

TELEFUNKEN



**Allwave Receiver
E 639 AW/2**

Description



Allwave Receiver E 639 AW/2

Frequency Ranges: 250 kHz to 510 kHz and 0,55 MHz to 30 MHz

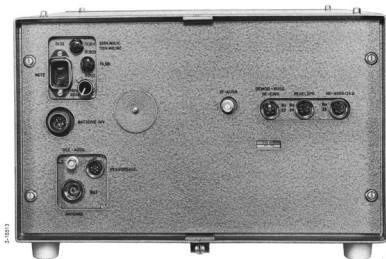
Description, Operating Instructions and Maintenance

3-18511



Allwave Receiver E 639 AW/2 in cabinet





Rear view of the Allwave Receiver E 639 AW/2 in cabinet

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1. TECHNICAL SUMMARY

1.1. Applications

Its large frequency range makes the Allwave Receiver E 639 AW/2 suitable as operating, search and surveillance receiver for all types of fixed and mobile radio receiving stations. The receiver is fully transistorised so that it has a low power consumption and long service life. It requires little maintenance. It is a lightweight unit with small dimensions. The all-wave receiver is equipped for mains and battery operation, so that it is particularly suitable for mobile utilisation in all types of vehicles and ships.

1.1.1. Extension possibilities with supplementary modules and accessories

(see also Block Circuit Diagram Sk 52-851, Bl.1)

The Allwave Receiver E 639 AW/2 can also be extended with supplementary modules and accessory modules, to constitute special receiving equipments:

Calibrating Oscillator EO 639 AW/2

The crystal-controlled calibrating oscillator provides calibrating markers at 100 kHz intervals throughout the entire reception frequency range. These serve for checking the frequency scale and permit recalibration of the receiver.

Bandsread Unit FL 639 AW/1

The crystal-controlled bandsread unit fulfils the function of the Calibrating Oscillator EO 639 AW/2 and in addition thereto provides a tuning scale calibration check with 1 kHz resolution. The additional calibrating markers of 1 kHz accuracy between two 100 kHz calibrating markers allow any desired reception frequency to be preset or to be determined subsequently.

Wideband IF Panorama Adapter Unit BPA 639 AW/2

The wideband panorama adapter possesses a wideband IF output as required for connecting a HF Panorama Accessory Unit PaG 724/525.

Crystal Oscillator QO 639 AW/1 for Fixed Frequency Reception

With this crystal oscillator in conjunction with crystal units plugged-in externally, fixed frequency reception (spot frequency operation) is possible in the range from 1 MHz to 23 MHz, in each case for a particular desired single reception frequency.

1.1.2. Extension with D.F. Adapter Unit PV 897 and Phase/Amplitude Regulator Unit PAR 1039

The D.F. adapter unit makes it possible to connect the allwave receiver to a 6-mast U-Adcock antenna system, whereupon it serves as D.F. receiver in the frequency range from 1.3 MHz to 25 MHz. With the additional phase/amplitude regulator, the receiver can be extended to constitute a Directional Rejection Receiving Equipment EST 1039.

1.1.3. Extension with Radio Teletype Keying Units 455 (FSK Converters)

In conjunction with radio teletype keying units (FSK converters), the allwave receiver can be used for reception of all types of digital code communications signals employing frequency shift keying.

1.2. Scope of Delivery and Accessories

- 1 Allwave Receiver E 639 AW/2, optionally in desk or rack version
- 1 Mains connecting cable according to 5 Lv 4941.001-58 or optionally
- 1 Battery connecting cable, Drawing No. 52.1131.070-00.
- 1 Antenna Plug, Type SHF 13/s-2, according to 5 N 4521.401-11, for 1.5/6.5 cable
- 1 Set of fuses and lamp bulbs, comprising:
 - 2 Equipment Fuse Cartridges T 0.1 B DIN 41571 according to 5 N 4811.065-01
 - 2 Equipment Fuse Cartridges T 0.16 B DIN 41571 according to 5 N 4811.067-01
 - 2 Equipment Fuse Cartridges T 0.5 B DIN 41571 according to 5 N 4811.072-01
 - 2 Festoon Lamps, 24 V 3 W, according to 5 Lv 5811.001-87
- 1 Description and Operating Instructions

Only to special order:

- 1 Calibrating Oscillator EO 639 AW/2 or
- 1 Bandspread Unit FL 639 AW/1.
- 1 Wideband Panorama Adapter BPA 639 AW/2
- 1 Crystal Oscillator QO 639 AW/1
- 1 Plug-In Crystal Unit for QO 639 AW/1, for one desired spot frequency
- 1 20-pole Test Cable, Drawing No. 52.1188.032-00
- 2 12-pole Test Cables, Drawing No. 52.1188.033-00
- 1 30-pole Test Cable, Drawing No. 52.1188.034-00
- 2 RF Test Cables, Drawing No. 52.0039.014-00

1.2.1. Connecting Plugs for the Allwave Receiver E 639 AW/2

Only to special order:

Connections	Designation	Item Number
Antenna Input	RF Plug (4/13)	5 N 4521.401-01 for 0.8/3.2 cable, or 5 N 4521.401-11 for 1.5/6.5 cable
	or RF Corner Plug	5 N 4521.402-01 for 0.8/3.2 cable, or 5 N 4521.403-01 for 1.5/6.5 cable
Oscillator Output IF Output (wide) IF Output (narrow)	RF Plug (BNC)	UG 88/U 5 Lv 4521.001-18

1.2.1. continued

Connections	Designation	Item Number
Battery Output (internal)	Coupling Plug 3-pole	5 Lv 4531.001-26
Demodulator Output AF Input	Coupling Plug 5-pole	5 Lv 4541.002-41
AGC Voltage Output 600 Ω Line Output and 2nd. Headset Output	Coupling Plug 5-pole	5 Lv 4531.001-28
D.F. Adapter Connection	6-pole Coupling Plug	5 Lv 4541.002-46
Mains Output (internal)	Plug with Fuse Bracket	5 Lv 4541.002-94 5 Lv 4591.002-41

1.2.2. Spare Parts (only to special order)

1 Loudspeaker	5 Lv 7701.001-11
1 Moving Coil Meter	5 Lv 7411.001-63
2 Carbon Potentiometers, 10 k Ω log. 1 W	5 Lv 5131.014-68
1 Carbon Potentiometer, 10 k Ω lin. 2 W	5 Lv 5131.014-20
3 Festoon Lamps, 24 V 3 W	5 Lv 5811.001-87
1 2-pole Changeover Switch	5 Lv 4612.001-43
1 Switch	52.1188.060-00 Bv
1 Switch	52.1188.061-00 Bv
1 Rotary Switch	5 Lv 4601.002-48
1 Control Knob	5 Lv 6301.003-10
1 Control Knob	5 Lv 6301.003-12
1 Control Knob	5 N 6301.021-01
1 Control Knob	5 Lv 6301.001-95
2 Button Knobs	52.1188.052-06 Fsz
1 Suppressor Choke	5 Lv 5051.001-77
1 Choke	52.1188.210-00 Bv
1 Choke	52.1188.140-00 Bv
1 Transformer	52.1188.211-00 Bv
1 Transformer	52.1188.431-00 Bv
1 Transformer	52.1188.432-00 Bv
1 Jack	5 N 4531.101-00
1 RF Jack	5 Lv 4511.001-14
1 RF Plug	5 Lv 4521.001-05
1 Coil	5 Lv 5051.001-43
1 Coil	52.1188.601-00 Bv
1 Coil	52.1188.602-00 Bv
1 Coil	52.1188.603-00 Bv
1 Coil	52.1188.604-00 Bv
1 Coil	52.1188.605-00 Bv

1 Coil	52.1188.606-00 Bv
1 Coil	52.1188.607-00 Bv
1 Coil	52.1188.608-00 Bv
1 Coil	52.1188.609-00 Bv
1 Coil	52.1188.610-00 Bv
5 Transistors, AF 134 V	5 Lv 5511.102-23
3 Transistors, AC 124 V	5 Lv 5511.102-41
1 Set of Fuses (3 x 2 fuses) - see Page 2, Section 1.2.-	

1.3. Technical Data

Frequency Range: 250 kHz to 510 kHz and
0.55 MHz to 30 MHz

Frequency Subranges:

Range 1	0.25 to 0.51 MHz
Range 2	0.55 to 1.05 MHz
Range 3	1.00 to 1.90 MHz
Range 4	1.80 to 3.42 MHz
Range 5	3.26 to 5.53 MHz
Range 6	5.30 to 8.48 MHz
Range 7	8.14 to 12.60 MHz
Range 8	12.15 to 17.50 MHz
Range 9	16.78 to 23.20 MHz
Range 10	22.35 to 30.00 MHz

Types of Service:

A1	CW Telegraphy
A2	MCW Telegraphy
A3	AM Telephony
A4	Facsimile, Picture Transmission

In conjunction with Radio Teletype Keying Units 455
(FSK Converters):

F1	2-frequency FSK Telegraphy (Teletype, Multiplex)
F1	3-frequency FSK Telegraphy (Data Transmission)
F4	2-frequency FSK Telegraphy (Facsimile, Weather Maps)
F6	4-frequency FSK Telegraphy (2 Teletype Channels, Code I and Code II)

In conjunction with the supplementary Wideband Panorama
Adapter Unit BPA 639 AW/2 and a Panorama Accessory Unit
PaG 724/525:

Surveillance of a frequency band up to 100 kHz wide.

In conjunction with a D.F. Adapter PV 897:

Operation as D.F. receiver, suitable for connecting to a
6-mast Adcock antenna system.

Read-Off Accuracies:

Cylindrical scale, graduation 294 mm long
Frequency scale drive ratio
coarse : fine = 1 : 16
1 mm scale displacement corresponds to about:

0.9 kHz in Range 1
1.7 kHz in Range 2
3.0 kHz in Range 3
5.3 kHz in Range 4
7.1 kHz in Range 5
10.8 kHz in Range 6
15.0 kHz in Range 7
18.0 kHz in Range 8
22.0 kHz in Range 9
26.0 kHz in Range 10

Setting Accuracy:	<p>Between +15°C and +25°C ambient temperature, after two hours operating time:</p> <p>up to 1 MHz better than ± 2.5 kHz up to 3.4 MHz better than ± 5 kHz up to 8.4 MHz better than ± 10 kHz up to 30 MHz better than ± 25 kHz</p> <p>In conjunction with the supplementary Bandsread Unit FL 639 AW/1: better than 1 kHz in ambient temperature range +10°C to +40°C better than 0.5 kHz in ambient temperature range +15°C to +25°C</p> <p>A 100 kHz harmonic spectrum can be generated and used for calibration checks, by incorporating the Calibrating Oscillator EO 639 AW/2 in place of the Bandsread Unit FL 639 AW/1.</p>
Frequency Drift:	<p>$\leq \pm (3 \times 10^{-5} / ^\circ\text{C} + 35 \text{ Hz})$</p> <p>$\leq 2 \times 10^{-6} + 50 \text{ Hz}$ for ± 10% mains voltage fluctuations and battery voltage fluctuations from 21.5 V to 31 V.</p>
Fixed Frequency Reception (Spot Frequency Operation):	<p>Through incorporation of the Crystal Oscillator QO 639 AW/1 and in conjunction with an external plug-in crystal unit, any single desired spot frequency in the range from about 1 MHz to 23 MHz can be set and received with crystal accuracy.</p> <p>Accuracy $2 \times 10^{-6} / ^\circ\text{C}$ at +20°C reference ambient temperature.</p> <p>Pulling range about $\pm 1 \times 10^{-4}$, adjustable on front panel.</p>
Sensitivity:	mean value 10 kT ₀ (10 dB)
Signal/Noise Ratio:	<p>≥ 10 dB for A1, bandwidth ± 250 Hz and 0.3 μV input signal EMF</p> <p>≥ 20 dB for A3, bandwidth ± 3000 Hz, 30% modulation depth and 10 μV input signal EMF</p>
Intermediate Frequency:	525 kHz

Bandwidths and Selectivity:

Switch Setting	Bandwidth for 3 dB down	Separation from passband center for response at least 60 dB down	Tolerance of passband center frequency in ambient temperature range +10°C to +40°C
± 0.25 kHz	≥ ± 0.25 kHz	≤ ± 0.9 kHz	≤ +200 / - 150 Hz
± 0.75 kHz	≥ ± 0.7 kHz	≤ ± 2.5 kHz	≤ +250 / - 200 Hz
± 3.0 kHz	≥ ± 2.7 kHz	≤ ± 6.5 kHz	≤ +300 / - 250 Hz

Image Frequency Rejection:

	Mean Value	Minimum Value
up to 2 MHz	95 dB	≥ 80 dB
from 2 to 12 MHz	75 dB	≥ 65 dB
from 12 to 30 MHz	50 dB	≥ 35 dB

IF Breakthrough Rejection:

≥ 90 dB
 from 250 kHz to 400 kHz and
 from 600 kHz to 1050 kHz > 60 dB
 from 400 kHz to 510 kHz and
 from 600 kHz to 550 kHz dropping to about 30 dB (IF gap)

Rejection of other
 response ambiguities:

Up to 12 MHz ≥ 60 dB) for antenna signal
 from 12 to 30 MHz ≥ 50 dB) EMF up to 10 mV

Cross-Modulation Factor:

An interfering signal with the specified EMF and 50% modulation depth produces a cross-modulation factor of 10%.
 Wanted signal 100 μ V unmodulated
 Interfering signal 10 mV, $m = 50\%$
 Off-tune ± 20 kHz

Parasitic Radiation:

Voltage from oscillator appearing at receiver input (terminated with 60 Ω):

	Mean Value	Maximum Value
up to 12 MHz	20 μ V	≤ 50 μ V
from 12 to 30 MHz	50 μ V	≤ 100 μ V

AGC:

The IF and AF output voltages change by less than 6 dB for input voltage changes between 1 μ V and 50 mV.

The AGC can be switched off for MGC. The AGC voltage is externally available for measuring purposes and diversity operation.

AGC Time Constant:

about 0.5 s

Beat Frequency Oscillator:

Tunable through at least ± 3000 Hz; can be switched off;
 $T_k \leq 10$ Hz / $^{\circ}\text{C}$

RF Input:

50 to 75 Ω , coaxial, protected from high antenna voltages up to 20 V rms EMF with $R_i = 60$ Ω .

Oscillator Output:

0.775 to 30.525 MHz ≥ 50 mV,
 load impedance ≥ 50 Ω

IF Output:

525 kHz, ≥ 50 mV, load impedance ≥ 50 Ω

Wideband IF Output
 (supplementary module):

525 kHz, bandwidth 100 kHz max.,
 load impedance ≥ 50 Ω

AF Passband:	from 200 Hz to 6000 Hz with 6 dB undulation	
Harmonic Distortion Factor:	< 10% at loudspeaker up to 250 mW < 10% at line output 600 Ω /0 dB	
AF Outputs:	2 headset outputs, high impedance 1 line output, 600 Ω /0 dB 1 loudspeaker (built in), 10 Ω 250 mW	
Power Supply:	a) 24 V battery supply (negative pole to chassis) permissible voltage fluctuation 21.5 to 31 V DC b) 110/220 V AC mains supply, 45 to 480 Hz permissible mains voltage fluctuation \pm 10%	
Power Consumption:	a) for 24 V battery operation: about 6.8 W (about 280 mA) in economy mode (without scale lighting) about 4.6 W (about 190 mA) b) for mains operation: about 14 VA	
Operating Time for Battery Operation without scale lighting:	a) with 24 V lead-acid storage battery: 5 hours per Ah of battery capacity b) with 20 commercial monocells or rechargeable cells: about 14 hours c) with 6 standard commercial 4.5 V pocket lamp batteries: about 2.5 hours	
Semiconductors fitted:	25 transistors 18 diodes	
Ambient Temperature Range:	+10°C to +40°C -20°C to +50°C -40°C to +70°C	full guarantee of performance specifications may be operated may be stored
Humidity Tolerance:	Operation is permissible for 96 hours with 90% relative humidity and +40°C ambient temperature.	
Vibration and Shock Tolerance:	Do damage results if the switched on unit is shaken with a stroke of 0.5 mm at 10 to 30 Hz or with an acceleration of 2 g at 30 to 70 Hz. Furthermore, mechanical shocks with 10 g acceleration and 10 ms duration are permissible.	

Dimensions and Weights:

	Height mm	Width mm	Depth mm	Net Weight approx. kg
Desk Version	224 ⁺	389	350	16
Rack Version	202	367	340 ⁺⁺	12
		(3/4 DIN)		

⁺) 246 mm with feet

⁺⁺) overall dimension

1.4. Functional Principles (see block and circuit diagrams)

1.4.1. Functional Principles of the Receiver

The Allwave Receiver E 639 AW/2 is a single superheterodyne receiver. Its large frequency coverage of 1 : 120 is divided into 10 subranges. The tuning capacitor assembly for each tuned circuit is subdivided into two tuning capacitor sections with different capacitance swings. Both tuning capacitor sections are connected in parallel in the ranges 1 to 4, the larger capacitance section is used in the ranges 5 to 7 and the smaller capacitance section is used in the ranges 8 to 10. The corresponding switching is effected with the range switch (1) which also brings into circuit the required preselector tuned circuit and second bandpass filter. The unused tuned circuits are grounded to chassis. The wavetrapp in Range 1 improves the IF breakthrough rejection factor.

1.4.1.1. RF Section (A)

When the receiver is switched to a given frequency range and the circuits in the RF section are tuned to the signal frequency, the antenna signal voltage from the RF input jack Bu 1 is fed via a relay Rs 501 and a pair of diodes as overvoltage protection, to the preselector tuned circuit (V 1 to V 10) and from there via a second diode pair as overvoltage protection, to the first transistor stage (Ts 501). This stage operates in grounded collector (emitter follower) circuit and functions as impedance changer to preserve small damping imposed on the preselector tuned circuits. The next transistor (Ts 502) operates in grounded base circuit. These two transistors employ strong negative feedback and AGC voltage is applied to them. These measures prevent excessive drive of the subsequent stage. The adopted circuit arrangement achieves good signal/noise ratio, high sensitivity and low back-reaction, so that parasitic radiation is small. Both transistors are protected by diodes to avoid exceeding the maximum permissible voltage between base and emitter.

From the second transistor stage, the signal is fed via the two-circuit tuned interstage bandpass filter (Z 1 to Z 10) to the mixer stage (Ts 503) which also employs negative feedback. The linearising effect to the negative feedback applied to the preselector and mixer stages improves the cross-modulation, intermodulation, blocking and other characteristics. The signal preselection with the preselector tuned circuit and interstage bandpass filter determines and improves the image frequency rejection factor, the IF breakthrough rejection factor and the rejection factor for other response ambiguities.

The local oscillator (Ts 507) is a free-running oscillator whose tuned circuits are also selected with the frequency range switch. To obtain good frequency stability, the local oscillator has been temperature compensated and its supply voltage is doubly stabilised. The oscillator voltage is taken off on a capacitive voltage divider on the collector side of Ts 507, and to prevent undesired back-reaction effects, it is fed to the mixer stage via a buffer stage (Ts 506).

The RF voltage of the crystal-controlled external oscillator can be fed in via a second buffer stage (Ts 505). The two buffer stages (Ts 505 and Ts 506) can be cut off or cut on. The local oscillator input (internal oscillator input) is cut on by connecting chassis via R 525 to the base voltage divider of Ts 506. At the same time, the external oscillator input is cut off by applying a blocking voltage via R 523 to the base voltage divider of Ts 505. Similarly, by interchanged application of the voltages, the external oscillator input is cut on and the internal oscillator input is cut off. The changeover switching is effected in the Crystal Oscillator QO 639/1 or in the shorting plug St 39. Beyond these two stages, the oscillator

voltage is also taken via a buffer stage to the oscillator output jack Bu 3 to which a frequency meter, e.g. TELEFUNKEN Type FA 990, can be connected.

In the RF section, the relays A and B of the D.F. Adapter Unit PV 897 are switched in the ranges 3 and 4 with the contacts 34, 35 and 36 of the range switch (1). These switching lines are taken out on the jack Bu 7.

In the mixer stage, the input signal frequency is converted to the 525 kHz intermediate frequency with the aid of the oscillator frequency. The IF signal is taken via the RF connection St 4/Bu 4 and the frame wiring, to the output coupling circuit.

1.4.1.2. Output Coupling Circuit (B)

The output coupling circuit is a π -filter. From here the IF signal is taken via the RF connection St 12/Bu 12 and a RF cable to the shorting plug St 45 and from there to the IF input jack Bu 18/St 18. The jack Bu 45 is required in the ELK 639 for connecting the VLF Adapter Unit LW 639.

1.4.1.3. IF Section (C)

In the IF section, the IF selection follows after the input stages. One of three different available bandwidths, 500 Hz, 1500 Hz and 6000 Hz, can be chosen with switched mechanical filters (Fi 351 to Fi 353). The switching is effected with respective pairs of switch transistors (Ts 351 to Ts 356), one ahead of and one beyond each filter. The bandwidth switch (3) applies the AGC voltage to the two transistors of the desired filter and at the same time applies a blocking voltage to the four transistors belonging to the other two filters. This largely prevents IF cross-couplings. The IF signal is now fed to an AGC regulated two-stage RC amplifier (Ts 357 and Ts 358) feeding a single tuned circuit, and from there via a buffer stage (Ts 359) to the IF output jack Bu 19 and parallel thereto via a second neutralised buffer stage (Ts 360) and the frame wiring to the AF section. This buffer stage is neutralised to prevent back-reaction from the beat frequency oscillator (BFO) to the IF output jack.

1.4.1.4. AF Section (D)

In the AF section, the IF voltage is taken to the AGC amplifier and to the demodulator stage (Ts 423). The demodulator stage uses a "leaky base" detector circuit. The AF signal is then fed via a low-pass filter to the switching jack Bu 23 (demodulator output and AF input) and to the front panel to the AF gain control (4). From there, the AF signal is taken back to the AF section, to the driver stage (Ts 424), to the push-pull output stage (Ts 425 and Ts 426) and to the output transformer Tr 422. From the secondary circuit of the output transformer, the AF signal is taken to the 600 Ω line output and second headset output at Bu 25 on the rear panel, and to the first headset output at Bu 36 and via the changeover switch (5) to the loudspeaker on the front panel. In the AGC amplifier, the IF voltage is amplified (Ts 427) and then rectified (Gr 424). The rectified voltage is then amplified in a DC amplifier (Ts 428). The base bias voltage of the transistor Ts 428 can be varied with the potentiometer R 459 for adjusting the AGC voltage to the desired value. This automatic gain control voltage is then fed via the mode switch (6) to the gain-controlled amplifier stages in the RF and IF section, and at the same time it is fed to Bu 24 and to Bu 45.

If the receiver is to be worked in parallel with a second receiver for diversity operation, the AGC characteristic of the AGC amplifier must be adjustable in order to match the two receivers. For this purpose, the jack Bu 24 has been provided on the rear of the AF section for connecting a potentiometer. If a 50 k Ω (approx.) potentiometer is connected between Bu 24/1 (+12 V) and Bu 24/3 (chassis) and its slider is connected to Bu 24/2, the gain of the IF amplifier stage (Ts 427) in the AGC amplifier, and thus the AGC voltage, can be adjusted with this potentiometer. In this simple manner the receiver signal levels can be matched correctly.

An additional rectifier branch (Gr 423) in the AGC amplifier provides the voltage for the relative field strength meter on the front panel.

The BFO is switched on via the mode switch (6) for reception of CW telegraphy signals (A1 service type). The BFO is a free-running oscillator (Ts 421) and its mean oscillation frequency of 525 kHz can be detuned through about ± 3 kHz with the BFO tuning control (8) via the varicap diodes (Gr 421 and Gr 422) connected in parallel with the tuned circuit capacitor. The BFO voltage is fed via a buffer stage (Ts 422) to the emitter of the demodulator stage transistor, where it beats with the IF signal. The BFO is accommodated in a metal case to avoid parasitic radiation.

1.4.1.5. Front Panel

The control voltage for manual RF gain control (MGC) is taken off on the front panel on a voltage divider (7) and fed to the mode switch (6). In the settings A1-Manual and A2/A3-Manual, this MGC voltage is fed to the gain-controlled stages. In the settings A1-Autom. and A2/A3-Autom., the automatic gain control voltage produced in the AGC amplifier is fed instead to the gain-controlled stages. In the settings A1-Manual and A1-Autom., the operating voltage is at the same time switched through to the BFO. The BFO tuning control (8) functions as voltage divider, the tapped off voltage serving to vary the capacitance of the varicap diodes. The logarithmic AF gain control (4) serves as volume control. The change-over switch (5) switches on the internal loudspeaker or places an equivalent AF load in circuit.

1.4.1.6. Power Supply (E) - Mains Power Unit -

In the power supply section, the mains supply voltage and the battery supply voltage are fed via respective filter circuits to the mains or battery switch (9), with which the unit can be switched on or off. The economy setting of this switch serves to switch off the scale lighting on battery operation. When the receiver is used as principal unit in a rack equipment, the power supply for the subsidiary units can be taken via the internal mains or battery output (Bu 30 and Bu 29) which are connected beyond the power switch (9). The mains voltage is fed from the switch via the fuse and the voltage selector to the mains transformer Tr 201, where it is transformed to 24 V, rectified by a bridge rectifier (Gr 201) and smoothed. The 24 V battery supply voltage is taken directly from the switch (9) via the fuse to the power supply circuit. The 24 V DC voltage is taken via a series resistor and the plug St 8 to the scale lamp. It also serves for switching the relay at the antenna input and it is taken to the 3 stabiliser branches. The DC voltages are stabilised with Zener diodes. In the first branch, the voltage is stabilised to 12 V with Gr 202. The stabilised voltage supplies the push-pull output stage in the AF section. In the second branch, Gr 203 provides another stabilised 12 V supply for feeding the other modules in the receiver. Double stabilisation is employed in the third branch, first to 16 V with Gr 204 and then to 11.2 V with Gr 205 and Gr 206,

for feeding the BFO tuning control (8) in a manner making the BFO frequency insensitive to supply voltage fluctuations.

1.4.2. Functional Principles of the Supplementary Modules

1.4.2.1. Calibrating Oscillator EO 639 AW/2 (F)

A DC voltage of 24 V is applied to the calibrating oscillator by pressing the button EICHEN (CALIBRATE) (10) on the front panel. At the same time, this button switches over to the narrow-band mechanical filter in the IF section and relay Rs 501 disconnects the antenna at the input to the RF section. The power supply to Bu 7 for the relay in the D.F. accessory unit is also interrupted. The DC supply voltage is stabilised to 12 V with a Zener diode. The calibrating oscillator contains a crystal-controlled 100 kHz oscillator. The oscillator voltage is applied to a differentiator network to produce needle pulses which are fed to a distorting stage producing a 100 kHz harmonic spectrum covering the entire reception frequency range. This harmonic spectrum is fed via a transformer and the plug connections Bu 42 and Bu 6 to the RF section, where it is injected between the preselector tuned circuit and the interstage bandpass filter. Thus the calibrating oscillator permits exact checks of the frequency scale at intervals of 100 kHz and a corresponding calibration correction of the receiver.

1.4.2.2. Bandspread Unit FL 639 AW/1 (G)

The bandspread unit contains the calibrating oscillator as described above, whereby the button EICHEN (CALIBRATE) (12) has the same function as previously. But the 100 kHz harmonic spectrum from the transformer (Tr 152) is fed to a ring modulator. In addition, the bandspread unit contains a free running, temperature compensated oscillator whose frequency can be varied from 200 kHz to 250 kHz with the tuning capacitor (11) on the front panel. The oscillator voltage is taken from a secondary winding on the oscillator tuned circuit to the ring modulator. The ring modulator has been chosen as mixer in order to suppress undesired harmonics. It mixes the 100 kHz harmonic spectrum of the calibrating oscillator with the frequency of the continuously tuned oscillator, the mixture being fed via the plug connections Bu 42 and Bu 6 to the RF section, the same as for the calibrating oscillator.

Thus the bandspread unit produces a 100 kHz harmonic spectrum and, in addition thereto, any desired movable frequency marker can be set with a spacing up to ± 50 kHz with respect to every 100 kHz marker, by tuning the continuously tunable oscillator accordingly. The variable frequency markers appear in image pairs symmetrically disposed on either side of the fixed 100 kHz markers, because the mixer product spectrum of the ring modulator takes the form $f = n \cdot 100 \text{ kHz} \pm f(\text{oscillator})$. Thus the bandspread unit serves to check the receiver frequency scale calibration between the 100 kHz marks, to tune the receiver in advance to any desired reception frequency, or to determine any tuned-in reception frequency subsequently with 1 kHz accuracy.

1.4.2.3. Wideband Panorama Adapter Unit BPA 639 AW/2 (H)

The wideband panorama adapter unit provides wideband output coupling of the IF signal for the Panorama Accessory Unit PaG 724/525. The IF signal is taken to the module from the mixer stage in the RF section via the frame wiring. A two-circuit bandpass filter having ± 50 kHz bandwidth is situated at the input of the wideband panorama adapter unit. From there, the IF signal is fed via a buffer stage (Ts 302) to the output jack Bu 13 on the rear of

the module, via a second neutralised buffer stage (Ts 301) parallel thereto to a π -filter, and from there via a RF cable and the shorting plug St 45 to the IF section.

1.4.2.4. Crystal Oscillator QO 639 AW/1 (J)

The QO 639 AW/1 serves as external oscillator for fixed frequency (spot frequency) reception.

The oscillator transistor Ts 101 of the crystal oscillator operates in grounded base circuit. The crystal with the pulling capacitor C 102 lies in the feedback path from the collector circuit to the emitter. The crystal frequency can be pulled with the tuning capacitor C 102 through about the factor of $\pm 1 \times 10^{-4}$. The oscillator voltage is fed via a buffer stage (Ts 102) and the frame wiring, to the RF section. The crystal and the collector circuit are mounted on a plug base St 40. The oscillator is switched on by plugging the crystal unit onto Bu 40. At the same time, the internal oscillator in the RF section is switched off, the internal oscillator input stage is cut off and the external oscillator input stage is cut on. A plug-in crystal unit is available for any desired spot frequency in the range from 1 MHz to 23 MHz.

A shorting plug St 40/A can be inserted into Bu 40 in place of the plug-in crystal unit. The crystal oscillator is then inoperative and the receiver again operates with its own internal oscillator.

1.5. Mechanical Construction

1.5.1. Mechanical Construction of the Receiver

The allwave receiver is available in two versions, as a 3/4 DIN drawer unit for rack equipment or as a desk unit in a cabinet.

The receiver is constructed almost exclusively from non-magnetic materials such as aluminium and brass and comprises a frame containing the individual modules and the front panel attached to the frame. All manual controls are mounted on the front panel. The front panel can be detached from the frame electrically by releasing three plug connectors and mechanically by releasing four screws. A plug on a short cable harness serves to establish the electrical connections between the manual controls and the frame wiring. The other two plugs are shorting plugs which are attached to the front panel with a sheet metal bracket. They are discarded when fitting the crystal oscillator, calibrating oscillator or bandspread supplementary units.

The frame comprises a well and two sidewalls attached thereto. Runners are present on the sidewalls under the well. When the front panel has been removed, the RF section can be pushed under the well from the front on these runners. The RF section has been provided with two Camloc fasteners for locking it in position in the frame.

On the left sidewall, above the well, is mounted an attaching bracket for the jack Bu 45 which is located there and takes up the shorting plug St 45.

Partitions divide the well into four compartments. Plastic guide rails are mounted on the right and left in each compartment. The four modules power supply section, output coupling circuit, IF section and AF section are pushed into these guide rails. Jacks are let into the

front side of the well for establishing the electrical connections between the pushed-in modules and the frame wiring. A common shielding lid is screwed down over the modules output coupling circuit, IF section and AF section.

The RF Section consists of a brass frame which is completed to a closed case with sheet aluminium panels screwed-on from below and above. At the front in the RF section is located the pressbutton assembly with its 10 switch wafers for switching the 10 oscillator tuned circuits. A paxolin switching strip is hooked in at the rear of each switching slider of this switch assembly and used for switching the preselector circuits and interstage bandpass filters. The oscillator circuits, preselector circuits and interstage bandpass filters are mounted on individual small paxolin boards directly above the switch wafers or switching strips. The alignment components (coils and trimmers) of the oscillator tuned circuits are accessible from the front, and those of the preselector circuits and interstage bandpass filters are accessible from below. All alignment components are easily operated when the unit without case is lying on one side wall.

The pressbuttons for actuating the range switch are located on the front panel, mechanically separated from the switch. Thus the switching slider is not moved when the pressbuttons are unintentionally touched, and the oscillator frequency remains constant. Holes are drilled in the front panel above the pressbuttons. These holes are normally closed with a covering plate and can be exposed when required to give access from the exterior for slight readjustment of the trimmers for the oscillator tuned circuits.

The main tuning capacitor is mounted on the right in the RF section, in a resiliently attached brass well. The mechanical link between the tuning capacitor and the drive system as well as between the two parts of the tuning capacitor, is established via membrane couplings. The coarse-fine drive possesses two reduction ratios of 1 : 6 and 1 : 96 respectively selected by pulling out or pushing in the tuning control knob. Thus the coarse drive permits rapid sweep through an entire frequency range and the fine drive enables a desired transmitter, a desired frequency or a desired calibrating marker to be tuned-in very exactly on the frequency scale.

The other circuit components, such as transistors and associated resistors and capacitors, are grouped on a printed circuit board mounted under the tuning capacitor.

The internal oscillator is built on a separate printed circuit board mounted directly onto the switching assembly. The wiring from these printed circuit boards to the switch wafers and tuned circuits is established across the switches and switching strips with silver-plated flat wires in a very synoptical manner.

The antenna jack, oscillator output jack and the jack for the control lines of the D.F. accessory unit are attached on the rear wall of the RF section frame, behind the printed circuit board and tuning capacitor. The power supply plug connection and the RF plugs for IF output, calibrating oscillator or bandsread unit input and external oscillator input are located on the front right on the upper side of the RF section. The drum scale and the scale lighting are attached to the lid above the oscillator tuned circuits. A tuning cord pulley for driving the frequency scale is mounted on the coarse-fine drive.

The drive rope (tuning cord) is a stranded diamond cord which runs from this pulley via an idler pulley and a tensioner round the scale and then via idler pulleys back to the cord drive pulley. For mounting the drive rope, the tuning scale can be locked in a definite setting with a blocking slider. For exact alignment of the scale, the rope can be slightly shortened or lengthened with an eccentric on the drive pulley (see also Sk 52-851, Bl.7).

The Power Supply Section consists of an aluminium chassis on which are mounted all large components and components requiring cooling. All small components are grouped together on a printed circuit board. A plug shoe attached to this circuit board establishes the electrical connection between the power supply section and the frame wiring. The circuit board is screwed onto the chassis on the front side. The extended shaft of the mains and battery power switch of the power supply section projects through a hole in the well and front panel, so that this switch can be actuated from the front panel of the receiver. On the rear side of the powersupply section, on the bent over chassis, are attached the mains and battery plug, the voltage selector switch and the fuseholder. Thus these items are readily accessible from the rear. The two jacks for internal power supply of accessory units in a common rack are screwed onto a mounting bracket which is spot-welded onto the chassis. The complete module is locked in position in the frame with a Camloc fastener.

The modules Output Coupling Circuit, IF Section and AF Section are similarly constructed. They each consist of a printed circuit board on which a plug shoe is attached at the front. At the bottom rear on each circuit board is attached a bracket serving for mechanical locking with a Camloc fastener. On the IF and AF board, at the top rear, a further bracket is mounted on each one and the respective output jacks are screwed onto these brackets. The jacks are arranged such that on the desk version of the receiver with cabinet, all associated plugs can be inserted directly through openings in the rear panel. On the IF section, after dip-soldering, the three mechanical filters are attached on the printed wiring side and connected to the circuit via soldering tiepoints. On the AF section, the BFO is accommodated in a metal container screwed onto the printed circuit board. For establishing the electrical connections, contact pins project out of the bottom of the container and these are pushed through the printed circuit board during assembly and soldered during the general soldering operations. All alignments and adjustments to these three modules can be effected in the assembled state from above through holes in the lid.

1.5.2. Mechanical Construction of the Supplementary Modules

1.5.2.1. Calibrating Oscillator EO 639 AW/2 and Bandsread Unit FL 639 AW/1

The calibrating oscillator and the bandsread unit possess the same basic mechanical construction. A printed circuit board with attached plug shoe for power supply is screwed to a sheet metal bracket on the inside. Under the printed circuit board, the pressbutton switch is attached to the bracket and connected with wires to the soldering tiepoints on the printed circuit board. The 100 kHz crystal is attached externally on the bracket. For the calibrating oscillator, the printed circuit board is only partially equipped, whereas it is fully equipped for the bandsread unit. In addition, the tuning capacitor is attached laterally above the printed circuit board on the bracket. Its shaft projects through the front panel when the bandsread unit has been incorporated in the receiver, and a pointer knob can be screwed on externally. The tuning scale for the bandsread unit is attached to the front panel externally and screwed to the bandsread unit bracket through the front panel. The complete module is screwed onto the front panel. The calibrating voltage is taken from the printed circuit board via a RF cable to a RF jack on the sheet metal bracket.

1.5.2.2. Crystal Oscillator QO 639 AW/1

The crystal oscillator consists of a printed circuit board and a sheet metal bracket. A jack for the crystal unit and below it the crystal frequency pulling trimmer are attached to the sheet metal bracket. The shaft of the pulling trimmer projects through the front panel when the module is incorporated in the receiver. The printed circuit board is attached on the other side of the bracket and possesses a plug shoe for power supply. The crystal oscillator is attached to the front panel. The crystal unit consists of a base with a printed circuit board mounted thereon. This printed circuit board carries the crystal and a tuned circuit. The plug-in crystal unit is accommodated in a shielding can. A shorting plug St 40/A is also supplied with the crystal oscillator. A mounting plate with contact springs is screwed externally to the front panel. It establishes the chassis connection between the shielding can of the plug-in crystal unit and the front panel.

1.5.2.3. Wideband Panorama Adapter BPA 639 AW/2

The wideband panorama adapter possesses the same mechanical design as the output coupling circuit, because it is fitted subsequently in place of the latter. It only possesses additionally at the top rear on the circuit board a sheet metal bracket carrying a RF jack for the wideband IF output.

2. OPERATING INSTRUCTIONS

2.1. Safety Precautions

The allwave receiver is capable of operating under ambient temperatures between -20°C and $+50^{\circ}\text{C}$. It has been developed for operation in buildings, motor vehicles, ships, etc. When operating the receiver, especially out of doors, it must be protected from rain, splashing water, excessive solar radiation, dust and sand.

Before commencing operation, make sure that the power supply section has been set to the correct mains input voltage and that for battery operation the battery cable is connected to the battery with the correct polarity.

The grounding screw terminal at the rear on the underside of the cabinet should be linked with a copper tape to a good ground connection.

2.2. Modification Instructions

2.2.1. Subsequent Incorporation of the Calibrating Oscillator EO 639 AW/2

Disconnect all plugs on the rear side of the receiver, release the 4 front panel catches and pull the unit out of the cabinet. Screw off the coverplate between the loudspeaker and the meter on the front panel. The shorting plate on the inside of the front panel is thereby released at the same time. Pull off Bu 41 and remove the shorting plate. Screw off the round cover disc, the spacer and the disc on the calibrating oscillator. Attach the calibrating oscillator to the front panel with the two lower screws. Insert the spacer into the upper hole and screw down together with the painted cover disc (exterior) and the disc (interior). Plug Bu 41 onto St 41 A and connect the calibrating oscillator to the RF section with the cable according to Drawing No. 52.1188.133-00, by plugging Bu 42 onto St 42 A and Bu 6 onto St 6. Screw off the cover sleeve and disc under the scale on the front panel and attach the control knob onto the pointer shaft. Reinsert the receiver into the cabinet and lock the front panel.

2.2.1.1. Functional Check of the EO 639 AW/2

Switch-on the receiver and press the EICHEN (CALIBRATE) button. Set the mode switch to A1-Autom. Adjust the BFO tuning control to give any convenient beat frequency pitch. Tune through several frequency ranges with the tuning control knob. A calibrating whistle must be audible at every 100 kHz interval. If necessary, the calibrating oscillator can be tested according to Section 3.2.2.4. and 3.3.5.

2.2.2. Subsequent Incorporation of the Bandsread Unit FL 639 AW/1

Disconnect all plugs on the rear side of the receiver, release the 4 front panel catches and pull the unit out of the cabinet. Screw off the coverplate between the loudspeaker and the meter on the front panel. The shorting plate on the inside of the front panel is thereby released at the same time. Pull off Bu 41 and remove the shorting plate. Take off the pointer knob and the scale on the bandsread unit and attach the bandsread unit to the front panel with the two lower screws. Place the scale onto the tuning capacitor shaft, observing proper

seating in the two guide pins, and then screw down. Screw on the pointer knob such that it does not scrape against the scale. Thereby make sure that the pointer knob reads exactly 0/100 kHz at the right stop and 50/50 kHz at the left stop. Plug Bu 41 onto St 41 B and connect the bandspread unit to the RF section with the cable according to Drawing No. 52.1188.133-00, by plugging Bu 42 onto St 42 B and Bu 6 onto St 6. Screw off the cover sleeve and disc under the scale on the front panel and attach the control knob to the pointer shaft. Reinsert the receiver into the cabinet and lock the front panel.

2.2.2.1. Functional Check of the FL 639 AW/1

Switch on the receiver and press the button EICHEN (CALIBRATE). Set the mode switch to A1-Autom. Adjust the BFO tuning control for any convenient beat frequency pitch. Set the bandspread unit pointer to 50/50 kHz and tune through several frequency ranges. Calibration whistles should thereby be heard at all 50 kHz intervals.

If three closely adjacent calibration whistles are heard in the setting 0/100 kHz, or two closely adjacent calibration whistles in the setting 50/50 kHz, realign the bandspread unit according to Section 3.3.6. and then test it according to Section 3.2.2.5.

2.2.3. Subsequent Incorporation of the Wideband Panorama Adapter BPA 639 AW/2

Disconnect all cables and plugs from the rear panel of the allwave receiver, take off the rear panel and pull off Bu 12 from St 12. Then unlock the output coupling circuit AK and pull it out. Push the wideband panorama adapter unit in in place of the output coupling circuit, lock it in position and plug Bu 12 onto St 12 A. Reattach the rear panel after removing the round cover disc.

2.2.3.1. Functional Check of the BPA 639 AW/2

.1. Checking the Bandwidth and Gain

Connect the RF signal generator to Bu 1. Set the mode switch to the position A2/A3-Manual. Turn the RF gain control to maximum. Feed-in a 25 MHz signal from the signal generator, switch to Range 10 and tune the receiver. Connect a VTVM to Bu 13 (terminated with 56 Ω) and adjust the RF gain control for 17 mV reading. Detune the RF signal generator through ± 50 kHz. The voltage at Bu 13 may thereby reduce by up to 3 dB. Retune the RF signal generator to the band center frequency. Connect the VTVM to St 12 A (terminated with 1 k Ω) and then adjust R 304 for 16.5 mV reading.

.2. Checking the Sensitivity

As described under 3.3.8.2., recheck the sensitivity on all ranges. It must be 10 kT₀ or better.

2.2.4. Subsequent Incorporation of the Crystal Oscillator QO 639 AW/1

Disconnect all plugs from the rear panel of the allwave receiver, release the four front panel catches and pull the unit out of the cabinet. Screw off the coverplate at the top left adjacent to the BFO tuning control. This releases the shorting plate on the inside on the front

panel. Pull off Bu 39 and remove the shorting plate. Screw on the crystal oscillator on the inside on the front panel, and at the same time screw on the mounting plate with the spring tapes and the coverplate on the outside of the front panel. Then screw on the pointer knob on the external section of the tuning capacitor shaft, such that it does not scrape on the front panel and such that the pointer reads against the graduation line on the extreme left when the tuning capacitor is fully enmeshed to maximum capacitance. Then push the receiver back into its cabinet and lock the front panel.

2.2.4.1. Functional Check of the QO 639 AW/1

Connect the RF signal generator to Bu 1 and feed in a frequency of $f = f(\text{crystal}) - 525 \text{ kHz}$. Mount a plug-on crystal unit for any convenient spot frequency. If the RF signal generator is not modulated, set the mode switch to A1-Autom. Switch the receiver to the appropriate frequency range, tune it to the frequency of the signal generator and check the reception.

2.3. Operation

2.3.1. First-Time Operation of the Receiver

Before commencing operation, check whether the shorting plug St 45 inside the unit is inserted onto the jack Bu 45.

2.3.1.1. Battery Operation

The nominal operating voltage of the receiver for battery operation is 24 V. The actual battery voltage may fluctuate between the limits 21.5 V to 31 V. The battery connection is established with the 2-pole battery cable according to Drawing No. 52.1131.070-00. The end of this cable carrying the jack must be plugged or screwed onto the plug BATTERIE 24 V (24 V BATTERY) on the rear of the unit. The other end with the marked cable lugs must be connected to the battery. It is important to observe correct polarity. The fuse for battery operation is Si 202 on the rear of the receiver, with rating T 0.5 B.

2.3.1.2. Mains Operation

The Allwave Receiver E 639 AW/2 may be operated on 110 V or 220 V $\pm 10\%$ AC mains supplies with 45 to 480 Hz nominal frequency. Unless a different mains supply voltage is specifically demanded with order, the receivers are set at the factory for 220 V AC nominal mains voltage. For operation on a 110 V AC supply, the voltage selector switch on the rear of the unit must be pulled out and the switch knob then turned until the pointer line indicates 110 V, whereupon the knob should be pressed in again again. The mains fuse must be exchanged when switching over to a different mains voltage. The correct ratings are 0.16 A medium delayed for nominal 110 V AC input, and 0.10 A medium delayed for nominal 220 V AC input. The mains connection is established with the mains connecting cable according to Drawing No. 5 Lv 4941.001-58 (3-pole cable). The socket end of the cable must be plugged onto the plug NETZ (MAINS) on the rear of the receiver, and the grounded plug on the other end of the cable must be inserted into a power point with ground contact.

2.3.2. Operating Instructions for Manual Controls

Position	Manual Control	Function
1	Range Selector Switch	Selector switch for the 10 frequency subranges
2	Tuning Control	Coarse/fine tuning within each frequency range
3	Bandwidth Switch	Selection of ± 0.25 kHz, ± 0.75 kHz or ± 3 kHz bandwidth
4	AF Gain Control	Volume adjustment
5	Loudspeaker Switch	On/off switch for loudspeaker
6	Mode Switch	Selection of MGC or AGC; in A1 service type switch-on of BFO
7	RF Gain Control	Manual adjustment of RF gain (MGC)
8	BFO Tuning Control	Tuning of the BFO through ± 3 kHz
9	Power Switch	On/off switch for the receiver
10	Pressbutton "Calibrate"	On/off switch for the calibrating oscillator
11	Bandsread Unit Tuning Control	Adjustment of calibration with bandsread unit
12	Pressbutton "Calibrate"	On/off switch for bandsread unit
13	Crystal Oscillator Tuning Control	Adjustment of crystal oscillator pulling trimmer
14	Plug-In Crystal Unit (or shorting plug)	Plug in the crystal unit for spot frequency reception; plug in the shorting plug for reception with the internal local oscillator (only when crystal oscillator unit incorporated)
15	Pointer Displacement Knob	Facility for displacing the pointer (only when incorporating the calibrating oscillator or bandsread unit) for recalibration

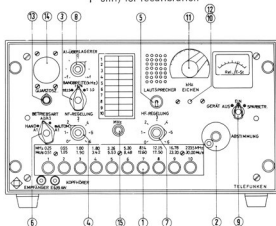


Fig. 1: View of the manual controls on the front panel, with supplementary modules FL 639 AW/1 (11) and QO 639 AW/1 (14) incorporated

2.3.2.1. Operation of the Receiver

Process	Manual Control	Execution	Remarks
Switch-On	9	Set switch to EIN (ON) or set switch to SPARBETR.(ECONOMY)	Receiver is switched on; scale lamp lights Receiver is switched on; scale lamp inoperative
Reception of a transmitter in A1 service type	3	Set switch to ± 3 kHz	Wideband mechanical filter in circuit for search operation
	6	Set switch to A1-Autom.	BFO switched on, AGC operative
	4	Turn AF gain control to maximum	Maximum volume obtained
	8	Commencing from 0 turn the control to the first graduation in +f or -f direction	BFO pitch is set to about 1 kHz, i.e. BFO frequency is about 524 or 526 kHz
	1	Press the range button	The desired frequency range has been selected
	2	Press the tuning control knob	Search for the transmitter with the coarse drive, or set the desired frequency coarsely
	3	Set switch to ± 0.25 kHz	Narrow band mechanical filter switched into circuit
	2	Pull out the tuning control knob	Exactly tune in the transmitter with the fine drive, or set the desired frequency exactly
	4	Turn back the AF gain control	Set for desired volume
	8	Adjust the AF pitch with this control	Adjust the AF pitch such that the unwanted one of any two closely adjacent transmitters is no longer heard
	6	Set switch to A1-Manual	If manual RF gain control (MGC) is desired
	7	Turn up RF gain control	Check the drive level on the relative field strength meter; increase drive only to full scale meter deflection

Process	Manual Control	Execution	Remarks
Reception of a Transmitter in A2 or A3 service type	3	Set switch to ± 3 kHz	Wideband mechanical filter is switched into circuit
	6	Set switch to A2/A3-Autom.	AGC is operative
	4	Turn AF gain control to maximum	Maximum volume is obtained
	1	Press the range button	The desired frequency range has been selected
	2	Press-in the tuning control knob	Search for the transmitter with the coarse drive, or set the desired frequency coarsely
		Pull-out the tuning control knob	With the fine drive, tune in the desired transmitter or the desired frequency exactly
	4	Turn back the AF gain control	Set for desired volume
	3	Set switch to ± 0.75 kHz	For A2 service type or for special applications narrower bandwidth selected
	6	Set switch to A2/A3-Manual	If manual RF gain control (MGC) desired
	7	Turn up the RF gain control	Check the drive level on the relative field strength meter; increase drive only to full scale meter deflection

2.3.2.2. Operation with Calibrating Oscillator EO 639 AW/2

Check of Frequency Scale Calibration	6	Set switch to A1-Autom.	BFO is switched on; AGC is operative
	10	Press the button EICHEN (CALIBRATE)	Calibrating oscillator is switched on; antenna is switched off; ± 0.25 kHz mechanical filter is switched into circuit
	4	Turn up the AF gain control	Maximum volume is obtained

Process	Manual Control	Execution	Remarks
Check of Frequency Scale Calibration (continued)	1	Press the range button	The desired frequency subrange has been selected
	2	Pull-out the tuning control knob	Using the fine tuning drive, tune to any convenient 100 kHz graduation (adjust for maximum pointer deflection on relative field strength meter)
	8	Turn the control	Set for any convenient AF pitch
	2	Turn the tuning control through entire range	Check the calibration; a calibration whistle and a maximum reading on the relative field strength meter should be obtained exactly at each 100 kHz graduation
	15	Displace the pointer	If necessary, slightly displace the pointer to make the pointer line coincide exactly with a 100 kHz scale graduation
	10	Press the button EICHEN (CALIBRATE)	The calibrating oscillator is switched off again

2.3.2.3. Operation with Bandsread Unit FL 639 AW/1

Check of Frequency Scale Calibration or Tuning the Receiver to a predetermined Reception Frequency	6	Set mode switch to A1-Autom.	BFO is switched on, AGC is operative
	12	Press the right button EICHEN (CALIBRATE)	The bandsread unit is switched on. The antenna is switched off and the ± 0.25 kHz filter is in circuit
	4	Turn the AF GAIN control fully to the right	Maximum volume is obtained
	1	Press the range button	The desired frequency subrange has been selected
	11	Set pointer knob to 0/100 kHz	The bandsread unit now generates only 100 kHz calibration markers
	2	Pull-out the right ABSTIMMUNG (TUNING) control knob	Use the fine tuning drive to tune to a 100 kHz graduation (maximum reading on relative field strength meter) whose separation from the frequency to be set or checked is less than ± 50 kHz

Process	Manual Control	Execution	Remarks
Check of Frequency Scale Calibration or Tuning the Receiver to a pre-determined Reception Frequency (continued)	2	Right ABSTIMMUNG (TUNING) control knob pulled out	Detune slightly to the left and right of this 100 kHz scale graduation until a calibration whistle is heard and a maximum reading is obtained on the meter
	15	Control knob for MHz scale pointer (below MHz scale)	If necessary, displace slightly until the pointer line coincides exactly with the 100 kHz scale graduation
	8	BFO tuning control	Adjust for any convenient BFO pitch
	11	Set bandspread unit tuning control to desired frequency	The bandspread unit can be tuned to any desired frequency separation or graduation between two 100 kHz graduations of the scale
	2	Tuning control knob is pulled out	With the fine tuning drive, slowly tune the MHz scale towards the set or to be checked frequency, until the calibrating frequency set on the bandspread unit has been reached and the calibrating whistle (heterodyne) is heard and the relative field strength meter shows maximum reading. Then check the calibration or leave the tuning control set to the tuned-in frequency
	12	Press the right button EICHEN (CALIBRATE)	The receiver is ready for signal reception; the bandspread unit is switched off again
Subsequent Determination of a Reception Frequency. Check the Frequency Calibration according to the foregoing Section before making a Frequency Determination	2	Do not touch the tuning control knob again	The tuning must not be displaced, because frequency determination is no longer possible otherwise
	6	Set MODE switch to A1-AUTOM.	BFO is switched on; AGC is operative for RF gain control
	12	Press the button EICHEN (CALIBRATE)	The bandspread unit is switched on. The antenna is switched off and the ± 0.25 kHz mechanical filter is in circuit
	4	Turn AF GAIN control fully to the right	Maximum volume is obtained

Process	Manual Control	Execution	Remarks
Subsequent Determination of a Reception Frequency. Check the Frequency Calibration according to the foregoing Section before making a Frequency Determination (continued)	11	Tuning of bandspread unit with pointer knob	The bandspread unit is tuned to the received frequency until a heterodyne whistle is heard or the relative field strength meter reads maximum. Read the frequency spacing on the scale and add it to the last 100 kHz graduation below the measured frequency. If a value close to 100 kHz is obtained as reading, e.g. 2/98 kHz, turn the tuning control knob to the right. If no heterodyne whistle is then heard in the immediate vicinity (and no maximum reading is obtained on the meter), then the smaller number (e.g. 2) should be added to the value of the 100 kHz graduation. But if 2 further heterodyne whistles (or two further maximum meter readings) are obtained in the immediate vicinity, then the larger number (e.g. 98) should be added to the value of the preceding 100 kHz graduation. If a reading close to 50 kHz is obtained (e.g. 49/51), then also turn the tuning control knob to the right. If no further heterodyne whistle is then heard (or no further maximum reading is obtained on the meter) in the immediate vicinity, then the larger number (e.g. 51) should be added to the value of the preceding 100 kHz graduation. But if one further heterodyne whistle (or one further maximum meter reading) is obtained, then add the smaller number (e.g. 49) to the value of the preceding 100 kHz graduation.

2.3.2.4. Operation with Crystal Oscillator QO 639 AW/1

Spot Frequency Reception	14	Take off the shorting plug	The internal local oscillator is switched off; the crystal oscillator is switched on
	1	Press the range button	The receiver is switched to the desired frequency subrange

Process	Manual Control	Execution	Remarks
Spot Frequency Reception (continued)	2	Adjust the tuning control knob	Tune to the desired transmitter or to the desired reception frequency
	13	Make fine adjustment to the crystal oscillator tuning control knob	Compensation of crystal tolerances or temperature drifts, if necessary

2.4. Receiver and D.F. Equipments with the Allwave Receiver E 639 AW/2

It is evident from the block diagram for receiver equipments given under 4.4.3., how the allwave receiver must be connected to the various accessory units in order to constitute these composite equipments. The following typical receiver equipments are cited as examples. A wide range of variations is available to meet individual requirements.

2.4.1. Allwave Receiver Equipment

In this receiver equipment, the Allwave Receiver E 639 AW/2 is operated with an allwave antenna and an antenna filter. A frequency indicator, a panorama accessory unit and a tape recorder are connected as accessory units.

2.4.2. HF Aural D.F. Equipment

In the HF aural D.F. equipment, the Allwave Receiver E 639 AW/2 is operated with a 6-Mast U-Adcock antenna system. A frequency indicator and a panorama accessory unit are connected as accessory units.

2.4.3. Directional Rejection Receiver Equipment

In the directional rejection receiver equipment, the Allwave Receiver E 639 AW/2 is operated with a phase/amplitude regulator, a D.F. adapter, an Adcock antenna system and an allwave antenna. A teletype keying unit (FSK converter) and teletypewriter, a frequency indicator and a panorama accessory unit are connected as accessory units.

2.5. Shut-Down and Storage of the Allwave Receiver E 639 AW/2

It suffices to switch the unit off if operation of the Allwave Receiver E 639 AW/2 is to be discontinued only for short periods. Thereby it is not necessary to disconnect the cables to the power source and to the accessory units. If operation of the unit is to be discontinued for a lengthy period, the unit should be stored in the original delivery package or in similar containers giving protection from dust. The allwave receiver should be stored in dry protected rooms. It may be stored at ambient temperatures from -20°C to $+70^{\circ}\text{C}$.

3. MAINTENANCE

To maintain the unit in perfect working order for long periods, maintenance tasks and tests must be carried out at regular intervals.

3.1. Basic Maintenance (carried out by operating personnel)

3.1.1. Cleaning the Unit

Regularly dust the cabinet and clean the manual controls with a small dusting brush. Clean the scale coverplate with a linen rag (moistened with methylated spirit if necessary).

3.1.2. Maintenance Tasks before Commencing Operation

After lengthy storage or interruption of operation, actuate every switch several times before recommencing operation. Withdraw and reinsert all plugs several times. These switch and plug actuations are intended to break up any oxidation layers which may have formed.

3.1.3. Functional Check

Connect the unit to the antenna and to the power supply and switch it on. Set the mode switch to A1 or A2/A3 Automatic, and set the bandwidth selector switch to ± 3 kHz. Then adjust the tuning control knob to tune in a transmitter. Set the AF gain control (volume) to any convenient position. Check that the built-in meter gives a reading. Now set the mode switch to A1 or A2/A3 Manual. Advance the manual RF gain control until the meter pointer stands at about the center of the scale.

3.2. Minor Maintenance (carried out with simple facilities)

3.2.1. Maintenance Tasks

3.2.1.1. Cleaning

Take the receiver out of the cabinet. Remove any dust deposits with a rag and small brush. Blow-out dust from inaccessible places (do not use an excessively powerful air jet). Pull the modules NT, AK, ZF(IF) and NF(AF) out of the frame and clean these, also all switch wafers especially those of the frequency subrange switch, with a small dry brush.

3.2.1.2. Lubrication

All parts at the stated places should be treated with the specified lubricants. Old lubricant residues must be removed first. Do not lubricate the bearing points of drive rope pulleys and the scale.

		Teresso C 5	Andok B	Kontakt 60
Front Panel:	Latch Mechanism of Mode and Bandwidth Switches, Bearing of Switch Shaft "Gerät" (Power), Guide Mechanism of Pressbuttons Contacts of Mode and Bandwidth Switches Bare Parts of Switches and Potentiometer Shafts	x	x	x
Power Supply Section:	Latch Mechanism of "Gerät" (Power) Switch Contacts of "Gerät" (Power) Switch Bare Parts and Shaft of "Gerät" (Power) Switch	x	x	x
RF Section:	Bearing Points of Drive, Gears of Drive and Range Switch Mechanism Contacts of Range Switch Bare Parts of Range Switch and Drive	x	x	x

3.2.1.3. Time Schedule

	Stationary Operation		Mobile Operation		
	3 Months	12 Months	3 Months	12 Months	
Cleaning		x	x		see 3.2.1.1.
Lubrication		x		x	see 3.2.1.2.
Functional Check	x		x		see 3.1.3.
Calibration Check	x		x		see 2.3.2.2.

3.2.2. Checking the Operating Voltages

Measurements of the operating voltages facilitate location of defective components. Use a voltmeter with at least 100 k Ω /V internal resistance for making these measurements. After switching on, first use a DC or AC meter with not more than 4 Ω internal resistance on its 0.3 A current range, to check the current drain:

Mains operation, 220 V AC: Current drain min. 50 mA, max. 70 mA AC
 Mains operation, 110 V AC: Current drain min. 80 mA, max. 120 mA AC
 Battery operation, 24 V DC: Current drain min. 260 mA, max. 300 mA DC

To check the operating voltage, take off the shorting plug St 45.

Nominal readings:

Between Bu 45/b 5 (+) and Bu 45/b 3 (-) min. 24.0 V, max. 29.5 V

Between Bu 45/b 4 (+) and Bu 45/b 3 (-) min. 10.8 V, max. 13.2 V

Plug St 45 back on.

3.2.2.1. RF Section: Check of Operating Voltages (see 4.3.1., 4.4.4. and 4.4.4.1.)

Screw off the lid at the bottom right on the RF section. Set the mode switch to A2/A3-Manual. Turn the RF gain control to its right-hand stop.

Measuring Point		Voltage Reading (V)	
		min.	max.
Point 21	with respect to chassis	10.8	13.2
Gr 503 (+)	with respect to chassis	7.7	8.7
Ts 501	C with respect to point 21	10.8	13.2
	B with respect to point 21	6.5	8.0
	E with respect to point 21	6.3	7.8
Ts 502	C with respect to point 21	10.8	13.2
	B with respect to point 21	6.5	8.0
	E with respect to point 21	6.3	7.8
Ts 503	C with respect to point 21	10.6	13
	B with respect to point 21	1.2	1.5
	E with respect to point 21	1.0	1.4
Ts 504	C with respect to point 21	9.6	11.8
	B with respect to point 21	7.6	9.4
	E with respect to point 21	7.4	9.1
Ts 505	C with respect to Gr 503 (+)	6.8	8.4
	B with respect to Gr 503 (+)	4.7	5.8
	E with respect to Gr 503 (+)	5.1	6.3
Ts 506	C with respect to Gr 503 (+)	6.8	8.4
	B with respect to Gr 503 (+)	5.3	6.5
	E with respect to Gr 503 (+)	5.1	6.3
Ts 507	C with respect to Gr 503 (+)	7.7	8.7
	B with respect to Gr 503 (+)	2.8	3.4
	E with respect to Gr 503 (+)	2.6	3.2

3.2.2.2. IF Section: Check of Operating Voltages (see 4.3.1. and 4.4.6.)

Screw off the lid over the modules AK, ZF(IF) and NF(AF). Connect the IF section via the 12-pole test cable according to Drawing No. 52.1188.033-00. Turn the RF gain control to its right-hand stop. Set the mode switch to A2/A3-Manual.

Measuring Point			Voltage Reading (V)	
			min.	max.
in bandwidth setting ± 3 kHz				
Ts 351	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	7.3	8.9
	E	with respect to St 17/3	7.0	8.6
Ts 352	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	6.75	8.25
Ts 353	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	6.75	8.25
Ts 354	C	with respect to St 17/3	9.2	11.2
	B	with respect to St 17/3	7.3	8.9
	E	with respect to St 17/3	7.0	8.6
Ts 355	B	with respect to St 17/3	6.75	8.25
Ts 356	B	with respect to St 17/3	6.75	8.25
in bandwidth setting ± 0.75 kHz				
Ts 351	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	6.75	8.25
Ts 352	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	7.2	8.8
	E	with respect to St 17/3	6.9	8.5
Ts 353	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	6.75	8.25
Ts 354	B	with respect to St 17/3	6.75	8.25
Ts 355	C	with respect to St 17/3	9.25	11.3
	B	with respect to St 17/3	7.2	8.8
	E	with respect to St 17/3	6.9	8.5
Ts 356	B	with respect to St 17/3	6.75	8.25
in bandwidth setting ± 0.25 kHz				
Ts 351	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	6.75	8.25
Ts 352	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	6.75	8.25
Ts 353	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	7.2	8.8
	E	with respect to St 17/3	6.9	8.5
Ts 354	B	with respect to St 17/3	6.75	8.25
Ts 355	B	with respect to St 17/3	6.75	8.25

3.2.2.2.
IF Section
(continued)

Measuring Point			Voltage Reading (V)	
			min.	max.
Ts 356	C	with respect to St 17/3	9.2	11.2
	B	with respect to St 17/3	7.2	8.8
	E	with respect to St 17/3	6.9	8.5
Ts 357	C	with respect to St 17/3	10.6	13
	B	with respect to St 17/3	7.3	8.9
	E	with respect to St 17/3	7.0	8.6
Ts 358	C	with respect to St 17/3	10.8	13.2
	B	with respect to St 17/3	7.2	8.8
	E	with respect to St 17/3	6.9	8.5
Ts 359	C	with respect to St 17/3	10.5	12.9
	B	with respect to St 17/3	7.65	9.35
	E	with respect to St 17/3	7.4	9.1
Ts 360	C	with respect to St 17/3	9.7	11.9
	B	with respect to St 17/3	8.35	10.2
	E	with respect to St 17/3	8.1	9.9

3.2.2.3. AF Section: Check of Operating Voltages (see 4.3.2. and 4.4.7.)

Screw off the lid over the modules AK, ZF(IF) and NF(AF). Connect the AF section via the 30-pole test cable according to Drawing No. 52.1188.034-00. Set the mode switch to A1-Autom. Set R 549 to its left-hand stop. Set the BFO tuning control to its left hand stop.

Measuring Point			Voltage Reading (V)	
			min.	max.
Ts 421	C	with respect to St 22/19	10.8	13.2
	B	with respect to St 22/19	3.0	3.6
	E	with respect to St 22/19	2.8	3.4
Ts 422	C	with respect to St 22/19	10.0	12.2
	B	with respect to St 22/19	4.8	5.9
	E	with respect to St 22/19	4.6	5.6

in operating mode A2/A3-Automatic

Ts 423	C	with respect to St 22/19	10.6	13
	B	with respect to St 22/19	0.9	1.1
	E	with respect to St 22/19	0.63	0.77
C 435	(+)	with respect to St 22/19	10.6	13
C 436	(+)	with respect to St 22/19	1.25	1.55
Ts 424	C	with respect to St 22/19	10.6	13.0
	B	with respect to St 22/19	1.25	1.55
	E	with respect to St 22/19	1.15	1.45
Tr 421	black	with respect to St 22/12	0.14	0.17

3.2.2.3.
AF Section
(continued)

Measuring Point			Voltage Reading (V)	
			min.	max.
Ts 425	C	with respect to St 22/12	10.8	13.2
	B	with respect to St 22/12	0.14	0.17
	E	with respect to St 22/12	0.018	0.022
Ts 426	C	with respect to St 22/12	10.8	13.2
	B	with respect to St 22/12	0.14	0.17
	E	with respect to St 22/12	0.018	0.022
Ts 427	C	with respect to St 22/19	3.5	4.6
	B	with respect to St 22/19	1.7	2.1
	E	with respect to St 22/19	1.5	1.9
C 439 (+)		with respect to St 22/19	1.6	2.0
Ts 428	C	with respect to St 22/19	0.34	0.42
	B	with respect to St 22/19	0.32	0.4
	E	with respect to St 22/19	0.07	0.09

3.2.2.4. Calibrating Oscillator EO 639 AW/2: Check of Operating Voltages (see 4.3.4. and 4.4.9.)

Press the button "EICHEN" (CALIBRATE).

Measuring Point			Voltage Reading (V)	
			min.	max.
Gr 133 (+)		with respect to chassis	10.8	13.2
Ts 131	C	with respect to Gr 133 (+)	10.8	13.2
	B	with respect to Gr 133 (+)	2.7	3.5
	E	with respect to Gr 133 (+)	2.6	3.4
Ts 132	C	with respect to Gr 133 (+)	3.0	3.8
	B	with respect to Gr 133 (+)	0.4	0.6
	E	with respect to Gr 133 (+)	0.28	0.4

3.2.2.5. Bandsread Unit (FL 639 AW/1): Check of Operating Voltages (see 4.3.4. and 4.4.10.)

Press the button "EICHEN" (CALIBRATE).

Measuring Point			Voltage Reading (V)	
			min.	max.
Gr 154 (+)		with respect to chassis	10.8	13.2
Ts 151	C	with respect to Gr 154 (+)	10.8	13.2
	B	with respect to Gr 154 (+)	1.2	1.6
	E	with respect to Gr 154 (+)	1.0	1.4
Ts 152	C	with respect to Gr 154 (+)	3.2	4.0
	B	with respect to Gr 154 (+)	0.35	0.45
	E	with respect to Gr 154 (+)	0.25	0.35

3.2.2.5.
Bandspread
Unit
(continued)

Measuring Point		Voltage Reading (V)	
		min.	max.
Ts 153 C	with respect to Gr 154 (+)	10.8	13.2
	B with respect to Gr 154 (+)	2.7	3.8
	E with respect to Gr 154 (+)	2.6	3.7

3.2.2.6. Wideband Panorama Adapter BPA 639 AW/2: Check of Operating Voltages
(see 4.3.4. and 4.4.11.)

Screw off the lid over the modules BPA, ZF(IF) and NF(AF). Connect the BPA via the 12-pole test cable according to Drawing No. 52.1188.033-00. Turn R 304 to its right-hand stop.

Measuring Point		Voltage Reading (V)	
		min.	max.
C 305 (+)	with respect to chassis	10.8	13.2
Ts 301 C	with respect to St 11 A/3	10.5	12.9
	B with respect to St 11 A/3	3.6	4.4
	E with respect to St 11 A/3	3.4	4.2
Ts 302 C	with respect to St 11 A/3	10.2	12.6
	B with respect to St 11 A/3	3.6	4.4
	E with respect to St 11 A/3	3.4	4.2

3.2.2.7. Crystal Oscillator QO 639 AW/1: Check of Operating Voltages
(see 4.3.4. and 4.4.12.)

Plug-on a crystal unit.

Measuring Point		Voltage Reading (V)	
		min.	max.
Point 3 (+)	with respect to point 5 (chassis)	7.7	8.7
Ts 101 C	with respect to point 5 (chassis)	7.7	8.7
	B with respect to point 5 (chassis)	3.5	4.3
	E with respect to point 5 (chassis)	3.1	3.9
Ts 102 C	with respect to point 5 (chassis)	7.7	8.7
	B with respect to point 5 (chassis)	0.9	1.2
	E with respect to point 5 (chassis)	0.3	0.5

3.2.3. Recalibration of the Frequency Indication

The oscillator frequency may possibly change in the course of time, due to capacitance changes (ageing) in the oscillator tuned circuits. This can easily be checked if the calibrating oscillator (or bandspread unit) supplementary module is incorporated. If recalibration is found to be necessary, proceed as follows.

Take off the coverplate over the pressbuttons on the front panel. The oscillator circuits trimmers in the RF section are then accessible through holes in the front panel. Set the mode switch to A1-Automatic and switch on the calibrating oscillator (or the bandspread unit if incorporated). If the bandspread unit is incorporated, set its pointer to 0/100 kHz. Set the BFO tuning control to the first scale graduation line to the right or left of the center setting (giving BFO pitch of about 1 kHz). Then set the frequency scale tuning to read exactly the frequencies shown in the following table and adjust the alignment trimmer above each respective subrange button (use a proper alignment tool) until a calibration heterodyne whistle is heard.

Range	Frequency (MHz)	Range	Frequency (MHz)
1	0.5	6	8.2
2	1.0	7	12.2
3	1.8	8	17.0
4	3.2	9	22.7
5	5.3	10	29.5

Align according to Section 3.3.1.1. if no calibrating oscillator or bandspread unit is incorporated, also if the calibration is found to be incorrect at the low frequency end of a subrange (L-alignment end).

3.2.4. Inserting a new Drive Rope (see 4.4.2.)

Take the unit out of the cabinet and screw off the front panel. After releasing the locking device, pull the RF section out of the frame. Take off the scale drum which is attached to the rope pulley A with pins. Then proceed in the following order of operations:

Fix the rope pulley A with the blocking slider C. Turn the drive to the left up to the stop. Bring the eccentric D on the rope pulley B into the depicted position. Commencing at the pin on pulley B, mount the drive rope. Remount the scale drum.

Turn the pointer to the center setting, and by displacing the eccentric D on the pulley B, bring the scale to the start of the scale baselines.

Fine adjustment for exact frequency readings is effected by adjusting the pointer with the knob 15.

3.3. Major Maintenance (with appropriate measuring equipment and trained personnel)

3.3.1. Alignment of the RF Section

3.3.1.1. Alignment of the Internal Local Oscillator

Switch the unit on and allow at least half an hour for warming up. Connect a frequency measuring device, e.g. a Digital Frequency Meter FA 990/30, to the oscillator output Bu 3. Alternately adjust the alignment controls for each subrange as specified in the following table, for correct alternate alignment at the specified frequencies. Thereby respectively set the tuning capacitor to the right or left stop. The alignment should finish in each case with a final adjustment of the trimmer capacitor.

Range	Drive at Left Stop		Drive at Right Stop	
	Frequency (MHz)	Align with Coil	Frequency (MHz)	Align with Trimmer
1	0.773	L 546	1.035	C 550
2	1.075	L 560	1.575	C 566
3	1.525	L 575	2.425	C 581
4	2.325	L 590	3.945	C 596
5	3.785	L 605	6.055	C 611
6	5.825	L 620	9.005	C 626
7	8.665	L 635	13.125	C 642
8	12.675	L 650	18.025	C 657
9	17.305	L 665	23.725	C 669
10	22.875	L 680	30.625	C 684

3.3.1.2. Alignment of the Input and RF Bandpass Filter Circuits

Connect the RF signal generator to the antenna input jack Bu 1. Disconnect Bu 4 from St 4 (IF output on RF section). Terminate St 4 with a 1 k Ω resistor and connect a VTVM. Turn the RF gain control to its right-hand stop. Feed in from the RF signal generator the lower alignment frequency according to the following table (max. 20 mV) and tune the receiver to this frequency. Then disconnect Bu 39 from St 39, to switch off the internal local oscillator. Align the coils as specified in the table for maximum reading on the VTVM. Plug Bu 39 back onto St 39 and tune the receiver to the upper alignment frequency specified in the table. Disconnect Bu 39 again and align the trimmers specified in the table for maximum reading on the VTVM. Repeat the alignments alternately until no further improvement is possible, always finishing with a final adjustment of the trimmers.

In subrange 1 the wavetrap must also be aligned. For this purpose, set the tuning control to its right-hand stop. Feed in a 525 kHz signal from the RF signal generator, pull off Bu 39 and adjust L 507 for minimum reading on the VTVM. Alternately repeat the alignment of the input circuit, RF bandpass filter and wavetrap, because the settings mutually affect each other.

Range	Lower Alignment Frequency (MHz)	Align with Coils	Upper Alignment Frequency (MHz)	Align with Trimmers
1	0.260	L 541, L 542, L 544	0.484	C 541, C 543, C 545
2	0.567	L 556, L 557, L 559	0.980	C 556, C 559, C 561
3	1.100	L 571, L 572, L 574	1.700	C 571, C 574, C 576
4	1.900	L 586, L 587, L 589	3.200	C 586, C 589, C 591
5	3.500	L 601, L 602, L 604	5.000	C 601, C 604, C 606
6	5.500	L 616, L 617, L 619	8.000	C 616, C 619, C 621
7	8.500	L 631, L 632, L 634	11.500	C 631, C 634, C 636
8	13.000	L 646, L 647, L 649	17.000	C 646, C 649, C 651
9	17.500	L 661, L 662, L 664	22.000	C 661, C 663, C 666
10	23.000	L 676, L 677, L 679	28.000	C 676, C 678, C 681

3.3.2. Alignment of the Output Coupling Circuit and the Single Tuned Circuit in the IF Section

Connect the RF signal generator to the antenna input Bu 1. Connect the VTVM to the IF output Bu 19 (terminated with $56\ \Omega$). Turn the RF gain control to maximum. Switch to $\pm 0.25\ \text{kHz}$ bandwidth. Feed-in any input frequency from the RF signal generator and tune the receiver to this frequency. Align L 321 and L 351 for maximum reading on the VTVM.

3.3.3. Alignment of the IF Section

For aligning the IF section, connect a RF signal generator to St 18 ($f = 525\ \text{kHz}$, crystal controlled) and connect a VTVM to the IF output Bu 19 terminated with $56\ \Omega$. Turn the RF gain control to its right-hand stop. Adjust the output voltage level of the RF signal generator such that the VTVM reads about 70 mV.

3.3.3.1. Alignment of the Mechanical Filter Fi 351

Set the bandwidth switch to $\pm 3\ \text{kHz}$. Adjust C 360 and C 367 for minimum undulation of the response curve of filter Fi 351.

Maximum permissible undulation:	3 dB
Bandwidth for -3 dB:	min. 5.4 kHz, max. 6.6 kHz
for -60 dB:	max. 13 kHz

Adjust L 351 such that the filter response curve is not restricted at the flanks.

3.3.3.2. Alignment of the Mechanical Filter Fi 352

Set the bandwidth switch to $\pm 0.75\ \text{kHz}$. Adjust C 363 and C 370 for minimum undulation of the response curve of the filter Fi 352.

Maximum permissible undulation:	3 dB
Bandwidth for -3 dB:	min. 1.4 kHz, max. 1.65 kHz
for -60 dB:	max. 5 kHz

3.3.3.3. Alignment of the Mechanical Filter Fi 353

Set the bandwidth switch to $\pm 0.25\ \text{kHz}$. Adjust C 366 and C 373 for minimum undulation of the response curve of the filter Fi 353.

Maximum permissible undulation:	3 dB
Bandwidth for -3 dB:	min. 0.5 kHz, max. 0.65 kHz
for -60 dB:	max. 1. kHz

3.3.3.4. Gain Measurement in the IF Section

Feed a 10 μ V, 525 kHz crystal-controlled signal from the RF signal generator to the IF input St 18. Turn the RF gain control to the right-hand stop.

The following voltage readings should be obtained with the VTVM at the IF output Bu 19 (terminated with 56 Ω):

Bandwidth Switch set to	Voltage Reading at Bu 19	
	min.	max.
± 3 kHz	80 mV	120 mV
± 0.75 kHz	60 mV	100 mV
± 0.25 kHz	50 mV	80 mV

3.3.4. Alignment of the Beat Frequency Oscillator (BFO)

Feed a crystal-controlled 525 kHz signal from the RF signal generator to the IF input St 18. Set the mode switch to A1-Automatic. Set the BFO tuning control to the center position (0). Connect an AF frequency meter to the headset output Bu 36. Adjust L 421 for zero beat frequency. Now turn the BFO tuning control to the right and left stops. The frequency meter should then read at least 3 kHz and at most 3.5 kHz in each case.

3.3.5. Alignment of the Calibrating Oscillator EO 639 AW/2

Connect a cathode ray oscilloscope to the output St 42 A of the calibrating oscillator. The pulse width displayed on the oscilloscope should be at least 0.15 μ s and at most 0.3 μ s, and the peak pulse amplitude should be at least 0.5 V and at most 0.7 V. Feed a 100 kHz signal from a standard reference frequency generator to the external input for horizontal deflection of the oscilloscope and adjust C 133 for zero beat frequency of the displayed pattern.

3.3.6. Alignment of the Bandsread Unit FL 639 AW/1

Connect an oscilloscope to connection 1 of the ring modulator Gr 151. Connect the stator of C 153 to chassis for the duration of the measurement. Disconnect Bu 42 from St 42 B. The pulse width displayed on the oscilloscope should be at least 0.15 μ s and at most 0.3 μ s, and the peak pulse amplitude should be at least 1.2 V and at most 1.7 V. Feed a 100 kHz signal from a standard reference frequency generator to the external input for horizontal deflection of the oscilloscope and adjust C 161 for zero beat frequency of the displayed pattern.

Connect a frequency measuring device, e.g. a Digital Frequency Meter FA 990/30, to connection 2 of Gr 151. Pull the crystal Q 151 out of its socket. Break the chassis connection of C 153 to chassis again. Turn the tuning capacitor to the right-hand stop to 0/100 kHz and align Tr 151 to 200 kHz. Turn the tuning capacitor to the left-hand stop to 50/50 kHz and align C 154 to 250 kHz. Repeat these alignment alternately, since they are mutually interdependent. Finish with a final adjustment of C 154. After completing the alignment, reinsert the crystal into its socket.

To check the alignment, reconnect the bandspread unit to the RF section, by plugging Bu 42 onto St 42 B. In the calibration operation only one calibration heterodyne whistle should be heard in each case in the 0/100 kHz setting and in the 50/50 kHz setting.

3.3.7. Alignment of the Wideband Panorama Adapter BPA 639 AW/2

Feed any convenient signal frequency from the RF signal generator to Bu 1 and tune the receiver to this frequency. Set the mode switch to A2/A3-Automatic. Connect a VTVM to Bu 13 terminated with 56 Ω and align L 301 and L 302 to maximum. Connect the VTVM to St 12 A terminated with 1 k Ω . Set R 304 to the center position. Adjust L 304 for maximum reading. Feed-in a 25 MHz signal from the RF signal generator and tune the receiver to this frequency. Set the mode switch to A2/A3 manual. Adjust the RF gain control for 17 mV at Bu 13 terminated with 56 Ω . Connect the VTVM to St 12 A terminated with 1 k Ω and adjust R 304 for 16.5 mV reading.

Feed a 150 mV crystal-controlled 525 kHz signal from the RF signal generator to St 12 A. Connect the VTVM to St 11 A/12. Align C 309 for minimum reading. Then check the alignment with L 301, L 302 and L 304.

3.3.8. Measurements on the Complete Receiver

3.3.8.1. AGC Adjustment and Measurement

Feed a 50 mV signal, $f = 4.6$ MHz, from the RF signal generator to Bu 1. Connect a VTVM to the IF output Bu 19 (terminated with 56 Ω). Set the mode switch to A1-Automatic and the bandwidth to ± 0.75 kHz. Connect an output meter to Bu 36. Adjust R 459 in the AF section for full-scale deflection of the meter J 51 on the front panel. The reading at Bu 19 should be min. 50 mV, max. 100 mV. The reading at Bu 36 should be min. 14 V, max. 20 V output.

Reduce the voltage at Bu 1 to 1 μ V by readjusting the RF signal generator. The IF voltage reading on the VTVM may reduce by not more than 6 dB.

Readjust the RF signal generator for 50 mV at Bu 1. Set the mode switch to A2/A3-Manual. Turn back the RF gain control to position 1. The voltage at Bu 19 should thereby drop back to zero.

3.3.8.2. Measuring the Input Sensitivity

Connect a noise generator ($R_i = 60 \Omega$) to the antenna input Bu 1. Connect a VTVM to the IF output Bu 19 (terminated with 56 Ω). Set the mode switch to A2/A3-Manual. Turn up the RF gain control to maximum. Switch to the frequency subrange to be checked. Measure the noise voltage at Bu 19. Turn up the noise generator until the VTVM reading has risen to 1.4 times the previously measured noise value. The kT_0 -value can then be read off directly on the noise generator. Measure the input sensitivity at several frequencies in each range. The average value over the entire reception frequency range from 250 kHz to 30 MHz should be better than 10 kT_0 .

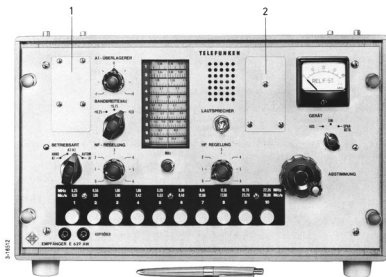


Fig. 2: Front view of the Receiver E 639 AW/2 with notes for incorporating supplementary modules

- 1 for Crystal Oscillator QO 639 AW/1
- 2 for Bandspread Unit FL 639 AW/1 or Calibrating Oscillator EO 639 AW/2

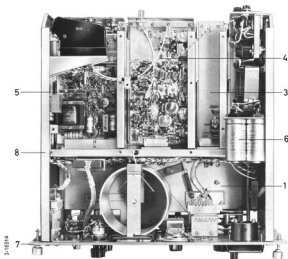


Fig. 3: Allwave Receiver E 639 AW/2 without cabinet, viewed from above

- | | |
|---------------------------|------------------------|
| 1 RF Section | 6 Power Supply Section |
| 3 Output Coupling Circuit | 7 Front Panel |
| 4 IF Section | 8 Frame |
| 5 AF Section | |

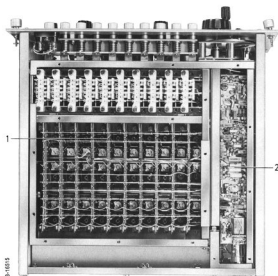


Fig. 4: Allwave Receiver E 639 AW/2 without cabinet, viewed from below, without shielding plate

- | | |
|--------------|------------------------------------|
| 1 RF Section | 2 RF Section printed circuit board |
|--------------|------------------------------------|

4. TECHNICAL DOCUMENTS

4.1. Plug Contact Connections

Jack/Plug	Contact	Circuit Connection
Bu 1		Antenna input
Bu 2/St 2	A	+12 V input
	C	Switching line for Rs 501
	D	Chassis
	F	+8 V output (to crystal oscillator)
	H	AGC voltage input
	J	+24 V input for D.F. adapter control lines
	K	Switchover line for external oscillator ON/OFF
	L	+8 V input (to internal oscillator)
	N	Switchover line for internal oscillator ON/OFF
Bu 3		Oscillator output
Bu 4/St 4		IF output
Bu 5/St 5		External oscillator input
Bu 6/St 6		Calibrating oscillator and bandsread unit input
Bu 7	1	Control line for D.F. adapter
	2	Control line for D.F. adapter
	3	Chassis
	4	+24 V output
Bu 8/St 8		+24 V input for scale lamp
Bu 11/St 11	3	+12 V output (to IF section)
	4	+12 V output (to calibrating oscillator or bandsread unit)
	5	+12 V input (from power supply section)
	7	Chassis
	11	Shielding
	12	IF input (from RF section)
St 12 (A)		IF output
Bu 12		IF line (to Bu 45)
Bu 13		IF output (on wideband panorama adapter)
Bu 17/St 17	1	Shielding
	2	IF output (to AF section)
	3	+12 V output (to AF section)
	4	+12 V input (from output coupling circuit)
	5	AGC voltage input
	7	AGC voltage output (to bandsread unit/calibrating oscillator)
	8	Chassis
	10	Switchover line for mechanical filter Fi 353
	11	Switchover line for mechanical filter Fi 352
	12	Switchover line for mechanical filter Fi 351

Jack/Plug	Contact	Circuit Connection
Bu 18		IF line from Bu 45
St 18		IF input
Bu 19		IF output jack (narrow-band)
Bu 22/St 22	5	Headset output (to front panel)
	7	Headset output (to front panel)
	9	Loudspeaker output (to front panel)
	11	Loudspeaker output (to front panel)
	12	+12 V input (for push-pull AF output stage)
	13	AF input
	14	Shielding
	16	Output for relative field strength meter (to front panel)
	17	AGC voltage (to front panel)
	18	Chassis
	19	+12 V output (according to Bu 45)
	20	+12 V output (to front panel)
	22	+12 V input (from IF section)
	23	Shielding
	24	Demodulator output (to front panel)
	25	Gain control voltage input
	26	Gain control voltage output (to IF section)
	27	IF input
Bu 23	28	Shielding
	29	+12 V input (for BFO)
	30	Control voltage input for varicap diodes in BFO
	1	Demodulator output
	2	Shielding
	4	AF input
Bu 24	5 and 6	Switching contacts
	1	+12 V output
	2	Line for gain control voltage matching (AGC)
	3	Chassis
Bu 25	5	Gain control voltage output (AGC)
	1	600 Ω line output
	2	Chassis
	3	600 Ω line output
Bu 28/St 28	4 and 5	High-impedance headset output
	1	Chassis line for Zener diodes Gr 202 and Gr 203
	2	+12 V output (for push-pull AF output stage)
	6	+24 V output (to calibrating oscillator/bandspread unit)
	7	+24 V output (to Bu 45)
	8	+24 V output (for scale lamp)
	9	+11.2 V output (for BFO tuning)
	11	Chassis
	12	+12 V output (operating voltage for output coupling circuit)

Jack/Plug	Contact	Circuit Connection
Bu 29	1	+24 V battery output, internal
	3	-24 V battery output, internal
Bu 30		Internal mains output
St 31	A	+24 V battery input
	D	-24 V battery input
St 32		Mains input
Bu 35/St 35	A	Switchover line for mechanical filter Fi 351
	B	Switchover line for mechanical filter Fi 352
	C	+12 V input
	D	Switchover line for mechanical filter Fi 353
	E	AGC voltage input
	F	Chassis
	H	+11.2 V input (for BFO tuning)
	J	Gain control voltage output (to Bu 45)
	K	+12 V output (for BFO)
	L	AGC voltage output (to AF section)
	M	AF input
	N	Input for relative field strength meter
	P	Shielding
	R	AF output
	S	Headset input
	T	Shielding
	U	Loudspeaker input
	V	Headset input
	W	Control voltage output for varicap diodes in BFO
	X	Loudspeaker input
Bu 36		2000 Ω headset output
Bu 39	1	Switchover line for internal oscillator ON/OFF
	2	+8 V input
	3	+8 V output (to internal oscillator)
	4	Switchover line for external oscillator ON/OFF
	9	Shielding
	10	Oscillator output
	11	Chassis
St 39	1	Switchover line for internal oscillator ON/OFF
	2 and 3	Shorting link
	4	Switchover line for external oscillator ON/OFF
Bu 40/St 40	4 and 11	Shorting link
	1	Crystal connection
	2	Chassis
	3	Tuned circuit connection
	4	Pulling trimmer connection
	5	+8 V output (switching line for internal oscillator ON)
	6	+8 V input

Jack/Plug	Contact	Circuit Connection
St 40 A	7	Pulling trimmer connection
	8	Chassis output (switching line for external oscillator ON)
	2, 4 and 5 6 and 7	Shorting link Shorting link
Bu 41/St 41 A/B	1	Switching line for Rs 501, FL or Cal.Osc. ON
	2	Switchover line for mechanical filter Fi 352
	3	Switchover line for mechanical filter Fi 351
	4	Switchover line for mechanical filter Fi 351
	5	Switchover line for mechanical filter Fi 352
	6	Switchover line for mechanical filter Fi 353
	7	+12 V input
	8	Switchover line for mechanical filter Fi 353
	9	+24 V output for D.F.adapter control lines
	10	Gain control voltage input
	11	+24 V input
	12	Chassis
St 41	2 and 5	Shorting link
	3 and 4	Shorting link
	6 and 8	Shorting link
	9 and 11	Shorting link
Bu 42/St 42A		Calibrating oscillator output
Bu 42/St 42B		Bandsread unit output
Bu 45	a 1	IF input
	a 2	Shielding
	a 3	Gain control voltage output
	a 4	+12 V input (to RF section)
	a 5	+24 V input (to scale lamp)
	a 6	+24 V output (for scale lamp)
	b 1	IF output
	b 2	Shielding
	b 3	Chassis
	b 4	+12 V output
	b 5	+24 V output
	b 6	Gain control voltage input
St 45	a 1 and b 1	Shorting link
	a 2 and b 2	Shorting link
	a 3 and b 6	Shorting link
	a 4 and b 4	Shorting link
	a 5 and a 6	Shorting link

4.2. Lists of Components for E 639 AW/2

4.2.1. List of Components of Frame RA (52.1188.001-00 (a) Sa)

Item	Description	Stock Number	Electrical Values Remarks
Bu 2 and Bu 35	Jacks Strips	5 L 4551.001-89	
Bu 4 and Bu 5	RF Jacks	5 L 4511.001-14	
Bu 8	Mounted Jack	5 L 4531.002-77	
Bu 11, Bu 17 and Bu 28	Spring Contact Strips	5 L 4551.002-20	
Bu 12 and Bu 18	RF Jacks	5 L 4511.001-14	
Bu 17	Spring Contact Strip	5 L 4551.002-20	
Bu 22	Spring Contact Strip	5 L 4551.002-13	
Bu 39 and Bu 41	Spring Contact Strips	5 L 4551.002-20	
Bu 45	Spring Contact Strip	B 12 DIN 41 622	
C 1 and C 2	Plastic Film Capacitors	5 L 5241.026-72	2.2 μ F \pm 10% 100 V DC
L 1 and L 2	RF Chokes	5 L 5051.001-23	120 μ H

4.2.2. List of Components of Front Panel FP (52.1188.050-00 (d) Sa)

Bu 36	Jack	5 N 4531.101-00	
Gr 51	Zener Diode	5 L 5532.201-40	BZY 85/C 8 V 2 Si
J 51	Moving Coil Meter	5 L 7411.001-63	40 μ A
Lt 51	Loudspeaker	5 L 7701.001-11	
R 51	Resistor	5 N 5102.010-25	10 Ω \pm 5% 0.5 W
R 52 and R 54	Carbon Potentiometers	5 L 5131.014-68	10 k Ω log. 1 W

Item	Description	Stock Number	Electrical Values Remarks
R 53	Resistor	5 N 5102.002-85	3.3 k Ω \pm 5% 0.25 W
R 55 and R 59	Resistors	5 N 5102.002-79	1.8 k Ω \pm 5% 0.25 W
R 56	Carbon Potentiometer	5 L 5131.014-20	10 k Ω lin. 2 W
R 57	Resistor	5 N 5102.002-97	10 k Ω \pm 5% 0.25 W
R 58	Resistor	5 N 5102.003-06	22 k Ω \pm 5% 0.25 W
S 51	Switch	52.1188.060-00 Bv	
S 52	Changeover Toggle Switch	5 L 4612.001-43	
S 53	Switch	52.1188.061-00 Bv	
St 35	Plug Contact Strip	5 L 4561.001-57	

4.2.3. List of Components of Shorting Plug for Bu 39 (52.1188.090-00 (a) Sa)

St 39	Plug Shoe	5 L 4561.001-77	
R 91	Resistor	5 N 5102.002-87	3.9 k Ω \pm 5% 0.25 W

4.2.4. List of Components of Shorting Plug for Bu 41 (52.1188.095-00 Sa)

St 41	Plug Shoe	5 L 4561.001-77	
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4.2.5. List of Components of Crystal Oscillator QO 639 AW/1 (52.1188.100-00 (a) Sa) and List of Components of Plug-In Crystal Unit (52.1188.110-00 Sa)

Bu 40	Octal Tube Socket	5 L 5711.001-18	
C 101	Plastic Film Capacitor	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 102	Air Dielectric Trimmer	5 L 5261.001-42	4/100 pF
C 105	Ceramic Capacitor	5 M 5222.220-99	3 pF \pm 0.5 pF 500 V DC
C 106	Plastic Film Capacitor	5 L 5241.026-72	2.2 μ F \pm 10% 100 V DC
C 107	Ceramic Capacitor	5 M 5221.237-64	10 pF \pm 0.5 pF 500 V DC
R 101 to R 103	Resistors	5 N 5102.002-89	4.7 k Ω \pm 5% 0.25 W
R 104	Resistor	5 N 5102.003-14	47 k Ω \pm 5% 0.25 W

Item	Description	Stock Number	Electrical Values Remarks
R 105	Resistor	5 N 5102.003-02	15 k Ω \pm 5% 0.25 W
R 107	Resistor	5 N 5102.002-87	3.9 k Ω \pm 5% 0.25 W
St 39 A	Plug Shoe	5 L 4561.001-77	
St 40	Base	in 52.1188.111-00 (4)	
St 40 A	Base	in 52.1188.109-00	
Ts 101 and Ts 102	Transistors	5 L 5511.001-08	2 N 708 npn Si
C 103	Ceramic Capacitor (according to crystal frequency)	5 M 5221.237-65 5 M 5221.237-66 5 M 5221.237-67 5 M 5221.237-68 5 M 5221.237-69	47 pF \pm 5% 500 V DC 56 pF \pm 5% 500 V DC 68 pF \pm 5% 500 V DC 82 pF \pm 5% 500 V DC 100 pF \pm 5% 500 V DC
C 104	Mica Capacitor (according to crystal frequency)	5 L 5231.014-34 5 L 5231.014-53 5 L 5231.014-55 5 L 5231.014-57 5 L 5231.014-59	470 pF \pm 5% 500 V DC 560 pF \pm 5% 500 V DC 680 pF \pm 5% 500 V DC 820 pF \pm 5% 500 V DC 1000 pF \pm 5% 500 V DC
L 101	Coil (according to crystal frequency)	5 L 5312.001-05 5 L 5312.001-07 5 L 5312.001-09 5 L 5312.001-11 5 L 5312.001-13 5 L 5312.001-15 5 L 5312.001-17 5 L 5312.001-19 5 L 5312.001-21	0.47 μ H 1 μ H 2.2 μ H 4.7 μ H 10 μ H 22 μ H 47 μ H 100 μ H 220 μ H
Q 101	Crystal	53.4021.255-00	Frequency according to order
R 106	Resistor (according to crystal frequency)	5 N 5102.002-83 5 N 5102.002-85 5 N 5102.002-87 5 N 5102.002-89 5 N 5102.002-91 5 N 5102.002-93 5 N 5102.002-95	2.7 k Ω \pm 5% 0.25 W 3.3 k Ω \pm 5% 0.25 W 3.9 k Ω \pm 5% 0.25 W 4.7 k Ω \pm 5% 0.25 W 5.6 k Ω \pm 5% 0.25 W 6.8 k Ω \pm 5% 0.25 W 8.2 k Ω \pm 5% 0.25 W

4.2.6. List of Components of Calibrating Oscillator EO 639 AW/2 (52.1188.130-00 (b) Sa)

Item	Description	Stock Number	Electrical Values Remarks
Bu 6 and Bu 42	RF Jacks	5 L 4511.001-14	
C 131 and C 135	Metalised Paper Capacitors	5 L 5211.004-15	1000 pF $\pm 30\pm 20\%$ 400 V DC
C 132	Ceramic Capacitor	5 M 5221.232-18	15 pF $\pm 5\%$ 500 V DC
C 133	Air Dielectric Trimmer	5 L 5261.003-44	2.8/30.5 pF
C 134 and C 138	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F $\pm 20\%$ 100 V DC
C 136	Electrolytic Capacitor	5 L 5271.005-08	25 μ F 15/18 V DC
C 137	Ceramic Capacitor	5 M 5221.236-03	220 pF $\pm 5\%$ 500 V DC
C 139	Ceramic Capacitor	5 M 5221.233-63	5 pF ± 0.5 pF 500 V DC
Gr 131 and Gr 132	Diodes	5 L 5531.101-42	AAV 41 V Ge, TELEFUNKEN
Gr 133	Zener Diode	5 L 5532.201-44	BZY 85/C 12 Si, TELEFUNKEN
Gr 134	Zener Diode	5 L 5532.201-40	BZY 85/C 8 V 2 Si, TELEFUNKEN
L 131	Choke	52.1188.140-00 Bv	
Q 131	Crystal	53.4021.103-00	100 kHz
R 131	Resistor	5 N 5102.003-02	15 k Ω $\pm 5\%$ 0.25 W
R 132	Resistor	5 N 5102.002-81	2.2 k Ω $\pm 5\%$ 0.25 W
R 133 and R 135	Resistors	5 N 5102.002-97	10 k Ω $\pm 5\%$ 0.25 W
R 134	Resistor	5 N 5102.002-75	1.2 k Ω $\pm 5\%$ 0.25 W
R 136	Resistor	5 N 5102.002-71	820 Ω $\pm 5\%$ 0.25 W
R 137	Resistor	5 N 5102.002-85	3.3 k Ω $\pm 5\%$ 0.25 W
R 138	Resistor	5 N 5102.002-49	100 Ω $\pm 5\%$ 0.25 W
R 139	Resistor	5 N 5102.002-53	150 Ω $\pm 5\%$ 0.25 W
R 140	Resistor	5 N 5102.002-69	680 Ω $\pm 5\%$ 0.25 W
R 141	Resistor	5 N 5102.003-06	22 k Ω $\pm 5\%$ 0.25 W
S 131	Pressbutton	5 L 4622.005-14	
St 41 A	Plug Shoe	5 L 4561.001-77	
St 42 A	RF Plug	5 L 4521.001-05	
Tr 131	Transformer	52.1188.141-00 Bv	

Item	Description	Stock Number	Electrical Values Remarks
Ts 131 and Ts 132	Transistors	5 L 5511.102-23	AF 134 V, pnp Ge, TELEFUNKEN

4.2.7. List of Components of Bandsread Unit FL 639 AW/1 (52.1188.150-00 (c) Se)

Bu 6 and Bu 42	RF Jacks	5 L 4511.001-14	
C 151	Ceramic Capacitor Battery	52.9522.000-14	300 pF \pm 2% 500 V DC
C 152	Ceramic Capacitor	5 M 5221.237-71	68 pF \pm 5% 500 V DC
C 153	Variable Capacitor	52.1188.160-00	9/259 pF
C 154 and C 161	Air Dielectric Trimmer	5 L 5261.003-44	2.8/30.5 pF
C 155	Mica Capacitor	5 L 5231.012-49	10 000 pF \pm 2% 500 V DC
C 157	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 158 and C 160	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 159 and C 163	Metalised Paper Capacitors	5 L 5211.004-15	1000 pF -30+20% 400 V DC
C 162	Ceramic Capacitor	5 M 5221.232-18	15 pF \pm 5% 500 V DC
C 164	Electrolytic Capacitor	5 L 5271.005-08	25 μ F 15/18 V DC
Gr 151	Diode	5 L 5531.101-46	AAZ 14 V, Ge, TELEFUNKEN
Gr 152 and Gr 153	Diodes	5 L 5531.101-42	AAY 41 V, Ge, TELEFUNKEN
Gr 154	Zener Diode	5 L 5532.201-44	BZY 85/C 12, Si, TELEFUNKEN
Gr 155	Zener Diode	5 L 5532.201-40	BZY 85/C 8 V 2, Si, TELEFUNKEN
L 151	Choke	52.1188.140-00 Bv	
Q 151	Crystal	53.4021.103-00	100 kHz
R 151 and R 167	Resistors	5 N 5102.003-06	22 k Ω \pm 5% 0.25 W
R 152	Resistor	5 N 5102.002-83	2.7 k Ω \pm 5% 0.25 W
R 153	Resistor	5 N 5102.002-89	4.7 k Ω \pm 5% 0.25 W
R 155	Resistor	5 N 5102.003-12	39 k Ω \pm 5% 0.25 W
R 156	Resistor	5 N 5102.002-41	47 Ω \pm 5% 0.25 W
R 157	Resistor	5 N 5102.002-53	150 Ω \pm 5% 0.25 W
R 158	Resistor	5 N 5102.002-85	3.3 k Ω \pm 5% 0.25 W

Item	Description	Stock Number	Electrical Values Remarks
R 159	Resistor	5 N 5102.002-49	100 $\Omega \pm 5\%$ 0.25 W
R 160 and R 165	Resistors	5 N 5102.002-81	2.2 k $\Omega \pm 5\%$ 0.25 W
R 161	Resistor	5 N 5102.002-71	820 $\Omega \pm 5\%$ 0.25 W
R 162	Resistor	5 N 5102.002-75	1.2 k $\Omega \pm 5\%$ 0.25 W
R 163	Resistor	5 N 5102.002-97	10 k $\Omega \pm 5\%$ 0.25 W
R 164	Resistor	5 N 5102.002-02	15 k $\Omega \pm 5\%$ 0.25 W
R 166	Resistor	5 N 5102.002-69	680 $\Omega \pm 5\%$ 0.25 W
S 151	Pressbutton	5 L 4622.005-14	
Sr 41 B	Plug Shoe	5 L 4561.001-77	
Sr 42 B	RF Plug	5 L 4521.001-05	
Tr 151	Transformer	52.1188.161-00 Bv	
Tr 152	Transformer	52.1188.141-00 Bv	
Ts 151 to Ts 153	Transistors	5 L 5511.102-23	AF 134 V pnp Ge TELEFUNKEN

4.2.8. List of Components of Power Supply Section NT (52.1188. $\frac{199}{200}$ -00 (c) 5a) (Power Supply)

Bu 29	3-pole Flange Socket	5 L 4531.001-23	
Bu 30	2-pole Jack	5 L 4531.002-63	
Bu 33	5-pole Flange Socket	5 L 4531.001-25	
C 201 to C 204	Paper Capacitors	5 N 5211.508-00	2200 pF $\pm 20\%$ 1000 V DC
C 205	Plastic Film Capacitor	5 N 5241.127-05	0.47 μ F $\pm 20\%$ 63 V DC
C 206	Electrolytic Capacitor	5 L 5271.007-19	500 μ F +50-20% 70/80 V DC
C 207	Electrolytic Capacitor	5 L 5271.012-96	1000 μ F +50-20% 35/40 V DC
Gr 201	Power Rectifier	5 L 5532.401-49	125 V AC 600 mA DC
Gr 202 and Gr 203	Zener Diodes	5 L 5532.202-70	ZX 12 Si, Intemetall
Gr 204	Zener Diode	5 L 5532.201-47	BZY 85/C 16 V 5, Si, TELEFUNKEN
Gr 205 and Gr 206	Zener Diodes	5 L 5532.201-36	BZY 85/C 5 V 6, Si, TELEFUNKEN
L 201 and L 202	Suppressor Chokes	5 L 5051.001-77	2 X 0.8 mH/0.5 A

Item	Description	Stock Number	Electrical Values Remarks
L 203	Choke	52.1188.210-00 Bv	
R 201	Resistor	5 N 5102.022-41	47 $\Omega \pm 5\%$ 1 W
R 202 and R 203	Wirewound Resistors	5 L 5111.003-34	120 $\Omega \pm 5\%$ 4 W
R 204	Resistor	5 N 5102.002-83	2.7 k $\Omega \pm 5\%$ 0.25 W
R 205	Resistor	5 N 5102.002-77	1.5 k $\Omega \pm 5\%$ 0.25 W
S 201	Rotary Switch	5 L 4601.002-48	
S 202	Plug Switch	5 L 4661.001-56	
Si 201	Equipment Fuse Cartridge	5 N 4811.065-01 5 N 4811.067-01	M 0.1 C DIN 41571 0.1 A medium delay for 220 V AC M 0.16 C DIN 41571 0.16 A medium delay for 110 V AC
Si 202	Equipment Fuse Cartridge	5 N 4811.072-01	T 0.5 B DIN 41571 0.5 A slow for 24 V DC
St 28	Plug Shoe	5 L 4561.001-77	
St 31	Flange Plug	5 L 4541.004-53	
St 32	Equipment Connector	5 L 4541.002-86	
Tr 201	Transformer	52.1188.211-00 Bv	

4.2.9. List of Components of Wideband Panorama Adapter Unit BPA 639 AW/2 (52.1188.300-00 (b) Sa)

Bu 13	RF Jack	5 M 4511.220-05	UG 625 B/U Ms 27035
C 301	Ceramic Capacitor	5 M 5221.237-72	240 pF $\pm 5\%$ 500 V DC
C 302	Ceramic Capacitor	5 M 5221.225-99	47 pF $\pm 5\%$ 500 V DC
C 303	Ceramic Capacitor	5 M 5221.226-02	150 pF $\pm 5\%$ 500 V DC
C 305 to C 308	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F $\pm 20\%$ 100 V DC
C 309	Air Dielectric Trimmer	5 L 5261.003-19	4/60 pF
C 310	Mica Capacitor	5 L 5231.014-61	1200 pF $\pm 5\%$ 500 V DC
C 311	Mica Capacitor	5 L 5231.014-98	0.01 μ F $\pm 5\%$ 500 V DC
C 312	Ceramic Capacitor Battery	52.9522.000-02	300 pF $\pm 5\%$ 500 V DC
L 301 and L 302	Coils	52.1188.310-00 Bv	
L 303	Choke	5 L 5051.001-23	120 μ H
L 304	Coil	52.1188.330-00 Bv	

Item	Description	Stock Number	Electrical Values Remarks
R 301	Resistor	5 N 5102.002-91	5.6 k Ω \pm 5% 0.25 W
R 302	Resistor	5 N 5102.003-08	27 k Ω \pm 5% 0.25 W
R 303	Resistor	5 N 5102.003-02	15 k Ω \pm 5% 0.25 W
R 304	Carbon Potentiometer	5 L 5131.009-43	5 k Ω lin. \pm 20% 0.8 W
R 305	Resistor	5 N 5102.002-81	2.2 k Ω \pm 5% 0.25 W
R 306	Resistor	5 N 5102.002-75	1.2 k Ω \pm 5% 0.25 W
R 307	Resistor	5 N 5102.002-43	56 Ω \pm 5% 0.25 W
R 308	Resistor	5 N 5102.002-57	220 Ω \pm 5% 0.25 W
R 309	Resistor	5 N 5102.002-59	270 Ω \pm 5% 0.25 W
St 11 A	Plug Shoe	5 L 4561.001-77	
St 12 A	RF Plug	5 L 4521.001-76	
Ts 301 and Ts 302	Transistors	5 L 5511.102-23	AF 134 V pnp Ge

4.2.10. List of Components of Output Coupling Circuit AK (52.1188.320-00 (a) 5a)

C 321	Mica Capacitor	5 L 5231.014-61	1200 pF \pm 5% 500 V DC
C 322	Mica Capacitor	5 L 5231.014-98	0.01 μ F \pm 5% 500 V DC
C 323	Ceramic Capacitor Battery	52.9522.000-02	300 pF \pm 5% 500 V DC
L 321	Coil	52.1188.330-00 Bv	
R 321	Resistor	5 N 5102.002-59	270 Ω \pm 5% 0.25 W
St 11	Plug Shoe	5 L 4561.001-77	
St 12	RF Plug	5 L 4521.001-76	

4.2.11. List of Components of IF Section (52.1188.350-00 (b) 5a)

Bu 19	RF Jack	5 M 4511.220-05	UG 625 B/U M5 27035
C 351 to C 357	Plastic Film Capacitors	5 L 5341.026-64	0.1 μ F \pm 20% 100 V DC
C 358	Ceramic Capacitor	see page 55	
C 359	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 360	Air Dielectric Trimmer	5 L 5261.003-19	4/60 pF
C 361	Ceramic Capacitor	see page 55	
C 362	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC

Item	Description	Stock Number	Electrical Values Remarks
C 363	Air Dielectric Trimmer	5 L 5261.003-19	4/60 pF
C 364	Ceramic Capacitor	see below	
C 365	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 366	Air Dielectric Trimmer	5 L 5261.003-19	4/60 pF
C 367	Air Dielectric Trimmer	5 L 5261.003-19	4/60 pF
C 368	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 369	Ceramic Capacitor	see below	
C 370	Air Dielectric Trimmer	5 L 5261.003-19	4/60 pF
C 371	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 372	Ceramic Capacitor	see below	
C 373	Air Dielectric Trimmer	5 L 5261.003-19	4/60 pF
C 374	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 375	Ceramic Capacitor	see below	
C 376 to C 387	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 388	Ceramic Capacitor	5 M 5221.225-99	47 pF \pm 5% 500 V DC
C 389	Ceramic Capacitor Battery	52.9522.000-13	364 pF \pm 2% 500 V DC
C 390 to C 392	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 393	Ceramic Capacitor	5 M 5221.225-98	22 pF \pm 5% 500 V DC
C 394 to C 400	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC

For the following 6 positions, one capacitor each from the following types:

C 358	Ceramic Capacitor	5 M 5221.225-99	47 pF \pm 5% 500 V DC
C 361	Ceramic Capacitor	5 M 5221.229-97	82 pF \pm 5% 500 V DC
C 364	Ceramic Capacitor	5 M 5221.226-01	120 pF \pm 5% 500 V DC
C 369	Ceramic Capacitor	5 M 5221.226-02	150 pF \pm 5% 500 V DC
C 372	Ceramic Capacitor	5 M 5221.226-02	150 pF \pm 5% 500 V DC
C 375	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
Fi 351	Mechanical Filter	53.1060.020-00	525 kHz \pm 3 kHz TELEFUNKEN
Fi 352	Mechanical Filter	53.1062.020-00	525 kHz \pm 0.75 kHz TELEFUNKEN
Fi 353	Mechanical Filter	53.1063.020-00	525 kHz \pm 0.25 kHz TELEFUNKEN
Gr 351	Diode	5 L 5531.101-42	AAY 41 V, TELEFUNKEN
L 351	Coil	52.1188.360-00 Bv	
R 351 to R 353	Resistors	5 N 5102.002-91	5.6 k Ω \pm 5% 0.25 W

Item	Description	Stock Number	Electrical Values Remarks
R 354	Resistor	5 N 5102.003-12	39 k Ω \pm 5% 0.25 W
R 355	Resistor	5 N 5102.002-57	220 Ω \pm 5% 0.25 W
R 356	Resistor	5 N 5102.002-91	5.6 k Ω \pm 5% 0.25 W
R 357 to R 359	Resistors	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 360 to R 365	Resistors	5 N 5102.003-04	18 k Ω \pm 5% 0.25 W
R 366 to R 368	Resistors	5 N 5102.002-91	5.6 k Ω \pm 5% 0.25 W
R 369	Resistor	5 N 5102.002-45	68 Ω \pm 5% 0.25 W
R 370, R 372, R 375, R 377 and R 379	Resistors	5 N 5102.002-91	5.6 k Ω \pm 5% 0.25 W
R 371	Resistor	5 N 5102.002-75	1.2 k Ω \pm 5% 0.25 W
R 373	Resistor	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 374 and R 378	Resistors	5 N 5102.002-33	22 Ω \pm 5% 0.25 W
R 376	Resistor	5 N 5102.002-51	120 Ω \pm 5% 0.25 W
R 380	Resistor	5 N 5102.003-04	18 k Ω \pm 5% 0.25 W
R 381	Resistor	5 N 5102.002-89	4.7 k Ω \pm 5% 0.25 W
R 382 and R 383	Resistors	5 N 5102.002-99	12 k Ω \pm 5% 0.25 W
R 384	Resistor	5 N 5102.002-85	3.3 k Ω \pm 5% 0.25 W
R 385	Resistor	5 N 5102.002-57	220 Ω \pm 5% 0.25 W
R 386	Resistor	5 N 5102.002-29	15 Ω \pm 5% 0.25 W
R 387	Resistor	5 N 5102.002-75	1.2 k Ω \pm 5% 0.25 W
R 388	Resistor	5 N 5102.002-81	2.2 k Ω \pm 5% 0.25 W
R 389	Resistor	5 N 5102.002-51	120 Ω \pm 5% 0.25 W
R 390 to R 393	Resistors	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 394	Resistor	5 N 5102.002-65	470 Ω \pm 5% 0.25 W
St 17	Plug Shoe	5 L 4561.001-77	
St 18	RF Plug	5 L 4521.001-76	
Ts 351 to Ts 360	Transistors	5 L 5511.102-23	AF 134 V pnp Ge TELEFUNKEN

4.2.12. List of Components of AF Section (52.1188.420-00 (c) 5a)

Item	Description	Stock Number	Electrical Values Remarks
Bu 23	Flange Socket	5 L 4531.002-41	
Bu 24 and Bu 25	Flange Sockets	5 L 4531.001-25	
C 421 and C 425	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 422	Ceramic Capacitor Battery	5 M 5221.237-61	246 pF \pm 2% 500 V DC
C 424	Plastic Film Capacitor	5 L 5241.041-01	0.01 μ F \pm 20% 400 V DC
C 426	Mica Capacitor	5 L 5231.014-61	1200 pF \pm 5% 500 V DC
C 427	Ceramic Capacitor	5 M 5221.237-59	12 pF \pm 2% 500 V DC
C 428	Mica Capacitor	5 L 5231.014-57	820 pF \pm 5% 500 V DC
C 429 to C 432	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 433	Electrolytic Capacitor	5 L 5271.006-98	50 μ F 15/18 V DC
C 434 and C 435	Paper Capacitors	5 N 5211.311-00	4700 pF \pm 20% 400 V DC
C 436	Electrolytic Capacitor	5 L 5271.005-07	10 μ F 15/18 V DC
C 437	Plastic Film Capacitor	5 L 5241.026-72	2.2 μ F \pm 10% 100 V DC
C 438	Ceramic Capacitor	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 439, C 443 and C 446	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 440	Electrolytic Capacitor	5 L 5271.006-99	100 μ F 15/18 V DC
C 441	Electrolytic Capacitor	5 L 5271.006-98	50 μ F 15/18 V DC
C 442 and C 444	Ceramic Capacitors	5 M 5221.226-03	220 pF \pm 5% 500 V DC
C 445	Plastic Film Capacitor	5 L 5241.026-68	0.47 μ F \pm 20% 100 V DC
C 447	Plastic Film Capacitor	5 L 5241.041-01	0.01 μ F \pm 20% 400 V DC
C 448 and C 449	Electrolytic Capacitors	5 L 5271.006-99	100 μ F 15/18 V DC
Gr 421 and Gr 422	Varicap Diodes	5 L 5532.301-36	BA 112 Si, Intermetall
Gr 423 and Gr 424	Diodes	5 L 5531.101-42	AAV 41 V, TELEFUNKEN

Item	Description	Stock Number	Electrical Values Remarks
L 421	Coil	52.1188.430-00 Bv	
L 422	Choke	5 L 5051.001-37	3 mH 0.08 A
R 422	Resistor	5 N 5102.003-52	1.8 M Ω \pm 5% 0.25 W
R 423	Resistor	5 N 5102.002-77	1.5 k Ω \pm 5% 0.25 W
R 424 and R 425	Resistors	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 426 and R 428	Resistors	5 N 5102.003-04	18 k Ω \pm 5% 0.25 W
R 427	Resistor	5 N 5102.002-93	6.8 k Ω \pm 5% 0.25 W
R 429	Resistor	5 N 5102.003-02	15 k Ω \pm 5% 0.25 W
R 430	Resistor	5 N 5102.002-57	220 Ω \pm 5% 0.25 W
R 431	Resistor	5 N 5102.002-35	27 Ω \pm 5% 0.25 W
R 432	Resistor	5 N 5102.002-75	1.2 k Ω \pm 5% 0.25 W
R 433	Resistor	5 N 5102.003-14	47 k Ω \pm 5% 0.25 W
R 434	Resistor	5 N 5102.002-87	3.9 k Ω \pm 5% 0.25 W
R 435	Resistor	5 N 5102.002-65	470 Ω \pm 5% 0.25 W
R 436	Resistor	5 N 5102.002-37	33 Ω \pm 5% 0.25 W
R 437	Resistor	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 438	Resistor	5 N 5102.003-18	68 k Ω \pm 5% 0.25 W
R 439	Resistor	5 N 5102.002-85	3.3 k Ω \pm 5% 0.25 W
R 440	Resistor	5 N 5102.002-97	10 k Ω \pm 5% 0.25 W
R 441 and R 442	Resistors	5 N 5102.002-85	3.3 k Ω \pm 5% 0.25 W
R 443	Resistor	5 N 5102.002-67	560 Ω \pm 5% 0.25 W
R 444	Resistor	5 N 5102.002-81	2.2 k Ω \pm 5% 0.25 W
R 445 and R 454	Resistors	5 N 5102.002-91	5.6 k Ω \pm 5% 0.25 W
R 446 and R 448	Resistors	5 N 5102.002-45	68 Ω \pm 5% 0.25 W
R 447	Resistor	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 449	Resistor	5 N 5102.002-83	2.7 k Ω \pm 5% 0.25 W
R 450	Resistor	5 N 5102.002-25	10 Ω \pm 5% 0.25 W
R 451	NTC Resistor	5 L 5171.002-08	50 Ω 1 W
R 452	Resistor	5 N 5102.002-43	56 Ω \pm 5% 0.25 W
R 453	Resistor	5 N 5102.003-06	22 k Ω \pm 5% 0.25 W
R 455 and R 462	Resistors	5 N 5102.002-89	4.7 k Ω \pm 5% 0.25 W

Item	Description	Stock Number	Electrical Values Remarks
R 456	Resistor	5 N 5102.002-18	5.1 $\Omega \pm 5\%$ 0.25 W
R 457 and R 460	Resistors	5 N 5102.002-65	470 $\Omega \pm 5\%$ 0.25 W
R 458	Resistor	5 N 5102.003-14	47 k $\Omega \pm 5\%$ 0.25 W
R 459	Carbon Potentiometer	5 L 5131.009-46	1 k Ω lin. 0.8 W
R 461	NTC Resistor	5 L 5171.003-76	1.5 k $\Omega \pm 0.5$ W
R 463	Resistor	5 N 5102.002-37	33 $\Omega \pm 5\%$ 0.25 W
R 464 and R 465	Resistors	5 N 5102.002-59	270 $\Omega \pm 5\%$ 0.25 W
St 22	Plug Shoe	5 L 4561.001-82	
Tr 421	Transformer	52.1188.431-00 Bv	
Tr 422	Transformer	52.1188.432-00 Bv	
Ts 421 to Ts 423	Transistors	5 L 5511.102-23	AF 134 V pnp Ge
Ts 424 to Ts 426	Transistors	5 L 5511.102-41	AC 124 V pnp Ge
Ts 427 to Ts 428	Transistors	5 L 5511.102-23	AF 134 V pnp Ge

4.2.13. List of Components of RF Section (52.1188.500-00 (f) Sa)

Bu 1	4/13 RF Jack	5 N 4511.401-01	
Bu 3	RF Jack	5 M 4511.220-05	UG 625 B/U
Bu 7	Flange Socket	5 L 4531.002-49	
C 501	Ceramic Capacitor	5 M 5221.228-75	33 pF $\pm 5\%$ 500 V DC
C 502	Ceramic Capacitor	5 M 5221.222-14	82 pF $\pm 5\%$ 500 V DC
C 503 to C 505	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F $\pm 20\%$ 100 V DC
C 506	Plastic Film Capacitor	5 L 5241.026-68	0.47 μ F $\pm 20\%$ 100 V DC
C 507 to C 512	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F $\pm 20\%$ 100 V DC
C 513	Paper Capacitor	5 N 5211.311-00	4700 pF $\pm 20\%$ 400 V DC
C 514 to C 517	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F $\pm 20\%$ 100 V DC

Item	Description	Stock Number	Electrical Values Remarks
C 519 to C 521	Plastic Film Capacitors	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 524	Ceramic Capacitor	5 M 5221.230-02	10 pF \pm 0.5 pF 500 V DC
C 525	Ceramic Capacitor	5 M 5221.231-55	100 pF \pm 2% 500 V DC
C 526	Plastic Film Capacitor	5 L 5241.026-64	0.1 μ F \pm 20% 100 V DC
C 527	Mica Capacitor	5 L 5231.012-23	820 pF \pm 2% 500 V DC
C 528	Ceramic Capacitor Combination, consisting of:		102 pF 500 V DC
	Ceramic Capacitor	5 M 5221.225-53	51 pF \pm 5% 500 V DC
	Ceramic Capacitor	5 M 5221.225-29	51 pF \pm 5% 500 V DC
C 529	Variable Capacitor	5 L 5251.002-39	3 X (7/15 pF + 6/81 pF)
C 530 to C 534	Variable Capacitors, integrated with C 529		
C 535	Variable Capacitor	5 L 5251.001-97	10/187 pF + 7/85 pF
C 536	Variable Capacitor, integrated with C 535		
C 541, C 543 and C 545	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 542	Ceramic Capacitor	5 M 5222.220-98	12 pF \pm 5% 250 V DC
C 544 and C 546	Ceramic Capacitors	5 M 5221.221-51	18 pF \pm 5% 500 V DC
C 547	Ceramic Capacitor Battery	52.1077.599-07	300 pF \pm 2% 500 V DC
C 548	Ceramic Capacitor Combination, consisting of:		220 pF 500 V DC
	Ceramic Capacitor	5 M 5221.222-69	120 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-33	100 pF \pm 2% 500 V DC
C 549	Paper Capacitor	5 N 5211.314-00	0.01 μ F \pm 20% 400 V DC
C 550	Air Dielectric Trimmer	5 L 5261.003-57	2/19 pF
C 551	Ceramic Capacitor	5 M 5221.229-37	39 pF \pm 2% 500 V DC
C 556, C 559 and C 561	Air Dielectric Trimmer	5 L 5261.003-57	2/19 pF
C 557, C 560 and C 562	Ceramic Capacitors	5 M 5221.221-69	33 pF \pm 2% 500 V DC
C 558 and C 573	Ceramic Capacitor Batteries	52.1077.599-06	480 pF \pm 2% 500 V DC

Item	Description	Stock Number	Electrical Values Remarks
C 563	Ceramic Capacitor Battery	52.1077.599-02	960 pF \pm 2% 500 V DC
C 564	Ceramic Capacitor Battery	52.9522.000-12	480 pF \pm 5% 500 V DC
C 565	Paper Capacitor	5 N 5211.314-00	0.01 μ F \pm 20% 400 V DC
C 566 and C 571	Air Dielectric Trimmer	5 L 5261.003-57	2/19 pF
C 567	Ceramic Capacitor Combination, consisting of:		45 pF 500 V DC
	Ceramic Capacitor	5 M 5221.226-37	27 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.226-34	18 pF \pm 2% 500 V DC
C 572	Ceramic Capacitor	5 M 5221.221-68	39 pF \pm 2% 500 V DC
C 574, C 576 and C 581	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 575 and C 577	Ceramic Capacitors	5 M 5221.221-69	33 pF \pm 2% 500 V DC
C 578 and C 593	Ceramic Capacitor Batteries	52.1077.599-02	960 pF \pm 2% 500 V DC
C 579	Ceramic Capacitor Combination, consisting of:		716 pF 500 V DC
	Ceramic Capacitor Battery	52.1077.599-04	660 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.237-58	56 pF \pm 2% 500 V DC
C 580 and C 595	Paper Capacitors	5 N 5211.314-00	0.01 μ F \pm 20% 400 V DC
C 582	Ceramic Capacitor	5 M 5221.226-38	27 pF \pm 5% 500 V DC
C 586, C 589 and C 591	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 587	Ceramic Capacitor	5 M 5221.221-68	39 pF \pm 2% 500 V DC
C 588	Ceramic Capacitor Battery	52.1077.599-06	480 pF \pm 2% 500 V DC
C 590 and C 592	Ceramic Capacitors	5 M 5221.221-69	33 pF \pm 2% 500 V DC
C 594	Ceramic Capacitor Combination, consisting of:		1210 pF 500 V DC
	Ceramic Capacitor Battery	5 M 5221.237-62	990 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.229-35	220 pF \pm 2% 500 V DC

Item	Description	Stock Number	Electrical Values Remarks
C 596 and C 601	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 597	Ceramic Capacitor	5 M 5221.221-52	15 pF \pm 5% 500 V DC
C 602	Ceramic Capacitor	5 M 5221.237-72	51 pF \pm 2% 500 V DC
C 603	Ceramic Capacitor Battery	52.1077.599-06	480 pF \pm 2% 500 V DC
C 604 and C 606	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 605 and C 607	Ceramic Capacitors	5 M 5221.227-69	47 pF \pm 2% 500 V DC
C 608	Ceramic Capacitor Battery	52.1077.599-02	960 pF \pm 2% 500 V DC
C 609	Ceramic Capacitor Combination, consisting of:		1470 pF 500 V DC
	Ceramic Capacitor Battery	5 M 5221.237-62	990 pF \pm 2% 500 V DC
	Ceramic Capacitor Battery	52.1077.599-06	480 pF \pm 2% 500 V DC
C 610	Paper Capacitor	5 N 5211.314-00	0.01 μ F \pm 20% 400 V DC
C 611 and C 616	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 612	Ceramic Capacitor Combination, consisting of:		39 pF 500 V DC
	Ceramic Capacitor	5 M 5221.237-57	27 pF \pm 5% 500 V DC
	Ceramic Capacitor	5 L 5222.001-71	12 pF \pm 0.5 pF 500 V DC
C 617	Ceramic Capacitor Combination, consisting of:		74 pF 500 V DC
	Ceramic Capacitor	5 M 5221.221-67	47 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.221-70	27 pF \pm 2% 500 V DC
C 618	Ceramic Capacitor Battery	52.1077.599-06	480 pF \pm 2% 500 V DC
C 619 and C 621	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 620	Ceramic Capacitor Combination, consisting of:		65 pF 500 V DC
	Ceramic Capacitor	5 M 5221.227-69	47 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-53	18 pF \pm 5% 500 V DC
C 622	Ceramic Capacitor	5 M 5221.221-55	68 pF \pm 2% 500 V DC
C 623	Ceramic Capacitor Battery	52.1077.599-02	960 pF \pm 2% 500 V DC

Item	Description	Stock Number	Electrical Values Remarks
C 624	Capacitor Combination, consisting of:		2200 pF 500 V DC
	Ceramic Capacitor Battery	5 M 5221.237-63	1980 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-22	220 pF \pm 2% 500 V DC
C 625	Paper Capacitor	5 N 5211.314-00	0.01 μ F \pm 20% 400 V DC
C 626 and C 631	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 627	Ceramic Capacitor Combination, consisting of:		54 pF 500 V DC
	Ceramic Capacitor	5 M 5221.226-14	27 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.226-79	27 pF \pm 2% 500 V DC
C 632	Ceramic Capacitor Combination, consisting of:		95 pF 500 V DC
	Ceramic Capacitor	5 M 5221.221-56	56 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-70	39 pF \pm 2% 500 V DC
C 633 and C 638	Ceramic Capacitor Batteries	52.1077.599-06	480 pF \pm 2% 500 V DC
C 634 and C 636	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 635	Ceramic Capacitor Combination, consisting of:		74 pF 500 V DC
	Ceramic Capacitor	5 M 5221.227-69	47 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.221-59	27 pF \pm 2% 500 V DC
C 637	Ceramic Capacitor Combination, consisting of:		86 pF 500 V DC
	Ceramic Capacitor	5 M 5221.227-69	47 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-70	39 pF \pm 2% 500 V DC
C 639	Ceramic Capacitor Combination, consisting of:		2460 pF 500 V DC
	Ceramic Capacitor Battery	5 M 5221.237-63	1980 pF \pm 2% 500 V DC
	Ceramic Capacitor Battery	52.1077.599-06	480 pF \pm 2% 500 V DC
C 640	Paper Capacitor	5 N 5211.314-00	0.01 μ F \pm 20% 400 V DC
C 641 and C 646	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 642	Ceramic Capacitor	5 M 5221.226-12	68 pF \pm 2% 500 V DC
C 647	Ceramic Capacitor	5 M 5221.221-67	47 pF \pm 2% 500 V DC

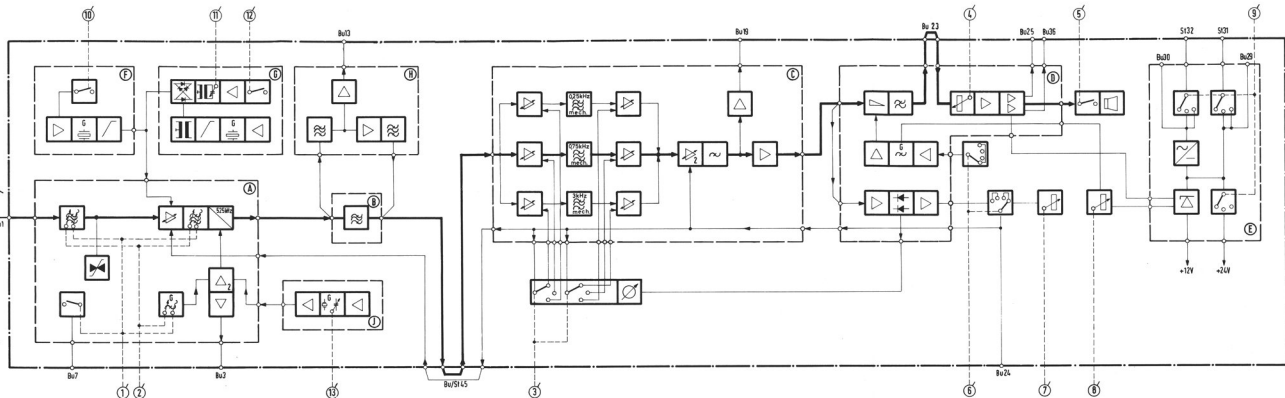
Item	Description	Stock Number	Electrical Values Remarks
C 648 and C 653	Ceramic Capacitor Batteries	52.1077.599-07	300 pF ± 2% 500 V DC
C 649 and C 651	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 650	Ceramic Capacitor	5 M 5221.226-27	20 pF ± 5% 500 V DC
C 652	Ceramic Capacitor	5 M 5221.226-32	43 pF ± 2% 500 V DC
C 654	Ceramic Capacitor Combination, consisting of:		2200 pF 500 V DC
	Ceramic Capacitor Battery	5 M 5221.237-63	1980 pF ± 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-76	220 pF ± 2% 500 V DC
C 655	Paper Capacitor	5 N 5211.505-00	1000 pF ± 20% 1000 V DC
C 656 and C 661	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 657	Ceramic Capacitor	5 M 5221.222-11	22 pF ± 2.5% 500 V DC
C 662	Ceramic Capacitor Combination, consisting of:		54 pF 500 V DC
	Ceramic Capacitor	5 M 5221.227-69	47 pF ± 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-71	7 pF ± 0.5 pF 500 V DC
C 663 and C 666	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 664	Ceramic Capacitor	5 M 5221.222-72	47 pF ± 2% 500 V DC
C 665	Ceramic Capacitor Combination, consisting of:		54 pF 500 V DC
	Ceramic Capacitor	5 M 5221.222-72	47 pF ± 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-71	7 pF ± 0.5 pF 500 V DC
C 667	Ceramic Capacitor Battery	5 M 5221.237-63	1980 pF ± 2% 500 V DC
C 668	Ceramic Capacitor	5 M 5221.230-47	68 pF ± 2% 500 V DC
C 669, C 676 and C 678	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 670	Ceramic Capacitor	5 M 5221.226-33	39 pF ± 2% 500 V DC
C 677	Ceramic Capacitor	5 M 5221.221-56	56 pF ± 2% 500 V DC
C 679	Ceramic Capacitor	5 M 5221.227-69	47 pF ± 2% 500 V DC
C 680	Ceramic Capacitor Combination, consisting of:		65 pF 500 V DC
	Ceramic Capacitor	5 M 5221.227-69	47 pF ± 2% 500 V DC
	Ceramic Capacitor	5 M 5221.222-53	18 pF ± 5% 500 V DC

Item	Description	Stock Number	Electrical Values Remarks
C 681 and C 684	Air Dielectric Trimmers	5 L 5261.003-57	2/19 pF
C 682	Ceramic Capacitor Battery	5 M 5221.237-62	990 pF \pm 2% 500 V DC
C 683	Ceramic Capacitor	5 M 5221.222-52	22 pF \pm 2.5% 500 V DC
C 685	Ceramic Capacitor Combination, consisting of:		37 pF 500 V DC
	Ceramic Capacitor	5 M 5221.226-14	27 pF \pm 2% 500 V DC
	Ceramic Capacitor	5 M 5221.230-48	10 pF \pm 0.5 pF 500 V DC
Gr 501 and Gr 502	Diodes	5 L 5531.101-42	AAY 41 V Ge
Gr 503	Zener Diode	5 L 5532.201-40	BZY 85/C 8 V 2 TELEFUNKEN
Gr 504 to Gr 507	Diodes	5 L 5531.101-42	AAY 41 V Ge
L 501 and L 503	RF Chokes	5 L 5051.001-23	120 μ H
L 502	RF Chokes	5 L 5051.001-43	0.33 μ H 2.4 A
L 505 and L 506	RF Chokes	5 L 5051.001-23	120 μ H
L 507	Coil	52.1188.600-00 Bv	
L 541	Coil	52.1188.601-00 Bv	
L 542	Coil	52.1188.611-00 Bv	
L 543	RF Choke	5 L 5051.001-69	10 μ H
L 544	Coil	52.1188.621-00 Bv	
L 545	RF Choke	5 L 5051.002-66	18 μ H
L 546	Coil	52.1188.631-00 Bv	
L 556	Coil	52.1188.602-00 Bv	
L 557	Coil	52.1188.612-00 Bv	
L 558	RF Choke	5 L 5051.002-67	22 μ H
L 559	Coil	52.1188.622-00 Bv	
L 560	Coil	52.1188.632-00 Bv	
L 571	Coil	52.1188.603-00 Bv	
L 572	Coil	52.1188.613-00 Bv	
L 573	RF Choke	5 L 5051.002-67	22 μ H
L 574	Coil	52.1188.623-00 Bv	
L 575	Coil	52.1188.633-00 Bv	
L 586	Coil	52.1188.604-00 Bv	

Item	Description	Stock Number	Electrical Values Remarks
L 587	Coil	52.1188.614-00 Bv	
L 588	RF Choke	5 L 5051.001-67	8.2 μ H
L 589	Coil	52.1188.624-00 Bv	
L 590	Coil	52.1188.634-00 Bv	
L 601	Coil	52.1188.605-00 Bv	
L 602	Coil	52.1188.615-00 Bv	
L 603	RF Choke	5 L 5051.001-63	5.6 μ H
L 604	Coil	52.1188.625-00 Bv	
L 605	Coil	52.1188.635-00 Bv	
L 616	Coil	52.1188.606-00 Bv	
L 617	Coil	52.1188.616-00 Bv	
L 618	RF Choke	5 L 5051.001-69	10 μ H
L 619	Coil	52.1188.626-00 Bv	
L 620	Coil	52.1188.636-00 Bv	
L 631	Coil	52.1188.607-00 Bv	
L 632	Coil	52.1188.617-00 Bv	
L 633	RF Choke	5 L 5051.001-69	10 μ H
L 634	Coil	52.1188.627-00 Bv	
L 635	Coil	52.1188.637-00 Bv	
L 646	Coil	52.1188.608-00 Bv	
L 647	Coil	52.1188.618-00 Bv	
L 648	RF Choke	5 L 5051.001-67	8.2 μ H
L 649	Coil	52.1188.628-00 Bv	
L 650	Coil	52.1188.638-00 Bv	
L 661	Coil	52.1188.609-00 Bv	
L 662	Coil	52.1188.619-00 Bv	
L 663	RF Choke	5 L 5051.001-67	8.2 μ H
L 664	Coil	52.1188.629-00 Bv	
L 665	Coil	52.1188.639-00 Bv	
L 676	Coil	52.1188.610-00 Bv	
L 677	Coil	52.1188.620-00 Bv	
L 678	RF Choke	5 L 5051.001-57	3.3 μ H
L 679	Coil	52.1188.630-00 Bv	
L 680	Coil	52.1188.640-00 Bv	
La 501	Festoon Lamp	5 L 5811.001-87	24 V 3 W
R 501 and R 506	Resistors	5 N 5102.002-89	4.7 k Ω \pm 5% 0.25 W

Item	Description	Stock Number	Electrical Values Remarks
R 502 and R 504	Resistors	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 503	Resistor	5 N 5102.002-97	10 k Ω \pm 5% 0.25 W
R 505	Resistor	5 N 5102.002-65	470 Ω \pm 5% 0.25 W
R 507	Resistor	5 N 5102.003-08	27 k Ω \pm 5% 0.25 W
R 508	Resistor	5 N 5102.002-85	3.3 k Ω \pm 5% 0.25 W
R 509 and R 518	Resistors	5 N 5102.002-49	100 Ω \pm 5% 0.25 W
R 510	Resistor	5 N 5102.002-79	1.8 k Ω \pm 5% 0.25 W
R 511	Resistor	5 N 5102.002-57	220 Ω \pm 5% 0.25 W
R 512 and R 522	Resistors	5 N 5102.002-43	56 Ω \pm 5% 0.25 W
R 513 and R 519	Resistors	5 N 5102.002-75	1.2 k Ω \pm 5% 0.25 W
R 514	Resistor	5 N 5102.002-95	8.2 k Ω \pm 5% 0.25 W
R 515, R 521 and R 526	Resistors	5 N 5102.003-06	22 k Ω \pm 5% 0.25 W
R 516	Resistor	5 N 5102.002-61	330 Ω \pm 5% 0.25 W
R 517	Resistor	5 N 5102.002-47	82 Ω \pm 5% 0.25 W
R 520 and R 524	Resistors	5 N 5102.002-91	5.6 k Ω \pm 5% 0.25 W
R 523 and R 525	Resistors	5 N 5102.002-83	2.7 k Ω \pm 5% 0.25 W
R 527 and R 528	Resistors	5 N 5102.002-73	1 k Ω \pm 5% 0.25 W
R 529	Resistor	5 N 5102.002-93	6.8 k Ω \pm 5% 0.25 W
R 530	Resistor	5 N 5102.002-97	10 k Ω \pm 5% 0.25 W
R 541 and R 542	Resistors	5 N 5102.003-38	470 k Ω \pm 5% 0.25 W
R 543	Resistor	5 N 5102.002-67	560 Ω \pm 5% 0.25 W
R 556 and R 557	Resistors	5 N 5102.003-32	270 k Ω \pm 5% 0.25 W
R 558	Resistor	5 N 5102.002-35	27 Ω \pm 5% 0.25 W
R 571 and R 572	Resistors	5 N 5102.003-24	120 k Ω \pm 5% 0.25 W

Diese Vorlesung darf weder kopiert, noch
drucken, fotokopieren, mitteilen, noch ander-
weitig in irgendeiner Weise benutzt werden.



- (1) BEREICHSSCHALTER (1 BIS 10)
- (2) ABSTIMMUNG (GROB/FINE)
- (3) BANDBREITE
- (4) NF-REGELUNG
- (5) LAUTSPRECHER (EIN/AUS)
- (6) BETRIEBSART
- (7) HF-REGELUNG
- (8) A1-OBERLAGERER
- (9) NETZ-BATTERIE-SCHALTER
- (10) EICHOSZILLATOR (EIN/AUS)
- (11) ABSTIMMUNG FREQUENZLUPE
- (12) FREQUENZLUPE (EIN/AUS)
- (13) ABSTIMMUNG QUARZOSZILLATOR

- BANDSWITCH (1 TO 10)
- TUNING (COARSE/FINE)
- BANDWIDTH
- AF VOLUME CONTROL
- LOUDSPEAKER (ON/OFF)
- TYPES OF SERVICE
- RF VOLUME CONTROL
- B.F.O.
- MAINS BATTERY SWITCH
- CALIBRATION OSCILLATOR (ON/OFF)
- TUNING FREQUENCY MAGNIFIER
- FREQUENCY MAGNIFIER (ON/OFF)
- TUNING CRYSTAL OSCILLATOR

- Bu 1 ANTENNE-EINGANG
- Bu 3 OSZ-AUSGANG
- Bu 7 STEUERANSCHLUSS FÜR PEILVORSATZ
- Bu 13 ZF-BREITBAND-AUSGANG
- Bu 19 ZF-AUSGANG
- Bu 23 DEMOD.-AUSGANG, NF-EINGANG
- Bu 24 REGELSPANNUNGS-AUSGANG
- Bu 25 LEITUNGS-AUSGANG
- Bu 29 BATTERIE-AUSGANG (INTERN)
- Bu 30 NETZ-AUSGANG (INTERN)
- Si 31 BATTERIE-EINGANG (24 V)
- Si 32 NETZ-EINGANG (220 V~/110 V~)
- Bu 36 KOPFHÖRER-AUSGANG
- Bu/Si 45 ZF-EINGANG, REGELSPANNUNGS-AUSGANG

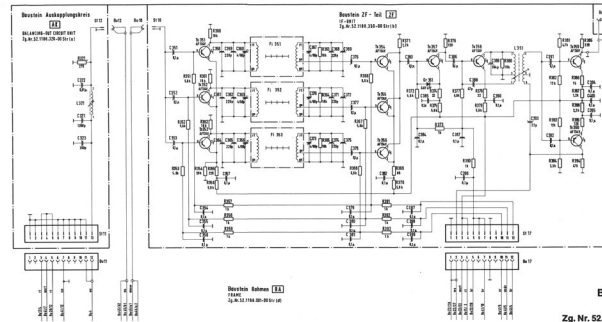
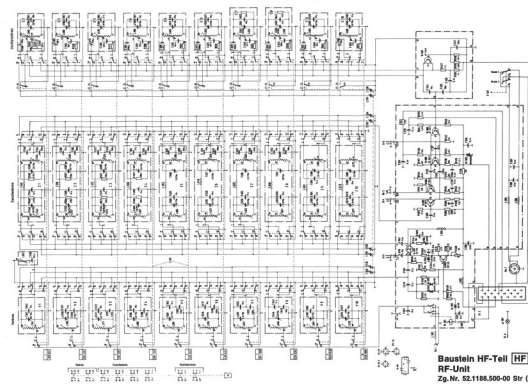
- ANTENNA INPUT
- OSCILLATOR OUTPUT
- CONTROL CONNECTION FOR DF ACCESSORY UNIT
- IF WIDEBAND OUTPUT
- IF OUTPUT
- DEMOD. OUTPUT, AF INPUT
- AGC VOLTAGE OUTPUT
- LINE OUTPUT
- BATTERY OUTPUT (INTERNAL)
- MAINS OUTPUT (INTERNAL)
- BATTERY INPUT (24 V)
- MAINS INPUT (220 V~/110 V~)
- HEADPHONE OUTPUT
- IF INPUT, AGC OUTPUT

- (A) HF-TEIL HF
- (B) AUSKOPPLUNGSKREIS AK
- (C) ZF-TEIL ZF
- (D) NF-TEIL NF
- (E) NETZTEIL NT
- (F) EICHOSZILLATOR EO 639 AW/2
- (G) FREQUENZLUPE FL 639 AW/1
- (H) FREIBAND-PANORAMA-AUSGANG BPA 639 AW/1
- (J) QUARZOSZILLATOR QO 639 AW/1

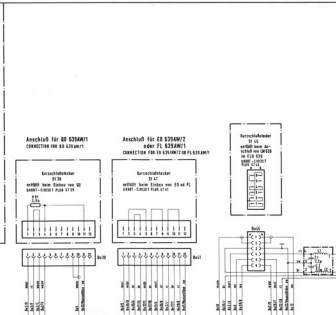
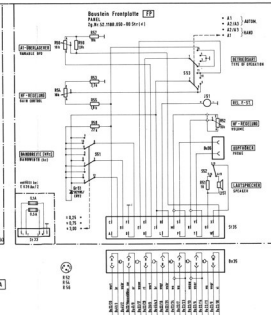
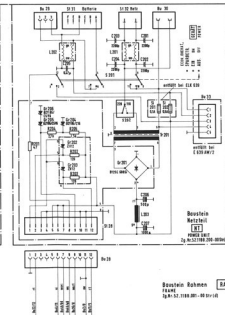
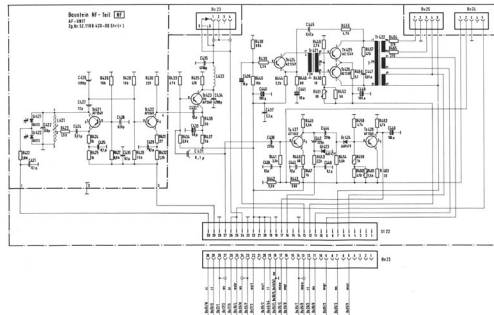
- RF SECTION HF
- OUTPUT CIRCUIT AK
- IF SECTION ZF
- AF SECTION NF
- MAINS SECTION NT
- CALIBRATION OSCILLATOR EO 639 AW/2
- FREQUENCY MAGNIFIER FL 639 AW/1
- WIDEBAND PANORAMA OUTPUT BPA 639 AW/1
- CRYSTAL OSCILLATOR QO 639 AW/1

Übersichtsschaltplan für E 639 AW/2
Block circuit diagram for E 639 AW/2
Sk 52-851 Bl. 1
Gültig ab Fabr. Nr. 200 240





4.3.1. Teil 1
Part 1
Baugruppen: HF und AK, ZF, RA
Units: RF and B-OC, IF, FR
Zg. Nr. 52.1188.500-00 Str (I) und Sk 52-851 Bl. 3



4.3.2. Teil 2
Part 2
Baugruppen: NF, NT, FP, RA
Units: AF, PU, PA, FR
Sk 52-851 Bl. 4

4.3.1. bis 4.3.2. Gesamt-Stromlaufbahn
Allwellenempfänger E 639 AW/2
Teil 1 bis 2
Total Circuit Diagram
Allwave Receiver E 639 AW/2
Parts 1 to 2
Sk 52-851 Bl. 3 bis Bl. 4



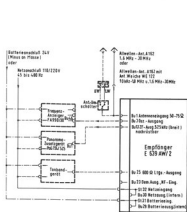


Bild 1:
Anschlussschema für den Empfänger E 639 AW/2
mit Frequenzmesser, Tonbandgerät und
Netzgerät als Zusatzanlage.

Fig. 1: Connecting Diagram for Receiver E 639 AW/2
with Digital Frequency Meter, Panorama Accessory
Unit and Magnetic Tape Recorder as Accessories.

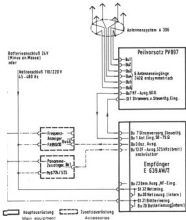


Bild 2:
Anschlussschema für eine PEIL-Vorrichtung
P 807 mit 8 Magn.-S.-Schleifen u. 220 V
Netzgerät P 807 und Empfänger E 639 AW/2
als Zusatzanlage.

Fig. 2: Connecting Diagram for an HF-OP-
Equipment P 807 with 8-Magn.-S.-Schleifen u. 220 V
Netzgerät P 807 und Empfänger E 639 AW/2
as Accessories.

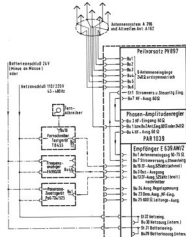


Bild 3:
Anschlussschema für den Empfänger E 639 AW/2
mit Frequenzmesser, Tonbandgerät und
Netzgerät als Zusatzanlage.

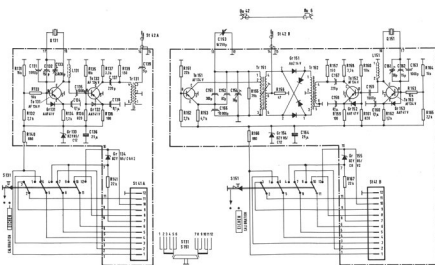
Fig. 3: Connecting Diagram for Receiver E 639 AW/2
with Digital Frequency Meter, Panorama Accessory
Unit and Magnetic Tape Recorder as Accessories.

BATTERIEANSCHLUSS 24 V
(MINUS AN MASS)
ODER
NETZANSCHLUSS 110/220 V-
45 HZ BIS 480 HZ
FREQUENZ-ANZEIGER FA 980/9
PANORAMA-ZUSATZGERÄT PAG 724/10/5
TONBANDGERÄT
ALLWELLEN-ANT. A 162
ODER
ALLWELLEN-ANT. A 162 MIT
ANT.-WEICHE WE 122
KNOB-W
ANT.-UMSCHALTER
EMPFÄNGER E 639 AW/2

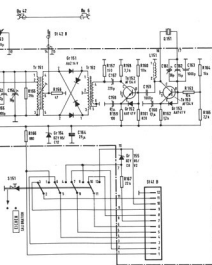
BATTERY TERMINAL 24 V
(NEGATIVE TO CHASSIS)
OR
MAINS TERMINAL 110/220 V AC
45 HZ TO 480 HZ
DIGITAL FREQUENCY METER FA 980
PANORAMA ACCESSORY UNIT PAG 724/10/5
MAGNETIC TAPE RECORDER
ALL-WAVE ANT. A 162
OR
ALL-WAVE ANT. A 162 WITH
ANT. FILTER WE 122
KNOB
ANTENNA SWITCH
RECEIVER E 639 AW/2

Anschlussschemen für Empfangs- und Peil-Anlagen mit dem Allwellen-Empfänger E 639 AW/2

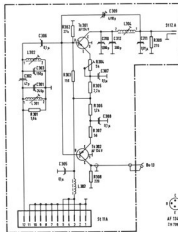
Connection plans for receiving and direction finding equipment with Allwave Receiver E 639 AW/2 SK 52-851 Bl. 8



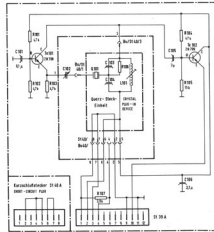
Bestenfalls Netzschalter E 639 AW/2
oder Netzschalter E 639 AW/2
Zu R. 52.108.10-00 (10/8)



Bestenfalls Netzschalter E 639 AW/2
oder Netzschalter E 639 AW/2
Zu R. 52.108.10-00 (10/8)



Bestenfalls Netzschalter E 639 AW/2
oder Netzschalter E 639 AW/2
Zu R. 52.108.10-00 (10/8)

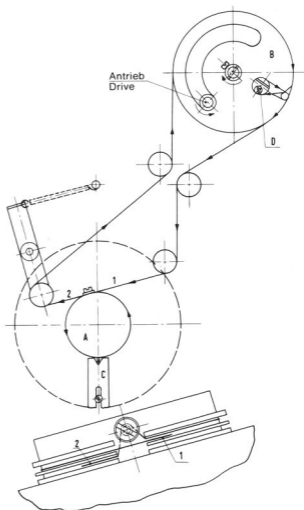


Bestenfalls Netzschalter E 639 AW/2
oder Netzschalter E 639 AW/2
Zu R. 52.108.10-00 (10/8)

4.3.4. Stromlaufpläne für Nachrüst-Baugruppen zum E 639 AW/2

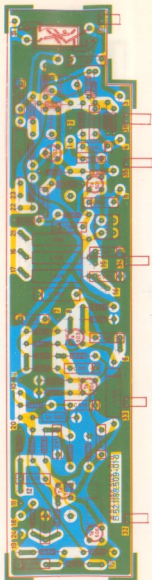
Circuit Diagrams of Supplementary Units for E 639 AW/2 SK 52-851 Bl. 6



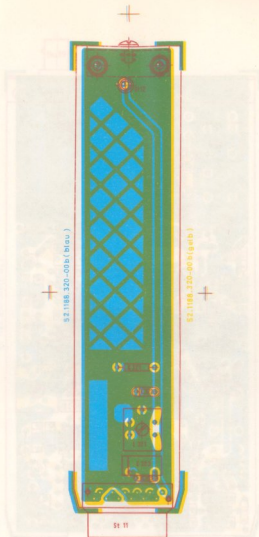


Auflegen eines neuen Antriebsseiles
Replacement of drive rope
 Sk 52-851 Bl. 7



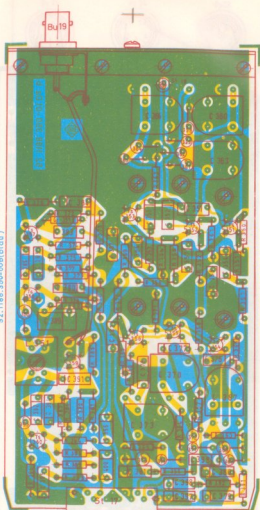


4.4.4. HF-TEIL-LEITERPLATTE
RF-UNIT PRINT
52.1188.509-00 (d)



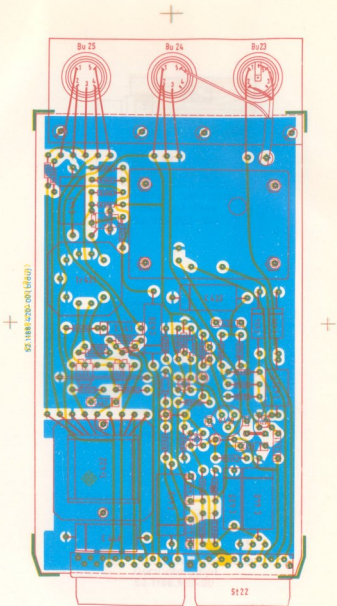
4.4.5. Auskopplungskreis
Balancing-Out Circuit
52.1188.320-00

52.1188.350-00b(bleu)

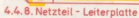


52.1188.350-00 b (getb)

4.4.6. ZF-Teil
JF-Unit
52.1188.350-00

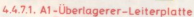


4.4.7. NF-Teil
AF-Unit
52.1186.420-00



Power Unit Print

52.1188.202-00



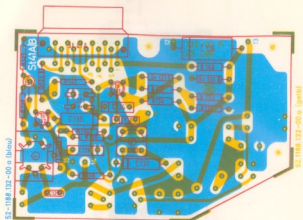
B.F.O. - Print

52.1188.422-00

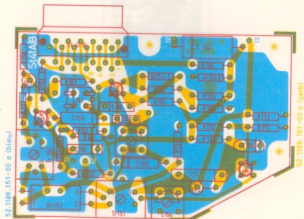


Oscillator Print

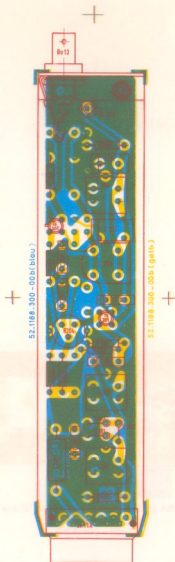
52.1188,510-00



4.4.9. Eichoszillator - Leiterplatte
Calibration Oscillator Print
52.1188.132-00



4.4.10. Frequenzlupe - Leiterplatte
Variable Calibration Oscillator Print
52.1188.151-00



4.4.11. Breitband-Panorama-Ausgang
Wideband Panoramic Output Unit
BPA 639.AW / 2
52.1188.300-00



4.4.12 Quarzoszillator Q 0639 AW/1
Crystal Oscillator
52.1188.100 - 00

Customers abroad are requested to write to:

ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT	
AEG-TELEFUNKEN	79 Ulm (Donau)
GESCHÄFTSBEREICH	Elisabethenstrasse 3
ANLAGEN	P.O.B. 830
EXPORT	Tel.: 6731 - 1921
	Telex: 7 - 12723

