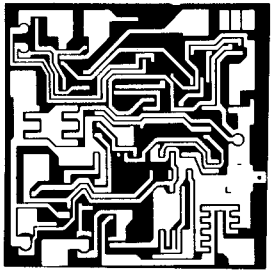
ULN-2291M and ULN-2294M
TV HORIZONTAL PROCESSORS

FEATURES

- Temperature Compensated Shunt Regulator
- Low Cost RC Oscillator Timing
- Adjustable Output Duty Cycle
- High Output Voltage Swing
- High Output Sink Current
- Internal Supply Decoupling
- Linear Balanced Phase Detector
- Low Thermal Drift
- Small Static Phase Error
- 8-Pin Dual In-Line Plastic Package
- ULN-2291M Replaces MC1391, CA1391, and LM1391
- ULN-2294M Replaces MC1394, CA1394, and LM1394



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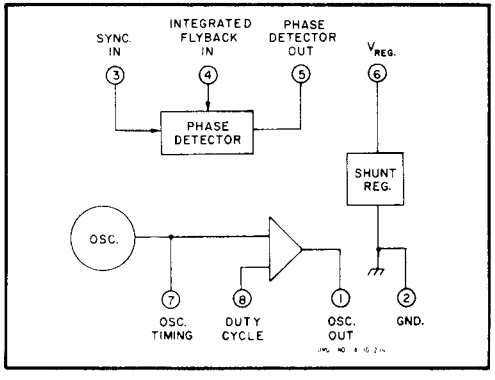
DESIGNED for TV horizontal oscillator and phase detector applications, the Type ULN-2291M and ULN-2294M Horizontal Processors feature all of the flexibility of conventional discrete component horizontal APC loops. Incorporated within these monolithic integrated circuits is a temperature-compensated shunt regulator and internal decoupling, a relaxation oscillator with an open collector predriver, and a linear balanced phase detector. These devices are used in both color and black and white TV receivers.



FUNCTIONAL BLOCK DIAGRAM

The Type ULN-2291M Horizontal Processor is intended for use with a positive-going flyback input while the Type ULN-2294M device requires a negative-going flyback input.

ABSOLUTE MAXIMUM RATINGS

Operating Temperature Range, T_A ..... −40°C to +85°C
Storage Temperature Range, T_S ..... −65°C to +150°C
Maximum Voltage and Current Ratings at T_A = +25°C:

Pin	Voltage Range in Volts	Current in mA	
		Input	Output
1	0 to +40	30	—
2	reference	1.0	40
3	0 to +5.0	10	0.25
4	0 to V_{REG}	—	—
5	0 to +7.0	1.0	1.0
6	Note	40	1.0
7	0 to +4.0	—	—
8	0 to V_{REG}	3.0	0

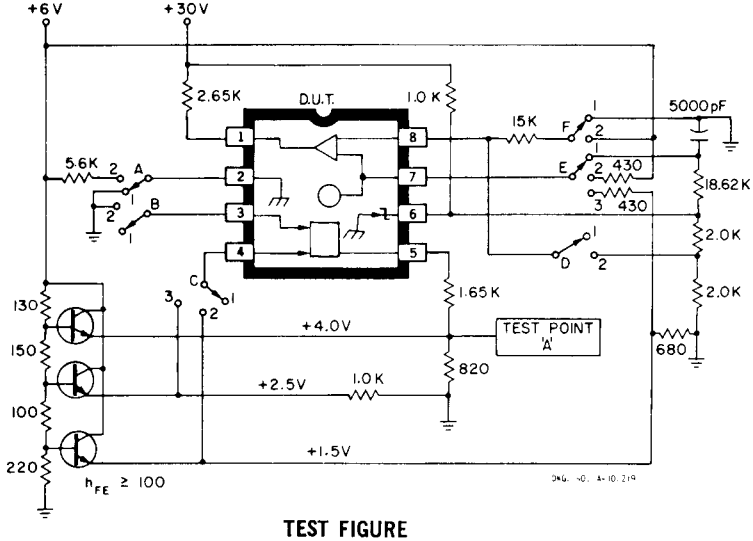
NOTES:

Dependent on value of external current limiting resistor, 0 to +8.0 V at 0 Ω.

ELECTRICAL CHARACTERISTICS at $T_A = +25°C$, Test Figure 1, (unless otherwise noted)

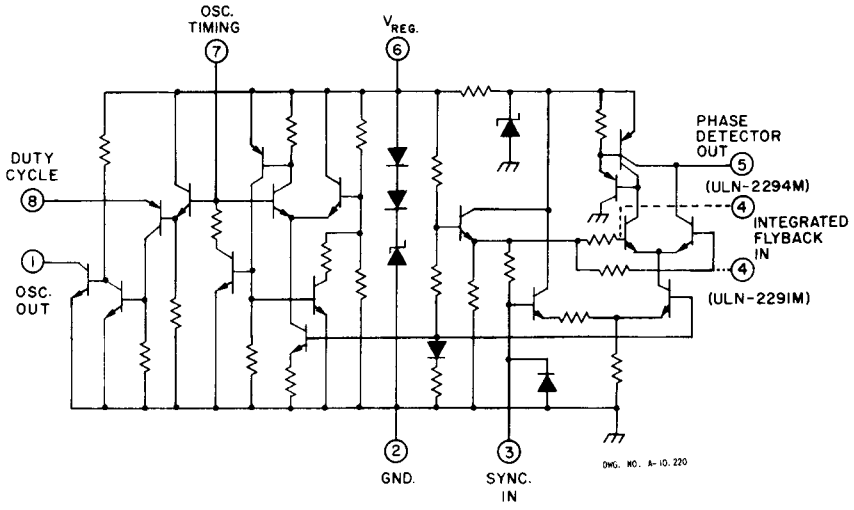
Characteristic	Test Pin	Switch Test Positions A	B	C	D	E	F	Limits Min.	Max.	Units	Notes
Regulator Voltage	6	1	1	1	1	1	1	8.0	9.0	V	
Free-Running Osc. Frequency	1	1	1	1	2	1	1	14734	16734	Hz	
Osc. Charge Current	7	1	1	1	1	3	1	—	±23	μA	1
Osc. Discharge Current	7	1	1	1	1	2	1	6.0	8.4	mA	
Output Leakage Current	1	1	1	1	1	2	2	—	3.8	μA	1
Output Saturation Voltage	1	1	1	1	1	2	1	—	150	mV	
Phase Detector Bias Voltage	3	1	1	1	1	3	1	1.60	2.45	V	
Phase Detector Leakage Current	5	1	1	3	2	3	1	—	±12	μA	1
Phase Detector Output Low	5	1	2	2	1	3	1	0.55	1.20	V	2
Phase Detector Output High	5	1	2	3	1	3	1	−0.55	−1.20	V	2
Phase Detector Output Balance	5							—	±0.10	V	3
Sync. Input Diode Voltage	2	2	2	1	1	1	1	0.3	1.2	V	
Freq. Drift	1	1	1	1	2	1	1	0.0	−5.0	Hz/°C	4

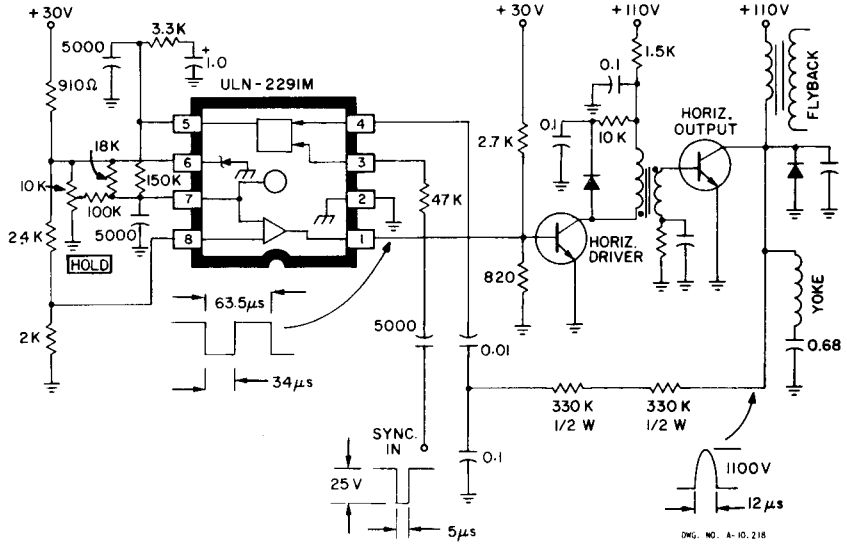
NOTES:
1. Resistor values in test figure include meter resistances. For low current measurements it may be necessary to measure voltage drop across specified resistors and calculate current flow.
2. Reference Test Point 'A.'
3. Calculated value from measured values of Phase Detector Output Low plus Phase Detector Output High.
4. Ambient temperature of device only is varied between +25°C and +70°C.



TEST FIGURE

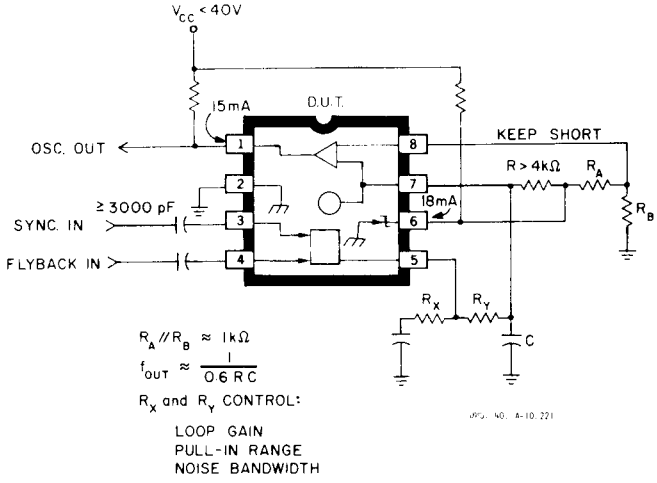
CIRCUIT SCHEMATIC



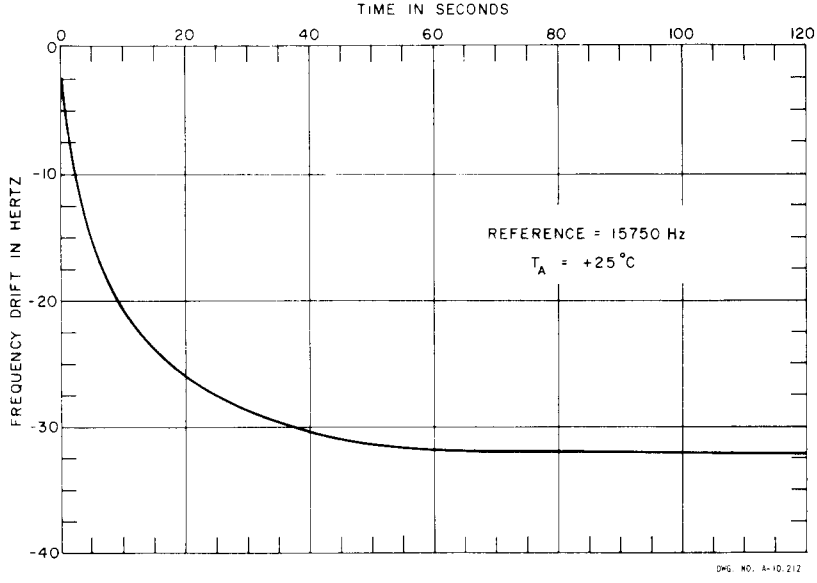


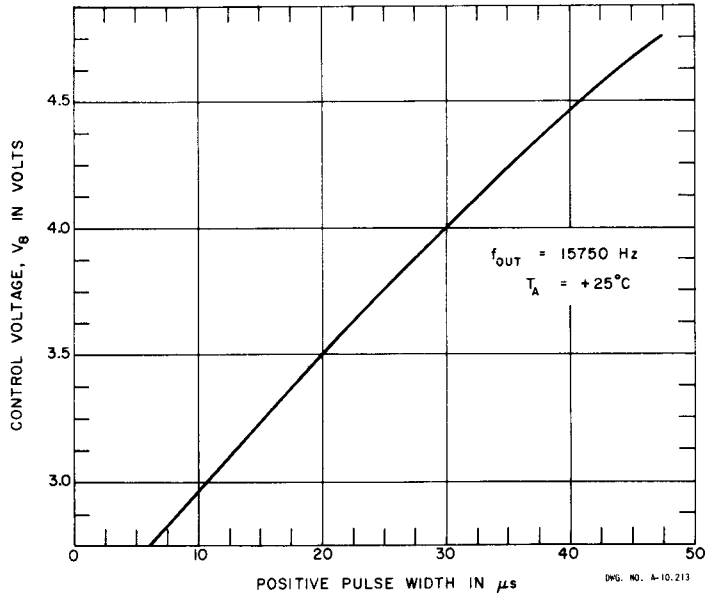
TYPICAL APPLICATION

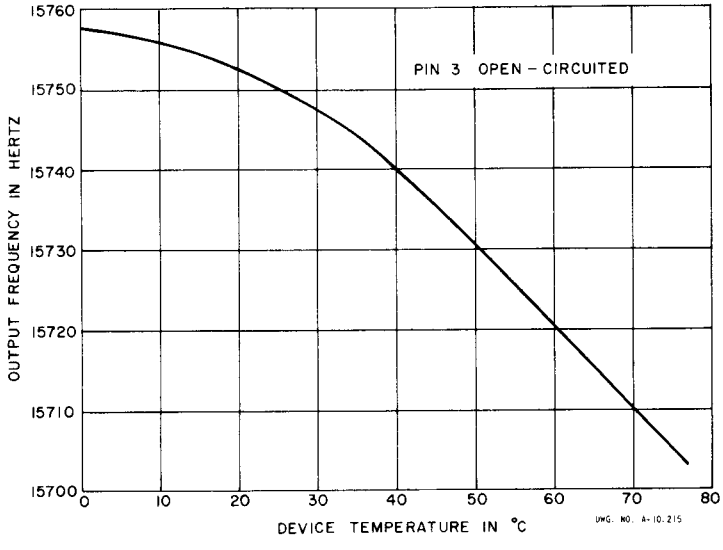
(Type ULN-2294M is designed to accept reverse polarity sawtooth at pin 4 if sync pulse is not derived from the output collector.)



CIRCUIT DESIGN NOTES




CONTROL VOLTAGE, V_8 IN VOLTS
4.5
4.0
3.5
3.0
0
10
20
30
40
50
POSITIVE PULSE WIDTH IN μs
f_{OUT} = 15750 Hz
T_A = +25°C
DWG. NO. A-10,213


OUTPUT FREQUENCY IN HERTZ
15760
15750
15740
15730
15720
15710
15700
0
10
20
30
40
50
60
70
80
DEVICE TEMPERATURE IN °C
PIN 3 OPEN-CIRCUITED
DWG. NO. A-10,215