

TBA 950, TBA 950:F

Controlled Pulse Generators for Transistor Line Output Stages

Monolithic integrated circuit for pulse separation and line synchronization in TV receivers with transistor line output stage.

The TBA 950 is an advanced version of the TAA 790. It comprises the sync separator with noise suppression, the frame pulse integrator, the phase comparator, a switching stage for automatic changeover of noise immunity, the line oscillator with frequency range limiter, a phase control circuit and the output stage.

It delivers prepared frame sync pulses for triggering the frame oscillator. The phase comparator may be switched for video recording operation. Due to the large scale of integration few external components are needed.

The 950 is delivered in two groups having different output pulse durations. The TBA 950:F is designed for TV receivers according to the French standard.

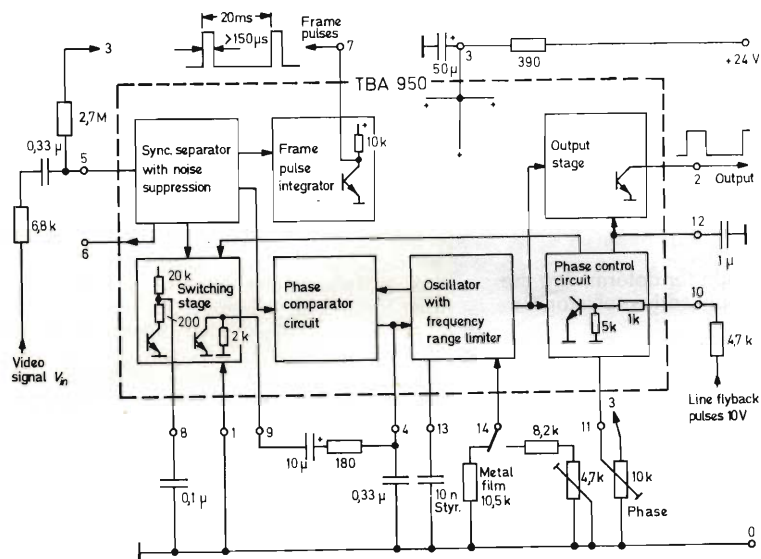


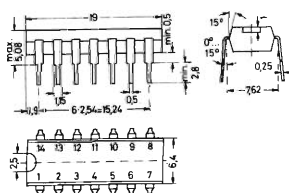
Fig. 1: Block diagram and test circuit for the TBA 950

Fig. 2:

TBA 950 in dual in-line (Dil)
plastic TO-116 package
20 A 14 according to DIN 41 866

Weight approx. 1.1 g

Dimensions in mm



TBA 950

Switch-over current	I_8	> 2	mA
Time difference between the output pulse at pin 2 and the line flyback pulse at pin 10	t_d	< 20	μs
Current consumption (see Fig. 8)	I_3	≤ 45	mA
Ambient operating temp. range	T_{amb}	$0 \dots 60$	$^{\circ}\text{C}$

Characteristics

for $T_{amb} = 25^{\circ}\text{C}$, $f_o = 15\,625\text{ Hz}^1$) in the test circuits Figs. 1 and 3

Amplitude of the frame pulse	V_7	> 8	V
Frame pulse duration			
TBA 950:1 and TBA 950:2 X	t_7	> 150	μs
TBA 950:F	t_7	> 20	μs
Output resistance at pin 7 (high state)	$R_{out\,7}$	$10\,(7.5 \dots 13)$	k Ω
Amplitude of the complete sync signal	V_6	> 8	V
Output resistance at pin 6	$R_{out\,6}$	$2.5 \dots 4.5$	k Ω
Output pulse duration			
TBA 950:1	t_2	$22 \dots 26$	μs
TBA 950:2 X	t_2	$25 \dots 28$	μs
TBA 950:F	t_2	$25 \dots 30$	μs
Residual output voltage at $I_2 = 20\text{ mA}$	$V_{2\,res}$	< 0.55	V
Oscillator frequency for $C_{13/1} = 10\text{ nF}$, $R_{14/1} = 10.5\text{ k}\Omega$	f_o	$15\,625 \pm 1562$	Hz
Frequency pull-in range	$\pm \Delta f_F$	$400 \dots 1000$	Hz
Frequency holding range	$\pm \Delta f_H$	$400 \dots 1000$	Hz
Slope of phase comparator control loop	df_o/dt_d	2	kHz/ μs
Gain of phase control	dt_d/dt_p	20	
Phase shift between leading edge of BAS signal and line flyback pulse ²⁾ at $t_5 = 4.7\text{ }\mu\text{s}$, $t_{10} = 12\text{ }\mu\text{s}$, $t_s = 5\text{ }\mu\text{s}$, pin 11 open circuit, see Fig. 4	t_v	$-1 \dots +3.5$	μs

¹⁾ By modification of the frequency determining network at pins 13 and 14 these integrated circuits can also be used for other line frequencies.

²⁾ The limited flyback pulse should overlap the BAS signal sync pulse on both edges.

TBA 950

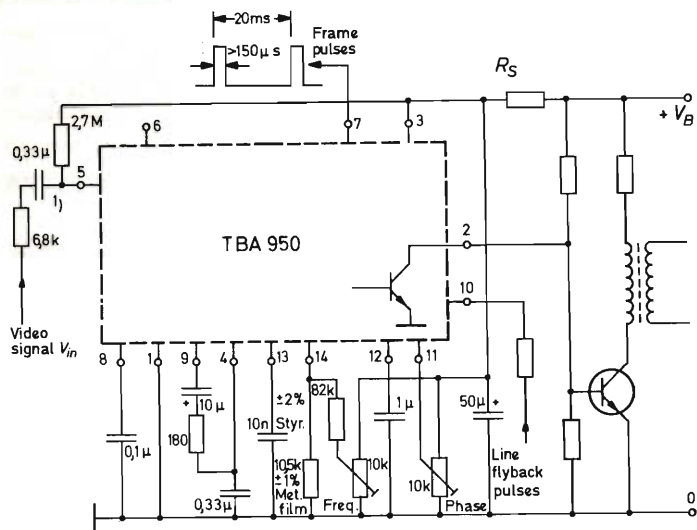


Fig. 6: Another possibility for line frequency adjustment for the TBA 950

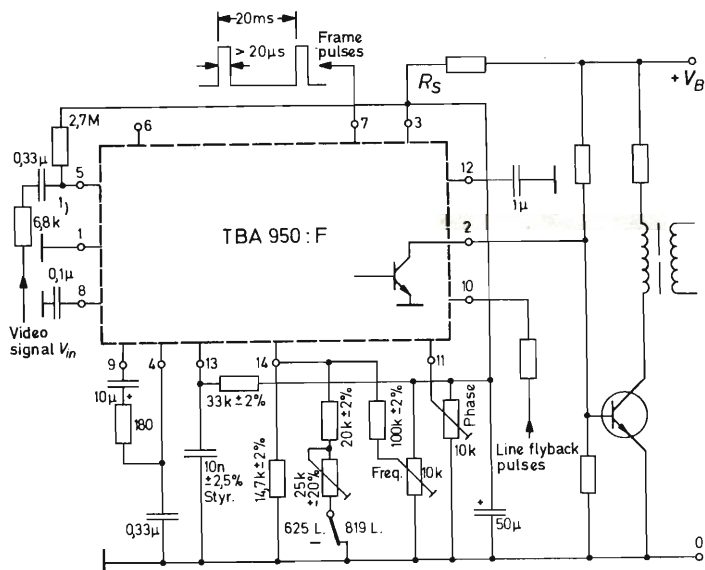


Fig. 7: Operating circuit of the TBA 950:F with line frequency changeover from 625 lines to 819 lines

1) Input circuitry must be optimized.

Design and Operation Mode

The sync separator separates the synchronizing pulses from the composite video signal (BAS signal). The noise inverter circuit, which needs no external components, in connection with an integrating and differentiating network frees the synchronizing signal from distortion and noise.

The frame sync pulse is obtained by multiple integration and limitation of the synchronizing signal, and is available at pin 7. The RC network hitherto required between sync separator and frame oscillator is no longer needed. Since the frame sync pulse duration at pin 7 is subject to production spreads it is recommended to use the leading edge of this pulse for triggering.

The frequency of the line oscillator is determined by a 10 nF Styroflex capacitor at pin 13 which is charged and discharged periodically by two internal current sources. The external resistor at pin 14 defines the charging current and consequently in conjunction with the oscillator capacitor the line frequency.

The phase comparator compares the sawtooth voltage of the oscillator with the line sync pulses. Simultaneously an AFC voltage is generated which influences the oscillator frequency. A frequency range limiter restricts the frequency holding range.

The oscillator sawtooth voltage, which is in a fixed ratio to the line sync pulses, is compared with the flyback pulse in the phase control circuit, in this way compensating all drift of delay times in driver and line output stage. The correct phase position and hence the horizontal position of the picture can be adjusted by the 10 k Ω potentiometer connected to pin 11. Within the adjustable range the output pulse duration (pin 2) is constant. Any larger displacements of the picture, e. g. due to non-symmetrical picture tube, should not be corrected by the phase potentiometer, since in all cases the flyback pulse must overlap the sync pulse on both edges (see Fig. 4).

The switching stage has an auxiliary function. When the two signals supplied by the sync separator and the phase control circuit respectively are in synchronism a saturated transistor is in parallel with the integrated 2 k Ω resistor at pin 9. Thus the time constant of the filter network at pin 4 increases and consequently reduces the pull-in range of the phase comparator circuit for the synchronized state to approximately 50 Hz. This arrangement ensures disturbance-free operation.

For video recording operation this automatic switchover can be blocked by a positive current fed into pin 8, e. g. via a resistor connected to pin 3. It may also be useful to connect a resistor of about 680 Ω or 1 k Ω between pin 9 and ground. The capacitor at pin 4 may be lowered, e. g. to 0.1 μ F. This alterations do not significantly influence the normal operation of the IC and thus do not need to be switched.

The output stage delivers at pin 2 output pulses of duration and polarity suitable for driving the line driver stage. If the supply voltage goes down (e.g. by switching off the mains) a built-in protection circuit ensures defined line frequency pulses down to $V_3 = 4\text{ V}$ and shuts off when V_3 falls below 4 V , thus preventing pulses of undefined duration and frequency. Conversely, if the supply voltage rises, pulses defined in duration and frequency will appear at the output pin as soon as V_3 reaches 4.5 V . In the range between $V_3 = 4.5\text{ V}$ and full supply the shape and frequency of the output pulses are practically constant.

Fig. 8:
Graph for determining the
supply series resistor R_S

