Equipment Documentation

Measuring Aerial
KAM 1300

Type 155343

We reserve the right to make modifications to the construction and design which serve the technical improvement and further development of our equipment without prior notice.

Order-No. of the Equipment 1553.043-01702 Bu
Documentation Edition 2/1982

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Supplement:

General diagram 1553.043-00001 Up (4)

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I. SPECIFICATION

Photograph of the equipment

82-017

1. Application

In the frequency range 1.6 MHz to 30 MHz, the measuring aerial KAM 1300 is suitable for:-

1. Measuring of the frequency response of the active power delivered by the transmitter across a 50-ohm load.
2. Measuring of the active power delivered by one transmitter to the aerial.
3. Measuring of forward and return powers on coaxial aerial cables.
4. Determination of mismatch factors of aerials in relation to Z = 50 ohm (standing-wave ratio s, reflection coefficient / r^* /).
5. A measuring output -40 dB is available for instrument connection for
   - harmonic measurements up to 100 MHz
   - intermodulation spacing measurements
   - measurement of spurious radiations
   - the connection of signal reconverting devices.

The measuring aerial contains a directly indicating power meter, a 50-ohm absorber/1000 W and a 40-dB divider.

2. Technical data

The guaranteed values for equipment acceptance are to be taken from the Technical Terms of Delivery 1553.043-00001 TLB.

2.1 General technical data

Operating temperature	
- for power meter	0 °C to +40 °C
- for absorber	-25 °C to +55 °C
Admissible air humidity	≦ 80% at +40 °C
Transport temperature	-40 °C to +85 °C
Storage temperature	+5 °C to +35 °C
Degree of protection	IP 20 (protection against solid particles, not protected against water)
Protection class	I (protective conductor terminal)
Mains connection	1-phase/neutral 220 V $^{+10\%}_{-15\%}$
Frequency	47 to 63 Hz
Power input	120 W

2.2 Special technical data

Frequency range of the power meter	1.6 to 30 MHz
Power-handling capacity of the power meter	0 to 1200 W at s = 1
Measuring ranges	$P_{forward}$ 1200 W
	$P_{forward}$ 250 W
	P_{return} 300 W
Characteristic impedance of the power meter	50 ohm
Inherent mismatch of the power meter	s ≦ 1.06 for f ≦ 30 MHz
RF connectors	
Power inputs and outputs (socket)	3/9.7 TGL 200-3801 (C socket)
-40 dB measuring output	2/6.6 TGL 200-3800/02 (BNC socket)
Accuracy of the power display	± 5% relative to calibration point

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Calibration points	1000 W, 200 W, 250 W
Frequency response/forward power	± 1.5%
Frequency response/return power	± 3 %
Data stability of the power indication	0 to 40 °C
Attenuation of the 40-dB divider	40 ± 0.25 dB for f ≦ 30 MHz 40 ± 0.5 dB for f ≦ 80 MHz 40 ± 1.0 dB for f ≦ 120 MHz
Loading factor of absorber max. continuous load	1000 W at T ≦ +55 °C 1200 W at T ≦ +25 °C
Mismatch of the absorber	s ≦ 1.05 for f ≦ 30 MHz s ≦ 1.2 for f ≦ 70 MHz s ≦ 1.5 for f ≦ 150 MHz
Mismatch of the series circuit of power meter and absorber	s ≦ 1.1 for f ≦ 30 MHz s ≦ 1.3 for f ≦ 70 MHz s ≦ 1.5 for f ≦ 150 MHz

All stipulated accuracies are applicable when measuring with harmonics < 1 %.

2.3 Weights and measures

Height	195 mm
Width	540 mm
Depth	375 mm
Weight	16 kg

3. Construction

The unit is provided with a casing from the uniform system of containers (EGS). It contains the power absorber 50 ohm, the RF measuring head with measuring range selector and display instrument, the 40-dB divider as current transformer assembly, four ventilators, the mains connection and the RF connection panel X01 to X04 as well as three connection cables.

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4. Mode of operation

cf. general diagram 1553.043-00001 Up.

4.1 Measuring technique

In the measuring head of the power and mismatch meter, two voltages are gained by vectorial summation and difference formation as well as rectification which are proportional to the root resulting from the forward and return power. These two voltages are applied to the 25-µA instrument via the measuring range selector and the balancing board. Consequently, the forward and return power can be measured successively.

4.2 40-dB divider

The current flowing in the absorber is attenuated by 40 dB by the current transformer (RF transformer) when the measuring output X04 is terminated with Z_o = 50 ohm.

4.3 50-ohm power absorber

Six carbon-film resistors, which are subjected to forced air coding by the four ventilators, form an extensive frequency-independent resistance which absorbs the RF power fed in at X03.

4.4 Overload protection

When the mains voltage is not applied, a relay K01 on the circuit board of the 40-dB divider shorts the power absorber.

5. Scope of delivery

5.1 Standard scope of delivery

1	Measuring aerial KAM 1300	Type 1553.43
1	Connection cable (3/9.7) (length 200 mm)	1553.043-01140
2	RF cables, compl. (3/9.7-7/16) (length 2000 mm)	1553.043-01150
2	RF adapters (socket-socket)	32 TGL 25603
1	Special unit connection lead	XL 1/11-2.5 gr TGL 34542
20	Fuse links	T 400 TGL 41571
1	Equipment documentation	1553.043-01702 Eu
1	Factory acceptance certificate	
1	Guarantee certificate	

5.2 Additional delivery

Against separate order and extra costs, the following items can also be agreed upon in the contract:-

-	Additional copies of the equipment documentation	1553.043-01702 Bu
-	Repair instructions	1553.043-01702 Rn
-	Spare parts, packed	1553.043-01812 E1

II. OPERATING INSTRUCTIONS

1. Connection of the measuring aerial

The unit is connected to the earthed 220-V mains. The ventilators start to run. The transmitter is connected to X01 (≋) and the aerial to X02 (⅄). The aerial can be a wideband aerial, e.g., dipole or similar, or a power absorber 50 ohm/1000 W X03. The transmitter can also be directly connected to X03. The power measurement is only possible between X01 and X02; it can also be carried out without the mains voltage being applied.

2. Power measurement

2.1 Power measurement across 50 ohm

Switch on mains voltage, connect transmitter to X01 (≋); connect X02 (⅄) with X03 (50 ohm/1000 W) by means of the connection cable 1553.043-01140. After having switched on the transmitter, switch over to return power. The display must be lower than approximately 1.5 W. Switch to $P_{forward}$ and read off the forward power delivered.
Applicable is: $P_{forward} = P_{active}$

2.2 Use of the measuring output -40 dB

Switch on transmitter at X03 (50 ohm/1000 W), connect the mains voltage. At X04 (-40 dB) connect the instrument required with 50-ohm input resistance. After having switched on the transmitter the desired parameters can be read off on the connected instrument.

2.3 Power measurement in aerial feeders

Connect transmitter to X01 (≋); mains voltage is not required. Connect aerial cable to X02 (⅄). After having switched on the transmitter the forward and return power can be read off separately.
The active power delivered results in:

$$P_{active} = P_{forward} - P_{return}$$

2.4 Determination of the standing-wave ratio s

The standing-wave ratio s is calculated from the forward and return power according to

$$a = \frac{1 + \sqrt{\frac{P_{return}}{P_{forward}}}}{1 - \sqrt{\frac{P_{return}}{P_{forward}}}}$$

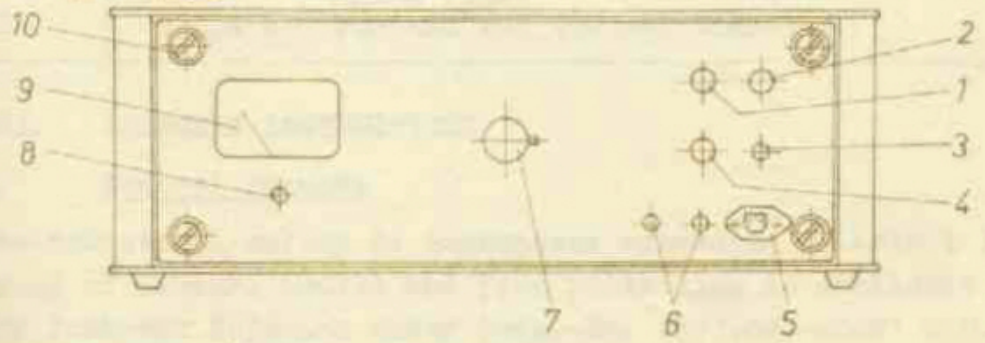
It can also be taken from the nomogram. The quantity of the reflection coefficient results directly from:

$$|r| = \sqrt{\frac{P_{return}}{P_{forward}}}$$

3. Protective measures against danger from mains voltage

The ventilation holes shall not be closed. Before the unit is opened, withdraw the mains plug. Repair work may only be carried out by skilled personnel. No metallic parts are to be inserted into the ventilation holes. The unit is to be operated on an earthed mains with earth contact.

4. Controls and connection facilities for measuring aerial KAM 1300



1 RF input (connection of transmitter)
2 RF output (connection of aerial or built-in absorber)
3 Measuring output of 40-dB divider
4 Input/absorber 50 ohm 1000 W
5 Equipment plug for mains connection
6 Mains fuses
7 Measuring range selector for power measurement
8 0-point correction for the instrument
9 Power display instrument
10 Fastening screws for plug-in

5. Explanation of the symbols

Position	Symbol	Designation
7	P ——→	Forward power 1200 W - 250 W
	P ←——	Return power 300 W
1	≋	RF input
2		RF output (aerial or absorber of KAM 1300 50 ohm/1000 W)
3	-40 dB	Measuring output of 40-dB divider
4	50 ohm/ 1000 W	Input of absorber
6	T 0.4 A	Mains fuses F01 and F02 400 mA, time-lag

III. ASSEMBLY INSTRUCTIONS

1. General remarks

The industrial safety is guaranteed according to ASVO § 3/1. Proof of labour, health and fire protection is available in VEB Funkwerk Köpenick under Drwg.-No. 1553.043-00001 GAB.

2. Application in mobile installations

When the unit is employed in vehicles, an additional shock absorption (foam base) is to be provided in order not to damage the tension band bedded moving-coil instrument.

3. Overheating protection

The rear side of the unit must have a spacing to the wall of ≥ 100 mm in order that the air can escape without obstruction. The air intake openings (base and cover area) shall not be covered.

IV. SERVICING INSTRUCTIONS

1. General remarks

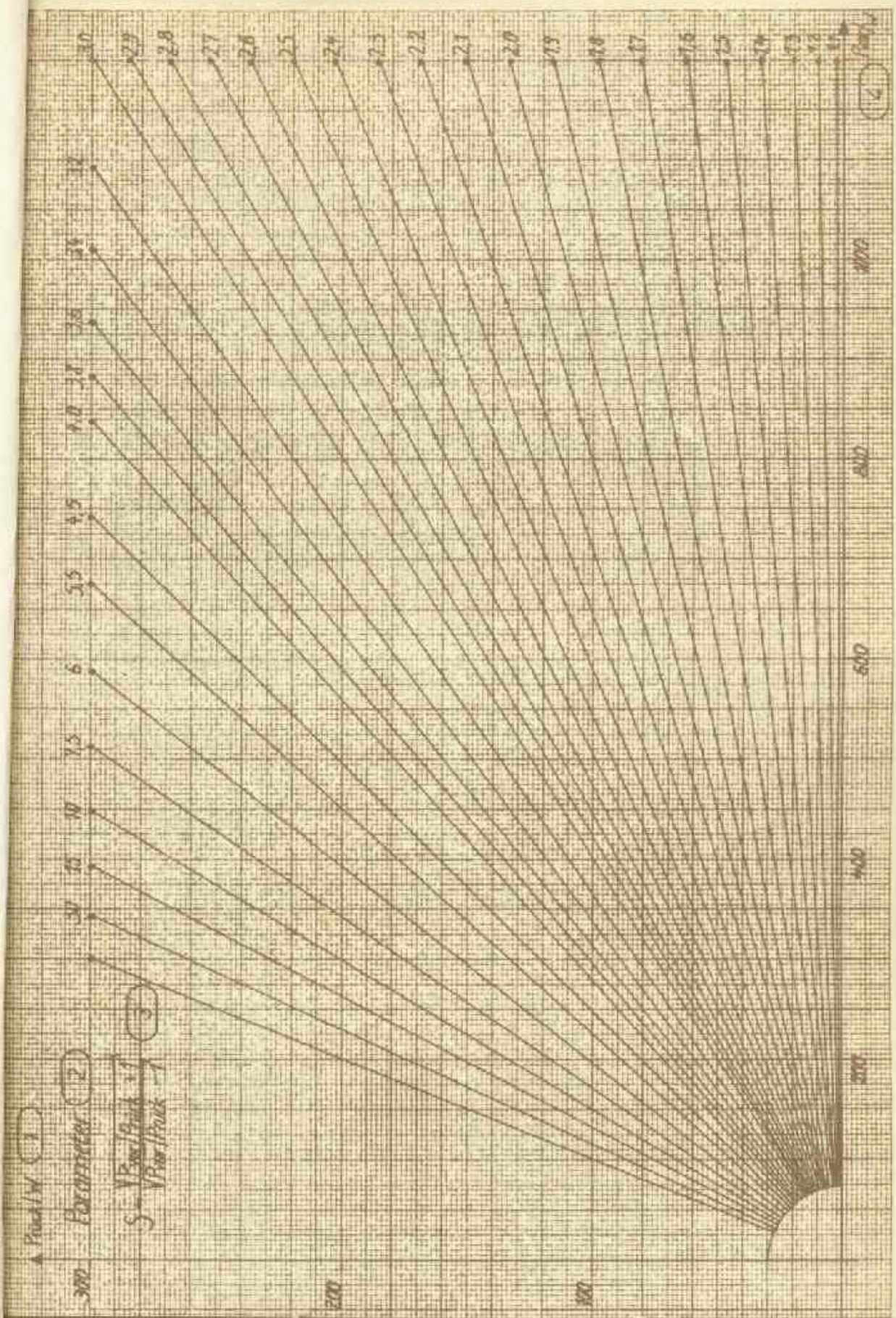
Before starting servicing work, disconnect the unit from the mains. The KAM 1300 requires little servicing.

2. Servicing work

On the measuring aerial servicing is limited to an inspection for corrosion damage. This applies especially during application in humid zones, and cleaning of the measuring aerial.
For the external parts only alkali-free cleansing agents (e.g. Fit) are to be used; for the internal parts use only a brush.

3. Functional tests

The functional tests are carried out in interaction with the transmitter and with RF power.
Special attention is to be paid to the four axial ventilators. When the mains is connected all four ventilators shall be in operation. It must be possible to uniformly turn the blades of the ventilators easily; this can be recognised when they run down (withdrawn mains plug) by looking into the intake opening.
With the mains plug withdrawn, the resistance measured between the inner conductor and outer conductor of socket X01 amounts to 0 ohm, and to 50 ohm with mains voltage.



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DIN A4 210x297mm

List of terms translated for page 13 1553.043-01702 Eu (4)

1) P_{return}/W
2) Parameter
3) $\frac{P_{forward}/P_{return} + 1}{P_{forward}/P_{return} - 1}$
4) $P_{forward}/W$

List of terms translated for Drwg.-No. 1553.043-00001 Up (4)

1) Measuring aerial KAM 1300
2) Block diagram KAM 1300
3) Measuring head of power and mismatch meter
4) P forward
5) P return
6) Measuring range selector
7) Balancing board
8) 40-dB divider
9) Absorber
10) 300 ohm 100 W each

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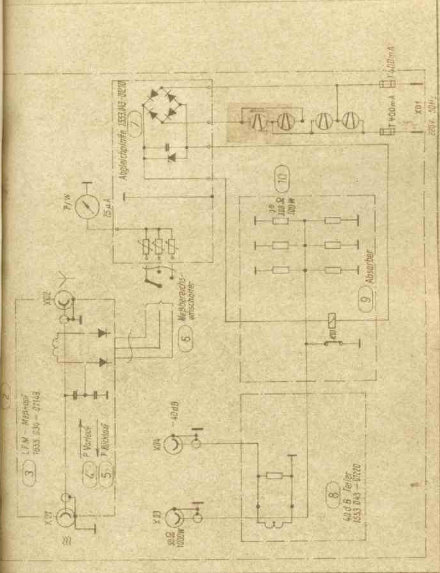

Übersetzung der beigefügten Übersetzungsliste entnehmen
Translation see attached table
Перевод см на приложенней таблице переводов

0901

Dargestellt auf

Bl	Tag	Name
Gez.	13.5	Boldt
Gepr.		
N.-gepr.		

EFO/111/13	9.3.82	
EE 05/11/98	5.7.82	
EFO/111/14	12.3.82	Schr
Änderung	Tag	Name

Benennung
Meßantenne KAM 1300

1553.043 – 00001 Üp (4)

EFK VEB Funkwerk Köpenick

Ersatz für

K6 K10

Dieser Teil wird vom FWB ausgefüllt

Gerät/Anlage: MM1300
device/installation:
l'appareil/l'installation:
aparato/instalación:

Fabrik-Nr.: 84/282.00087
fabrication No.:
No. de fabrication:
número de fabricación:

Endprüfung: 17.10.84
final test:
control final:
contrôle final:

Garantiefrist: Monate: 12
Validity guarantee: months:
delai de garantie: mois:
plazo de garantia: meses:

Werksauslieferung: 30.10.84
delivery ex factory:
marchandise départ usine:
entrega desde fábrica:

Die Garantie erstreckt sich auf den Lieferumfang gemäß Spezifikation und die Fabrikations-Nr. lt. Werkabnahmeprotokoll Nr. ____ / ____ vom ____

The guarantee extends for the scope of delivery according to the specification and fabrication No. referring to Manufactur's Certificate of Test No. ____ / ____ dated ____

La garantie couvre le volume de la livraison selon la spécification et le numéro de fabrication conformément au procés-verbal de la réception en usine No. ____ / ____ du ____

La garantia se extiende al volumen de entrega según la especificacion y el número de fabricación según protocolo de control de mercancias número ____ / ____ del ____

Dieses Gerät ist mit folgenden bes. gekennzeichneten Baulementen bestückt:

Lfd. Nr.	Baulemente	Kenn-Nr.	Lfd. Nr.	Baulemente	Kenn-Nr.
1			9		
2			10		
3			11		
4			12		
5			13		
6			14		
7			15		
8			16		

Es wurden ersetzt:

Stempel und Unterschrift der zuständ. Dienststelle	Ersatz für	Ersetzt am	durch Type	Kenn-Nr.

RFT VEB FUNKWERK KÖPENICK

BETRIEB DES VEB KOMBINAT NACHRICHTENTECHNIK

Betrieb der ausgezeichneten Qualitätsarbeit
Factory of excellent quality work
Предприятие отличной высококачественной работы

Werkabnahmeprotokoll

Factory Test Certificate
Протокол заводской приемки

Für das Erzeugnis
For the product Meßantenne KAM 1300
Для изделия

Typ / Type / Тип: 1553.43
Fabr.-Nr. / Serial-No. / Зав.-№: 84/282.00087

und die nachstehend aufgeführten Geräteteile
and the partial units listed below
и ниже приведенных деталей прибора

Benennung / Denomination / Наименование	Typ / Type / Тип	Geräte-Nr. / Unit-No. / Прибор-№
Ende der Eintragung		

wird die Freigabe zur Lieferung erteilt.
the release for delivery has been granted.
дается тем самым допуск на поставку.

Berlin, 19. Okt. 1984

GF Fertigungsendabnahme Funk

Beauftragter der IKO
Commissioner of the Quality Control
Уполномоченный ОТК