Ordering number : EN 3343A

Monolithic Linear IC

SANYO No.3343A

LA7680, 7681

Single-Chip Signal Processor for Color TV Use

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

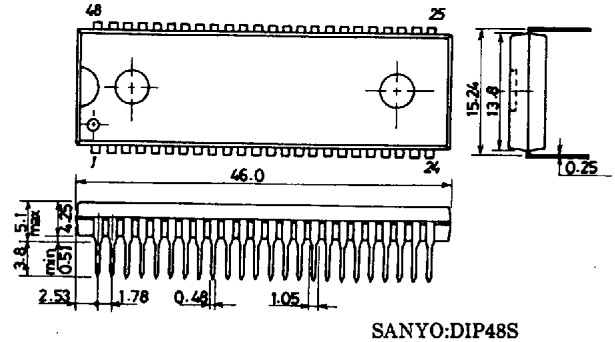
Chroma demodulator
- PAL and NTSC system compatible
- Optimized demodulation angles and ratios
- High performance burst cleaning filter and ACC/killer detector
- On-chip tint circuit (NTSC only)

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

Absolute Maximum Ratings at Ta=25℃

				unit
Input Voltage	V_{13} max		12	V
	V_{11} max		12	V
Input Current	I_{25} max		16	mA
Allowable Power Dissipation	Pd max	Ta≦65℃	1.35	W
FBP Input Current	I_{26} max		5	mA
	I_{24} max		10	mA
FBP Input Voltage	V_{26} min		−5	V
Operating Temperature	**Topr**		−10～+65	℃
Storage Temperature	Tstg		−55～+150	℃

Recommended Operating Conditions at Ta=25℃

			unit
Supply Voltage	V_{13}	9	V
	V_{11}	9	V
Supply Current	I_{25}	13	mA
Operating Voltage Range	V_{13} op	8～10	V
	V_{11} op	8～10	V
Operating Current Range	I_{25} op	10～16	mA

Operating Characteristics at Ta=25℃, Vcc=V_{13}=V_{11}=9V, Icc=I_{25}=13mA

			min	typ	max	unit
[Supply Characteristics]						
Horizontal Supply Voltage	V_{25}		7.0	7.5	8.0	V
Supply Current	I_{11+13}		90	110	140	mA
[VIF Characteristics]fp=38.9MHz						
Video Output Voltage	V_{42}	With no inputs	4.2	4.6	5.0	V
AFT Output Voltage	V_{44}	With no inputs	2.8	4.2	5.7	V
Maximum RF AGC Voltage	V_{46H}	CW=85dBμ RF AGC VR=min	7.6	8.0	8.3	V
Minimum RF AGC Voltage	V_{46L}	CW=85dBμ RF AGC VR=max	0	0.01	0.3	V
Input Sensitivity	Vi	VIF input level generating 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 generating +1dB video output	100	107		dBμ
Video Output Amplitude	V_{O42}	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, $20\log\frac{1.43(Vp\text{-}p)}{noise(Vrms)}$	47	53		dB
Sync Signal Tip Level	$V_{42\,TIP}$	CW=80dBμ	2.0	2.3	2.6	V
Frequency Characteristic	fc	Frequency generating -3dB video output	7	10		MHz
VIF Intermodulation	$I_{1.07}$	$V_{4.43MHz}/V_{1.07MHz}$, Vi=80dBμ	35	42		dB

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			min	typ	max	unit
Maximum AFT Output Voltage	V_{44H}	CW=80dBμ, over a range of frequencies	8.0	8.3	8.7	V
Minimum AFT Output Voltage	V_{44L}	CW=80dBμ, over a range of frequencies	0.2	0.4	0.9	V
AFT Detector Sensitivity	Sf	CW=80dBμ, over a range of frequencies	35	60	90	mV/kHz
AFT Defeat Switching Voltage	$V_{AFT\ SW}$	Measured at sweep signal	1.0	5.0		V
Black Noise Threshold	V_{BTH}	Measured at sweep signal	1.2	1.5	1.8	V
[SIF Characteristics]fs=5.5MHz						
SIF Limiting Voltage	Vilim	SIF input level generating -3 dB video output		45	52	dBμ
FM Detector Output Voltage	V_{O1}	Vi=100dBμ, Δf=±30kHz	480	680	880	mVrms
FM Detector Output Distortion	THD	Vi=100dBμ, Δf=±30kHz		0.4	1.0	%
AM Rejection	AMR	Vi=100dBμ, $\frac{\text{FM:}\Delta f=\pm 30\text{kHz}}{\text{AM:}30\%}$	43	56		dB
AF Amplifier Voltage Gain	G_{AF}	Vi=100mVrms, f=400Hz	18	20	22	dB
Maximum AF Amplifier Output Voltage	V_{O5} max	Output level generating 10% AF amplifier output distortion	2.0	2.8		Vrms
Maximum Attenuation For Electronically Variable Resistors	ATT	Vi=200mVrs, f=400Hz	70	80		dB
[Video Characteristics]						
Video Softener Range	ΔSoft	f=2MHz, 100mVp-p, voltage at video tone variable resistor, 4 to 0V	−6	−4	−2	dB
Video Sharpener Range	ΔSharp	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	C_{CEN}	f=100kHz, 100mVp-p, voltage at contrast variable resistor 6V	0.45	0.57	0.69	Vp-p
Contrast Control Range	ΔCv	f=100kHz, 100mVp-p, voltage at contrast variable resistor 3 to 9V	20	22	24	dB
Brightness Control	BR_H	Voltage at brightness variable resistor 2V	5.8			V
	BR_{CEN}	Voltage at brightness variable resistor 4.5V	2.6	3.1	3.6	V
	BR_L	Voltage at brightness variable resistor 7V			1.2	V
Video Frequency Characteristic	fV	Voltage at contrast variable resistor 6V, voltage at video tone variable resistor 4V, 3 dB down	5	7		MHz
Direct Current Transfer Rate	R_{DC}	200mVp-p staircase input	88	93		%
[PAL/NTSC Chroma Characteristics]						
Color Control Chrominance Residue	Ec min	Voltage at color variable resistor 0V, voltage at color contrast variable resistor 9V			30	mVp-p
LA7680 Color Contrast Range	ΔCc	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	Vcout	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_{C-Y}	For burst signals only. Voltage at color variable resistor 0V	4.7	5.2	5.7	V
Demodulator Output DC Voltage Difference	ΔV_{C-Y}	For burst signals only. Voltage at color variable resistor 0V	−300	0	300	mV
Demodulator Output Carrier Leakage Voltage	Ecar				0.3	Vp-p
APC Pull-in Range	Δf_{APC}		±500			Hz

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			min	typ	max	unit
[PAL Chroma Characteristics]						
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	Ecmax	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
[NTSC Chroma Characteristics]						
Contrast Control Center Setting	Ec cenN	Voltage at color variable resistor 4.5V (LA7680)	0.7	1.1	1.5	Vp-p
		Voltage a contrast variable resistor 6V (LA7681)	1.3	1.8	2.3	Vp-p
ACC Amplitude Characteristic	ACCM1N	+6 dB	−3	0	+3	dB
	ACCM2N	−20dB	−5		+1	dB
ACC Phase Characteristic	ACCP1N	+6 dB	−3	0	+3	deg
	ACCP2N	−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		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	EkONN		−38	−34	−30	dB
Maximum Demodulator Output	EcmaxN	Voltage at color variable resistor 9V, voltage at contrast variable resistor 9V	2.8	3.4		Vp-p
[Deflection Characteristics]						
Synchronization Separator Input Voltage	VSDC		6.0	6.3	6.6	V
Vertical Free-Running Frequency (50Hz)	TVfree50			312.5		H
Vertical Free-Running Frequency (60Hz)	TVfree60			262.5		H
Maximum Vertical Synchronization Frequency (50Hz)	TV max50	With horizontal synchronization signal only		357		H
Maximum Vertical Synchronization Frequency (60Hz)	TV max60	With horizontal synchronization signal only		297		H
Minimum Vertical Synchronization Frequency (60Hz)	TV min60			225		H
Minimum Vertical Synchronization Frequency (50Hz)	TV min50			269		H
Vertical Blanking Pulse Level	VH VBL		7.0	7.5		V
Vertical Blanking Pulsewidth (50Hz)	PWBLK50			21.5		H

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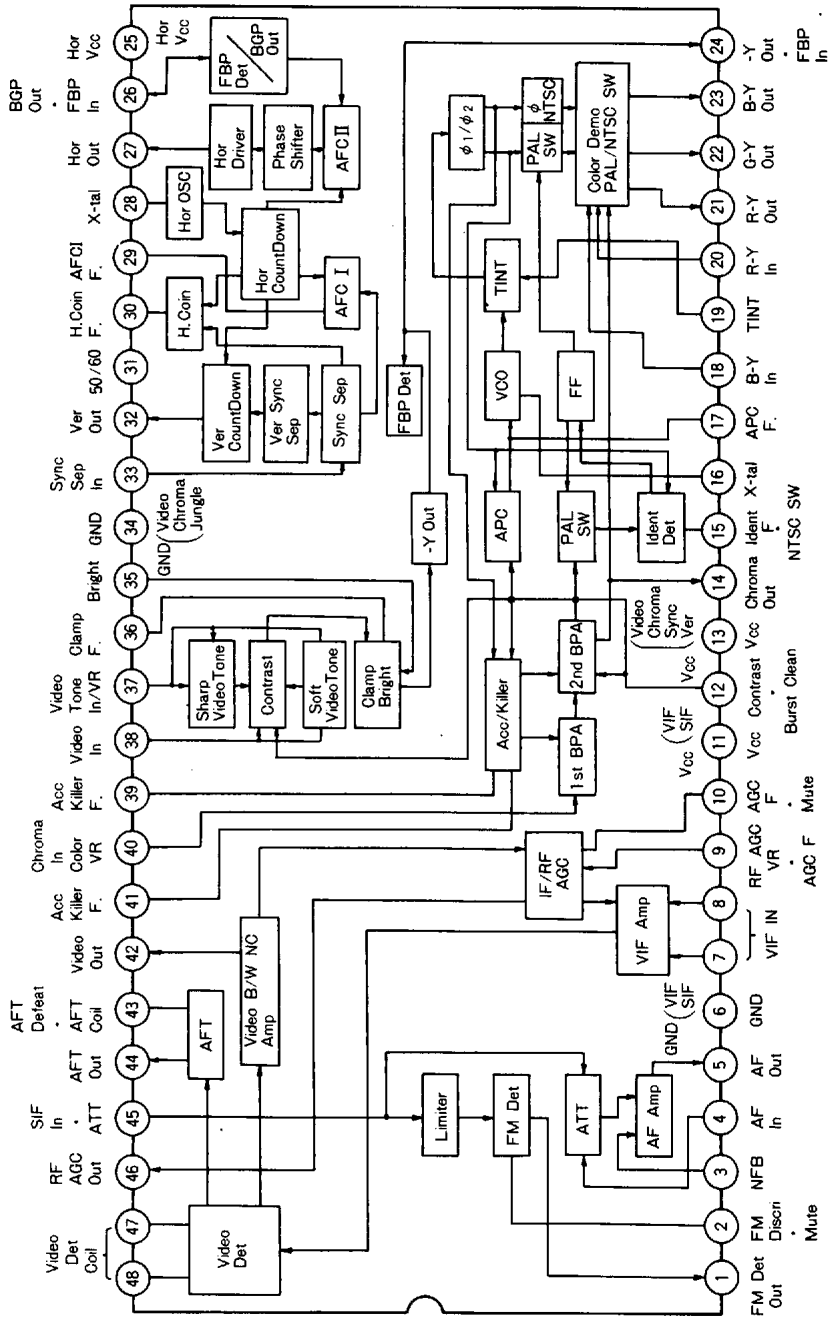
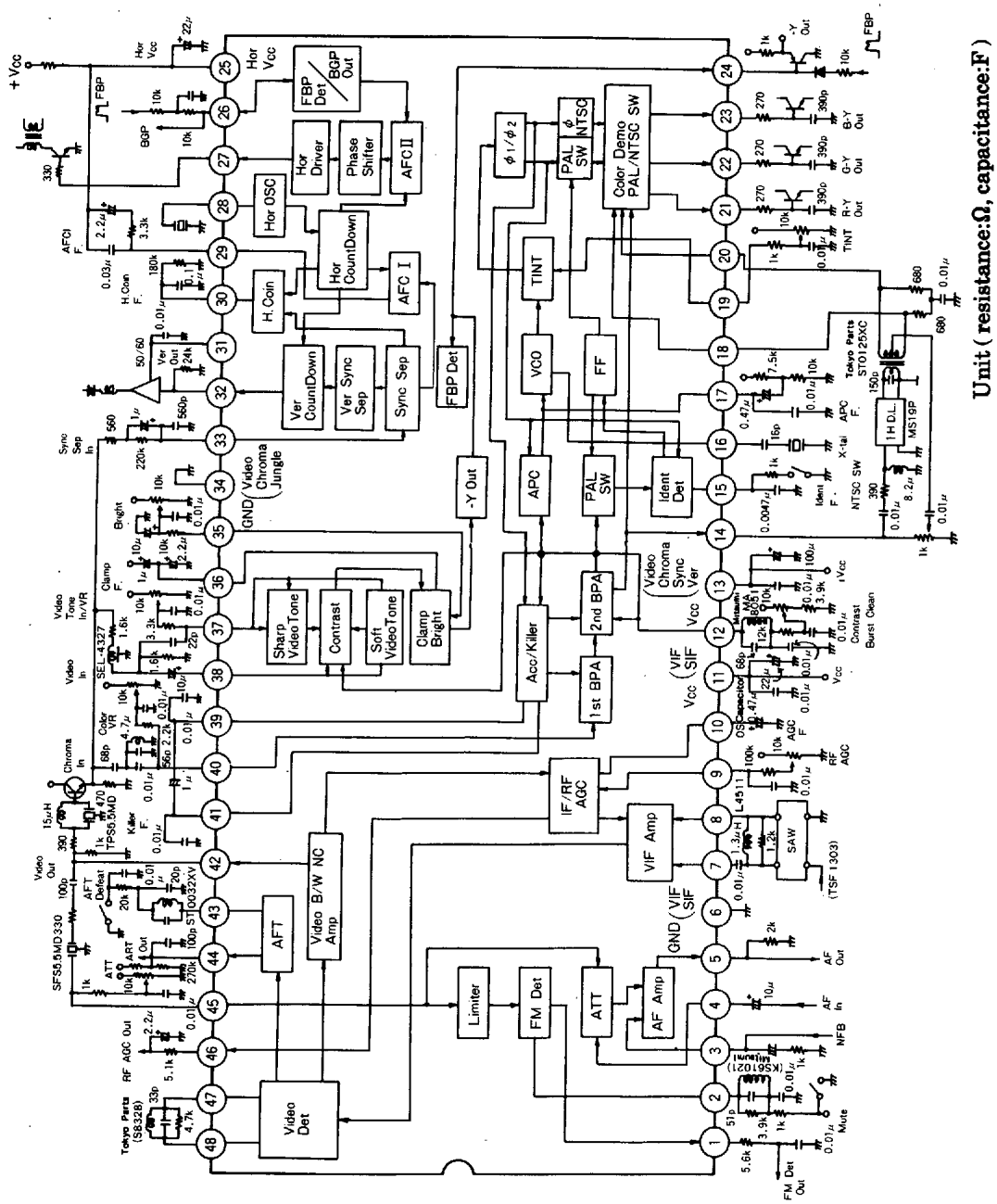
			min	typ	max	unit
Vertical Blanking Pulsewidth (60Hz)	P_{WBLK60}			17.5		H
Vertical Output Pulsewidth	$P_{W\ VOUT}$			8.5		H
Vertical Output Voltage	$V_{OUT\ H}$		5.7	6	6.3	V
	$V_{OUT\ M}$		4.3	4.6	4.9	V
	$V_{OUT\ L}$				0.3	V
Vertical Deflection External Trigger Load Impedance	R_{TR}		2.5	3.6		kΩ
Vertical Deflection Automatic Synchronization Cutoff Voltage	V_{SAS}			1.9	2.4	V
Vertical Output Pulse Vcc Starting Level	S_{VV}				4	V
Horizontal Free-Running Frequency Deviation	Δf_H	Deviation from 15.680kHz	−100	0	100	Hz
Horizontal Free-Running Frequency Dependence on Vcc	Δf_{HVcc}	V_{25}=6.6V (reference value)		2		Hz
Horizontal Pull-in Range	$f_{H\ PULL}$	Deviation from 15.680kHz	±450			Hz
Horizontal Output Pulse Vcc Starting Level	S_{Hv}			4.3	5	V
AFC II FBP Peak Level	FBP_H		4.1	4.6	5.1	V
VCR Switch Input Level	VCR			1.3	2.0	V
Horizontal Output Pulsewidth	P_{WHOUT}		21.8	23.8	25.8	μs
Horizontal Output Pulse Phase	H_{PF}		12			μs
	H_{PCEN}		3.4	4.4	5.4	μs
	H_{PR}				0	μs
Burst Gate Pulsewidth	P_{WBGP}		2.7	3.7	4.7	μs
Burst Gate Pulse Phase	Td_{BGP}		0.2	0.6	1.2	μs
Horizontal Synchronization Detector Threshold Level	Hcoin		4.2	4.5	4.8	V
50/60Hz, Output Voltage	V_{50}			0.4	0.5	V
	V_{60}		2.8	3.5		V
50/60Hz, Input Voltage	Vin_{60}				8.7	V
	Vin_{50}		0.15			V

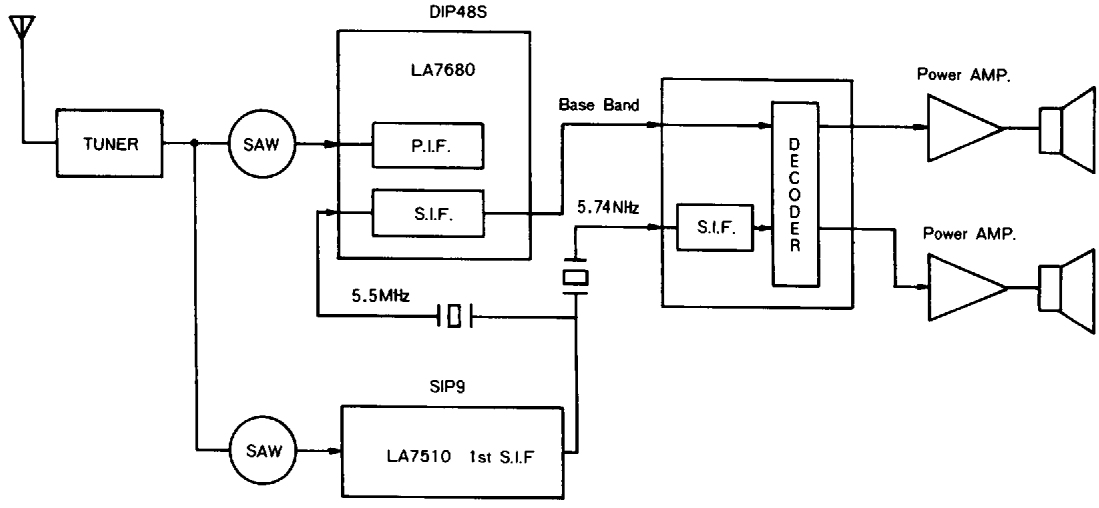
Block Diagram: PAL/NTSC System



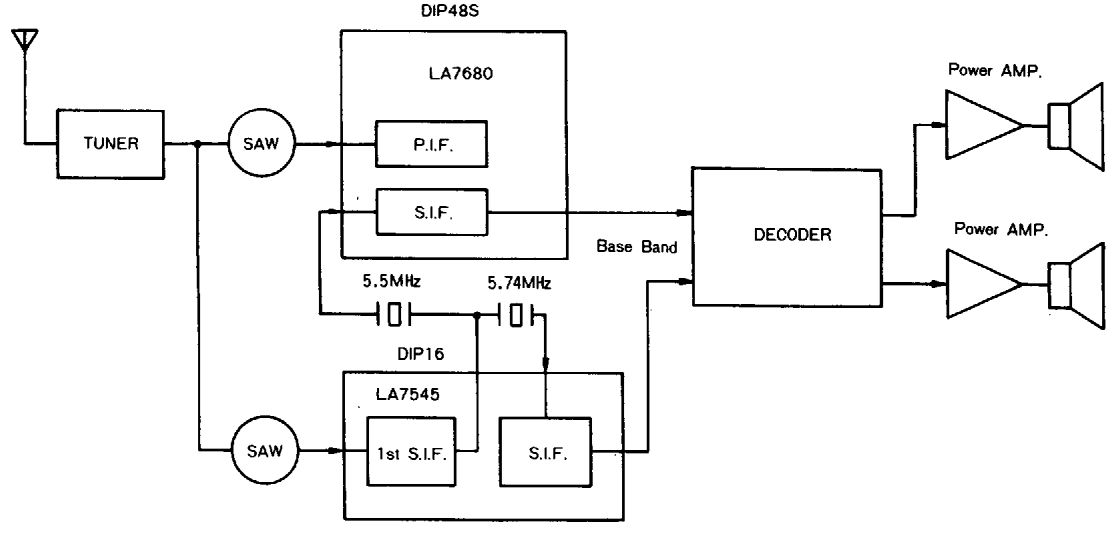
Sample Application Circuit: PAL/NTSC System



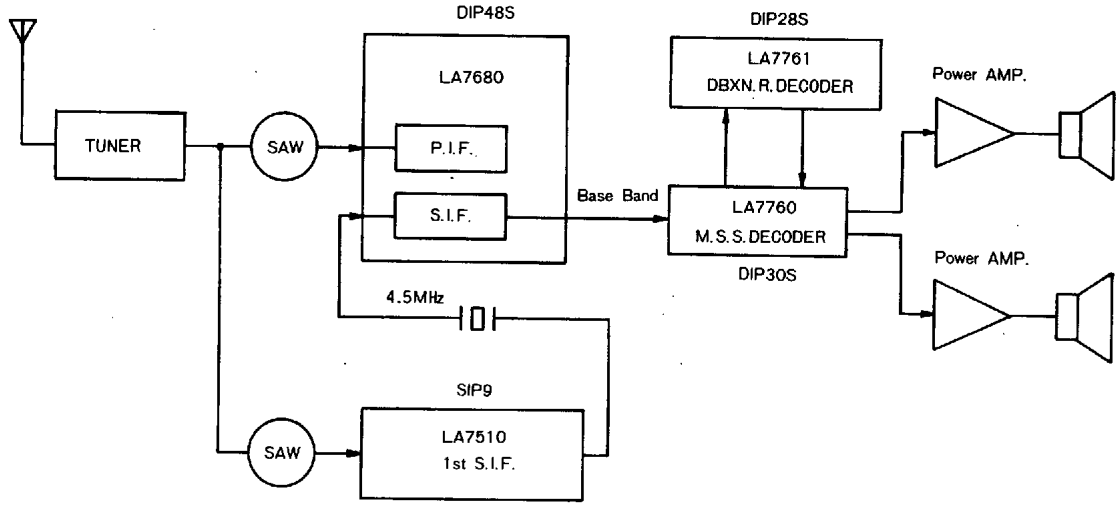
PAL Multi-sound System



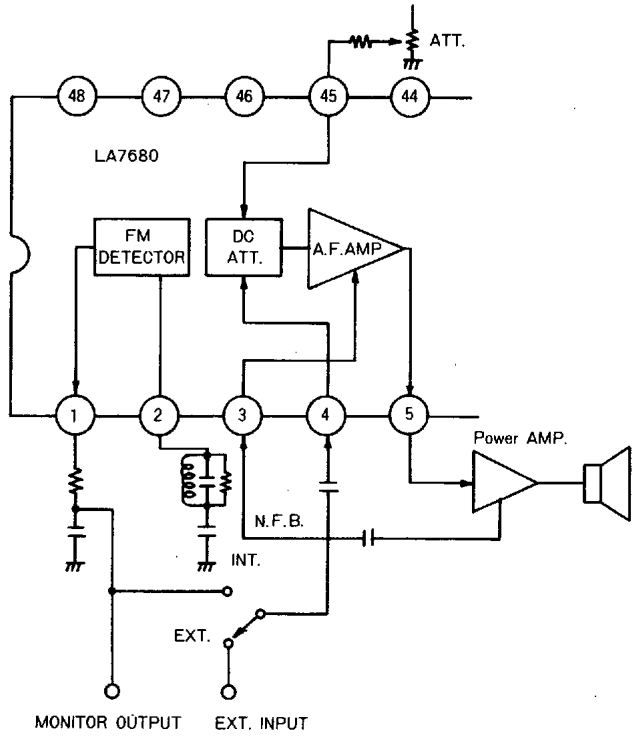
PAL Multi-sound System



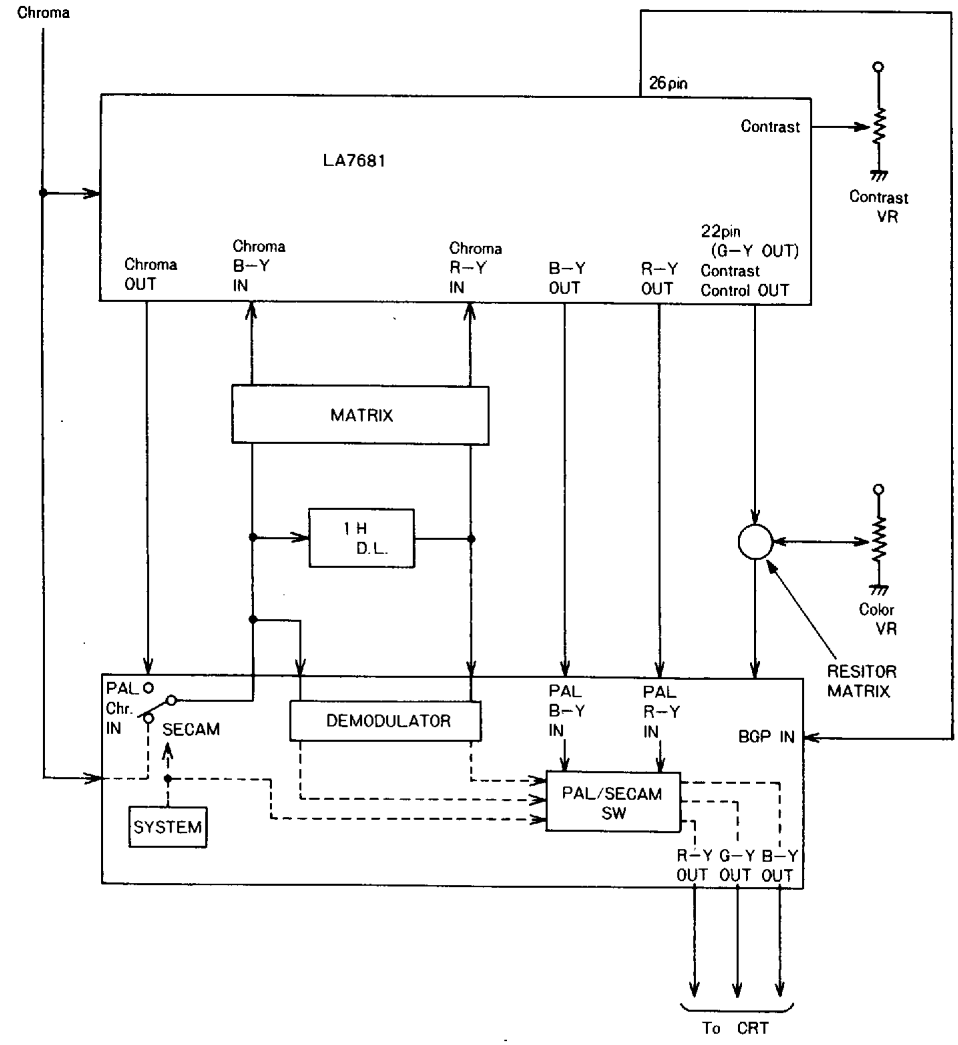
U.S. Multi-sound System



Sound Input/Output



PAL/SECAM Chroma Demodulator Interface



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