

SECTION 16

PULSE AND BAR GENERATORS GE4/516 SERIES

Introduction

The GE4/516 series of pulse-and-bar generators provides a line frequency pulse-and-bar signal which contains the following waveform components:

- a sine-squared pulse positive-going from black level
- a sine-squared pulse negative-going from white level
- a line-frequency bar.

Three feeds of trigger pulses^{1,2} are required and the order in which the waveforms are generated is determined by the time relationships between the feeds of trigger pulses. Normally the positive-going pulse occurs a few microseconds after the trailing edges of syncs and the inverted pulse occurs a few microseconds after the start of the bar waveform. Synchronising pulses, and other externally generated waveforms, can be mixed with the internally generated waveforms in the output stage of the unit. A typical mixed output waveform of a GE4/516A unit, with synchronising and chrominance pulses added, is shown in Fig. 1.

The differences between the various generators in the series are listed below:

GE4/516 operates on the 405-line standard and provides 2T pulses³.

GE4/516A operates on the 625-line standard and provides 2T pulses⁴.

GE4/516B operates on the 405-line standard and provides both T and 2T pulses.

GE4/516C operates on the 625-line standard and provides both T and 2T pulses⁵.

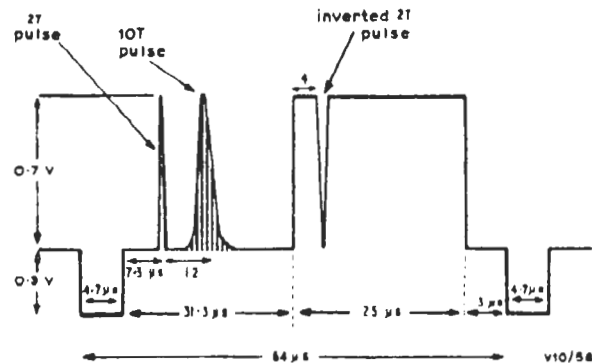


Fig. 1 Typical Output Waveform from the GE4/516

The units are constructed on CH1/12A plug-in chassis with index peg positions 18 and 28. Where either T or 2T pulses can be provided the change-over switch is on the front panel of the unit. Power supplies of +12 volts at 80 mA and -12 volts at 80 mA are required⁶.

Circuit Description

A circuit diagram is shown in Fig. 2. Negative-going trigger pulses are applied via emitter-follower TR1 to the base of TR2. Transistors TR2, TR3 and TR4 form an emitter-coupled monostable multivibrator (see Television Engineering, Volume 3) in which the base-emitter junction of TR4 forms the coupling between the collector of TR2 and the base of TR3. The duration of the unstable state is determined by the values of the components in the emitter circuits and is 40 μ s for those generators working on the 405-line standard and 25.6 μ s for those generators working on the 625-line standard. Zener diode D1 limits the collector potential of TR3 to 9.1 volts and diode D2 is used to compensate for temperature effects in transistor TR4. The output from the stage is negative-going and is taken from the collector of TR4. Transistor TR5 functions as an amplifier-inverter and the signal developed at the collector is applied, via the contacts of SA1, to the pulse-shaping networks.

Negative-going trigger pulses are differentiated and applied to TR6. This transistor is normally cut off but is driven into conduction by the negative-going spikes of the applied waveform and so amplified positive-going pulses are developed at the collector and applied to TR7. Transistor TR7 functions as a blocking oscillator and feeds a switching pulse to TR8 which causes it to conduct. When TR8 conducts C7 discharges through R19 and the resulting positive-going pulse is amplified and inverted by TR9. The pulse is then applied, via switch SA1, to the pulse-shaping networks. Preset resistor RV1, in the emitter circuit of TR9, acts as a pulse amplitude control.

In those units where either T or 2T pulses can be provided the T pulses pass through an attenuation pad before being fed to the networks. This equalises the heights of the T and 2T pulses which, as pulse height is proportional to filter bandwidth, would otherwise differ by 6 dB.

Transistors TR10 to TR12 form a pulse generating stage similar to that described above but, in this instance, with a negative-going trigger applied to the blocking oscillator. Therefore the pulse developed across R27 is negative-going and the pulse applied, via inverter-amplifier TR13, to the shaping networks is positive going.

In the pulse-shaping networks the pulse waveforms, and the edges of the bar waveform, are given a sine-squared shape. The waveforms are then applied, via SA2, to the base of TR14.

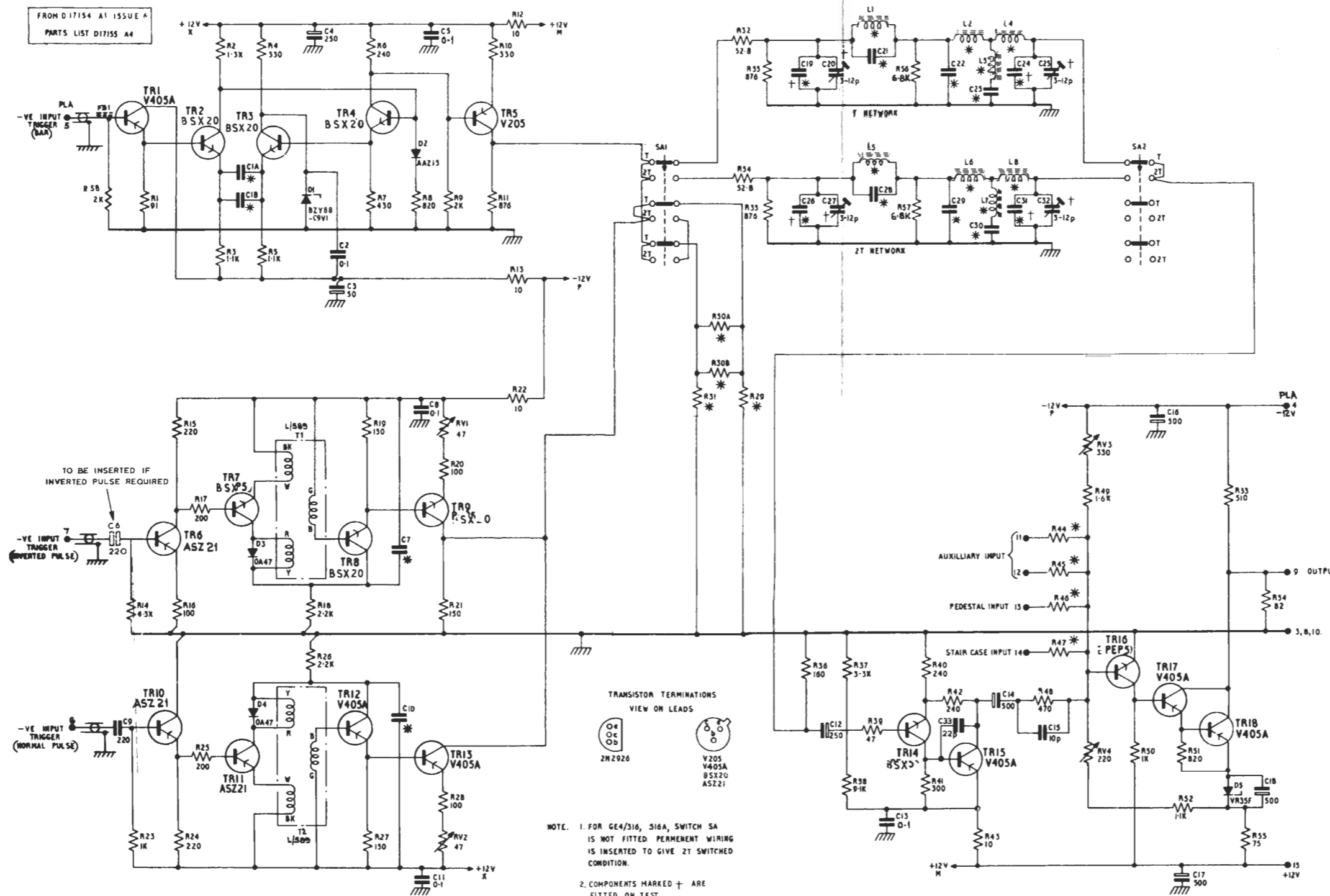
Transistors TR14 and TR15 form a direct-coupled complementary amplifier and the signal developed at the collector of TR15 is applied to the base of TR16. The base of transistor TR16 is also fed with sync pulses and auxiliary inputs (in the GE4/516C the chrominance pulse is applied at this point). Transistors TR16, TR17 and TR18 form a feedback amplifier in which negative feedback is applied from the emitter of TR18 to the

base of TR16. The amount of feedback, and hence the gain of the stage, can be varied by means of RV4. RV3 is adjusted so that the positive-going output signal starts from zero volts. The output signal is taken from the common collector circuit of TR17 and TR18; it has an amplitude of 1 volt p-p and an impedance of 75 ohms.

References to Typical Associated Equipment

1. Waveform Timing Pulse Generator GE2/540
2. Auxiliary Waveform and Timing Pulse Generator GE2M/547.
3. Test Line Signal Inserter Generator GE4M/518A
4. Test Line Signal Inserter Generator GE4M/518
5. Augmented Pulse and Bar Generator GE2M/543
6. Stabilised Power Supplier PS2/13F (Instruction G.2)

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FOR VALUES OF COMPONENT MARKED THUS *
SEE TABLE BELOW WHICH SHOWS VARIATIONS
FOR GE4/516, 516A, 516B, 516C.

CIRCUIT REFERENCE	GE4/516 (405 2T)	GE4/516A (625 2T)	GE4/516B (405 1/2T)	GE4/516C (625 1/2T)
C19	NOT FITTED	NOT FITTED	22 p	5 p
C21	"	"	33 p	22 p
C22	"	"	278 p	163 p
C25	"	"	0-001087	650 p
C24	"	"	68 p	27 p
C26	62 p	27 p	62 p	27 p
C28	82 p	44 p	82 p	44 p
C29	562 p	335 p	562 p	335 p
C30	0-002175 uF	0-0013 uF	0-002175 uF	0-0013 uF
C31	150 p	82 p	150 p	82 p
C7	300 p	160 p	300 p	160 p
C10	300 p	180 p	300 p	180 p
L1	NOT FITTED	NOT FITTED	3-16 uH (L1991)	1-800 uH (L1995)
L2	"	"	6-185 uH (L1990)	3-71 uH (L1996)
L3	"	"	0-615 uH (L1992)	0-369 uH (L1997)
L4	"	"	0-07 uH (L1993)	3-642 uH (L1998)
L5	6-32 uH (L1990)	3-792 uH (L1996)	6-32 uH (L1990)	3-792 uH (L1996)
L6	12-365 uH (L1994)	7-42 uH (L1996)	12-365 uH (L1994)	7-42 uH (L1996)
L7	1-23 uH (L1994)	0-738 uH (L1996)	1-23 uH (L1994)	0-738 uH (L1996)
L8	12-14 uH (L1995)	7-284 uH (L1996)	12-14 uH (L1995)	7-284 uH (L1996)
C1A	0-047 uF	0-022 uF	0-047 uF	0-022 uF
C1B	0-015 uF A.O.T.	0-01 uF A.O.T.	0-015 uF A.O.T.	0-01 uF A.O.T.
R29	NOT FITTED	NOT FITTED	465-B	465-B
R31	"	"	465-B	465-B
R30A	"	"	107-7	107-7
R30B	"	"	A.O.T.	A.O.T.
R44	470	470	NOT FITTED	470
R45	470	NOT FITTED	1-5 k	1-5 k
R46	100 k	100 k	2-4 k	2-4 k
R47	1-6 k	1-6 k	1-5 k	1-5 k

GE4/516/1T

Fig. 2. Circuit of the Pulse and Bar Generator GE4/516.