

## TELEVISION I.F. AMPLIFIER AND DEMODULATOR

The TDA2540 is an i.f. amplifier and demodulator circuit for colour and black and white television receivers using n-p-n tuners.

It incorporates the following functions:

- gain-controlled wide-band amplifier, providing complete i.f. gain
- synchronous demodulator
- white spot inverter
- video preamplifier with noise protection
- a.f.c. circuit which can be switched on/off by a d.c. level, e.g. during tuning
- a.g.c. circuit with noise gating
- tuner a.g.c. output (n-p-n tuners)
- VCR switch, which switches off the video output; e.g. for insertion of a VCR playback signal

### QUICK REFERENCE DATA

Supply voltage	V <sub>11-13</sub>	typ.	12 V
Supply current	I <sub>11</sub>	typ.	50 mA
I.F. input voltage at f = 38,9 MHz (r.m.s. value)	V <sub>1-16</sub> (rms)	typ.	100 $\mu$ V
Video output voltage (white at 10% of top sync)	V <sub>12(p-p)</sub>	typ.	2,7 V
I.F. voltage gain control range	G <sub>V</sub>	typ.	64 dB
Signal-to-noise ratio at V <sub>i</sub> = 10 mV	S/N	typ.	58 dB
A.F.C. output voltage swing for $\Delta f = 100$ kHz	$\Delta V_{5-13}$	typ.	10 V

### PACKAGE OUTLINES

TDA2540 : 16-lead DIL; plastic (SOT-38).

TDA2540Q: 16-lead QIL; plastic (SOT-58).

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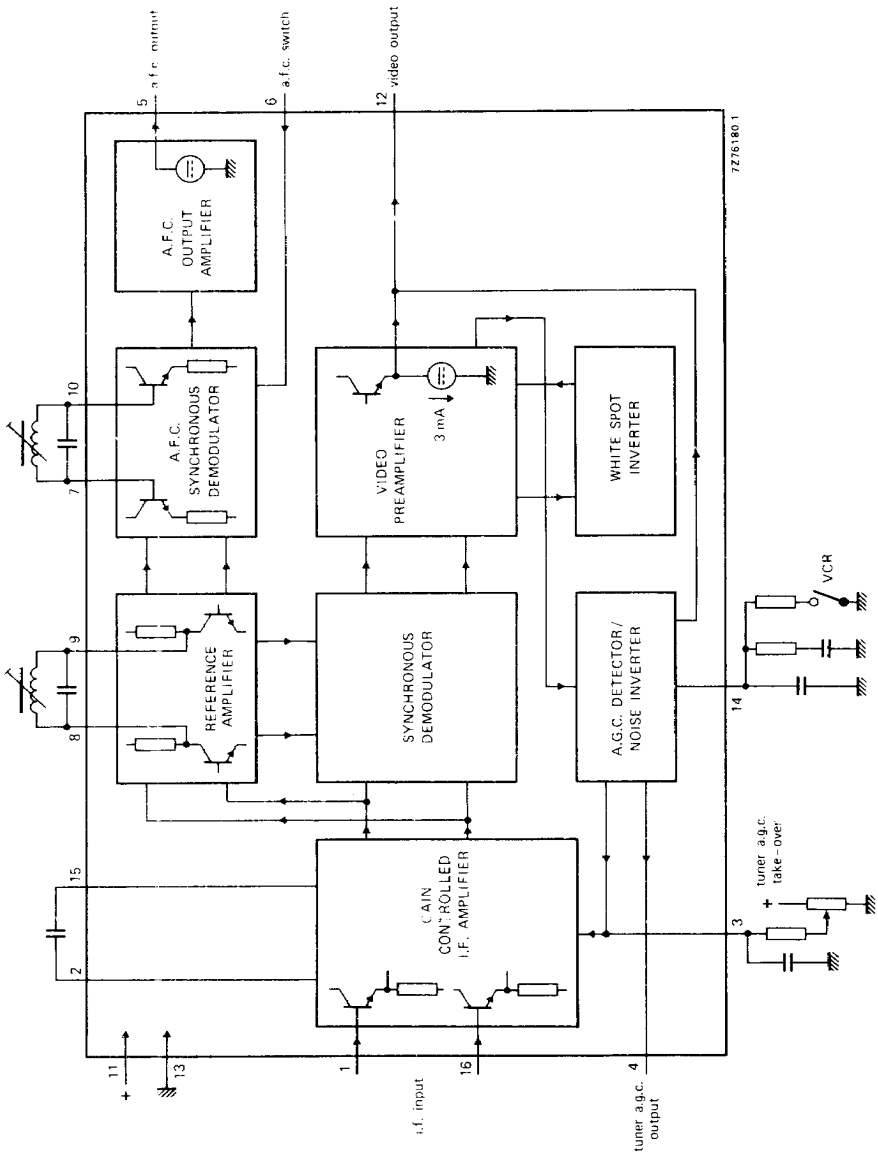


Fig. 1 Block diagram.

**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage	$V_{11-13}$	max.	13,2 V
Tuner a.g.c. voltage	$V_{4-13}$	max.	12 V
Total power dissipation	$P_{tot}$	max.	900 mW
Storage temperature	$T_{stg}$		-55 to + 125 °C
Operating ambient temperature	$T_{amb}$		-25 to + 60 °C

**CHARACTERISTICS** (measured in Fig. 5)

Supply voltage range	$V_{11-13}$	typ.	12 V 10,2 to 13,2 V
The following characteristics are measured at $T_{amb} = 25$ °C; $V_{11-13} = 12$ V; $f = 38,9$ MHz			
I.F. input voltage for onset of a.g.c. (r.m.s. value)	$V_{1-16(rms)}$	typ. <	100 $\mu$ V 150 $\mu$ V
Differential input impedance	$ Z_{1-16} $	typ.	2 k $\Omega$ in parallel with 2 pF
Zero-signal output level	$V_{12-13}$	typ.	$6 \pm 0,3$ V*
Top sync output level	$V_{12-13}$	typ.	3,07 V 2,9 to 3,2 V
I.F. voltage gain control range	$G_v$	typ.	64 dB
Bandwidth of video amplifier (3 dB)	B	typ.	6 MHz
Signal-to-noise ratio at $V_i = 10$ mV	S/N	typ.	58 dB**
Differential gain	dG	typ. <	4 % 10 %
Differential phase	d $\varphi$	typ. <	2° 10°

\* So-called 'projected zero point', e.g. with switched demodulator.

$$** S/N = \frac{V_o \text{ black-to-white}}{V_{n(rms)} \text{ at } B = 5 \text{ MHz}}$$

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CHARACTERISTICS (continued)

Intermodulation at 1,1 MHz: blue\*

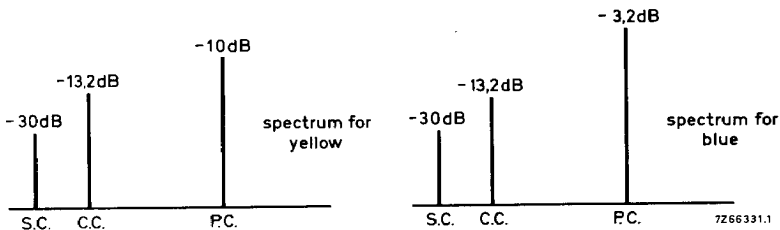
> 46 dB  
typ. 60 dB

yellow\*

> 46 dB  
typ. 50 dB

at 3,3 MHz\*\*

> 46 dB  
typ. 54 dB



S.C.: sound carrier level  
C.C.: chrominance carrier level  
P.C.: picture carrier level } with respect to top sync level

Fig. 2 Input conditions for intermodulation measurements; standard colour bar with 75% contrast.

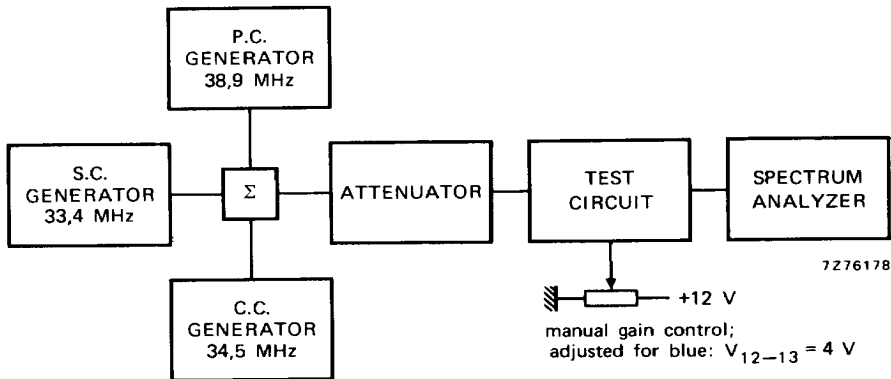


Fig. 3 Test set-up for intermodulation.

\*  $20 \log \frac{V_o \text{ at } 4,4 \text{ MHz}}{V_o \text{ at } 1,1 \text{ MHz}} + 3,6 \text{ dB.}$

\*\*  $20 \log \frac{V_o \text{ at } 4,4 \text{ MHz}}{V_o \text{ at } 3,3 \text{ MHz}}.$

Carrier signal at video output		typ.	4 mV
		<	30 mV
2nd harmonic of carrier at video output		typ.	20 mV
		<	30 mV
White spot inverter threshold level (Fig. 4)		typ.	6,6 V
White spot insertion level (Fig. 4)		typ.	4,7 V
Noise inverter threshold level (Fig. 4)		typ.	1,8 V
Noise insertion level (Fig. 4)		typ.	3,8 V
External video switch (VCR) switches off the output at:	V14-13	<	1,1 V

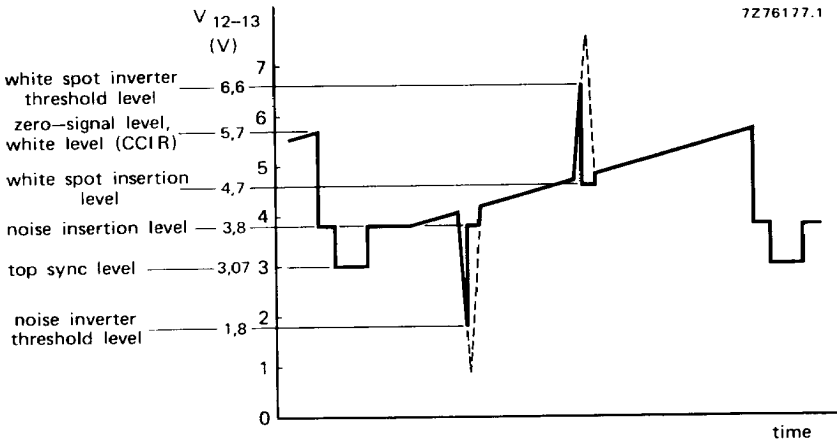


Fig. 4 Video output waveform showing white spot and noise inverter threshold levels.

Tuner a.g.c. output current range	$I_4$	10 to 0 mA
Tuner a.g.c. output voltage at $I_4 = 10$ mA	V4-13	< 0,3 V
Tuner a.g.c. output leakage current $V_{14-13} = 5$ V; $V_{4-13} = 12$ V	$I_4$	< 15 $\mu$ A
Maximum a.f.c. output voltage swing	$\Delta V_{5-13}$	> 10 V typ. 11 V
Detuning for a.f.c. output voltage swing of 10 V	$\Delta f$	typ. 100 kHz < 200 kHz
A.F.C. zero-signal output voltage (minimum gain)	V5-13	typ. 6 V 4 to 8 V
A.F.C. switches on at:	V6-13	> 3,2 V
A.F.C. switches off at:	V6-13	< 1,5 V

APPLICATION INFORMATION

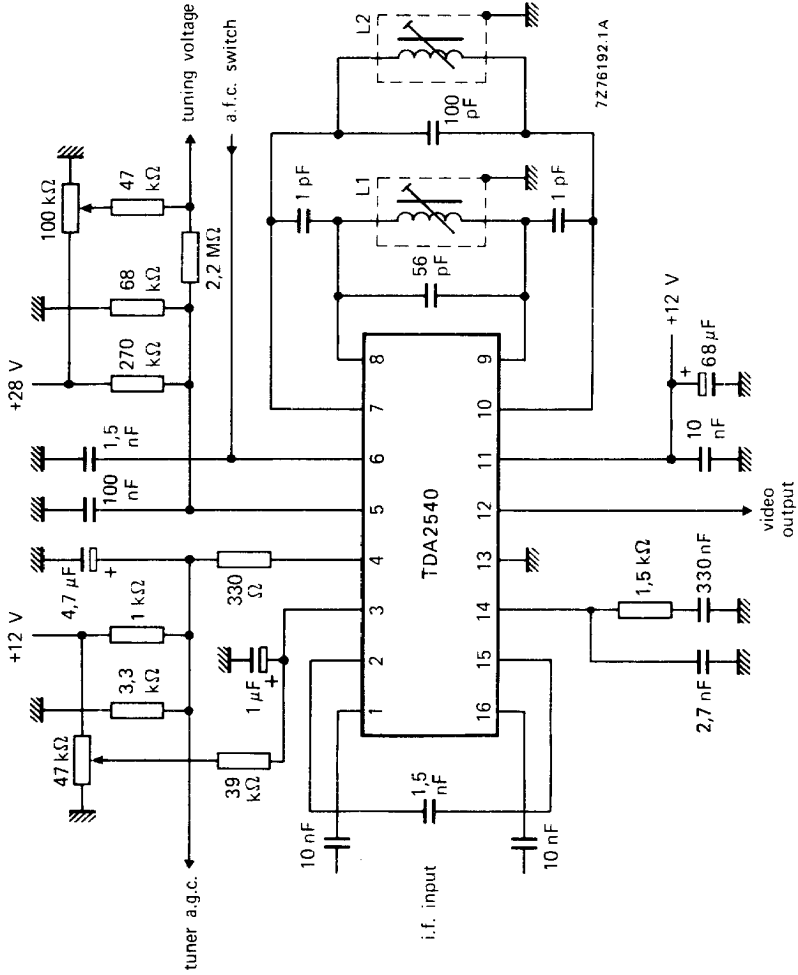


Fig. 5 Typical application circuit diagram; Q of L1 and L2 ≈ 80; f = 38.9 MHz.

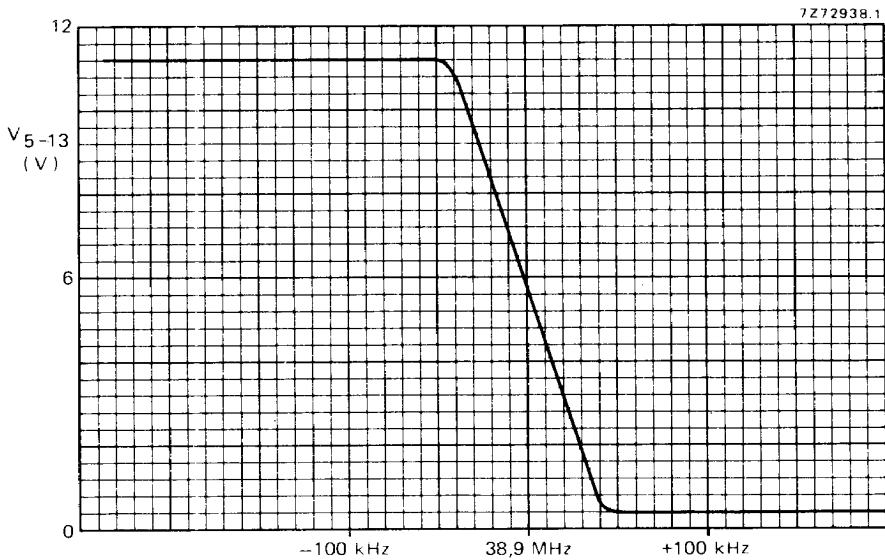
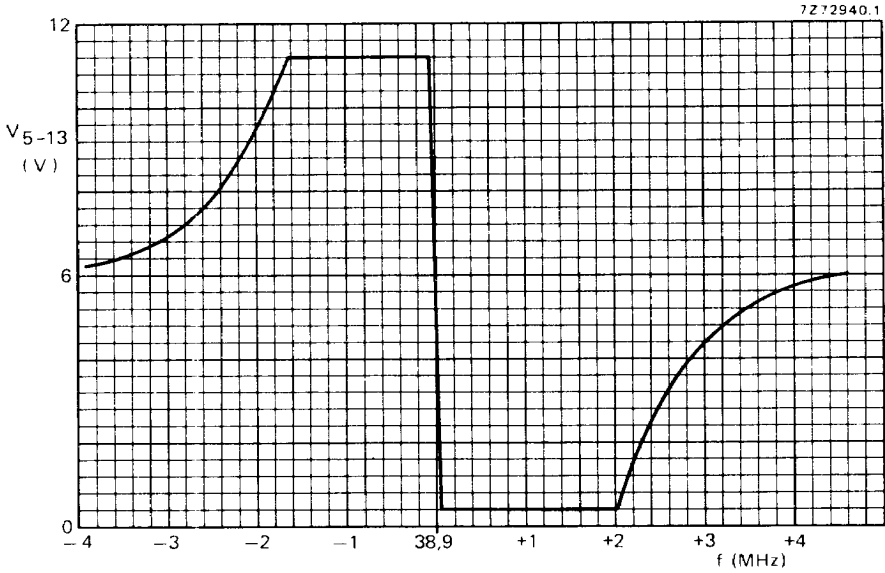


Fig. 6 A.F.C. output voltage ( $V_{5.13}$ ) as a function of the frequency.

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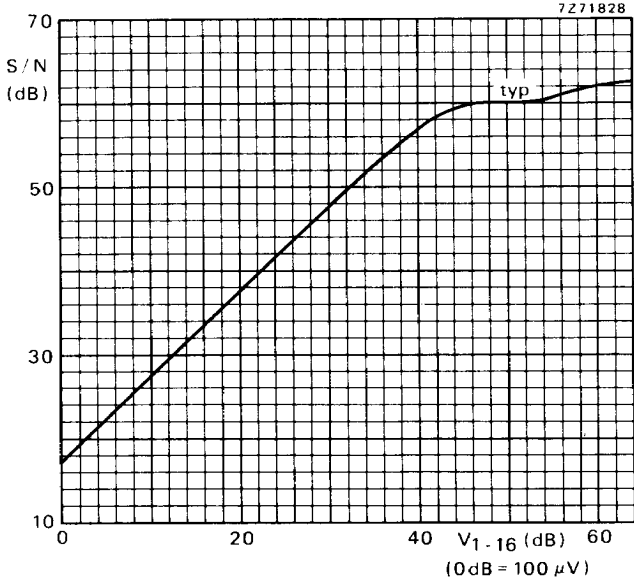


Fig. 7 Signal-to-noise ratio as a function of the input voltage ( $V_{1.16}$ ).