

# Bundesamt für Post und Telekommunikation

# BZT

Federal Office for Posts and Telecommunications

Talstraße 34-42 . D-66119 Saarbrücken

Telefon: +49 (0)681 598-0

Telefax: -1600

Labor für nichtöffentliche Funkanwendungen

Untertürkheimer Straße 6-10 . D-66117 Saarbrücken

Telefon: +49 (0)681 598-1377

Telefax: -1613

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13-83

issue test report consist of

26 Pages

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## Akkreditiertes Prüflaboratorium

DAR-Registriernummer:  
TTI-P-066/94-40 vom 02.12.96

Test report no.: 523-13g/00024/98

FCC 47 Part 74.802

d.a.i.sy MSA VHF

## 1.2 Testing laboratory

Regulierungsbehörde für Telekommunikation und Post

Postfach 10 04 43, 66004 Saarbrücken

Talstraße 34-42 , 66119 Saarbrücken

Deutschland

Telefone: + 49 681 598 - 0

Telefax : + 49 681 598 - 1600

E-mail : poststelle@regtp.de

Internet : http://www.regtp.de

**Accredited testing laboratory**

**DAR-registration number : TTI-P-G-066/94-40 vom 02.12.96**

## 1.3 Details of applicant

**Name** : mtc maintronic GmbH

**Street** : Carl-Zeiss-Str. 10

**City** : D-97424 Schweinfurt

**Country** : Germany

**Telephone** : +49 9721 76650

**Telefax** : +49 9721 766518

**Contact** : Mr. G. Werner

**Telephone** : +49 9721 76650

## 1.4 Application details

Date of receipt of application : 23.10.97

Date of receipt of test item : 27.11.98

Date of test : 02.02.98

## 1.5 Test item

Type of equipment : Wireless Transmitter

Type designation : d.a.i.sy MSA VHF

Manufacturer : applicant

Street :

City :

Country :

Serial number : -.-

**Additional informations:** :

Frequency : 185.750 MHz

Modulation : 100KF3E

Number of channels : 1

Antenna : integral antenna

Power supply : 9V D.C.

Type of equipment : not applicable

Unmodulated carrier : not applicable

## 1.6 Test standards

**CFR 47, Part 74 Subpart H**

TEST REPORT REFERENCE  
LIST OF MEASUREMENTS

| PARAMETER TO BE MEASURED           |                                                  |    |
|------------------------------------|--------------------------------------------------|----|
| Transmitter parameters             |                                                  |    |
| Effective radiated power - Maximum | Frequency stability                              | 7  |
|                                    | Temperature variation                            | 8  |
|                                    | Characteristic of the audio modulation circuitry | 9  |
|                                    | Occupied bandwidth                               | 10 |
|                                    | Spurious emissions                               | 12 |
| Test equipment listing             |                                                  | 15 |
| Photographs of the equipment       |                                                  | 16 |
|                                    |                                                  | 18 |

Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

Relative humidity : 36,0%

**EFFECTIVE RADIATED POWER**

**FCC Rule Part 74.861**

Polarisation of the measurements for the larger power level .: vertical

| TEST CONDITIONS                                                         |                           | TRANSMITTER POWER (mW) |  |  |
|-------------------------------------------------------------------------|---------------------------|------------------------|--|--|
| Frequency (MHz)                                                         |                           | 185.750                |  |  |
| T <sub>nom</sub> ( 23 )°C                                               | V <sub>nom</sub> ( 9.0 )V | 0,813                  |  |  |
| Maximum deviation from output power under extreme test conditions (dBc) |                           | 0,8                    |  |  |
| Measurement uncertainty                                                 |                           | ±3dB                   |  |  |

**LIMIT**

**FCC Rule Part 74.861**

| Frequency range<br>MHz | Power level radiated<br>mW |
|------------------------|----------------------------|
| 54-72, 76-88, 174-216  | 50                         |
| 470-608, 614-806       | 250                        |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED  
(for reference numbers see test equipment listing)

Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

Relative humidity : 36,0%

**FREQUENCY STABILITY**

| TEST CONDITIONS               |                             | FREQUENCY (MHz)              |  |  |
|-------------------------------|-----------------------------|------------------------------|--|--|
| Theoretical Frequencies (MHz) |                             | 185.750                      |  |  |
| T <sub>min</sub> (23)°C       | V <sub>min</sub> ( 7.65 )V  | 185.74946                    |  |  |
|                               | V <sub>max</sub> ( 10.35 )V | 185.75463                    |  |  |
| Limit (MHz)                   |                             | 184.82125<br>to<br>186.67875 |  |  |
| Measurement uncertainty       |                             | < ± 10 <sup>-7</sup>         |  |  |

Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

Relative humidity : 36,0%

**TEMPERATURE VARIATION :**

| TEST CONDITIONS               | FREQUENCY (MHz)              |  |  |
|-------------------------------|------------------------------|--|--|
| Theoretical Frequencies (MHz) | 185.750                      |  |  |
| Temperature( ° Celsius)       |                              |  |  |
| -30                           | 185.76178                    |  |  |
| -20                           | 185.76066                    |  |  |
| -10                           | 185.75928                    |  |  |
| 0.0                           | 185.75758                    |  |  |
| +10                           | 185.75564                    |  |  |
| +20                           | 185.75372                    |  |  |
| +30                           | 185.75176                    |  |  |
| +40                           | 185.74986                    |  |  |
| +50                           | 185.74864                    |  |  |
| Limit (MHz)                   | 184.82125<br>to<br>186.67875 |  |  |
| Measurement uncertainty       | $< \pm 10^{-7}$              |  |  |

Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

Relative humidity : 36,0%

**CHARACTERISTICS OF THE AUDIO MODULATION CIRCUITRY**

FCC Rule Part 74 Sec. 2.987

Frequency: 185.750 MHz

| Modulation<br>Frequency<br>(Hz) | Carrier Deviation (kHz) |                       |
|---------------------------------|-------------------------|-----------------------|
|                                 | Modulation Input Level  |                       |
|                                 | 50 mV <sub>rms</sub>    | 100 mV <sub>rms</sub> |
| 100                             | 23.1                    | 28.0                  |
| 200                             | 24.0                    | 27.4                  |
| 300                             | 25.1                    | 27.9                  |
| 400                             | 25.3                    | 28.5                  |
| 500                             | 26.0                    | 28.3                  |
| 600                             | 26.3                    | 28.3                  |
| 700                             | 26.4                    | 28.3                  |
| 800                             | 26.6                    | 28.6                  |
| 900                             | 26.6                    | 28.2                  |
| 1000                            | 26.6                    | 28.2                  |
| 1500                            | 27.0                    | 27.8                  |
| 2000                            | 27.3                    | 28.4                  |
| 2500                            | 27.8                    | 27.9                  |
| 3000                            | 28.0                    | 27.9                  |
| 3500                            | 27.6                    | 28.0                  |
| 4000                            | 27.4                    | 28.4                  |
| 4500                            | 27.4                    | 28.5                  |
| 5000                            | 27.6                    | 28.9                  |
| 5500                            | 27.5                    | 28.6                  |
| 6000                            | 27.7                    | 28.9                  |
| 6500                            | 27.5                    | 29.0                  |
| 7000                            | 27.2                    | 29.4                  |
| 7500                            | 26.7                    | 28.7                  |
| 8000                            | 26.6                    | 28.9                  |

| Modulation<br>Frequency<br>(Hz) | Carrier Deviation (kHz) |                       |
|---------------------------------|-------------------------|-----------------------|
|                                 | Modulation Input Level  |                       |
|                                 | 50 mV <sub>rms</sub>    | 100 mV <sub>rms</sub> |
| 8500                            | 26.8                    | 29.9                  |
| 9000                            | 27.0                    | 29.5                  |
| 9500                            | 27.6                    | 29.6                  |
| 10000                           | 28.5                    | 28.8                  |
| 10500                           | 28.7                    | 28.1                  |
| 11000                           | 29.0                    | 27.5                  |
| 11500                           | 29.0                    | 30.2                  |
| 12000                           | 28.9                    | 31.4                  |
| 12500                           | 28.0                    | 32.7                  |
| 13000                           | 28.0                    | 33.1                  |
| 13500                           | 27.7                    | 33.1                  |
| 14000                           | 27.5                    | 33.1                  |
| 14500                           | 27.2                    | 32.9                  |
| 15000                           | 26.8                    | 32.5                  |
| 15500                           | 26.3                    | 32.2                  |
| 16000                           | 26.0                    | 31.8                  |
| 16500                           | 25.5                    | 31.4                  |
| 17000                           | 25.3                    | 31.1                  |
| 17500                           | 25.4                    | 30.5                  |
| 18000                           | 25.8                    | 29.7                  |
| 18500                           | 26.0                    | 30.8                  |
| 19000                           | 25.9                    | 31.1                  |
| 19500                           | 25.9                    | 30.6                  |
| 20000                           | 26.6                    | 30.0                  |

Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

Relative humidity : 36,0%

**CHARACTERISTICS OF THE AUDIO MODULATION CIRCUITRY**

FCC Rule Part 74 Sec. 2.987(d)

Test: Low-Pass Filter Characterization

Frequency : 185.750 MHz

| Modulation Input<br>Level (mV) | Carrier Frequency Deviation (kHz) |         |          |
|--------------------------------|-----------------------------------|---------|----------|
|                                | Modulation Input Frequency        |         |          |
|                                | 2500 Hz                           | 5000 Hz | 10000 Hz |
| 1                              | 19.0                              | 18.4    | 19.2     |
| 2                              | 19.0                              | 19.1    | 20.3     |
| 3                              | 19.0                              | 19.6    | 20.9     |
| 4                              | 20.2                              | 20.5    | 21.9     |
| 5                              | 20.8                              | 21.0    | 22.6     |
| 6                              | 20.9                              | 21.7    | 23.2     |
| 7                              | 20.9                              | 22.2    | 24.3     |
| 8                              | 21.5                              | 22.9    | 25.2     |
| 9                              | 21.5                              | 23.6    | 25.6     |
| 10                             | 22.3                              | 23.9    | 25.7     |
| 20                             | 24.7                              | 25.3    | 29.0     |
| 30                             | 26.1                              | 26.5    | 28.6     |
| 40                             | 26.5                              | 27.9    | 28.6     |
| 50                             | 27.5                              | 27.8    | 28.6     |
| 60                             | 27.8                              | 27.8    | 29.8     |
| 70                             | 27.6                              | 28.0    | 27.7     |
| 80                             | 27.9                              | 28.4    | 27.6     |
| 90                             | 27.8                              | 28.7    | 28.2     |
| 100                            | 27.7                              | 28.7    | 29.0     |



Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

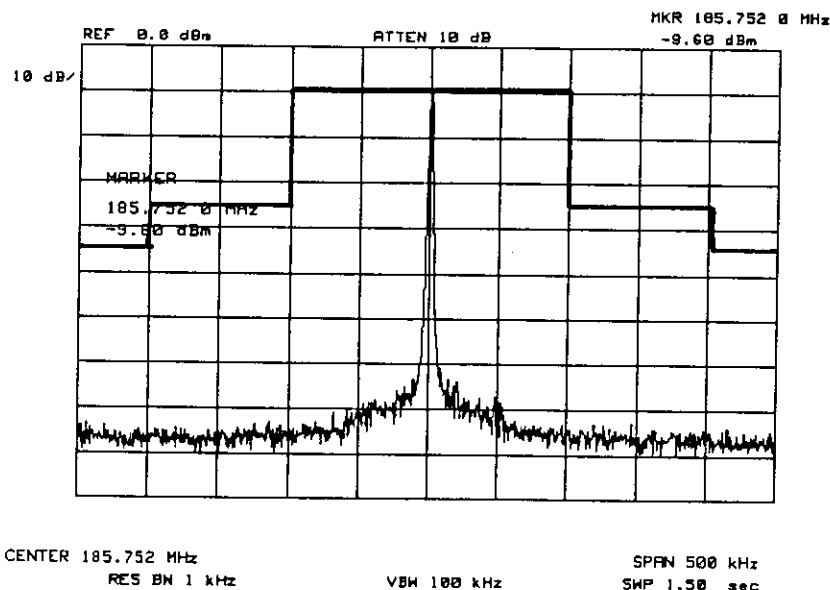
Relative humidity : 36,0%

## OCCUPIED BANDWIDTH

FCC Rule Part 74 Sec. 2.989

Unmodulated Carrier

Frequency: 185.750 MHz



Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

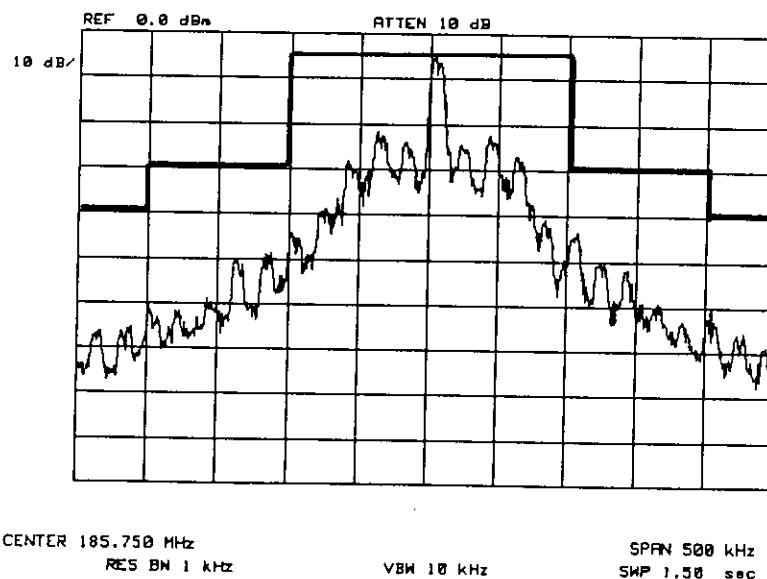
Relative humidity : 36,0%

**OCCUPIED BANDWIDTH**

FCC Rule Part 74 Sec. 2.989(c)(1)

50% Modulation

Frequency: 185.750 MHz



Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

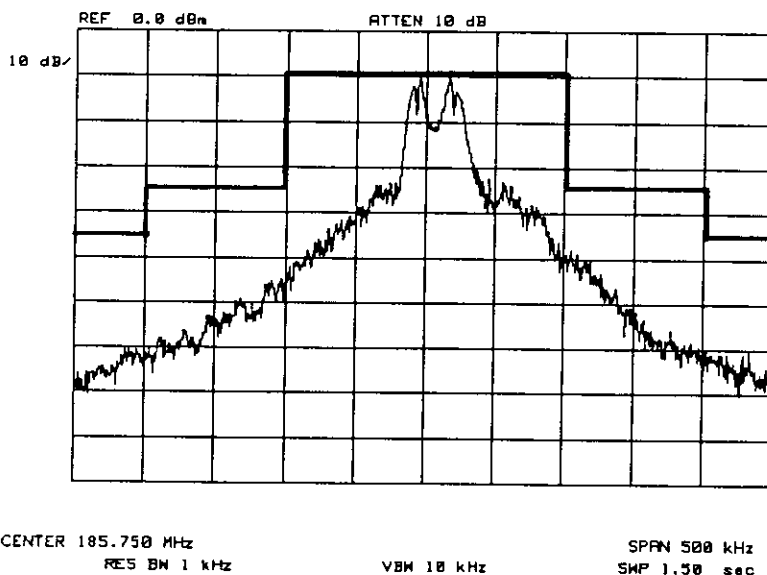
Relative humidity : 36,0%

**OCCUPIED BANDWIDTH**

FCC Rule Part 74 Sec. 2.989(E)(3) / (6)

**85% Modulation**

**Frequency: 185.750 MHz**



**REFERENCE NUMBER(S) OF TEST EQUIPMENT USED**

(for reference numbers see test equipment listing)

01 ; 02 ; 05

Equipment under test : d.a.i.sy MSA VHF

Ambient temperature : 23°C

Relative humidity : 36,0%

**RADIATED EMISSIONS****FCC Rule Part 74 subpart H**

Power level at which the measurement has been performed : -0,9 dBm / 0,813 mW

**Transmitter operating**

| SPURIOUS EMISSIONS LEVEL (dBm) |                         |                |            |                         |                |            |                         |                |
|--------------------------------|-------------------------|----------------|------------|-------------------------|----------------|------------|-------------------------|----------------|
| 185.750 MHz                    |                         |                |            |                         |                |            |                         |                |
| f<br>(MHz)                     | Band-<br>width<br>(kHz) | Level<br>(dBm) | f<br>(MHz) | Band-<br>width<br>(kHz) | Level<br>(dBm) | f<br>(MHz) | Band-<br>width<br>(kHz) | Level<br>(dBm) |
| 37.51                          | 100                     | -66.2          |            |                         |                |            |                         |                |
| 56.27                          | 100                     | -65.8          |            |                         |                |            |                         |                |
| 206.03                         | 100                     | -66.0          |            |                         |                |            |                         |                |
| 223.44                         | 100                     | -66.7          |            |                         |                |            |                         |                |
|                                |                         |                |            |                         |                |            |                         |                |
|                                |                         |                |            |                         |                |            |                         |                |
|                                |                         |                |            |                         |                |            |                         |                |
|                                |                         |                |            |                         |                |            |                         |                |
|                                |                         |                |            |                         |                |            |                         |                |
|                                |                         |                |            |                         |                |            |                         |                |
|                                |                         |                |            |                         |                |            |                         |                |
| Measurement uncertainty        |                         |                | ± 3dB      |                         |                |            |                         |                |

Bandwidth (kHz); this refers to the bandwidth of the measurement receiver

**Limits****FCC Rule Part 74.861(e)(6)**

| f ± 100 kHz to f ± 200 kHz | f ± 200 kHz to f ± 500 kHz | f ± 500 kHz                                               |
|----------------------------|----------------------------|-----------------------------------------------------------|
| 25 dBc                     | 35 dBc                     | -43 +10 log <sub>10</sub> (mean output power in watts) dB |

**TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| No | Instrument/Ancillary  | Type      | Manufacturer    | Serial No.  |
|----|-----------------------|-----------|-----------------|-------------|
| 01 | Spectrum Analyzer     | 8566 A    | Hewlett-Packard | 1925A00257  |
| 02 | Analyzer Display      | 8566 A    | Hewlett-Packard | 1925A00860  |
| 03 | Oscilloscope          | 7633      | Tektronix       | 230054      |
| 04 | Radio Analyzer        | CMTA 54   | Rohde & Schwarz | 894 043/010 |
| 05 | System Power Supply   | 6038 A    | Hewlett-Packard | 2848A07027  |
| 06 | Signal Generator      | 8111 A    | Hewlett-Packard | 2215G00867  |
| 07 | Signal Generator      | 8662 A    | Hewlett-Packard | 2224A01012  |
| 08 | Funktionsgenerator    | AFGU      | Rohde & Schwarz | 862 480/032 |
| 09 | Regeltrenntrafo       | MPL       | Erfi            | 91350       |
| 10 | Netznachbildung       | NNLA 8120 | Schwarzbeck     | 8120331     |
| 11 | Relais-Matrix         | PSU       | Rohde & Schwarz | 893 285/020 |
| 12 | Power-Meter           | 436 A     | Hewlett-Packard | 2101A12378  |
| 13 | Power-Sensor          | 8484 A    | Hewlett-Packard | 2237A10156  |
| 14 | Power-Sensor          | 8482 A    | Hewlett-Packard | 2237A00616  |
| 15 | Modulationsmeter      | 9008      | Racal-Dana      | 2647        |
| 16 | Frequenzzähler        | 5340 A    | Hewlett-Packard | 1532A03899  |
| 17 | Absorber Schirmkabine | ---       | MWB             | 87400/002   |
| 18 | Spectrum Analyzer     | 85660 B   | Hewlett-Packard | 2747A05306  |
| 19 | Analyzer Display      | 85662 A   | Hewlett-Packard | 2816A16541  |
| 20 | Quasi Peak Adapter    | 85650 A   | Hewlett-Packard | 2811A01131  |
| 21 | RF-Preselector        | 85685 A   | Hewlett-Packard | 2833A00768  |
| 22 | Biconical Antenne     | 3104      | Emco            | 3758        |
| 23 | Log. Per. Antenne     | 3146      | Emco            | 2130        |
| 24 | Double Ridge Horn     | 3115      | Emco            | 3088        |
| 25 | EMI-Testreceiver      | ESAI      | Rohde & Schwarz | 863 180/013 |
| 26 | EMI-Analyzer-Display  | ESAI-D    | Rohde & Schwarz | 862 771/008 |
| 27 | Biconical Antenne     | HK 116    | Rohde & Schwarz | 888 945/013 |
| 28 | Log. Per. Antenne     | HL 223    | Rohde & Schwarz | 825 584/002 |
| 29 | Relais-Switch-Unit    | RSU       | Rohde & Schwarz | 375 339/002 |
| 30 | Highpass              | HM985955  | FSY Microwave   | 001         |
| 31 | Amplifier             | P42-GA29  | Tron-Tech       | B 23602     |
| 32 | Absorber Schirmkabine |           | Frankonia       |             |
| 33 | Steuerrechner         | PSM 7     | Rohde & Schwarz | 834 621/004 |
| 34 | EMI Test Reciever     | ESMI      | Rohde & Schwarz | 827 063/010 |
| 35 | EMI Test Receiver     | Display   | Rohde & Schwarz | 829 808/010 |

**TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| No | Instrument/Ancillary                   | Type      | Manufacturer    | Serial No.  |
|----|----------------------------------------|-----------|-----------------|-------------|
| 36 | Controler                              | HD 100    | Deisel          | 100/322/93  |
| 37 | Relais Matrix                          | PSN       | Rohde & Schwarz | 829 065/003 |
| 38 | Control Unit                           | GB 016 A2 | Rohde & Schwarz | 344 122/008 |
| 39 | Relais Switch Unit                     | RSU       | Rohde & Schwarz | 316 790/001 |
| 40 | Power Supply                           | 6032A     | Hewlett Packard | 2846A04063  |
| 41 | Spektrum Monitor                       | EZM       | Rohde & Schwarz | 883 720/006 |
| 42 | Meßempfänger                           | ESH 3     | Rohde & Schwarz | 890 174/002 |
| 43 | Meßempfänger                           | ESVP      | Rohde & Schwarz | 891 752/005 |
| 44 | Biconi Ant. 20-300MHz                  | HK 116    | Rohde & Schwarz | 833 162/011 |
| 45 | Logper Ant. 0.3-1 GHz                  | HL 223    | Rohde & Schwarz | 832 914/010 |
| 46 | Amplifier 0.1-4 GHz                    | AFS4      | Miteq Inc.      | 206461      |
| 47 | Logper Ant. 1-18 GHz                   | HL 024 A2 | Rohde & Schwarz | 342 662/002 |
| 48 | Polarisationsnetzwerk                  | HL 024 Z1 | Rohde & Schwarz | 341 570/002 |
| 49 | Double Ridge G Horn Antenne 1-26.5 GHz | 3115      | EMCO            | 9107-3696   |
| 50 | Microw. Sys. Amplifier 0.5- 26.5 GHz   | 8317A     | Hewlett Packard | 3123A00105  |
| 51 |                                        |           |                 |             |
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