

TELEVISION I.F. AMPLIFIER AND DEMODULATOR

The TDA2541 is an i.f. amplifier and demodulator circuit for colour and black and white television receivers using p-n-p 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 (p-n-p tuners)
- VCR switch, which switches off the video output; e.g. for insertion of a VCR playback signal.

QUICK REFERENCE DATA

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

PACKAGE OUTLINES

TDA2541 : 16-lead DIL; plastic (SOT-38).

TDA2541Q: 16-lead QIL; plastic (SOT-58).

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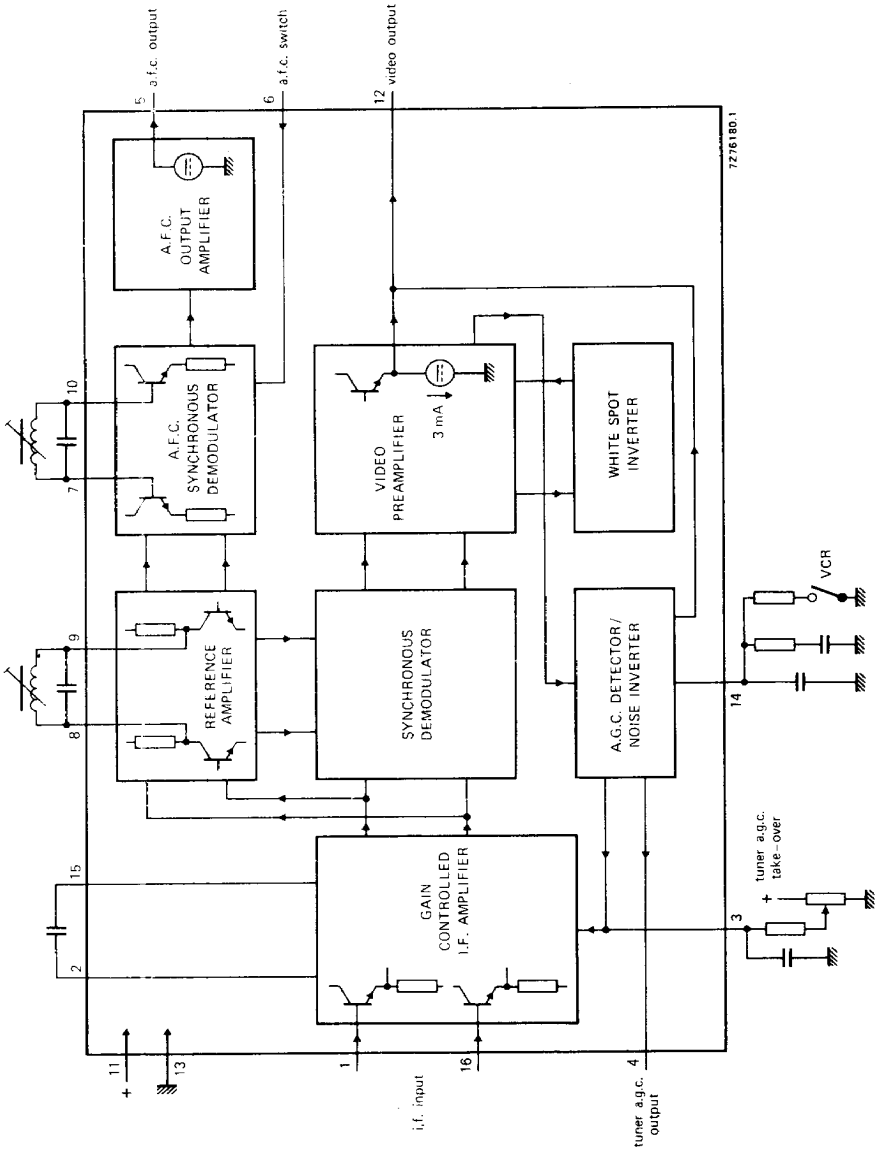


Fig. 1 Block diagram.



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 μ V
		<	150 μ V
Differential input impedance	$ Z_{1-16} $	typ.	2 k Ω 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 ϕ	typ.	2°
		<	10°

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

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

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CHARACTERISTICS (continued)

Intermodulation at 1,1 MHz: blue*

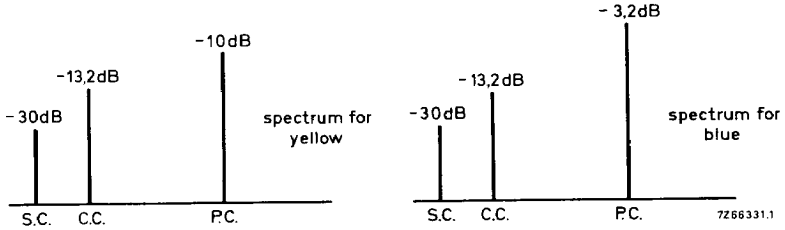
> 46 dB
typ. 60 dB

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.

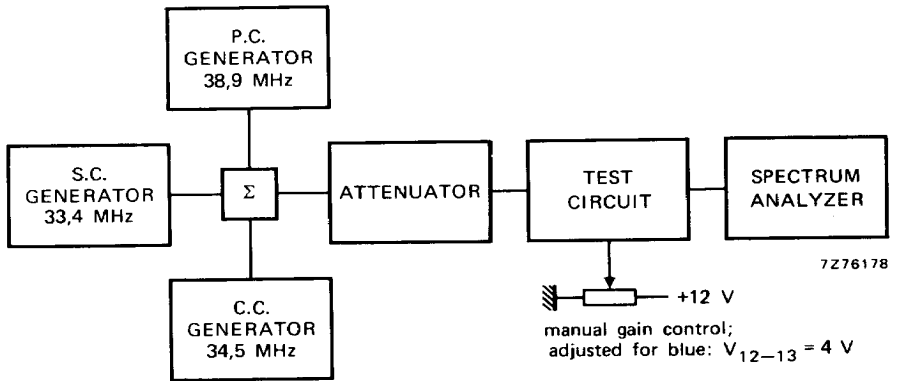


Fig. 3 Test set-up for intermodulation.

* $20 \log \frac{V_0 \text{ at } 4,4 \text{ MHz}}{V_0 \text{ at } 1,1 \text{ MHz}} + 3,6 \text{ dB.}$

** $20 \log \frac{V_0 \text{ at } 4,4 \text{ MHz}}{V_0 \text{ at } 3,3 \text{ MHz}} .$

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

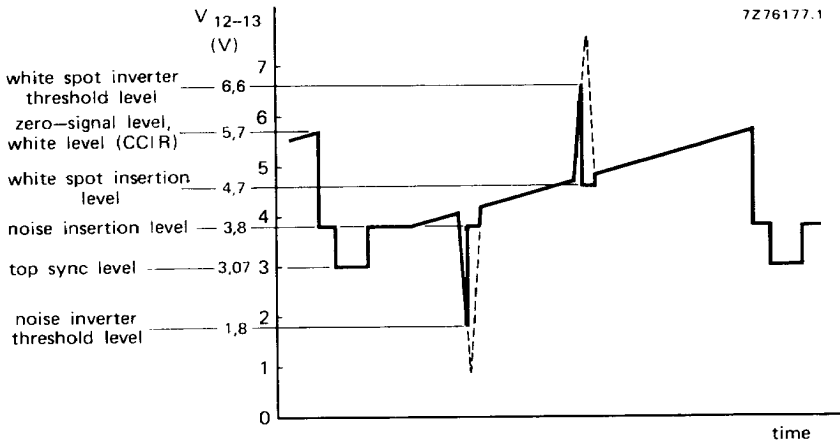


Fig. 4 Video output waveform showing white spot and noise inverter threshold levels.

Tuner a.g.c. output current range	I_4	0 to 10 mA
Tuner a.g.c. output voltage at $I_4 = 10$ mA	V4-13	< 0,3 V
Tuner a.g.c. output leakage current V14-13 = 11 V; V4-13 = 12 V	I_4	< 15 μ A
Maximum a.f.c. output voltage swing	ΔV_{5-13}	> 10 V typ. 11 V
Detuning for a.f.c. output voltage swing of 10 V	Δf	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

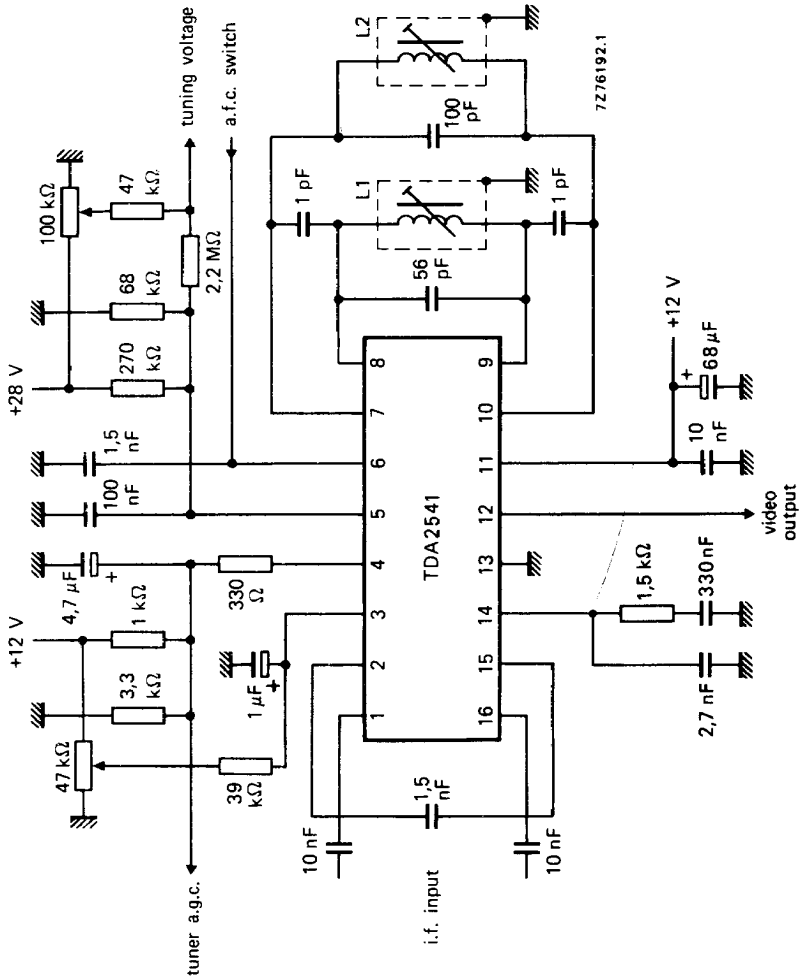


Fig. 5 Typical application circuit diagram; Q of L1 and L2 ≈ 80; f₀ = 38.9 MHz.

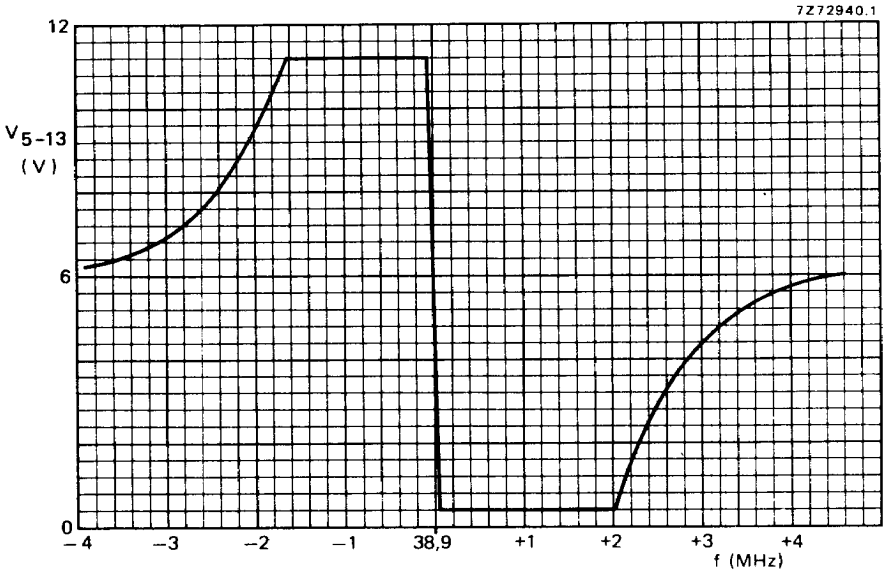


Fig. 6 A.F.C. output voltage ($V_{5,13}$) as a function of the frequency.

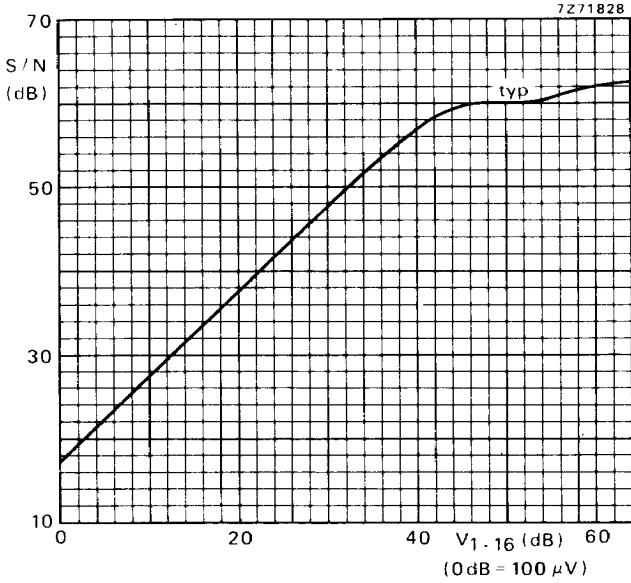


Fig. 7 Signal-to-noise ratio as a function of the input voltage (V_{1-16}).

