IR3P76 AV Switch

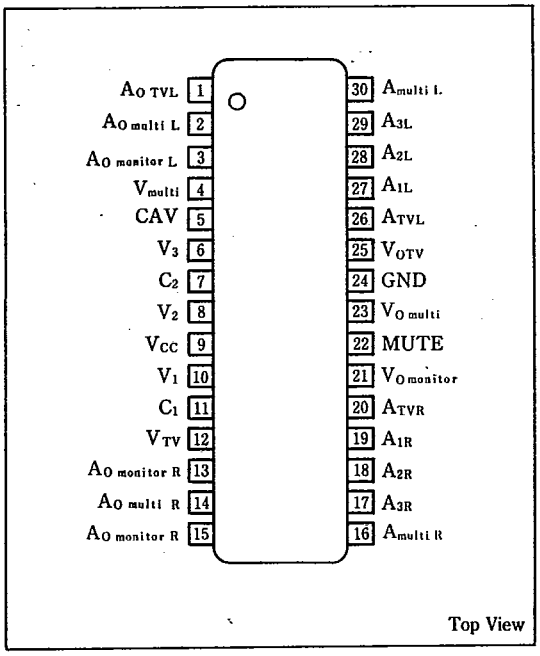
Description

The IR3P76 is an analog switch IC for a television. It incorporates one video line and two audio lines (L and R), each of which has five inputs and three outputs. It permits those three lines to be switched simultaneously. The switches consist of a 4-contact switch which selects one from the TV input and three external inputs and sends it to each output, and a 2-contact switch which switches between the selected inputs and the multi-inputs and sends either of them to the output for a television.

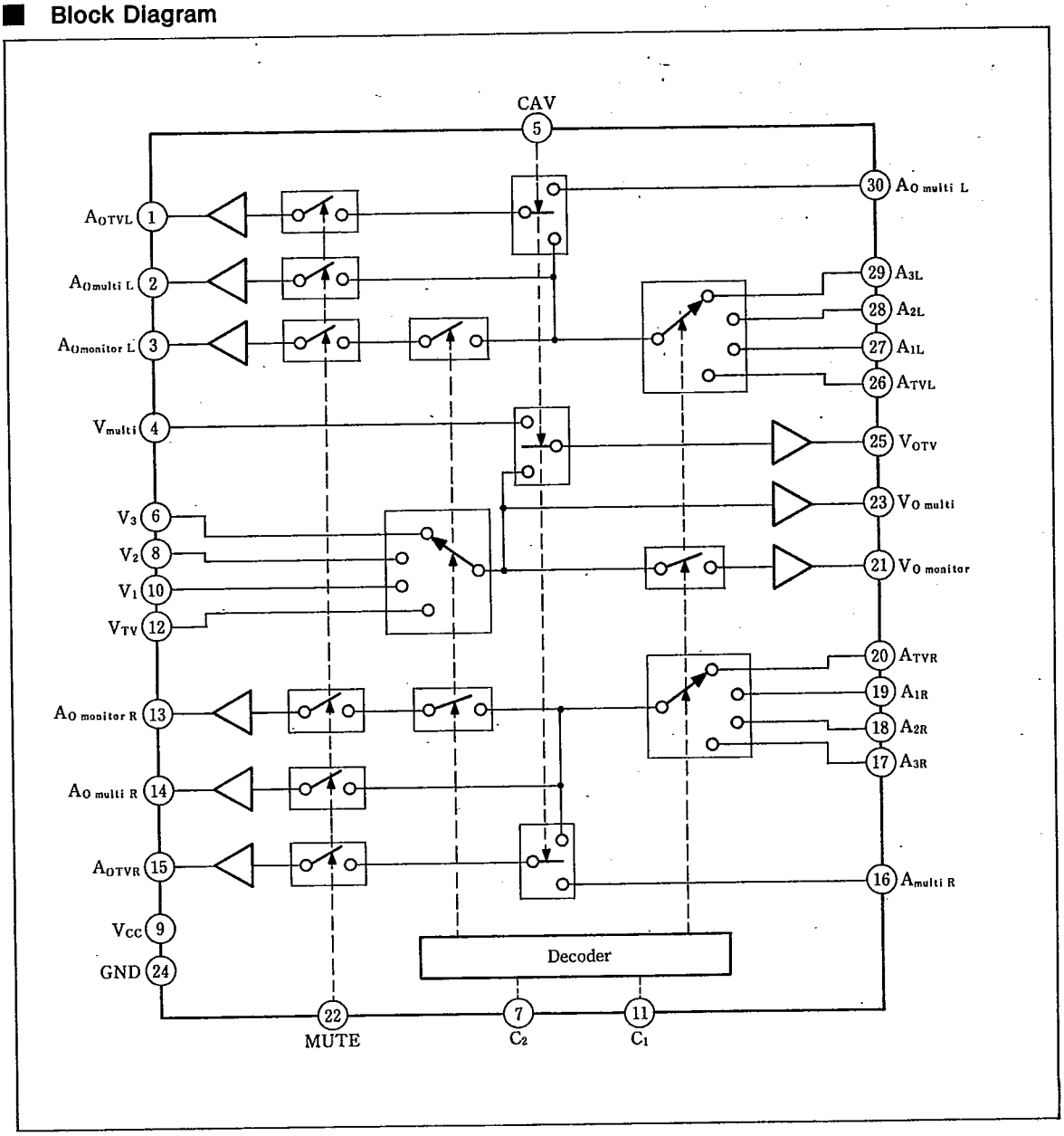
Features

1. Video frequency, 26MHz (TYP.)
2. Video crosstalk, 55dB (TYP.)
3. Audio line
   Input: 3 pins × 2 for external input,
   1 pin × 2 for multi-input,
   1 pin × 2 for TV input
   Output: 1 pin × 2 for multi-pin output,
   1 pin × 2 for monitor output,
   1 pin × 2 for TV output
4. Video line
   Input: 3 pins for external input,
   1 pin for multi-input,
   1 pin for TV input
   Output: 1 pin for multi-pin output,
   1 pin for monitor output,
   1 pin for TV output
5. Mode switching input
6. Sound mute
7. Amplifier for 6dB in video and 3dB in audio
8. 30-pin shrink dual-in-line package

Pin Connections



Block Diagram



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Pin Description

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	A_{OTVL}	Audio output (L) for TV	16	$A_{multi\ R}$	Audio multi input (R)
2	$A_{O\ multi\ L}$	Audio output (L) for multi-pin	17	A_{3R}	Audio external input 3 (R)
3	$A_{O\ monitor\ L}$	Audio monitor output (L)	18	A_{2R}	Audio external input 2 (R)
4	V_{Multi}	Video multi input	19	A_{1R}	Audio external input 1 (R)
5	CAV	AV control	20	A_{TVR}	Audio TV input (R)
6	V_3	Video external input 3	21	$V_{O\ monitor}$	Video monitor output
7	C_2	Control 2	22	MUTE	Audio mute
8	V_2	Video external input 2	23	$V_{O\ multi}$	Video output for multi-pin
9	V_{CC}	Power supply	24	GND	Ground
10	V_1	Video external input 1	25	V_{OTV}	Video output for TV
11	C_1	Control 1	26	A_{TVL}	Audio TV input (L)
12	V_{TV}	Video TV input	27	A_{1L}	Audio external input 1 (L)
13	$A_{O\ monitor\ R}$	Audio monitor output (R)	28	A_{2L}	Audio external input 2 (L)
14	$A_{O\ multi\ R}$	Audio output (R) for multi-pin	29	A_{3L}	Audio external input 3 (L)
15	A_{OTVR}	Audio output (R) for TV	30	$A_{multi\ L}$	Audio multi input (L)

Absolute Maximum Ratings

(Ta=25℃)

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	V_{CC}		15	V
Input signal voltage	V_{IN}		5	V_{P-P}
Power dissipation	P_D	Ta≦25℃	1.3	W
P_D derating ratio	ΔP_D/℃	Ta>25℃	13.0	mW/℃
Operating temperature	T_{opr}		−20~65	℃
Storage temperature	T_{stg}		−55~150	℃

Electrical Characteristics

(Unless otherwise specified: Ta=−20~65℃, V_{CC}=8~13V)

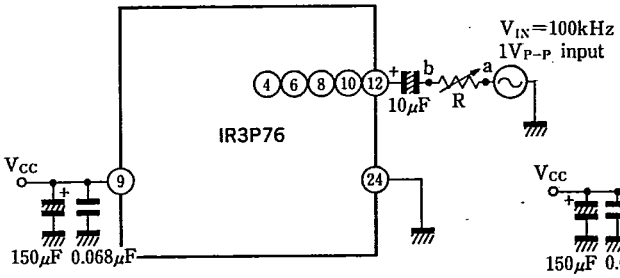
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating supply voltage	V_{CC}		8	9	13	V
Current consumption	I_{CC}	V_{CC}=9.0V	27	33	50	mA
Mode switching threshold voltage	V_{th} (MODE)		1.5	1.9	2.5	V
Mode switching input resistance	R_C		20	35		kΩ
Video section						
Video input impedance	Z_{IV}	100kHz sine wave $1V_{P-P}$ input	9	15	23	kΩ
Video output impedance	Z_{OV}	100kHz sine wave *		20	40	Ω
Video gain	G_V	APL 50% stair step wave $1V_{P-P}$	5	6	7	dB
Allowable video input	V_{IV}	V_{CC}=9.0V APL10~90% Point at stair step wave−5%	1.8	2.2		V_{P-P}
Differential gain	D_G	Input $1V_{P-P}$			3	%
Differential phase	D_P	Input $1V_{P-P}$			3	deg
Video frequency characteristic	f_{BV}	V_O (100kHz) =0dB Point at−3dB $1V_{P-P}$ input	10	26		MHz
Video crosstalk	C_V	V_{CC}=9.0V, Ta=25℃ 1~5 MHz $1V_{P-P}$ input	50	55		dB

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Audio section						
Audio input impedance	Z_{IA}	1kHz Sine wave $0.5V_{rms}$ input	32	50	68	kΩ
Audio output impedance	Z_{OA}	1kHz Sine wave *		20	50	Ω
Audio gain	G_A	1kHz $0.5V_{rms}$	2	3	4	dB
Allowable audio input	V_{IA}	V_{CC}=9.0V, 1kHz Point at which 1kHz output results in 1% distortion	1.5	1.7		V_{rms}
Total harmonic distortion	THD	1kHz $0.5V_{rms}$ Input		0.1	0.5	%
Audio frequency	f_{BA}	V_O (1kHz)=0dB Point at−3dB, $0.5V_{rms}$ input	100			kHz
Audio crosstalk (1)	C_{A1}	Between each mode Ta=25℃, 100Hz~20kHz $0.5V_{rms}$	60	80		dB
Audio crosstalk (2)	C_{A2}	Between L and R, Ta=25℃ 100Hz~20kHz, $0.5V_{rms}$	70	80		dB
Sound mute effect		Ta=25℃, 100Hz~20kHz $1V_{rms}$ Input	70	85		dB
Mute input resistance	R_{IM}	When muting	20	30		kΩ
Mute threshold voltage	V_{th} (MUTE)		1.8	2.4	3.3	V
Audio DC offset (1)	V_{os1}	Mode switching	−50	0	+50	mV
Audio DC offset (2)	V_{os2}	Mute operation	−50	0	+50	mV

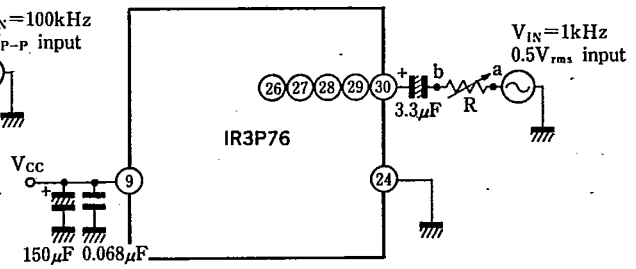
* Make measurements at such an input level as free from the distortion of the output waveform with "R" connected.

■ Test Circuit

(1) Test circuit for video input impedance

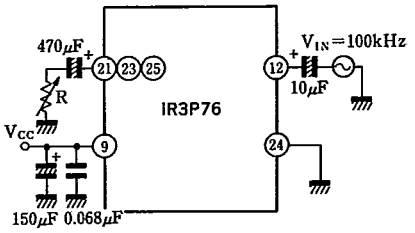


(2) Test circuit for audio input impedance (for the audio L side)

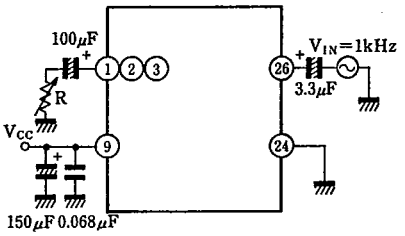


Test method : Test the resistance when the waveforms at the points "a"(V_{IN}) and "b"(V) satisfy "V/V_{IN}=0.5" with the input signal V_{IN} entered.

(3) Test circuit for video output impedance



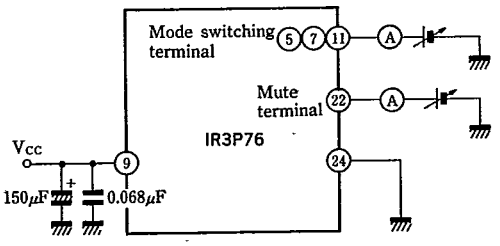
(4) Test circuit for audio output impedance (for audio L side)



Test method : Test the resistance when the waveforms V_O and V which are monitored when the input signal V_{IN} is entered with the resistor "R" on the output side removed and connected, respectively, satisfy "V/V_O= 0.5".

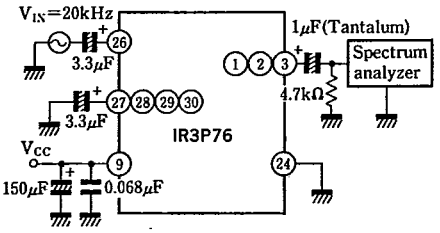
Note) Control the input level so that the waveform may not be distorted when "R" is connected.

(5) Test circuit for input resistance of mode switching and mute pin

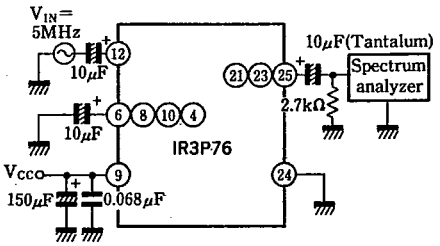


Test method : Apply voltage to the input pin to be tested, read the current, and then obtain the resistance from "V/I= R".

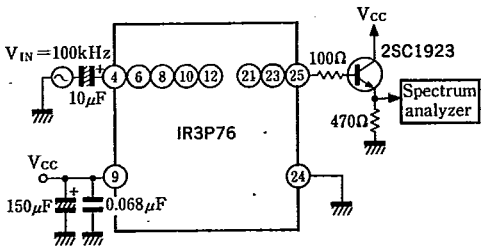
(6) Test circuit for video crosstalk



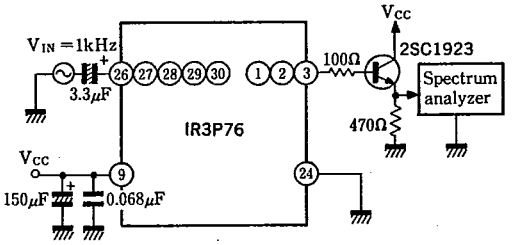
(7) Test circuit for audio crosstalk (for the audio L side)



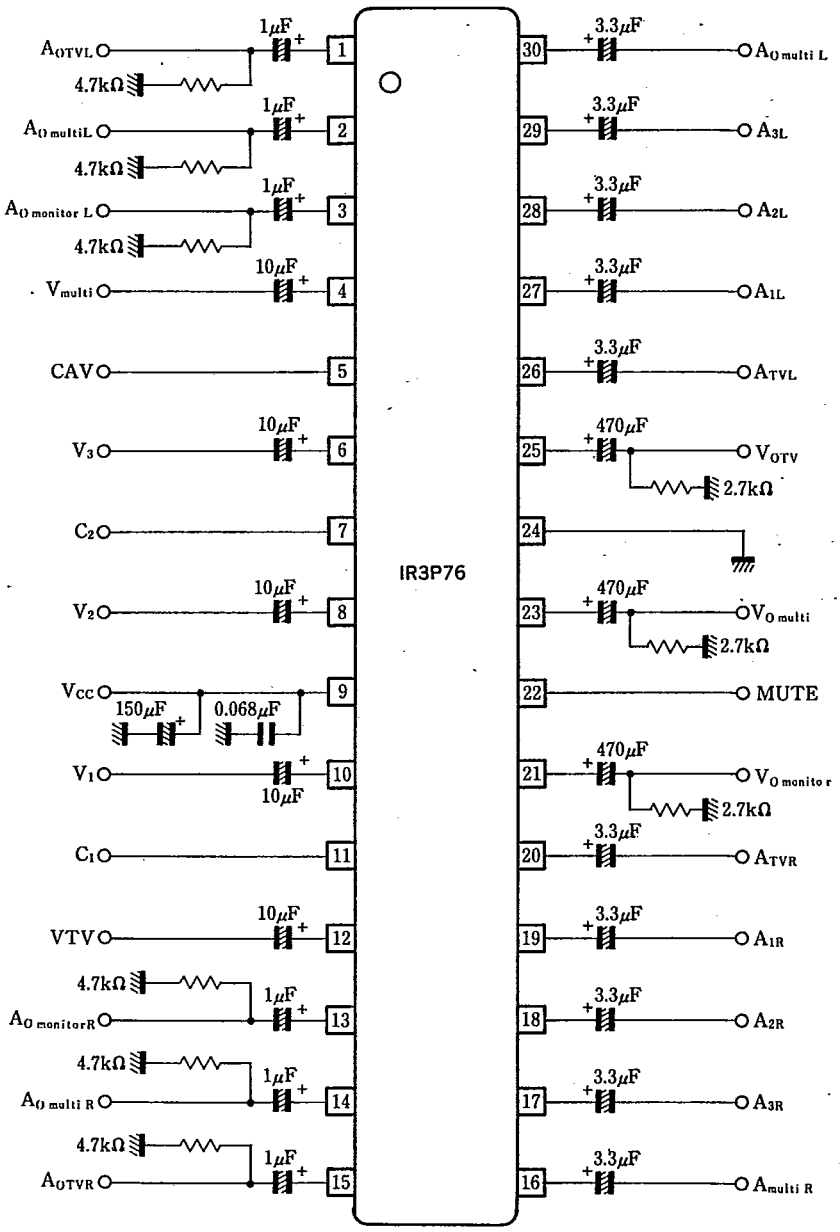
(8) Test circuit for video frequency characteristic



(9) Test circuit for audio frequency (for the audio L side)



Basic Connection Diagram



Control Mode Table

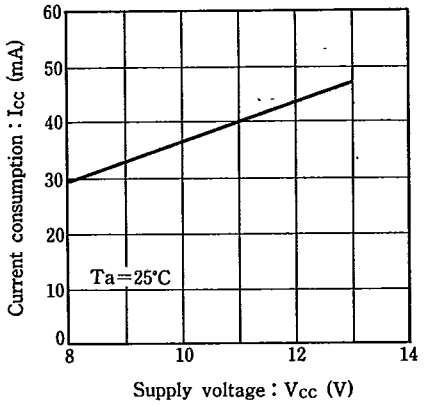
Control input			Video			Audio(L)			Audio(R)		
C_{AV}	C_1	C_2	V_{OTV}	$V_O$multi	$V_O$monitor	A_{OTVL}	$A_O$multi L	$A_O$monitor L	A_{OTVR}	$A_O$multi R	$A_O$monitor R
5	11	7	25	23	21	1	2	3	15	14	13
L	L	L	TV	TV	TV	TV	TV	TV	TV	TV	TV
L	H	L	P_1	P_1	—	P_1	P_1	—	P_1	P_1	—
L	L	H	P_2	P_2	P_2	P_2	P_2	P_2	P_2	P_2	P_2
L	H	H	P_3	P_3	P_3	P_3	P_3	P_3	P_3	P_3	P_3
H	L	L	P	TV	TV	P	TV	TV	P	TV	TV
H	H	L	P	P_1	—	P	P_1	—	P	P_1	—
H	L	H	P	P_2	P_2	P	P_2	P_2	P	P_2	P_2
H	H	H	P	P_3	P_3	P	P_3	P_3	P	P_3	P_3

- TV—— VTV, ATVL, ATVR
- P_1—— V_1, A_{1L}, A_{1R}
- P_2—— V_2, A_{2L}, A_{2R}
- P_3—— V_3, A_{3L}, A_{3R}
- P—— V multi, A multi L and A multi R

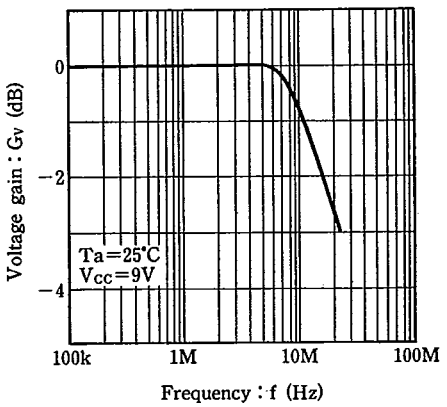
Note: When the P_1 mode is selected with C_1=H and C_2 =L, no output is mode to the monitor output terminals (V_O moniter, A_O monitor L and A_O monitor R.)

Electrical Characteristic Curves

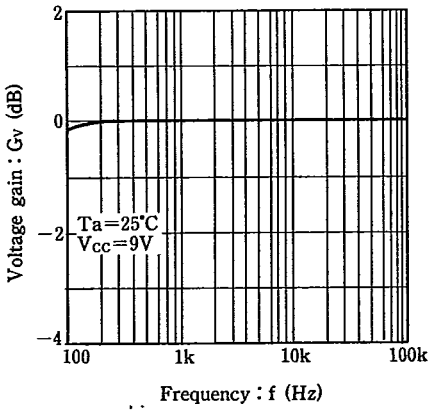
Current consumption—Supply voltage



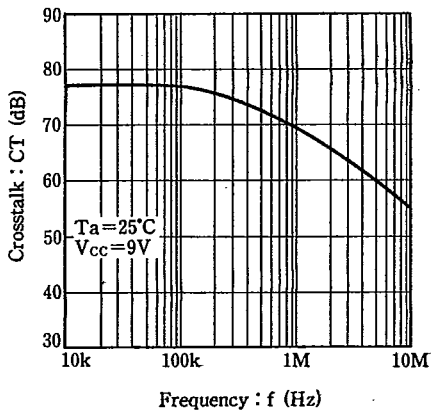
Voltage gain—Frequency (Video)



Voltage gain—Frequency (Audio)

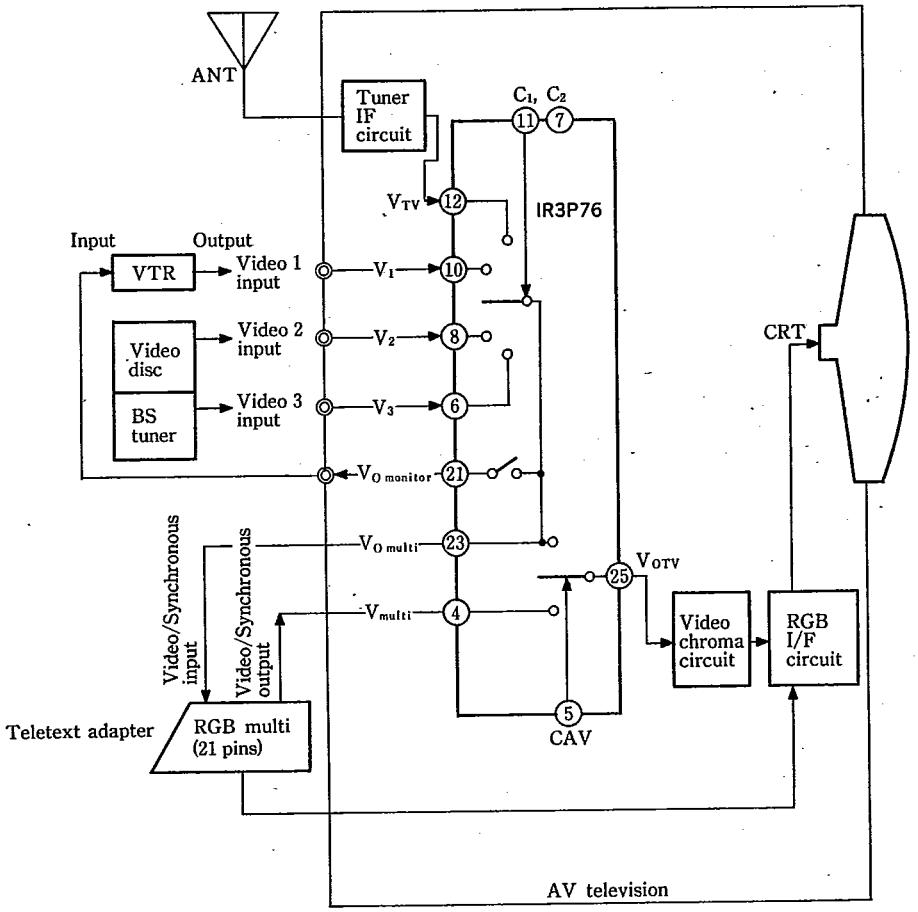


Crosstalk—Frequency (Video)



■ Application Circuit Example

(1) Video section



(2) Audio Section