BLANKING AMPLIFIERS AM1/563 AND AM1/564

Introduction

The AM1/563 is a blanking amplifier designed for use in a monochrome or colour telecine or slide scanner. In addition to its blanking function, it clips components of the signal below black level and above white level and can add syncs to a monochrome waveform. Front panel controls for lift and gain are provided; remote control is also possible by means of a switch on the panel. A second switch, controlling external relays, permits selection of a test waveform in place of the normal input signal.

The AM1/563 has its own internal power supply and input circuits for processing mixed blanking and mixed syncs.

For colour work, the AM1/563 is used with an AM1/564 Slave Blanking Amplifier (two channel), the lift and gain controls on the parent unit controlling all three channels together.

The AM1/564 is identical to the AM1/563 except that it has two signal circuits but does not have an internal power supply, or lift and gain controls or pulse processing circuits; it draws power and blanking from the parent unit. It has a front panel switch, controlling external relays, for providing an RGB shorting facility.

The AM1/563 is mounted in a CH1/26B chassis with index pegs 17 and 42; the AM1/564 is in a CH1/26A chassis with index pegs 17 and 41.

General Specification

Inputs	
Video (each channel)	0·7 V p-p
Mixed Syncs (AM1/563 only)	2 V p-p
Mixed Blanking (AM1/563 only)	2 V p-p
Input Impedance	
Video	2·7 kilohms
Mixed Syncs	2·0 kilohms
Mixed Blanking	2·0 kilohms
Output	
Non-composite Processed Video (per channel)	0·7 V p-p
Composite Video (AM1/563, monochrome working only)	1·0 V p-p
Output Impedances (each channel)	75 ohms ±0·2%
Control Ranges (local or remote)	
Gain	+3 dB to −3 dB
Lift	+30% to −50%
White Clip Level	700 mV ±10%
Black Clip Level	At Blanking Level
White Clip Stability (between any two channels)	Better than 1%
Lift and Gain Tracking (between any two channels)	Better than 1% (7 mV)
Pulse and Bar Ratio	
2T	100% Clear
1T	99% to 101% of both clippers
Clamp Pulse in Back Porch	Approximately 2 μs wide
Mains Input Voltage	230 V ±20%, 50 Hz
Weight	
AM1/563	2¾ lb
AM1/564	1½ lb
Operating Temperature Range (ambient)	10°C to 50°C

Circuit Description

The circuit diagram of the AM1/563 is given in Fig. 1 and of the AM1/564 in Fig. 2; the circuit description below refers to Fig. 1.

The input signal is fed via the emitter follower TR3 which, with R13 and C5, forms the tail of the long tailed pair TR2. Variable forward bias is used on both bases of TR2 to control gain. The output is taken from the junction of R16 and R17 which bridge the collectors of TR2. The circuit is balanced and thus no change of d.c. potential occurs at the output point as the gain is varied but, because of C3, an output signal appears across R16. R6 is the main local gain control and operates via the d.c. amplifier TR1; the preset control R22 sets

the basic gain of the circuit. Switch SA allows the gain to be controlled remotely.

The signal is capacitively coupled to one half of TR4, a long tailed pair, the second half serving to stabilise the working point of the first half. TR5 feeds the clamp circuit, TR6/TR7, the clamping potential being set by the lift control R2. The clamping pulses are fed from TR28 and are derived from mixed syncs (see below). TR8 and TR9 form a bootstrapped emitter follower circuit which, as it uses complementary transistors, is self compensating for temperature changes. It presents a very high impedance to the clamp circuit.

TR11 and TR12 are in series across the power supply and have a common collector circuit. The signal is fed to TR11 and blanking from TR31, via TR10, to TR12.

TR11 and TR12, in conjunction with D3 and D4 form the black clip circuit. If any signals appear tending to go below blanking level as set by the lift control R2, D3 conducts and the low input impedance of TR13 short circuits them to earth. At the same time, D4 cuts the signal path and the onset of the clipping action is very rapid.

The white clipping circuit operates similarly, the clipping diodes D5 and D6 are fed from the common collector circuit of TR14 and TR15, (the picture signal at this point is inverted). R56 sets the clipping level.

From the collector of TR14 the signal passes to the long tailed pair TR16 and thence via TR17 and TR18 to the output. Variable negative feedback via R61, R68 and C20 provides gain control. The bases of TR16 are approximately at earth potential and the d.c. feedback forces the emitter of TR18 to take up the same potential.

For monochrome working, syncs are mixed in by injection on to the second base of TR16. The sync input is obtained via TR23, TR24 and TR25, R87 provides amplitude control.

The clamp pulses for TR6/TR7 are derived from the sync pulses at the collector of TR24. After differentiation by C30 and R92, the positive peak only is passed by TR27 and appears inverted at the emitter of TR28.

The input mixed blanking pulses are fed by TR29, TR30 and TR31 to TR10. For monochrome working, C33 is adjusted to give the correct duration of front porch. Front panel monitoring points are provided for signal input and output and pulse inputs (AM1/563 only).

The power supplier in the AM1/563 is conventional and gives a 24 volt output, set by R80.

Transistors TR19 to TR31 with their associated components are not included in the AM1/564; they are replaced by a second identical signal chain and power and pulse inputs are obtained from the associated AM1/563.

Maintenance

Routine maintenance is unnecessary, but the following alignment checks can be made occasionally or if the performance of the units become suspect. In a three channel colour system, the AM1/563 (green channel) should be checked first and then the red and blue channels of the AM1/564 aligned to it.

AM1/563

1. There should be 24 V across C26 and C27 in series, R80 provides adjustment. There should be 5·5 V ±0·5 V across C27 alone.
2. Apply mixed blanking and mixed syncs to the appropriate input pins and 0·7 V p-p linear sawtooth to the signal input PLA8. With an oscilloscope and probe check the clamp pulse waveform on PLB7. The pulses are negative going, 8 V p-p in amplitude with a duration of 1·5 µs and located in the line-sync back porch.
3. With conditions as in 2 above and with R6 and R22 set to mid range, there should be 2 V p-p linear sawtooth at TP1 as indicated on an oscilloscope with high impedance probe. Adjust with R22; R6 the main gain control, should give ±3 dB on this setting.
4. Check that the d.c. off-set at the output PLA 10, unterminated, is 0·5 V or less.
5. Terminate the output PLA10 with 75 ohms at the oscilloscope input. Set R2 and R6 to mid range then, with no input to PLA8, adjust R41 to give just discernable lift. With a linear sawtooth input, R2 should give −50% to +30% lift. The −50% is estimated by proportion from the position along the line at which clipping begins.
6. To adjust the white clipper, set R2 and R6 to mid range and R56 to maximum (no white clipping) adjust R68 to give exactly 700 mV (blanking to white level) of sawtooth. Now turn R2 to maximum and adjust R56 to give 700 mV between blanking and the onset of clipping.

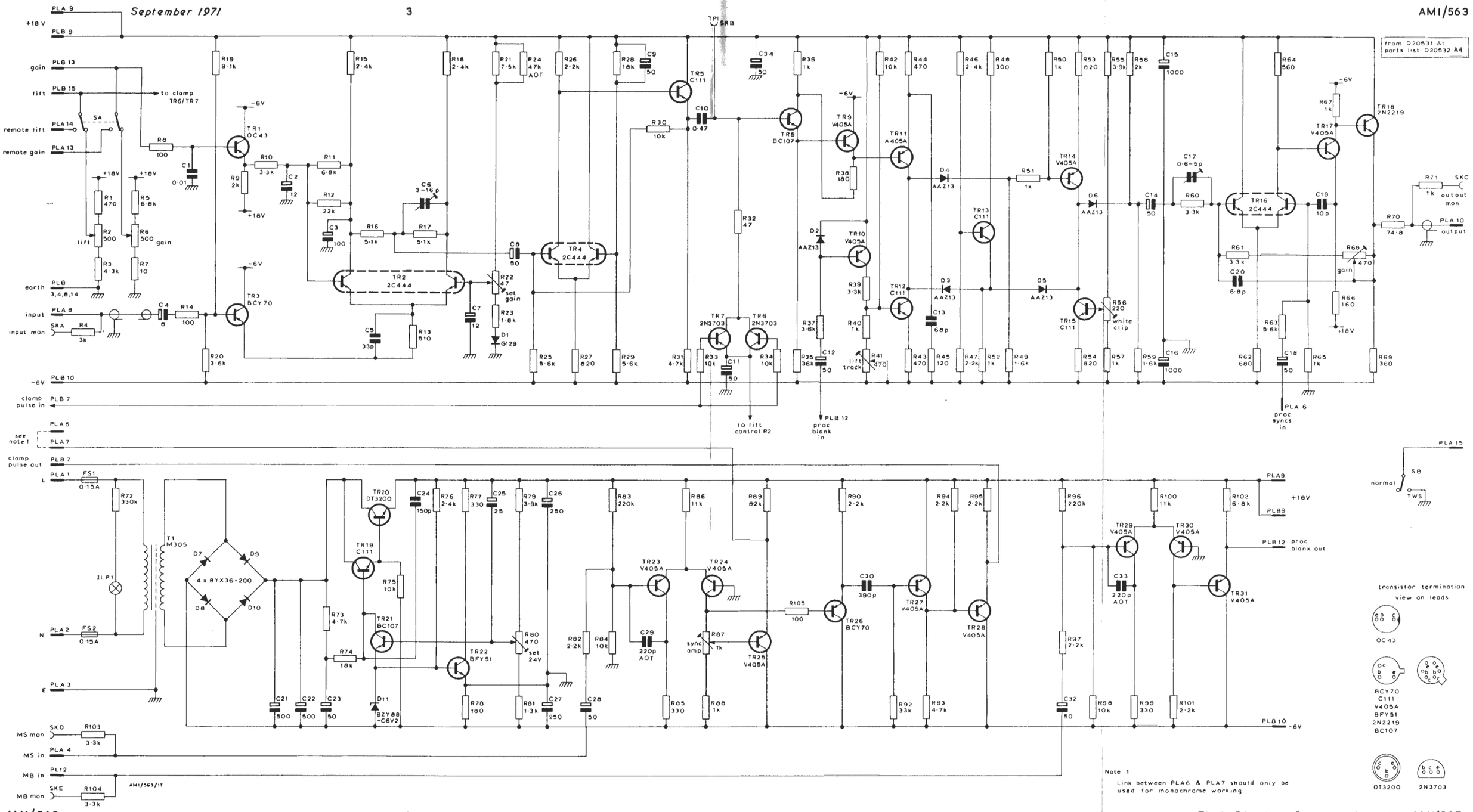

Fig.1. Circuit of Blanking Amplifier AMI/563

7. For monochrome working, the sync pulse amplitude is adjusted with R87. If the sync pulse rise time is not correct at the unit output, it may be adjusted with C29 (250 ns ±50 ns). The duration of front porch between the leading edge of blanking and the edge of line syncs should be 1·55 μs ±50 ns. C33 provides adjustment.
8. With a 2T pulse and bar input and monitoring on the unit output, the white clipper should affect both pulse and bar simultaneously as the gain is increased. If not, adjust C6.
9. The pulse to bar ratio should be unity. If not, and using a 1T signal, set R2 and R6 to give a display clear of both clippers and adjust C17.

AM1/563 and AM1/564 for colour working

With the AM1/563 adjusted as above, the red and blue channels of the AM1/564 should be aligned to it as follows. (N.B. The preset controls of the AM1/563 must not be shifted.) In addition, the tests detailed in 8 and 9 above must be carried out for both channels.

1. With a linear sawtooth input to the AM1/563 and to the red channel of the AM1/564, set the main gain control of the AM1/563 to mid range and, using the oscilloscope with a differential input amplifier, check that the voltage difference between TP1 (AM1/563) and TP1 (AM1/564) is zero. Adjust with 1R16. The gain of the two amplifiers should now track to less than 1% of the signal amplitude at the test point. If not, adjust the a.o.t. resistor 1R6. If any adjustment is made, the setting of 1R16 must be rechecked.
2. Repeat 1 above but using TP2 (blue channel).
3. With a linear sawtooth input to the AM1/563 and to the red channel of the AM1/564, set the main gain control to maximum and the lift control to give some degree of lift. Monitor the output of both channels with the oscilloscope and differential amplifier, terminated with 75 ohms ±0·2%. Adjust 1R61 to equalise the gains over the unclipped portion of the line and adjust 1R50 and 1R35 to match the white and black clippers. There should now be no output from the differential amplifier as the lift control is varied.
4. Repeat 3 above for the blue channel, adjusting 2R61, 2R50 and 2R35 to achieve a perfect balance.

References

1. Designs Department Specification No.8.271(67)
2. Designs Department Specification No.8.272(67)

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