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AIR RAID WARNING SYSTEM



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CIVILIAN AIR RAID WARNING SYSTEM

Prepared under the supervision of the Chief Signal Officer, U. S. Army, with suggestions of the National Technological Civil Protection Committee.

FOREWORD

The effectiveness of the entire scheme of civilian defense depends largely upon the effective organization and functioning of the civilian air raid warning system.

An understanding of how, when, and where the military aircraft warning service is coordinated with the civilian air raid warning system and of how the latter functions with the whole scheme of civilian defense is essential to the successful organization and operation of any of these defense agencies.

In this connection attention is particularly directed to the civilian defense pamphlets "Blackouts" and "Fire Protection."

The data and information contained herein are based upon the latest and most authoritative information available upon the date of publication, and are intended as helpful suggestions, many of which may be modified and adapted to each local situation and to specific installations. However, care must be taken to be certain that no modification of essential procedure is introduced.

In no sense should issuance of this pamphlet be construed as a signal to start work immediately upon installations. Using the material in this pamphlet as a guide, studies of existing installations and plans for extending or adapting them can be initiated by responsible agencies. The Office of Civilian Defense will announce when the actual installations should be made.

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Chapter I.—GENERAL

1. PURPOSE.—This pamphlet is furnished primarily as a guide to aid local civilian defense organizations in the proper and efficient discharge of their duties with the air raid warning service in the event of air raids, and its purpose is twofold:

a. To furnish a set of instructions to local civilian defense organizations for the installation and operation of a civilian air raid warning system.

b. To explain how the civilian air raid warning system will be coordinated with the military aircraft warning service.

2. DEFINITIONS.

a. **Air Raid.** An attack or threatened attack upon terrestrial objectives by enemy aircraft.

b. **Civilian Air Raid Warning System.** A system organized to give warning by messages and signals of the approach of enemy aircraft in order that steps may be taken in ample time to preserve life and adopt such measures of passive defense as may be deemed necessary.

c. **Blackout.** Noun—A condition under which all or certain lights are extinguished or effectively screened. Verb—To extinguish or screen lights for this purpose.

d. **Air Defense Region.** The basic territorial division for air defense. Each such region is served by an information center.

e. **Warning District.** A subdivision of the air defense region. It is the basic territorial division for the application of air raid warning messages.

f. **Warning Sub-district.** A city, community, or subdivision within a warning district.

g. **District Warning Center.** The agency which receives and acknowledges air raid warning messages originating in information or filter centers.

This agency then distributes the air raid warning messages to the warning sub-districts.

h. **District Toll Office.** The principal telephone exchange in a warning district.

i. **Sub-district Toll Office.** A minor telephone exchange in an air raid warning district which aids in distributing messages to recipients.

j. **Information Center.** The military installation in each air defense region to which all reports of approaching enemy aircraft are submitted and which takes necessary action and notifies the proper agencies.

k. **Filter Center.** Filter centers receive and evaluate reports of hostile and friendly aircraft and immediately transmit the evaluated information to information centers. In some cases filter centers are control centers for active defense troops and distributing centers for warnings to district warning centers in their filter areas.

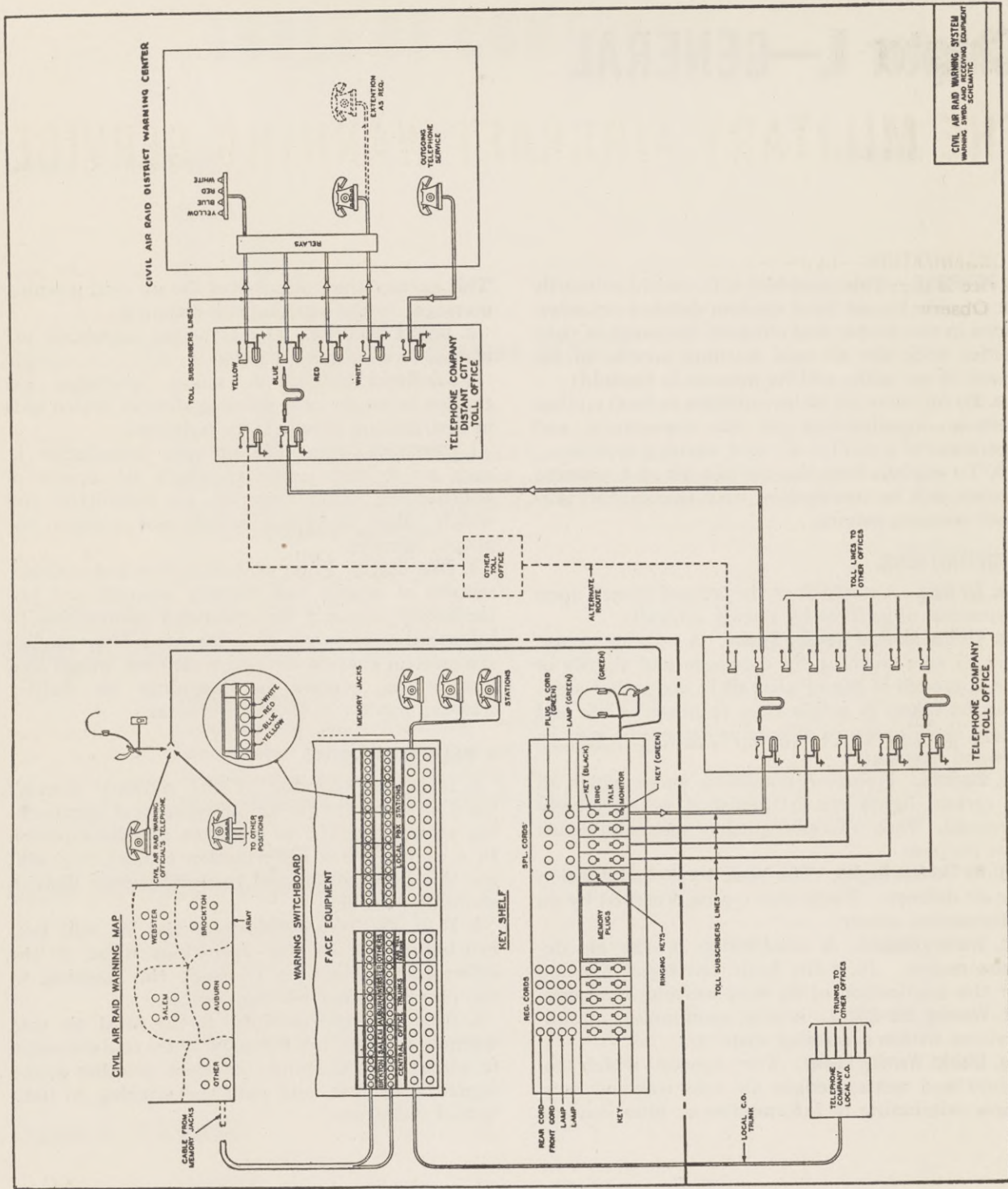
3. RESPONSIBILITIES.

a. It is the function of the military aircraft warning service to gather information of approaching enemy aircraft, to transmit this information to a central point (information center), to evaluate this information and to decide which district should be warned.

b. It is the responsibility of the air raid precaution officer in the operations room at the information center to transmit the warning to the proper district warning center.

c. It is the responsibility of the local air raid warning officials, upon receipt of air raid messages to sound local warnings on sirens or other sound signaling devices, and pass the warning to individual recipients.

The Civilian Air Raid Warning System



CIVIL AIR RAID WARNING SYSTEM
WARNING & AIR RAID RECEIVING STATION
SCHEMATIC

Figure 1

Chapter II.—

THE MILITARY AIRCRAFT WARNING SERVICE

4. ORGANIZATION.—In general the aircraft warning service is organized as follows:

a. Observation stations are established to observe and report the approach of all enemy aircraft.

b. An information center is established to which reports from observation stations are transmitted directly or through filter centers where these reports are charted and necessary action taken. (See par. 7.)

c. A communication system is provided consisting of telephone, telegraph printer, radio, or any other means of signal communication connecting these various agencies together so as to afford rapid and accurate intercommunication.

5. FUNCTIONS.—One of the functions of the aircraft warning service is the timely transmittal of warnings of approaching enemy aircraft to affected localities. The information center will selectively transmit warnings to the warning districts at such time prior to the arrival of the hostile aircraft as will permit adequate dissemination of warning and proper measures for meeting the threatened attack. The information center also informs all previously warned agencies when the threat of air attack has passed.

6. EQUIPMENT IN THE ARMY INFORMATION CENTER.—The telephone equipment provided in each Army information center for use in transmitting air raid warning messages will normally consist of the following:

a. A hand telephone set or operator's telephone set for the air raid precaution officer. If more than one warning switchboard position is provided, keys are furnished to connect this telephone set to the different positions.

b. An air raid warning map within view of the air raid warning official. This map covers the area of all districts under the information center and is equipped with four lamps colored yellow, blue, red, and white for each warning district. It will be specially prepared for each information center and its size will depend on the number of districts served.

c. An air raid warning switchboard of sufficient capacity to handle all air raid warning calls without delay. This switchboard will be connected to the appropriate telephone operating centers (see Fig. 1). The installation and the operation of the "Air Raid Warning Switchboard" is a responsibility of the Army.

d. Extension lines from this warning switchboard to nearby telephones. One of these could be located near the air raid precaution officer for emergency use.

e. A line from the telephone circuit of each warning switchboard position directly to the telephone set of the air raid precaution officer.

f. Wiring between the jacks in the warning switchboard and the lamps in the warning map.

7. PROCEDURE AT THE INFORMATION CENTER AND INFORMATION CENTER EXCHANGES.

a. Air raid warning messages originate in the operations room of the information center or filter center, where all information in regard to the movement of hostile airplanes over the region is received and evaluated.

b. The air raid precaution officer transmits the warning to the proper district warning centers.

Insofar as possible, the warnings will be transmitted to the district warning centers in sufficient time to allow its dissemination to the lowest using agency prior to the arrival of hostile aircraft over the warning district.

(1) To illustrate the method of transmitting a message, assume that a Red air raid warning message originates in the Alpha Information Center to warn the Beta District of the imminent approach of hostile airplanes.

(a) The telephone orderly in the Alpha Information Center lifts his handset, and when the switchboard operator answers, announces, "Beta—red." (An air raid message is passed by first announcing the name of the district to be warned, followed by the color of the type of air raid warning message.)

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(b) While the connection is being completed, the telephone orderly fills in the necessary information on a form colored to correspond to the type of warning issued (see Figure 2).

AIR RAID WARNING—RED	
<i>Exchange to be advised</i>
<i>Time message dispatched</i>
<i>Initials of dispatcher</i>

Figure 2

This form when completed is filed with the information center records.

(c) Upon receipt of the message, the operator at the information center air raid warning switchboard connects an idle cord to the jack in the face of the switchboard which is designated as "Beta—red." This, together with the operation of the "talk" key, lights the line lamp in the Alpha Toll Central Office and also lights a red lamp on that part of the warning map representing the Beta District. This map is within view of the air raid precaution officer. When the Alpha toll operator answers, the warning switchboard operator announces "Air raid warning—Beta—red." Then the Alpha operator establishes a regular toll connection to Beta over any one of the available inter-toll trunks. The Beta inward operator then completes the connection to a jack in the face of her switchboard which is clearly designated "Beta—red." The circuit associated with this jack is multiplied before all inward operators and it terminates in the message receiving equipment in the district warning center in Beta.

(d) When the Beta inward operator rings on this line to the Beta District Warning Center, a bell is rung and a lamp is lighted in the center. The lamp is colored the same as the color with which the toll office jack is designated, which is, in this case, red. The air raid warning officer in the district warning center answers the call by stating "Beta—red." When the switchboard operator on the information center air raid warning switchboard hears this answer he replies "Right, Warning Operator No. ———," unless the answer is erroneous, in which case he corrects the message. Then the switchboard operator at the information

center disconnects the cord from the memory jack and restores the associated talk key. However, he inserts a memory plug in the jack from which the cord was disconnected for the purpose of keeping lighted the lamp in front of the air raid precaution officer, and also for the purpose of providing a record of the transmitted warnings, which is visible to himself.

8. COORDINATION WITH THE CIVILIAN AIR RAID WARNING SYSTEM.—In order that the civilian air raid warning system may function properly and efficiently, close cooperation and coordination must be maintained between the military aircraft warning service and the civilian air raid warning organizations.

When the appropriate military commander decides that an air defense area is vulnerable to bombardment, he will alert that area, even though there appears to be no immediate threat of enemy action. A district is alerted when it is considered that the enemy is capable of delivering an effective attack upon it.

(Note.—Since the "Alert" requires preliminary measures of readiness on the part of all air raid precautions agencies, such as first-aid stations and fire and police departments, it is applicable to the situation by day as well as by night, and may be intermittent or continuous over long periods.)

Prior to the time of being alerted there need be no lighting restrictions imposed upon an area. However, that area should have made preparations to put into effect the lighting restrictions required by the various warnings.

An area which has been alerted will be blacked out at night except for the following:

- (1) Essential industry and transportation will be allowed sufficient lights for efficient operation.
- (2) Street lights will be kept on but will be properly screened and of such low power that they cannot be seen from the air.

When the appropriate military commander finds that the area is not likely to be subject to aerial bombardment he will so inform the civilian air defense authorities in the area.

9. AIR RAID WARNING MESSAGES.—The types of air raid warning messages are as follows:

a. **Air Raid Message—Yellow—Preliminary Caution.**—This warning is a message issued by telephone to essential industry and transportation which have been allowed special lights. It serves to notify them that they must get ready to obscure their special lights upon a Blue or Red warning. This warning

AIR RAID WARNING SIGNALS





COLOR	NAME OF MESSAGE	TEXT OF MESSAGE PASSED BY TELEPHONE	DISTRIBUTION AND MEANING	SIGNAL
	PRELIMINARY CAUTION	"AIR RAID MESSAGE - YELLOW"	CONFIDENTIAL - TO LIMITED NUMBER OF RECIPIENTS WHO TAKE PRECAUTIONARY AND UNOBTRUSIVE MEASURES TO BE READY TO ACT INSTANTLY THE ACTION WARNING IS RECEIVED.	TELEPHONE CALL ONLY
	2 ND STAGE OF CAUTION	"AIR RAID MESSAGE - BLUE"	CONFIDENTIAL - TO LIMITED NUMBER OF RECIPIENTS SAME AS ABOVE AND AS A "LIGHTS WARNING."	TELEPHONE CALL ONLY
	ACTION WARNING	"AIR RAID WARNING - RED"	PUBLIC WARNING - MEANING THAT AN AIR RAID MAY OCCUR WITHIN A SHORT TIME.	TELEPHONE CALL PLUS PUBLIC AIR RAID WARNING INSTRUMENT.
	ALL CLEAR	AIR RAID MESSAGE - WHITE"	CIRCUMSTANCES NECESSITATING THE PRELIMINARY CAUTION NOW PASSED. ALSO, IF OTHER WARNINGS HAVE BEEN SENT THIS INDICATES "ALL CLEAR"	TELEPHONE CALL. PUBLIC WARNING ALSO IF "RED" IS STILL IN FORCE.

Figure 3

may also be issued to places where action in connection with air raid precautions require a long time to put into effect.

b. **Air Raid Message—Blue—Lights Warning.**—This warning is a message issued by telephone to essential industry and transportation. It means that raiders are expected to pass over that area. It serves to notify essential industry and transportation that they must obscure their special lights at once. If, as may happen, a Red warning is given without a prior Blue warning the special lights must be obscured at once.

c. **Air Raid Message—Red—Action Warning.**—This warning, upon which a public warning shall be given, is issued by all planned means of communication. It means that an air raid may occur in five minutes and that immediate action in regard to air raid precautions is to be taken.

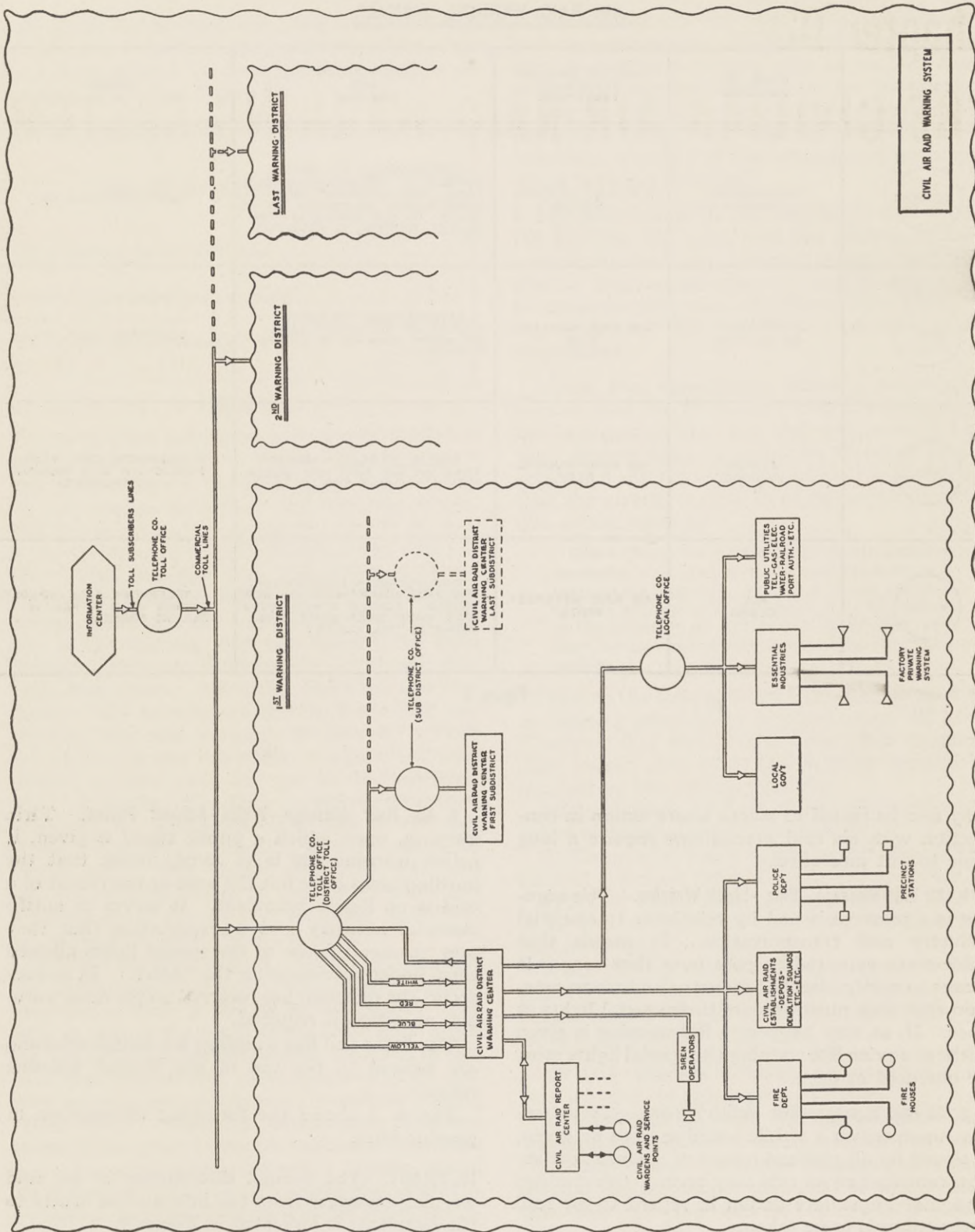
d. **Air Raid Message—White—Raiders Passed.**—This warning, upon which a public signal is given, if action warning Red is in force, means that the hostile planes have left the area or the threat of a raid is no longer imminent. It serves to notify essential industry and transportation that they may resume the use of the special lights allowed them under provisions for the "Alert." If, as may occur, the recipient has received no previous warning, no action is required.

The Yellow and Blue warnings are confidential and are limited to the use of the district warning center.

Figure 3 shows the foregoing information in graphic form.

10. **CHART.**—The normal distribution of air raid warning messages from the information center to the recipients is indicated in Figure 4.

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Figure 4

Chapter III.—

THE CIVILIAN AIR RAID WARNING SYSTEM

11. ORGANIZATION.

a. This section details the standard procedure to be adopted in connection with the distribution of air raid warning messages from the information center to their final distribution to authorized recipients.

b. The United States has been divided into air defense areas and each such area is, or will be, subdivided into warning districts. The warning district is the unit of the civilian air raid warning system, and a message transmitted to any warning district will always apply to the whole of that district and to that district only. It is important that a message for one warning district should not become known to persons in another district. Messages will be dispatched from the point of origin to the warning districts, one at a time, as each district becomes threatened by the progress of a raid.

c. (1) (a) The telephone will be the principal means of communication, supplemented by commercial telegraph service, telegraph printer service, and messengers. While telephone cables may be damaged by bombs, it is not thought that widespread breakdown of the telephone service need be feared; emergency repairs can be effected quickly. The local telephone manager should be informed of the telephone numbers of the lines which are essential to the air raid warning system so that if they are broken, priority may be given to their repair.

(b) In many areas extensive police systems are in operation, the lines terminating on a switchboard at a police station and providing telephonic communication with boxes in various parts of the area concerned. It is essential that the use of the system for air raid warning purposes should not prejudice the efficiency of police communications either in peace or in war. It follows that an enlargement of the police switchboard will be needed if it is to be included in the air raid warning system for other than police activities.

(c) The use of fire alarm systems for air raid warning purposes is to be deprecated as, even though they afford telephone facilities, their use for purposes other than fire calls might embarrass fire operations.

(d) Although radio has obvious advantages for certain purposes, especially for communicating with mobile units, its use is subject to many limitations and must be confined to the special purposes for which it is essential.

(2) (a) The boundaries of the warning districts will be clearly defined and will be confined to a relatively small area in order to restrict the warning messages to a threatened area so as to avoid spreading anxiety and dislocating normal activity more than is absolutely necessary.

(b) The boundaries of warning districts and the location of district warning centers will be fixed by the regional offices of civilian defense of the several regional civilian defense areas, with the cooperation of the signal officers of interceptor commands and the air defense regions of interceptor commands. They will be determined on the basis of facilitating further dissemination of warnings, or existing commercial communications, and the operating methods of the aircraft warning service. They may be a city, a group of cities, a county, or in areas having few targets for hostile aviation a group of counties. In populous areas they should be not less than 15 miles square.

d. **Principal Features of the Civilian Air Raid Warning System.**—The principal features of the civilian air raid warning system are as follows:

(1) The maintenance by certain specified telephone exchanges and civilian air raid control centers of warning lists of those officials and establishments designated to receive warning messages in the event of a threatened air attack.

(2) One source in each air defense area from which air raid warning messages will be issued.

(3) The communication systems of the Nation

will receive the calls from the information centers and transmit them to the warning districts, which in turn notify the proper sub-districts. Sub-districts will be responsible for notifying individual recipients.

e. Messages Transmitted Through Special Conference Equipment.—Special conference equipment and lines should be made available, if the necessity warrants the additional cost to the recipients, to permit a group of as many as 10 people to be called simultaneously and thus increase the number of recipients who may be called by a single person within a short period of time. This special equipment will be particularly applicable in the following localities:

- (1) Where the number of recipients is exceptionally large in proportion to the number of people available for transmitting the messages.
- (2) Where it is considered important to minimize the delays in transmitting messages to a group of strategic locations.

12. EQUIPMENT IN DISTRICT WARNING CENTERS.—In each district warning center, equipment is provided for receiving air raid messages from the nearby toll office and transmitting these messages to the persons and places authorized to receive them, such as subdistrict warning centers, report centers, siren operators, fire departments, police departments, public utilities, and essential industries. Most of the equipment in these district warning centers will consist of telephone sets, key telephone sets, and key telephone units of the types generally employed for regular telephone usage.

13. PROCEDURE AT DISTRICT AND SUBDISTRICT WARNING CENTERS.

a. After a message has been received in a district or subdistrict warning center, this message is relayed to all persons and places on the associated warning lists. The method by which this message is relayed may be one of several different methods, depending on the various conditions in this particular locality, and may be broadly classified as follows:

- (1) Messages transmitted by district warning center personnel.
- (2) Messages transmitted by telephone company central office operators.
- (3) Messages transmitted through special conference equipment. (See section 11, subparagraph e.)

In some districts, it is probable that combinations of all three of these methods will be advantageous. However, the selection of the proper

method for each district will depend on studies of local conditions.

b. Where air raid messages are transmitted from a district warning center, prepared warning lists are kept in an appropriate location in this center within ready access of the air raid warning officer who receives the air raid messages. After an air raid warning officer receives a message, he distributes the prepared warning lists to those who have been delegated to assist in transmitting the messages, and these people proceed to transmit the messages. Any one person who has been delegated to assist in transmitting the messages should not distribute a particular message to more than 10 recipients. When all recipients on a list have been called, the time of dispatch and the initials of the person who transmitted the messages are also noted.

(1) The lists mentioned above should be on prepared forms, a suggested example of which appears in Figure 5. These forms will be made up in colors corresponding to the type of warning message and kept in such a manner as to be always available. Recipients should be listed in the priority of calling.

c. Where the plans for relaying air raid warnings to subdistricts include the services of central office operators, the authorization to transmit such messages will be made by the air raid warning officer in the district warning center. This transmission will be initiated by the telephone company operator immediately upon verification of the air raid warning message by the information center operator. Central office operators designated to transmit air raid warnings will be supplied with the prepared forms for recording calls shown in Figure 5.

d. The operator, charged with transferring the air raid messages, will proceed as follows:

- (1) One date column, as shown on the forms in Figure 5, will be used for each warning published.
- (2) Exchanges or recipients will be called in the order listed.
- (3) No attempt will be made to call a recipient by any number other than that listed on the form.
- (4) When calling an individual recipient, if no answer is received within 15 seconds, "DA" will be entered in the appropriate date column and the next recipient will be called. This condition should not occur as all recipients must understand that their telephones will be manned continuously.
- (5) On receipt of a satisfactory acknowledgment, a check will be made in the appropriate date column.

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(6) On dial systems, the 15-second ringing period should be checked by counting three complete ringing tone cycles.

(7) If a busy signal is encountered, a "BY" is entered in the appropriate date column and the next recipient called immediately.

(8) If no ringing tone is obtained, the number should be redialed at once.

(9) Only two attempts will be made to obtain any recipient.

(10) In the event that no reply is received from a recipient, the air raid warning officer at the district warning center should take the necessary steps to see that the telephone is manned.

(11) In the event that no ringing tone is obtained or any other condition exists, indicating that trouble is present on the telephone system, the air raid warning officer will immediately call the operator, attempt to obtain connection through her, and, in addition, report the trouble previously encountered.

(12) When the last recipient on the list has been called, the attendant will make a second attempt to reach those showing "DA" or "BY" opposite their names.

14. EQUIPMENT IN SUBDISTRICT WARNING CENTERS.—

In general, the telephone service to subdistrict warning centers will be regular exchange telephone service. In special cases, equipment like that provided for district warning centers may be found necessary.

15. PREPARATION AND MAINTENANCE OF WARNING LISTS.

a. *Recipients of messages.*

(1) The persons to receive the warning messages in each warning district will be recorded, together

with their telephone numbers, on warning lists.

(2) Since the recipients will not be the same for the preliminary caution (yellow), and lights warning (blue), or action warning (red), there will be three lists for each district, one list for the preliminary caution, one for lights warning, and another for the action warning. Obviously, some names will appear on all lists.

(3) As the speed of distribution of the messages is dependent on the lists not being too long, strict control will be exercised over the selection of those who may be included on them.

(4) The compilation of these lists is a responsibility of the heads of the civilian air raid warning organizations. These lists must be kept constantly under revision.

(5) Those included in the warning lists must comply with the following conditions:

(a) Telephones may be scheduled in the lists only if it is certain that, in time of war, they will be manned continuously day and night and will be answered promptly.

(b) Air raid warning messages received are not to be passed to persons in a different warning district.

(c) Recipients of the preliminary caution or lights warning are not to make it known by telephone or otherwise, except for the purpose of completing the preparatory measures for which the warning was conveyed to them. In the case of special factories, which are given the preliminary caution, the employees are not to be warned by means of signals which would be audible outside.

(d) The following is a suggested list showing the class of individuals and establishments together with normal priorities that should properly be included in warning lists as the recipients of warning messages:

The Civilian Air Raid Warning System

Recipient	Preliminary Caution (Yellow)	Priority	Lights Warning (Blue)	Priority	Action Warning (Red)	Priority
1. Local civilian defense authorities	yes	1	yes	1	yes	1
2. Local civilian government officials	yes		yes	3	yes	
3. Operators of public warning signals	no		no		yes	1
4. Fire stations	yes	2	yes	3	yes	3
5. Police stations	yes	1	yes	1	yes	1
6. First-aid stations	yes	4	yes	5	yes*	4
7. Decontamination squads	no		no		yes*	4
8. Hospitals, all types	no		yes		yes*	4
9. Public utilities:						
a. Railroads	yes		yes		yes	
b. Dock facilities	yes	2	yes	3	yes	2
c. Electricity generating plants	yes	3	yes	2	yes	3
d. Gas works	yes	3	yes	4	yes	3
e. Water works, pumping stations.	no		yes		yes*	4
f. Communication facilities	yes	2	yes	2	yes	2
g. Oil refineries and storage plants	yes	4	yes	5	yes*	3
h. Defense works dealing with high explosives, in- flammable or toxic materials	yes	2	yes	3	yes	3
i. Blast furnaces or similar establishments	yes	2	yes	2	yes	3
j. Factories of national importance or those em- ploying more than 500 persons	no		yes		yes*	5
k. Schools	(see note)	2	(see note)	4	yes*	2

(Note.—In places where the local government has not provided ample shelter near the school, preliminary warning should be given.)

*Only if not within earshot of a public signal.

Chapter IV.—PUBLIC WARNING SYSTEMS

16. PUBLIC WARNING SYSTEMS.

a. The available instruments used to give warnings of suitable types fall into three main classes. They are steam sirens and whistles, rotary sirens fed by compressed air and with power-driven rotor (compressed-air sirens), and electrically driven rotor sirens in which the air input is generated by the rotor alone (self-generating sirens).

(1) Steam sirens require a steam generating source, but they are not affected by the failure of electrical power.

(2) Compressed-air sirens require a source of compressed air and power to turn the rotor. The power is usually electricity.

(3) Self generating type sirens require power to turn the rotor. The usual power source is electricity but the rotor can be driven by an internal combustion engine. In the latter case, starting equipment must be constantly ready for use.

b. These instruments should be practically instantaneous in operation. They should give a note or range of notes of adequate loudness within the frequency range of 400–800 cycles and should be capable of making the necessary signals. They should be of a design not easily liable to go out of order, of a construction not liable to damage by weather or foreign bodies, and of a size and weight which permits their being erected at a height. Other things being equal, the source of power should preferably be in the same building as the instrument.

17. LOCATION OF SIGNALS.

a. The question as to where a public warning signal should be provided should be considered broadly along two lines. In towns where the population is scattered a complete system of public signals may not be practicable or necessary. In such areas the information that air raiders are in the neighborhood may be conveyed by telephone to someone in the village, such as the local police chief, who will then be in a position to warn those directly concerned to stand by. But this need not be done by a warning system. In small country towns, hand-operated sirens may be used.

b. In localities where an important factory or other establishment which might attract bomb-

ing is situated in an isolated position, the warning signal provided in the premises themselves should be of sufficient power to warn those living in its immediate vicinity.

c. In industrial areas where public warning signals are to be provided, the first step should be to give consideration to the existing sirens and whistles in the district on the assumption that, in war, their use for any purpose other than air raid warnings will be discontinued. Any which give reasonable range of effective audibility will be allocated for air raid warning purposes. A map of the district should then be marked to show the areas regarded as effectively covered by each of the selected instruments. Suitable steps should then be taken to fill the gaps.

d. Factory whistles not included in the layout of public warning signals will be sounded after the public signal has been heard or the air raid warning has been officially received for passing on the warning to the operatives in the factory and for supplementing the scheduled public signals. The use of factory whistles for purposes other than air raid warnings will be prohibited in war.

e. Where any considerable area has to be covered, the minimum number of large signaling devices is preferable to a multiplicity of small signaling devices which in time of war would increase the number of points to which orders for sounding warnings would have to be transmitted and the personnel necessary to man these points.

f. The signaling devices will be so spaced as to give an effective warning over the whole area intended to be covered.

g. The range and effective coverage of signaling devices must be considered when plans are made for their installation. In many cases cost and operation will be factors which must be considered. It is desirable that these signals have a source of power in the same building with the alarm device.

18. TYPES OF SIGNALS.

a. It is not necessary to aim at distinctive or peculiar sounds for air raid warning signals. Recognition of the signal from any sound source can be secured by a standard code of blasts,

coupled with the attentiveness to such signals which can be assumed under war conditions and the prohibition of the use of similar sound signals for ordinary industrial purposes.

b. Whatever type of signal is used for public warning signals, the code used will be as follows:

For the air raid warning, air raid message—red.

A signal of 2 minutes' duration consisting of either a fluctuating or warbling signal of varying pitch in which the frequency range is not less than 10 percent above and below the mean pitch, the complete cycle of each fluctuation to extend over a period of 3 to 8 seconds, or a succession of intermittent blasts of about 5 seconds' duration separated by a silent period of about 3 seconds.

For the all-clear signal, air raid message—white.

A continuous signal of 2 minutes' duration at a steady pitch.

19. TELEPHONE CONNECTIONS.

a. Provision will be made in the plan of the local civilian defense area for a telephone connection to the point of operation of signaling devices to be used for public warning signals, where such connection does not already exist.

b. Each signaling device will be manned continuously by someone who is accessible by telephone and who can operate the signaling device within a maximum of 10 seconds after receipt of the telephone message.

20. OTHER COMMUNICATION REQUIREMENTS.

a. The transmission of air raid warning messages is only one of a multiplicity of signal communica-

tion functions required in connection with civil air raid precautions. Under war conditions the civil air raid control organization will be of considerable size and will be required to administer all phases of this work, each phase of which will require the employment of some agency of signal communication.

Examples of such work are:

Fire control.

First aid.

Rescue work.

Control of lighting.

Reporting damage.

Highway clearance.

Additional phases as dictated by local conditions.

For all of these functions considerable communication facilities will be required, but these will be of the present standard types readily available and the existing local plant will be utilized insofar as is practicable. In the promulgation of local defense plans, civilian air raid warning officers must coordinate closely with the representatives of the communication companies for their particular localities.

b. It should be pointed out that all communication facilities will be taxed to the utmost by the operations of the air raid precautions organizations listed in paragraph a above. Each community or locality will constitute an individual problem, depending upon the facilities available. It may be necessary to impose certain restrictions in the use of communication facilities by other than official personnel.

Chapter V.—TRAINING

21. GENERAL.—It will be appreciated that the object of all training is not only to enable each individual to attain personal efficiency in the type of work for which he or she has volunteered, but further, to build up by progressive stages that degree of combined efficiency which will enable each part of the organization to work as a team.

The organization of training on sound, progressive lines is also of importance in maintaining the interest of the volunteers and helping to foster that team spirit without which true efficiency cannot be attained.

The suggestions put forward in these notes are meant for general guidance. There is obviously much scope for local initiative in devising practical and interesting training and exercises. Every encouragement should be given to such developments, provided they are based on sound general principles.

22. TRAINING STAGES.—It will be found generally convenient to arrange that training should proceed by the following stages:

a. Individual training, the object of which is to enable every volunteer to attain practical training and such theoretical training as is necessary in the work of that branch of the organization to which he or she is attached.

b. Collective training, the object of which is to afford practice for trained individuals as a team in accordance with the organization laid down.

c. Combined exercises, the object of which is to afford practice for groups of trained teams in order to insure proper coordination of services and the cooperation of teams whose work may be interdependent.

It is advisable to carry out combined exercises first on a small scale, and gradually to increase their scope until it becomes practicable to exercise the complete organization together.

d. Refresher courses, the object of which is to bring individuals and teams up to date and insure that their efficiency is maintained.

It is realized that circumstances may make it difficult to proceed on exactly the lines suggested above. It is important, however, to avoid exercises or other forms of training which are over-ambitious or in advance of the capabilities of the volunteers at that time.

23. HINTS TO INSTRUCTORS.—All training should be progressive, starting with elementary work and leading up systematically to more advanced work

in accordance with the progress of the individuals and teams under training. It is important to insure that volunteers have reached a reasonable degree of individual practical efficiency before the more advanced stages of training are attempted.

In giving actual instruction particular attention should be directed to the following points:

a. **Type of Instruction.**—Theoretical and practical instruction are both necessary but the instructor must adjust the balance between these two aspects very carefully and with particular regard to his class.

b. **Method of Instruction.**

(1) **Theoretical.**—Theoretical instruction should include lectures and study of prepared instruction sheets and similar material, illustrated where possible by models, sketches, or diagrams. Care must be taken, of course, that any illustrations are technically correct.

(2) **Practical.**—This type of instruction should include the practical application of matters dealt with in the theoretical instruction, such as use of warning lists, execution of forms, preparation of reports, and similar tasks. In order to retain their interest it is desirable that the members of the class should be given something practical to do at as early a stage as possible in their training.

24. COLLECTIVE TRAINING.—Collective training should be started slowly at first, speeding up as each member learns his part. At intervals it is helpful if members exchange duties with each other, so that they can more readily master the work of the teams and be prepared to take on another member's duties if the need should arise.

Collective training should be progressive. It is important that such training should be made as realistic as possible and should reproduce conditions likely to arise in any emergency.

25. GENERAL.—Instructors should aim at short periods of instruction. Lectures should seldom exceed 45 minutes, with another 15 minutes for questions and discussion.

For lectures, classes need only be limited by the accommodations available and the ability to hear and see clearly. For practical work, however, the numbers should rarely exceed 20.

Wherever possible, the instruction should be by demonstration. Lengthy verbal explanations should be avoided, as they make it difficult to retain the attention of the class. As soon as the instructor has given his demonstration, the class should, if possible, practice until they become proficient.

