COMBOLOOK Color
MANUAL

combolook COLOR

```
      FREQ
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1Picture
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3Span Min
4X-pol
5DiSEqC
6Setup
7Beeper
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9Memory
013/18U
#22KHz
```

emitor

Owner´s Manual

Thank you for purchasing an Emitor-AB **COMBOLOOK** Color instrument.
This manual covers the operation and maintenance of the Emitor AB **COMBOLOOK-**
Color instrument

All information in this publication is based on the latest product information available at the time of printing.
Emitor AB reserves the right to make changes at any time without notice and without incurring any obligation.
No part of this publication may be reproduced without written permission.
This manual should be considered a permanent part of the instrument and should remain with it if it is resold.
If a problem should arise, or if you have any questions about the instrument, consult www.emitor.se, or other authorized dealer.

! NOTICE !
Operating this instrument requires special skills. Please read this Owner's Manual thoroughly before operation.

Contents:
I. Description.
II. Operation.
     A. Unpacking.
     B. Connections.
     C. Potentiometer-knob/Control-button/keypad functions.
     D. Information.

This instrument functions under two specific bandwidths: 2-900 MHz and 920 – 2200MHz

I. Description:

The **COMBOLOOK** Color is a Swedish made SAT-TV/CATV instrument and spectrum-analyzer.
The unit was designed for the exact alignment and adjustment of satellite-dishes, terrestrial antennas, as well as trouble-shooting and quality control of MDU systems layout (including CATV networking).
It is intended for professional use when accuracy and precise information are needed.
Easily operated without a lot of unnecessary buttons and knobs, the basic functions are easy to access and take only minutes to learn.

A 5" 16:9 color LCD –display is provided which shows either normal "Free to air" SAT-TV-channel (analog or digital DVB-S), the frequency spectrum 950-2150 MHz (or parts thereof) alt. Digital data.
Menus/help-displays are shown on the LCD-screen (64x128) beside the monitor.

"Free to air" Digital (DVB-S, QPSK) and Analog SAT-TV channels can be tuned in and viewed upon (Multistandard Video –PAL, NTSC and SECAM).
Audio frequencies between 5.5 – 8.5 MHz may be listened to.
Both analog SAT-TV, and CATV channels can be tuned in and viewed upon.

COMBOLOOK Color presents, under a sub menu, digital information like BER (bit error rate), constellation-diagram (QPSK) and S/N (signal/noise ratio) for both DVB-S and DSS formats.

COMBOLOOK Color can also identify a found satellite and present the satellite-provider with its orbital-position (and in some cases name).
NIT stands for NETWORK INFORMATION TABLE which is part of the DVB-standard that almost all TV-satellites transmit..
The NIT contain information about the Satellite and TV/Radio-channels.

COMBOLOOK Color can very easily <u>identify a Satellite</u> as it can readout the NIT information.

The **COMBOLOOK** Color is capable of working with the return-path signals in Cable-TV networks (5-65 MHz) (according to the EN50083 standard).
The TV-part presents the full range spectrum of 2-900 MHz which can be zoomed to smaller segments of bandwidth (min 13 MHz-span).
Accuracy (presentation of data): ± 1 dB (at +20 C).

Resolution and accuracy in SAT mode: presents measured data ± 2 dB (at around 20 C).
The Sat-TV spectrum can be expanded (zoom in) for correct adjustment of polarization ("cross-polarization").
The SAT- function presents, under "Digital Mode", digital information like BER (bit error rate), constellation-diagram (QPSK) and S/N (signal/noise ratio).

COMBOLOOK Color has 99 memory-positions for spectrum-pictures and frequency/signal data (both analogue and digital transponders).

The **COMBOLOOK** Color is powered by a built- in, rechargeable Li-Ion battery. The battery is recharged from the external battery charger or the car-adaptor.
Battery-status is shown on top of the LCD-display (in shape of a battery).

Very light and flexible; the **COMBOLOOK** Color weighs less than 4kg including the battery and the carrying-case.

Start-up menu on the LCD-display

II. Operation:

A. Unpacking.
Start with unpacking the instrument and check that the following items are included:
1. **COMBOLOOK** Color -instrument.
2. Nylon carrying case with shoulder strap.
3. Power supply 110-230VAC/13.5VDC, center-pin positive.
5. Auto-charger cord 12VDC.
6. Adapter BNC-male/F-female.

The instrument's keypad, control knobs and control-button are shown below. These items control the **COMBOLOOK** Color's functions and modes.

The power-plug is used when charging the battery or running the instrument with the **COMBOLOOK** Color power supply.

RF-input is made via the BNC-connectors and adapter plug which is provided.

The instrument also has a RS232 (computer interface) connector for software revisions and transferring saved signal spectrums to your PC for storage/printing/e-mailing.
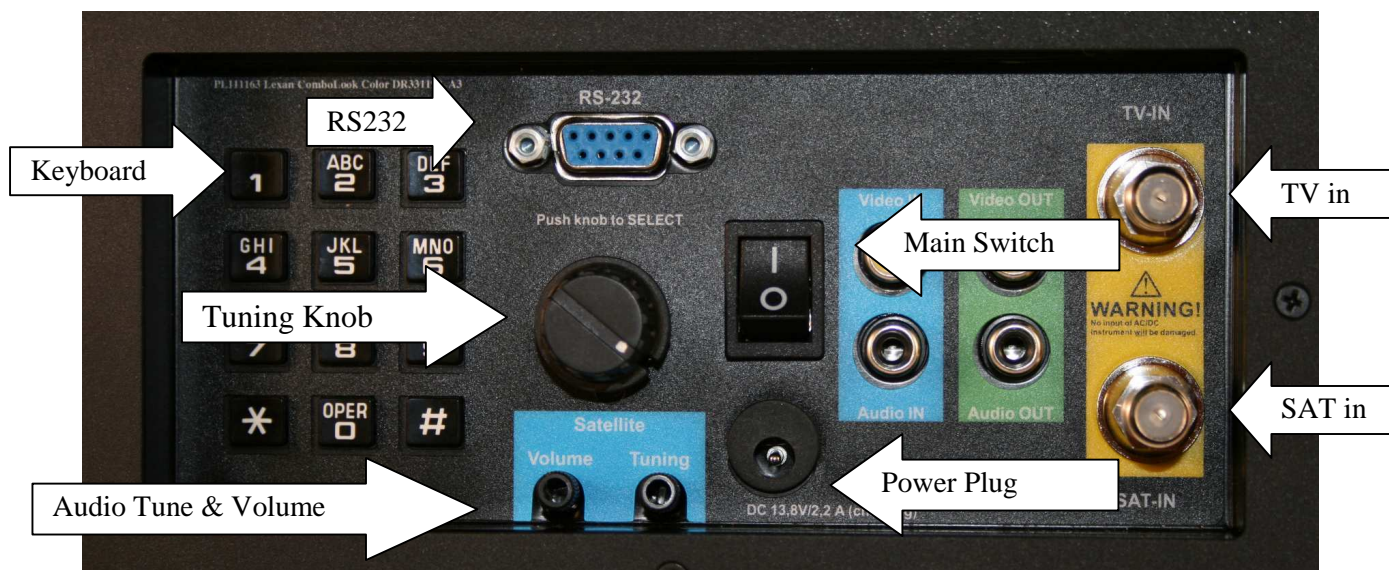
B. Connection and "Power On":
The main switch is used to turn the instrument "On" after connecting a signal-source to one of the two inputs (SAT/TV) via the BNC/ F-connector adapter. After a few seconds to warm-up, the **COMBOLOOK** Color will prompt you for the function you wish to work with (see diagram at top of previous page).

Select the desired function with button # 1, or #2, on the keyboard.
The instrument will display the frequency spectrum of 2-900MHz (TV) or 920-2200 MHz (SAT) on the picture-screen and the main-menu on the LCD-display.

C. Selection of function using the Tuning knob:

SAT/TV Mode:

The **Tuning knob** indexes Frequency/Span (zoom); controlled by the KNOB. The text on the front panel LCD-display (upper row) will change from **FREQ** (frequency) to **SPAN** (frequency-span). Another push and the display returns to the FREQ-mode. Frequency, or amount of "zoom/span", is controlled by rotation of the Knob.

The **Tuning knob** handles a few other important functions, dependent on the Mode of Operation the instrument is currently in:

Spectrum:	Picture-mode:	Digital-mode:
Frequency	Frequency	Frequency
Bandwidth (span)	Memory	Memory

With the **COMBOLOOK** Color in *Frequency-mode*, the cursor-line is moved with the tuning knob. Move the cursor up/down by rotation (clock-wise/counter-clock wise).

D. Information displayed on the screen in the Spectrum Mode:

Cursor position (frequency), the spectrum start-frequency (920 MHz), and ending frequency (2150 MHz), plus total (displayed) bandwidth (1231 MHz) can be read from the monitor.

The most important measured data, the dB-value, is displayed in the middle of the screen (use Button #6 for "Set-Up", then #5 for "Display", to set the "Unit of Measure" the instrument uses for tuning).
Measurement of the tuned frequency is continuous with the presentation (updated a couple of times per second).

note control

Stand by. Not in use

Buttons 0-9.

Go back (previous channel). "$*$" function.

-/---   One or two digits. "$\#$" function

Text   Text-TV function. Not in use.

Mute

'T   Tech.info. Not in use.

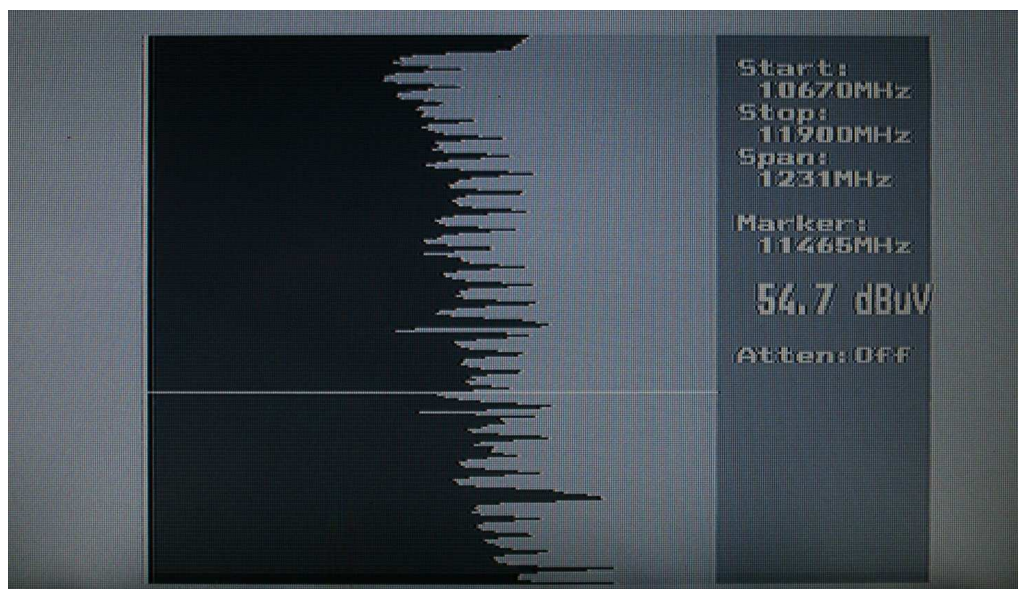Programme info   Not in use.

Volume +/-   Not in use.

P+ P-   Channel +/- Not in use.

III. SATV Functions - MAIN MENU

After the instrument is initially powered "ON", and "SAT/TV function is selected, you will see the following display:

1. Digital Picture ("Free to air").

Start by choosing a specific frequency (digital transponder). A digital transponder is identified and charactarised by the thickness of the signal as the digital transponder is thicker than an analogue transponder. As shown in the picture below there are mainly digital transponders and only a few analogue ones.
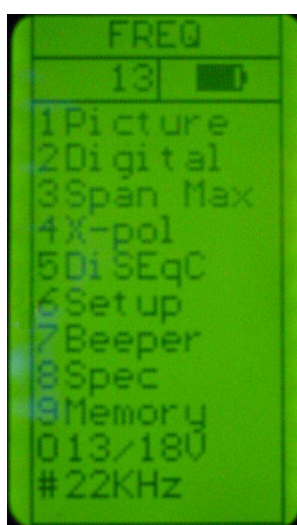
Access the Digital TV-mode by pressing button # 2 (Digital) in the Main Menu.

- The monitor displays, in the left upper corner, the so called, constellationdiagramme (QPSK).

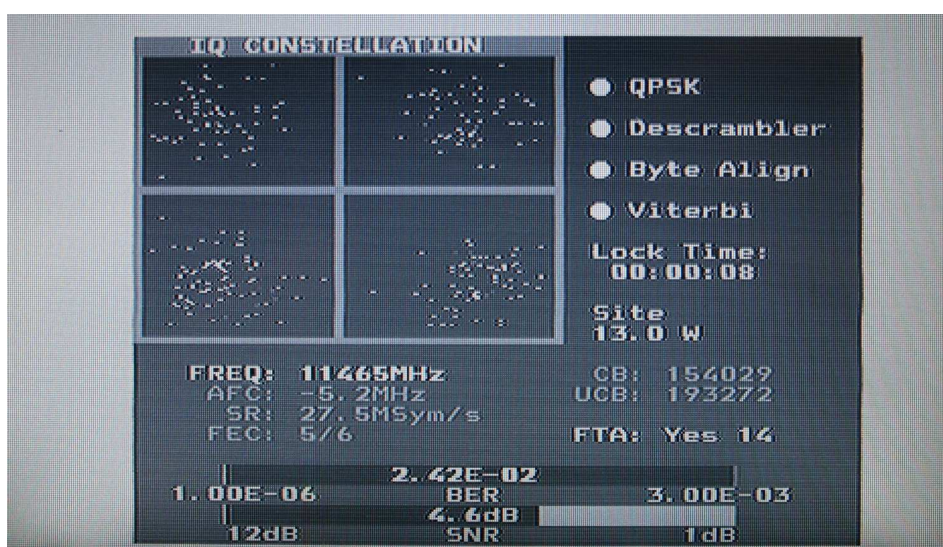- To the right of it, four "lock-parameters" and a time counter (that shows the "lock-time" on a bit-stream") are shown.
  These "lock parameters" should be turned On (become white) and the clock should start counting as soon as a Digital transponder is found.

This example shows that the instrument has locked on Eutelsat 13.0 (Hotbird), 11465 MHz.

Press button nr 4 (Channels) to see what TV and Radio channels there are on the selected transponder.

```
TV:      GlobeCast
         123 SAT
         ARTE
         ARTE
         ARTE-ARTE CHANNEL
         Best of Shopping
         CARISMA-TV
         Cartomanzia LOTTO
         ITALIA CHANNEL
         K+
         Nostradamus
         RTL 102.5 TV
         TV ROMANIA
         TeLepiu Channel
         KBS_WORLD

RADIO:  GlobeCast
         ARTE Radio.com
         Guardia Costeria
         RTL_102-5
         RTL-102:5 CLASSIC
         RTL_102:5 HC
         RTL_102:5_ROCK
```
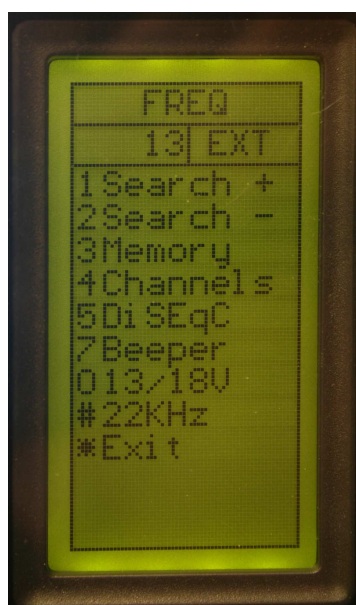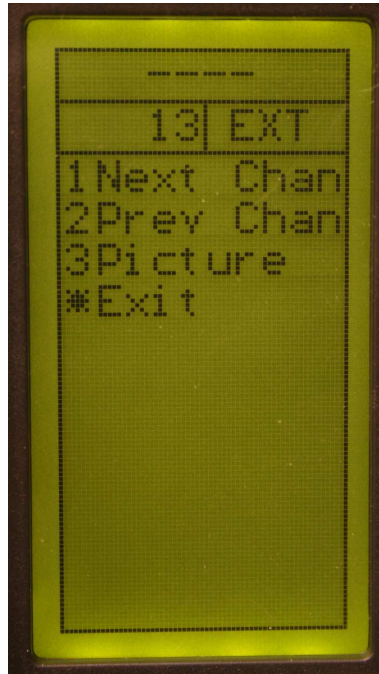
The picture above shows:

- The selected channel -in white.
- Free to air channels – in green.
- Coded channels –in red.

Example:

* Press button nr 3 (Picture) to watch the selected TV-channel
* Press button nr 1 (Next) to see the next "Free to air" channel on the transponder.
* Press button nr 2 (Prev) to go backwards in the channel-list.

2. Analogue picture .

Choose a specific frequency (an analogue transponder in thinner than a digital transponder, see example below), then access the TV-mode by pressing button # 1 or "Picture" in the Main Menu.
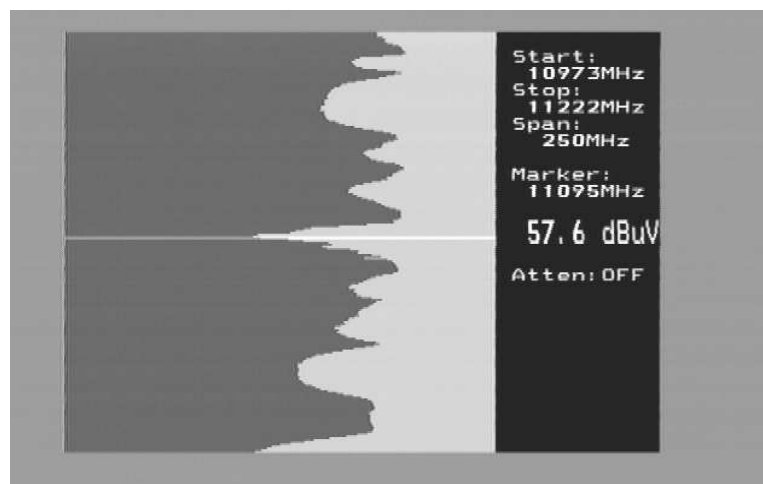
The tuning knob controls the frequency-position in this mode, but the function changes if the knob is pushed. *Remember, the chosen function is displayed at the top of the LCD display; (FREQ is selected in the example above).*

Example:

Measuring a specific frequency can be executed while in "**Picture-Mode**" (dB-value is shown in the LCD-display).

Other functions in the analogue Picture-Mode:

1. **Invert**   Switch between normal video (KU-band) and inverted-video (C-band). Selected position is displayed on the LCD-display.

2. **Sound**   For listening to analog audio: Audio volume and frequency (5.5 – 8.5 MHz) are adjusted with the two small knobs just under the main-knob.

3. **Memory**   For storing the different analog and digital channels (frequencies). *Tune in the "desired" frequency before entering this function (ex. 1720 MHz).*
Enter the Memory function (button # 9) and push "Save" (Button # 1).
You will be prompted: "SAVE, ARE YOU SURE ?"

Check that the Memory position is the desired one (displayed at the right bottom on the LCD-display). If not, choose a new one with the knob (0-99).
Free positions are labeled: "**Pos free**"

After selecting a position; push Button #1 (YES).
Note: the pre-selected 13V/18V, 22 kHz on/off will be saved, also.

<u>TEXT EDITOR</u>:
When the "Save" is selected; "TEXT EDITOR" appears on the monitor allowing you to name the memory-position (e.x: CNN).
Rotate Knob to select the first letter (e.g.: "G"), then push the knob.
Move to the next letter (e.g.: "a"), and so on.
If you mistakenly enter the wrong selection, simply correct by pushing Button #1 (Delete) and the cursor will move one position backward.

4. **Atten**:   <u>Attenuation</u>. Manual attenuation of 15dB on/off.
Selected position is displayed in the LCD-display.

0. **13V/18V**   Selects the voltage supplied to the LNBF for polarity-switching.
Selected voltage is displayed at the top of the LCD-display.

#. **22kHz**   22 kHz tone (for integrated switching components) on/off.
Selected position is displayed at the top of the LCD-display.

3. Digital measurement

COMBOLOOK Color can make accurate measurements of digital transponders (MPEG-streams).
This kind of measuring is handy once alignment is complete, for quality-control and verification that the installation is correct performed (fingerprint of the installation).
It is a less accurate tool for alignment of the dish and cross-polarization fine adjustments.

For dish alignment, begin with finding the desired satellite in the Spectrum Mode.
The "Max zoom in" function may be used for cross-polarization purposes.

* Test the maximum with the **X-pol function** (Button #4 in the main menu). The instrument will measure the strength of the selected peak and then automatically "jump" to the other polarisation and measure there as well (using the same frequency and settings).
The difference (for e.g.: "-7dB") is presented on the right hand side of the display.

Choose a suitable transponder (by moving the *Cursor Line* on top of a transponder's "peak") and select **Digital Mode** with Button #2 on the keypad.

- The monitor displays, in the left-upper-corner, a *Constellations* diagram (QPSK)

that will give the user a reference for the "concentration" of the data-stream.

- Four "lock-parameters" and a time counter (that shows the "lock-time" on a bit-stream") are shown on the right of the CRT display.
  When these "lock parameters" are met, the circles on the left of each will fill-in (become white) and the "Lock Timer" clock will begin countdown (indicating a digital transponder lock has occurred with that particular signal).
  If no lock occurs, or if the signal fades in and out, the signal is either very poor and/or weak.
  Fine-tune adjustment of the dish may be required and/or check the setting of the LNB to improve the signal.

- The other measured data such as S/N-ratio (signal/noise ratio) and BER (Bit Error Rate) are displayed just under the constellation diagram as Bar graphs (thermometer-scales). The higher level, the better the quality of the signal !

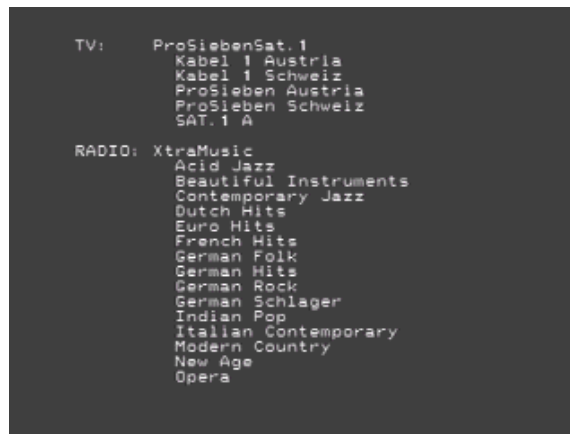### Example of a "Locked" frequency:

The window also displays the following Digital readout:

Freq: The frequency that the meter's tuned to.
AFC: Automatic frequency control -the instrument automatically adjusts the frequency and tells the offset frequency from the center of the carrier.
SR: Symbol Rate of the signal transmission.
FEC: Forward Error Correction.
CB: Corrected Bits –Bits that have been corrected in Viterbi.
The Lower the number; the better.
UCB: Uncorrected Blocks – Blocks unable to be repaired. Value should be zero. Even small numbers of uncorrected block will result in loss of picture (mosaic).

NIT - Network Information Table.

The word "searching" is displayed on right side of the LCD as soon as a digital transponder is locked. After about 5-10 seconds, **if** the satellite is transmitting NIT, the satellite position will appear (and in some cases the satellite name also), for ex Astra 19.2. Pressing button #4 "Channels" will show a list of the present TV- and Radio-channels on that specific transponder/frequency. (See the following diagram)

```
TV:     ProSiebenSat.1
        Kabel 1 Austria
        Kabel 1 Schweiz
        ProSieben Austria
        ProSieben Schweiz
        SAT.1 A

RADIO: XtraMusic
        Acid Jazz
        Beautiful Instruments
        Contemporary Jazz
        Dutch Hits
        Euro Hits
        French Hits
        German Folk
        German Hits
        German Rock
        German Schlager
        Indian Pop
        Italian Contemporary
        Modern Country
        New Age
        Opera
```

Note in **Digital Mode**:

- The constellation diagram is like a "shower of hail". No signal will spread out the noise over the window. The better signal, the more concentrated the "hailstorms" in the windows.
- SNR. The signal/noise ratio should be as high as possible. A good signal should have at least 8.0 dB S/N-ratio.
- BER. The Bit Error Rate should be as low as possible.
  As the values are really small, on the other side of zero (presented as something raised to minus something), they should be as high as possible.
  A BER at 5.00 –05 is therefore better than 9.00 –04.
  A BER at 4.00 –05 is therefore better than 5.00 –05.
  It can be said, in general, that a signal should be at least x.xx –04 to be accepted.

Other Digital functions:

1. **Search +**   Automatically search for the next digital transponder **higher** in frequency. "Searching" is displayed on the screen.

2. **Search –**   Automatically search for the next digital transponder **lower** in frequency. Again, "Searching" is displayed on the screen.

3. **Memory**   For storing **digital transponders** (digital channels - frequencies). **Tune in the "right" frequency before entering this function (ex. 1650 MHz).**
   Enter the **Memory** function (button #9) and push Save button #1).
   The instrument asks: -"SAVE. ARE YOU SURE ?"
   Check that the Memory position is the right one (displayed at the right bottom on the monitor). If not, chose a new one with the knob (0-99). Free positions are named: Pos free

   After selecting a position, push button nr 1 (YES).
   Notice that even the pre-selected 13V/18V, 22 kHz on/off will be memorized.

   - Load a memory-position by pushing the control-button – "Memory" will appear on top of the LCD and a memory-position will be shown in the bottom of the LCD-display. Step between the stored memory-positions with the knob.

<u>**Text-editor**</u>:
When the channel (frequency) is saved, the Text-editor appears on the monitor which makes it possible to enter a name for that memory-position (ex. Digital).
Use the knob to select the first letter (ex. D) and save it with the control-button. Move to the next letter (ex. i) and so on.
If a mistake is made and a wrong letter is saved, simply correct by pushing button # 1 (Delete) and the cursor will move one position backward.

4. **Channels**   Shows a list of the present TV- and Radio-channels on a certain transponder/frequency (if the satellite is transmitting NIT).

5. **DiSEqC**   Choose between the different DiSEqC commands by using the buttons on the side of the instrument.
<u>Submenu</u> 7 (SWx) shows the extended DiSEqC-commands (DiSEqC 1.1). <u>Submenu</u> 8 (Motor) shows the command-list for DiSEqC actuator-control (DiSEqC 1.2). Even 13/18V and 22 kHz can be adjusted under the DiSEqC-menu.

7. **Beeper**   The instrument utilizes the "beeper"-function to help finding the max-strength signal. It works with a variable-pitched tone that gets higher as the quality of the signal improves.
The beeper (ON/OFF) is controlled with button # 7.

0. **13/18V**   Selection of 13V, or 18V. Selected position is displayed at the top of the LCD-display.

#. **22kHz**   22 kHz tone (ON/OFF). Selected position is displayed at the top of the LCD-display.

4. Full spectrum -"Max zoom in" - Span Min /Span Max.

This function makes it easy to index between the full spectrum (920-2150 MHz) and "Maximum zoom" (250 MHz bandwidth).
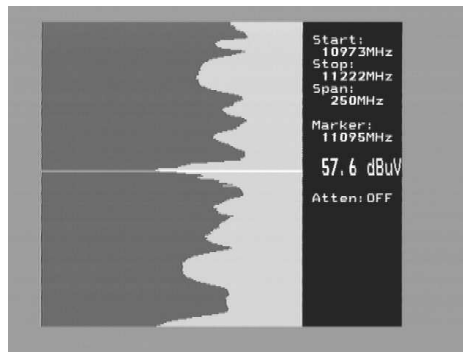The "Max zoom in"-function is useful when adjusting for cross-polarization.
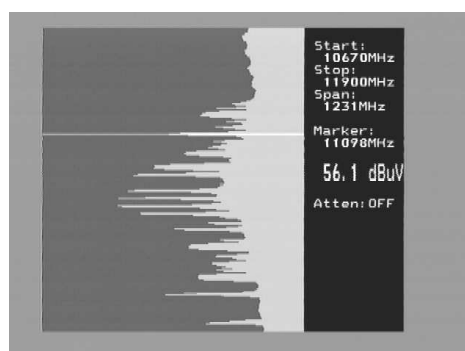
- Move the cursor to any desired frequency (peak).

Push the # 3 button (**Span Min**) on the keyboard.
The instrument "zooms in" to maximum for viewing the selected frequency (Span Min = 250 MHz bandwidth).

Rotate the LNB so that either the **Horizontal** or **Vertical** polarization will be in its maximum-position – adjusting the **cross-polarization**.
Pressing the # 3 button again (span Max), takes you back to "Max zoom out".

5. X-pol: Test the maximum Cross-polarization setting with the **X-pol f=Function**.
The instrument will measure the strength of the selected peak and then automatically "jump" to the other polarity and measure it as well (same frequency and settings).
The difference (for ex. -7dB) is presented on the right hand side of the display.
This function is useful for checking the correct setting of the LNB cross-polarization.

6. DiSEqC (Chooses DiSEqC command with the keypad).
<u>Submenu</u> 7 (SWx) shows the extended DiSEqC 1.1 commands.
<u>Submenu</u> 8 (Motor) shows the DiSEqC actuator-control commands (DiSEqC 1.2).
Even 13/18V and 22 kHz on/off can be adjusted in this mode.

7. Setup (Basic-operation setup):
1. **LNB LO.**: Select the LNB L.O. (Local Oscillator) for showing the correct LNB frequency.
   Default setting is button # 9 (IF).
2. **Analog**. Choose between Normal (KU-band) - Inverted (C-band) video.
3. **Motor**. Choose the type of actuator to be used; standard DiSEqC 1.2, SatSelect or SATSCAN.
4. **Display**. Submenu **units**: Select dB-presentation: dbuV, dbm or dBmV.
   Under submenu **LCD** can contrast (level) and Backlight (on/off) be set.
5. **AutoOff**. Choose between automatic turn-off alternatives (timer).
6. **Version**. Instrument data: serial number/software/Mfg. date.
7. **Keyclick**. On or off. Audible tone when buttons are depressed.

8. Beeper: The instruments variable-pitched tone/ "beeper"- (signal strength) #7
Notice that the function works with a narrow bandwidth (one transponder) and not with the full bandwidth.   To use this function: put the cursor on top of a selected"peak" and align the dish.

9. Spec: Special-functions. Select with button # 8 in the Main Menu.

1. Max hold

The "Max hold" may be used when you're observing certain frequency-ranges for changes. This will allow you to see how/if temporary signals/disturbances are affecting the picture quality.

Adjust the frequency-bandwidth (see **Function 3**) and put the cursor on the desired frequency (peak). Choose button # 1 for the "**Max hold**"-function. The instrument starts to sample all top-values in the shown bandwidth and only updates the presentation if there's any new measured data with higher dB-values than the previous measurement.

Turn off the function by pressing the button # 1 again (No hold).

Measured data may be stored. *Read more about the Memory-function under section 4 below.*
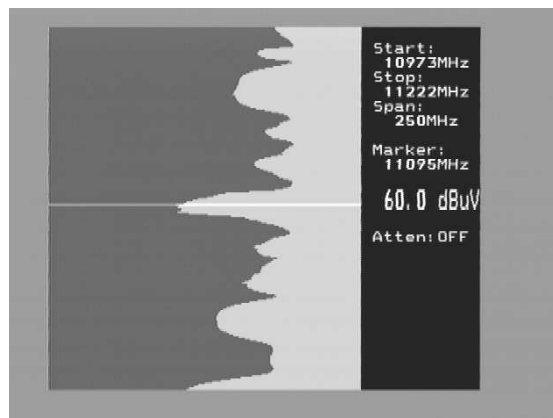
2 Reference cursor and Signal-to-Noise-Ratio.

The **COMBOLOOK** Color is capable of measuring the Signal-to-Noise Ratio; as well as the Picture-carrier/audio-carrier ratio.

To Set-up the desired signal for measurement:

* Select function #2 **Refmrkr**
* Tune in the desired frequency with the cursor (so it stands on top of the transponder "peak").
* Push button # 1 (Ref set) and a new cursor will appear on top of the first.
* Turn the knob and place the cursor on another carrier or on the noise-floor.
* The relation between cursor # 1 and cursor # 2 is presented in the lower right hand corner of the viewing monitor.

Note that 13/18V and 22 kHz on/off may be adjusted while in this mode with the "0" and "#" buttons.

3. Span Min – Span Max

This function is covered under the "Main Menu" section 3 above.

Push button # 3 (**Span Min**) on the keypad.
The instrument zooms in for maximum viewing of the selected frequency (Span Min = 250 MHz bandwidth).

Another push of # 3 button (**Span Max**) indexes the view back to "Max zoom out".

4. Memory

Memory Positions. Same function as described under **Main Menu** in section 9, (below).

5. Multi-channel

Channels (frequencies) that have been memorized under Main Menu (section 1 and 2) are displayed and measured together with this function. Up to 10 channels may be measured simultaneously.

Note that all the channels have individualized set-up of the following: 13/18V and 22 kHz on/off.

Multi-channel is useful for "scanning" a satellite signal, in order to ensure all parameters are right/max values received on both V/H and low/high.

Pg down   To step down the pages. 10 pages with 10 frequencies per pagemay be stored (10 analog + 10 digital = 200 frequencies).

Pg down   To step up the pages.

Max hold   "Locks" the dB-values and will only change when higher values are received.
Turn off the function by pressing the button again (no hold).

6. Attenuator:

Attenuation of 15dB. manual on/off with button # 6.
Selected position will be displayed at the right hand side of the monitor.

0. 13/18V:

Sets the LNB voltage to 13V/18V. Selected voltage is displayed in the upper-left of the LCD-display.

#. 22 kHz

Selection of 22 kHz tone ON/OFF for switching mechanisms. The selected mode is displayed in the upper-left of the LCD-display.

10. Memory - Storing Spectrum-Pictures.

All spectrum-pictures may be stored in the **COMBOLOOK** Color
This is useful for documentation and use in the future for recognition; or identification of a specific signal, through characteristic spectrum display.
The Mix-function helps in identifying and "finding the way back" to already known (and previously stored) satellites.
The function places a previously saved spectrum on top of the current spectrum.
When the "right" satellite is found it will be like "fitting a hand to a glove"

To store measured-data:

* Choose the spectrum to store (i.e. exactly as displayed on the monitor) and push button # 9 in the Main Menu (Memory).
* Select "Save" button # 2.
* The instrument asks: -"SAVE. ARE YOU SURE ?"
* Check that the memory position (Mem Pos) is the right one (shown in lower-right of the monitor).
   If not, choose another one with the main-knob (Pos free: 00-99).
* Having selected a position, press button # 1 (YES).
* Notice that the setup of 13V/18V, 22 kHz on/off will be stored as well.

   Text-editor:
   When the spectrum is saved, the Text-editor appears on the monitor making it possible to enter a name for that memory-position (ex. ASTRA 1D).
   Use the knob to select the first letter (ex. A) and save it with the control-button. Move to the next letter (ex. S) and so on.
   To correct an entry; simply push button # 1 (Delete) and the cursor will index one position backward.

To collect a stored spectrum:

* Select "Memory"-function with button # 9 in the Main Menu.
* Select the spectrum you wish to load (use the main-knob: pos 00-99 displayed down to the right in the monitor).
* Load the spectrum to the monitor with button # 1.

   Notice that the function **Reference cursor,** Ref mrkr, is enabled when a stored spectrum is loaded.

To mix a stored spectrum with an ongoing measurement:

* Select "Memory"-function with button # 9 in the Main Menu.
* Select the spectrum you wish to load (use the main-knob: pos 00-99 displayed down to the right in the monitor).
* Mix the spectrum with the ongoing measurement using button # 4.

- Turn off the Mix-memory by pushing the # 4 button again.

IV. TV-functions (CATV) – Main Menu

The tuning knob handles a few important functions (*only controlled by this button and not via the LCD's menu system*). It is important to familiarize yourself with these functions:
The functions of the knob (**when in TV-mode**):

Spectrum:	Picture-mode:	Ceefax (text-TV):
Frequency	Frequency	Page
Bandwidth(span)	Channel	
Attenuation	Favourite	

When the **COMBOLOOK Color** is in **Frequency-mode**, the cursor is controlled by the knob. Move the cursor up/down by turning the knob left/right.

The **cursor position** (frequency), the spectrum **start-frequency** (2.00 MHz), the spectrum **stop frequency** (902 MHz) and **bandwidth** (900.00 MHz) is displayed on the monitor screen.
The dB attenuation value is shown with actual value (ATT:).
VBW and **RBW** stands for **Video-Bandwidth** and **Resolution-Bandwidth** of which will be detailed later in this manual.
Perhaps the most important information, **dB-values**, are shown in the middle of the info-panel portion of the monitor's display.
Measurements of frequencies are continuously updated a couple of times per second.

A. Full spectrum, Span 13, Center and SPAN

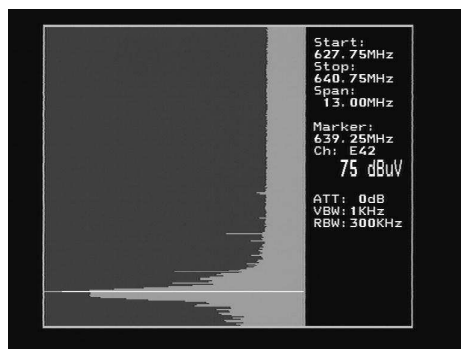- Tune by moving the cursor to any signal-peak.
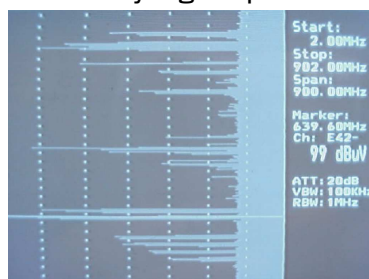
- Push the # 3 button (**Span 13**) on the keypad.
The instrument will "zoom in" for a maximum viewing of the selected frequency (13 MHz bandwidth)
Use the *-button (exit) to index back in the menu-system.

- Tune to any signal-peak and push button # 5 (**Center**).
  The instrument will center the cursor position on the selected frequency.

- Push button # 3 (**Span 900**) to index back to the original (**full**) bandwidth.

- While in **Spectrum-mode**, you may always adjust the bandwidth with the "**Span**" function. *Use the control-button and index to the "Span"-mode.* Adjust the bandwidth by turning the knob left/right.
  This "*zoom-in*" is measured from the cursor position; and the bandwidth is reduced from the opposing ends. Maximum "zoom-in" (most narrow bandwidth) is 13 MHz and full bandwidth is 900 MHz.

B. Max hold

Max hold is useful for monitoring a certain frequency-range for changes. You may see how/if temporary signals/disturbances can affect a network's quality.

- Adjust the frequency-bandwidth (see above "**Span**") and place the cursor on the desired frequency (peak). Depress button # 6 for the "**Max hold**"-function. The instrument will begin to sample all top-values in the displayed bandwidth and will only update the presentation should any new data, with higher dB-values than the previous measurement, present.


All measured data may be memorized and transferred to a computer. More on this function will be covered later in this manual (and in the attached **COMBOLOOK** Color - software manual).

C. Reference cursor and Signal-to-Noise Ratio.

The COMBOLOOK Color is capable of performing measurements of the Signal/Noise/ Picture-Carrier/Audio-Carrier ratio.

To perform these measurements:
- Put the cursor on any signal carrier and "zoom in" with the "**Span 13**" button (button # 3).
- Push button # 7, reference cursor (**ref mrkr**).
- Tune in the "right" frequency with the cursor (so it stands on the "top" of the signal to measure on).
  Push button # 1 (**Ref set**) and a new cursor appears on top of the earlier.
  Turn the knob and place the cursor on another carrier (signal peak), or on the *noise-floor*.

- The relation between cursor # 1 and cursor # 2 is presented in the lower right hand corner of the picture-screen.
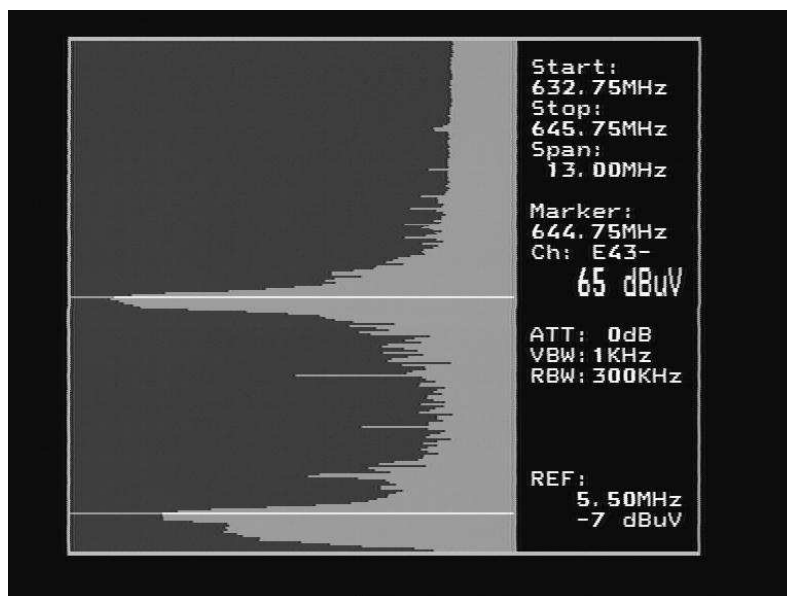
D. Digital measururing:

The **COMBOLOOK** Color will also measure the digital output-level (in dB) of digital transponders (such as in digital terrestrial transmissions).
Simply input the start and stop frequencies of the transponder to measure on *(digital transponders are normally 8 MHz wide)* and the **COMBOLOOK** Color presents the measured and corrected value (in dBuV) in the lower right-hand corner of the monitor's screen.

To measure a digital transponder's output signal level:
- Place the cursor on the digital signal and "zoom in" with the "**Span 13**" button (button # 3).
- If needed, increase the displayed bandwidth with the "**Span**"-function.
- Push button # 0, Digital.

- Tune to the start frequency with the cursor (so the cursor stands in the beginning of the signal/transponder peak).
- Push button #1 (**Set strt**) and a new (second) cursor appears on top of the earlier.
- Turn the knob and place the new (second) cursor at the end of the carrier (stop frequency).
- The measured result (and the adjusted bandwidth –BW) is displayed in the lower right hand corner of the monitor's screen.
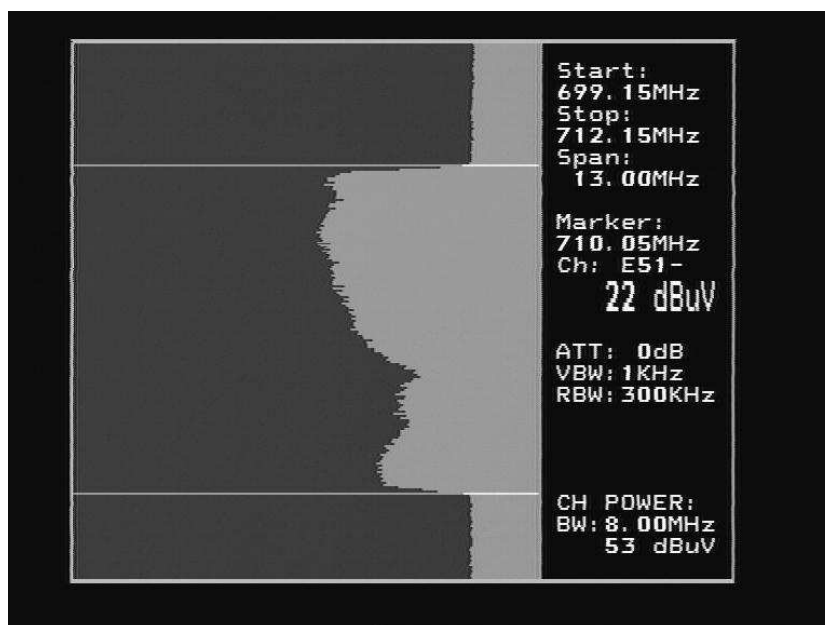
The above example illustrates some components of a digital signal that differentiate it from analog signals:

- *Note the bandwidth displayed in the lower-right corner (BW: 8.00 MHz). "Digital" signals usually have a bandwidth of 8 MHz; or 4 MHz.*
- *Also, note the (3) distinct "humps", or "peaks" of the signal. The larger one will be the "video carrier"; the next smaller one is the "color carrier"; and the smallest represents the "audio carrier".*

E. Memory Function:

All displayed spectrums may be saved to one of the 99 memory positions in the **COMBOLOOK** Color. This can be a useful tool for new installations, service and maintenance work may now be documented.

Later on, the *memory-position* may be easily transferred to a standard PC (with help of the attached PC-software) and even printed out on the PC´s printer.

To save measurement data:
* Tune to a desired spectrum and push button # 9 in the *Main Menu* (**Memory**).
* Push button # 1 for "Spectrum" (or button # 2 for "**User span**". (detailed in another section of this manual).
* Select the *Memory-Position* desired (00-99). The position (number) is shown in the lower, right-hand corner of the monitor's display screen, and index to other positions by turning the knob.
* Push the "Save"-button (button # 1) and the selected spectrum/data will be saved to the designated Memory Position (*make a "mental note" of the position's number!*)

To load previously saved data:

* Choose "**Memory**", button # 9 in the *Main-Menu*.
* Next, select "**Spectrum**" button # 1.
* Locate the *Memory-position* of the desired signal you wish to retrieve, by turning the knob.
   The number of the desired position will be displayed in the lower-right-hand corner of the monitor's screen.
* Push the "**Load**"-button (button # 2) and the previously saved spectrum display is presented on the monitor's screen.
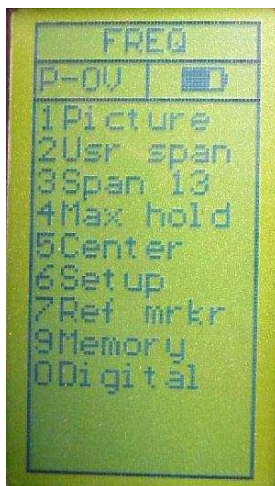
F. Picture, TV, CEEFAX (Text-TV).

After tuning to the desired TV-carrier signal; you may easily access the *picture-mode* by selection of "**Picture**" with button # 1 in the *Main-Menu*).

The large (potentiometer) knob controls *frequency tuning,* but mode of functioning may be changed for controlling/adjustment of: "**Channel**", "**Favourite**" (for "*Favorite-channels*"), or "**Volume**" (and then back to **Freq**, for "*Frequency*").

The "**Control Button**" is used to index between the various "modes of operation" (above), while using the large potentiometer knob for the tuning/adjustment of each of the individual modes. (see the illustration/description of the unit's control panel earlier in this manual).

Measurements of a TV-channel are normally performed while in the **"Picture-mode"** (*Picture and dB-level is shown at the same time*). A more thorough check of the picture quality can be done in the **TV- mode** (*see TV-menu below*) as the presented video will not be disturbed by the measuring filter in that mode.

 Access "**TV-mode**" by selection of button # 1.

The LCD screen also display the "TV-mode sub-menus".
Select "**Text-TV" (CEEFAX)** with button # 1.

- If the selected TV-channel is transmitting **Text**-**TV (CEEFAX**); it will now be displayed on the monitor's screen.
  Index the page, between 100-899, by turning the knob.
  The Video (picture) **and** Text-TV (CEEFAX) may be mixed with button # 2.
  Hidden text may be displayed using button # 1 (for "**Reveal**").

G. Attenuation Mode – "Automatic" and "Manual":

The **COMBOLOOK** Color normally utilizes *automatic attenuation* when in **TV-mode** (*the signal is always attenuated manually in* **Spectrum-Mode**).
This ensures accuracy in measurements by reducing any potential device conflict in.
However, certain circumstances, may justify manual attenuation in order to view/measure certain carriers.

To access the "Manual Attenuation" functioning:
In "**Spectrum-Mode**", press the **control-button** until "**Atten**" is displayed at the top of the LCD-display. Select the suitable attenuation-value by turning the large knob left/right for lower/higher value (the *Attenuation Value is displayed in the center of the info-window on the monitor's screen*).
While in **Picture**- and **TV- mode**; push button # 4 "**Man att**" (for manual attenuation), then select suitable attenuation-values (displayed) with the large knob in the LCD.

To return to "Automatic Attenuation":
While in **Picture/TV-mode**, use button # 4 for "**Auto att**".

H. Audio Mode:

This version of the **COMBOLOOK** Color is compatible for functioning with the three most common TV-sound systems in Europe (*tune in the distance between the picture-carrier and sound carrier)*. The selection is made under the sub-menu option of "**Sound**" in the **TV-Menu**.

Select (using button # 1 thru 3) any of the following three versions:

• **Beeper**:
For use when situations inhibit viewing of the signal level on the meter's display. The **COMBOLOOK** Color's "beeper"-function aids in antenna alignment by utilizing a variable-pitched tone (also has a "volume" setting) that increases in pitch as the signal strength increases.
This function may also be accessed via "**Sound**" in the *Main-Menu* by pressing button # 3 for "**beeper**".
The beeper is turned Off by selecting "Beep off" with button # 2.

I. External Video/Audio.

External Video and Audio signals may be used with the COMBOLOOK (for ex. TV-signals from a head-end).
This is made by first connecting the Video/Audio signals via the RCA-type connections on the side of the instrument.
The function is accessed by choosing "**Picture**" in the "*Main-Menu*" and then by pressing button # 6 for "**Ext A/V**" (and button # 2).

J. Favorite Channels.

Thanks to the instrument's powerful processor, it can easily memorize and measure data on (up to) 100 favourite channels (for ease in selection of channels).

Programming of Favorite-Channels:
* In "**Spectrum Mode**"; place the cursor on the desired frequency for programming (ex. 125 MHz).
* Choose "**Picture**" (button # 1).
* Next; choose "**Memory**" (button # 5).
* Then select a suitable *memory position* (00-99) for placement of this frequency
 (using the large potentiometer knob).
  The Memory Position will be displayed at the bottom at the LCD-display (e.g.: "Pos free", or "Pos 1"), along with data indicating if the selected position is currently "used", or "free".
* Repeat the procedure for additional signal information storage.
 The channels are permanently stored in the **COMBOLOOK** Color
 (until the user is prompted for confirmation of the deletion function).

Measurements on Favorite-Channels:
Measurements of the "Favourite-Channels" are easily carried out once they have been programmed. **These are perfomed while in "Picture-Mode":**
First, choose "**Favorite** " with the *control-button* ("*Favourite*" is displayed at the top of the LCD-display).

The Favorite-Channels are displayed in sequential-order, on the monitor's screen; Indexed by turning the large knob.

K. User Span (individual setup of frequency-bands).

The **COMBOLOOK** Color (TV Component) initally powers "ON" with the display showing the entire frequency range of 2 – 900 MHz.

In many cases, however, only certain areas of this bandwidth are really needed in order to complete a specific task.

The **COMBOLOOK** Color is capable of set-up and operation within a user specified set of parameters (e.g.: "return path"; "UHF only"; "FM Only"; etc.). This unique feature allows an installer to individualze a specific Set-Up for a specific job, or objective.

To program the meter to only "view" a user-defined portion of bandwidth:
* Choose a frequency-band to program (e.g.: 5 - 65 MHz) and position the cursor in the approximate median/center of that area (approx.imately 31 MHz).

* Using the **control-button**; index to the **"SPAN"** function ("Span" will be displayed at the top of the LCD screen). Reduce the "view-window" of the spectrum by turning the knob so that only the desired bandwidth is visible on the monitor's screen.

Note: It may take a bit of effort (indexing between the "Freq" and "Span" modes) in order to obtain the "exact" bandwidth; but remember this will be saved to memory and there's no need to touch it again, until it's deleted!

* When the desired Bandwidth is tuned in, press the "**Memory**"-button (# 9).
* Press button # 2 for "**User span**" and then, "**Save**" (button # 1).
* Determine the *memory-position* this programmed bandwidth should have (as well as an identifying name/number). The desired bandwidth will be programmed to a specific location in the LCD-display.

- Repeat the above steps to memorize more than one set of frequency-bands (up to 8 bands).

To Open and operate within a "User Defined Span":
* Select "**User span**" in the *Main-Menu* (button # 2).
* Choose from any of the programmed frequency-bands that may be listed.

L. Set (Personal Set-up):

The **COMBOLOOK** Color may be set-up to individually-defined parameters for specific measurements.
This kind of set-up is performed under the menu (# 6) "**SET**" in the *Main-Menu*.

The following parameters may be defined and adjusted:

Button # 1: "Vid BW" (Video Bandwidth filter):
The *Video filter* is placed *after* the measuring chip-set in the instrument, and is used in conjunction with various resolutions within a specified bandwidth.
The resolution of details on a *signal-carrier* is progressively refined in relation to the narrowing of a filter (*sweep-time is increased*).
The different **Video filters** are: **auto-mode** (*default*), **100 kHz, 10 kHz, 1 kHz or 100 Hz.**

Button # 2: "Res BW" (Resolution Bandwidth):
The resolution bandwidth shows the incoming signal *before* the measuring chip-set in the instrument. Choose between the *narrow 300 kHz* or the *wider 1 MHz* resolution. The instrument is normally working in the "**auto**" mode.

Button # 3: "P-insert" (Power Insert):
This function is used for powering external, active accessories (*such as antenna amplifiers*) which require a power-source in order to operate.
The output voltage may be adjusted between 12 - 24 volt DC and is connected via the BNC-connector.

The **selected output voltage** is *always* visible in upper-left-hand of the LCD-display (next to the battery-symbol).
The default setting of "**P – insert**" is "**Off**" (0 volt).
Warning ! *Mis-use of this function may cause irreparable damage to all connected equipment not intended to accept/receive voltage!!!!*

Button # 4: Set up, with sub-menu:
Button # 1: LCD –Contrast and "Backlite" On/Off can be adjusted.
Button # 2: Screen-saver On/Off. Default setting is On.
Button # 3: Display and **Sub-menu 1, S-cursor** (*Scan-cursor*). Indicates how quickly the instrument "scans" a certain frequency range. *Default setting is Off.*
Sub-menu 2; Grat. (*grating*) shows a grating-net which may make the read-out easier to view, under some circumstances. Default setting is **Off.**
Sub-menu 3; Units, choose between the signal-level values/readouts of dBuV, dBm or dBmV
Sub-menu 4; TV level, the level which the *automatic attenuation* uses for the video-presentation (*should be between 53-63 dB*).
Button # 4: Version. Specific manufacturing info/data concerning this instrument's serial number, date of manufacturing, software-version etc.
Button # 5: CH-Table. Choose between different channel-plans.

<u>Button # 5: FM/AM mrkr:</u>
>Choose between FM or AM marker.
>**FM** = Normal spectrum measuring.
>**AM** = Peak spectrum-measuring (preferable when measuring TV-signals due to the speed at which calculations are processed.

<u>Button # 6: "SAT/TV":</u>
>Option available for setting the unit up to start-up either in "**SAT**" or "**TV**" mode; or user prompted at every power "On".

V. Maintenance.

The instrument is equipped with a rechargeable battery and it is important that the battery is maintained.
Recharging should be done with the, enclosed car-adaptor or external power supply of 220v/13.5v DC, center-pin +.

Note: The instrument may be operated, for short periods of time, by the external power supply. However, the COMBOLOOK Color **is not made for permanent operation. Contact your dealer for more information.**

Adjustments for **vertical hold**, **brightness** and **contrast** are located under the instrument.
Contact your dealer for proper adjustments.

The battery needs recharging when the battery-symbol at the top of the LCD-display is empty.

Remember that a cold battery has much lower capacity than a warm one and powering "cold" hardware is an additional strain/current load.

The **COMBOLOOK** Color is designed for outside under average conditions, but it should not be exposed to rain, moisture, or snow as this can damage or shorten the life-span of the instrument.

Checking/charging the battery.

As the instrument has been stored for some time before shipment/delivery; it is important to check the battery-condition. To do this turn the main switch "On".

When start is cycled; the instrument, the monitor, and LCD-display will turn "On".
There's a battery symbol at the top of the LCD-display that shows the status of the battery. All black means that the battery is fully-charged. If the symbol is empty; it means that the battery is empty, also.
Should the battery need recharging, use the power-supply supplied with the instrument.
A thermometer-scale (0-100%) will light on the LCD-display as the recharging process begins.
The instrument should be turned "Off" prior to re-charging.
Recharging from a fully discharged battery to approximately 98% capacity takes an average of 30 hours.
When the battery-level indicator shows fully-recharged, the **COMBOLOOK** is ready for use.

PC-software.

With this **COMBOLOOK** Color is PC-software (on CD) which makes it easy to transfer the earlier saved memory-positions from the **COMBOLOOK** Color to a PC.

The software also makes it simple to transfer the data to other programs (such as **MicroSoft Word**) and additional information (like addresses, time-date etc.).

Print-outs may be done from a standard PC-printer.

Manual for the software is attached with the CD, or may be downloaded from the manufacturer's website at www.emitor.se

For additional technical assistance in the operation of this meter, e-mail: support@emitor.se

COMBOLOOK Color Technical specification.

Input frequency:	5-900 Mhz and 920-2150MHz.
Sat-TV min level in:	About 35 dBuV (noise).
Sat-TV max level in:	About 90 dBuV.
CATV max input level, picture:	110 dByV.
Spectrum:	120 dByV.
Sat-TV attenuation:	15 dB attenuator on/off.
CATV attenuation:	45 dB in 1 dB step.
Display of signal level (analog):	dB on LCD/monitor. Pitch-tone.
Sat-TV accuracy:	±2 dB (at +20 C)
CATV accuracy:	±1dB (at +20 C)
CATV resolution bandwidth:	1 MHz or 300 kHz.
CATV video bandwidth:	100, 10 ,1 kHz or 100Hz
Sat-TV Digital display of signal level:	S/N (signal/noise-ratio) BER (bit error rate) Constellation (QPSK)
Satellite-identification:	**Yes, by reading out the NIT in the Bit stream. Info about the TV and Radio channels.**
TV standard:	Multi TV/ (PAL, NTSC, SECAM).
CATV text-TV (CEEFAX):	Yes.
KU- C-band:	Yes, selectable.
Input impedance:	75 Ohm, F-con.
Picture-screen:	5" 16:9 TFT color display.
Menus:	On LCD 64x128.
Memory:	Lots of spectrum pictures can be stored with name. Stored spectrum can be mixed for easy identification of satellite. -"Maxhold"-function.
Favorite channels	Both analog and digital frequencies can be stored (with name).
PC-connection:	RS232-output and PC-software.
Sat-TV power out:	Yes, 13-18V.
CATV power out:	On/off. 15-24 volt.
Sat-TV control:	22 kHz, DiSEqC, DiSEqC/SatScan/ SatSelect-positioner.
DiSEqC	Yes, all 1.0 and 1.1. Also Toneburst on/off.
DiSEqC actuator:	Built in positioner for DiSEqC 1.2, SatScan and SatSelect.
Battery:	Li-Ion, rechargable 12v, 3.5 amp/tim.
Weight:	About 4 kg incl.battery.
Accessories:	Nylon carrying-case. Power-supply of 220v/13.5v, 1.7amp. Car-charger, F/IEC-adapters.

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