Feeder and Auxiliary Equipment

FOR F.M AND TELEVISION BROADCASTING

BETWEEN the transmitter and aerial in an f.m or television broadcasting system there can be a number of auxiliary items together with inter-connecting coaxial feeder. Although these are to a certain extent a matter of individual choice, a definite pattern of requirements has emerged as a result of experience. In addition to harmonic filters (which are fitted directly at the output of the transmitter) and the combining unit or filterplexer (described on page 167) equipment is available for testing, continual monitoring and protection. In order that transmitters may be set up and tested without radiating from an aerial, test loads are available to dissipate the various transmitter powers. For rapidly diverting the transmitter output from the aerial to the test load coaxial switches are used. For continual monitoring of the aerial and main feeder impedance condition, a reflectometer, which provides a visual indication of the reflection coefficient, is normally connected in the feeder run. This equipment also has a pair of contacts which may be used to close down the transmitter as a protective measure if the reflection coefficient rises above a certain predetermined level, for example due to mechanical damage to the aerial. These various components are available in different sizes and on different frequencies as detailed later. Interconnections are normally made with rigid coaxial feeder although on low-power installations flexible feeder is sometimes used throughout for economy.

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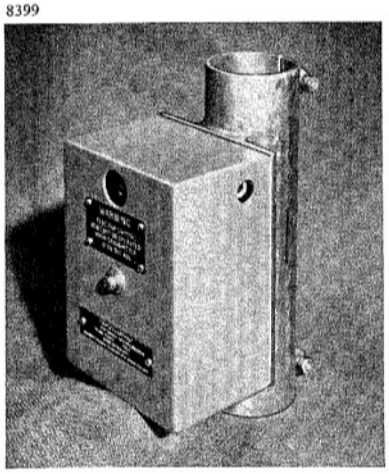
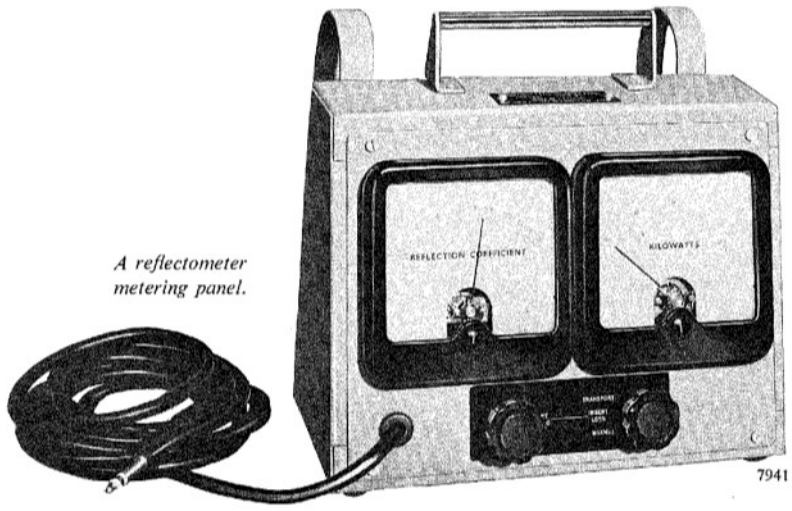


A reflectometer monitoring unit.

External feeder

The Marconi Company supplies most of the well-known varieties of semi-flexible coaxial feeder in current use. The feeder 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 feeder in any instance depends upon the transmitter power, the height of the mast or tower, operating frequencies and desired effective radiated power.



A reflectometer metering panel.

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Internal feeder

Internal feeder is available in two sizes, 2 in. and 3⅛ in. (5·1 and 8·3 cm) dia. having a nominal characteristic impedance of 5·15 Ω, for v.h.f, and with 3⅛ in. (8 cm) dia. having a characteristic impedance of 50 Ω for u.h.f. The feeder is normally supplied in standard lengths of 10 ft (3 m), 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 feeders of different characteristic impedance. Adaptors can also be supplied to connect to other feeders with different dimensions but the same impedance. The approximate power-handling capacities are as follows:

	SIZE OF FEEDER		
Freq. band	*2 in.*	*3⅛ in.*	*3⅛ in.*
I	20 kW	40 kW	—
II	15 kW	30 kW	—
III	10 kW	20 kW	—
U.H.F	—	—	25 kW

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 same outer diameter as the feeder in use. Different versions exist for different bands.

Reflectometers

Reflectometer monitoring units can be provided to fit into all sizes of feeder. These units contain two directional couplers, which respond respectively to the forward and backward waves in the feeder, 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 the transmitter in the event of an excessive mismatch.

A portable reflectometer panel is available as a plug-in accessory to the test length 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.

Due to its portability only one panel is essential for a station.

Change-over switches

Coaxial change-over switches for use with all sizes of feeder 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 straightforward two-way types or as 'cross-over' (sometimes known as 'transfer' type) switches where, on operation, the two coaxial inputs change over to the opposite output. Motorized versions of some switches are also available for remote control.

2-inch coaxial change-over links

Where feeder change-over facilities are at all complicated, it is frequently more simple and cheaper to employ coaxial change-over links. An individual link consists of two sockets taking one U-link, which is secured to the sockets by means of threaded flanges. Various numbers of sockets can be mounted on a flat panel to accommodate different arrangements of links.

Test loads

A complete range of air-cooled test loads is now available for use on Band I, II & III, both for 1 kW and 5 kW 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.

Two water-cooled test loads are available. These loads are very compact and are 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. The loads consist of an accurately matched resistive element which is directly cooled by the water itself with no intermediate coolant. A 20 kW load is available for use on Bands I, II and III and a 25 kW load for use on u.h.f. Fitting is by flange connectors, $3\frac{1}{4}$ in. for v.h.f and $3\frac{1}{8}$ in. for u.h.f.

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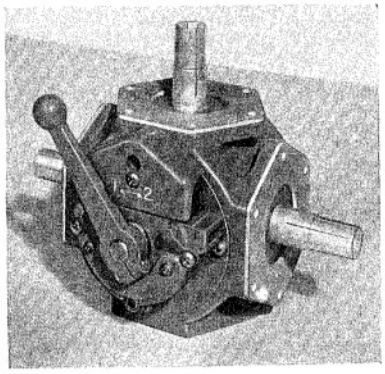

A 2-inch 2-way feeder change-over switch.

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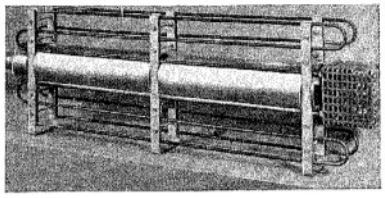

A 5 kW air-cooled test load.

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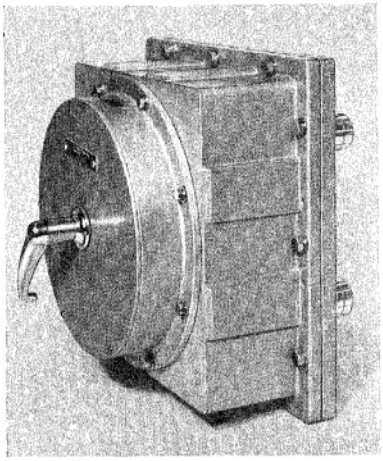

A change-over switch for u.h.f. $3\frac{1}{8}$-inch feeder.

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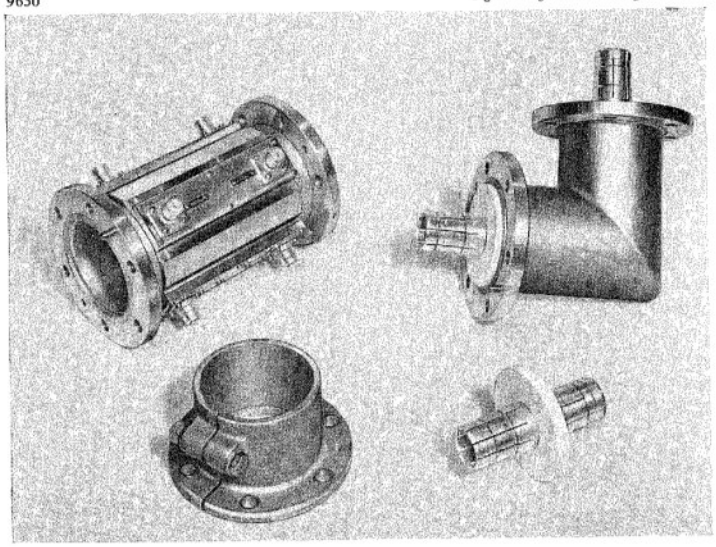
$3\frac{1}{8}$-inch feeder components.



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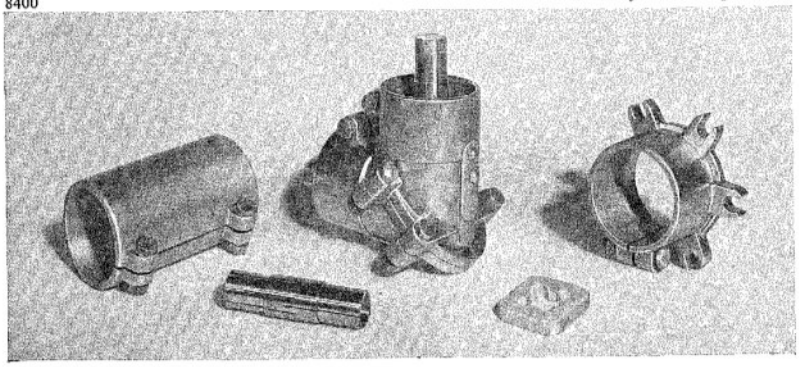
2-inch feeder components.



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