

SHIFT REGISTERS PA1/511 AND PA1/511A

Introduction

The PA1/511 comprises two identical sixteen-stage shift registers. Each shift register accepts an input of positive-going start pulses and two inputs of interleaved negative-going drive pulses. A pulse appears at the output of each stage in turn coincident with a drive pulse. The PA1/511A is identical to a PA1/511 except for the input circuits.

The PA1/511 is constructed on an Elliot Minilog mounting chassis, the dimensions of which are 17 inches by 10 inches by 1 1/4 inches.

General Description

A block diagram of the PA1/511 is given in Fig. 1 and the input and output waveforms are given in Fig. 2. Each stage is put into a set state by a positive-going pulse from the previous stage. While it is in this set state, the stage produces an amplified clipped and inverted version of a drive pulse which is fed to it. The trailing edge of the drive pulse also puts the stage into a clear state in which it does not react to further drive pulses. Thus each stage in turn is put in to the set state and

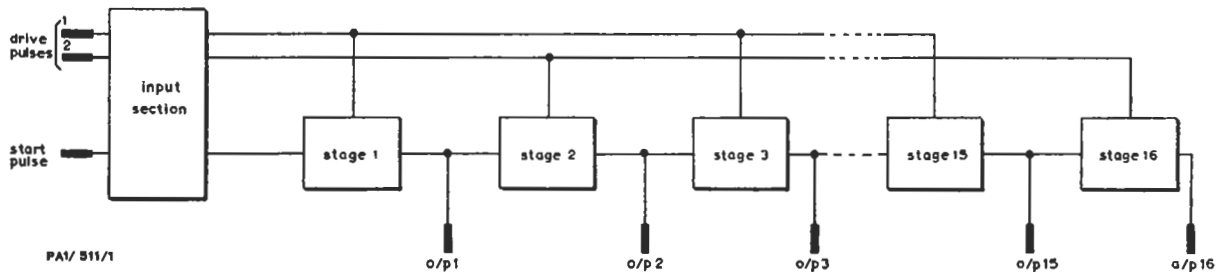


Fig. 1 Block Diagram of the PA1/511

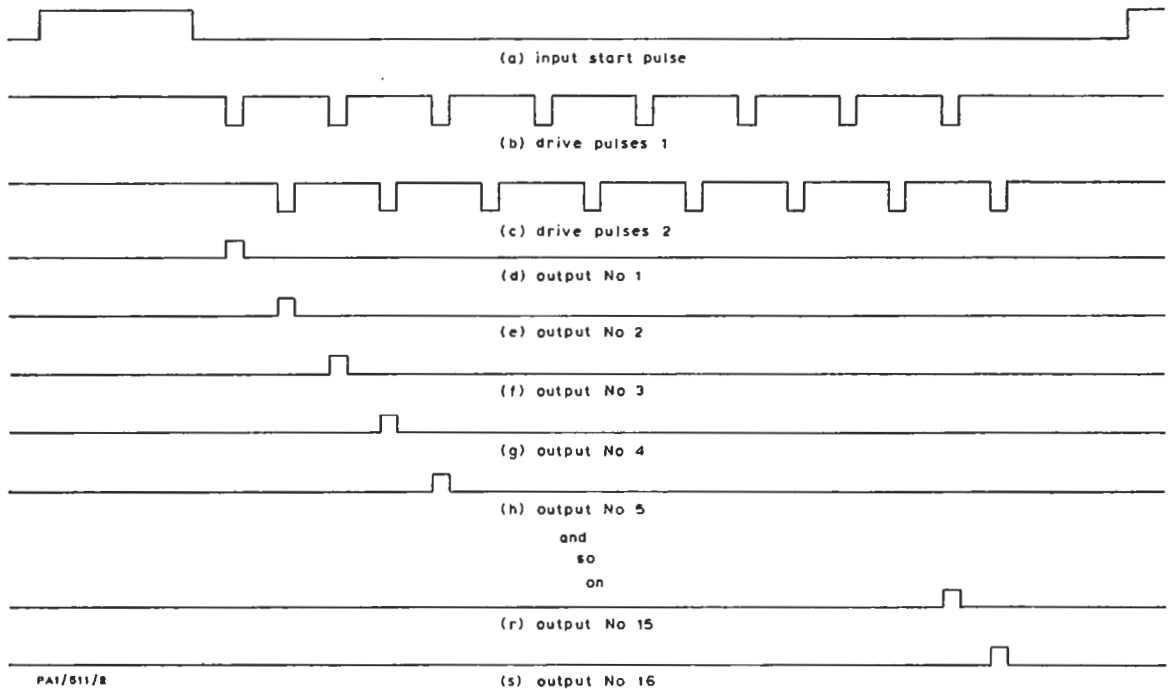


Fig. 2 Input and Output Waveforms of the PA1/511

in turn each stage produces an output pulse. The first stage is put into the set state by the input start pulse. The drive pulses are separated into two interleaved sets to prevent successive output pulses appearing during the one input drive pulse.

Circuit Description

A simplified circuit of a single stage is given in Fig. 3 and the waveforms for this stage are given in Fig. 4. A negative-going drive pulse at the base of transistor TR3 causes it to bottom. If transistor TR2 is cut off, the collector current of TR3 is fed out of the circuit to give a positive-going output pulse. If transistor TR2 is bottomed there is no output pulse.

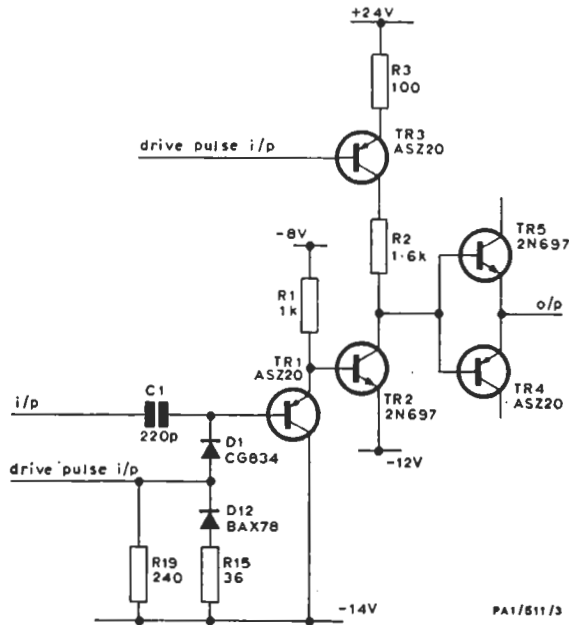


Fig. 3 Simplified Circuit of One Stage of the PA1/511

A positive-going input pulse fed via capacitor C1 causes the base-emitter diode junction of transistor TR1 to break down at a reverse voltage of about 0.5 volt. The forward voltage drop across the base-emitter junction of transistor TR2 is about a further 1 volt. Thus the positive-going excursion at the base of transistor TR1 is clamped at about -10.5 volts. The negative-going excursion is limited to -14 volts via the diodes and R15. Capacitor C1 starts to discharge through transistor TR1 and resistor R1 with a time constant of

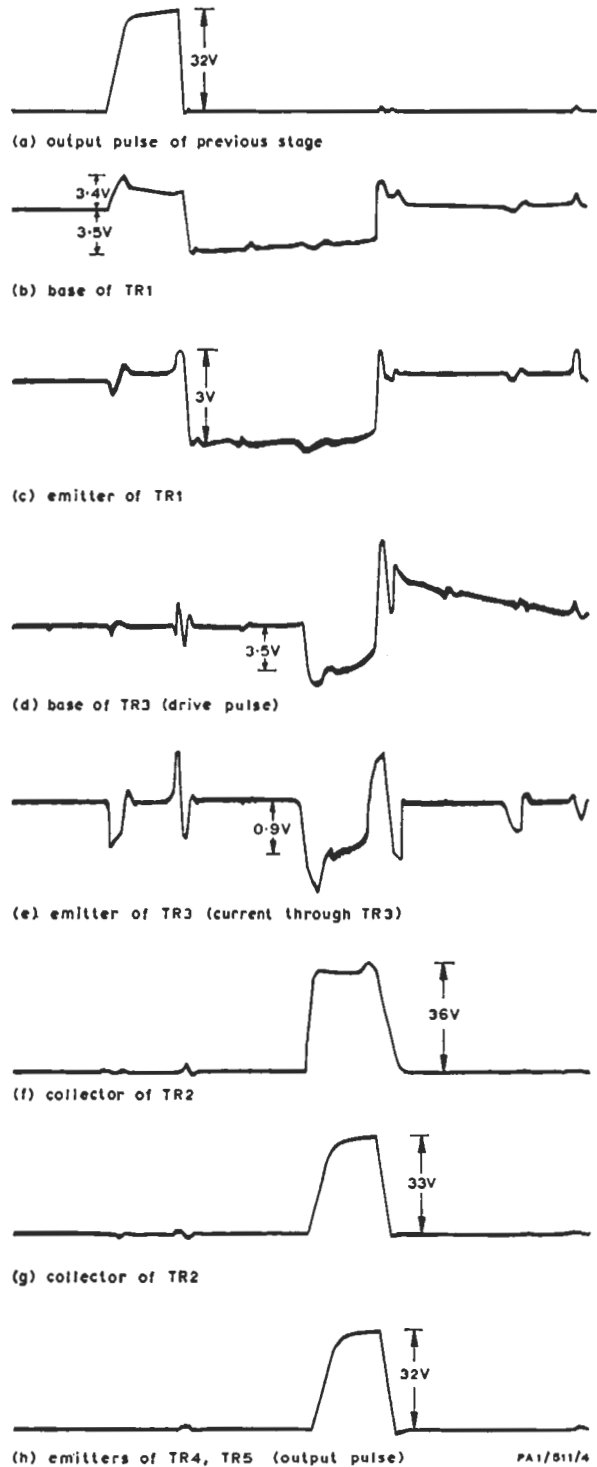


Fig. 4 Waveforms in the PA1/511

TABLE 1

<i>Connection</i>	<i>Front unit</i>	<i>Rear unit</i>
+24 V	D11	B11
-8 V	D12	B12
-12 V	D13	B13
-14 V	D14	B14
Start pulse	C1	A1
Drive pulse 1	C13	A13
Drive pulse 2	C14	A14
Output 1	A4	A3
Output 2	A6	A5
Output 3	A8	A7
Output 4	A10	A9
Output 5	B4	B3
Output 6	B6	B5
Output 7	B8	B7
Output 8	B10	B9
Output 9	C4	C3
Output 10	C6	C5
Output 11	C8	C7
Output 12	C10	C9
Output 13	D4	D3
Output 14	D6	D5
Output 15	D8	D7
Output 16	D10	D9

approximately 10 μ s. The positive-going transition of the next drive pulse completes the discharge of capacitor C1 through diode D1. While capacitor C1 is being discharged through transistor TR1, the voltage drop across resistor R1 keeps transistor TR2 cut off and thus an output pulse is produced.

With capacitor C1 discharged by the positive-going edge of the drive pulse, transistor TR1 is cut off and thus transistor TR2 is bottomed through resistor R1. This ends the output pulse of the stage and prevents the production of further output pulses by the rest of the drive pulses.

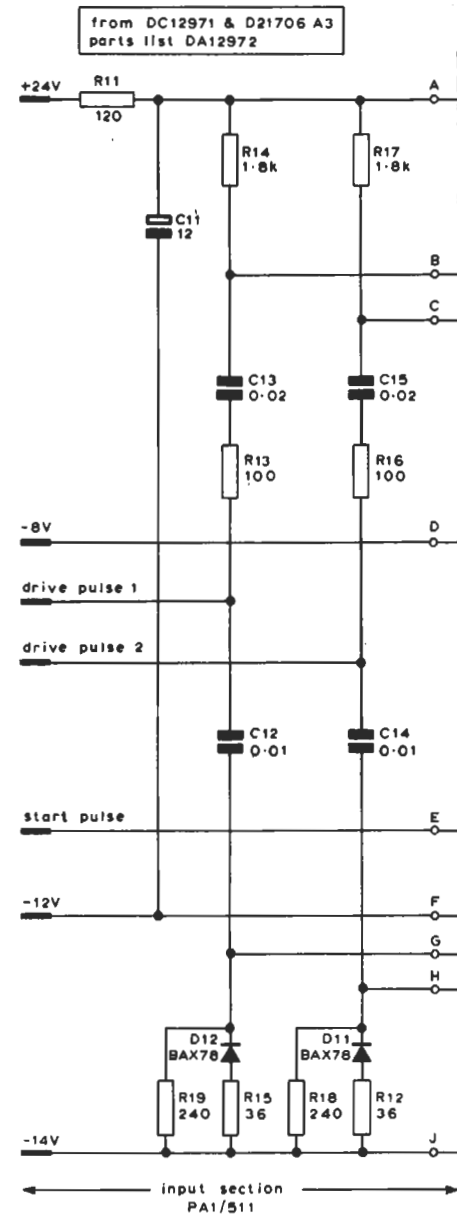
Fig. 5 shows the circuit of the PA1/511 and of the modified input section of the PA1/511A. The plug connections for both the front and the rear shift registers are given in Table 1.

Test Procedure

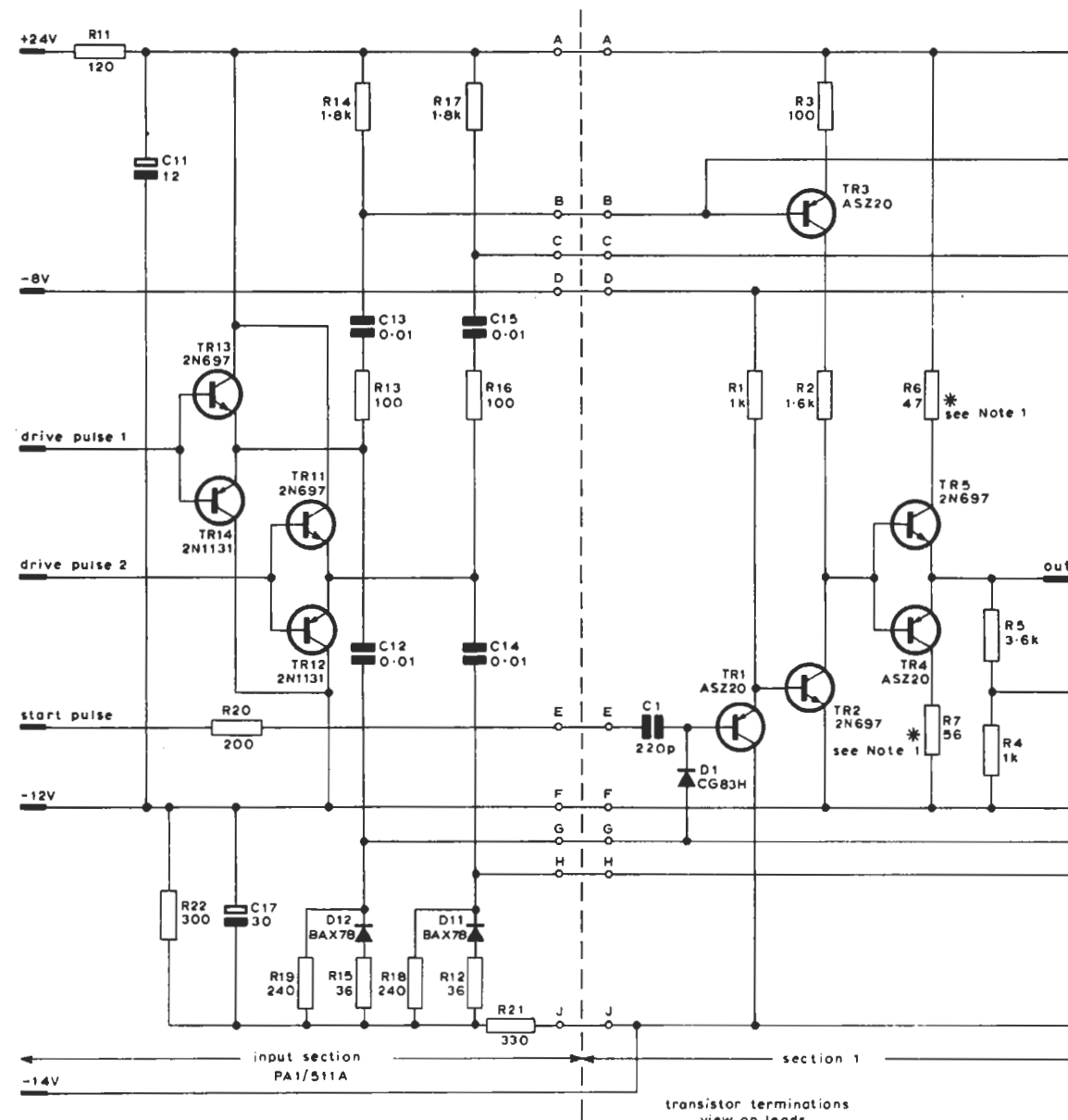
The PA1/511 is tested as part of its parent unit.

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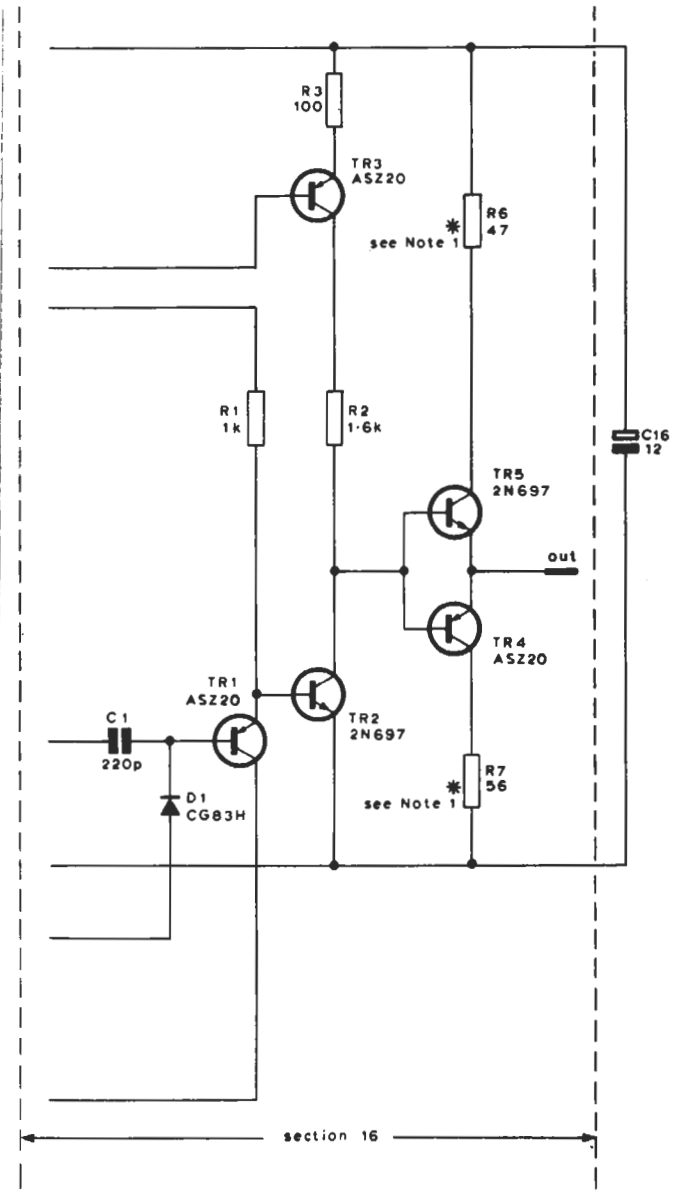
See page 5 for Fig. 5



PA1/511/5T



sections 2-15 (odd numbered sections are identical to section 1. even numbered sections are identical to section 16.)



Note 1
* these resistors are omitted in units up to serial No 124

Fig. 5 Circuit of the PA1/511