SECTION W

BUZZER OUTFITS AND R.C. CIRCUITS.

BUZZER OUTFITS AND R.C.CIRCUITS.

With the introduction of valve buzzer outfits for internal signal communication, opportunity has been taken to allocate type numbers to the following:-

(a) Signal Communication Buzzer Outfits (vibrating buzzers).
(b) Signal Communication Buzzer Outfits (valve buzzers).
(c) Instructional Buzzer Outfits.
(d) R/C Circuits.

The system of allotting type numbers is as follows:-
There are eleven classes of ship to be provided for, but as each has not been given an entirely separate type number of its own, it has only been necessary to allocate 9 different type numbers to each system.

Type Nos. 501 to 509 - Vibrating Buzzers.
" " 511 to 519 - Valve Buzzers.
" " 521 to 529 - Instructional Buzzers.
" " 531 to 539 - R/C Circuits.

The 2nd figure indicates the system and the 3rd figure the class of ship in which the particular system is fitted.

Type of Ship.	Vibrating Buzzer Outfits.	Valve Buzzer Outfits.	Instructional Buzzer Outfits.	R/C circuit Outfits.
Battleships and Battle Cruisers (private ships)	501 or	511	521	531
Battleships and Battle Cruisers (flagships)	501 or	511	521F	531
Cruisers (private ships)	502 or	512	522	532
Cruisers (flagships)	502 or	512	522	532
Flotilla Leaders.	503	-	523	533
Divisional Leaders.	504	-	523	534
Destroyers.	504	-	524	534
Sloops, Minesweepers and River Gunboats.	Nil	Nil.	524	Nil
Submarine Depot Ships.	505 or	515	523	535
Repair Ships.	506 or	516	523	536
Aircraft Carriers.	507 or	517	527	537

In each of the two buzzer systems the various types of outfit only differ from each other in the allowance of stores. The circuits are all identical. Figure b shows the principal positions supplied by each buzzer line and figures a and c typical diagrams of connections for vibrating and valve buzzer circuits respectively.

Buzzer lines are lettered as follows and are used for purposes as stated.

Line	Use
P	Gunnery Fire Control
Q	Gunnery Spotting Aircraft and 2nd office manoeuvring in Flotilla Leaders.
R	D/F
S	Omnibus.
T	~~Main Office Manoeuvring and also~~ Type 83 Manoeuvring in Leaders and Destroyers.
~~U~~	~~Auxiliary Office Manoeuvring.~~

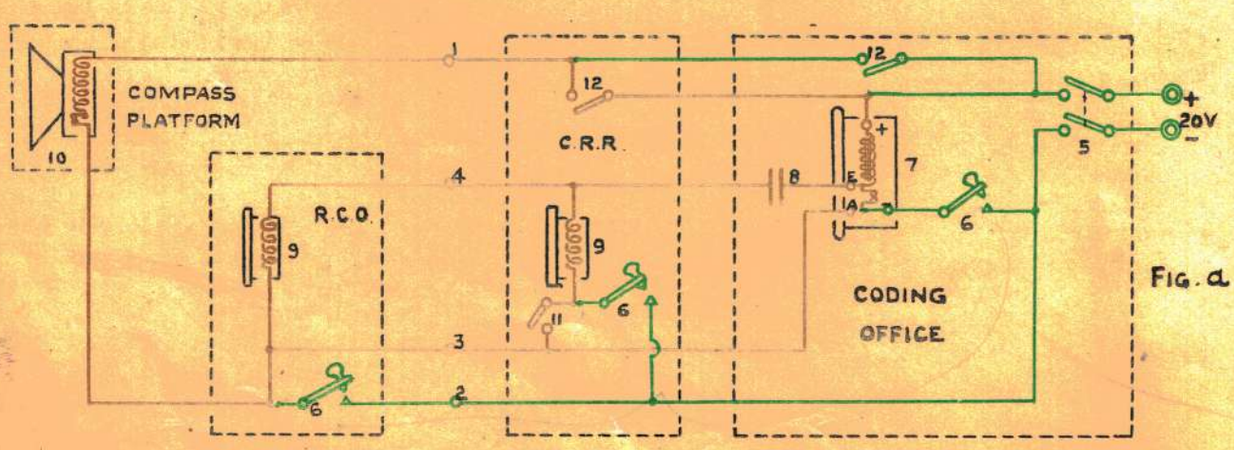

FIG. a.

BUZZER OUTFITS AND R.C. CIRCUITS.

Figure b. shows the positions supplied by each buzzer line in Types 501 to 517 inclusive. Minor variations from this table may be found in certain ships, particularly in aircraft carriers (Types 507 and 517).

POSITIONS.	TYPES 501 & 511	TYPES 502 & 512	TYPE 503	TYPE 504	TYPES 505 & 515	TYPES 506 & 516	TYPES 507 & 517
	P Q R S T U	P Q R S T U	Q S T	T	S Q T V	S Q T V	Q R S T U
MAIN CODING OFFICE.	■ ■ ■ ■	■ ■ ■ ■	■ ■	●	■ ■	■ ■	■ ■ ■ ■
C.R.R.	●	●	●	●	●	●	●
MAIN SET.							
SECOND OFFICE.	■ ●	■ ●	■		■ ●	■ ●	■ ●
AUXILIARY W/T COMPT.	■ ● ■	■ ● ■			● ■	● ■	● ■
D/F COMPARTMENT	●	●					
GUNNERY W/T COMPT.	■ ●	■ ●			●	●	
TYPE 71 COMPARTMENT	●	●					
GUNNERY T.S.	■ ●	■ ●					
DUMMY PLOT ROOM	■ ●						
GUN CONTROL TOWER.	■						
UPPER CONNING TOWER.	● ■						
LOWER CONNING TOWER	X X X						
R.C.O.	■ ● ■ ●	■ ● ■ ●	■ ●	●			●
COMPASS PLATFORM (PORT)	⋈	⋈ ⋈	⋈		⋈	⋈	⋈
COMPASS PLATFORM (STARD)	⋈	⋈ ⋈	⋈	⋈	⋈	⋈	⋈
ADMIRAL'S BRIDGE	■						
SIGNAL OFFICER'S CABIN	●	●					
W/T OFFICER'S CABIN.	●	●			●	●	
SIGNAL D.O.	●	●					●
GUN CONTROL POSN (FORD)	■ ●	■ ●					
GUN CONTROL POSN (AFT)	■ ●	■ ●	■				
WHEEL HOUSE			●				
TYPE 83 OFFICE			●	●			
R/T OFFICE							●
FORE LINK.	●	●					
AFTER LINK.	●	●					

⋈ LOUD SOUNDING BUZZER. ● BUZZER REPEATER. ■ BUZZER. X ISOLATING SWITCH.

FIG. b.

VIBRATING BUZZERS.

The principles on which the vibrating buzzer system is built up are as follows:-

(a) The supply is taken from either the ships Low Power 20 volt supply or the W/T Emergency Battery.

(b) Each line has its own Buzzer, 40 jar condenser and 20 volt supply, which are fitted in the principal W/T office on that line.

Figure a shows a typical diagram of connections in a vibrating buzzer line in Types 501 to 507 inclusive with the different instruments which may be fitted.

Supply and Input Circuit. The supply is taken from the 20 volt terminals on the charging board in the W/T office concerned to the D.P. switch (5) on the Buzzer Board and thence to a morse key (6), and the buzzer contacts and primary winding of the vibrating buzzer (7) joined in series. All other morse keys are wired in parallel with the morse key (6) on the Buzzer Board.

The Buzzer Repeater Output Circuit. This circuit is wired across the MAKE and BREAK or buzzer contacts of the Vibrating Buzzer (7) and consists of a 40-jar condenser (8) joined in series with a buzzer repeater (9). A S.P. switch (11) is usually fitted at each position and is wired in the return lead from the morse key (6) and the buzzer repeater (9) and so isolates that position on that line. In certain positions this switch is permanently short circuited.

The Loud Sounder Buzzer Circuit. This circuit is wired across the 20 volt supply and consists of the Loud Sounder Buzzer (10) and the morse key (6) joined in series. A S.P. switch (12) is fitted at each position on a loud sounder line and is wired directly in series with the Loud Sounder Buzzer circuit.

Wiring. A 4 core cable is required where loud sounders are fitted, otherwise a 3 core cable is used and the connections for any particular instrument are always the same i.e.,

Morse key (6)	is joined between leads marked	2 and 3
Telephone Repeater (9)	" " " " "	3 and 4
Loud Sounder (10)	" " " " "	1 and 3
Switch (12)	" " " " "	1 and the positive supply lead.
Switch (11)	" " " " "	3 and the common return lead from key (6) and repeater (9).

W4. BUZZER OUTFITS AND R.C. CIRCUITS.

VALVE BUZZERS.

Wave form	Method of producing oscillation	Nature of circuit	Grid Excitation	Feed.	High oscillating potential electrode
C.W.	Self	Tuned circuit between anode and grid.	Direct Inductive	Series	Anode

Reference Admiralty Handbook of W/T (1931) paragraph 829.

The principles on which the Valve Buzzer system has been drawn up are as follows:-

(a) Supply is normally taken from the 220/100 V. ships mains. The ships 4 V. and 100 V. Receiving Battery system can be used in emergency.

(b) An audio-frequency valve oscillator of between 500 - 1500 cycles is used, and oscillations are generated independent of the Morse Key.

(c) The anode coil of the oscillator is coupled to an output circuit which takes the form of a buzzer repeater.

(d) The output circuit is made and broken by the action of a magnetic key, and the bobbin of the latter is worked by the morse key from a 20 V. or 4 V. source.

(e) 20V. Indicating lamps, when fitted, are wired in parallel with the supply to the bobbin of the magnetic key.

(f) Each line has its own oscillator, magnetic key and supply which are fitted in the principal W/T office on that line.

Figure c shows a typical diagram of connections in a valve buzzer line in Types 511 to 517.

H.T. and Filament supply to the A/F oscillator. The 4 pole 2 way switch (6) connects either the ship's mains or the H.T. and filament receiving batteries to the NR18 valve (7).

H.T. Supply. In the normal position the H.T. is connected from the positive supply via one pole of the C.O.S. (6) a 5000 ohm resistance (10) and a second pole of the C.O.S. (6) to the decoupling choke (13), anode coil (15), and anode of the valve (7). The negative H.T. and filament are common. In the emergency position, using the H.T. receiving battery, only one pole of the C.O.S. (6) is required. This connects the positive supply direct to the decoupling choke (13) thence to the anode coil (15) and valve (7).

Filament Supply. In the normal position, a potentiometer consisting of a 16 c.p. lamp (9) and an adjustable 70 ohm resistance (8) in series, is connected across the supply. This reduces the ship's voltage to that required for the filament of the valve (7). The supply is then connected to the filament via 2 poles of the C.O.S. (6). An R/F choke (11) is connected in the positive, and an R/F choke (12) and decoupling choke (14) in the negative, supply. In the emergency position the 4 volt receiving battery is connected direct to the C.O.S. (6) and through the above circuit to the filament of the valve (7).

A/F Oscillatory Circuit. The A/F oscillatory circuit consists of the anode coil (15), grid coil (16), condenser (19) and the tuning condensers (18) (30) (31) (32). This circuit is connected between the anode and grid of the valve (7). The 2mfd. condenser (19) forms a complete path for the oscillatory current, and the condensers (18) (30) (31) (32) alter the A/F of the circuit and therefore the note transmitted to the repeaters (26) or loud sounder (29). These condensers are connected in the circuit by the switches (33) to (36).

Grid excitation is provided by the grid coil (16). The 0.1 mfd. grid isolating condenser (20) and 10,000 ohm grid leak (21) enable the valve (7) to work on the most suitable part of its characteristic curve. Oscillations are generated as soon as the C.O.S. (6) is made.

Output Circuit. The output circuit consists of the output coil (17), buzzer repeater (26) and/or loud speaker (29), and for signalling purposes, is made and broken by the magnetic key (22). It is coupled to the A/F oscillator by means of the output coil (17) anode coil (15) and grid coil (16).

The single pole switches (27) and (28) are fitted in series with the buzzer repeater (26), and loud sounder (29) respectively, and connect either in the output circuit. In some cases the switch (27) is permanently short circuited.

"Operating" and "Indicating Lamp" Circuits. These circuits are supplied from the 20 volt terminals on the charging board in the W/T office concerned to a D.P. switch (23) on the valve buzzer board. The operating circuit consists of a morse key (24) in series with the bobbin of the magnetic key (22). All the morse keys at other positions are connected in parallel with the morse key on the valve buzzer board concerned. A condenser (37) is connected across the keys (24) to absorb the rush of current when the keys are made or broken. The indicating lamps (25) are connected in parallel with the magnetic key bobbin (22) and are fitted in the principal buzzer positions. They indicate that a particular buzzer line is being operated, even though the buzzer repeater switch (27) may be broken.

Wiring. A 5 core cable is required where loud sounders are fitted, otherwise a 4 core cable is used. The connections for any particular instrument are always the same i.e.,

Morse key (24)	is joined between leads marked	1 and 2.
Indicating Lamp (25)	" " " " "	2 and 3.
Repeater (26)	" " " " "	3 and 4.
With switch (27) in series		
Loud sounder (29)	" " " " "	3 and 5.
With switch (28) in series		

BUZZER OUTFITS AND R.C. CIRCUITS.

VALVE BUZZERS.

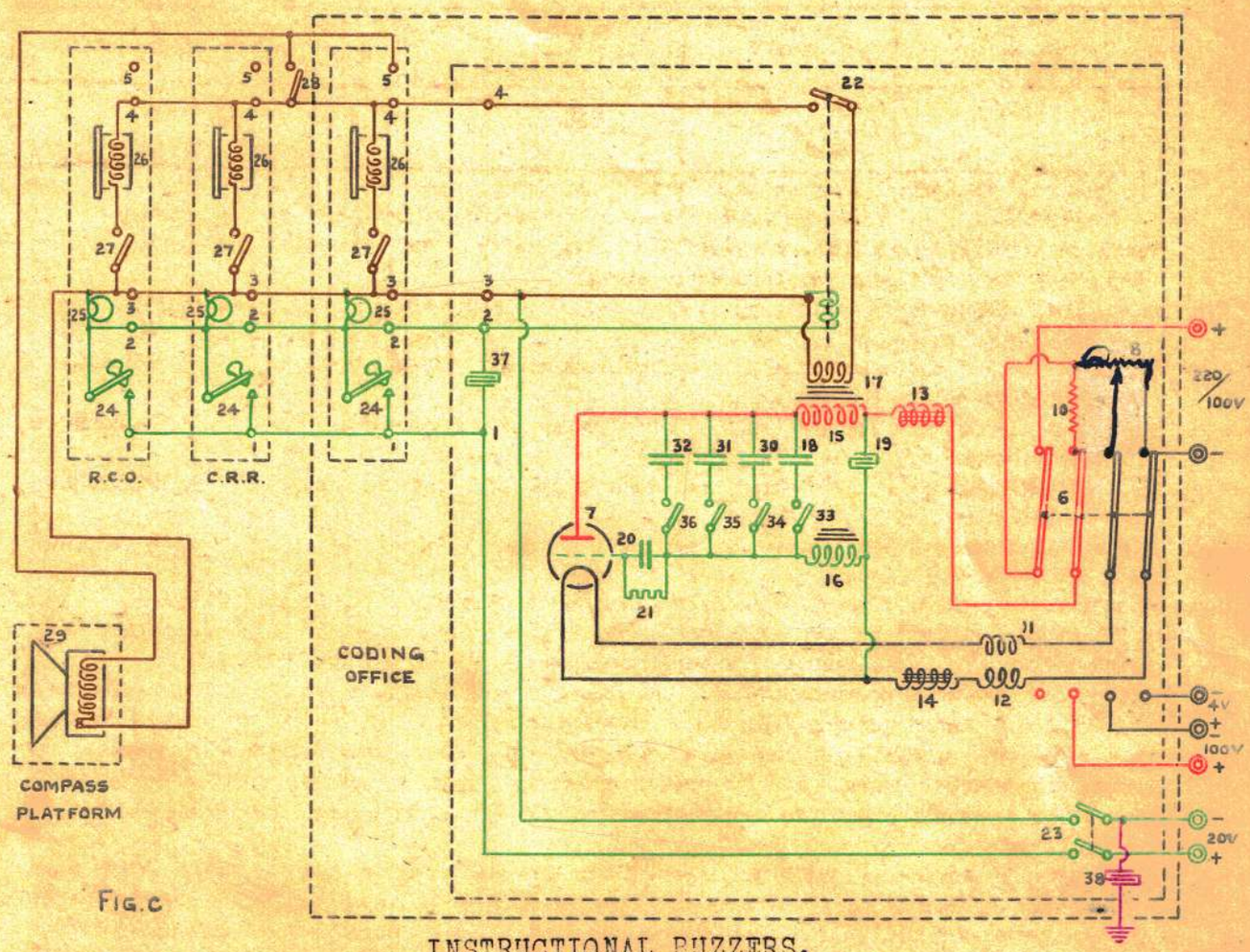

FIG.C

INSTRUCTIONAL BUZZERS.

There are no technical details connected with Types 521 and 529 as these type numbers have only been allotted to simplify storing arrangements, each class of ship having a different allowance of buzzers and morse keys for fitting up as required for instructional purposes. Figures a. and c. should be of assistance in wiring up these sets.

R.C. CIRCUITS.

There is no technical difference between the types of R.C. circuit outfits i.e., types 531 to 539. These numbers have been allocated to simplify storing arrangements as each class of ship has a different allowance of R.C. circuit outfits. Typical arrangements of Remote Control lines are shown in figure d.

POSITIONS.	TYPE 531		TYPE 532		TYPE 533		TYPE 534		TYPES 535 & 536		TYPE 537	
	T	R	T	R	T	R	T	R	T	R	T	R
GUN CONTROL POSITION FOR^D.		●		●								
GUN CONTROL POSITION AFT.		●		●								
UPPER CONNING TOWER.	●	●										
REMOTE CONTROL.	●	●	●	●	●	●	●	●			●	●
ADMIRAL'S BRIDGE.	■	●	■	●	■	●					■	●
MAIN W/T SET.	■		■		■						■	
CENTRAL RECEIVING ROOM.		■		■					■	■		■
SECOND W/T SET.		■	■	■	■	■					■	■
AUXILIARY W/T SET.	■	■	■	■							■	■
TYPE 37 / TYPE 43 } FITTED TOGETHER IN SECOND OFFICE.									■	■		
GUNNERY W/T COMPARTMENT.		■	■	■								
GUNNERY T.S.	●	●	●	●	●	●	●	●				
DUMMY PLOT ROOM.	●	●										
TYPE 83 OFFICE.					■	■	■	■				
TYPE 71.	■	■									■	■
AIRCRAFT R/T OFFICE											●	●
FLYING OFFICERS POSITION.											●	●

■ TRANSMITTING OR RECEIVING SET.

FIG.d

● REMOTE CONTROL POSITION.