

# SAT-Kabel®

Satelliten- und Kabelfernsehanlagen/Industrievertretung GmbH  
Chemnitzer Straße 11 · 09217 Burgstädt

## Operating instructions

Beta4 18.10.2010

# AMS-SD

Automatic measuring system  
for the measuring of spurious field  
strength from CATV systems



Thank you for purchasing a product of the company SAT-Kabel®.

This manual shall help to understand the functions of the device and to facilitate its use. If you have questions about the device or suggestions for further improvement, please let us know.

## Contents

AUTOMATIC MEASURING SYSTEM	4
Scope of delivery	4
Main components	4
Optional accessories	4
Available antennas	5
Charging the battery	5
System preconditions	5
Measuring principle	5
Measuring device configuration	6
Measuring device arrangement in the vehicle (1)	6
Measuring device arrangement in the vehicle (2)	7
Measurement with a vehicle	7
Measuring device arrangement individual	8
Measurement individual	8
Measuring instruments	9
AMS-SD	9
Functional element	9
Recognize and correct errors	10
Thresholds	10
Technical data AMS-SD	11
Memory Card	12
Memory Card installing and removing	13
GPS receiver	13
Measuring antenna ANT-Duo Set	13
AMS mounting set	14
AMS-LCD	14
Guarantee	15

# AUTOMATIC MEASURING SYSTEM

The AMS-SD is an automatic measuring system for detecting of spurious field strength of broadband cable networks.

It was designed specifically for autonomous use in vehicles. Special emphasis was placed on ease of use. The basic operation for a test drive is limited only to the plug in, switch on and off the AMS-SD.

## Main components



Fig. 1

## Scope of delivery

### ATTENTION!

Factory setting:

The internal memory is configured with the antenna factors of the duo band antenna *ANT-Duo Set*.

- |    |                                                |
|----|------------------------------------------------|
| 1x | AMS-SD (base unit)                             |
| 1x | SD memory card                                 |
| 1x | GPS receiver                                   |
| 1x | Imitation leather bag                          |
| 1x | Car connecting cable                           |
| 1x | AC adapter (for charging the internal battery) |
| 1x | USB data cable                                 |
- The software is on the SD memory card.

## Optional accessories

- AMS-LCD – display with integrated GPS receiver for use outside of the vehicle
  - Clamp for *AMS-SD* for installation in the vehicle
  - Radio set *AMS-FS433* for data transmission from the vehicle to the service technician in the building
  - GPS Receiver for permanent installation on request
  - Antenna for fixed installation on request
- Database for convenient storage and management of measurements on request.

## Available antennas

- ANT-Duo Set duo band antenna with magnetic foot and VT 87/301 (10/30) twin preamplifier (87/301 MHz)

## Charging the battery

- Connection of charging cable or AC adapter
  - PWR LED begins to flash
  - If the battery is fully charged, the PWR LED shines permanently green
  - Charge time ca. 4-10 hours

## System preconditions

- GPS receiver:
- with serial Mini-DIN connector (MD6)
  - with »Sirf3« - or »u-blox« chipset
  - Supporting the NMEA protocol
  - Support of 38 400 Baud necessary

- Memory card:
- SD or MMC card (not SDHC)
  - max. 2 GB storage capacity
  - FAT16 (FAT) formatted (not FAT32)
  - free space in the root directory (max. 512 files)

- Measuring antenna:
- Optimum antenna for the frequency range to be measured  
Recommendation: *ANT-Duo Set*, dual band antenna with magnetic foot
  - Preamplifier is recommended  
Recommendation: *VT 87/301*, also belongs to the *ANT-Duo Set*
  - Antenna factor is set in the device

The measuring system *AMS-SD* requires the use of subcarriers in the coax distribution network. For this purpose, the use of a code frequency generator in the head end is necessary. There are the types *KFG 1* or *KFG 2* in a compact design available. The *KFG 2* is to be given the priority because of the integration of two code frequencies ( $f_1 = 301.3$  MHz and  $f_2 = 87.3$  MHz).



More information on the *KFG 2* are available on our website.  
(<http://www.sat-kabel.de/Stoerstrahlung.html>)

## Measuring principle

The field strength is determined by measuring the sub-carrier. The feeding in the head end is carried out by using a *KFG 2*. The sub-carrier, or code frequencies called, are additional FM-modulated. There are 13 alphanumeric

characters available to modulate to the carrier. The detecting code allows a clear assignment of the spurious radiation to the coaxial distribution network.

In addition to the identification are of course determined the field strength of each carrier in dB( $\mu$ V)/m and the GPS coordinates at the measurement location. For a better documentation each measurement is assigned with a time and date stamp. All data are automatically recorded and stored in a reading file on the SD card.

The measurement file is further processed in the basic software. Simple evaluation possibilities as well as the creation of measuring orders realizes the basic software. The creation of measuring orders has the background to make special specifications, which is measured:  $f_1$  and  $f_2$  together, or single  $f_1/f_2$ , in which time window as well as speed-dependent or constant (see Table 2).

## Measuring device configuration

Subsequently are shown the three possible arrangements for measuring geographical area with this system for spurious field strength out of CATV systems. There are two versions for measurements with a car. They differ only in the equipment configuration. And there is the possibility of measuring distance on foot, because you can not work anywhere with a vehicle. However the measuring principle is the same.

### Measuring device arrangement in the vehicle (1)

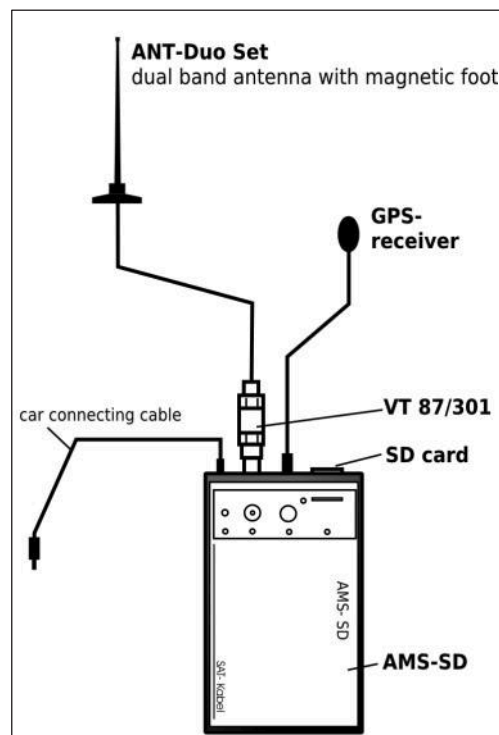


Fig. 2

This is the basis of the interconnection of the measuring instrument (AMS-SD) and accessories.

## Measuring device arrangement in the vehicle (2)

This arrangement shows the base as before but instead of the GPS receiver, an LCD display with integrated GPS is used.

This allows settings of the *AMS-SD* and measurements to read off immediately.

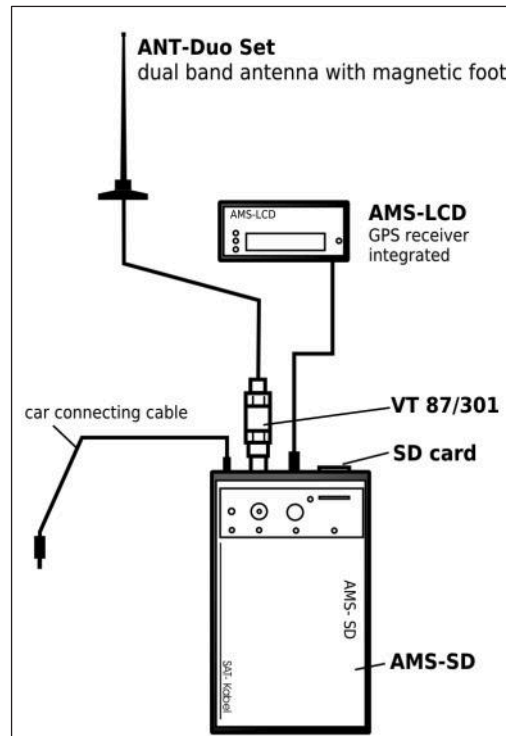


Fig. 3

## Measurement with a vehicle

Preparation (see Figure 2 and 3)

1. Mount the measuring antenna and connect it with preamplifier to the F-socket of the AMS-SD
2. Position the GPS receiver to a convenient location (clear sight to the sky) and connect it to the Mini-DIN (PS2) socket.
3. Insert memory card (note system requirements)

Switch on (1) – AMS-SD on battery power

1. Push briefly the button
  - The device is now in readiness – PWR LED starts flashing. If no further operation, so the device switches off after 10 seconds)
2. Now press the button briefly to start the measurement.
  - If the GPS LED and SDC LED shine green, the measurement starts.
  - Lights an LED red, an error has occurred (see troubleshooting).

Switch on (2) – AMS-SD connection to vehicle electrical voltage or power supply

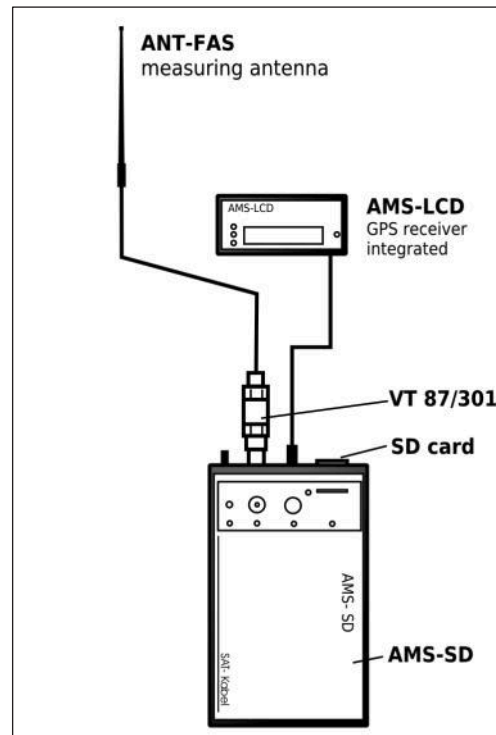
1. Connect charging cable or AC adapter
  - The device is now in readiness – PWR LED starts flashing.
2. Now press the button briefly to start the measurement.
  - If the GPS LED and SDC LED lights green, then starts the measurement when valid GPS data are available.
  - Lights an LED red, an error has occurred (see troubleshooting).

Switch off (end measurement)

1. Press button a long time (3–4 seconds) until all LEDs light up yellow
  - The current measured value file is closed.
  - The device switches off shortly thereafter.

While the AC adapter or car adapter cable is connected, the device starts again on standby until it is unplugged (LED flashes green).

## Measuring device arrangement individual



The test setup only differ from the vehicle option by the lack of the connection cable for the supply voltage to the vehicle.

The measuring process will be in this case with battery power. (Pay attention to a sufficient state of charge)

## Measurement individual

It must be assumed that not all local areas are accessible by a vehicle. For this reason, the AMS-LCD is available. By combining AMS with the AMS-SD-LCD, the field strength can be directly read or evaluated from the display. Like at the use in vehicles the recording of data is also on the SD card. For the measurement setup, see the Figure 4

Preparation (see Figure 4)

1. Insert AMS and AMS-LCD into the bag AMS-KLT
2. Connect measuring antenna type ANT-FAS to the F-socket of the AMS-SD
  - A separate GPS receiver is not used! A GPS module is already in the AMS-LCD.
3. Insert memory card (note system requirements)
  - Pay attention to the correction factor of the antenna ANT-FAS when creating the measurement order!



## Switch on

1. Push briefly the button
  - The device is now in readiness - PWR LED begins to blink \*
  - (On battery power the unit switch off after 10 seconds again)
2. Now press the button briefly to start the measurement.
  - If the GPS LED and SDC-LED shines green, the measurement starts.
  - Lights an LED red, an error has occurred (see troubleshooting).

## Switch off (end measurement)

1. Press button a long time (3-4 seconds) until all LEDs light up yellow
  - The current measuring value file is closed.
  - The device switches off shortly thereafter.

## Measuring instruments

### AMS-SD

The device *AMS-SD* is a compact measuring instrument in a rugged aluminium die-cast housing. The controls are arranged on the front side. Thus, the wiring in the vehicle is quickly realized. Any configuration of the interfaces is given in Figure 5.

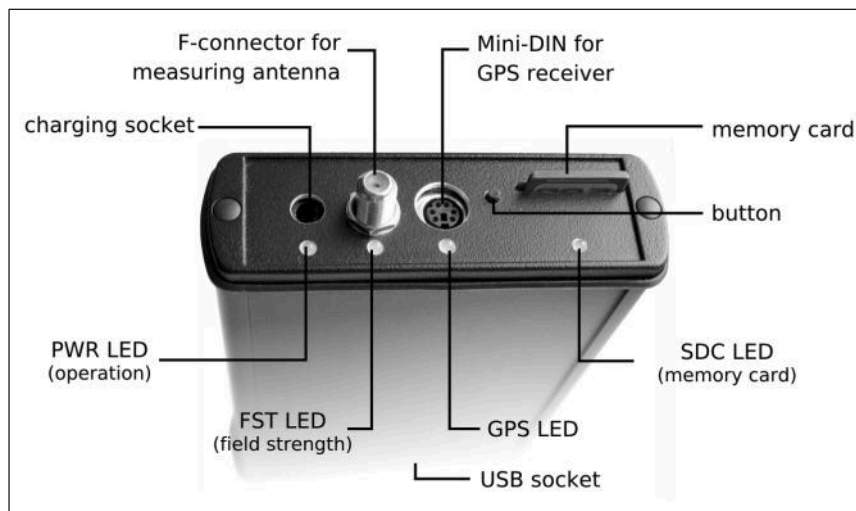


Fig. 5 Functional elements

## Functional elements

Each interface has an associated LED element. Thus is achieved that is easily seen with a look the functional status of the system. The following Table 1 shows, in a clearly manner the meaning of each LED.

The LED which is assigned to the RF-input, performs the function of the threshold display. The threshold itself can be changed by the basic software. Exceeds the field strength at an existing detecting code the value of 25 dB(μV)/m\*, the LED change to the color red. The LED lights green if the field strength is in the range of 15 to 25 dB(μV)/m\* at an existing detecting code. Below that the LED is off. This function is useful for individual use.

(see Fig. 6)

\*) Factory setting

## Thresholds

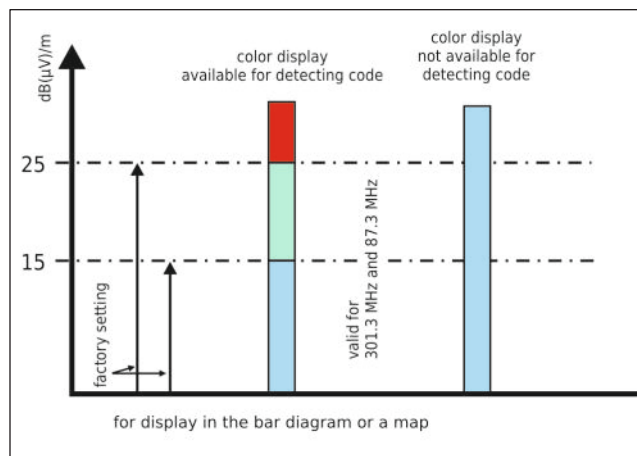


Fig. 6

The AMS-SD is basically designed to measure the field strength in dB(μV)/m. Additionally, it is able to measure and evaluate the code frequencies (sub-carriers) fed from the code frequency generators *KFG 2* or *KFG 1* into the distribution network. Thereby every code frequency is provided with a code, which is detected by the device. The GPS receiver, also connected to the AMS-SD, delivers to each measurement the corresponding GPS coordinates. From the determined measurement values of each measuring point, a complete data set is formed, which consists of measuring frequency, detecting code, GPS coordinates, date and time. From each measurement point this complete data set is stored on the SD card.

The AMS-SD required for its function a measurement order. This is created in the basic software. The measurement order then passes through two ways to the AMS-SD:

1. Data exchange between PC with the basic software to the AMS-SD via USB data cable  
For this, the AMS-SD has on its underside a USB interface.
2. Exchange of data between the PC Card Reader with inserted SD card. Is on the SD card no measurement order, so automatically is carried out the measurement order stored in internal memory. The measuring orders in the internal memory and on the SD card are so long valid until they are overwritten with a new measurement order.

## Recognize and correct errors

GPS LED shines red

Error: No GPS receiver connected, or could not be detected

Solution: Connect a compatible GPS receiver

SDC LED shines red

Error: Unable to access the memory card

Solution:

1. Insert a memory card without write protect
2. Root directory of the card is full (max. 512 files), remove files from the root
3. Card is not formatted FAT16 – reformat
4. Use SD card – SDHC cards are not supported \*

FST-LED shines red

Error: error in the RF part of the AMS-SD

Solution: Switch off the device by push button and restart

Device shows no activity and can not be switched off

Error: Fatal system error

Solution: Press the button so long (at least 10 seconds) until the LEDs don't shine any more (Reset)

If the device is after that not yet working, please contact us.

		<b>PWR LED</b>	<b>FST LED</b>	<b>GPS LED</b>	<b>SDC LED</b>
	Standby	blinking green	off	off	off
battery	battery full (standby)	shines green	off	off	off
	low battery (battery operating)	shines yellow	/	/	/
	battery empty (turns off shortly after)	shines red	/	/	/
RF input	detecting code is received, field strength below limit	on	shines green	/	/
	Detecting code is received, field strength over limit	On	blinking red	/	/
	device is internally new calibrated	On	shines yellow	/	/
	error in the receiver	on	shines red	/	/
GPS connection	GPS receiver ready	on	/	shines green	/
	no GPS receiver found	on	/	shines red	/
	data transfer with GPS receiver	on	/	shines briefly yellow	/
	active connection to the PC (via data cable)	on	off	blinking very fast yellow	off
memory card	memory card ready	on	/	/	shines green
	error - memory card	on	/	/	shines red
	data transfer to memory card	on	/	/	blinking briefly yellow
	AMS-SD starts in standby	alternating	alternating	alternating	alternating
	active measurement is completed /	shines yellow	shines yellow	shines yellow	shines yellow
	device is switched off	off	off	off	off

table 1  
LED status display  
/) LED status undefined

Connections	Measuring antenna	F-connector, 75 Ohm
	GPS receiver	PS-2 onnector
	Car charge cable	DC onnector
	PC	USB sonnector (over USB data cable)
Card slot	SD card (no SDHC)	
Button	Device switch on and off	
	The measurement process starts automatically.	

Technical data  
AMS-SD

## Technical data (continued)

### ATTENTION!

Factory setting:

The internal memory is configured with the antenna factors of the duo band antenna *ANT-Duo Set*.

\*\* ) relating to the code frequency

Battery	Running time on battery power min. 4 hours (With preamplifier, GPS receiver and display <i>AMS-LCD</i> with active lighting)	
Measuring frequency	$f_2=87.3$ MHz	changable by basic software
	$f_1=301.3$ MHz	changable by basic software
Frequency selection	$f_1 / f_2 / f_1 + f_2$	adjustable by basic software
Measuring cycle	one measuring frequency - maximum 4 per second two measuring frequencies - a complete field strength measurement takes 0.75 seconds	
Field strength	17-80 dB( $\mu$ V)/m** for $f_1=301.3$ MHz with <i>ANT-Duo Set</i> and <i>VT87/301(10/30)</i> 20-80 dB( $\mu$ V)/m** for $f_2=87.3$ MHz with <i>ANT-Duo Set</i> and <i>VT87/301(10/30)</i>	
Accuracy	$\pm 2$ dB	
Speed-dependent measurement	yes, adjustable by basic software	
permissible ambient temperature	-10 ... +50 °C	
Storage temperature	-20 ... +60 °C	
Current consumption	maximum 250 mA	
Voltage range	12-24 V <sub>DC</sub>	
Dimensions	W 110 mm × H 165 mm × D 30 mm	
Weight	500 g	

## Memory Card

An SD memory card is also included in the scope of delivery This is used for storing the measured values and the measurement order. It can also be used for data transport, even if no USB data cable should be available.



The new SDHC memory cards do not work in this device. Take care when formatting memory cards on the FAT16 format. A formattig with FAT32 doesn't work too.

### Features

- SD or MMC card (not SDHC cards)
- Capacity max. 2 GB
- FAT16 (FAT) formatted (not FAT32)
- free space in the root directory for max. 512 files

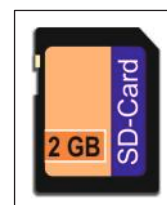


Fig. 7

For inserting the memory card this is to insert it with the mark to the button (see Figure 8) into the card slot and pushed with gentle pressure until it clicks.

To remove the card with light pressure unlatch and withdraw.

Fig. 8



Memory Card  
installing and removing

The GPS receiver is included in the scope of delivery. For the function of the entire system the GPS receiver represent an essential role, therefore it is strongly recommended: use only the original, supplied GPS receiver!

#### Features

- with serial Mini-DIN connector (MD6)
- with »Sirf3« - or »u-blox« chipset
- supporting the NMEA protocol
- support of 38400 Baud necessary



Fig.9

**GPS receiver**

Also the measuring antenna with the preamplifier of the type *VT 87/301 (10/30)* is an essential component in the measurement result. All belonging to the system components are matched. Also here the principle applies too, only use original accessories.

#### Features

- optimum antenna for the frequency range to be measured
- for field strength measurement with higher FM Immunity
- antenna factor is set in the device

Frequency	87.3 and 301-310 MHz
Antenna length	78 cm
Magnetic feet	12 cm diameter
Mounting place	car roof with magnetic foot
Connecting cable	ca. 3m, F-connector,
Preamplifier	VT 87/301 (10/30)

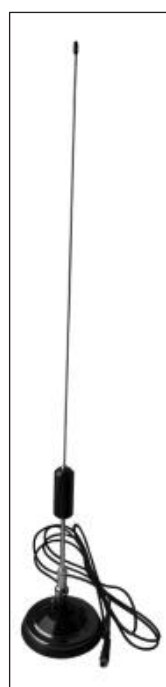
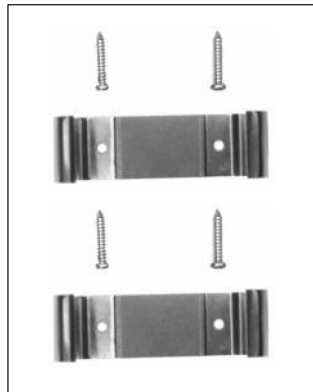


Fig.10

**measuring antenna  
ANT-Duo Set**

## AMS mounting set



The AMS mounting set is optional available. It is used for permanent installation of the *AMS-SD* in a car. By the resilience of the clamp the quick removal of the device is ensured.

Fig. 12

## AMS-LCD

In a small plastic housing a 2 inch LCD display is placed. By the integrated PS2 connecting cable the connection to the *AMS-SD* is made. Over this cable the exchange of data is made and the display receives the supply voltage. A backlight is alternatively switchable. The four-line display shows the various measurements.

### Functional elements

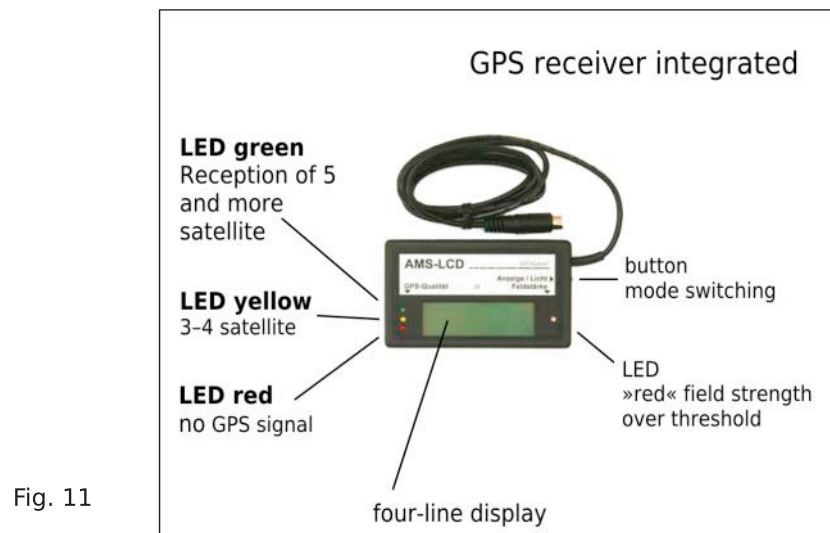


Fig. 11

### Operation

press button briefly	change display
press button a long time (at least 3 s)	lighting on/off

### Display reading

start message

```
* * * AMS-LCD * * *
Automatisches GPS-
Störstrahlungsmesssystem
mit SD-Speicherkarte
```

<div> Freq:2 [301.3/087.3]  Faktor 1/2 [13/10]dB  MZY:0.5s 02.03.2010  Datei: GPS_0001.MWD </div>	display_settings
<div> 012.2 dBµV/m 301.3  Musterstrasse MHz  xxxx.xxxx-N 07:25:12  xxxxx.xxxx-E 03§ [A] </div>	display_mode 1
<div> 012.2 dBµV/m 301.3  Musterstrasse MHz  xxxxNxxxx 180° 0350m  xxxxxExxxx 025km/h </div>	display_mode 2
<div> 012.2 dBµV/m 301.3  Musterstrasse MHz  025.1 dBµV/m 087.3  Musterstrasse MHz </div>	display_mode 3
<div> 1  12<sup>2</sup> Musterstrasse  07:25:12 03§ [MZY:A]  xxxxNxxxx 180° 0350m  xxxxxExxxx 025km/h </div>	display_mode 4

For this instrument will be granted a service life (in following called guarantee) to following conditions:

- This guarantee is valid for new instruments purchased in Germany.
- New instruments and their components, which are defective because of production faults and/or material faults, are repaired or are replaced from SAT-Kabel® against a corresponding instrument.
- For wear parts, like accumulators, keyboards, housings, bags, connecting cables this guarantee is valid for 6 month from the purchasing date.
- The guarantee claim expires at matings by the purchaser or third persons.
- At defects, caused by improper handling or operating, by wrong installation or store, by improper connection or mounting, no guarantee is granted.
- For not justified demand of our service we charge for our service the usual payment for material, working hours and forwarding costs.
- Repairs are only made with filled service covering.

(Forms for service coverings and further information are found in the standard form contracts under: [www.sat-kabel.de](http://www.sat-kabel.de))

**Guarantee**  
State July 2006

SAT-Kabel®

Satelliten- und Kabelfernsehanlagen/Industrievertretung GmbH

Telephone: +49 3724 6665-0

Telefax: +49 3724 6665-44

info@sat-kabel.de • www.sat-kabel.de

