HAMLET
EXCELLENCE IN VISION

MICROSCOPE 302 WVA

VIDEO MONITORING SYSTEM

OPERATOR'S HANDBOOK

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IN CORRESPONDENCE CONCERNING THIS INSTRUMENT
PLEASE QUOTE THE SERIAL NUMBER PRINTED ON THE
LABEL AT THE REAR OF THE UNIT

SERIAL NUMBERS 24311 ON

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GENERAL INFORMATION

WARRANTY

This product is manufactured by Hamlet Video International Ltd and is warranted to be free from defects in components and factory workmanship under normal use and service for a period of one year from the date of purchase.

FREE EXTENDED WARRANTY

The warranty period can be extended to two years by registering the instrument on the Hamlet web site
http://www.hamlet.co.uk/serv.html

TERMS AND CONDITIONS

During the warranty period, Hamlet Video International Ltd will undertake to repair or at its option, replace this product at no charge to its owner when failing to perform as specified, provided the unit is returned shipping prepaid, to the factory or authorised service facility.

No other warranty is expressed or implied. Warranty shall not be applicable and be void when this product is subjected to:

1. Repair work or alteration by persons other than those authorised by Hamlet Video International Ltd in such a manner as to injure the performance, stability, reliability or safety of this product.

2. Misuse, negligence, accident, act of God, war or civil insurrection.

3. Connection, installation, adjustment or use otherwise than in accordance with the instructions in this manual.

Hamlet Video International Ltd reserves the right to alter specifications without notice.
This warranty does not affect the statutory rights of the UK customer.

GENERAL INFORMATION

SAFETY COMPLIANCE

This product is manufactured and tested to comply with **BS EN 61010-1 : 1993**
Safety requirements for electrical equipment for measurement, control and laboratory use.

EMC COMPLIANCE

We: Hamlet Video International Limited
Maple House, 11 Corinium Business Centre, Raans Road
Amersham, Bucks, HP6 6FB, England.

Declare under our sole responsibility that the product **HAMLET MICROSCOPE 302WVA** to which this declaration relates is in conformity with the following standards:

EN50081-1 Generic emissions standard for light industrial applications.
EN50082-1 Generic immunity standard for light industrial applications.

Following the provisions of EU EMC directives 89/336/EEC and 92/31/EEC.

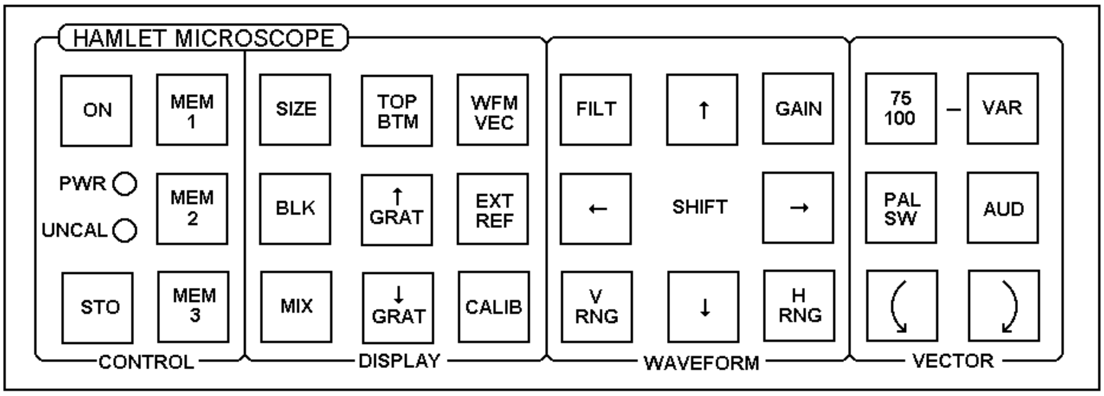
NOTE. During the EMC certification of this product, shielded cables were used.
We recommend that they be used in operation.

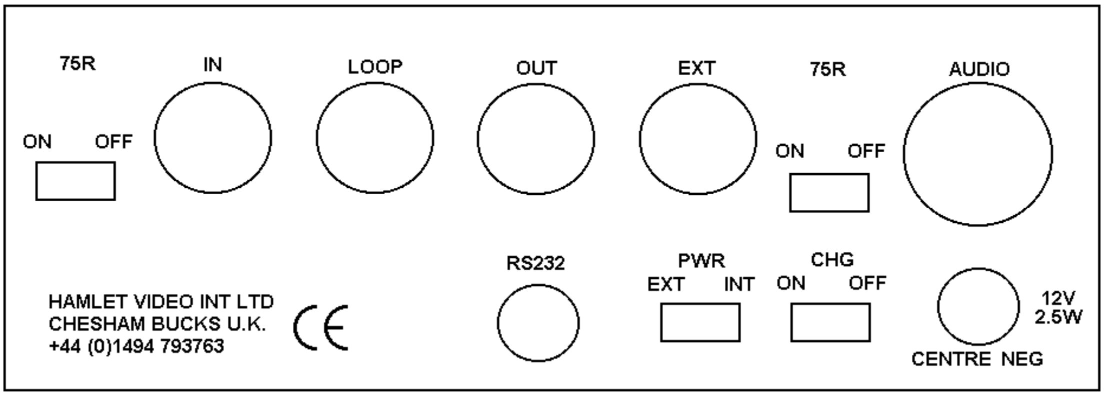
PRODUCT DISPOSAL INSTRUCTIONS

The symbol shown above and on the Hamlet Microscope 302WVA means the product is classed as Electrical or Electronic Equipment and should not be disposed with other commercial waste at the end of its working life.
The Waste of Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) has been put in place to recycle products using best available recovery and recycling techniques to minimise the impact on the environment, treat any hazardous substances and avoid the increasing landfill.
Product disposal instructions for business users.
Business users should contact their Hamlet Microscope 302WVA supplier to arrange for its return to Hamlet, who will safely dispose of it and ensure that this Hamlet Microscope 302WVA is not mixed with other commercial waste for disposal.

FRONT AND REAR PANEL

HAMLET MICROSCOPE 302WV PANEL DETAILS





TECHNICAL SPECIFICATION

DISPLAY AREA

	The waveforms are in square boxes burnt into the video signal
Small mode:	Video and vector boxes are each 128 lines high with a width of 8.5uSec in PAL and 10uSec in NTSC
Half mode:	Video and vector boxes are each 256 lines high with a width of 17uSec in PAL and 20uSec in NTSC
Expand mode:	Video and/or vector boxes, are each 512 lines high with a width of 34uSec in PAL and 40uSec in NTSC

SIGNAL CONNECTIONS

IN:	BNC connector with input impedance of 22K.
LOOP	BNC connector. Separate 75ohm term switch.
EXT	BNC connector. Impedance 22K. Separate 75ohm term switch.
OUT	Output to monitor is 1 Volt to 75 ohms. Auto switch to input when off. Internal jumper allows loop protect.
AUDIO	6 pin mini din. Stereo balanced input. Impedance 22K.

WAVEFORM MONITOR

Response:	FLAT is +/- 1% from 25Hz to 5.5MHz, -5% at 10MHz LPASS is a low pass filter -1db at 1MHz, -40db at 3.58 / 4.4MHz CPASS is a band pass filter -3db at +/- 750KHz
Sensitivity:	1V video-in displays 100% (140 IRE) in CAL mode Gain variable between 1.0 and 3.0 Error in CAL position is less than 1%.
D.C. Restorer:	Attenuation of less than 30% to line hum signals Display level change less than 2% for 1 volt change in signal level.
Timebase:	2V, V, VMAG, 2H, H, HMAG. Accuracy limited only by display resolution due to crystal sweep.

VECTOR MONITOR

Accuracy:	Better than 1% in 75% or 100% positions Variable up to 3 times gain Display phase is continuously variable by +/- 45 degrees.

POWER

INT:	7.2V Nicad x 0.7AH
EXT:	7V-15V D.C. at 0.2 amp Consumption: 2.5 W nominal. Centre neg 2.1mm skt.

TEMPERATURE	0 to 45 deg.C. ambient to 10,000 ft.
WEIGHT	600g or 730gr with batteries.

OPERATING INSTRUCTIONS

ON
Toggles power on and off.

MEM 1,2,3
Recall stored panel settings.

STO
Stores current panel settings. Press store, then the desired memory button.

SIZE
Toggles between half and quarter size displays.

TOP BTM
Displays the smaller displays at top or bottom of screen

WFM VEC
Displays full-screen waveform, vectors or both.

BLACK
Displays waveforms on black. With no input, gives syncs out only.

MIX
Provides a mix between picture and waveforms.

GRAT
Controls the brightness of the internal electronic graticules.

EXT REF
Switches to external sync reference. Hold down for one second for HFT mode.

CALIB
Enables internal waveform and vector calibrators.

FILT
Switches the video filtering between flat, low pass and chroma pass modes.

GAIN
Varies the gain of the waveform monitor, giving 1.0 x and variable.

SHIFTS
Provides horizontal and vertical shift for the waveform monitor section.
Press both buttons together for preset position.
To store a new vertical position, press both GRAT buttons together.

V RNG, H RNG
Control the horiz sweep rate of the waveform monitor section giving two fields, one field, vertical magnified, two lines, one line and one line magnified.

75 100
Varies the gain of the vectorscope section for 75% and 100% colour bars.

VAR
Gives variable vector gain (internal adj).

PHASE
Provides continuous rotation of the vector display to +/- 45 deg.
Press both buttons for preset position.

PAL SW
Disables the PAL switch action for a 6 vector display.

AUDIO
Turns the audio display and graticule on and off.

APPLICATION

The condensed size of the Hamlet Micro Scope lends itself to numerous operational applications, P.S.C. (Portable Single Camera shoots), flyaway editing packs, mobile satellite links, inject points, links packs etc.

The Hamlet Micro Scope provides full broadcast measuring and monitoring capability, producing displays of waveforms and vectors which may be seen on any standard monitor, LCD screen or via the return feed to a camera viewfinder.

The unit provides accuracy better than 1%, 1 deg, and includes individual or combination full screen displays of both waveform and vectors, 1/2 and 1/4 size screen displays, plus mix display. Waveform functions include H, 2H, HMAG, 2V, V, VMAG, Chroma Pass, Low Pass and Flat filtering, vertical and horizontal shift and gain magnification.

Vector controls include 75% and 100% set positions for vectorscope, plus magnification and phase control. The standby mode (auto bypass) ensures no battery drain if the unit is not required "on" all the time.

GRATICULE

PAL WAVEFORM GRATICULE

The waveform graticule divides the vertical axis into twelve amplitude steps of 100mV each, with markings on levels 0 to 1.0. At the 1 volt level, there are additional
K factor marks for +/- 2«% and +/- 5%.
The horizontal axis graticule marks are placed on the black level line.
Horizontal calibration is: 1 uS per division in HMAG
5 uS per division in H
10uS per division in 2H
In small mode, a simpler graticule is used, with amplitude lines drawn at 0V, black level and 1V.

PAL VECTOR GRATICULE

The vector graticule shows the vector amplitude and phase positions for standard input 75% or 100% colour bars together with the U and V axis. The boxes represent limits of +/-5% amplitude and +/-3 deg phase and are labelled with the appropriate colour letter. Burst marks are provided for 75% and 100% gain settings.
Differential phase marks are provided every 90 degrees on the vector circle and are spaced 2 degrees apart.
Differential gain marks are on the left hand axis and are 2.5% apart.
The audio graticule can be specified for PPM, NORDIC or VU.
In small mode, a simpler graticule is used, without the lettering or diff phase marks.

NTSC WAVEFORM GRATICULE

The waveform graticule divides the vertical axis into 140 IRE units, with markings at levels -40 to +100 and % marks at 0, 12.5, 75 and 100.
At the one volt level there are additional marks for K factor levels of +/-2«% and +/-5%.
The horizontal axis graticule marks are on the zero IRE line
Horizontal calibration is: 1 uS per division in H MAG
5 uS per division in H
10uS per division in 2H
In small mode, a simpler graticule is used, with amplitude lines drawn at 0V, black level and 1V.

NTSC VECTOR GRATICULE

The vector graticule shows the vector amplitude and phase positions for standard colour bars, together with the U,V,I & Q axis. Boxes represent limits of +/- 3.5% of amplitude and +/- 2.5deg of phase and are labelled with the appropriate colour letter. A burst cal mark is provided on the left U axis
Differential phase measurement marks are provided at each 90 deg point on the vector circle and are spaced 2 degrees apart
Differential gain measurement marks are provided on the left hand U axis at 2.5% intervals
In small mode, a simpler graticule is used, without the lettering or diff phase marks.

BATTERY CARE

The Micro Scope contains an internal NiCad battery pack of 7.2V x 0.7Ah and a C/10 constant current charger. The charger operates whether or not the unit is switched on and draws 70mA from the external 12V supply. The rear panel CHG switch should be set to 0 if this current drain is unacceptable. The batteries will fully charge in 14 hours and then give an operational life of approximately two hours. The charger can be left on permanently but this may cause a slight reduction in battery life over a long period.

For maximum battery capacity, the batteries should be fully discharged before a recharge cycle is commenced, to avoid the memory effect.

The front panel power light will turn red when the batteries have only 10% capacity remaining, giving about ten minutes of operational life. When the batteries are exhausted the Micro Scope turns itself off automatically to avoid disturbed or inaccurate displays. Output video is maintained by a bypass relay unless the internal jumper is set to loop-protect.

ADJUSTMENTS AND CALIBRATION

AMPLITUDE CALIBRATION
Preset controls are provided for fine adjustment of waveform and vector gain in relation to the electronic graticule.
Adjust RV6 (WCAL) for waveform and RV10 (CCAL) for vector calibration.

FILTERS
Adjust L6 (LPASS) for minimum chroma in low pass mode.
Adjust L7 (CPASS) for maximum chroma in chroma pass mode.

CALIBRATOR
Only adjust if an accurate comparison source is available!
Adjust RV12 (CAL) for 1 volt luminance display.
Adjust RV9 (CALC) for 1 volt chroma display.

MIX LEVEL
Adjust RV13 (MIX) for desired background level in mix mode.

DIGITAL VCOS
Using a meter with input resistance greater than 1M ohm:
Adjust CV2, with a plastic tool, for 2.5 volts at U1 pin 9
Adjust CV1, with a plastic tool, for 2.5 volts at R18

TIMEBASE CALIBRATION
As the horizontal sweep and graticule are both derived from a crystal reference, there is no need, nor is there provision for any adjustments.

VECTORSCOPE LINEUP
With colour bars applied to the input, select VEC mode
Adjust RV2 (U_SHIFT) and RV1 (DIAG) for centring
Adjust L3 (90 deg) and RV11 (UGAIN) for balanced display
Adjust L5 (CFILT) for straight lines between the vector dots
Adjust L1 (REF) for centered phase control action.
AUDIO
Adjust RV5 (VPOS) so bottom of bars touch bottom of graticule
Adjust RV3 (LCAL) for left channel gain calibration.
Adjust RV4 (RCAL) for right channel gain calibration.

GENERAL DESCRIPTION

INTRODUCTION

The Micro Scope is basically an oscilloscope, but with the CRT tube replaced by an analog to digital converter circuit and a television field store, which act as a digital scan converter
In order to obtain a display identical to that produced on an analog CRT, the field store is addressed in the same way as the electron beam in a conventional instrument scans its phosphor

INPUT VIDEO

The incoming video signal is buffered and DC restored, then split in two ways. One path is via the output waveform inserter and out to the t.v. display monitor. The second path is to the oscilloscope section which contains the usual filters, gain controls and sync separators. A feed is also output to the decoder (option). The resultant video signal of video or of vector V is then digitised to provide the Y axis data for the video memory Vector U is digitised to provide X axis data for the video memory.

DIGITAL STAGES

Video memory X axis data is obtained from a crystal controlled counter, with its division ratio controlled by the timebase range switch, and its phase controlled by a digital phase shifter fed by internal syncs, to allow locking to the syncs and for horizontal shift control.
The memory is read-out from in synchronism with the input video signal to produce the required output display areas, with their size and position being selectable.

GRATICULE

The internally generated electronic graticules are stored in an Eprom, which allows custom designs to be implemented. They are superimposed on to the output video in synchronism with the field store to give exact calibration with no parallax errors

CONTROL

All Micro Scope functions are controlled by a microprocessor in conjunction with an EEprom. This allows power down function storage, function memories and remote control.

The Micro Scope is split into three main circuit boards: Analog, Digital and Front Panel.

ANALOG BOARD

VIDEO IN/OUT
The input video is amplified and DC restored using feedback restoration at U13a. Video is then fed to switcher U14 which gates in the waveform display on black or variable background video, and is output via video buffer U13b and the bypass relay.

SYNC SEPERATOR
U15 provides internal sync separation and clamp pulse formation for the memory read side, whilst the vector decoder separates syncs for the write side.

VIDEO PATH
The video signal is fed out to the gain and filter switches and is then amplified at U5 and goes to the digital board via switcher U2.

VECTOR PATH
The dual demodulator U9 is fed with subcarrier and chroma and outputs vectors V and U. These are filtered, buffered and clamped and go to the digital board via switcher U2.

AUDIO
The stereo input is unbalanced by U12c/d. In PPM mode it is fed to non linear stage U12a/b. Jumpers J2/3 select PPM or VU signals and time constants, feeding the ramp generator around U4. Alternate L/R ramps are buffered by U8a and fed to the digital board via switcher U2.

DIGITAL BOARD

This board is the digital scan converter, comprising analog to digital conversion, clock and control signal generators for the analog board and memory, two field memories and graticule generator. It is split into read and write sections

READ ADDRESS
Syncs from the analog board are digitally separated to produce horizontal and vertical trigger pulses. The horizontal pulses lock the read clock oscillator, which clocks the horiz read timing counter. Similarly, vertical sync phases up the vertical timing counter, which is clocked by H drive. These two counters determine the output display sizes and positions for full screen displays, small screen top and small screen bottom displays.
The 25Hz interlace signal is digitally separated from the syncs to enable the memories to changeover between reading and writing in synchronism with the input video

WRITE ADDRESS
Syncs from the analog board are digitally separated to produce horizontal and vertical trigger pulses as above. These are used to phase-up the write counter to in coming video. The 20MHz write clock is divided by two to produce the clock for the ADC and the memory write enable. This clock is then divided down to the required rates for the timebase switcher.
Horizontal shift is obtained by controlling an up/down counter from the front panel shift control, which is then loaded into a down counter clocked at timebase rate, to vary the phase of the horizontal write counter.

A to D CONVERTION
The analog board selects whether video, vector or audio signals are fed to the 8 bit flash ADC converter U2, controlled by the digital board. The ADC is fed with a 10 MHz timing clock which governs the sample point and output latch clocking.

CHROMA INTERLEAVING
The remainder of the circuitry is mainly for the generation of the chroma interleaved samples. To allow only one ADC converter to be used, the chroma samples are interleaved with the video samples. This is offset line by line to mask any patterning.
A counter and decoder produce the required sequence of eleven video samples followed by a chroma U sample and a chroma V sample, and also enable sch samples. This thirteen bit sequence repeats only every thirteen lines, thus all horiz addresses are sampled. The writing is blanked on the 12th count to prevent chroma U from being written into the video memory during the U storage cycle.

ADDRESSING
Memory A0 to A7 is the horizontal address, with A0 selecting video or vector output displays in the small display mode and being the least significant bit in expand mode.
Memory A8-A15 is the vertical address, with A8 the least significant bit in full screen mode, but not used in normal mode (held low).

DIGITAL BOARD

WRITING
The memory is written into in a read-modify-write manner, so that at each write address, previous memory data is read out, incremented by one and written back in. This gives true 4 bit (15 level) brightness output.

MEMORY
The two 64Kx4 fast static rams are the two fields of memory for the scan converter.
During television field one, the first memory is written into and the second is read out from. During television field two the action is reversed, allowing totally separate reading and writing, and doubling memory speed.

OUTPUT
The memory outputs are latched and fed to a 4 bit DAC to provide the waveform brightness information to feed back to the analog board, where it is inserted into the output video signal
The output data rate is 15Mhz (PAL) in small mode and 7.5Mhz in full screen mode.

ERASURE
Erasure is carried out by writing a logic 0 into each memory address during its readout frame. In full screen mode, each bit is erased straight after it has been read out, but in small mode, erasure is carried out separately after the display area by cycling through all the addresses, to conserve memory speed.

GRATICULE
The graticules are stored in an Eprom chip, for full screen waveform, full screen vectors, full screen both and small.
The data is output via a serial to parallel converter to the analog board. The front panel scale pot controls the level by varying the load impedance.

INTERNAL PULSE GENERATOR
A full broadcast specification mono sync generator is enabled if no input sync is present. This allows the monitor output display to be maintained and a pure sync output to allow tape blacking etc.

FRONT PANEL BOARD

The board contains the power supply and controls the other boards.

Internal or external supply (via the digital board) is regulated to 5 volts by switcher U4. U1 inverts this to produce the -5 volt rail. Bistable T3/T4 enables the power regulator. This is reset by U6B if the incoming supply is too low.
U6A compares the supply (internal or external) with a fixed reference and outputs to a bi-colour led. This will glow green for supplies over 6 volts and red for supplies below this. This gives a warning of low external supply or when the internal batteries are 90% discharged - giving about 10 minutes operation remaining.

Microcontroller U3 interfaces with the remote panel and external RS232 to control the other boards. Scale, V Shift and Phase dc voltages are produced by filtering a variable mark-space ratio output. EEprom U5 stores settings when power is removed.

PARTS LIST

MICANA PART NUMBERS

R1 = 24K	0.25W 1%
R2 = 18K	0.25W 1%
R3 = 6.8K	0.25W 1%
R4 = 3.3K	0.25W 1%
R5 = 1K	0.25W 1%
R6 = 1K	0.25W 1%
R7 = 470R	0.25W 1%
R8 = 100R	0.25W 1%
R9 = 470R	0.25W 1%
R10 = 4.7K	0.25W 1%
R11 = 47K	0.25W 1%
R12 = 390R	0.25W 1%
R13 = 1.2K	0.25W 1%
R14 = 27K	0.25W 1%
R15 = 2.2K	5 res in 6 sil
R16 = 470R	0.25W 1%
R17 = 470K	0.25W 1%
R18 = 220K	0.25W 1%
R19 = 2.2K	4 res in 8 sil
R20 = 680R	0.25W 1%
R21 = 1K	0.25W 1%
R22 = 1.5K	0.25W 1%
R23 = 3.6K	0.25W 1%
R24 = 1K	0.25W 1%
R25 = 1K	4 res in 8 pin sil
R26 = 4.7K	0.25W 1%
R27 = 4.7K	0.25W 1%
R28 = 10K	4 res in 8 sil
R29 = 1M	0.25W 1%
R30 = 1K	0.25W 1%
R31 = 100R	0.25W 1%
R32 = 180R	0.25W 1%
R33 = 180R	0.25W 1%
R34 = 2.2K	4 res 8 sil
R35 = 10K	0.25W 1%
R36 = 10K	0.25W 1%
R37 = 12K	0.25W 1%
R38 = 300R	0.25W 1%
R39 = 2.2K	0.25W 1%
R40 = 120R	0.25W 1%
R41 = 1M	0.25W 1%
R42 = 1K	4 res in 8 sil
R43 = 470R	0.25W 1%
R44 = 220K	4 res in 8 sil
R45 = 100K	4 res in 8 sil
R46 = 22K	0.25W 1%
R47 = 75R	0.25W 1%

MICANA PART NUMBERS

R48 =	75R	0.25W 1%
R49 =	680K	0.25W 1%
R50 =	47K	0.25W 1%
R51 =	47K	0.25W 1%
R52 =	22K	0.25W 1%
R53 =	75R	0.25W 1%
RV1 =	200R	MEC Citec 406P
RV2 =	100K	MEC Citec 406P
RV3 =	100K	MEC Citec 406P
RV4 =	100K	MEC Citec 406P
RV5 =	20K	MEC Citec 406P
RV6 =	200R	MEC Citec 406P
RV7 =	1k	Bourns 3266W
RV8 =	2K	Bourns 3266W
RV9 =	200R	MEC Citec 406P
RV10=	2k	MEC Citec 406P
RV11=	500R	MEC Citec 406P
RV12=	200R	MEC Citec 406P
RV13=	1K	MEC Citec 406P
C1 =	22p	low K 0.1"
C2 =	0.1u	ceramic 0.1"
C3 =	10u	16v radial
C4 =	1n	10% 0.1"
C5 =	10u	16v radial
C6 =	10u	16v radial
C7 =	4.7n	10% 0.1"
C8 =	4.7n	10% 0.1"
C9 =	1u	16v radial
C10 =	33p	low K 0.1"
C11 =	100p	low K 0.1"
C12 =	0.1u	ceramic 0.1"
C13 =	47p	low K 0.1"
C14 =	10u	16v radial
C15 =	150p	low K 0.1"
C16 =	180p	low K 0.1"
C17 =	10u	16v radial
C18 =	10u	16v radial
C19 =	47u	6V tant 0.2"
C20 =	N/F	
C21 =	47u	6V tant 0.2"
C22 =	10u	16v radial
C23 =	10u	16v radial
C24 =	47p	low K 0.1"
C25 =	3.3p	low K 0.1"
C26 =	0.1u	ceramic 0.1"

MICANA PART NUMBERS

C27 =	47n	10%	0.1"
C28 =	68p	low K	0.1"
C29 =	10n	10%	0.1"
C30 =	39p	low K	0.1"
C31 =	18p	low K	0.1"
C32 =	10n	10%	0.1"
C33 =	18p	low K	0.1"
C34 =	18p	low K	0.1"
C35 =	68p	low K	0.1"
C36 =	68p	low K	0.1"
C37 =	15p	low K	0.1"
C38 =	10n	10%	0.1"
C39 =	10n	10%	0.1"
C40 =	100p	low K	0.1"
C41 =	470p	med K	0.1"
C42 =	10n	10%	0.1"
C43 =	0.1u	ceramic	0.1"
C44 =	3.3p	low K	0.1"
C45 =	470p	med K	0.1"
C46 =	0.1u	ceramic	0.1"
C47 =	0.1u	ceramic	0.1"
C48 =	220p	low K	0.1"
C49 =	0.1u	ceramic	0.1"
C50 =	0.1u	ceramic	0.1"
C51 =	0.1u	ceramic	0.1"
C52 =	22u	10v radial	
C53 =	22u	10v radial	

CV1 =	50p	trimmer	0.2"

D1 = BAT85	schottky diode
D2 = BAT85	schottky diode
D3 = 1N914	diode
D4 = 1N914	diode
D5 = 1N914	diode
D6 = 1N914	diode
D7 = BAT85	schottky diode
D8 = BAT85	schottky diode
D9 = BAT85	schottky diode
D10 = BAT85	schottky diode
D11 = BAT85	schottky diode
D12 = BAT85	schottky diode
D13 = BAT85	schottky diode
D14 = BAT85	schottky diode

MICANA PART NUMBERS

L1 = 33uH	Toko 5P
L2 = 270uH	Toko 5P
L3 = 33uH	Toko 5P
L4 = 270uH	Toko 5P
L5 = 33uH	Toko 5P
L6 = 270uH	Toko 5P
L7 = 68uH	Toko 5P
L8 = 6.8uH	Toko 7BS
J1 = Jumper	2 pin Jumper 0.1" pitch
J2 = Jumper	3 pin Jumper 0.1" pitch + link
J3 = Jumper	3 pin Jumper 0.1" pitch + link
J4 = Jumper	Dual 3 pin Jumper 0.1" pitch + 2 links
PL1 = 26 pin	Double row 90 deg plug (cut from Rapid 22-0895)
PL2 = BNC	Protech elbow socket
PL3 = BNC	Protech elbow socket
PL4 = BNC	Protech elbow socket
PL5 = BNC	Protech elbow socket
PL6 = DIN	6 pin mini din 90 deg skt
RY1 = RELAY	SDS/Matsushita TQ2 5V
SW1 = SPDT	Rapid 76-0270
SW2 = SPDT	Rapid 76-0270
T1 = BC548	npn
T2 = BC548	npn
T3 = BC548	npn
T4 = BC548	npn
T5 = BC548	npn
T6 = BC548	npn
T7 = 2N7000	fet
T8 = 2N7000	fet
T9 = BC548	npn

MICANA PART NUMBERS

U1 = CXA1228 Sony Colour Decoder
U2 = PC74HC4051
U3 = LM317LZ Regulator
U4 = PC74HC4053
U5 = EL2044 Elantec amp
U6 = PC74HC4053
U7 = TBA520 Colour dual demod
U8 = LM358 Dual opamp
U9 = PC74HC4053
U10= 74HC00
U11= PC74HC4053
U12= TL064 Quad opamp
U13= EL2244 Elantec amp
U14= PC74HC4053
U15= EL4581 Elantec sync sep

X1 = 4.43MHz crystal HC49
CR1= 4.43MHz ceramic resonator

PCB= 4.75" x 3.8" 2 layer pth

MICDIG PART NUMBERS

C1 = 47u	6V tant 0.2"
C2 = 2.2u	50v radial
C3 = 0.1u	ceramic 0.1"
C4 = 0.1u	ceramic 0.1"
C5 = 10n	10% 0.1"
C6 = 0.1u	ceramic 0.1"
C7 = 100p	low K 0.1"
C8 = 0.1u	ceramic 0.1"
C9 = 0.1u	ceramic 0.1"
C10 = 0.1u	ceramic 0.1"
C11 = 100p	low K 0.1"
C12 = 100p	low K 0.1"
C13 = 0.1u	ceramic 0.1"
C14 = 0.1u	ceramic 0.1"
C15 = 0.1u	ceramic 0.1"

CV1 = 50p	ceramic trimmer 0.2"
CV2 = 50p	ceramic trimmer 0.2"

D1 = 1N914	diode
D2 = 1N914	diode
D3 = BAT85	shottky diode
D4 = BB609B	varicap diode
D5 = 1N4002	diode
D6 = 1N4002	diode

R1 = 47K	0.25W 1%
R2 = 3.3K	0.25W 1%
R3 = 10K	0.25W 1%
R4 = 10K	0.25W 1%
R5 = 39K	0.25W 1%
R6 = 18K	0.25W 1%
R7 = 4.7K	0.25W 1%
R8 = 10K	0.25W 1%
R9 = 1K	0.25W 1%
R10 = 4.7K	0.25W 1%
R11 = 47R	0.25W 1%
R12 = 2.2K	0.25W 1%
R13 = 10K	0.25W 1%
R14 = 1K	0.25W 1%
R15 = 2.2K	0.25W 1%
R16 = 100K	0.25W 1%
R17 = 1K	0.25W 1%
R18 = 220K	0.25W 1%
R19 = 10K	0.25W 1%
R20 = 220K	0.25W 1%
R21 = 220R	0.25W 1%

MICDIG PART NUMBERS

R22 =	22K	0.25W 1%
R23 =	10K	0.25W 1%
R24 =	1K	0.25W 1%
R25 =	10R	0.25W 1%

T1 =	BC548	npn
T2 =	BC548	npn
T3 =	2N7000	fet
T4 =	BC548	npn
T5 =	BD131	npn power
T6 =	BC548	npn

U1 =	PC74HC4046	
U2 =	CXD1175	Sony adc
U3 =	TLE2425	Texas virtual ground
U4 =	ACT1020	Gate Array
U5 =	ACT1020	Gate Array
U6 =	64K X 4	Static Ram -35nS
U7 =	64K X 4	Static Ram -35nS
U8 =	27C010	1Meg Eprom -150nS
U9 =	PAL18CV8	ICT Peel -25nS

X1 =	20MHz	HC49/4H @15pF

SW1 =	SPDT	Rapid 76-0270
SW2 =	SPDT	Rapid 76-0270

J1 =	Jumper	3 pin jumper 0.1" + link

PL1 =	34 pin	Double row 90 deg (cut from Rapid 22-0895)
PL2 =	RS232	1.3mm power skt (Farnell 224-947)
PL3 =	BATT	2 pins on 0.2" pitch
PL4 =	12V	2.1mm power skt (Rapid 20-0970)

PCB = 4.75" x 3.8" 4 layer pth

MICPAN PART NUMBERS

C1	= 220u	16v radial (ELNA-RSH)
C2	= 220u	16v radial (ELNA-RSH)
C3	= 220u	16v radial (ELNA-RSH)
C4	= 10u	16v radial
C5	= 220u	16v radial (ELNA-RSH)
C6	= 10u	16v radial
C7	= 220u	16v radial (ELNA-RSH)
C8	= 330p	low K 0.1"
C9	= 0.1u	ceramic 0.1"
C10	= 47u	10v radial
C11	= 10u	16v radial
C12	= 0.1u	ceramic 0.1"
C13	=0.22u	10% 0.2"
C14	= 22p	Low K 0.1"
C15	= 22p	Low K 0.1"
C16	= 2.2n	10% 0.1"
C17	= 10n	10% 0.1"
C18	= 0.1u	ceramic 0.1"
C19	= 47n	10% 0.1"
C20	= 2.2u	50v radial
C21	= 1u	50v radial

D1	= 1N914	diode
D2	= 1N914	diode
D3	= LED	3mm Red/Green bicolour led
D4	= LED	3mm Red led
D5	= BYV10-40	schottky diode
D6	= 1N914	diode
D7	= C4V7	400mW Zener diode

R1	= 4.7K	4 res in 8 pin sil
R2	= 100K	0.25W 1%
R3	= 470K	0.25W 1%
R4	= 10K	0.25W 1%
R5	= 1M	0.25W 1%
R6	= 100R	0.25W 1%
R7	= 10K	4 res in 8 pin sil
R8	= 100K	4 res in 8 pin sil
R9	= 100R	0.25W 1%
R10	= 22K	0.25W 1%
R11	= 4.7K	0.25W 1%
R12	= 100K	0.25W 1%
R13	= 680K	0.25W 1%

MICPAN PART NUMBERS

R14 = 27K	0.25W 1%
R15 = 47K	0.25W 1%
R16 = 1M	0.25W 1%
R17 = 2.2K	8 res in 9 pin sil
R18 = 100K	0.25W 1%
L1 = 10uH	Toko 8RHB
L2 = 100uH	90 Turns on T68-1 toroid
L3 = 10uH	Toko 8RHB
L4 = 100uH	Toko 8RHB
PL1 = 26pin	pcb socket (see Rapid 22-0665)
PL2 = 13pin	0.1"sil pin row
PL3 = 34pin	pcb socket (see Rapid 22-0665)
T1 = BC548	npn
T2 = BC558	pnp
T3 = 2N7000	fet
T4 = 2N7000	fet
U1 = MAX660	sw reg (CPA)
U2 = 4094B	Cmos logic
U3 = 87C51	Microcontroller
U4 = MAX738	sw reg (ACPA)
U5 = 93C46	Eeprom
U6 = LM358	dual opamp
U7 = LM358	dual opamp
X1 = 11.059MHz	HC49/4H crystal
PCB = 4.90" x 1.78"	2 layer pth

CASE PARTS

1 x Case (Hammond 1598RBBK)

1 x Front panel (Tactile membrane)

1 x Rear panel (Punched, painted and silk screened)

1 x Insulating Sheet, 100mm x 90mm x 0.8mm

2 x Battery packs (3 x AA Nicad 0.7AH)

2 pin plug (0.2" pitch) and two wires to batteries

1 x Battery bracket

REMOTE CONTROL

FOR MORE DETAILED INFORMATION, PLEASE READ THE DISC HELP FILE.

The software package is for remote control of the Hamlet Micro Scope from a personal computer via an RS 232 serial link. It is recommended that the disk be copied to your hard disk drive and then kept safely as a backup. Please note this version is for a Microsoft Windows Environment. A DOS version is available from the factory if required. Before installation of the application please ensure that your system is able to run it correctly.

HARDWARE REQUIRED

IBM PC or 100% compatible personal computer.
At least 1M Byte of RAM.
A VGA type colour monitor.
A Hard Disk Drive.
An RS-232 Serial Port for connection to the Micro Scope.
A Mouse.
A 3.5" Floppy Disk Drive
The supplied cable to connect the Serial Port to the Micro Scope.

SOFTWARE REQUIRED

Microsoft Windows Version 3.0 or greater.
MS DOS Version 3.3 or greater.
Hamlet Video MICROSCOPE software (disk supplied)
The software consists of the following files:

MICRO.EXE	Executable file
VBRUN100.DLL	Runtime file
MICRO.HLP	HELP file. This is a text file which maybe printed out or called from the HELP window while running the application.
MICRO.SET	Set up file of 4 bytes.
INSTALL.EXE	Installs the software on your hard disk.

INSTALLATION FROM DOS:

To install the software on your hard disk first ensure the computer is in DOS, fit the application disk in the floppy drive,

Type A: to give the A:> prompt then type INSTALL <enter>

This will create a directory on your hard disk called C:\HAMLET then the application files will be copied to that directory.

Note: The files are not protected or compressed so they may be manually copied to any directory required. The INSTALL program also sets up the serial port.

TO RUN THE SOFTWARE FROM THE WINDOWS ENVIRONMENT

On first use of the software, a group window and application file are needed.

To Create a Group Window, start Windows in the usual manner, e.g. Type WIN <enter>

From the Program Manager Window select: FILE NEW. Select Program Group

In the description box type: HAMLET. Select OK

To Add the Application file, in the Group Window, select FILE NEW, select Program Item

In the Description box type MICROSCOPE

In the Command box type the full path name of the application:

i.e. C:\HAMLET\MICRO.EXE Select OK.

The software is now installed on your hard disk and can be called from the Windows Program Manager in the normal way. i.e. double click on the HAMLET Group icon, then double click on the MICRO icon. The first time the software is run it may be necessary to set the COM PORT option in the SETTINGS window. Remember to save it before you return to the main panel window

OPERATION
From the Hamlet Program Manager, double click on the MICROSCOPE icon.

BUTTONS
Use the mouse to point and click the required buttons.

VARIABLE CONTROLS
These use arrows on the computer panel and can be operated in 2 ways.

1) Point the mouse at the arrow of a slider control and hold down the left mouse button, this causes the control to increment or decrement slowly.

2) Point the mouse at the arrow of a slider control and double-click the left mouse button, this causes the preset function to operate.

THE OPTIONS MENU.

BEEP ON/OFF.
When each control is pressed the computer issues a beep, this may be disabled if not required by clicking the "beep off" button.

SERIAL PORT SUB MENU
Used to change the COM PORT used to control the MicroScope. See installation instructions. This command will usually only be used when the MicroScope is first installed.

THE HELP WINDOW
Click on the HELP caption for the information text. The text can be scrolled using the mouse on the "vertical scroll bar" at the right hand side of the window or from the keyboard by using the cursor keys or the PgUp and PgDn keys.

TO QUIT THE PROGRAM
Double click on the "control menu box" (top left window button)

ANALOG BASICS

COMPONENT COLOUR

The colour picture can be distributed in two forms, whether in 625 or 525 line standards:

RGB

This is the basic signal produced by a camera etc and fed to a colour CRT. It consists of three primary signals, **R**ed, **G**reen and **B**lue. By convention, black level is at 0mV and peak brightness is at + 700mV.

YCrCb

As the human eye can see less resolution with colours, the video can be modified to take advantage of this to reduce the amount of information needed. The picture is separated into monochrome and colour components. The monochrome Y signal is formed from:

Y = (0.3 x Red) + (0.59 x Green) + (0.11 x Blue) approximately.
This signal has black level at 0mV and maximum white level at + 700mV.

The colour components are two colour difference signals:

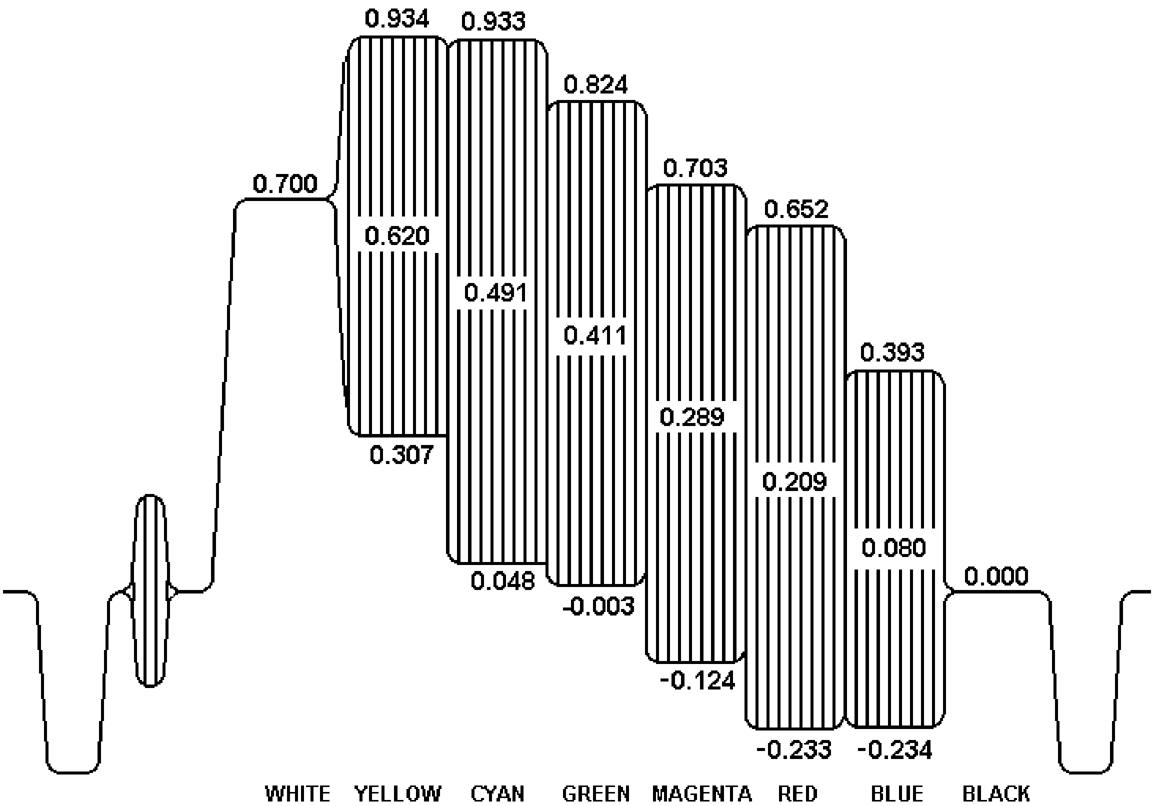
Cr = (R-Y) and Cb = (B-Y)
These are weighted to give maximum values of +/- 350mV and are bandwidth restricted to half that of the Y component.

PAL

Fig 3 shows an encoded 100% colour bar signal. The two colour components of Cr and Cb are used to amplitude modulate a 4.43361875Mhz carrier signal. The two carriers are arranged to be 90 degrees apart before they are combined with the Y luminance signal, so that they can be decoded separately. The PAL system is designed to minimise hue errors by phase reversing the Cr axis on alternate lines (**P**hase **A**lternate **L**ine). This reversal is copied by the decoder, so that the hue error will now alternate in phase. By combining the chrominance from two adjacent lines, the error is thus cancelled out.

NTSC

Fig 4 shows an encoded SMPTE (75%) colour bar signal. The two colour components of Cr and Cb are used to amplitude modulate a 3.579545Mhz carrier signal, but they are first modified into I and Q signals to reduce the overall maximum chrominance level when combined.



100% COLOUR BARS

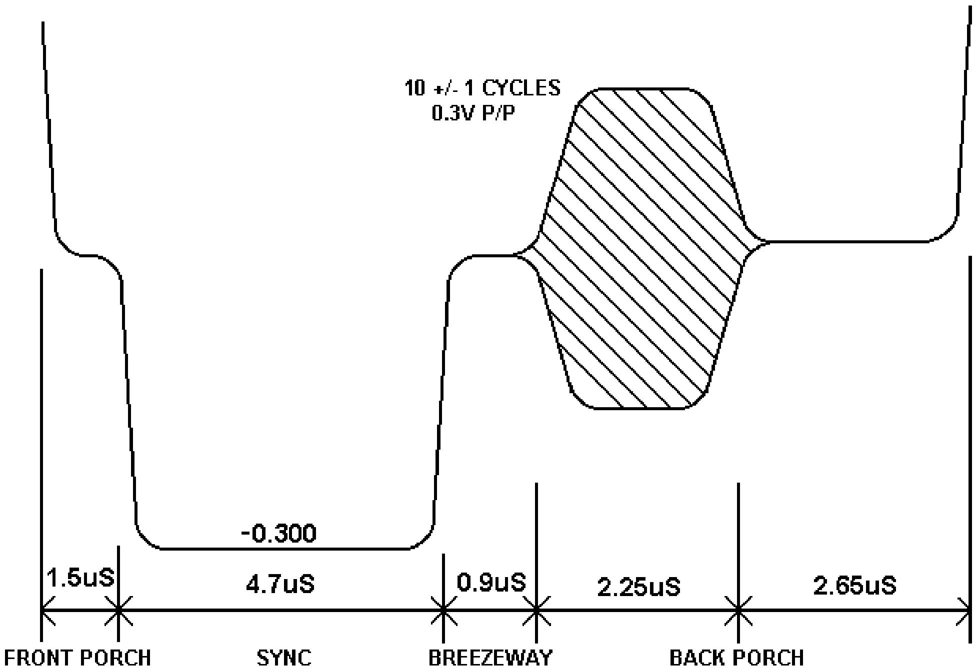


Fig 3 .

NTSC BASICS

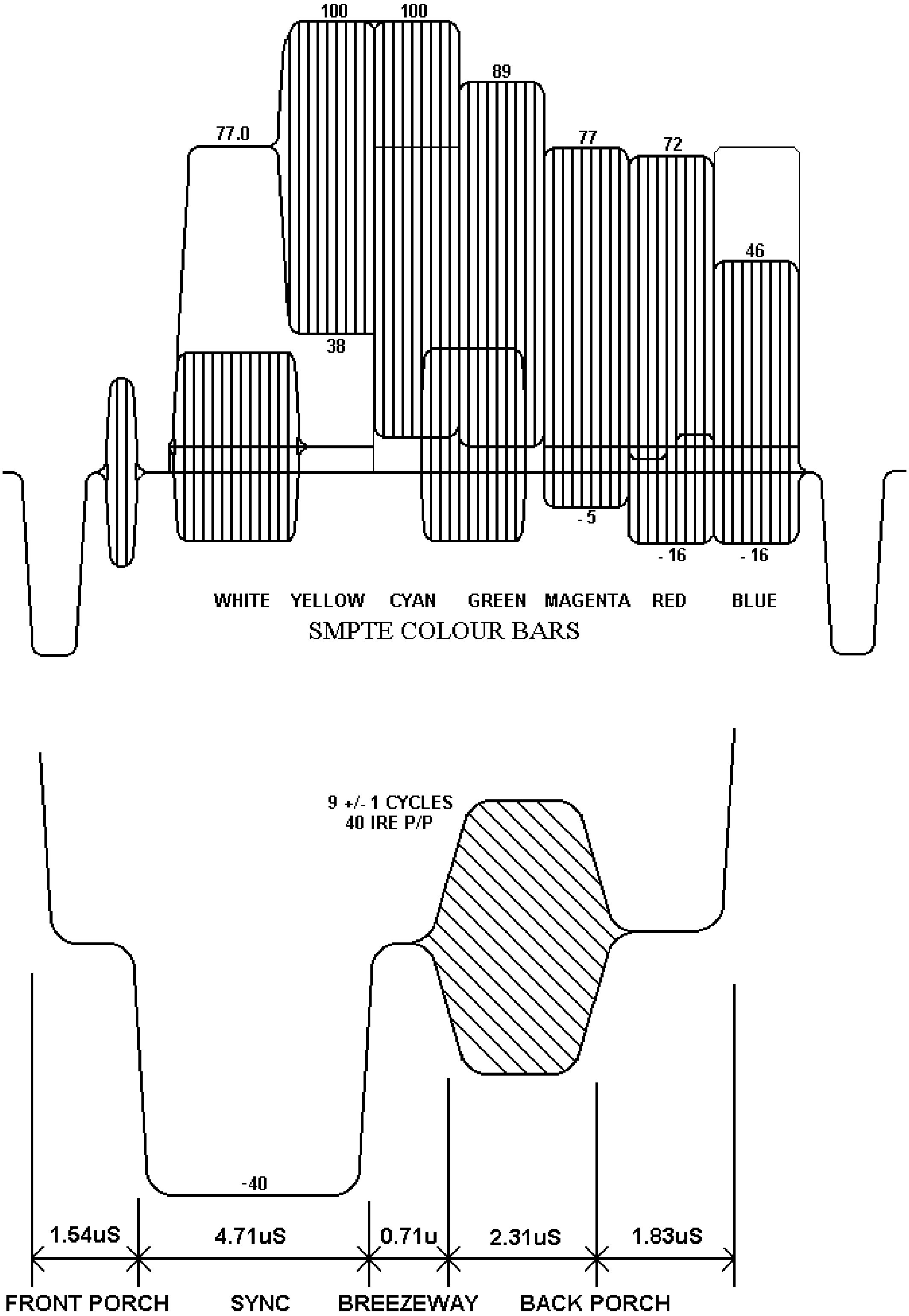


Fig 4 .

SC-H RELATIONSHIP

PAL appears, at first sight, to be a four field system: field 1 being identical to field 5, and field 3 having the opposite pal switch phase. However, if a switch or edit is made between two video sources which are in the same pal sequence only, a small horizontal picture shift will often be noticed, this is due to the relationship between subcarrier and line frequencies.
In order to avoid chroma patterning on monochrome receivers the PAL subcarrier frequency was chosen to have a 90 degree offset per television line, with 25Hz added on so that any remaining patterning would run through the picture:

F (pal) = (283.75 x 15.625KHz) + 25Hz = 4.43361875MHz

The drawback of this is that after one PAL frame of four fields the subcarrier will have executed exactly 354689.50 cycles, so it will be 180 degrees shifted from its original phase at the same sync point. Hence the subcarrier to horizontal sync (SC-H) phase will only repeat every EIGHT fields.
A similar problem also exists in NTSC, except that it is a four field system rather than eight field.

F (ntsc) = (227.5 x 15.73426373KHz) = 3.579545MHz

After one NTSC frame of two fields, the subcarrier will have executed exactly 119437.50 cycles, so it will then be exactly 180 degrees shifted from its original phase at the same sync point hence the sc-h phase will only repeat every FOUR fields.

If a video edit or switch is made without regard to the above field sequence, there is a 50/50 chance of picking the wrong eight field match. This will cause an SC-H phase jump producing a picture shift of half a cycle of subcarrier. Whilst this may be acceptable if cutting to a different shot, in animation or tag-editing the shift would be very noticeable.
To produce reliable match frame edits it is therefore necessary to identify the correct field sequence. In addition, if due to misalignment, the SC-H phase was displaced from the ideal by 90 degrees, the field relationship would be uncertain.

Both these problems can be addressed by having an instrument which displays the subcarrier phase to horizontal sync phasing. Zero SC-H phase has been defined as a positive zero-crossing of subcarrier at the vertical sync point on field 1.

Systems can now be adjusted in the exactly correct SC-H phase to avoid uncertainty when near to the 90 degree point. A video signal in the exactly wrong eight-field sequence would show up as an 180 degree SC-H phase error.

USEFUL WEBSITES

HAMLET	www.hamlet.co.uk	
HAMLET (USA)	www.hamlet.us.com	
SMPTE	www.smpte.org	Society of Motion Picture Television Engineers
DIN	www.din.de	German Standards Institute
EBU	www.ebu.ch	European Broadcasting Union
AES	www.aes.org	Audio Engineering Society
ITU	www.itu.int	International Telecommunication Union

CONTACT DETAILS AND CUSTOMER SUPPORT

For any form of assistance in maintaining your Micro Scope, please contact:

Hamlet Video International Limited
Maple House 11 Corinium Business Centre Raans Road Amersham Bucks HP6 6FB England
Main Line: +44 (0)1494 729 728
Fax Line: +44 (0)1494 723 237
Free phone (UK) 0500 625 525
E-mail: sales@hamlet.co.uk Web site: www.hamlet.co.uk

Hamlet Video International USA service center , Tecads Inc, 23 Del Padre St, Foothill Ranch, CA 92610, U.S.A.
Tel: +1 (949) 597 1053,
Fax: +1 (949) 597 1094.
Toll Free Tel number: (866) 4 HAMLET
E-mail: service@hamlet.us.com Web site: www.hamlet.us.com

In correspondence concerning this instrument, please quote the serial number, which you will find printed on the label at the back of the unit.