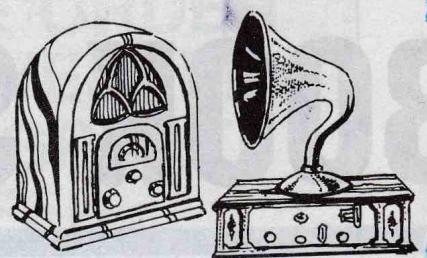


Vintage Radio

by PETER LANKSHEAR



Vintage remote control

Today, wireless remote control of domestic electronic equipment is commonplace, but before the advent of solid state and digital technology, this concept was generally in the realm of science fiction. However, even 50 years ago, there were remarkable exceptions – including American Philco's two radio controlled receivers.

Included in the Philco 1939 range were two console broadcast receivers, the 14 valve 39-116 and the slightly less elaborate 11 valve 39-55, which were capable of remote operation from a small control box. This provided a selection of 8 preset stations, volume control and switch off. Today this specification would be considered to be minimal, but when it is realised that this was achieved with a control unit containing a single triode valve, we can only be impressed by Philco's engineering ingenuity.

Both models were housed in austere but handsome cabinets, that could be the centrepiece of any collection. In 1939, with import and tariff controls firmly in place, few of these receivers would have been imported into Australasia, and to find one today would be quite an achievement. It seems that Beggs, the New Zealand franchised Philco dealers, procured two for display at the 1939/40 Centennial Exhibition. One of this pair, a 39-55 has survived.

Telephone dial control

In the pre-semiconductor and digital era, the universal control system was the combination of the mechanical pulse generator dial and electro-mechanical stepping selector or 'Strowger' switch used for the automatic telephone. This technology was the basis of the ingenious Philco 'Mystery Control' remote control.

The controller is contained in a wooden box about 230 by 180mm, topped by a large rotary telephone type dial. Inside is room for batteries, the dial mechanism and a one valve oscillator, its 150mm-diameter coil acting as a transmitting loop aerial.

Two receivers in one

The console cabinet houses a chassis incorporating two receivers. At one end is a special purpose TRF which I will describe shortly. The main receiver is a more or less standard superheterodyne, similar to push button tuned radios of the period.

Of interest is the push-pull output stage with an early example of negative feedback tone control. Whilst the 39-166 used a conventional triode phase

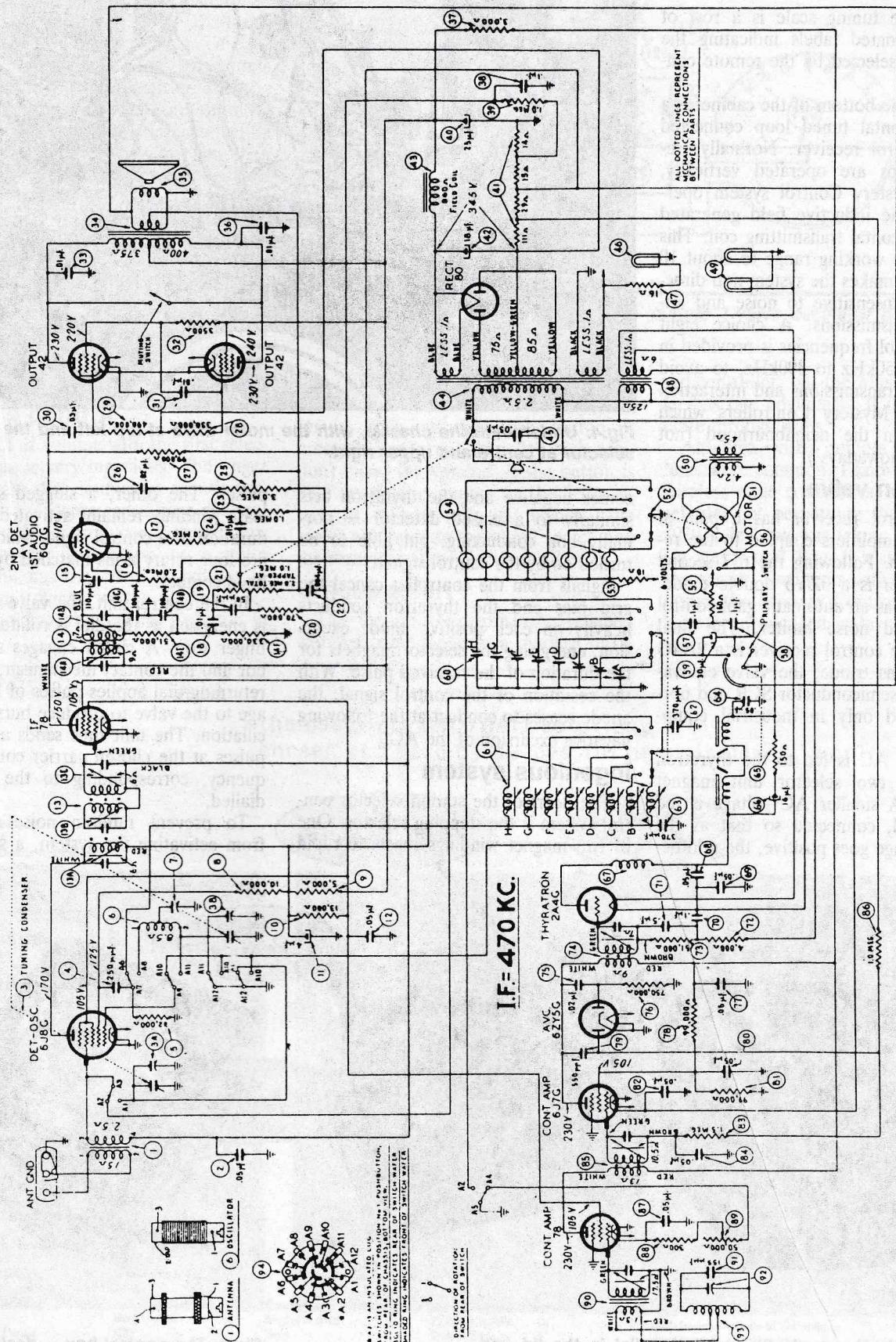
splitter, the 39-55 derives the drive for the second output valve from the screen grid of its companion, as can be seen. The feedback for the tone control is taken from a tapping on the secondary of the output transformer.

At each end of the tuning scale are two edge driven knobs controlling tone, volume, tuning and the remote/manual switch. With the exception of the volume control, manual operation is conventional.

The volume knob activates a switch controlling a bi-directional motor, connected through a gear train to a standard 'pot' with mains switch. Upwards pressure on the knob raises the volume. Downwards pressure reduces volume and if sustained, eventually switches the receiver off.



Fig.1: The well-proportioned 39-55 reflects the awareness, by 1939, of the need for a shallow cabinet in avoiding the worst resonances. This plus a 12" speaker and push-pull audio amplifier with negative feedback results in good sound reproduction.



The main circuit. Note the push-pull audio amplifier, with its novel phase splitting system and negative feedback. The control receiver section is at lower and centre left.

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Below the tuning scale is a row of eight illuminated labels indicating the station last selected by the remote control.

Around the bottom of the cabinet is a large horizontal tuned loop connected to the control receiver. Normally, receiving loops are operated vertically, but the Mystery Control system operates with the inductive field generated by the horizontal transmitting coil. This confines the working range to about 10 metres, but makes the system non directional and insensitive to noise and unwanted transmissions. A choice eight preset control frequencies is provided in the range 350kHz to 390kHz, to avoid interfering transmissions and interaction with other Mystery Controllers which might be in the neighbourhood (not very likely nowadays!).

Thyatron valve

The control receiver has a pair of tuned RF amplifiers coupled to the receiving loop. Following the 6J7 second RF amplifier is a 6ZY5 double diode, functioning as an automatic gain control rectifier and noise limiter. The final valve of the control receiver is a 2A4G thyatron gas triode, the valve equivalent of the semiconductor SCR and normally found only in industrial equipment.

110 volts AC is fed to the thyatron anode via two selector unit magnet windings. A smaller AC voltage is fed to the grid, connected so that as the anode voltage goes positive, the grid be-

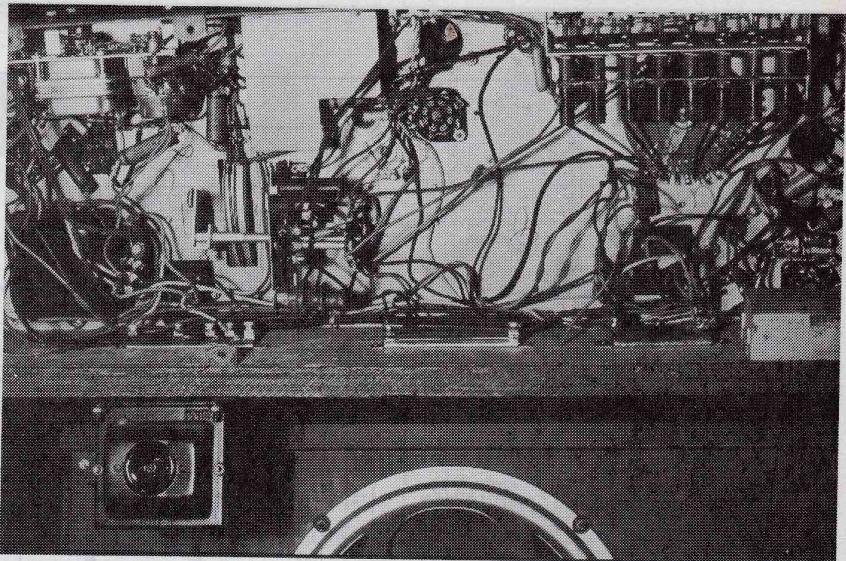


Fig.4: Underneath the chassis, with the motor drive at top left and the tuning selector at centre and upper right.

comes negative and the thyatron acts similarly to a biased detector — normally non conducting, but able to be turned on by the control signals.

Signals from the controller cancel the grid bias and the thyatron conducts heavily on each positive anode excursion, energising the selector magnets for the duration of the received pulse. With the cessation of the control signal, the anode ceases to conduct at the following negative excursion of the AC.

Ingenious system

The heart of the station selector control system is the stepping selector. One of two magnet windings reacts to rapid

pulses. The other, a slugged slow release winding, remains activated for the duration of a control signal train. There are four rotary arms matched by sets of fixed contacts.

In the control unit, the valve filament is energised as the dial is rotated to the finger stop. A clutch engages a governor and the contact mechanism, and the returning dial applies pulses of HT voltage to the valve to produce bursts of oscillation. The unit thus sends a train of pulses at the chosen carrier control frequency, corresponding to the number dialled.

To prevent random noise impulses from activating the system, a single re-

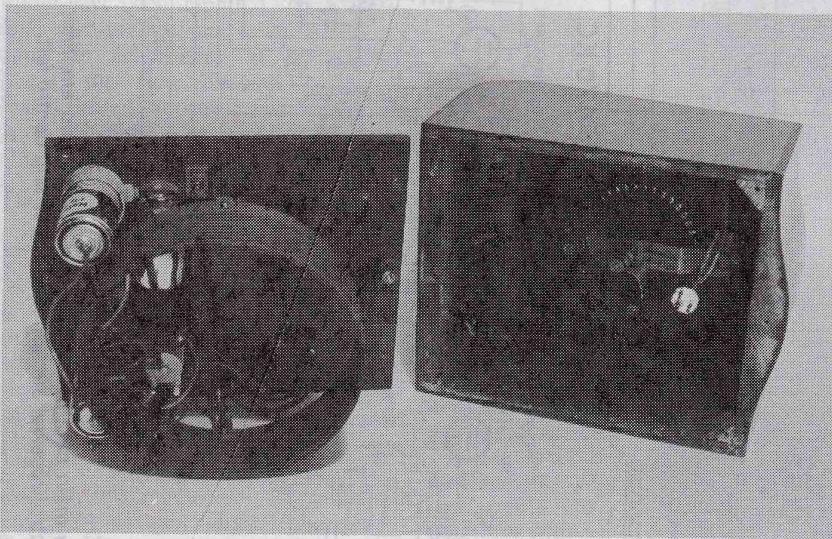


Fig.3: Inside the controller, with the dial in the lid and the oscillator in the base. The oscillator coil is also the transmitting loop.



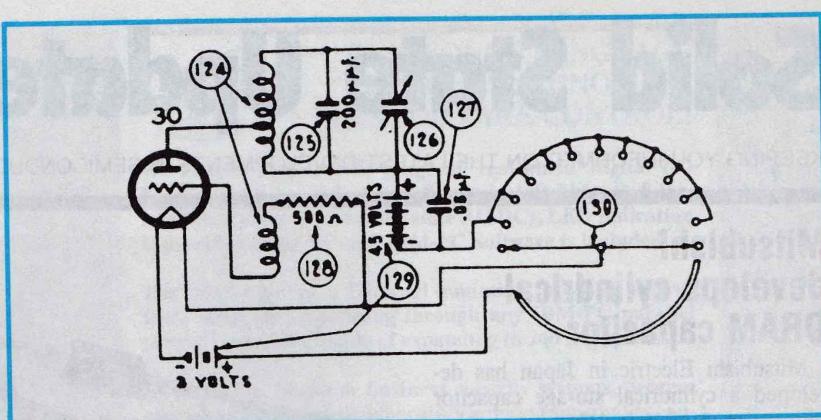
Fig.2: The control box — designed for table operation rather than hand holding!

ceived pulse steps the selector switch to the first contact, which is blank. Consequently an extra pulse is added to all trains. At the commencement of a train, the slow release magnet engages the selectors. A mechanical interlock permits the first three pulses to activate only the volume control selector. Four or more pulses return the three station selectors to the first station position, and then step them round to the position dialled.

As the selector arms come to rest on the contacts associated with the required station, one set switches various preset capacitors for aerial tuning. The second set similarly switches inductors for the local oscillator tuning, while the third set switches the indicator lamps. The arms remain in position until reset by the controller.

Volume control

Control of volume with the first selector section is very ingenious. The finger stop on the dial doubles as a push button. If this is depressed during dialling, the transmitter produces a continuous carrier at the conclusion of a pulse train. This has the effect of holding in the slugged magnet of the receiver's selector, holding the volume selector in position.



The control transmitter circuit — a simple 1-valve oscillator pulsed by a telephone-type dial.

If the selector is on contacts 2 or 3, the volume control motor is energised for as long as the push button is pressed. Contact 2 (the 1st dial position) raises the volume. If the button is held down long enough on the 3rd contact, as well as reducing volume, the motor will operate the on/off switch and the receiver will be switched off.

Unique effort

The system is surprisingly reliable, with a similar range to a modern infra-

red controller, but the Mystery Controller has one advantage. It is able to operate through walls!

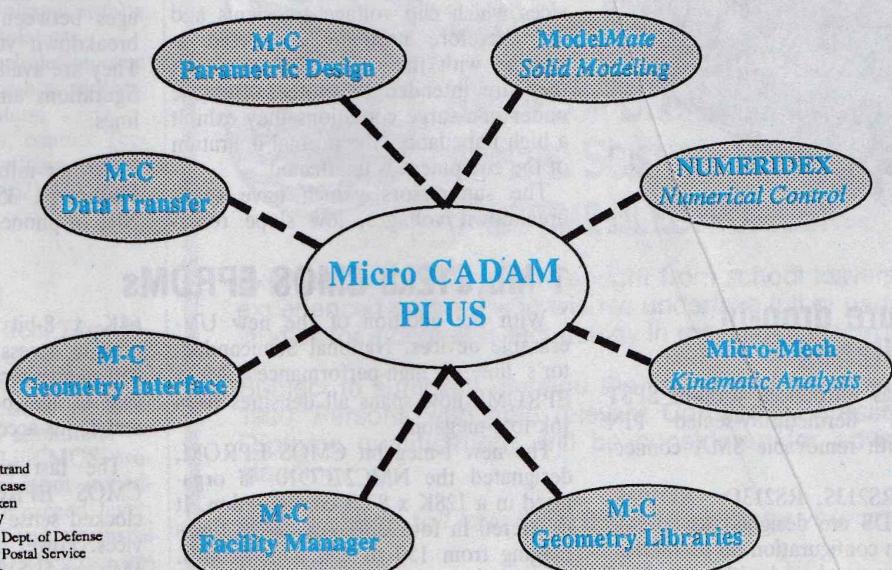
Although wired remote control systems were common, I know of no other wireless radio controllers, and Philco itself did not perpetuate the system. By 1939, television was taking off in America and World War II was just around the corner. Engineers with the ability to design the Mystery Control would soon have been engaged in less frivolous activities.

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