HAMLET

VIDEOSCOPE 301WV & WVA

VIDEO MONITORING SYSTEM

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SERIAL NUMBERS 23187 ON

In correspondence concerning this instrument, please quote the serial number printed on the label at the rear of the unit.
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 LTD
    ORCHARD HOUSE
    AMERSHAM ROAD
    CHESHAM
    BUCKS
    HP5 1NE

declare under our sole responsibility that the products

HAMLET VIDEO SCOPE 301WV and 301WVA

to which this declaration relates are in conformity with the following standard,

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 are used in operation.
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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.

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 pre-paid, to the factory or authorised service facility.

No other warranty is expressed or implied.

This 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.
TECHNICAL SPECIFICATION

DISPLAY AREA
The waveforms are in square boxes burnt into the video signal.
Expand mode: Video and/or vector boxes, are each 512 lines high with a width of 34uSec in PAL and 40uSec in NTSC.
Small mode: Video and vector boxes at top or bottom of screen. Internal selection of half or quarter size.

SIGNAL CONNECTIONS
Inputs: Three B.N.C connectors for the A, B and C inputs, with loop through outputs. Return loss is better than 40db. Zin of 25K ohm, max d.c. +/- 3 volts.
B.N.C. connector for external reference sync or video signal, sync amplitude of 0.1V to 4V, Zin of 25K ohm loop through output. Return loss is better than 40db.
Front panel B.N.C. Zin of 1M ohm parallel with 30pF
Outputs: 1 + 2 to monitor, 1 Volt to 75 ohms.

WAVEFORM MONITOR
Response: Flat +/- 1% from 25Hz to 5.5MHz, -5% at 10MHz
Low pass is -1db at 1MHz, -40db at 3.58 / 4.4MHz
Chroma is a bandpass filter -3db at +/- 750KHz
Sensitivity: 1V video-in displays 100% (140 IRE) in CAL mode
Gain variable between 0.5 and 5 times.
Error in CAL position is less than 1%.
D.C. Restorer: Attenuation of less than 30% to line hum signals, displayed level changes less than 2% for 1 volt change in mean signal level.
Timebase: 2V, V, 2H, H, V mag, H mag. ABC parade, Filter parade. Accuracy limited only by display resolution due to crystal sweep.

VECTOR MONITOR
Accuracy: Better than 1% in CAL mode 75% or 100% positions
Gain is continuously variable from .5 to 3 times
Display phase is continuously variable by more than 360 degrees.
Pal switch on/off.

POWER REQUIREMENTS
105V-120V A.C. 48Hz to 66Hz @ 20VA, with 200ma slow T fuse.
210V-250V A.C. 48Hz to 66Hz @ 20VA, with 100ma slow T fuse.
9V-24V D.C. @ 10VA, with internal 2amp fast F fuse.

ENVIRONMENT
Indoor use, 5 to 40 deg C ambient to 2,000 m.
Max humidity 80% to 31deg C decreasing to 50% at 40deg C.
Overvoltage category 2. Pollution degree 1.

WEIGHT
3.5Kg.
INSTALLATION

UNPACKING

The HVI 301 unit is shipped from the factory in a specially constructed packing case. Exercise caution when unpacking the unit to prevent damage to the case finish. Examine the unit carefully for damage which may have occurred during shipment.

MOUNTING INSTRUCTIONS

The Videoscope has been designed to fit into a standard 19 inch equipment rack, where it occupies 1U of height. The unit itself generates little heat and does not need forced ventilation, but heat generated from adjacent units should not cause the case temperature to rise above 50 deg.C.

POWER REQUIREMENTS

Mains supplies of 110V, 240V or 12V DC are all suitable. The AC voltage selector is on the rear of the unit. When operating from mains supplies, the integrity of the supply earth should be checked to maintain electrical safety. The mains cable should be protected by a fast fuse of no greater than 6 amps in the supply feed.

SIGNAL AND CONTROL CONNECTIONS

Input and output cable connections are all made to BNC sockets on the rear panel. To utilise all the Videoscope functions, the A B C and BNC inputs, both outputs, and external reference (vid or syncs) should all be wired. The inputs need not be composite video signals, as in EXT VID mode they are displayed keyed into the external video signal.

CHECKOUT FOR INITIAL USE

After installation as above, switch on the Videoscope unit and operate each control in turn, verifying correct response as described in the operating instructions.

PREVENTATIVE MAINTENANCE

The Hamlet 301 should be visually inspected, cleaned and the calibration checked every one year of operation.

CAUTION. The front panel is made from polycarbonate, which may soften if cleaned with some organic solvents. Do not allow water to get inside the equipment case.
OPERATING INSTRUCTIONS

1M
Is the high impedance BNC input

ABC
Selects input A, B or C

BNC CAL
Selects the front panel BNC or internal calibrator

INTERNAL PG
If no input is fed to the unit, an internal pulse generator maintains a locked monitor display.

EXT REF
Controls whether internal or external reference is used for the waveform monitor and vectorscope.

EXT-VID
Allows any input waveforms to be keyed into the external video signal, useful where the input signal is not a composite one

SCALE
Controls the brightness of the internal electronic graticules

OFF MIX
Removes the waveform displays or provides a mix between picture and waveforms, controlled by the preset under the button.

FRZ STO
Controls the display persistence, normally standard 20mSec, STORE is infinite persistence and FRZ freezes the display.

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

TOP BTM
Displays the smaller displays at top or bottom of screen.
GAIN
Varies the gain of the waveform monitor from 0.5 to 5x with CAL position adjustable by the adjacent preset control.

SHIFT
Vertical shift for the waveform monitor section

FLAT LPASS CPASS
Switches the video filter between flat, low and chroma pass.

BC LIFT
Adds a 350mV step to inputs B and C for use with Y,U,V inputs.

TIMEBASE SWITCHES
Selects: Two field vertical, Vertical, Vertical magnified (internally variable), Two lines, One line, One line magnified, ABC parade and Filter parade.

GAIN
Varies the gain of the vectorscope section from 0.5 to 5 times

CAL
Sets the gain of the vectorscope section in unity gain position

PHASE
Provides 360 degree rotation of the vector display.

75 100
Controls the gain of the vectorscope for 75% and 100% bars.

PAL SW
Disables the 7.8KHz PAL switch to give a 'six vector' display
**PAL WAVEFORM GRATICULE**

In the WFM mode, 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 +/- 2σ% and +/- 5%. The horizontal axis graticule marks are placed on the black level line.

Horizontal calibration is:
- 1 μS per division in H MAG
- 5 μS per division in H
- 10 μS per division in 2H
- 15 μS per division in ABC or FILT

The television operating standard is displayed in the bottom left hand corner of the graticule.

**PAL VECTOR GRATICULE**

In the VEC mode, 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. Sc-H phase error marks are provided on the left hand bar. The television operating standard is displayed in the bottom left hand corner of the graticule.

**NTSC WAVEFORM GRATICULE**

In WFM mode, 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 +/-2σ% and +/-5%.

The horizontal axis graticule marks are on the zero IRE line.

Horizontal calibration is:
- 1 μS per division in H MAG
- 5 μS per division in H
- 10 μS per division in 2H
- 15 μS per division in ABC or FILT

The television operating standard is displayed in the bottom left hand corner of the graticule.

**NTSC VECTOR GRATICULE**

In VEC mode, 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. Sc-H marks are provided on the left hand bar.

The television operating standard is displayed in the bottom left hand corner of the graticule.
ADJUSTMENTS AND CALIBRATION

OBSERVE NORMAL SAFETY PRECAUTIONS WHEN OPERATING
THE UNIT WITH THE COVER REMOVED

TIMEBASE V-MAG MAGNIFICATION
On the digital board, SW1 (VM1 and VM2) select the number of lines displayed: 4 lines, 8
lines, 16 lines or 32 lines.

DISPLAY SIZE
On the digital board, SW1 (>o) selects half or quarter size small displays.

SC-H PHASE
On the digital board, SW1 (SCH) enables the sc-h phase display.

DIGITAL ADJUSTMENTS
Set CV1 (W_VCO) for 2.5V at the adjacent test point, TP.
Set CV2 (R_VCO) for 2.5V at the adjacent test point, TP.
Set R21 for display brightness. Centre position is 1 volt out.

AMPLITUDE CALIBRATION
Presets are provided on the front panel for fine adjustment of video and vector gain in relation
to the electronic graticule
Adjust CV601 on the Analog board to trim H.F. response.
An internal 1 volt video CAL waveform is provided, this can be fine trimmed by RV102 and
CV103/2 (PAL/NTSC).

CHROMA PASS FILTER
On the Analog board, L101/2 set the PAL chroma pass filter.
On the Analog board, L104/5 set the NTSC chroma pass filter.

VECTORSCOPE CENTRING
On the vector board RV602/3 adjust the centring

VECTORSCOPE CALIBRATION
With colour bars applied to any input, and no signal to the external input, switch to VEC and
EXT modes
Adjust CV603 (PAL) or CV604 (NTSC) 90 degree delays and RV607 width for circular
trace.
Adjust CV606 for maximum circle size.
Adjust CV601 (PAL) or CV602 (NTSC) for nearly locked condition Switch back to INT
SYNC.
Trim CV606 for straight lines between vectors
Adjust the front panel cal preset for correct gain calibration
Adjust RV605 to give 450 degrees phase control range.
Do not attempt to adjust L603.
GENERAL DESCRIPTION

INTRODUCTION

The Videoscope 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 or external 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. The persistence of the display is varied by gating the erasure signal applied to the memory.

GRATICULE

The internally generated electronic graticules are stored in eproms which allow 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.

The Videoscope is split into four main circuit boards: Analog Digital, Controller and Vector.
ANALOG BOARD

VIDEO IN/OUT
The input video selected by IC107 and amplified at TR117/118 and DC restored using feedback restoration. Video is then fed to switcher IC606 which gates in the waveform display on black or variable background video, and is output via video buffer IC104. The waveform information is formed at TR115/119 by adding the field store and scale signals.

SYNC SEPARATORS
Two adaptive sync slicers are incorporated, for internal and external sync. IC110, a dual fast comparator is used as a sync slicer, with filtered and clamped video applied to its positive input and half sync-tip voltage applied to its negative input. Transistors TR122 and TR123 generate back porch clamp signals. IC108 provides sync output buffering and selects int/ext sync feed to the logic board for timing purposes.

VIDEO PATH
The required video signal is selected by IC102, amplified by TR103/104, dc restored and fed to the filter switch IC101. The video is then amplified and fed to the front panel gain control. From here it is amplified by TR105/107/112/113 and goes to the digital converter via switch IC115.

VECTOR PATH
Vector V and U and sc-h V and U from the Vector board (OPTION) are fed to the digital converter via IC115.

A to D CONVERSION
Switch IC115 selects whether video, vector or sch signals are fed out to the 8 bit flash ADC chip IC111. IC115 operates as a chopper, controlled by the digital board.

To conceal the sampling spaces produced in the video waveform the sequence is offset line by line. This occurs automatically due to the selection of a 13 count sequence. Additionally, the sampling point is varied by +/-50nS over the field to guarantee that all horizontal positions are sampled.

The ADC is fed with a 10 Mhz timing clock from the digital board which governs the sample point and output latch clocking.

The power supply operates either from 15 volts DC derived from the mains transformer or an external DC input of 9 to 24 volts. IC114 is a switching regulator which provides the +5V supply.

The negative supply is obtained from an overwinding on transformer TFR 1, providing -8V, which is regulated by IC118 down to -5V.
DIGITAL BOARD

This board is the digital scan converter, comprising 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
Internal 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 in Pal and Ntsc. The television standard is determined digitally by timing the interval between V sync pulses. The 25Hz interlace signal is digitally separated from the internal syncs to enable the memories to changeover between reading and writing in synchronism with the input video.

WRITE ADDRESS
Internal or external sync, as selected on the analog board, is digitally separated to produce horizontal and vertical trigger pulses as above. These are used to phase-up the write counter to incoming 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.

PERSISTANCE
Memory erasure is controlled by gating the memory enable inputs. The normal mode is erasure of each bit after readout giving one field of persistence, STORE is no erasure at all and HOLD disables all memory writing operations, thus it freezes the displayed waveform.

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.

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.

**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).

**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.

**OUTPUT**
The memory outputs are latched and fed to a four 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 four Eprom chips, for full screen waveform, full screen vectors, full screen both and small. The data is output via a serial to parallel converter to a variable amplifier, which allows the graticule level to be varied by the scale pot.
CONTROLLER BOARD

This board interfaces between the front panel controls, switches and indicators and the active circuit boards, using a microprocessor and backup EEprom.

SWITCH INPUTS

The 16 front panel switches are wired in a 4 x 4 matrix. The columns are scanned by the processor IC1, to produce a unique four bit word on the rows for each key press. Software permanently stored within the 8751 processor chip itself determines the logical operation of the front panel switches, providing contact bounce suppression, storage of each of the Videoscope functions and the required switch toggling between these functions.

BACKUP

The current Videoscope state is always stored in EEprom IC3, so that it is kept when power is removed. On power up, the same state is thus restored.

INDICATORS

The processor outputs in serial form to the led driver chip IC 2 which converts from serial to parallel, latches the data and provides power driving to the 34 front panel leds.

INTERFACE

The required control signals for the Videoscope are taken from the led drives where possible, otherwise they are taken direct from the processor.
FRONT PANEL BOARD

The front panel contains all the normal operating controls for the Videoscope.

SWITCHES

The sixteen switches are of the momentary normally-open type, and are scanned by the controller board in a 4 x 4 matrix.

ANALOG POTentiometers

The Scale, Vert shift and Phase controls, all feed 0 to 5V dc control voltages via the controller board to the active boards. The Mix preset varies the level of the background video applied to it. The two Gain controls and associated presets are wired directly to the Analog and vector (option) boards.

DIGITAL POTentiometer

Horizontal shift is controlled by a shaft encoder, which feeds out two logic levels, 90 deg apart, via the controller board to the digital board.

ILLUMINATION

The appropriate legends are back lit by high-brightness rectangular leds, driven by the controller board in response to switching action. The two Cal leds are wired directly to their respective pots.
COMPOSITE VECTOR BOARD

Video in from the analog board is fed to the 75%-100% gain switch, buffered and fed to the gain pot. From the pot, it is filtered by L602 and associated capacitors and fed to the demodulator IC603. Reference video is filtered then gated by IC607 and the resultant burst is amplified by TR601 and fed to the reference generator IC606. The resultant subcarrier goes to IC605 which acts as a variable delay, controlled by the front panel phase pot. It is then limited, filtered and a 90 deg path is formed, before being fed to the double demodulator IC603.

Outputs U and V are filtered by L608/L609 etc and then buffered and dc restored at TR605/6 before being fed out to the analog board. In Pal mode, the error signal from the phase comparator in IC606 is used to phase up 7.8KHz divider IC610 to the incoming Pal switch. The pal switch is then fed to the demodulator, allowing its Pal switch to be correctly phased, so enabling the input Pal switch to be defeated if selected.

SC-H
Subcarrier from IC606 is buffered by TR602, sampled by IC612a and the output buffered by IC613a. Sampling is carried out on the horiz sync edge, every 4 lines, producing a 25Hz sine wave in Pal and a dc error signal in NTSC. IC612b further samples the signal at 25Hz to give a steady dc error in PAL and NTSC. This is buffered by IC613b giving the sc-h phase error signal, which is alternatively inverted to produce a ramp with a height proportional to the error signal. This is fed out to the analog board as sc-h V. Sc-h U is a fixed dc offset from RV601.

LINEUP
With 100% colour bars applied to any input, and with no signal to the external input, switch to maximum vector gain and to EXT sync modes.

Adjust CV603 for PAL and/or CV604 for NTSC to give correct 90 degree phase and adjust RV607 for width of the circular trace
Adjust CV606 for maximum circle size.
Adjust CV601 (PAL) or CV602 (NTSC) for near lock condition then switch back to INT sync.
Trim CV606 to obtain straight lines between vector dots
Adjust the front panel cal preset for correct gain.
Adjust RV605 to give approx 400 degrees of phase control range.
Do not adjust L603.

For sc-h phase lineup;
Adjust RV606 for a full height bar
Adjust RV606 for a symmetrical bar display
CV605 and the jumper at IC611 set the sc-h phase calibration ONLY ADJUST IF ANY COMPONENTS HAVE BEEN REPLACED ON THIS BOARD.
SC-H PHASE MEASUREMENT

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:

\[ F_{\text{pal}} = (283 \times 15.625\text{KHz}) + 25\text{Hz} = 4.43361875\text{MHz} \]

The drawback of this is that after one PAL frame of four fields the subcarrier will have executed exactly 354689* cycles, so it will be 180 degrees shifted from its original phase at the same sync point. Hence the subcarrier to the 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.

\[ F_{\text{ntsc}} = (227.5 \times 15.73426373\text{KHz}) = 3.579545\text{MHz} \]

After one NTSC frame of two fields, the subcarrier will have executed exactly 119437* 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.
With a composite PAL video signal applied to any input, set the Videoscope to VEC and INT sync.

A vertical bar will be seen on the left of the display which reads against the adjacent graticule. The height of this bar indicates the SC-H phase relationship of the input video.

If no SC-H phase error is present, the bar will appear as just a dot in the centre of the graticule line. Any error will increase the display height, and can be measured by comparison with the scale on the graticule, which has marks at 5, 10, 20 and 45 degrees. The extreme of the graticule represents 90 deg.
COLOURED AUDIO OPTION

This option provides the following additional features:

1. Coloured bar graph displays of audio levels burned into the video output, independent of the main Video Scope displays. Two XLR female sockets for stereo left and right, produce red and green bars with an accuracy of +/- 0.5dB wrt the graticule. Internal selection of PPM, VU or NORDIC displays and 2, 4 or 8 second peak hold times.

2. Polar audio vectors displayed on the Video Scope vector display. 30db of compression is applied for clarity at low audio levels. This allows easy checking of stereo phase problems.

3. Component vectors displayed on the Video Scope vector display from a YUV or GBR source fed to Video Scope inputs A, B, and C.

SELECTION

The colour bar graphs operate independently of the main Video Scope, though the SCALE MIX and OFF functions follow the front panel selections.

Switching between composite vectors and component vectors / polar audio is accomplished by pressing the front panel PAL SW button twice within one second. Then:

PAL SW = ON is component vectors.
PAL SW = OFF is polar audio.
LINE-UP INSTRUCTIONS

POLAR AUDIO

Adjust R72 (V) for vert centring and R73 (U) for horiz centring, to give a central dot on the graticule with no audio input.

With 0db audio input, adjust R61 (POL_L) and R62 (POL_R) for a vertical line of just over half vector circle diameter.

COMPONENT VECTORS

Set Jumper J3 for (YUV) or (RGB) as required.
Adjust R31 (OFFSET) to fine trim the centring.
Adjust R12 (UG) and R13 (VG) to centre the vector dots in their respective graticule boxes.

LINEAR AUDIO

Set jumpers J1 and J2 for (VU) or (PPM) characteristic.
Set dip sw SW1 as follows:

D1 and D2 set the peak hold delay. Both ON = no hold.
Both OFF = 8 sec hold. Intermediate settings are 2 and 4 secs.
D3 sets PPM or VU graticule.
D4 off sets NORDIC graticule.

Adjust L4 (VCO) with a plastic tool for a locked display with 1.5 volts between R101 (either end) and ground.

With 0db audio input, adjust R45 (L) and R48 (R) for correct gain calibration. PPM should read 4. VU should read -3db.

With +8db audio input, adjust R63 (L) and R59 (R) for peak calibration. PPM should read 6.

Recheck the 0db calibration.

Set R58 (BRIGHT) for correct bar brightness.

Set C46 (P_PH) and C64 (N_PH) for correct colour phase.

Set R60 (MIX) for the desired background video in MIX mode.