STEREO/DUAL TV SOUND PROCESSING CIRCUITS

GENERAL DESCRIPTION

The TDA3800 is a stereo/dual TV sound decoder circuit for processing an a.f. and a sound i.f. signal in TV and VCR equipment.

The TDA3800A is applicable for active filters in selective frequency processing.

Features

- 2nd i.f. limiter/amplifier and FM demodulator (5,742 MHz) for the second sound channel
- Level adjustment of the demodulated a.f. signal for channel matching
- Pilot carrier processing with digital identification, hysteresis and short switching times
- De-matrixing of the signals for the two audio channels
- De-emphasis
- Mode selection of stereo/audio or sound I sound II with storage of selected mode
- Two dual channel, independently controllable a.f. outputs
- Low-resistance a.f. outputs (short-circuit protected); can be used for headphone
- Switched output for controlling external audio/video equipment
- Signal path control by an identification bit (also in audio/video mode)
- LED indication of selected mode (also in audio/video mode)
- Possibility to apply a.f. signals from external equipment via the de-emphasis inputs (audio/video mode)

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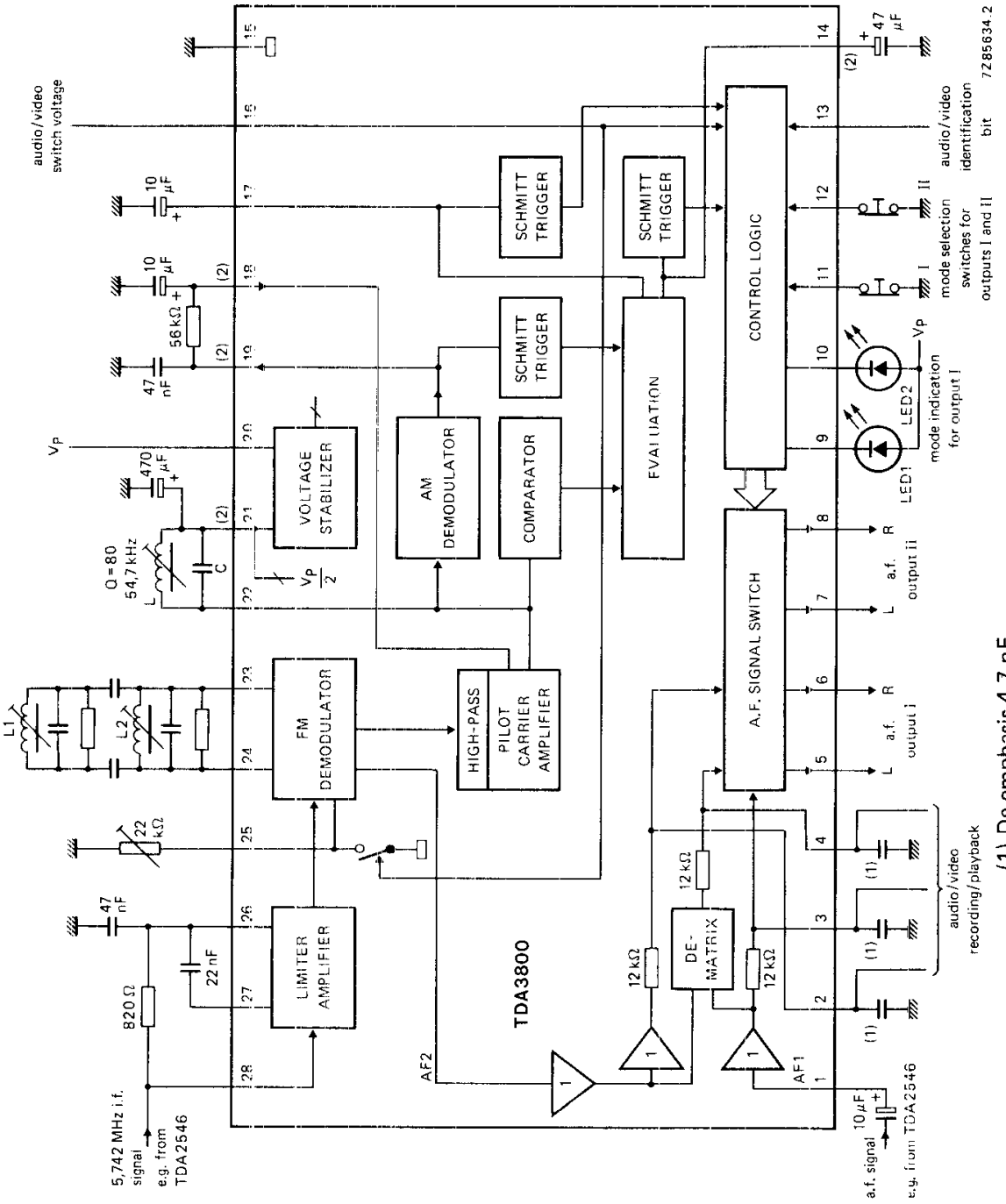
QUICK REFERENCE DATA

Supply voltage (pin 20)	$V_P = V_{20\text{-}15}$	typ.	12 V
Supply current (pin 20)	$I_P = I_{20}$	typ.	53 mA
2nd sound i.f. input voltage for start of limiting (r.m.s. value)	$V_{i(rms)}$	typ.	50 μV
Pilot carrier amplifier control range	ΔG_v	>	20 dB
A.F. input voltage (r.m.s. value)	$V_{i(rms)}$	typ.	1 V
A.F. demodulator output voltage (r.m.s. value)	$V_{o(rms)}$	typ.	1 V
LED output current	I_{LED}	typ.	15 mA
Signal-to-noise ratio of the a.f. signal switches	S/N	typ.	80 dB
Crosstalk in stereo mode	α_S	>	40 dB
Crosstalk in dual sound mode	α_{DS}	>	60 dB

PACKAGE OUTLINES

28-lead DIL; plastic (SOT-117).



(1) De-emphasis 4,7 nF.
(2) TDA3800A application using active filters; see Fig. 2.

Fig. 1 TDA3800 block diagram and test circuit.

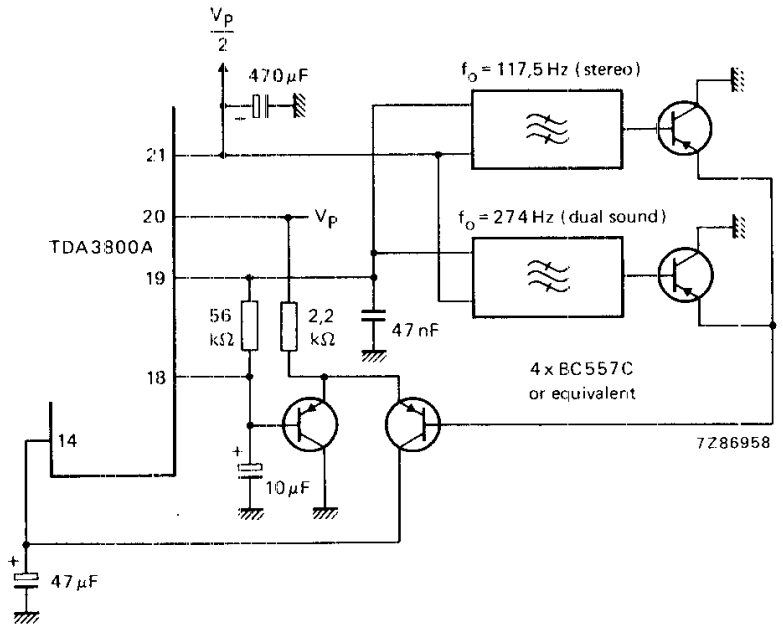


Fig. 2 Application using active filters in selective frequency processing with TDA3800A.

FUNCTIONAL DESCRIPTION

The ICs provide two independent double-audio outputs with mode selection of stereo/mono or sound I/ sound II with storage of the selected mode. Selection of output I is indicated by two LEDs.

The limiting amplifier and FM demodulator detects the 5,742 MHz i.f. for stereo/dual TV processing. The a.f. output of the demodulator is adjusted via pin 25.

A 54,687 kHz pilot carrier amplifier, AM demodulator and Schmitt-trigger identifies the 117,5 Hz stereo signal and the 274,1 Hz dual sound signal. AM modulation of the pilot-signal is eliminated by the comparator which produces a rectangular wave to drive the I^2L frequency divider.

The I^2L frequency divider comprises 8 flip-flops and in combination with an evaluation flip-flop provides a d.c. output for indication of the selected mode. An integrator and Schmitt-trigger with built-in hysteresis eliminates noise and interference on the stereo/dual sound switching signal.

An integrator and modified comparator followed by a Schmitt-trigger with built-in hysteresis eliminates noise and interference on the stereo/dual sound respective mono identification signal. The circuit automatically switches to mono when noise or interference dominates.

The I^2L control logic circuit is driven by the stereo/dual sound switching signal, the identification/ mono signal and the externally applied audio/video switching voltage at pin 16. Also manually switched inputs at pins 11 and 12 provide mode selection for sound output I (pins 5 and 6) and sound output II (pins 7 and 8) respectively. Output control signals operate the audio switches and the LED-driver circuit. Incorporated flip-flops store the selected mode information.

A decoder circuit is fed with the AF2 audio signal from the FM demodulator and the AF1 audio signal externally applied via pin 1. The decoder output provides the stereo or dual sound signal for the audio switches and the de-emphasis at pins 2, 3 and 4 for audio/video recording/playback.

The audio switches provide two independent double stereo/dual sound outputs.

RATINGS

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

Supply voltage (pin 20)	$V_P = V_{20-15}$	max.	14 V
Voltage			
at pin 1	V_{1-15}	max.	V_P
at pins 9 and 10	$V_{9;\,10-15}$	max.	V_P
at pin 16	V_{16-15}	max.	V_P
Current			
at pins 11 and 12	$I_{11;\,12}$	max.	1 mA
at pin 13	I_{13}	max.	1 mA
at pin 21	short-circuit protected		
Total power dissipation	P_{tot}	max.	1,5 W
Storage temperature range	T_{stg}	−25 to +125	°C
Operating ambient temperature range	T_{amb}	−20 to +70	°C

CHARACTERISTICS

V_P = 12 V; T_{amb} = 25 °C; measured in Fig. 1 with a 1 kHz signal. $V_{1-15(rms)}$ = 0,5 V, an i.f. signal $V_{28-15(rms)}$ = 5 mV (VC/2SC = 20 dB, $\Delta f = \pm 50$ kHz, f_m = 400 Hz) and with adjusted de-matrix circuit; i.f. filter selection at input pin 28 as in Fig. 3

Supply voltage range	$V_P = V_{20-15}$	10,8 to	13,2 V
Supply current	$I_P = I_{20}$	typ.	53 mA
FM limiter/amplifier and demodulator			
Start of limiting at:	$V_{28-15(rms)}$	typ.	50 μV
Input resistance	R_{28-15}	typ.	40 kΩ
Input capacitance	C_{28-15}	typ.	4,5 pF
AM suppression	α_{AMS}	typ.	60 dB
Pilot carrier processing			
Input voltage	V_{18-15}	typ.	6,9 V
D.C. voltage (reference via tuning coil)	V_{22-15}	typ.	6,0 V
AM demodulator output voltage	V_{19-15}	typ.	7,0 V
Controlled pilot carrier output voltage (peak-to-peak value)	$V_{22-21(p-p)}$	typ.	200 mV
Output resistance	R_{22-15}	>	50 kΩ
Identification frequency evaluation			
No identification signal (lower threshold)	V_{14-15}	typ.	2 V
Identification signal (upper threshold)	V_{14-15}	typ.	4 V
Stereo transmission	V_{17-15}	<	2 V
Dual sound transmission	V_{17-15}	>	7 V
De-matrixing			
Output voltages	$V_{2;3;4-15}$	typ.	5,3 V
De-emphasis output resistances	$R_{2;3;4-15}$	typ.	12 kΩ
A.F. output signal of 2nd i.f. (r.m.s. value; see Fig. 4)	$V_{2-15(rms)}$	<	1 V
Attenuation of the demodulator output signal AF2 at audio/video mode	α_{AF2}	>	75 dB
AF1 input			
Input voltage	V_{1-15}	typ.	6 V
Input resistance	R_{1-15}	typ.	14 kΩ
Maximum input signal (r.m.s. value)	$V_{1-15(rms)}$	typ.	2 V
A.F. signal switches			
Output voltages	$V_{5;6;7;8-15}$	typ.	5,3 V
Output resistances	$R_{5;6;7;8-15}$	typ.	200 Ω*

* Connection of high-impedance headphones is possible.

DEVELOPMENT SAMPLE DATA

CHARACTERISTICS (continued)

Maximum a.f. output signals (r.m.s. value)				
for $V_{AFI(rms)}$	$V_{5;\,6\text{-}15(rms)}$	typ.	2	V
for $V_{AF\,II(rms)}$	$V_{7;\,8\text{-}15(rms)}$	typ.	2	V
Total distortion during applying a signal:				
$V_{2;\,3;\,4\text{-}15(rms)} = 0{,}5$ V	d_{tot}	typ.	0,1	%
Signal plus noise-to-noise ratio	S + N/N	typ.	80	dB
Crosstalk attenuation				
in stereo mode	α_S	>	40	dB
in dual sound mode (f = 20 Hz to 20 kHz)	α_{DS}	>	60	dB

Audio/video switch

Audio/video switch voltage					
for playback (HIGH)	$V_{16\text{-}15}$	7	to	V_P	V
for recording (LOW)	$V_{16\text{-}15}$	0	to	2,5	V
Audio/video identification bit					
for stereo mode (LOW)	$V_{13\text{-}15}$	0	to	0,2	V
for dual second mode (HIGH) $V_{13\text{-}15} = 0{,}7$ V	I_{13}	typ.		0	mA

Mode selection switches for output I and II (see Fig. 1)

The pushbuttons at pins 11 and 12 are assigned to the a.f. outputs I and II respectively.

Serial commands can be applied to the mode selection switch inputs (pins 11 and 12) for choice of stereo/mono or AF1/AF2. The choice for stereo and dual sound transmission is stored internally.

Switching stereo/mono and sound I and II

Stereo transmission				
switching voltage to pin 12 (pin 11 not affected)				
a.f. outputs I and II mono	$V_{12\text{-}15}$	<	0,8	V
a.f. outputs I and II stereo	$V_{12\text{-}15}$	>	2,4	V
Mono transmission both outputs I and II mono				
Dual sound transmission				
switching voltage to pin 11 (pin 12 not affected)				
a.f. output II sound and output I sound II	$V_{11\text{-}15}$	<	0,8	V
a.f. output I sound I and output II sound II	$V_{11\text{-}15}$	>	2,4	V

When a television transmitter changes its identification from dual sound to stereo and then back to dual sound again, the last selected dual sound signal is available automatically because of the internal storage of the choice. This holds for mono/stereo selection too.

Power-on reset: when applying the supply voltage, the stereo or the AF1 signal appears at both the outputs I and II or depending on the type of transmission.

Switching at LOW level (see Fig. 5)	$V_{11;\,12\text{-}15}$	0	to	0,2	V
Situation at HIGH level (see Fig. 5) $V_{11;\,12\text{-}15} = 0{,}7$ V	$I_{11;\,12}$	typ.		0	mA
Pulse duration	t_p	>		1	μs

Mode indication (pins 9 and 10)

Only the mode for output I is indicated.

Maximum output current	$I_{9;10}$	typ.	15 mA

Indication possibilities

LED 1	LED 2	selected reception mode
OFF	OFF	mono at mono or stereo transmission
ON	ON	stereo at stereo transmission
ON	OFF	AF1 signal at dual sound transmission
OFF	ON	AF2 signal at dual sound transmission

Voltage stabilizer (pin 21)

Output voltage	V_{21-15}	typ.	6 V
Maximum d.c. output current short-circuit protected	$\pm I_{21}$	typ.	0,5 mA

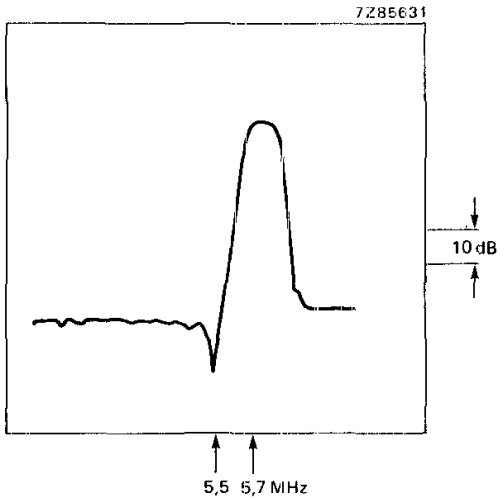


Fig. 3 IF2 filter selection.

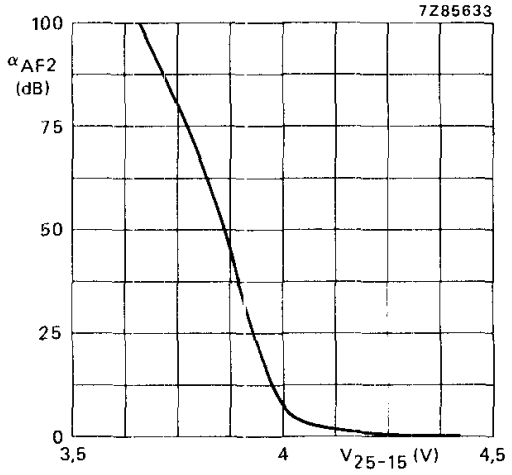


Fig. 4 Level adjustment in the demodulator part for matching of the AF2 signal to the AF1 signal; attenuation α_{AF2} as a function of V_{25-15}.

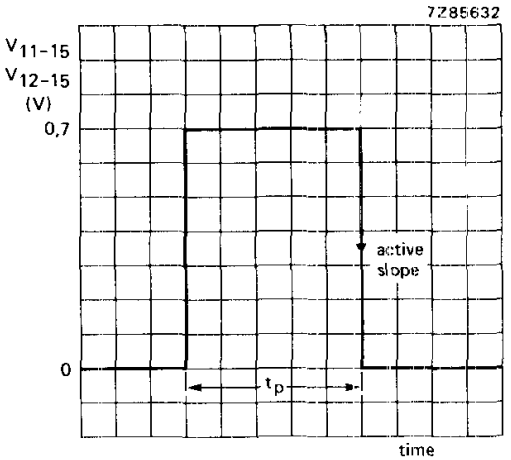
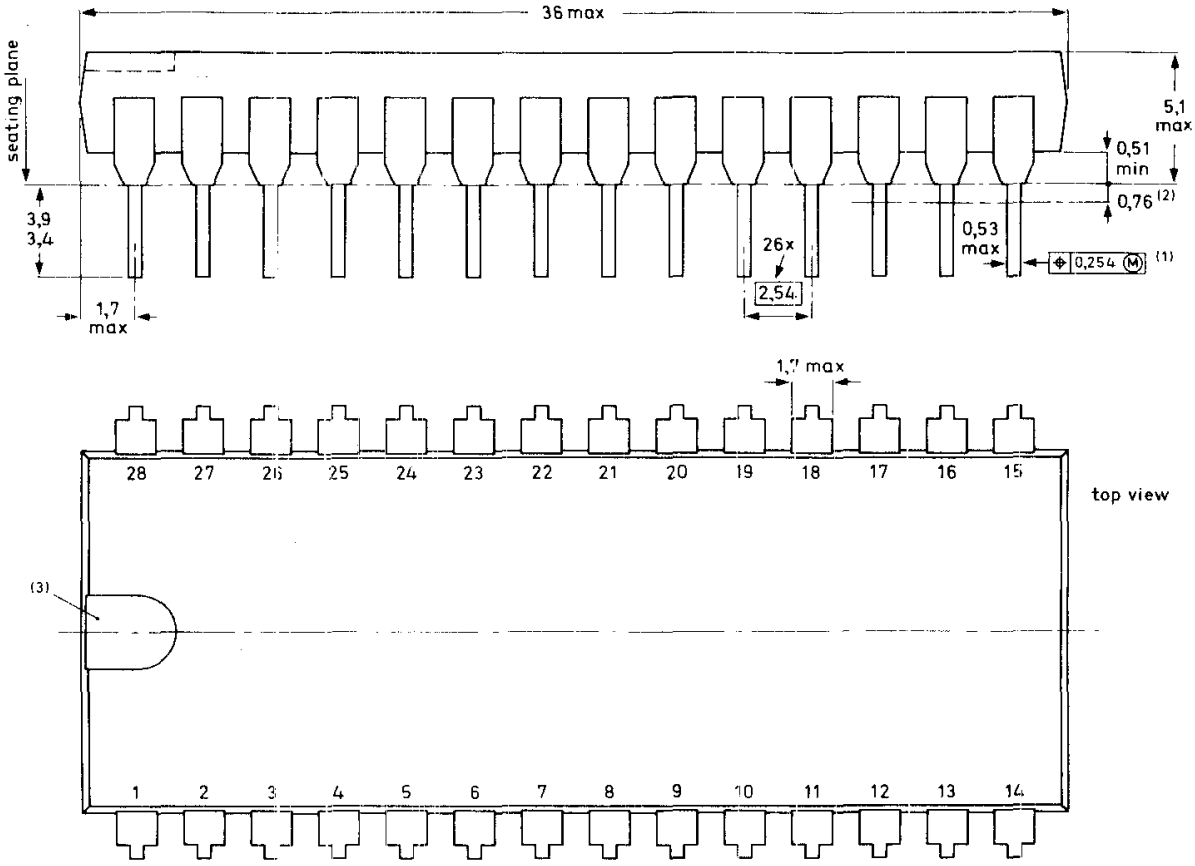
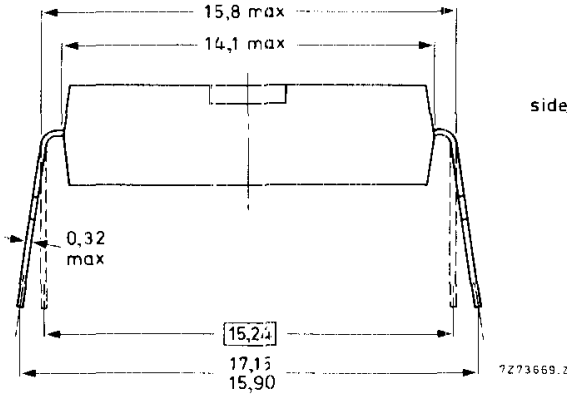


Fig. 5 Mode selection switching levels.

28-LEAD DUAL IN-LINE; PLASTIC (SOT-117)





⊕ Positional accuracy.

Ⓜ Maximum Material Condition.

(1) Centre-lines of all leads are within ±0,127 mm of the nominal position shown; in the worst case, the spacing between any two leads may deviate from nominal by ±0,254 mm.

(2) Lead spacing tolerances apply from seating plane to the line indicated.

(3) Index may be horizontal as shown, or vertical.

Dimensions in mm

SOLDERING

See next page.

SOLDERING

1. By hand

Apply the soldering iron below the seating plane (or not more than 2 mm above it).
If its temperature is below 300 °C it must not be in contact for more than 10 seconds; if between 300 °C and 400 °C, for not more than 5 seconds.

2. By dip or wave

The maximum permissible temperature of the solder is 260 °C; this temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.
The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified storage maximum. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

3. Repairing soldered joints

The same precautions and limits apply as in (1) above.