

A U.D.U. will be provided in the Type 960 office for setting up and as an emergency display. The U.D.U. provides a P.P.I. with a sector display below it. Other details were given in the article on Displays in the last issue of the Bulletin, (RH.600(6)). Trials with aircraft have already shown that the 20 miles expanded scan is a great improvement on the simple sector display of the L43 type for height finding by echo amplitude methods and also for following small signals at ranges in excess of 100 miles. Once the operator has learned to use the control switches by touch, following with this type of display becomes simple and automatic.

In addition to the display controls which are part of every U.D.U., the U.D.U. for Height Estimation and the U.D.U. in the Type 960 office, are fitted with a special Type 960 control panel situated in the top left-hand corner. These panels provide remote control of pulse length, receiver bandwidth, A.J. filters and receiver gain, and swept gain with ranges of 0, 20 and 40 miles respectively. The framework supporting the remote U.D.U. contains a hand operated selsyn for Type 960 frequency control, mag slip frequency indicator and aerial speed control. The framework supporting the local U.D.U. in the Type 960 office contains the Type 960 frequency control and a special trigger unit for firing all sets associated with Type 960 in synchronism.

In order to avoid confusion remote control of Type 960 is operative either at the local or remote U.D.U. but never at both simultaneously. Remote control is changed from one position to the other by means of a single switch situated in the Type 960 office.

GUNNERY NOTES

TYPES 282/3/4/5

PHOTOGRAPHIC SPOTTING TUBE.

Type 284/5P(3)/P(4) installations include a C.R. and R. Unit Design 4 (Spotting Tube) associated with Panel L24. The full value of this spotting tube will only be realised if, after a practice firing, what the spotter reported can be compared with what he saw and what the fall of shot actually was. The latter can be obtained from the elevation record of the practice; the only way of recording the former is by cine-photographing the spotting tube. So that the normal operation of the spotting tube shall not be interfered with, however, arrangements will be made for the fitting of a second spotting tube, to be known as the Photographic Spotting Tube.

The Photographic Spotting Tube will be supplied to Fleet Bases complete with connections and spares. Ships requiring it will draw this tube for practice firings in the same way as dial recording cameras. Base staffs will construct a portable stand to support the tube and the camera. As the C.R. and R. Unit is not watertight, a wooden stowage box will have to be provided also for transporting the equipment between ship and base.

Ships fitted with Type 284 will be provided with junction boxes to insert in the existing wiring between the spotting tube and the L24 panel; one gland of a W6431 Junction Box has been fitted with a 10H/160 socket and three of these modified Junction Boxes will be supplied. A lens of 14.3 inches focal length will also be supplied for use with the 16 mm. Magazine Cine-Kodak. Kodak Super XX films must be used.

The connections on the photographic spotting tube are provided with 10H/159 plugs so that, when this tube is drawn from the base, it can be plugged straight into the modified set-up in the ship's T.S. without upsetting the operation of the existing spotting tube.

H.M.S. RODNEY is responsible for this excellent suggestion.

TRAINING TUBES DISPLAY

Lieutenant Allsop's comments on A.S.E's rendering of his modification to the display on training tubes (C.A.F.O.1326/45) are of interest :-

"Completed by Wren Mechanic - no difficulties - time taken 1½ hours - suggest increasing separation by a 4.7 megohm across R45, Fig. 15/11 in C.B.4221".

OSCILLATOR G41.

Complaints have been received about the operational life of valves in this equipment. This is undoubtedly due to the fact that a number of ships have not yet fitted the ventilated door to their G41s. A.F.O.2499/44 refers.

AERIAL STUB, PATT. W3483

In A.S.E's view, the correct position for this tuning stub is between the Transmitter and the Common Aerial Switch. By putting the stub between the Receiver and the Common Aerial Switch, the main effect would be to 'clean up' after the ground wave, but only if the spark gap is poorly set.

TRANSFORMERS, PATT. W8827

English Electric state that an improved method of impregnation was used with transformers having Serial Numbers EE5000 - E8250 and EE6 - 1945. This accounts for the improvement noticed recently.

A.S.E's redesigned transformer has not gone into production yet due to lack of impregnating plant.

RADAR ROUTINE REPORTS

The revised method of rendering Radar Routine Reports, as laid down in C.B.3090(45) Section D, is working well. A.S.E. are still receiving insufficient S.1183's however, and valve lives are still being given in weeks or months instead of hours !

When reporting modifications which have not been completed due to lack of stores, it is important to quote the ship's demand numbers or times of origin of signals, where applicable, if A.S.E. is to 'chase' successfully the stores required.

THE FUTURE OF THE RADAR OFFICER

We have been asked to publish the following personal message from the Director of Radio Equipment, Admiralty, to Radar Officers :-

"D.R.E. is fully conscious of the fact that since the issue of C.A.F.O. 2652/44, Radar Officers have been anxiously awaiting the promulgation of a concrete scheme for the transfer of volunteers to the Royal Navy. He realises that with the end of the war and the start of the Release plan, many officers feel that their days in the Service are numbered and that they are, in consequence, most concerned about their future careers. He appreciates that there will be many who, whilst wishing to continue serving in the Navy, are, in the absence of any concrete transfer scheme, influenced to seek civil employment by the practical necessity for having a job with adequate prospects.

He wants, therefore, to assure all Radar Officers that a scheme for the transfer of a number of them to the Royal Navy is under active consideration in the Admiralty, such transfers being dependent on satisfying the conditions of the Electrical Branch into which Radar Officers will be absorbed."



PORTRAIT OF EDITOR MOWING LAWN

RADAR TYPE 930

Type 930 is an X-band fall of shot set which is being produced concurrently with Type 931 - which was described in the last issue of the Bulletin, to meet the need for better spotting facilities for Low Angle Gunnery. Like Type 931 it is not intended to replace Type 274, but since it has an accurate ranging system and remote bearing tube, it will also serve as a standby GS set.

Type 930 is a Naval version of an Army Coast Artillery set known as C.A. No. I Mark V ("William"); about half the units which comprise it are being manufactured by R.R.D.E. Malvern and the remainder by Radio contractors. The set is then "built" and modified for Naval Service either by A.S.E., or by a Radio Contractor.

The display system employs a total of 5 - 5" Cathode Ray Tubes, all of which provide either "Coarse" or "Fine" range azimuth ("B") presentation as follows :-

"COARSE" DISPLAY

$\pm 3^\circ$ in azimuth horizontally across the tube and 0 - 60,000 yds. in range vertically. This provides a plan sector 6° wide and 60,000 yards long and will be used when the whole field is to be examined. On the face of the display is incorporated a scale graduated in thousands of yards.

"FINE" DISPLAY

$\pm 3^\circ$ in azimuth horizontally across the tube and ± 1000 yards relative to the range setting. This provides a plan sector 6° wide and 2000 yards long, and will be used to determine the fall of shot relative to the target, which will appear in the centre of the picture. On the face of the display are graduations for every 200 yards of range and $\frac{1}{2}^\circ$ of azimuth. It can also be used for accurate ranging and following in bearing, as an alternative to Type 274.

The main features of Type 930 are as follows :-

P.R.F. - 2000
Pulse length $\frac{1}{10}$ th microsec.
Range discrimination - 40 yards.
Bearing discrimination - 1°
Peak power - 150 kW.

Naval performance trials have not yet been carried out, but the following figures are available from Army sources :-

Accuracy of observation

Individual rounds 15 yards for range, 5 min. for bearing.
Salvos (3 rounds) 25 yards for range, 5 min. for bearing.

Ranging capabilities (aerial height 70')

Trawler - 24,000 yards.
3,000 ton ship - 32,000 yards.
6" shell splash - 26,000 yards.

The major units of which the set is comprised are as follows :-

AERIAL OUTFIT ANP.

In ships fitted with a stabilised Type 274 aerial, ANP will be mounted underneath, carried by the arms which support the Type 274 aerial and stabilised by the same unit. In ships which cannot take a stabilised Type 274 aerial, ANP will be mounted above the D.C.T. with a stabilising unit: the Type 274 unstabilised aerial being carried in front of the D.C.T. below the layer and trainer.

EQUIPMENT FITTED INSIDE THE D.C.T.

The Inclinator will be removed to make room for the Type 930 equipment, leaving a clear space in the port forward corner of the after upper compartment of the D.C.T. This space will then be used to accommodate the following units :-

Panel 3BW Transmitting.

This panel consists of the Transmitter Receiver Unit Des. 2, Modulator Unit Des. 15 and the Blower, which are contained in trays which can be withdrawn for servicing.

By means of a Blumlein circuit and spark gap, the Modulator produces a pulse at approximately 18,000 volts. This pulse is of 1/10 microsec. duration and occurs 2,000 times per second. The Blumlein circuit consists of two artificial lines which are charged up in parallel and discharged in series to give an 18 kV negative pulse to the cathode of the magnetron. The magnetron, a CV251, oscillates at a frequency of 9,400 Mc/s and sets up electromagnetic waves which pass up a waveguide to a flare and so to the aerial.

Terminal Unit.

A Terminal Unit for Panel 3BW is fitted on the right hand side of the panel and contains fuses, switches and field control rheostat for the control of power to the modulator. All connections to the Modulator, Transmitter Receiver Unit and aerial are made through the terminal unit, which also contains an attenuator and a scan waveform filter.

EQUIPMENT FITTED ELSEWHERE

Panel L55.

This is provided in two halves:- Panel L55 (upper) comprises Amplifier Unit M100, Terminal Unit and Indicator C.R. Des. 3 Ranging and Spotting ("Ranging Unit"): Panel L55 (lower) comprises the Phase Adjusting Unit Des. 3 and Rectifier Unit Des. 111. The "Ranging Unit" consists of a Coarse and a Fine display, as described above. At the front of the Phase Adjusting Unit is an R.T.U. Mark VII which is fed from the associated A.F.C.T. with Range Rate derived from Type 274; should however Type 274 be out of action, the R.T.U. Mark VII in Panel L55 will become the controlling R.T.U. and will feed Type 930 range into the A.F.C.T.

The location of this panel depends on the class of ship, the preferred position being in or adjacent to the T.S., should there not be room it will have to be fitted in the Type 274 office.

Indicator C.R. Des. 4 Bearing ("Bearing Unit").

This unit is for the bearing plot operator of the A.F.C.T. and serves as a standby for the Type 274 Bearing Panel L32. It should therefore be situated in the most convenient position for this operator. This indicator consists of a "Fine" display, as described above.

Power Supplies.

Power Outfit DUY takes power from the ship's 220 volt D.C. ring main and provides two A.C. supplies each at 2,000 cycles/sec. A 230v. 50 cycle supply, taken from a stabilised supply is rectified to supply 24v. excitation for the alternators.

One of the 2,000 cycle supplies, regulated to 80 volts by a carbon pile regulator, is used for the Rectifier Unit, Amplifier Unit, all Indicator Units and the Magnetron filaments. The other is variable and the voltage is adjusted by a Rheostat control in the Terminal Unit for Panel 3BW; this variable voltage provides the H.T. for the modulator.

The 230v. 50 cycle also supplies the Blower Motor, Modulator Contactor and scanner motor.

Signal Generator No. 8.

This is an Army type test oscillator which produces modulated R/F signals which may be used for tuning the set when no echoes are available.



"BUT SIR! YOU SAID "LOW COVER" AT ANY COST!"

U. S. NAVY FIRE CONTROL RADAR

The following brief description of U.S. Navy Fire Control Radars now in use or about to come into service has been received from D.R.E.(W) and is promulgated for information.

GA RADARS

Radar on Gun Directors Marks XXXIII and XXXVII

Radar Mark IV

Radar Mark IV Mod. 1 is now installed on the Marks XXXVII and XXXIII Gun Directors for control of 5"/38 guns. The basic Mark IV was first fitted in 1942, and operates on a frequency approximately that of Type 285 but with a lower P.R.F. and longer pulse length. Power is 15-20 kW. peak. Beam width in both horizontal and vertical planes is 12° to half power, and reliable range on a single seater fighter at 10,000 feet is 25,000 yards. Mod. 1 has A.G.C. and pre-amplifier and elementary A-J features.

Mark XXII Radar is installed in association with Mark IV Mod.1 for accurate determination of elevation of air targets, especially those at low elevations.

Radar Mark XII

The arrangement above is being replaced by the combination of Radars Mark XII and Mark XXII. Mark XII operates on a frequency similar to Type 275 with similar P.R.F. and pulse length at about 100 kW. peak.

Beam width in both horizontal and vertical planes is 10° to half power, and reliable range on a single seater fighter at 10,000 feet is 35,000 yards.

Radar Mark XII Mod. 2 has high pass video filters, but a Mod.3 now in progress incorporates further A-J measures.

Radar Mark XXII

Radar Mark XXII, working as an elevation vernier, has a beam scanned vertically + 6° about the elevation angle of the Mark XII (or Mark IV), and is 4.5° wide in the horizontal plane and 1.2° in the vertical plane. Reliable range on a torpedo bomber at 100 feet is 10,000 yards. Mod. 0 has intensity modulated elevation scan, gated ± 1000 yards around the range fed into the unit from the main radar.

Mod. 1 now in production has a 'B' display with two range scales and range marker. There is only one display unit, and this is located in the director. An interesting feature is that the display is viewed via a 45° mirror in order that the indicator may be more easily accommodated in the space available.

Radar Mark XXVIII

A number of Mark XXXIII Directors, and round-backed Mark XXXVII Directors are fitted with Radar Mark XXVIII Mod. 0 or 3 on account of the antenna weight and director turning circle problems. Radar Mark XXVIII was designed primarily as a Radar for a Heavy Machine Gun Control. In Mods. 0 and 3 the Antenna and R/F package are mounted integrally.

GS RADARSRadar on Gun Directors Marks XXVIII, XXXIV and XXXVIIIRadar Mark VIII

Radar Mark VIII is the surface fire-control radar now fitted on main-battery Gun Directors Marks XXXIV and XXXVIII. The equipment was first fitted in 1942 and has gone through Mods. 0, 1, and 2. Mod. 1 saw the replacement of the first transmitter by one of higher power, and Mod. 2 involved the removal of the primary control equipment to below deck locations.

Radar Mark VIII Mod. 2 operates on the same frequency as Type 274.

The beam is scanned $\pm 15^\circ$ in azimuth at 10 scans/sec. by electrical phasing of the elements of the polyrod antenna. Beam is 2° wide in the horizontal plane and 6° in the vertical plane. 'B' presentation with coarse and fine range scales. Reliable range battleship to battleship is 40,000 yards.

All Mark VIII Radars are now to be converted to Mod. 3. This will be conversion to the same frequency as Type 930 and substitution of a mechanically scanning antenna for the phased array. It is, in fact, the replacement of the Radar Mark VIII transmitting and receiving units, including the antenna, by those of the Radar Mark XIII (see below). Performance is then anticipated to be very similar to Mark XIII.

Radar Mark XIII

Gun Directors Mark XXXIV and XXXVIII for Main Battery Control are now being fitted with Radar Mark XIII. This is confined to new construction in the first instance.

Radar Mark XIII operates on the same frequency as Type 930. The beam is 0.9° wide in the horizontal plane, 3.5° in the vertical plane, and is scanned $+ 5^\circ$ in azimuth at 10 scans/sec. by mechanical rocking of the dish. The I/F bandwidth is 4 Mc/s. and at present no special A.J. features are incorporated in the receiver. All primary control equipment is below deck, and remote indicators contain cathode ray tubes only; all scans, H.T. and Video are piped out from the control location. 'B' presentation with coarse and fine range scales. Little data is yet available on performance, but trials indicate that an angular accuracy of ± 1 mil (3.6 minutes) can be obtained, and that shell-splash spotting to maximum gun-range - i.e. 30 - 40,000 yards on 16" - can be obtained.

It is further intended to use the Radar Mark XIII antenna mounted alone as a "radar director" on certain ships which cannot accommodate the antenna on their directors.

Radar Mark XVIII

There are still a number of Mark XXVIII Secondary Battery Directors in use which are unable to accommodate the standard fire-control radars, and to these have been fitted a number of Mark XVIII Radars. This radar uses the Radar Mark X Transmitter and Antenna (the antenna is mounted directly on the R/F package) and also Radar Mark IX "below deck" units.

It operates on Type 274 frequency. Presentation is "A" with range step, coarse and accurate ranging. The antenna is a $45''$ paraboloid, with conical scan, of total weight 255 pounds. Beam is 6.5° by 6.5° in the Mod. 1, and reliable range on a destroyer is 15,000 yards.

Radar Mark XXVII

Radar Mark XXVII is a Stand-by control for Main Battery, used with Gun Director Mark XXXV.

Radar Mark XXVII is a derivative of SJ-1 radar, and was at one time contemplated as a "Turret Set". It is now intended for the Fire Control Tower. The radar operates on Type 274 frequency and has "A" presentation with range step, and optional P.P.I.

GB AND GC RADARS

Radar on Gun Directors Marks LII, LVI, LVII, LX and LXIII

Radar Mark XXVI - with Gun Director Mark LII.

Radar Mark XXVI Mods. 3 and 4 are used on the Mark LII Gun Director for control of 3"/50 or 5"/38 guns. Radar Mark XXVI operates on Type 275 frequency. Presentation is circular "A" with radial deflection. Antenna is mounted on director, and radio units around base of director or (preferably) below deck. The beam is 7° wide in the horizontal plane and 9° in the vertical.

42 of these equipments were to be supplied under lend-lease to the Royal Navy where they will be used as medium range equipments.

Radar Mark 35 - with Gun Director Mark LVI

The Gun Director Mark LVI incorporating the Mark XXXV Radar is being developed as an integrated system by Radiation Laboratory; firing trials were expected in June, 1945. The system is planned for the control of 5"/38 or 40 mm guns against intermediate range aircraft targets. The associated computer provides accurate future ranges from 6000 yds. downwards.

Two characteristics of importance are :-

- (a) Completely blind "target pick-up" and firing are possible
- (b) Once the radar is on target, the system tracks automatically and feeds gun orders and fuze times to the guns.

The director is a fully stabilized two axis director and furnishes its computer with data in co-ordinate system stabilised about the line of sight.

The director is trained by a 3 H.P. motor controlled by a 1500 watt amplidyne at a maximum rate of 72° per sec. The radar dish is elevated by a 1/4 H.P. motor controlled by a 300 watts amplidyne. The director can be trained continuously as slip rings are used for all supplies, while the dish can be elevated in the range -30° to +85°. (The servo system is very tight). Weight of above deck director is approximately 5600 lbs and below deck units 4500 lbs.

Radar Mark 35 operates on the same frequency as Type 262. The magnetron may be tuned over a 12% range and plumbing is broad-banded. It has a minimum range of 400 yards and range accuracy ± 20 yards. Auto-tracking of aircraft above 1° elevation is accurate to better than ± 1 mil. Accuracy of angular tracking rate is ± 1/2 mil/sec.

There are two antenna motions. In the first a 12° cone is scanned spirally by the 2° beam twice a second for search. In the

second, the beam nutates at 30 cycles/sec. to form a conical scan of 3°. This "locks on" to the target for auto-tracking.

The radar has a reliable pick-up range of 25,000 yards on a medium bomber.

Display is below deck on a 3 scope console. The first scope has simultaneous display of full 30,000 yard "A" scan, with a 1000 yard "R" scan above it. The second scope has a long persistence screen on which the target is shown as a spot on an R-E scope with rectangular co-ordinates - range 0 to 30,000 yards, elevation - 10° to 90°. The 12° elevation sector being scanned at any one time appears as a bright band in which a brighter spot is the target.

The third scope has a high persistence screen and shows on a "B" scan 2000 yards in range and 12° in azimuth in the vicinity of the target.

At the moment no decision as to production has been made. The reason for this is a feeling in the Bureau of Ordnance that the Mark LVI system is "neither fish nor fowl" in its range capabilities. However, the system is the most advanced in thought of any at present under development and will provide much data for any future integrated system.

Radars Mark XXIX - Mod. 2. Mark XXXIV - Mods. 3 and 4. Mark XXXIX - with Gun Director Mark LVII

The Mark LVII Gun Director System for the control of 40 mm. and 5"/38 guns was developed by Section T of O.S.R.D. It incorporates a lead computing sight operating on the undisturbed line of sight principle.

(a) Mark XXIX Mod. 2.

The radar at present used with this director system is the Mark XXIX Mod. 2, made up of units readily available from previous manufacture of Mark XIX. It is on the same frequency as Type 262. The R/F Unit and Modulator of the SU (Shipborne Surface Search) Radar are used, together with Mark XIX units converted. The antenna is mounted on the director and has a 30" diameter dish with nutating feed for constant polarisation in the conical scan. Antenna weight is 68 pounds. The main display and control equipment is below deck, but 2 'scopes are mounted on the director and viewed through one of the pointers eyepieces. One 'scope has target spot presentation for pointing, actuated by the target in the range gate, while the other has an auxiliary "A" presentation (to 15,000 yards) to assist the pointer in target acquisition. Angular discrimination with the system is about 3° while pointing accuracy is about ± 2 mils. Range discrimination and accuracy are about 200 yards and $\pm (20 + 0.1\%R)$ yards respectively. Aided tracking in range is provided and from this unit range rate is transmitted to the director computer. The use of pointing scopes for the director number gives some assistance in "Blind" tracking of targets, but the effective radar field of view is so narrow that target acquisition presents a considerable problem. It is hoped later to incorporate some target acquisition feature. Production of Mark XXIX Mod. 2 will be very limited.

(b) Radar Mark XXXIV - Mods. 3 and 4

Radar Mark XXXIV Mods. 3 and 4 have been designed as part of the Mark LVII Director System. Both Mods. use the ST (Submarine Penscope) Radar R/F Unit and have similar antenna

systems, display, and performance as the Mark XXIX Mod. 2. The radars operate on Type 262 frequency. Mod. 3 uses below deck components of Radar Mark XIX, while Mod. 4 uses Mark XXVIII Radar below deck components. The Mark XXXIV Mods. will replace Mark XXIX Mod. 2 as soon as available.

(c) Mark XXXIX Mod. 1

Radar Mark XXXIX is the standard radar for the Mark LVII Director System. In its operating characteristics and performance it is similar to Marks XXIX Mod. 2, and 34.

It uses the SU R/F Unit and Modulator, with conical scan. Indicating and control equipment below deck is similar to that of Marks XIX and XXVIII, but is reduced in weight and repackaged into a normal console.

Radar Mark XXXVI Mod. 1 with the Gun Director Mark LX.

The Mark LX Director System is one not sponsored by the Navy Department but produced speculatively and independently by the General Electric Company for the control of 40 mm. guns. It incorporates the G.E. Co's Lead Computing Gyro Sight and the Mark XXXVI Radar, with dish mounted on the director.

The Mark XXXVI Mod. 1 Radar operates on Type 262 frequency and has a 24" dish. It has two types of beam scan:

- (a) Nodding of the antenna in the vertical plane through 20° at one cycle per second for target acquisition.
- (b) Conical scan for tracking after gating of target.

With (a) is associated a 'B' display (Range v. Elevation) for location, and with (b) is associated the normal "target spot" display for tracking. These are shown one at a time on the pointers scope on the director and also below decks on the main control console. The below deck operator controls the change-over from one type of presentation to the other. Target Indication features in the form of "Right" or "Left" neon train indicators are built into the director display and main display for control from a central position.

Radars Mark XXVIII Mod. 2, Mark XXXIV Mod. 2, and Mark XXXVIII Mod. 1 with Gun Director System Mark LXIII

This system consists of the Mark LI Mod. 6 Director, carrying the Mark XV Mod. 12 Sight, and, at present, the Mark XXVIII Mod. 2 Radar. The system is designed for the control of 40 mm. guns.

- (a) The Mark XXVIII Mod. 2 Radar operates on Type 275 frequency. The R/F unit is on the gun-mount, while the 45" dish with conical scan is on the guns themselves. Consequently, as the sight uses the disturbed-line-of-sight principle it is necessary for the radar dish to be off-set by servo's to point to present position of the target. The director operator has a "target spot" scope visible in one of his eye-pieces, and can thus track blind on a range gated target.

The below deck units are almost the same as those of the Mark XIX Radar. Presentation is "A" scan with range step, 0 - 40,000 yards with 1500 yard precision sweep. Reliable range on torpedo bombers above 5° is 12,000 yards. Field of view with conical scan is some 10° . Angular discrimination is about 5° , and for angles of sight above 5° tracking accuracy is about ± 3 mils. There is aided tracking in range.

To facilitate picking up of targets, mechanical up and down nodding of the antenna has been introduced, together with Target Acquisition Unit Mark I. This unit is used from the

main central position below deck, where there is a 'B' scan, and enables the operator to indicate to the director number where to look for the target, by displacement of the spot on the director "target spot" scope. This is done by the T.A. Unit Mark I which has handwheels for transmission of True Bearing and True Elevation to the Director. It also has indication of Relative Gun Position, and Nodding Rate Control.

In effect, the radar operator below deck searches for targets with the nodding dish on the gun mount, and having found one hands over to the director operator by use of the T.A.U. Mark I and the "target spot" scope, at the same time stopping the nod.

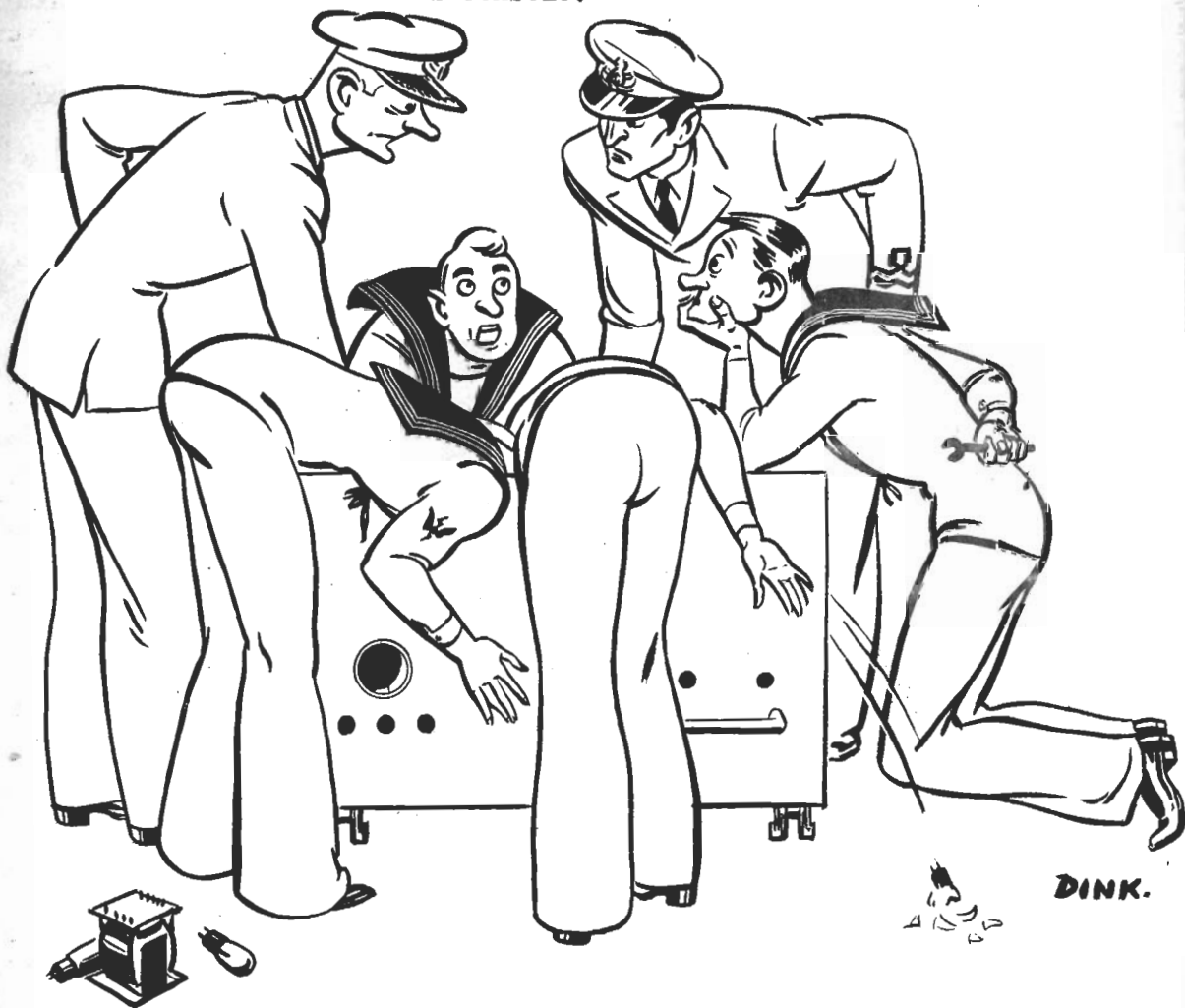
(b) Radar Mark XXXIV Mod. 2.

This radar is an interim development to allow of the use of Type 262 frequency equipment with the Mark LXIII System. It will use the ST R/F unit, and a 30" dish with conical scan on the gun.

Improved accuracy and discrimination at low angles of sight are accompanied by a six fold reduction in the field of view and consequent accentuation of target acquisition problems. The characteristics of the equipment are the same as those of Mark XXXIV Mods. 3 and 4.

(c) Radar Mark XXXVIII

This is to be the standard radar for the Mark LXIII System, and operating characteristics will be similar to those of Mark XXXIV Mod. 2. Improved target acquisition features are aimed at, but all proposals are still fluid. It is expected that the Mark XIII Radar Transmitter will be used, with a new below decks console.



" — ! WE'VE LOST A — D6 ! "