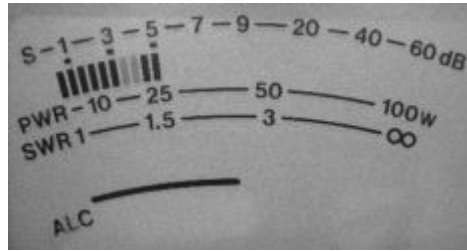


# S-meter in TS-570S

Tests and calibration performed by SP2MKT



I made measurements of my TS-570S, to check S-meter factory calibration. Because results of measurements were unacceptable for me, I've decided to perform S-meter calibration, using procedure from Service Manual.

Tracking generator of HP8593E with "zero span" worked as source of RF signal (CW, 14.100kHz). Signal, has been delivered to TS-570S antenna socket via set of variable attenuators (HP8495A/8494B). It allows to adjust level of signal between -123 and -13 dBm.

To compare calibration results, the same tests were performed before and after calibration:

## • TEST 1

- RF signal from generator, delivered to ANT connector of TS570S.
- level of RF signal changed, from -121dBm (S1) to -13dBm (S9+60dB).
- TS570S S-meter readings were recorded.

## • TEST 2.

- signal delivered to ANT connector of TS570S.
- level of RF signal from generator changed, to obtain specific S-meter reading (S1 to S9+60dB).
- min and max levels of RF signal were recorded for each S-meter point.

## • TEST 3

- signal delivered to ANT connector of TS570S.
- generator and TS570S were tuned to different ham bands
- RF input level (on TS570S ANT socket) was S9 (-73dBm)
- S-meter readings were recorded.

## Before calibration

- S-meter does not show signals bellow S6
- for signals stronger than S6, S-meter had error 6-10dB (1-2S).
- for S9 signal, S-meter had error 1-2S, depending on the frequency.
- **S-meter never shows proper "S" value**

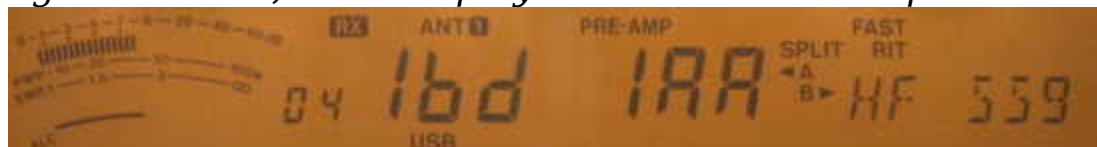
## Calibration

Menu No. 03,04,05 allows to adjust "S1","S9" and "S9+60dB" points.

Service menu is accesible as follows:

- -switch off your TS-570
- -put 13pin plug in ACC2 socket. Pins 9 and 8 of this plug should be connected together
- -hold down "N.R."key, "LSB/USB" key and turn on "POWER" switch on.
- -you should see "ADJUST" info on LCD.
- -remove plug from ACC2 socket
- -select desired Menu,using "MULTI/CH" knob.

During calibration, main display is divided into two parts:



Adjustment data (for specyfic point) is visible on left part of display (here "1bd"),current AGC signal level (depending on received signal)- on right part (here "1AA").

To calibrate point"S9"is necessary to:

- select Menu No.04
- set level of input signal (from generator) to -73dBm (=S9)
- compare values on left and right site of display
- press "UP:" or "DOWN" keys to align both readings to the same value.
- make sure, that now S-meter shows "S9" level.

Similary, "S9+60dB" point can be adjusted using Menu No.05, in this case signal from generator should be set to -13dBm (=S9+60).

Calibration of "S1" point is more problematic. Signal -121dBm (S1) not causes sagnificant changes of AGC voltage. Additionally, AGC voltage changes for weak signals are not linear. There is not possible to obtain precise readings for all signals between S1 and S9. I decided, to align S1 point, to obtain max accuracy for signals higher than S5. In this case, I delivered signal -110dBm from generator, and made calibration of S1 point using Menu No.03.

After calibration, all adjustment data should be saved in the EEPROM by:

- selecting MenuNo.51
- pushing UP (or DOWN) key.
- "ready->run->good" messages should be displayed.

## After calibration

- S-meter is not able to show signals bellow S3.
- S3 signal is visible as S1 (error 12dB)
- S4 signal is visible as S3 (error 6dB)

- **for signals between S5 and S9+60dB S-meter has no errors**

Detailed results results of measurements before and after calibration:

- **TEST 1**

Results:

| <b>GENERATOR signal</b> | <b>TS570S S-meter</b> |            |
|-------------------------|-----------------------|------------|
| level[dBm]/S            | before cal.           | after cal. |
| -121dBm=S1              | 0                     | 0          |
| -115dBm=S2              | 0                     | 0          |
| -109dBm=S3              | 0                     | 1          |
| -103dBm=S4              | 0                     | 3          |
| -97dBm=S5               | 0                     | 5          |
| -91dBm=S6               | 3                     | 6          |
| -85dBm=S7               | 5                     | 7          |
| -79dBm=S8               | 7                     | 8          |
| -73dBm=S9               | 8                     | 9          |
| -63dBm=S9+10dB          | 9                     | 9+10dB     |
| -53dBm=S9+20dB          | 9+10dB                | 9+20dB     |
| -43dBm=S9+30dB          | 9+20dB                | 9+30dB     |
| -33dBm=S9+40dB          | 9+30dB                | 9+40dB     |
| -23dBm=S9+50dB          | 9+40dB                | 9+50dB     |
| -13dBm=S9+60dB          | 9+60dB                | 9+60dB     |

- **TEST 2**

Results:

| <b>TS570S</b>   | <b>SIGNAL-before calibration</b> |           | <b>SIGNAL-after calibration</b> |           |
|-----------------|----------------------------------|-----------|---------------------------------|-----------|
| S-meter reading | level min                        | level max | level min                       | level max |
| 1               | -94dBm                           | -93dBm    | -110dBm                         | -108dBm   |
| 2               | -93dBm                           | -91dBm    | -108dBm                         | -107dBm   |
| 3               | -91dBm                           | -88dBm    | -106dBm                         | -105dBm   |
| 4               | -88dBm                           | -85dBm    | -104dBm                         | -101dBm   |
| 5               | -85dBm                           | -82dBm    | -100dBm                         | -97dBm    |
| 6               | -82dBm                           | -78dBm    | -96dBm                          | -91dBm    |
| 7               | -78dBm                           | -73dBm    | -90dBm                          | -86dBm    |
| 8               | -73dBm                           | -68dBm    | -85dBm                          | -79dBm    |
| 9               | -68dBm                           | -53dBm    | -78dBm                          | -69dBm    |
| 9+10dB          | -53dBm                           | -47dBm    | -68dBm                          | -58dBm    |
| 9+20dB          | -47dBm                           | -37dBm    | -57dBm                          | -45dBm    |
| 9+30dB          | -37dBm                           | -28dBm    | -44dBm                          | -36dBm    |
| 9+40dB          | -28dBm                           | -20dBm    | -35dBm                          | -28dBm    |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 9+50dB | -20dBm | -12dBm | -27dBm | -20dBm |
| 9+60dB | -12dBm | ...    | -20dBm | ...    |

### • TEST 3

Results:

| Generator<br>frequency | TS570S S-meter |           |
|------------------------|----------------|-----------|
|                        | before cal     | after cal |
| 3,600                  | 8              | 8         |
| 7,050                  | 8              | 8         |
| 14,100                 | 8              | 9         |
| 21,100                 | 8              | 8         |
| 28,100                 | 7              | 8         |
| 50,100                 | 7              | 7         |

Remarks:

- During calibration, I used : [S-meter Calibration and Interpretation table](#)
- RF signal values included in TS570 service manual are different.
- My final settings:

Menu No 3. **0E5**

Menu No 4. **160**

Menu No 5. **2E0**

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