Voice	*Meaning*
AWAY	Aircraft is flying away from controlling station.
BASE	Home airfield or home carrier.
BENT	Equipment indicated inoperative or unserviceable.
BLANKET	Amount of clouds (with a number, amount in tenths).
BOGEY HEADING	Bogey's magnetic heading is _____.
BOGEY INDICATING	Bogey's indicated air speed is _____.
BURST	Am about to fire AA Shells to burst at estimated altitude and direction of enemy.
BUSTER	Fly at maximum continuous speed (power).
CATSEYE	Night visual air interception.
CENTER	Center of unit or of indicated part of unit.
CHECK PORT	Alter heading _____ degrees to left momentarily for airborne radar search and then resume heading.
CHECK STARBOARD	Alter heading _____ degrees to right momentarily for airborne radar search and then resume heading.
CLARA	Radar scope is clear of contacts other than those known to be FRIENDLY.
COCKEREL	IFF Mark III (cockerel CROWS and is "heard," not "seen.")
COCKEREL GEORGE	IFF Mark III, "G" band (manual switch).
COCKEREL GEORGE PLEASE.	Press IFF Mark III "G" band auto button.
CONTACT	I have an indication on my radar.
CONTACT LOST	The indication on my radar has faded.
CONTINUE PORT	Continue turning left at present rate of turn to heading indicated.
CONTINUE STARBOARD	Continue turning right at present rate of turn to heading indicated.
COVER	Keep fighters between FREDDIE and raid/track designated at distance stated from FREDDIE. (e. g. "Cover Raid twenty-seven to thirty-six").
DANGER	You are entering zone of fire from battery at location stated.
DETACH	Detach your unit from patrol or mission.
DITCH(ING)	Make(ing) forced landing in sea.
DOWN	Decrease height as indicated.
DROP	Release bombs or weapons (previously specified).
DUD CIRCLE	Position clear of the Force in which aircraft unserviceable for their assigned missions, but not requiring emergency landing, are ordered to wait.
EASE TURN	Ease rate of turn.
EXPEDITE	As quickly as possible—"Hurry up".
FAMISHED	Have you any instructions for me.

Voice	*Meaning*
FREDDIE	Air controlling ship or station.
FREDDIE INDICATING	Am identifying myself as air controlling ship or station by making smoke or some other prearranged signal.
FREE LANCE	Aircraft released from close ground control. Pilot may attack targets of opportunity. (Used in EMERGENCY ONLY where ground control system is saturated or ineffective. Latest PIGEONS will be given).
FRIENDLY	Friendly aircraft or ship.
FUEL	Amount of fuel remaining (number of gallons, pounds, or minutes, specify as necessary, e. g., "Fuel forty-two gallons").
GATE	Fly at maximum possible speed (power). (To be maintained for a limited time only, depending on type of aircraft.) (Use of after burners, rockets, etc., in accordance with local doctrine.)
GRAND SLAM	All enemy aircraft originally sighted shot down.
GRIDIRON	Jamming signals appear on my P. P. I. scope.
HAYRAKE	Radio homing beacon (YE, YG, etc.).
HEADS UP	Enemy got through (part or all).
HEY RUBE	Need support, come to my assistance.
JUDY	Take over (or, am taking over) the interception (used *only* with airborne radar interceptions).
LEFT	Alter heading to left by indicated number of degrees.
LEVEL	Enemy is at your altitude.
LEVEL OFF	Level off immediately at present ANGELS.
LIGHTS	Make your recognition signal now. (Not to be confused with IFF.)
LINER	Fly at speed giving maximum cruising range.
MACH NO	I have reached compressibility and am not closing my target.
MACH YES	I have reached compressibility and am closing my target.
MARCONI	Change over to W/T (CW) control.
MARK	Indicates aircraft has reached the point over land, or water, to which it has been controlled or ordered.
MATTRESS	Below clouds (with a number, height of cloud base in thousands of feet).
MIDNIGHT	Change over from Close to Broadcast Control.
MOTHER	Radar homing beacon.
NO JOY	Cannot find the raid assigned me.
..... O'CLOCK	In clock code sector indicated. (Nose of own aircraft being 12 o'clock.)
ON THE DECK	At minimum altitude.
ORANGES SWEET	Weather is suitable for aircraft mission.
ORANGES SOUR	Weather is unsuitable for aircraft mission.

Voice	*Meaning*
ORBIT	Circle and search. (Limit orbit diameter to smallest practicable for type aircraft.)
ORBIT FIGURE EIGHT	Make figure of eight and search (may be used "orbit figure eight port" or "orbit figure eight starboard").
ORBIT PORT	Circle to left and search.
ORBIT STARBOARD	Circle to right and search.
PANCAKE	Land, refuel, rearm.
PANCAKE AMMO	Returning short of ammunition. Wish to land.
PANCAKE FUEL	Returning short of fuel. Wish to land.
PANCAKE HURT	Returning wounded or damaged. Wish to land.
PIGEONS	The magnetic bearing and distance of your controlling unit from you is ------ degrees and ------ miles.
PIGEONS	The magnetic bearing and distance of ---------- from you is ------ degrees and ------ miles (e. g., "Pigeons BOLO, one eight three, eighty-two", meaning, "The magnetic bearing and distance to a station whose call sign is BOLO is 183° and 82 miles").
PILLOW	Visibility (with a number, visibility in miles).
POPEYE	In clouds or area of reduced visibility.
PRONTO	As quickly as possible.
PUNCH	You should very soon be obtaining a contact on the aircraft that is being intercepted. (Used only with airborne radar interceptions.)
PUSH DOWN	Push over and dive down as low as possible (ON THE DECK) and go out on vector indicated.
QUILT	Above cloud (with a number, height of cloud top in thousands of feet).
REAR	Rear of unit or indicated part of unit.
REQUEST HOMING	Give me a magnetic heading to steer to reach you (or ————).
RESUME	Resume last patrol ordered.
RIGHT	Alter heading to right by indicated number of degrees.
SALVOS	Am about to open fire. Keep clear. (Magnetic bearing may be indicated.)
SALVOS PROXIMITY	Am about to open fire with VT fused shells. Keep clear and use especial caution. (Magnetic bearing may be indicated.)
SAUNTER	Fly at best endurance.
SCRAMBLE	Take off as quickly as possible (usually followed by course and altitude instructions).
SEE YOU	Unit called in sight.
SKIP IT	Do not attack, cease attack, cease interception.
SOUR	Equipment indicated is operating at reduced efficiency.

Voice	*Meaning*
SPEED	Fly at indicated air speed ordered.
SPEED UP	Increase speed ——— knots.
SPLASHED	Enemy aircraft shot down (followed by number and type).
STEER	Set magnetic heading indicated to reach me (or ——).
STEADY	Am on prescribed heading, or straighten out immediately on present heading.
STRANGLE	Switch off equipment indicated.
SWEET	Equipment indicated is operating efficiently.
TALLYHO	Aircraft sighted (presumably the aircraft I have been ordered to intercept). (This should be followed by initial contact report as soon as possible.)
TALLYHO HEADS UP	I see the enemy but am not able to reach him before he reaches effective AA range.
TALLYHO POUNCE	I see the enemy and can get him before he reaches effective AA range.
TIGHTEN TURN	Tighten rate of turn to maximum.
TOUCH	In touch of homing beacon.
TOWARDS	Aircraft is flying towards controlling station.
THROTTLE BACK	Decrease speed —— knots.
TRADE	Enemy raiders are in the offing. (This is a warning message and is followed by the general direction of the approach of the raiders, e. g. "Trade South".)
UP	Climb as indicated.
VAN	Front of unit or indicated part of unit.
VECTOR	Alter heading to magnetic heading indicated (must always be used with three digit group, e. g. "Vector six zero", NOR "Vector sixty"). (Four homing heading use STEER.)
VECTOR HARD PORT	Alter heading to magnetic heading indicated, turning left in a tight turn. (May be abbreviated to HARD PORT.)
VECTOR HARD STARBOARD.	Alter heading to magnetic heading indicated, turning right in a tight turn. (May be abbreviated to HARD STARBOARD.)
VECTOR PORT	Alter heading to magnetic heading indicated, turning left. (May be abbreviated to PORT.)
VECTOR STARBOARD	Alter heading to magnetic heading indicated, turning right. (May be abbreviated to STARBOARD.)
WEAPON	Airborne intercept radar.
WHAT LUCK	What has been the result of assigned mission.
WHAT STATE	Report amount of fuel and ammunition remaining.

QUESTIONS

1. Why is it necessary to have various channels of communications in the AC & W System?
2. What is the primary type of AC & W communications?
3. What are the three types of Wire Communications?
4. What is the difference between Teletype and Facsimile types of communications?
5. What is used in the AC & W System as a secondary type of communications?
6. Why is it necessary to have a secondary type of communications?
7. What type of Radio is used in air to ground communications?
8. Is H/F or high frequency radio line of site transmission?
9. VHF/DF is used for what?
10. What does H/F radio waves reflect off of as they travel around the world?
11. Name a type of point to point communications.
12. Do hot line communications go through a switchboard?
13. Why is Radiotelephone procedure so important?
14. Name the three parts of a Radiotelephone message.
15. Would a message terminating in "over" expect a return answer?

AIR DEFENSE CONTROL CENTER

Scope: Structure and operation of the Air Defense Control Center and the duties of the personnel therein.

Student Objective: To learn the structure and operation of the Air Defense Control Center and the responsibilities and duties of its personnel.

INTRODUCTION

Standing high up on the dais in the Air Defense Control Center (ADCC) and looking down, one could see that the airmen working here had to know their business. Over fifty different Christmas trees or raid stands were on the horizontal board and each one would be moved periodically to display the track or course it was making through the control area. If you just listened quietly for a moment, all you could hear would be low mumbling of voices as each man was giving orders, relaying instructions or getting information on what looked like a hundred and one different items. But to the trained eye a different picture was impressed upon the mind. The two different sectors were pictured before you, tracks were coming in and going out, some would creep along the board, while others advanced with astounding speed. Small fighter stands would be chasing and cutting off questionable tracks as the interceptions progressed with amazing accuracy. The controllers were evaluating all action taken by the different Ground Control Intercept stations under this command. Frequently the call would go out, "Hello Woodcraft, this is Rainbow, over!" and then the sharp but clear answer over the squawk box would come in, "Hello Rainbow, this is Wood-

Figure 1. The Air Defense Control Center in Action.

craft, go ahead, over!" "Woodcraft, this is Rainbow, cancel interception on track #14, and intercept hostile track #20, over!" Back would come Woodcraft, "Roger, Rainbow, am now intercepting track #20 out." If a close look at the horizontal plotting board was made at this time, you would see a small fighter stand swerve off course and head for a distant target, to check its identity. Our defense was in action and it was working, this was the ultimate in perfection and team-work in Air Defense.

This is the Air Defense Control Center, the heart or pulse of the AC&W System. This is the Commanding General's War Room, this is where the decisions are made that might well affect all Americans if an enemy should come toward our shores. Here all decisions by GCI stations are evaluated and either approved or disapproved. Here in this room lies a great portion of the United States that will be defended by airmen at all costs. Here is where all final action on Air Defense is planned and acted upon.

FUNCTIONS OF THE ADCC

In order to successfully carry out its mission as planned by higher headquarters, the ADCC has several definite functions:

1. To supervise the operations of all combative air defense elements within the area.
2. To collect, analyze and present intelligent information pertaining to air defense.
3. To maintain active liaison with all interested military and civil agencies within the area.

In order to more fully understand how the three functions mentioned above are tied together, a small but workable knowledge of Air Defense Means is helpful.

AIR DEFENSE MEANS

Military air defense extends from general warning of an impending air raid until the final "all clear" is given. The degree of supervision varies from command, in the case of purely military means, to warning in the case of certain civil agencies. Military air defense control exercises varying degrees of supervision over all air defense activities within its area of responsibility. Civil air defense in its simplest form involves individuals seeking cover when proper warning is received. In its complicated aspects it involves: air raid warning, fire and disaster control, chemical detection, biological and radiation detection, decontamination, bomb disposal, rescue and medical aid, emergency repairs and a control agency to administer and coordinate these means.

Classification of Air Defense Means

All air defense means have been divided into three classifications according to mission, these are—

1. *Combative:* Those means which are capable of attacking and destroying the hostile air activity. They are military in character and include fighter aviation, anti-aircraft, guided missiles, and associated devices designed primarily for the control of these weapons.

2. *Deceptive:* Those means and activities the purpose of which is to hinder navigation of hostile air forces and prevent the recognition and bombing of targets. These means are both military and civil in character. For this reason these means are normally planned for, and ordered into action by military control authority; the details of construction, manning and operation are normally civil responsibility. They include such activites as camouflage, preparation of dummy targets (both visual and radar), suppression of navigational and broadcast radio facilities, blackouts and smoke screens.

3. *Protective and Reparative:* Those means and activities which tend to reduce the susceptibility to damage of a community or facility and provide for rapid restoration and recovery after attack. Since they are primarily civil in character, they become a responsibility of the civil defense agency. However, military advice and coordination may be provided.

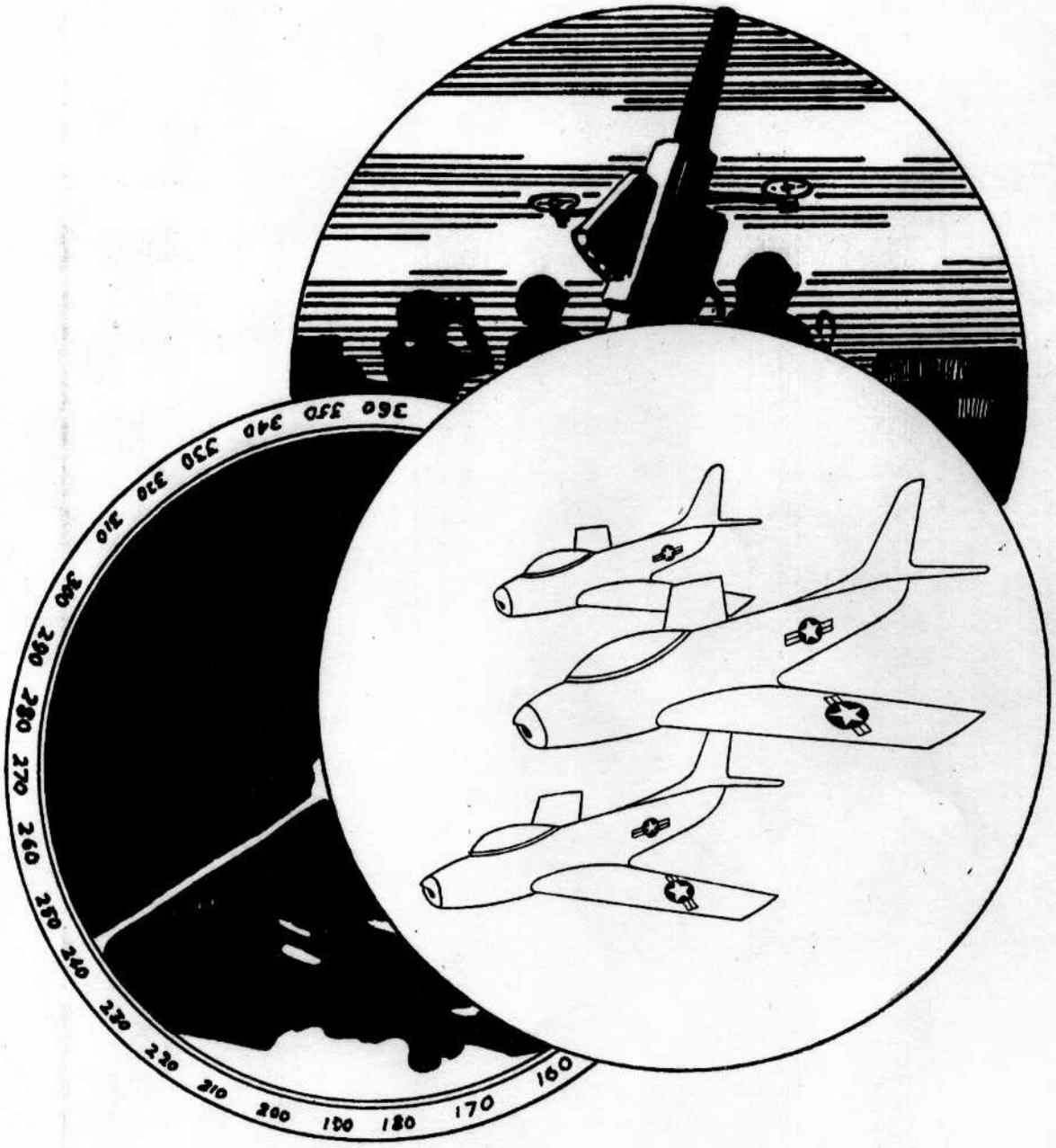

Figure 2. The Air Defense Team, Fighters, Radar and Antiaircraft.

COMBATIVE MEANS

All combative air defense means are strictly military in nature, and are under military command and control. The Aircraft Control and Warning System is combative in that it controls and coordinates the activities of fighter aviation, anti-aircraft and guided missiles.

1. *Fighter Aircraft:* Fighter Aircraft is assigned to the Air Defense Control Center for operational employment, and reassigned to GCI Stations. The actual control of the intercept operations is delegated to GCI Stations. The over-all functions of comand and coordination are retained by the Air Defense Control Center.

2. *Anti-aircraft Artillery:* Anti-aircraft artillery furnished its own fire control agency. The over-all control and coordinating author-

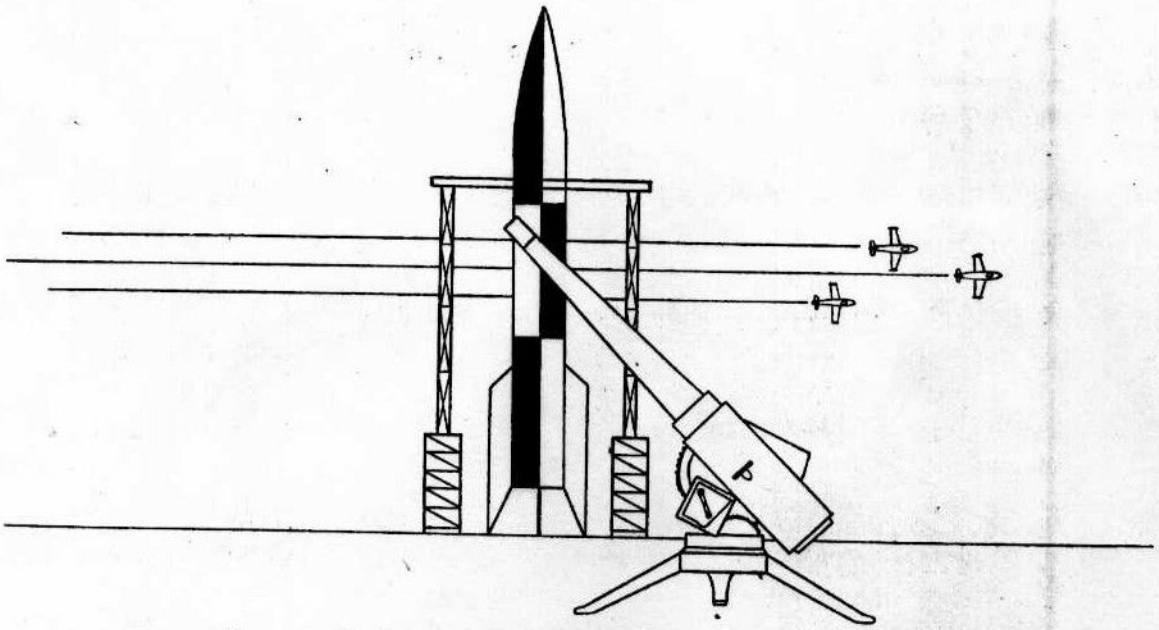

Figure 3. Combative Air Defense Means: Fighters, AA and Missiles.

ity is retained at Air Defense Control Center. The Controller on duty is responsible for identifying the target as hostile and providing position information with sufficient speed and accuracy to permit anti-aircraft artillery fire control radars to get on target. To facilitate the rapid acquisition of targets by anti-aircraft radars the nearest GCI Station may be connected directly to the AAA Operations room.

3. *Ground to Air Guided Missiles:* Ground to Air Guided Missiles will probably have their own control agency or operations room in much the same manner as anti-aircraft artillery. The restricted flying area around missile sites will be much larger than that required by anti-aircraft artillery. Therefore, since the missiles will probably be target seeking, it will be necessary to keep intercepting fighter aviation from entering the missile defended area.

DECEPTIVE MEANS

Deceptive air defense means are those which attempt to mislead hostile forces and prevent them from properly identifying their tragets. They include smoke screen operations, radar navigation and bombing deception, camouflage, and the suppression or radio broadcast and navigation facilities, and planned blackout or controlled lighting procedures. Generally speaking, a higher degree of coordination between civil and military agencies is required for deceptive than for combative and reparative means. The military authority at the Air Defense Control Center or higher level has the responsibility for effecting the coordination required in each instance.

1. *Chemical:* Against visual bombing techniques, chemical smoke or artificial clouds may provide good protection by decreasing the accuracy of aiming. Chemical smoke companies are provided for in the military establishment. They are usually assigned for operations to the anti-aircraft artillery troops within the area; however, the use of smoke to screen targets is subject to the decision of the Controller at the Air Defense Control Center. The depth and intensity of the smoke screen provided by the military can frequently be augumented by causing industrial power sources to exhaust heavier than normal concentrations (usually caused by incomplete combustion of fuels) from stacks. In addition simple and inexpensive burners using low grade or waste fuel may be manned

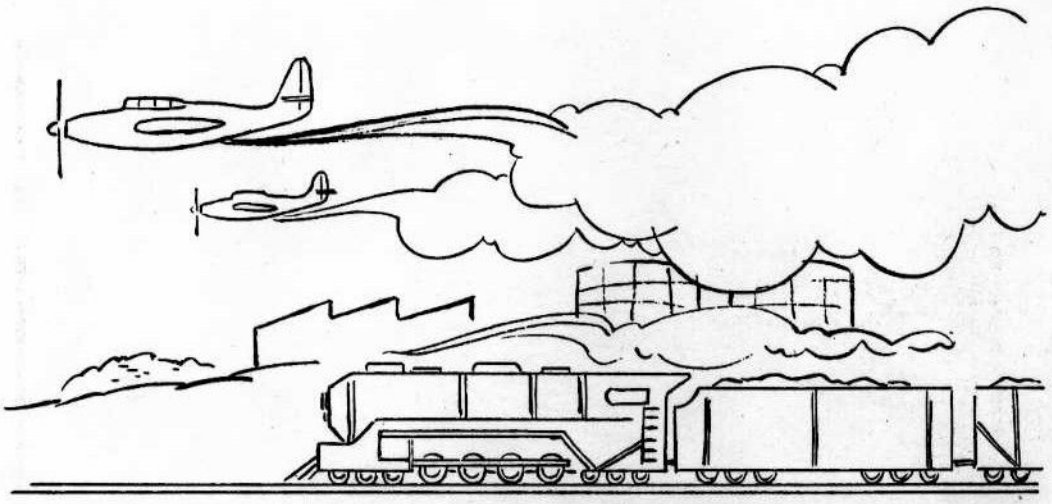

Figure 4. Deceptive Means: Aircraft Laying Smoke Screen.

by either the civil defense corps or employees of industrial plants. Approximately 10 minutes of warning will be required to coordinate this operation and build up an effective smoke concentration. Under some atmospheric conditions smoke will not plume and spread properly and may serve only to outline the area. In addition, its use may interfere with operations of anti-aircraft artillery, and it is generally disagreeable and slightly toxic to people and animals. Since the use of a smoke screen as an air defense means must be coordinated with local weather conditions and combative defense means, it must be rigidly controlled by military authority.

2. *Radar Deception:* Radar Deception may be used to present false returns on the hostile radar scopes or to jam airborne radar so that no distincitve features of the ground are visible on the scopes. This may be accomplished either by placing fabricated radio wave reflectors in sparsely settled areas to cause radar returns similar to those received from built up areas surrounding the target, or by beamed transmission of jamming signals covering the frequency of the hostile radar. The success of this type operation will depend upon a knowledge of hostile radar bombing devices, and the ability of science and industry to fabricate countermeasure equipment on a high priority basis. To assure the maximum strategic protection from electronic countermeasures, the plan for their procurement, allocation, and method of use will originate at the Joint Chiefs of Staff level.

3. *Camouflage:* Some protection against visual bombardment and reconnaissance is provided by camouflage. The expense involved in completely hiding all possible targets by camouflage methods is prohibitive. It is, however, sometimes possible to deceive hostile forces by altering the geometric pattern of the objective, by erecting additional geometric designs which are similar to the objective and by erasing prominent landmarks which would be useful to an aerial observer as reference points. Care must be exercised in the preparation and execution of camouflage plans of this type because of the expense, and because such camouflage invites the destruction of one area in preference to another. The camouflage plan is the responsibility of the military authority, its execution a responsibility of the civil defense.

4. *Electronic:* To prevent the enemy from using our permanently installed radio broadcast and navigation facilities as navigation aids some of these services will be discontinued when hostile aircraft are known to be approaching the defended area. In addition, it may be desirable to ground all aircraft, civil and military, which do not contribute to the air defense mission. During peacetime, the facilities for accomplishing this are controlled by Federal Communications Commission (FCC), Civil Aeronautics Authority (CAA), and Airways and Air Communications Service (AACS).

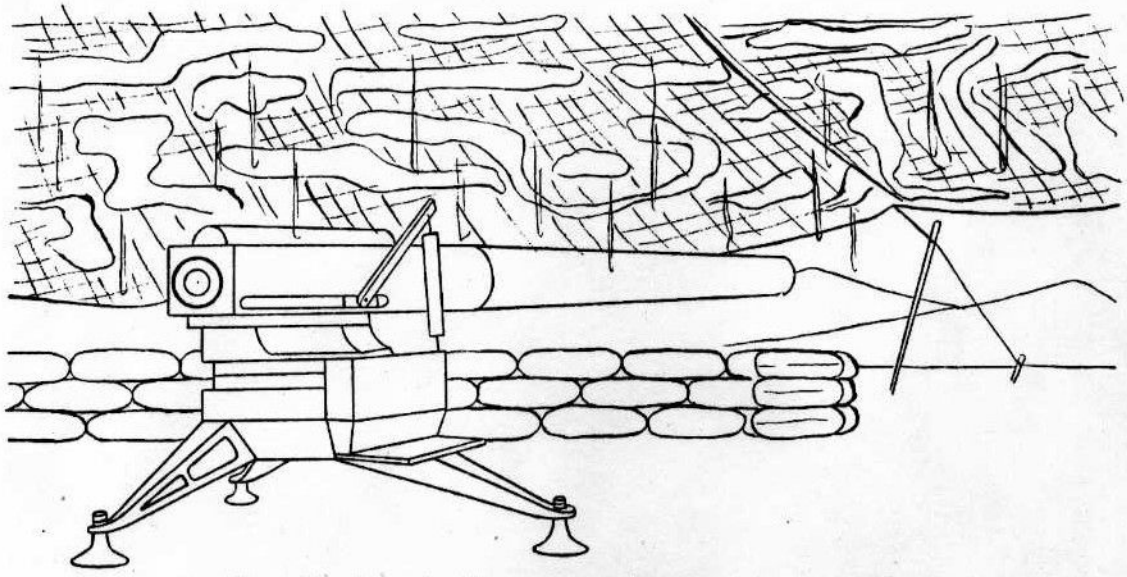

Figure 5. Deceptive Means: Camouflage of AAA Installations.

During national emergencies all of these facilities may be commanded and controlled by military authority. Control of navigation facilities may be affected over an area considerably larger than that assigned to an Air Defense Control Center. For this reason, operational control of navigational and communications aids is exercised at a higher command level.

5. *Lighting:* Blackouts may be used as a deterrent to visual navigation and accurate bombing. A variation of the full blackout which uses controlled lighting to divert the visual bomber's attention away from high priority objectives offers the principal virtue of the blackout with limited inconveniencing of the civil population. The control of lighting is a civilian function, and will be executed by the Civil Defense Operations Center upon receipt of information from the civil defense representative at the Air Defense Control Center.

Protective and Reparative Means

Protective and reparative air defense means are by definition primarily civil in character. For this reason, their command, control and coordination is provided by the civil air defense agency. Normally, the military Air Defense Division Commander acts in an advisory and coordinating capacity to the civil air defense agency. One of the functions of an air defense system is to furnish air raid warning to the civilian control centers. In addition, the Air Defense Division Commander may furnish certain technical units to operate on a temporary basis under the control and coordination of the civil agency during emergencies.

1. *Warning Service:* Air Raid Warning is a service which the AC & W System is required to furnish for protective and reparative defense means. This warning is usually transmitted through the Civilian Defense Operations Center (CDOC) to subordinate civil agencies. The CDOC's alert and supervise all civil air raid warning activities including: fire and disaster control, evacuation and transportation control, medical aid control, and civil defense battalions which furnish reinforcements for civil defense agencies. The degree of warning required in each instance varies. It must always be sufficient to permit a partial mobilization of manpower and precautionary positioning of equipment prior to the expected disaster. On the other hand, it is equally desirable to cause the least practicable disruption of normal civil activity. For this reason the various defense agencies usually mobilize by phases. The phase is determined by the time which is expected to elapse before attack is imminent.

2. *Protective Measures:* Listed below are some of the protective measures, listed in the approximate order in which they should be initi-

ated under normal conditions of air raid warning.

a. Shut-off and draining of fuel lines carrying highly inflammable or caustic chemicals at manufacturing plants.

b. Alert key personnel of civilian control center.

c. Alert Police, Fire Departments and Hospitals.

d. Alert Fire Wardens.

e. Alert transportation facilities and key personnel of civil defense battalions.

f. Alert engineers at all utilities, substations (gas, water, electricity).

g. Close plants, theaters, schools and other places, where many people are assembled.

h. General warning (Prepare to take cover.)

i. Final warning. Attack imminent (Take cover.)

j. All Clear. No attacks imminent.

Under normal conditions in the event of an air raid only (*h*, *i*, and *j*) of the above are announced to the public. This announcement can come in many ways and probably will differ from area to area. They will be announced to the general public and can come in the form of whistles, bells, sirens, etc. All alerts usually come in the form of 3 separate stages:

a. A warning (or flash blue).
b. Final warning (flash red).
c. The all clear (flash white).

The flash blue alert will usually signify enemy aircraft in vicinity, bombing is probable, prepare to take cover. The flash red usually signifies enemy aircraft in immediate area, bombing in progress, take cover. The white flash designates bombing over, or enemy aircraft driven from the area, means all clear.

3. *Bomb Disposal:* Bomb disposal is a reparative defense means. In other than purely military areas this function is controlled and coordinated by the civil air defense agency. To assist in this work the military will usually dispatch bomb disposal teams to the affected areas. When this is done, the responsibility for plotting the position of unexploded bombs, and isolating the danger areas surrounding them, remains with the civil agency. The function of the disposal team is to deactivate the bombs and arrange for the removal. Operationally, the Air Defense Control Center has no responsibilities for bomb disposal.

Figure 6. Protective Air Defense, Air Raid Warning.

4. *Decontamination:* Chemical, biological and nuclear detection and decontamination are protective and reparative air defense means. Due to the specialized nature of this work, it is normally more expedient to have it supervised by special military units and teams. These organizations are controlled by the military but they may be assigned to civil defense authorities when civil areas are known to be, or suspected of being, contaminated. For major decontamination projects these units must be logistically supported by civil police, labor, technical labor, technical laboratory facilities, supplies, tools, etc. To a great extent the team serves in an instructional, advisory and supervisory capacity until the contamination has been brought under control. As a general rule, the military team can expect to find an organized nucleus of specially trained personnel (doctors, nurses, policemen, firemen and laboratory technicians) to assist it. As with bomb disposal teams, the Air Defense Control Center has no responsibilities for controlling these teams.

ADCC EQUIPMENT

Plotting Boards

In order to carry out its duties the ADCC must have certain methods and means of displaying information. The information on all targets called into the ADCC is displayed on various types of plotting boards. These boards for the control room can be of several types, the most common of which is the horizontal board. Vertical translucent or vertical magnetic boards can also be used.

1. Horizontal operations boards are usually constructed of wood carefully joined and sanded smooth. The plotting surface should not be less than 26 inches nor more than 34 inches from the floor. No point on the board should be over 8 feet from at least one plotter. The surface of the board should have a painted surface showing main geographical features and the whole area covered with the proper grid. Subject to physical limitations the scale of the map should be as large as practicable. In the average area the scale will be 1 inch equals 2 miles.

2. Vertical Translucent Boards are made of a clear lucite material and edge lighted to assure a clear presentation of the data presented on the board. Where possible the operations and status boards should form the one wall of the room with all plotting and status personnel having access to their positions through a door into a corridor. Plotting positions behind the board are provided by means of platforms arranged to give access to the area covered by each air surveillance station for the plotter. Permanent markings such as geographical features and grid systems are painted or etched upon the board. Plots and other temporary data are marked in chinagraph pencil for ease in erasing when they have served their

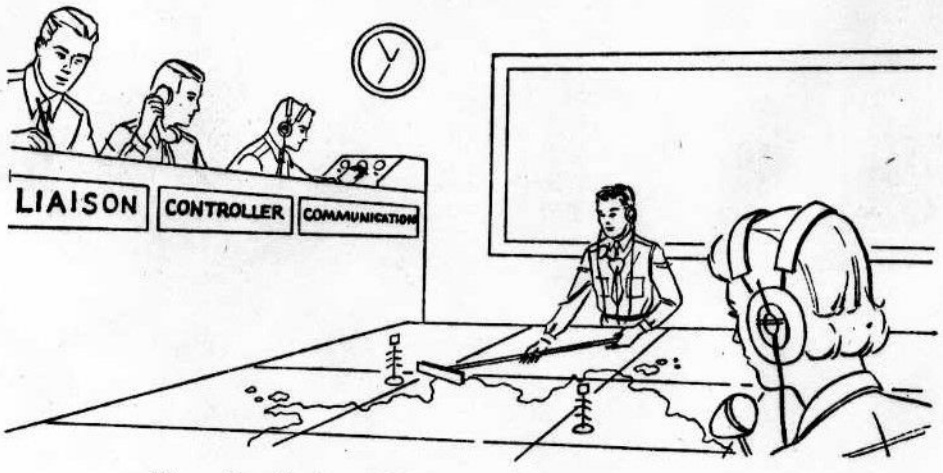

Figure 7. Horizontal Plotting Board, as Used in the ADCC.

purpose. (Plotting and posting are discussed under procedures in Section III.) The scale used on vertical boards should be as large as practicable although it need not be as large as that used on horizontal boards.

3. Vertical magnetic boards are similar to the type described above, except that plotting personnel operate in front of the board with magnetic plotting arrows, target numbers and identifying plaques. The scale of the board should follow that required on the horizontal board. Special construction providing additional bracing for the increased weight of the metal surface on the board should be considered. This board has its maximum usefulness in displaying areas contained minimum air traffic, the deployment of ground forces and shipping or naval forces in large water areas. Arrangements for providing plotting positions are usually of special design.

ORGANIZATION OF ADCC

To accomplish the functions of the Air Defense Control Center, it is organized into four principal sections:

1. *Control Section:* This section is headed by the Command Controller and includes Senior Controllers, Controllers, Control Technicians and related liaison personnel. It implements the tactical decisions relative to the employment of all means of defense within the area.

2. *Movement-Identification Section:* This section is headed by a Movement-Identification Officer and includes the Movement-Identification Officers, Movement-Identification Technicians, necessary clerks and liaison personnel. The functions of this section is to collect, analyze, and disseminate flight plan information on all friendly traffic pertinent to the Area, and to review hostile identifications made at GCI Stations.

3. *Air Surveillance Section:* This section is headed by an Air Surveillance Officer and includes the Air Surveillance Officer, Air Surveillance Technicians and necessary personnel to collect, report, display and analyze all information pertinent to the defense of the area.

4. *Communication Section:* This section is headed by the Communication Officer and includes an HF Radio Officer, a VHF Radio Officer, a Wire Officer and the operating and maintenance personnel required for the installation, operation and maintenance of all means of communication necessary for the coordination and direction of the forces available for the defense of the Area. It is usually divided into the following sections: Radio Maintenance, Wire Maintenance, and Message Center.

DUTIES OF PERSONNEL

The number of personnel required to operate an Air Defense Control Center will depend primarily on the number of sources of information, air traffic, vital targets and subordinate units within the Area. During periods of light activity many functions of the ADCC can be combined; however, a sufficient number of personnel must always be kept in reserve to operate all positions in an emergency.

Command Controller

The Command Controller is the officer responsible for the operation of the AC&W System, including the ADCC and subordinate installations. He exercises tactical-control over all air defense units assigned to the Area. He is directly responsible to the Air Defense Division Commander. Some of his duties are:

1. To implement the commands, directives, and plans of the Air Defense Division Commander insofar as they pertain to the Area.

2. To weld all sections into efficient teams.

Chief Controller

The Chief Controller is responsible to the Command Controller for the efficient operation of AC&W and functions in a designated Sector. Normally, he will devote his time to associated administrative, tactical and supervisory activities.

Senior Controllers

These Controllers have little or no administrative responsibilities. During their tour of duty they represent the Air Division Commander in all matters of tactical nature. The controller responsible for a duty shift within the ADCC and/or GCI Station, when more than one Controller is on duty, is designated as the Senior Controller.

Control Technician

The Control Technician is the controller's administrative assistant. He will be well versed in the duties and responsibilities of the control personnel. Duties include—

1. To insure that accurate and current information is displayed on all status boards.
2. To transmit pertinent information to GCI, Early Warning and Adjacent Air Defense Control Centers.
3. To maintain forms and records which the controller may require.
4. To be thoroughly familiar with means and types of communications available to the controller.
5. To fully brief the relieving Control Technician concerning current and pending operations.

Liaison Personnel

The purpose of Liaison Personnel in the Air Defense Control Center is to effect cooperation and coordination of effort between the AC & W System and other forces and agencies operating within the Area. Liaison Officers are normally located at the ADCC, but may be assigned to GCI Stations for specific missions. In each instance their title describes their functions. They are under the jurisdiction of the Controller on duty for operational control.

Liaison Personnel (AAA NAVY, CIV. Def. Agen.)

1. Ascertain their mission and be thoroughly familiar with the situation of their own units.
2. Know the locations, strength, availability and limitations of their units and keep the controller informed of the current situation.
3. Be familiar with the situation at the Air Defense Control Center and transmit pertinent information to their headquarters.
4. Maintain appropriate records and reports for their liaison position.

Movement-Identification Officer

The Movement-Identification Officer is responsible to the Controller for providing the information necessary for determining the identity of all aircraft at the point of initial pick-up. He reviews and confirms, recommends a change of the hostile identification established at the GCI Station.

Movement-Identification Technician

The Movement-Identification Technician, is an airman who is the administrative and technical assistant of the Movement-Identification Officer. He will be well versed in the duties and responsibilities of the Movement-Identification personnel. Among his duties are—

1. To insure that accurate and current information is collected, analyzed, disseminated and displayed on preplot and flight plan toteboards.
2. To maintain forms and records which the Movement-Identification Officer may require.
3. To be thoroughly familiar with means and types of communications available to the Movement-Identification Officer.
4. To fully brief the relieving Movement-Identification Technician concerning all current and pending operations.
5. To supervise the training, discipline, shift change-overs and duty assignment of Movement-Identification personnel.

Collection Clerk

The Collection Clerk is an airman assigned to collect, record and pass to the analysis clerk all information concerning movements of aircraft.

Analysis Clerk

The Analysis Clerk is an airman assigned to plot the course and compute the surveillance ETA for dissemination and display of all flights approaching a Sector of the Area.

Dissemination Clerk

The Dissemination Clerk is an airman assigned to check the accuracy of flight plans received from the analysis clerk. At the proper time he disseminates flight plan information to the Movement-Identification preplotter and to GCI and Early Warning Stations concerned. This information includes destination, surveillance, ETA, speed, altitude, class and number of aircraft in the flight.

Preplotter

The preplotter is an airman assigned to plot information on the preplot board and place flight plan information on the flight plan tote boards.

Air Surveillance Officer

The Air Surveillance Officer is responsible to the controller for the tactical efficiency of the Air Surveillance System, and for the display of pertinent information on Air Defense Control Center Operations and status boards.

Air Surveillance Technician

Air Surveillance Technician is the Air Surveillance Officer's assistant. He will be well versed in the duties and responsibilities of the Air Surveillance Officer. He must—

1. Insure that accurate and current information is displayed on operations.
2. Prepare stands for display of information required for tracks shown on the operations board. (When necessary, this duty may be assigned to an airman designated as the raid clerk).
3. Maintain forms and records which the Air Surveillance Officer may require.
4. Be thoroughly familiar with means of communication and all operations display equipment.
5. Supervise the discipline and efficiency of the Airmen in the Air Surveillance section.
6. Brief the relieving Surveillance Technician on all current and pending operations.

Status Board Clerk

The Status Board Clerk is an airman whose duty is to post and keep current status board information concerning aircraft, airdromes, weather, communications, radar, etc.

Teller

The teller is an airman whose duty is telling information to higher, lateral and subordinate units.

Recorders

All Air Surveillance information displayed at the ADCC and information reported to an outside agency will be recorded. One (1) Recorder will be required for each Teller and will be connected on the reporting line. He will record all information being passed over the telling line. If available, wire recorders will be utilized for recording telling information.

Specific Duties:

a. The Recorder will make a record of all information on tracks passed by the Teller on an appropriate form. This information will include track number identification, direction of flight, grid position, number of aircraft, and altitude.

b. Time of plots will be recorded to the nearest half minute.

c. The Recorder should number sheets serially starting at midnight daily and should enter the Teller's and Recorder's names on each sheet.

d. Care will be taken to write legibly and keep the sheets neat and clean. These sheets will constitute permanent records of the ADCC.

In addition to recording all information passed by the Teller a recording must be made of all air surveillance information passed to the ADCC. This is accomplished by the use of an overlay. The recorder has a miniature duplicate of the plotting board over which tracing paper is placed. He records the plot on the overlay and connects such plots to form tracks as indicated on the plotting board. The direction of the track will be indicated, by an arrow. The time of each plot, to the nearest half minute, and all other information concerning the plot will be recorded. His duties will include the following:

1. To plot all plots appearing on the plotting board.
2. To connect the plots of a track by a line and indicate direction of movement by an arrow.
3. To record all information concerning the flight.
4. To indicate the grid coordinates on the overlay in the upper left and lower right side so that it can be again placed on the overlay board in the same position.
5. To record the time and date the overlay is placed on the board and the time and date the overlay is removed.
6. To record his name on the overlay.
7. To replace the overlay as required to maintain clarity.

Plotter

The plotter is an airman whose duty is to display information received over the telling line to which he is assigned.

ADCC OPERATIONS

In order to give you a more complete understanding of how information is received and acted upon in the ADCC, we will follow one particular track from the time it is put on the horizontal plotting board until final identification and action is taken.

The particular track has been picked up by a GCI Station and plotted on a vertical plotting board. IFF has interrogated the target and no code has been received. It is not on flight plans available at the ground Controlled Interception Station, and, therefore, carried as hostile.

Fighters have been scrambled, which have been allocated to GCI by our ADCC.

One minute thirty seconds from time of initial pickup the plotter in ADCC is alerted for an initial plot and the first Grid Reference and Coordinates come over the wire. The plotter now glances at the minute hand of the color clock and finds the hand on a red color, he automatically picks up a Red Helma which is used for initial plots in ADCC and places it at the exact Grid Reference and Coordinates phoned in to him. Each additional plot that comes over the air will be marked with a colored arrow, the color determined by the minute hand of the clock. These arrows are placed on the table pointing in the direction the track is moving and with the point of the arrow at the exact grid Coordinate and References called in. Only 3 arrows at most will be used to record one track. When the fourth plot is called in, place the arrow in its correct place and pick up the tail end arrow, placing it in the proper container. By the time that two or three arrows are plotted on the table, the raid clerk will assign it a track number and place a raid stand or "Christmas Tree" on the board. This "Christmas Tree" will contain all information necessary for the controllers and liaison personnel to attempt identification and contemplate necessary action.

By looking at the track's position and determining its heading and course being flown, the information is evaluated by the controllers and fighter aircraft are turned over to the GCI for interception to be accomplished. Soon there will appear a small fighter stand on the horizontal board also. It will be our friendly fighters and will gradually close with the hostile track. When the Tally-ho or "enemy is sighted" call comes in, the lolly pop on the arm of the fighter stand will be taken out and placed in the middle position. Then the fighter will move in for combat. If the track turns out to be a friendly aircraft off course, or without a flight plan, he will identify it.

This is the general procedure that will take place on each hostile track called into the ADCC. More complete or definite existing SOP's will be found in the corresponding work project.

Remember that the SOP's you learn here will in some cases be greatly modified in field installations. Many of these modifications are due to different equipment, as well as larger or smaller amounts of traffic and also changing terrain at different installations. However, the training you receive here will enable you to easily adjust yourself to most changes in procedures and SOP's.

QUESTIONS

1. What part does the ADCC play in Air Defense?
2. What one unit of the AC&W System is in complete charge of all the other units?
3. What is meant by Air Defense Means?
4. What are the three components of the Air Defense Team?
5. What is Combative Air Defense?
6. How is camouflage used in AC&W work?
7. What is reparative Air Defense?
8. In the event of an air attack a flash red would indicate what?
9. What equipment will be found in an ADCC?
10. What is a Raid Stand?
11. Who is in complete charge of an ADCC?
12. Will you find a Vertical Plotting Board in ADCC?
13. What are the four (4) sections of the ADCC?
14. What part does the Communication Section play in the ADCC?
15. What is the difference between Chief Controller and Senior Controller in ADCC?

GROUND CONTROL INTERCEPT

Scope: Mission of Ground Control Interception station and typical intercept procedures.

Student Objective: To learn and understand how radar interception of aircraft is accomplished and the procedures used intercept problems.

INTRODUCTION

In the semi-darkness of the Ground Controlled Intercept Station, designated as Woodcraft Control, a controller is hunched over a PPI scope, tense; eyes alert, as fighters draw close to the enemy. The interceptors close in: the controller gives his final instructions; "Hello, Blue Leader, this is Woodcraft. Bandits twelve o'clock low at five miles. Over." The answer comes back—"Hello Woodcraft, this is Blue Leader. Roger and out." Then seconds later comes the anticipated message—"Hello Woodcraft, this is Blue Leader. Tally Ho—Out." Those two words, "Tally Ho", signify that the fighters have sighted the enemy and an interception has been made. By completing an interception, the GCI Station is carrying out its primary mission—to guide combat air defense forces in interception of hostile air targets within a designated Sector. To accomplish its primary mission, many varied complex operations must be carried out. However, before delving into these operational procedures some basic information is necessary so let's leave Woodcraft Control temporarily.

Figure 1. The Enemy Is Sighted, and Directions Are Given to the Fighters Directly From the Radar Scope.

The GCI Station is a component part of the AC & W System. It is a radar installation equipped and manned to perform air surveillance, identification, intercept control and limited operational control of combative air defense units assigned to a sector. The GCI station functions under the direction of the ADCC.

FUNCTIONS OF THE GCI

In carrying out its mission, the GCI station has several varied functions:

1. Maintain continuous air surveillance throughout the Sector and provide the ADCC with the air surveillance information gathered.

2. Coordinate and exchange information with adjoining Sectors as required for mutual defense.

3. Identify all air activity within the sector as either friendly or hostile.

4. Scramble and control assigned fighters for interception of hostile targets.

5. Control fighters passed over into its Sector by the ADCC or adjoining GCI's in interception of hostile targets.

6. Coordinate all combative air defense activities within the Sub-sector in a manner calculated to bring about the timely destruction of hostile targets.

7. Provide air rescue and navigational assistance by directing controlled missions out of or around bad weather, hazardous terrain, or anti-aircraft and guided missile zones; by rendering assistance to friendly aircraft lost or in distress; and by aiding rescue units in locating the scene of an emergency.

8. Warn civil and military authorities through the ADCC of the presence or approach of hostile aircraft.

9. Report weather information obtained by local and/or radar observation.

EQUIPMENT

To carry out the many varied functions efficiently, a GCI station will use various types and combinations of equipment. A GCI station is fundamentally a radar and communications installation. Therefore, the majority of the facilities provided will consist of radar and communications equipment.

Radar Equipment

The GCI station is responsible for determining range, azimuth and height of the detected aircraft. The radar sets employed must provide for plan position reporting of *range* and *azimuth* and in addition, must provide for some method of measuring *height*. One radar set or combination of sets can provide this information. Some type of electronic identification equipment must be used to supplement the radar equipment. IFF, radar beacon, or similar types of identification systems may be used.

Communications Equipment

The GCI station makes use of three types of communications: air-ground communications, point-to-point communications, and internal communications.

Air-ground communications provide a means of contacting the aircraft under control or aircraft requesting navigational aid or assistance.

Point-to-point communications permit rapid exchange of information with the ADCC, adjoining the GCI's, EW stations, and other military and civilian agencies.

Internal communications are those which are used to connect various positions within the GCI station itself.

Plotting Equipment

Information in a track form, concerning all air activity in the GCI's sector of responsibility is posted on a vertical transparent plotting board superimposed with polar and "georef" grids. Other pertinent information including height, IFF, and number of aircraft is posted on a vertical, transparent tote board. Both boards are edge lighted so as to make the information visible for all concerned. The edge lighting also makes it possible for the scopes to be operated at maximum efficiency without light interference.

ORGANIZATION

To insure that all the functions of the GCI station are carried out, it is usually organized on a basis of six sections.

Each GCI detachment will have an *Administrative Section* which will provide mess facilities, supply, transportation, medical service, and personnel administration.

The *Control Section* will direct or "control" the interception of hostile air targets, coordinate all combative air defense activities within its area of responsibility and work along with the adjoining Sectors or other GCI stations as required for mutual air defense.

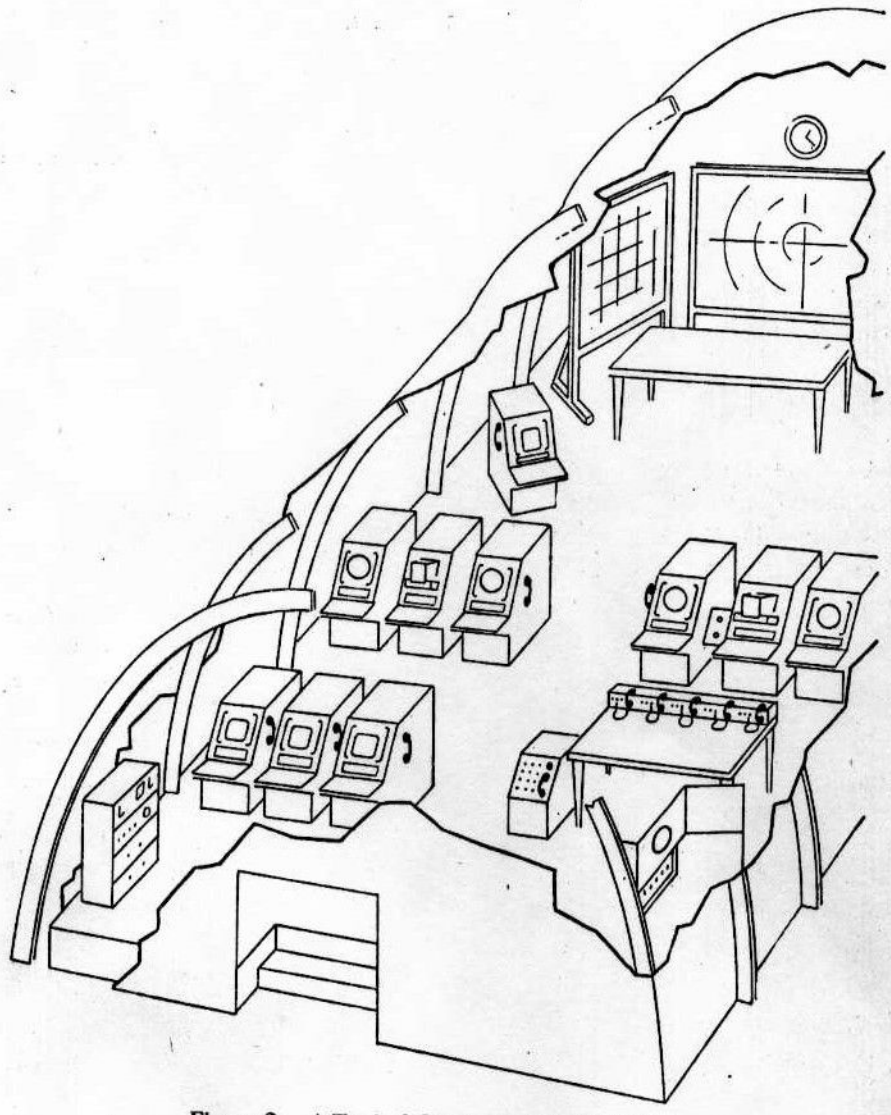

Figure 2. A Typical Ground Intercept Station.

The functions of the *Surveillance Section* are to secure and display Sector air activity information detected by air surveillance equipment. It will secure and display any other current information important to Sector defense. The Surveillance Section will report all the air surveillance information to the ADCC and adjoining Sectors as directed.

The Movement Identification Section must promptly and accurately identify all air activity within the Sector as friendly or hostile. The identification factor which is an important phase in the GCI operations is accomplished through the use of flight plans or radar identification (IFF). Flight plans filed with *M*ilitary *F*light *S*ervice (MFS) are received by the GCI through the ADCC.

It is the responsibility of the *Communications Section* to install, maintain, and operate the communications equipment of the GCI station.

The sixth and final section, the one on which the GCI station is dependent is the *Radar Maintenance Section.* This section must maintain the radar equipment of the GCI station at peak operating efficiency, for the radar sets are the "eyes" of the AC&W System.

PERSONNEL

Introduction

When we left Woodcraft Control earlier, an interception was about to be made, the operation was in its final phase. Now, before such an interception is possible, what has to be done? (Who enters the picture?) How was the enemy detected and identified? The answers to these questions tell the story of a GCI station performing its mission.

Detecting the target, partial identification, posting information concerning the target, and relaying the information to the ADCC—all of this is accomplished by the Air Surveillance Section. Let's look in on a GCI Station. "Operator to plotter. Initial target two six zero at one hundred ten, over."

PPI Operator

We're in luck, for a new target has just been picked up by a *PPI Operator* who is responsible for reporting all targets appearing on his scope in a designated sector. Depending upon the number of PPI scopes available, each operator will scan a certain number of degrees or sector. Every operator must be thoroughly familiar with the tactical situation as far as the scope picture is concerned when he reports for duty. A PPI operator must be always on the alert for new targets, fading targets, indications of jamming or malfunctioning of the equipment.

Specific Duties:

a. Report all targets as often as the volume of traffic will permit.

b. Report all new tracks and fades.

c. Determine by echo interpretation, number and speed of aircraft.

d. Report immediately all indications of jamming.

e. Report any malfunctioning of equipment.

Plotter

As we returned to Woodcraft Control, the PPI operator was reporting a new target to the *plotter*. The plotter is located behind the vertical plotting board and is connected to the operators by telephone: Upon receiving the message he will answer, "Roger and Out."

The plotter, using a chinagraph pencil, will

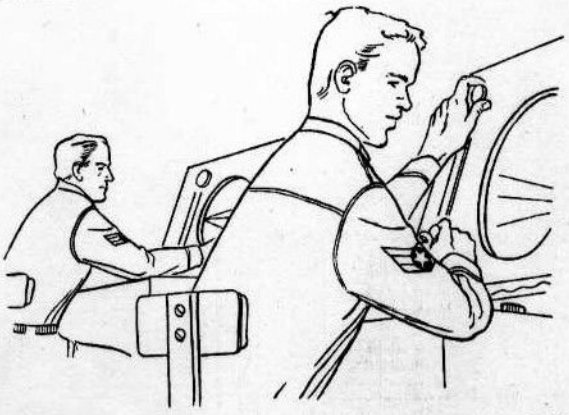

Figure 3. The Height Range Indicators on the Job.

then place the information on the plotting board in such a way as to form "tracks." The tracks placed on the board will indicate the course of the target.

Specific Duties:

a. Plot the position of all targets reported in terms of azimuth and range.

b. Assign track numbers to new tracks as they are reported.

c. Remove tracks that have "faded" or disappeared according to prescribed procedures.

d. All information posted must be neat and accurate.

Height Tote Track Clerk

As the plotter places the plot "two six zero at one hundred ten" on the plotting board he calls out to the *Height Tote Track Clerk* "Track twenty-four up." This indicates that the number 24 has been designated as the track number for the new target and should be placed on the Height Tote board. The Height Tote Track Clerk is located behind the Height Tote board. He has no telephone equipment so he must be continually alert for all information called out to him by the plotter.

Specific Duties:

a. Record track numbers as called by the plotter.

b. Record number of aircraft as called by the plotter opposite proper track number.

c. Record speed of aircraft as called by the plotter opposite proper track number.

d. Denote information when a track fades.

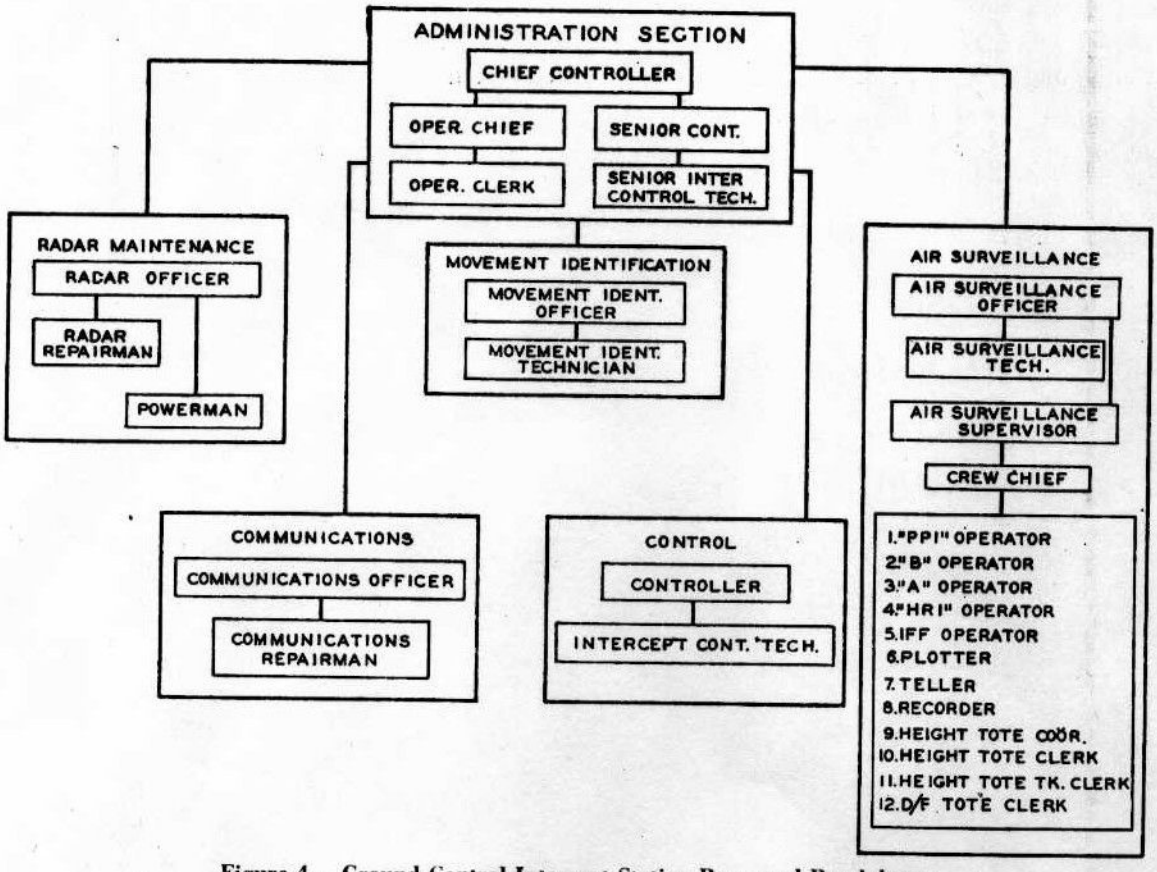

Figure 4. Ground Control Intercept Station Personnel Breakdown.

Height Tote Coordinator

As the height tote track clerk places track 24 on the height tote board, the *Height Tote Coordinator* notes the range and azimuth of track 24 as shown by the plot on the vertical plotting board. As he checks the range and azimuth he contacts the IFF operator and HRI operator who are connected to the Height Tote Coordinator by telephone. "HRI operator number one and IFF operator, this is Height Tote Coordinator, track twenty-four, two to six zero at one hundred ten, over." The Height Tote Coordinator receives the acknowledgment—"Roger and Out." It is the responsibility of the Height Tote Coordinator to see that IFF and height information is obtained on all new tracks as they appear. He must also see that the information already obtained is checked from time to time to insure its accuracy.

Specific Duties:

a. Direct the IFF operator to check all plots as they appear.

b. Direct the HRI operators to determine the height of all targets as they appear.

c. Direct both IFF and HRI operators to recheck any plot as may be necessary.

HRI Operator

When the *HRI Operator* acknowledges the information passed to him by the height tote coordinator, he has signified that he understood the message. Upon receiving the message, the HRI Operator will adjust his set on the proper range and adjust the azimuth dial to the azimuth given in the message. When the target appears on the scope, the HRI Operator will report to the Height Tote Clerk—"HRI to Height Tote Clerk, track twenty-four, angles two five, over." This report indicates that the target is at an altitude of 25,000 feet. The HRI Operators are responsible for obtaining initial and accurate height information on all targets. As often as the volume of traffic permits, he must make rechecks of all height information as requested by the Height Tote Coordinator.

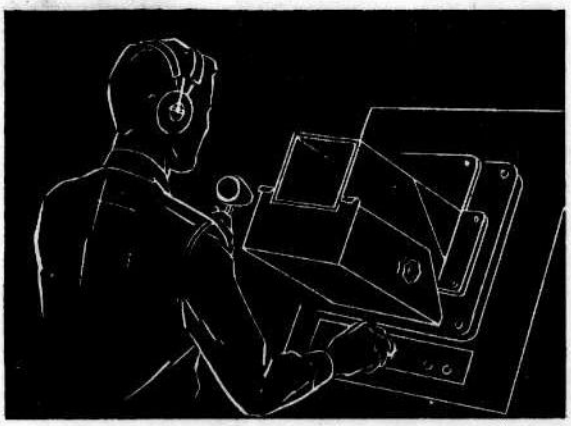

Figure 5. The Radar Operator at Work.

Specific Duties:

a. Obtain height information on all new targets.

b. Recheck height information as often as possible.

c. Report information to Height Tote Clerk.

IFF Operator

At the same time the HRI Operator is checking the height of the target, the *IFF Operator* is adjusting his set on the proper range and adjusting the azimuth dial to 260 degrees, for he has acknowledged that he understood the message from the Height Tote Coordinator. The IFF Operator peers intently at his scope, waiting for the identifying code. No code appears. He checks his range setting, his azimuth setting—they read 110 miles and 260 degrees respectively. Still no identifying signal so he reports to the Height Tote Clerk, "IFF to Height Tote Clerk, track twenty-four, no IFF, over." It is the responsibility to interrogate all targets as directed by the Height Tote Coordinator, Air Surveillance Supervisor or Air Surveillance Officer.

Specific Duties:

a. Interrogate all targets as directed.

b. Report information to Height Tote Clerk.

Height Tote Clerk

When the *Height Tote Clerk* receives the information passed to him from the HRI and IFF Operators, he will acknowledge that he understood the message by answering, "Roger and Out" to both men. He will then record on the height tote board, the height data and IFF information in the columns provided opposite the proper track number. The information must be recorded neatly and legibly so that it can be read with ease. The Height Tote Clerk will also post information as to type of aircraft if such information is available.

Specific Duties:

a. Record height data on height tote board.

b. Record IFF information on height tote board.

c. Record type of aircraft on height tote board.

"A" Scope Operator

While the height of the target is being determined and IFF is being checked, the PPI operator has been trying to estimate the number of aircraft. He has been unsuccessful so he contacts the *A Scope Operator.* Since the A scope operator is connected to the plotters as is the PPI operator, contact can be made through the plotter. "PPI operator to plotter. Have A scope operator check track twenty-four two six one at one hundred six for number of aircraft, over." The plotter answers, "Roger, Out" and then—"Plotter to A scope operator, check track twenty-four, two six one at one hundred six for number of aircraft, over." The A scope operator adjusts his controls to the proper range and azimuth and at the same time acknowledges the requests, "Roger and Out." When the echoes appear on his scope, he contacts the plotter. "A scope to plotter, track twenty-four, three aircraft, over." As the plotter acknowledges, "Roger and Out," the plotter calls out to the Height Tote Track Clerk, "Track twenty-four, three aircraft." The Height Tote Track Clerk then posts the information on the Height Tote Board.

In addition to aiding the PPI operator, the A scope operator will have a sector assigned to him to scan at long range due to the sensitivity of the A scope. He must constantly be alert for all targets appearing within his sector and to report them in the proper procedure. He must be alert for any jamming that occurs and should report it at once. If at any time his

equipment is not operating properly, he should report the malfunction immediately.

Specific Duties:

a. Report all targets in assigned sector.

b. Report any jamming that may occur.

c. Report all malfunctions of equipment.

d. Aid in determining number of aircraft in each target.

Teller

As soon as the initial plot appears on the vertical plotting board, the *Teller* reports the presence of a new track to the plotter in ADCC. "Target, Woodcraft, Initial Plot. Queen-Able one five one two, over." The plotter in ADCC will answer in the usual manner, "Roger, Out." The number of tellers will be determined by the amount of traffic in the GCI station's area of responsibility. As other information concerning the track appears on the vertical plotting board and height tote board, it will be passed to the ADCC plotter concisely and with as little delay as possible. The teller must be sure that the information passed to the ADCC is correct.

Specific Duties: Forward all information concerning tracks in GCI station to the ADCC.

Recorders

All information forwarded to the ADCC and all information shown on the vertical plotting board must be recorded for future reference. Using a recorder's log all information passed by the teller will be recorded by a *Recorder.* If electrical recording equipment is available, it will be used in place of the recorder's logs. If, however, the reports are written, then they must be kept neat and legible.

To record information as it appears on the vertical plotting board, an overlay recorder is employed. The overlay recorder is provided with a miniature duplicate of the plotting board over which tracing paper is placed. As plots appear on the master plotting board, the overlay recorder will reproduce them on the tracing paper and connect the plots to form tracks. He will also record all information concerning each track. The overlay recorder must replace his tracing paper as often as is necessary to keep his records clear and legible.

Specific Duties:

a. Record all information passed to ADCC.

b. Record all air surveillance information as posted on vertical plotting board and height tote board.

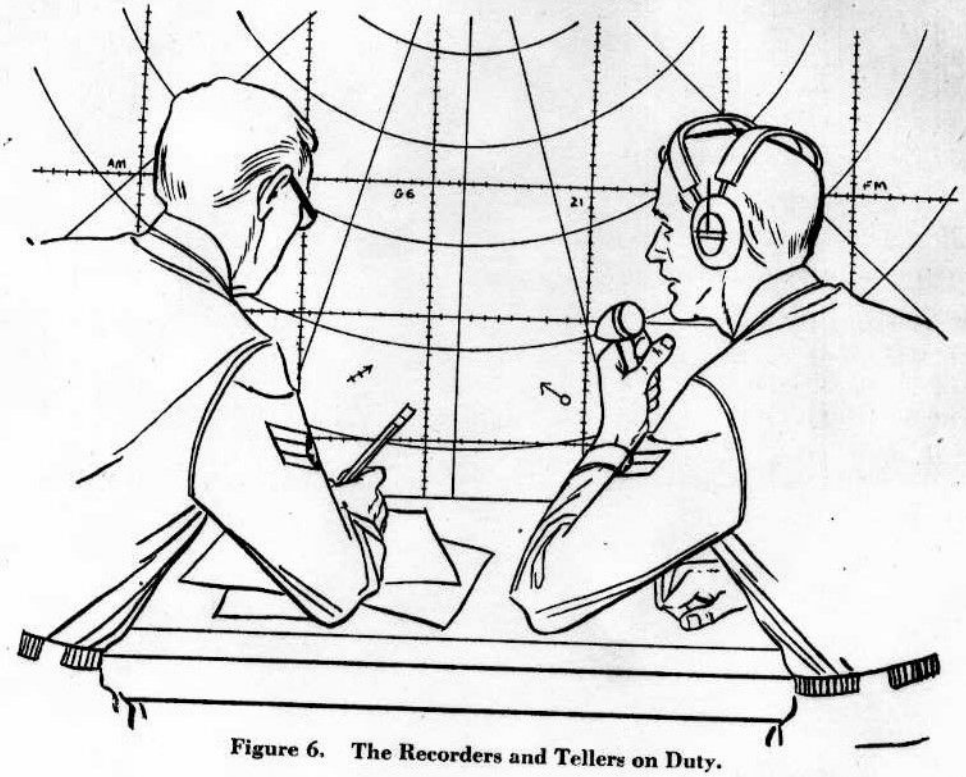

Figure 6. The Recorders and Tellers on Duty.

Air Surveillance Officer

All the persons of the Air Surveillance Section as listed above are responsible to a group of supervisory personnel. In charge of the section is the *Air Surveillance Officer.* The ASO is responsible to the Senior Controller for the tactical efficiency of all Air Surveillance operations within the GCI station's sector of responsibility during his shift. He is also responsible for the display of all important information on the Plotting, Tote and Status Boards.

Air Surveillance Technician

Assisting the Air Surveillance Officer is the *Air Surveillance Technician.* He will coordinate all air surveillance activities and keep a constant check on the Plotting Board to make sure that the picture presented is as complete and accurate as possible.

Specific Duties:

a. Check to see that information posted on the Plotting, Tote and Status Boards is neat and accurate.

b. Make sure that tracks entering an adjoining GCI's sector of responsibility are reported to that GCI.

c. Coordinate all air surveillance activities.

Air Surveillance Supervisor

Also checking for accuracy and neatness on the Plotting, Tote and Status Boards is the *Air Surveillance Supervisor.* The responsibilities and duties of this position closely parallel those of the Air Surveillance Technician. In addition, as his title suggests, he supervises the work of the enlisted personnel in the section—through and with the aid of the crew chief. To aid the Air Surveillance Supervisor in checking the accuracy of the plots as they appear on the vertical plotting board, he is provided with a PPI scope. The Air Surveillance Supervisor will determine the areas to be covered by the B scopes and PPI scopes. If any changes are necessary, he must refer them to the Air Surveillance Officer for approval.

Specific Duties:

a. Check to see that all information posted is accurate and neat.

b. Determine sectors to be scanned by each scope.

c. Coordinate all air surveillance activities.

Crew Chief

Assisting the Air Surveillance Supervisor in his work of supervising the enlisted personnel is the *Crew Chief.* He is in charge of the operating crew and will see that all men are fully briefed in their duties before assuming their positions. The Crew Chief will have the responsibility of rotating the men among the various positions and will arrange for rest periods. He will see that each man is provided with the proper equipment necessary for each position. When any malfunction of equipment is reported to him, he must in turn report it to the Air Surveillance Technician. It is the responsibility of the Crew Chief to see that all men on his crew attain a high level of proficiency in any and all duties that they may be called upon to perform.

Specific Duties:

a. Maintain an efficient crew of operating personnel.

b. Report malfunctioning of equipment.

B Scope Operator

There are two more positions in the Air Surveillance Section which played no part in the mission as it progressed to a successful interception. The first of these is the *B Scope Operator.* The B scope is used as a short range scope since more accurate range and azimuth readings can be obtained from the B scope at short range. As with the PPI scopes, each B scope is assigned a designated sector to scan. When targets enter into his area of responsibility, the B scope operator will report the position to the plotter by telephone. All B scope operators must familiarize themselves with the scope picture upon taking over the scope. They must be always on the alert for new targets, fading tracks, any indications of jamming or malfunctioning of equipment.

Specific Duties:

a. Report all tracks as often as the volume of traffic will permit.

b. Report all new tracks and fades.

c. Determine by echo interpretation, number and speed of aircraft.

d. Report immediately all indications of jamming.

e. Report any malfunctioning of equipment.

D/F Tote Clerk

The other position in the Air Surveillance Section is the *D/F Tote Clerk.* He will receive information from the D/F Teller in the D/F station by telephone. Information pertaining to bearing and range along with the call sign and time are posted on the D/F Tote Board by the D/F Tote Clerk.

Specific Duties: Records all D/F information passed by D/F Teller.

Let's backtrack a bit in our mission to the point where the IFF operator has just informed the Height Tote Clerk that the target at two six zero, 110 miles shows no IFF. While the IFF operator was checking IFF, the Movement Identification Section was checking their pre-plot board.

Movement Identification Technician

The responsibility of identifying the target at initial pickup is designated to the *Movement Identification Technician.* Flight plan information will be called to the Movement Identification by the dissemination clerk in the ADCC. As this information is received, the M. I. Technician will record it in the flight plan log and will then plot the course on the pre-plot board.

Upon checking the pre-plot board for a target at 260° and 110 miles, he finds that there is no corresponding track on the pre-plot board. Upon looking at the IFF column on the Height Tote Board he sees that the target shows "No IFF." He then notifies the Movement Identification Officer that the initial track at 260° and 110 miles has not been identified. It is the responsibility of the M. I. Officer to designate the track as hostile. As soon as the track has been declared hostile, the M. I. Technician will give the following message to the Height Tote Clerk. "Movement Identification Technician to Height Tote Clerk, track twenty-four hostile. Over." The Height Tote Clerk answers, "Roger and Out."

Movement Identification Officer

The Movement Identification Technician is the assistant to the *Movement Identification Officer.* These two men make up the M. I. Section. The M. I. Officer is responsible for the identification of all aircraft at the point of initial pickup within the assigned area of responsibility.

Controller

The word "Hostile" appearing on the Height Tote Board, is the signal for the Control Section to go into action. The orders to initiate action come from the Senior Controller. When track 24 was declared hostile, the Senior Controller contacted the fighter base—"Hello Timber, this is Woodcraft Control, scramble Blue flight vector two five eight, vector two five eight, over."

"Hello Woodcraft Control, this is Timber, scramble Blue flight vector two five eight out." When this answer comes back to the Senior Controller, the mission is turned over to a Controller. "Senior Controller to Controller one, intercept track twenty-four, two six one at one hundred six. Blue flight scrambled initial vector two five eight over." Controller one acknowledges, "Roger and out."

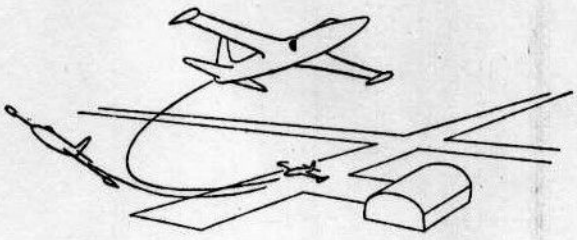

Figure 7. When the "Scramble" Order Is Given, the Fighters Go Into Action.

The Controller will be provided with a PPI scope and VHF communications to provide contact with the aircraft. Telephone communications are also available to Senior Controller and other positions in the GCI station through a common switchboard. As soon as he is assigned to an interception, he must make a "radio check" with the fighters to make sure that radio contact is being made. After radio contact is made, the Controller will direct the fighters to the intercept point and the message "Tally Ho" is received. After the enemy has been met and destroyed the fighters will be given all assistance possible until they have returned safely to the home base.

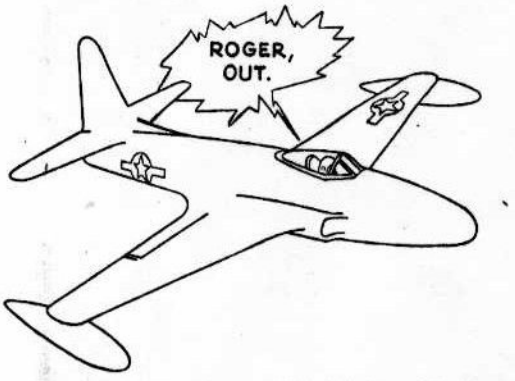

Figure 8. The Controller and the Fighters Work as a Combat Team.

Intercept Control Technician

Assisting each Controller in his work is an *Intercept Control Technician.* Any information concerning height, identification, weather status, or aircraft status required by the controller in conducting a mission will be provided by the Intercept Control Technician. One of his responsibilities of prime importance is figuring fuel consumption to determine how much flight time remains for the aircraft under control. As the mission progresses, the Intercept Control Technician will also maintain a log of instructions issued by the Controller.

Specific Duties:

a. Obtain any and all information required by Controller.

b. Figure fuel consumption of controlled aircraft.

c. Inform Senior Controller of progress of the mission.

d. Maintain Controller's log.

Chief Controller

The operation of the GCI station will be the responsibility of the Chief Controller. He is also responsible for the operation of the subordinate units within the sector. He exercises operational control over all Air Defense units assigned to the sector. He is responsible to the Command Controller located in the ADCC.

Operations Chief

The *Operations Chief* is the NCO in charge of all operating enlisted personnel. He receives and carries out instructions of the Chief Controller regarding matters pertaining to control personnel, procedure and control facilities. He receives and carries out instructions of the Air Surveillance Officer pertaining to reporting, telling, and display of information. He will also carry out instructions of the Movement Identification Officer regarding personnel assigned to that section.

Specific Duties:

a. Assign personnel to various crews.

b. Prepare crew schedules.

c. Make sure that the SOP's set-up are being complied with.

d. Prepare and maintain files of such records and papers directed by Chief Controller.

Operations Clerk

Another of the Chief Controller's administrative assistants is the *Operations Clerk.* He will receive and distribute all incoming orders and messages as directed by the Chief Controller. He will assist the Operations Chief in maintaining any files and records that may be required.

Specific Duties:

a. Receive and distribute incoming messages and operation orders.

b. Maintain files and records as directed.

Senior Controller

Naturally the Chief Controller cannot work 24 hours a day. Therefore, an officer is designated as the Senior Controller who will be in charge of the GCI station during the absence of the Chief Controller. During that period he will direct employment of the combative air defense forces assigned for sector defense and is responsible to the Chief Controller. Remember that the Senior Controller gave the scramble order and initial vector to the fighters when an interception was necessary. After giving that directive, the Senior Controller must contact the ADCC and obtain confirmation of that scramble order.

Senior Intercept Control Technician

Assisting the Senior Controller is the *Senior Intercept Control Technician.* He will issue all instructions as authorized by the Senior Controller. It is his job to obtain aircraft

status information, airdrome status information, weather information, and VHF status information and see that the information obtained is posted on the proper status boards. In addition, he must complete all operations forms and records of missions. He must be familiar with all types of communications used by the Senior Controller and must determine that all incoming and outgoing messages are fully understood by all parties concerned.

Specific Duties:

a. Issue orders as authorized by Senior Controller.

b. Obtain the information necessary to complete all status boards.

c. Be familiar with all types of communications.

Radar Officer

The responsibility of keeping the radar equipment in operating condition belongs to the *Radar Maintenance Section.* In charge of this section is the *Radar Officer.* He is in complete charge of all radar equipment and is responsible for all routine and emergency maintenance. He must be proficient in erection and dismantling of the radar sets. This section is extremely important for without its radar, the GCI station becomes useless for it contributes nothing to the operation of the AC & W System.

Radar Repairmen

The *Radar Repairmen* in the Radar Maintenance Section perform on-the-spot repairs during operations, maintain a supply of spare parts, and carry out preventive maintenance as directed by the Radar Officer. The Radar Repairmen must at all times keep the radar working at maximum efficiency.

Powermen

Power for most of the equipment is provided by diesel or gasoline engine-driven power units. To set up the units and keep them operating, *powermen* are assigned to the Radar Maintenance Section.

Communications Officer

Also important in the operation of the GCI station is the communications facilities. The *Communications Officer*, in charge of the communications section, must establish a communication system flexible enough to meet any and all requirements needed by the GCI station. He is responsible to the Chief Controller and advises him on all matters pertaining to communications.

COMMUNICATIONS REPAIRMEN

The section has several *Communications Repairmen* to keep the equipment working at maximum efficiency.

In this discussion, the GCI station has been broken down into the six sections: administrative, air surveillance, control, movement identification, radar maintenance, and communications. Even though these six sections have their own duties and responsibilities, no one section can work independently of the others. Complete cooperation and maximum effort on the part of every individual is necessary if the GCI station is to accomplish its mission.

RADAR SITING AND CALIBRATION

Introduction

If a professional photographer wanted to take a picture of a landscape he would first spend a considerable length of time in selecting the subject. He would consider the possibilities of each possible view that might serve as the ideal landscape. After selecting a subject, the professional photographer will not simply take his camera and snap a picture. He would go to great lengths to position his camera properly. He has to consider the lighting, proper tripod elevation, camera setting. After everything is as it should be, he takes the picture.

So it is in siting or locating a GCI station. Choosing the proper location is extremely important if the installation is to fulfill its role

as a vital link in the AC & W system. To a large extent, the performance of a radar station depends upon its location. Each and every site should be selected with consideration of the tactical mission, topography and type of equipment.

Aerial reconnaissance will result in selection of several possible sites that meet general specifications. Final choice will be determined from data obtained as a result of ground reconnaissance.

Responsibility of choosing a site is generally delegated to a team called a "Siting and Calibration Team" of specially qualified officer and enlisted personnel. If such a team is not available the radar detachment commander may be responsible for selecting the site for his particular station.

Site Requirements

For any type of equipment, the antenna must have clear paths extending outward in all directions where coverage is desired. These paths should be unobstructed by thick woods, dense foliage, buildings or high ground. Because of this, a site overlooking water is usually best. Such a situation is not always possible, however. As a result, inland sites must be carefully elected.

Some of the factors to be considered are—

a. Sources of ground clutter must be kept at a minimum.

b. Water supply.

c. Camouflage possibilities.

d. Suitability of site for associated communications equipment; feasibility of running telephone line to site.

e. Isolation of site to possible enemy raid.

f. Climatic conditions, as affecting health of personnel.

g. Roads for bringing in supplies and personnel.

h. Drainage to prevent site from turning into a swamp.

i. Windbreak shelter from prevalent storms.

After a final choice has been made and radar equipment has been installed, a performance test should be run by a skilled calibration team. If the site has been selected with care the results of the performance test will be favorable.

Calibration

The performance test run off by the calibration team consists of a series of observations of signal strengths received from an aircraft of known type flying at a known azimuth and range with respect to the station. Its purpose is to check the extent and accuracy of the radar coverage of the chosen site. Due to the characteristics of a radar set, there will be certain areas where no signal will be returned because of a "null" between the lobes of the radar beam. By knowing the location of these "nulls," loss of a target echo can be expected and undue alarm is unnecessary.

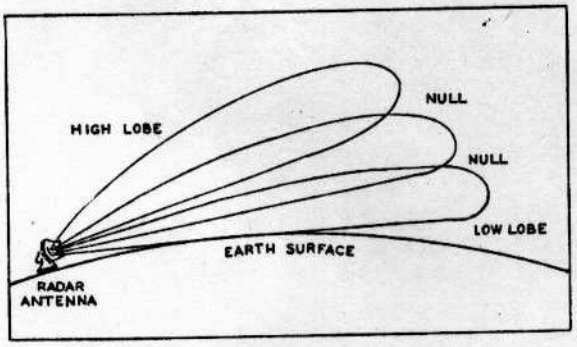

Figure 9. Null Areas Between Lobes of Radar Set.

As radar operators, you may be called upon to assist in performance tests. Scope operators, plotters and recorders are necessary to track the aircraft making the test flight. Because the decision as to whether the site has been properly located depends upon the results of the test, only the most skilled operators will be utilized. It is absolutely essential that accurate data is obtained upon which to base a decision.

If the location is approved as a result of the performance tests, check flights must be run from time to time to determine if peak operating efficiency is being maintained. The calibration team is also responsible for running the check flights. As in the performance tests, the check flights must be run with extreme care so as to obtain accurate data.

246766°—53——6

QUESTIONS

1. What is the primary mission of a GCI Station?
2. Would a GCI Station have a vertical or horizontal plotting board?
3. Is it necessary for a GCI Station to have air to ground communications?
4. What are the duites of the radar operator in a GCI Station?
5. Why are tracks, which are picked up on a scope, duplicated on the plotting board?
6. What is the difference between the height tote track clerk and the height tote coordinator?
7. Of what use is the determination of altitude of enemy aircraft to a GCI Station?
8. What duties do the recorders and tellers perform?
9. What does the overlay recorder do in the GCI Station?
10. What enlisted man is in charge of the Movement Identification Section?
11. What duties does the Control Technician have?
12. What is the difference between a Chief Controller and a Senior Controller in a GCI Station?
13. Who is in charge of an operating shift in a GCI Station?
14. Why is the location of a radar site so important to its function?
15. What are some of the obstacles encountered in locating a radar station?

EARLY WARNING IN THE AC & W SYSTEM

Scope: Mission and function of early Warning Radar.
Student Objective: To learn and understand mission of Early Warning Radar and its place in AC & W system.

INTRODUCTION

In the early part of 1949, a small convoy of two 6 x 6 trucks, a jeep and a weapons carrier came to a final halt half way up the highest mountain on Okinawa. It was raining a very slow, but determined drizzle as the G. I.'s started slowly to unload the trucks. This was the jumping off point. The next 2 miles of up and down climbing and sliding would be accomplished on foot. Most of the supplies would be left at the truck stop under guard, but the necessities still had to be carried to the top, the final destination.

Approximately 4 hours after leaving the trucks, the men arrived at the base of a knoll about 2600 feet high. The officer in charge pointed to a small clearing, which had been cleared of trees, and told the men to pitch the tents there.

The detachment had finally arrived; this was the location of an Early Warning Station and would be their home for the next few months. The party consisted of one Lieutenant, a 1st Sergeant, twelve Radar Operators, four Radio Operators, one Radio Maintenance man, one Radar Maintenance man, three cooks, a medic and a powerman. The mission was to supplement range as well as cover a small blind spot of the GCI station they had just left. It was already dark, and the winter air of the rainy season was pretty chilly, even in the South Pacific. They set to work immediately and had one squad tent up in a short while. They were all pretty well tired out by this time, so they spread out a tarpaulin and all slept in the one tent until morning. Even though the comforts were small, the men were in fine spirits, for this was a new experience to them and they were enjoying it.

Reveille was at daybreak and that's when the work began. MOS and AFSC's made little difference. Everyone pitched in and by noon the other tents were up and the camp site was fairly well established. By this time, everyone was interested in the large squad tent centrally located from which a strong but pleasant odor of G. I. coffee drifted. This naturally brought all work to a close and a well-earned hot meal and rest began.

So far the men had been enjoying a new experience, and didn't mind the odd labor too much. But when the novelty had worn off, the radar men gathered around their equipment, and the radio operators were edging toward the communications tent while major construction of the site almost ceased. However, it was soon learned that total cooperation would be necessary or all would suffer from the inconveniences of it. At an installation such as this, job descriptions are not according to regulations, and if they were, it would take volumes to hold them.

Thus they established the first Early Warning site on Okinawa and had it in operation in a week. It extended the GCI station's range some 50 to 75 miles and covered everything coming from the China area which was the hot spot of the world at this time. Everyone remembers when the Communists were over-running China and the Nationalist Government was taken to Formosa, an island off the south China coast.

The location of Okinawa put it almost in the cross fire of the two rival parties. Feelings were very high and the need for an Early Warning Station was critical.

We will now take a closer look at this small station for which a need at times is very great.

EMPLOYMENT

The Early Warning Station is the most versatile unit of the AC&W System. It is fundamentally a radar installation, equipped and manned to perform air surveillance of a *Sector* or a *Sub-Sector.*

Subsector Early Warning

When an Early Warning Station is employed as a supplement or Gap Filler of a GCI Station, it will be known as a sub-sector Early Warning Station. It will report directly and is responsible to the GCI Station.

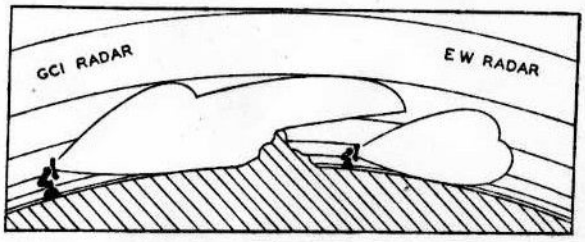

Figure 1. Early Warning Covering Blind Spot.

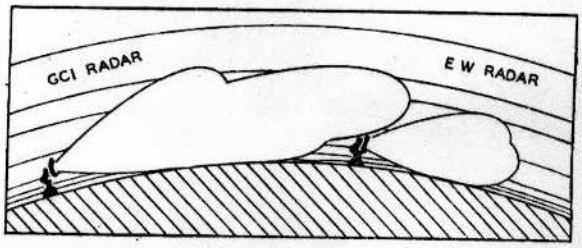

Figure 2. Early Warning Extending GCI Range.

1. *Equipment.* Equipment will be of a light weight and very mobile nature. The sites will not always be permanent but will sometimes change location as the tactical situation warrants. The type of set commonly used will be a TPS–1B (ground transportable Radar Search), and a CPX–1, TPX–1, or a BN–2 for identification purposes. Minimum communications and plotting equipment will be necessary. This is to cut down on the weight or bulk when a sudden movement is made.

2. *Mission.* A sub-sector Early Warning Station will have two primary missions. It can be used to cover blind spots (Gap Filler), or to supplement range of a GCI Station. When a GCI does not have full 360° coverage to maximum range, they will employ one of these stations to cover the azimuth in which the blind spot occurs. They will do this by locating a small unit at this blind spot. It will be the duty of this Early Warning Station to call into the GCI Station all traffic appearing within this area. When supplementing range, an Early Warning Station is usually placed at a critical or important point at the limits of the GCI station's range. Here, the Early Warning station will scan a certain sector and give advanced information to the GCI station which would otherwise be impossible for it to obtain.

3. *Duties:*

a. To maintain continuous air surveillance throughout the sub-sector.

b. To report air surveillance information to the GCI station as required.

c. To obtain and pass on to the GCI station electronic identification of air activity within the sub-sector.

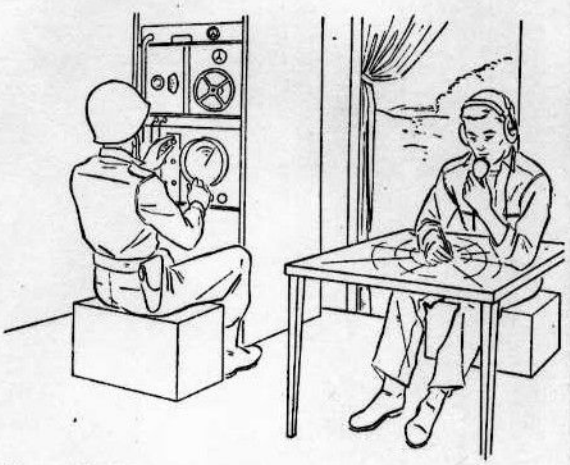

Figure 3. Interior View of an Early Warning Station.

4. *Personnel:*

Radar Officer: Usually officer in charge of all personnel at the station. Is a qualified Radar Maintenance Officer and is responsible to the GCI station.

Crew Chief: Airman in charge of all Radar Operations at the installation. Trains other airmen in their duties, keeps discipline, acts as 1st Sergeant of site.

Scope Operator: Scans and reports to the plotter all targets appearing within his sector on a Radar Scope.

Plotter: Accurately and quickly plots all targets in Chinagraph pencil on a vertical or horizontal plotting table.

Recorder: Records quickly and accurately on the proper logs all plots called into the GCI Station by the teller.

Teller: Tells all information presented to him concerning tracks on the plotting table to the GCI Station, using correct R/T procedure.

Radar Maintenance Man: Responsible for keeping the Radar in top performance at all times.

Powerman: Responsible for power facilities of site. Includes both Radar and utilities.

Supply Technician: Orders all tech supplies for Radar Equipment and the site. This includes shovels, picks, hammers, tents, Cathode Ray Tubes, etc.

SECTOR EARLY WARNING

A sector Early Warning Station will be somewhat different from a sub-sector station. Its duties will be the same but the strength in equipment and personnel will be changed. Its main difference will be its ability to assume the roll of a GCI station if necessary. It will report directly to and is responsible to the ADCC.

1. *Equipment.* Equipment could consist of a TPS–1B or CPS–5. It will have a CPX–1, TPX–1 or BN–2 for identification purposes. Because of its ability to take over the responsibilities of a GCI station it will also include a CPS–4 for height finding purposes. The communications will be somewhat more elaborate due to GCI responsibilities. It will consist of landline, HF, VHF and possibly FM.

2. *Mission.* A sector Early Warning Station's mission will consist of all the responsibilities of a sub-sector station, plus the additional GCI requirements. It will assume GCI responsibilities upon notification from the ADCC. The reasons for assuming GCI status are many and varied. It could be because of a large volume of traffic or due to the sector Early Warning Station being located close to a hostile area. It also will assume these responsibilities when the normal GCI station is off the air for any particular reason.

3. *Duties:*

a. To maintain continuous air surveillance throughout the sector.

b. To coordinate and exchange information with adjoining sectors as required.

c. To identify all air activity within the sector as friendly or hostile.

d. To provide the ADCC with air surveillance information.

e. To warn civil and military authority of the presence or approach of hostile aircraft as directed.

f. To report weather information obtained through local and/or radar observation to authorized agencies as directed.

4. *Personnel.* Personnel will consist of all airmen attached to a normal GCI station.

QUESTIONS

1. What are the two main uses of an Early Warning Station?
2. When an Early Warning Station is performing sub-sector duties, to whom does it report?
3. What type equipment will usually be found at a sub-sector Early Warning Station?
4. Why is it necessary to cover blind spots in a GCI station's radar?
5. What are the primary types of communications at an Early Warning Station?
6. Does a sub-sector Early Warning Station employ IFF Equipment?
7. Does a sub-sector Early Warning Station employ height finding equipment?
8. To what station does a sector Early Warning Station report?
9. Can a sub-sector Early Warning Station assume GCI responsibility?
10. What IFF set could be used with the TPS–B?
11. Under what conditions would a sector Early Warning Station assume GCI responsibilities?
12. Name three duties of a sector Early Warning Station.
13. Will a sector and sub-sector Early Warning Station differ in personnel requirements?
14. Does a sector Early Warning Station have height finding equipment?
15. Would a sector Early Warning Station scramble aircraft?

WEATHER IN THE AC & W SYSTEM

Scope: The importance of weather in AC & W operation and interpretation of teletyped weather sequences.

Student Objective: To learn and understand the importance of a knowledge of weather in AC & W operations, and to learn to read and interpret teletype weather sequences accurately and transmit them correctly to aircraft in flight.

INTRODUCTION

Weather will play an important role in the successful accomplishment of the mission of the AC & W System. You have learned that one of the main purposes of the AC & W System is to control and direct aircraft in flight to a designated target. To do so successfully, the controller in the GCI Station must know the conditions of weather along the line of interception so as to insure a successful interception. By knowing such weather conditions, the controller can direct the aircraft out of bad weather as much as possible.

The controller is usually provided with information concerning *ceiling*, *sky condition*, *visibility*, *type of weather*, *temperature*, *dew point*, *wind direction* and *speed* and *altimeter setting* of the reporting station. Such information is included in hourly and special weather reports received by the GCI Station. Special reports are sent only when a crucial change (for better or worse) occurs in the weather. Only those elements that have changed will be included in the special report. All special reports will be preceded by the letter "S" and a number. Additional information such as *obstruction to vision*, *barometric pressure* and *special remarks* are included in the regular hourly reports. From time to time, you may be required to copy weather reports as they are received by the GCI Station. In addition to receiving the reports, you may be required to post weather information on the weather status board. To accomplish these duties proficiently, you must be familiar with the sequence followed in a weather report and with the various symbols and code letters used in the reports.

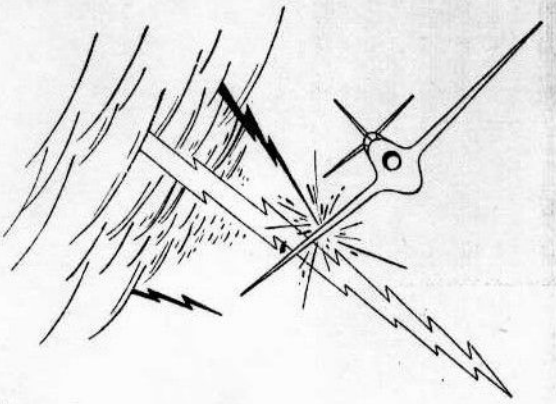

Figure 1. Advanced Weather Information Prevents This.

TELETYPE REPORTS

Introduction

Let's look at a weather report received via teletype:

CYS M3 ⊕ 1/2V RF 115/48/46 ← 18/998/CIG VRBL 2 to 5

The above report, at first glance, looks to be quite complicated. Upon breaking it down, it becomes a clear and concise picture of the weather. Let's see what that picture looks like.

Call Letters

The first element of the report will consist of two or three letters. These letters will indicate the origin of the report and are called "*station designators*" or the "*call letters*" of the station making the report.

Ceiling

The next element will provide information concerning the *ceiling*. Ceiling is defined as a level rather than a layer of clouds. It is the level at which more than five-tenths blue sky is covered thus forming a base. Information given concerning the ceiling contains a letter followed by a figure. The letter will indicate either the type of ceiling or the method of determining the ceiling. The letters used are as follows:

M denotes a ceiling *measured* by a ceiling light.
E denotes that the height of the ceiling was *estimated*.
B denotes a ceiling measured by a ceiling *balloon*.
A denotes a ceiling reported by an *aircraft*.
W indicates a ragged or *indefinite* ceiling.
P indicates a ceiling that is caused by *precipitation*

The figure will give the height of the ceiling in hundreds of feet. If the letter V follows the figure, it will indicate that the ceiling height is changeable or *variable*.

Sky Conditions

The sky condition will follow the ceiling information. Sky condition is the amount of clouds in the sky and is the factor that determines whether or not a ceiling exists. The symbols used in giving sky condition are as follows:

○ *clear:* less than one-tenth blue sky covered with clouds.
◔ *scattered:* one-tenth to five-tenths blue sky covered with clouds.
◍ *broken:* six-tenths to nine-tenths blue sky covered with clouds.
overcast: more than nine-tenths blue sky covered with clouds.
X *obscurement:* sky condition obscured by rain, fog, etc.

When the sky is clear or "scattered clouds" are reported, no ceiling information is included in the report since no ceiling exists. A combination of two symbols can be used, with the first symbol referring to the higher layer of clouds. However, the clear symbol can only be used alone. When two symbols such as E6 ◍ ⊕ are used, the ceiling figure refers to the symbol closest to the right. E6 ◍ ⊕ would read "estimated ceiling 600 broken." The height, if known, of the overcast condition indicated by the first symbol, will be included in the remarks section of the report. If two symbols such as E80 ◍ 35 ◔ are used, the second symbol does not denote a ceiling; therefore, the ceiling figure refers to the first symbol and a figure preceding the second symbol will denote the height of the clouds designated by the second symbol. E80 ◍ 35 ◔ would read "estimated ceiling 8000 broken, 3500 scattered."

If more than two layers of clouds exist, the amount and height of the additional layers will be reported in the remarks column.

Visibility

Information pertaining to *visibility* follows the sky condition. Visibility is defined as the greatest distance in any direction toward the horizon that prominent objects such as mountains, towers, and buildings can be seen and identified with the unaided eye. The information will be given by using one or two figures. When the visibility is 3 miles or less, it is reported to the nearest whole mile and/or fraction of a mile. If the visibility is between 3 and 15 miles, it is reported to the nearest whole mile. When the visibility is more than 15 miles, it is reported to the nearest 5 miles. If the letter V follows the figure, it will indicate a varying visibility.

Weather Conditions and Obstructions to Vision

The present *existing weather* and *obstructions to vision* information follows visibility in the weather report. Code letters (usually a prominent letter from each word) will indicate the type of precipitation or obstruction to vision. The following code letters are utilized for types of precipitation:

R	*R*ain.	E	sl*E*et.
RW	*R*ain sho*W*ers.	A	h*A*il.
ZR	free*Z*ing *R*ain.	AP	small h*A*il (*P*ellets).
S	*S*now.	IC	*I*ce *C*rystals.
SW	*S*now sho*W*ers.	SG	*S*now *G*rains.
SP	*S*now *P*ellets.	Q	s*Q*ualls.
L	drizz*L*e.	T	*T*hunderstorm.
ZL	free*Z*ing drizz*L*e.		

Tornado SW—Tornado is never abbreviated and is followed by the letter abbreviation showing the direction from the reporting station.

A plus (+) following any of the above symbols will indicate heavy intensity; a minus (−), light intensity; and the absence of a sign, moderate intensity. Examples R+ heavy rain; L− light drizzle; Q moderate squalls.

Code letters for obstruction to vision are as follows:

F	*Fog.*	BS	*Blowing Snow.*
GF	*Ground Fog.*	BD	*Blowing Dust.*
IF	*Ice Fog.*	BN	*Blowing saNd.*
K	smo*K*e.	H	*Haze.*
D	*D*ust.		

Barometric Pressure

The next component, *barometric presure*, consisting of three figures, will not be utilized in the AC&W System. This information is provided in the weather report for the use of weather forecasters.

Temperature and Dew Point

Separated from the barometric pressure by a slant line is the *temperature* reading in two figures which is given in whole degress Fahrenheit.

Closely related to and following the temperature reading, also separated by a slant line, is the *dew point* temperature. The dew point is the temperature at which droplets of moisture will form. When the temperature reading approaches within one or two degrees of the dew point, the controller can anticipate rain, fog, etc., and can advise pilots of the controlled aircraft of the impending weather. A minus (−) preceding either the temperature or the dew point reading will indicate a below zero reading. Examples: −05−07 would read 5 degrees below zero temperature 7 degrees below zero dew point.

Wind Direction and Speed

One of the most important factors in controlling aircraft follows the dew point reading in the weather report. Information giving *wind direction* and *speed* enables the controller to accurately determine the effect of said factors (wind direction and speed) upon the controlled aircraft. With such information, the speed at which the controlled aircraft would have to travel to accurately intercept the hostile aircraft can easily be computed. The direction the wind is blowing "*toward*" will be indicated by any one of sixteen arrow symbols. When reading the direction, however, you use the direction the wind is blowing "*from*". The sixteen direction arrows are obtained by reading a compass clockwise. This procedure is known as "boxing the compass."

Example:

→5 is read, "wind west, five.' Note that the arrow points east but is read "west."

As is seen in the above example, the figure following the arrow indicates the speed or velocity at which the wind is blowing in knots per hour. When the velocity has been estimated, the letter F will follow the figure. A plus (+) following the wind velocity will indicate strong gusts; a minus (−) fresh gusts; the absence of a sign, a steady wind. When the wind is calm, the letter C will be substituted for the wind data symbol and figure.

The sixteen arrow symbols follow:

COMPASS ROSE

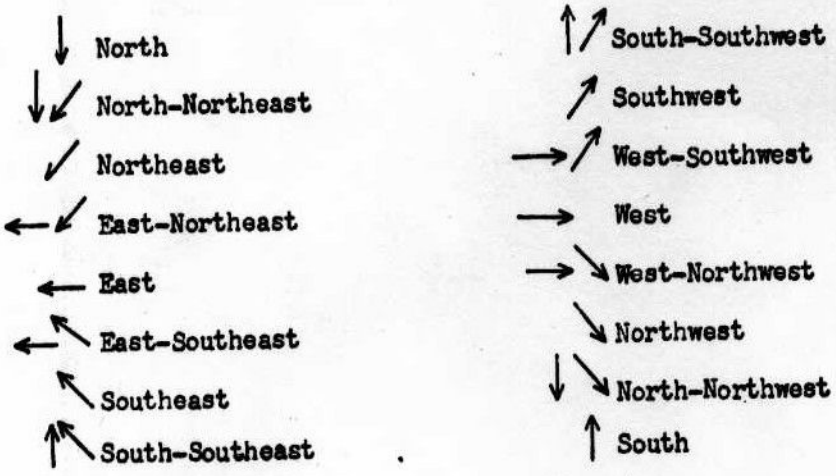

Figure 2.

Altimeter Setting

The altimeter setting always follows the wind data and is separated by a slant line. It is indicated by a group of three figures that represent the inches and hundredths of an inch of pressure involved. The altimeter setting is affected by the air pressure at various altitudes and the atmospheric conditions. Readings are obtained by using a mercury barometer. As conditions change, the mercury will rise or fall giving different readings in inches and hundredths of inches. It will never vary in great amounts and will always be near 30.00 inches. In decoding altimeter settings, remember two things:

1. Always place a decimal point before the last two figures.
2. Before the reported figures, always place a 2 or a 3, whichever will make the result closer to 30.00 inches of mercury.

Examples:

098 would be recorded as 30.98 inches.

998 would be recorded as 29.98 inches.

Remarks:

Following the altimeter setting and separated by a slant line is the "*remarks*" section of the teletype sequence in which the weather observer includes any information he wishes to send in addition to that provided for in the regular sequence.

Summary

Now that the weather report has been broken down, let's see what picture is presented from the sample report included earlier in this section.

"Cheyenne, Cheyenne, measured ceiling three hundred, overcast, visibility one half variable, moderate rain, fog, barometer one one five, temperature—four eight, dew point four six, wind east, one eight, altimeter two nine nine eight, ceiling variable two hundred to five hundred." Here is how it will appear:

Call letters	CYS
Type of ceiling	M
Height of ceiling	3
Sky condition	⊕
Visibility	1/2V
Weather	R
Obscurement to vision	F
Barometric pressure	115
Temperature	48
Dew point	46
Wind Direction	←
Speed	18
Altimeter setting	998
	Clg VRBL 2 to 5
Remarks	

Figure 3. Terminal Forecast Groups.

Introduction

From time to time, additional information in the form of a weather forecast will be added to the standard weather reports. This information usually consists of two groups of numbers with five numbers in each group. These groups are called "*terminal forecast groups.*" The forecast groups are added at the discretion of the weather station forecaster submitting the sequence.

Sample Forecast Group

Let's use the group 05164 as an example of a terminal forecast group. The first two figures will indicate the *ceiling height* in hundreds of feet. The third digit will denote the *visibility* in miles. The fourth digit will denote the *time in hours* from the present observation that the conditions given in the group will begin. The final digit will denote the *type of weather.* This is coded as follows:

0 No weather.
1 Obstruction to vision other than fog.
2 Frontal passage.
3 Strong gusty surface wind.
4 Fog.
5 Freezing precipitation.
6 Continuous rain.
7 Continuous snow.
8 Showers.
9 Thunderstorms at or within sight of the station.

Now, using the above information, the sample group 05164 would read, "Ceiling, five hundred, visibility one, phenoma forecast to begin six hours from the time of present observation, fog." If two groups are given, the time digit of the second group will be added to the time digit of the first group. Examples 05164, 10236. The time digit 3 in the second group would be added to the time digit 6 in the first group. This would indicate that the second forecast would begin 9 hours from the time of the original report.

WINDS ALOFT REPORTS

Introduction

As mentioned previously, wind information is a very important factor in the successful completion of a controlled mission in the AC & W System. For this reason, *winds aloft reports* will be received by the GCI Station. From the name of the report comes the answer as to what information is presented by such a report. The word "aloft" refers to the winds above the surface of the ground. These reports, therefore, will give information as to the speed and direction of winds at various altitudes.

A winds aloft report follows:

CYS 22 03211 3608 80212 0306 00000 22820 42725
62730 82835 08005 52945

Such a report will give information pertaining to the wind direction and speed at various altitudes. This follows the identifying call letters and time of report. Altitude readings

are taken at certain heights as indicated in the following table:

Level	Indicated
Surface	0
1,000	None
2,000	2
3,000	None
4,000	4
5,000	None
6,000	6
7,000	None
8,000	8
9,000	None
10,000	0
12,000	2
14,000	4
16,000	6
18,000	8
20,000	0
25,000	5
30,000	0
35,000	5
Etc	Etc.

Breaking the sample report into its various elements, the following pertinent information is obtained.

Call Letters and Time of Observation

As before, *station designators* or *call letters* will precede the report and will consist of two or three letters.

The next element, consisting of two figures, is the *time of observation*. Observations are made four times daily at 0400—1000—1600 and 2200 Greenwich Civil Time. Only the first two digits are used in the report. Conversion to the time zone in which the reporting station is located is necessary when using this report.

Five Figure Groups

In all five figure groups, the first figure will indicate the *altitude*. The first group after the call letter and time will always begin with a zero and indicates that this is the surface level. Observations are made at every 1,000 foot level up to 10,000 feet. However, only the even thousand foot levels are indicated. Above 10,000 feet, observations are made every 2,000 feet. Above 20,000 feet, observations are made every 5,000 feet.

The second and third figures in the five figure group will express the *direction* in degrees from which the wind is blowing. The wind direction is always expressed to the nearest ten degrees thus it will always end in zero. The zero does not appear in the report but must be supplied when the report is read. The figures 18 would indicate a wind from 180 degrees (a south wind). The figures 09 would indicate a wind from 090 degrees (an east wind).

The last two figures in each five figure group will always express the *velocity* of the wind in knots. The figures 02 would indicate a velocity to two knots. If the velocity reaches a speed over 100 knots, 50 is added to the wind direction figures and the velocity over 100 is indicated. Thus, if the figures 07541 would appear, it would indicate a wind from 250 degrees at 141 knots. A wind direction of 250 degrees would be shown by the figures 25. By adding the number 50 to 25, the result of 75 indicates a velocity over 100 knots. The figures 41 are added to 100 to give a velocity of 141 knots. When the velocity exceeds 200 knots, the same process is used except that the direction and velocity figures are separated by a slant line, as 075/41. This means that the wind is from 250 degrees, but at a velocity of 241 knots. No velocity exceeding 299 knots can be reported.

Four Figure Groups

In the four figure groups, the altitude figure is omitted. The altitude for this group is determined by referring to the next group in the sequence. If the first figure in the next group is 6, then the four figure group refers to the 5,000 foot observation.

Summary

When reading the sample report included at the beginning of this section over a telephone, it should be read as follows:

Item	Spoken
CYS 22	"WINDS ALOFT REPORT, CHEYENNE, ONE FIVE ZERO ZERO OBSERVATION" (CONVERTING TO MOUNTAIN STANDARD TIME).
03211	(NOT SPOKEN.)
3608	"SEVEN THOUSAND, THREE SIX ZERO DEGREES, EIGHT."
80212	"EIGHT THOUSAND, ZERO TWO ZERO DEGREES, ONE TWO."
0306	"NINE THOUSAND, ZERO THREE ZERO DEGREES, SIX."

Item	*Spoken*
00000	"TEN THOUSAND, CALM."
22820	"TWELVE THOUSAND, TWO EIGHT ZERO DEGREES, TWO ZERO."
42725	"FOURTEEN THOUSAND, TWO SEVEN ZERO DEGREES, TWO FIVE."
62730	"SIXTEEN THOUSAND, TWO SEVEN ZERO DEGREES, THREE ZERO."
82835	"EIGHTEEN THOUSAND, TWO EIGHT ZERO DEGREES, THREE FIVE."
03005	"TWENTY THOUSAND, THREE ZERO ZERO DEGREES, ONE ZERO FIVE."
52945	"TWENTY FIVE THOUSAND, TWO NINE ZERO DEGREES, FOUR FIVE."

The surface direction and velocity shall be omitted from radio telephone transmission of all winds aloft reports, since they are primarily intended for use of the meteorologist.

When the winds aloft report is not available due to fog, snow, instrument trouble, etc., an appropriate announcement shall be spoken. Example:

"Ellensburg winds aloft report not available, snowing."

One of the most important factors governing the flying of aircraft is weather. It is of prime importance that you become thoroughly familiar with all types of reports presented in this section. Competency at interpreting weather symbols can be acquired only by constant practice and sincere application. It is your responsibility to receive and post all weather reports accurately and promptly, for the controller depends on information posted by you on the weather status board. At the same time, the pilot is depending upon the controller to provide him with accurate information so that a successful interception can be made and a safe return to the home base made possible by accurate weather information.

QUESTIONS

1. Why is weather so important in the AC&W system?
2. Where are weather reports posted in a GCI station?
3. The letter M preceding the ceiling in a weather report will designate what?
4. What is the symbol for a clear sky?
5. How would you designate an overcast condition?
6. What is visibility as used in weather reports?
7. How would you designate foggy conditions in a weather report?
8. In what respect are temperature and dew point related?
9. Wind direction is designated by what means?
10. Will altimeter setting go above 30.00 inches of mercury?
11. Of what value are winds aloft reports?
12. In all weather reports what two items always precede the actual report?
13. What is the difference between altimeter setting in inches of mercury and millibars?
14. Why is the time of observation important to the controller?
15. Where do weather reports originate?

LOGS AND STATUS BOARDS

Scope: Logs and status boards and their uses.
Student Objective: To become familiar with and learn to use properly all logs and status boards and any other written records used in normal AC & W operation.

INTRODUCTION

Information concerning the various phases of AC&W operations must be made a matter of record for future reference. Similarly, the information must be posted for visual reference at the time it is received by the various stations. Therefore, several forms of *logs* are employed for recording information and several types of *status boards* are used for posting information.

In addition to your duties as a scope operator and plotter, you will be required to fill out the different forms and post information on the various status boards. By now, you are fully aware of the fact that ACCURACY, SPEED and NEATNESS are prime factors in AC & W operations. It follows, therefore, that these three factors are also important in recording and posting information. When someone desires information from logs or status boards, he does not have time to waste in decoding inaccurate and scribbled data.

RECORDER'S LOG

One of the more common logs is the Recorder's Log, an official record of all information on tracks passed by the teller. Directives will usually specify the length of time that the log will be retained on file and the method of disposal.

When the recorder is relieved he will indicate the time and the person relieving him on the line immediately following the last record made.

The recorder will sign his log thereby taking responsibility that the record was logged by him.

The illustrated form on page 88 is an example of the Recorder's Log. All logs in blank form are classified as *RESTRICTED*; filled out, *CONFIDENTIAL*.

Headings shown on the page are explained as follows:

1. *Page No.*—Indicates the page number of the log.

2. *Teller.*—Indicates the name of the person who passed this information.

3. *Page Starting Time.*—Indicates first entry time on that page.

4. *Page Finishing Time.*—Indicates final entry time on that page.

5. *Installation.*—Indicates the station at which the recording is accomplished.

6. *Date*—Indicates the date by day, month, year.

7. *Designated Station Track No.*—Indicates the station originating the track (A) and the number of the track (55).

8. *Grid Reference*—Indicates the section of the map in which the track is located (KN).

9. *Grid Coordinate*—Indicates the exact position on the map in which the track is located (5624) (Use either #9 or #10).

10. *Azimuth and Range*—Indicates the exact position on a scope or map in which the track is located (270 at 10). Used only in certain type operations.

11. *Direction and Number of Aircraft*—Indicates the direction of track (N) and the number of aircraft in that flight (5).

12. *Identification*—Indicates the identification of the track (H).

13. *Height*—Indicates the height of the target to the nearest 1000 feet.

14. *Time*—Indicates the time (hours, minutes) of receipt of recorded information. It is recorded to the nearest minute.

15. *Remarks*—Indicates the speed or any other pertinent information not listed.

16. *Signature*—Indicates the name of the person who recorded the information.

Note: In all figures, the number (1) (2) etc., are used merely for explanatory purposes.

MONITOR'S LOG

Another common type of form is the Monitor's Log, the official record of all transmissions intercepted on designated communications. As before, directives will usually specify the length of time that the log will be retained on file and the method of disposal.

When the Monitor on duty is relieved, he will indicate on the page the time of relief and the name of the Monitor relieving him on the line following the last report.

The Monitor reporting on duty indicates time and name of Monitor he relieves *or* shows in initial entry, the time monitoring on his channel was resumed following a shutdown.

An example of a Monitor's Log is found on page 89.

Headings shown on the page are explained as follows:

1. *Installation*—Show here the station at which the monitoring is being accomplished.

2. *Channel*—Show by the alphabetical designation (2a) of the channel being monitored (A), and the frequency (26) on which the channel is operating. (95.mc).

3. *Date*—Show the date by day, month and year. (26 Nov. 1950).

4. *Page No.*—Show the page number of the Log (3). These should be consecutive by periods, either day, weeks or months.

PAGE NO. (1) RECORDER LOG STARTING TIME (3)
FINISHING TIME (4)
INSTALLATION (5)
TELLER (2) DATE (6)

DESIGNATED STATION TRACK NO.	GRID REFERENCE	GRID COORDINATE	AZIMUTH AND RANGE	DIRECTION AND NO. A/C	IDENTIFICATION	HEIGHT	TIME	REMARKS
A55 (7)	KN (8)	5624 (9)	270 AT (10) 10	N5 (11)	H (12)	28 (13)	0954 (14)	SPEED 370 (15)

(16)
SIGNATURE OF RECORDER

Figure 1.

5. *Time*—Show time (hours and minutes) of receipt of the transmission monitored (0847).

6. *From*—Show the station making the transmission. (Brookley).

7. *To*—Show the station to which the transmission is directed. (Keesler).

8. *Text*—A complete accurate and legible record of the transmission. (Ten aircraft departed Brookley AFB 0845, ETA Keesler 0910).

9. *Signature*—Monitor on duty signs each page of the log recorded by him (John Doe).

MONITORS LOG

INSTALLATION (1) KEESLER

DATE (3) 26 NOV. 1951

CHANNEL (2A) A (2B) 95 mc.

DESIGNATION FREQUENCY

PAGE NO. (4) 3

TIME	FROM	TO	TEXT
(5)	(6)	(7)	(8)
0847	BROOKLEY	KEESLER	TEN AIRCRAFT DEPARTED BROOKLEY AFB, 0845, ETA KEESLER 0910.

(9) John Doe

SIGNATURE - MONITOR ON DUTY

Figure 2.

FLIGHT PLAN LOG

You have learned that one of the means of identification in the AC&W system is the use of flight plans. Information concerning flight plans is received by the GCI stations from Military Flight Service through the dissemination clerk in the ADCC. A copy of all flight plans filed is filed with Military Flight Service. The information called in by Military Flight Service is recorded on a Flight Plan Log.

As with the other logs, directives will usually specify the length of time the logs should be retained and the method of disposal.

Page 90 shows an example of a typical flight plan log.

Headings on the flight plan log are explained as follows:

1. *Track No.*—Track number assigned when picked up by radar (Track #23).

2. *Type A/C*—Indicates type of aircraft (B-29).

3. *Call Sign*—Identifying call letter of aircraft (AF–8395).

4. *Dept. Point*—Point of departure of aircraft (Mitchell).

5. *Dest.*—Destination of aircraft (Keesler).

6. *Alt.*—Altitude in thousands of feet of aircraft (25).

7. *ATD*—*A*ctual *T*ime of *D*eparture of aircraft in hours and minutes (0917 Z).

8. *ETA*—*E*stimated *T*ime of *A*rrival at destination of aircraft in hours and minutes (1700 Z).

9. *MFS Initials*—Initials of person giving report in Military Flight Service (S. C.).

10. *Change ETA*—Any change in the estimated time of arrival will be recorded in hours and minutes (1730 Z).

11. *Initial Plot and Time*—The initial plot is recorded in azimuth and range: (040°—180), time is recorded in hours and minutes (1630 Z).

12. *GCI Initials*—Initials of person receiving report in GCI station (C. S.).

13. *Intercept AC*, *Intercept Point Azimuth-Range*—The flight making the interception (if one occurs), will be recorded. The intercept point will be recorded in azimuth and range. (None—no intercept made).

14. *IFF No.*—The IFF code number is recorded. If no IFF is reported, that fact will be recorded (4).

15. *Remarks*—Any information for which space is not provided in the log is recorded in this column (3 aircraft).

FLIGHT PLAN LOG

TRACK NO.	TYPE A/C	CALL SIGN	DEPT POINT	DEST	ALT	ATD	ETA	MFS INITIALS	CHANGE ETA	INITIAL PLOT TIME	GCI INITIALS	INTERCEPT-AC INTERCEPT-PT. AZIMUTH-RANGE	IFF NO.	REMARKS
23	B-29	AF 8395	MITCHEL M	KEESLER BIX	25	0917 Z	1700 Z	S.C.	1730 Z	040-180 1630 Z	C.S.	NONE – NO INTERCEPT MADE	4	3 AIRCRAFT
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)

Figure 3.

MISSION SUMMARIES

At the completion of a mission, it will usually be necessary to prepare a mission summary. Data to be included in the report will be compiled from various sources. A mission summary form follows.

In making out the report, the Radar Data, (part A) will be obtained from the recorder logs. Parts B and C of the report will also be obtained from recorder logs. In Part B, the time of first and last plots, and the total

number of plots received will be given for both the intercepting aircraft and hostile aircraft. If more than one flight is scrambled, the above information will be recorded for all flights.

Part D of the summary will be filled in from data obtained from both aircraft status board and recorder logs. Such information is required for all flights scrambled.

Under the Controller's remarks, pertinent information concerning the mission and not included in the regular form will be recorded.

FORM FOR MISSION SUMMARIES

A. Radar Data:
1. Initial plot by station no.
2. Time of initial plot.
3. Range of initial plot.
4. Azimuth of initial plot.
5. Grid coordinate of initial plot.
6. Distance in miles track carried by surveillance system after IP.

B. 1. Plotter action—bomber—fighter:
a. Time of first plot.
b. Time of last plot.
c. Number of plots received.
2. Different sets of fighters.
a. Time of first plot.
b. Time of last plot.
c. Number of plots received.

C. Movement Identification:
1. Time of first plot on board.
2. Time track established.
3. Time identified (Hostile).
4. Distance in miles at time of first plot.

D. Intercept:
1. Type.
a. Scramble order given.
b. A/C airborne.
c. Hostile altitude.
d. Type of approach (head-on, cut-off, tail chase).
e. Interception-grid position.
2. Type:
a. Scramble order given.
b. A/C airborne.
c. Hostile altitude.
d. Type of approach.
e. Interception-grid position.

E. Controllers Remarks.

AIRDROME WEATHER STATUS BOARD

In the section on weather, you were told that you would be required to post weather information received by the AC&W stations. Such information is posted on the Airdrome Weather Status Board.

The majority of boards used for posting information are either a transparent board, edge lighted to provide illumination or a blackboard type. The information posted on the weather status board gives the controller an accurate and up-to-the-minute picture of the weather conditions. By referring to the information posted on the board, he can direct his fighters through or around bad weather.

Headings on the Weather Status Board are as follows:

1. *Airdrome*—Name of Airdrome.
2. *Runway Length*—Distance in feet.
3. *Airdrome Status*--Closed instrument or contact.
4. *Ceiling*—Ceiling height in 100 feet.
5. *Visibility*—Miles in number.
6. *Clouds %*—Coverage Symbol. Indicated by a sky condition symbol.
7. *Base*—100's of feet.
8. *Top*—100's of feet.
9. *Wind Direction*—Arrow symbol.
Wind Velocity—Miles per hour.
10. *10,000*—Arrow symbol and knots per hour.
11. *20,000*—Arrow symbol and knots per hour.
12. *30,000*—Arrow symbol and knots per hour.
13. *Temperature*—Degrees Fahrenheit.
14. *Dew Point*—Degrees Fahrenheit.
15. *Altimeter*—Inches of mercury.

246766°—53——7

HEIGHT TOTE BOARD

Another board you will use for posting information is the Height Tote Board used to display information concerning tracks on a vertical board in the GCI Station. Each track on the vertical plotting board will be listed on the height tote board. Information such as the number of aircraft, identification, height and speed will be provided for each track.

Illustrated is an example of a height tote board.

1. *Track No.*—Identifies station which made initial pickup and station's track number (22).

2. *Number of A/C*—Number of aircraft in the track (10).

3. *Identification*—Friendly or hostile. If hostile (H) : If friendly code number (C–1).

4. *Height*—Altitude of aircraft in thousands of feet (11).

5. *Speed*—Speed of aircraft in the track (220).

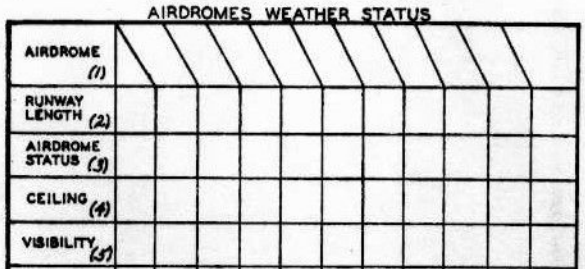

Figure 4.

HEIGHT TOTE BOARD

Track No. (1)	Number of A/C (2)	Identification (3)	Height (4)	Speed (5)	Track No.	Number of A/C	Identification	Height	Speed
22	10	H	11	220					

ELECTRONIC STATUS BOARDS

The Electronic Status Board is used to display information concerning communications and radar operational equipment status.

By referring to the Communications Air Ground Board, the Controller will know what communications are available for controlling a mission.

By referring to the Communications-Telling-Reporting-Others Board, the Air Surveillance Officer will know what telephone equipment is available for operations.

Finally by the use of the Radar Board, the Chief Controller or Senior Controller can tell just what radar equipment is available for operation.

Illustrated is an example of the Electronic Status Board for Communications Air-Ground.

1. *Station*—Code name or designation of the Station.

2. *Equipment*—Name and type of equipment.
3. *In*—Operational status of equipment. "X" indicating in operations.
4. *Out*—Operational status of equipment. C–3 indicates condition 3 or some type of abbreviated code giving information as to the type of trouble encountered.
5. *Remarks*—Additional information not previously covered.

Also illustrated are Electronic Status Boards for "Communications - Telling - Reporting-Others" and a Status Board for Radar.

CONCLUSION

From time to time, you may encounter some log or type of board that has not been illustrated and explained in this section. As a result of what you have learned here, you should encounter little or no difficulty when confronted with such a situation. If you will always be ACCURATE, utilize SPEED, be NEAT, then nothing more can be expected in your work for recording and posting information.

ELECTRONIC STATUS BOARD

COMMUNICATIONS AIR-GROUND

STATION	EQUIPMENT	IN	OUT	REMARKS
ABLE	SCR 399	X		
BAKER	SCR 188		C-3	DUE BACK 1400

COMMUNICATIONS TELLING-REPORTING

STATION	EQUIPMENT	IN	OUT	REMARKS
GEORGE	SCR 399	X		

RADAR

STATION	EQUIPMENT	IN	OUT	REMARKS
ABLE	AN/TPS-1B		C-4	DUE TO DAMPNESS
BAKER	AN/CPS-5	X		

Figure 5.

QUESTIONS

1. List the types of logs and status boards discussed in this section.
2. Who fills out the logs and posts information on the status boards?
3. For what purpose is the Recorder's Log used?
4. Under what security classification do blank forms fall? Filled out?
5. Why must the Recorder sign the Recorder's Log?
6. For what purpose is the Monitor's log used?
7. From whom does the dissemination clerk in the ADCC receiver flight plan information?
8. Why are flight plan logs kept in the GCI?
9. What report must be filled out upon the completion of a mission?
10. For what purpose is the Airdrome Weather Status Board used?
11. Who is concerned with the information posted on the Airdrome Weather Status Board?
12. For what purpose is the Height Tote Board used?
13. What specific information is posted on the Height Tote Board?
14. What is the purpose of the Electronic Status Board?
15. What three (3) factors must be utilized in filling out logs and posting information on status boards?

WORLD GEOGRAPHIC REFERENCE SYSTEM

Scope: World Geographic Reference System.
Student Objective: To be familiar with the "Georef Grid" and the breakdown and time changes that occur within the system.

INTRODUCTION

Behind a door marked "Secret" in a large private room in London, England, sometime in 1950, a group of imposing looking men were gathered around a circular conference table. Each time that someone spoke, a secretary hurriedly recorded the words. One could tell by the grim lines that were visible on every countenance that an important meeting was in progress. The room was encased with charts and maps and by the pinpoints covering the walls it was evident that the conversation was dealing with world wide affairs. Their discussions were indeed world wide. For this was a meeting of the Western Allied leaders and world wide strategy was being planned. To these men it had to be grim work, because the decisions made here could in the future decide life or death for the Free World. A certain plan would be presented. These great men, trained for this work all their lives, would immediately start discussing it. Portions of the idea would be modified to suit all, and then that particular plan would be adopted. It was a very slow and tedious job. A job where mistakes could be costly.

One of the biggest jobs of these world leaders was standardization of certain methods being used by each country involved. The need was very evident, because if all the Allied Powers were to use the same methods in doing a particular operation, they could operate together much more closely and efficiently.

At one particular session of this gathering, the need for a method of more exactly and efficiently pinpointing certain targets anywhere on the earth's surface was presented.

Ideas were gathered, discussed and modified until finally a simple, more complete and very logical method was devised. This method came to be known as the *WORLD GEOGRAPHIC REFERENCE SYSTEM* or in short "*GEOREF*" *GRID*. (Its main use is the transferring of targets picked up by Radar, from one section to another thus giving the Allies world wide control of aircraft and advanced information to prevent being taken by surprise).

This new "GEOREF" GRID was simple because it consisted of only one major breakdown and two subdivisions of the earth, whereas the old method contained seven major breakdowns and five subdivisions. It was very easy to read and quickly adaptable to all needs.

The implementation of this type of grid was very logical from the beginning. This was true because it was based upon Latitude and Longitude, thereby making it applicable to any map of any nation. Also in the old type grid the furthest points North and South were to the 80° North and South Latitudes, thus leaving the two poles lacking in coverage. The new "GEOREF" GRID gives complete coverage from 90° North Latitude to 90° South Latitude.

DEFINITIONS

Before we go into the actual method of breaking down the earth's surface, let us first take a look at a few simple definitions. All of us have heard the expressions Latitude and Longitude. Now we will learn actually what they mean and are and how they are used.

Latitude

Latitude is defined as imaginary lines, runing East and West around the earth's surface, but measuring distances North and South.

Longitude

Longitude is defined as imaginary lines running North and South over the surface of the earth, but measuring distances East and West.

By combining two of these lines, one of Latitude, and one of Longitude, you will have a point where they cross. So if you were looking for the Latitude and Longitude of New Orleans, Louisiana, you would look at 030° North Latitude, follow this line until you come to 090° West Longitude, and where they cross will be the location of this city. See illustration, page 96.

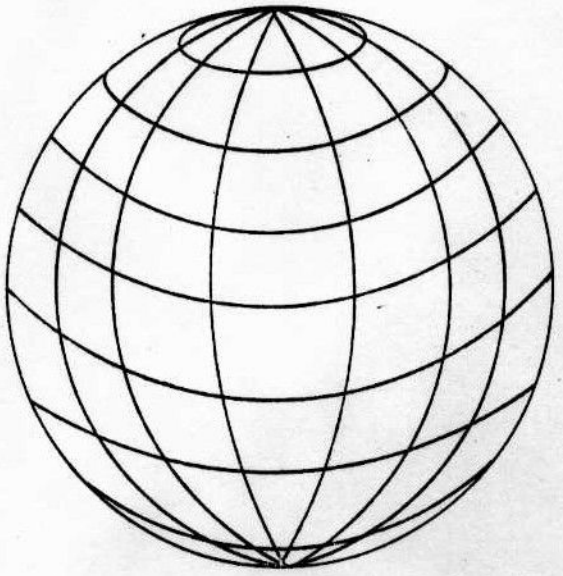

Figure 1.

"GEOREF" GRID 1st BREAKDOWN

The point of origin of this grid will always be at the International Date Line and the South Pole (180th Meridian and 090° South Latitude). Picture before you a map of the world, laid out flat with the 180th or Prime Meridian facing you. Starting here at the point of origin and working to the right, the world is marked off in every 15° of Longitude. The markings will run thusly 180°—165°—150°—135°, etc. You will continue to mark off in this manner until you circumnavigate the globe arriving back at the International Date Line. When you have completed this first step, you should end up with twenty-four 15° breakdowns around the earth. The next step will be to letter each of the twenty-four breakdowns A through Z omitting the letters I and O. These two are omitted because of their similarity to the numbers 1 and 0. See illustration, page 97.

The next step will be to start back at the 180th Meridian and move down to the South Pole. At this point we again break down the earth into 15° sectors moving North along the International Date Line. We letter these sections in the same way, A through M, omitting again the letter I.

By extending lines of Latitude and Longitude at each breakdown, clear around the earth, we will end up with the first breakdown 15° squares laid out upon the earth's surface. It will be noted at this time that due to the fact that the earth is a sphere, perfect squares will not be formed at all points. The closer to the poles that you will go, the more distortion you will have. See illustration, page 97.

In order to identify each block formed by the lines of Latitude and Longitude, we will now use the letter designation running along the Latitude and Longitude axis. Starting with the A Latitude square and working to the right we will always have the first letter or reference of each square. Then going up to the square we wish to designate and reading the letters identifying the breakdowns running North we have our second letter reference. Therefore, the block to the right of the 180th