CHAPTER 15

FLEET COMMUNICATIONS

A commanding officer must be able to communicate whenever necessary with both ships and shore stations to maintain effective command and control of the situation at hand. Communications is still and always will be the "Voice of Command." In this age of nuclear weapons, guided missiles, supersonic aircraft, and high speed submarines, top performance is required of our fleet communicators. Therefore, they must always remain in a condition of constant preparedness.

The Navy has phased out many of its older ships during the last decade and has commissioned many new ones. Along with the modern ships, many up-dated computerized communications systems have been implemented.

The information in this chapter may seem of most use to the "sea-going" Radioman, but all personnel in the communications community should be familiar with the information for preparation for sea duty.

FLEET MULTICHANNEL BROADCAST SYSTEM ("N" SYSTEM)

The Fleet Multichannel Broadcast (MULCAST) System is now the primary means of delivering message traffic to ships. It has replaced the single channel radioteletype system. The MULCAST is keyed by the automated Naval Communications Processing and Routing System (NAVCOMPARS) and is transmitted via satellite, low (LF), medium (MF), and high (HF) frequencies. The HF component of the MULCAST is transmitted via several frequencies at the same time to enable the ships to pick the best reception for their location. Through the use of multiplex equipment, the MULCAST provides the opportunity for the delivery of large quantities of traffic with a small number of transmitting stations. The MULCAST provides a linking network to support communications coverage to all ocean areas of the world.

The ocean areas mentioned are divided into four Naval Communications Areas (NAVCOMMAREA), as shown in figure 15-1. Each NAVCOMMAREA has a Naval Communication Area Master Station (NAVCAMS) tasked with the responsibility of coordinating fleet broadcasts as well as other communications circuits within their areas. There are NAVCAMS at Norfolk, Naples, Honolulu, and Guam, acting as NAVCAMSLANT, NAVCAMSMED, NAVCAMSEASTPAC, and NAVCAMSWESTPAC, respectively.

BROADCAST CONTROL

The Broadcast Control Authority (BCA) is the controller of a specific broadcast. Normally, the authority is under the cognizance of the Fleet Commander in Chief or a Force Commander. The BCA directs the implementation of the broadcast and provides direction and guidance toward its configuration and content. The BCA may control the broadcast completely, or it may assign some responsibility to a subordinate command.

The Broadcast Control Station (BCS) is the activity that engineers the broadcast and delivers the keying to the transmitting stations. The NAVCAMS usually assembles the keystreams for all channels of a broadcast and delivers keying to the transmitter station.

The Broadcast Keying Station (BKS) is the activity responsible for placing the message traffic directly into the broadcast. Different stations may operate as BKSs on the same broadcast, but on separate channels.

A Broadcast Radiating Station (BRS) is a station responsible for radiating a signal from a broadcast supplied by the BCS and may or may not be a NAVCOMMSTA.

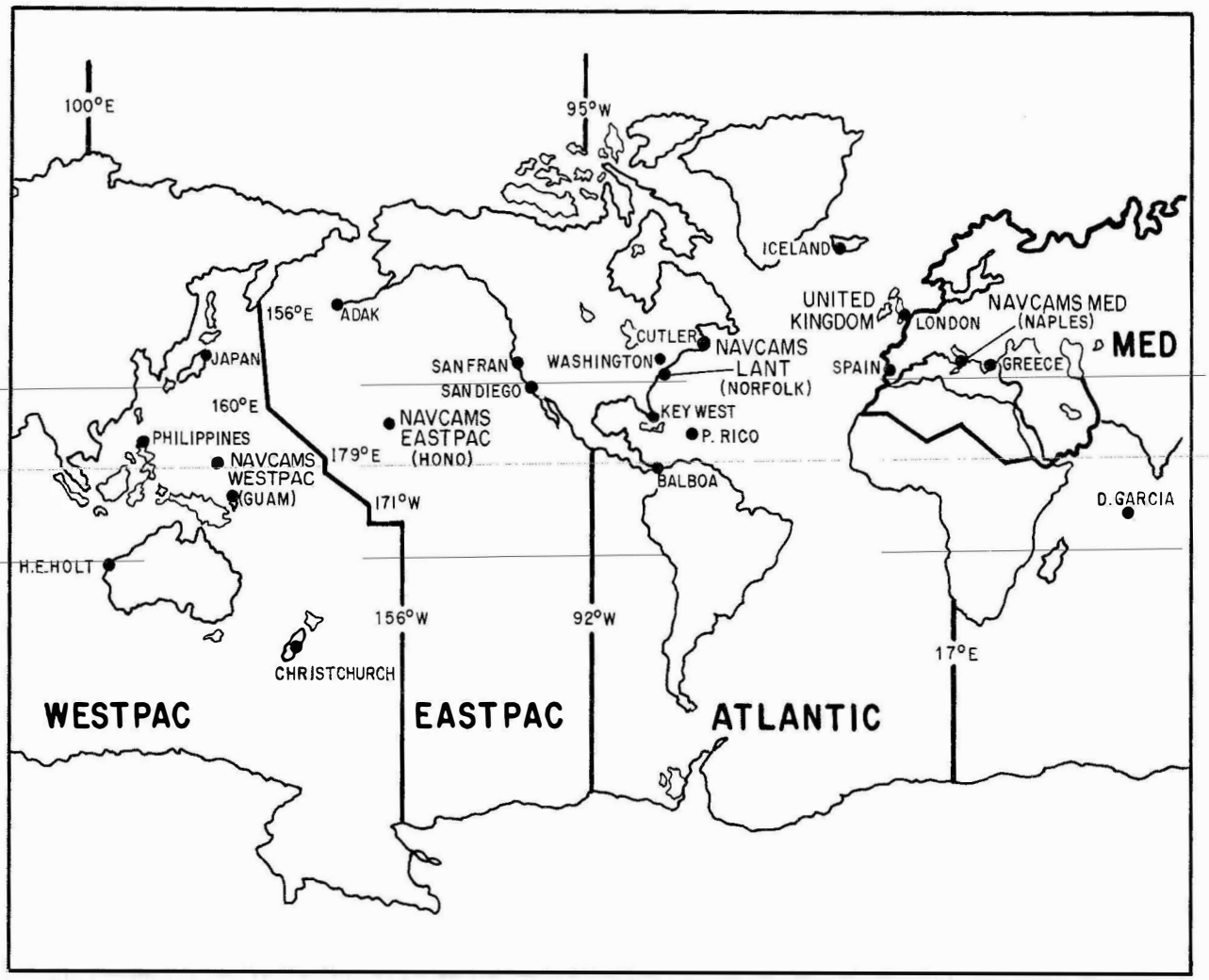

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Figure 15-1. — Communications area master stations.

BROADCAST IDENTIFICATION

Multichannel broadcasts are assigned designators for identification. The first letter of the designator identifies the naval communication area, and additional letters let us know the type of broadcast it is. For example, a broadcast beginning with a "K" originates from the Mediterranean Communication Area (Naples), and an "N" means the broadcast is from the Atlantic (Norfolk) Communication Area. So, a broadcast with the designator NMUL is a multichannel broadcast (MUL) in the Atlantic COMMAREA, and one with a designator KSUB is a submarine broadcast (SUB) in the Mediterranean COMMAREA. A complete list and description of broadcast designators can be found in NTP 4.

A typical multichannel broadcast (N) system consists of receiving antennas, the antenna multicoupler, two receivers (if diversity reception is employed), AN/UCC-1 multiplex equipment, the TSEC/KWR-37 and TSEC/KG-14 crypto equipments, and a teletype machine for each channel copied. The receivers are patched to the AN/UCC-1 via the receiver audio switchboard. The output of the AN/UCC-1 is patched via the black DC patch panel to the crypto equipments, and the output of the crypto equipments

are patched to the teletype machines via the red DC patch panels. An illustration of how the equipment is connected through the patch panels and switchboards to develop the communication system is shown in figure 15-2.

Reception of the multichannel broadcast via satellite will be discussed later in this chapter.

The multichannel broadcast is divided into sixteen channels. Ships copying the broadcast are matched to broadcast channels by class according to similarities of mission, task, and equipment capabilities. Each ship is assigned a primary channel to copy for traffic and a secondary channel to copy for reruns or overload traffic. The secondary channel transmits the same traffic as the primary channel one hour later. This enables a ship to pick up missing numbers on the broadcast within one hour by copying the secondary channel. Ships are not required to copy the secondary channel unless they miss a broadcast number or unless the channel is activated as an "overload" channel for "first run" traffic. If the secondary channel is activated for "first run" traffic, the notification message informing operators is sent giving sufficient notice via the primary channel. Broadcast channel alignment is outlined in NTP 4, Section 2.

BROADCAST OPERATION

The Fleet Multichannel Broadcast (MULCAST) is operated continuously and requires restart at the beginning of each new crypto day and also each time the synchronization is lost. The TSEC/KWR-37 crypto device is used for the decryption of message traffic on specific broadcast channels. It also provides timing for the TSEC/KG-14 on other channels.

A spare TSEC/KWR-37, if available, should be prepared for the new radio day by inserting the new day's key card in the holder approximately 45 minutes prior to daily restart time. The actual patching of the new TSEC/KWR-37 should not take place until about one minute prior to restart time so that reception of high precedence traffic is available up to the last minute.

Every Radioman on board should be thoroughly familiar with the operation of the TSEC/KWR-37. The operating instructions for this equipment

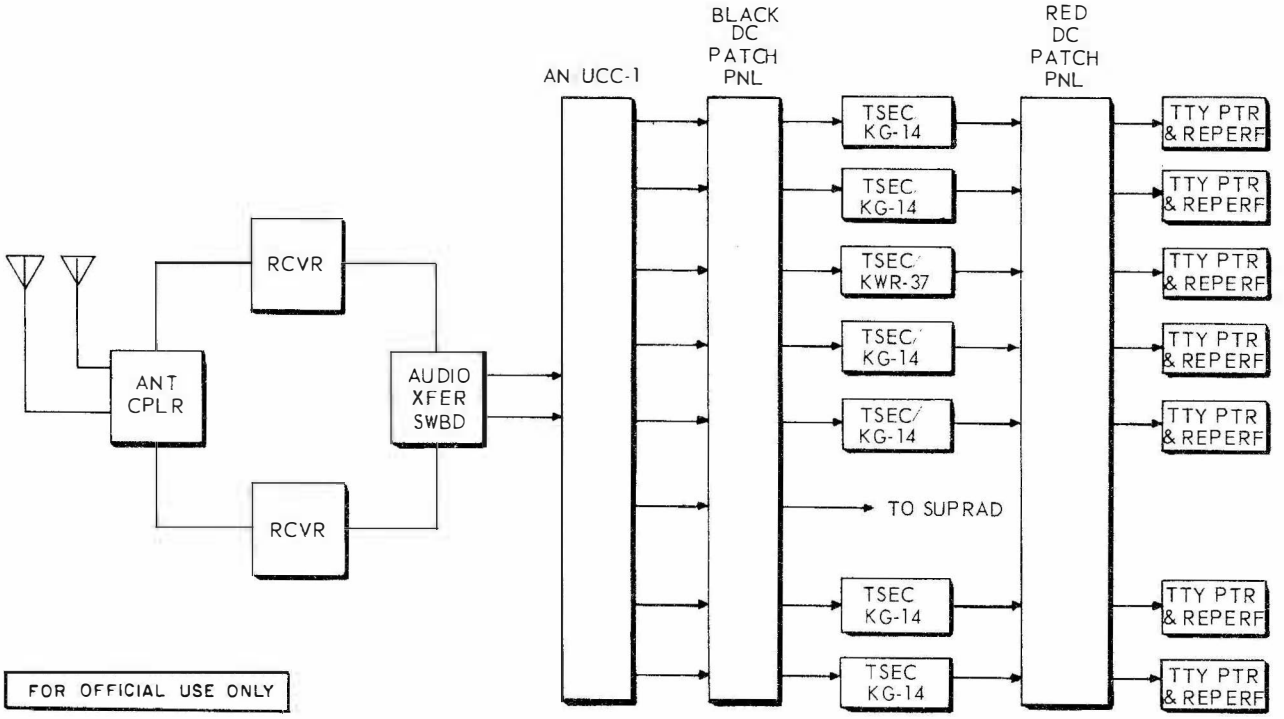

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Figure 15-2.—Fleet Multichannel Broadcast ("N" System).

are contained in the publication KAO-34 (series) and will provide all operating personnel with helpful hints to keep your broadcast file up to date with the least amount of "missing numbers".

BROADCAST SHIFTS

There will be times occasionally when a ship has the requirement to shift from one broadcast to another. If a ship transits the Atlantic, for instance, it is not feasible that the Radioman will be able to copy the Norfolk (Atlantic) broadcast during the entire trip without reception problems. Normally, there should be a broadcast shift to the Mediterranean (Naples) broadcast at about the half-way point during the transit.

The shift from one broadcast to another or a shift off the broadcast should be accomplished at 0001Z. The broadcast shift message should be sent early enough so that it reaches the common source file authorities at NAVCAMSLANT Norfolk, VA and NAVCAMSEASTPAC Honolulu, HI by 1600Z on the day before the radio day of the shift. In the case of an emergency broadcast shift, the ship should commence copying the new broadcast immediately. It should continue to copy the original broadcast for as long as possible, or until the originally scheduled time of the shift occurs. The notification of an emergency shift message should be sent with a PRIORITY or IMMEDIATE precedence. A format example for broadcast shift messages can be found in NTP 4, and updated information may be promulgated by the NAVCAMS Communication Information Bulletins (CIBs).

BROADCAST FILE

The broadcast file contains a copy or filler for each message transmitted or received on the broadcast. The file is stored in accordance with the highest classification of the information contained in the file. Segregated stowage by classification is not required. Broadcast copies, carbons, and tapes are safeguarded in accordance with OPNAVINST 5510.1 (series) and must be retained for a period of ten days. Top Secret messages received but not addressed to an afloat command should be removed from the broadcast copies, and ticklers should be entered in the broadcast file in lieu of the Top Secret message. The Top Secret message should be destroyed immediately by authorized methods. The destruction should be certified by two witnessing officials who place their initials next to the appropriate broadcast serial number on the check-off sheet. These check-off sheets are exempted from the regulation requiring that certificates of destruction be retained for two years but, instead, are destroyed with the broadcast files after ten days. Top Secret traffic handled by NAVCOMMSTAs for relay or broadcast delivery need not be controlled as described in OPNAVINST 5510.1 (series) and DODINST 5200.1, providing all copies (except the monitor roll and monitor reel) are destroyed immediately after they have served their purpose. Monitor copies must be marked Top Secret and afforded appropriate security and storage. These monitor copies may be destroyed after the mandatory retention period, with proper documentation.

Missed Broadcast Messages

If a ship misses broadcast messages, the Radiomen should make all attempts to obtain the missing messages from ships in company or other fleet units via local circuits, visual means, or messenger. If the messages are not available locally, then the ship must ask for a retransmission of the messages from the broadcast station. The retransmission request sent by the ship is called a Broadcast Screen Request. The screen request is sent "action" to the BKS and "information" to the appropriate NAVCAMS. Any unit requesting a retransmission of more than 25 missing broadcast numbers must include their numbered Fleet Commander (e.g., COMSEVENTHFLT, COMSECONDFLT) as an information addressee.

A complete copy of missed messages not addressed to the ship's guardlist need not be obtained. Heading fillers of heading recaps can be substituted in place of the complete message. Once an hour, a message summary heading recap is sent on each first-run broadcast channel. This recap supplies the headings of the previous hour's traffic. This is an excellent means of recovering messages that may have been missed during the previous hour via the broadcast.

Broadcast Check-Off Sheets

The form utilized as the broadcast circuit log and destruction sheet (check-off list) lists the number of messages received/transmitted via the broadcast and the classification of each message. The form also serves as the record of destruction for the classified messages in the

file. An example of this form is shown in figure 15-3. The form is not available through the Navy Supply System, but it may be reproduced locally for use.

OTHER BROADCASTS

As previously stated, the most popular means of message traffic delivery to the fleet is via the multichannel broadcast. There are ships in the Navy, however, that do not have the capability or the need to copy a multichannel broadcast. The ship may not have the multiplex equipment installed, or the assignments or mission of the ship may require it to copy one or more of the following broadcasts.

SINGLE CHANNEL BROADCAST

If a ship is not equipped to copy the multichannel broadcast, then it must be a subscriber to a single channel broadcast. The single channel broadcasts are identified by "RTT" or "SPG" preceded by the COMMAREA designator letter. For example, the LANTSOAM (Norfolk) single channel broadcast has the designator NRTT.

The single channel broadcasts are keyed continuously and require cryptographic restarts at the beginning of each new crypto day or whenever synchronization is lost. Frequencies in the LF/MF/HF ranges are assigned to the broadcasts by the area CAMS in Communications Information Bulletins (CIBs). The cryptographic equipments used on a single channel broadcast can be either the TSEC/KW-37 or the TSEC/KW-7CR. A frequency shift converter (usually an AN/URA-8 or AN/URA-17) is used on the single channel broadcast in lieu of the AN/UCC-1 that is required for the multichannel broadcasts.

The guidelines concerning service messages, missing number procedures, stowage and retention of files, and message format are the same as outlined previously for the multichannel broadcasts.

Submarine Broadcasts

Several frequency shift keying (FSK) single channel submarine broadcasts have been established to provide a means of communications from force commanders to their operational units. These broadcasts are the primary means of telecommunications to submarines underway. Broadcast operations and traffic content are carefully controlled by the BCA to accommodate various submarine operations. Cryptographic start times are staggered to avoid more than one broadcast from being off the air at the same time for cryptographic restarts. Each schedule begins on a prescribed hour. The first message is a traffic list (ZBO) to let each submarine determine the need for further copy. Messages are repeated three, four, six, or twelve times, depending on the operational requirements.

A new multichannel submarine broadcast system called VERDIN using minimum shift keying (MSK) has been developed to replace the existing single channel FSK broadcast. Some VERDIN shore terminals have already been constructed, and more will be completed in the near future. VERDIN installations on U.S. submarines should be completed during 1979.

Composite Fleet/ General Broadcast

The Composite Fleet/General Broadcast (CMP) is a CW broadcast used by those fleet units unable to copy a covered broadcast (either the MUL or RTT). The broadcast is keyed on a scheduled basis for U. S. Fleet units, providing narrative message traffic, weather, and hydrographic messages. This broadcast also serves Allied ships and other authorized users on a preset schedule. The fleet schedule is maintained only for the use of U. S. and friendly foreign warships.

Transmissions of fleet schedules consist of a call-up transmitted five minutes prior to commencement of the schedule. This call-up will consist of the called station call sign sent three times, the prosign "DE" followed by the call sign of the calling station sent three times, and the word "FLEET." An example is as follows: NERK NERK NERK DE NAB NAB NAB FLEET.

When it is time for the schedule to commence, the same procedures as set forth above are used, except this call will be preceded by a series of eight "Es" and will include the appropriate operating signal for the number of messages to be transmitted (ZBO). An example is as follows: EEEEEEEE NERK NERK NERK DE NAB NAB NAB ZBO 04. After this is sent, the transmitting station can commence sending traffic.

If a message is received for relay at the transmission station after the schedule has

BROADCAST CIRCUIT NUMBER LOG and RECORD OF DESTRUCTION

Retain traffic for a period of 10 days in accordance with SECNAVINST P5212.5B SubPara 2100(3). Destruction in accordance with NTP 4 01.03.0326 and 02.01.1400

BCST No. CLASS	BCST No. CLASS	BCST No. CLASS	BCST No. CLASS
_01 UECST	26 UECST	51 UECST	76 UECST
02 UECST	27 UECST	52 UECST	77 UECST
03 UECST	28 UECST	53 UECST	78 UECST
04 UECST	29 UECST	54 UECST	79 UECST
05 UECST	30 UECST	55 UECST	80 UECST
06 UECST	31 UECST	56 UECST	81 UECST
07 UECST	32 UECST	57 UECST	82 UECST
08 UECST	33 UECST	58 UECST	83 UECST
09 UECST	34 UECST	59 UECST	84 UECST
10 UECST	35 UECST	60 UECST	85 UECST
11 UECST	36 UECST	61 UECST	86 UECST
12 UECST	37 UECST	62 UECST	87 UECST
13 UECST	38 UECST	63 UECST	88 UECST
14 UECST	39 UECST	64 UECST	89 UECST
15 UECST	40 UECST	65 UECST	90 UECST
16 UECST	41 UECST	66 UECST	91 UECST
17 UECST	42 UECST	67 UECST	92 UECST
18 UECST	43 UECST	68 UECST	93 UECST
19 UECST	44 UECST	69 UECST	94 UECST
20 UECST	45 UECST	70 UECST	95 UECST
21 UECST	46 UECST	71 UECST	96 UECST
22 UECST	47 UECST	72 UECST	97 UECST
23 UECST	48 UECST	73 UECST	98 UECST
24 UECST	49 UECST	74 UECST	99 UECST
25 UECST	50 UECST	75 UECST	_00 UECST

Signature of individual authorizing destruction	Rank	File or Service No.

Signature of Witnessing Official	Signature of Witnessing Official

LEGEND:

U = Unclassified E = Unclassified/EFTO C = Confidential S = Secret T = Top Secret

NOTE: This form is not stocked in the Naval Supply System but may be reproduced locally.

Date of Destruction: _____

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Figure 15-3. — Broadcast circuit log and record of destruction.

commenced, the operator should put the message into proper format, assign it the next open broadcast number, and send it out on the schedule already in progress. If the new message is of a higher precedence than those on the schedule to be transmitted, the new message of higher precedence should be inserted out of sequential order into the schedule. The broadcast number of that message should be sent, preceded by the operating signal "ZIA."

After all fleet traffic has been transmitted, a "QRU" tape should be transmitted once. A fleet QRU tape consists of the call sign of the called station transmitted three times, the prosign "DE" followed by the call sign of the calling station sent three times, the last broadcast number sent, the operating signal "QRU," followed by the prosign "AR." An example follows: NERK NERK NERK DE NAB NAB NAB NR 004 QRU AR.

If, at the time of the next schedule the transmitting station has no new traffic for the broadcast, the operator should use the "QRU" tape from above, except the tape should be preceded by a series of eight "Es". As an example: EEEEEEEE NERK NERK NERK DE NAB NAB NAB NR 004 QRU AR.

The Merchant Ship Broadcast (MERCAST) is used to deliver U. S. Government originated message traffic to MSC ships and Navy controlled merchant ships in accordance with NTP 10. The schedules on the MERCAST are a portion of the Composite Fleet/General Broadcast and are keyed by a COMMSTA in each designated area for ships copying the MERCAST. Detailed information concerning MERCAST systems during peacetime is found in publication H. O. 117, where a listing of stations, schedules, frequencies, hydrographic data, ice reports, and time signals are available. ACP 149 contains the wartime schedules and frequencies of each Allied MERCAST area.

The MERCAST is primarily a CW broadcast with a normal operating speed of 25 words per minute. Speed may be increased up to a maximum of 29 words per minute after subscribers have been notified of the increasing transmission speed.

Another component of the Composite Fleet/General Broadcast is the Hydrographic Schedule. It consists of messages providing hydrographic information, Coast Guard Notices to Mariners (navigational aids), and Notices to Airmen (NOTAMS). Normally, they are addressed to "HYDROLANT" or "HYDROPAC," depending on the area affected. The call up is sent five minutes prior to the transmission of the hydrographic schedule to enable the receiving station to prepare to copy.

Weather Schedules are storm warnings, forecasts, fallout reports, etc. Forecast and weather warnings provide information such as air observations required for flight operations. The schedule and frequencies for these broadcasts are contained in the COMMAREA Communications Information Bulletins (CIBs). The publication H. O. 118 also provides frequencies and area coverage of non-Navy weather broadcasts. Ships and bases with a weather unit on board are required to copy at least the synoptic schedules of the Navy weather broadcast for their respective areas of operation. Ships and bases without weather units on board do not have a requirement to copy a weather broadcast, but this is at the discretion of the commanding officer or other competent authority.

All messages sent or received on the Composite Fleet/General Broadcast schedules must be filed in the communications center in date-time group order.

If any of the Composite Fleet/General Broadcast schedules are guarded, covered, or copied, the operators must maintain a radio log. This log is used to record each transmission heard on the circuit, whether it is addressed to his station or not. Commands may utilize OPNAV Form 2810-1 (Radio Log) or a locally reproduced form as shown in figure 15-4. If a message is addressed to or relayed by the receiving station, the message may be typed on a message form instead of in the log, and only the essential accounting information (time-of-receipt, originator, date-time group), need be entered in the log. The radio log should also record operating conditions of the circuit, opening and closing down of the net, causes for traffic delays, frequency changes, and any unusual circumstances noted by the operators. As the watch changes and the operator is relieved, he must sign the log in ink. This is also a requirement when a net or circuit is closed down. An entry must be made in each radio log at least every five minutes. If the operator on watch is too busy to comply every five minutes, he may enter the essential information later, indicating the times.

Facsimile Broadcast

The facsimile broadcast is normally used to receive weather maps transmitted by designated shore facilities. The system consists of the

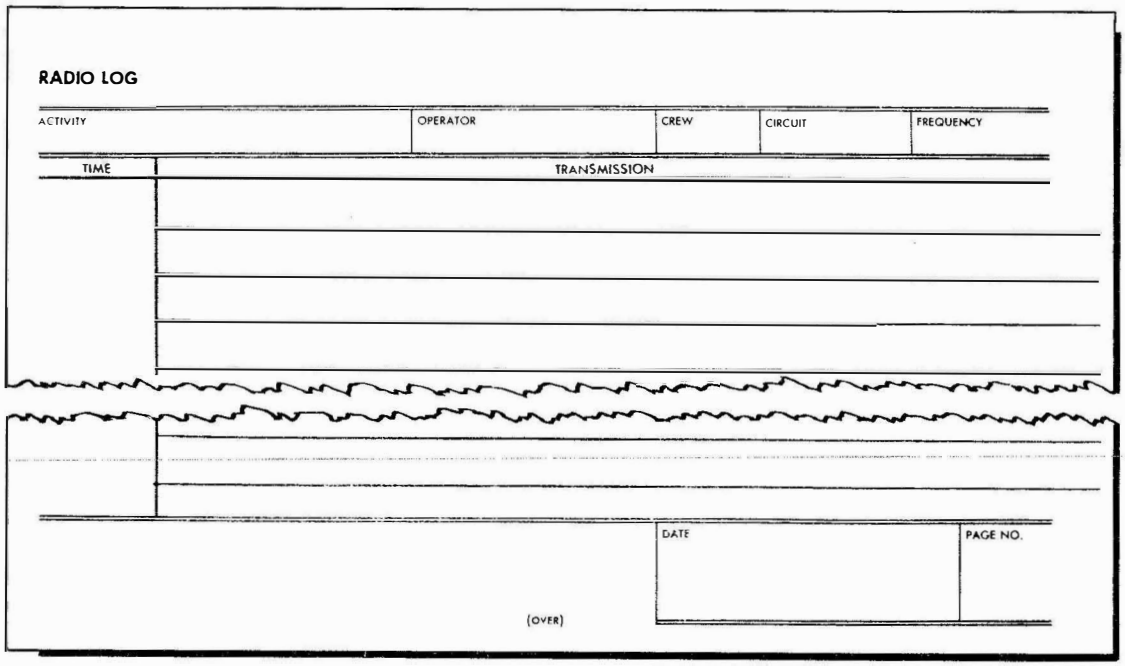

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Figure 15-4. — Radio log.

receiving antenna system, an HF receiver, a facsimile converter, and the facsimile recorder. Keying for the transmission of facsimile broadcasts is controlled by the local communications activity. Facsimile terminal equipment is provided to those naval meteorological offices that prepare weather maps for transmission on the broadcast and is not physically located near the controlling communications facility.

The material transmitted on a facsimile broadcast is assigned serial numbers running consecutively for each calendar month. For continuity, the transmitting station should provide a daily recapitulation containing a list of that day's transmissions, showing the time of each transmission and the associated serial number.

It is imperative that facsimile transmitting stations commence their schedules on time. Prior to commencing a schedule, each station normally should make a preliminary test call for approximately five minutes before the schedule is to begin. After the test call, the synchronous signal is transmitted at least two minutes before the schedule time to enable the receiving stations to synchronize their equipment for usable reception.

SHIP/SHORE AND SHIP/SHIP CIRCUITS

Earlier we discussed the principal of the fleet broadcast and how it is used to deliver the largest percentage of message traffic to operating ships. Now we will discuss the means by which an operating ship can transmit its message traffic ashore or to other ships for delivery or relay.

Until the early 1960s, the primary means of communications for a ship was via CW. CW transmissions were stable and had a great capacity for long-range transmission. However, the slowness of transmission, necessity for repetitions, the cumbersome security measures, and the increasing volume of message traffic greatly detracted from the usefulness of CW. This led to the radioteletype (RATT) circuits, which are the primary means of ship/shore communications today.

SHIP/SHORE NETWORK

Ship/shore circuits are established by designated NAVCOMMSTAs and NAVCOMMUs to accept and relay traffic from afloat commands.