

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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PM 5410 family of TV Signal Generators

Multi-standard for the
world's needs



All the signals you need for TV, VCR and monitor testing

Select the configuration that matches your test needs and budget

- Over 100 video test patterns for PAL, NTSC and SECAM video standards
- High-precision, digitally generated patterns for geometry alignment
- 16:9 and 4:3 aspect ratio patterns
- Special patterns for VCR and 100 Hz IDTV (Improved Definition TV) testing
- Mono, Stereo, NICAM and MTS Stereo plus SAP (BTSC) sound test signals
- Teletext TOP/FLOF, VPT and Antiope test signals
- Easily programmable PDC (Program Delivery Control) and VPS test signals
- Closed Caption test signals
- Full RF coverage from 32 to 900 MHz with int./ext. modulation
- RGB, Y/C (S-VHS/Hi-8), CVBS and audio outputs
- IEEE-488 programmable



The PM 5410 family from Fluke offers today's widest choice of TV and video test signals from a range of compact instruments. These versatile generators incorporate leading-edge expertise in TV technology, together with state-of-the-art know-how in electronic instrumentation and test equipment.

The family comprises multistandard basic generators for TV, VCR and monitor testing in all the PAL, NTSC and SECAM standards. In addition, dedicated test signals for all special TV functions can be specified as options, such as teletext TOP/FLOF, Closed Caption, stereo sound including NICAM and MTS Stereo/SAP. Dedicated signals are also available for testing and aligning VCRs, including programmable data signals for PDC and VPS.

The basic functionality of the PM 5410 family generators includes all test patterns and capabilities needed to test and align the total signal paths for video, audio and teletext – be it using baseband signals directly or through an RF carrier. Overall and specific tests are included for picture geometry, for both 4:3 and wide screen 16:9 aspect ratios, as well as high-voltage stability, beam current, static and dynamic convergence, picture resolution, color purity and color reproduction, and all vision and sound demodulators. Special test patterns for additional requirements like VCR and 100 Hz TV make these today's most versatile generators in terms of test patterns and functions. The cost-effective, modular

design of these instruments offers the flexibility to select the optimum configuration to match your application requirements, but avoiding the cost of features you do not need. The multistandard, multifunction capability of these instruments, together with the wide range of options, means that there is always a model to match any dedicated set of requirements, whether it is in R&D, manufacturing, quality assurance, installation, service or training.

The compact size of these generators provides an unmatched capability for one compact and easily portable instrument to meet a complete set of test requirements. The Fluke PM 5410 family is well suited for maintenance work by

central service workshops that need to have access to all TV and VCR functions. Their portability also makes them ideal for servicing high-end wide screen and projection TV receivers, of which size and weight necessitate on-site field service. On the other hand, the IEEE-488 GPIB-programmable PM 5418TDSI model is perfect for automated production-line testing, where high throughput speed is essential.

On the last page of this document, a selection guide is included that gives an overview of the test functionality per model.

RF selection

All models with RF output cover the entire frequency range from 32 to 900 MHz, including IF and all TV transmission bands, as well as all S- and hyperband cable TV channels. Selection of the synthesized RF frequency within these bands is done electronically via the keyboard. The step function enables fine adjustment and RF tuning. The RF carrier can also be switched off at intervals of approximately 10 seconds to test the synchronization circuitry.

Memory

Up to ten front panel settings for different test situations can be stored in memory for later recall. In this set-up data, the channel selection can be defined as frequency in MHz or as channel number.

Teletext

The growth of electronic communications has seen a rapid increase in the introduction of text transmission. The -TX and -TDS(I) configurations have been

specially developed to meet the highly specialized requirements for the checking and alignment of teletext receivers and decoders in PAL B, G and I systems. Both these instruments offer a selection of over ten teletext pages with special contents for decoder testing. The DIDON ANTIOPE teletext signal is also available as standard. Selection of DIDON ANTIOPE or UK Teletext is by a rear-panel switch.

FLOF, TOP and VPT

The test facilities of the PM 5415 and PM 5418 teletext versions have been extended by a selection of teletext pages including normal teletext, FLOF (Full Level One Features), TOP (Table Of Pages) and VPT (Video Programming by Teletext). FLOF is used in the UK, while TOP is used in Germany, Switzerland and Austria, as well as via cable distribution systems in the Netherlands. TOP and FLOF also feature extra country characters. Selection of TOP or FLOF is by a rear panel switch. VPT provides a menu that makes VCR programming simple, allowing programs to be selected by setting the start and stop time.

Y/C + RGB option PM 9553G adds S-VHS/Hi-8 capability

An optional Y/C + RGB module gives the Fluke PM 5415 and PM 5418 range of TV signal generators the separate luminance and chroma (Y/C) outputs needed by S-VHS / Hi-8 video recorders and Y/C monitors. By separately recording the Y and C signals, these VCRs eliminate cross-color effects to give dramatically improved color reproduction. The PM 9553G Y/C + RGB module can be retrofitted to any of the PM 5414 V, PM 5415 and

PM 5418 TV signal generators, and provides output signals to the S-VHS / Hi-8 VCR or Y/C monitor via a special connector. RGB signals and a SYNC and subcarrier facility are available to meet the rapid advances in computer graphics techniques, for example in the servicing of color video monitors. Color subcarrier and sync signals are supplied as standard (BNC connectors) for PAL and NTSC systems.

NICAM digital sound

Specific benefits of the NICAM generators include the ability to select more than 55 digital sound test signals instantly at any time, thereby speeding and simplifying operation. NICAM, now also available in SECAM L, is compatible with the existing PAL types B, G and I terrestrial TV and cable TV standards, and adds two high-quality digital sound channels. Suitable TV sets can receive two mono channels for simultaneous translation of foreign-language programs, stereo signals or transparent transmission of data. The two digital sound channels have selectable low- or high-amplitude signals to test the expander of the TV receiver. Standard 1 kHz tones check the sound channels, and a 3 kHz tone on channel 1 can test the stereo or dual-sound performance of the TV. Three special test signals (Data 1, 2 and 3) are available to check the operation of the demodulator and decoder. An RSSF (Reserve Sound Switching Flag) is high/low selectable to indicate that the analog and digital sound carriers are transmitting different information, or to indicate faults in the digital transmission.

MTS Stereo and SAP (BTSC sound)

Generation of BTSC sound signals, Multi-channel Television Sound (MTS), is available in combination with NTSC M and PAL M TV standards. As well as mono and stereo sound, a Secondary Audio Program (SAP) is also available. The various combinations can be selected directly from the front panel. Testmodes 1 to 3, special test signals, are very useful for easy functional testing of the stereo and SAP decoder. The sound signals are digitally generated which ensures high stability, and are available at the RF output or via baseband processing at the precision MPX output.

PDC/VPS test facilities

PDC and VPS use control information transmitted by the broadcaster, and are used to synchronize recording on a VCR with the transmitted program. Complete testing of video cassette recorders equipped with PDC / VPS under the PAL B, G, H, I, D and N standards is offered. A maximum of 9 coded PDC / VPS signals are available. With PDC, the PIL (date & time), CNI (country & network) PTY and PTL are programmable. Special signals such as timer control code, recording inhibit/terminate code, interruption code and continuation code can also be selected. In VPS mode, information on date, transmission time, country indication, TV channel, stereo/dual/mono sound and adult/general is present. Special signals such as LEER code, program interrupt and system status can also be selected.

PDC / VPS data is shown in a 1/6 screen height horizontal bar which can be combined with any test pattern and displayed in six positions, either on- or off-screen. A unique feature of PDC / VPS instruments is on-screen display of codes, and programming of the generator to set codes locally if required.

Closed Caption

Closed Caption is used to provide a visual depiction of information simultaneously being provided on the audio portion of a television signal. TV receivers with a screen size of 13" or larger, sold in the USA after July 1993, have to be equipped with a Closed Caption decoder. The PM 5415 and PM 5418 offer both Caption and Text modes in either of two operating channels. The Closed Caption information is present in line 21 of the NTSC video signal. The -TDS(I) version offers factory pre-coded Closed Caption information with a selection of 8 different types of information. Additionally, memory 9 is an automatic Closed Caption sequence of memories 1 to 8, so all modes can be tested easily.

IEEE-488 version

For use in systems applications, the PM 5418TDSI model is equipped with an IEEE-488 interface. All the available TV and sound modulation standards can be selected remotely, and "bus learn mode" as well as "identification mode" are included.

Every test pattern you need, at the touch of a button

Circle on a black background for checking the overall linearity and geometry. The white circle changes automatically to black when used with the white pattern and is useful for checking reflections. In 16:9 Aspect Ratio format, small circles are present in the corners of the screen.

Checkerboard pattern of six times eight (4:3) or six times eleven (16:9) columns of squares provides a visual standard for basic picture tube alignments, for example: centering, focus, horizontal and vertical deflection and linearity.

Center Cross / Border castellations are ideal for centering TV monitors and TV screens, for checking the deflection linearity and for pincushion correction.

White 100% with swinging burst is designed for setting white D and for an overall check of purity. Also for beam current adjustment. White D is the correct white, necessary for a natural color reproduction.

Grey scale Full-screen linear staircase signal with 8 equal steps from black to white is used to locate faulty linearity of the video amplifier or gray-scale setting.

Multiburst contains eight full-screen vertical bars of definition lines in the frequency ranges 0.8, 1.8, 2.8, 3.0, 3.2, 3.4, 3.8 and 4.8 MHz. This checks the

bandwidth of the video or luminance amplifier in black and white or color TV as well as the resolution of monitors and video recorders.

Cross hatch / Center Indication / Top-Left

Indication with either 17 (4:3) or 21 (16:9) vertical and 11 horizontal lines are used for checking and re-aligning dynamic and corner convergence. The advantage is that there is no interlacing which would normally tire the eyes. If interlacing is required this can be achieved by superimposing another pattern such as center cross, circle or dots.

Dot pattern is mainly used for static convergence. The screen should contain pure white dots.

VCR is a specially-designed test pattern to check the bandwidth, linearity, sensitivity and AGC of the chroma amplifiers in color video recorders. This combined test pattern is divided into 4 horizontal segments:

- 24 lines of 100% white level.
- Eight bars of resolution of which 2.8 - 3.0 - 3.2 - 3.4 MHz are used to align the high-pass filter for a maximum resolution in VCR bandwidth.
- Eight steps of decreasing linear levels of saturation from 100 to 0% to check the chroma amplifier linearity and color AGC circuitry.
- A black horizontal bar with a moving white field to check moving pictures on video recorders.

Purity with a choice of the three primary colors is clearly indicated by LEDs. The red

pattern is used for checking color purity. The green pattern provides a purity check for three-in-line tubes. Blue is also available to check color performance. The three complementary colors magenta, yellow and cyan can also be displayed by selection, as can white and black. Combinations with circle and/or center cross are easy to select.

Color bar standard bar pattern.

The vertical bars are white, yellow, cyan, green, magenta, red, blue and black. Since they are dependent on the TV system selected, the luminance contents are automatically corrected for each setting. The color bar pattern therefore provides sufficient information for a good overall check of color performance, including checks on burst keying, subcarrier regeneration, RGB amplifiers, the delay color versus B/W signal and saturation.

DEM-Pattern. Demodulator is a combined test pattern which, divided into 4 sections, contains information to make on-screens checks and alignments of the color demodulators and subcarrier frequency. For PAL it is used to check the chroma delay line for amplitude and phase ('venetian blinds'). For the NTSC system, the pattern is according to the NTSC requirements and contains 7 color bars, -I and +Q signals and a black and white reference field.

Test pattern combinations.

Over 100 test pattern combinations can be selected to meet special requirements.

Technical Specifications

The technical specifications shown here are valid over a temperature range from +5 °C to +50 °C. Specifications apply with outputs terminated into 75Ω, unless stated otherwise. Stated tolerances apply after a warming-up time of 30 minutes and a recalibration interval of 12 months.

VIDEO CARRIER

FREQUENCY (PM 5415, PM 5418)

Range:	32 to 900 MHz, without interruption, covering VHF, UHF, S- and Hyperbands Frequency
selection:	Keyboard
Fine tuning:	± 250 kHz steps for TV frequencies, ± 100 kHz steps for IF frequencies (32 to 44.9 MHz)
Frequency tuning:	Tuning speed is automatically increased when step button is continuously pressed
Storage:	a) Possibility for 10 different RF frequencies b) As a), indicated as TV channel numbers
Indication:	4-digit display a) First digit: memory, store and recall position 0 to 9 b) Digits 2-4 plus separate LEDs for frequency indication with 250 kHz display resolution. c) Keyboard-selectable TV channel numbers (e.g. C21 or C70)

RF OUTPUT (PM 5415, PM 5418)

RF output:	BNC connector on front panel
Impedance:	75Ω
Output voltage:	10 mV ± 2 mV
Attenuation:	60 dB, continuously variable

VIDEO

VIDEO MODULATION (PM 5415, PM 5418)

Modulation:	AM internal/external source selectable
Polarity:	Negative (except SECAM L); positive for SECAM L

VIDEO INPUT (PM 5415, PM 5418)

Video input:	BNC connector (front panel)
Input voltage (Vpp):	1 V Max.
Permissible input voltage:	± 5 V
Impedance:	75Ω
Polarity:	White level positive
Coupling:	DC (clamping on sync.)

VIDEO OUTPUTS

Video output:	a) BNC connector b) SCART connector (Euro-AV connector), pin 19 (rear)
Impedance:	75Ω
Voltage (Vpp):	a) 1 V fixed b) Continuously variable, 0 to 1.5 V into 75Ω
Polarity:	White level positive
Coupling:	DC

CHROMA

CHROMA NTSC/PAL

Chroma standards:	NTSC according to system M (switchable)
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Selection:	PAL according to system B, D, G, H, I, (M, N)
Subcarrier frequency:	Rear panel thumbwheel system switch 3.579545 MHz for NTSC 4.433619 MHz for PAL B, D, G, H, I; 3.582056 MHz for PAL N; Subcarrier frequencies coupled to line frequency according to selected standard
Tolerance:	≤ 30 ppm
Burst:	Position, number of cycles and phase according to selected standard
Amplitude:	Chroma with burst a) Fixed (100%) b) Continuously variable from 0 to 150%
Chroma vectors inaccuracy:	Phase ≤ 3°, amplitude ≤ 5% relative to luminance amplitude

CHROMA (PM 5418 TDS / TDSI)

As above, with additional inclusion of PAL M and N standards.	
Tolerance:	3 ppm
Aging:	2 ppm/year

CHROMA SECAM

Chroma standards:	SECAM B, D, G, H, K, K1 and L
Selection:	Rear panel thumbwheel system switches
Chrominance subcarrier:	f _{OB} = 4.250000 MHz f _{OR} = 4.406250 MHz
Tolerance:	< 2 kHz
Type of chrominance subcarrier modulation:	Frequency modulation
Transmitted chrominance information:	Line-sequential D' _R and D' _B
Signals:	D' _R = -1.9 (E' _R - E' _Y) D' _B = 1.5 (E' _B - E' _Y)
Amplitude:	a) Fixed, according to standard b) Continuously variable from 0 to 150%

Frequency deviation of chrominance subcarrier:	According to TV standard
Video pre-emphasis:	Low frequency pre-correction and high-frequency bell filter according to TV standard
Bell center frequency:	4.286 MHz
Tolerances:	≤ 20 kHz

CHROMA SECAM (PM 5418 TDS / TDSI)

Tolerance:	3 ppm
Aging:	2 ppm/year

SYNCHRONIZATION

Line frequency:	15,734 Hz (RTMA), 15,625 Hz (CCIR), ≤ 0.4 Hz
Frequency tolerance:	≤ 0.4 Hz
Number of lines:	525 (RTMA), 625 (CCIR)
Field frequency:	60 Hz (RTMA), 50 Hz (CCIR)
Line and frame sync.:	According to TV standard, interlacing
Output:	BNC connector (on front)
Trigger signal:	Combined signal contains line and field synchronization pulses of different amplitude
Voltage (open-circuit):	2.6 V for line pulse, 5.0 V for field pulse
Impedance:	6 kΩ
Polarity:	Negative

SYNCHRONIZATION SECAM

Identification:	According to TV system in line and frame
Frame identification:	Position in lines 7 to 15 of odd fields, in lines 320 to 328 of even fields.
Line identification:	By burst (chrominance subcarrier reference signal) on the back porch according to TV standard (SECAM B, D, G, H, K, K1, L)
Amplitude:	Line and frame identification according to TV standard, but also variable between 0 and 150% together with chroma information

SOUND CARRIER AND MODULATION (PM 5415, PM 5418) MONO

Sound carrier:	On/off switchable
Sound carrier frequency:	4.5 MHz for standard M, N; 5.5 MHz for standard B, G, H; 6.0 MHz for standard I; 6.5 MHz for standard D, K, K1 and L
Tolerance:	≤ 30 ppm
Vision/sound carrier ratio:	13 dB for standard B, G, H; 11 dB for standard D, K, K1, L; 13 dB for standard M, N; 12 dB for standard I
Sound modulation:	FM, internal and external, on/off switchable; AM for SECAM L
Pre-emphasis:	50 μs for standard B, D, G, H, I, K, K1; 75 μs for standard M, N
Internal	
Frequency deviation:	± 30 kHz, standard B, G, H; ± 15 kHz, standard M, N; ± 31 kHz, standard I; ± 27 kHz, standard D, K, K1
Modulation depth:	50% for standard SECAM L
External	0.4 V will give the same deviation or modulation depth as with internal modulation
Input:	DIN connector, pin 3 + 5 (rear panel)
Impedance:	0.5 MΩ
Bandwidth:	40 Hz to 15 kHz
Max input voltage:	± 40 V
Output:	SCART connector (Euro-AV connector), pin 1+3 (rear panel)
Impedance:	1 kΩ
Voltage:	0.4 V rms (open circuit)

STEREO

Sound Section for Stereo and Second Sound Channel Transmission for -TX and -TDS / TDSI Versions	
Standards:	B, G
Sound carriers:	Carrier 1: 5.5 MHz; Carrier 2: 5.7421875 MHz
Vision / sound carrier ratio:	Carrier 1: 13 dB; Carrier 2: 20 dB
Frequency tolerance:	< 30 ppm
Modulation:	FM, internal and external on/off switchable
Pre-emphasis:	50 μs
Internal	
FM Sound channel 1:	1 kHz or 3 kHz sinewave, on/off switchable
Deviation:	±30 kHz in mono/dual-channel ±15 kHz in stereo, right channel switched off

Sound channel 2:	±30 kHz in stereo, left and right channels switched on with 1 kHz internal signal
Deviation:	1 kHz sinewave, on/off switchable ± 30 kHz
External FM	
Sound channels 1 & 2	
input voltage:	0.4 V will give the same deviation as the internal signal
Inputs:	DIN connector (rear panel)
Contacts:	Pin 2 (ground), Pin 3 Sound channel 1 Pin 5 Sound channel 2
Impedance:	0.5 MΩ
Bandwidth:	40 Hz to 15 kHz
Max. permissible voltage:	± 40 V
Outputs:	SCART connector (Euro-AV connector)
Contacts:	Pin 3 Sound channel 1 Pin 1 Sound channel 2
Impedance:	1 kΩ
Voltage:	0.4 V rms (open circuit)
Operating Mode Detection	
Pilot frequency:	54.6875 kHz (3.5 x f _H)
Tolerance:	< 30 ppm
Modulation:	AM
Modulation depth:	50%
Identification frequencies:	117.5 Hz (f _H /133) for stereo mode; 274.1 Hz (f _H /57) for dual-channel mode
Deviation of 2nd sound carrier:	± 2.5 kHz by modulation of carrier with unmodulated pilot
For standards D, I, M, N, all stereo versions also offer all mono facilities.	

NICAM

Sound Section for NICAM Digital Sound Transmission (PM 5418 TDS / TDSI)	
AM/FM sound:	As for -TX-models
MONO, DUAL, STEREO:	As for -TX-models with the following additions and changes:
Modulation of the AM/FM sound carrier with NICAM off:	As for -TX-models
Modulation of the AM/FM sound carrier with NICAM on:	AM/FM MONO carrier remains; FM STEREO carrier off
Internal modulation of mono sound carrier	
MONO and DUAL:	Same contents as NICAM channel 1
STEREO:	Sum of NICAM channels 1 and 2
FM deviation:	± 30 kHz
Test:	Modulation off
External modulation	As for PM 5418, MONO sound RSSF (Reserve Sound Switching Flag) automatically set to LOW

DIGITAL SOUND SECTION NICAM

Sound carrier:	On/off switchable by selecting/deselecting the NICAM modes MONO, DUAL, STEREO, TEST
Frequency:	Related to bit-rate clock. Automatically

matched to chosen TV system :
 System B, G, L: 5.85 MHz;
 System I: 6.552 MHz

Tolerance: 3 ppm
 Aging: 2 ppm/year
 Amplitude: -20 dBc (related to video carrier)
 Tolerance: ± 2 dB
 Modulation: Quadrature phase shift keying (QPSK)
 Modes: MONO, DUAL, STEREO, TEST selectable

Internal Sources

Channel 1: 1 kHz or 3 kHz sinewave, on/off switchable
 Channel 2: 1 kHz sinewave, on/off switchable
 Amplitude: Two different amplitudes selectable by AMPL LOW key; FM deviation of MONO carrier remains at ± 30 kHz

Amplitude high: Reference is the maximum encodable amplitude at 15 kHz. 1 kHz and 3 kHz amplitudes are attenuated relative to this level according to pre-emphasis CCITT Rec. J17

Amplitude low: 1/3 of high amplitude
 Reserve sound switching flag (RSSF): High/low selectable by RSSF LOW key. High/low selectable for all NICAM modes.

Content of the FM modulated carrier is different from the QPSK modulated NICAM carrier, but it is not indicated NICAM demodulator test
 Test 1: NICAM decoder test
 Test 2: Unmodulated NICAM carrier
 Test 3: Unmodulated NICAM carrier
 Sound coding: 10 bits/sample and 32 samples/block according to NICAM-728

Bit rate: 728 kbit/s ± 3 ppm
 Pre-emphasis: CCITT Rec. J17
 Spectrum shaping: System B, G: 40% cosine roll-off
 System I: 100% cosine roll-off

NICAM data output: BNC rear panel
 Data format: According to NICAM-728
 Data level (Vpp): 1V into 75Ω
 Output impedance: 75Ω
 NICAM clock output: BNC (rear panel)
 Frequency: 728 kHz ± 3 ppm
 Clock amplitude (Vpp): 1V into 75Ω
 Output impedance: 75Ω

Analog sound section (NICAM)

Analog output: Euro-AV connector (SCART) rear panel
 Impedance: 1 kΩ
 Output voltage (rms): 0.4V (open circuit)
 Internal Modulation: Pin 3 Contents of channel 1
 Pin 1 Contents of channel 2

For RSSF flag low (both pins): Modulation contents of the FM MONO channel

External modulation of FM carrier combined with NICAM sound: RSSF (Reserve Sound Switching Flag) automatically set to LOW
 Pin 3 Signal supplied to pin 3 of the AUDIO IN connector
 Pin 1 Signal supplied to pin 5 of the AUDIO IN connector

MTS Stereo plus SAP (BTSC sound)

Sound Section for -TDS/TDSI Versions. MTS Stereo and SAP

(Second Audio Program) are according to the BTSC standard and are available in TV standards NTSC M and PAL M

Sound carrier: On/off switchable
 Frequency: 4.5 MHz
 Vision / sound carrier ratio: 13 dB
 Modulation: FM with BTSC Baseband
 Baseband: Mono-channel (75 μs pre-emphasis)
 Stereo-channel, AM modulated with suppressed carrier (BTSC compressed)
 SAP-channel, FM modulated (BTSC compressed)

Internal Sources

Sound channel 1: 1 kHz or 3 kHz sinewave, on/off switchable
 Pilot: On/off switchable
 Sound channel 2: 1 kHz sinewave, on/off switchable
 SAP channel: 5 kHz sinewave, on/off switchable
 Test 1: Channel separation test/alignment
 Test 2: Channel separation quality check
 Test 3: Audio level test/alignment
 MPX output: BNC connector on rear panel
 Impedance: 50Ω
 Voltage (rms): 0.32V (into 50Ω)
 Channel separation: > 36 dB
 Sound channel 1&2: SCART connector (Euro-AV connector)
 Contacts: Pin 3 Sound channel 1
 Pin 1 Sound channel 2
 Impedance: 1 kΩ
 Voltage (rms): 0.36V for 54% modulation

TELETEXT FOR -TX, -TDS / TDSI VERSIONS

TXT

Data synchronization frequency: PAL B,G,I: 6.9375 MHz (444 x fH) ;
 SECAM L: 6.203125 MHz (397 x fH)
 According to standards (TOP, FLOF, Antiope)

Data coding: PAL: '1' = 66% of white level, '0' = black level
 SECAM: '1' = 100% of white level, '0' = black level

Signal levels: PAL system: 13, 14, 326, 327
 Data contents: Text pages with special contents for decoder testing for each standard

Normal working mode: Combinations possible with all test patterns

SIGNAL OUTPUT

Teletext signal combined with video signal: All CVBS outputs
 Modulated RF signal: RF output, RF from basic unit

PDC / VPS FOR -TDS / TDSI VERSIONS

PDC

Program Delivery Control is a data broadcasting system which carries program related information for exploitation by suitably-equipped video recorders according to the EBU specification SPB 459 Revision 2

Data synchronization frequency: 6.9375 MHz
 Modulation: Binary NRZ

Data coding: According to standard
 Location of data: Lines 13, 14, 20, 21, 326, 327, 333, 334
 Signal levels: '0' = 0V, '1' = 66% of white level
 Signal shaping: Cos² filter
 Data contents: 9 different sets of PDC data of which 4 are freely programmable
 Normal operating mode: Combination possible with all (except cross hatch) test patterns and teletext; on/off switchable
 Programming: Via keyboard and text strip inserted in the test pattern
 Text strip: 6 different positions or not visible

VPS

Video Programming System for pre-programmed recording with home video recorders according to German broadcasting organizations ARD, ZDF and ZVEI

Data synchronization frequency: 5 MHz
 Bit length: 400 ns
 Modulation: Bi-phase modulation
 Data coding: According to the guideline issued by ARD, ZDF and ZVEI
 Signal levels: '0' = black level, '1' = 71.4% of white level
 Signal shaping: Cos² filter
 Location of data: Line 16 (VPS system)
 Data contents: 9 different, freely programmable non-volatile sets of VPS data preset at factory
 Normal operating mode: Combination possible with all (except cross hatch) test patterns and teletext; on/off switchable
 Programming: Via keyboard and text strip inserted in the test pattern
 Text strip: 6 different positions, or not visible

CLOSED CAPTION FOR -TDS / TDSI VERSIONS
CC

Closed Caption is a subtitling system mainly used in the USA (NTSC M).
 Data synchronization frequency: 503.4965 kHz (32 * f_H)
 Data coding: Binary NRZ
 Signal levels: '0' = blanking level; '1' = 50 IRE level
 Signal shaping: filtered to a 2T response
 Location of data: line 21 of field 1 in the NTSC M system
 Data contents: 7 cycle sine wave clock run-in burst, start bit and 16 data bits
 Display modes: Pop On, Roll Up, Paint On and Text Mode
 Second language: Available
 Data information: 8 pre-defined Closed Caption data sets, non-programmable; 1 sequence of these 8 pre-defined data sets is possible

IEEE-488 INTERFACE (PM5418 TDSI)

IEEE

Allows selection and control of all functions, except video-, chroma- and RF amplitudes.

Y/C + RGB OPTION PM 9553 G (optional for all models)
RGB

RGB outputs: BNC connectors (rear)
 Output Voltage (Vpp): 0.7V into 75Ω
 Impedance: 75Ω
 Subcarrier output: BNC connector (rear), only for PAL and NTSC systems

Output Voltage (Vpp): 2V into 75Ω
 Impedance: 75Ω
 Sync. output: BNC connector (rear)
 Output Voltage (Vpp): 2V into 75Ω
 Impedance: 75Ω

Y/C SIGNAL

Y/C Output: 4-pin S-connector (rear panel)
 Y Signal (luminance): Y signal at pin 3, Y ground at pin 1
 Impedance: 75Ω
 Nominal output level: 1 Vpp (into 75Ω)
 Tolerance: 10%

For Standards B, D, G, H, I, N, K, K1, L:
 Sync. level -43% ± 3%
 Blanking level 0%
 Black level 0%
 White level 100%
 For Standard M:
 Sync. level -40% ± 3%
 Blanking level 0%
 Black level 7.5% ± 2.5%
 White level 100%

C signal (chroma): Complete chroma signal including color burst of CVBS signal
 C signal at pin 4; C ground at pin 2
 Impedance: 75Ω
 Output level into 75Ω: Normal value 100% ± 10% in stop position
 Setting value: 0 to 150% continuously variable (PM 5415 and PM 5418)
 0 or 100% switchable (PM 5414 V)

UNIVERSAL PAL / NTSC CHROMA MODULE
(= Optional PM 9546)

UNIVERSAL CHROMA

NTSC systems: M
 PAL systems: B, D, G, H, I, M, N

GENERAL SPECIFICATIONS (all models)

ENVIRONMENTAL CONDITIONS:

Temperature
 Operating: +5°C to +50°C
 Non-operating: -40°C to +70°C
 Humidity
 Acc. to MIL-T-28800D :
 +5°C to 10°C is not controlled,
 +11°C to 30°C is 95%,
 +31°C to 40°C is 75%,
 +41°C to 50°C is 45%
 Reliability: MTBF = 20,000 hours (calculated value)
 Safety: IEC 1010-1 Class I; CSA-C22.2 No 231
 EMC: EN 55011, VDE 0871 Level B; FCC Part 15J Class A

POWER REQUIREMENTS:

Selectable: 100 V, 120 V, 220 V, 240 V ± 10%;
 50 Hz / 60 Hz ± 5%; 35 VA to 57 VA depending on model and installed options.

DIMENSIONS AND WEIGHT:

Width: 300 mm (11.8 in)
 Height: 140 mm (5.5 in)
 Depth: 400 mm (15.7 in)
 Weight: Net 6.5 kg to 8.6 kg (14.4 lb to 19.0 lb)
 Shipping 10 kg to 12.7 kg (22.2 lb to 28.0 lb) depending on model and installed options

Selection Guide

Model	PAL B D G H I	PAL M N (option PM 9546)	NTSC M M:4.43	SECAM B D G H K K I L	RF	16:9	Analog stereo sound (BTSC)	MTS stereo+ SAP sound	NICAM stereo sound	Tele-text TOP/FLOP Antiope	PDC/VPS	CC	IEEE	Y/C+ RGB
PM 5414 V	•	opt	•											
PM 5414 V+Y/C	•	opt	•											•
PM 5415	•	opt	•		•	•								
PM 5415 +Y/C	•	opt	•		•	•								•
PM 5415 TX	•	opt	•		•	•	•			•				
PM 5415 TX +Y/C	•	opt	•		•	•	•			•				•
PM 5418	•	opt	•	•	•	•								
PM 5418 + Y/C	•	opt	•	•	•	•								•
PM 5418 TX	•	opt	•	•	•	•	•			•				
PM 5418 TX +Y/C	•	opt	•	•	•	•	•			•				•
PM 5418 TDS	•	opt	•	•	•	•	•	•	•	•	•	•		
PM 5418 TDS + Y/C	•	opt	•	•	•	•	•	•	•	•	•	•		•
PM 5418 TDSI + Y/C	•	•	•	•	•	•	•	•	•	•	•	•	•	•

• = Standard in instrument

opt=requires the optionally available unit PM 9546, Universal PAL/NTSC chroma module, to be ordered with the main instrument

ORDERING INFORMATION

BASIC MODELS

PM 5414 V: Video Pattern Generator
 PM 5415: NTSC / PAL TV Signal Generator
 PM 5418: NTSC / PAL / SECAM TV Signal
 Generator

Refer to Selection Guide for complete overview of configurations.

ACCESSORIES INCLUDED WITH INSTRUMENT

PM 9538 RF cable BNC TV connector 75Ω
 Power cord
 Operating manual

ACCESSORIES

PM 9075 75Ω BNC-BNC Cable (1 m / 3 ft)
 Service manual
 PM 9546** Universal Chroma Unit
 PM 9553G** Y/C + RGB Output
 PM 9561G 19" Rackmount (retrofitable)

** Factory and Service Center installable only

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