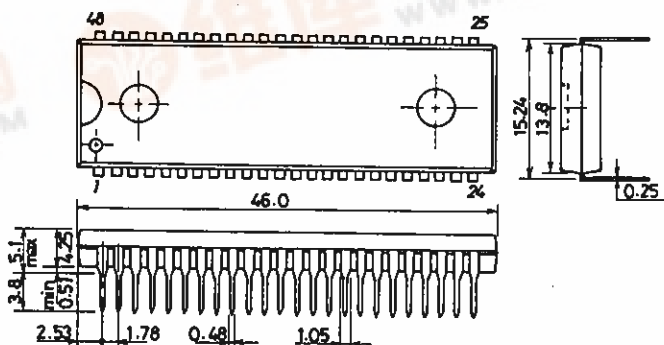
- Fixed picture height for both PAL and NTSC

- Fixed picture height

### Package Dimensions

unit:mm

3149



SANYO:DIP48S

LA7680, 7681

Absolute Maximum Ratings at Ta=25°C

			unit
Input Voltage	V13 max	12	V
	V11 max	12	V
Input Current	I25 max	16	mA
Allowable Power Dissipation	Pd max	1.35	W
FBP Input Current	I26 max	5	mA
	I24 max	10	mA
FBP Input Voltage	V26 min	-5	V
Operating Temperature	Topr	-10~+65	°C
Storage Temperature	Tstg	-55~+150	°C

Recommended Operating Conditions at Ta=25°C

			unit
Supply Voltage	V13	9	V
	V11	9	V
Supply Current	I25	13	mA
Operating Voltage Range	V13 op	8~10	V
	V11 op	8~10	V
Operating Current Range	I25 op	10~16	mA

Operating Characteristics at Ta=25°C, Vcc=V13=V11=9V, Icc=I25=13mA

[Supply Characteristics]

		min	typ	max	unit
Horizontal Supply Voltage	V25	7.0	7.5	8.0	V
Supply Current	I11+13	90	110	140	mA

[VIF Characteristics]fp=38.9MHz

			min	typ	max	unit
Video Output Voltage	V42	With no inputs	4.2	4.6	5.0	V
AFT Output Voltage	V44	With no inputs	2.8	4.2	5.7	V
Maximum RF AGC Voltage	V46H	{ CW=85dBμ RF AGC VR=min	7.6	8.0	8.3	V
Minimum RF AGC Voltage	V46L	{ CW=85dBμ RF AGC VR=max	0	0.01	0.3	V
Input Sensitivity	Vi	{ VIF input level generat- ing 0.8Vp-p video output with 40% modulation	30	36	42	dBμ
AGC Range	GR	{ Maximum input(Vo=0.8Vp-p) less input sensitivity	60	68		dB
Maximum Input	Vi max	{ VIF input level generat- ing +1dB video output	100	107		dBμ
Video Output Amplitude	VO42	Vi=80dBμ, AM=78%MOD	1.7	2.0	2.3	Vp-p
Differential Gain	DG	{ Vi=80dBμ, 87.5% Video MOD		3.0	10	%
Differential Phase	DP	{ Vi=80dBμ, 87.5% Video MOD		3.0	10	deg
Video Signal-to-Noise Ratio	S/N	{ Vi=80dBμ, 20 log $\frac{1.43(Vp-p)}{\text{noise}(Vrms)}$	47	53		dB
Sync Signal Tip Level	V42 TIP	CW=80dBμ	2.0	2.3	2.6	V
Frequency Characteristic	fc	{ Frequency generating -3dB video output	7	10		MHz
VIF Intermodulation	I1.07	V4.43MHz/V1.07MHz, Vi=80dBμ	35	42		dB

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			min	typ	max	unit
Maximum AFT Output Voltage	V <sub>44H</sub>	CW=80dB $\mu$ , over a range of frequencies	8.0	8.3	8.7	V
Minimum AFT Output Voltage	V <sub>44L</sub>	CW=80dB $\mu$ , over a range of frequencies	0.2	0.4	0.9	V
AFT Detector Sensitivity	S <sub>f</sub>	CW=80dB $\mu$ , over a range of frequencies	35	60	90	mV/kHz
AFT Defeat Switching Voltage	V <sub>AFT SW</sub>	Measured at sweep signal	1.0	5.0		V
Black Noise Threshold	V <sub>BTH</sub>	Measured at sweep signal	1.2	1.5	1.8	V
<b>[SIF Characteristics] f<sub>s</sub>=5.5MHz</b>						
SIF Limiting Voltage	V <sub>lim</sub>	[ SIF input level generating -3 dB video output		45	52	dB $\mu$
FM Detector Output Voltage	V <sub>O1</sub>	V <sub>i</sub> =100dB $\mu$ , $\Delta f = \pm 30$ kHz	480	680	880	mVrms
FM Detector Output Distortion	THD	V <sub>i</sub> =100dB $\mu$ , $\Delta f = \pm 30$ kHz		0.4	1.0	%
AM Rejection	AMR	V <sub>i</sub> =100dB $\mu$ , $\frac{FM: \Delta f = \pm 30 \text{ kHz}}{AM: 30\%}$	43	56		dB
AF Amplifier Voltage Gain	G <sub>AF</sub>	V <sub>i</sub> =100mVrms, f=400Hz	18	20	22	dB
Maximum AF Amplifier Output Voltage	V <sub>O5 max</sub>	[ Output level generating 10% AF amplifier output distortion	2.0	2.8		Vrms
Maximum Attenuation For Electronically Variable Resistors	ATT	V <sub>i</sub> = 200mVrs, f=400Hz	70	80		dB
<b>[Video Characteristics]</b>						
[ Video Softener Range	$\Delta$ Soft	[ f=2MHz, 100mVp-p, voltage at video tone variable resistor, 4 to 0V	-6	-4	-2	dB
[ Video Sharpener Range	$\Delta$ Sharp	[ f=2MHz, 100mVp-p, voltage at video tone variable resistor, 4 to 9V	7	10	13	dB
Video Voltage Gain	GV	[ f=100kHz, 100mVp-p, voltage at contrast variable resistor 9V, voltage at video tone variable resistor 4V	17	20	23	dB
[ Contrast Control Center Setting	CCEN	[ f=100kHz, 100mVp-p, voltage at contrast variable resistor 6V	0.45	0.57	0.69	Vp-p
[ Contrast Control Range	$\Delta$ Cv	[ f=100kHz, 100mVp-p, voltage at contrast variable resistor 3 to 9V	20	22	24	dB
Brightness Control	BRH	Voltage at brightness variable resistor 2V	5.8			V
	BrCEN	Voltage at brightness variable resistor 4.5V	2.6	3.1	3.6	V
	BRL	Voltage at brightness variable resistor 7V			1.2	V
Video Frequency Characteristic	f <sub>V</sub>	Voltage at contrast variable resistor 6V, voltage at video tone variable resistor 4V, 3 dB down	5	7		MHz
Direct Current Transfer Rate	RDC	200mVp-p staircase input	88	93		%
<b>[PAL/NTSC Chroma Characteristics]</b>						
Color Control Chrominance Residue	E <sub>c min</sub>	[ Voltage at color variable resistor 0V, voltage at color contrast variable resistor 9V			30	mVp-p
[ LA7680 Color Contrast Range	$\Delta$ Cc	[ Voltage at color variable resistor B-Y=2.5Vp-p, voltage at contrast variable resistor: 3 to 9V	18.5	20	21.5	dB
[ LA7681 Color Contrast Output Voltage	V <sub>cout</sub>	[ Voltage at color variable resistor 4.5V, voltage at contrast variable resistor 6V	5.8	6.0	6.1	V
Demodulator Output DC Voltage	V <sub>C-Y</sub>	[ For burst signals only. Voltage at color variable resistor 0V	4.7	5.2	5.7	V
Demodulator Output DC Voltage Difference	$\Delta$ V <sub>C-Y</sub>	[ For burst signals only. Voltage at color variable resistor 0V	-300	0	300	mV
Demodulator Output Carrier Leakage Voltage	E <sub>car</sub>				0.3	Vp-p
APC Pull-in Range	$\Delta$ f <sub>APC</sub>		$\pm 500$			Hz

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			min	typ	max	unit
<b>[PAL Chroma Characteristics]</b>						
Contrast Control Center Setting	Ec cen	Voltage at color variable resistor: 4.5V (LA7680)	1.0	1.5	2.0	Vp-p
		Voltage at contrast variable resistor: 6V (LA7681)	1.9	2.6	3.3	Vp-p
ACC Amplitude Characteristic	ACCM1p	+6 dB	-3	0	+3	dB
	ACCM2p	-20dB	-5	-1	+1	dB
Demodulator Output Ratios	B/Rp	(Common to both LA7680 and LA7681)	1.50	1.78	2.00	
	G/Rp	With no B-Y signal(LA7680 only)	-0.56	-0.51	-0.46	
	G/Bp	With no R-Y signal(LA7680 only)	-0.21	-0.19	-0.17	
Demodulation Angle	∠RBp		85	90	95	deg
Maximum Chrominance Output	Ech	Voltage at color variable resistor 9V, voltage at contrast variable resistor 9V	1.0	1.5	2.0	Vp-p
Maximum Demodulator Output	Ecm <sub>ax</sub>	Voltage at color variable resistor 9V, voltage at contrast variable resistor 9V	3.4	4.0		Vp-p
Killer Trigger Point	Ekonp		-35	-31	-27	dB
<b>[NTSC Chroma Characteristics]</b>						
Contrast Control Center Setting	Ec cen <sub>N</sub>	Voltage at color variable resistor 4.5V (LA7680)	0.7	1.1	1.5	Vp-p
		Voltage at contrast variable resistor 6V (LA7681)	1.3	1.8	2.3	Vp-p
ACC Amplitude Characteristic	ACCM1 <sub>N</sub>	+6 dB	-3	0	+3	dB
	ACCM2 <sub>N</sub>	-20dB	-5		+1	dB
ACC Phase Characteristic	ACCP1 <sub>N</sub>	+6 dB	-3	0	+3	deg
	ACCP2 <sub>N</sub>	-20dB	-7		+7	deg
Tint Control Center Setting	TCEN	Voltage at tint variable resistor 4.5V Voltage at color variable resistor 4.5V Voltage at contrast variable resistor 6V	-9	+3	+15	deg
Tint Range	ΔT	Voltage at tint variable resistor 0 to 4.5 to 9V Voltage at color variable resistor 4.5V Voltage at contrast variable resistor 6V	±40			deg
Demodulator Output Ratio	R/BN	Voltage at contrast variable resistor 6V	0.81	0.90	0.98	
	G/BN	(LA7680)	0.24	0.3	0.38	
Demodulator Angle	∠RBN		90	96	102	deg
	∠GBN	(LA7680)	-131	-121	-111	deg
Killer Trigger Point	Ekon <sub>N</sub>		-38	-34	-30	dB
Maximum Demodulator Output	Ecm <sub>axN</sub>	Voltage at color variable resistor 9V, voltage at contrast variable resistor 9V	2.8	3.4		Vp-p
<b>[Deflection Characteristics]</b>						
Synchronization Separator Input Voltage	VSDC		6.0	6.3	6.6	V
Vertical Free-Running Frequency (50Hz)	Tv <sub>free50</sub>			312.5		H
Vertical Free-Running Frequency (60Hz)	Tv <sub>free60</sub>			262.5		H
Maximum Vertical Synchronization Frequency (50Hz)	Tv <sub>max50</sub>	With horizontal synchronization signal only		357		H
Maximum Vertical Synchronization Frequency (60Hz)	Tv <sub>max60</sub>	With horizontal synchronization signal only		297		H
Minimum Vertical Synchronization Frequency (60Hz)	Tv <sub>min60</sub>			225		H
Minimum Vertical Synchronization Frequency (50Hz)	Tv <sub>min50</sub>			269		H
Vertical Blanking Pulse Level	VH <sub>vBL</sub>		7.0	7.5		V
Vertical Blanking Pulsewidth (50Hz)	PWBLK50			21.5		H

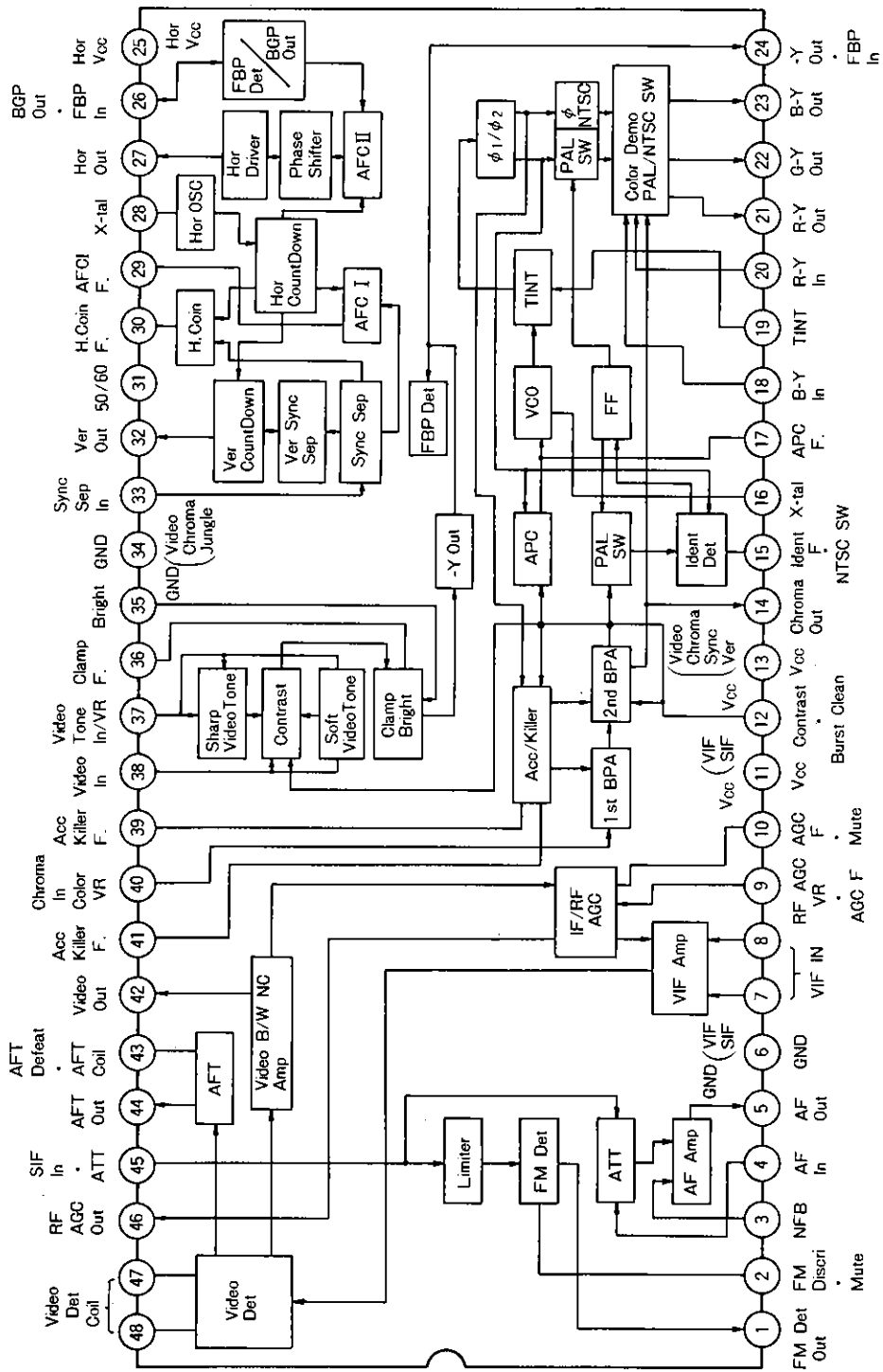
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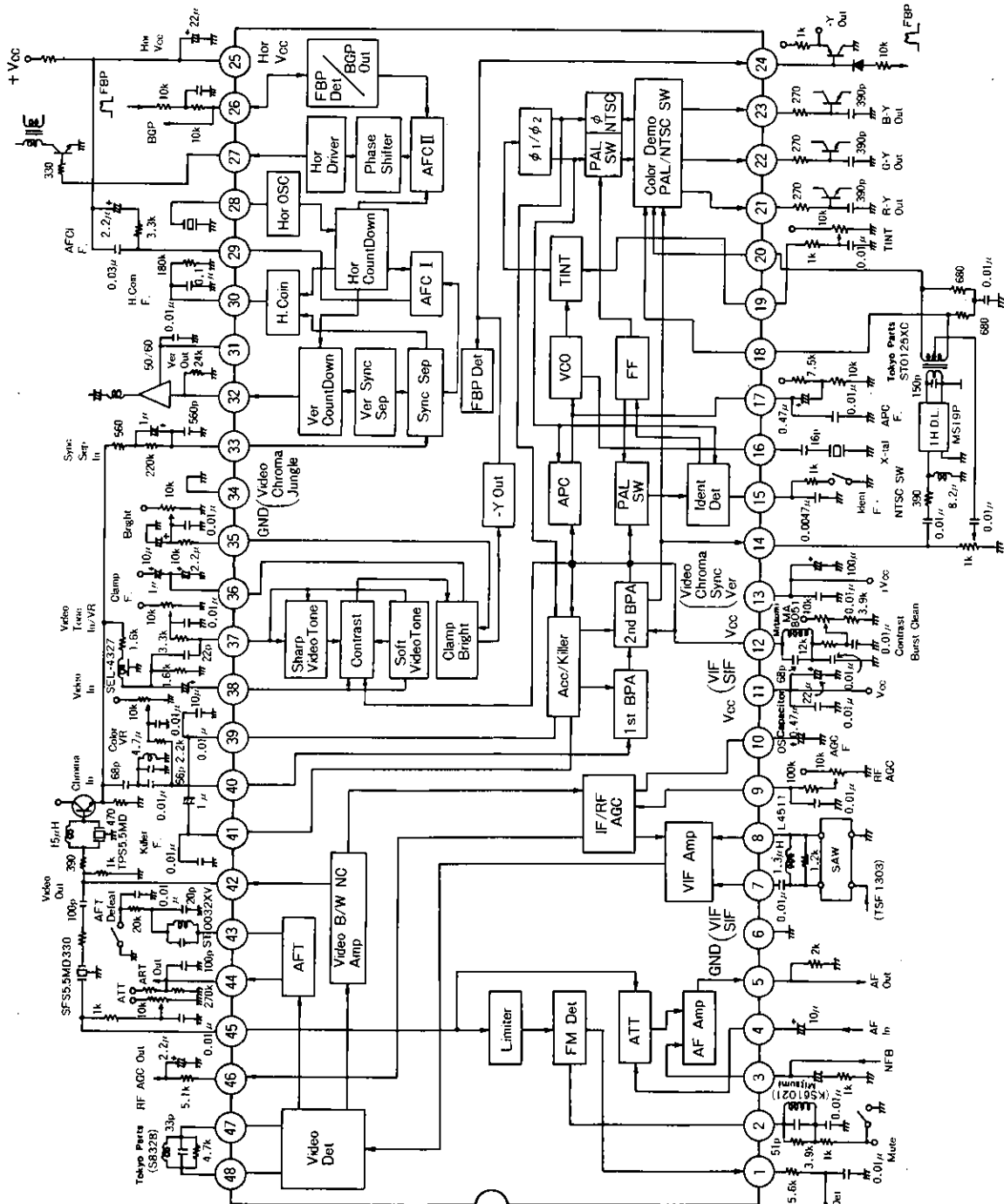
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Vertical Blanking Pulsewidth (60Hz)	PWBLK60		17.5		H	
	Vertical Output Pulsewidth	PW VOUT	8.5		H	
Vertical Output Voltage	VOUT H	5.7	6	6.3	V	
	VOUT M	4.3	4.6	4.9	V	
	VOUT L			0.3	V	
Vertical Deflection External Trigger Load Impedance	RTR	2.5	3.6		k $\Omega$	
Vertical Deflection Automatic Synchronization Cutoff Voltage	VSAS		1.9	2.4	V	
Vertical Output Pulse Vcc Starting Level	SvV			4	V	
Horizontal Free-Running Frequency Deviation	$\Delta f_H$	Deviation from 15.680kHz	-100	0	100	Hz
Horizontal Free-Running Frequency Dependence on Vcc	$\Delta f_H V_{CC}$	$V_{25} = 6.6V$ (reference value)	2			Hz
	Horizontal Pull-in Range	$f_H PULL$	Deviation from 15.680kHz	$\pm 450$		Hz
Horizontal Output Pulse Vcc Starting Level	SHV		4.3	5		V
	AFC II FBP Peak Level	FBPH	4.1	4.6	5.1	V
VCR Switch Input Level	VCR		1.3	2.0	V	
Horizontal Output Pulsewidth	PWHOUT	21.8	23.8	25.8	$\mu S$	
Horizontal Output Pulse Phase	HPF		12		$\mu S$	
	HPCEN	3.4	4.4	5.4	$\mu S$	
	HPR			0	$\mu S$	
Burst Gate Pulsewidth	PWBGP	2.7	3.7	4.7	$\mu S$	
Burst Gate Pulse Phase	TDBGP	0.2	0.6	1.2	$\mu S$	
Horizontal Synchronization Detector Threshold Level	HCOIN	4.2	4.5	4.8	V	
	50/60Hz, Output Voltage	V50		0.4	0.5	V
	V60	2.8	3.5		V	
50/60Hz, Input Voltage	Vin60			8.7	V	
	Vin50	0.15			V	

Block Diagram: PAL/NTSC System



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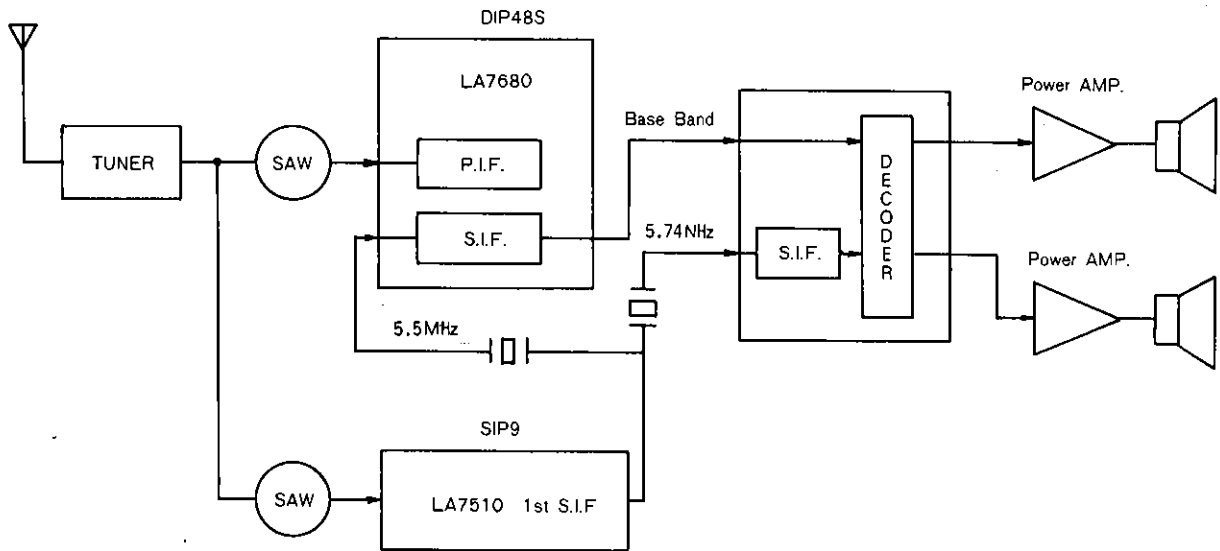
Sample Application Circuit: PAL/NTSC System



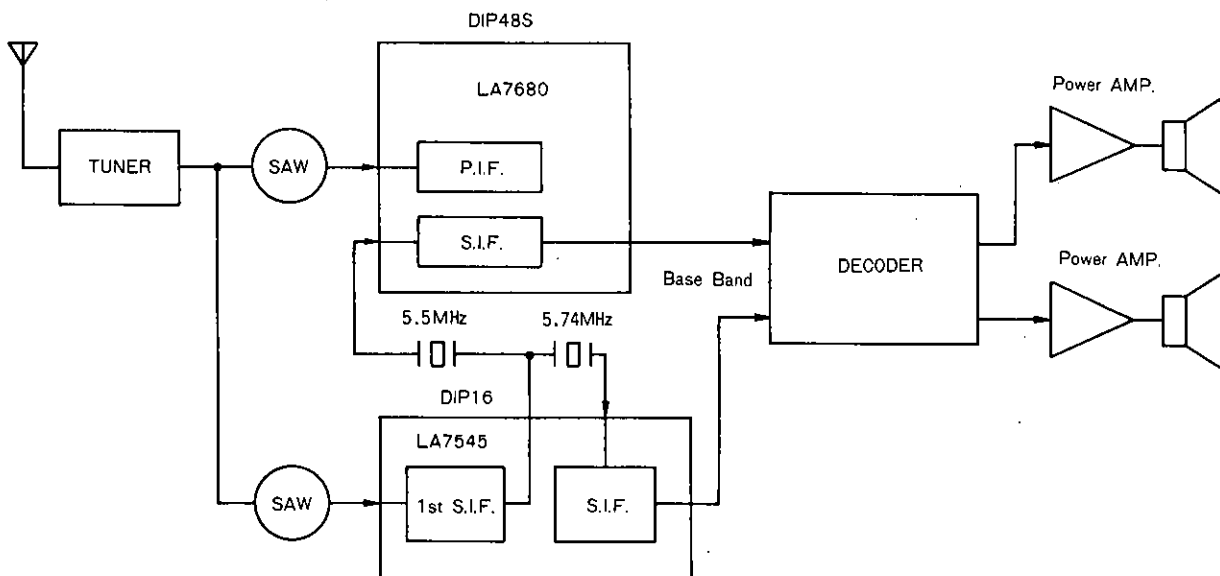
Unit (resistance:Ω, capacitance:F)

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## PAL Multi-sound System



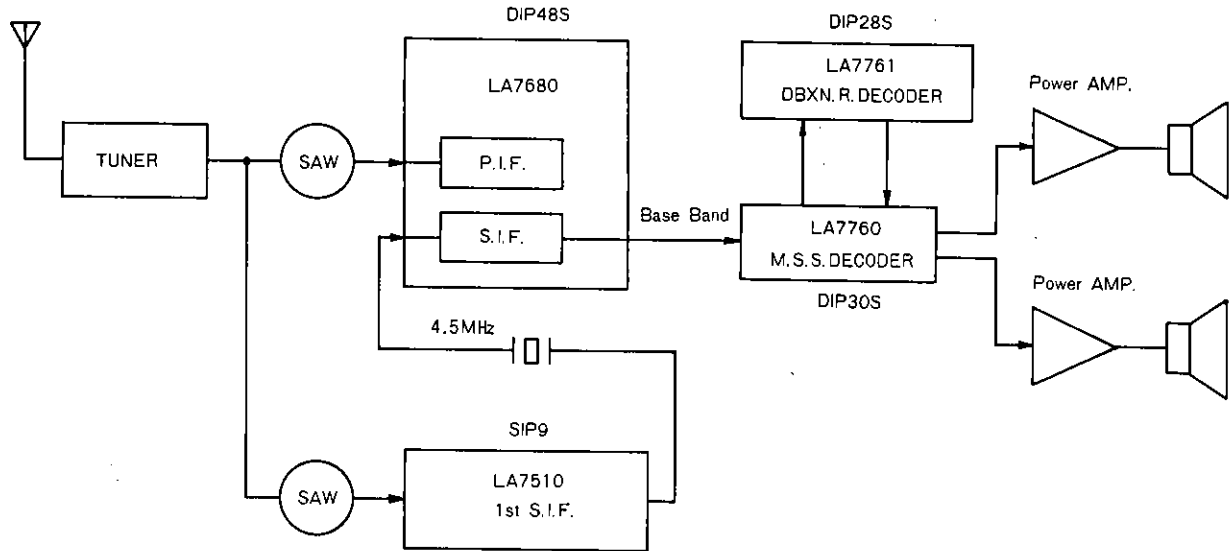
## PAL Multi-sound System



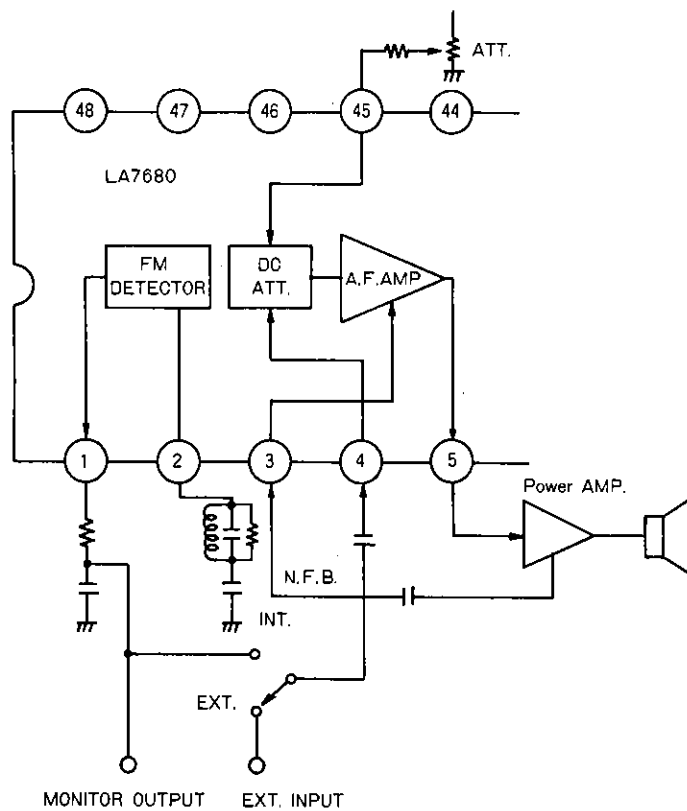


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## U.S. Multi-sound System

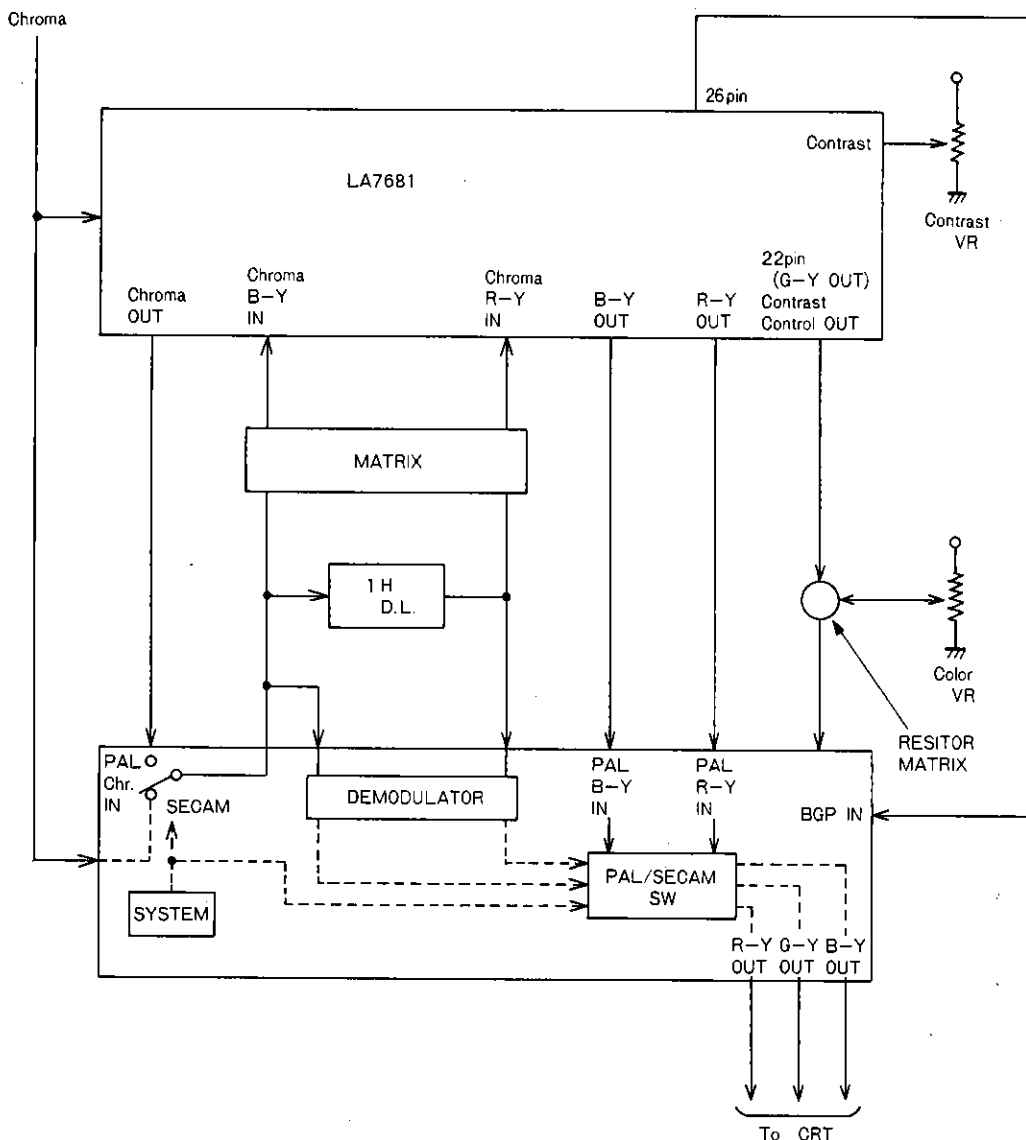


## Sound Input/Output



LA7680, 7681

PAL/SECAM Chroma Demodulator Interface



Note: The LA7680 may be used with the transcode type of SECAM chroma demodulators.

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