



## TELEVISION TRANSMITTING EQUIPMENT

### 5kW V.H.F Television Transmitter

Band I: B 7101 Vision with B 6550 Sound.

Band III: B 7201 Vision with B 6600 Sound.

#### Features

Covers all channels in Band I and III.  
Full safeguarding of personnel is provided.  
Designed for single or parallel operation.  
No underfloor ducting required.  
Crystal controlled vision drive accommodated in the transmitter.  
R.F Envelope Monitor built-in.  
Blanking level feedback eliminates manual adjustment of blanking level during programme.  
High-order sound frequency stability by frequency-modulated quartz technique.  
Filtered air cooling by built-in blowers.  
Runner-mounted sub-units for easy access and maintenance.

#### Data summary

##### Power output:

Vision: 5kW Peak sync. when operating on CCIR standard 'B'.  
Sound: 1kW at nominal mains voltage.

##### Frequency range:

41-68MHz.  
174-223MHz.

##### Type of transmission:

Vision A.M Vestigial sideband (A5C).  
Sound F.M Broadcast quality (F3).

**Output impedance:** 51.5Ω unbalanced.

##### Frequency stability:

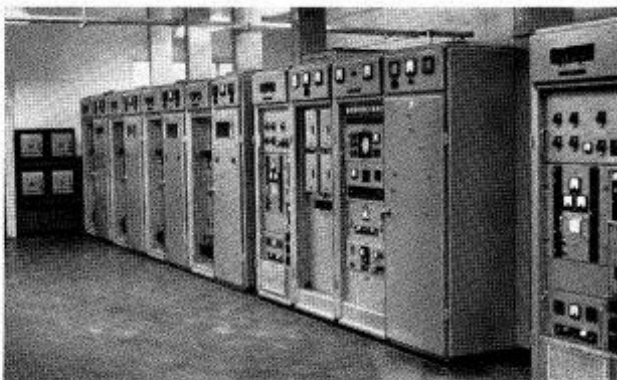
Vision: Better than  $\pm 500$ Hz.  
Sound: Better than  $\pm 100$ Hz.  
With  $\pm 1\%$  change in mains voltage and  $\pm 10^\circ\text{C}$  change in temperature.

##### Input level and impedance:

Vision: 1V p-p composite into 75Ω  
Sound:  $+6\text{dBm}$  for  $\pm 50\text{kHz}$  deviation with attenuator at mid-position into 600Ω balanced.

**Audio pre-emphasis:** 0, 25, 50 and 75 $\mu\text{s}$  (by switch selection).

**Frequency response:** Vision: When measured at output of filterplexer, working into a matched load and using an input of 25% p-p of maximum



One of a pair of 5kW Band III Vision Transmitters (type B 7201), and 1kW Band II F.M Sound Transmitters, (type B 6600), installed at Singapore. Four 5kW F.M transmitters are seen in the background

picture amplitude at mid-grey level, amplitude/frequency response (measured relative to 200kHz u.s.b) will be within the following limits:

System	U.S.B	L.S.B
525 lines - neg. mod.	Less than 3dB down at 4MHz	Not more than 4dB down at 0.75MHz; not less than 20dB down at 1.25MHz.
625 lines - neg. mod.	Less than 4dB down at 5MHz	Not more than 4dB down at 0.75MHz; not less than 20dB down at 1.25MHz.

Sound: A.F response:  $\pm 1\text{dB}$  from 30Hz to 15kHz.

With zero pre-emphasis, levels are relative to that at 400Hz. With pre-emphasis, response is relative to that of appropriate pre-emphasis curve.

**Amplitude linearity:** Departure less than 4% of the peak over the full picture amplitude range.

**A.F distortion:** for 50kHz deviation: less than 1%, 100Hz-10kHz.  
less than 1½%, 30Hz-15kHz.

**Blanking level stability:** Better than  $\pm 2\%$ .

##### Noise:

Vision: At least 50dB below the rectified voltage corresponding to peak output power.

Sound: F.M noise at least 50dB below the level corresponding to  $\pm 50\text{kHz}$  deviation.

A.M noise lower than -50dB relative to carrier level.

**Ambient temperature:** 0 to  $+45^\circ\text{C}$ .

##### Power supply:

Vision: 415V, 3-phase, 4-wire 50-60Hz. For optimum performance and valve life, phase voltages balanced to 1% and stabilized to  $\pm 1\%$ .  
Sound: 200-250V, single phase a.c 45-65Hz.

**Power consumption:** Vision: 17.5kW (approx.) at 0.95 power factor, for blanking level signal plus synchronizing pulses. 14kW at 0.9 power factor black picture plus synchronizing pulses.  
Sound: 2.6kW.

##### Dimensions:

Height 2.21m (7ft 3in.)  
Width 3.04m (10ft)  
Depth 1.14m (3ft 9in.)  
Weight 2281kg (5020lb)

Full details are given in TD B 7101, TD-1-B 6550, TD-1-B 7201 and TD-2-B 6600.



## 15–20kW Band III Television Transmitter

B 7201 Vision transmitter with B 7202 amplifier and B 6601 sound transmitter. The addition of B 7202 amplifier to the B 7201 Band III Vision Transmitter, and the use of the type B 6601 F.M transmitter enables 15 to 20kW vision power to be obtained.

### Features

- Special amplifier output circuit allows high v.s.w.r on output without detriment to performance.
- Amplifier input broad banded, no tuning required.
- Grounded grid and d.c filaments in amplifier ensure low hum figures.
- No underfloor ducting.
- Air cooled by external blower.

### Data summary

(as for 5kW equipment except as follows):

#### Power output:

Vision: 18kW peak (625 lines 7MHz channel) or 20kW peak (525 lines, 6MHz channel) or 15kW peak (625 lines, 8MHz channel).  
Sound: Set up to provide required vision/sound power ratio.

Frequency range: 174 to 216MHz.

Power consumption: Approx. 67kW at 0.9 power factor with vision radiating



20kW Band III Vision Transmitter type B 7202 and 5kW Sound Transmitter type B 6601 at Channel 13 transmitter hall, Latin American Tower, Mexico City

blanking level and sync. pulses, and sound at 4kW.

#### Dimensions:

Height 2.22m (7ft 3.5in.)  
Width 6.22m (20ft 5in.)  
Depth 1.15m (3ft 9in.)  
Weight 4768kg (10,500lb)

Full details are given in TD B 7202 and TD B 6601.



5kW Vision and 2kW Sound Transmitter at Annam, Jordan

## V.H.F Television Filterplexers and Diplexers

### Filterplexers

#### Function

The function of the filterplexer is to provide the shaping of the vestigial sideband and at the same time to combine the vision and sound transmissions in one transmission line.

#### Method of Operation

Two diplexers have their outputs connected by coaxial transmission line to form a complete ring, in such a way that the vision input is split in the first and recombined in the second, using the in-phase dividing function. By feeding the sound input to the remaining port of the second diplexer, anti-phase sound signals appear in the ring. By placing sound resonators in suitable positions in the ring, the sound signals are reflected in the correct phase relationship to recombine in the second diplexer and appear at the output. A similar method is used to reflect energy from the vision lower sideband back to the first diplexer, to be dissipated in a dummy load, thus achieving the required vestigial sideband shaping.

Mechanically, the filterplexers are composed of rigid transmission line and tubular resonators. The ring type of diplexer is employed on Band I, the integral coaxial type on Band III. The filterplexers are freestanding in a tubular steel framework.

#### Data summary

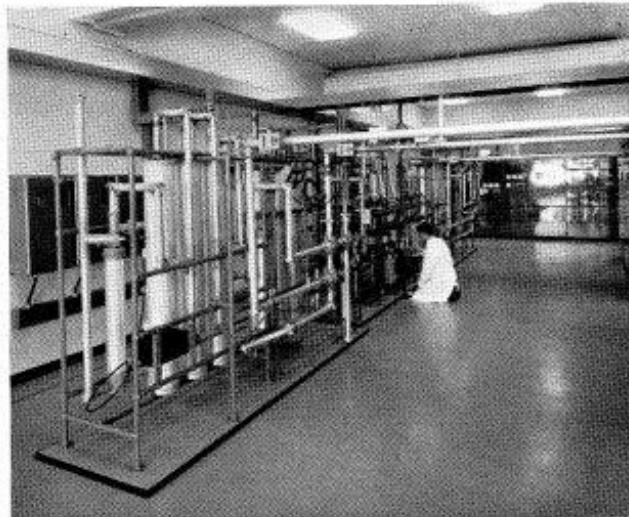
(Note: The following figures do not include the amplitude/frequency response, which can be adjusted to meet the majority of requirements in current demand.)

#### Filterplexers

	Band I	Band III
<b>Power input (kW):</b>		
Vision	10	20
Sound	5	10
<b>Operating frequencies in the bands (MHz):</b>	41-88	174-223
<b>Input impedance:</b>	51.5Ω	51.5Ω

(V.S.W.R at vision carrier not greater than 1.05:1)

**Insertion loss:** Not greater than 0.25dB on vision carrier. Not greater than 0.5dB on sound carrier.



Band I Filterplexers installed at New Zealand Broadcasting Corporation Station

**Crosstalk:** Not worse than 30dB throughout the channel.

### Diplexers

A diplexer is a four terminal device. Signals at the same frequency at either of two terminals are divided equally in amplitude between the remaining two terminals. The choice of input determines whether the two outputs are in phase or anti-phase. The device can also be used in reverse so that two equal inputs on the same frequency can be combined, the output terminal being determined by whether the signals are in phase or out of phase.

Diplexers are available in two different forms physically. On Band I, a ring of coaxial feeder, with one arm acting as a phase inverter, is used. On Band III a compact diplexer of integral coaxial construction is available. Either of these can be supplied separately but they are normally used as components of the filterplexers described above.



# V.H.F Transmission Line and Auxiliary Equipment for Television Broadcasting

## Internal Transmission Line

Internal transmission line is available in two sizes; 2in. and 3½in. (5.1 and 8.3 cm) dia. having a nominal characteristic impedance of 51.5Ω. The transmission line is normally supplied in standard lengths of 3m (10ft), complete with inner, outer and insulators. The outer conductor is aluminium and the inner copper. A full range of angle bends and clamps of different types is available. Impedance transformers can be supplied to match into transmission lines of different characteristic impedance. Adaptors can also be supplied to connect to other transmission lines with different dimensions but the same impedance. The approximate power-handling capacities are as follows:

Freq. band	Size of transmission line	
	2in.	3½in.
I	20kW	40kW
II	15kW	30kW
III	10kW	20kW



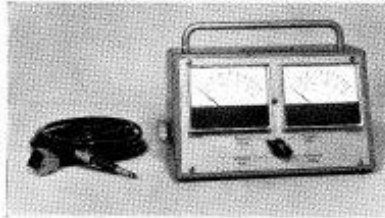
2-in. transmission line components

## Harmonic Filters

In order to suppress the harmonic radiation of transmitters to a very low level, harmonic attenuators are used. These are available having the appropriate connectors for the transmission line in use. Different versions exist for different bands.

## Reflectometers

Reflectometer monitoring equipment can be provided to fit into both sizes of transmission line. These units contain two directional couplers, which respond respectively to the forward and backward waves in the transmission line, and associated circuits which measure and compare their relative amplitudes. A sensitive relay is also incorporated in one version, which may be used to switch off



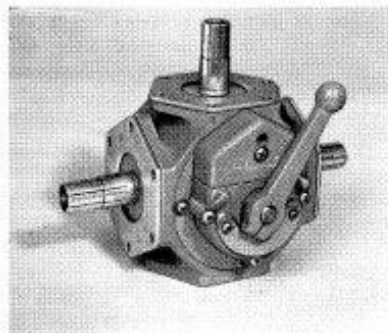
A reflectometer monitoring panel

the transmitter in the event of an excessive mismatch.

A portable reflectometer panel is available as a plug-in accessory and indicates the value of the reflection coefficient. This panel also measures r.f. power in the forward wave. A facility for indicating the insertion loss of combining filters can also be provided.

## Coaxial Change-over Switches

Coaxial change-over switches for use with all sizes of transmission line are available. These switches are invaluable for switching a transmitter into a test load, for setting up or testing, and also for aerial change-over and emergency feeder facilities. Switches are available as 'cross-over' (sometimes known as 'transfer' type) switches where, on operation, the two coaxial inputs change over to the opposite outputs. Motorized versions of some switches are also available for remote control.



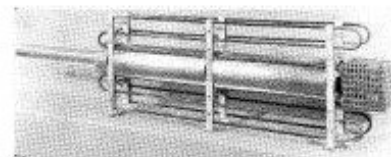
2-in. 2-way coaxial changeover switch

## Test Loads

A complete range of air-cooled test loads is now available for use on Band I, II and

III, for 5kW dissipation. Careful design using lengths of 'lossy' line, matched where necessary by a coaxial transformer, has reduced the size of the loads to easily manageable units. They are normally wall-mounted.

A 20kW load is also available for use on Bands I, II and III using an accurately matched resistive element which is directly cooled by the water itself with no intermediate coolant. Fitting is by flange connectors 8.9cm (3.25in.). This load is very compact and is particularly valuable for making precise measurements of power dissipated by measuring the rate of flow and the rise in temperature of the water flowing through the test load.



5kW air-cooled test load

## External Transmission Line

The Marconi Company supplies most of the well-known varieties of semi-flexible coaxial transmission line in current use. The transmission line is normally in one continuous length from the transmitter building to the aerial at the top of the mast or tower, and is fixed in position by clamps at intervals on the structure. The most economical transmission line in any instance depends upon the transmitter power, the height of the mast or tower, operating frequencies and desired effective radiated power.