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Television Receiver Field-Strength Indicator

A received level indicator is for the amateur television operator very advantageous. I have designed a field-strength indicator in the form of a moving column of light along the top of the TV screen. This is more suitable as there is no room to mount a moving coil instrument (portable TV) and in any case the TV housing should not be drilled into.

1. FUNCTIONAL DESCRIPTION

A_s may be seen from the circuit diagram of **fig. 1**, there is nothing very difficult about the practical realization of this circuit. The transistor T1 to-

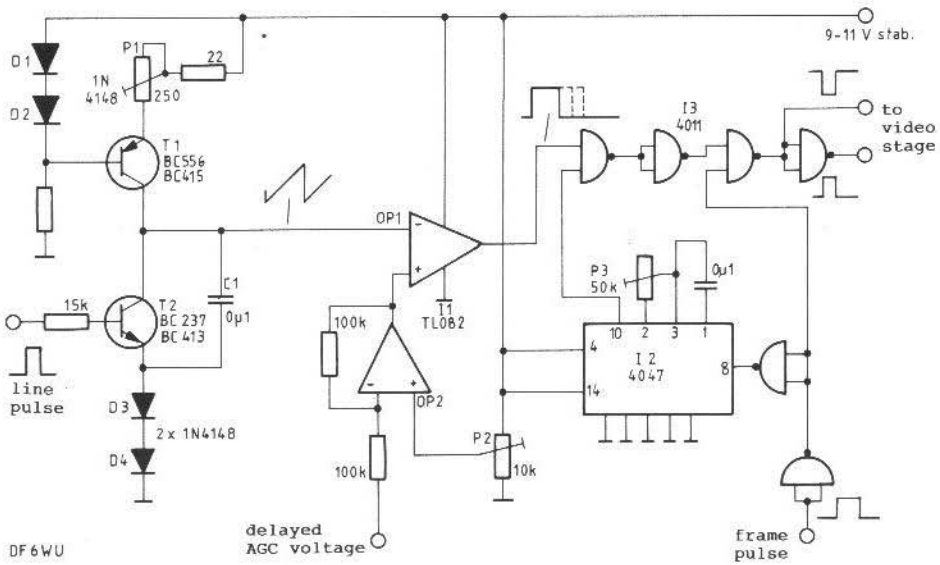

Fig. 1: TV receiver field-strength indicater

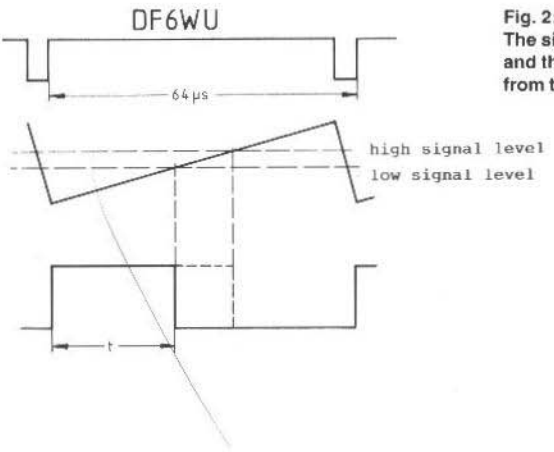

Fig. 2:
The signal control voltage, saw-tooth wave and the variable duration pulse derived from them

gether with potentiometer P1 form a constant current source which charges capacitor C1. The charging time is controlled by P1 and lies in the region of 60 μs. The capacitor C1 is being discharged by transistor T2 during the period of every line impulse. This produces a saw-tooth wave which is synchronized to line frequency and the amplitude of which is dependent upon the charging current – the latter being controlled by P1.

The diodes D3 and D4 prevent the saw-tooth wave from reaching zero volts because otherwise the following operational amplifier OP 1 will receive a voltage overload at its input terminals.

The AGC voltage of a television tuner is, in general, 6 to 9 V in the absence of signal and reduces with increasing signal-strength. For our purposes, this behaviour must be reversed and that is accomplished by OP 2 connected as an adder. The potentiometer P2 at its non-inverted input controls the scaling value of the AGC control voltage.

The inverted AGC voltage is then taken to OP 1 which is used as a comparator. When the AGC voltage at any instant is more positive than the saw-tooth wave, the output of the comparator goes directly to the potential of the postive rail + V_b. The length of time it stays at this potential is dependent upon the AGC voltage which, in turn, is dependent upon the incoming signal-strength. This sequence is repeated for the duration of line time (**fig. 2**) at line frequency.

In order that half of the screen, from top to bottom, does not "white out", the incoming signal must, in some way, be connected with the frame-pulse. For this purpose a C-MOS type 4047 mono stable trigger is used. Its output pulse duration is controlled by P3, this being the control for the width of the moving column of light indicator. This signal is now gated with the column-length signal in the 4011 NAND gate.

The following gating with the frame pulse is intended to prevent TV sets, having automatic brilliance control, and which, in the vertical blanking time, produces a white line for every colour channel, from throwing the colour symmetry out of balance. It also ensures that the moving column starts only at the end of the frame pulse.

2. INSTALLATION AND ADJUSTMENT

The few components employed are loaded quite simply on to a piece of vero-board and connected up. The main problem is the determination of suitable circuit interface points which will accommodate the board without causing any deterioration to the rest of the picture. Unfortunately, no specific instructions can be given here as there are simply too many basically different circuit concepts.

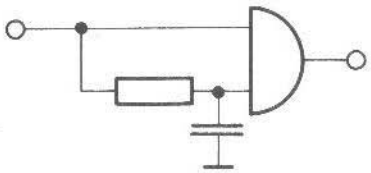

Fig. 3: 5μs delay circuit. R = 10 KΩ, C = 470 pF

In the author's set, the "sandcastle" pulse was used to derive the line pulse. Difficulties can occur if the picture blanking pulse is used since it is not possible to blank brilliance and black at the same time. In this case, it is recommended to delay the line pulse by a further 5 μs using the simple gate delay circuit of **fig. 3**.

The frame pulse can be obtained from the limiter which, as the same time, is used for the synchronization of the vertical deflection. The accompanying spurious pulses are rendered harmless by the second gate. After the module has been completed and successfully connected into the TV circuitry, P1 and P2 are turned to midposition and P3 to maximum. The set is then switched on and a very strong signal is tuned-in. The indicator column of light should be visible. With an oscilloscope, connected to the output of the unit, a pulse should be visible whose width is a function of the field-strength.

The length of the column is now adjusted with P1 such that it nearly reaches the right-hand edge of the screen. The signal is removed and P2 adjusted until the column is now nearly at the left-hand extremity of the screen. These two pot'meters should be iterated until the column moves satisfactory from extreme left to extreme right with no, and full, signal respectively. Finally the column width is set by P3.