

CONFIDENTIAL

MANUAL OF INSTRUCTIONS
TYPE X-12 NAN SYSTEM
(Second Edition)

Bureau of Ships
Electrical Section

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TABLE OF CONTENTS

	<u>Page No.</u>
Letter of Promulgation	1
INTRODUCTION	2
OPERATING INSTRUCTIONS	2
INSTALLATION INSTRUCTIONS	
Component relations	2
Installation procedure	3
MAINTENANCE INSTRUCTIONS	3
PARTS LIST	5
ILLUSTRATIONS	
Figure 1 - The X-12 Beacon	
Figure 2 - Typical X-12 Installation	
Figure 3 - Selector Switch and Key	
Figure 4 - Wiring Diagram of System	
Figure 5 - Wiring Diagram of Switch	
Figure 6 - Wiring Diagram of Key	

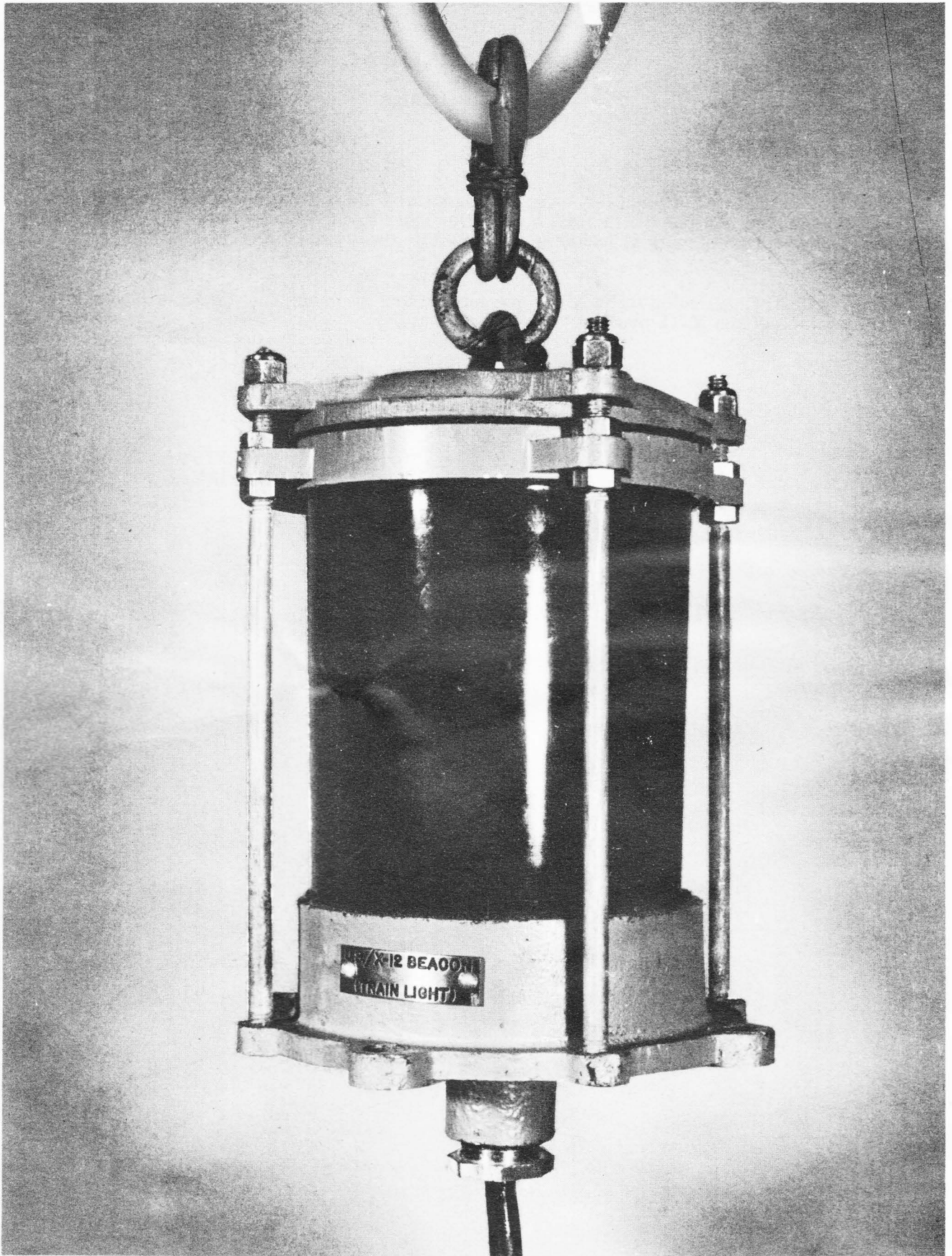


FIGURE 1

THE X-12 NAN SYSTEM

INTRODUCTION

The type X-12 NAN system was designed to provide a point of train for signalmen using the 12 inch signalling searchlight equipped with the type H NAN hood. The system is designed around a NAN beacon which transmits steady or keyed signals through 360 degrees of azimuth, (Figure 1). Messages may be flashed by means of a manual key which is furnished with the beacon.

Included in the complete X-12 system is the 500 watt, 110 volt, AC or DC, 360 degree beacon; and a manual key. It is shipped in a single crate, complete with the cable necessary for installation and with the spare parts shown in the parts list in this manual. Figure 2 shows a typical X-12 installation aboard a destroyer.

OPERATING INSTRUCTIONS

When communication by means of NAN is desired, and the 12 inch searchlight with NAN hood is to be used, the following operation of the point of train light (X-12) is recommended:

1. Energize the electrical circuit to which the beacon is connected.
2. Turn the selector switch to the "STEADY" position.
3. Check the X-12 beacon by examining it through your NAN receiver.
4. Begin communications with the 12 inch light.

If it is necessary to use the X-12 beacon to broadcast messages throughout 360 degrees or around-the-clock, the circuit is energized and the selector switch is turned to "MANUAL KEY" position. This action will place the manual key in the circuit and it may be used to flash messages from the beacon in International Morse Code, (See Figure 3).

The use of the X-12 beacon for communication or identification purposes as a keyed source is useful only over short ranges. Because of the heavy filament necessary to carry the high current and provide the required candlepower, the best results will be obtained if the keying speed does not exceed five words per minute. Letters sent at speeds above this will have a tendency to mush and become indistinct to the receiving signalman.

NAN equipment cannot be used for promiscuous communications. In order to assure satisfactory use of the equipment, the doctrines which have been promulgated for NAN must be explicitly followed. Blind attempts at call-up which are not in conformance with the doctrine will result in wasted time and possible confusion of ships observing the doctrine.

INSTALLATION INSTRUCTIONS

Simple both in mechanical construction and electrical design, the X-12 system may be easily installed by shipboard personnel. Two men, with pliers, screw driver, wire strippers, drill, cable cutters, and soldering iron, are required.

All cable required for the interconnection of the X-12 system components is packed with the equipment. The cable necessary for connecting the switch box of the system to the ship's power supply must be furnished by the ship. The wiring diagram of the system is shown in Figure 4.

Before the installation is started, the personnel who will work on the job should read and understand the following considerations:

Beacon

The beacon should be mounted as high on the mast as practicable. Its vertical separation from the 12 inch searchlight with type H hood should be at least 40 feet to minimize

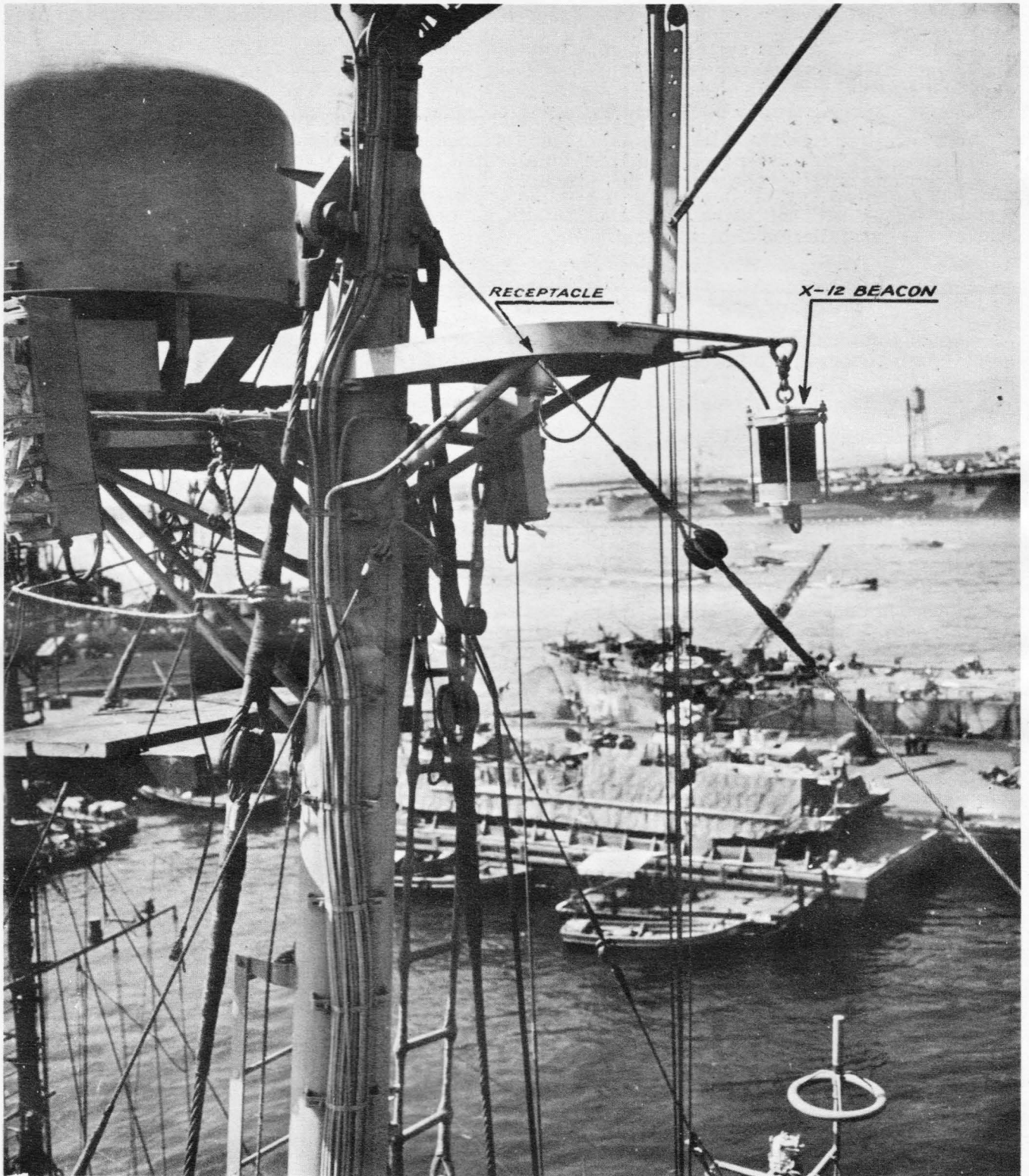


FIGURE 2

confusion of the two by receiving signalmen on other ships. On destroyers, the beacon has been successfully suspended from the guard rail on the after side of the mast below the SC radar. The mast will block out a small sector dead ahead but this may be tolerated. The sister-hook by which the beacon is suspended should be securely lashed with marline to prevent its opening in service.

Receptacle

The watertight receptacle box should be mounted on the mast within five feet of the beacon. Seventy-five feet of cable, with a free end for connection to the selector switch, is wired to the receptacle. The receptacle should be located so that the cable connecting the beacon to it will not obstruct the view of the beacon.

Selector Switch

The watertight selector switch may be mounted on the mast. Whenever practicable, it should be located in the signalman's hutch, (Figure 5). Six feet of cable connects this switch to the manual key.

Manual Key

The manual key is provided with a monitor lamp and a mechanical dimmer. The monitor is a Navy type VG-7 neon glow lamp which is connected in parallel with the beacon lamp and indicates the operation of the beacon, (Figure 6).

Power Supply

The X-12 system should be connected through the selector switch box to a fused (10 ampere), 115 volt, alternating or direct current supply.

The actual installation should proceed in the following manner:

1. Unpack the crate in which the system is delivered.
2. Check the parts in the case against the parts list in this manual.
3. Study Figures 1, 2, and 5. Then choose the locations of your ship for mounting the beacon, the receptacle, the selector switch, and the manual key.
4. Mark the chosen locations and any obstructions which must be removed or bulk-heads which must be pierced.
5. Measure and cut the necessary lengths of cable.
6. Wire the circuit and secure the receptacle, selector switch, and manual key in their proper locations. Be sure the key is grounded. In order to facilitate wiring, the selector switch is internally wired and all connections to it are made on a terminal block provided within the switch enclosure. (See Figure 5). **CHECK THE CIRCUIT!**
7. Install one of the four lamps packed in the shipping crate in one of the two beacons.
8. By means of the sister-hook, suspend this beacon from the guard rail or other projection on the after side of the mast. Insert the plug in the receptacle and screw it down tightly.
9. While the signalman watches the beacon through his NAN receiver, go through the operating procedures outlined in the section on "Operating Instructions" in this manual to insure that the system is ready for use.

MAINTENANCE INSTRUCTIONS

After installation, a regular procedure for maintenance should be followed so failures will not occur at a time when communications are dependent upon the operation of the X-12 system.

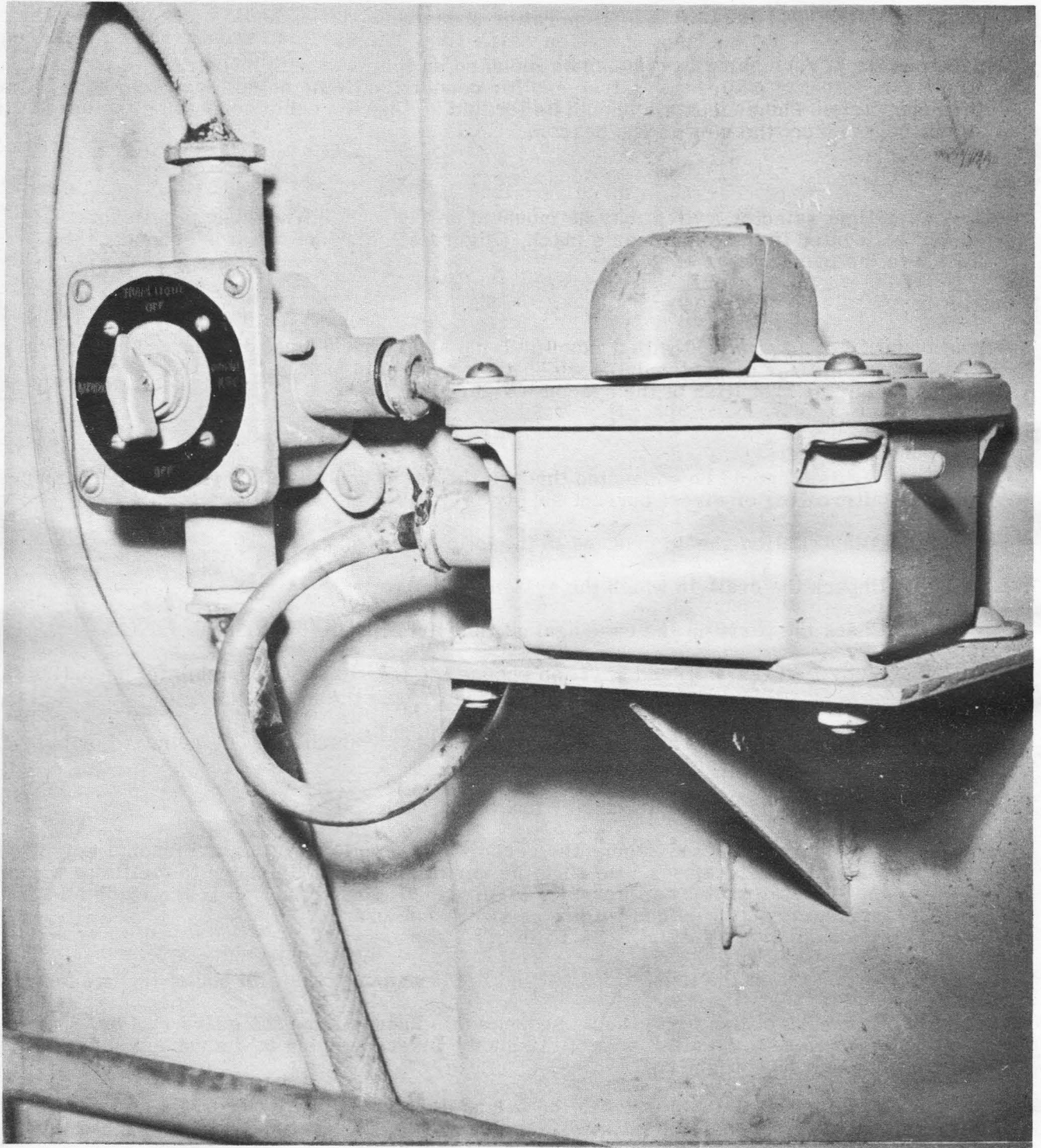


FIGURE 3

For convenience, one complete beacon is supplied as a spare. After the installation is completed, one of the three remaining lamps should be mounted in this spare beacon. The beacon should then be stowed in a convenient location where it is available for immediate replacement in the event of a failure. This spare beacon and the two spare lamps should be checked for satisfactory operation before stowage.

A log should be kept of the hours of operation of the beacon. It should be replaced by the spare beacon when the total hours of operation reach 100. The old lamp should then be replaced by a spare and the beacon stowed in the usual place.

A frequent check should be made of the following points:

Beacon

The beacon should be checked to make sure that the filter is intact and allows no visible light to escape, and that the lamp has not failed because of shock or age.

Manual Key

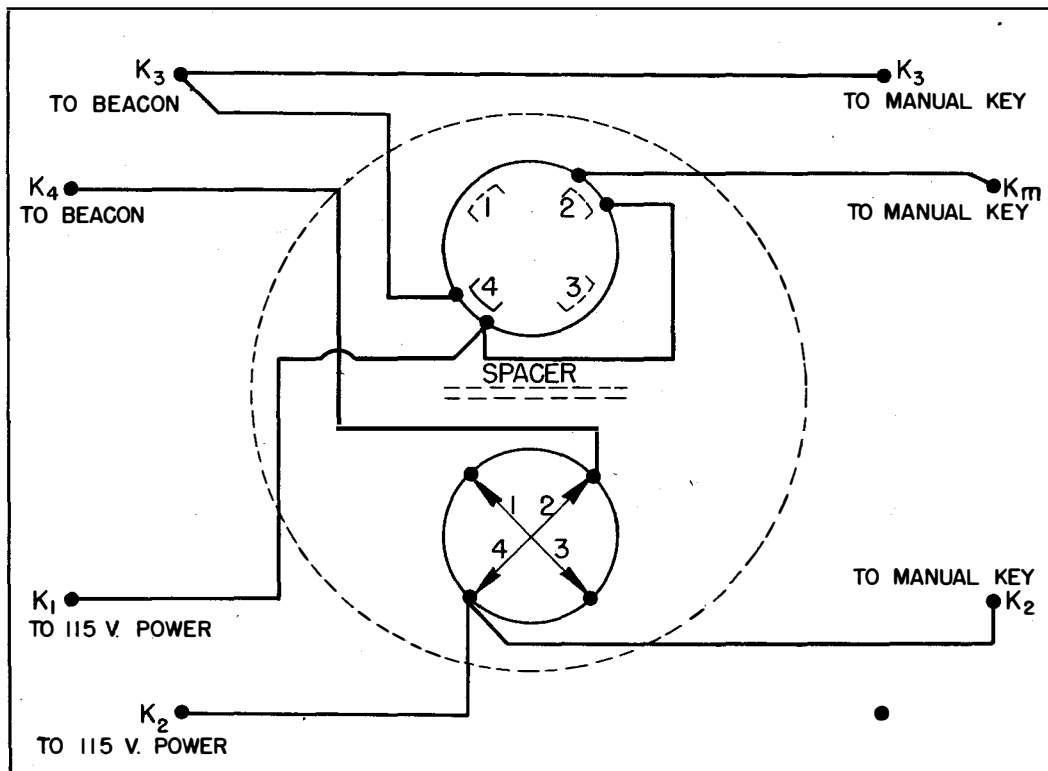
This key should be checked to see that the condenser is in good condition and that the silver contacts are clean and do not draw a large arc. Check the monitor lamp to be sure that it is in operating condition. (Because the monitor lamp is in parallel with the beacon lamp, failure of the monitor does not mean failure of the beacon. The monitor is intended only as an indicator of the signal being sent from the beacon when both the signal and the monitor lamp are in operating condition.)

Selector Switch

This switch should be checked after every use to see that it is in the "OFF" position during the day, for whether the beacon is on or off, no difference in its appearance can be noted. The monitor lamp will light when the beacon is on.

If this check reveals any failures, they should be corrected immediately, making use of the spare parts which are shipped with the system. These are included in the parts list which follows. Additional spares should be requisitioned by Navy number as soon as those originally provided are placed in service.

The first X-12 systems are being equipped with Crane Packing Company Super-seal Plastic Packing No. 1 (or equivalent), Navy Stock Numbers 33-P-897 and 33-P-902, for the upper two gaskets. The lower gasket is rubber (Navy Department Specification 33R1.). As soon as production permits, a newly developed high temperature resistant gasket will be furnished for use in place of the Crane Packing. A set of three of the new type gaskets for the X-12 system will be designated by the Navy Number N-G-4000.



SWITCH POSITIONS:

(1) OFF, (2) MANUAL KEY, (3) OFF, (4) STEADY.

TO CONNECT SELECTOR SWITCH TO

CONNECT SELECTOR SWITCH CONTACTS TO.....

SOURCE OF POWER	K ₁ , K ₂ .
MANUAL KEY.....	K _m , K ₂ , K ₃ .
BEACON OR BEACON RECEPTACLE.....	K ₃ , K ₄ .

FIGURE 4

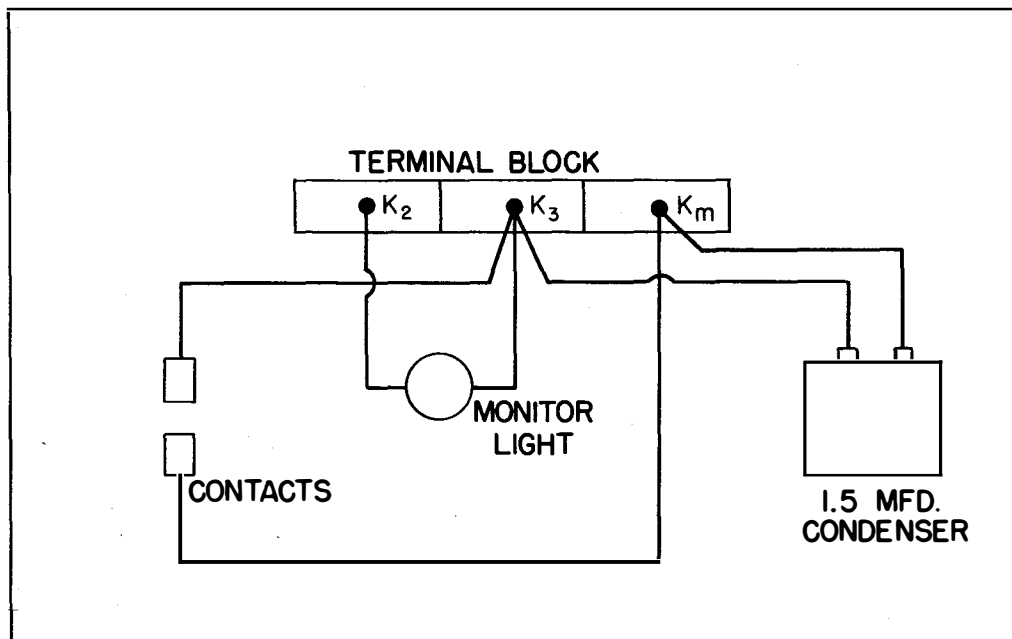


FIGURE 5

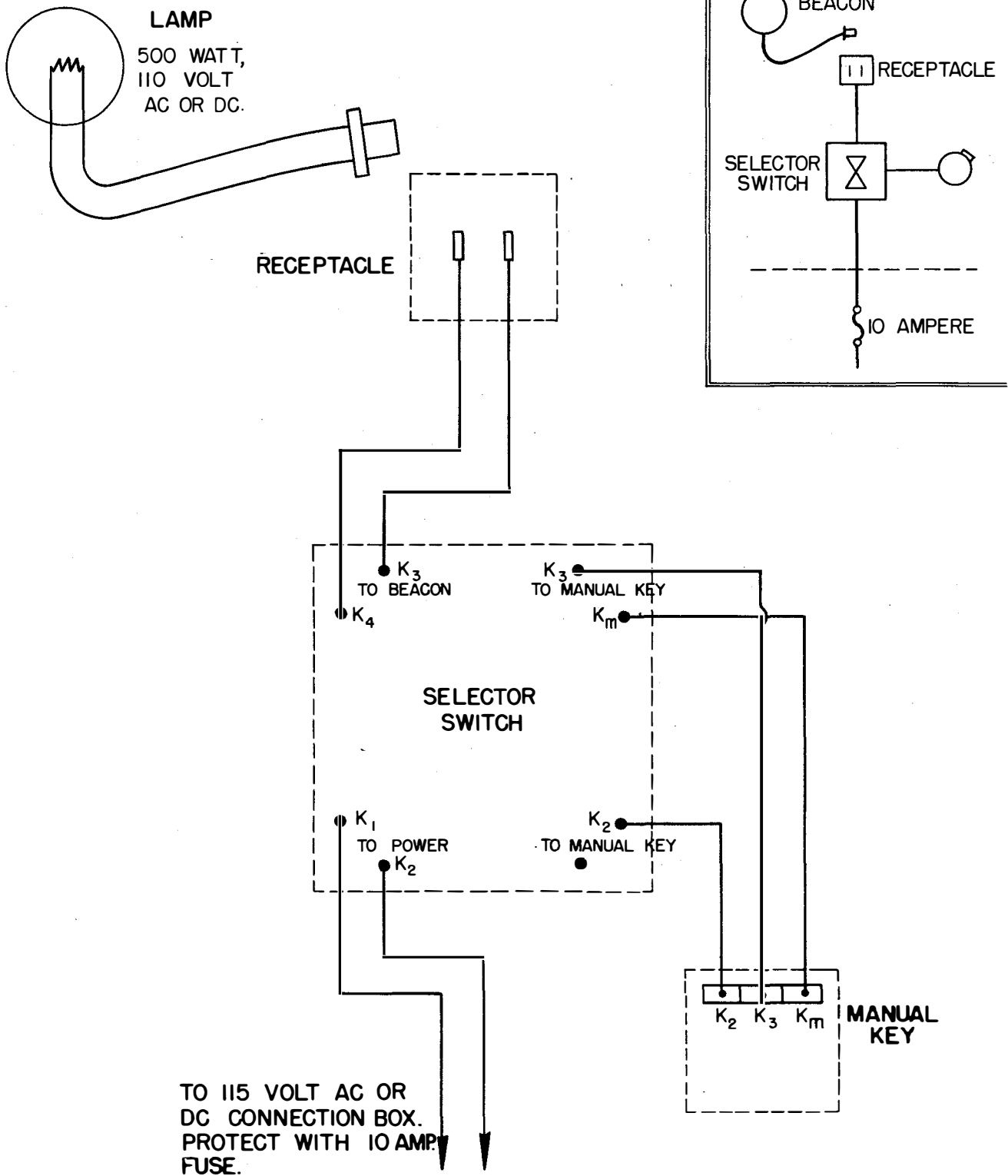


FIGURE 6

PARTS LIST

The following list of parts itemizes all pieces, including spare parts, which are shipped in one crate as the type X-12 system: This list should be checked against the material as it is unpacked.

Component	Navy Number	Size and Weight	Description
Beacon	N-B-3000	10-1/2" high,	The beacon consists of a NAN filter and lamp socket, mounted in a cast bronze housing, wired with six feet of portable cable to a receptacle plug. The nameplate is marked "U.S./X-12" (TRAIN LIGHT). A sister hook is attached to each of the beacons.
Filter	N-F-1102	7" O.D.,	
Socket	N-S-1005	18-1/2" lbs.	
Sister Hook		Two beacons are packed. Approximately 1-2/8" dia.	
Lamps	N-L-1014	5 ³ packed	500 watt, 110 volt signalling type lamp with T-20 bulk marked "X-12" and a medium bi-post base. Rated laboratory life: 200 hours of steady burning.
Receptacle	¹⁷ N R-2265-15	3-1/2" x 3-1/2" x 2-1/4", 2 lbs. One packed	This is a standard receptacle box, BuShips Plan 9-S-4264, with a nameplate marked "U.S./X-12 (TRAIN LIGHT)." It is wired with 75' of DHFA-4 cable.
Selector Switch	N-S-1015	5" x 5" x 4" 2 lbs. One packed	This switch is of the double-throw type. The nameplate is marked "OFF", "MANUAL KEY", "OFF", and "STEADY". The switch box is provided with a terminal block and terminal tubes for the power cables. An internal wiring diagram is enclosed.
Manual Key	N-K-1065	4-1/2" x 5-1/2" 5 lbs. One packed	This is a modification of a standard watertight signalling key, (BuShips dwg. 9000-S6202-73117). The nameplate reads "MANUAL KEY FOR X-12 NAN SYSTEM." The manual key is wired before shipment to the selector switch by six ft. of COP-4 cable. The manual key is provided with a monitor lamp and mechanical dimmer.

Component	Navy Number	Size and Weight	Description
Spare Parts for Manual Key	9-S-4244-L-5 9-S-4244-L-12 9-S-4244-L-13 9-S-4244-L-30 VG-7 Dwg. S6700-696055 pcs. 12 and 23.	One set packed	Diaphragm (1 per set) Lock nut (1 per set) Stop Screw (1 per set) Contact Lever Spring (1 per set) Lamps (2 per set) Contacts (2 per set)
Stuffing Tube	9-S-5166-L, type XXX-1, size E.	One packed	These two items are fas- tened to the cable by rope.
Terminal TUBE	9-S-5235-L 9-S-5235-L , size E.	One packed	
Spare Gaskets	N-G-4000	One set packed	Each set consists of three gaskets similar to those provided on each beacon. (No spare gaskets are being furnished with the early X- 12 systems which are equip- ped with Crane packing material).
Cable	DHFA-4 DCOP-4 DCOP-4	75 feet 6 feet 6 feet	These three lengths of cable are connected at one or both ends to the above components of the X-12 sys- tem.

PACKING LIST FOR X-12 BEACON SYSTEM

Item No.	Name of Item	No. Per Set	Navy Number	Remarks
1	X-12 BEACON - CONSISTING OF: (A) NAN FILTER (B) SOCKET (C) BRONZE LIGHT HOUSING (D) SISTER HOOK	2	N-B-3000 N-F-1102 N-S-1005	PIECES IN THIS ITEM SHALL BE COMPLETELY ASSEMBLED AND WIRED WITH 6 FEET OF CABLE ATTACHED TO A RECEPTACLE PLUG.
2	X-12 LAMP	3	N-L-1014	500 W. 110 V. MED. B1-POST
3	SPARE GASKETS	1 SET OF 3	N-G-4000	NO SPARES FURNISHED FOR BEACONS WITH CRANE PACK'G
4	RECEPTACLE	1	17R-2265-15	WIRED WITH 75' OF DHFA-4 CA.
5	SELECTOR SWITCH	1	N-S-1015	
6	MANUAL KEY & SPARES	1	N-K-1065	WIRED WITH 6' OF TCOP-4 CAB. SPARES ATTAC'D TO KEY ENC.
7	STUFFING TUBE SIZE "E" TERMINAL TUBE SIZE "E"	1 1	9-S-5166-L 9-S-5235-L	THESE 2 ITEMS ARE FASTENED TO THE CABLE BY ROPE.
8	CABLE DHFA-4 75 FEET CABLE DCOP-4 6 FEET CABLE TCOP-4 6 FEET	1 2 1		THESE 4 LENGTHS OF CABLE ARE CONNECTED TO ABOVE COMPONENTS OF SYSTEM.
9	PACKING LIST	1		
10	MANUAL OF INSTRUCTIONS	1		Ports. Na. Yd.-3-22-45-1500

PACKING LIST FOR X-12, (115 VOLT, A.C. OR D.C.) SYSTEM Project Order, (347/45,Q)