CLAMP UNIT UN13/502

Introduction

The UN13/502 is a blanking-level clamp[1]. It accepts a 1-volt peak-to-peak positive-going video signal and provides a clamped positive-going output signal. The unit can operate on the 405, 525 or 625 line standards and can handle PAL, NTSC or SECAM colour signals.

The unit is constructed on a CH1/12A chassis with index-peg positions 27 and 30. An *On/Off/Remote* key is mounted on the front panel of the unit, together with a star indicator which is energised when the key is in the *On* position; the indicator is also energised when the key is in the *Remote* position, if an external short-circuit is provided between pins 10 and 11 of PLA. Power supplies at +8 volts and −12 volts are derived from an integral mains-driven power supplier.

General Specification

Maximum Input Level	1·45 volts p-p (sync pulses 0·3 ± 0·15 V, video signal up to 1 V p-p)
Insertion Gain (in 75-ohm circuit)	0 dB ±0·3 dB
Input Impedance	75 ohms at 10 kHz
Output Impedance	75 ohms ±2% between 0 Hz and 6 MHz
Clamping Level	zero volts
Amplitude/frequency response (with clamping inhibited)	±0·5 dB between 10 kHz and 6 MHz
k-rating (625 lines)	less that 0·2%
50-Hz rejection (625 lines)	28 dB nominal
Hum on Output (with zero hum at input)	−50 dB with respect to an 0·7 V p-p video signal
Non-linearity Distortion	less than 1%
Differential Phase	less than 0·5° at 4·43 MHz
Differential Gain	less than 1%
Permitted d.c. at Input	±3 V
Ambient Temperature Range	0—45° C
Clamping Level Variation with Temperature	less than 3 mV per degree C
Clamping Level Variation with 10 V Mains Voltage Variation	5 mV
Mains Input	200—250 V, 50 Hz
Current Consumption	about 25 mA
Weight	about 2 lb.

General Description

A simplified block diagram which shows the principle of operation of the unit is given in Fig. 1. The input, a composite video signal V plus an error signal e, is applied to a long-tailed pair which produces positive and negative-going versions of the input signal. The positive-going signal is applied directly to a linear adder; the negative-going signal is passed through filter F1 which attenuates the high-frequency components of the signal. Clamp pulses, generated from the filtered signal, are used to operate a transistor switch which detects the error component of the signal by charging or discharging capacitor C during back-porch periods. The error signal is passed through the low-pass filter F2, where any spurious information above line-frequency is removed, and is then added in antiphase to the uncorrected video signal.

The transistor switch is resistive and thus forms a low-pass section with capacitor C which, in effect, is part of filter F1. The linear adder and filter F2 are an integral network.

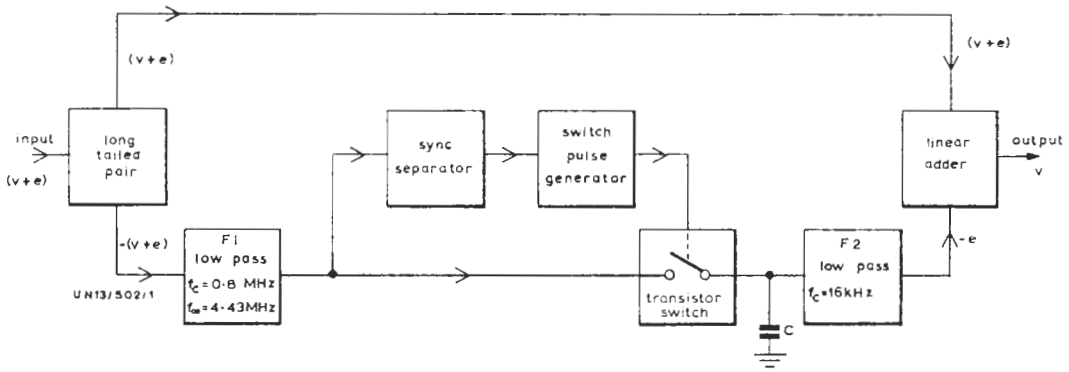


Fig. 1 Simplified Block Diagram of the UN13/502

Circuit Description

The circuit diagram is given in Fig. 2.

Signal Circuit

A positive-going input signal is applied via contact RLA-1 to transistor TR1. Transistors TR1 and TR2 form a long-tailed pair; an amplified version of the input signal appears at the collector of TR2 and an amplified and inverted version appears at the collector of TR1.

The inverted signal is applied, via a low-pass filter comprising L1 and C3, to emitter-follower TR5 and thence to the switching transistor TR6 and also to the sync separator stage TR8. The sync-pulse output from TR8 feeds the clamp-pulse generator TR7 and the clamp pulses developed at the collector of TR7 are applied to TR6 which is thus driven into conduction for the duration of each pulse. When transistor TR6 conducts it charges or discharges capacitor C5; this charge constitutes an error-correction signal which is applied, via the complementary pair TR3—TR4 and the low-pass filter L2—C4, to the collector of TR2 where it is added to the uncorrected signal developed at that point. The corrected signal is then fed to the output of the unit via emitter-followers TR9 and TR10 and relay contact RLA-2.

If the mains supply to the unit fails, or if the *On/Off/Remote* switch is put to the *Off* position, relay RLA is de-energised and the input signal is routed straight through to the output of the unit via the unoperated relay contacts.

Power Supplier

Power supplies at +8 volts and −12 volts are obtained from a conventional stabiliser circuit comprising transistors TR11 to TR13. The voltage developed across the zener reference diode D5 constitutes the +8 volts supply; this results in the positive supply being a fixed fraction of the negative supply. Adjustment of RV4 varies this fraction over a small range; the resistor is adjusted to set blanking level at the output of the unit to zero volts.

The power supplier circuit contains also relay RLA and a star indicator. These two components are connected between the positive and negative junctions of the bridge rectifier via the *On/Off/Remote* key. To operate the unit when the key is set to *Remote* a short-circuit must be applied between pins 10 and 11 of the connector.

Remote Indicator

If required, a remote indicator can be provided in addition to the local indicator. A circuit diagram for such an indicator is given in Fig. 3. The diode in the circuit stops the passage of reverse current

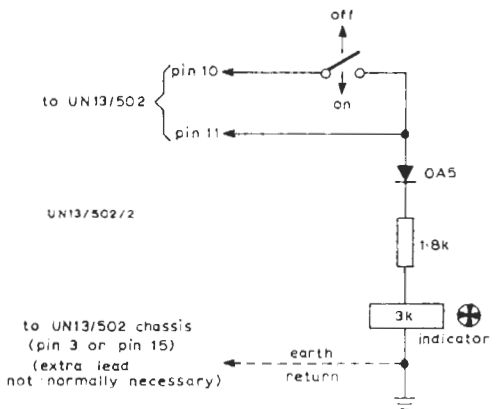
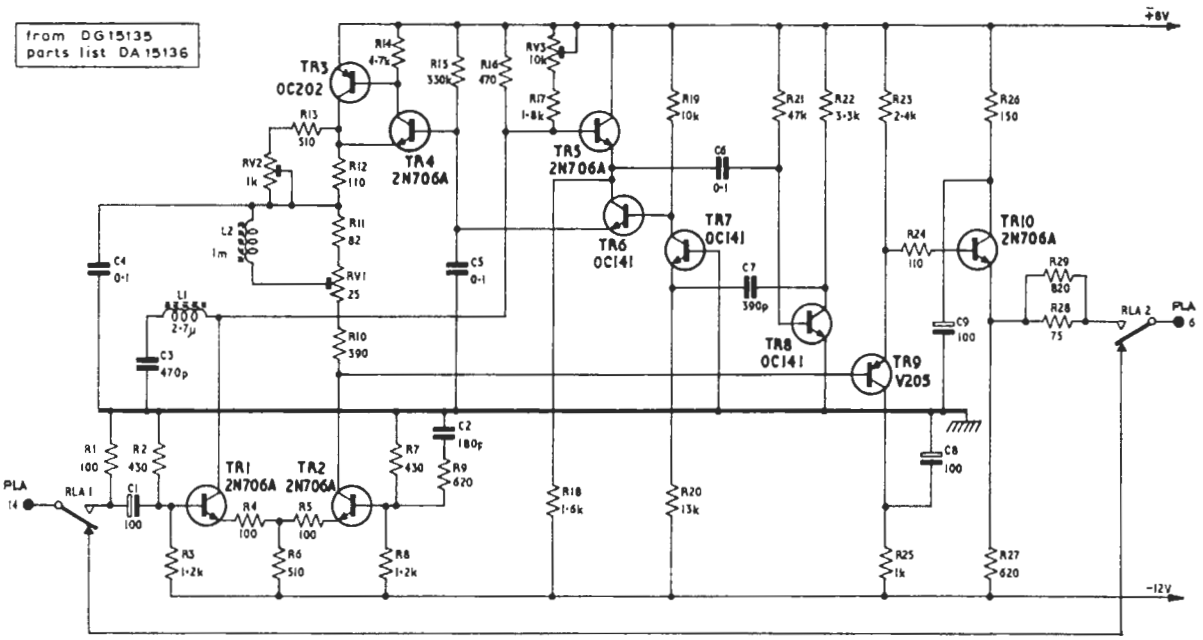


Fig. 3 Circuit of the Remote Indicator



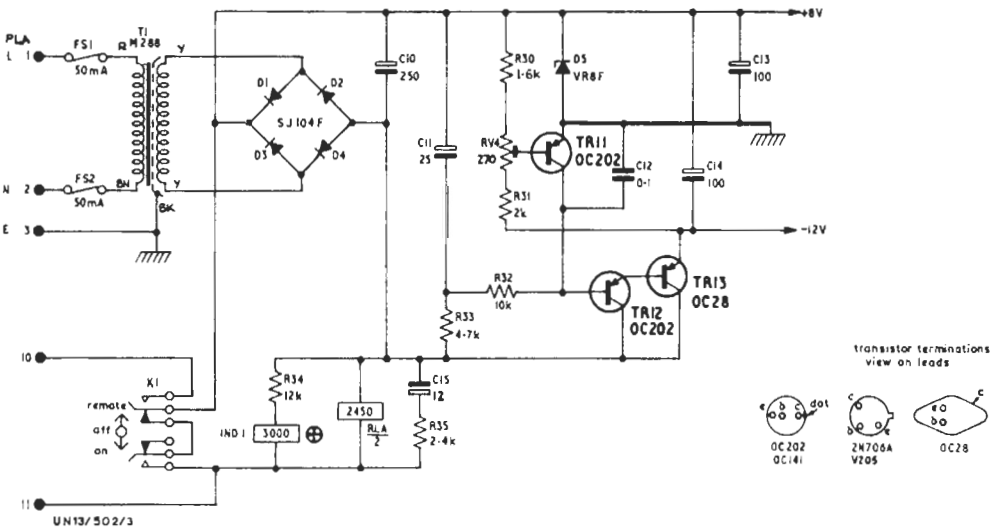


Fig. 2 Circuit of the UN13/502

and so prevents a false indication being given when the unit is powered but RLA is not energised. Any earth return current must not exceed 2 mA.

Alignment Procedure

Response to Bar Waveform

1. Apply a pulse-and-bar signal to the input of the unit and observe the output signal on an oscilloscope terminated in 75 ohms.
2. Adjust RV1 so that the first 5 μs of the bar waveform is as near as possible identical in shape to the input waveform. (Use the *On/Off* switch to compare the input and output waveforms.)
3. Adjust RV2 so that the full bar is, as near as possible, identical in shape to the input waveform.

Error Signal Balance

1. Apply a video test signal which can be switched to cover a large range of average picture levels (e.g. the output of a GE4/506 Sawtooth and Lift Generator) to the input of the unit.
2. Observe the output of the unit on an oscilloscope set to measure d.c.
3. Adjust RV3 until no change is observed in the blanking level of the output signal when the average picture level of the input signal is varied.

Output D.C.

1. Apply a video signal to the input of the unit and observe the output signal on an oscilloscope set to measure d.c.
2. Adjust RV4 to set the blanking level of the output signal to zero volts.

References to Typical Associated Equipment

1. Waveform Monitor Auxiliary Panel, PA1M/529.

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