



LOOKOUT

A MANUAL FOR

**LOOKOUT OFFICERS
SUPERVISORS AND
SHORE-BASED INSTRUCTORS**

RESTRICTED

NAVPERS 16198

BUREAU OF NAVAL PERSONNEL
TRAINING
STANDARDS AND CURRICULUM DIVISION
August 1945

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Supervisors and
Shore-Based Instructors**

PREFACE

This manual is primarily intended for officers and petty officers whose first duties concern lookouts. Part I covers problems of administering a lookout organization aboard ship. Part II contains training outlines for instructing lookouts either aboard ship or on shore. Part III describes drills for the Night Lookout Stage, part of the shore training.

For the Lookout Officer, Parts I and II are a guide in organizing and training his men into an efficient unit. His supervisors will study these sections also.

For the shore-based instructor, Part I provides important background material in training men for sea duty. Parts II and III are designed for constant use in the classroom, in outdoor drills, and at the Night Lookout Stage.

To others not so directly concerned: to officers in positions of command and to junior officers, this manual indicates what services can be performed by a modern alert lookout organization.

RESTRICTED

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PART I
LOOKOUT PROBLEMS

The Need for Good Lookouts

Officers with battle experience rarely underrate the value of good lookouts. Far from supplanting lookouts, radar has made them even more vital to the welfare of the ship. Radar and the lookouts have become closely interlocked units, working hand in hand through CIC. It is very often the responsibility of the lookouts to identify radar contacts. Furthermore, there are many signs of the enemy that only lookouts can detect. They guard the inner zone where protection is most vital, for whatever gets by radar *must* be caught by the lookouts. A ship's lookouts cannot be too well-trained, too alert, too much on the job.

The Navy recognizes the importance of lookouts

The Navy is bending every effort to turn out better lookouts. The Bureau of Personnel has set up a Lookout-Recognition Training Program for both officers and enlisted men. Millions of dollars are going into new methods of training and improved equipment.

In addition, to answer the need for some concrete form of recognition, the Navy has established an Expert Lookout Designation, to be awarded only to highly qualified men.

The lookout has a tough job

The job of standing a lookout watch is often extremely monotonous. A man may scan the empty sea by the hour without sighting anything. Then he does spot something—only to have it turn out to be of no importance.

On top of this, many lookouts have to stand their watches out in the open—in snow, rain, hail, or blazing heat. It is difficult to stay alert under such conditions.

In spite of the difficulties, the lookout must be on his toes every second of his watch. He is expected not only to pick up everything in his sector, but also to tell what it is as swiftly as possible.

Battle reports tell the story

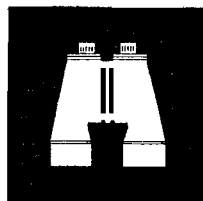
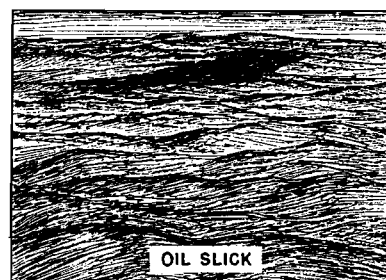
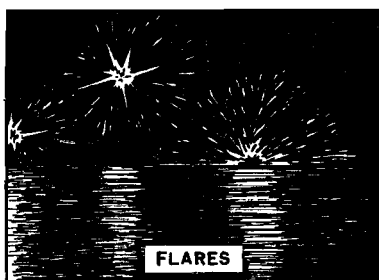
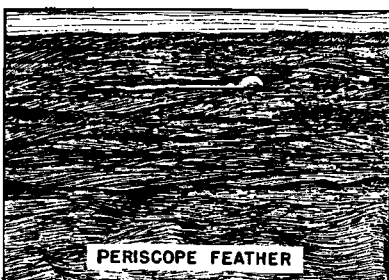
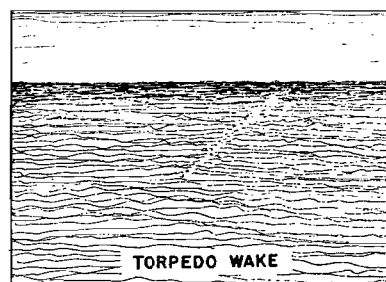
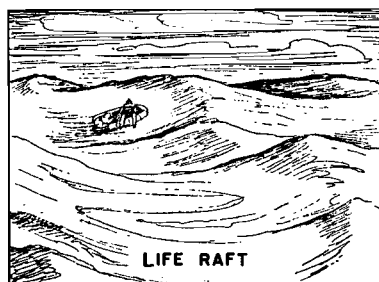
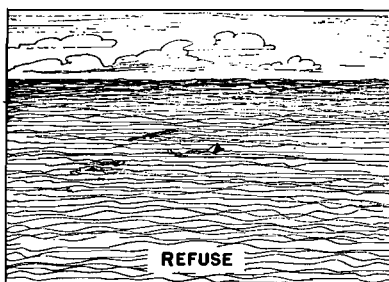
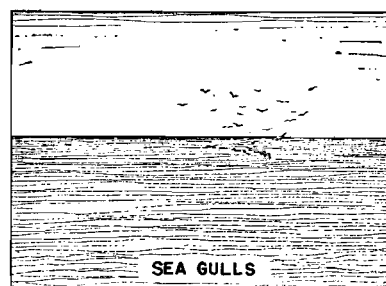
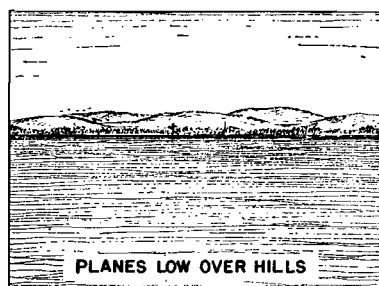
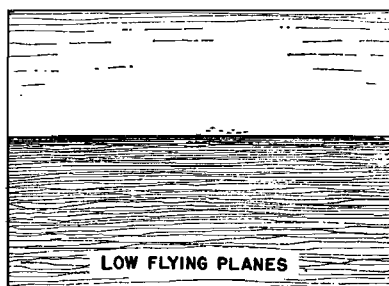
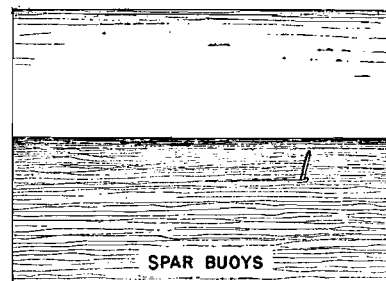
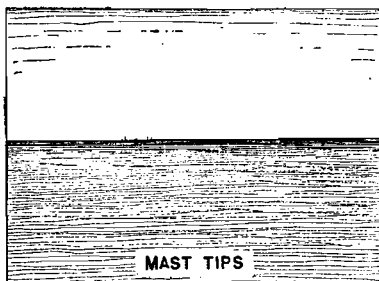
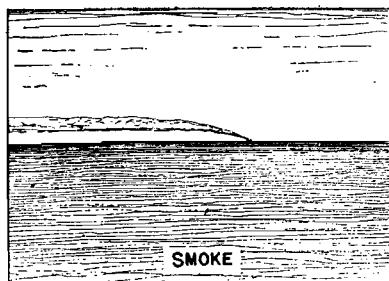
Reports from ships in action give repeated instances of specific cases where lookouts have done an outstanding job. Detecting low-flying planes, noting mines and other hazards to navigation, saving fliers adrift on life rafts, catching the wake of a torpedo in time for the ship to maneuver. . . .

The Lookout Officer will do well to keep a file of such instances from recent reports. They provide invaluable material to boost the morale of lookouts when the going is tough and monotonous. They show clearly why the Lookout Officer needs good men, trained to do a good job.

The Lookout Officer can help

Knowing that the lookout has a tough but mighty important job, the Lookout Officer has a double responsibility. He must, of course, make his men into good efficient lookouts. At the same time, he must not stand in the way of any man who is ambitious enough to strike for a rate. He must feel—and let the men know that he feels—that any man who succeeds in becoming a good lookout deserves good breaks.

Only the eyes can detect . . .



EXPERT LOOKOUT DESIGNATION

Getting Rid of the Unfit

Except where he heads his own L-Division, the Lookout Officer often has little to do with the initial choice of men for lookout duty. But even if the men were carefully selected in the first place, some of them may turn out to be unsatisfactory later on. It is up to the Lookout Officer to follow up continually on the performance of his men, and to replace those who are unsuitable as quickly as possible.

Check by your own observation

If you are on a DD or a DE, you can possibly observe the performance of some of your men without moving from your post. On ships that are large, it is a good idea to make the rounds of lookout stations as often as you can. A very effective way of finding out what your lookouts are doing is to cut into the lookout telephone circuit periodically. If the men know that you are likely to do this, they will be more on the job at all times.

Hold as many drills on board as possible. These will enable you to rate your men by the reports they give on friendly ships and planes. But remember that you must expect the lookouts to make mistakes until they have had a chance for adequate training.

You will also do well to invite your men in for private interviews. These are effective morale builders.

Listen to the opinions of others

Whenever your lookouts fall down on the job, your fellow officers will probably let you know about it. Supplement their opinions by having your supervisors give you periodic reports on the performance of all the lookouts. The talker on the Bridge (or in Conn) can also give you valuable information because he receives the reports from all the lookout stations. But before you act on any report that is unfavorable, always investigate the trouble thoroughly yourself.

Use these physical yardsticks

VISION—To make sure that all your lookouts have at least 20/20 vision, get the Medical Officer to give them eye examinations once every 6 months. Have those men who are to stand night watch tested on the Radium Plaque Adaptometer. Do not be satisfied with written records showing the men have taken this test. Arrange for all of them to take another under the supervision of the Medical Officer.

HEARING—Since your lookouts will have to man phones in the din of battle, they must have excellent hearing. Also, they will often have to depend heavily on their ears in fog and smoke. Do not put too much faith in the usual type of test, like coin clicking or speaking to the subject in whispers. If possible, have your men tested on an audiometer.

SPEECH—Sound-powered phones are such that your men will have to speak especially clearly to be understood on the circuit. You cannot allow anyone who has a speech defect to man these phones.

GENERAL—Examine each lookout's Health Record and Service Record to get further information on his fitness for the job. These records will enable you to distinguish between a temporary disability and a chronic condition.

How to get rid of your worst men

In some cases, the officer in charge of your department may assume the responsibility of replacing your poorest lookouts for you. If he is the Gunnery Officer, this presents little difficulty. He will probably be glad to trade some of his own men for any of yours who are brawny. Muscle is of much more value in a handling room than on a lookout station.

Whenever a new draft steps aboard, remember that most department heads prefer men who have had experience on the ship. Some of the men who make poor lookouts may fit into another job quite satisfactorily. Offer such men in exchange for the chance to pick some from the draft. Be on watch particularly for those who have always been interested in airplane models; they usually turn out to be highly-motivated lookouts, through their interest in recognition.

Often you will be expected to use your own initiative in weeding out the worst of your lookouts. If everything else fails, try to convince the Executive Officer of the necessity for having topnotch men on every lookout station. But remember that there are other divisions on the ship just as much in need of good men as yours is.

Every once in a while you may come across a lookout who is purposely doing a poor job, hoping to get transferred to some other duty. You can often convert such a man into a worthwhile lookout. A little patience and some well-placed praise may convince him that he wants to do a good job right where he is.

Promoting an Efficient Unit

As Lookout Officer, you will need all the support you can possibly muster. The obstacles in your path will be such that you cannot afford to face them alone. If the Gunnery Officer heads your department, for example, he may favor his guns over the lookouts. No matter who is in charge of your division, he may feel he has to replace the men he loses in a draft by pulling lookouts off their stations. In spite of all handicaps, it is up to you to maintain efficiency and build morale.

Enlist the help of your superiors

Take every opportunity you can to impress your superior officers with the importance of lookout duty. Welcome any suggestions they may have about how you can improve the efficiency of your organization. You will find that they will take greater interest in your problems if you show a readiness to act upon their suggestions. Remember that all topside personnel are lookouts, including the Captain himself. Never fall into the error of thinking that your superiors are indifferent to the performance of your lookouts. It is as much to their interest that your men do a good job as it is to yours.

You should be able to convince the Captain of the value of giving public praise to the men who do outstanding work. Since he has already been in action, he knows the worth of lookouts.

Answer the most skeptical of your fellow officers by offering to give them training in recognition. A few sessions of this will convince them of the value of good lookouts to their ship.

Allow your men to strike for rates

Though there is no lookout rate, let your men know that their duty will not necessarily prevent them from striking for rates in other divisions. It is often not wise to stand in a man's way to advancement because he has

EXPERT LOOKOUT DESIGNATION

The Bureau of Naval Personnel Circular Letter No. 91-45 announces the establishment of an expert lookout designation to be worn by lookouts who meet the necessary qualifications. The expressed purpose of this award is threefold: (1) to furnish standards for the selection and training of lookouts, (2) to raise the performance level of all personnel engaged in lookout duties, and (3) to provide recognition for outstanding lookout personnel. To merit continuous wearing of this distinguishing mark, a man must qualify every six months. The opportunity to be recognized for outstanding work should help the morale of all your lookouts.

turned out to be of value to you as a lookout. If your men learn that you will not prevent them from getting rates, their morale will increase considerably. Naturally you cannot afford to lose all your good lookouts to other divisions, but it is possible to maintain an efficient organization and at the same time allow some of your best men to advance. If a lookout gets a chance to stand radar watches, for example, do not discourage him from studying radar. Some of your men may get the opportunity to strike

for Gunner's Mate or Coxswain. You can show your interest in their ambition without endangering the welfare of your organization.

If you are in charge of a separate L-Division, your lookouts may not get the chance to strike for rates by standing watches in other divisions. Try not to let this stand in their way permanently. When a lookout has shown outstand-

ing work over a long period of time, you should give him the chance to be relieved from his duty to strike for a rate elsewhere on the ship. In order to do this, you will have to maintain a small pool of dependable replacements. The fact that all topside personnel need experience in lookout and recognition gives you the chance to establish such a pool.

Make the Most of Your Own Set-up

Lookouts in the Gunnery Division

If your men are under the Gunnery Officer, get him to let you train the gun crews in the skills of lookout and recognition. He probably will agree that every gunner should be an expert lookout as well. While men from the gun crews are on lookout stations, your own men can be picking up experience on the gun crews. Such a scheme of alternations will prove beneficial to everyone.

Lookouts in the Radar Division

Lookouts who are in this division are often better than ordinary, for the Radar Division has a good chance to get top choice of the men in the draft. You should be able to convince the Radar Officer that a system of alternating between radar duty and lookout duty would help all the men in the division to do a better job. Lookout watch will show a radar operator just how closely he must work with the lookouts. On the other hand, you can point out that the nature of your lookouts' job makes them well-motivated radar operators.

Lookouts in Deck Divisions

It should be possible to convince your superiors that all topside personnel must have training and experience in lookout and recognition work. Then you can arrange to have your lookouts stand off-duty watches that will give them a crack at rates.

Lookouts in an

L

Division

If you have your own L-Division, you will enjoy several advantages. In the first place, you will have much more opportunity for training the lookouts into a smoothly working team. Heads of departments will not be able to pull them out of your classes for other duties. You will have more to say about when drills should be run.

The existence of an L-Division is a valuable boost to morale. Occupying compartments together will help the lookouts work together on station. For beach parties and the like, the lookouts can plan their own activities as a group.

You can assign your best lookouts to the most vital posts without any fear that they will be taken off for other duties. Also, you have the opportunity to give your best men a tangible reward for their work by appointing them as supervisors. With an L-Division, there is less chance of the lookouts considering their job as unimportant.

But there is one disadvantage to always keep in mind: lookouts in an L-Division have even less chance to strike for rates. You can help the morale of your entire division by periodically relieving an outstanding man from lookout duty so that he will be free to strike for a rate.

Assigning Lookout Stations

To cover thoroughly every bit of sea and sky all the time, you would like to be able to use all the men aboard the ship as lookouts. Since this is impossible, it is important to make the best possible use of all the men you can get. If you are in charge of an L-Division, you will likely make up your own Watch, Quarter, and Station Bill for approval. If there is no L-Division, the head of your department will probably let you advise him in the matter. In either case you should be ready to present a definite plan for manning the lookout stations on your ship day and night.

Fundamental plans

Fundamental lookout plans for Condition III are shown on pages 8 and 9. The total number of lookouts assigned depends on the ship's complement. Their assignments to sky and surface stations vary with the type of ship. For example, on carriers there are relatively more sky and fewer surface lookouts, because adequate surface protection is afforded by escorting ships.

For General Quarters the number of lookouts should be doubled at least. Also, a special sun lookout and a special zenith lookout should be posted if possible.

Surface lookouts

The actual placement of lookouts on various stations depends upon the facilities available. The main point is to ensure adequate coverage according to the basic plan. Notice that there is a 5° overlap on each side of each sector. For example, with six lookouts covering 360°, each man scans a sector of 70°.

Visit all the surface lookout posts before you assign the men to their stations. Make sure that no lookout has his view blocked by something like a gun turret. Be on the watch also for lookout posts too near any of the big guns. Lookouts must have their ears, as well as their eyes, protected from injury.

On some ships, the men look through binoculars out of small openings called "peepholes." Before you order them to do any naked-eye scanning, make sure that these peepholes are large enough to see past the fixed binoculars in front of them.

Low-sky lookouts

The low-sky lookouts use binoculars (usually fixed to sky chairs) to scan the area from the horizon to a 5° position angle. They are on watch particularly for distant planes, or planes that are skimming above the water.

Before you place any of these lookouts, visit the sky stations and look for obstructions to the full view of the sector.

High-sky lookouts

The high-sky lookouts scan with the naked eye from horizon to zenith. They have to cover a much larger area in a far shorter time, because any planes they spot will be at closer range. They sit in sky chairs, if available, but use binoculars only to identify planes they have spotted with the naked eye.

Standbys

Every lookout should be relieved by a standby every 30 minutes. The best plan is to provide a standby for each lookout and make him a talker. The two men will alternate every 30 minutes. If there are not enough men available for this, see "Expedients to overcome personnel shortages" on page 10.

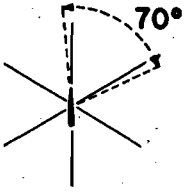
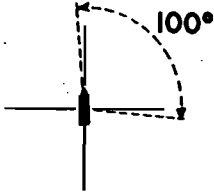
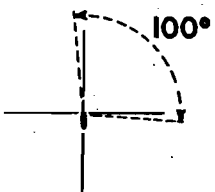
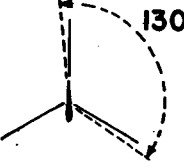
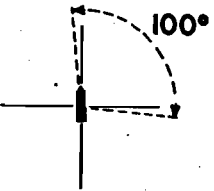
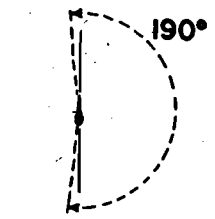
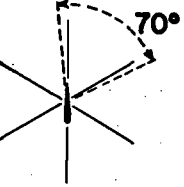
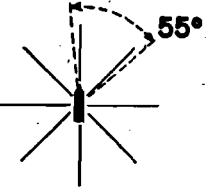
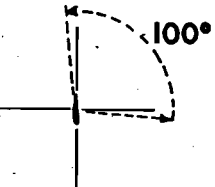
Horizon lookout

If you assign a horizon lookout, post him at the highest possible station. The higher the position of the horizon lookout, the greater the range he can cover.

LOOKOUT PLANS

CONDITION III

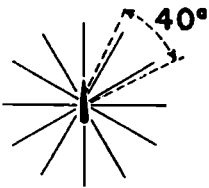
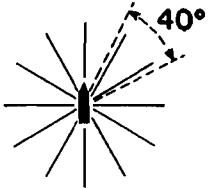
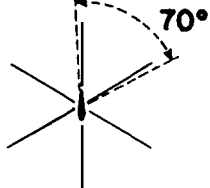
DAYTIME

Battleships and Cruisers	Carriers	Destroyers and Smaller Ships
 <p>6 SURFACE 6 STANDBYS</p>	 <p>4 SURFACE 4 STANDBYS</p>	 <p>4 SURFACE 4 STANDBYS</p>
 <p>3 HIGH SKY (Horizon to zenith-Naked Eye) 3 STANDBYS</p>	 <p>4 HIGH SKY (Horizon to zenith-Naked Eye) 4 STANDBYS</p>	 <p>2 HIGH SKY (Horizon to zenith-Naked Eye) 2 STANDBYS</p>
 <p>6 LOW SKY (Horizon to 5° above-Binoc.) 6 STANDBYS</p>	 <p>8 LOW SKY (Horizon to 5° above-Binoc.) 8 STANDBYS</p>	 <p>4 LOW SKY (Horizon to 5° above-Binoc.) 4 STANDBYS</p>
<p>30 PER WATCH 15 Lookouts 15 Standbys</p>	<p>32 PER WATCH 16 Lookouts 16 Standbys</p>	<p>20 PER WATCH 10 Lookouts 10 Standbys</p>

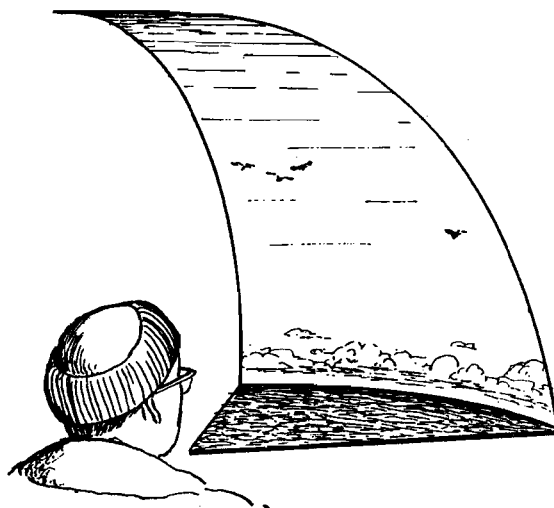
LOOKOUT PLANS

CONDITION III

NIGHT

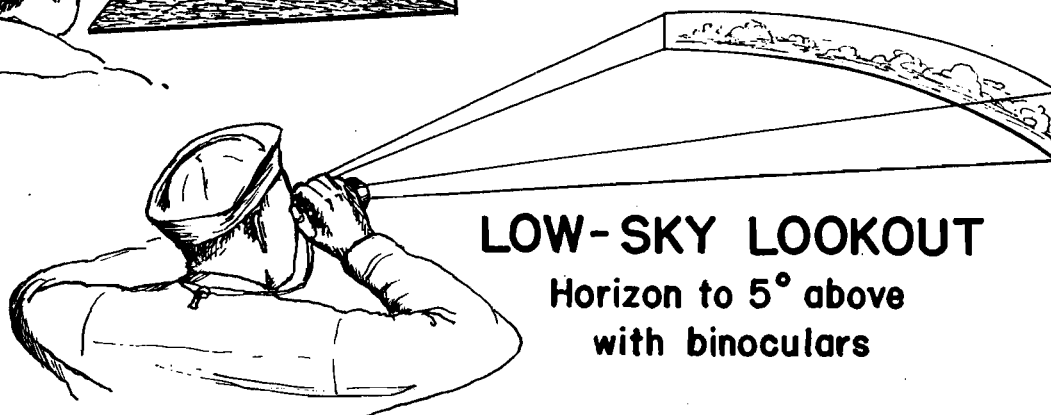
Battleships and Cruisers	Carriers	Destroyers and Smaller Ships
 <p data-bbox="378 605 672 690">12 SURFACE 12 STANDBYS</p>	 <p data-bbox="760 605 1036 690">12 SURFACE 12 STANDBYS</p>	 <p data-bbox="1146 605 1414 690">6 SURFACE 6 STANDBYS</p>

TWO KINDS OF SKY LOOKOUTS



HIGH-SKY LOOKOUT

Horizon to zenith
with naked eyes



LOW-SKY LOOKOUT

Horizon to 5° above
with binoculars

EXPEDIENTS

to overcome personnel shortages:

1. To get enough reliefs for your lookouts, try to borrow men from the gun crews, from radar, and from the various deck divisions. Make every effort to get the best men possible.
2. If you happen to have horizon lookouts on your ship, you may be able to transfer them to sky or surface duty. Horizon lookouts are the least important because both the surface and the sky lookouts are responsible for the horizon also.
3. In the daytime, sky lookouts are much more important than surface lookouts. If you can afford it, transfer some of your surface men to sky duty. A ship in the center of the Force, for example, can often get along with only two surface lookouts in the daytime. Planes come in much faster than any object on the water.
4. Get the Gunnery Officer to have some of his men scan the sky also. But remember that contacts on planes are still the lookouts' responsibility.
5. If necessary, reduce the number of standbys to only one for every two lookouts. This will mean you will have to adopt a triangular form of relief; for instance, the talker takes the port lookout post, the port lookout moves over to starboard, and the starboard lookout takes over the phones. Remember that though each man spends only the usual half hour as standby, he has to stand a full hour as lookout with this system.
6. As a last-ditch measure only, try to substitute a watch-in-3 for the 4-section watch. Of course, this puts more strain on all your men.

**FIRST DO EVERYTHING YOU POSSIBLY CAN TO GET
AN ADEQUATE NUMBER OF REGULAR LOOKOUTS**

Lookout Reporting

One of the most difficult problems in training lookouts is teaching them to report speedily and accurately. For some reason, inexperienced men seem to get tongue-tied when they have to handle important information in a hurry. Even experienced lookouts suffer from hesitancy in critical moments. Since lookouts also have to serve as talkers, the first step is to train them in using battle phones to their fullest advantage.

TELEPHONE TALKING

The phones

To train your men in the care and use of headset phones, distribute among them copies of "U. S. Fleet Telephone Talkers' Manual" (NavPers 14005). To train your supervisors how to instruct the men in telephone talking, use "Supplement I" (NavPers 16115) or "A Guide for Shipboard Telephone Talker Instruction" (NavPers 16148).

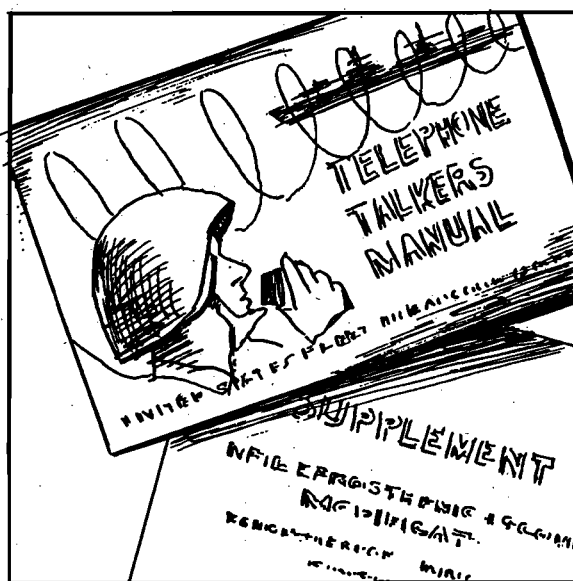
Sound-powered phones permit communications to continue even when the ship's electrical system is knocked out. However, the phones often get out of order. When a set fails to test properly, have the lookout or supervisor take it to the Interior-Communications Room for repair right after he secures. To be on the safe side, provide at least one spare set for each jackbox on the ship.

The men on the phones

Keep men with strong dialects away from the battle phones. It is hard enough to get normal talkers to speak clearly enough to be understood. Emphasize the necessity for talking loudly over these phones. The fact that they are not run by batteries makes this essential.

However, if the trouble lies in the inability of the Bridge talker (or other central talker) to understand lookout language, replace him with one of your own men.

Always insist on your talkers using standard procedure and standard phraseology. This will not only make it easier for them to be understood, but will also help relieve battle tension.



Circuit discipline

A telephone talker is often tempted to carry on conversations with his mates. Give the Bridge talker, as well as your supervisors, the authority to stop all aimless chatter on the circuit. You can often find the culprit yourself by cutting each phone out of the circuit until a sudden silence gives away his location. Unfortunately, some of the offenders may turn out to be officers. If so, the best thing to do is to point out tactfully to them that their thoughtlessness is making the job of maintaining circuit discipline among the enlisted men more difficult.

HINTS ON REPORTING

Emphasize the need for speed

Train your lookouts to report on the slightest suspicion of anything unusual. The main job of the lookouts is to LOCATE AND REPORT OBJECTS AT EXTREME RANGES. Important contacts are very often made on what the men think of as hunches. The tendency of lookouts is to hesitate until they make certain that what they see is an actual target. But . . . a lookout can detect an object at more than double the range he can identify it. The primary duty of the lookout is *detection*.

Hold frequent drills

In off-duty practice sessions, have the men report range and bearing of friendly ships and planes, and check their estimates by radar, range finders, or your own observation. Also give them as much practice as possible in reporting various aids to navigation. They should be able to identify buoys and channel markers, especially in enemy waters. Always make them use standard Navy phraseology.

Have lookouts report everything

It should not be up to the lookout to distinguish between what is important and what is not. Such decisions must rest wholly with you and other responsible officers, though at times your supervisors can help.

Every lookout should report even a previously sighted object as soon as it enters his sector, unless he has been specifically ordered not to. You will need to issue such orders at times to prevent jamming up the circuits with needless reports.

Your fellow officers may be inclined to brush off lookouts who follow your order to "report everything." You will have to use your tact to get them to stop this practice. Under no circumstances can you afford to let your lookouts get discouraged. Keep pointing out to them the importance of reporting everything they see.

The significance of acknowledgments

"Aye" or "Aye, aye" This acknowledgment from the central talker is the only way to let the lookout know that his report has been heard and understood. If he receives no such acknowledgment, he has to stay on the target and repeat his report at intervals until he does. For a target obviously friendly or easy to find, this acknowledgment is the lookout's signal to resume scanning the rest of his sector.

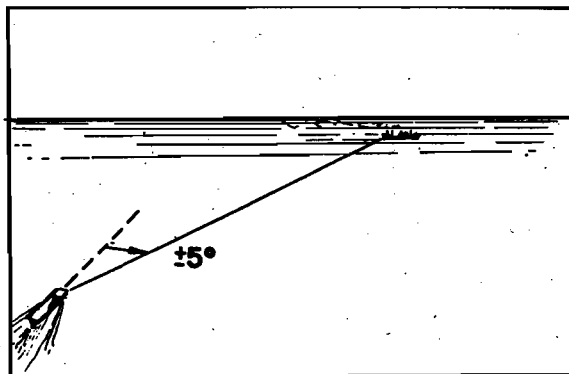
"Resume search" This order from the central talker tells the lookout that a responsible officer has located the target and relieved him of any further need for staying on it himself. Such a positive order forces the lookout to return to scanning his sector if he is still gazing at the target.

"Amplify" The central talker must give the lookout this order whenever the target cannot be readily located. The lookout then gives as much additional information as he can. A target sometimes disappears before an officer can train his glasses on it. Lookouts will not amplify without this order unless there is some definite change from the time of the contact report.

WHAT ACCURACY TO EXPECT

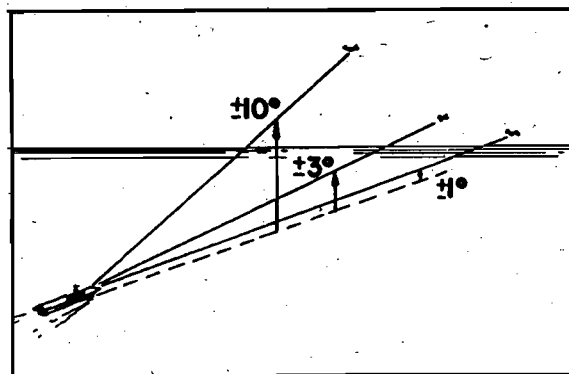
Relative bearings

Every lookout should be able to estimate relative bearings within 10° . With a reasonable amount of practice, a lookout should become able to estimate to the nearest 5° . This is close enough to enable others to locate the target. Bearing indicators are supposed to give absolute accuracy, but check them periodically. Report "true" or "relative" when confusion may exist.



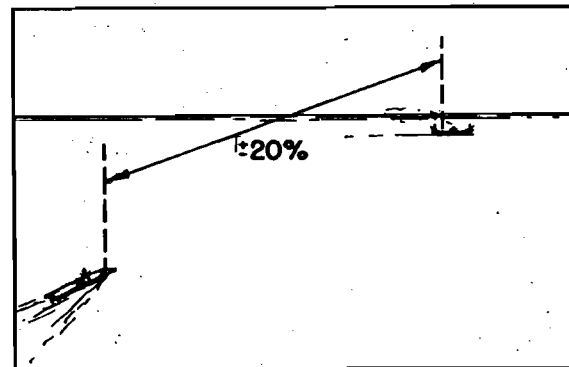
Position angle

Every sky lookout should be able to estimate position angles within 10° . With extended practice on friendly planes, high-sky lookouts who scan with naked eye up to the zenith should learn to estimate position angles up to 30° within 3° . Of course, low-sky lookouts, who cover the area only up to 5° above the horizon, should be able to give very accurate estimates by remembering that the binocular field is 7° .



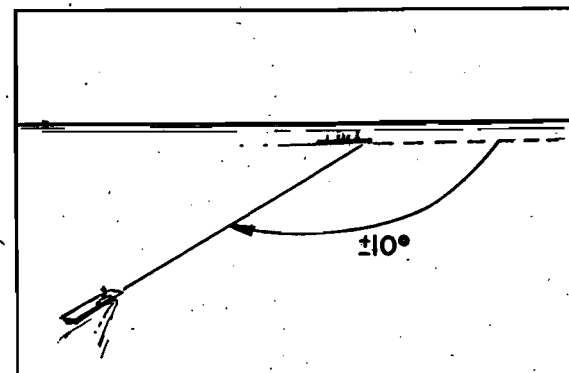
Range

On some ships the lookouts are expected to give only rough estimates of range, such as "hull down," "halfway," etc. However, on many ships the lookouts are required to estimate range in yards. Extensive practice—checking estimates against radar or range-finders—will bring the average error down considerably. Within 20 percent is not too much to expect from an experienced lookout. Emphasize accuracy on ships close aboard.



Target angle

It is essential to have lookouts give the target's direction of travel, like "moving right," "moving left," "opening," and "closing." These rough estimates of direction are especially necessary in reporting fast-moving planes. Target angle is usually a problem for Fire Control—a difficult skill to teach to lookouts. When target angle is demanded, train your men to estimate it as closely as possible. With practice, they should be able to estimate within 10° .



RELIEF FOR LOOKOUTS

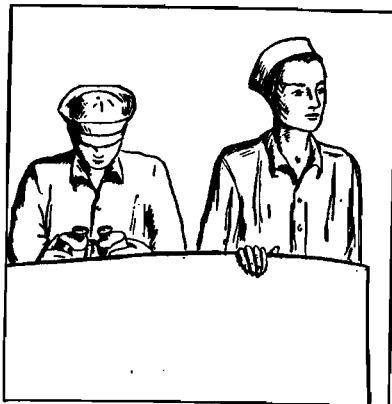
Always limit continuous lookout duty to 30 minutes. During a 4-hour watch, have the lookouts alternate with their standbys or talkers every half hour. These alternations do not have to be reported over the circuit.

Keep every lookout at his station until he is properly relieved. Have it understood that whenever a relief is late, the lookout is to report the fact to the responsible person. But he must stay on his station until a relief appears.

Order every lookout to inform his relief fully about the sector. At the end of a 4-hour watch the lookout's tendency will be to rush off as soon as he catches sight of his relief. But before any lookout begins a watch, he must know what is happening and what has happened in the sector which becomes his responsibility.

Hold your supervisors responsible for the proper relief procedure. Make them aware that it is their duty to report any violation immediately after the offense occurs.

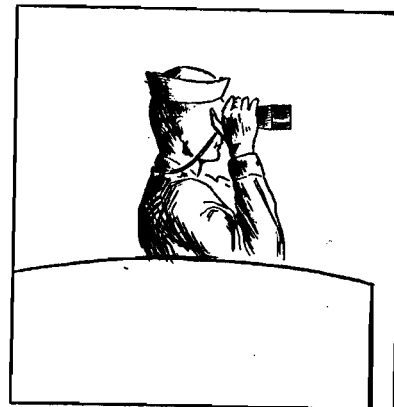
THE THREE MAIN STEPS IN RELIEVING THE WATCH



1. Relief takes binoculars and checks settings, while lookout continues to scan with naked eyes.



2. Relief scans sector once while lookout tells him about what has happened in the sector.



3. Relief takes over the watch. Retiring lookout reports that the sector has been properly relieved.

6

Morale and Discipline

No matter what the set-up is on your ship, you will constantly be faced with the problem of motivating your lookouts. The monotony of standing routine watches may induce your men to slacken up from time to time. It is your job to overcome any tendency of the lookouts to become lax, especially in safe waters. If you let down in your vigilance during normal cruising, the men will form bad habits which will show up sharply at General Quarters. The only way to prevent this is to preserve morale and discipline at all times.

BUILDING MORALE

Provide for lookouts' comfort

Never allow any lookout to stand watch for more than 30 minutes at one time, unless the ship is at General Quarters. Without the stimulation of battle, it is practically impossible to pay full attention to the job for more than a half hour at a stretch.

Try to keep your lookouts from being assigned to heavy physical labor right before going on watch. Fatigue is the chief enemy to alertness. Also, do not allow any of your men to stand a radar watch and a lookout watch in succession. Two such watches in a row will cause extended eye strain.

Within the regulations of your ship, make the lookout on duty as comfortable as you possibly can. But never let your night lookouts smoke or even light a match on deck.

Make sure that your men get the best of all the new gear that comes aboard, especially the foul weather gear. The comfort of your lookouts is vital.

Keep your lookouts informed

Your lookouts will greatly appreciate it if you take them into your full confidence whenever possible. Before any shore bombardment, for example, show them relief maps of the area involved. Point out all the shore installations, pill boxes, gun emplacements, air fields, and the like. They will do much better work if they know something about what to expect.

Offer special incentives

Organize as many field trips as possible to nearby airports. The lookouts will get great satisfaction out of seeing planes at close hand.

Give monetary rewards for lookout work of outstanding merit. You should be able to get an allotment for this purpose from the ship's welfare fund. Also, a standing offer of a case of beer for spotting stranded flyers may save the lives of many men.

Use praise when deserved

Whenever the situation merits it, be as generous as possible with your own compliments. Your lookouts are human enough to respond very favorably to your praise. For example, a trouble maker is sometimes best handled by inflating his ego. It is also wise to urge your fellow officers to praise lookouts who do outstanding work.

Rid your men of their awe of radar

Inexperienced lookouts depend too much on what they consider to be the magic power of radar. It will often be up to you to rid them of illusions so that they will more fully realize their own worth to the ship. First of all, emphasize the inability of radar to identify con-

tacts. Then tell the men that radar does have blind spots for aircraft, usually up to a 10° position angle and directly overhead. This fact often makes the lookout the only warning against suicide attacks and attacks from torpedo planes. Most of all, keep reminding

the lookouts that even radar is never any better than the man who operates it.

Let your lookouts know about it every time they pick up a target radar has missed. Also, inform them of any targets within visual range that they miss and radar detects.

MAINTAINING DISCIPLINE

Morale and discipline are closely allied problems. You will very likely have men in your organization who cannot be motivated to do a good job. These will make up the majority of your disciplinary cases. But even some of your best men may sometimes be among the guilty.

How to treat offenders

The best way to combat indifference is to offer more incentives for good work. Punishment cannot stimulate honest interest in a job.

If a lookout makes an error in his report, merely correct him on the spot. Bawling him out for his mistake will only discourage him from giving future reports speedily. But if any of your men get into the habit of imagining targets that are not there, have their eyes—and the state of their nerves—examined by the ship's doctor. However, do not be too quick to brand a lookout's report as an hallucination; he may have spotted something too difficult for anyone else to pick up.

If a man in normal health misses a target completely, it is your duty to call him down in no uncertain terms. If he continues to be lax in his duty, try to get him shifted to some other type of work—preferably unpleasant.

Bear down hard on any lookout who concentrates on the action of battle and leaves his sector unguarded. Any man who does this endangers the whole ship.

Also for breaches of circuit discipline, do not hesitate to use the full weight of your authority.

Common Offenses

1. An attitude of complete indifference, especially prevalent in safe waters.
2. Erroneous reports: incorrect bearings, position angle, range, or target angle.
3. Failure to report targets which an alert lookout would get.
4. A tendency to gaze at attacking planes, leaving the sector totally uncovered.
5. Breaches of circuit discipline, such as cluttering up the phones with chatter.
6. Carelessness with gear, especially rough treatment of binoculars and phones.
7. Attempts to be "tough." (Bad eggs can persuade other men to imitate them.)

Never put up with carelessness in handling the lookout gear. Threaten to put such offenders on report if they continue to mishandle Navy property. However, avoid putting men on report indiscriminately. It is never wise to take too many of your own affairs to the Exec's Mast. If you are burdened with incorrigibles, remember that other divisions have their share too, and it is up to you to handle them strenuously rather than to try to get them transferred to someone else.

7

Lookout Supervisors

Whether or not you have the chance to choose your own supervisors, you will have to work closely with them. If a supervisor is a rated man, he may have the idea that his only job is to discipline the lookouts. You must make such men realize at once how small is this part of their duty. Supervisors should be connecting links between the lookouts and the Lookout Officer. The quality of lookout work often depends on how well they carry out their tasks.

Breaking in new men

A supervisor should take charge of every new lookout, train him in the basic skills, make him familiar with his stations, and introduce him into the routine of his watches. It is up to you to follow up this introduction.

Keeping lookouts alert

Hold the supervisor responsible for men who fall asleep on watch. It should also be his duty to see to it that the lookouts are all actually scanning and not daydreaming behind their binoculars.

Ensuring continuous coverage

It is up to the supervisor to see that the lookouts cover their sectors at all times. During General Quarters, lookouts often leave their sectors unguarded while they gaze at the battle action.

Checking lookout performance

The supervisor should learn the capabilities of every lookout under him. It should be his duty to give the Lookout Officer regular reports on performance, so that good work can be quickly commended and poor work just as speedily rectified.

Maintaining discipline

Most supervisors will be eager to take care of disciplinary problems, but be sure to keep a close check on the methods they employ. You must make the supervisor feel responsible,

REQUIREMENTS

for a qualified supervisor

Maturity—Older men usually make the best supervisors; try men between 25 and 35.

Experience—Pick men who have had a fair amount of sea duty. Whenever possible, try to get men with experience as lookouts.

Skill—A supervisor must be an expert in both lookout and recognition.

Enthusiasm—The attitude of the supervisor will reflect itself in that of the lookouts. Well-motivated supervisors lighten your job.

Rate—Usually a rated man will command more respect. But it is often wise to reward a first-class seaman by making him a supervisor.

however, for the behavior of the men in his charge. Emphasize the need for circuit discipline and quick reports.

Checking relief of the watch

The supervisor should make periodic checks on whether the lookouts are following the correct procedure for relieving the watch. He should arrange for substitutions, and see to it that no lookout ever leaves his station before being properly relieved.

ASSIGNING SUPERVISORS

Assign a roving supervisor to each watch section—Have him make periodic check-ups of all the lookout stations on the ship. It is his duty to report to you after every lookout watch.

Check your roving supervisor whenever you can—Make frequent rounds of the lookout stations yourself. It is up to the supervisor to check the various stations, but he will often fail to accomplish much unless you show your own interest in what is actually going on.

Assign an assistant supervisor to each station—Since the supervisor can be at only one station at a time, appoint a lookout on each station to act as assistant supervisor.

Give your assistant supervisors authority—Pick the best lookout on each station, and let him know that he is directly responsible to his supervisor for what the other lookouts do.



Reminders for General Quarters

As Lookout-Recognition Officer, you will be too busy on your own station during General Quarters to take care of any details regarding the lookouts. Therefore, you cannot afford to overlook anything when you train your men to take part in Condition I. Long before the call to G. Q., every man must know his job without having to think about it.

Special instructions for lookouts

Tell your lookouts not to concentrate on attacking planes but to scan their sectors for targets that Air Defense and Gunnery are not aware of. Alert your men for unusual actions on the part of ships in your Force, as well as for targets.

Lookouts should also report battle formations, floating mines dropped by planes, temporary buoys and other markings laid down to identify swept areas or fire support areas, and all other floating objects.

If there is to be a bombardment, tell your lookouts to be quick to report splashes near the ship and all gun flashes from shore installations, giving relative bearings.

Special instructions for supervisors

During General Quarters remind the supervisors that they will have to use their skill in recognition to the fullest. In many cases, they cover all the sectors on the battle platform. In addition, they must keep a constant check on all the lookouts. Convince your supervisors that it is up to them to save confusion by sifting important lookout reports from those that are trivial. Make your supervisors feel their responsibility in connection with all equipment. They must see to it that all the needed gear is where it should be and is in topnotch shape. The supervisors should be an inspiration to the men.

INFORMATION

G. Q. lookouts should have

The more specific information the lookouts have, the less afraid they will be and the less they will let their minds wander from the job. Lookouts should all receive advance ranges and bearings of targets picked up by radar. Information received by radio should be routed as soon as possible to the lookout platforms.

Some time before the ship is sealed for General Quarters, you should show the lookouts a relief map of the battle area. In shore bombardments, point out all the probable spots for gun emplacements, air fields, towers, and other landmarks in the area concerned.

Special instructions for telephone talkers

During General Quarters it is very important for the talkers to stay out of the way. Tell them also to keep their wire leads from underfoot of all personnel. Point out to the talkers how necessary it is to get the essential information from the lookouts without distracting them from their job. At General Quarters every talker must also know just what he is to do in case of battle damage to his phones. But most important, convince every talker that he must talk above the din of battle.

Lookout equipment for G. Q.

New binoculars should be issued at G. Q. with all the adjustments carefully checked. If old pairs have to be used, the lenses of all of them should be examined for any dirt or scratches. The proper sun glasses should be available on all stations, and in good order. Every lookout should be outfitted with a kapok life jacket. The kapok type is superior for protection against shell bits, flying debris, and attacks from sharks. There should be at least one spare headset phone for each jackbox. Bensedrine tablets should be on hand to ward off fatigue. Morphine and first-aid gear on every station are necessary for emergencies.

Provisions for relief

Before Condition I goes into effect, the manner in which the men are to be relieved must be carefully set up. During General Quarters all hands topside are virtually lookouts too. The reliefs, as well as the lookouts on actual watch, must search for targets. Naturally, the lookouts cannot be relieved from their duty as often as they are under Condition III. But it is important not to allow them to stay on the job for more than twelve hours, on and off. At the end of this period, try to send your men to less strenuous jobs, like the clipping rooms or the light machine gun battery. Whenever you can, arrange to give them a chance to sleep.

Should Sky Lookout Stations Be Manned at Night?

For Conditions III and II, the sky lookouts are usually assigned to surface lookout duty at night. But during General Quarters, there are strong arguments for keeping the sky lookouts right on their stations. In the first place, there is often no place for them to go when the ship is buttoned up for G. Q. Secondly, there must be lookouts on the alert for flares in the sky. On a moonlight night, an enemy plane may reveal itself by passing over the path of the moon. In fact, it is often the case that the night is light enough to pick up distant targets. Sky lookouts have frequently spotted planes at night. Finally there is always the possibility that the break between night and dawn may be sharp and abrupt.

IF A LOOKOUT IS EXPOSED TO GLARE WITHOUT THE PROPER PROTECTION, HE MAY NOT BE ABLE TO USE HIS NIGHT VISION EFFECTIVELY FOR A LONG TIME. Experience has proved that such exposure can well prevent the eyes from dark-adapting fully for as much as a whole month afterwards. Be especially careful to protect the eyes of those daytime lookouts who stand night watch as well.

Pointers on Binoculars

Most men take for granted that it is always better to search with binoculars than without. They think only in terms of the magnification afforded, which allows them to see farther. But the problem of when to use binoculars is not that simple. It is true that binoculars double the range on a clear day and quadruple the range on a clear night. However, these are only two of the many facts a man should know before using them.

LIMITATIONS OF BINOCULARS

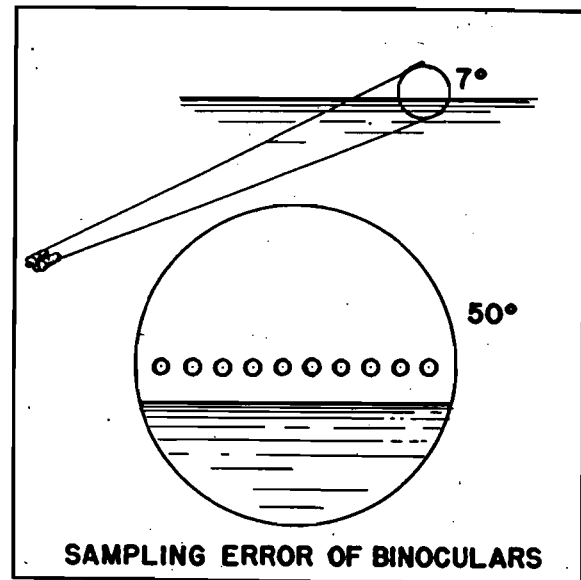
Limited sampling of an area

In daytime scanning with binoculars, the lookout is merely sampling his sector. Here is why:

His binoculars actually cover 7° , but the magnification blows this up to an apparent field of 50° (7° times the $7\times$ power of the lenses). It is this 50° field that he must examine step-by-step. His most acute vision in daylight is limited to a region of about 2° around the line of sight. In order to cover the 50° field with his 2° area of acute vision, he would have to take 25 steps. No one can do this, even if he could afford to take time enough. What the eyes actually do is to take about 10 steps, leaving a good part of the area untouched by the most acute vision. (This does not apply to night scanning with binoculars, because night vision does not have any small acute region.)

Useless in fog

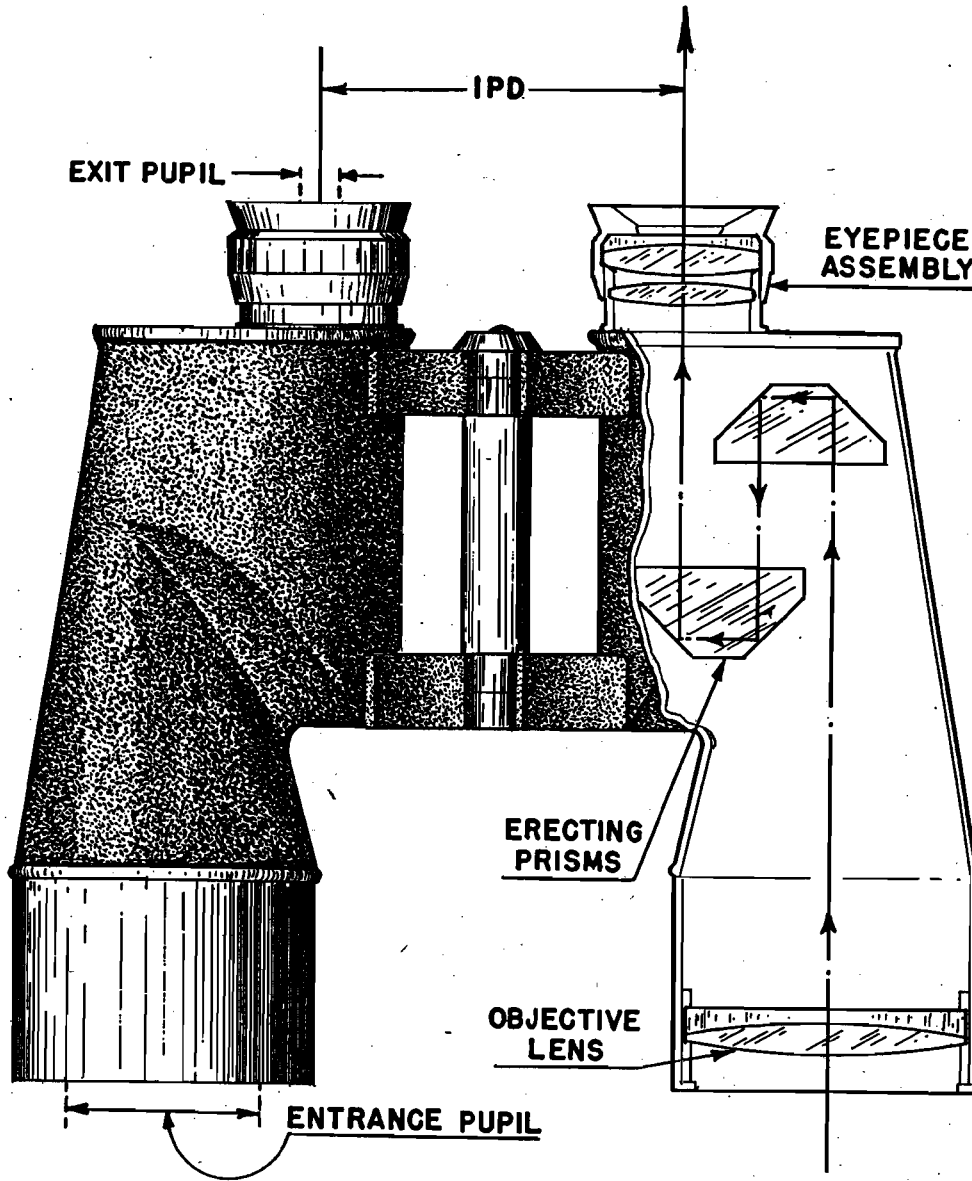
In thick haze or fog the range will shorten so much that any target sighted will be relatively large. Binoculars will magnify such a target to the extent that the lookout will not be able to see its outline. For example, he might have his binoculars trained right on another ship close by and not even be aware of it. Furthermore, thick haze or fog greatly reduces visibility by diminishing the contrast in illumination. Binoculars will further reduce the light contrast, thereby making visibility worse than with the naked eye. Binoculars are



not only useless in fog, they are actually dangerous—for they may cause the lookout to miss targets he might pick up with his naked eyes.

All but 7° blocked off

When scanning with the naked eyes, a lookout may happen to pick up a target (a fast-moving plane, for example) even if he is not looking directly at it. When scanning with binoculars, however, his entire field of vision at any moment is limited to a circular area 7° across. He is bound to miss any target, no matter how prominent, that lies beyond the rims of the binoculars.

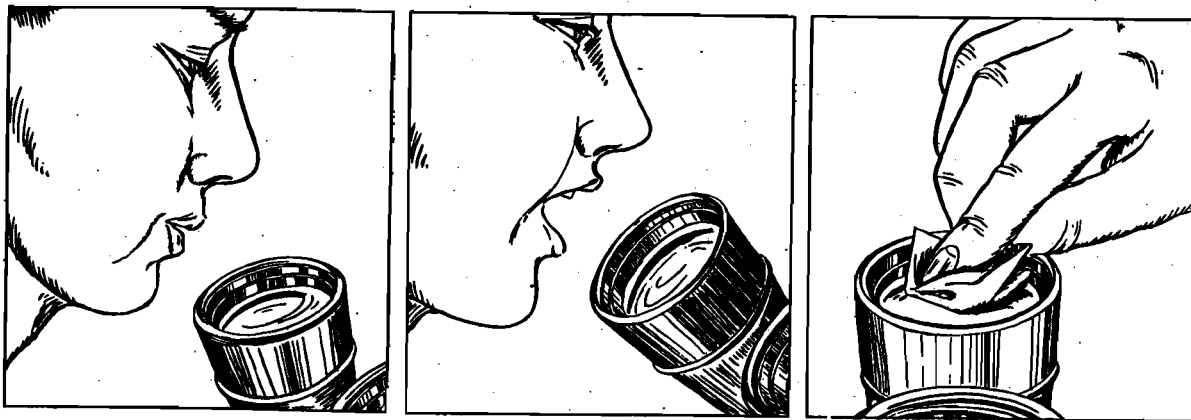


7X50 BINOCULARS

How to Take Care of Binoculars

1. Never let anyone but an expert try to repair binoculars. Send any pair that gets out of order to the Optical Shop as soon as possible.
2. Whenever a lookout complains of eyestrain or headaches, send his binoculars to the Optical Shop immediately. Have all the binoculars in your charge examined periodically by experts in the Shop. They might need adjustment without anyone being aware of it.
3. Make sure that your night lookouts use only binoculars that have been night-treated properly. Check to see that the coating on one barrel is equal to that on the other. Remember that this material will flake off if exposed to excessive spray.
4. Have wet binoculars dried as soon as possible. The safest way to do this is to put them in a warming box. You can have one constructed by hooking up a 100-watt bulb in a big wooden box.
5. Have your men try to prevent the binoculars from getting overheated. Overheating will not only melt the cement around the lenses, but may also cause bubbles to appear in them. Protect binoculars from sudden changes in temperature by keeping them encased when not in use.

CLEANING BINOCULARS



First blow off the loose dust from the glass. Rubbing over the dust would scratch up the lenses.

Then breathe on the lenses and clean them with lens paper. Lens paper can be procured from the Optical Shop.

Rotate the lens paper gently until you can see that the glass is dry and clean. Never smudge it up with your fingers.

Using binoculars in the DAYTIME

In the daytime, the frequency with which the lookouts use their binoculars depends largely on what type of sector they are covering. For instance, the surface lookouts use binoculars every time they scan across their sector, though they may make the return sweeps with their naked eyes.

The low-sky lookouts also use binoculars each time they scan across their sector, taking as many small steps as possible. They too may make the return sweeps with naked eye.

But the high-sky lookouts never use their binoculars except to identify a target picked up by naked eye.

On days when the horizon is invisible because of haze, everyone scans with the naked eye only, of course.

Using binoculars at NIGHT

At night, all lookouts use their binoculars for scanning. Here, as in the daytime, they may make the return sweeps with the naked eye. Binoculars are always much more effective at night than they are in the daytime.

In fact, the chief problem they present at night is setting the focus and IPD adjustments in the dark. Make certain that your men can make settings accurately by providing each night lookout with a small red flashlight.

Remind each man that he must set his focus for each eye at exactly -1 from his own day setting.

Particularly at night, there is only one way to guarantee that the IPD setting will be correct at all times. That is to insert the proper size of template between the barrels of the binoculars. Each lookout should wear his template on a cord around his neck when he reports to go on watch, and should immediately insert it between the barrels of the binoculars when he takes over.

If there are no templates aboard, get the Optical Shop to make enough, of the right sizes, so that every lookout has one to fit his own IPD measurement. Each template should have a small hole bored in the corner for the suspending cord.

WARNING: The focus calibrations of all binoculars should agree, but in some cases they vary. To be safe, have every lookout refocus for both eyes if he has to use binoculars different from his previous pair.

Hints on Special Problems

Throughout the preceding chapters there has been little opportunity to deal with anything but normal situations. But there are special problems in lookout work which are every bit as important. Lookouts must be given every chance to do the best work possible regardless of circumstances. Conditions of weather, time of day, and atmosphere must be dealt with wisely.

LOOKOUT DUTY AT NIGHT

What to do with the sky lookouts

Most lookout organizations transfer the sky lookouts at night to surface duty. For any condition but General Quarters, there is not much point in scanning the sky after the sun goes down. Besides, the surface is much more important at night, especially since it is not uncommon for other ships in the Force to get off course in the dark. The lookouts scanning the surface can warn of threatening collision courses. The addition of sky men to surface coverage will enable you to reduce the size of the sectors considerably. But if there are any sky lookouts you cannot use in this way, secure the sky stations anyway and send the extra men below. This helps morale.

What lookouts can be expected to spot at night

Though night lookouts are most essential for safe maneuvering, they also can often pick out ships, and even masts, on the horizon. Of course, this is impossible without binoculars. With them, however, there are many other things the night lookouts should be able to spot. On a clear night, they can detect rafts, buoys, and channel markers without very much trouble. Even boxes are visible within a fairly good range.

The phosphorescence stirred up by bow waves or wakes shows up sharply in the surrounding area of darkness. This same phenomenon helps a lot in spotting feathers produced by periscopes of enemy submarines.

Of course, the night lookouts will readily spot lights of all kinds. You will be certain to get many reports on flares, star shells, gun flashes, fires at sea, and plane exhaust flames.

Their ability at night to spot so many things should help the lookouts from becoming discouraged by the greater ranges of radar in the darkness.

How to adjust binoculars at night

Due to the larger area of night vision and the increased light-gathering power of binoculars, they are much more effective than the naked eye for night scanning.

FOCUS—Make the night lookouts set their focuses by red flashlight. They cannot get correct adjustments by training on the moon, a star or a wake. The setting for each eye should be exactly -1 from the day setting. For example, a man who has readings of $+\frac{1}{2}$ and -1 in the daytime will adjust his night settings to $-\frac{1}{2}$ and -2 respectively.

IPD—Here especially the exact adjustment is essential. At night, the lookout will get no warning headache or pull in his eyes. But even a slightly incorrect IPD setting at night will cut down the light-gathering power. To preserve the exact setting, each lookout should use an IPD template of the correct size between the barrels of the binoculars. If no templates have been provided on your ship, have enough made in the Optical Shop to supply each man with his correct size. Issue orders that each lookout is to wear his template on a cord around his neck when he reports to go on watch.

PROTECTING LOOKOUTS FROM GLARE

During the daytime, glare is nearly always present in the lookout sectors. Some men feel that there is no glare unless the sun is shining brightly. Nevertheless, on so-called "dull" days, glare is actually worse. To keep their eyes from injury, order lookouts on watch in

the daytime to fix filters on their binoculars on all occasions except when there is a particularly heavy overcast or rain. The lookouts who scan with the naked eye should wear sun glasses for their protection.

STANDING FOG WATCHES

Fog watches are often ordered by the OOD or by some other officer not in charge of the lookouts. Therefore, you must have men prepared and instructed in advance of the need. In each section pick four men who have excellent hearing. They will normally be stationed in the eyes of the ship, the best place for hearing the important sounds that are in the direct path of the ship. Also, they should be placed so that they will be shielded as much as possible from all distracting noises.

On fog watch duty, two men act as lookouts, while the other two wear headsets and serve as telephone talkers. They change places every 20 minutes. Instruct them forcefully not to do any talking except in line of duty. Their main job is to listen. The men should have two pairs of binoculars on station. In low visibility they will not use them for scanning, but the binoculars will prove quite handy if the fog suddenly lifts.

STANDING WATCHES IN ROUGH WEATHER

In either rain or snow, it is a good idea to secure all the binoculars. The poor visibility renders them useless anyway, but even more important is the fact that water will harm the lenses.

Make certain that every lookout is equipped with adequate foul weather gear in rough weather. Those lookouts who have to stand watch out in the open should all wear the clear-glass wind goggles.

SPECIAL SUN LOOKOUT

If you can possibly do it, post a special lookout to cover the area of the sun. This man will be especially valuable at General Quarters. He will be able to catch planes in the path of the

sun, particularly when it is low. Every sun lookout should be equipped with special gear for this duty. He should also have a standby who relieves him every half hour.

SPECIAL ZENITH LOOKOUT

Some ships have adopted the plan of assigning a special lookout who scans only the zenith of the sky. This man lies on his back, so that he does not run any risk of straining his neck. He is especially useful at General Quarters for spotting planes that attack from directly overhead. The two advantages of a zenith lookout are: (1) The top blind spot of radar is never

left uncovered, even while the high-sky lookouts search elsewhere. (2) The size of all the sectors is reduced. However, there are also two disadvantages: (1) There are often not enough men to warrant sparing a special lookout for this duty. (2) There is always the possibility that a man who lies on his back will fall asleep on his job.

Training Lookouts Aboard Ship

Most of your men will have been exposed to some training in lookout work before reporting to your ship. But no matter how splendid the efforts of shore-based activities, your lookouts will need lots of training on shipboard. Yet to do a good job, you will probably first have to overcome several handicaps. Besides lack of interest—there may be lack of time, of space, and of gear.

Lack of time

On smaller ships especially, the pressure of other duties often prevents the Lookout Officer from spending enough time with his own men. Since the lookouts have other duties too, it is also quite difficult to get all of them together for classes at the same time.

In addition to handling the lookouts, moreover, the Lookout Officer on any ship has to train all topside personnel in recognition. Some heads of departments make this job more trying by their reluctance to spare their men for even so important a purpose.

On any ship, large or small, lack of time is quite common.

Lack of gear

Though training gear is automatically supplied to all ships by the Training Aids Libraries, there is always the possibility that you may not receive all the gear you need when you need it. At times you may have to carry on your instruction with inadequate equipment.

Lack of space

If you are aboard a cruiser, a carrier, or a battleship, you should be able to use a mess hall for holding your classes.

But if you are on a smaller ship, the classroom situation may well be more acute. Indeed, you may have to be content with any

Subjects to Stress

All lookout work is important, but past experience has shown there are certain phases that need special emphasis:

Put over to the lookouts their own value to the ship. This will be one of your most difficult tasks, but it is very important.

Keep reminding them of the necessity for staying wide awake at all times. The monotony of their watches is bound to make them sleepy.

Stress correct scanning procedures. Since scanning is not a natural habit, it will require lots of practice.

Impress your men with the necessity for dark adapting themselves completely.

Run frequent drills in estimating target data and reporting. The men will always need them.

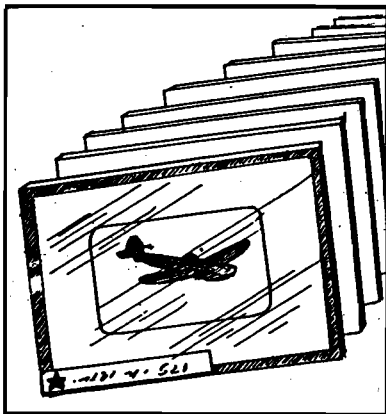
Push plane recognition every chance you get.

makeshift space you can procure: a hold, a wardroom, or other available space.

If you run into interference from blowers, you can best combat the noise with a loudspeaker.

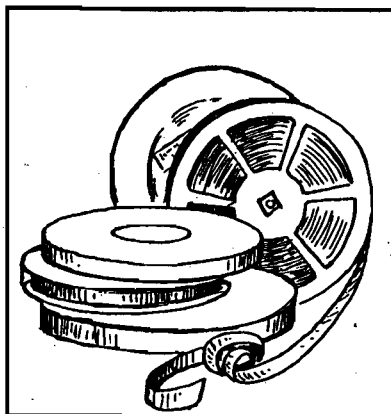
For stowage space, you will find that built-in shelves are often a great help.

TRAINING AIDS



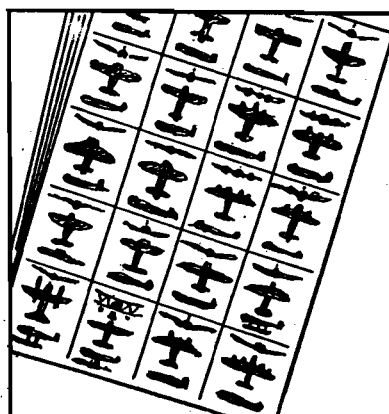
SLIDES

Use them as frequently as possible for sessions in recognition. Stress planes.



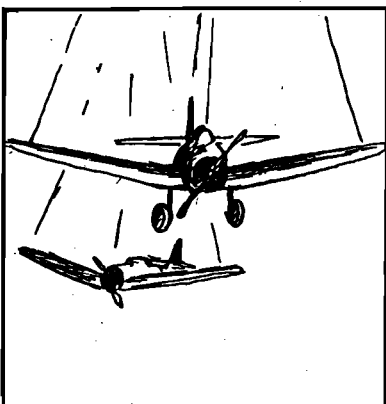
FILMS

Before showing a film, always check it against the latest data you can obtain.



CHARTS

Post these NavPers Airplane Charts on each of the lookout stations.



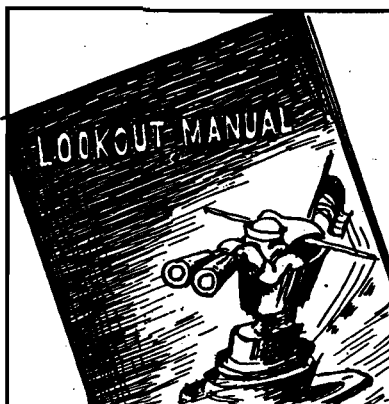
MODELS

Hang plane models in all conspicuous places where they will not become fire hazards.



POSTERS

Put striking posters in passageways. Use those that will motivate every lookout.



MANUALS

Give every man copies of the *Telephone Talkers' Manual* and *Lookout Manual*.

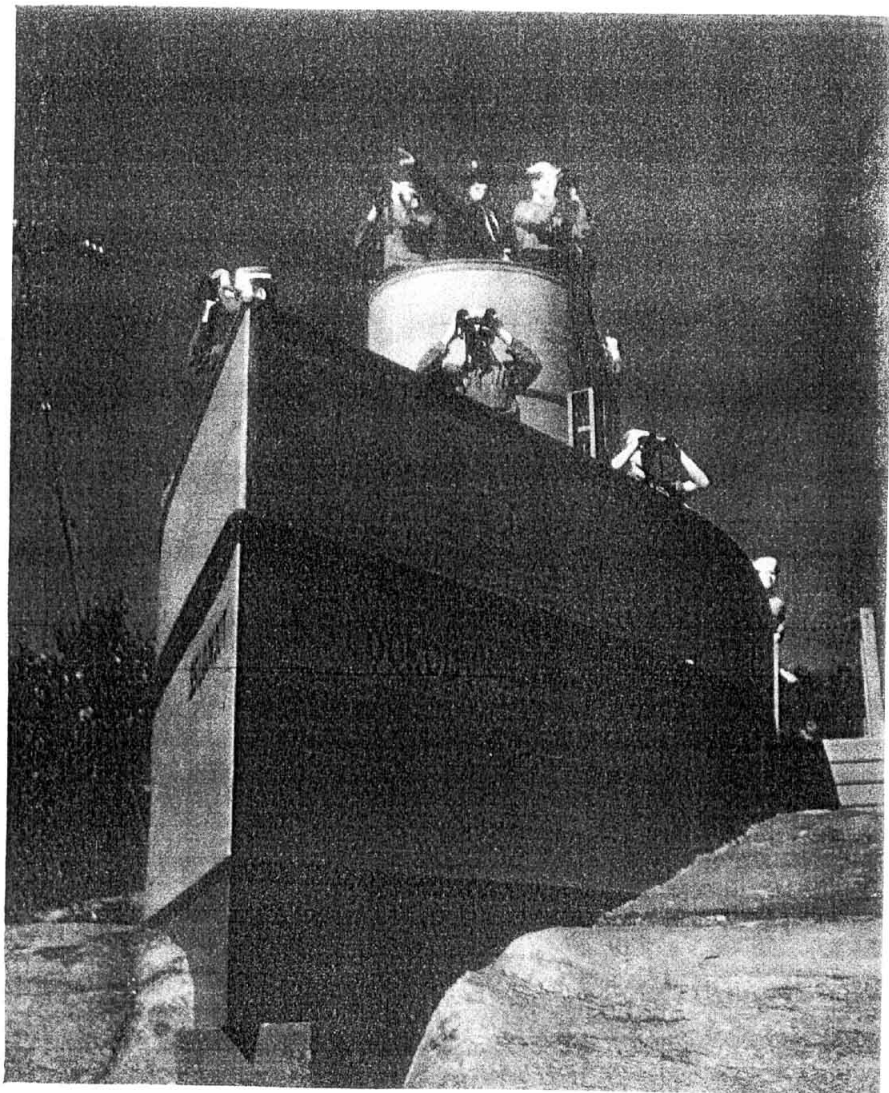
HOW TO GET TRAINING AIDS

Before requesting any device, make certain that your ship is entitled to it. Remember that most of the Training Aids are sent to ships automatically. To find out just what is available, take one or more of these steps: (1) Contact your local Training Aids Section under the District Director of Training; (2) find the address of the Training Aids Library nearest you in the Standard Navy Distribution List; (3) examine the lists of available Training Aids in a recent issue of the BuPers Training Bulletin.

PART II

TRAINING OUTLINES

These outlines are arranged for easy use by the instructor in class. Major headings are printed in bold-face type so that the lecturer can refer to them quickly. Details to be covered under each heading are given in a lighter face. After an instructor has become familiar with the outlines, the bold-face headings will probably provide sufficient reminders. Material enclosed in boxes, such as descriptions of drills and demonstrations, is for the use of the instructor only. Each outline covers only the minimum essentials, and may be expanded by the instructor as he wishes.



TRAINING 1 OUTLINE

The Importance of Lookouts

This is the most important lecture you will give. Right from the beginning you will be faced with the problem of overcoming the common tendency of the men to view the job as dull routine. If you cannot inspire the men yourself, get someone else who can to give this first lecture.

I. The Navy realizes the importance of having good lookouts

1. Millions of dollars have gone into lookout training and equipment.
 - (a) Every Naval district in the United States includes lookout classes in its training program.
 - (b) Lookout training is given by Boot Camps, Class A Schools, Midshipmen Schools, and Operational Schools.
2. Combat reports tell vivid stories of the worth of lookouts to the Fleet.
(If you know a battle story, give one here.)

II. The Captain knows their value

1. He appreciates that alert lookouts help protect the ship from enemy attacks. For this reason, he sees to it that the lookouts get all significant Intelligence reports as they come in.
2. He knows that lookouts are important in preventing collisions with other ships in the task force or convoy.
3. Many skippers have personally praised good lookouts over the public address system of the ship. Some have even held commendatory masts for outstanding lookout work.

III. The increased speed of warfare demands expert lookouts

1. Enemy planes come in very fast.
2. Torpedoes travel at great speed.
3. The increased speed of your own ship multiplies the dangers to navigation, such as mines, reefs, collisions, etc.

IV. Radar has made the lookout's job even more important

1. Friendly planes often forget to turn on their IFF.
2. Enemy planes imitate our IFF signal.
3. In land-locked areas, planes fly low above the hills, where radar misses them.
4. Even far out at sea, enemy planes attempt to hit the blind spots of radar.
5. Radar may also miss shadow planes and snoopers. (Shadow planes follow a task force out at the horizon, continually dipping below it. Snoopers come into visual range, take a quick look, and then fly away.)
6. There are many signs of the enemy's presence that radar cannot pick up. (For examples, refer to page 2.)
7. The lookouts and radar work so closely together that on many ships the Lookout Officer and his men are in the Radar Department.

V. Show the film "Lookout" (MN-16u)

[If this is not available, show the film "Your Importance" (MN-16n).]

VI. A lookout has to be an expert at

1. Using correct scanning procedures
2. Sighting everything in his sector
3. Estimating bearing, range, position angle, and (sometimes) target angle
4. Handling binoculars and using them wisely
5. Picking up targets at night
6. Sending reports over the battle phones
7. Overcoming obstacles like fog, glare, and rough weather

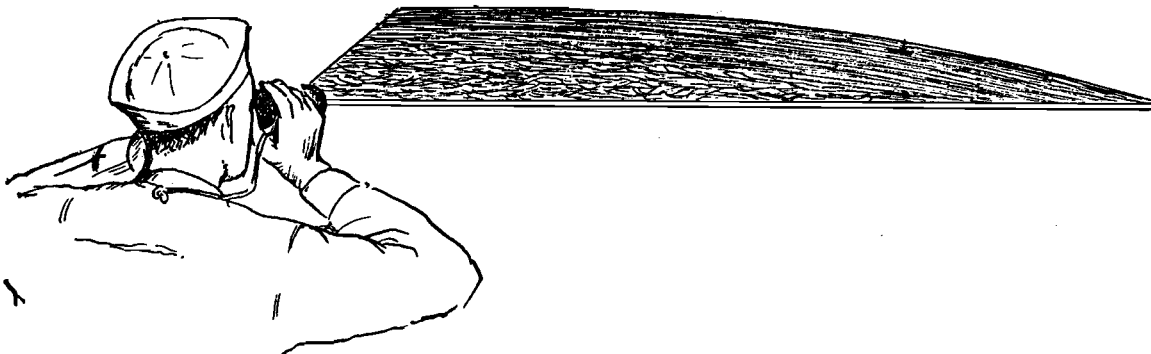
TRAINING 2 OUTLINE

The Lookout on Station

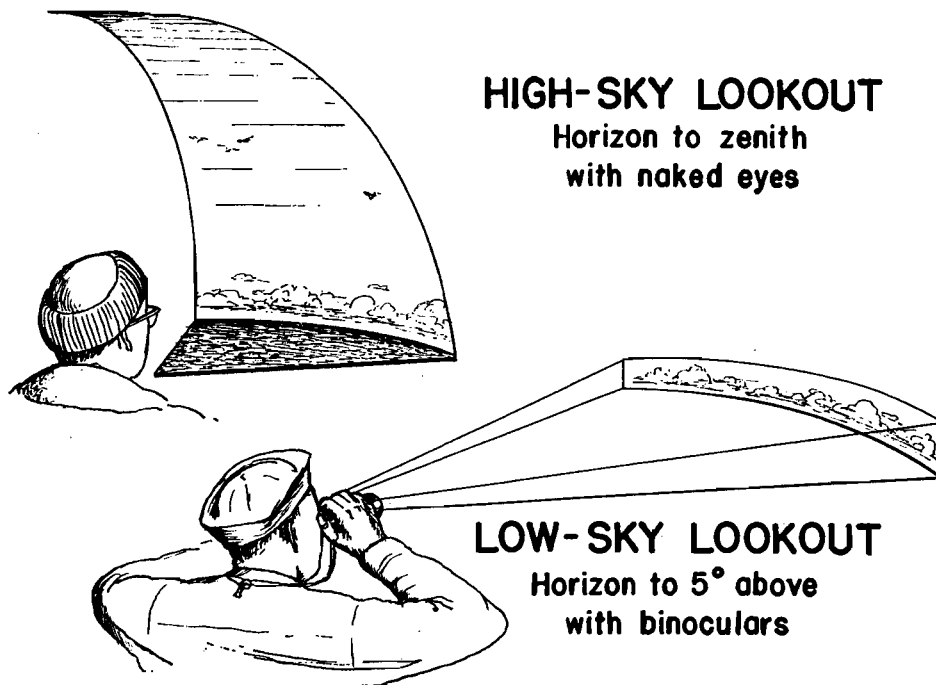
For this lecture, try to take the men on a tour of the lookout stations on a ship. If that is impossible, use a blown-up picture of a ship or a large diagram of one while you talk about the various stations on board.

I. SURFACE LOOKOUTS

1. Surface lookouts cover the water from ship to horizon and are also responsible for anything on the horizon. Regardless of the size of sector, they scan to a 5° overlap on each side.
2. On cruisers and battleships, they usually sit on stools behind openings called "peepholes" and look through binoculars that are fixed on pivots. On smaller ships, they are usually stationed out in the open.
3. Surface lookouts normally search across the sector with binoculars and then make a return sweep with the naked eyes. (In some cases, however, the peepholes are not big enough to allow the lookout to see around his fixed binoculars.)
4. In thick haze or fog (whenever the horizon is not visible), binoculars become useless, and the lookouts are ordered to search with naked eyes.
5. At night, the number of surface lookouts is usually increased because
 - (a) Ships operating in a task force often endanger each other at night by failing to keep station with the guide ship.
 - (b) At night, surface lookouts spot such important things as small boats, rafts, suicide swimmers, small suicide craft, channel markers, buoys, flares, fires at sea, star shells, gun flashes, periscope feathers, torpedo wakes, and other disturbances in the water.



II. TWO KINDS OF SKY LOOKOUTS



HIGH-SKY LOOKOUT

Horizon to zenith
with naked eyes

LOW-SKY LOOKOUT

Horizon to 5° above
with binoculars

1. LOW-SKY LOOKOUTS use binoculars to scan the sky between the horizon and 5° above the horizon. They are searching particularly for torpedo planes and low-flying suicide planes at long ranges.
2. HIGH-SKY LOOKOUTS, wearing sun glasses as a protection from glare, scan the sky from horizon to zenith with the naked eyes. They have to cover this large region much faster than they could possibly do with binoculars. They use binoculars only when needed to identify a plane picked up by naked eye.
3. Usually sky lookouts sit in special chairs which have a relative bearing indicator attached. The low-sky lookouts scan with the binoculars which are attached to the chair.
4. Sectors covered by sky lookouts overlap 5° on each side to ensure complete coverage.
5. At night, sky lookout stations are usually secured.
 - (a) The sky lookouts are normally transferred to surface duty, because more surface lookouts are needed at night. On some ships, however, the sky lookouts sleep in.
 - (b) During General Quarters, many ships keep the sky lookouts on their posts at night—scanning the sky for plane exhaust flames, running lights, flares, and the like.

III. HORIZON LOOKOUT (seldom used)

1. There are two good reasons why a horizon lookout is seldom used: (1) both the surface lookouts and the sky lookouts cover the horizon and (2) there is no place to put him on many modern ships.
2. When there is a horizon lookout, he is put as high up as possible.
3. Horizon lookouts are on duty at night searching for land, objects on the horizon, and distant lights.

IV. LOOKOUT REPORTS

1. What lookouts report:

- (a) The presence of all visible planes, ships, and other objects.
- (b) Their location: relative bearing, range, elevation.
- (c) Their actions: direction of movement, etc.
- (d) Their identity, especially whether friendly or enemy.

Sample report: "Bridge, high sky aft, plane, bearing one fo-wer fi-yiv, position angle two fi-yiv, moving right."

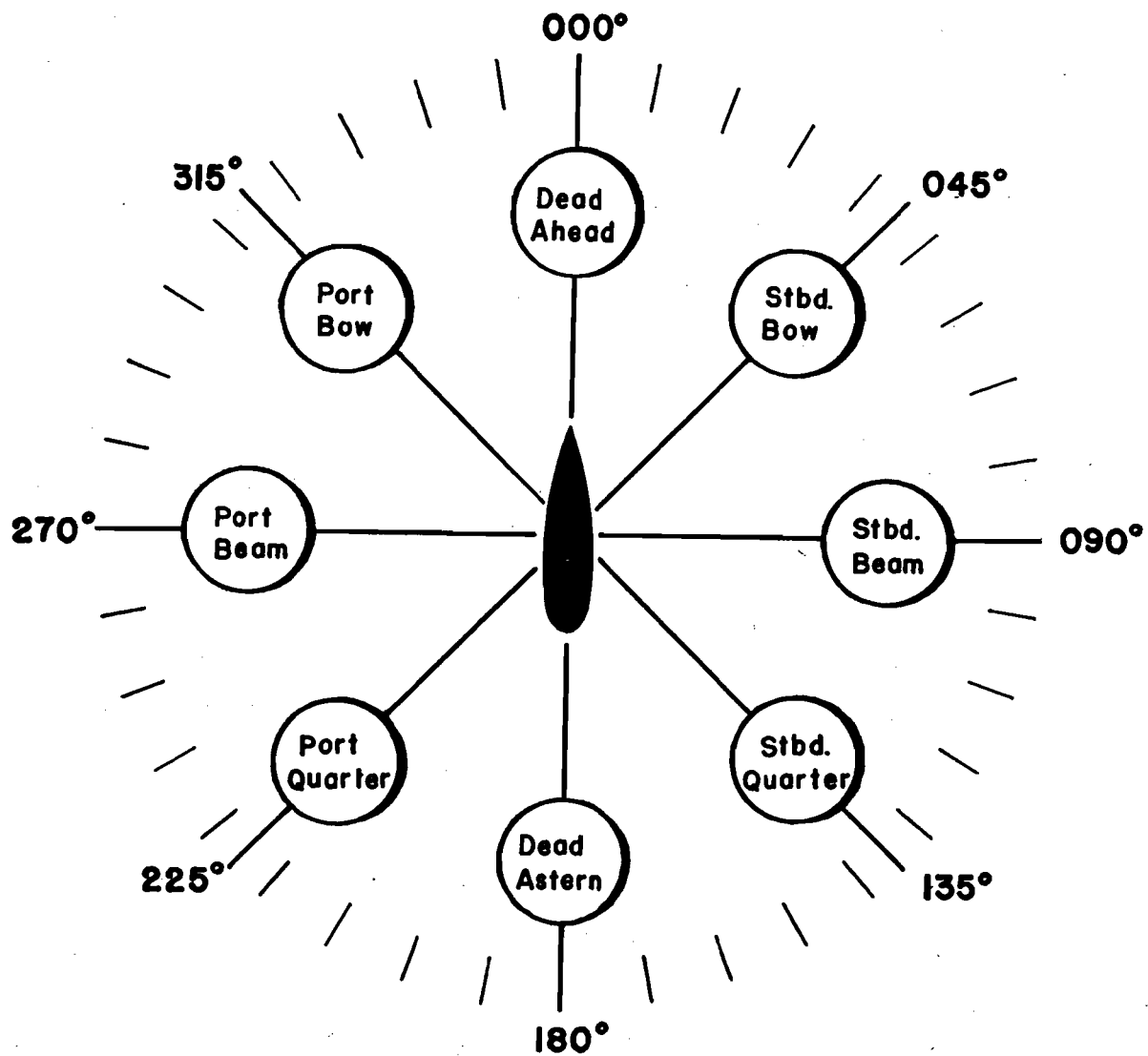
2. Where the reports go:

Bridge (or Conn) talker.	Lookout-Recognition Officer.	Gunnery Officer. Executive Officer.
Officer of the Deck.	Air Defense Officer.	Captain of Ship.
Combat Information Center.	Navigation Officer.	

3. How the reports are used:

- (a) To bring more eyes to bear on the target.
- (b) To identify radar and sonar contacts.
- (c) To make ready the guns for firing.
- (d) To maneuver the ship out of danger.
- (e) To permit the Captain to prepare the ship for action.

The end of this outline is one of the best spots for an exciting sea story. The trouble with most sea stories, however, is that they have too little to do with the subject matter you are trying to get over.



**MAJOR REFERENCE POINTS
OF RELATIVE BEARINGS**

TRAINING 3 OUTLINE

Relative Bearings

Relative bearings can be learned only by lots of practice in estimating them. Your talk and the film are merely introductions to the subject. Put all your stress on actual drill from now on.

I. Why relative bearings are used

1. When a lookout spots a target, he must have a way of letting his officers know where it is.
2. The only quick and accurate method is to give the direction of the target with reference to his own ship's bow.

(The Navy once used the point system: 8 points to each 90°. Another method is the "clock face" system, often used by our flyers. The British divide the horizon into two sections of 180° each, reporting bearings as "red" for port, and "green" for starboard.)

II. How to get relative bearings

1. Think of the 360° of the horizon as numbered clockwise from the bow of your own ship.
2. It will help to divide this circle into its four main reference points: dead ahead (000°), starboard beam (090°), dead astern (180°), and port beam (270°).

As you state these positions, point them out in the room. Use two or three reference points in the room for dead ahead.

3. If you need more reference points, use: starboard bow (045°), starboard quarter (135°), port quarter (225°), and port bow (315°).

Again put the men through a short drill of calling out bearings, while you point to the various parts of the room.

4. At times, you may be expected to state the reference point (port beam, etc.) in reporting objects close to your ship. Even here, however, the OOD will nearly always prefer to have you report in relative bearings (two-seven-zero, etc.)

III. How to report relative bearings

1. First say the word "bearing"; then add the three digits.
2. There are no "ohs" in relative bearings; they are all "zeros."
3. For all the other numerals also, use the standard Navy pronunciation. This prevents confusion.

Call out several numbers, using a liberal sprinkling of zeros. Have the men call them back to you as bearings.

4. While you report the bearings of a target, keep your eyes on it.

IV. *Show the film "Bearings" (MN-16r).*

V. *Drill the men in calling relative bearings outdoors.*

In this first drill, work for speed and clarity rather than for extreme accuracy. Teach the men to give full reports, which include station called, station calling, object, and the relative bearing.

VI. *In bad weather, use your ingenuity for drilling indoors.*

If you have a Night Lookout Stage, use the drills described in Part III of this manual.

For effective classroom drill, arrange the chairs so that one is in the middle, with several others forming a circle around it. In the central chair seat one of the men and get him to call relative bearings of other men as they sit in the various chairs around him. Change the position of the central chair frequently to vary the "sector."

TRAINING 4 OUTLINE

Position Angle, Range, and Target Angle

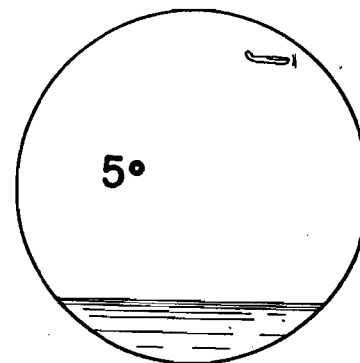
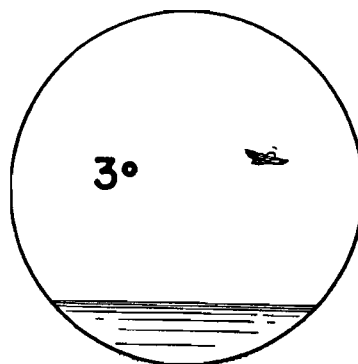
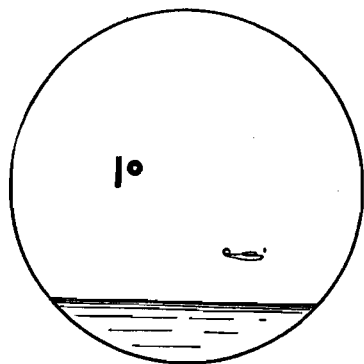
POSITION ANGLE

I. Why the lookout reports position angle

1. Since position angle is the angle your line of sight makes with the horizontal, it enables any officer to locate a plane more quickly by telling him how high it is above the horizon.
2. It also gives the officer a rough idea of range, because the position angle increases as a plane nears your ship. (It can never be greater than 90° , because that is the zenith, directly overhead.)

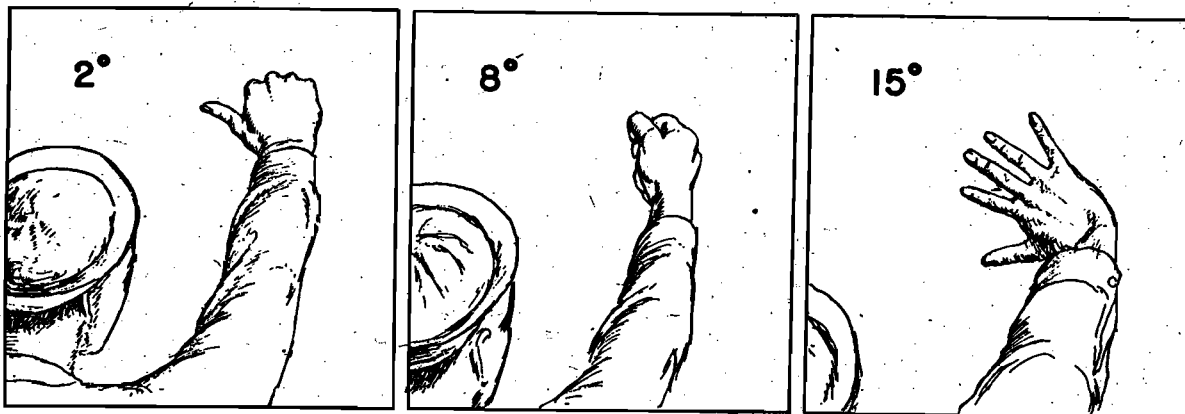
II. How to estimate position angle through binoculars

1. If you are a sky lookout covering from the horizon to 5° above with binoculars, you will be expected to give estimates of position angle that are very accurate; that is, within 1° .
2. Practice estimating the position angle from the relation of the plane to the horizon within the binocular field of 7° .



III. How to estimate position angle with the naked eyes

1. If you are a sky lookout covering from horizon to zenith with the naked eyes, you will be expected to estimate position angles above 30° within 10° . Angles below 30° can be estimated more accurately. With extended practice on friendly planes, you should learn to estimate angles up to 10° within 1° , and angles up to 30° within 3° .
2. Watch out for a tendency to overestimate the angle. This is quite a common fault.
3. It may help to know that the width of your thumb held horizontally at arm's length is 2° , your fist held vertically is 8° , and the hand with the fingers spread is 15° .



IV. How to report position angle

1. After the words, "Position angle", give the two numerals separately. For numbers below ten, include the preceding "zero." For example:

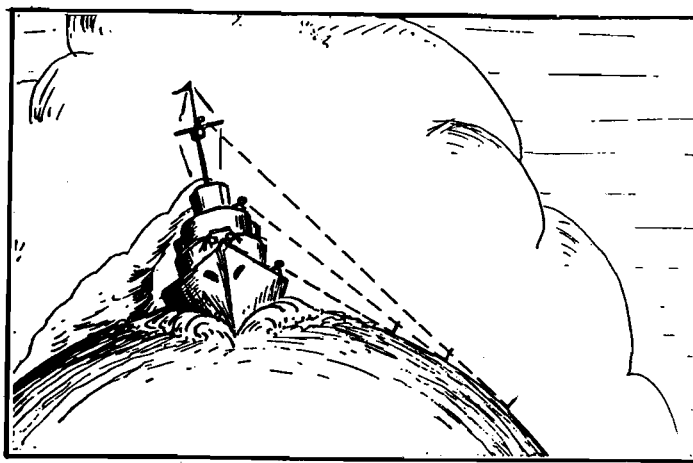
08° ----- "Position angle, zero eight."

10° ----- "Position angle, one zero."

23° ----- "Position angle, two thu-ree."

2. Do not include the word "degrees" in your report.

V. *Drill the men in giving position angles. If you are on shore, first use plane models suspended at 30° , 45° , 60° , and 90° . When the men know these well, have them estimate position angles of tops of trees, buildings, and (if possible) planes. For position angles up to 5° , show the men how they can use their binocular field as reference (See pictures on page 39).*



HEIGHT OF EYE (feet)	RANGE TO HORIZON (yards)
10	7,200
20	10,200
30	12,600
40	14,400
60	17,800
80	20,600
100	23,000

RANGE

I. How to estimate range

1. The distance to the horizon varies with the height of eye. (See table above.) Use the distance to your horizon as a reference point for your estimates. Watch out for a tendency to overestimate the range of objects between you and the horizon. For example, something actually halfway to the horizon in range looks as if it were more than halfway.
2. On shipboard, you will be drilled in estimating ranges of other ships in your force. Your reports will then be checked against radar, CIC, and range finders. To become expert, take full advantage of all drills.

II. How to report range

1. After the word "Range" give the numerals one by one, except when there are two or more zeros in succession.
2. Report the last two zeros of the range as "double-oh", and any zero immediately before these as simply "oh". For example:

200..... "Range, two double-oh."
 2,000..... "Range, two oh-double-oh."
 20,000..... "Range, two oh-oh-double-oh."

III. *In shore training, give the men a brief drill in calling back numbers in the form of correct range reports. The actual development of skill in estimating ranges requires extensive practice on shipboard. Drill in judging ranges of friendly ships should be part of the daily routine of lookouts on shipboard.*

TARGET ANGLE

I. Why lookouts seldom report target angle

1. Usually the lookout is required to give only the general direction of a target's movement: "moving right", "moving left", "closing", etc. This is especially important for reports of planes.
2. More accurate measurement of the direction of movement is usually a problem for Fire Control.

II. How to estimate and report target angle

1. Target angle is the angle between the heading of the target and your line of sight. For example: a target heading straight toward you is 000° , one heading straight away from you is 180° , one going to your right 090° , and to your left 270° .
2. You should be able to estimate target angles within 10° .
3. To report target angle, use the same phraseology as for relative bearings. For example: "Target angle one-two-zero".

III. *Drill briefly, using slides or models. Spend only enough time to give the men the rudiments of calling target angles, because this is a skill they will rarely be called upon to use.*

TRAINING 5 OUTLINE

Binoculars

For this lecture, have on hand as many binoculars as possible. If you cannot procure 7 x 50's, the 6 x 30's will serve the purpose.

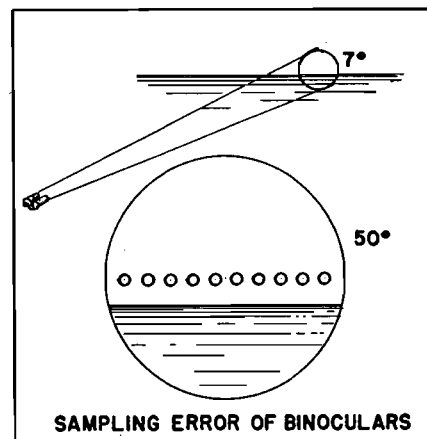
I. What the Navy 7 x 50 binoculars are

1. The "7" means that these binoculars make objects look 7 times as big as they are. The "50" is the width of the front lens in millimeters.
2. The 7-power magnification enables you to spot smaller targets than you could with a weaker glass—for example, a 6 x 30.
3. The 50-millimeter entrance lens gathers more light than a smaller lens, allowing you to see farther at night.

(6 x 30 binoculars give too little magnification and have too small a field. The 9 x 63's and 10 x 70's are excellent for special purposes, such as identifying distant planes, but are too unwieldy for ordinary lookout work.)

II. How binoculars limit your coverage of a sector

1. Haze reduces range, so that even on clear days the 7 x 50's only double your range. In thick haze or fog, they are not useful at all.
2. When you look through a pair of 7 x 50 binoculars, you can see only a circular area about 7° across. The rims of the lenses block off the rest of your sector, making it possible to miss objects you might see by naked eye. (The 7° has nothing to do with the 7 in "7 x 50.")
3. With 7 x 50 binoculars, the 7° that you actually cover is blown up seven times, so that you have to scan a circular area whose apparent field is nearly 50° across. You cannot scan this 50° as quickly or as thoroughly as you could the 7°, with the naked eye. In the daytime your clearest vision sees only samples of it. (The 50° has nothing to do with the 50 in "7 x 50.")



III. Why binoculars are used at night

1. Under good conditions you can see four times as far at night with night-treated binoculars as you can with the naked eyes. (You can tell that binoculars have been night-treated by the purplish color of the lenses. This process adds to the light-gathering power of the lenses by cutting down reflection, so that 83 percent of the light is transmitted as compared to 52 percent by untreated lenses.)
2. Also at night, you run no danger of sampling your sector with binoculars. The increased area of your night vision allows you to cover the blown-up field of 50° thoroughly, and in a reasonably short time.

IV. How to take binoculars out of the case

DEMONSTRATE STEP BY STEP

1. Put the strap of the case around your neck, and loosen the cover.
2. With your forefinger and middle finger, grasp the binoculars by the hinges.
3. Draw the binoculars SLOWLY out of the case, getting a firmer grip on them.
4. Unroll the strap of the binoculars, and put it around your neck.
5. Now close the cover of the case, and remove its strap from your neck.

V. How to clean the lenses

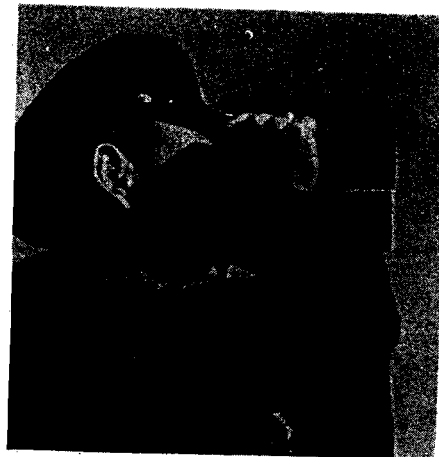
DEMONSTRATE

1. First blow off the loose dust from the glass.
2. Then breathe on the lenses, and clean them with lens paper.
(CAUTION: Never breathe on the glass in freezing weather.)
3. Rotate the lens paper gently until you see that the glass is dry and clean. Do not smudge the glass by touching it with your fingers.
4. NEVER POUR ALCOHOL ON THE LENSES. This would dissolve the cement around the lenses. But to remove any grease, you may moisten the cleaning paper or cloth with alcohol.

VI. How to hold the binoculars

DEMONSTRATE

1. Hold your binoculars with both hands, one grasping each barrel steadily.
2. Rest the eyepieces of the binoculars firmly against your eyebrows.
3. Use your thumbs as shields against wind and glare. Some binoculars are equipped with eyecups for this purpose, but they keep out all ventilation and fog up the lenses.



VII. Why snap-on filters are used in daytime

1. The snap-on filters in the binocular case protect your eyes against glare, which is even worse on dull days than on sunny days.
2. Exposure to glare will damage your night vision for a long time.
3. These filters appear too dark when you first put them on, but they actually help your vision.

VIII. How to safeguard binoculars on watch

1. Whenever you pick up binoculars, always put the strap around your neck.
2. Try not to expose binoculars to sudden changes of temperature. Keep them in their case to slow down the warming or cooling process.
3. If your binoculars get wet, have them dried off in a warming box.

IX. How to secure binoculars

DEMONSTRATE

1. Bend the barrels together, and roll up the binocular strap.
2. Slide the binoculars into the case small end first, with their curved-in side up against the back or hinged side of the case. Close the cover.

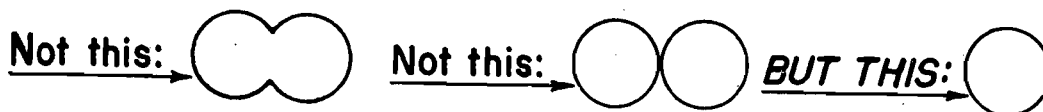
X. How to get your exact focus for each eye

1. First turn both eyepiece scales to the +4 mark.
2. Bring the binoculars up so that they rest firmly against your eyebrows.
3. Cup one hand over one lens, keeping your palm away from the glass.
4. Keep both eyes open, because closing one will give an incorrect focus.
5. Train the binoculars on a small, well-defined object a half mile off.
6. Slowly turn the eyepiece from its +4 setting until the image is sharp.
7. Now slowly turn it back as far as you can without losing any clearness.
8. Lower the glasses and note the reading on the scale.
9. Using the same eye, repeat two or three times to get the exact setting.
10. Do the same for the other eye. It may well require a different focus.
11. MEMORIZE BOTH READINGS, for making future settings on the same binoculars.

*Have each man get his focus for both eyes, while you check him.
Never allow focusing through a closed window.*

XI. Why an exact IPD setting is important

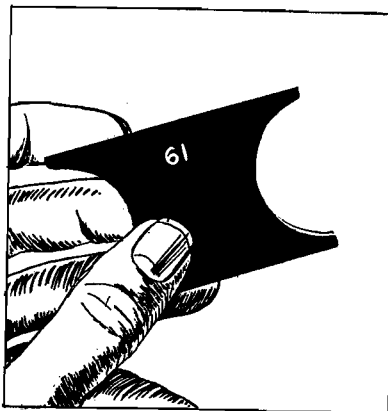
1. IPD means Inter-Pupillary Distance. It is the distance between the pupils of your eyes in millimeters. Your focus may change as you grow older, but your IPD remains the same always.
2. For an accurate setting, get your IPD measurement from the Medical Department.
3. However, you can get a rough idea of your IPD setting by looking through the binoculars and moving the barrels until you see a single, perfect circle. Repeat this several times, and note the average reading on the IPD scale.



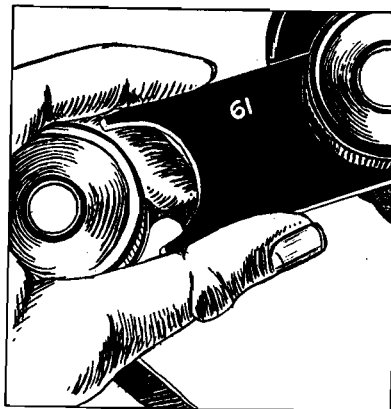
4. In the daytime, an incorrect IPD setting will strain your eyes.
5. At night, an incorrect IPD setting will greatly reduce your value as a lookout. In the dark, the pupils of your eyes expand to about the same size as the exit pupils of the binoculars. (Point out the exit pupils.) If the IPD setting is incorrect, part of the light coming through will be wasted on the iris. An error of only one millimeter can cut down your vision at night.
6. Day or night, there is only one way to guarantee a correct IPD setting. That is by using a template made for your IPD size. The template holds your IPD setting exactly right at all times, despite jar or vibration.

XII. *Outdoor drill is the best way to teach the men how to use their binoculars properly. Have every man get his focus for each eye. If he has no record of his exact IPD setting, let him get a rough one himself. If you can get hold of filters and templates, use them. See that the men take binoculars out of their cases and secure them properly.*

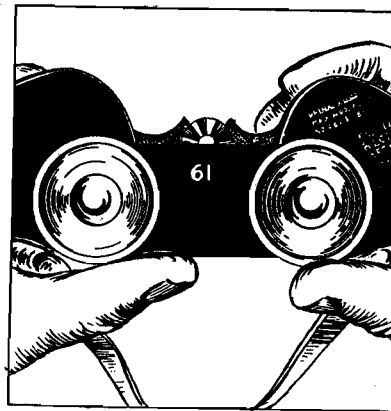
HOW TO INSERT A TEMPLATE



Use the correct size template for your IPD.



Spread the barrels and slip the template into place.



Close up the barrels snugly against the template.

TRAINING **6** OUTLINE

Day and Night Vision

This outline covers only the material for a lecture on vision. For the necessary demonstrations on dark adaptation and night vision, use Part III of this manual, called "Night Lookout Training."

I. In your eyes are two types of nerve endings: cones and rods

II. Cones are used for day vision

1. The cones in your eyes work only in strong light, not in twilight or darkness.
2. The cones see color, depth, and details of shape.
3. In the fovea (immediately back of the pupil), there are only cones. This is why you see things in the daytime best by looking directly at them.

III. Rods are used for night vision

1. Rods work only in twilight and darkness, not in strong light.
2. The rods do not see color, depth, or details of shape; they give only the rough form of an object.
3. To see well at night, the rods must be allowed to become thoroughly dark-adapted. This requires at least 30 minutes in darkness, or with the eyes protected by red goggles. When fully dark-adapted, the rods are about 10,000 times as sensitive as in daylight.
4. In the fovea there are no rods; so the fovea is blind at night. This is why you cannot see anything at night by looking directly at it. You must look near the object, using what is called your "off-center vision."

IV. Protect your eyes before going on night watch

1. Wear protecting goggles or binocular filters on day watches. Exposure to glare will spoil dark-adaptation for some days.
2. Before going on night duty, wear red goggles for at least a half hour. Since red light does not affect the rods, the goggles will allow dark-adaptation to take place.
3. To complete the dark-adaptation, spend 5 minutes on deck without goggles before you go on watch.

V. Protect your eyes while on night lookout duty

1. Keep your red goggles handy, and use them if you have to go into a lighted compartment. It takes only a few seconds to damage your dark-adaptation.
2. If you have to enter a lighted place without your goggles, cover one eye to keep it dark adapted.
3. Do not stand near a red-lighted bearing indicator, compass, or other instrument. Even the slight glare from the red light will interfere with your ability to spot targets.

VI. *Show the film "Night Vision" (MN-16q) of the Navy Training Lookout Series. If there is time, show also the GI movie, "Night Vision."*

Remember that no amount of talk or movies will teach the men how to use their eyes at night. To accomplish this, you must use the drills given under "Night Lookout Training," which is Part III of this manual.

TRAINING **7** OUTLINE

Daytime Scanning

Scanning means moving the eyes methodically in correctly-spaced steps—a method of systematic search to give the maximum chance of seeing anything that is in the sector. Lookouts, if left to themselves, will not drop naturally into the proper methods of scanning. This is an artificial skill which takes plenty of painstaking practice.

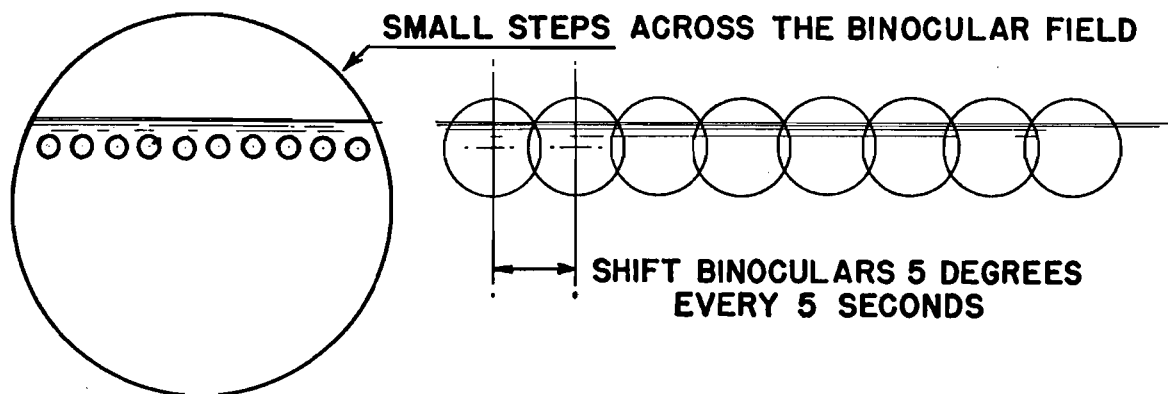
I. These are the facts to remember

1. In the daytime, the best vision of the eye is limited to a few degrees around the fovea (which is centered behind the pupil).
2. In the daytime, while the eye is moving it is practically blind.
3. Therefore, it is necessary to take many small steps to bring as much of the area as possible onto the center of clearest vision.

II. How to scan the SURFACE with binoculars

DIAGRAM

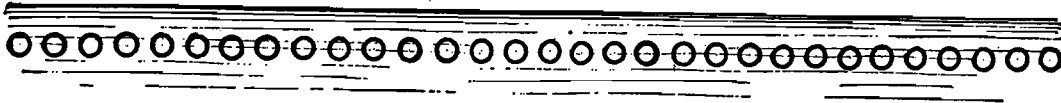
1. Hold the binoculars steady so that the horizon is in the top third. Direct your eyes just below the horizon. Now for five seconds, take as many small steps as you can across the field you see in the binoculars.
2. Shift the binoculars 5° , and scan again for five seconds.
3. Continue to repeat this process until you reach the end of your sector.
4. Then make a return sweep with the naked eyes to the beginning of your sector, and start over again.
5. Whenever you get a contact, keep your binoculars on the target. Take your eyes from it only long enough to determine the relative bearing. Get back on the target and stay there until your report has been properly acknowledged.



III. How to scan the SURFACE with naked eyes

DIAGRAM AND DEMONSTRATE

AS MANY SMALL STEPS AS POSSIBLE

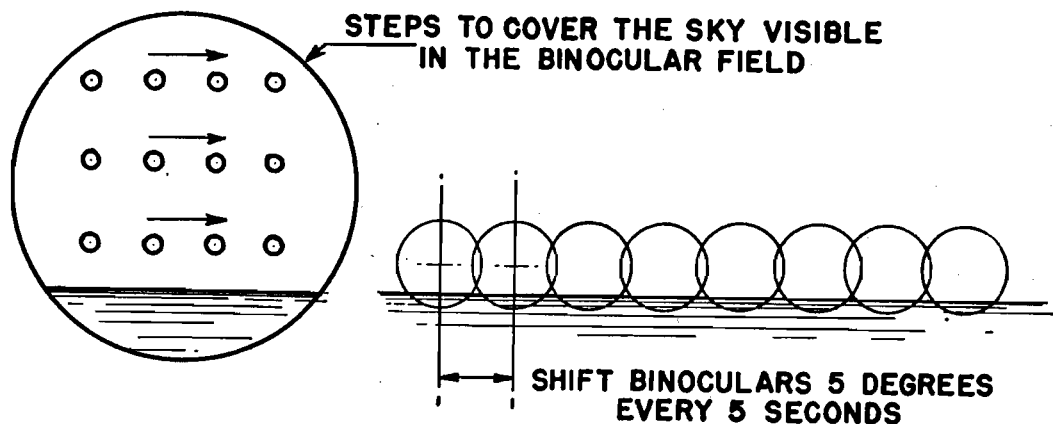


1. Direct your eyes below the horizon, and move them across your sector in as small steps as possible.
2. Cover your sector in about 10 seconds, if your sector is 100° or less.
3. When you reach the end of the sector, rest your eyes by blinking them for a few seconds. Then go back to the beginning and repeat.
4. Whenever you pick up a contact, report it, and then use your binoculars if necessary, to identify it.

IV. How to scan LOW SKY (horizon to 5° above) with binoculars

DIAGRAM AND DEMONSTRATE

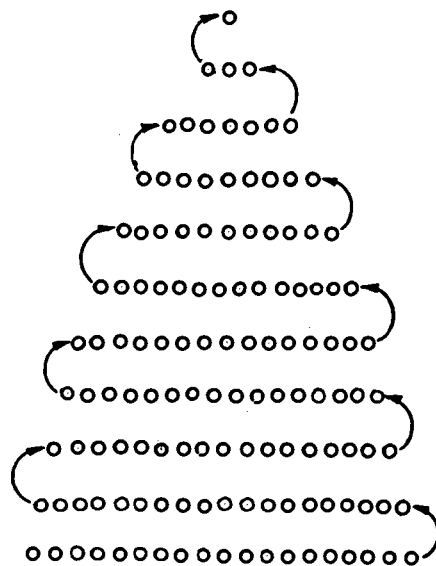
1. Hold the binoculars steady so that the horizon is in the lowest quarter of the binocular field.
2. Take at least 12 steps to cover all of the sky area visible above the horizon.
3. Every 5 seconds shift the binoculars 5° , and repeat.
4. When you reach the end of your sector, rest your eyes by blinking them for a few seconds. Then make a return sweep slightly above the horizon with your naked eyes, and start over.
5. Whenever you get a contact, make your report without lowering your binoculars. The telephone talker will read the relative bearing from the scale on the sky chair. Keep your eyes on the target until the report has been acknowledged.



V. How to scan HIGH SKY (horizon to zenith) with the naked eyes

DIAGRAM AND DEMONSTRATE

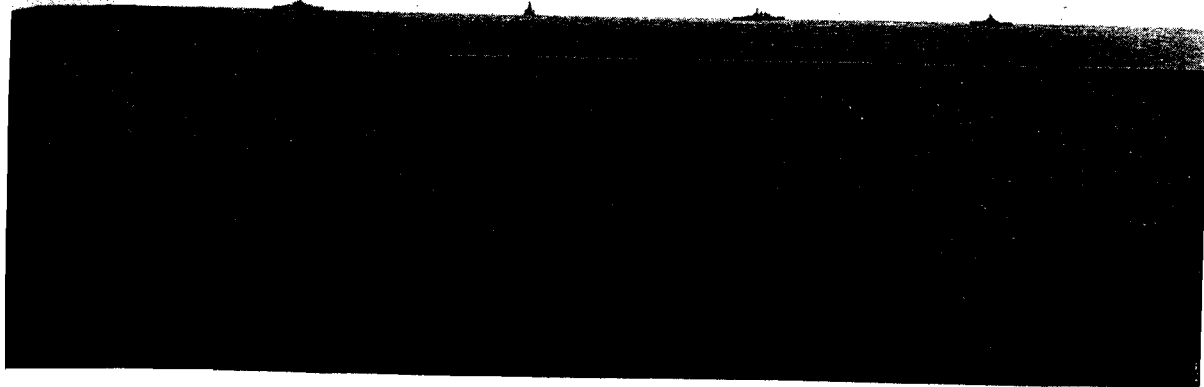
1. Move your eyes in quick steps across your sector just above the horizon.
2. Shift your eyes upward about 10° and move them back in quick steps.
3. Continue in this way up to the zenith.
4. Cover your sector in about 20 seconds, if your sector is 100° or less.
5. When you reach the zenith, rest your eyes by blinking them for a few seconds; then start over.
6. Whenever you pick up a contact, report it, and then use binoculars if necessary, to identify it.



- VI. *Drill outdoors in the proper scanning procedures for SURFACE, LOW-SKY, and HIGH-SKY lookouts. Emphasize that the HIGH-SKY lookout always scans with the naked eyes.*

One Way To Conduct an Effective Drill

1. *In each 90° sector around the skyline, locate 12 targets of any description. Make a record of their exact relative bearings. (These targets should be visible through binoculars, but not too easy to find.)*
2. *Make up a mimeographed sheet for each sector, showing individual sketches of the 12 targets.*
3. *Divide your group into four watches, each lasting for about 12 minutes. Follow the correct procedure for relieving the watch.*
4. *As each of the four watch sections goes on duty, give each man in it the mimeographed sheet for his sector. Require him to find two or three of the targets and to write down their relative bearings.*
5. *Keep a constant check on the scanning method of each man, as well as on his scanning rate.*
6. *Have the other men practice scanning and estimating relative bearings, checking each other against pelorus readings.*



Targets on the Night Lookout Stage

This picture shows how ship models look on the Night Lookout Stage with the illumination turned up fully. The stage can be used for training surface and horizon scanning as well as for estimating relative bearings, range, and target angle.