3. Maintenance

3.1 Measuring Instruments and Auxiliary Equipment Required

For the measuring instruments and auxiliary equipment required see Table 5-17 in the appendix.

3.2 Performance Check

The performance check must be made only after the functional check in accordance with section 2.2.4 has been carried out, to avoid carrying out a performance check on a faulty receiver.

3.2.1 Checking the Accuracy of the Level Measurement

The accuracy of the level measurement of the Test Receiver ESH 3 is determined by

- the accuracy of the calibration generator,
- the accuracy of the internal attenuator, and
- the accuracy of the A/D converter path.

The permissible resulting total error (assuming that an adequate signal-to-noise ratio is ensured) in average or peak value modes is ≤ 1 dB. For checking, set the measuring times to the standard values (0.1 s; 1 s) by means of the MEAS. TIME key 37.

3.2.1.1 Checking the Level Indication in the 20-dB Operating Range

a) Average value:

Settings on the ESH 3:

Operating range 33:	20 dB
Indicating mode 35:	AV.
IF attenuation 40, 41:	40 dB*
RF attenuation 40, 41:	50 dB
IF bandwidth 5:	500 Hz (model 52) < 1 kHz (model 56)
Calibrate receiver 15	

Apply sinewave signal of 78 dBµV ±0.1 dB in the frequency range from 10 kHz to 29.9999 MHz.

Nominal indication ..... 78.0 dBµV

Permissible error of level indication ..... ≤ 1 dB

---

* The IF attenuation I = IF attenuation, R = RF attenuation and P_{lower} = lower level of operating range is derived from the formula $I/dB = P_{lower} + 30 - R$

b) Peak value:

Settings on the ESH 3:	Indicating mode 35:	PEAK
	IF attenuation 40, 41:	40 dB
	RF attenuation 40, 41:	10 dB
	IF bandwidth 5:	10 kHz
	Calibrate receiver (15)	

Apply pulse signal of 78 dBµV/MHz, pulse repetition frequency 100 Hz, to the RF input of the ESH 3 (45) (corresponds to a setting of 48 dB with the Schwarzbeck CISPR 2/4 standard pulse generator).

Nominal indication with $f_{in} > 1$ MHz	38.0 dBµV
Permissible error of level indication	≤ 2 dB

c) Pulse spectral density:

Settings on the ESH 3: Indicating mode 35: MIL

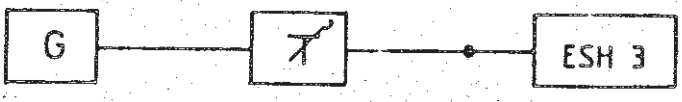
(All other settings same as under section 3.2.1.1b)

Nominal indication	78.0 dBµV/MHz
Permissible reading error	≤ 2 dB

d) Checking the scale accuracy and the analog level indication:

Settings on the ESH 3: Same as under section 3.2.1.1a

Test setup:



Reduce the level by 20 dB by switching the external attenuator in steps of 1 dB starting at full-scale analog indication.

Check the light dot of the analog level indication from maximum to minimum (left-hand scale end).

Check the scale accuracy:

Permissible scale error of 13

in upper half of operating range	≤ 0.2 dB
in lower half of operating range	≤ 0.3 dB

3.2.1.2 Checking the Level Indication in the 40-dB/60-dB Operating Level Range

a) Average value:

Settings on the ESH 3:	Indicating mode 35:	AV
	IF attenuation 40, 41:	40 dB
	RF attenuation 40, 41:	30 dB or 10 dB
	IF bandwidth 5:	500 Hz (model 52) 1 kHz (model 56)
	Calibrate receiver (15)	

Apply sinewave signal of 78 dBµV ±0.1 dB in the frequency range from 9 kHz to 29.9999 MHz.

Nominal indication ..... 78.0 dBµV
Permissible error of level indication ..... < 1 dB

b) Peak value:

Settings on the ESH 3:	Indicating mode 35:	PEAK
	IF attenuation 40, 41:	40 dB
	RF attenuation 40, 41:	10 dB
	IF bandwidth 5:	10 kHz
	Calibrate receiver (15)	

Apply pulse signal of 90 dBµV/MHz, pulse repetition frequency 100 Hz, from a standard pulse generator to the RF input 45 of the ESH 3 (corresponds to a setting of 60 dB with the Schwarzbeck-CISPR 2/4 standard pulse generator).

Nominal indication with f_{in} = 1 MHz ..... 50.0 dBµV
Permissible indicating error ..... < 2 dB

c) Pulse spectral density:

Settings on the ESH 3: Indicating mode 35: MIL
(All other settings same as under 3.2.1.2b)

Nominal indication ..... 90.0 dBµV/MHz
Permissible reading error ..... < 2 dB

d) Checking the scale accuracy and analog level indication:

Settings on the ESH 3: Same as under section 3.2.1.2a

Operating range 33: 40 dB or 60 dB

Reduce level by 40 or 60 dB by switching the external attenuator in 2-dB steps starting at full scale deflection of the analog level indication.

Check the light dot of the analog level indication from maximum to minimum (left-hand scale end).

Checking the scale accuracy:

Permissible scale error of 13 ..... < 1 dB

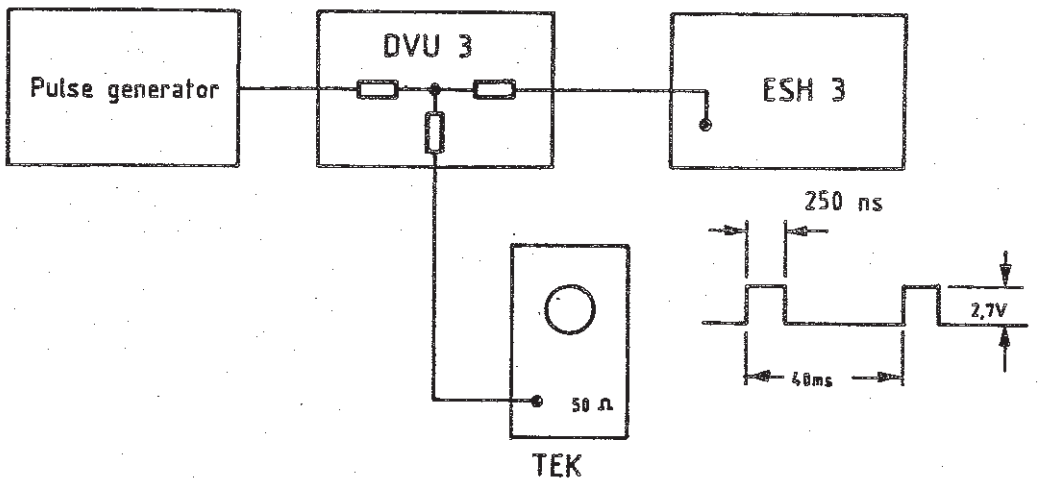
3.2.1.3 Checking the Level Indication in the CISPR (Publication 3) Mode of Indication

Settings on the ESH 3: Receive frequency: < 150 kHz

Indicating mode 35: CISPR

Attenuation 43, 42: AUTO, LOW NOISE

Test setup:



The pulse generator (pulse repetition frequency 25 Hz) supplies the standard pulse required in compliance with CISPR 3
(EMF 1.35 µVs = 5.4 V · 250 ns; Z_{out} = 50 Ω)

Nominal indication ..... 40.0 dBµV

Permissible reading error ..... ±1 dB

When varying the pulse repetition frequency as shown in Fig. 5-9 the indication on the receiver must be within the tolerances specified.

3.2.1.4 Checking the Level Indication in the CISPR (Publication 1) Mode of Indication

Settings on the ESH 3: Receive frequency: > 150 kHz
Indicating mode 35: CISPR
Attenuation 43, 42: AUTO, LOW NOISE

Connect standard pulse generator which supplies a standard pulse with an EMF of 0.316 µVs (Z_{out} = 50 Ω) and a pulse repetition frequency of 100 Hz to the RF input 45.

Nominal indication ..... 60.0 dBµV

Permissible reading error ..... ±1 dB

NOTE:

When using the Schwarzbeck pulse generator IGU the following should be taken into consideration:

The IGU pulse generator supplies a pulse of 0.044 µVs (EMF) in compliance with CISPR 2/4. The difference between this pulse and the CISPR 1 pulse is -17.12 dB. The indication on the ESH 3 is, therefore, correspondingly less.

When varying the pulse repetition frequency as shown in Fig. 5-10 the indication on the receiver must be within the specified tolerances.

3.2.1.5 Checking the Generator Output

3.2.1.5.1 Checking the Generator Output in the TWOPORT Mode

Settings on the ESH 3: Mode of operation 38: TWOPORT

Connect the RF Insertion Unit URV-Z2 of the URV 4 to socket 44 and an RMC Termination to its output.

Nominal indication on the URV 4 ..... -27 dBm

Permissible deviation over entire receive frequency range ±0.3 dB

3.2.1.5.2 Checking the Generator Output in the REM. FREQ. Mode

Settings on the ESH 3: Operating mode 38: REM. FREQ.

Connect a counter with a sensitivity of < 10 mV to the generator output 44. Apply a signal of a known frequency, e.g. from a sound broadcasting station, to the RF input 45. The frequency read out on the counter must not vary when tuning the receiver between the -3-dB points of the IF pass band. Select the IF bandwidth to match the modulation and the channel spacing.

3.2.1.6 Checking the Attenuator

Settings on the ESH 3:	Indicating mode 35:	AV.
	Operating range 33:	20 dB
	IF attenuation 40, 41:	40 dB
	IF bandwidth 5:	500 Hz (model 52) 1 kHz (model 56)
	RF attenuation 40, 41:	90 dB
	Measuring time 37:	0.5 s

Same test setup as under section 3.2.1.1d)
Tune the signal generator (level 118 dBµV) to the receive frequency of the ESH 3. Set the attenuator to 0 dB. Set the level on the signal generator such that the indication on the ESH 3 is ..... 118.0 dBµV.
Increase the attenuation in steps of 10 dB and reduce the ESH 3-RF attenuation setting starting from 90 dB and check deviations from the rated indication.
Deviation ..... ≤ 0.4 dB

3.2.1.7 Checking the IF Level Switch

Same test setup as under section 3.2.1.1d)

Tune the signal generator to the exact receive frequency of the ESH 3 (level approx. 78 dBµV).

Settings on the ESH 3:	IF attenuation 40, 41:	40 dB
	RF attenuation 40, 41:	40 dB
	IF bandwidth 5:	200 Hz

Set the attenuator to 10 dB.

Set indication to ..... 68.0 dBµV

Reduce the IF attenuation of the ESH 3 in steps of 10 dB and increase the attenuator setting accordingly. Check deviation from the original indication.

Permissible deviation ..... ≤ 0.3 dB

3.2.2 Checking the Analog Readouts

3.2.2.1 Checking the Analog Level Indication

Settings on the ESH 3:	Indicating mode 35:	AV.
	Operating range 33:	20 dB
	IF bandwidth 5:	10 kHz
	IF attenuation 40, 41:	30 dB
	RF attenuation 40, 41:	10 dB
	Receive frequency:	1 MHz

Same test setup as under section 3.2.1.1d)

Tune the signal generator to the receive frequency of the ESH 3 (level 40 dBµV) and set the attenuator to 10 dB.

Check the LED light dot ..... right-hand scale end

Increase the attenuation to 20 dB.

Check the LED light dot ..... scale centre

Increase the attenuation to 30 dB.

Check the LED light dot ..... left-hand scale end

Increase the attenuation to 40 dB.

Check the LED light dot ..... MIN. LED lights

Set the attenuator to 0 dB.

Check the LED light dot ..... MAX. LED lights

3.2.2.2 Checking the Analog Frequency Offset Indication

Settings on the ESH 3: Same as under section 3.2.2.1

Calibrate receiver (15)

Check the light dot ..... scale centre, CENTRE LED lights

Tune signal generator to a frequency 5 kHz below the receive frequency.

Check the LED light dot ..... left-hand scale end

Tune the signal generator to a frequency 5 kHz above the receive frequency.

Check the LED light dot ..... right-hand scale end

3.2.3 Checking the Special Functions

3.2.3.1 Checking the Modulation Depth Measurements

Settings on the ESH 3:

Operating range 33:	20 dB
IF bandwidth 5:	10 kHz
IF attenuation 40, 41:	40 dB
RF attenuation 40, 41:	40 dB
Calibrate receiver (15)	
SPEC. FUNC. 11:	"10"

Apply signal to RF input 45 of the ESH 3 (frequency = $f_{ESH\,3}$, level = 68.0 dBµV, modulation depth 50%, f_{mod} = 1 kHz).

a) Modulation depth m: SPEC. FUNC. 11: "21"

Nominal indication ..... 50% m

Permissible deviation of the indication ..... ≦5 digits

b) Positive modulation peak m+: SPEC. FUNC. 11: "20", "23"

Nominal indication ..... 50% m+

Permissible deviation of the indication ..... ≦5 digits

c) Negative modulation peak m-: SPEC. FUNC. 11: "22", "25"

Nominal indication ..... 50% m-

Permissible deviation of the indication ..... ≦5 digits

3.2.3.2 Checking the Frequency Offset Measurement

Settings on the ESH 3: Attenuation 43, 42: AUTO, LOW NOISE

Operating range 33: 60 dB

All other settings same as under section 3.2.3.1

Calibrate receiver (15)

SPEC. FUNC. 11: "10", "31"

Apply unmodulated signal (frequency = $f_{ESH\,3}$, level = 40 dBµV) to the RF input (45) of the ESH 3.

Nominal indication ..... 0.00 kHz

Permissible reading error ..... ≦ 0.1 kHz

Increase frequency of input signal to $f_{ESH\,3}$ + 3 kHz.

Nominal indication ..... 3.00 kHz

Permissible reading error ..... ≦10%

Reduce frequency of input signal to $f_{ESH\,3}$ - 3 kHz.

Nominal indication ..... -3.00 kHz

Permissible reading error ..... ≦10%

3.2.3.3 Checking the Deviation Measurements

Settings on the ESH 3:

Attenuation 43, 42:	AUTO, LOW NOISE
Operating range 33:	60 dB
IF bandwidth 5:	10 kHz
Calibrate receiver (15)	
SPEC. FUNC. 11:	"10"

Apply signal to RF input of the ESH 3 45 (frequency = $f_{ESH\ 3}$, level = 40 dBµV, frequency deviation 3 kHz and f_{mod} = 400 Hz).

a) Frequency deviation: SPEC. FUNC. 11 "41"
Nominal indication ..... 3.00 kHz
Permissible deviation of the indication ..... ≤ 10%

b) Positive peak deviation: SPEC. FUNC. 11: "40", "43"
Nominal indication ..... 3.00 kHz
Permissible deviation of the indication ..... ≤ 0.4 kHz

c) Negative peak deviation: SPEC. FUNC. 11: "42", "45"
Nominal indication ..... 3.00 kHz
Permissible deviation of the indication ..... ≤ 10%

d) Subsequently set SPEC. FUNC. to ØØ

3.2.4 Checking the Frequency Accuracy

Settings on the ESH 3:

Receiver frequency:	29.9999 MHz
Operating mode 38:	TWOPORT

Connect frequency counter with an accuracy of 1×10^{-7} and a sensitivity of < 10 mV to the generator output 44 of the ESH 3.

Permissible frequency error ..... < 500 Hz

3.2.5 Checking the IF Bandwidths

Settings on the ESH 3:	Operating range 33:	20 dB
	Indicating mode 35:	AV.
	IF attenuation 40, 41:	40 dB
	RF attenuation 40, 41:	10 dB
	Operating mode 32:	GEN, OFF

Adjust level of generator signal (frequency = f_{ESH3}) applied to the receiver RF input 45 until the level indication is exactly 40.0 dBµV (maximum analog level indication). For each of the four bandwidths provided, detune the signal generator towards lower and then towards higher frequencies until the level indication decreases by 3 and 6 dB. The -3 dB and -6 dB IF bandwidths are given by the difference between the upper and the lower tuning frequency at which these level drops occur.
Tolerances for the various bandwidths are contained in the specifications.

3.2.6 Checking the Noise Figure

Settings on the ESH 3:	Operating range 33:	20 dB
	Indicating mode 35:	AV.
	IF bandwidth 5:	10 kHz
	RF attenuation 40, 41:	0 dB
	IF attenuation 40, 41:	10 dB

Connect noise generator to the RF input 45 of the ESH 3.

Read off level indication.

Increase level of the noise generator until the level indication increases by 3 dB.

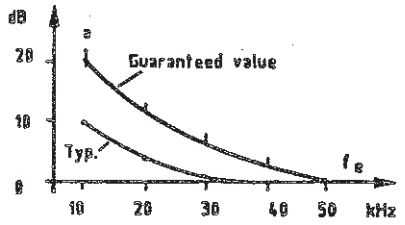
Due to the special calibration of the noise generator it now reads the noise figure directly in dB. If f > 50 kHz, the noise figure is as follows:

At IF bandwidths 10 kHz/2.4 kHz/200 Hz ..... typ. < 14 dB,
at IF bandwidths 500 Hz (model 52) ..... typ. < 16 dB.

If f_{in} > 50 kHz, the noise indication on the ESH 3 is as follows:

Average value	(B = 200 Hz)	.....	typ. -30 dBµV
Peak value	(B = 200 Hz)	.....	typ. -22 dBµV
CISPR 1	(B = 1Ø kHz)	.....	typ. -6 dBµV
CISPR 3	(B = 200 Hz)	.....	typ. -28 dBµV
Pulse spectral density (MIL)	(B = 10 kHz)	.....	typ. 38 dBµV/MHz

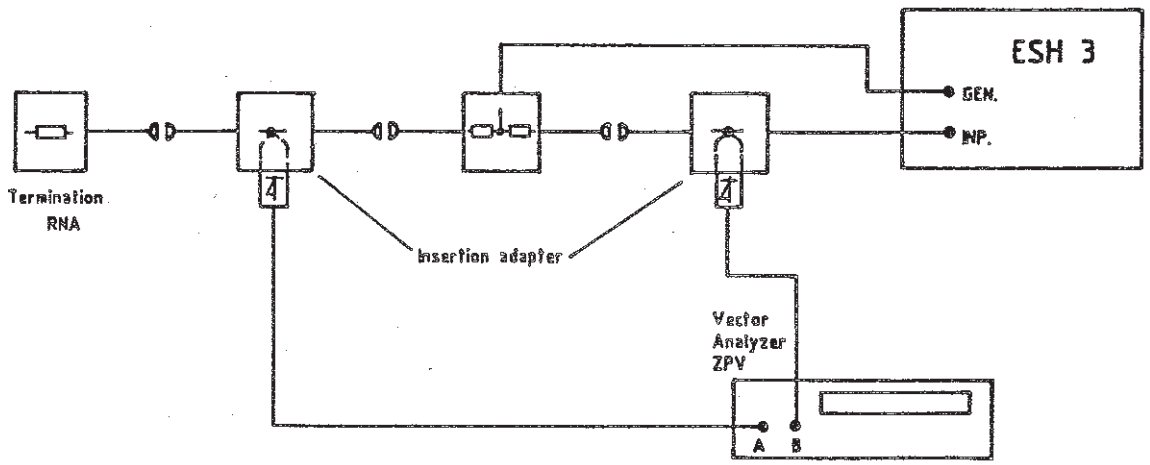
If f_{in} < 50 kHz (B = 200 Hz) (model 52), the noise indication increases as shown in the diagram below.



There is no noise increase for model 56.

3.2.7 Checking the Input Reflection Coefficient

Test setup:



The reflection-coefficient indicator, such as the ZPV, operates at the frequency to which the receiver is tuned.

RF attenuation:	0 dB	.....	r < 33% (= VSWR < 2)
	> 0 dB	.....	r < 10% (= VSWR < 1.2)

3.2.8 Checking the Oscillator Reradiation at the RF Input

Settings on the ESH 3: RF attenuation 40, 41 : 0 dB

Connect a sensitive selective voltmeter (e.g. wave analyzer) to the RF input 45 of the ESH 3. The receive frequency of this meter must be $f_{ESH\,3}$ + 75.000 MHz.

Level indication ..... ≦ 0 dBµV

3.2.9 Checking the 75-MHz IF Rejection

Settings on the ESH 3:

Operating range 33 :	20 dB
IF bandwidth 5 :	200 Hz
Indicating mode 35 :	AV.
IF attenuation 40, 41 :	0 dB
RF attenuation 40, 41 :	0 dB

Apply signal (frequency = 75.000 MHz, level = +70 dBµV) to the RF input 45 of the ESH 3 and check all tuning frequencies of the ESH 3.

Permissible increase in the noise indication ..... ≦ 3 dB.

3.2.10 Checking the Image Frequency Rejection

Same settings on the ESH 3 as under section 3.2.9.

Apply signal (frequency = $f_{ESH\,3}$ + 150.000 MHz, level = +70 dBµV) to the RF input 45 of the ESH 3 and check all tuning frequencies of the ESH 3.

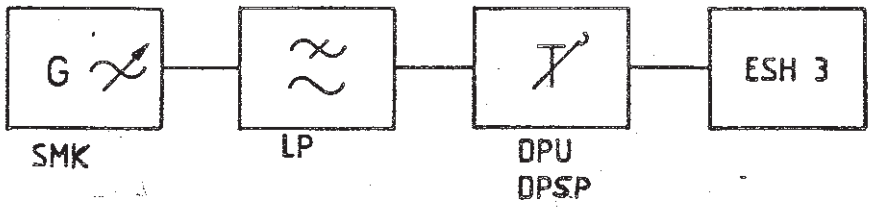
Permissible increase in the noise indication ..... ≦ 3 dB.

3.2.11 2nd Order Harmonic Distortion (a_{K2})

Apply signal of low harmonic content (frequency f_1) to the RF input 45. Due to the non-linearity of the input mixer, for example, a signal $f_2 = 2 \cdot f_1$ is obtained. Measure the level of this signal and compare it with the wanted signal level. There is a square-law relationship between the level of the spurious product and the wanted signal level. This means that when the input level is increased by n dB the spurious product increases by $2 \cdot n$ dB and the level difference between the two signals decreases by n dB.

The requirements placed on the test assembly for measuring harmonic distortion and intermodulation rejection are very exacting since the Receiver ESH 3 features excellent characteristics.

Test setup:



The attenuation of the low-pass filter, LP, should be > 60 dB at the 2nd harmonic of the generator signal and the harmonic distortion of the signal generator should be down > 35 dB.

Calculation of the harmonic distortion and the 2nd-order intercept point K2:

Input signal to the receiver: level l_1 / dBµV
frequency f_1

Resulting unwanted signal: level l_2 / dBµV, frequency f_2

Harmonic distortion a_{K2} / dB = down $l_1 - l_2$ at a level of l_1 / dBµV

Intercept point K2: K2 intercept / dBm = $l_1^+ + a_{K2}$ where
$l_1^+ = l_1$ converted into dBm, i.e.
$l_1^+ = l_1$ / dBµV - 107 dB

Measurement:

Settings on the ESH 3: Indicating mode 35: AV
IF bandwidth 5: 200 Hz
RF attenuation 40, 41: 0 dB

For level and frequency see "Specifications".

3.2.12 2nd and 3rd Order Intermodulation Rejection

Apply two signals of low harmonic content at frequencies f_1 and f_2 to the input of the receiver. Due to the non-linearity of the input mixer signals of the

2nd order: $f_3 = f_1 + f_2$, $f_4 = f_2 - f_1$ and

3rd order: $f_5 = 2f_2 - f_1$, $f_6 = 2f_1 - f_2$

are produced.

Measure the level of the signals f_4, f_5 and f_6. The averaged level difference between f_1, f_2 and f_3, f_4 determines the 2nd order intermodulation rejection (a_{D2}) and that between f_1, f_2 and f_5, f_6 determines the 3rd order intermodulation rejection (a_{D3}). The minimum frequency spacing between the two signals f_1, f_2 must be > 40 kHz. Very exacting requirements are placed on the test assembly for measuring the 2nd and 3rd order intermodulation rejection since the Receiver ESH 3 features excellent characteristics.

Calculation of the intermodulation rejection and the respective intercept points:

Input signals: level l_1 / dBµV, frequency f_1

level $l_2 = l_1$, frequency f_2

Resulting 2nd order IM products: level l_3 / dBµV, frequency $f_3 = f_1 + f_2$

level l_4 / dBµV, frequency $f_4 = f_2 - f_1$

2nd order intermodulation rejection a_{D2} / dB = $l_1 - \frac{l_3 + l_4}{2}$ at a level of l_1 / dBµV

Intercept point D2: D2 intercept / dBm = l_1 / dBm + a_{D2}

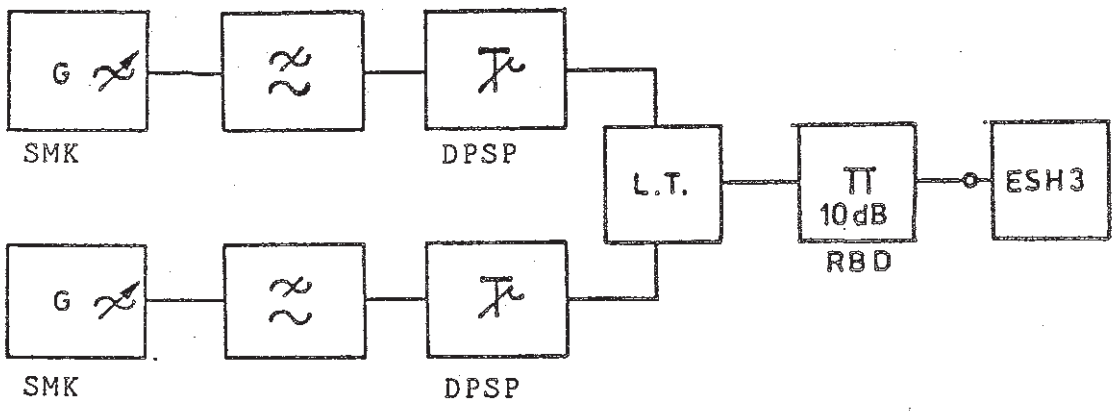
Resulting 3rd order IM products: level 15 / dBµV, frequency $f_5 = 2f_2 - f_1$

level 16 / dBµV, frequency $f_6 = 2f_1 - f_2$

3rd order intermodulation rejection a_{D3} / dB = $l_1 - \frac{l_5 + l_6}{2}$ at a level of l_1 / dBµV

Intercept point D3: D3 intercept point / dBm = l_1 / dBm + $\frac{a_{D3}}{2}$

Test setup:



Both signal generators are set to maximum output. The attenuation of the low-pass filters must be > 60 dB at twice the wanted signal.

Measurement:

Settings of the ESH 3:	Indicating mode 35:	AV.
	IF bandwidth 5:	200 Hz
	RF attenuation 40, 41:	0 dB

For level and frequency see "Specifications".

3.2.13 Checking the Crossmodulation

For test setup, see 3.2.12.

Connect a spectrum analyzer to the IF output (30 kHz) of the ESH 3.

A spurious signal of 36 dB at a frequency spaced 1 kHz away corresponds to a crossmodulation content of 3%. This signal must, however, be a discrete line and should not be caused by the sideband noise of one of the oscillators involved.

Measurement:

Setting on the ESH 3:	RF attenuation 40, 41:	0 dB
	IF attenuation 40, 41:	30 dB
	IF bandwidth 5 :	10 kHz
	Operating range 33:	20 dB

Set transmitter 1 to receive frequency

Level ..... 20 dBµV

Set transmitter 2 (AM-modulated, m = 30%, f = 1 kHz)

to a frequency at a spacing > 100 kHz from f_{rec}

Level ..... 100 dBµV

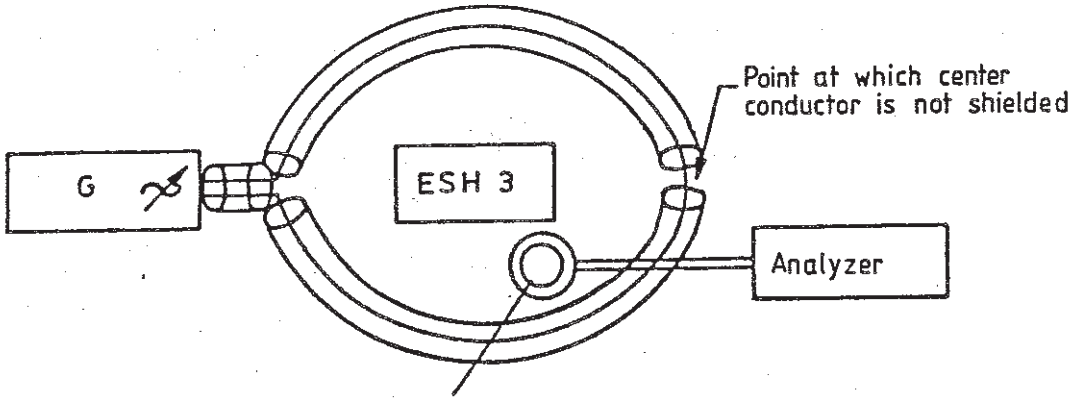
The spurious modulation on the receive frequency is ..... < 3%

(this corresponds to a 1-kHz spurious signal of ..... > 36 dB).

3.2.14 Checking the RF Leakage

Place the Test Receiver ESH 3 in a 10-turn toroidal coil (frequency range < 150 kHz) or a single-turn coil (frequency range > 150 kHz).
Connect the toroidal coil to a signal generator, the level of which is adjusted such that a field strength of 10 V/m is obtained (measured with inductive probe).

Test setup:



Inductive Probe HFH 2-Z4

Level required at the analyzer due to the conversion

factor of the probe ..... 1 mV ±6 dB corresponding to -47 dBm ±6 dB

The toroidal coil (1 turn or 10 turns) is shielded.

There is a gap in the shield at one place, to prevent a shorted turn.

3.2.15 Checking the Outputs

3.2.15.1 30-kHz IF Output

Apply signal corresponding to the upper end of the selected operating range (full-scale analog level indication) and measure at the BNC socket 48 via a high impedance (>> 1 kΩ).

Voltage ..... 2 V

Permissible error ..... ±2 dB

3.2.15.2 75-MHz IF Output

Settings on the ESH 3: RF attenuation 40, 41 : 0 dB

Frequency : > 1 MHz

Change a connection on the Mixers 1 and 2 board (Y9) to activate the amplifier.

Connect RF input 45 to generator output 44.

Select TWOPORT mode by means of key 38 and measure the output level at BNC socket 49 .

Output level ..... 30 mV

Permissible error ..... ±3 dB

3.2.15.3 AM Demodulator Output

Apply signal of 50% modulation depth (modulation sidebands are within the IF passband) to RF input 45 and measure at BNC socket 50 via a high impedance (>> 10 kΩ).

V_{pp} ..... 0.5 V

Permissible error ..... ±3 dB

3.2.15.4 FM Demodulator Output

Apply signal of exactly known frequency to RF input 45 of the ESH 3. Tune the test receiver to this frequency and measure at FM demodulator output 51:

Voltage ..... 0 V

Permissible error ..... ±25 mV

When tuning the receiver to higher frequencies the voltage should increase by 10 mV with every 100-Hz step. Conversely, when tuning the receiver to lower frequencies the voltage should decrease by 10 mV with every 100-Hz step.

Detune the receiver by 5 kHz and measure voltage at BNC socket 51:

Voltage ..... 0.5 V

Permissible error ..... ±50 mV

3.2.15.5 Level Output AV./PEAK

Settings on the ESH 3: Indicating mode 35: AV. or
PEAK or
MIL

Apply signal corresponding to upper end of operating range (full-scale analog level indication) to RF input 45 of the ESH 3. Measure output voltage at BNC socket 53 via a high impedance (>> 10 kΩ):

Voltage ..... 5 V

Permissible error ..... ±75 mV

With CISPR indicating mode:

Voltage ..... 2 V

Permissible error ..... ± 75 mV

3.2.15.6 Level Output CISPR

Same as under 3.2.15.5.

This output (BNC socket 52) includes a low-pass network for simulation of moving-coil-meter response according to CISPR Publ. 1 and 3.

3.2.15.7 Frequency Offset Output

Same as under 3.2.15.6, but voltage higher by a factor of 10 (BNC socket 54).

3.2.16 Check of Operation Using External Reference

Settings on the ESH 3:

Left-hand switch 55 down: external reference

Right-hand switch 55 down/up: 5 MHz / 10 MHz

Apply external standard frequency of 5 or 10 MHz to BNC socket 55 on the rear panel of the receiver. Carry out performance check in accordance with section 2.2.3.

3.2.17 Checking the Recorder Output

Setting on the ESH 3: Scan 25: ON

a) Call up MIN. LEVEL 27 for recorder calibration
and measure output voltage at pins 3 and 4 of socket 58:

Voltage	0 V
Permissible deviation	+0.1 V

b) Call up MAX. LEVEL 26 for recorder calibration
and measure output voltage at pins 3 and 4 of socket 58:

Voltage	+10 V
Permissible deviation	≦ 5%

3.2.18 Checking the IEC-bus Output

- Connect an IEC-bus controller, such as the PCA to the IEC-bus input 57.
  Check all device functions using setting instructions in accordance with section 2.3.21.
  Check the indication of the Remote state, and function of LOCAL key 24.

- Select Talk Only mode by means of switch 56 and connect printer in Listen Only mode to the IEC-bus socket 57.
  Switch on all the test routines by means of the SPEC. FUNC. key 12 ("21", "31", ..., "81").
  Press TALK key 19 to initiate and check data output on printer.

3.3 Electrical Maintenance

Owing to its design the ESH 3 requires very little electrical maintenance:

- Check frequency accuracy (see section 5.3.1.4.2) and readjust reference oscillator once every year.
- Check the calibration level (see section 5.3.10.2) once every year.
- Check NiCd battery BA1 on the computer board Y2 (voltage: 3.6 V) every six months.

3.4 Mechanical Maintenance

The ESH 3 uses a minimum of moving parts. It therefore requires only very little mechanical maintenance. However, frequent use of the ESH 3 in vehicles will make mechanical maintenance necessary more often than if the unit is used only in the lab.

The following maintenance work should be carried out:

- Clean front panel with a soft cloth dipped in alcohol.
- Check that all cable and plug-and-socket connections as well as screws are tightened down properly.

3.5 Storage

The Test Receiver ESH 3 can be stored over an extended period of time at temperatures between -25°C and +70°C. At high temperatures and high relative humidity, seal the receiver with plastic material or waxed paper to minimize any ill effects.

After the receiver has been stored for some time at high relative humidity proceed as follows:

- Unscrew the external top and bottom covers.
- Unscrew the internal top and bottom covers.
- Allow the receiver to dry for a period of 4 to 6 hours at a temperature of between +40 and 45° C.
- Carry out performance check in accordance with section 2.2.3.