



## Special Pulse, Coding and Test Equipment for Colour Television

### Colour Synchronizing Unit Type B 3640

This unit, working together with a television synchronizing pulse generator, will provide sub-carrier and locking signals to enable television waveforms to be encoded and used in accordance with the N.T.S.C system of colour transmission.

The B 3640 generates a sine-wave output at the required colour sub-carrier frequency and is designed to produce a frequency suitable for either 625 or 525 lines. The basic oscillator is crystal controlled and housed in a change-of-state oven which provides a highly stable output.

The output from the oven module is fed to a high-frequency counter which provides a jitter-free output at twice-line frequency. This output is used to lock the system synchronizing generator.

The counters, which require no day to day adjustment, provide a stable continuous output.

It has been the practice in the past to provide separate burst gating pulse units to key the sub carrier into the back porch of the line synchronization pulse to achieve colour synchronization. Transistors have enabled Marconi's to combine a burst gating module as part of the B 3640.

The colour synchronizing unit has an integral regulated power supply which is contained on one of the plug-in modules.

#### DATA SUMMARY

##### INPUTS

**Mains:** All transformers will have series/shunt primaries enabling operation over mains input ranges 100–125 V in 5 V steps, 200 to 250 V in 10 V steps, 48 to 60 c/s. Mains variation of  $\pm 5\%$  and surges of  $\pm 5\%$  not greater than 1 sec. in duration. Power consumption 70 VA.

**Synchronizing signal:** 525/625 line system, negative going, nominally 2 V peak to peak (1.6 V–6 V peak to peak), high-impedance bridging.

**Field pulse:** If a burst eliminating pulse is available from the synchronizing pulse generator this is used, otherwise field drive. Both negative going, normally 2 V peak to peak (1.6–6 V) high impedance bridging.

##### NOTE

The high impedance quoted in 'Syncs' above and 'Field Pulse' above will be greater than 10k  $\Omega$  at low frequency and less than 15 pF.

**External sub-carrier:** By simple soldered link changes, an external sub-carrier can be fed into the sub-carrier oscillator unit thereby replacing the internally generated sub-carrier signal. The input level required is 2 V peak to peak and the input impedance is 75  $\Omega$ .

##### OUTPUTS

**Sub-carrier:** Frequency stability better than 1 in  $10^7$  per week or 0.44 c/s in the worst case.

Single output of 2 V  $\pm 10\%$  peak to peak into 75  $\Omega$  (preset).

Amplitude stability  $\pm 0.2$  dB over the stated temperature range.

Output impedance 75  $\pm 5 \Omega$  at sub-carrier frequency.

**Twice-line frequency:** Single pre-set output of 2 to 5 V peak to peak into 75  $\Omega$ .

Amplitude stability over stated temperature range:  $\pm 1$  dB.

Output impedance: 75  $\pm 5 \Omega$ .

**Burst gating pulse:** Single output at a pre-set level of 1.5–3.0 V peak to peak into 75  $\Omega$ .

Amplitude stability over stated temperature range:  $\pm 1$  dB.

Output impedance: 75  $\pm 5 \Omega$ .

Rise times of pulse edges: Less than 0.1  $\mu$ s.

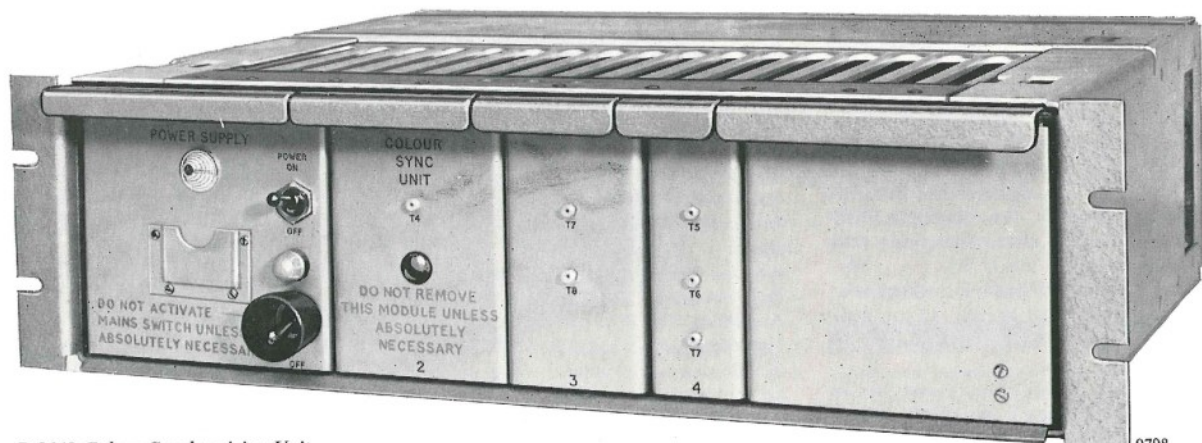
Width of pulse at half amplitude can be adjusted between 1.9 and 2.6  $\mu$ s, i.e. 625 line system 8.5–11.5 c/s, 525 line between 6.8 and 9.3 c/s. The front edge of this pulse is timed with respect to the front edge of line syncs and delayed to lie in the back porch.

##### Dimensions:

Height	Width	Depth	Weight
5½ in.	19 in.	15¾ in.	18 lb
(13.3 cm)	(48.3 cm)	(40 cm)	(8.2 kg)

### Colour Coder Type B3370

The B 3370 Colour Coder, working in conjunction with a B 3600 synchronizing generator and a B 3640 colour synchronizing



B 3640 Colour Synchronizing Unit.

9798

unit, provides all the signals necessary to code RGB video inputs into a composite colour signal of the N.T.S.C form.

The coder also accepts a separately generated  $Y^{\frac{1}{2}}$  signal in addition to the RGB signals and transmits it in the N.T.S.C form. Where the luminance signal is  $E_Y^{\frac{1}{2}}$ , the colour difference signals are as in the N.T.S.C system.

Provision is made, by changing the matrices, to accept video signals  $Y^{\frac{1}{2}}$ , R and B, and transmit in the N.T.S.C form where the luminance signal is  $E_Y^{\frac{1}{2}}$  and the colour difference signals are (i)  $E_B^{\frac{1}{2}} - E_Y^{\frac{1}{2}}$  and  $E_R^{\frac{1}{2}} - E_Y^{\frac{1}{2}}$ .

### FEATURES

Suitable for operation on 525 or 625 lines.  
Integral power supply.  
Fully transistorized.  
Modular construction.

### DESCRIPTION

To form a suitable compatible signal for broadcasting within the allocated bandwidth of normal the black and white system, three simultaneous colour signals are encoded to form a single composite colour signal. This composite signal comprises the luminance signal conveying the standard black and white information and the chrominance signal conveying the colour information.

The unit is normally fitted with matrices to derive Y, I, and Q signals in accordance with the N.T.S.C system. However, the matrices can be altered to provide signals as shown previously under (i).

To cater for various systems, I and Q pre-modulator filters provide various bandwidths as shown in the data summary.

In addition, the unit contains control of phasing, so that between two encoders

phasing can be adjusted to provide a range of sub-carrier phase of greater than  $360^\circ$ .

Provision is made to include a suitable notch filter, if required, in the luminance channel only centred on the sub-carrier.

### DATA SUMMARY

#### INPUTS

**Mains:** All transformers have series/shunt primaries enabling operation over mains input ranges 100–125 V in 5 V steps, 200–250 V in 10 V steps, 48–60 c/s. Mains variations of  $\pm 6\%$  and surges of  $\pm 5\%$  for less than 1 sec. in duration. Power consumption 77 VA.

**Synchronizing signal:** 525/625 line system, negative going, nominally 2 V peak to peak (1.6 V–6 V peak to peak), high-impedance bridging.

**Burst gating pulse:** 525/625 line system, negative going, 2 V (1.5–3.0 V) peak to peak, high-impedance bridging (from Colour Synchronizing Unit).

**Sub-carrier c.w.:** 2 V +3 dB to –8 dB peak to peak, high-impedance bridging (from Colour Synchronizing Unit).

**Video inputs:** Colour signals positive 0.7 V peak to peak into 75  $\Omega$ , high-impedance bridging.

**Alternative video inputs:** As 'Video Inputs' above. Normally colour bar generator outputs.

#### OUTPUTS

Two outputs of composite colour signal at source impedance of 75  $\pm 2 \Omega$ .

Output level 1.21 V peak to peak with 100% saturated colour bars input. Provision for output level to be increased to +3 dB on 1.21 V peak to peak.

#### PERFORMANCE

**Temperature range:** Maximum –10 to +50°C. Full performance as specified: 0 to +45°C.

**Resolution of sub-carrier phase shifter:** Better than  $0.5^\circ$ .

**Burst amplitude:** Level constant to  $\pm 0.5$  dB including variations due to phase shifter.

#### Luminance channel:

Overall frequency response:  $\pm 0.4$  dB from 50 c/s to 8 Mc/s, including delay line. Less than 3 dB down at 10 Mc/s.

50 c/s square-wave tilt: Less than 2%.

With d.c step input to produce 0.7 V peak to peak at output at the initial transition: L.F overshoot not more than 15% amplitude and 0.5 sec. duration; the second cycle less than 3% amplitude.

Pulse and bar response: Better than that required for 1 K factor.

Differential gain distortion: Less than 0.5% for 10 to 90% A.P.L (average picture level).

Gain stability: Gain constant to within  $\pm 0.25$  dB.

#### I, Q and Y channels

Sync. rise time: 0.2 to 0.25  $\mu$ s.

Equivalent video bandwidths of chrominance channels before modulator.

#### 525 – Q channel:

$\pm 0.25$  dB to 350 kc/s.

Less than –2 dB at 400 kc/s.

Less than –6 dB at 500 kc/s.

Greater than –6 dB at 600 kc/s.

#### 525 – I Channel:

$\pm 0.25$  dB to 1.15 Mc/s.

Less than –2 dB at 1.3 Mc/s.

Greater than –20 dB at 3.6 Mc/s.

#### 625 – Q Channel:

$\pm 0.25$  dB to 700 kc/s.

Less than –2 dB at 800 kc/s.

Less than –6 dB at 1 Mc/s.

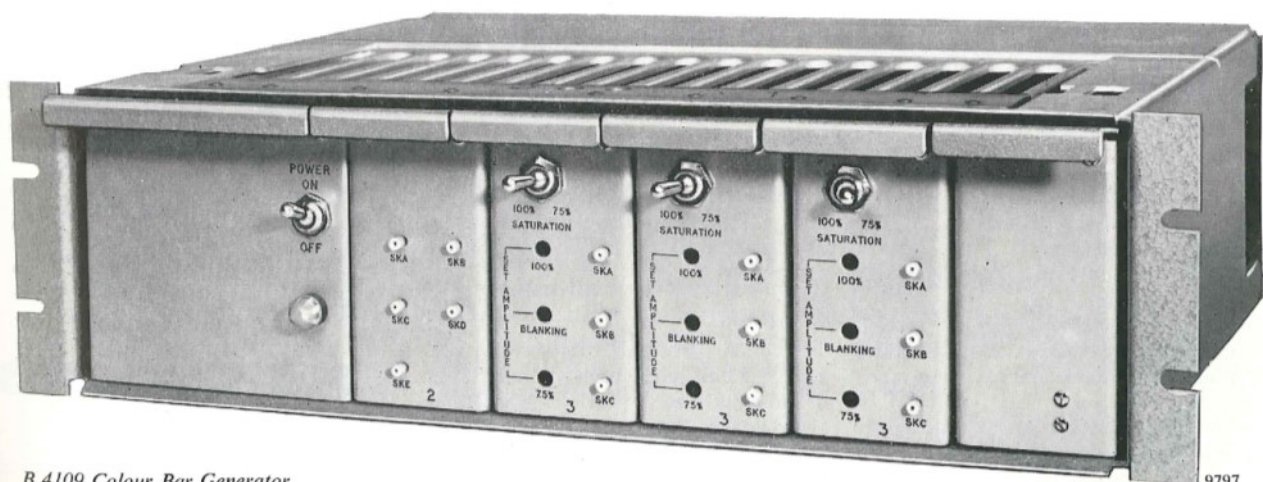
Greater than –6 dB at 1.2 Mc/s.

#### 625 – I channel:

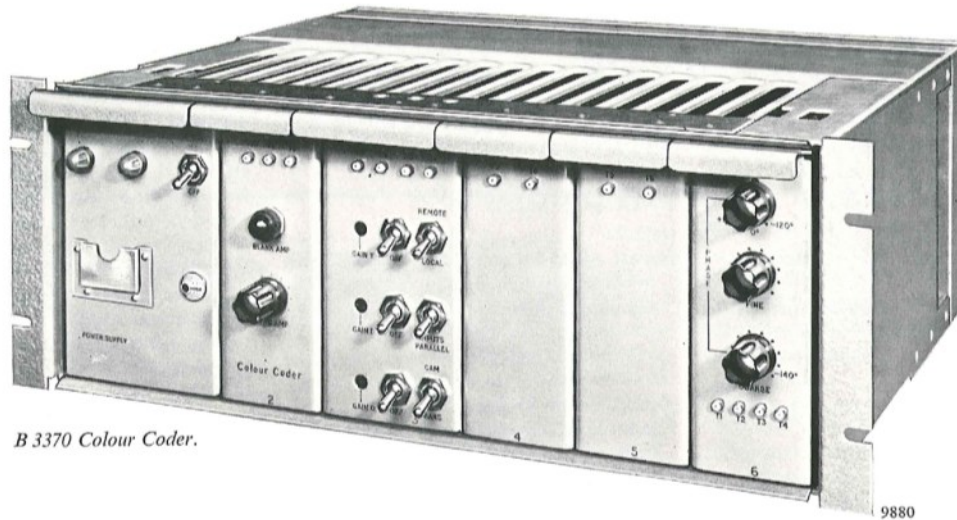
$\pm 0.25$  dB to 1.4 Mc/s.

Less than –2 dB at 1.6 Mc/s.

Greater than –20 dB at 4 Mc/s.



B 4109 Colour Bar Generator.



B 3370 Colour Coder.

The above responses are those obtained from the combined effect of the I video filter and matrix amplifiers and the Q video filter and matrix amplifiers.

*Nominal bandwidths of Q and I filters*

**525 - Q filter:**

- ±0.15 dB to 350 kc/s.
- Less than -1.5 dB at 400 kc/s.
- Less than -5.5 dB at 500 kc/s.
- Greater than 6.5 dB at 600 kc/s.

**525 - I filter:**

- ±0.15 dB to 1.15 Mc/s.
- Less than -1.5 dB at 1.3 Mc/s.
- Greater than -20 dB at 3.6 Mc/s.

**625 - Q channel:**

- ±0.15 dB to 700 kc/s.
- Less than -1.5 dB at 800 kc/s.
- Less than -5.5 dB at 1 Mc/s.
- Greater than -20 dB at 4.0 Mc/s.

*Q and I modulator nominal bandpass characteristics with respect to sub-carrier frequency:*

**525 lines:**

- ±0.1 dB to -1.15 Mc/s, ±3 dB at -3.3 Mc/s.
- ±0.1 dB to +1.15 Mc/s, ±3 dB at +3.3 Mc/s.

**625 lines:**

- ±0.1 dB to -1.4 Mc/s, ±3 dB at -4.0 Mc/s.
- ±0.1 dB to +1.4 Mc/s, ±3 dB at +4.0 Mc/s.

**Differential gain distortion:** Less than 0.5% for +3 dB of nominal output level, i.e. 0.7 V peak to peak luminance.

I.R.E test waveform.

Gain change of I and Q amplifiers less than ±0.25 dB.

Differential phase less than 0.2° for +3 dB of nominal output level i.e. 0.7 V peak to peak luminance I.R.E test waveform.

The change of the ratio of chrominance/luminance on the output signal will be less than 0.25 dB.

**Dimensions:**

Height	Width	Depth	Weight
7 in.	19 in.	15½ in.	33 lb
(17.8 cm)	(48.3 cm)	(40 cm)	(15 kg)

## Colour Bar Generator Type B 4109

This unit, an ancillary to the colour synchronizing and the colour coder is designed to 'set up' and check the performance of colour synchronizing and coding systems. It can also be used for the adjustment signal for setting some of the controls on colour monitors.

**Features**

Sub-standard stability (the output signal can be used to calibrate levels throughout the studio).

Colour bars, switchable between 100 and 75% saturation.

Suitable for operation on 525 or 625 lines.

Integral power supply.

Fully transistorized.

Modular construction.

**CONSTRUCTION**

The unit, containing five plug-in modules, is housed in the standard modular mounting frame which is suitable for mounting in a 19 in. rack, but a suitable mobile case is also available for use in outside broadcast applications.

**OPERATION**

The output signal pulses representing red, green and blue, when displayed on a colour monitor, show as vertical bars going from left to right as follows: white, yellow, cyan, green, magenta, red, blue. The red, green and blue pulses are timed so that, when fed

to a N.T.S.C coder, they provide a coded signal of the three primary colours and their complementaries as above.

**Data Summary**

*Controls available from the front panel of the module*

**Power On-Off.**

Switch for 100 and 75% saturation on each RGB module.

Gain adjustment on RGB module for both 100 and 75% saturation.

Pedestal on each of the RGB modules.

**PERFORMANCE**

**Inputs:** Mains tapings provided on the transformer for 100-125 V in 5 V steps and 200-250 V in 10 V steps for 48-60 c/s. Power consumption 22 VA.

**Mixed blanking:** Blanking signals for 625/525 lines negative gain at normal 2 V peak-to-peak.

Bridging inputs provided.

Input impedance: 10 kΩ and capacity less than 20 pF.

**Outputs:** Colour bars: One each of red, green and blue, adjustable to provide 100 or 75% saturation.

Amplitude stability over temperature range 0 to 45°C: ±0.1 dB.

Rise times of bar edges: 0.1 to 0.15 μs.

**Timing errors:** Less than 25 ns.

**Overshoot:** Less than 5%.

**Output impedance:** 75 Ω ±5 Ω.

**Dimensions:**

Height	Width	Depth
5½ in.	19 in.	15½ in.
(13.3 cm)	(48.3 cm)	(40 cm)

**Marconi**

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