SECTION 11

SAWTOOTH GENERATOR GE1/511

Introduction

The GE1/511 accepts inputs of mixed sync pulses and field drive pulses: it produces line and field sawtooth waveforms, line and field clamp pulses and a key blanking waveform. For a change of line standard certain time constants are changed by means of relays.

The GE1/511 is constructed on a CH1/12A chassis with index peg positions 5 and 25.

Integrator Circuit

A circuit typical of the integrators used in the GE1/511 and some of its associated generators is given in Fig. 11.2. Transistors TR1 and TR3 are used as input and output emitter followers. The common emitter stage transistor TR2 has its gain increased by positive feedback. The signal voltage at the emitter of transistor TR3 is almost equal to the voltage at the collector of transistor TR2.

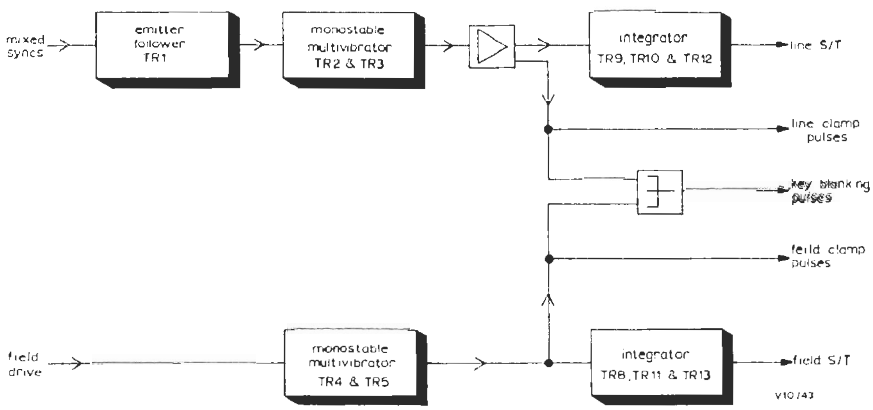

Fig. 11.1 Block Diagram of the GE1/511

General Description

A block diagram of the GE1/511 is given in Fig. 11.1. Mixed sync pulses are differentiated to trigger a monostable multivibrator (see Television Engineering, Volume 3) whose output pulses start at the start of line sync pulses and end just before the end of line blanking. These pulses are integrated to produce a line sawtooth waveform. The pulses are also used as line clamp pulses and as the line-frequency component of the key blanking waveform.

The field drive pulses are differentiated to trigger a monostable multivibrator. The output pulses of this multivibrator are used as field clamp pulses, the field-frequency component of the key blanking waveform and as the input to an integrator. The output of the integrator is a field sawtooth waveform.

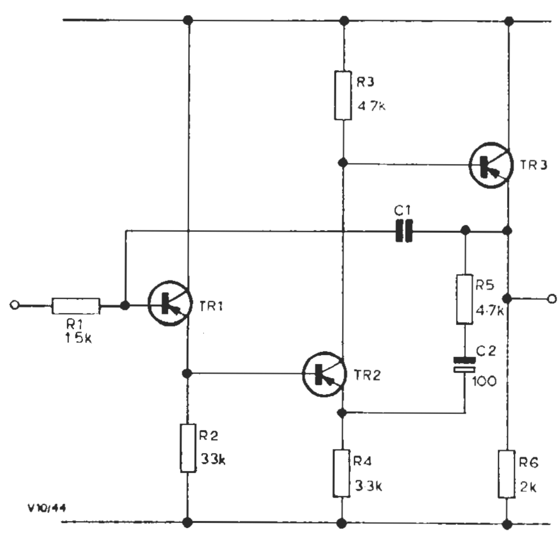

Fig. 11.2 Circuit of the Integrator

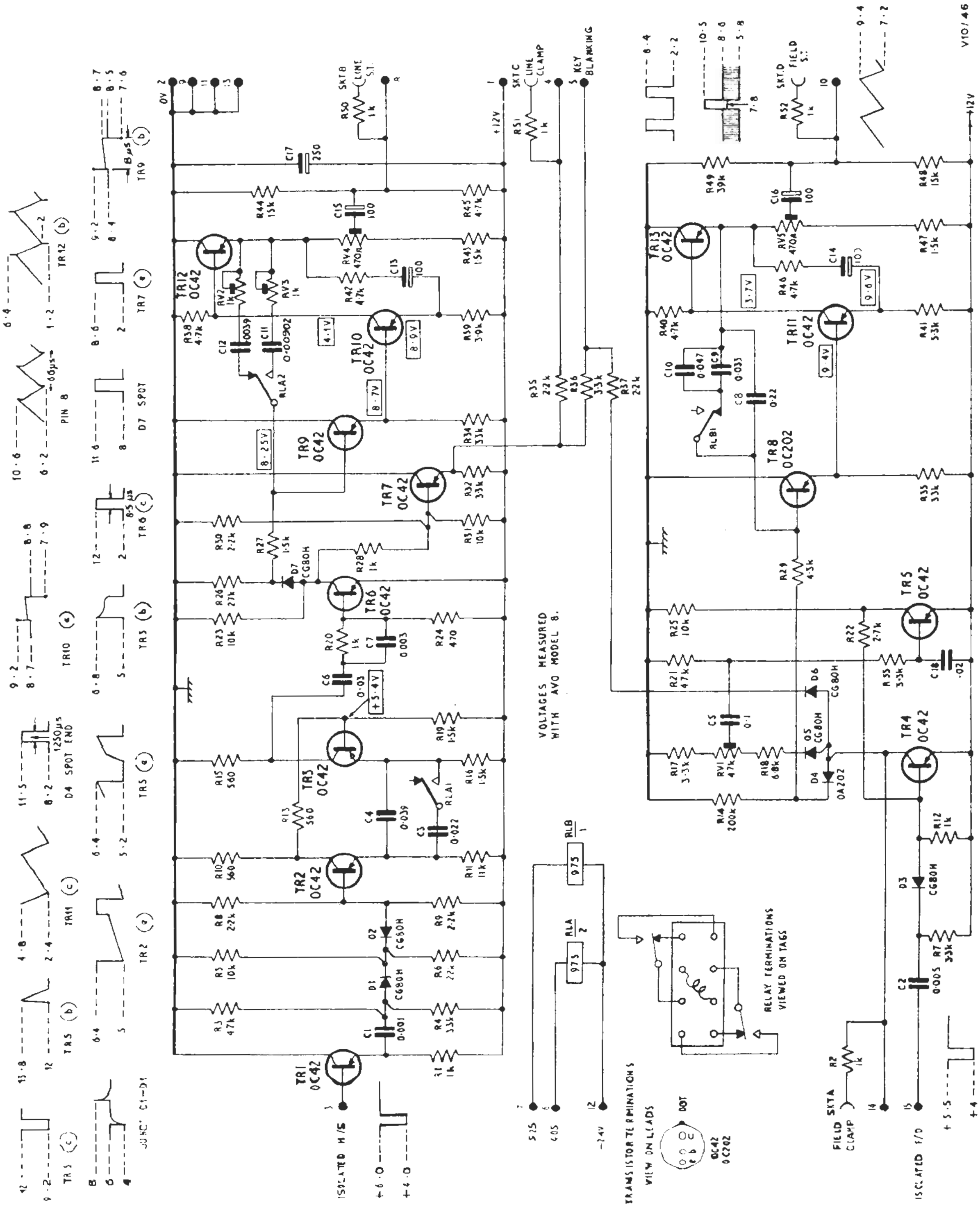

Fig. 11.3 Circuit of the GE1/511

Resistors R3 and R5 have equal values and so carry almost equal signal currents. Because the emitter signal current for transistor TR2 is fed from resistor R5, resistor R4 is effectively decoupled. Capacitor C2 reduces the gain at low frequencies.

Capacitor C1 and resistor R1 convert the high-gain amplifier into an integrator circuit* as shown in the appendix.

Circuit Description

The circuit of the GE1/511 is shown in Fig. 11.3. Diodes D1 and D2 limit the input pulses to the line-frequency emitter-coupled monostable multivibrator. The time-constant of this multivibrator is increased for 405-line working by the operation of relay RLA. The output of the multivibrator is fed via a speed-up capacitor C7 to the base of transistor TR6. The line-frequency integrator is similar to the basic circuit described above.

The output of the field-frequency monostable multivibrator is fed via isolating diodes D4, D5 and D6. The time-constant of the field-frequency integrator circuit is increased for 525-line working by the operation of relay RLB.

Test Procedure

The GE1/511 is tested as part of its parent unit.

Appendix

In the block diagram shown in Fig. 11.4:

$$V_o - v = 1/C \int i_c \, . \, dt$$

* See Towers, T. D. *The Pulse Circuit Family*; Wireless World, Jan., 1964.

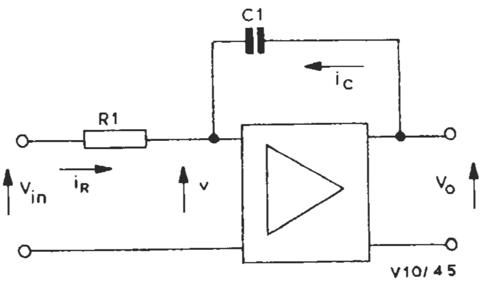

Fig. 11.4 Diagram Illustrating the Operational Integrator

If the amplifier gain is high then the input voltage v may be ignored with respect to the output voltage V_o. Therefore:

$$V_o \approx 1/C \int i_c \, . \, dt$$

If the feedback current is high with respect to the input current of the amplifier then the current through the input resistor is approximately equal to the feedback current:

$$i_r \approx -i_c$$

Therefore:

$$V_o \approx -1/C \int i_r \, . \, dt$$

$$\approx -1/C \int \frac{V_{in} - v}{R_i} \, dt$$

If the voltage across the input resistor is large with respect to the input voltage to the amplifier (v) this gives:

$$V_o \propto \int V_{in} \, . \, dt$$

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