

Parts-List
and
Trouble Shooting
Deviation Bridge
Type 1504

Brüel & Kjær



DENMARK

PARTS-LIST 1504

Component Type	Stock Reference	Circuit-diagram Reference
Power cable, Eur.	AN 0005	
Power cable, USA	AN 0006	
Condensers		
Electrolytic 25/25	CE 2002	C 4
» 100/6	CE 3428	C 5-6
» 16/450	CE 2209	C 1
» 50/500	CE 0901	C 2-3
Polyester 400 V 0.1 μ F	CS 0113	C 15-16, 24
» 0.22 μ F	CS 0117	C 17
» 10 nF	CS 0101	C 12
» 22 nF	CS 0105	C 13-14
Polystyrene 500 V 3 nF \pm 5 %	CT 0124	C 11
Polystyrene 400 V 1 nF	CT 0018	C 21
» 500 V 5 nF \pm 5 %	CT 0126	C 22
» 15 nF \pm 2 %	CT 3527	C 23
» 200 pF	CT 0007	C 25
Trimmer	CV 0015	C 26
Rubber foot	DF 7010	
Moving coil meter	IM 1504	I
Binding post	JK 6269	
Meter lamp socket	JO 0001	
Dial case	KE 1504	
Cabinet	KQ 1504	
Power on-off switch	NN 0563	N
Impedance-Phase angle switch	NT 0005	03
Power voltage selector	OA 0013	04
Range switch	OR 1504	01
RL-C switch	OS 1502	02
Trimmer potentiometer 100 k Ω	PG 4100	P 5
Carbon potentiometer lin. 25 k Ω	PP 3250	P 3
» lin. 500 k Ω	PP 4508	P 2
» log. 500 k Ω	PT 4500	P 1
Wire-wound potentiometer 200 Ω	PU 1200	P 4
Germanium diode (1N34)	QV 0079	Q 1-2
Silicon diode	ZV 0023	Q 3-4

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Component Type	Stock Reference	Circuit-diagram Reference
Resistors		
Carbon film 1/8 W	RK 100 Ω	R 1
» » »	RK 100 k Ω	R 3
Carbon film 1/2 W $\pm 5\%$	RK 100 Ω	R 4
» » »	RK 315 Ω	R 5
» » »	RK 400 Ω	R 6
» » » $\pm 5\%$	RK 800 Ω	R 7
» » »	RK 1 k Ω	R 18
» » »	RK 4 k Ω	R 8
» » » $\pm 5\%$	RK 10 k Ω	R 9
» » »	RK 50 k Ω	R 10
» » »	RK 80 k Ω	R 11
» » »	RK 100 k Ω	R 12
» » »	RK 500 k Ω	R 13, 15
» » »	RK 315 k Ω	R 14
» » »	RK 1 M Ω	R 16
» » »	RK 10 M Ω	R 17
Carbon film 1 W	RK 20 k Ω	R 19
Wire-wound 3 W 10 k Ω	RO 0132	R 21
» 10 W 800 Ω + 1200 Ω	RO 0600	R 22
Precision Resistors		
Carbon film 1/2 W $\pm 3\%$	RK 500 Ω	R 31-32
» » » $\pm 0.5\%$	RK 497.5 Ω	R 33
» » » »	RK 1941 Ω	R 34
» » » »	RK 6642 Ω	R 35
» » » »	RK 90,91 k Ω	R 36
Wire-wound 4 W $\pm 0.2\%$ 2 \times 100 Ω	RM 1531	R 37-38
1 % dial	SA 0101	
5 % dial	SA 0102	
20 % dial	SA 0103	
- 50 % + 100 % dial	SA 0105	
Dial for individual calibration	SA 0104	
Bakelite-knob for push-button switch	SN 0002	
Bakelite-knob	SN 0814	
Power transformer	TN 8622	T 3
Oscillator transformer	TU 1201	T 2
Output transformer	TU 3201	T 1

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Component Type	Stock Reference	Circuit-diagram Reference
Tubes:		
Amplifier pentode 6 AU 6 (EF 94)	VA 0021	V 4, 5, 6
Output pentode 6 AQ 5 (EL 90)	VA 0025	V 1
Stabilizer OA 2	VA 0037	V 3
Fuse 1 A	VF 0008	V 7
Meter lamp	VS 8024	V 8, 9
Cap nut	YM 0001	
Cap nut for grounding	YM 0003	
Insulating washer for binding post	YO 2404	
Insulating washer for binding post	YO 2405	

Please state type and serial number of apparatus, when spare-parts are ordered.

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TROUBLE SHOOTING 1504

Symptom and Condition	Defect	Cure
Apparatus dead, no scale light.	Fuse or main switch defective.	Replacement.
App. dead, scale light intact, stabilizer tube does not light.	No anode voltage, rectifier diodes or electrolyte defective.	Replacement.
Apparatus dead, scale light intact, stabilizer tube lights.	a) Oscillator does not oscillate (normal sec. voltage approx. 8 V). b) Q1 Q2 defective. c) meter, zero potentiometer or R 31—32 defective.	Check tube V 4, transformer T 2, and C 3. Replacement. Check these parts.
Zero adjustment intact app. does not work on »Ref« and »Operation«.	a) Output stage does not work, no a.c. on bridge. Normal voltage max. 7 V. b) Preamplifier does not work.	Check V1, T1, C13, P1, R1, C4, R5. Check V 5—6 and all component belonging hereto.
Zero adjustment and »Ref« functioning, app. does not work on »Operation«.	Selector 01 or 02 defective.	Check or replace.
App. does not work on one of »Ref«s.	Selector 01 or resistors R 33—36 defective.	Replacement with resistors $\pm 0.5\%$.
Pointer sticks on stop.	Pointer or stop dirty.	Clean with ether or benzine (cleaner's naphtha).
Instrument must be tapped to bring pointer to proper position.	Steel particles in magnet, dirt in spring cone bearings.	Cleaning of meter.
Pointer quivers or moves about, App. shows too small deflections.	Amplifier hum-excited.	Ground apparatus. Screen standard and object.
Apparatus reads too low in measurements of small impedances.	Wrong adjustment.	Both standard and object should be connected prior to »Ref« adjustment.
Apparatus reads too low in measurements of high impedances.	a) Wrong adjustment. b) Unsuitable standard or too long wires.	Use the curves. Use standards in small boxes on pin plugs.
App. indicates wrongly at Zero point of scale.	Base resistors unlike.	Check or replace.
App. indicates wrongly at extremes of scale.	V 5 or V 6 saturated.	Check tube, anode, screen, grid and cathode resistors.

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TROUBLE SHOOTING 1504

Symptom and Condition	Defect	Cure
Meter pointer oscillating, wrong indication.	V 3 oscillating plate voltage low. Q 3-4—C 2 worn out, line voltage low	Replace V 3. Replace Q 3-4—C 2, use step-up transformer.
Phase angle readings too low or to high.	Wrong bridge voltage	Adjust P 2 as described in »Re-alignment«.
Phase angle readings too dependent on impedance deviation.	Phase shift in R 11—P 3—C 22 not exactly 90°.	Adjust oscillator frequency and P 3 as described in »Re-alignment«.
Impedance readings too dependent on phase angle deviations.	Phase shift in output stage.	Adjust T 1 as described in »Re-alignment«.

RE - ALIGNMENT

- 1) Set frequency to 1000 c/s \pm 5 c/s by adjusting the air gap of T 2.
- 2) Connect 2 equal (\pm 0,01 %) resistors of 1 k Ω as »standard impedance« and »unknown«. Use the 5 % range. Adjust P 5 to zero deflection. Connect a 1600 pF low-loss condenser across one of them and adjust the air gap of T 1 to zero impedance deflection.
- 3) Switch to phase angle. Replace the condenser with a 100 k Ω resistor and adjust P 3 to zero phase angle deflection.
- 4) Connect an a. c. voltmeter to the top-left and bottom-right binding post to measure the bridge voltage. Adjust P 2 to give same bridge voltage for »impedance« and »phase angle« position of 03.
- 5) Check dial calibrations.

