GAMMA AMPLIFIER AM19/505

SLAVE GAMMA AMPLIFIER AM19/506

Introduction

The AM19/505 and AM19/506 apply fixed gamma correction to non-composite video signals. The AM19/505 is used alone for monochrome working; the AM19/505 and the AM19/506 are used together for colour working.

The AM19/505 consists of an amplifier, a power supplier and a clamp pulse generator. The AM19/506 consists of two amplifiers and draws power and clamp pulses from the associated AM19/505.

The units are mounted on CH1/12A chassis and have index pegs 12 and 38 (AM19/505) and 12 and 39 (AM19/506). The two units are available as a pair coded AM19L/508.

General Specification

Inputs	
Video (non-composite)	0·7 V p-p
Syncs (AM19/505 only)	2 V p-p
Input Impedances	
Video	10 kilohms approx
Sync	greater than 3·3 kilohms
Outputs	
Video (non-composite, gamma corrected)	1·4 V p-p
Clamp Pulse (AM19/505 only)	4·5 V p-p neg. going
Output Impedance Video	not greater than 0·25 ohms
Clamp Pulse Duration	2·5 μs
Propagation Delay	26 ns
Gamma Characteristic	
Down to approximately 3·5% of input signal level	power law of 0·4
Black-level gain	18 dB
Frequency Response	
White	±1 dB to 6 MHz ±2 dB to 10 MHz
Black	−3 dB at 5 MHz approx −6 dB at 7 MHz approx
Power Requirements	240 V ±20% 50 Hz
Weight	
AM19/505	2 lb
AM19/506	1 lb
Operating Temperature Range	10°C to 45°C ambient

Circuit Description

Circuit diagrams for the two amplifiers are given in Fig. 1 and Fig. 2, a block diagram and the gamma characteristic are shown in Fig. 3 and Fig. 4. The description below is given with reference to Figs. 1 and 3.

TR1 and TR2 form a complementary common-emitter pair feeding TR3 and TR4 in parallel. TR3 passes the signal to TR9, a buffer amplifier feeding the non-linear element. The base of TR9 is clamped to earth by TR5 and TR6. Clamping transients, which would otherwise affect the operation of the non-linear element, are held off by R9. R9 is bootstrapped by TR4 to maintain a high impedance across the signal circuit between TR3 and TR9.

The operation of the non-linear gamma circuit can be seen from the block diagram of Fig. 3. The signals from the linear and non-linear arms, via resistors Ra and Rb, are added to give the required law. See Fig. 4.

TR9 operates with very low collector current. The signal appearing at its collector is largely determined by the signal at the emitter of TR10 via R18. The bootstrap action of R18, in forcing the collector of TR9 to follow its base, ensures that the impedance seen by the clamp is high.

The signal from the gamma circuit is applied to TR11, a long-tail pair, the second half of which stabilises the working point of the first half and also permits the application of negative feedback to adjust the gain of the stage to about 18 dB. It also

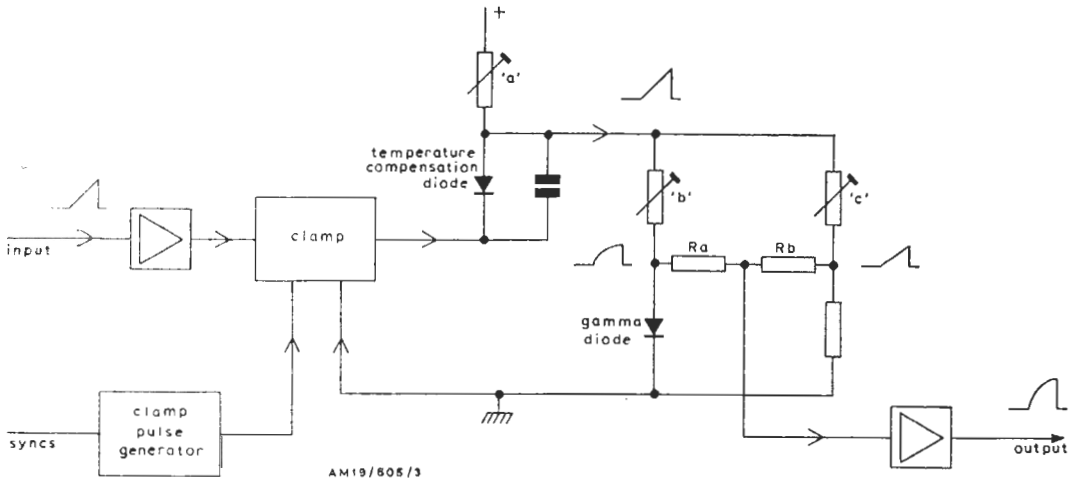

Fig. 3 Block Diagram of the AM19/505

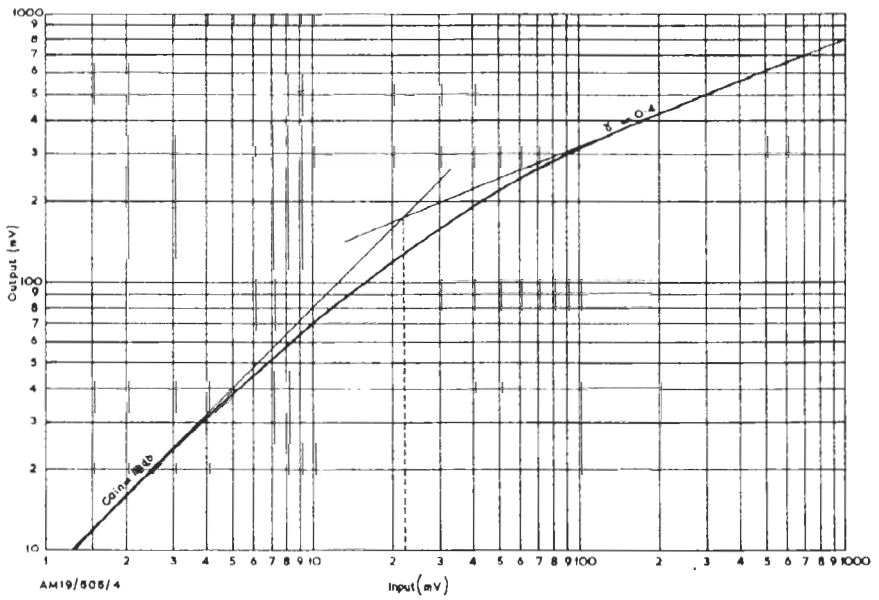

Fig. 4 Gamma Characteristic of AM19/505 and AM19/506

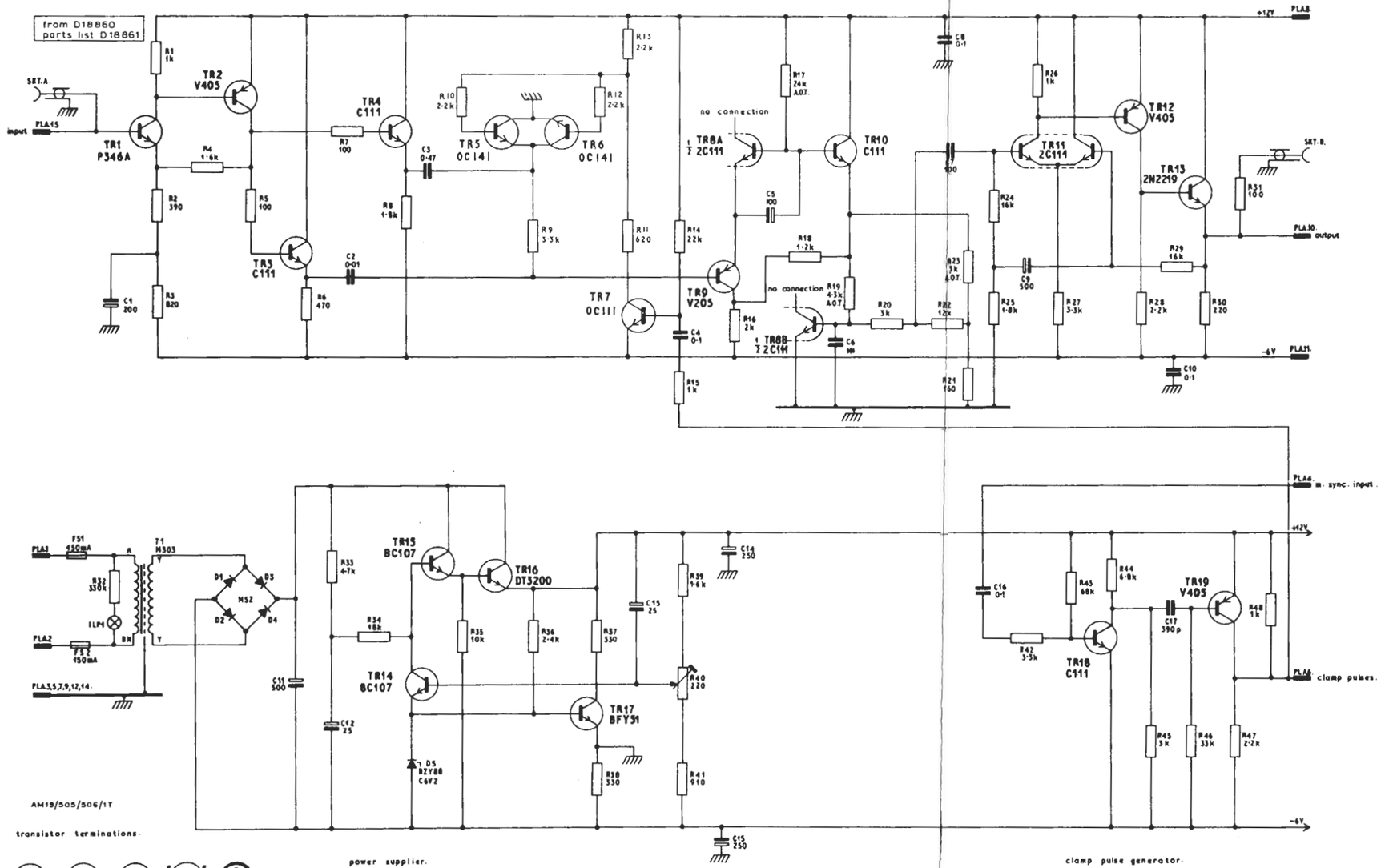

Fig.1. Circuit of the Gamma Amplifier AM19/505

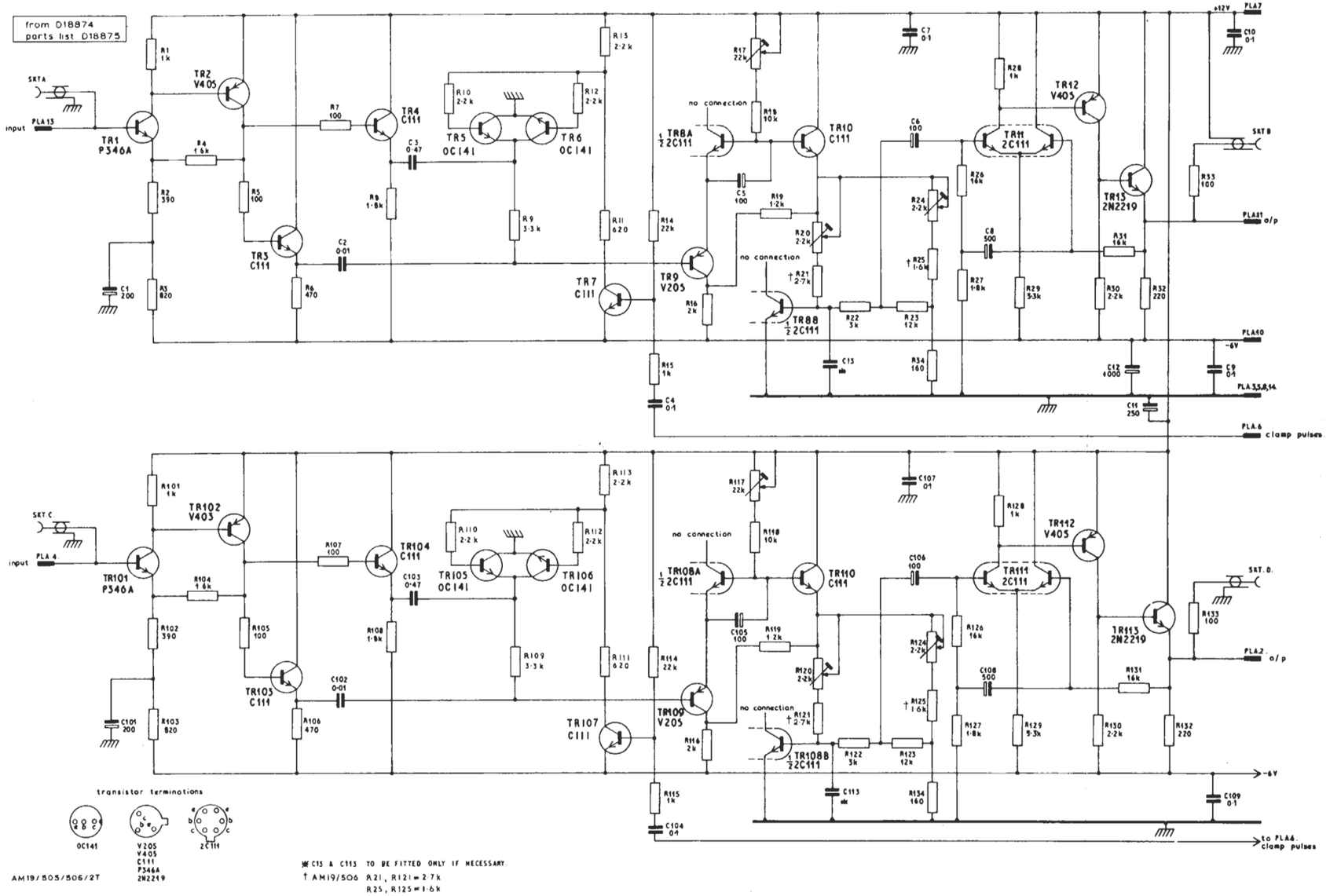

Fig. 2. Circuit of the Slave Gamma Amplifier AM19/506

provides an impedance transformation from the high impedance of the gamma circuit to the low impedance output. The bootstrap action of C9 assists this.

The clamp pulses are formed by TR18 and TR19 from mixed syncs. After clipping and inversion by TR18, the pulses are differentiated by C17 and R46, the negative pulses are removed by TR19 and the positive pulses are inverted and fed to the clamp pulse amplifier TR7.

The stabilised power circuit is conventional with TR17 forming a 6 volt tapping point.

The circuit of the AM19/506 is essentially identical with the AM19/505 circuit but includes two extra capacitors to decouple the power circuits as they enter the unit. Resistors R17, R20 and R24 and R117, R120 and R124 are made preset so that accurate matching may be achieved between the three channels of a colour system.

Maintenance

Routine maintenance is not required but, in a colour system, the matching of the three channels should be checked occasionally. There are no preset controls on the AM19/505 and if the transmission characteristic departs from that shown in Fig. 4 then R17, R19 and R23 should be checked and, if necessary, adjusted until agreement to ± 7 mV is obtained at all points. For this test a properly aligned unit and an oscilloscope with differential input amplifier, is very convenient. If another unit is not available, then an accurate non-composite sawtooth signal must be used and comparison made with Fig. 4. It should be noted that the accuracy of the sawtooth signal near black level has a marked influence on results.

When checking the matching between channels, compare each channel of the AM19/506 in turn with the AM19/505 and adjust the preset resistors to obtain the ± 7 mV agreement.

In all these tests the signals from the outputs must be taken via 74·8 ohm $\pm 0{\cdot}2\%$ resistors to an accurate 75 ohm termination on the oscilloscope. If the units are mounted together as an AM19L/508, the hold-off resistors are not required as they are included in the inter unit wiring.

The clamp pulses at PLA6 should have an amplitude of 4·5 V p-p and a duration of 2·5 μs $\pm 0{\cdot}5$ μs.

The offset from earth potential at the output of each channel, with no input signal, should not exceed 0·25 V.

References

1. Designs Department Specification No.8.255(67)
2. Designs Department Specification No.8.272(67)

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