

Waveform Monitor/Vectorscope, PM 5661

Waveform Monitor/Vectorscope, Sc-H, PM 5661/70



- Two instruments combined in one unit
- PM 5661/70 features Sc-H phase display
- Input Signal Subtraction (A-B) for easy check / alignment of colour framing correction
- All lines (525/625) selectable from front panel
- Front panel probe input for Quick Fault-finding
- Familiar control panels for fast, easy use

The two-in-one combination instruments, the PM 5661G/00 Waveform Monitor/Vectorscope and PM 5661G/70 Waveform Monitor/Vectorscope with Sc-H phase display, deliver all essential waveform monitor and vectorscope capabilities.

The units' compact size - only a half-rack wide - makes these combination instruments ideal for applications with limited space and restricted power. The PM 5661G/00 and PM 5661G/70 contain the wide range of measuring facilities required in TV broadcast studios, OB-vans, ENGs, TV transmitters, CATV head ends, and production studios. Either instrument is ideal for integration into video tape recorders.

When Sc-H phase measurement is needed, then the PM 5661G/70 is a must. The PM 5661G/70 provides horizontal sync timing, relative to the reference subcarrier (burst), to verify colour framing and signal format. The PM 5661G/70 Sc-H phase display greatly simplifies a previously complex monitoring and analysing task.

Sc-H phase measurement, a feature of the PM 5661G/70 Waveform Monitor/Vectorscope, is an easily readable display. (Fig. 2 PAL - show the definition of the Sc-H phase). Fig. 3 shows the PM 5661/70 Sc-H display. The dot to the left indicates Sc-H phase with zero at the horizontal axis.

Brightest and Crispest Displays

Every instrument in the PTV's range of waveform monitors and vectorscopes delivers the brightest, crispest displays available. Even single line and VITS (ITS) appear brighter and crisper than ever before in all measuring modes.

Advanced Benefits

The PM 5661G/00 and PM 5661G/70 includes a probe input on the front. This input gives together with a standard oscilloscope probe the possibility to use the instrument in advanced fault finding situation.

The PM 5661G/00 and PM 5661/70 displays have higher resolution, even for differential gain/phase. And with the highest frequency response available, the PM 5661G/00 and PM 5661G/70 give the optimum pulse response. The PM 5661G/00 and PM 5661G/70 user enjoys the option of selecting either fast or slow clamp.

This highly versatile 2-in-one combination unit also has internally selectable, alternating filters. A magnifier on all 7 time bases, even for single lines, gives the possibility to analyse signal spikes. The instrument is exceptional for allowing the user extremely easy access when adjusting astigmatism and trace rotation.

Although compact units, the PM 5661G/00 and PM 5661G/70 are not to be outdone in filling most users' monitoring and measuring needs, as evidenced by the instruments' display capabilities. And of course, as with all the PTV's Waveform monitors / Vectorscopes, this 2-in-one combination unit has a parallax free internal graticule.

CRT

The CRT gives problem-free single line display. The thumb-wheel switch on the front-panel enables selection of any line in the TV signal. The state-of-the-art technology used in these instruments delivers the highest bandwidth of all waveform monitors currently available. The units' bright display allow use even where light conditions are very high, e.g. on ENG/EFP productions.

A minus B Display

The A-B input facility in the PM 5661G/00 and PM 5661G/70 makes it simple to compare correct colour-framing of two gen-locked video signals. With this facility, the user can set both signals to the same timing, by adjusting until an S-shape appears at the leading edge of the sync-pulses and the burst vanishes. (See figs. 4 & 5).

Line Selection of Single Line Display

With the line selector (thumb-wheel on the front panel), the user can easily select every desired single line in the TV signal. The "TIME BASE" selector next to the line selector makes it simple to switch from one line in field 1 to the corresponding line in the second field. The user can see the part of the signal being worked on via a strobe pulse in the single display line on the "PIX" monitor output. Fig. 6 shows the single line display.

Highest Frequency Response Available

The ultra high frequency response in the PM 5661/00 PM 5661/70, up to 28 MHz - 3db, allows the user to measure pulse response even at as short a rise time as 50 nsec. This is very important when adjusting e.g. the VTRs or video amplifiers. For use with HDTV signals, the high resolution and the frequency response is a must and is available with the PTV standard range of waveform monitors and vectorscopes. (See figs. 7, 8 & 9.)

Differential Gain/Phase Display

The differential gain display on the PTV units produces a display far easier to see than is currently available on any similar instrument. An envelope detector is built-in to improve viewing of differential gain particularly with a single line display. (See figs. 10 & 11). The differential phase measuring facility is included in the PTV series of combi-Waveform monitors Vectorscopes. Fig. 12 illustrates how simple it is to read this parameter not only on full-field signals, but also on single lines.

Probe Input at Front Panel

The PM 5661G/00/PM 5661/70 probe input simplifies fault-finding because the video oscilloscope is built into the WFM. The sensitivity of the probe input is higher than that of normal looped-through inputs, yielding the same deflection on the screen with a standard 10:1 probe as the rear side inputs. This means 100 mV full screen sensitivity can be obtained with a 1:1 probe mounted.

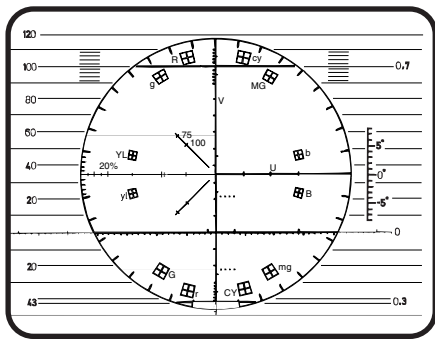


Fig. 1. Graticule, PAL G version, PM 5661 and PM 5661/70

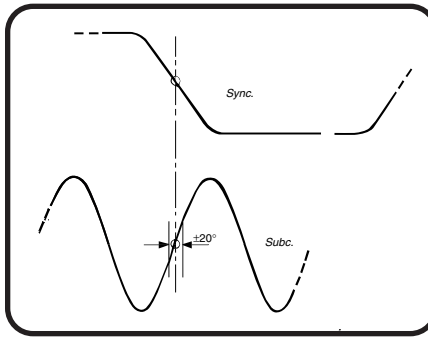


Fig. 2. The phase of the U component of the continuous subcarrier at the half amplitude of the leading edge of the sync pulse, in line 1 field 1 of the PAL signal

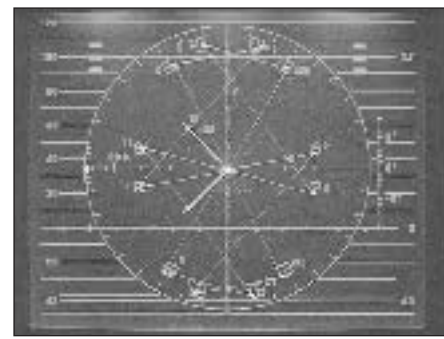


Fig. 3. Sc-H phase of a PAL signal measured in line 1 field 1

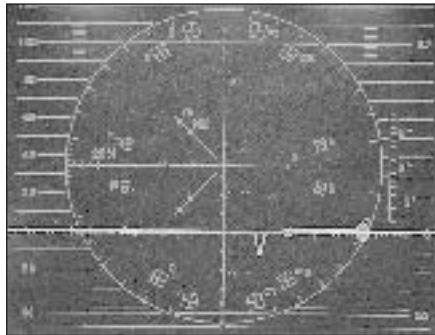


Fig. 4. A-B mode: The display in "2H MAGN" mode of the sync complex of two video signals. B input is subtracted from the A input signal. Note the shape at the leading edge of the sync pulse

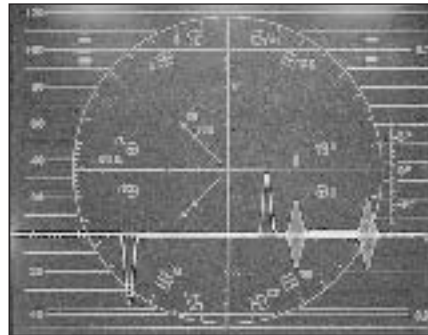


Fig. 5. Same as fig. 7, but with a time difference of 44 nsec. corresponding to 70° in Sc-H measurements

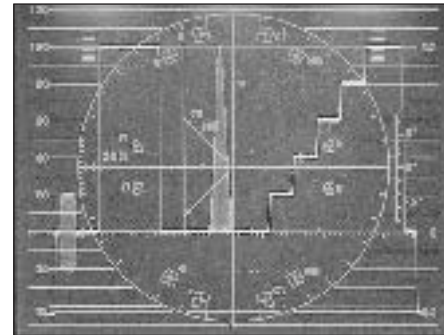


Fig. 6. The EBU in line 17 signal displayed as a single line display

Clamp Selectable Slow/Fast, and on/off

Clamp can be selected from the front panel. The available modes are: no clamp/slow clamp; no clamp/fast clamp; slow clamp/fast clamp. Slow clamp means the signal is clamped but it is so slow that hum goes through to the display. The configuration of these three modes is done internally in the instrument.

Clamp Reference

The clamp timing reference may be selected either from the displayed signal or from the timebase synchronization signal. This is very convenient when the instrument is used together with VTRs or when used with external sync on unlocked or very jittering signals.

Input DC/AC Coupling

The input may be either DC or AC coupled. The selection is done internally and is individual for the two channels.

Parade Display RGB/YRGB

The so-called parade display represents another type of deflection, displaying the three (or four) signals one after the other. This mode is suitable for aligning colour cameras, telecines, etc. The parade display requires an externally supplied staircase signal and an external switch box.

Product Data

Waveform Monitor Mode Vertical System

Inputs

Directly from the PM 5661G/00/ PM 5661G/70 front panel, the user can select inputs A, B, and A-B

- Input impedance: high ohmic, 75 Ω looped through
- Return loss: > 40 dB up to 15 MHz
- Max. input level: 2V peak-to-peak AC: +6V DC to -2V DC
- Gain difference between inputs A & B: < 1% at 0.5 MHz & f_{SC}
- Phase difference between inputs A & B: < 0.5° at f_{SC}

- Crosstalk between inputs A & B: < -60 dB at f_{SC}
- < -50 dB at 7 MHz

- Connector type: BNC

The user can select a front panel probe input via the input selector switch

- Input impedance: 1 M Ω , 20 pF
- Max. input level: 10V (DC +AC peak)

Frequency Response

- Flat: 50 kHz to 10 MHz, within $\pm 1\%$, 10 MHz to 15 MHz $\pm 3\%$; $f_{-3dB} > 28$ MHz

Filters

The user can select filters directly from the front panel.

- Luminance attenuation: < 3 dB at 1 MHz, > 40 dB at f_{SC}
- Chrominance: -3 dB bandwidth: $f_{SC} - 800$ kHz ± 100 kHz $f_{SC} + 800$ kHz ± 100 kHz

With an internal jumper, the user can select alternate displays of flat and luminance response in LUM mode, overlay in H and V mode, parade in 2H and 2V mode

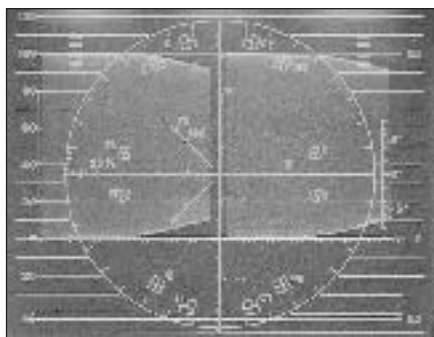


Fig. 7. Frequency response shown with a sweep signal up to 22 MHz. The fall-off starts at 18 MHz

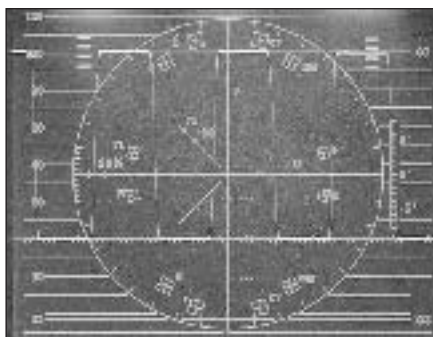


Fig. 8. Transient response of a 250 kHz square wave signal; Rise time 100 nsec.; Mode "2H Magnified"

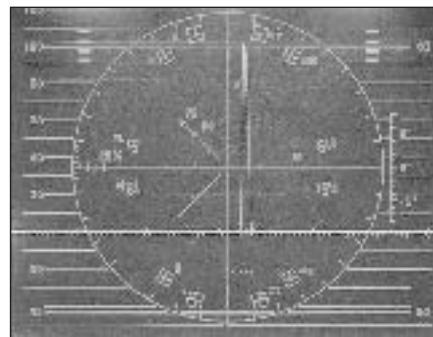


Fig. 9. 2T pulse signal shown in "2H mode"

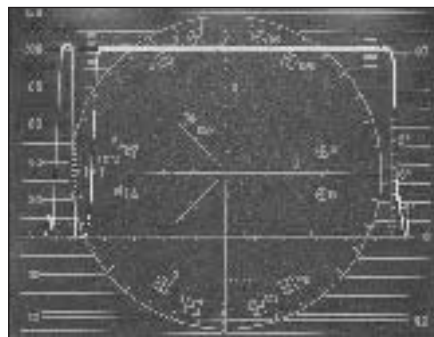


Fig. 10. Differential gain. The new differential gain display shown with a signal without any failure

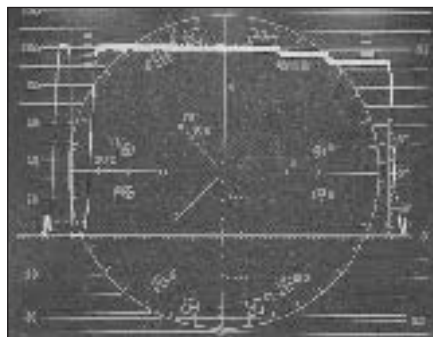


Fig. 11. Same display as fig. 10, but with a failure of device under test at 7% differential gain

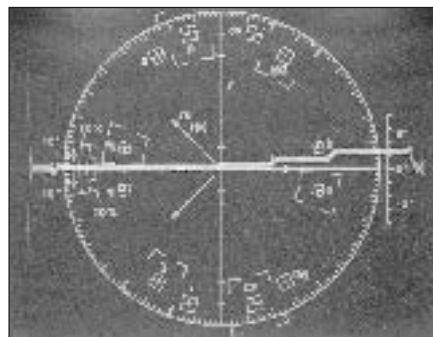


Fig. 12. Differential phase. The display shows a signal with a failure of 2.5° differential phase

Synchronization External Input Signal Requirements

- All modes: composite video or black burst with 300 mV (PAL), amplitude of sync and burst ± 6 dB
- Waveform monitor mode: composite sync (300 mV) (PAL), -6 dB/+23 dB
- Input impedance: high ohmic 75 Ω looped through
- Return loss: > 46 dB up to 7 MHz
- Max. input signal: 5 Vpp AC, +6V DC to -2V DC
- Crosstalk between EXT REF and A or B input: < -65 dB at f_{SC}

Pix Monitor Out

- Input/output gain ratio: $1.0 \pm 3\%$ into 75 Ω
- Frequency response: 50 kHz to 10 MHz within 3%
- Output impedance: 75 $\Omega \pm 1\%$.
- Strobe pulse: bright up (intensification) 180 mV on the single line selected
- Return loss: > 34 dB
- Differential gain: < 1% at 1 V video into 75 Ω
- Differential phase: < 1° at 1 V video into 75 Ω

Vertical Amplifier Deflection Sensitivity

- Video inputs: 1V full scale $\pm 1\%$
- Probe input: 0.1V full scale $\pm 3\%$
- Maximum deflection: 2 x screen height
- Vertical positioning: 3 x screen height
- Continuous gain range: fixed gain +14 dB to fixed gain -6 dB

Distortions

- 2T K-rating: < 0.25%
- 2T pulse-to-bar ratio: $100\% \pm 1\%$
- 625 Line -10 μs bar tilt: < 1%
- 625 Line -50 Hz square-wave tilt: < 1%
- Differential gain: < 0.25%

Differential Gain (DG Mode)

The user can select differential gain mode from the front panel.

- Measuring range: +20 to -100%
- Inherent error: < 0.25%
- Accuracy: $\pm 10\%$ of reading

Clamp

- Hum attenuation: slow < 1 dB; fast > 26 dB
- Black level shift due to absence/presence of burst: < 10 mV
- Black level shift due to change in APL from 10% to 90%: < 10 mV

Calibrator

- Calibrator frequency: 100 kHz, crystal-controlled
- Amplitude: $1V \pm 1\%$

Waveform Monitor Mode Horizontal System

Time Base

- All ranges: 2V- equal to frame rate
V - equal to field rate
2H - equal to half line rate
H - equal to line rate
- 1 line:
F 1 - single line of field 1
F 2 - single line of field 2
Both - single line of fields 1 and 2
- Selectable line number:
625 Line system line 1-625 incl.
- Magnification (X MAG).
Magnification around screen center:
H: x 10 (0.5 μs /div.)
2H: x 10 (1 μs /div.)
2V, V: x 20
- Sweep Length:
2V: 12.8 div. ± 0.5 div.
2H: 12.4 div. ± 0.1 div.
- Timing accuracy: 1 μs /div. < 3%, excluding first & last major div.
- Linearity: < 3%, excluding first & last major div.



Fig. 13. Alternating LUM filter: displayed in 1H mode, with all lines superimposed. PAL colour bar signal is displayed

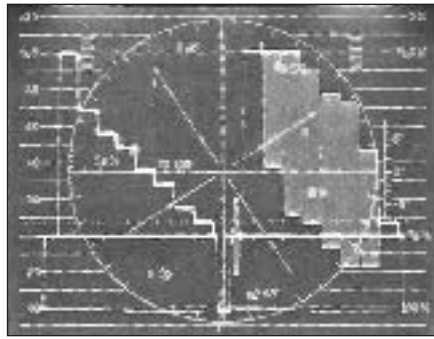


Fig.14. Same video signal as fig. 13, but shown in 2H mode, where the lines with LUM filter are placed next to the lines without any filter

Parade Display

Modes RGB/YRGB are internally selectable. Control is via a 25-pole connector on the rear panel

- Staircase amplitude for 10 div. deflection: 10V \pm 15%. The staircase is positive
- Maximum staircase amplitude: Peak AC + DC must not exceed +12 V and -12 V
- Sweep repetition rate in RGB/YRGB mode: V or H
- Sweep length: RGB, 27% to 33% of normal sweep; YRGB, 20% to 25% of normal sweep

Vectorscope Mode Inputs

- (Same as above)

Chrominance Bandwidth

- Upper: -3 dB point: $f_{SC} + 500$ kHz \pm 100 kHz
- Lower: -3 dB point: $f_{SC} - 500$ kHz \pm 100 kHz

Chrominance Amplifier

- All versions : Fixed gain position 75% saturation
- Continuous gain range: fixed gain -6 dB to fixed gain +14 dB
- Gain stability (input A or B to CRT): < 0.5%
- Differential gain: < 1%
- Differential phase: < 1°
- Position control range: Horizontal: \pm 5 mm from center Vertical: \pm 5 mm from center
- Clamp stability: within \pm 3 mm from center
- Center spot movement with rotation of phase control: < 0.15 mm

Differential Phase (DP Mode)

- Display range: \pm 8°
- Accuracy: within 0.5° if differential gain < 5%

Test Circle (Test Mode)

From the front panel, the user can select a test circle. The signal consists of the chrominance vectors from the A input signal which are rotated.

In test mode, the V demodulation axis shifts 180° every other line. In this mode, the 180° V-shift is not synchronized to the PAL burst shift.

Subcarrier Regenerator

- Pull-in range: $f_{SC} \pm 50$ Hz
- Pull-in time: < 1 s
- Phase shift with change in sub-carrier frequency: < 0.5° within pull-in range
- Phase shift with change in sub-carrier amplitude: < 2° for \pm 6 dB change from the nominal
- Phase shift with change from internal to external synchronization: < 0.5°
- Phase shift with input channel change: < 0.5°
- Phase shift with front panel gain control change: < 1°
- Displayed burst jitter: < 0.5°
- Subcarrier frequency: G version, 625-line, PAL: $f_{SC} = 4.43361875$ MHz

Remote Control

Selectable functions, via 25-pole connectors

- Mode: waveform monitor or vector-scope
- Input: A, B, A-B, Probe or Test
- Filter WFM mode: FLAT, LUM, CHR, DG
- Response VECT mode: STD, +V, PAL, DP
- Clamp

- Timebase: V, 2V, 2H, H, 1 line of field 1, 1 line of field 2, or 1 line of both fields
- (Y) RGB staircase control
- X-MAG
- Ext ref.
- Control method: ground closure of TTL-level input

PM 5661/70 Sc-H Phase Display

Signal requirements: (applied to A, B, or EXT REF):

- Signal type: composite video or black burst
- Sync & burst amplitude: 300 mV (PAL) \pm 3 dB
- Working range: timing between EXT REF and displayed signal: < \pm 15 μ s
- Display range with internal reference: \pm 80° without field reference pulse; 360° with field 1 reference pulse available

Accuracy

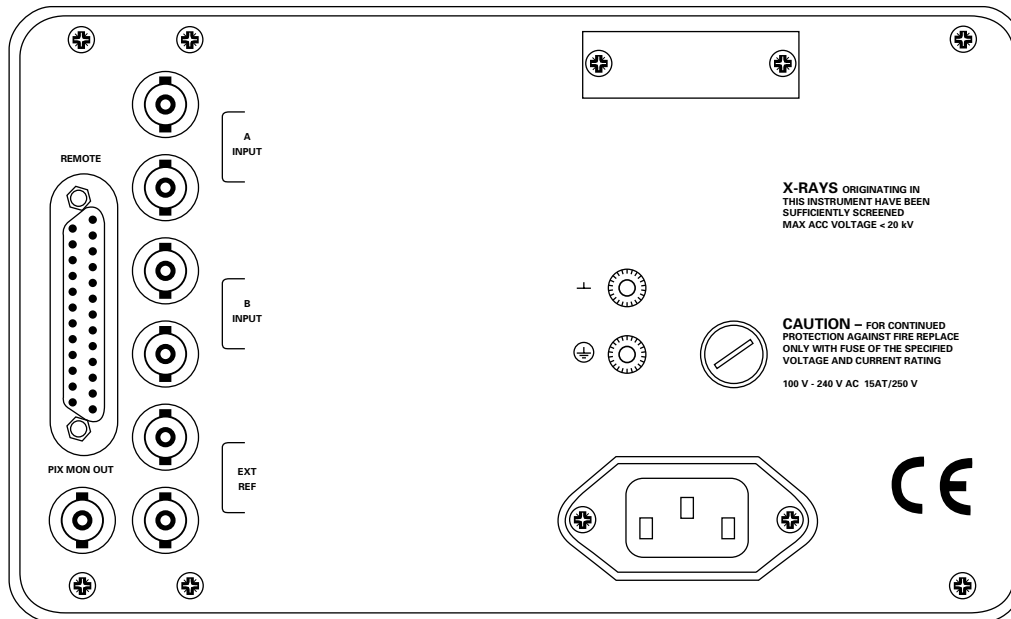
- Absolute: \pm 5° phase at 25°C (77°F)
- Relative: \pm 2° (0° to 45°C); (32° to 113°F)

Matching

- Internal reference to EXT REF match: \pm 0.5°
- Input A to input B match: \pm 0.5°

CRT

- Measuring area: 8 x 10 cm
- Screen type: P 31 (GH)
- Total acceleration voltage: 17 kV
- Graticule: internal



General Specifications

Power Supply

- Mains supply voltage: 85 to 250V AC
- Frequency: 48-65 Hz
 - Consumption:
 - PM 5661G/00, 35 W at 100-240V
 - PM 5661G/70, 45 W at 100-240V

Mechanical Data

- Height: 133 mm (5.25")
- Width: 216 mm (8.5")
- Depth: 465 mm (18.3")
- Weight: 6.5 kg (14.3 lb.)

Environmental Conditions

- Storage temperature:
 - 30°C to + 70°C (- 22°F to + 158°F)
- Operating temperature:
 - 0°C to + 45°C (32°F to 113°F)

Electromagnetic Compatibility

- Complying with VDE 871/DIN 57871 class B
- Altitude: operating, 5000 m (475 mbar) non-operating, 15000 m (100 mbar)

Safety

- IEC 348 class I

Ordering Information

Ordering Information

PM 5661G/00 625 Line, PAL, 4.433 MHz
 PM 5661G/70 625 Line, PAL, 4.433 MHz

The instruments are supplied without cabinet. For cabinets, see "Options"

Options

PM 8539 19" Rack Cabinet
 PM 8540 Blind Plate for PM 8539
 PM 8541 Carrying Case
 PM 8543 Cabinet plain

Note: For safety reasons, the PM 5661 must be mounted in one of the cabinets PM 8539, PM 8541, or PM 8543 before it is switched on.