



Time Signal Generator
TSG800

Version
P143.02

Application:

- Simulation of time signals DCF, MSF, WWVB, HBG and JJY
- Creation of exact defined time signals for measuring purposes
- Support of software development for RC watches, clocks...
- Creation of highly exact frequencies
- Production test mode

Features:

- Mains operated equipment with 50 Ohm output for time signal
- Back-up function with continuous clock in switched off condition, settings remain unchanged
- Operation + Display with 18 buttons and four-lined, illuminated display (20 characters each)
- Simple adjustment of time, date, time signal transmitter and output power in main menu
- Automatic calculation of the day-of-the-week
- After indicating the antenna factor, indication of field strength instead of output power is possible (main menu)
- Fine tuning of time in 100ms, 10ms and 1ms steps
- Automatic switch to DST and back for all signals
- Separate menu for each time signal for adjustment/input of special protocol bits
- All bits (including 2nd bit level for MSF, marker bits for WWVB and JJY) are changeable
- Possibility of flexible change of carrier frequency, modulation and impulse length
- Creation of narrow-band-noise with and without heterodyning possible
- Modulation can be switched off, carrier frequency can be switched off
- Fine tuning of time pulse and frequency between $-99,9\text{ppm}$ and $+99,9\text{ppm}$
- Connection for GPS receiver for time-and/or seconds synchronisation
- Automatic adjustment when connecting GPS receiver
- additional output for modulation signal (second impulse)
- Production test mode

Technical data

	value	Condition
Case dimension	290 x 260 x 125 mm	W x L x H
Weight:	3,0 Kg	
Voltage:	115 / 230 V +-10%	Fuses: 250mA 230V 500mA 115V
Storage temperature	-20° - +50°C	
operating temperature	+10° - +40°C	
Humidity	0% - 90%	not condensing
output voltage	1.0μV – 9.00V eff.,	before 50 Ohm output resistor, in 7 decades, each is 3 digit adjustable
Deviation of output voltage	±2%	
Adjustment of output voltage via time signal	0% - 99% of carrier amplitude,	1% steps
Adjustment of narrow band noise	0% - 99%	with 25Hz band width relative to carrier amplitude, 1% steps
Frequency	10kHz – 99,9999kHz	0.1Hz steps adjustable, with guaranteed accuracy of output voltage
Time pulse and frequency deviations	±0.5ppm equals ± 43ms/day	
Time pulse and frequency deviations	short term: ± 0.1ppm 1 day and > 1day: 0ppm	with connected GPS receiver after 30 minutes
Accuracy of modulation impulse length	±0.5ms	
Accuracy of impulse flank	±75μs	at the start of the second, in GPS operation
Time pulse and frequency change	-99.9ppm – 99.9ppm	0.1ppm steps
Data memory of backup battery	> 100 years	OFF time: >2days
field strength	lower limit: 1μV/m (or: higher value of field strength that is created at 1μV output voltage) upper limit: 9.00V/m (or: the lower value of field strength that is created at 9.00V output voltage)	from 1 abbreviating antenna factor

Operation

1. General

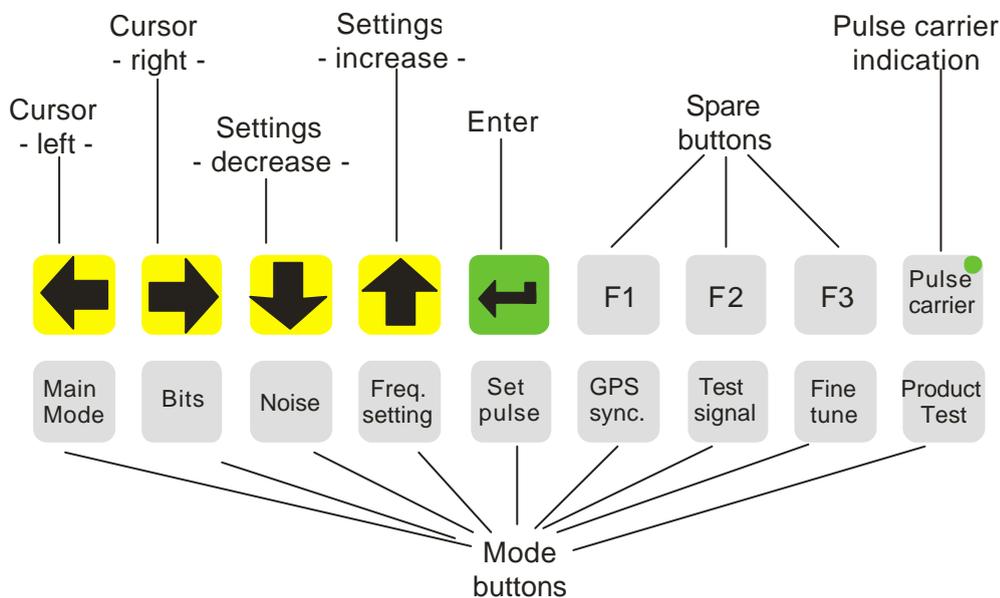
The TSG800 time signal generator simulates the time signals DCF, MSF, WWVB, HBG and JJY. Due to its flexible features, all time signal parameters can be adjusted accordingly. Therefore, changes of parameters can be done such as impulse length, frequency, modulation etc. in order to make measurements with RC time pieces and define their tolerance ranges. Connection of the GPS receiver enables maintain free operation, since switch to DST is done automatically within the corresponding signals. Operation is done via buttons, display via four-line, illuminated LCD. In the main menu, all important parameters such as time, antenna factor, date, time signal and output voltage are easy to recognize and modify.

2. Button functions

After turning on the TSG800, always the main menu is shown in the display. The values that have to be adjusted can be chosen by using the buttons

◀ and ▶ The chosen value is indicated by the cursor (underline). The cursor will only move to positions, where something can be adjusted. The actual adjustment of any values is done with the buttons ↑ and ↓

In some adjustments, by pushing ↑ and ↓ continuously (>1s), a fast mode can be activated. To enter a different mode, push the adequate button.



2.1 Button

With this button, the cursor can be moved to its next position to the right.

If the last character in a line is reached, the cursor will move to the very left character in the next line. If no other line is available, the cursor will stay in its current position.

2.2 Button

With this button, the cursor can be moved to its next position to the left.

If the last character in a line is reached, the cursor will move to the very right character in the next line. If no other line is available, the cursor will stay in its current position.

2.3 Button

With the + button, a selected value can be increased

2.4 Button

With the – button, a selected value can be decreased.

2.5 Button -

With the  button, settings are confirmed. If this button is pushed, the chosen values are confirmed.

2.6 Button **F1**

With the F1 button, the sub menu STORED SETTINGS can be selected

2.7 Button **F2, F3** – Spare buttons

These buttons have no function at this time. They are prepared for future features.

2.8 Button **pulse/carrier**

This button has the same function in all modes. By pushing the button, following selection can be made with the generator:

Modulated output signal (normal condition: LED will flash once a second)

Non-modulated output signal (carrier frequency only: LED is in continuous operation and not flashing)

No output signal (carrier frequency OFF: LED is OFF)

2.9 Buttons – **9 single mode buttons**

Each mode can be directly selected by pressing the corresponding button.

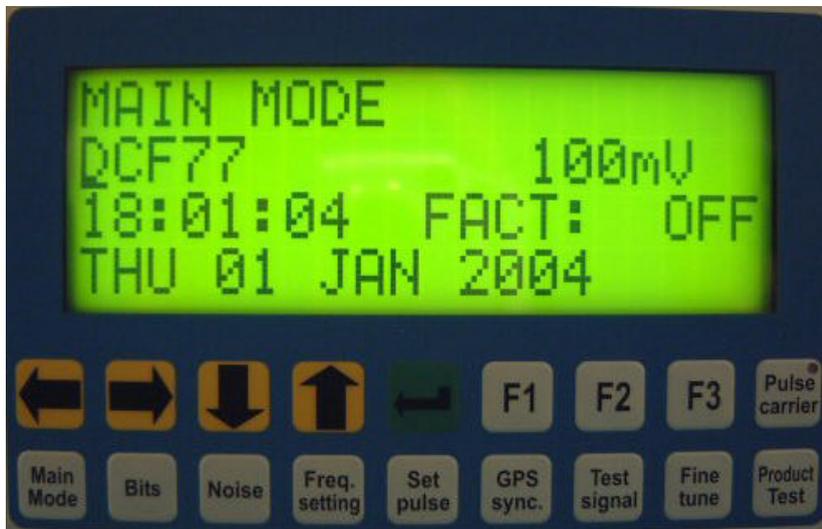
3.0 Operation

3.1 MAIN MODE

After Turning on the TSG800, following information will appear in the display:



After 5 seconds, it will automatically be switched to the MAIN MODE



In this mode, following adjustments can be done:

Protocol, output voltage/field strength, hours, minutes, seconds, antenna factor, day, date, month, year.

The icons in the upper right corner of the display are defined as following:

 = Attention, basic settings have been changed

 = Noise interference set

 = "Sync sec" activated

The adjustment of time and date in GPS operation is not recommended, since all values will be re-adjusted to the actual ones if "Sync time" is activated.

Default values:

Protocol:	DCF77	Output voltage (field strength):	100 mV (/m)
Time:	Actual time	Antenna factor:	OFF
Date:	Actual date		

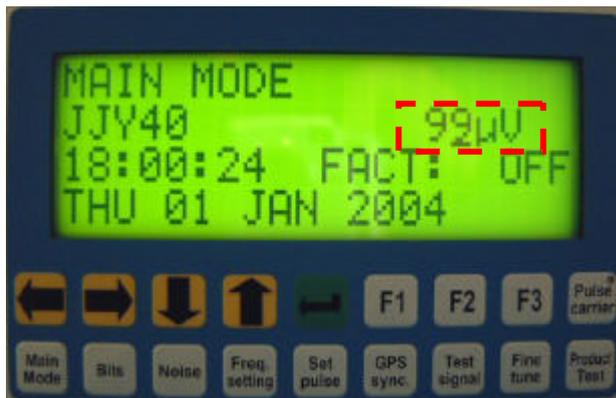
3.1.1 Adjustment of protocol



If the cursor is positioned onto any name of a time code transmitter, another transmitter can be chosen with the buttons  and . Standard settings for the chosen transmitter will be valid at this time.

3.1.2 Adjustment of output voltage and field strength

To place the cursor to the output voltage/field strength, use the  button.

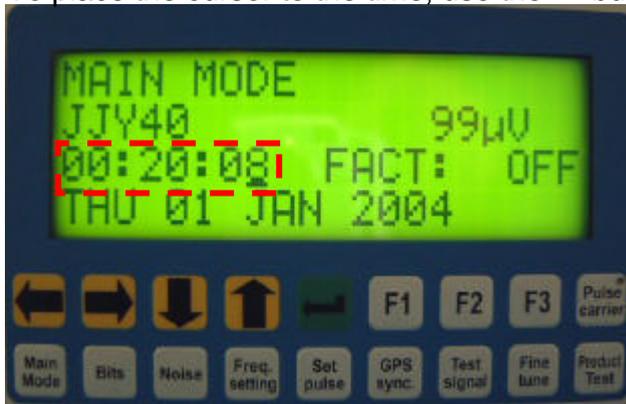


The cursor can be positioned onto the three possible digits for value adjustment or point onto the corresponding unit of the output voltage/field strength. The desired value can be adjusted with the  and  buttons. If the cursor is positioned onto the unit, the unit for output voltage /field strength can be increased or decreased with the  and  buttons.

Note: If any value other than 1 is adjusted for the antenna factor, the indication of the output voltage (μV) will change to indication of field strength ($\mu\text{V}/\text{m}$)

3.1.3 Adjustment of time

To place the cursor to the time, use the  button.

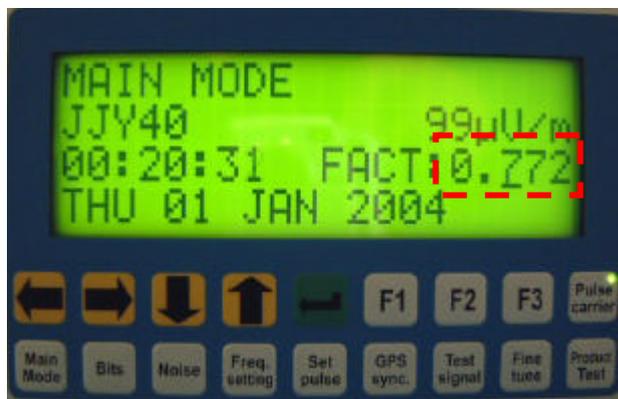


The cursor may be positioned onto hour, minute or second.

Hours and minutes can be increased or decreased with the buttons  and . If positioned onto seconds, the seconds can be set to 00 with the buttons  (minute will be increased) and . (only second set to 00 no change of the minute)

3.1.4 Adjustment of antenna factor

To place the cursor to the antenna factor, use the  button.



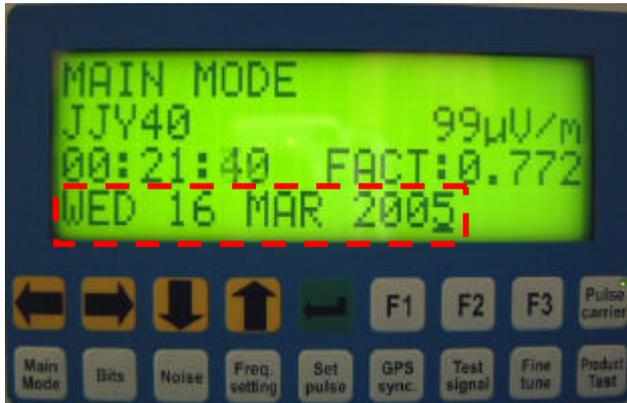
To switch from OFF to any value, use the  button.

Then, the cursor can be positioned onto 4 possible digits for value adjustment of the antenna factor. The desired value can be adjusted with the  and  buttons.

Note: If any value other than 1 is adjusted for the antenna factor, the indication of the output voltage (μ V) will change to indication of field strength (μ V/m)

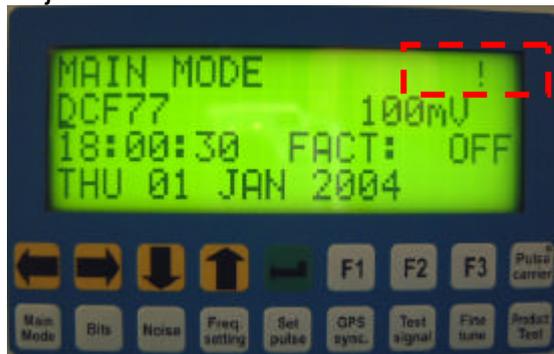
3.1.5 Adjustment of date

To place the cursor to the date, use the  button.



The cursor may be positioned onto date, month and year. The chosen value can be increased or decreased with the buttons  and . If a date has been chosen which is larger than the length of the displayed month, the date is automatically adjusted to the largest allowed value. The adjustment of the year is possible from 2000 up to 2099. The day-of-the-week is calculated automatically.

3.1.6 Adjustment of standard values



This option (!) is only available if values (other than noise, for noise adjustment, refer to 3.2.7)) have been adjusted, that are deviating from the standard values. By positioning the cursor below the icon ! and pressing the ENTER key, the standard values can be adjusted, then, the ! option will disappear. Following standard values will be adjusted:

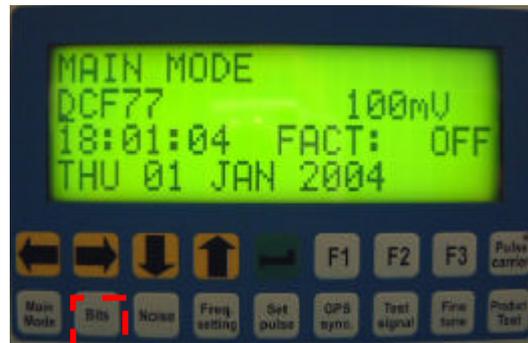
- a) Frequency
- b) Impulse length
- c) Modulation
- d) BIT EXCHANGE-Mask to 0, exception: bits 0 to 16 of the second bit level in MSF

3.1.7 Adjustment of standard values for noise



This option  is only available if any type of noise has been edited.

By positioning the cursor below the  icon and pressing the ENTER key, noise Creation is switched off.

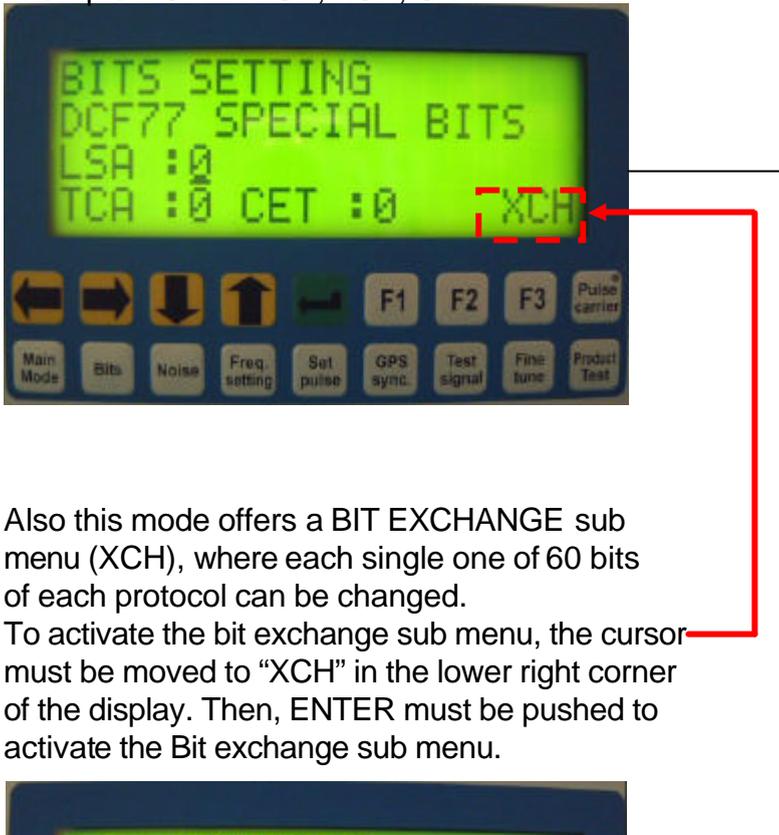
4. BIT SETTING MODE

To activate the BIT SETTING MODE the corresponding signal must be chosen within the main mode and the button BITS must be pushed.

With the time information, also additional information is transmitted, which is not included in the adjusted time in the main mode. This information is included in special protocol bits, which vary depending on the selected transmitter station. In this mode, the special bits of each protocol can be changed. Values can be changed with the  and  buttons.

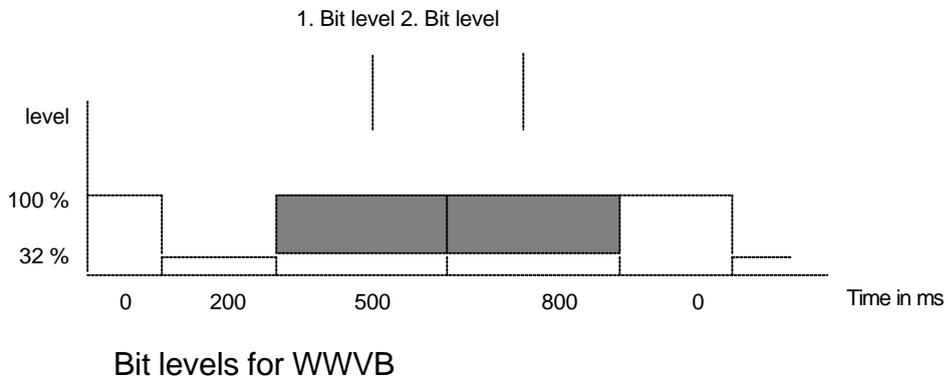
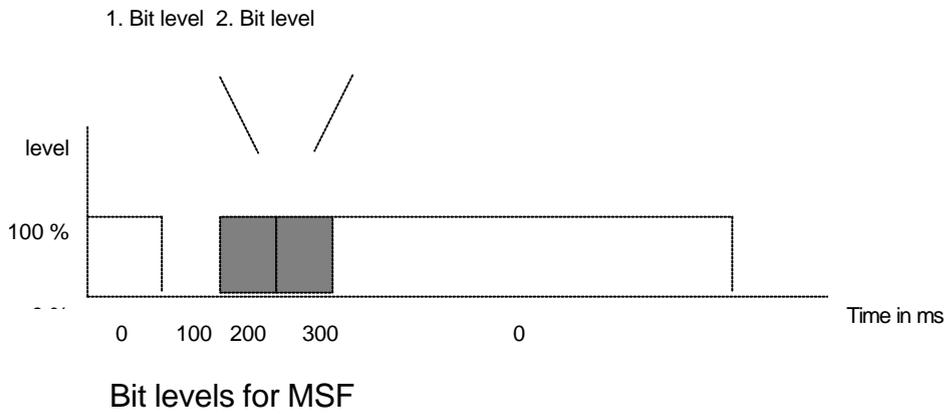
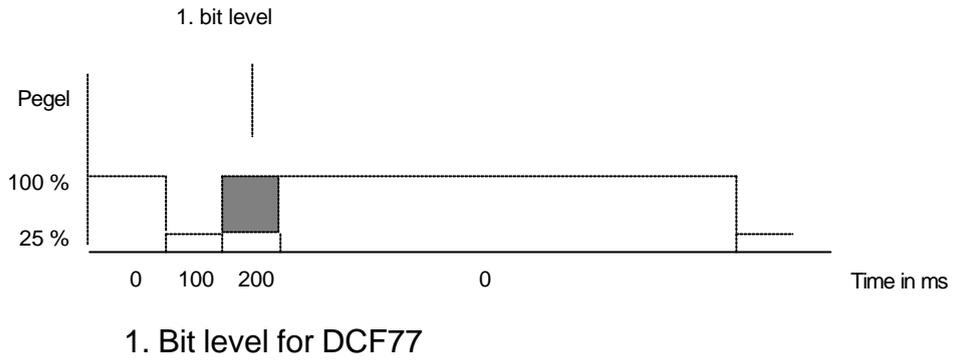
An important adjustment in the bit setting mode is the possibility to choose DST (Daylight saving time) in DCF, MSF and WWVB. Special attention has to be paid, that, if switching to DST and back in Bit setting mode, no change of the transmitted time information itself is being done. Only additional information about DST (ON or OFF) will be transmitted. If the TCA bit (Time Change Announcement in DCF and MSF) is transmitted, the TSG800 will change the time accordingly after reception of the next right time information. This means a change of time by 1 hour back or forth, switch to or from DST and reset of TCA bit (also see Summer time / Winter time adjustment).

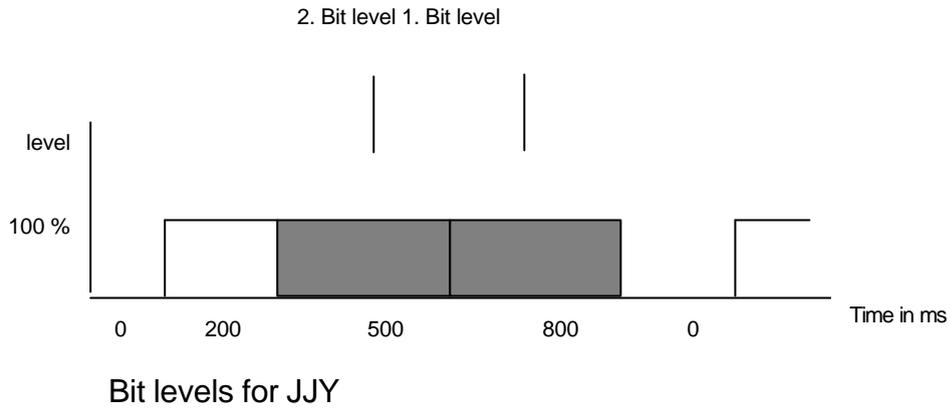
When choosing this mode, the special bits of each mode will be shown:
Example DCF77: LSA, TCA, CET



Also this mode offers a BIT EXCHANGE sub menu (XCH), where each single one of 60 bits of each protocol can be changed.
To activate the bit exchange sub menu, the cursor must be moved to "XCH" in the lower right corner of the display. Then, ENTER must be pushed to activate the Bit exchange sub menu.







DCF – Special bits



The option CET or CEST allows the switch of the two bits which mark the DST within the DCF signal. CET = Central European Time (Winter), CEST = Central European Summer Time (Summer).

The announcement bit for this change is switchable by TCA.

The leap second announcement bit is switchable by LSA (Leap Second Announcement).

HBG – Special bits

The option CET or CEST allows the switch of the two bits which mark the DST within the HBG signal. CET = Central European Time (Winter), CEST = Central European Summer Time (Summer).

The announcement bit for this change is switchable by TCA.

The leap second announcement bit is switchable by LSA (Leap Second Announcement).

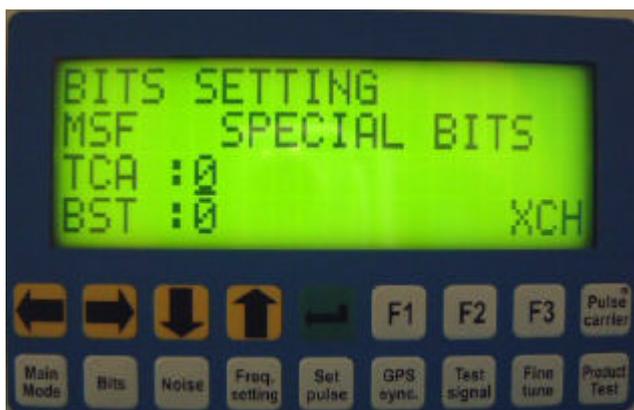
**MSF – Special bits**

The option UTC or BST allows the switch of the summer time bits.

UTC = Universal Time Coordinated (Winter)

BST = British Standard Time

TCA = Time change announcement bit



WWVB – Special bits

Winter time is marked with ST (Standard Time), summer time with DST (Daylight saving time). Four variants can be adjusted with summertime/wintertime:



Furthermore, the announcement bit for the leap second can be switched (LSA L= Leap Second Announcement)

The bit sequence for DST / TCA is as following:

	TCA (bit 57)	DST (bit 58)
ST	0	0
ST change to DST	1	0
DST	1	1
DST change to ST	0	1

ST = Standard time, DST = Daylight saving time

JJY – Special bits

With the mode options LS1 and LS2 both announcement bits for the leap second can be activated (positive or negative).

Summer time is not intended at this time. Yet, there are two reserved bits, which are named SU1 and SU2 in this mode. These two bits can be switched. Possibly, these two bits will have the function of the summer/winter time switch in the future.



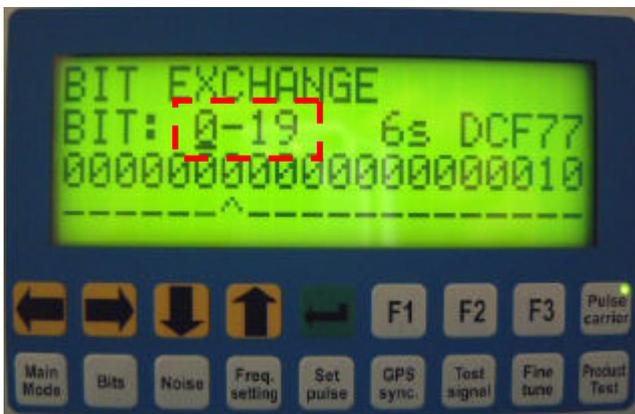
4.1 BIT EXCHANGE

The option BIT EXCHANGE is being used to activate another two sub-modes where a total of 60 bits can be switched.

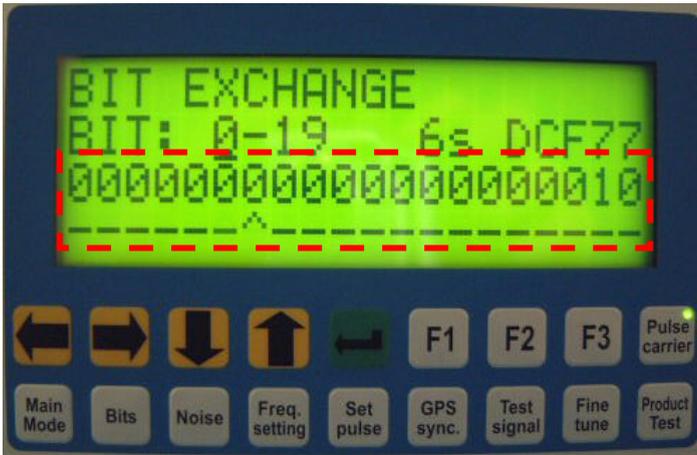
Signal	1. bit level	2. bit level	special bits in 2nd bit level
DCF	100ms or 200ms	--	--
MSF	100ms or 200ms	200ms to 300ms	parity bits, UT1 offset, summer time bit and TCA (time change announcement) bit
WWVB	200ms or 500ms	500ms to 800ms	marker bits
JJY	500ms or 800ms	200ms to 500ms	marker bits

With the BIT EXCHANGE-Mask, every protocol bit can be turned around. In each mode, 60 bits can be chosen and switched.

1. After selecting the XCH option for BIT EXCHANGE, the cursor is positioned on option "0-19". By using the  and  buttons, the bit range 20-39 or bits 40-59 can also be selected.



2. After selecting the bit range, move cursor with  button to bit setting level and adjust bits with the  and  buttons to the desired value.

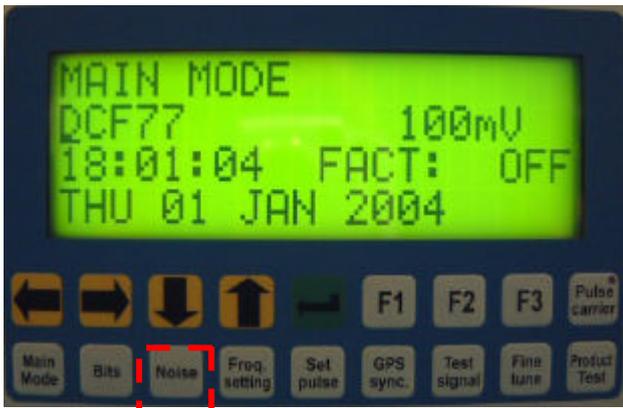


Possible settings:

Setting	Bit
-	remains unchanged
0	value 0
1	value 1
X	inverted value (0=1 or 1=0)

In case a bit is set within the BIT EXCHANGE-Mask, the corresponding information will be send with the appropriate second (according to table above).

5. NOISE GENERATION

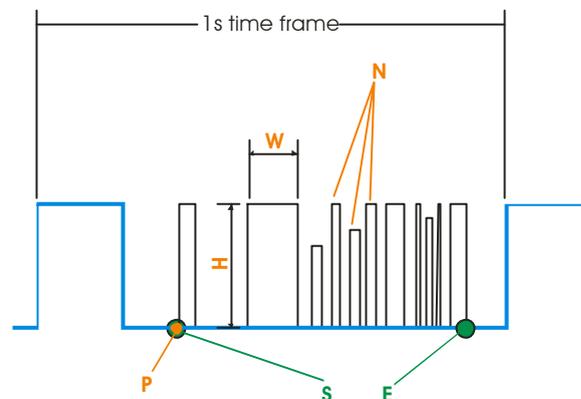


To activate the noise generation mode, push button NOISE.
 The noise generation mode allows creation of two different individual noise interferences.

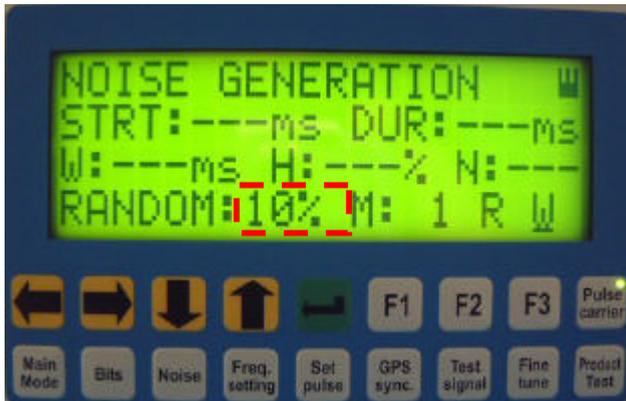
a) Manual noise

Detailed parameters for the noise creation can be set as :

- Start point of noise
- Durarion of noise
- Noise width
- Noise height
- Number of interferences (spikes) within the chosen range



Width	W	smallest value: 1ms
Height	H	
Position in 1s	P	
Position symetrical	PS	
Number of spikes	N	
Starting/Ending point of spike period	S/E	

b) Random noise

To activate RANDOM NOISE, the cursor must be placed at Random noise – OFF. By pushing the  or  button, a percentage for the random noise is selected. When Random is chosen, no other noise adjustment is possible.

Maximum values of 0% (no noise) and 99% (maximum noise) can be adjusted. The percentage expresses the ratio of the maximum stochastic noise level toward the output voltage. Therefore, 99% means, that the noise level is nearly as big as the chosen output voltage. If output voltage is set >5V, the output voltage can be increased by additional noise enough for the limit within the output booster to be activated. Then neither the sinus form nor the adjusted voltage value will be kept. Error-free is ensured only if the sum of the output voltage and the noise level is <10V. In carrier switched off condition, this is not valid (button pulse/carrier). If the carrier has been switched off, the generator will only create the noise. If this noise is radiated via antenna, it will not lead to beats with possibly existing carrier on the same frequency.

The random noise pattern can be stored. Up to 10 different random noise pattern can be stored. To store it select the memory (M) no. (1-10) and then place the cursor below the W (write)
To read out the data place the cursor after selecting the number under the R (read).

If a value not equal 0 is adjusted,  will be displayed in the upper right corner of the LCD.

6. FREQUENCY ADJUST

To activate the FREQUENCY ADJUST MODE, the button FREQ. SETTING must be pushed.

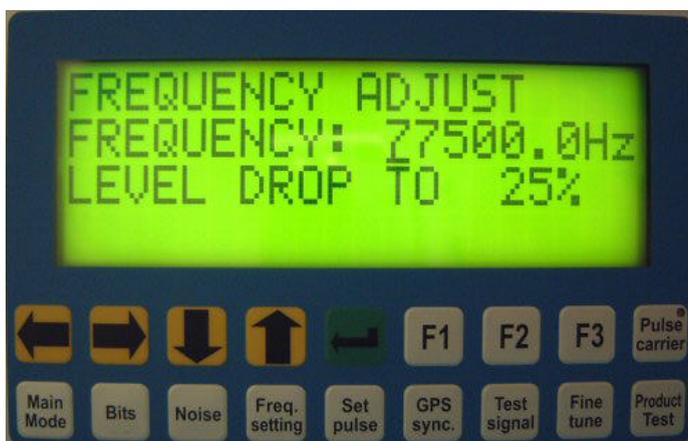
In this mode, any value of the carrier frequency in the range from 10 kHz to 100 kHz can be adjusted. The verification of the output level is only guaranteed in the area between 10 kHz and 100 kHz. The resolution is 0.1 Hz, the frequency fault at exact adjustment (0.1ppm) is maximum 0.075 Hz at 77.5 kHz, 0.06 Hz at 60 kHz and 0.04 Hz at 40 kHz.

If a carrier frequency has been selected that is deviating from the standard frequency,

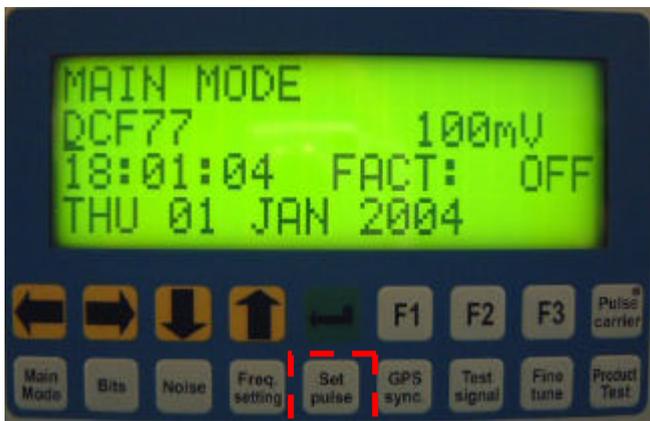
! will be displayed in the upper right corner of the LCD.

Level drop

Values between 0% and 99% can be adjusted. Depending on the transmitter there will be standard value, which will be adjusted automatically. A value of 25% (standard at DCF) will express, that, at the beginning of the second, the output voltage of the TSG800 will drop to 25% of the displayed value. If a value is adjusted that is deviating from the standard value, ! will be displayed in the main mode.



7. PULSE SETTING

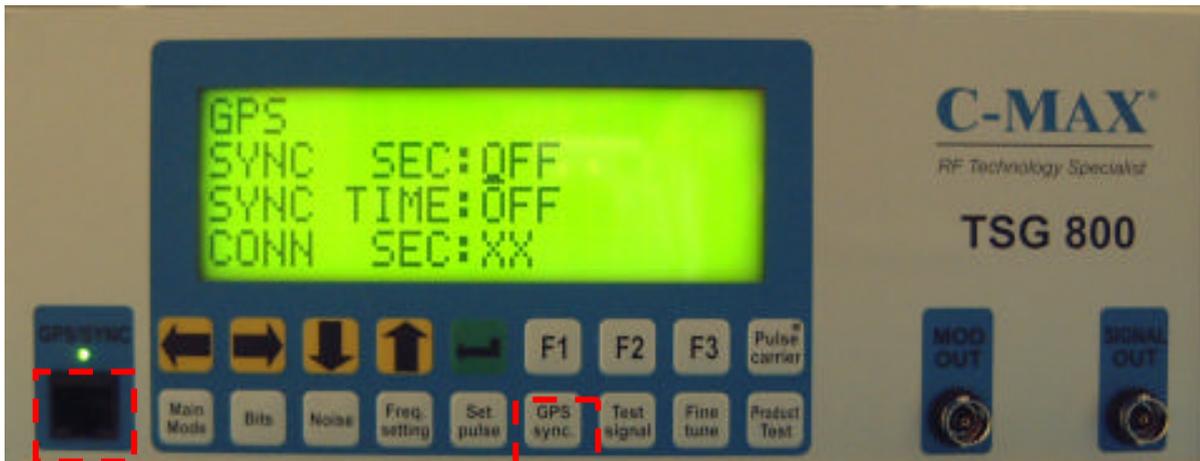


To activate the PULSE SETTING MODE, the button SET PULSE must be pushed.

In this mode, all pulse times of the corresponding signal can be changed. The time shown at the very left (100ms at DCF77 and MSF or 200ms at WWVB and JJY) indicates, at what time after the change over of the second the first modulation switch can take place (from dropped to full at DCF77, MSF and WWVB or from full to dropped at JJY). All times can be changed in ms-steps by the  and  buttons. Overlays are not allowed, meaning that the first time may not be larger than the second, the second time may not be larger than the third. The maximum value of the third time is 999ms.

If another than the standard time has been adjusted  will be indicated in the main mode.



8. GPS SYNC.

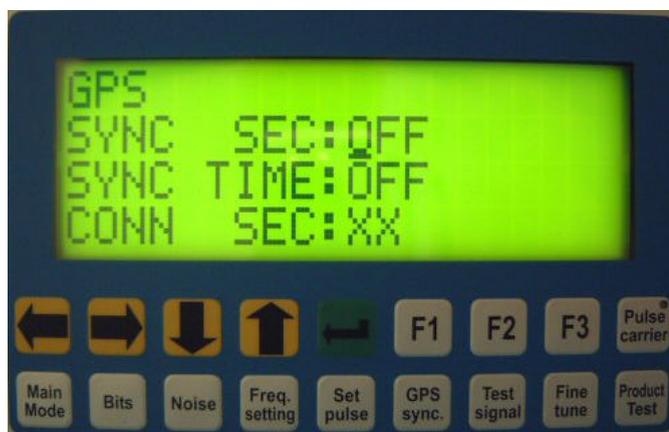
To start the GPS SYNC., push “GPS SYNC” button and connect the C-MAX “GPS100” unit by using the RJ45 GPS/SYNC. connector at the left side of the front panel.

The GPS mode will allow different operating options. Available are the options “Sync sec” and “Sync Time”. If “Sync sec” is set to ON, the change over of the second is adjusted exactly to the change over of the second of UTC time. If this feature has successfully finished,  will be displayed in the upper right corner of the display. If, in addition, “Sync Time” is set to ON, the time that is supplied by the GPS receiver will be calculated into local time (exception: WWVB) and be transmitted as time and date. The calculation will also take possible summer time settings into consideration. If the GPS receiver is connected, the recently transmitted values of the second will be displayed. If the GPS receiver is not connected XX will be displayed in the same position.

If “Sync Time” is chosen, “Sync sec” will be turned on automatically.

If “Sync sec” is activated, an automatic fine tuning of frequency and time pulse will be done in addition to adjustment of the second impulse to UTC.

A precision of ± 0.1 ppm will be accomplished after max. 30 minutes. If a highly deviating value has been adjusted previously, the display “locked” might appear and disappear in uneven periods.



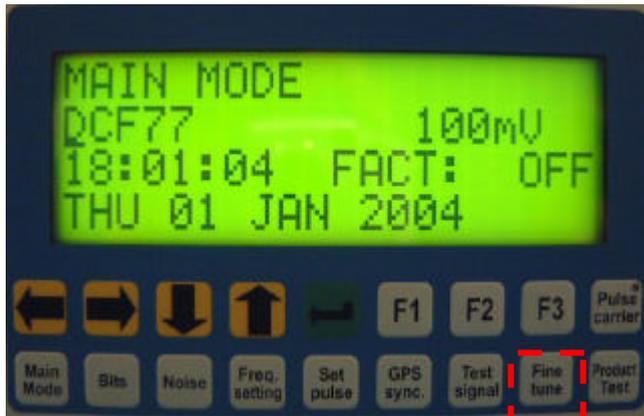
9. TEST SIGNAL

To activate the TEST SIGNAL MODE, the button TEST SIGNAL must be pushed.

If the mode TEST SIGNAL is chosen, the TSG800 will create a signal without any informational content. This test signal is marked by sending a 0-bit and a 1-bit in turn. Therefore, impulses of two different lengths are being send in turns. Frequency, output voltage, pulse length and modulation polarity are adjustable.



In the upper line, frequency, and output voltage are available as menu options. Impulse length can be changed in the middle line, the modulation polarity is adjusted in the bottom line. The adjustment of frequency, output voltage and pulse length are done in the same way as described in the previous modes. The modulation polarity be changed between “inverted” and ”directly”. The meaning of “directly” is the signal output is directly the same as the phase of the local transmitter signal (from carrier level modulated down to low level). The meaning of “inverted” is that the output signal is inverted to the phase of the local transmitter (carrier level modulated up to high level).

10. FINE TUNE

To activate the FINE TUNE MODE, the button FINE TUNE must be pushed.

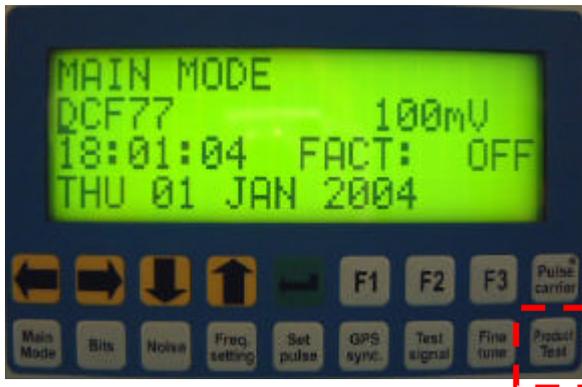
This mode offers the possibility for the adjustment of the second and the deviation of the TSG800 time in small steps. If connected to the GPS receiver this menu should not be used (depending on GPS options). If option "Sync sec" is activated, the use of the adjustment for 0.001s up to 1.000s is not recommended since the deviation of time will always be corrected. Also, for the same reason, the adjustment of the second is not recommended if GPS option "Sync time" is activated (second will be continuously re-adjusted).

i. Adjustment

If the cursor is positioned onto the seconds display, time can be adjusted back and forth by 1/1000 second steps with the buttons  and .



11. PRODUCTION TEST



To activate the PRODUCTION TEST MODE, the button PRODUCT TEST button must be pushed.



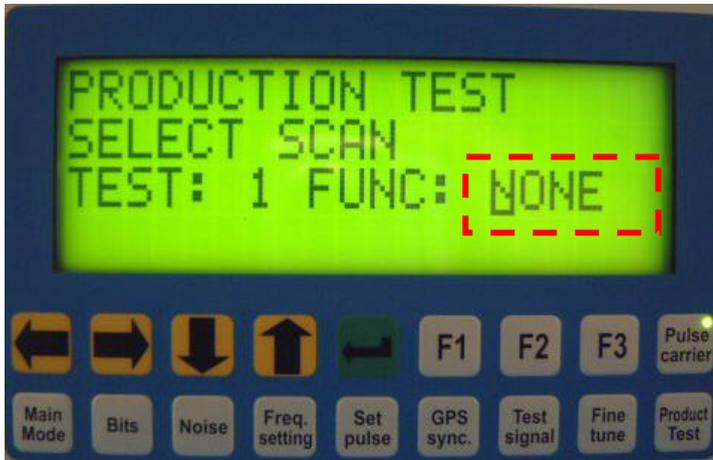
The test jig must be connected to the SUB25 parallel connector at the back side of the TSG800.

In the Production test main menu Following tests can be selected:

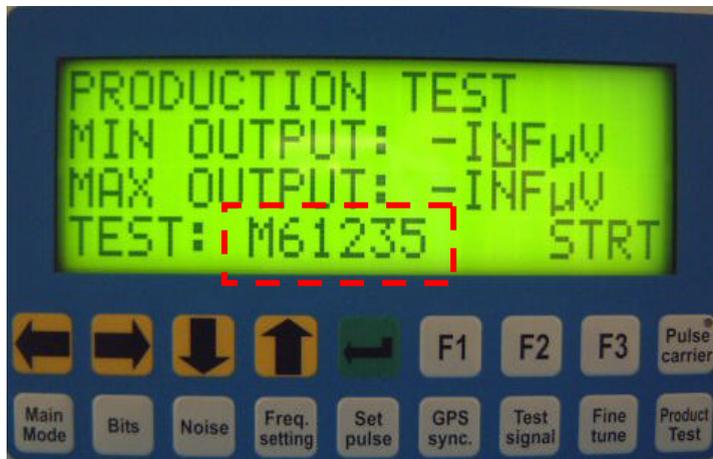


- TEST:
- MANUAL
 - SCAN
 - JJY-D
 - MSF
 - WWVB
 - JJY60
 - JJY40
 - HBG
 - DCF77

If MANUAL is selected and confirmed by the  key following sub menu appear
 With the  and the  buttons, the single protocol can be selected and confirmed by pressing the  key. The next protocol can be now selected: By using this MANUAL selection an own customised SCAN mode can be done.

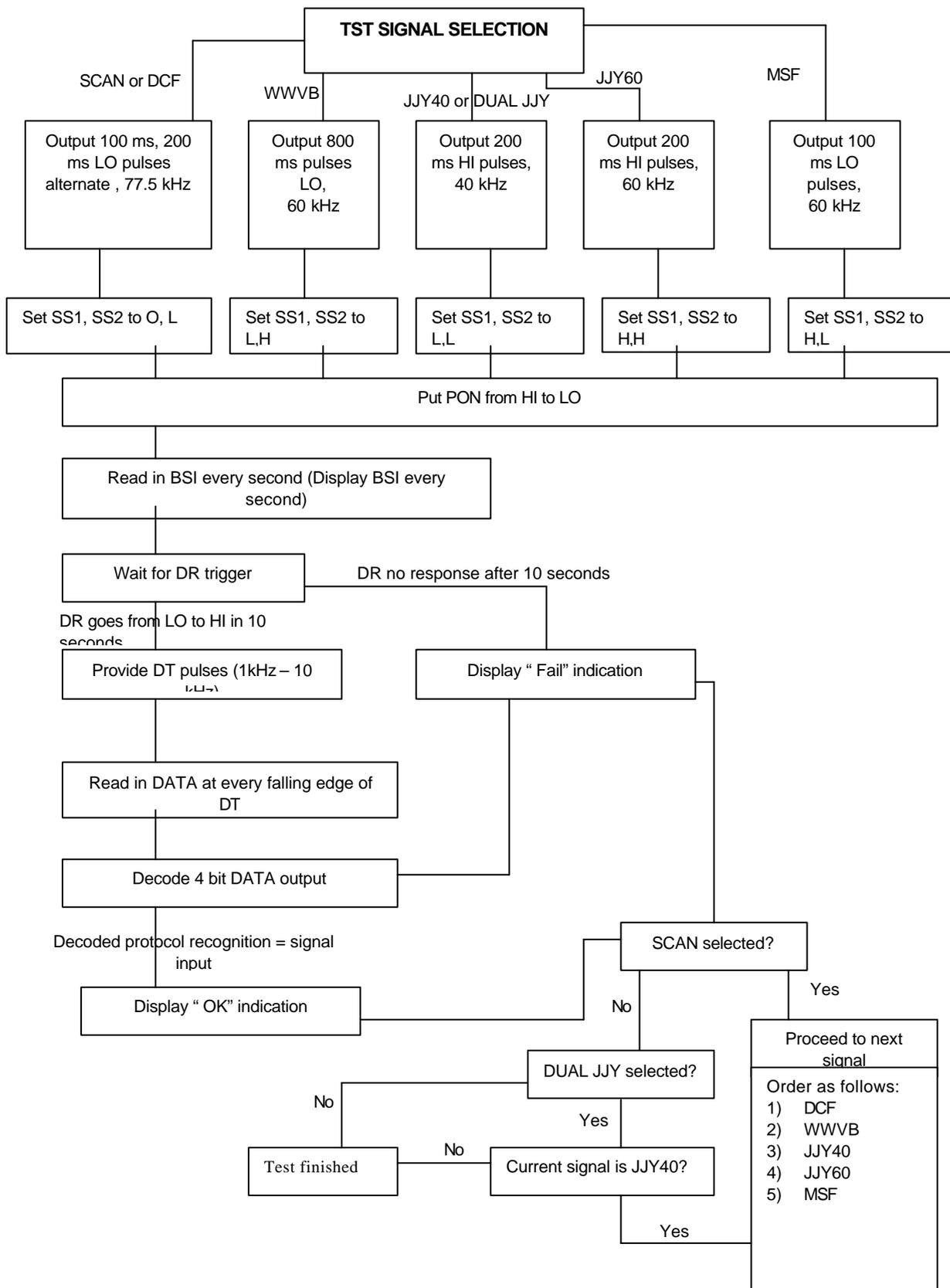


This mode will be stored and appear in future as M (up to 5 numbers)
 Following are our internal protocol sequence numbers:



- 1: DCF77
- 2: HBG
- 3: JJY40
- 4: JJY60
- 5: WWVB
- 6: MSF

In case that only 2,3 or 4 protocols should be used for the customised SCAN the other Functions must be filled up by selecting: NONE.

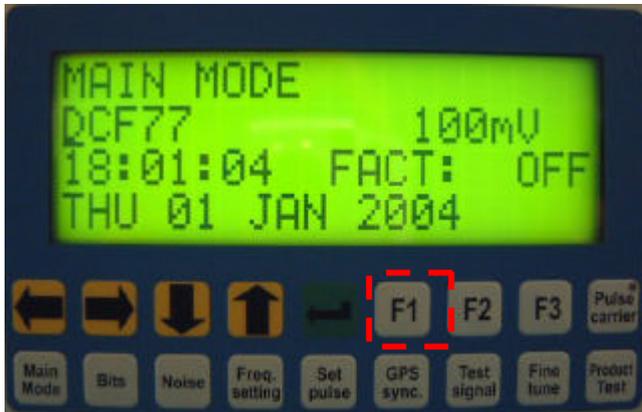


ROUTINE:

1. Set output level to defined min. value
2. Output pulse as set in TST signal
3. Set SS1, SS2 to TST Signal (PON Reset first)
4. Wait for protocol recognition
5. Repeat for max. value

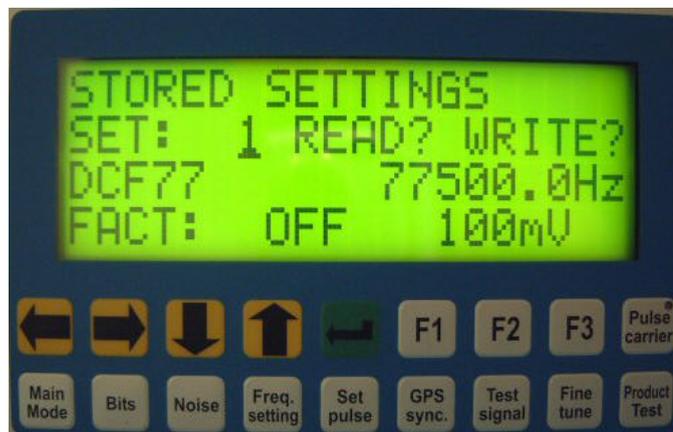
SCAN:

1. DCF
2. WWVB (MSF – WWVB)
3. JJY60
4. MSF
5. JJY40

12. STORED SETTINGS

To activate the STORED SETTINGS MODE, the button F1 must be pushed.

In this mode, up to 9 complete settings of the TSG800 which are deviating from the TSG800 standard settings, can be stored and/or recalled. This mode is activated by pushing the F1 button. After entering the mode, READ for storing a setting sequence or WRITE for transmitting a previously stored setting to the TSG800 can be chosen. In the bottom two lines, protocol, frequency, output voltage and antenna factor of the selected setting sequence are displayed.



13. Summer time / winter time adjustment

In the protocols of DCF77, MSF and WWVB the switch from summer time to winter time and vice versa is intended. The switch is done automatically by the TSG800. Therefore, the TSG800 has to be turned on during the period of the switch over.

13.1 Switch in DCF

Base condition for accurate switch of time is, that the TSG800 is adjusted to the currently transmitted time. In order to switch to summer time, the TSG800 has to be adjusted previously to winter time. If the date is the last Sunday in March, at 01:00 the bit TCA is set as an indication for the change. At 02:00 the hours will be set to 03:00, the signal bit summer time / winter time will be set to summer time and the TCA bit will be deleted.

To switch to winter time, the TSG800 has to be adjusted previously to summer time. If the date is the last Sunday in October, at 02:00 the TCA bit is set for the switch over. At 03:00, the time is re-adjusted to 02:00, the signal bits will be set to winter time and the TCA bit will be deleted.

13.2 Switch in HBG

Base condition for accurate switch of time is, that the TSG800 is adjusted to the currently transmitted time. In order to switch to summer time, the TSG800 has to be adjusted previously to winter time. If the date is the last Sunday in March, at 01:00 the bit TCA is set as an indication for the change (see 4.0 et seqq.). At 02:00 the hours will be set to 03:00, the signal bit summer time / winter time will be set to summer time and the TCA bit will be deleted.

To switch to winter time, the TSG800 has to be adjusted previously to summer time. If the date is the last Sunday in October, at 02:00 the TCA bit is set for the switch over. At 03:00, the time is re-adjusted to 02:00, the signal bits will be set to winter time and the TCA bit will be deleted.

13.3 Switch in MSF

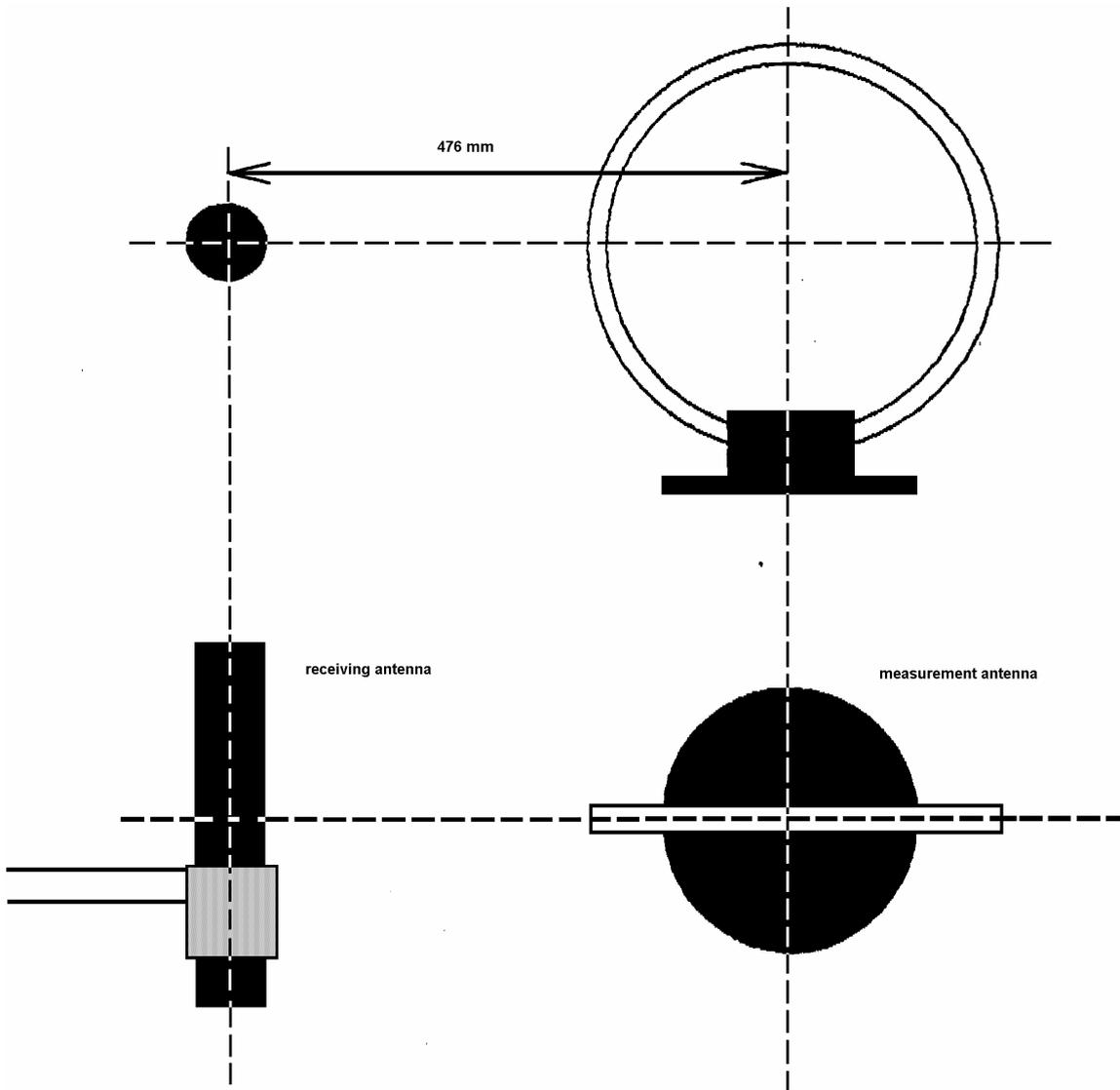
Base condition for accurate switch of time is, that the TSG800 is adjusted to the currently transmitted time. In order to switch to summer time, the TSG800 has to be adjusted previously to winter time. If the date is the last Sunday in March, at 00:00 the TCA bit is set as indication for the change (see 4.0 et seqq.). At 01:00 the hours will be set to 02:00, the summer time bit will be set within the protocol and the TCA bit will be deleted.

To switch to winter time, the TSG800 has to be adjusted previously to summer time. If the date is the last Sunday in October, at 01:00 the TCA bit is set for the switch over. At 02:00, the time is re-adjusted to 01:00, the signal bits will be set to winter time and the TCA bit will be deleted.

13.4 Switch in WWVB

Base condition for accurate switch of time is, that the TSG800 is adjusted to the currently transmitted time. In order to switch to summer time, the TSG800 has to be adjusted previously to winter time. If the date is the first Sunday in April, at first bit 57 will be set at 00:00 UTC time within the time protocol. With the set bit 57 and the not yet set bit 58 this day is marked as the day for the switch over from summer time to winter time. All watches and clocks must now do the change automatically, according to the corresponding point of time in their time zone. On the following Monday, the bit 58 will be set also. Then, the switch over is finished.

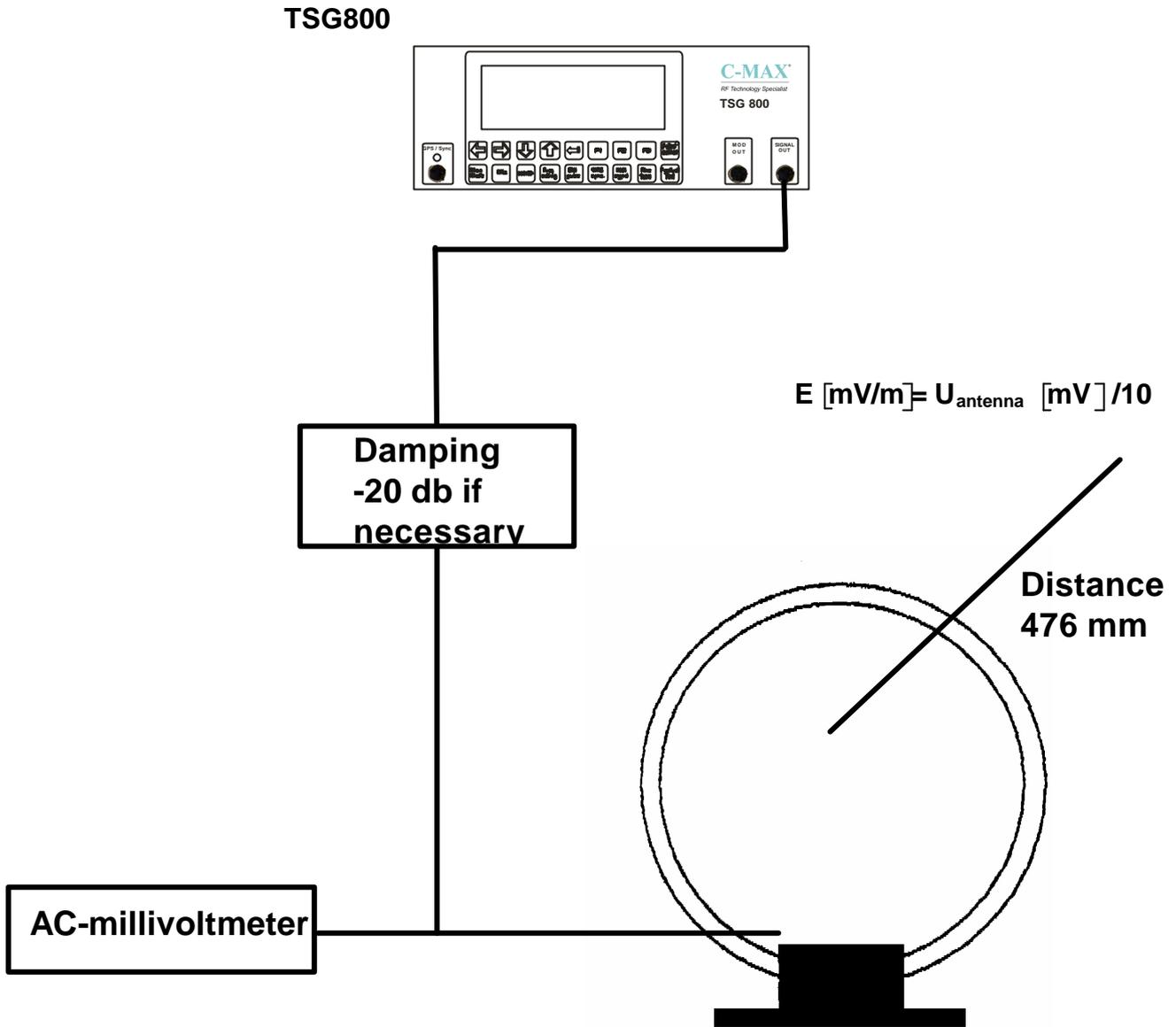
To switch to winter time, the TSG800 has to be adjusted previously to summer time. If the date is the last Sunday in October, at 00:00 UTC time the bit 57 is reset within the time protocol. Due to the reset bit 57 and the still set bit 58, this day is marked as the day for switch over from summer time to winter time. All watches and clocks must now do the change automatically, according to the corresponding point of time in their time zone. On the following Monday at 00:00 UTC time, bit 58 is also reset. Then, the switch over is finished.



Between the shown generator idle motion voltage $G_{GEN} \mathcal{V}_S$ and the receiving field power under restriction of the above measurement set up following relation exists.

$$E [V/m] = k * 0,313 * U_{GEN} [V_S] * 2 \quad ; k = 0,1 m^{-1}$$

To increase the accuracy of the measurement we recommend to make the measurement in a shielded room and to adjust the antenna measurement with a separate voltage meter



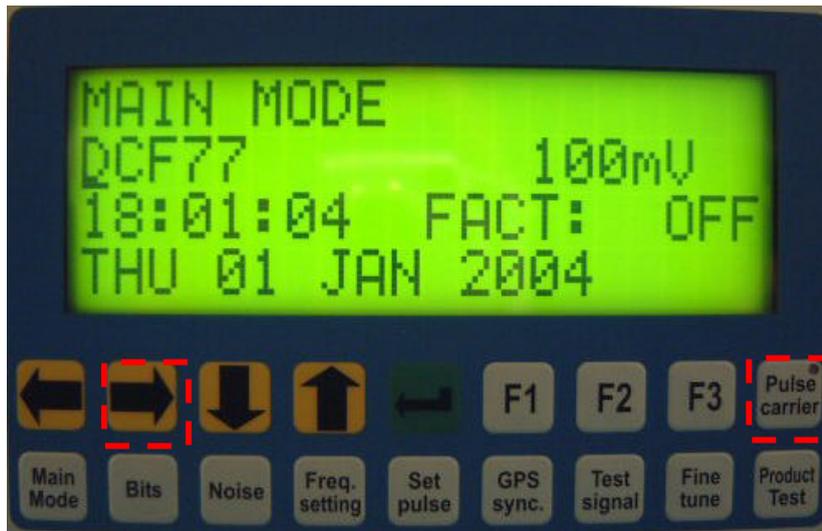
When using the 4-loop-antenna, please refer to the corresponding antenna manual for detailed information.

14. TSG800 – Hardware calibration

In this mode the base settings of the equipment can be adjusted.

We recommend a re-calibration every 12 month. This calibration can be done in the C-MAX calibration facility or in an other calibration facility using the calibration standards described in the attached “Calibration Certificate”.

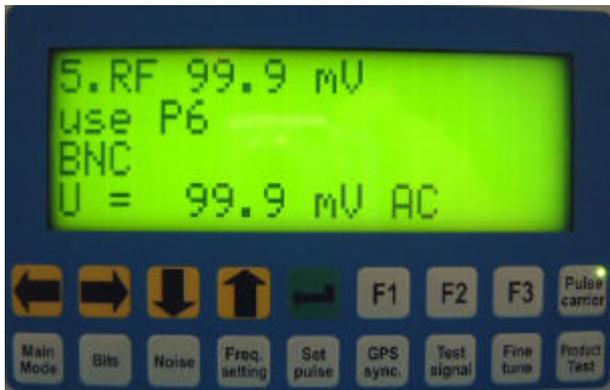
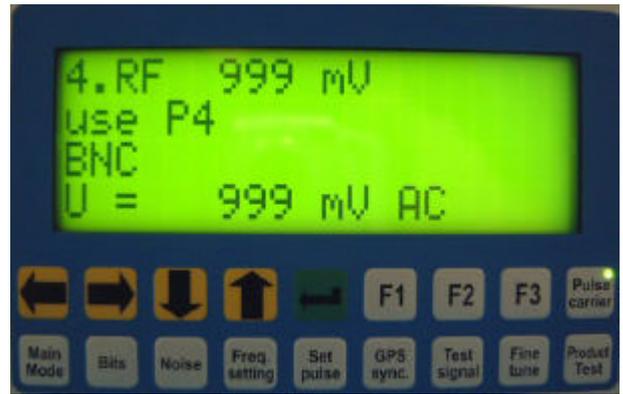
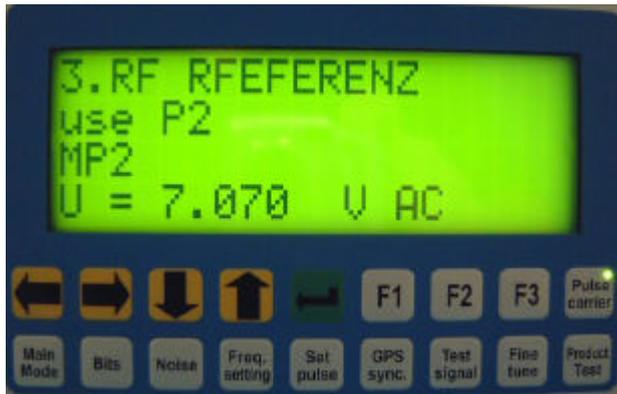
To allow an independent calibration facility to calibrate this unit we have put down the instruction below:



To activate the **HARDWARE CALIBRATION MODE** of the TSG800, the buttons  and **PULSE/CARRIER** must be pushed >2 seconds.

The different settings for calibration can be selected with the  and  buttons. To exit the calibration mode, the TSG800 has to be turned off.





Note: Factory settings are accessible for manufacturer only via password.