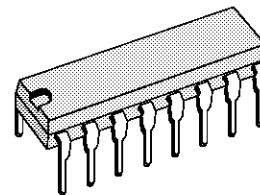


**SYNCHRO AND HORIZONTAL DEFLECTION  
CONTROL FOR COLOR TV SET**

- LINE OSCILLATOR (two levels switching)
- PHASE COMPARISON BETWEEN SYNCHRO-PULSE AND OSCILLATOR VOLTAGE Ø 1, ENABLED BY AN INTERNAL PULSE, (better parasitic immunity)
- PHASE COMPARISON BETWEEN THE FLYBACK PULSES AND THE OSCILLATOR VOLTAGE Ø 2
- COINCIDENCE DETECTOR PROVIDING A LARGE HOLD-IN-RANGE
- FILTER CHARACTERISTICS AND GATE SWITCHING FOR VIDEO RECORDER APPLICATION
- NOISE GATED SYNCHRO SEPARATOR
- FRAME PULSE SEPARATOR
- BLANKING AND SAND CASTLE OUTPUT PULSES
- HORIZONTAL POWER STAGE PHASE LAGGING CIRCUIT
- SWITCHING OF CONTROL OUTPUT PULSE WIDTH
- SEPARATED SUPPLY VOLTAGE OUTPUT STAGE ALLOWING DIRECT DRIVE OF SCR'S CIRCUIT
- SECURITY CIRCUIT MAKES THE OUTPUT PULSE SUPPRESSED WHEN LOW SUPPLY VOLTAGE

**DESCRIPTION**

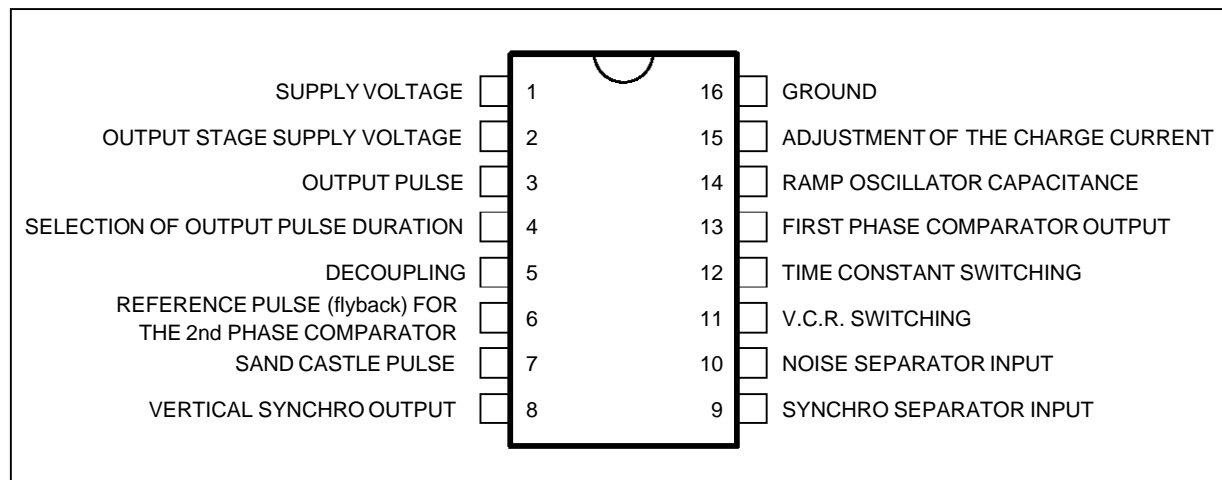
The TDA2593 is a circuit intended for the horizontal deflection of color TV sets, supplied with transistors or SCR'S.



**DIP16**  
(Plastic Package)

**ORDER CODE : TDA2593**

**PIN CONNECTIONS**



2593-01.EPS

# TDA2593

## MAIN CHARACTERISTICS

Symbol	Parameter	Typ.	Unit
V(1-16)	Supply Voltage	12	V
I(1)	Supply Current	30	mA

### INPUT SIGNALS

V(9-16) (pp)	Synchro Separator Input Voltage	3 to 4	V
V(10-16) (pp)	Noise Separators Input Voltage	3 to 4	V
V(4-16)	Control Voltage of the Output Pulse Switching Circuit t = 7 μs (thyristor) t = 14 μs + t <sub>d</sub> (transistor) t = 0 (V(3-16) = 0)	9.4 to V(1-16)	V
V(4-16)		0 to 3.5	V
V(4-16)		5.4 to 5.6	V

### OUTPUT SIGNALS

V(8-16) (pp)	Frame Synchro Pulse	11	V
V(7-16) (pp)	Sandcastle Pulse	11	V
V(3-16) (pp)	Horizontal Driver Stage Control Pulse	10.5	V

2593-01.TBL

## ABSOLUTE MAXIMUM RATINGS (Maximum Ratings according to CEI 134 Datasheet)

Symbol	Parameter	Value	Unit
V(1-16)	Supply Voltage to Pin 1	13.2	V
V(2-16)	Supply Voltage to Pin 2	18	V
V(4-16)	Voltage to Pin 4	13.2	V
V(9-16)	Voltage to Pin 9	±6	V
V(10-16)	Voltage to Pin 10	±6	V
V(11-16)	Voltage to Pin 11	13.2	V
I <sub>2M</sub> = -I <sub>3M</sub>	Current at Pins 2 and 3 (with thyristor)	650	mA
I <sub>2M</sub> = I <sub>3M</sub>	Current at Pins 2 and 3 (with transistor)	400	mA
I(4)	Current to Pin 4	1	mA
I(6)	Current to Pin 6	±10	mA
I(7)	Current to Pin 7	-10	mA
I(11)	Current to Pin 11	2	mA
P <sub>tot</sub>	Power Dissipation	800	mW
T <sub>oper</sub>	Operating Ambient Temperature	-20, +70	°C
T <sub>stg</sub>	Storage Temperature	-25, +125	°C

2593-02.TBL

## ELECTRICAL OPERATING CHARACTERISTICS

(T<sub>amb</sub> = 25°C, V<sub>1</sub>-V<sub>16</sub> = 12V, unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>9-16</sub>	Input Signals Synchro Separator (Pin 9) Input Threshold Voltage		0.8		V
I <sub>9</sub>	Input Threshold Current			5	μA
I <sub>9</sub>	On-state Input Current		5 to 100		μA
I <sub>9</sub>	Disconnect Input Current	100	150		μA
I <sub>9</sub>	Off-state Input Current (V <sub>9-16</sub> = -5V)			-1	μA
V <sub>9</sub>	Video Input Signal (positive synchro pulses) (note 1)		3 to 4		V <sub>PP</sub>
V <sub>10-16</sub>	Noise Separator (Pin 10) Input Threshold Voltage		1.4		V

2593-03.TBL

Note : 1. Allowed range 1 to 7V

**ELECTRICAL OPERATING CHARACTERISTICS**(T<sub>amb</sub> = 25°C, V<sub>1</sub>-V<sub>16</sub> = 12V, unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
I <sub>10</sub>	Input Threshold Current	100	150		μA
I <sub>10</sub>	Input Current		5 to 100		μA
I <sub>10</sub>	Off-state Input Current (V <sub>10-16</sub> = -5V)			-1	μA
V <sub>10</sub>	Video Input Signal (positive synchro pulses) (note 1)		3 to 4		V <sub>PP</sub>
V <sub>10</sub>	Allowed superimposed parasitic signal			7	V
V <sub>6-16</sub>	Fly-back Pulse (Pin 6) Input Threshold Voltage		1.4		V
V <sub>6</sub>	Input Limitation Level		-0.7 and +1.4		V
I <sub>6</sub>	Input Current	0.01	1	2	mA
V <sub>4-16</sub>	Output Pulse Width Control Switch (Pin 4) Input Voltage t = 7 μs (thyristor) t = 14 μs + t <sub>d</sub> (transistor) t = 0 (V <sub>3-16</sub> = 0) (note 2)		9.4 to V <sub>1-16</sub> 0 to 3.5 5.4 to 6.6		V V V
I(4)	Input Current t = 7 μs (thyristor) t = 14 μs + t <sub>j</sub> (transistor) t = 0 (V <sub>3-16</sub> = 0)	200 200	0		μA μA μA
V <sub>11-16</sub>	Video Recorder Switch (Pin 11) Input Voltage (Pin 11 low level) (Pin 11 to +V <sub>CC</sub> )		0 to 2.5 9 to V <sub>1-16</sub>		V V
I <sub>11</sub>	Input Current (Pin 11 low level) (Pin 11 to +V <sub>CC</sub> )			200 2	μA mA
V <sub>8-16</sub>	Output Signals Frame Synchro Pulses (positive) (Pin 8) Output Voltage (peak value)	10	11		V
R <sub>8</sub>	Output Impedance		2		kΩ
t <sub>on</sub>	Delay Between Leading Edge of Input Signal and Leading Edge of Output Signal		15		μs
t <sub>off</sub>	Delay Between Trailing Edge of Input Signal and Trailing Edge of Output Signal		15		μs

**SANDCASTLE PULSE (POSITIVE) (PIN 7)**

V <sub>7-16</sub>	Output Voltage (peak value)	10	11		V
R <sub>7</sub>	Output Impedance		70		Ω
I <sub>7</sub>	Output Current During Trailing Edge		2		mA
t <sub>7</sub>	Sandcastle Pulse Width (V <sub>7</sub> = 7 V)	3.7		4.3	μs
Δt	Phase Between Middle Input Synchro Pulse and Leading Edge of Sandcastle Pulse (V <sub>7</sub> = 7 V)	2.15		3.15	μs

**FLY-BACK BLANKING PULSE (PIN 7)**

V <sub>7-16</sub>	Output Voltage (peak value)	4		5	V
R <sub>7</sub>	Output Impedance		70		Ω
I <sub>7</sub>	Output Current During Trailing Edge		2		mA

**CONTROL PULSE FOR HORIZONTAL DRIVER (POSITIVE) (PIN 3)**

V <sub>3-16</sub>	Output Voltage (peak value)		10.5		V
R <sub>3</sub>	Output Impedance (leading edge) (trailing edge)		2.5 20		Ω Ω
t <sub>3</sub> t <sub>3</sub>	Control Pulse Width V <sub>4</sub> = 9.4 to V <sub>1-16</sub> V <sub>4</sub> = 0 to 4V (note 3)	5.5	14 + t <sub>c</sub>	8.5	μs μs
V <sub>1-16</sub>	Control pulse is disabled for		4		V

- Notes :**
1. Allowed range 1 to 7V
  2. Or Pin 4 not connected.
  3. With t<sub>r</sub> = 12μs

2593-04.TEL

## TDA2593

### ELECTRICAL OPERATING CHARACTERISTICS (continued)

( $T_{amb} = 25^{\circ}\text{C}$ ,  $V_1-V_{16} = 12\text{V}$ , unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
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#### OVERALL PHASE RELATIONSHIP

$t_z$	Phase Between Middle Synchro Pulse and Middle Fly-back Pulse ( $t_r = 12 \mu\text{s}$ , note 4)	1.9		3.3	$\mu\text{s}$
$\Delta I/\Delta t$	Sensitivity to Current Adjust		30		$\mu\text{A}/\mu\text{s}$

#### OSCILLATOR (PINS 14 AND 15)

$V_{14-16}$	Threshold Voltage (low level) (high level)		4.4 7.6		V V
$I_{14}$	Current Generator		$\pm 0.47$		mA
$f$	Free Running Frequency ( $C_{osc} = 4700\text{pF}$ , $R_{osc} = 12\text{k}\Omega$ )		15625		Hz
$\Delta f$	Tolerance on Frequency (note 5)			$\pm 5$	%
$\Delta f/15$	Frequency Control Sensitivity		31		Hz/ $\mu\text{A}$
$\Delta f$	Spread of Frequency		$\pm 10$		%
$\frac{\Delta f/f}{\Delta V/V \text{ nom.}}$	Influence of Supply Voltage on Frequency (note 5)			$\pm 0.05$	%
$\Delta f$	Frequency change when decreasing the supply down to 5 V ( $V_{1-16} = 5\text{V}$ , note 5)			$\pm 10$	%
T	Frequency Temperature Coefficient (note 5)			$\pm 10^{-4}$	Hz/ $^{\circ}\text{C}$

#### PHASE COMPARATOR $\phi 1$ (PIN 13)

$V_{13-16}$	Control Voltage Range		3.8 to 8.2		V
$I_{13}$	Control Current (peak value)		$\pm 1.9$ to $\pm 2.3$		mA
$I_{13}$	Off-state Current ( $V_{13-16} = 4$ to $8\text{V}$ )			-1	$\mu\text{A}$
$R_{13}$	Output Impedance ( $V_{13-16} = 4$ to $8\text{V}$ , note 6) ( $V_{13-16} < 3.8\text{V}$ or $> 8.2\text{V}$ , note 7)		High Low		
	Control Sensibility		2		kHz/ $\mu\text{s}$
$\Delta f$	Catching and Holding Range		$\pm 780$		Hz
$\Delta f/f$	Catching and Holding Range Tolerance (note 5)		$\pm 10$		%

#### PHASE COMPARATOR $\phi 2$ AND PHASE-SHIFT (PIN 5)

$V_{5-16}$	Control Voltage Range		5.4 to 7.6		V
$I_5$	Control Current (peak value)		$\pm 1$		mA
$I_5$	Off-state Output Current ( $V_{5-16} = 5.4$ to $7.6\text{V}$ )			-5	$\mu\text{A}$
$R_5$	Output Impedance ( $V_{5-16} = 5.4$ to $7.6\text{V}$ , note 6) ( $V_{5-16} < 5.4\text{V}$ or $> 7.6\text{V}$ )		High 8		k $\Omega$
$t_d$	Max. delay Between Output Pulse Leading Edge and Fly-back Pulse Trailing Edge ( $t_r = 12 \mu\text{s}$ )			15	$\mu\text{s}$
$\Delta t/\Delta t_d$	Static Control Error			0.2	%

#### COINCIDENCE DETECTOR (PIN 11)

$V_{11-16}$	Output Voltage		0.5 to 6		V
$I_{11}$	Output Current (without coincidence) (with coincidence)		0.1 -0.5		mA mA

#### TIME CONSTANT SWITCH (PIN 12)

$V_{12-16}$	Output Voltage		6		V
$I_{12}$	Output Current		$\pm 1$		mA
$R_{12}$	Output Impedance ( $V_{11-16} = 2.5$ to $7\text{V}$ ) ( $V_{11-16} < 1.5$ or $> 9\text{V}$ )		100 60		$\Omega$ k $\Omega$

#### PULSE GENERATOR (INTERNAL)

t	Pulse Width		7.5		$\mu\text{s}$
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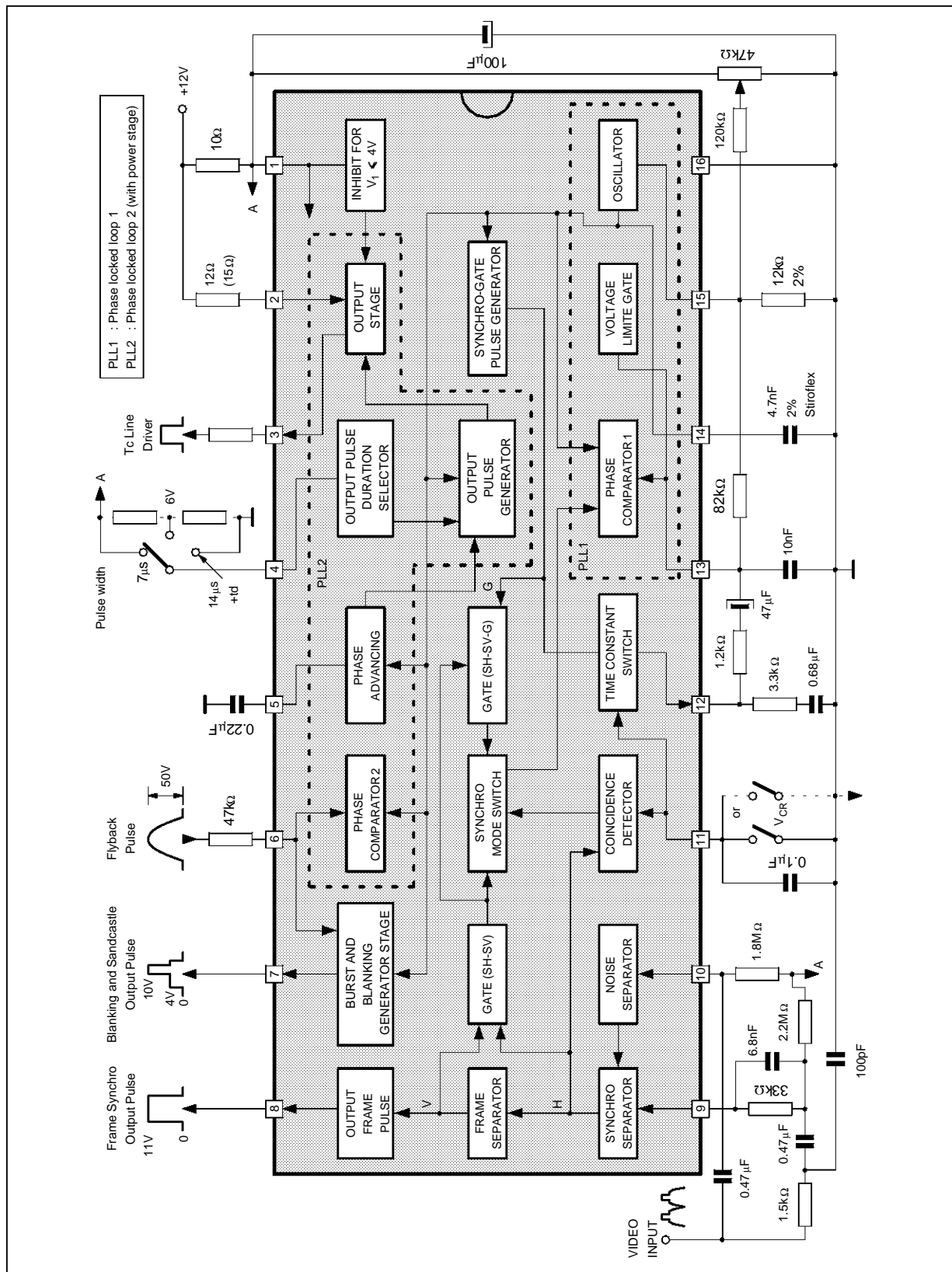
**Notes :** 4. The adjustment of overall phase relation (and output pulse leading edge position) is automatically performed by phase comparator  $\phi 2$ . If additional adjustment is needed, a current have to be imposed at pin 5.

5. Tolerance of peripheral components not included.

6. Current generator.

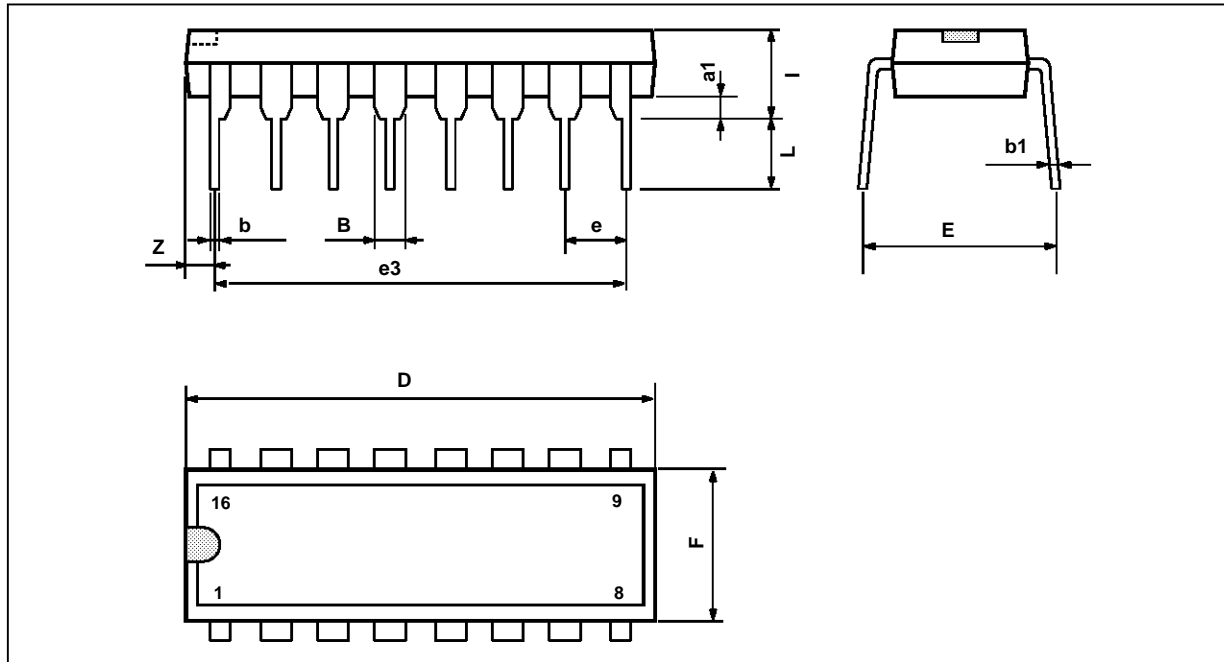
7. Emitter-follower

BLOCK DIAGRAM AND TYPICAL APPLICATION



2593-02.EPS

**PACKAGE MECHANICAL DATA**  
16 PINS - PLASTIC DIP



PMDIP16.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
i			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050

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