

TDA2590

TV HORIZONTAL OSCILLATOR COMBINATION

FAIRCHILD LINEAR INTEGRATED CIRCUITS

GENERAL DESCRIPTION — The TDA2590 is a monolithic integrated circuit designed as a horizontal oscillator combination for TV receivers and monitors. It is constructed using the Fairchild Planar* process.

- LINE OSCILLATOR USING THE THRESHOLD SWITCHING PRINCIPLE
- PHASE COMPARISON BETWEEN SYNC PULSE AND OSCILLATOR VOLTAGE (ϕ_1)
- PHASE COMPARISON BETWEEN LINE FLYBACK PULSE AND OSCILLATOR VOLTAGE (ϕ_2)
- SWITCH FOR CHANGING THE FILTER CHARACTERISTIC AND THE GATE CIRCUIT (WHEN USED FOR VCR)
- COINCIDENCE DETECTOR (ϕ_3)
- SYNC SEPARATOR
- NOISE SEPARATOR
- VERTICAL SYNC SEPARATOR AND OUTPUT STAGE
- COLOR BURST KEYING AND LINE FLYBACK BLANKING PULSE GENERATOR
- PHASE SHIFTER FOR THE OUTPUT PULSE
- OUTPUT PULSE DURATION SWITCHING
- OUTPUT STAGE FOR DIRECT DRIVE OF THYRISTOR DEFLECTION CIRCUITS
- SYNC GATING PULSE GENERATOR
- LOW SUPPLY VOLTAGE PROTECTION

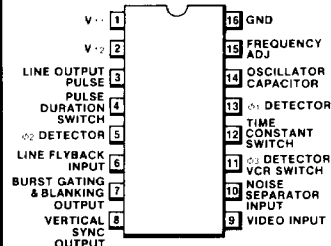
*Planar is a patented Fairchild process.

CONNECTION DIAGRAM

16-PIN DIP

(TOP VIEW)

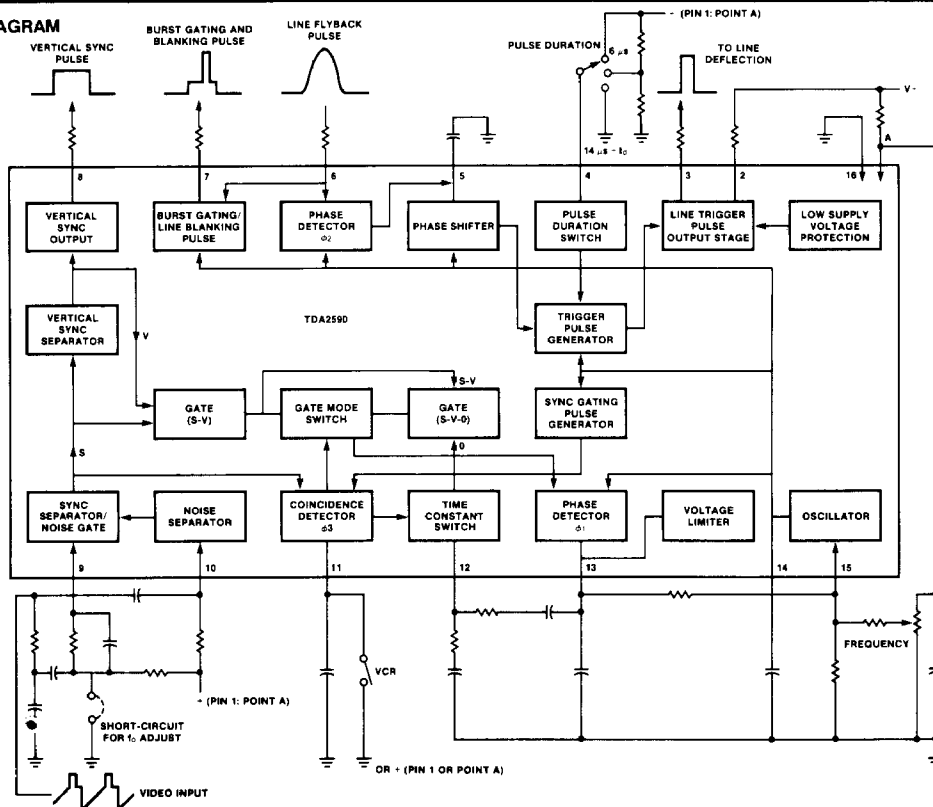
PACKAGE OUTLINE 9B



ORDER INFORMATION

TYPE	PART NO.
2590	TDA2590

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Supply Voltage at Pin 1 (When Supplied by the IC)	13.2 V
Supply Voltage at Pin 2	18 V
Power Dissipation	800 mW
Storage Temperature	-25°C to +125°C
Operating Temperature	-20°C to +60°C
Pin Temperature (Soldering, 10 s)	260°C

VOLTAGES

V ₄ , V ₁₁	0 to 13.2 V
V ₉ , V ₁₀	-6 to +6 V

CURRENTS

I ₂ (peak)	400 mA
I ₃ (peak)	-400 mA
I ₄	1 mA
I ₆	±10 mA
I ₇	-10 mA
I ₁₁	2 mA

ELECTRICAL CHARACTERISTICS: T_A = 25°C; V₁ = 12 V. See test circuit unless otherwise noted.

CHARACTERISTICS		CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I ₁			30		mA
SYNC SEPARATOR (PIN 9)						
Input Switching Voltage	V ₉			0.8		V
Input Keying Current	I ₉			5	100	μA
Input Blocking Current	I ₉	V ₉ = -5 V			1	μA
Input Switching Current	I ₉				5	μA
Input Voltage (pk-pk)	V ₉	Sync Positive Video Signal	1	3	7	V _{pk-pk}
NOISE SEPARATOR (PIN 10)						
Input Switching Voltage	V ₁₀			1.4		V
Input Keying Current	I ₁₀			5	100	μA
Input Switching Current	I ₁₀			150		μA
Input Blocking Current	I ₁₀	V ₁₀ = -5 V			1	μA
Input Voltage (pk-pk)	V ₁₀	Sync Positive Video Signal	1	3	7	V _{pk-pk}
Superimposed Noise Voltage (pk-pk)	V _n				7	V _{pk-pk}
LINE FLYBACK PULSE (PIN 6)						
Input Current	I ₆		10			μA
Input Switching Voltage	V ₆			1.4		V
Input Limiting Voltage	V ₆			-0.7 to +1.4		V
Input Resistance	R ₆			400		Ω
PULSE DURATION SWITCH (PIN 4)						
Input Voltage	V ₄	t = 0 μs, V ₃ = 0 (Note 1)		5.4 to 6.5		V
		t = 6 μs		9.4 to V ₁		V
		t = 14 μs + t _d (Note 6)		0 to 4		V
Input Current	I ₄	t = 0 μs, V ₃ = 0		0		μA
		t = 6 μs	200			μA
		t = 14 μs + t _d (Note 6)			-200	μA

ELECTRICAL CHARACTERISTICS: $T_A = 25^\circ\text{C}$; $V_1 = 12\text{ V}$, See test circuit unless otherwise noted. (Cont'd)

CHARACTERISTICS		CONDITIONS	MIN	TYP	MAX	UNITS
OSCILLATOR (PIN 14 and PIN 15)						
Low Level Threshold Voltage	V_{14}			4.4		V
High Level Threshold Voltage	V_{14}			7.6		V
Discharge Current	I_{14}			± 47		mA
Free Running Frequency	f_o	$C_{14} = 4.7\text{ nF}$, $R_{15} = 12\text{ k}\Omega$		15625		Hz
Spread of Frequency	$\Delta f_o/f_o$	Note 4	-5		+5	%
Frequency Control Sensitivity	$\Delta f_o/\Delta I_{15}$			31		Hz/ μA
Adjustment Range	$\Delta f_o/f_o$			± 10		%
Frequency Change With Supply Voltage	$\frac{\Delta f_o/f_o}{\Delta V/V_{\text{nom}}}$	$V_1 = 12\text{ V}$, Note 4	-0.05		+0.05	
Frequency Change With Supply Voltage	Δf_o	$V_1 = 12\text{ to }5\text{ V}$, Note 4	10		+10	%
Temperature Coefficient of Oscillator Frequency per $^\circ\text{C}$		Note 4	-10^{-4}		$+10^{-4}$	
COINCIDENCE DETECTOR (ϕ_3) and SWITCHING ON VCR (PIN 11)						
Input Voltage	V_{11}	Note 2		0 to 1.5		V
Input Current	I_{11}	Note 2			-200	μA
Input Voltage	V_{11}			9 to V_1		V
Input Current	I_{11}			1 to 2		mA
Output Voltage	V_{11}			0.5 to 6		V
Peak Output Current	I_{11}	Without Coincidence		0.1		mA
Peak Output Current	I_{11}	With Coincidence		-0.5		mA
VERTICAL SYNC PULSE (PIN 8)						
Output Voltage	V_8	Positive Going	10	11		$V_{\text{pk-pk}}$
Output Resistance	R_8			2		$\text{k}\Omega$
Turn-ON Delay	t_{on}	Delay between leading edge of input & output signal		12		μs
Turn-OFF Delay	t_{off}	Delay between trailing edge of input & output signal	t_{on}			μs
BLANKING AND BURST GATING PULSE (PIN 7)						
Burst Gating Pulse Output Voltage	V_7	Positive Going	10	11		$V_{\text{pk-pk}}$
Output Resistance	R_7			400		Ω
Phase Relationship to Leading Edge	t	Note 3 $V_7 = 7\text{ V}$		1.9 typ 1.0 to 2.8		μs
Phase Relationship to Trailing Edge	t	Note 3 $V_7 = 7\text{ V}$		6.6 typ 5.8 to 7.4		μs
Blanking Pulse Output Voltage	V_7			2.5 to 3.5		V
LINE DRIVE PULSE (PIN 3)						
Output Voltage	V_3	Positive Going		10.5		$V_{\text{pk-pk}}$
Output Current (Average Value)	I_3			-100		mA
Output Resistance	R_3	For leading edge of Line Pulse		2.5		Ω
Output Resistance	R_3	For trailing edge of Line Pulse		20		Ω
Output Pulse Duration	t_p	$V_4 > 9.4\text{ V}$		6 typ 4.5-7.5		μs
Output Pulse Duration	t_p	$V_4 < 4\text{ V}$, Note 6		14 + t_d		μs
Supply Voltage for Switching off the Output Pulse	V_1			4		V

ELECTRICAL CHARACTERISTICS: $T_A = 25^\circ\text{C}$; $V_1 = 12\text{ V}$. See test circuit unless otherwise noted. (Cont'd)

CHARACTERISTICS		CONDITIONS	MIN	TYP	MAX	UNITS
PHASE COMPARISON (ϕ_1) (PIN 13)		Sync Pulse/Oscillator				
Control Voltage Range	V_{13}			3.8 to 8.2		V
Peak Control Current	I_{13}			± 2.1 typ ± 1.9 -2.3		mA
Output Blocking Current	I_{13}	$V_{13} = 4$ to 8 V			1	μA
Output Resistance	R_{13}	Current Source $V_{13} = 4$ to 8 V		High		ohmic
Output Resistance	R_{13}	Emitter Follower $V_{13} < 3.8$ or $> 8.2\text{ V}$		Low		ohmic
Control Sensitivity				2		kHz/ μs
Capture & Holding Range	Δf	$82\text{ k}\Omega$ between Pins 13 & 15		± 780		Hz
Spread of Capture & Holding Range	$\Delta(\Delta f)$	Note 4		± 10		%
PHASE COMPARISON (ϕ_2) (PIN 5)		Oscillator/Line Flyback Pulse				
Control Voltage Range	V_5			5.4 to 7.6		V
Peak Control Current	I_5			± 1		mA
Input Current at Blocked Phase Detector	I_5	$V_5 = 5.4$ to 7.6 V			5	μA
Output Resistance	R_5	Current Source $V_5 = 5.4$ to 7.6 V		High		ohmic
Output Resistance	R_5	$V_5 = < 5.4$ or $> 7.6\text{ V}$		8		$\text{k}\Omega$
Allowable Delay between Leading Edge of Output Pulse and Leading Edge of Flyback Pulse ($t_{fp} = 12\text{ }\mu\text{s}$)	t_d			0-15		μs
Static Control Error	$\Delta t/\Delta t_d$				0.2	%
OVERALL PHASE RELATION		Note 5				
Phase Relation Between Middle of Sync Pulse and the Middle of the Flyback Pulse	t			2.6		μs
Tolerance of Phase Relationship	Δt		-0.7		+0.7	μs
TIME CONSTANT SWITCH (PIN 12)						
Output Voltage	V_{12}			6		V
Output Current	I_{12}		-1		+1	mA
Output Resistance	R_{12}	$V_{11} = 2.5$ to 7 V		100		Ω
Output Resistance	R_{12}	$V_{11} = < 1.5\text{ V}$ or $> 9\text{ V}$		60		$\text{k}\Omega$
INTERNAL GATING PULSE						
Pulse Duration	t_p			7.5		μs

NOTES:

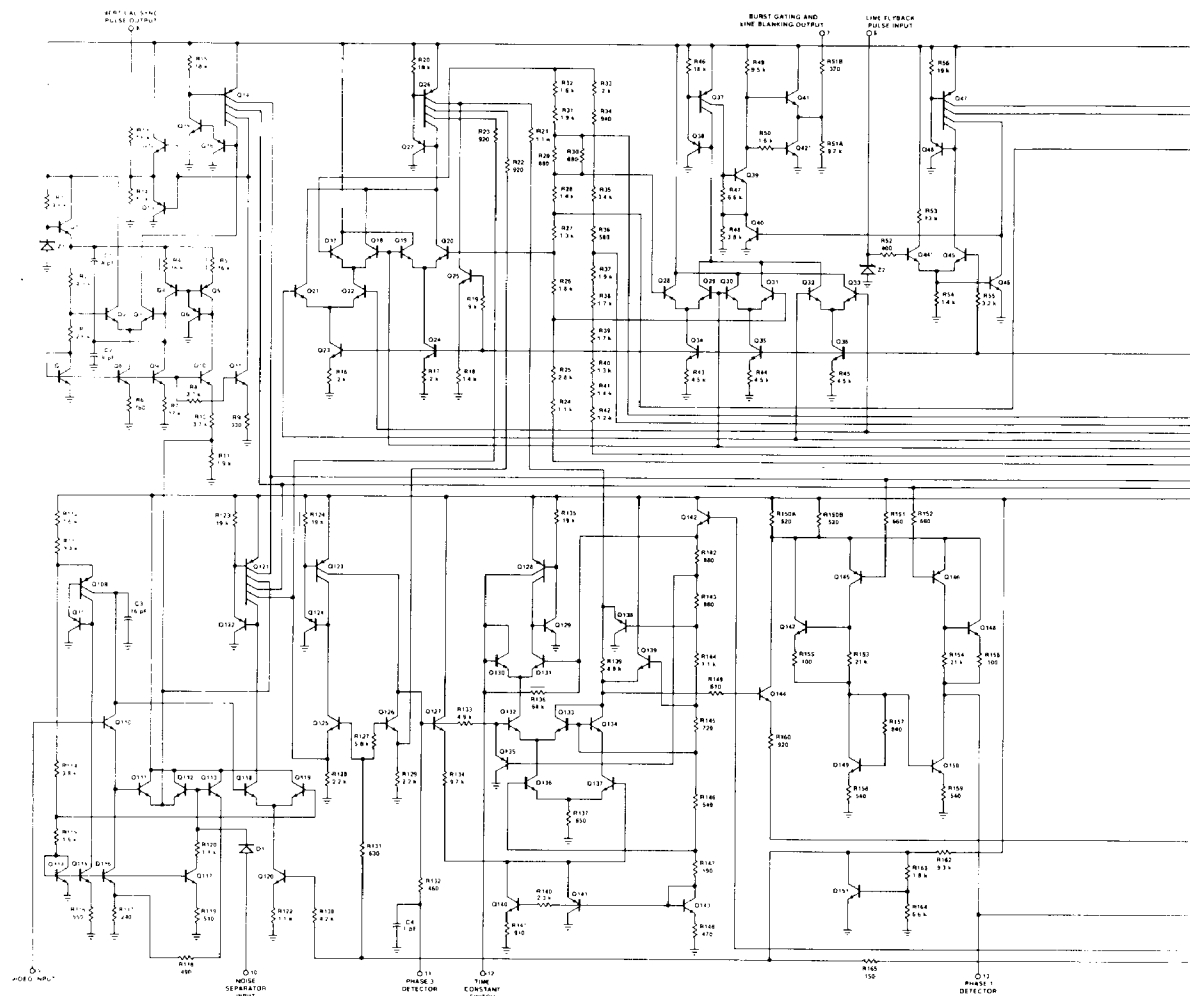
- Can also be left unconnected.
- When supplied by the IC.
- Phase relationship between the middle of the sync pulse at the input and leading or trailing edge of the burst gating pulse.
- Excluding the affect of variations in external components tolerances.
- The adjustment of the overall phase relation and consequently the leading edge of the output pulse occurs automatically by phase control ϕ_2 . If additional adjustment is used, the following values apply:

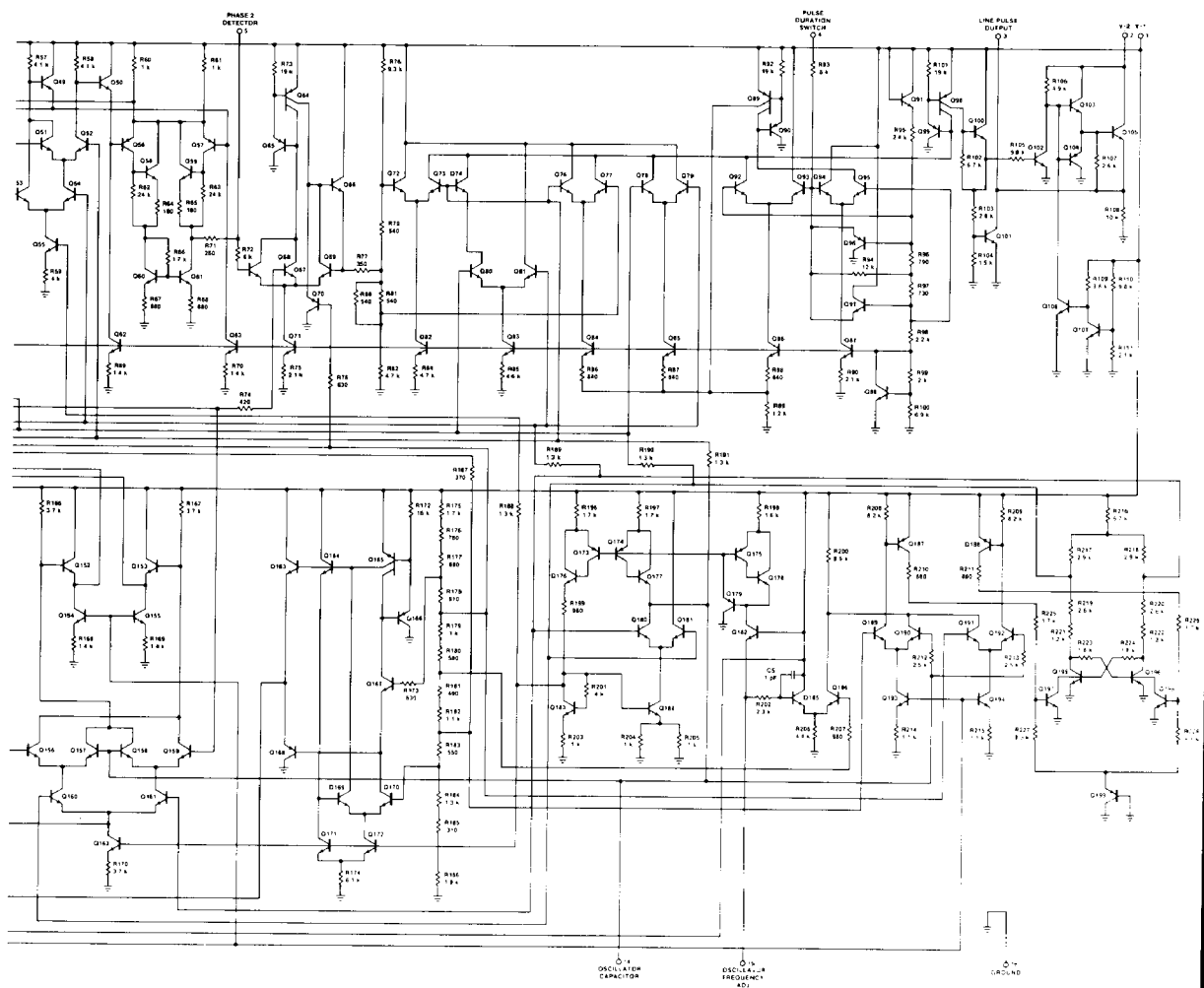
ADJUSTMENT SENSITIVITY

caused by: adjustment voltage $\Delta V_5/\Delta t$ typ $0.1\text{ V}/\mu\text{s}$
adjustment current $\Delta I_5/\Delta t$ typ $30\text{ }\mu\text{A}/\mu\text{s}$

- t_d = switch-OFF delay of the line output stage.

EQUIVALENT CIRCUIT





TEST AND APPLICATIONS CIRCUIT

