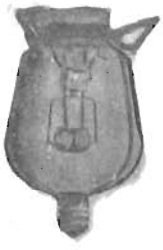


NR4

NR4C

NR7

NR7A

NR12A

NR13

NR13A

NR14

NR15

NR15A

NR16

NR16A

NR17

NR18

NR28

3 ELECTRODE AC HEATED VALVES

NR26

NR27

4 ELECTRODE VALVES

NR19

NR22

NR23

NAME OF VALVE.	FILAMENT		ANODE		MUTUAL CONDUCTANCE. (g_m)	A. C. RESISTANCE OHMS (r_a)	AMPLIFICATION FACTOR. (μ)	TYPE OF FITTING	CLASS OF FILAMENT.
	VOLTS	AMPERES	VOLTS	CURRENT (Ma)					
NR4	3.8	0.8	50	0.7	0.12	58000 to 140000	7 – 17	Screw	Bright
NR4C	3.8	0.8	50	0.7	0.15	30000 to 52000	7 – 12	Screw	Bright
NR7	3.2	0.65	50	0.7	0.18	30000 to 100000	5 – 13	Clip	Bright
NR7A	3.2	0.65	50	0.7	0.18	30000 to 100000	5 – 13	Clip	Bright
NR12A	4.0	0.7	80	1.0	0.18			4 pin	Bright
NR13	3.2	0.65	50	0.7	0.18	30000 to 100000	5 – 13	Inter Service	Bright
NR13A	3.2	0.65	50	0.7	0.18	30000 to 100000	5 – 13	– do –	Bright
NR14	3.6	0.115 (max)	50	0.5 1.5	0.2	30000 to 60000	6 – 8	Clip	Dull
NR15	3.6	0.12 (max)	50	0.7–2.5	0.7	20000 (max)	12 – 16	4 pin	Dull
NR15A	3.6	0.085–0.105	70	2 – 4	1.2–2.4	6000 to 12000	12 – 16	4 pin	Dull
NR16	3.6	0.25 (max)	50	7 – 15	0.9	4000 (max)	3	4 pin	Dull
NR16A	3.6	0.207–0.253	50	8	1.3–2.6	2000 to 4000	3.5–5.5	4 pin	Dull
NR17	3.6	0.115 (max)	50	0.5–1.5	0.2	30000 to 60000	6 – 8	4 pin	Dull
NR18	3.0	0.22 (max)	50	0.3	0.16	100000 (max)	15	Miniature Clip	Dull
NR26	4.0	1	200	7	1.8–3.2	5000 to 8000	14 – 18	5 pin	Indirectly heated cathodes.
NR27	4.0	1	200	15	2.5–4.5	1850 to 3850	9.5–11.5	5 pin	
NR28	2.0	0.2	200	10	1.2–2.0	3500 to 6000	6 – 8	4 pin	Dull

NOTE – NR7A is gettered, NR7 is not.

4 ELECTRODE (DULL EMITTER).

NAME OF VALVE.	FILAMENT		ANODE		MUTUAL CONDUCTANCE. (g_m)	A. C. RESISTANCE OHMS (r_a)	AMPLIFICATION FACTOR. (μ)	TYPE OF FITTING	SCREEN VOLTS.
	VOLTS	AMPERES	VOLTS	CURRENT (Ma)					
NR19	3.6	0.3	100	2	0.35	150000	70	Double-ended	75
NR22	3.6	0.07–0.11	100	2	0.6	300000	260	4 pin {with Anode terminal.	80
NR23	3.6	0.07–0.11	100	2	0.6–1.8	167000 – 360000	130–360	4 pin {with Anode terminal.	80

TEST BOARD FOR DULL EMITTER VALVES (PATTERN 1248).

This Test Board is supplied to enable gradual failure of a valve due to loss of emission to be observed. (There are three known causes of loss of emission (a) Excessive filament volts, (b) Excessive anode volts (c) Continuous running on too low a filament voltage). There are two fittings, one for four pin valves (1) and one for clip in valves (2). The voltmeter is a pattern 5526 used on the 25 volt range as a milliammeter connected to terminals (3) and (4). The 4 volt and 50 volt supplies are from the ordinary receiving batteries via terminals (7)(8) and (5)(6) respectively. With this arrangement the emission of each valve can be measured under standard conditions – i.e. constant supply of 4 volts L.T., 50 volts H.T., and grid connected to negative filament. In the case of screen grid valves NR22 and NR23 the screen grid is used as the anode, and the anode is left disconnected. The following table gives the minimum values of the voltmeter reading for various valves when the full scale reading is 25 volts:-

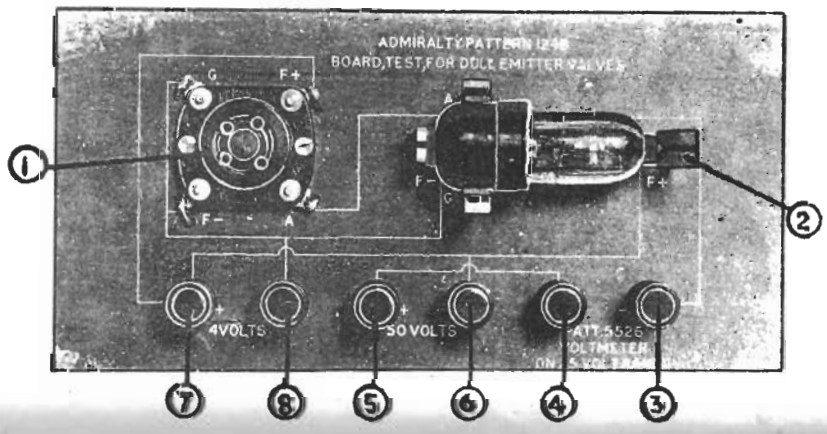
VALVE	VOLTMETER READING.
NR14	1
NR17	1
NR15	1.4
NR15A	1.3
NR16	11.0
NR16A	12.0
NR22	1.75
NR23	1.75

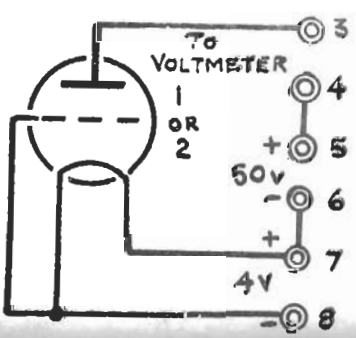
ALLOWANCE OF RECEIVING VALVES.

The number of receiving valves allowed to a ship is based on the total number of receiving valve sockets in a ship.

Bright Emitter first 15 sockets 5 valves per socket.
remainder 3 valves per socket.

Dull Emitter first 10 sockets 8 valves per socket.
remainder 2 valves per socket.





Date of design:- 1933.

This board is supplied to enable the ship's staff to carry out periodical tests on receiving valves in order to detect loss of emission. The circuit diagram is shown in Figure a. Deterioration in valves takes the form of increase in A.C. resistance and decrease in mutual conductance.

With this board the mutual conductance and A.C. resistance values for triodes, and the mutual conductance values for screen grid valves can be measured.

The board is fitted with a holder for valves of the NR14 type (17) and a standard 5-pin valve holder (16). There is also a terminal (18) for connection to the anodes of screen grid valves.

The 100 volt (1) and 4 volt (2)(3) battery supplies should be connected to the battery terminals through the rack switch and the condition of the batteries can be checked by means of the dual range voltmeter (6).

To measure filament voltage the voltmeter switch (7) must be in the filament position (14) and for anode voltage the switch must be in the anode position (13). The main switch (15) must be in any of the "ON" positions.

The anode voltage can be varied by means of a potentiometer (4) in series with a fixed resistance (8) between H.T. positive and L.T. negative and is equal to the supply voltage when the potentiometer is set to its maximum position.

When the main switch (15) is in position Triode 1 or 2, the variable H.T. potential is applied to the anode terminals of the valve holders (16) and (17). When the switch is in position SGV 1 or 2 the variable potential is applied only to the SGV anode terminal (18) and the valve holders anode terminals are connected to the junction of the potentiometer (4) and the fixed resistance (5).

The anode current of the valve under test is measured by means of the dual range milliammeter (9). The switch (11) has two positions (10) and (12) for readings of 0 - 100 milliamps and 0 - 10 milliamps.

A fixed potentiometer (19) is connected across the L.T. supply for applying grid bias to the grid terminals.

There are two tappings (20) and (21) on the potentiometer - one to be used when the L.T. supply is from a 4-volt battery, and the other in the case of 2 volt supply.

When the main switch (15) is moved from position Triode 1 to Triode 2 or from SGV1 to SGV2, the grid bias is altered from 0 to + 0.5 volts.

Triodes with directly heated filaments.

Method of test - Measurement of A.C. resistance.

To carry out the tests, the main switch is to be put to position Triode 1 and the anode current is to be measured first with an anode voltage of 70 volts and then with an anode voltage of 80 volts. The difference between these readings should be greater than the minimum difference given for each type of valve.

Valve type	Minimum difference of anode currents.
NR14	0.15 milliamp.
NR17	0.15 "
NR15	0.4 "
NR15A	0.7 "
NR16	2.0 "
NR16A	2.0 "

Triodes with indirectly heated filaments.

Method of test - Measurement of mutual conductance.

To carry out this test, the anode voltage should be 96 volts and the anode current is to be measured first with the main switch in position Triode 1 and then with the switch in position Triode 2. The difference between the two readings should be greater than the minimum difference for each type of valve.

Valve type	Minimum difference of anode currents.
NR26	0.6 milliamp.
NR27	1.0 "
NR31	0.8 "

Screen Grid Valves.

Method of test - Measurement of mutual conductance.

To carry out this test, the anode of the valve under test is to be connected to the SGV anode terminal (18) and the H.T. potentiometer (4) set to give an H.T. voltage of 96 volts. The anode current is measured first with the switch in position SGV1 and then with the switch in position SGV2. The difference between the two readings should be greater than the minimum difference for each type of valve.

Valve type.	Minimum difference of anode currents.
NR22	0.25 milliamp.
NR23	0.25 "

In all cases the filament voltage is not to be less than 3.6 volts.

VALVE TEST BOARD.

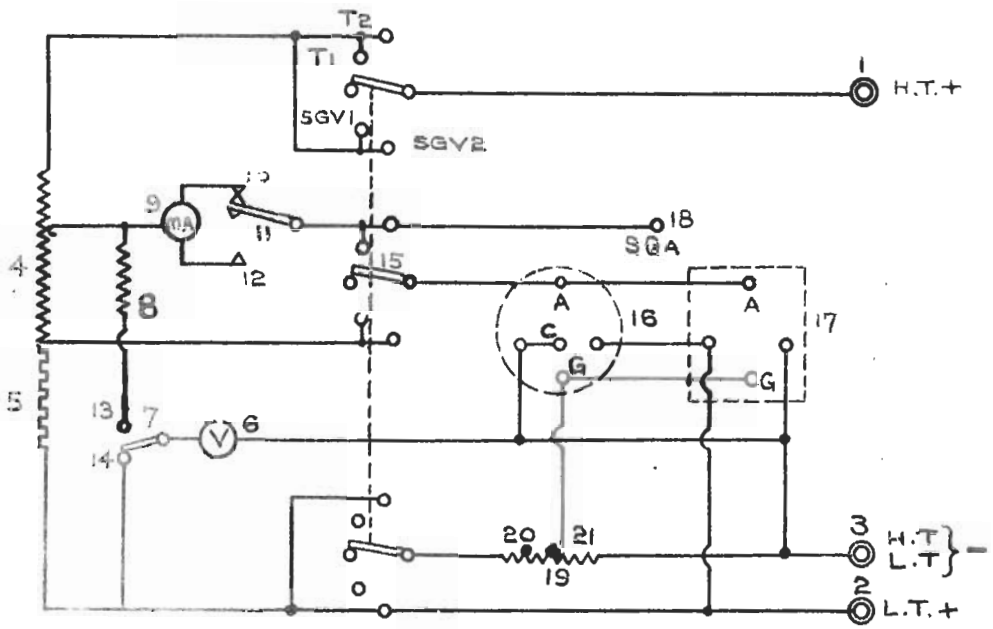


FIG. a.