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	$V_{11\text{-}13}$	typ.	12 V
Supply current	I_{11}	typ.	50 mA
I.F. input voltage at f = 38,9 MHz (r.m.s. value)	$V_{1\text{-}16(rms)}$	typ.	100 μV
Video output voltage (white at 10% of top sync)	$V_{12(p\text{-}p)}$	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 Δf = 100 kHz	$\Delta V_{5\text{-}13}$	typ.	10 V

PACKAGE OUTLINES

TDA2541 : 16-lead DIL; plastic (SOT-38).
TDA2541Q: 16-lead QIL; plastic (SOT-58).

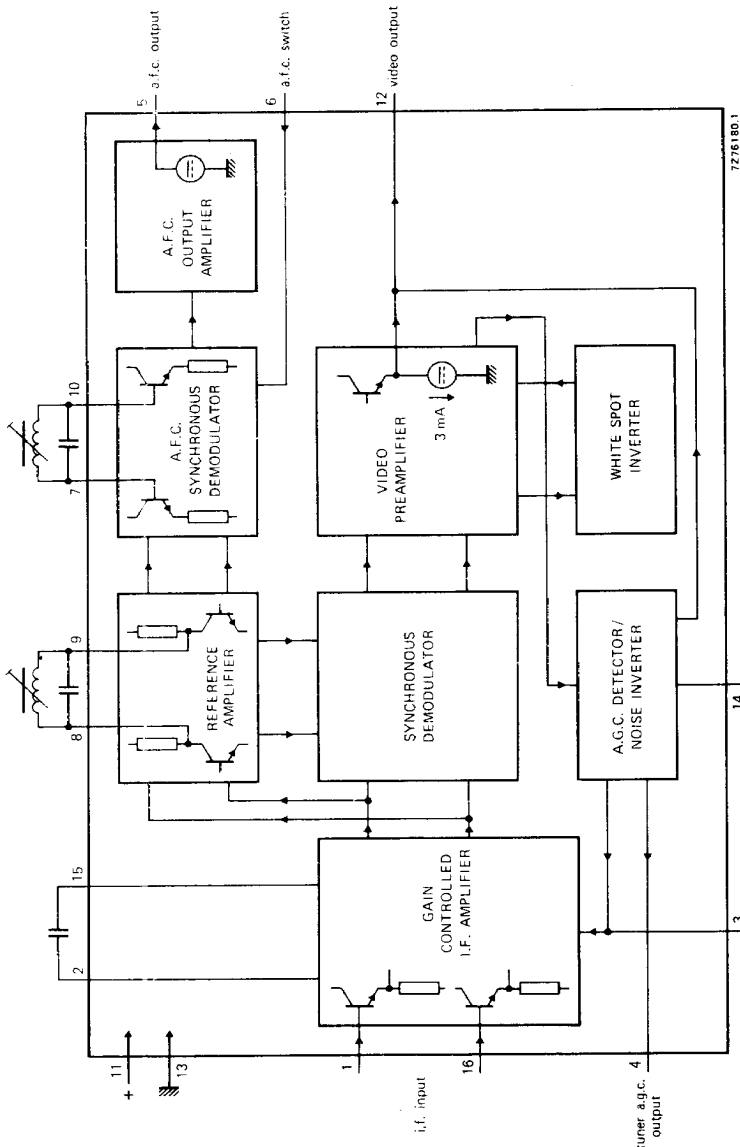


Fig. 1 Block diagram.

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)

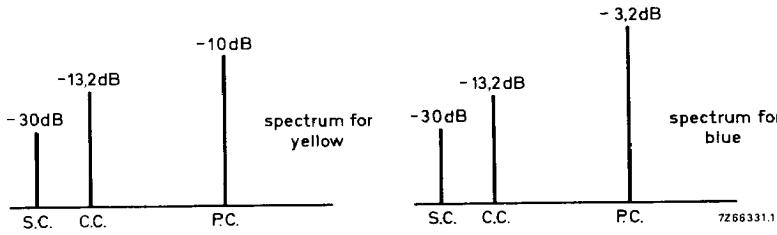
Supply voltage range	V_{11-13}	typ.	12 V 10,2 to 13,2 V
The following characteristics are measured at T_{amb} = 25 °C; V_{11-13} = 12 V; f = 38,9 MHz			
I.F. input voltage for onset of a.g.c. (r.m.s. value)	$V_{1-16(rms)}$	typ. <	100 μV 150 μV
Differential input impedance	$\lvert Z_{1-16} \rvert$	typ.	2 kΩ in parallel with 2 pF
Zero-signal output level	V_{12-13}	typ.	6 ± 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.

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

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.

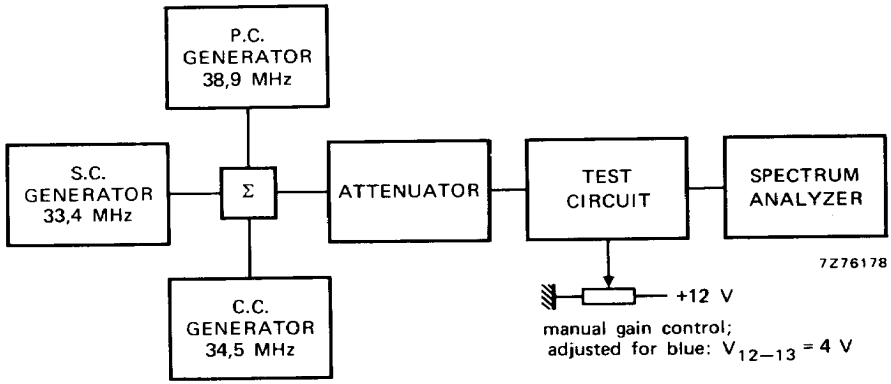


Fig. 3 Test set-up for intermodulation.

* $20 \log \frac{V_o \text{ at } 4{,}4 \text{ MHz}}{V_o \text{ at } 1{,}1 \text{ MHz}} + 3{,}6$ 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:	V_{14-13}	<	1,1 V

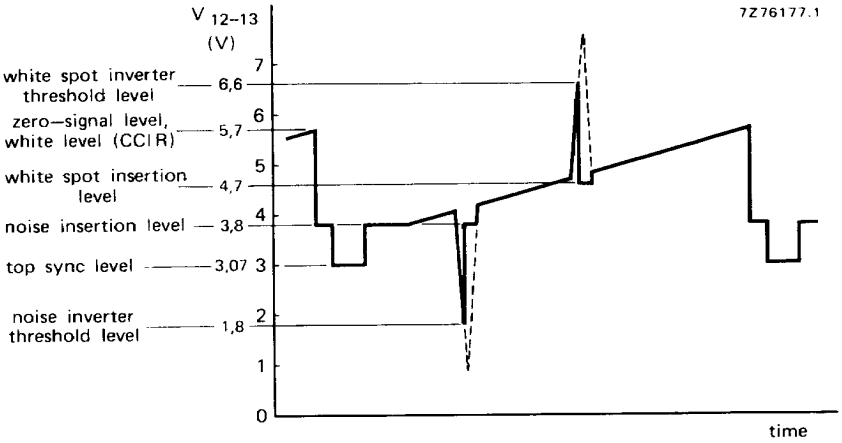


Fig. 4 Video output waveform showing white spot and noise inverter threshold levels.

Tuner a.g.c. output current range	I_4		0 to 10 mA
Tuner a.g.c. output voltage at I_4 = 10 mA	V_{4-13}	<	0,3 V
Tuner a.g.c. output leakage current V_{14-13} = 11 V; V_{4-13} = 12 V	I_4	<	15 μA
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)	V_{5-13}	typ.	6 V
			4 to 8 V
A.F.C. switches on at:	V_{6-13}	>	3,2 V
A.F.C. switches off at:	V_{6-13}	<	1,5 V

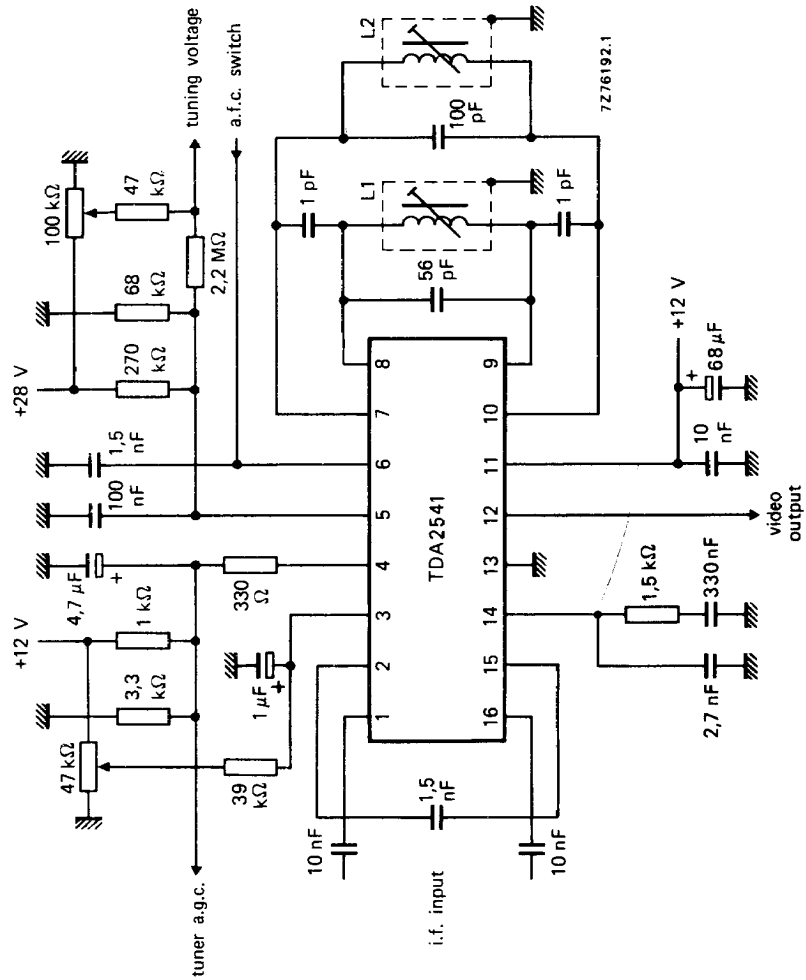


Fig. 5 Typical application circuit diagram; Q of L1 and L2 ≈ 80; f_O = 38,9 MHz.

APPLICATION INFORMATION

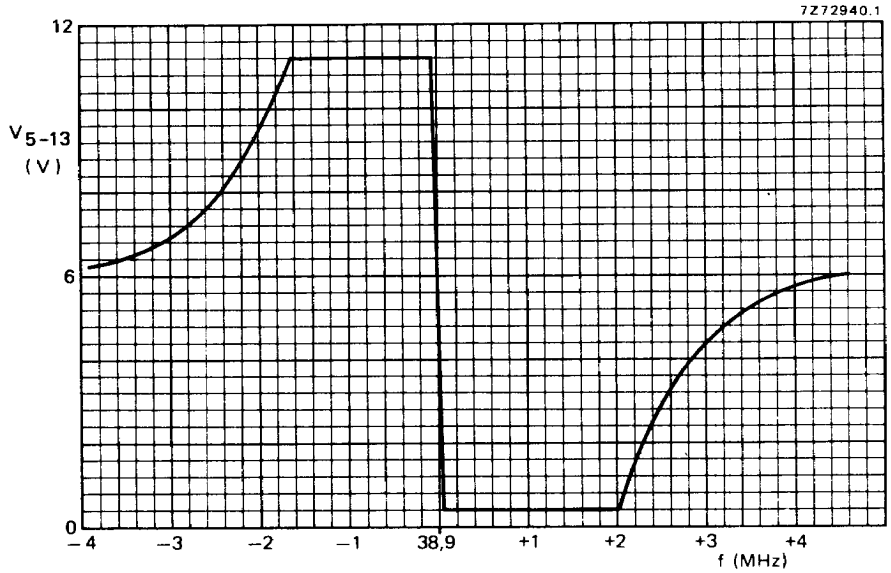


Fig. 6 A.F.C. output voltage (V_{5-13}) as a function of the frequency.

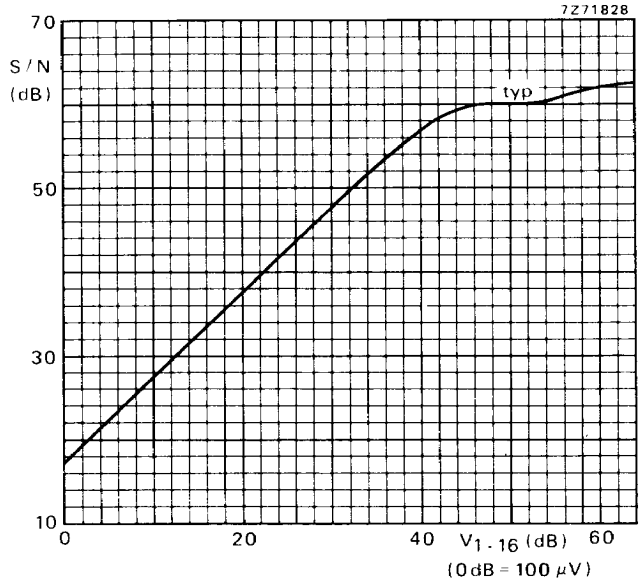


Fig. 7 Signal-to-noise ratio as a function of the input voltage (V_{1-16}).