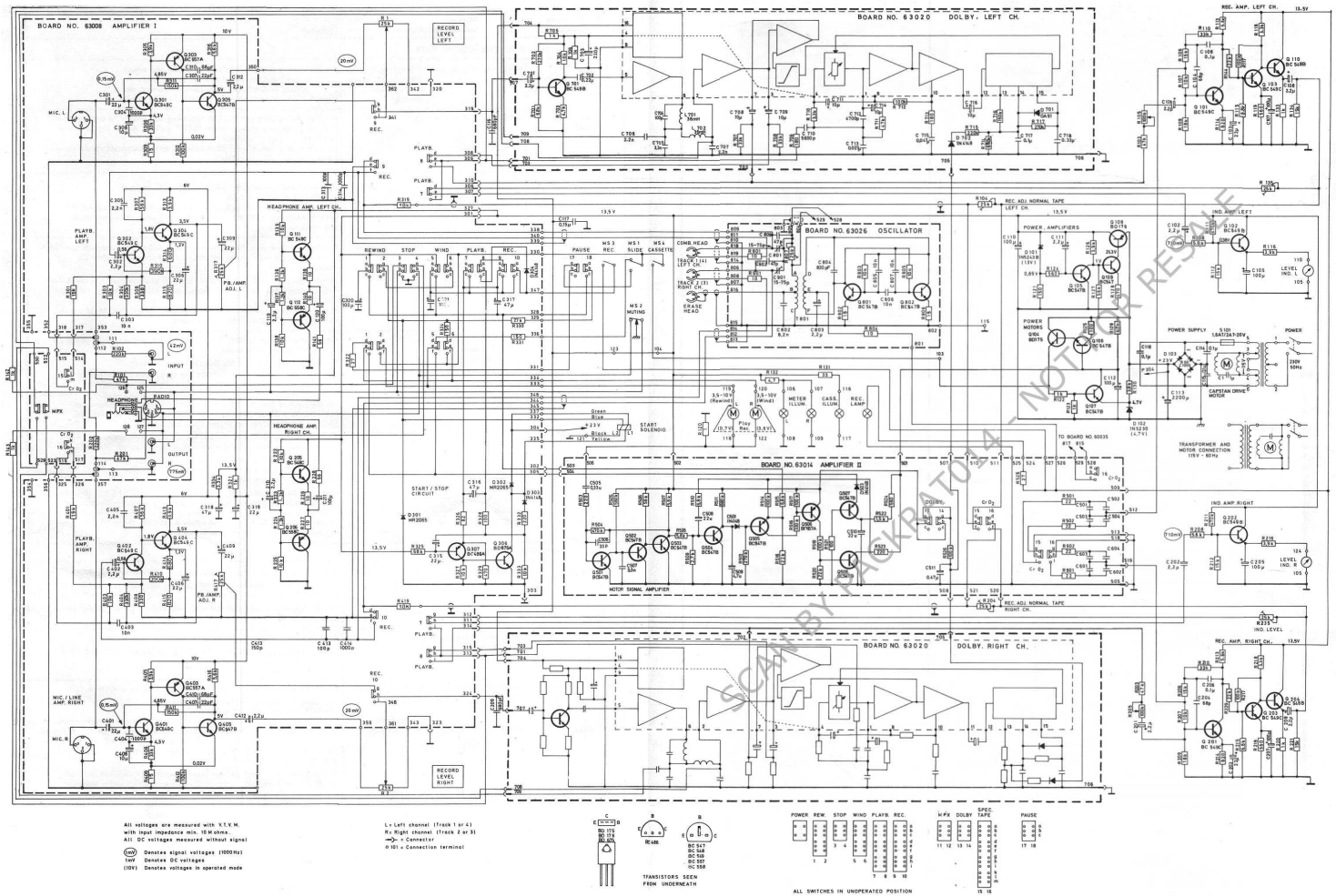
TANDBERG
TCD 310 Mk II
Circuit Diagram



All voltages are measured with V.T.V.M. with input impedance min. 10 M ohms
All DC voltages measured without signal

(1mV) Denotes signal voltages (1000 Hz)
1mV Denotes DC voltages
(10V) Denotes voltages in operated mode

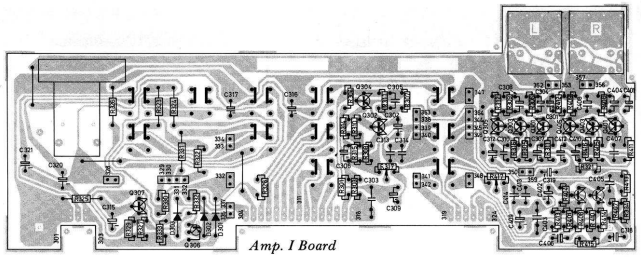
L = Left channel (Track 1 or 4)
R = Right channel (Track 2 or 3)
○ = Connector
○ 101 = Connection terminal

TRANSISTORS SEEN FROM UNDERNEATH

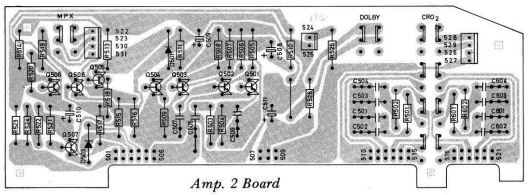
ALL SWITCHES IN UNOPERATED POSITION

FROM SERIAL NO. 4400326

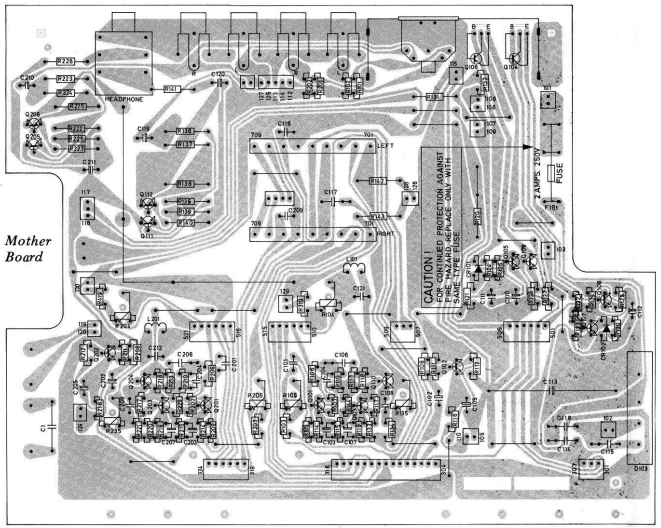
1458 - 11 - 76 Part No. 714025
Printed in Norway by Petlitz



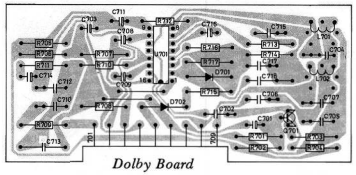
Amp. 1 Board



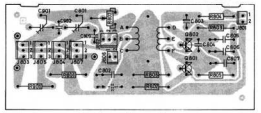
Amp. 2 Board



Mother Board

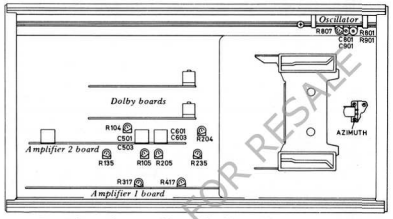


Dolby Board



Osc. Board

ELECTRICAL CHECKS AND ADJUSTMENTS FOR TCD 310 Mk II



Location of test points and adjustable components

GENERAL

– "0 dB" level is defined as 775 mV. Thus – 5 dB equals 450 mV and – 35 dB equals 14 mV.

– Make the adjustments in the order in which they are listes here. Many of the adjustments require that previous adjustments have already been correctly made. It is especially important that adjustment for SPECIAL tape be made before adjustment for NORMAL tape.

– Clean and degauss the tape path before and after the adjustments. It is assumed that the tape path has already been correctly adjusted as described in the Service Manual for the TCD 310.

NECESSARY EQUIPMENT

– 2 high impedance voltmeters (do NOT use universal meters).
– Frequency counter.
– Audio generator.
– Distortion meter.
– Wow meter (required for wow test only).
– Hum/noise meter (required for signal/noise test).
– Tandberg test tapes No. 21 (1,000 Hz speed test), No. 22 (3,150 Hz wow test), No. 23 (6,300 Hz azimuth test) and No. 24 (1,000 Hz playback level).
– TDK C60 SA or equivalent.
– Maxell C60 UD or equivalent.

No.	Adjustment or check	Tape	Set the cassette deck to	Measuring instrument	Measure at	Correct reading	Adjust	Comments
1	Record/playback head azimuth	No. 23	Playback	Voltmeters	OUTPUT sockets	Maximum output signal. Difference between the tracks: < 4 dB	Azimuth screw on head	Adjust to best compromise
2	Playback level	No. 24	Playback	Voltmeters	OUTPUT sockets	775 mV	R317 (left channel) R417 (right channel)	–
3	Tape speed	No. 21	Playback	Frequency counter	OUTPUT socket	± 1% (990 – 1010)	–	–
4	Wow	No. 22	Playback	Wow meter (according to DIN 45507	OUTPUT socket	≦ 0.2% (DIN 45511 peak weighted)	–	Measure at end of tape. Measure both in vertical and horizontal position.
5	Oscillator frequency	SPECIAL	SPECIAL Recording	Frequency counter	Connect inductively to erase head (see comments)	80 – 100 kHz	–	Connection is made with a coil or a few turns of ordinary wire. Instead of a frequency counter a long-wave receiver (tuned to 3rd. harmonic) can be used.
6	Oscillator erase volatge	SPECIAL	SPECIAL Recording	Voltmeter	Across erase head	28 – 32 V	–	–
7	Oscillator	SPECIAL	SPECIAL	Voltmeters	OUTPUT	≦ 2 mV	–	INPUT sockets open.

No.	Adjustment or check	Tape	Measuring instrument	Measure at	Procedure
2	**ADJUSTMENT FOR SPECIAL TAPE**				
2.1	Bias (preadjustment)	SPECIAL	Voltmeters	R801 (left channel) R901 (right channel) see "location" drawing	Set the cassette deck to SPECIAL recording and adjust C801 (left ch.) and C901 (right ch.) to readings of approximately 6–8 mV. (Measure between ground and the side of the resistor which is connected to the head).
2.2	Recording level	SPECIAL	Voltmeters	OUTPUT sockets	Set the cassette deck to SPECIAL recording. R1 and R2 to mid-position. Connect an audio generator to the INPUT sockets. Adjust the generator to 400 Hz, – 5 dB (= 450 mV on the voltmeters). [– 5 dB is used instead of 0 dB in order to avoid inaccurate results caused by varying tape characteristics.]
					Rewind and play back. The voltmeters should now read – 5 dB (= 450 mV) ± 0.5 dB. If outside the tolerance, make a new recording while adjusting R105 (left channel) and R205 (right channel) as required. Then play back and check once more.
2.3	Overall frequency response (adjustment)	SPECIAL	Voltmeters	OUTPUT sockets	Set the cassette deck to SPECIAL recording. Adjust the generator to – 35 dB (= 14 mV on the voltmeters) and record a 400 Hz and a 10,000 Hz signal at this level. Rewind and play back. Use the 400 Hz signal as a reference and check on both channels that the 10,000 Hz signal is within the following tolerance: – 0 dB to + 5 dB. If outside the tolerance adjust C801 and C901 (bias). Then make a new recording, play back and check once more.
2.4	Distortion	SPECIAL	Distortion meter	OUTPUT sockets	Set the cassette deck to SPECIAL recording. Generator to 1000 Hz, 0 dB (= 775 mV on the voltmeters). Rewind and play back. Check that the distortion is ≦ 3%. If outside the tolerance adjust C801 and C901 (bias). Make a new recording, play back and check once more. Then repeat step 2.3
2.5	Overall frequency response (check with DOLBY)	SPECIAL	Voltmeters	OUTPUT sockets	Set the cassette deck to SPECIAL DOLBY (!) recording. Adjust the generator to – 35 dB and record the following frequencies: 400 Hz, 55 Hz, 1000 Hz, 4000 Hz, 10,000 Hz, 14,000 Hz. Rewind and play back. Use the 400 Hz signal as a referance, and check that the other signals are within the following tolerances: 55 Hz: – 3 dB to + 2 dB; 10,000 Hz: 0 dB to + 5 dB; 1000 Hz: – 2 dB to + 2 dB; 14,000 Hz: – 2 dB to + 5 dB; 4000 Hz: – 2 dB to + 4 dB. If outside the tolerances try changing the values of C501/C502 (left ch) and C601/C602 (right ch). Increased values give higher treble response.
2.6	Indicators	SPECIAL	Indicators		Record a 400 Hz, 0 dB signal and adjust R135 (left ch) and R235 (right ch) to 0 dB deflection on both indicators.
3	**ADJUSTMENT FOR NORMAL TAPE**				
3.1	Recording level	NORMAL	Voltmeters	OUTPUT sockets	Same as in step 2.2, except that the SPECIAL button is released. If outside the tolerance adjust R104 (left ch) and R204 (right ch). DO NOT TOUCH R105 OR R205. NOTE! Adjustment of R104 and R204 will not affect the readings on the indicators of the cassette deck.
3.2	Overall frequency response (adjustment)	NORMAL	Voltmeters	OUTPUT sockets	Same as in step 2.3, except that the SPECIAL button is released. If outside the tolerance adjust R807. DO NOT TOUCH C801 OR C901.
3.3	Distortion	NORMAL	Distortion meter	OUTPUT sockets	Same as in step 2.4, except that the SPECIAL button is released. Is outside the tolerance adjust R807. Then repeat 3.2. DO NOT TOUCH C801 OR C901.
3.4	Overall frequency response (check with DOLBY)	NORMAL	Voltmeters	OUTPUT sockets	Same as in step 8.5, except that the SPECIAL button is released. Tolerances: 55 Hz: – 3 dB to + 2 dB; 10,000 Hz: – 2 dB to + 5 dB; 1000 Hz: – 2 dB to + 2 dB; 14,000 Hz: – 3 dB to + 4 dB; 4000 Hz: – 2 dB to + 4 dB. If outside the tolerances try changing the values of C503/504 (left ch) and C603/C604 (right ch). Increased values give higher treble response.
3.5	Erasure	SPECIAL	Voltmeters	OUTPUT sockets	Record a 1000 Hz, 0 dB signal. Rewind and erase. Then rewind once more and play back the erased piece. The voltmeters should read < – 62 dB.
3.6	Signal/noise	SPECIAL and NORMAL	Hum/noise meter (according to DIN 45405)	OUTPUT sockets	The signal/noise ratios at 3% distortion should be at least as good as specified in the table below:

DOLBY N.R.	OFF		ON	
Signal/tape noise:	NORMAL	SPECIAL	NORMAL	SPECIAL
DIN 45511 (Geräuschspannung)	46 dB	49 dB	55 dB	58 dB
DIN 45511 (Fremdspannung)	46 dB	48 dB	50 dB	50 dB