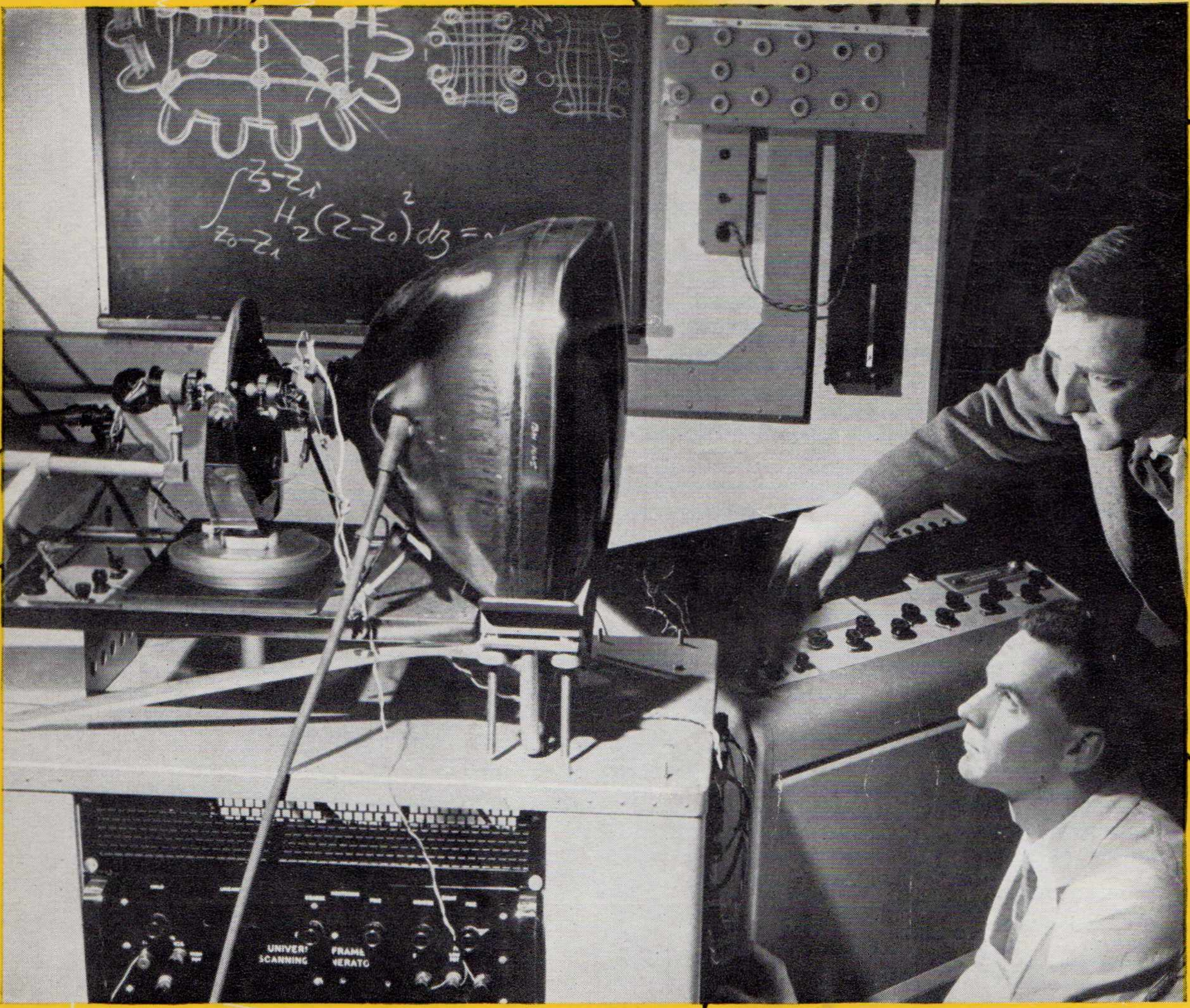
Mullard Outlook

Australian Edition



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MULLARD-AUSTRALIA PTY. LTD.

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JOERN BORK

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Our cover picture was taken in the Mullard Research Laboratories at Salfords during development of television tube deflection components.

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MULLARD LTD., LONDON
MULLARD OVERSEAS LTD.

"I have six faithful serving men
Who taught me all I know;
Their names are Why and How and What
And Where and When and Who."

RUDYARD KIPLING.

ARL-APPLICATIONS RESEARCH LABORATORY

THIS somewhat classical phrase is the name of the Mullard Technical Service Laboratories which ensure that valves designed with particular parameters for specific purposes are indeed applied within the design ratings. Should a design engineer find a new application for an existing valve type the ARL team are there to advise on its further development or perhaps recommend an alternative type more suitable for the function. It is a service welcomed by AM receiver, TV receiver and electronic apparatus design engineers to check their own engineering—to obtain a clean bill of design health resulting in their equipment being well accepted, reliable, acclaimed for long valve life, and so on.

In many cases the ARL service provides a complete engineering design right down to the smallest detail of inductor insulation specification and component rating.

To see the need, initiate the design, and later produce valves, electron tubes and semiconductor devices requires a tremendous amount of knowledge—physicists, chemists, metallurgists, mechanical engineers, production engineers and a host of skilled technicians of many trades and ultimately the important service provided by the valve and semiconductor application engineers.

The mutual respect—the respect of confidences—the bonds between Mullard application engineers and design engineers in every electronic field where valves, electron tubes and semiconductors are applied, reflects a specialised service of the highest code. The interchange of information and personnel between the various Mullard Applications Research Laboratories provides the valve user with the benefit of a vast amount of practical experience; in Australia the Laboratory is situated at Mullard-Australia Pty. Ltd., Head Office, 35-43 Clarence Street, Sydney.

We invite you to avail yourself of this service.

M.A.B.

VIEWPOINT WITH MULLARD

NEWCASTLE

Introduced by Mr. R. K. Broughton of Martin de Launay Pty. Ltd., Mullard Distributors for New South Wales, Mr. M. A. Brown welcomed 140 guests to the first "Viewpoint" held outside the capital cities. He said that Mullard were pleased that this meeting had been held in Newcastle and in stressing the service available to all Mullard valve users from Martin de Launay Pty. Ltd., he outlined the facilities provided in Newcastle for valve and picture tube sales and service.

In welcoming industrial valve users Mr. Brown went on to say: "If you had an X-Ray at the Royal Newcastle Hospital it would be taken with a Mullard X-Ray tube, radar fitted ships at present moored in Newcastle harbour were almost certain to be equipped with Mullard magnetrons and klystrons. Many electronic monitoring and control devices at the Newcastle steel works and other industrial concerns were also fitted with Mullard industrial valves."

TASMANIA

On the 25th and 27th February "Viewpoint" meetings were held in Hobart and Launceston respectively in conjunction with Messrs. Medhursts Wholesale Ltd., newly appointed Mullard Distributors for Tasmania.

These meetings followed the pattern set previously. Mullard personnel were introduced by Mr. Oakley of Medhursts Wholesale Ltd. in Hobart, and by Mr. Walsh, also of Medhursts, in Launceston. Mr. Goldthorp demonstrated the well known Mullard amplifiers and introduced a novel transistor amplifier using a loud speaker frame as chassis and heat sink. He outlined the technical service available from Mullard, together with the policy of valve replacement through Medhursts. Films were shown and copies of the first issue of the Mullard Outlook, Australian edition, distributed at these meetings.

WOLLONGONG

On the 21st March Mullard entertained South Coast Wholesalers, Retailers and Industrial Valve Users at Wollongong. The guests were welcomed by Mr. P. C. Bidencope, Mr. J. Goldthorp spoke briefly on technical service and demonstrated audio equipment and Mr. B. P. A. Beresford discussed replacement procedure for valves and picture tubes, and mentioned technical publications available on request.

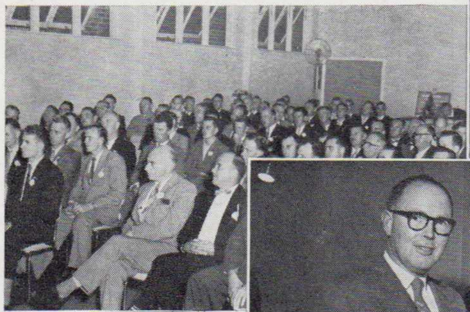
Keen interest was shown in the Mullard displays and films and a vote of thanks moved by Mr. Reg Lindsay of Reg Lindsay Service Co. was received with acclamation.

MEDHURSTS WHOLESALE LIMITED

The Tasmanian "Viewpoint with Mullard" functions happily coincided with the appointment of Medhursts Wholesale Limited as sole Mullard distributors for Tasmania. Established in 1907, the traditional service offered by this company is reflected in their progress through the years and no less their tremendous contribution to electrical development in Tasmania. With the introduction of cheap hydro-electric power, Tasmania proved a good market for electrical equipment and the Medhurst organisation played a leading part in catering for the demand. The introduction of broadcasting in the early '20's proved another great opportunity for the company to meet public needs for technical services and supply of radio equipment.

Medhursts Limited now function as a holding company operating three subsidiaries—Medhursts Wholesale Limited, Medhurst and Sons Pty. Limited and the Electrical Finance Company Limited. The new Hobart warehouse has three floors, totalling over 30,000 sq. ft. with street frontages on two floors greatly facilitating goods handling and providing considerable parking space. In Launceston the warehouse has a frontage to three streets and provides adequate parking facilities. The Medhursts organisation is actively preparing to meet the expected demand for television equipment which will follow the commencement of the Tasmanian television service and they feel that their recent appointment as state distributors for Mullard valves and electron tubes represents a substantial advance towards this objective.

May we say "Welcome" to Messrs. Medhursts Wholesale Limited, the youngest Mullard distributor—but perhaps one of the oldest and most respected wholesale traders in the Commonwealth.



A glimpse of the audience at the recent Newcastle meeting.

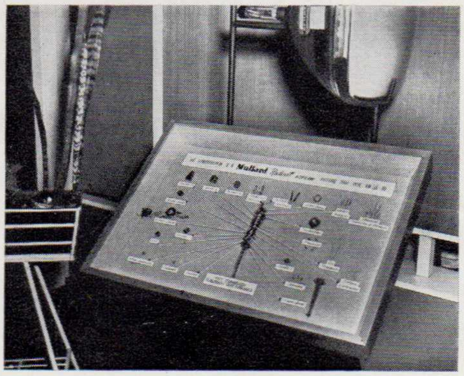
Mr. Mark Jessup arriving at the Mullard meeting at Launceston. Miss H. Cairns attaches his lapel badge.

Mr. John Goldthorp discusses aspects of the well-known Mullard Audio Amplifiers at the gathering in Launceston.

FUTURE MEETINGS

Melbourne: Dennis' Hotels Pty. Limited, Banquet Hall, 334 Glenferrie Road, Hawthorn, May 29, 1958.
Brisbane: Tentative—June.
Sydney: Tentative—July.

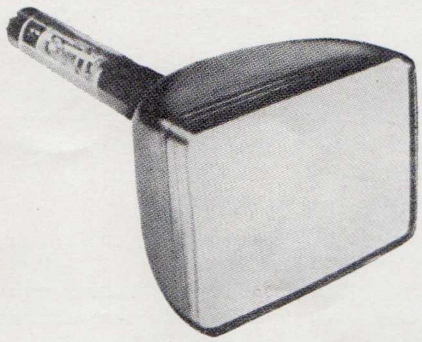
MULLARD DISPLAYS



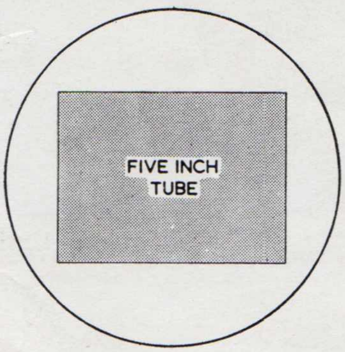
Several new displays such as the one illustrated are now available on loan to Retailers. They are accompanied by a selection of leaflets, show cards, etc. which may be obtained on request to the Maintenance Valve Sales Department.

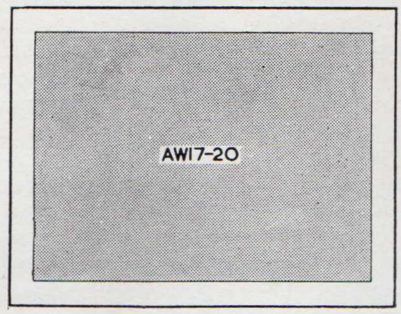
RECTANGULAR VIEWFINDER

Type AW17-20



The AW17-20 is a camera viewfinder or picture monitor tube with a rectangular face. It is designed to give the largest possible picture area for a given total tube volume. When a conventional circular tube is used with the standard picture aspect ratio, the four unused segments of the screen represent a considerable volume of wasted space. In addition, the four corners of the square housing are also wasteful.





The optimum ratio of useful picture area to tube (or tube plus housing) volume is achieved in the manner indicated in the diagram, in which the picture areas of the AW17-20 and a five-inch tube are drawn to the same scale. The volumes of the two tubes are similar. The efficient use of panel space which the rectangular tube provides is achieved with the same scanning angle as that of normal five-inch tubes. Thus the usable screen area is doubled, but there is no necessity to redesign the scanning circuits.

The AW17-20 has magnetic deflection and low voltage electrostatic focusing. It provides adequate resolution at peak white brightness of 50 foot-lamberts for both the 405-line and 625-line systems.

Tentative Data

Heater	6·3V, 300mA	
Limiting Values		
$V_{a2,\ a4}$ range	8 to 14	kV
V_{a3} max.	±500	V
V_{a1} range	200 to 500	V
$-V_g$ max.	200	V
R_g max.	1·5	MΩ
Characteristics		
$V_{a2,\ a4}$	12	kV
V_{a1}	300	V
V_g for cut-off	−30 to −70	V
V_{focus}	±200	V
I_{a3}	±15	µA
Base	B12A duodecal	
Overall length	339±7·5	mm
Useful screen area	93 by 124	mm

Z700U SUBMINIATURE COLD CATHODE TRIGGER TUBE

The Z700U is intended primarily for electronic switching and computing in the speed range 0 to 4kc/s. It is intended for operation from d.c. supplies, and uses the solid metal cathode technique. An auxiliary discharge of about 3µA, flowing between anode and primary cathode, ensures freedom from ambient light effects.

The range of trigger ignition voltage, covering all tubes over life, is 137 to 153V. This range, together with comparable close tolerances on other characteristics, enables a designer to produce either an equipment with a very well defined performance or, alternatively, one allowing a wide tolerance on associated components (e.g., resistors and capacitors).

Advance Data

Characteristics		
Anode working voltage range	210 to 310	V
Anode maintaining voltage range over life ($I_a = 30 \cdot mA$)	113 to 121	V
Trigger breakdown voltage range over life ($V_a = 250V$)	137 to 153	V
Maximum variation of trigger breakdown voltage over life (any tube)	±5·0	V
Minimum anode to primer cathode ignition voltage	210	V
Nominal anode to primer cathode maintaining voltage	175	V
Minimum trigger current to ensure transfer over life ($V_a = 250V$)	20	µA

GERMANIUM PHOTOTRANSISTOR

Type OCP71

The germanium phototransistor is one of the latest additions to the range of industrial photosensitive devices. The Mullard OCP71 is a small germanium junction device with an extremely high light sensitivity. It will find immediate use in industrial applications where its rapid response and ability to operate relays directly set it apart from previously available photosensitive devices. The maximum collector current rating is 10mA, which is more than adequate to operate a medium size relay.

The OCP71 differs from the photosensitive semiconductors previously available in Great Britain, in that it is both a detector and current amplifier. The sensitivity of the cell is indicated by the fact that if it is exposed to collimated light at a level of 75 foot-candles, collector currents of at least 1.5mA can be expected.

The cell is similar in size to the Mullard OC71, with a maximum diameter of 5.9mm and a maximum length (excluding leads) of 15mm.

The OCP71 is available from stock and data sheets may be obtained from the Communications and Industrial Valve Department.

PLUG-IN END VIEWING PHOTOCELLS

Types 53CG and 53CV

In some applications the use of end-viewing photocells with wire-in connections is inconvenient or undesirable. Two new end-viewing cells with B3A (pee-wee) bases are therefore being introduced. The new types are the 53CG (a gasfilled cell equivalent to the 58CG); and the 53CV (a vacuum cell equivalent to the 58CV). Both types have photocathodes of 'C' type and are particularly sensitive to incandescent light sources and to the near infra-red.

The 53CG and 53CV are available in sample quantities.

SOME FACTS ABOUT SCREENBURN

The most destructive form of screen burn is caused by bombardment of the screen material by heavy negative gas ions. These are produced in the neighbourhood of the cathode where the velocity of the electrons is low and where, therefore, it is more likely that collision between a gas molecule and an electron will result in the electron attaching itself to the molecule, forming a negative gas ion, than that it will expel an electron from the molecule, forming a positive ion.

These negative ions can be accelerated by the potentials on the electron gun, and if allowed to reach the luminescent screen, may strike it with sufficient momentum to damage the luminescent properties of the screen.

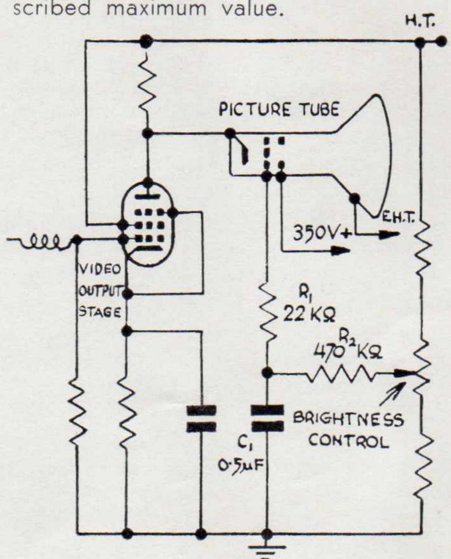
Negative ions can be prevented from reaching the screen by means of an ion trap. The form of trap adopted in Mullard tubes is shown in the accompanying illustration. The axis of the gun is bent in such a way that the combined stream of electrons and negative ions is at first directed towards the wall of the final anode. A small magnet fitted on the neck of the tube provides a lateral field which deflects the electrons to an axial path, but is of insufficient strength to deflect the more massive negative ions, which ultimately reach the second anode. A secondary cause of screen burn is bombardment of the screen by heavy positive ions, produced as the result of collisions between swiftly-moving electrons and gas molecules—a certain number of which inevitably remain in the tube, no matter how well it has been pumped.

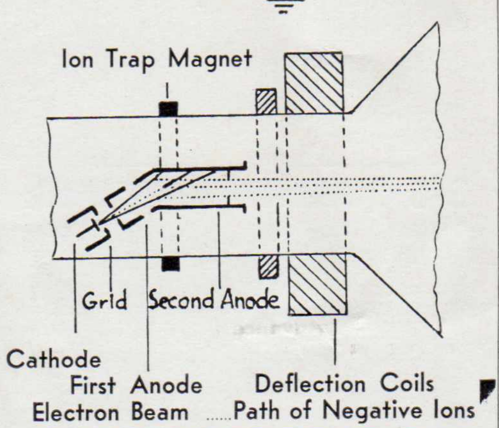
These collisions result in the expulsion of electrons from the gas molecules which are thus left positively charged. Under specified working conditions, however, risk of damage by positive ion burn is insignificant. There is a third form of screen burn, due to bombardment not by gas ions, but by the electron beam itself. It can occur through the existence of a stationary electron beam during the period immediately after switching off and before the discharge of the E.H.T. capacitance. Operating conditions which avoid this risk are specified and television receiver manufacturers take precautions to ensure that any such spot is of insufficient intensity to cause screen damage.

A suitable circuit arrangement for tube protection is given in the basic diagram below, which shows a typical video stage driving a picture tube together with the associated brightness control.

On switching off, the H.T. voltage applied to the video stage, and hence the cathode potential of the picture tube decays very rapidly, but owing to the time constant of C1R2 the potential of the tube grid decays at a slower rate, and maintains beam current at a sufficiently high value to discharge the E.H.T. capacitance before the scanning voltage decreases.

At some instant during this period the voltage between grid and cathode assumes a value at which grid current flows. This current is limited by the resistor R1 so as to prevent the grid-to-cathode potential exceeding the prescribed maximum value.





HIGH QUALITY SOUND REPRODUCTION

Further reprints of this Publication may not be available until later in the year, therefore to enable us to offer our usual service, reprints of the circuit diagrams and component parts lists for the 10 and 20 Watt High Quality Amplifiers and Pre-Amplifiers will be available on request to the Technical Service Department.

VOLTAGE REFERENCE & STABILISER TUBES

A wide and diverse range of electronic applications in industry, telecommunications and research would not be possible without extremely stable d.c. voltage sources.

At the heart of these circuits which provide these stable voltages are voltage reference and stabiliser tubes—tubes which must be accurate, reliable and correctly chosen.

Mullard tubes are manufactured with the skill and care of long experience, and fulfil critical requirements of performance and reliability.

Immediate delivery can be offered for the following comprehensive range of voltage reference and stabiliser tubes. For further technical details please contact the Communications and Industrial Valve Department in Sydney or Melbourne.

PREFERRED REFERENCE TUBES

European	E.I.A.
75C1	—
85A2	OG3
85A3	5783WA

PREFERRED STABILISERS

European	E.I.A.
90C1*	—
90C2	—
150B2*	6354
108C1*	OB2
150C2	OA2
150C4	—

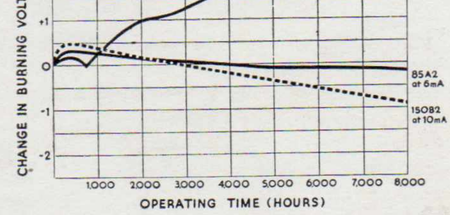
BRITISH MAINTENANCE TYPES

European	E.I.A.
75B1	—
85A1	OE3
95A1	—
150B3	—
4687	—
7475	—
13201A	—

AMERICAN MAINTENANCE TYPE

European	E.I.A.
150C3*	OD3

* Also available in M8000 Special Quality series.



Sample burning voltages characteristic of 85A2, 90C1 and 150B2 over the first 8,000 hours of operation.

LOUD SPEAKERS AND THE TRANSISTOR

In transistorised portable radio receivers and record players there is a trend towards a circuit technique known as asymmetrical or single ended push pull. This configuration is basically an interchange of the position of the supply and the loud speaker in the conventional or symmetrical push pull arrangement. Although a centre tap battery of double the voltage is required the asymmetrical push pull technique permits a loud speaker of suitable impedance to be coupled directly to the output transistors so overcoming the physical and electrical limitations of the conventional output transformer.

A wide variety of load impedances appears necessary to match not only different types of output transistors, but also different operating conditions for any given pair of transistors, but tentative measurements indicate a variation in load impedance by 20% will reduce the available power output by less than 2 db.

As a consequence, it is suggested that loud speaker voice coil impedances for this application be confined to EIA/RETMA values extrapolating from the already standard 15 ohm voice coil to yield preferred values of 22 ohm, 33 ohm, 47 ohm and 68 ohm.

It is not the intention of this note to suggest that a loud speaker manufacturer would of necessity make speakers with voice coil impedances of these four values, but rather where a demand exists for a loud speaker of this type he standardises the voice coil impedance at the nearest EIA/RETMA value. It could well be that for some special application the intermediate 10% values of 18 ohm, 27 ohm, 39 ohm and 56 ohm may be desired, but measurements to date indicate that for commercial entertainment equipments the marginal increase in performance would not warrant the addition of these further preferred values.

For engineers and technicians as yet unfamiliar with the techniques of semiconductors, it should be noted that the optimum load impedance of a class B transistor output stage is a function of the supply voltage and the ratio of peak to quiescent collector current. Although the supply voltage is normally a factor fixed early in the design, the peak collector current dependent upon the desired output power within the capabilities of the transistor, and in the interest of efficiency the quiescent collector current a minimum consistent with permissible switching distortion, some juggling of these latter two factors is possible in a design enabling a match to be secured directly to one of the 20% preferred EIA/RETMA values of voice coil impedance.

J. R. GOLDTHORP.

THYRATRON RECOVERY TIME

Recent work on thyratrons has established that the time which elapses between the end of conduction and the regaining of control by the grid is not necessarily the same thing as the time taken for all the electrons and positive ions to recombine. Since this latter process is the 'deionisation time' in the strict sense, it has been decided that this expression shall be used only to describe that process. Therefore, in all future Mullard publications and data sheets, the time taken for the grid to regain control will be known as 'recovery time' rather than 'deionisation time'.

The recovery time of a thyratron is the characteristic which is of practical interest to the circuit designer, since it determines the maximum allowable operating frequency. The recombination of the electrons and ions is a matter of valve physics, with no direct effect on circuit design.

This change in terminology will be accompanied by the issue of more detailed information about the variation of recovery time (and therefore of maximum operating frequency) with grid voltage and grid series resistance.

3-3 QUALITY AMPLIFIER

Please note that the anode voltage for the EF86 should be 20V not 30V as shown in last month's issue.

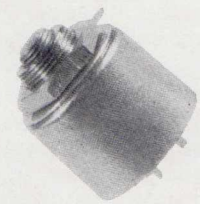
The value of R5 for various voice coil impedances is as follows:—

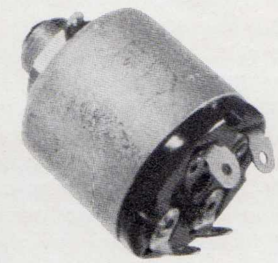
3.75Ω = 150Ω; 2.0Ω = 225Ω;
2.7Ω = 192Ω; 8.0Ω = 112Ω;
12.0Ω = 92Ω; 15.0Ω = 82Ω.

NEW MULLARD FILM

In many industries the size and distribution of microscopic particles is all important. The Mullard Film Scanning Particle Analyser described in the film "Particles Count" is capable of rapidly sizing and counting particles displayed on electron microscope slides. The application of electronic techniques enables a distribution curve to be obtained almost immediately, thus providing information of inestimable value in quality control.

ADJUSTABLE FERROXCUBE POT CORES





The Mullard 14mm. and 18mm. pot cores are completely self contained, simple to mount and easily adjusted after mounting with an average range of 10% and a setting accuracy of .5%. Unique features include single hole fixing and two- or four-way terminal plates. Adjustments of inductance are made by means of a screw which varies the position of a magnetic shunt in the centre of the core; in many cases this eliminates the need for trimming capacitors. Designers will see from the brief characteristics listed here that Mullard adjustable pot cores are particularly suitable for use in high grade communications equipment, tuned circuits and filter networks.

Abridged technical data:

14mm. Pot Cores

Four types available	LA32-35
Air gaps	From 0.2 mm. - 0.5 mm.
Frequency range	10 kc/s - 100 kc/s
Q values in the higher frequency range	> 200

18mm. Pot Cores

Four types available	LA42-45
Air gaps	From 0.3 mm. - 1.0 mm.
Frequency range	10 kc/s - 100 kc/s
Q values in the higher frequency range	> 300

These Pot Cores are available from stock and further technical details may be obtained from the Communications and Industrial Valve Department.

PULSE OPERATION OF TRANSMITTING VALVES

With some exceptions the data given in the "Mullard Technical Handbook" apply for conditions of continuous operation only. For many present-day techniques, such as pulsed radar, it would be more appropriate to publish intermittent or pulse ratings. The variety of such uses is, however, so great that a comprehensive set of data sheets is out of the question. Instead, this article discusses the limitations and precautions which should be observed, and gives the experimenter or designer some indication of what he can reasonably do. Advice on particular applications is, of course, freely available from the Industrial Technical Service Department.

This article is not concerned with valve types specifically designed for pulse operation.

Limiting Factors

Any pulse operation of a transmitting valve is governed by four interdependent factors: emission, pulse length, temperature, and interelectrode breakdown.

Emission is limited by the saturation current of the cathode or filament. This current is appreciably higher than the normal allowable peak cathode current of the valve, and prolonged operation at this level would rapidly destroy the cathode; but if each peak is followed by a considerably longer rest period, the emission will recover and the cathode will not be damaged.

The saturation current of a thoriated tungsten filament may be taken (in the absence of a specific published figure) as being about 50 to 70mA for each watt of filament consumption. A peak cathode current equal to this value is allowable where the duty cycle is below 0.01, the pulse length is less than 0.1 second, and the frequency of oscillation (in a pulsed r.f. amplifier or oscillator) exceeds 10 kc/s. In a pulse modulator with d.c. pulses the high current duration should be restricted to 0.1 msec. For longer pulses or less favourable duty cycles in c.w. applications the peak cathode current must be reduced to half the saturation current. If high current is essential, even at the cost of reduced life, the saturation current of a thoriated tungsten filament can be doubled by a 10% increase in filament voltage.

Oxide-coated cathodes can generally tolerate currents of 500mA for each watt of cathode heating power. The pulse length for this peak value must not exceed 3 micro-seconds.

An alternative method of obtaining high peak power outputs is to increase the H.T. voltages. In general, a peak anode voltage equal to the peak value of the 100% modulation of an a.m. stage (say four times the d.c. anode voltage) is allowable under pulsed grid conditions. When normal working voltages are increased, attention must be given to the voltage limitations of valve-holders, wiring, and circuit components, and to high altitude effects. Care must be exercised when applying the high voltage for the first time or after a period of normal operation or disuse. Efficient protective devices must be included to handle any flashovers which may occur.

Electrode temperatures are associated with the dissipation and the pulse duration. No increase in **average** electrode dissipation is allowable; and the **maximum** published dissipation must not be exceeded for longer than one-tenth of a second.

Bulb temperatures should not be allowed to rise above the normal published limits; and abnormal heating of the leads (which may produce electrolysis in the glass seals of the valve) must be avoided.

Guarantees

It should be realised that the kinds of operation which have been discussed are marginal, and that the limitations quoted in this article must never be exceeded (excepting where destruction of the valve is of secondary importance). Factory tests are normally confined to the characteristics and conditions given in the data sheets, therefore operation and life are not guaranteed under any of the conditions discussed or implied in this article. Only pulse conditions which are specifically approved by Mullard-Australia Pty. Ltd., and published in data sheets, are covered by guarantee.

E180F NOISE FACTOR

In addition to its use as a wideband amplifier under pentode conditions, the E180F is very suitable for use, triode-connected, in low noise r.f. or i.f. input stages. For example, when used in a cascode configuration, a noise factor of about 4.5dB can be achieved at 200Mc/s, with a band-width of 10Mc/s. At 45Mc/s, with a band-width of 3.6Mc/s, the noise factor is about 2.0dB.

For additional information refer Vol. I of the Mullard Technical Handbook.

NEW ELECTROMETER

As is well-known, a diode operated in the retarding field region exhibits a logarithmic relationship between diode current and applied anode voltage. Within certain limitations, this property also applies to the control grid-cathode characteristic of a triode.

Assuming that over the required operating range the anode current to grid voltage relationship of a triode is approximately linear, it follows that a suitable triode may be operated under conditions in which the anode current is approximately proportional to the logarithm of the positive grid current. The Mullard electrometer triode, ME1404, is specifically intended for this mode of operation. When operated under suitable conditions this logarithmic relationship between positive grid current and the anode current holds over the range of grid current 3×10^{-12} to 3×10^{-9} amps.

Applications

The ME1404 is particularly convenient for use in radiation monitors in which the resulting logarithmic scale enables a wide range of radiation levels to be covered without range changing. This, of course, is extremely advantageous both from the point of view of equipment design, in that the problem of switching very high values of grid resistor is avoided, and from the user point of view, since it completely obviates the risk of confusion due to reading the wrong scale. Furthermore, circuit simplification is achieved, in that the ionisation chamber current may be fed directly to the grid of the electrometer without the need for any grid resistor.

This mode of operation may best be understood by appreciating that, if the chamber is directly connected to the grid, then at any given current an equilibrium condition will only be reached when the electrometer grid current and ionisation chamber currents are of equal and opposite value. At this point, the grid of the electrometer takes up a potential which is related to the logarithm of the chamber current, and hence the anode current of the valve is similarly related.

Clearly this property may also be applied to other instruments. For example, a precisely similar mode of operation results in a logarithmically scaled current meter operating in the range dictated by the valve. By the addition of suitable series resistors, such a device may, of course, be converted into a high impedance logarithmic voltmeter.

Samples of the ME1404 are available and complete data will be issued shortly.

75C1 UPRATING

This 75V stabiliser now has an increased current range, covering 2 to 60mA. Over this range the maximum change in burning voltage for any tube is 8V, with a typical regulation of 5V.

Advance Data

Limiting Values (absolute ratings)		
Minimum voltage necessary for ignition (light or dark)	115	V
Maximum burning current	60	mA
Minimum burning current	2.0	mA
Maximum ambient temperature limits	−55 to +90	°C
Characteristics		
Burning voltage at I_a = 30mA	75 to 81	V
Maximum difference between maximum and minimum burning voltages over current range	8.0	V
Typical percentage variation of burning voltage in first 1000 hours	±1.0	%
Typical voltage jumps in the current range		
10 to 20mA	20	mV
above 20mA	<10	mV
Maximum burning current above which the incremental resistance is always positive	7.0	mA
Dimensions		
Max. overall length	54.5	mm
Max. seated height	47.5	mm
Max. diameter	19	mm

XG15-12

HIGH VOLTAGE GRID CONTROLLED RECTIFIER

The XG15-12 is an indirectly heated mercury vapour triode with a maximum average current rating of 12.5A at a maximum peak inverse voltage of 15kV. Its control characteristic is negative over the working range.

With normal convection cooling the XG15-12 will operate over an ambient temperature range of 10-30°C. This range can, however, be extended by using forced air cooling.

The valve is designed for direct chassis mounting. The terminal connections are brought out on leads for direct circuit connection.

The XG15-12 is primarily suitable for power supplies in r.f. heating and transmitting valve equipments.

Advance Data

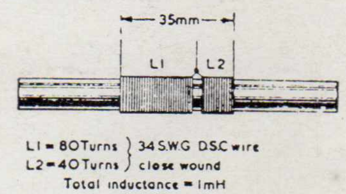
Heater voltage	5.0	V
Max. heater current	20	A
Max. peak anode voltage		
Inverse	15	kV
Forward	15	kV
Max. cathode current		
Peak	75	A
Average (max. averaging time 30 sec)	12.5	A
Max. negative grid voltage	1000	V
Max. control grid resistor	10	kΩ
Ambient temp. range (unblown)	10 to 30	°C
Typical heating-up delay	5	mins
Max. diameter	154	mm
Max. seated height	389	mm

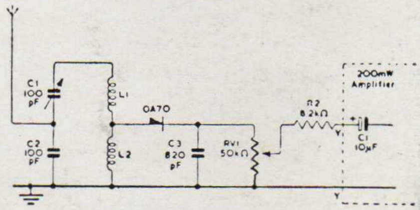
HAM SHACK

A medium wave receiver can be made up from a diode front-end feeding into a sensitive amplifier. The front-end equipped with a germanium diode such as the OA70 is of course only the modern counterpart of the crystal detector, and the sensitivity is necessarily poor. This unit must be used with a good external aerial capable of giving a signal of the order of 50mV. A good earth must also be provided.

The diode front-end may be fed into the 6-volt version of the 200mW transistor amplifier at terminals Y-Y. With the signal voltages available, the amplifier will not be driven to anything like full output—this is not a 200mW receiver.

The chief point of interest in this receiver is that, unlike the other circuits described, it is tunable over a large part of the medium waveband. The frequency range is 650 to 1500 kc/s, that is, from 460 to 200 metres. The coils, as shown in the illustrations, should be close wound from 34 s.w.g. double silk covered wire on a Ferroxcube rod, part No. FX 1247.





OA202: SILICON JUNCTION DIODE 150V at 30mA

The Mullard OA202 is the first of a range of silicon diodes intended for telecommunications and industrial applications.

It is our intention to produce diodes to cover applications ranging from r.f. second detectors to power rectifiers. The OA202 is the first type to reach full quantity production.

Advance Data

Characteristics

Forward voltage at forward current of

	25°C Av	100°C Av	
100μA	0.53	0.38	V
10mA	0.8	0.7	V
30mA	0.9	0.8	V

Limiting Values (absolute ratings)

Max. inverse voltage (peak or d.c.)	50	100	150	V
Max. forward current				
Peak	150	120	100	mA
Average*	50	40	30	mA

* averaged over any 50ms, or d.c. component

Ambient temperature range —50 to +125°C

Dimensions

Max. diameter	3.5	mm
Max. body length	7.6	mm
Max. length (including wires)	66.5	mm

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