Equipment Documentation

Transmitter 1000 W
KSG 1300

Typ 1614.11

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 Documentation: 1614.011-01702 Eu
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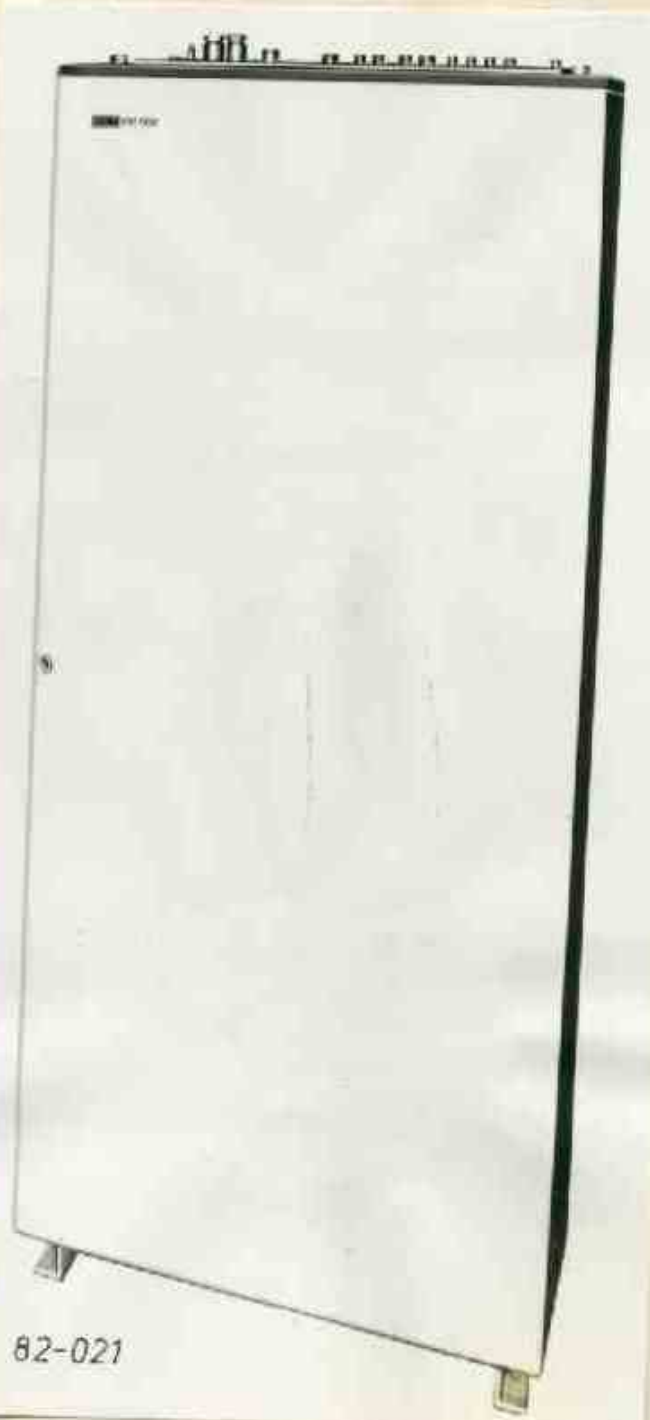
Contents

Supplement

I. SPECIFICATION

Photograph of the equipment



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1. Application

The transmitter 1000 W KSG 1300, master unit of the transmitting system KSS 1300, serves for establishing continental and intercontinental radio links.
The control of the transmitter KSG 1300 is effected with special control units (terminals). Due to the international standardized input interfaces selected, terminals (e.g. process computers) at any distance away can be either directly series connected with the transmitter or over transmission paths which are in accordance with the operating mode of the KSS 1300 system.
The design of the transmitter as wideband amplifier with full program operation and the shortest possible setting time, allows the efficient application for the solution of commercial and tactical tasks. As a result of the possibility of being able to connect additional equipment of the system KSS 1300, the use of the transmitter in transmitting stations is very manifold.
Monitoring of the transmitter KSG 1300 is carried out internally and automatically; operating states and output are remoteley indicated. Thus it is not necessary to man the position of installation of the transmitter.
The high degree of protection of the casing and the robust construction permit application under hard mechanical and climatic conditions. For this reason the transmitter is especially suitable for use on land and sea vehicles as well as containers and fixed radio stations.

2. Technical data

The guaranteed values for equipment acceptance are to be taken from the Technical Terms of Delivery 1614.011-00001 TLB.

2.1 General technical data

Weight	326 kg	
Fire load factor:		
KSG 1300	approx.	1000 MJ
Accessories	approx.	40 MJ
Spare parts E 1	approx.	85 MJ
Spare parts E 7	approx.	700 MJ

Dimensions (w x h x d)	800 x 1726 x 457 mm with base
Degree of protection	IP 54 (dust-proof and hose-proof) IP 21 for external air system (protection against foreign bodies ≥ 12 mm, drip-water proof) per TGL/RGW 778
Protection class	I per TGL 21366 (protective conductor connection)
Application group	G II per TGL 200-0057/04 (transport on good spring-suspended vehicles)
Design class	T III per TGL 9200/01 (tropical, installation in rooms)
Temperature range	
- operable	-25 °C to +55 °C
- functional	-10 °C to +40 °C
- transport	-40 °C to +70 °C
- storage	-25 °C to +45 °C
Admissible relative humidity	≤ 95 % at +40 °C
Max. application altitude	3000 m
Shock load	max. 15 g
Operating time	continuous 24 h/day
Readiness time for operation	≤ 1 s following the start command
Kind of control	remote by means of serial telegram
- Interfaces (incl. transmitting command)	V24/V28 or WT-O, optional
Frequency range	1.605 MHz to 29.99999 MHz
Transmitting power for class of emission F1	1 kW (rated power)
Characteristic impedance (asymmetrical)	50 ohm
Classes of emission	
- Telegraphy	

No. of Channels	Without carrier	Single side band (SSB) With carrier	Single side band (SSB) Without carrier	
1	A1A/B/D (A1)	H2A/B/D (A2H)	J2A/B/D/X (A2J)	amplitude-modulated
≥ 2		H7B/D/X (A7H, e.g.VFT)	J7B/D/X (A3J, e.g.VFT)	≥ 50 Bd
≥ 2		R7B/D/X (A7J, e.g.VFT)		

No. of Channels	Without carrier	Single side band (SSB) With carrier	Without carrier	
1		P1A/B/D (P1)		frequency-modulated ≤ 200 Bd
2		P7B/D/X (P6)		

- Telephony

No. of Channels	Single side band (SSB) With carrier	Without carrier	
1	H3C/E (A3H)	J3C/E/X (A3J)	amplitude-modulated 300 to 3000 Hz
1	R3C/E/X (A3A)		
≥ 2	H8X (A3H, B=6 kHz)		amplitude-modulated 250 to 6000 Hz
≥ 2	R8E/X (A3A, B=6 kHz)	J8E/X (A3J, B=6 kHz	
2	B_R8E/X (A3Ba)	B8E/X (A3Bj)	

- Telegraphy and telephony (combinations)

No. of Channels	Single side band (SSB) With carrier	Without carrier	
1	H9W/X	J9W/X	amplitude-modulated 300 to 3000 Hz or 250 to 6000 Hz
1	R9W/X		
2	B_R9W (A9B)	B9W/X	
2	B_R8X		

Remarks

Letters in the third position mean:

A - Telegraphy for listening reception
B - Telegraphy for automatic reception
C - Facsimile
D - Data transmission
E - Telephony
W - Combination of different information types
X - other kinds of modulation ; / means "or"
Classes of emission in brackets represent the old designations

Nominal frequency spacings (shift)	
- Single-channel telegraphy F1B	85 Hz/170 Hz/250 Hz/340 Hz/500 Hz
- Two-channel telegraphy F7BDX	200 Hz
Power supply	
- Mains connection	3-phase/neutral 50 Hz 220/380 V
or	1-phase/neutral 50 Hz 220 V
admissible voltage tolerance	+10 %, -15 %
admissible frequency tolerance	± 3 Hz
Power input	6.5 kVA[1], 4.3 kW
- Battery connection	
No. of conductors, voltage	2 - 24 V
admissible voltage tolerance	+ 9 V
	- 3 V
Battery current	0.6 A (for store support)
	1.9 A (for initial heating current frequency standard)
	0.25 A (average heating current at +25 °C
Type of cooling [1]	air cooling, internal ventilator

[1] cf. remarks in the Project Documentation

2.2 Special technical data

Frequency adjustment	decadic in 10-Hz steps
Frequency tolerance	
- with thermostat oscillator	$< 2 \times 10^{-6}$ after 10 min warming-up time in the temperature range from -25 °C to +55 °C
	$< 5 \times 10^{-8}$ after 1 h warming-up time in the temperature range from -10 °C to +40 °C
- with temperature-compensated oscillator (TCXO)	$< 5 \times 10^{-7}$ after 15 min warming-up time in the temperature range from -10 °C to +40 °C
- Ageing of the frequency standard	$< 1 \times 10^{-6}$ /year
Permanent/peak transmitting power P	
- Waviness s = 1 to 1.4	1 kW
- Waviness s = 2	0.5 kW
- Waviness s = 3	0.3 kW

Harmonic attenuation	> 60 dB
Subsidiary wave attenuation	> 60 dB for subsidiary waves < 40 MHz > 90 dB for subsidiary waves > 40 MHz
Intermodulation attenuation d3 ; d5	> 41 dB mean value, but better than > 36 dB, relative to PEP
Extraneous voltage attenuation	> 46 dB
Damping of the residual emission in keying intervals	
t ~ 1 s	~ - 45 dB
t ~ 1 s	~ -100 dB
Telephony inputs	
- Number of channels	2
- Level	- 18 dBm0 to + 9 dBm0
- Input resistance	600 (1 ±0.2 x e $^{j\varphi}$) ohm φ = 0 to 360 ^{o}
AF frequency response (relative to the position for max. power in AF frequency range)	300 Hz to 750 Hz ~ 3 dB 750 Hz to 2500 Hz ~ 1 dB 2500 Hz to 3000 Hz ~ 3 dB
Telegraphy inputs	
- DC	2 channels (A and B)
- Interface	V 24/ V 28 or WT-0, optional
- V 24 - Current paths	
. Definition according to CCITT White Book, Vol. VIII/1969 for the interface lines 101 to 106 and 108	
- WT-0	
. Input resistance	1000 ohm ± 10 %
. Loop resistance	≦ 200 ohm
. Working-current range	± 15 to 30 mA
Telegraphy distortions	~ 10 %
Control (control KSG 1300)	
- Input/check back	serial telegram

- Telegram format	1 start bit 8 information bits 1 parity bit 2 stop bits
- Transmission speed	50 Bd, 100 Bd, 200 Bd, 300 Bd, 600 Bd or 1200 Bd
- Work store	1 x 64 bits
- Program store	15 x 64 bits

Store contents

- Work store	
. Aerial tuning units and/or aerials	4
. Transmitting frequency (decades)	7
. Program numbers	16
. Classes of emission	14
. Channel procedures	
Sideband A	6
Sideband B	4
. Control positions	4 (with control selector KWS)
. HF power messages (steps)	8
. Operating state (input)	9
. Operating state (messages)	6
- Program store	
. Aerial tuning units and/or aerials	4
. Transmitting frequency (decades)	7
. Classes of emission	14
. Channel procedures	
Sideband A	6
Sideband B	4

Operating state

- Input commands
  - . Preparation for operation
  - . Tuning with HF
  - . Tuning without HF
  - . O P (ready for transmission)
  - . O.1 P

. 0.25 P
. 1 P
. Reception with tuned serial
(tuning is made with serial tuning unit KTA)
Reception with untuned serial
(serial switched through in serial tuning unit KTA)

- Messages
  . End of tuning
  . Radiation check (transmitting power - 25 W)
  . Transmitting power reduction (mismatch, module disturbance)
  . Summation fault
  . RF power (stages 1 to 8)
  . Operating check (roughly every 3rd second)

Channel procedure

- Channel A
  . Volume controlled
  . Volume uncontrolled
  . 1000 Hz ± 1 Hz (transmitting level -10 dB)
  . WT (operation with VFT equipment)
  . GT (DC keying)
  . TT (tone keying)
- Channel B
  . Volume controlled
  . Volume uncontrolled
  . 1000 Hz ± 1 Hz (transmitting level -10 dB)
  . WT (VFT)

3. Construction

The transmitter KSG 1300 is accomodated in a rack of the type program EGS (unified system of containers) whose front side is closed by a hose-proof door. The unscrewable rear side contains the openings for the inlet and outlet of the cooling air of the external cooling system. The air stream generated by the incorporated fan is separated from the RF amplifier space and for this reason it does not require filtering. Into this air stream project the heat sinks of the RF amplifiers and power supplies as well as the RF interconnection facility.

The dissipated heat occurring in the RF amplifier is given mainly by thermal conduction to the heat sinks and the remaining part is applied through the internal cooling system to the heat exchangers and thus reaches the external cooling circuit. The subassemblies of the preamplifier, driver amplifier, four 250-W amplifiers, interconnection facility and the module power supplies are screwed onto the seperating wall to the external cooling system in the amplifier inner compartment. In front of the aforementioned, the harmonic filter and the process control unit are accommodated in a swivel-type frame construction. The above-mentioned subassemblies are connected with the rack by means of plug-type connections which allow easy servicing. The RF control unit is arranged in a separate compartment in the upper part of the rack. It consists of two swivel-type frames; the upper one takes up the decadic drive unit (DSS) whilst the lower one contains the modulator (Mo). Both subassemblies are designed as cassettes which can easily be exchanged. In this case as well the connection to the rack is established by means of plug-type and screw-type cable connections.
Access to the rack is necessary through the front door for servicing work.
All line inputs and outputs (interfaces) are on the top side of the rack.
In transmitting stations the cabinets can be mounted next to each other without spacing.
With its space-saving design and high component packing density, good servicing possibilities have been reached by the principle of construction.
The industriel safety is guaranteed according to ASVO § 3/1. Proof of labour, health and fire protection is available in VEB Funkwerk Köpenick under Drwg.-No. 1614.011-00001 GAB.

4. Mode of operation

cf. General Circuit Diagram 1614.011-00001 Up (3).

4.1 RF control unit KCS 1300

The RF control unit consists of the modulator (Mo) and the decadic drive unit (DSS).

The decadic drive unit generates with its subassemblies the transmitting frequency for the power amplifier KVS 1300 with high accuracy.
In the 200-kHz position, the modulation of the decadic drive unit in the normal amplitude and frequency-modulated classes of emission takes place with the subassemblies of the modulator. A reference frequency of 1 MHz from the decadic drive unit serves for guaranteeing the frequency stability. Both the decadic drive unit and the modulator have complete electronic control by the input bus generated in the process control unit KPS 1300.

4.2 RF power amplifier KVS 1300

All amplifiers are wideband amplifiers.
The overmodulation protection (ÜS), level control (PR) and amplifier (V) form the preamplifier unit (VV).
The overmodulation protection, a high-speed attenuator with PIN diodes, blocks the power amplifier in case of overmodulation and inadmissible mismatch, controlled from the power and mismatch meter and the power and mismatch meter evaluator, in the transmitter automatic system. This is followed by a binary-staged level controller (PR) for automatic power levelling which is controlled by the level controller logic (PRL). In the preamplifier (VV) the power level is amplified from roughly 20 mW to 5 W across 50 ohm. Including the last stage of the preamplifier, the amplification is carried out in push-pull amplifiers. The driver amplifier (TV) consists of two uniform amplifier sections 1 and 2 which deliver roughly 2 x 10 W control power each for the 250-W amplifiers 1 to 4.
The output of the 250-W amplifiers 1 to 4 are added in the interconnection facility ZSE. In case of unequal powers, for example, in case a module breaks down or an amplifier section of the driver fails, the load compensating resistors of the interconnection facility come into action, and the guarantee is given that a non-reactive further operation of the functioning amplifiers up to a maximum of two module break downs takes place.
Ten harmonic filters are provided for filtering the transmitting frequencies. In accordance with the operating frequency selected, these filters are switched on at their input and output by

switches. The control necessary for this purpose is effected by the range selection (BA) and the switching amplifier (VS) in the transmitter automatic system (VS). Before the transmitter output Z = 50 ohm, s < 3, the power and mismatch meter (LPM) is arranged which delivers criteria to the evaluator (A).
For ventilation purposes, the external cooling circuit is provided with a double radial fan (ALÜ); the internal cooling circuit has an axial fan (ILÜ). All fans are switched by the fan control (LÜS).
Temperature-dependent measuring resistors (ϑ I) and (ϑ Z.) serve for monitoring the interior temperature of the rack and the temperature of the supply air.
In case of disturbances, criteria (K_v) and temperature criteria (temp) are delivered by the amplifiers to the peripheral logic for evaluation.

4.3 Interface converter (SSW)

The interface converter serves for providing the WT-O terminals for telegraphy, transmitting command and control by adapting the equipment-internal terminals V24/V28 for telegraphy and transmitter control to the VPT equipment.

4.4 Peripheral logic

In this electrical unit, consisting of the measured value logic (MWL 1), (MWL 2) and (MWL 3), the criteria of the HF power amplifier (K_v, temp) and the power supplies KNS 1300/1310 (K_g) are processed for the process control. This is effected by A/D converters and a combiner.
In the measured value logic 1 (MWL 1), temperature monitoring for the 250-W amplifiers and driver amplifier (TV) is carried out.

4.5 Process control unit KPS 1300

The process control unit consists mainly of the "data section" and the "transmitter automatic system". The subassemblies of these two sections and the sections themselves are connected by wiring boards.

4.5.1 Data section

The data section consists of the circuit boards
remote-control section (FW)
store logic (SpL), and
data and program store (DPS).

With this electrical unit the respective control terminal, for example, transmitter control unit KBS 1300, is adapted to the transmitter automatic system. The supply of the data section is effected by a serial telegram.
The input of the data in the transmitter automatic system is carried out via an input bus; the bus also reaches the subassemblies (Ko) (decadic drive unit DSS) as well as the peripheral units of the system KSS 1300, for example, aerial tuning unit KTA 1300.
The subassembly/remote-control section contains mainly a series-parallel converter for the incoming control telegrams and a parallel-series converter with up-date store for check-back of the commands and operating states.
The transmitting frequency is adjustable (cf. technical data).
In addition to the store circuits, the subassembly/data and program store also contains facilities which, in interaction with the subassembly/store logic, either receive or refuse the telegram for the individual operating states.
A plug-and-socket connection is provided to tapping the input bus.

4.5.2 Transmitter automatic system

The transmitter automatic system consists of

organizer 2	(O 2)
transmitter protective logic	(SSL)
power and mismatch meter evaluator	(A)
range selection 1	(BA)
level control logic	(PRL)
switching amplifier	(▷I)

This electrical unit processes the control and monitoring signals for the transmitter as well as for the peripheral units. The subassembly/organizer 2 contains the organization program for the control algorithm for establishing the operating states.

The results of the control algorithm and the resulting influence for optimum operation of the transmitter are processed in the subassembly/transmitter protective logic (SSL). The latter also has a display panel which shows in case of disturbance the malfunctioning assembly. The display can be seen after having opened the front door.
The socalled "disturbance bus" is available via a plug-and-socket connection for testing and servicing work in case of mechanical evaluation.
The subassembly/power and mismatch meter evaluator (A) contains A/D converters for the evaluation of the RF criteria from the power and mismatch meter (LPM) as well as for processing the digital power display.
The subassembly/range selection 1 (BA) derives the ranges of the harmonic filter out of the first digits of the transmitting frequency.
The subassembly/level control logic (PSL) contains counters and control as well as interface for the level control.

4.5.3 Logic power supply

In the process control unit a 2 x 5-V power supply (switching controller) is provided for the supply of the logic subassemblies, thereof a battery-supported voltage for the supply of the stores in case of mains failures. A pulse generator (G) of this power supply delivers a clock voltage (⊓) for a part of the switching controller.

4.6 Power supply

4.6.1 Power supply 50 V KNS 1300
Power supply 28 V KNS 1310

These constant-voltage power supply modules 1 to 5 function according to the principle of pulse-width-regulated 25-kHz switching controllers so that mains transformers for high powers can be omitted.
The majority of the components are applied to mains potential. For mains potential isolation, optoisolators are provided for control and regulation procedures.

The switching controllers work with a high efficiency factor; occurring leakage powers are mainly routed via coolers to the external cooling circuit.

4.6.2 Power supply 26 V KNS 1320

In this unit ± 26-V voltages are generated through mains voltage transformation, rectification and filtering which can be used by internal and external switching controllers for the further low-loss conversion into other voltages.
The automatic battery changeover switch (UB) offers a non-interruptable power supply in case of mains failures for stores and high-constant master oscillators in the decadic drive unit (DSS).

4.7 AC line filter (NV)

This unit prevents the delivery of inadmissibly high RF interference voltages to the mains (radio interference factor).

5. Scope of delivery

5.1 Standard scope of delivery

1 Transmitter KSG 1300	Type	1614.11
1 Accessories, packed		1614.011-01800 Zl
1 Equipment documentation		1614.011-01702 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	1614.011-01702 Eu
- Project documentation	1614.011-01702 Pu
- Service documentation	1614.011-01702 Su
- Spare parts, packed	1614.011-01810 E12 1614.011-01870 E72
- Set of cables	1614.011-01601

5.3 Cables

The required cables do not form part of the scope of delivery. For cable types cf. Project documentation 1614.011-01702 Pu. (Supplement Assembly instructions 1614.011-00001 Mv, Sect. 1.2)

II. OPERATING INSTRUCTIONS

1. General remarks

The transmitter KSG 1300 may only be placed in operation by skilled personnel who have been instructed according to the binding safety regulations.
It is assumed that the transmitter has been set up according to the Assembly Instructions 1614.011-00001 Mv, contained in the Project Documentation 1614.011-01702 Pu.

2. Preparatory work for operation

(cf. 1614.011-00001 U (4), Sheet 5)
Carry out the following checks on the transmitter after having completed transport:
- Check the fastenings of the subassemblies.
- Check for mechanical damage.
- Check the cable connectors leading to the peripheral units.
- Fill up oil in both bearings of the ventilator motor (roughly 25 cm^3 per bearing) according to Sect. III, 2.2.

For this work, disconnect the power supply connection (e.g. remove fuse) and disconnect peripheral units.

2.1 Adjustment of the interface

V24/V28 or WT-0 interface level

- The adjustment depends on whether the telegraphy lines, line of the transmitting command or the control and check-back lines for the transmitter are operated with V24/V28 or with WT-0 (VFT) interface level. The lines for transmitter control and modulation have separate switches so that different forms of operation are possible. The switches are arranged on the subassembly/interface converter 1614.011-01250.
- The sensitivity of the AF inputs A and B have been set to 0 dB by the manufacturer. It is recommended when placing into operation to use this level as well as the transfer level also from and to the additional equipment in order to be able to work without problems as regards the connection of units.
  If, however, another transfer level is selected or the incoming AF lines have a different level, carry out an AF levelling according to the supplement 1614.011-00001 Wp (4), Sheet 4.

Adjustment of the modulation-controlled transmitter command

If the peripheral units such as PEB 02 or KBK 1300 are used for the connection of the AP terminal units, the carrier is automatically controlled via the line "transmitting command remote". This initial position is preferably adjusted on the interface converter 1 by a soldering bridge.
If modulation transfer units without carrier control or terminal units are directly used for modulation, this soldering bridge can be changed to automatic control by the modulator (signal path blocking, internal) and the line for the transmitting command can be omitted.
A further adjustment possibility is the bridge "permanent transmitting command"; consequently, the carrier path is always open for modulation signals.
The position of the soldering bridge is to be taken from the following table.

Interface converter 1
1614.011-01250

Bridge 1 - 2 transmitting command remote
Bridge 1 - 3 signal path blocking, internal
Bridge 1 - 4 permanent transmitting command

2.2 Adjustment of the transmission speed

The transmission speed between the transmitter control terminal (e.g. transmitter control unit KBS 1300) and the transmitter RSG 1300 can be selected on the subassembly/remote control section 1787.009-01270 which is accommodated in the lower part of the process control unit.
The transmission speeds of both units must have the same setting and coincide with any possible units of the transmission path.
The remote control sections are adjusted to 200 bit/s ex workn.

Remote control section 1787.009-01270

Bridge 18 - 21 50 Bd
Bridge 17 - 20 100 Bd
Bridge 16 - 19 200 Bd
Bridge 15 - 18 300 Bd
Bridge 14 - 17 600 Bd
Bridge 13 - 16 1200 Bd

824-M 21-325 VV Freiberg Ag 307-82 III-15-4 2400-1 382 80,6 T-C 14835

2.3 Cabling

The connectors of the tented cables are to be firmly screwed by hand onto the distributors on the top side of the rack in accordance with the lettering; the sealing effect takes place at the same time. The plug-and-socket connections of the unit which are not used are to be closed off by the accompanying sealing covers.

2.4 Insertion and checking of the fuses

(cf. 1614.011-00001 U (4), Sheet 4)

Check the firm seating of the fuses at the top right side in the rack and the fuses of the mains supply unit KNS 1320. The fuses of the mains sections KNS 1300 and 1310 are arranged in the interior of the units.

Attention:

When opening these mains supply units, residual charges of the mains capacitors are to be awaited. Observe the printed discharging instructions.
Furthermore, another fuse is provided in the interface converter.
The guarantee expires for units that have been damaged as a result of incorrectly rated fusing.
After having checked the fuses the cabinet door is closed.

2.5 Battery changeover

(cf. 1614.011-00001 U (4), Sheet 5)

- Remove cap from the mains supply unit KNS 1320
- On the printed circuit "Battery changeover" according to Drwg.-No. the following soldering connections will be required:

24 - 25 open:	with battery, without preservation charge
26 - 27 open:	
24 - 25 connected:	with battery, with preservation charge
24 - 25 connected:	without battery, only mains supply
26 - 27 connected:	

- After the selection the mains supply unit KNS 1320 is to be closed again using the cap.

2.6 Internal and external frequency standard (reference frequenc

Connections on the REF cassette 1648.067-01135,
cf. 1614.011-00001 U (4), Sheet 5

2.6.1 Operation with TCXO

Soldering point 05 - 06 connected
Soldering point 09 - 10 connected

X52 of the REF cassette is the 10-MHz measuring output.

2.6.2 Operation with internal oscillator KOC 1000 or with external frequency standard f_N = 10 MHz

Soldering point 05 - 06 open
Soldering point 09 - 10 open

X52 is the control input. It is to be connected with X53 in the transmitter rack or the RF output KOC 1000 (RF cable connection forms part of the accessories).

2.6.3 Operation with external frequency standard f_N = 5 MHz

Soldering point 05 - 06 open
Soldering point 09 - 10 open
Soldering point 11 - 12 open
Soldering point 13 - 14 open
Soldering point 11 - 13 connected

X52 is the control input. It is to be connected with X53 in the transmitter rack or the RF output KOC 1000 (RF cable connection forms part of the accessories).

3. Operation

- Switch on the 220-V mains.
- Switch on the 24-V battery voltage.
  (In this case it can happen that the transmitter is already put on the air, but without emitting a carrier.
  This procedure is not of importance; it is conditioned by the initial position of the stores.)
- From the control position, the command is given now "preparing for operation" in which case the transmitter taken up the initial position for receiving further commands.

3.1 Control

- The transmitter KSG 1300 has no controls and control displays.
- The complete communication with the transmitter KSG 1300 is to be carried out with the corresponding control position (e.g. transmitter control unit KBS 1300)which is in a position of transmitting and receiving telegrams for transmitter control according to functional diagram 1614.011-00001 Wp, Sheets 1 to 3, cf. KBS 1300, to provide the information for the modulation channels (e.g. by the control unit for remote modulation FMB 02).
- The transmitter monitors itself automatically and initiates automatically measures for its own protection in case of overloads.

3.2 Checking the operating function

This testing work is made by the control unit KBS 1300 under the precondition that the control unit and the transmission path are in order.

3.2.1 Testing of the data section

(During this test emission is not made and the power supplies 50 V and 28 V are not switched on.)
Actuate the pushbutton for the operating state "preparing for operation".
In this operating state, all commands from the transmitter KSG 1300 must be executed according to the functional diagram 1614.011-00001 Wp, Sheets 1 and 2, cf. Equipment Documentation of KBS 1300. Checking is effected in the unit by comparing the check-back with the input. If the comparison is positive the luminous pushbutton actuated lights up.

3.2.2 Testing of tuning and programming of the transmitter

Attention:

During the test the carrier is emitted for a short time in installations with aerial tuning unit KTA. For operation without aerial tuning unit, only the power supplies 50 V and 28 V are stepped up. There will be no emission.

Control sequence:

- Actuate the pushbutton for the operating state "preparing for operation" and compile a program; select program number.
- Actuate the pushbutton for the operating state "tuning with carrier" and wait until the green signal "end of tuning" lights up.
  Consequently, the program from the data store has been written in into the program store whose number was selected.
- Now actuate the pushbutton for the operating state "preparing for operation", select the program number or leave the former number as selected.
  Thus the program from the program store is written in into the data store without destroying the program store contents.
- Actuate the pushbutton for the operating state "tuning without carrier" and wait until the green signal "end of tuning" lights up.
  In this way all program stores must be written in and read correctly.

3.2.3 Checking of the power stages

In order to prevent transmission it is recommended to use a dummy aerial, e.g. KAM 1300.

Control sequence:

- Actuate the pushbutton for the operating state "preparing for operation".
- Compile a program or take a program from the program store by depressing the program pushbutton 1 - 15.
- Carry out tuning by depressing the pushbutton for the operating state "tuning with carrier" (or "tuning without carrier").
- Actuate the pushbuttons "power stages" 0 P to 1.0 P (ventilator starts at 0.1; 0.25 and 1.0 P).
- Actuate the pushbutton "class of emission" with full carrier, e.g., A 1, F 1. In each case the power, radiation control as well as the end of tuning must be visually confirmed.
- When using a dummy aerial KAM 1300 the power can be read off.

3.2.4 Checking of the complete signal path

This checking work can be performed at the position of transmitting with the inclusion of the aerials or the Measuring Aerial KAM 1300 and a suitable receiver.

Control sequence:

Switch on the corresponding frequency and class of emission. With the receiver, e.g. receiver EKD 300 made by VEB Funkwerk Köpenick, check the frequency and modulation content and compare them with the frequency adjustment and the modulation of the transmitter.

4. Automatic power reduction

If a power reduction is signalled on the control unit KBS 1300, it is an indication that the transmitter KSG 1300 is being operated with a mismatch s > 1.5 or a module is faulty. Both kinds of power reduction do not result in an interruption of the transmission. It can be continued without objection. Power checking is only possible for each class of emission with a 100 % carrier (A 1, F 1).

For a mismatch s > 1.5 the transmitter starts automatically after a few seconds with the new input of the original level values at intervals of roughly 5 seconds.

Only when a new levelling takes place does an existing partial failure be considered as continuously present and the level is correspondingly adjusted from the beginning.

If the reason for power reduction is caused by a short-time aerial mismatch, e.g. during mobile operation, a complete regeneration of the level takes place as soon as the mismatch is corrected.

In other cases the power reduction remains or as the case may be continue to exist.

If the power takes up a value which is too low, a new balancing would result under certain circumstances to an improvement. This is, for example, the case when the aerial installation are changed. A too high voltage loading of the aerial tuning unit ETA 1300 can also be the reason for a power reduction.

In cases of doubt or with a continuously occurring power reduction, which possibly occurs already when switching on a power stage, the reason can be determined easily by opening the door of the rack and reading the numerical display. The numerical display is explained in the Functional Diagram 1787.009-01220 Wp, Sheets 1/3. (Also see table on the cover of the power supply unit KPS).

5. Operating disturbances

The reason for operating disturbances can be found within and outside of the transmitter KSG 1300.

5.1 Operating disturbances in the transmission path and in the incoming mains supply

These disturbances can be present when a control of the transmitter is not possible, e.g., faulty command line or transmission units, or when the red display "mains disturbance of the transmitter" lights up at the control position.
The latter means that either the supply voltage is missing in the transmitter or the check-back line or corresponding transmission units in the check-back path are defective. The reason for the indication is that the indication pulse of the transmitter which is put out via the check-back line at intervals of roughly 3 seconds does not arrive at the control position. Check the transmission path and the incoming mains supply of the transmitter.

5.2 Operating disturbances of the unit - summation fault - serial fault

cf. transmitter protective logic 1787.009-01220 Wp (4), Sh. 2-5

Such a disturbance is present when the "summation fault" is indicated at the control position (red display "summation fault" on the control unit KBS 1300).

- In this state the transmitter blocks the carrier automatically and switches off the power supplies 50 V and 28 V in case of danger for the components.
- From this moment onwards the transmitter tries to take up operation again through everlasting short-time cancellation of the disturbance store so that the transmitter automatically starts operation again following a short-time disturbance.
- If, following a new connection and possible tuning with carrier, the disturbance is still present, the reason for malfunctioning can be determined with the aid of the numerical display after having opened the door of the transmitter. The transmitter can be operated with the door open. The list of disturbance addresses for this purpose is contained in the Functional Diagram 1787.009-01220 Wp, Sh. 2-5.

If several disturbance addresses occur at the same time, those disturbances are to be eliminated first of all which are caused by blown fuses or missing operating voltages. Only then are subassemblies exchanged or other faults looked for.

Exchange subassemblies or fuses only when the transmitter is in the dead state.

The replacement of subassemblies and fuses may only be carried out by instructed personnel.

- Before all work in the transmitter and on the aerial installation the transmitter is to be disconnected from the mains supply.
- If the aerial installation is to be checked, it has to be earthed before being entered.

III. SERVICING INSTRUCTIONS

1. General remarks

Attention:

Before starting servicing work, disconnect the transmitter from the mains and earth the aerial installation.
The transmitter hardly requires servicing.
The remarks given in the following are preferably for mobile application, since in this case the mechanical and electrical connections are loaded most of all.

2. Servicing work

2.1 Servicing of the connections

Following all extended periods of transport, open the rack door and swivel out the swivel-type frame for the process control unit and the harmonic filter in order to subject the equipment to a visual inspection.
All incoming and outgoing lines of the subassemblies, which are present in the form of exposed plug-and-socket connections, are to be checked for their firm seating. Loose screw connections or possible line breakages are to be eliminated.
Check the firm connection of the equipment protective earth.
Check also the subassemblies for their firm mechanical connection.
The aforementioned work is to be carried out once a year during stand operation.

2.2 Servicing of the external air path

The cooling action of the heat sinks arranged in the cooling air duct is influenced by contamination deposits which, in turn, depend on the operating time and the contamination factor of the cooling air. For this reason, the cooling air duct, the vanes of the fan and the cooling ribs of the subassemblies are to be cleaned once a year, but at least every three years.
For this work, remove the rear wall.
At the same time check the oil level of the fan motor by refilling the supplied oil into the oil filling connection until it starts to flow out of the overflow bores which are provided roughly 5 mm below the motor shafts.
After every three years change the oil according to the servicing instructions.

Cleaning is also possible without removing the rear side. In this case the subassemblies KNS 1300/1310/1320 (power supply), preamplifier, driver amplifier, 250-W amplifier 1 to 4 and the interconnection facility are taken out of the transmitter rack. On the other hand, servicing of the fan motor is not possible.

3. Periodic functional tests

It is recommended to carry out partial tests from the section dealing with "checking of the operating functions" and to elaborate together with the sequences and conditions of the operating station to form a testing and attendance plan.

IV. ADDITIONAL EQUIPMENT

The additional equipment does not form part of the scope of delivery of the transmitter KSG 1300 and has to be ordered separately.
The system KSS 1300 is being supplemented continuously.

Connection possibilities to the transmitter KSG 1300

Transmitter control unit	KBS 1300
Modulation control unit	FSB 02 or KBM 1300
Aerial tuning unit	KTA 1300/1302/1304
Aerial selector	KWA 1310/1320
Transmitting dipole aerial	KAD 1300
Vertical cage aerial	KAV 1300
Measuring aerial	KAM 1300
Control selector	KWB 1300

Transmitter control unit KBS 1300, Drwg.-No. 1493.142-00001

The transmitter control unit KBS 1300 has been designed for the control of commercial short-wave transmitters and can be operated either at the transmitting position or separately via corresponding transmission paths. The control keyboard contains in clear text the complete scope of commands of the transmitter. All commands entered into the transmitter and their operating state are visually indicated over check-back lines. Furthermore the unit is in a position to put out commands to standard control position switches and aerial selectors.
The unit is suitable for the equipment of radio operators' positions and is equipped with interfaces for VFT equipment and V24/V28 according to CCITT.

Control unit for remote modulation FMB 02 1493.147-00001

The control unit for remote modulation permits the connection of terminal units for telephony, telegraphy and teletype operation, and is provided with an input for the connection of a receiver. Via its interfaces for VFT equipment for telegraphy operation as well as via AF interfaces, the control unit represents the connection from the terminal units to the modulation input of the transmitter. The unit is suitable for setting up radio operators' positions.

Aerial tuning unit KTA 1300 1554.103-00001

Preferably suitable for the automatic tuning of narrow-band aerials such as the 6-m or 10-m rod aerial KAS 1300 or KAS 1310 or the wire aerial KAL 1300.

Variants of the KTA 1300 are the aerial tuning units KTA 1302 with terminals for two aerials and KTA 1304 for maximum four aerials. The units are provided with 15 program stores.

Aerial selector KWA 1310 1073.942-00001
KWA 1320 1073.943-00001

Suitable for the operation of a transmitter (KWA 1310) or of two transmitters (KWA 1320) on four aerials.

Switching of the matrix crossing points is realized with electromechanical special RF contacts.

The aerial selection (four pushbuttons) is carried out on the transmitter control unit KBS 1300.

Transmitting dipole aerial KAD 1300 1557.023-00001

Horizontal wideband aerial, high-angle radiation (elevation angle 45°) in the frequency range 1.6 MHz to 10 MHz; especially suitable for short distances up to approximately 1000 km for fixed application.

This aerial is a wideband aerial and can be directly connected to the transmitter KSG 1300 with coaxial cable.

Vertical cage aerial KAV 1300 1557.026-10001

Wideband aerial, low-angle radiation in the frequency range 3 MHz to 30 MHz for long-distance connections up to roughly 3000 km for fixed application.

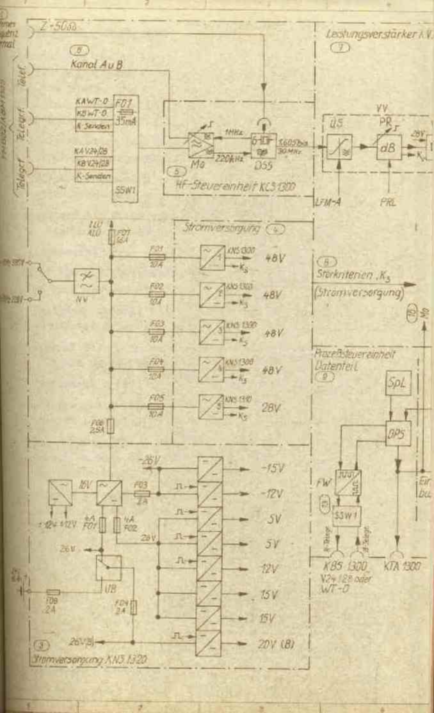
Direct connection to the transmitter KSG 1300 with coaxial cable.

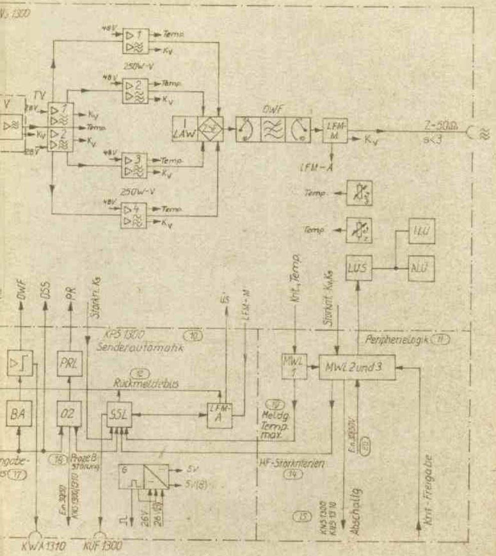
Measuring aerial KAM 1300 1553.043-00001

Desk-top unit, suitable for measuring and servicing work. Connection to the transmitter is established by means of the associated RF cable. The unit measures the power of the transmitter across a 50-ohm absorber resistance and the RF power given to the aerial. Determination of the mismatch s from the measured forward and return power.

Control selector 2/1 KWB 1300 1493.145-00001

The control selector serves to split up the transmitter control and modulation inputs in order to be able to control the transmitter KSG 1300 from two radio operators' positions, e.g. remote and in-situ.


Z-50Ω
Leistungsverstärker KV
Kanal A u B
Telef.
Telegr.
KAWT-0
KBWT-0
K-Senden
KAV24/28
KBV24/28
SSW1
F01 35mA
1MHz
220kHz
Mo
DSS
1,6...30MHz
HF-Steuereinheit KCS 1300
VV
PR
dB
PRL
LFM-A
Stromversorgung
KNS 1300
48V
28V
F01 10A
F02 10A
F03 10A
F04 10A
F05 10A
F06 2,5A
NV
Störkriterien, K_S
(Stromversorgung)
Prozeßsteuereinheit
Datenteil
SpL
DPS
FW
SSW1
KBS 1300
V24/28 oder WT-0
KTA 1300
-26V
16V
F03 2A
-15V
-12V
5V
5V
12V
15V
15V
20V (B)
26V
28V
26V (B)
UB
F08 2A
F04 2A
Stromversorgung KNS 1320



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

Liste Nr. (20)

	Tag	Name
1981		
Bearb.	21.12.	
Gepr.	11.2.82	
Norm	11.20.	

Ausgabe | Änd.-Mitt.-Nr. | Tag | Name

K5 | K6

EFK
VEB Funkwerk Köpenick

Benennung: Sendegerät 1000 W
KSG 1300

1614.011 – 00001 Üp (3)

Levelling of the AP lines on transmitter KSG 1300

Levelling of the AP lines is necessary when transmitting is carried out without a volume control (mode of operation /≈U). Open the cabinet door.
Levelling is carried out with the facilities of the modulator; control is performed by the transmitter control unit.

1. The generation position of the modulation signals delivers a 1000-Hz continuous tone in channel A and channel B.

2. Telephony channel A
2.1 Adjustment error = ± 0.5 dB

Set control A1/ / in such a way that the green LED marked with a ▽ lights up in LED row A.

2.2 Adjustment error < ± 0.5 dB

Connect the millivoltmeter to solder eye A1/ /≈U and set 195 mV with control A1/ / .

3. Telephony channel B
3.1 Adjustment error = ± 0.5 dB

Set control B1/ / in such a way that the green LED marked with ▽ lights up in LED row B.

3.2 Adjustment error < ± 0.5 dB

Connect the millivoltmeter to solder eye B1/ /≈U and set 195 mV with control B1/ / .

4. Tone keying (TT)
4.1 Switch on mode of operation tone keying and apply the continuous tone.

4.2 Depress the pushbutton TT (subassembly A51/cassette -01190) and set control TT in such a way that the green LED marked with TT lights up in LED row A.

1. List of disturbance addresses

Display of the two upper digits	Type of disturbance		
01	250-W amplifier	Position 1	Excess temperature
02	KNS 1300	Position 3	disturbed
04	KNS 1320	Circuit E	disturbed
05	Internal cooling circuit		disturbed
06	Level		too high
11	KNS 1300	Position 1	disturbed
12	KNS 1300	Position 4	disturbed
14	KNS 1320	Circuit D	disturbed
15	Harmonic filter		disturbed
16	Level		too low
20	Rated power		not reached
24	KNS 1320	Circuit C	disturbed
25	KNS 1300 or 250-W amplifier	> 2 modules	disturbed
26	Reserve		
30	KTA		Excess temperature
34	KNS 1320	Circuit B	disturbed
35	Mistuning		s > 2.5
36	Preamplifier		disturbed
40	250-W amplifier	Position 3	disturbed

Display of the two upper digits	Type of disturbance		
41	Driver amplifier 1		disturbed
42	250-W amplifier	Position 3	Excess temperature
44	Organization		Exceeding of time
45	KNS 1310		disturbed
50	Final amplifier	Position 4	disturbed
51	KNS 1300	Position 2	disturbed
52	Driver amplifier	2	disturbed
54	KTA		disturbed
55	Driver amplifier	1 or 2	Excess temperature
60	250-W amplifier	Position 1	disturbed
61	250-W amplifier	Position 2	Excess temperature
62	250-W amplifier	Position 4	Excess temperature
64	KNS 1320	Circuit G	disturbed
70	250-W amplifier	Position 2	disturbed
74	KNS 1320	Circuit F	
75	Reserve		

Further remarks concerning disturbance display:

Measuring point A — is represented on the subassembly/transmitter protective logic by the yellow LED and indicates whether the voltage is present for the disturbance logic.
If this LED is not lit, check the mains voltage or fuse KNS 1320/F01.

Circuit B +26 V
(KNS 1320 / F01 /6.3 A)

+26 V : Interface converter 1, relay for harmonic filter KWA 1310, KNS 1320 internal, KPS 1300
+15 V : Switching controller for thermostat

Circuit C +26 V
(KNS 1320 / F02 /6.3 A)
Loads

+20 V : Longitudinal control KCS 1300
+15 V : Longitudinal control KCS 1300
+ 5 V : Switching controller KCS 1300

Circuit D -26 V
(KNS 1320 / F03 /2 A)
Loads

-26 V : Interface converter 1
-15 V : Longitudinal control KCS 1300
-12 V : RF level control, driver amplifier, 250-W final amplifier, measured value logic, KNS 1300/1310, KPS 1300

Circuit E +12 V
(KNS 1320 / F02 /6.3 A)
Loads

+12 V : RF level control, driver amplifier, 250-W final amplifier, measured value logic, KNS 1300/1310, KPS 1300
+ 5 V : RF level control, driver amplifier, 250-W final amplifier, measured value logic, KNS 1300/1310

Circuit F +26 V (uninterruptable)
(KNS 1320 / F04 / 2 A)
Loads

+26 V : KPS 1300 (store support)
+15 V : Switching controller for thermostat

Circuit G +24 V

(KSG 1300 / F08 / 2 A)

Indication of battery undervoltage or no battery voltage.

The measuring point for carrier release is represented on the subassembly/transmitter protective logic by the green LED.

2. List of the organization sections

Indication of the lower digit	Type of organization
0	Rest position
1	Setting of the harmonic filter
2	Adjustment of the frequency decade
3	Loading of an organization section in dependence on the operating state
4	Provision of the level for KTA tuning
5	Automatic tuning of the KTA
6	Resetting of the level
7	Levelling of the transmitter

Parts List 1614.011-00001 ZL for Transmitter 1000 W KSG 1300

Item	Designation	Qty.
1	RF cable 1614.011-01171	2 B
2		
3	Bow 1614.011-02370 (Wt)	2 E
4	Extractor 1787.009-01019 (Wt)	2 B
5	Spanner 1414.006-02002 (Wt)	1 E
6	Double-ended spanner 8x10 TGL 37411	2 NS
7	Double-ended spanner 13x17 TGL 37411	1 NS
8	Screwdriver A0.6x75 TGL 48-73503	1 NS
9	Screwdriver A0.8x100 TGL 48-73503	1 NS
10	Screwdriver A1.0x125 TGL 48-73503	1 NS
11	Screwdriver A1.2x150 TGL 48-73503	1 NS
12	Screwdriver A1.6x175 TGL 48-73503	1 NS
13	Assembly spanner 50-BNC	2 NS
14	Box spanner 1 TGL 25080/09	2 NS
15	RF plug 11-2 TGL 25603	1 NS
16	RF connector 11-1 TGL 25602	1 NS
17	Connector 2 RMT 14 KPN4 G1 W1 TGL 32855	2 NS
18	Connector 2 RMT 18 KPN 7 G1 W1 TGL 32855	2 NS
19	Connector 2 RMT 24 KPN 19 G1 W1 TGL 32855	1 NS
20	Ring 1614.011-02520 (Wt)	2 B
21	Ring 1614.011-02521 (Wt)	2 E
22	Ring 1614.011-02522 (Wt)	1 E

Item	Designation	Qty.
23	Washer 11.5 TGL 0-434 gal Zn 15 cB	4 NS
24	Cable lug A 6x3.1 TGL 11108	6 NS
25	Cable lug A 8x8.2 TGL 11108	1 NS
26		
27		
28		
29	Cover board (250-W amplifier) 1614.011-01190	1 B
30	Cover board (KMS 1300) 1614.011-01195	1 B
31	Block 1787.009-02030 (Wt)	10 E
32	Sealing 1614.011-02010 (Wt)	10 E
33		
34		
35	Power-current fuse link F 200 TGL 0-41571	50 NS
36	Power-current fuse link F 2 TGL 0-41571	30 NS
37	Power-current fuse link F 4 TGL 0-41571	50 NS
38	Power-current fuse link F 6.3 TGL 0-41571	20 NS
39	Power-current fuse link T 35 TGL 0-41571	10 NS
40	Power-current fuse link T 1.6 TGL 6111	10 NS
41	Power-current fuse link T 2.5 TGL 6111	10 NS
42	Power-current fuse link T 10 TGL 6111	50 NS
43	Cemusil 2 tubes 80 g each Supplier: VEB Chemiewerk Nünchritz	160 N
44	Hydraulic oil HLP 36 TGL 17542/03	100 NS

Item	Designation	Qty.
45	Bottle A 50 TGL 8681	2 NS
46	Screw plug A-Rd 18/2-22x15 TGL 7-5006	2 NS
47	Bag FOS-PE 150x200 TGL 22115	4 NS
48		
49		
50	Case 1030.093-02020 (Wt)	1 E

List of terms translated for Drwg.-No. 1614.011-00001 Up (3)

1) Transmitter 1000 W, KSG 1300
2) External frequency standard
3) Power supply KNS 1320
4) Power supply
5) RF control unit
6) Channel A and B
7) Power amplifier KVS 1300
8) Interference criteria, K_s (power supply)
9) Process control unit, data section
10) KPS 1300 transmitter automatic system
11) Peripheral logic
12) Check-back bus
13) R telegraphy
14) RF disturbance criteria
15) Disconnection
16) Disturbance criteria, K_s
17) Input bus
18) Process disturbance
19) Indication/max. temperature
20) On 30/50 V

List of terms translated for Drwg.-No. 1614.011-00001 U (4) 4&5

1) Transmitter 1000 W KSG 1300, Arrangement of soldering bridges
2) REP-cassette (from 2nd series)
3) REP-cassette (up to 1st series incl.)
4) Interface converter
5) Battery changeover
6) Remote control section

1) Transmitter 1000 W KSG 1300, Arrangement of fuses
2) Protective circuit
3) PWM-logic

VEB Funkwerk Köpenick	Transmitter 1000 W KSG 1300	No.of pages: 1 Page: 1
Name Tag Datum	Nr. 1614.011-00001 Up (4) 02	VP Nr. / Nr.

Dieser Teil wird vom FWB ausgefüllt

Gerät/Anlage: KSE/1300
device/installation:
l'appareil/l'installation:
aparato/instalación:

Fabrik-Nr.: 84/252.00063
fabrication No.:
No. de fabrication:
número de fabricacion:

Endprüfung: 22.10.84
final test:
control final:
contrôle final:

Kontrolle FWB 488

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

Werkauslieferung: 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 procès-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 Bauelementen bestückt:

lfd. Nr.	Bauelemente	Kenn-Nr.	lfd. Nr.	Bauelemente	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.

Das umseitig beschriebene Gerät bzw. der Geräteumfang wurde auf Grund der geltenden Qualitätssicherungsordnung einer Kontrolle durch die Technische-Kontroll-Organisation (TKO) unterzogen.
Das Erzeugnis einschließlich der aufgeführten Geräteteile entspricht den „Technischen Lieferbedingungen", den einschlägigen DDR-Standards, den zutreffenden Vorschriften der Deutschen Post, der Funkverkehrsordnung „Genf 1969" sowie den Bestimmungen der Schutzgüte.

The product and/or the scope of units as listed on the front page have been submitted to a check by the Technical Control Organization (TKO) owing to the applying Quality Assurance Regulations.
The product as well as the listed partial units comply with the Technical Terms of Delivery, the relevant Standards of the GDR, the applying Regulations of the Ministry of Post and Telecommunication of the GDR, the Stipulations of the Radio Regulations "Geneva 1969", and with the Regulations of the Protection Classification.

Описанные на обороте приборы или комплектность прибора были, на основании действующего постановления по обеспечению качества, подвержены контролю со стороны отдела технического контроля (ОТК).
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