

HA11235

彩色电视行场扫描电路

日立公司

性能说明:

本电路专用于行场扫描电路。其两次同步分离电路输出达 10V(峰峰值)。行扫描部分附稳压电路和自动频率控制电路(直流增益为7.5kHz/rad),保证了行频的稳定性,场频采用双稳振荡电路,可以消除从输出级来的正反馈信号,使场频稳定,若在场振荡级的5、6端间接2.2 μ F高质量钽电容,并在场激励放大级3端引入深度的直流负反馈,可使场偏转锯齿电流线性良好。因而,不必进行场线性调整。另外,为防止显象管加速电压过高时产生X射线,从高压分压后所得到的电压输入到9端,可控制开关电路动作,使行频停振。

极限值($T_A = 25^\circ\text{C}$)

参 数 名 称	符 号	极 限 值	单 位
电源电压	V_{CC}	16	V
功耗($T_A = 25^\circ\text{C}$)	P_D	500	mW
2、10、16端输出电流	I_C	200	mA
工作环境温度	T_A	-20~75	$^\circ\text{C}$
贮存温度	T_{stg}	-55~155	$^\circ\text{C}$

电特性($T_A = 25^\circ\text{C}$)

参数名称	符号	测 试 条 件	最 小	典 型	最 大	单 位
同步分离输入电压	V_i	负向同步信号,测出值为峰峰值	0.2			V
输出电压	V_o	测出值为峰峰值	8	10		V
APC环路增益			57.75	750	1070	$\mu\text{s}/\mu\text{s}$
行控制电压	V_{HC}	$I_{CC} = 15\text{mA}$			12.8	V
电源电流	I_{CC}			15		mA
自激振荡频率	f_H	$R = 12.6\text{k}\Omega, C = 5.6\mu\text{F}$	14734	15734	16734	Hz
捕捉范围		$R = 12.6\text{k}\Omega, C = 6.6\mu\text{F}$	± 450	± 650		Hz
捕捉范围				-10	-7.5	Hz
场自振频率	f_V	$R_V = 5.2\text{k}\Omega$	55	60	65	Hz

引出端说明 (18-DIP 见封装图B39)

代号	引出端说明与符号	代号	引出端说明与符号	代号	引出端说明与符号
1	接防振电容	2	场锯齿波输出	3	场负反馈输入
4	防振电容	5	场振定时电容	6	场电源
7	场同步输入	8	场同步	9	地

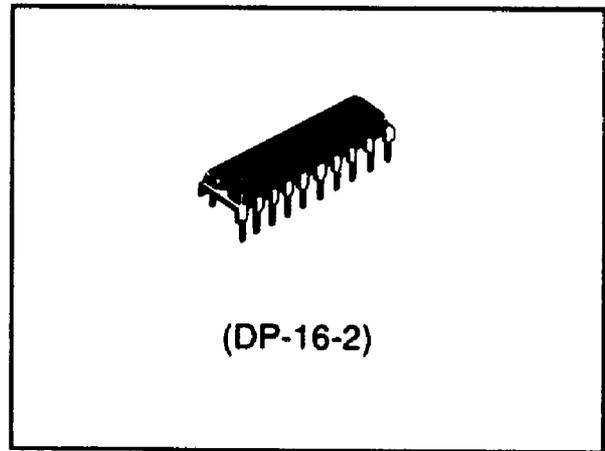
Synchronous Signal Processing System

Functions

- Sync separator
- Horizontal automatic frequency control (AFC)
- Horizontal oscillator
- X-ray protector
- Vertical oscillator
- Vertical driver

Features

- Fewer external components
- 10 V_{p-p} sync separator output
- Voltage regulator for horizontal supply voltage
- 7.5 Hz/rad horizontal AFC DC loop gain
- Output stage positive feedback eliminated by vertical oscillator's astable multivibrator
- Vertical oscillator waveform used for vertical output drive; only one high-stability (tantalum) capacitor required for vertical stage
- Vertical output stage stabilized by DC feedback to pin 3
- Vertical linearity adjustment can be eliminated



Ordering Information

Type No.	Package
HA11235	DP-16-2

Pin Description

Pin No.	Function	Max. Input/Output Voltage/Current
1	Connected to capacitor to prevent parasitic oscillation	Less than V _{CC}
2	Vertical output pin	15 mA
3	Feedback input pin for vertical DC/AC output voltage	Less than V _{CC}
4	Connected to resistor to determine vertical oscillation discharge time constant	5 mA
5	Connected to capacitor for vertical oscillation frequency	Less than V _{CC}
6	Vertical oscillator power supply pin	16 V
7	Vertical sync input pin	Less than V _{CC}
8	Determines vertical oscillation frequency	5 mA
9	X-ray protector input pin	5 mA
10	Horizontal section output pin	15 mA
11	Horizontal oscillator power supply pin	25 mA
12	Connected to horizontal oscillator CR	12 V

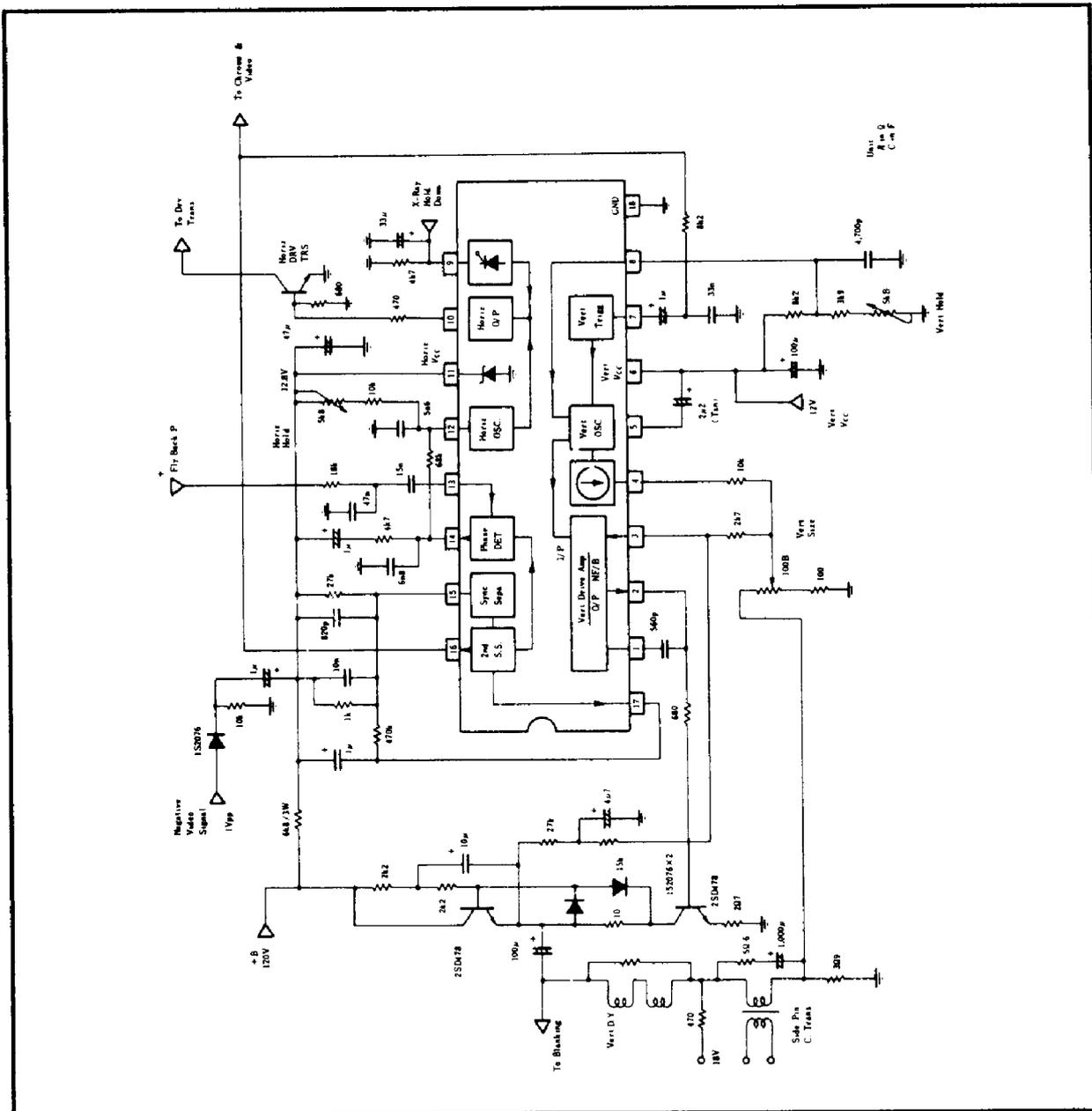


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Pin Description (cont)

Pin No.	Function	Max. Input/Output Voltage/Current
13	Phase detector FBP (flyback pulse) input pin	5 V _{p-p}
14	Phase detector output pin	2 mA
15	Sync separator video signal input pin	3 mA
16	Sync separator output pin	15 mA
17	Sync separator feedback pin	12 V
18	GND pin	—

Block Diagram



Circuit Schematics

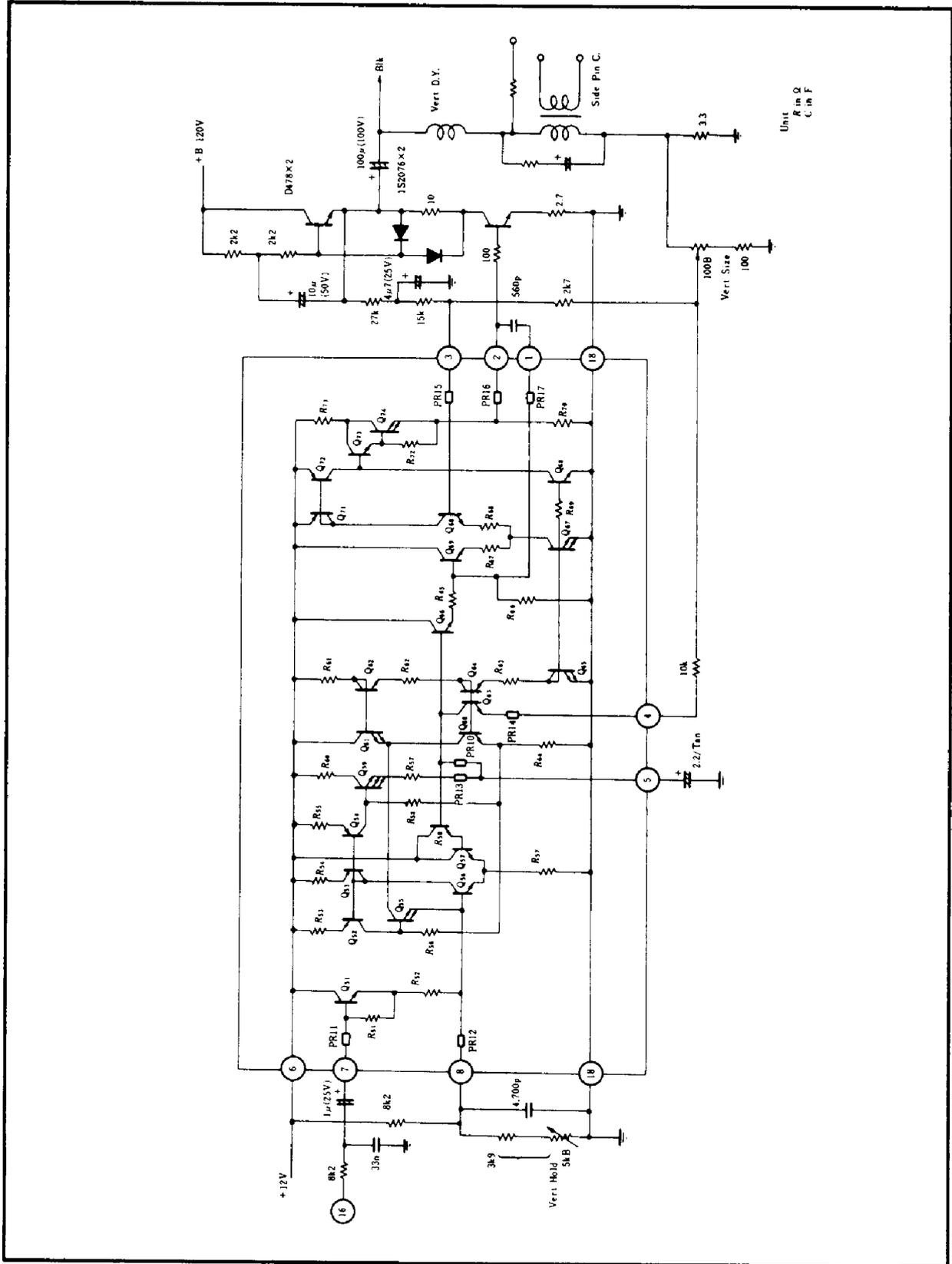


Figure 1 Vertical Oscillator and Driver



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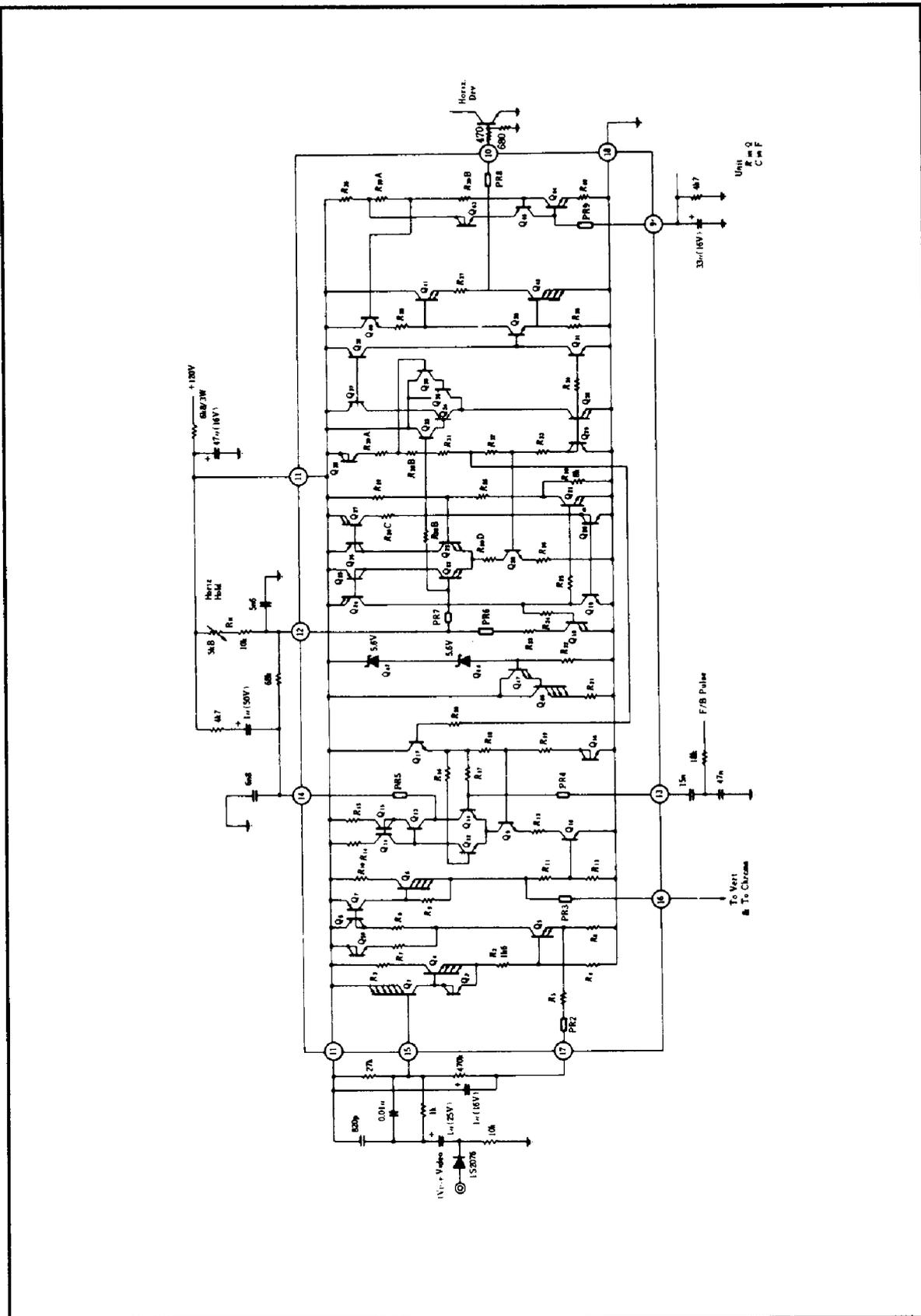


Figure 2 Circuit Schematic (Sync Separator and Horizontal APC)



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External Parts Functions

Pin No.	Part No.	Functions	
1, 2, 3	C ₁₀₉	<ul style="list-style-type: none"> • Feedback capacitor preventing parasitic oscillation • Determines closed loop gain (560 pF recommended to prevent abnormal oscillation and crossover distortion) 	
	R ₁₁₁	<ul style="list-style-type: none"> • Current limiter • Prevents excessive current and surge breakdown • Determines Q₂₀₂ base current value 	
	R ₁₁₀	<ul style="list-style-type: none"> • Determines vertical oscillation section's idling current 	
	R ₁₀₆	<ul style="list-style-type: none"> • Determines DC feedback to pin 3 <p>where $V_{1\text{ DC}} = \text{DC voltage at pin 1 (3.3 V type)}$ $V_{+B} = +B \text{ supply voltage applied to the vertical}$</p> $\frac{V_{1\text{ DC}}}{R_{112}} \times (R_{112} + R_{109} + R_{108}) = \frac{V_{+B}}{2}$ $I_{dy} = \frac{V_{p-p}(R_{112} + R_{109})}{R_{109} R_{117}}$ <p>output I_{dy} = current into the deflection yoke V_{p-p} = peak-to-peak voltage at pin 1 (1.5 V_{p-p})</p>	
	R ₁₁₇	<ul style="list-style-type: none"> • Determines deflection current 	
	C ₁₀₆	<ul style="list-style-type: none"> • Decoupling capacitor 	
	C ₁₀₅	<ul style="list-style-type: none"> • Bootstrap capacitor 	
	R ₁₁₅	<ul style="list-style-type: none"> • Determines vertical size 	
	4	R ₁₀₅	<ul style="list-style-type: none"> • Determines vertical oscillator's discharging time • Vertical deflection yoke current linearity adjustment (Large R₁₀₅ value lengthens discharging time and reduces oscillation frequency)
		C ₁₀₄	<ul style="list-style-type: none"> • Determines vertical oscillation discharging time constant (Tantalum capacitor recommended)
7	R ₁₀₁ , C ₁₀₁	<ul style="list-style-type: none"> • Integrates composite vertical sync pulse • Determines vertical pull-in range 	
	C ₁₀₂	<ul style="list-style-type: none"> • AC coupling capacitor 	
8	R ₁₀₂ , R ₁₀₃ , R ₁₀₄	<ul style="list-style-type: none"> • Determines vertical oscillation bottom voltage (Lower bias voltage at pin 8 increases peak-to-peak oscillation level and reduces oscillation frequency) 	
	C ₁₀₃	<ul style="list-style-type: none"> • Integrates composite vertical sync pulse • Eliminates horizontal sync component 	
9	R ₁₃₂ , C ₁₃₀	<ul style="list-style-type: none"> • Highpass filter in X-ray protection circuit 	
10	R ₁₃₀	<ul style="list-style-type: none"> • Protects against surge breakdown 	
	R ₁₃₁	<ul style="list-style-type: none"> • Determines horizontal drive transistor on/off level 	



External Parts Functions (cont)

Pin No.	Part No.	Functions
11	R ₁₂₉	• Determines +B supply current into horizontal drive transistor (Supply 15 mA current. Approximately 9 mA consumed internally and 6 mA used to keep V _{CC} level constant.)
	C ₁₂₉	• Decoupling capacitor for constant V _{CC}
12	C ₁₂₈ , R ₁₂₆ , R ₁₂₇	• Horizontal oscillation (Larger time constant reduces oscillation frequency)
14	R ₁₂₅ , R ₁₂₈ , C ₁₂₇	• Determine AFC circuit AC loop gain
	C ₁₂₆	• Bypass capacitor
15, 17	C ₁₂₀	• Eliminates high frequency noise
	C ₁₂₁ , R ₁₂₀ , R ₁₂₁ , R ₁₂₂ , C ₁₂₂ , C ₁₂₃	• Determines sync separator base time constant R ₁₂₀ : Discharging R ₁₂₂ : Negative feedback C ₁₂₂ : Pin 17 time constant credit C ₁₂₃ : Separates stable sync
	D ₁₀₃	• Noise limiter

- Notes
1. Use the service switch to turn the vertical output off, with pin 3 grounded.
 2. C₁₂₈ (horizontal oscillator): Use polyester capacitors and polypropylene capacitors in 1:1 ratio for zero of the temperature coefficient of the horizontal oscillation frequency.

Notes for Pattern Wiring

1. To avoid problems like frequency offset, the GND pin should be connected to the GND line in the video detection section.
2. The GND lines in the external application circuit's horizontal and vertical sections should be kept separate until connected at the same point.
3. Problems like offset in the horizontal oscillator section have been caused by separation and long wiring of pin 12 and 14 V_{CC} lines.
4. 470 Ω and 680 Ω resistances at pin 10 should be connected close to the GND.



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

Item	Symbol	Rating	Unit
Supply Voltage	V _{CC}	16	V
Operating Temperature Range	T _{opr}	-20 to +75	°C
Storage Temperature Range	T _{stg}	-55 to +125	°C
Power Dissipation (Ta = 75°C)	P _T	500	mW
Output Current (Pin 2, 10, and 16)	I _O	20	mA

Electrical Characteristics

Table 1 Line Circuitry

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Regulated Voltage	V ₁₁	—	12.8	—	V	I _{CC} = 15 mA
Supply Current	I _{CC}	—	15	—	mA	
Free-Running Frequency	f _{oh}	14,734	15,734	16,734	Hz	R _h = 12.6 kΩ, C _h = 5.6 nF
Pull-In Range	Δf _{ph}	±450	±650	—	Hz	
APC Loop Gain	f _c	577.5	750	1070	Hz/μs	
Temperature Coefficient	Δf _{oh}	-6.0	-3.0	0	Hz/°C	
Output Pulse Width	t _{hw}	22.5	25.0	27.5	μs	Pin 10

Table 2 Frame Circuitry

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Free-Running Frequency	f _{ov}	55	60	65	Hz	R _v = 5.2 kΩ
Pull-In Range	Δf _{pv}	—	-10	-7.5	Hz	
Temperature Coefficient	Δf _{ov}	-0.03	0	+0.03	Hz/°C	

Table 3 Sync Separator

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input Voltage Peak-to-Peak Value	V ₁₅	0.2	—	—	V	Negative-going sync
Output Voltage	V _{sy}	8.0	10.0	—	V	Peak-to-peak value
Output Pulse Width	t _{sy}	4.5	5.0	5.5	μs	Pin 16



Typical Performance Curves

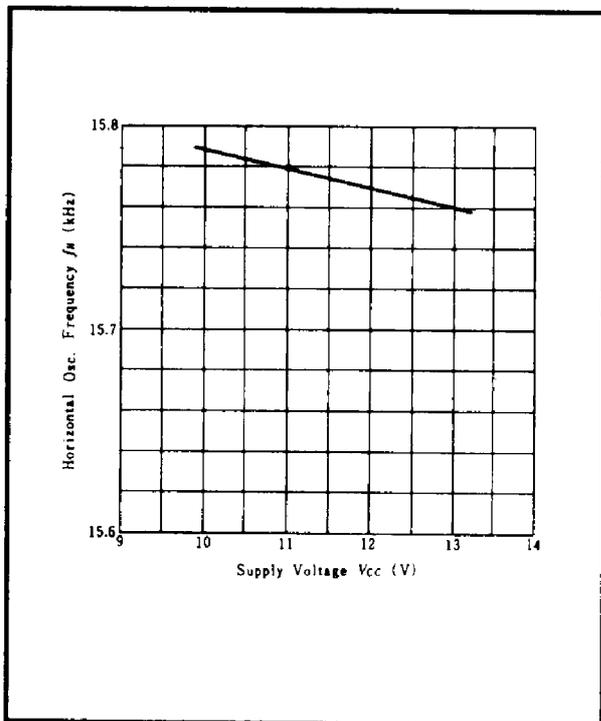


Figure 4 Horizontal Oscillation Frequency vs. Supply Voltage

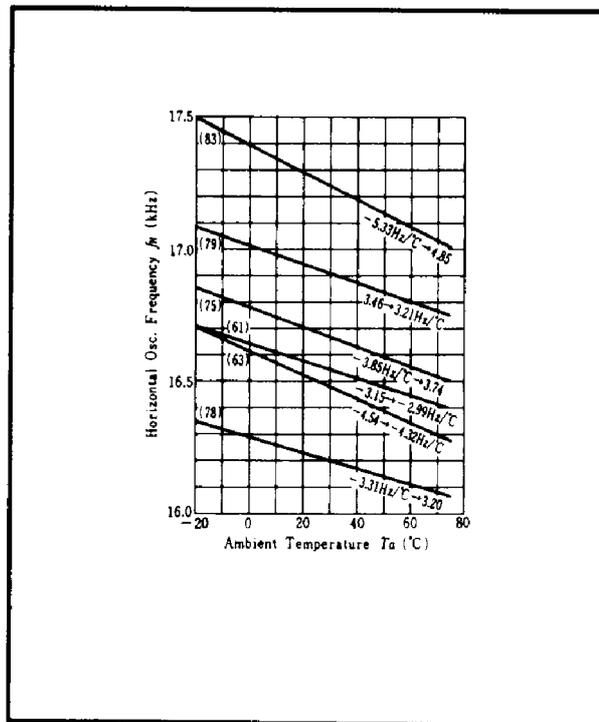


Figure 5 Horizontal Frequency vs. Ambient Temperature

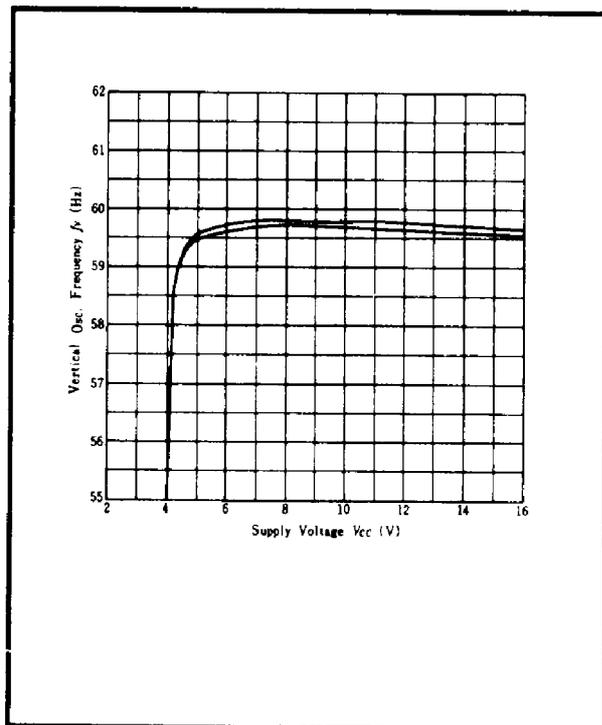


Figure 6 Vertical Oscillation Frequency vs. Supply Voltage

