



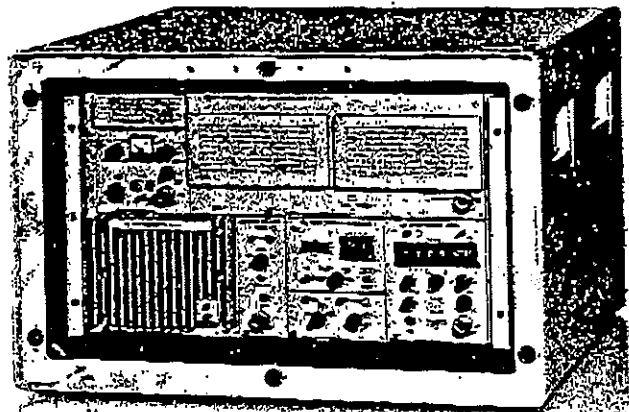
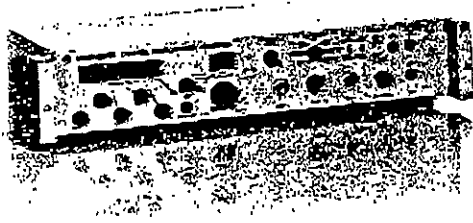
ROHDE & SCHWARZ  
MÜNCHEN

TECHNICAL INFORMATION

# VHF-UHF- TRANSCEIVER XT 3030

100-162 MHz  
225-400 MHz

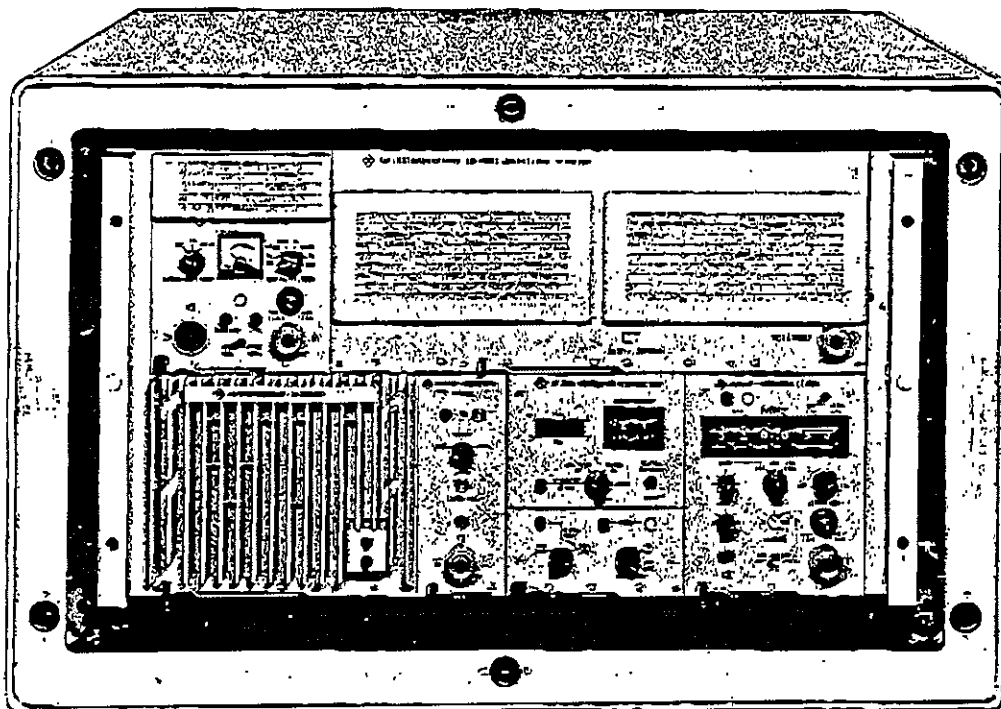
100W FM/ 30W AM  
2 W AM/FM reduced



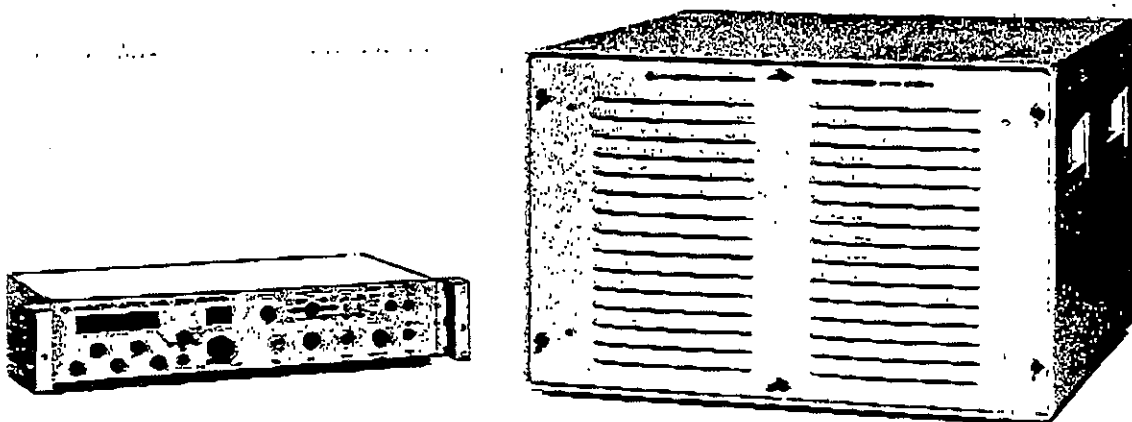
- Fully transistorized
- AM and FM
- Up to 30 preset channels
- Local and remote control
- High RF power output

R26257 E  
81  
1976

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VHF/UHF Transceiver XT 3030  
- shock frame mounted -  
(Photo 22566)



Control Panel GB 030  
with XT 3030 (splash-proof)  
(Photo 22564)



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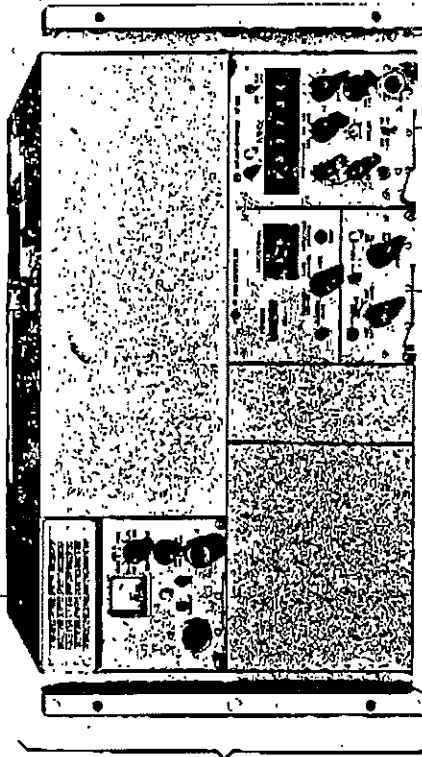
# VHF/UHF TRANSCIVER XT 3030

Power Amplifier

VHF: 30 W AM/FM and/or  
UHF: 30 W AM/100 W FM



VHF/UHF Transmitter  
ST 3030



VHF/UHF  
Transceiver  
Basic Unit

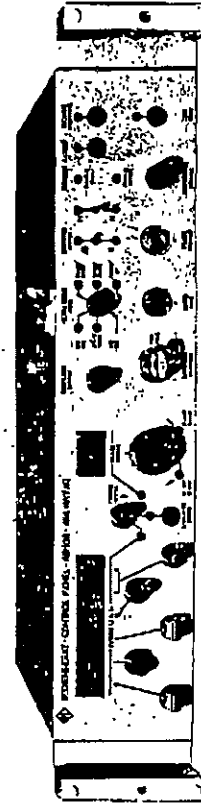
Control Unit  
NZ 3330

VHF/UHF  
Receiver  
ET 3030

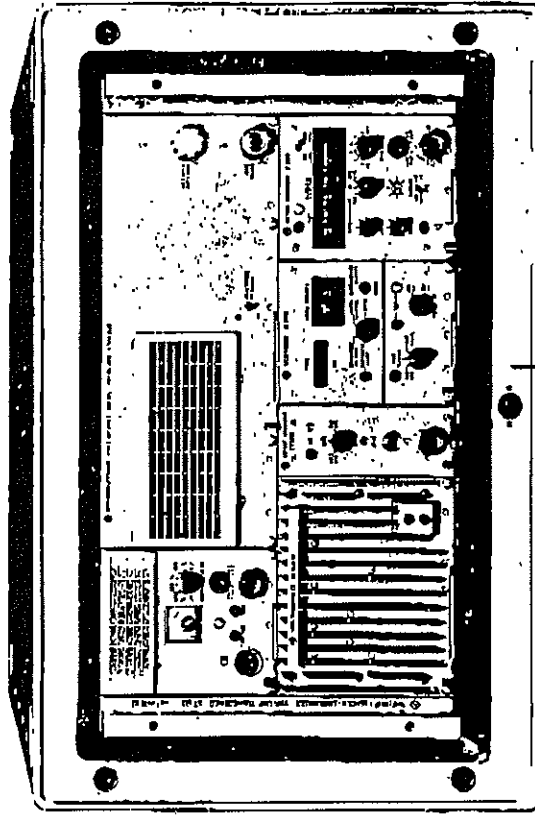
VHF/UHF  
Guard  
Receiver  
ET 2030 \*)



Emergency  
Power Supply  
NZ 3030/24 \*)



Control Panel GB 030  
(used for remote control only)



Shockmounted Cabinet  
KS 030

High-power model for shipborne,  
mobile or stationary applications  
(shock-mounted)

MODULAR CONCEPT

\*) If this optional plug-in will  
not be desired connection  
units are inserted.

The VHF/UHF Transceiver Type XT 3030 comprises of modules of a new generation of ROHDE & SCHWARZ radio equipment. It is designed as a multi-channel shipborne or ground station for fixed or mobile military and civil application.

The main technical features of the equipment are:

- Use of semiconductors throughout
- Fully electronic tuning
- Electronic switches
- Modular construction
- High reliability due to use of the latest components and techniques (monolithic and hybrid IC's)
- Self-test facility for rapid performance checks and trouble shooting

Special technical features for use as a multi-channel transceiver:

- Can be remote-controlled from up to 10 control panels
- Power supply either 115/220 V AC (47...440 Hz) or 2...30 V DC (DC for the basic unit XT 13. only!)\*
- Automatic power-supply switchover between AC and DC (then operating with reduced power 2 V to save energy). After manual switchover high-power (100/30 Watts) operating is possible again.

The development of our transceiver XT 3030 is based on latest MIL-Specifications such as:

- MIL-E 16 400
- DEF 133
- MIL-STD 461
- MIL-STD 470, as well as applicable
- VG -STD's

\* For the DC operation of the (Remote) Control Panel GB 030 an external DC/AC converter (approx. 70 VA) must be provided!

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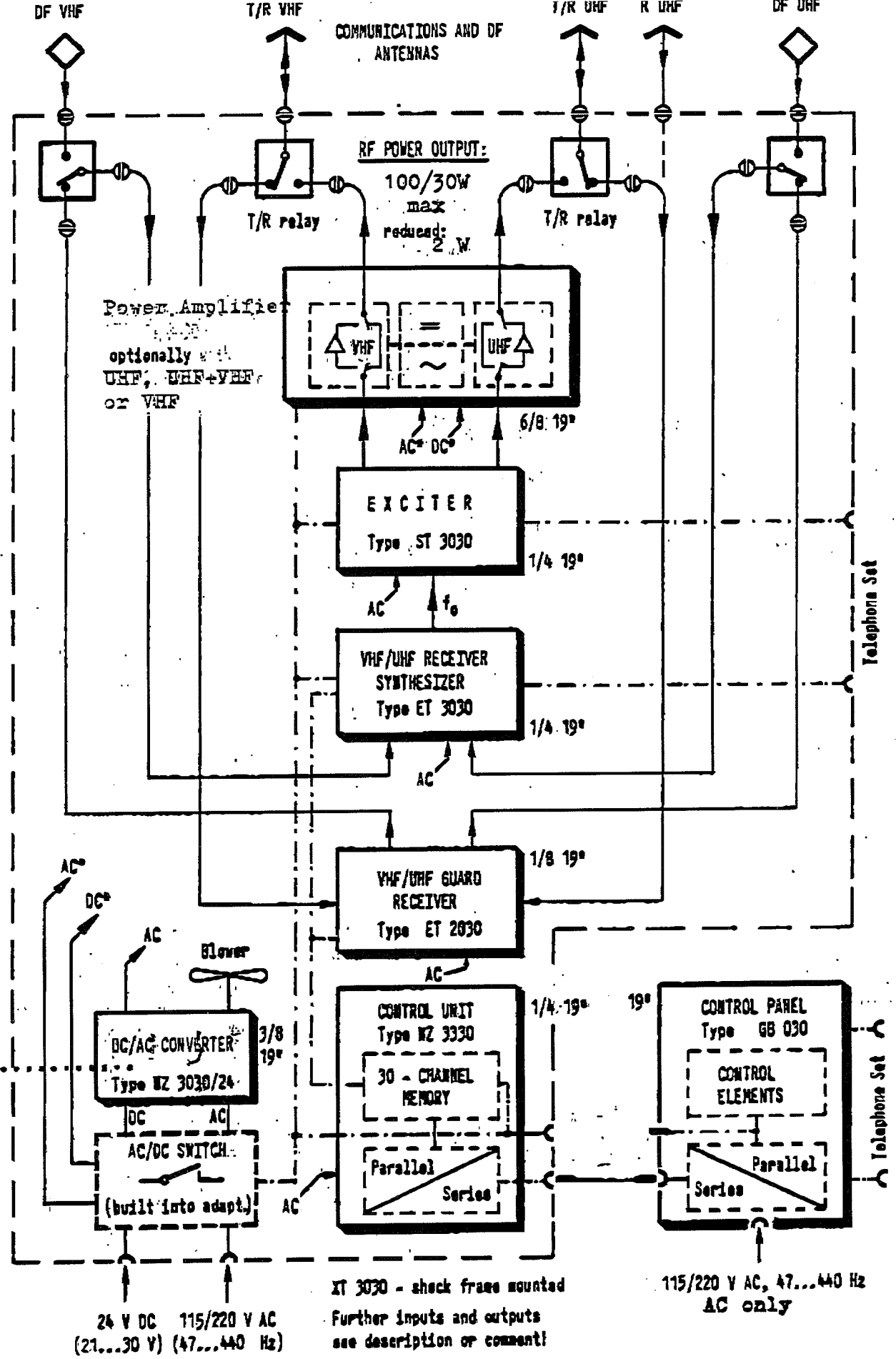
075  
4 FU-Wr  
4YTU-K1

ROHDE & SCHWARZ · 8 MÜNCHEN 80 · WESTERN GERMANY

R 26257 E P. 3

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

Subject to changes without notice



§) or Connect. Unit NZ 3230

4 FU-Wr  
4 YTU-KI

VHF/UHF MULTICHANNEL TRANSCEIVER  
Block diagram

XT 3030  
R 26257 E P. 2



# 1. Characteristics

## 1.1 Uses

The multichannel VHF/UHF Transceiver Systems XT 3030/... for amplitude- or frequency-modulated simplex radiotelephone communication operate in the frequency ranges 100 to 162 MHz (VHF) and 225 to 399,975 MHz (UHF). Both are designed for continuous operation in mobile or fixed stations. The carrier power of 2 W can be switched to 30 W for AM and FM transmissions in the VHF range or to 30/100 W for AM/FM transmissions in the UHF range. The channel spacing is 25 kHz. Any of 2482 VHF or 7000 UHF channels can be rapidly selected with decade switches. A magnetic-core memory permits presetting of up to 30 channel frequencies which can be called up as required with channel switches. The selectivity can be switched over to make the XT 3030/.. compatible with equipment operating with a channel spacing of 50 kHz.

The operating mode can be selected locally on the front panel or remotely from a separate control unit. Up to ten such control units can be connected any one of which can take over control of the systems.

If the AC supply fails, the system can be automatically switched over to an emergency battery. In this case, the transmitter output is 2 W in order to minimize the power consumption unless the output power is manually switched to 30 or 100 W.

A self-test facility enables rapid and reliable performance checks of the complete system and speedy trouble shooting.

## 1.2 Description

The subunits of the VHF/UHF Transceiver System XT 3030/... are:

- VHF/UHF Multichannel Receiver ET 3030
- VHF/UHF Transmitter ST 3030
- Power Amplifier VT 130 (VHF+UHF) or VD 130 (UHF) or VU 130 (VHF)
- VHF/UHF Guard Receiver ET 2030 or Connection Unit
- Control Unit NZ 3330 or other (e.g. for only local or not-preset channel operation)
- Emergency Power Supply NZ 3030/24 or Connection Unit (for AC only)
- Shockmounted Cabinet KS 030
- 19" Adapter KR 030
- Control Panel GB 030 (one or more)

The final system configuration depends on operational and installation requirements such as: VHF and/or UHF high power? Simultaneous guard receiver? Local or remote (see 1.3.2.5), AC or DC operation? Fixed or mobile use?

Please tell us your special requirements!

R 26257 E P.5

System designations under consideration  
of different combinations

=====

- Version XT 3030/0: Basic unit XT 130 (19" plug-in)  
and shock frame cabinet KS 030  
UHF 100 W FM/30 W AM carrier  
VHF 2 W FM/AM carrier  
with DC/AC converter NZ 3030/24
- Version XT 3030/01: Version XT 3030/0 with remote control  
panel GB 030
- Version XT 3030/1: Basic unit XT 131 (19" plug-in)  
and shock frame cabinet KS 030  
UHF 100 W FM/30 W AM carrier  
VHF 2 W FM/AM carrier  
without DC/AC converter  
with connection unit NZ 3230
- Version XT 3030/11: Version XT 3030/1 with remote control  
panel GB 030
- Version XT 3030/2: Basic unit XT 132 (19" plug-in)  
and shock frame cabinet KS 030  
UHF 100 W FM/30 W AM carrier  
VHF 30 W FM/30 W AM carrier  
with DC/AC converter NZ 3030/24
- Version XT 3030/21: Version XT 3030/2 with remote control  
panel GB 030
- Version XT 3030/3: Basic unit XT 133 (19" plug-in)  
and shock frame cabinet KS 030  
UHF 100 W FM/30 W AM carrier  
VHF 30 W FM/30 W AM carrier  
without DC/AC converter  
with connection unit NZ 3230

Version XT 3030/31      Version XT 3030/3 with remote control  
panel GB 030

Version XT 3030/4      Basic unit XT 134 (19" plug-in)  
and shock frame cabinet KS 030  
UHF 2 W FM/AM carrier  
VHF 30 W FM/AM 30 W carrier  
with DC/AC converter NZ 3030/24

Version XT 3030/41      Version XT 3030/4 with remote control  
panel GB 030>

Version XT 3030/5      Basic unit XT 135 (19" plug-in)  
and shock frame cabinet KS 030  
UHF 2 W FM/AM carrier  
VHF 30 W AM/FM 30 W carrier  
without DC/AC converter  
with connection unit NZ 3230

Version XT 3030/51      Version XT 3030/5 with remote control  
panel GB 030



### 1.2.1 19" Adapter KR 030

The individual subunits of the system are plug-in cassettes to be inserted in the 19" Adapter. They are electrically interconnected via the adapter wiring; all input and output connectors for external equipment are located on the rear panel of the 19" Adapter.

The Adapter also incorporates some circuitry and other facilities, including the power-supply section, relays and ventilator fans.

Two electronic switches are provided for transmit/receive switchover, VHF and UHF being switched separately. Two coaxial relays switch the antennas for DF operation.

### 1.2.2 Shockmounted Cabinet KS 030

The Cabinet KS 030 consists of a shockproofed frame and the splashproof cabinet proper. Frame and cabinet are screwed together via rubber pads. The 19" Adapter KR 030 containing the various subassemblies can be inserted in the cabinet and fixed with four screws. This ensures optimum serviceability of the complete system.

### 1.2.3 VHF/UHF Multichannel Receiver ET 3030

The VHF/UHF Multichannel Receiver ET 3030 incorporates the frequency-determining multichannel oscillator (derivator) generating the oscillator frequency (adjustable in 25-kHz steps) for both receiver and transmitter. The oscillator frequency can be set in digital steps either on the front panel of the Receiver ET 3030 or on the Control Panel GB 030.

The broadband receiver input is split up into four subranges which are selected electronically so that analog tuning of selective circuits is not required when varying the receive frequency. The incoming signal is then converted to the IFs of 80.0 and 10.7 MHz. The bandwidth optimally suited for the desired mode of operation is selected by one of three electronically switched crystal filters. The receiver can handle AM and FM narrowband (speech) and broadband (data) transmissions.

#### 1.2.4 VHF/UHF Transmitter ST 3030

The VHF/UHF Transmitter ST 3030 contains the circuitry processing the transmitting frequency and the power amplifier with modulator.

The transmitting frequency is obtained in three steps. First the signals delivered by two crystal-controlled oscillators, suitable for F1, F3 and F9 modulation are mixed to produce a frequency-modulated 80-MHz signal (1st IF of receiver ET 3030). This in turn is mixed with the signal from the derivator in the ET 3030 (operating frequency + 80 MHz) and the resulting mixture product is used for phase-locking a voltage-controlled VHF or UHF oscillator operating at the transmitting frequency.

This is followed by a PIN-diode network which acts as a carrier-power regulator and amplitude modulator, a power amplifier, lowpass filters and a directional coupler. The latter, which is included in the AM loop, permits measurement of the output power and of the reflection coefficient. The signal corresponding to the incident power is demodulated and compared with the AF signal delivered by the modulation amplifier. The difference signal is applied to the modulator to ensure linear modulation of the power amplifier.

#### 1.2.5 VHF/UHF Power Amplifier VT 130

An UHF, VHF or combined VHF/UHF-Power Amplifier version is available. The latter is laid out as follows:

For AM and FM transmissions in the VHF range, the broadband VHF/UHF Power Amplifier VT 130 boosts the carrier power from 2 W to 30 W. The amplifier is included in the AM loop of ST 3030 so that the output is delivered by the directional coupler incorporated in VT 130, rather than that of ST 3030.

For FM transmissions in the UHF range the output power can be amplified to 100 W. Push-pull transistor pairs on separate modules are used for amplifying the 2-W input signal to the required level of 30 or 100 W. The Power Amplifier contains four such modules, connected at the inputs and outputs via directional couplers. Lowpass and highpass filters following the amplifier output provide the required suppression of harmonics and spurious emissions.

#### 1.2.6 VHF/UHF Guard Receiver ET 2030

The international distress frequencies in the VHF and UHF range can be monitored with the VHF/UHF Guard Receiver ET 2030. Range switchover is made either automatically when selecting the operating frequency or manually with a switch

R 26257 E P. 7

on the front panel. The ET 2030 is a self-contained unit which is loosely coupled to the transmit/receive antenna.

#### 1.2.7 Control Unit NZ 3330

The Control Unit NZ 3330 basically consists of a serial-parallel converter for remote-control purposes and a magnetic-core memory for 30 frequency channels, which is proof against erasure by any power failures.

In conjunction with the serial-parallel converter, the Transceiver System can be remotely controlled via a two-wire line (plus lines for transmission of AF signals).

The magnetic-core memory is partly in the form of a thin-film circuit to save space.

On the front panel of the Control Unit are some controls affecting the operation of the complete system, e.g. the main power switch, DF-mode selector, channel selector, selector for frequency-setting modes and the test button with signal lamp for testing the performance of the system.

When the test button is depressed, an AF-modulated signal of approx. 100 msec duration is generated, amplified, and received and demodulated in the receiver. The original modulating signal is then compared with the demodulated signal, and when the difference between the two exceeds a preset threshold, a "no go" signal is delivered. The test also covers the transmitter output power, antenna VSWR, synchronization of frequency-processing circuits, and the bearing indicator used for DF applications. This test can also be initiated from the remote Control Panel GB 030.

#### 1.2.8 Emergency Power Supply NZ 3030/24

The Transceiver System is powered from the Emergency Power Supply NZ 3030/24. An internal switchover circuit switches the system from the 220-V AC supply to a 24-V DC source for emergency operation in which case the NZ 3030/24 converts the 24 V DC to 220 V AC.

The performance of the system can be checked during emergency operation by pressing the test button on the front panel of the NZ 3030/24.

### 1.2.9 Control Panel GB 030

The Control Panel GB 030 consists of three functional units: the control panel proper, the remote-control circuitry and the power supply section.

- a) The control panel proper comprises all elements required for operating the system. The effective setting is indicated by numerical indicator tubes and LEDs.

The overall frequency range of the Transceiver System is split up into 9482 channels with 25-kHz spacing. The required operating frequency can be set either with five frequency-selector switches or with a channel selector for 28 + 2 preset channels.

A microphone and a pair of headphones can be connected; the AF level available at the phones output is adjustable.

A signal is given when RF power is emitted and when the squelch circuit has responded. Frequency settings can be stored in the system's memory.

A self-test circuit can be brought into operation and the test results are indicated.

- b) The remote-control circuitry converts the parallel setting and signalling information into serial form and transmits these data to the remote-control input of the Transceiver System.

In systems where one or more (up to 10) remote Control Panels GB 030 are connected, the operation can be controlled either locally or remotely from any one of the Control Panels, depending on the settings of the associated switches on the ET 3030 and NZ 3330.

- c) The power-supply section converts the local AC-supply voltage to the operating DC voltage for the Transceiver System.

1.3 Specifications

1.3.1 Performance Data

1.3.1.1 Reception

Input impedance ..... 50 Ω; VSWR ≤ 2

S/N ratio for input EMF of 4 μV

(acc. to CCITT; m = 0.3, f<sub>m</sub> = 1 kHz) ..... ≥ 10 dB

within +10 MHz of guard frequencies ..... > 8.5 dB

Selectivity .....	-6 dB	-60 dB	-80 dB
> ±8.0 kHz	< ± 18 kHz	< ± 45 kHz	
> ± 18 kHz	< ± 36 kHz	< ± 50 kHz	
> ± 45 kHz	< ±100 kHz	< ±120 kHz	

IF rejection ..... > 80 dB

Image-frequency rejection ..... > 80 dB

Suppression of spurious frequencies ..... > 80 dB

Permissible exceptions:

VHF: at any one frequency ..... } > 70 dB  
 UHF: at any three frequencies .....

Oscillator reradiation at antenna input ..... < 50 μV

Suppression of 3rd-order intermodulation products with two interfering signals > 0.2 MHz off the carrier frequency ..... 75 dB

The above specifications for selectivity and suppression of unwanted responses are obtained at a level of the wanted signal at which the squelch circuit, adjusted for

10 dB  $\frac{S+N}{N}$ , responds.

Desensitization to .....  $\frac{S+N}{N} \geq 10$  dB

with

- a) EMF of wanted signal = 10 μV and EMF of interfering signal = 100 mV, Δf > 0.2 MHz
- b) EMF of wanted signal = 30 μV and EMF of interfering signal = 1 V, Δf > 3 MHz

AF-level fluctuations due to error of AGC circuit

for input EMF of 5  $\mu$ V to 1 V .....  $\leq$  3 dB  
 for input EMF of 5  $\mu$ V to 3 V .....  $\leq$  6 dB  
 ( $m = 0.9$ ,  $f_m = 1$  kHz)

AF distortion .....  $\leq$  5%, input EMF  $\leq$  300 mV } A3, A9  
 (mod. depth = 30% for AM, frequency  $\leq$  10%, input EMF  $\leq$  1 V } F3, F1  
 deviation 1.5/5 kHz (channel spacing 25/50 kHz) for FM)

Squelch circuit ..... Nominal response threshold:  $\frac{S+N}{N} = 10$  dB  
 Range of adjustment:  $\frac{S+N}{N} = 6$  to 16 dB  
 Response time:  $\leq$  30 msec

Max. permissible input EMF ..... 10 V for  $f > 30$  MHz  
 50 V for  $f < 30$  MHz

AF Outputs

Audio, clear ..... 600  $\Omega$   $\pm$ 20%, balanced  
 Frequency range ..... 300 to 3400 Hz (-4 dB)  
 Max. output level ..... -3 dBm  $\pm$ 1.5 dB

Audio, clear ..... 9  $\Omega$   $\pm$ 20%  
 Frequency range ..... 300 to 3400 Hz (-4 dB)  
 Max. output level ..... 400 mW, adjustable

Audio, coded ..... 600  $\Omega$   $\pm$ 20%, balanced  
 Frequency range ..... 300 Hz to 20 kHz  
 (-4 dB ref. to 10 kHz)  
 Max. output level ..... 1.4 V<sub>pp</sub>  $\pm$ 1.5 dB

Audio - link 4 ..... 2 k $\Omega$   $\pm$ 10%, balanced  
 Frequency range ..... 0 to 10 kHz (-0.8 dB)  
 Max. output level ..... 10  $\pm$ 2 V<sub>pp</sub>

Audio - link 11 ..... 600  $\Omega$   $\pm$ 20%, balanced  
 Frequency range ..... 300 to 3100 Hz (+1 dB),  
 deemphasis 6 dB/octave  
 Max. output level ..... +14.7 dBm  $\pm$ 1.5 dB  
 (for  $f_m = 1.93$  kHz, 30 kHz deviation,  
 $< 1\%$  distortion)

1.3.1.2 Transmission

Carrier power ..... 2-W and - depending on the type version  
 in VHF range ..... switchable to 30 W (AM + FM)  
 in UHF range ..... switchable to 30 W (AM)/100 W (FM)  
 Carrier compression (90% AM) .....  $\leq$  0.5 dB

R 26257 E P. 11

Ripple of output power ..... max. +1 dB; -0.5 dB  
 Nominal load impedance ..... 50  $\Omega$   
 Permissible mismatch ..... 0 to  $\infty$   $\Omega$   
 Permissible VSWR  
 (without carrier cut-off) ..... 2.5 : 1  
 Total harmonic emission .....  $1 \times 10^{-5}$  W  
 Non-harmonic emission  
 70 MHz < f < 500 MHz .....  $1 \times 10^{-5}$  W  
 f < 70 MHz, f > 500 MHz .....  $1 \times 10^{-7}$  W  
 Max. modulation depth ..... 90%  
 Max. frequency deviation  
 F1 ..... +20 kHz  
 F3 .....  $\pm 3.5/10.5$  kHz (channel spacing  
 25/50 kHz)  
 F9 ..... +50 kHz  
 Modulation distortion ..... < 5% (A3, A9, F3, F1)  
 < 1% (F9)

AF inputs

Audio, clear ..... 4  $\Omega$   $\pm 20\%$ , balanced  
 Input level for m = 0.9 .....  $\leq 50$   $\mu$ V  
 Frequency range ..... 300 to 3400 Hz (-4 dB)  
 Audio, clear ..... 600  $\Omega$   $\pm 20\%$ , balanced  
 Input level for m = 0.9 ..... -15 dBm  
 Frequency range ..... 300 to 3400 Hz (-4 dB)  
 Control range of AGC amplifier  
 (audio, clear) ..... 20 dB (input)/ 1 dB (output)  
 Audio, coded ..... 600  $\Omega$   $\pm 20\%$ , balanced  
 Input level for m = 0.9 ..... 1.4 V<sub>pp</sub>  
 Frequency range ..... 300 Hz to 20 kHz  
 (-4 dB ref. to 10 kHz)  
 Audio - link 11 ..... 2500  $\Omega$   $\pm 10\%$ , with centre tap  
 Input level for  $\Delta f = 20$  kHz ..... +5 V  
 Frequency range ..... 0 to 10 kHz (+1 dB)  
 Audio - link 11 ..... 600  $\Omega$   $\pm 10\%$ , with centre tap  
 Max. input level for  $\Delta f = 30$  kHz  
 ( $f_m = 1.93$  kHz) ..... +14.7 dBm  
 Frequency range ..... 300 to 3100 Hz (+1 dB)  
 Suppression of spurious modulation  
 (m = 0.9, weighted acc. to CCITT) ...  $\geq 40$  dB (A3, F3)

## 1.3.2 Operational Data

### 1.3.2.1 Frequency Data

Frequency range .....	100 to 162,025 MHz (2 W) 225 to 399.975 MHz (2 W, 30/100 W)
Frequency variation due to environmental influences .....	$\leq +5 \times 10^{-6}$
aging .....	$\leq \pm 1 \times 10^{-6}$ /year
Channel spacing .....	25/50 kHz
Number of frequency channels	
VHF .....	2482
UHF .....	7000
Number of presettable channels .....	28 + 2 guard channels
Switchover time for channel selection .....	$\leq 100$ msec

### 1.3.2.2 Classes of Emission Received

- A3 - audio, clear; radioteletype
- A9 - audio, coded
- F1 - link 4; radioteletype
- F3 - audio, clear; radioteletype
- F9 - link 11; audio, clear

### 1.3.2.3 Modes of Operation

OFF

- T/R + G      Transmission and reception with guard receiver.  
The system is normally switched to "reception";  
switchover to "transmission" is performed by  
pressing a PTT button.
- T/R            Transmission and reception without guard receiver.  
Otherwise as above.
- RAIT          Transmission and reception without guard receiver.  
AF lines are connected to teletype socket.
- DATA          Transmission and reception without guard receiver.  
FM operation. AF inputs and outputs connected to socket  
"link equipment" on rear panel.
- DF            Reception only. The RF input of the main receiver is  
connected to a DF antenna. The AF or IF can be used for  
evaluation.

R 26257 E P.13



The above modes can be selected locally as well as from a remote Control Panel GB 030. In the latter case, the toggle switch on the ET 3030 and the rotary switch on the NZ 3330 must be set to REM.

#### Frequency-setting modes

- FREQ.** The operating frequency is set with the associated thumbwheel switches.
- STORE** By pressing the STORE button, the set frequency can be entered in the memory corresponding to the channel set on the channel selector.
- Channel** The operating frequency is set by selecting a stored channel with the CHANNEL switches. When the channel selector is at 00 or 29, the VHF or UHF guard channel, respectively, is switched on. The frequency indicator remains dark.
- Channel TEST** The frequency indicator displays the frequency of the selected channel.

#### 1.3.2.4 Power Supply

##### AC supply

Voltage ..... 115/220 V  $\begin{matrix} +10\% \\ -15\% \end{matrix}$

Frequency ..... 47 to 420 Hz

Max. power consumption ..... 900 VA

Power factor ( $\cos\varphi$ ) .....  $\geq 0.8$

##### DC supply (emergency operation)

Voltage ..... 20 to 30 V

Current drain (transmission)

    2 W output power ..... max. 15 A

    100 W output power ..... max. 30 A

#### 1.3.2.5 Remote Control

Functions..... all transceiver functions (the frequency read-out can be blocked by key)

No. of control units GB 030..... up to 10 in parallel

Remote control distance

- if using GB 030.....  $\leq 1.4$  km

- if using GB 030 and the long range transmission units (2x CT 005/.....).....  $\leq 20$  km (higher distances on request)

Recommended type of control cable RAYCHEN type EPD 2029

R 26257 E P.14

### 1.3.3 Mechanical Data

#### 1.3.3.1 Dimensions and Weight

	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
Transmitter ST 3030	133	116	320	6.0
Receiver ET 3030	133	116	320	5.0
Control Unit NZ 3330	133	116	320	3.8
Guard Receiver ET 2030	133	53	320	2.0
Emergency Power Supply NZ 3030/24	133	160	320	11.3
Power Amplifier VT 010/3030	133	320	354	23.8
Cabinet KS 030	370	570	585	23.5
19" Adapter KR 030	266	482	485	14.5
Complete system	370	570	585	89.9
Control Panel GB 030	88	500	308	12.5
Connection Unit NZ 3230	133	160	320	2.25

#### 1.3.3.2 Climatic and Mechanical Strength

- a) splash-proof acc. to DIN 40050, class IP 33
- b) shock test acc. to BV 043
- c) vibration test acc. to BV 044
- d) drip-proof acc. to DEF 133, 15.2
- e) dry heat acc. DEF 133, 11.0, test "A"
- f) damp heat acc. to DEF 133, 11.1
- g) low temperatures acc. to DEF 133, 12.0, test "C"
- h) drop test acc. to DEF 133, 7.3
- i) visual inspection acc. to DEF 133, 6.1
- k) non-magnetic construction

R 26257 E P.45