

**RESTRICTED**

**Section 15**  
**SONAR SOUNDING EQUIPMENT**

**COMMUNICATION EQUIPMENT MAINTENANCE BULLETIN**

**RESTRICTED**

## SECTION 15. SONAR SOUNDING EQUIPMENT

## MODEL NJ—GENERAL

The NJ series equipments are of the moderate or light weight magnetostriction echo sounding type. Depths scales do not ordinarily exceed 200 feet or 200 fathoms. These equipments are designed for smaller vessels such as 110-foot SC's YMS's, and district and coastal craft. Models currently in use are as follows: NJ-3, -4, -6, -7, -8, and -9. The NJ-3, -4, and -9 equipments are of Submarine Signal Co. manufacture and include an indicator as well as recorder. Models NJ-6 and -7 do not include indicators. NJ-6 is manufactured by Blutworth Marine, Inc.; NJ-7 is manufactured by Submarine Signal Co. All of the above are of the same basic design and, in general, most parts are interchangeable. Model NJ-8 is a Blutworth Marine design which provides for an indicator only. However, this incorporates many features not incorporated in the other NJ series equipments. A separate recorder for attachment to the NJ-8 is provided for installation on some ships.

→NJ-3/-9 SONAR SOUNDING EQUIPMENT  
FIELD CHANGE NO. 1

ADDITION OF ISOLATION TRANSFORMER TO  
INDEX STYLUS CIRCUIT

*Equipment affected.*—For equipments operating directly from an ungrounded a.-c. supply. This field change is available at NSD Bayonne, SSD NSC Norfolk and NSY Mare Island.

1/1/50←

NJ-3/-9 SONAR SOUNDING EQUIPMENT  
FIELD CHANGE NO. 2

ADDITION OF R-119 TO PROTECT C-126

*Equipment affected.*—The receiver-amplifier CBM-46131 or CBM-46131A in NJ-3, NJ-7, or NJ-9 equipments in which R-119 is not already installed as determined by visual inspection.

*Purpose.*—To protect C-126 against high voltage surges.

*Action required.*—Addition of a resistor.

*Time required.*—Estimated at 1/2 man-hour

when accomplished by an average technician.

*Material required.*—One 10,000-ohm, 2-watt resistor designated as R-119.

*Disposition of old parts.*—None.

*General.*—When the equipment is first turned on there is a momentary voltage surge frequently great enough to damage capacitor C-126. This field change adds a resistor across C-126 thereby protecting the capacitor from any voltage surge.

*Procedure.*—Refer to the schematic wiring diagram in the equipment's instruction book. Connect R-119 across the terminals of C-126.

*Changes in instruction books.*—Add R-119 to the parts list and schematic wiring diagram in the instruction book.

*Miscellaneous.*—Upon completion of a field change the responsible technician should insure that the person completing the field change completes the following routine:

1—Forward field change report to the Bureau of Ships, Code 983. Field change report cards (NavShips 2369—Rev. 6-45) will ordinarily be supplied in the field change kits. For changes not requiring kits and for kits distributed prior to the field change program, or when field change report cards are not available, a failure report card, NavShips (NBS) 383 (Rev. 3-45), with the notation under "Remarks" that it reports a field change, and carrying the following information is to be forwarded:

Equipment Model.....  
Equipment Serial No.....  
Unit Serial No.....  
Navy Field Change No.....  
Date Field Change Made.....  
Made By.....  
(Signature and Naval Activity  
or company.)

2—Record the completion of the field change on the Electronic Equipment History Card—NAVSHIPS 536, and on the Field Change Record Card—NAVSHIPS 537.

3—Correct equipment instruction books, if necessary.

### MODEL NJ-6 BLUDWORTH EC-2 COMMERCIAL SOUNDING EQUIPMENT

The EC-2 and NJ-6 sounding equipments, manufactured by Bludworth Marine, are identical in their operation and component parts. The NJ-6 equipments are Navy inspected at the plant and have individual type numbers assigned to certain component parts. The EC-2 equipments were built for the Maritime Commission and do not have Navy designations for parts. All parts are interchangeable between either of the two systems.

### NJ-6 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 1

#### STABILIZATION OF AMPLIFIERS

*Equipment affected.*—NJ-6 equipments in which terminal #10 of the receiver-amplifier CIP-46173 is not connected directly to ground.

*Purpose.*—To prevent oscillation and instability in the receiver-amplifier.

*Action required.*—Grounding of filament terminal #10.

*Time required.*—Estimated at 1/2 man-hour when accomplished by an average technician.

*Material required.*—None.

*Disposition of old parts.*—None.

*General.*—Although assigned as a field change to NJ-6 equipment only, this modification is also applicable to EC-2 equipment.

*Procedure.*—(Refer to figure 10 in the "Installation, Operating, and Maintenance Instructions" for NJ-6, Contract NXs-4853, Bludworth B-54.) Connect terminal #10 directly to a good grounding point. Do not use the hinged chassis cover on the amplifier as a ground.

*Changes in instruction books.*—Change figure 10 of the "Installation, Operating, and Maintenance Instructions" for NJ-6 and figure 10 of the supplement to this book to show terminal #10 of the receiver-amplifier connected directly to ground.

*Miscellaneous.*—Upon completion of the change follow instructions given under "Miscellaneous" on page NJ: 1.

### NJ-7 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 1

Same as F. C. No. 2—NJ-3/-9.

### MODEL NJ-8 INDICATOR SWITCH ADJUSTMENTS

The following instructions for adjusting the indicator keying switches S-103 and S-104 on the NJ-8 equipments are given by the contractor and should be regarded as supplementary to the instructions given in the NJ-8 instruction book, paragraph C, page no. 14:

1—In making adjustments, use a multiple leaf mechanics feeler gauge.

2—Rotate the motor shaft until the switch rollers are not on the "lifter" surface of the cam. Check the operation of the switch by raising roller gently until a click is heard. Then lower it slowly until a second click is heard. (The second click indicates the OFF position of the switch contacts.)

3—By means of the adjusting screw, adjust the switch position until the OFF click occurs when the roller is 0.010 inch off the cam, as measured by the 0.010 leaf on the feeler gauge.

4—To check the accuracy of the setting, tighten the lock screw and insert a 0.012 inch feeler leaf. No OFF click should be heard as the roller is lowered towards the cam.

### MODEL NJ-8 WIRING CHANGE

All vessels having Model NJ-8 sonar sounding equipment recorders, Navy type No. CIP-55127, or obtaining these units as a future installation, are requested to check the wiring to volume control R-803. The correct wiring and circuit arrangement are shown in Figure 1. A marked increase in amplifier sensitivity will occur when the wiring of the recorder is changed to agree with that shown in the illustration.

The NJ-8 recorders were apparently shipped from the factory with incorrect wiring in this circuit. Due to the fact that no new parts are required and no major rewiring is called for, no field change kit will be issued and no field change number will be assigned to this wiring change. 4/1/47

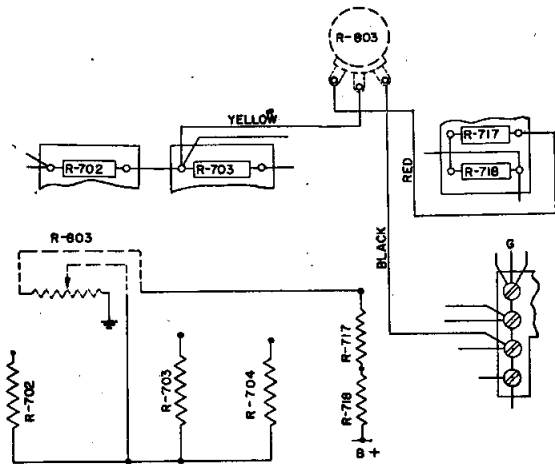


FIGURE 1.—Correct wiring for CIP-55127 recorder of the NJ-8 equipment.

### NJ-8 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 1

#### RESISTOR ACROSS C-210 IN RECEIVER-AMPLIFIER

*Equipment affected.*—The receiver-indicator CET-55093 in NJ-8, ser. nos. 1-212 incl., except those equipments already modified as determined by visual inspection.

*Purpose.*—To eliminate erratic flashing of the strobotron tube V-101.

*Action required.*—Estimated at 1/2 man-hour when accomplished by an average technician.

*Material required.*—One 0.5-megohm, 1-watt, Navy type 63288-10 resistor.

*Disposition of old parts.*—None.

*General.*—Instances of erratic flashing due to excessive voltage on the plate of the strobotron tube V-101 have been reported. By placing a resistor across C-210 the voltage on the plate of V-101 is reduced sufficiently to prevent unwanted flashing.

*Procedure.*—Add the resistor across C-210 as indicated in Figure 1.

*Changes in instruction book.*—Indicate the added resistor on figure 9 in the "Preliminary Installation, Operation and Maintenance Instructions for NJ-8," Contract NXs-4853.

*Miscellaneous.*—Upon completion of the change follow the instructions given under "miscellaneous" on page NS: 1.

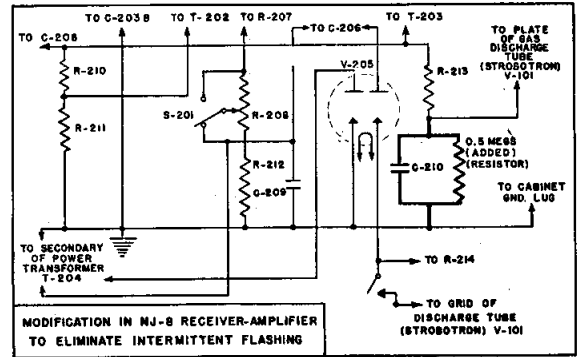


FIGURE 1.—Modification in NJ-8 receiver to eliminate intermittent flashing.

### NJ-8 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 2

#### CHANGE TO PERMIT OPERATION FROM 115-VOLT A-C SHIP'S SUPPLY

*Equipment affected.*—The receiver-indicator CET-55093 in NJ-8 equipments connected to 115-volt a-c, 60-cycle, single phase ship's power supply.

*Purpose.*—To eliminate the possibility of power remaining on the receiver-amplifier and driver-rectifier when the equipment power switch is OFF.

*Action required.*—Internal rewiring.

*Time required.*—Estimated at 2 man-hours when accomplished by an average technician.

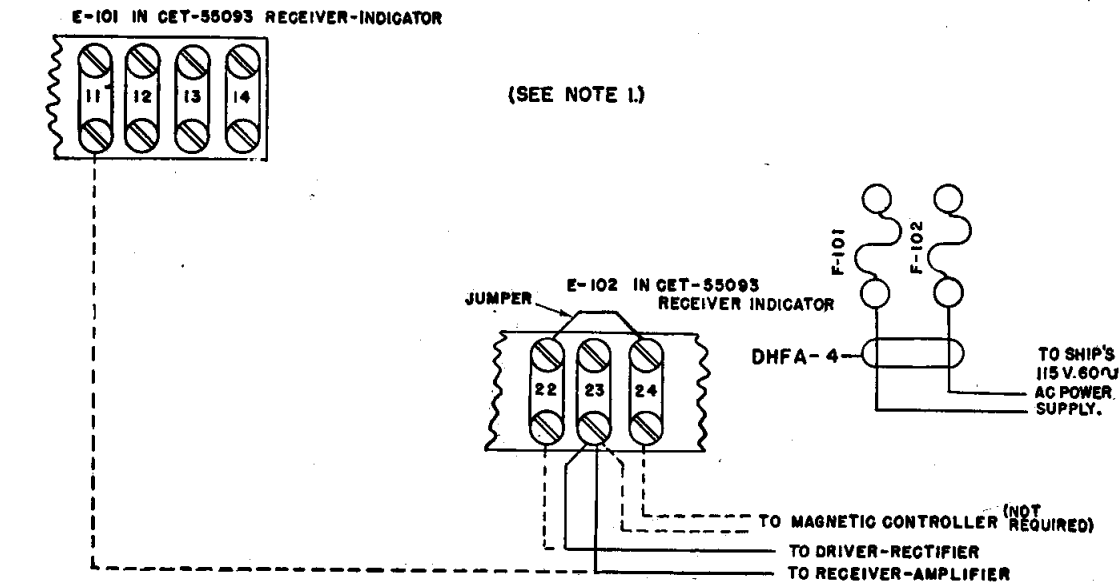
*Material required.*—Laminated bakelite or brass for fabricating new switch plate.

*Disposition of old parts.*—Scrap the old switch plate (removed in step 3 of first part of Procedure).

*General.*—The NJ-8, as shipped, is wired for operation from a magnetic controller and a motor-alternator set as used on vessels having a d-c supply. Since the equipment itself may be operated without the motor-alternator from a 115-volt, 60-cycle, a-c power supply, numerous installations without use of a motor-alternator have been made on vessels supplied with a-c power. Usually in these instances an external switch has been installed between the ship's power panel and the equipment. It has been reported that occasionally this external switch was left on when the equipment was not

in use. Thus, power remained on the receiver-amplifier and driver-rectifier units even though the equipment power switch was in the OFF position. In order to eliminate this possibility

the internal wiring of all NJ-8 equipments operating directly from ship's a-c supply should be modified in accordance with this field change.



**NOTE:**

1. WHEN THE SHIP'S SUPPLY IS 115 VOLTS, 60 CYCLES, A.C., THE MAGNETIC CONTROLLER AND MOTOR ALTERNATOR UNIT ARE NOT FURNISHED AND THE ASSOCIATED CABLES ARE NOT REQUIRED. THE SHIP'S POWER SUPPLY IS CONNECTED DIRECTLY TO F-101 AND F-102 IN THE RECEIVER-INDICATOR AND THE WIRING CHANGES MADE AS SHOWN.
2. ABOVE SHIP SUPPLY MUST BE 115V. ± 5% 60-± 1-1φ.

**LEGEND**

- DISCONNECTIONS
- CONNECTIONS

**REFERENCE:**

BLUDWORTH MARINE LTR. (NXs-4853 & NXss-28255) OF 11 SEPT 1944 AND B.M. PRINT Es-108.

FIGURE 1.—Wiring changes in field change No. 2 on Model NJ-8 equipment.

*Procedure.*—Refer to Figure 1:

1—Disconnect the internal lead to the receiver-amplifier at terminal #11 on terminal strip E-101 in the receiver-indicator. Reconnect this wire to terminal #23 on terminal strip E-102.

2—Disconnect the external lead to the driver-rectifier at terminal #22 on terminal strip E-102. Reconnect this wire to terminal #23 on terminal strip E-102.

3—Insert a jumper between terminals #22 and #24 on terminal strip E-102.

4—Connect the 115-volt, 60-cycle, single phase power leads directly to the terminals on the lower ends of F-101 and F-102.

Refer to figure 2:

1—Fabricate a laminated bakelite or a brass switch plate. The new plate is to be the same size as the original and engraved or stamped as indicated.

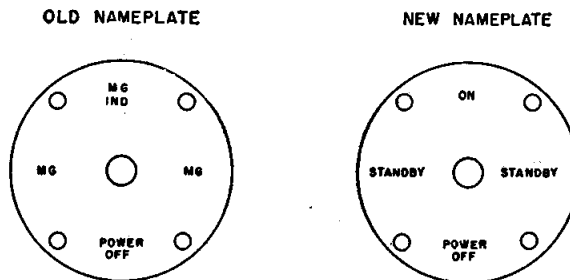


FIGURE 2.—Switch plate lay-out for field change No. 2 on Model NJ-8 equipment.

2—Remove the control knob from the power switch S-102.

3—Replace the present switch plate with the new switch plate.

4—Replace the control knob.

*Changes in instruction books.*—Alter the following figures to conform to Figure 1.

1—Figure 9 in "Preliminary Installation, Operation, and Maintenance Instructions for NJ-8," Contract NXs-4853.

2—Figure 9 in "Preliminary Instruction Book for NJ-8," NAVSHIPS 900,493-IB.

*Miscellaneous.*—Upon completion of the change follow the instructions given under "Miscellaneous" on page NJ: 1.

### NJ-8 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 3

#### CIRCUIT CHANGE TO IMPROVE DEPTH RANGE AND RECORDER TRACE

*Equipment affected.*—All NJ-8 equipments with CIP-55127 receiver-recorders.

*Purpose.*—To improve depth range and recorder trace.

*Action required.*—Circuit change.

*Time required.*—Estimated at 1 man-hour when accomplished by an average technician.

*Material required.*—"Hook-up" wire.

*Disposition of old parts.*—Removed wire should be scrapped.

*General.*—This change increases the gain of the receiver-recorder amplifier by raising the screen grid voltage of the output tube. The increased gain makes possible the recording of greater depths and results in a darker trace for all recorder depths.

*Procedure.*—(Refer to Fig. 6, page 11-11, in the "Preliminary Instruction Book for Receiver-Recorder Type CIP-55127, Switching Unit Type CIP-24245.")

1—Remove the red-purple wire connection between C-714 and terminal 4 of X-703.

2—Add a jumper wire between terminal 4 of X-702 and terminal 3 of T-703.

3—Refer to section 4, paragraph A2 in preliminary instruction book. Retune the input

stage of the receiver-recorder to maximum sensitivity. NOTE: If this is done with the ship in shallow water, it is suggested that the volume control be turned to zero during the operation. It may be necessary to tie in an additional fixed capacitor, which is provided on the input circuit, to obtain maximum signal strength.

*Changes in instruction books.*—Indicate the circuit changes on figures 5, page 11-9, and 6, page 11-11, in "Preliminary Instruction Book for Receiver-Recorder Type CIP-55127, Switching Unit Type CIP-24245."

*Miscellaneous.*—Upon completion of this field change follow the instructions given under "Miscellaneous" on page NJ: 1.

### REPOLARIZING MODELS NJ AND NK RECEIVING PROJECTORS

It has been found that the receiving projectors of the NJ and NK series equipment require periodic repolarization in order to maintain the proper level of sensitivity. This is especially true after the equipment has been subjected to shock or to excessive vibration. The contractors of these equipments, Submarine Signal Co. and Bludworth Marine Co., have been consulted as to the best procedure to accomplish repolarization.

Submarine Signal Co. engineers have recommended the following procedures as very effective for their particular requirements:

1—For the NJ series, a momentary connection of 3 volts DC from two No. 6 dry cells connected in series across the oscillator terminals G and H in the receiver-amplifier will adequately polarize the unit. Due to the extremely low resistance of the 713F oscillator, the shunt current in the receiver-amplifier input windings need not be considered, so that the operation may be conducted without disconnecting the projector. In this case, polarity need not be observed.

2—The NK series projector must be disconnected from the equipment by unplugging it. The polarizing voltage is then momentarily

applied between prongs 1 and 2 of the connection plug. A 6-volt battery is recommended. Correct polarity with the positive lead applied to the No. 1 prong must be observed.

Quarterly repolarization of these Submarine Signal Co. impulse type receiving projectors is recommended.

Bludworth Marine Co. suggests that in equipment of the NJ-6 and NJ-8 type, "flash" polarization may be accomplished by any of the following methods:

1—When the supply voltage is 230 volts DC, 115 volts DC, or 24-32 volts DC, the leads from the receiving oscillator pack should be disconnected from the amplifier terminals and the oscillator placed across the d-c supply through a 3-ampere fuse. The fuse will allow an instantaneous current to pass and then burn out. This momentary current will accomplish the desired polarization.

2—If the ship is a-c operated, disconnect the leads to the amplifier input. Flash polarization may then be accomplished by momentarily connecting a 6-volt storage battery across the receiving oscillator pack leads.

3—In the NK-2 disconnect the amplifier by pulling out the plug from the receiving oscillator to the recorder case. Polarization may then be accomplished as indicated in the "NK series" paragraph above.

Bludworth Marine Co. states further: "In subsequently issued instruction books such flash polarization of the receiving oscillator will be made a part of the recommended maintenance procedure. It will be further recommended that such magnetization shall be made whenever a vessel has been subjected to severe vibration or shock."

#### RESISTANCE - TO - GROUND READINGS ON MODELS NJ-3 AND NJ-9 TRANSMITTING AND RECEIVING PROJECTORS

Satisfactory performance of the models NJ-3 and NJ-9 equipments can be obtained providing the resistance-to-ground of the CBM-78138 transmitting projector leads is not less than 50

megohms. There are instances when the resistance-to-ground of the CBM-78139 receiving projector leads may be less than the normal average of 50,000 ohms. It is suggested that, when the resistance is less and the operation is poor, the receiving projector leads be interchanged at the amplifier to see if operation is improved. Polarizing of this oscillator may be required to bring it up to maximum sensitivity. (See Article on "Repolarizing Models NJ and NK Receiving Projectors", page NJ: 5 of this bulletin for details on polarization.)

#### USE OF TRANSMITTING PROJECTORS FOR RECEIVING ON MODELS NJ-3, NJ-4, NJ-6, NJ-7, AND NJ-9 EQUIPMENTS

Reports indicated excessive failures of the type -78139 receiving projector used with NJ-3, -4, -6, -7, and -9 equipments as compared to failures of the type -78138 transmitting projector.

Investigations conducted by the contractors and by the Bureau of Ships have indicated that the type -78138 transmitting projector may be substituted for the type -78139 receiving projector without serious loss in performance. Present procurement of spare projectors for these equipments includes only the type -78138.

Use of the type -78138 as the receiving projector for NJ-3, NJ-4, NJ-6, NJ-7, and NJ-9 equipments is authorized whenever failure of the receiving projector occurs and a type -78139 replacement is not available.

Damaged type -78139 projectors should still be returned to the manufacturer. These will be converted to type -78138.

To date, all reports received from installation activities have supported the results of the preliminary investigation. As insufficient time has elapsed to permit final determination of the effectiveness of the substitution, all installation activities and cognizant ships' personnel are requested to report promptly any instance of unsatisfactory performance to the Bureau of Ships. 8/1/46

**CORRECTIONS AND ADDITIONS TO MODELS  
NJ-3 AND NJ-9 INSTRUCTION BOOKS**

Following are the corrections and the additions to be made to the NJ-3 and NJ-9 final instruction books (SubSig. Spec. 8345):

**Page 7:**

Under "BuShips Type No." change prefix CGP in two places to CBP.

**Page 17:**

Paragraph 3.1, part (b)—Change nos. CGP-21640 and CGP-21639 to CBP-21640 and CBP-21639, respectively.

**Page 22—(Alteration 691):**

Add under heading "Every Two Weeks" the following:

"There is also a third fitting for oil in the vicinity of the oil-fitting H-302 on the gear box cover. This fitting is different from the other fittings on the gear box, in that it is turned to open for oiling. Introduce into this fitting a few drops of good grade SAE 30."

**Page 38:**

Interchange the contents of paragraph 4.45 and 4.46, leaving the paragraph heading unchanged.

**Page 46:**

Delete asterisk in front of E-309.

**Page 48—(Alterations 883, 979, 1019):**

Opposite K-402 (for CBM-52288 only) change "Mfr's. Desig." from 1000 to SA1000 XRBS, and change "Contr's Part No." from 746-305 to 746-456.

**Page 49—(Alterations 1071):**

Opposite K-402C change "Mfr's Desig." to JC.

**Figure 24—(Alteration 777):**

Connect resistor R-119 across condenser C-126 in the receiver amplifier.

**Page 43—After R-118 add the following:**

\*R-119 Protective Resistor (CBM-46131A only) 10,000 ohms, 2W 24 BT-2 738-77.



## MODEL NK—GENERAL

The NK series sounding equipments are super-sonic semi-portable equipments designed to use a storage battery power supply and to require a minimum amount of labor to install. All models use two magneto-striction projectors (one transmitting and one receiving) in one streamlined housing hung overside. The transmitting projectors are shock excited by condenser discharge in order to produce the outgoing pulse.

The units of the equipment are:

- 1—Projectors and housing.
- 2—Driver-receiver-recorder (or indicator).
- 3—Necessary interconnection cables and projector fittings.
- 4—Storage battery (not furnished by equipment manufacturer).

Projectors have been purchased for the NK-2 equipments to allow installation inboard when more permanent installation is desired, or when the normal overside projector mounting is not satisfactory.

Table I gives the principal characteristics of the various models of equipment.

## MODEL NK-2 MAINTENANCE AND OPERATION

Normal operation of NK-2 equipment produces a fine metallized dust or powder which accumulates on all surfaces of the recorder, particularly on surfaces where there is a trace of oil or grease. It is therefore important that the commutators and contact surfaces be free of oil and grease. The recorder interior should be completely cleaned in order to remove this powder each time a new roll of paper is installed.

When the NK-2 is to be put in operation after having been out of use for a period of time (2 weeks or more), all keying contacts and commutator segments should be polished and cleaned. Only very fine sandpaper, relay burnishing tools, or ordinary bond paper should be used for polishing. After polishing is completed, clean thoroughly with carbon-tetrachloride. The contact fingers and the commutator segments are composed of different materials and after being stored for a short time, corrosion develops. This is particularly true if stored in a salt air atmosphere.

Another source of trouble from corrosion is the phasing device on the end of the roller shaft drum. A small amount of corrosion or dirt on

TABLE I

Model	Manufacturer	Scale <sup>1</sup>	Power supply	Source of high voltage	Remarks
NK.....	SubSigCo.....	0-55 35-90 70-125 105-160	12 volts DC 14 amperes.	Dynamotor.....	Recording.
NK-1.....	do.....	0-200	6 volts DC 21 amperes.	do.....	Recording.
NK-2.....	Bludworth Marine.....	0-60 60-120 120-180	12 volts DC 8 amperes.	Vibrator supply.....	Straight line recording.
NK-3.....	SubSigCo.....	0-200	6 volts DC 21 amperes.	do.....	Recording.
NK-4.....	Cancelled.....				
NK-5.....	Bludworth Marine.....	0-100	6 volts DC 6 amperes.	do.....	Light weight, low power consumption, small size—reads directly on meter.
NK-6.....	do.....	0-200	12 volts DC	do.....	Straight line—recording—deep reading—for survey use.
NK-7.....	SubSigCo.....	0-200	6 volts DC 21 amperes.	do.....	Deep reading—recording—for survey use.
NK-8.....	Cancelled.....				
NK-9.....	SubSigCo.....	0-200	6 volts DC 21 amperes.	do.....	Same as NK-7 except for new motor in recorder.

<sup>1</sup> Feet or fathoms.

the contact surface of the copper brush will result in failure of the transmitter to function. The commutator must be removed in order to properly clean it.

For best results a 12-volt storage battery should be assigned to each NK-2 equipment. This battery should be stored with the equipment and tested and charged periodically.

### NK-2 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 1

#### R-303 CONNECTED IN SERIES WITH R-301 AND R-302

*Equipment affected.*—The driver-rectifier in all NK-2 equipments except those already modified as determined by visual inspection.

*Purpose.*—To eliminate misfiring of the discharge tube V-301.

*Action required.*—Relocation of R-303.

*Time required.*—Estimated at ½ man-hour when accomplished by an average technician.

*Material required.*—None.

*Disposition of old parts.*—None.

*General.*—It has been found that the power supply voltage of the NK-2 is slightly too high for the discharge tube V-301. This condition causes the tube to fire without application of the keying voltage. By relocating R-303 in accordance with this field change, the voltage is sufficiently reduced to eliminate misfiring.

*Procedure.*—Refer to Fig. 1:

1—Remove the connection between R-302 and L-303.

2—Disconnect R-303 presently located between the plate of V-301 and the junction of L-303 and R-302. Reconnect R-303 between R-302 and L-303.

3—Connect the plate of V-301 to the junction of R-303 and R-302.

*Changes in instruction books.*—Alter figure 7 in "Installation, Operation, and Maintenance Instructions for NK-2," Contracts NXs-2341 and NXss-21997, to conform to Figure 1.

*Miscellaneous.*—Upon completion of the change follow the instructions given under "Miscellaneous" on page NJ : 1.

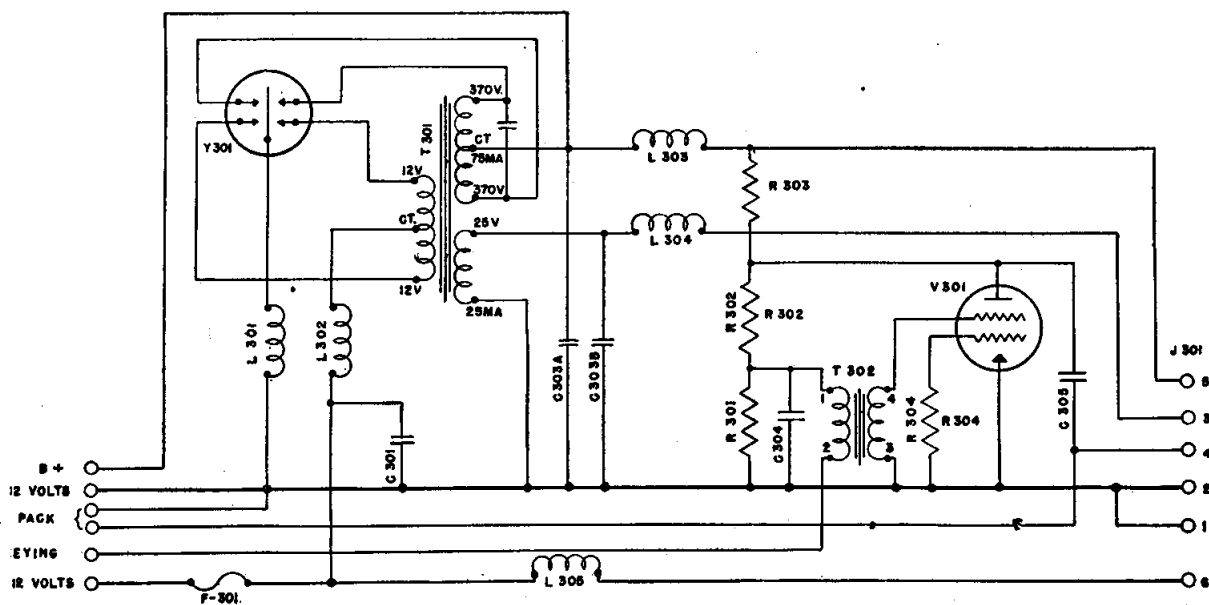


FIGURE 1.—Revised schematic to eliminate misfiring of discharge unit assembly in Model NK-2 equipment.

### MODEL NM—GENERAL

The letters NM indicate that this equipment is of heavy duty magnetostriction echo sounding type. Depth ranges are from 0 to 2000 fathoms maximum. Models NMB and NMB-1, manufactured by Submarine Signal Co. and RCA respectively, include recorders. These equipments use a single rectangular projector for both receiving and transmitting. Models NMC and NMC-1, manufactured by RCA and Submarine Signal Co., respectively, are similar in principle to NMB models. They do, however, make use of circular projectors which are interchangeable as to size with the NJ series projectors. This was done in the interests of standardization of old fittings for all types of ships. The NMC is so constructed as to prevent separation of the driver from the receiver-amplifier and indicator. It is used on larger combatant ships and in all large auxiliaries. The NMC-1 is so constructed as to allow the driver to be mounted below deck, separated from the receiver-indicator-recorder. These equipments are installed on DD's and DE's and other antisubmarine vessels.

### INSTALLATION, ADJUSTMENT, AND CARE OF INDICATOR BELTS ON MODELS NMB-1 AND NMC EQUIPMENT

The number of failures of indicator belts in RCA ranging and sounding equipments indicates a need for care in handling, installing, and adjusting these belts.

Handling of indicator belts should be avoided as much as possible. When necessary, handle them carefully. Failures are generally caused by nicks, kinks, or bends incurred in handling. Each belt is carefully inspected and tested before shipment, but should be reinspected before being installed.

The manufacturer has issued instructions on installation and adjustment. Adherence to these should reduce the number of break-downs and generally prolong their life. The instructions issued by the manufacturer are included

here for the benefit of those who do not have them.

To install belt, remove old one and proceed as follows:

1—Rotate the drive pulley (which is located at the rear of the indicator shelf) until the red index dot on the upper surface points to the rear.

2—Examine the new belt and note the four indicator holes centrally located along its length in addition to the sprocket holes along the upper and lower edges. Select one of the index holes and make certain that the group of three holes (formed by the index hole and two sprocket holes) slants up from the lower left to upper right. Should this group slant in the opposite direction, carefully turn the belt inside out. View the inside of the belt in checking the hole slant.

3—Hold the belt in such a manner that the group of three holes is to the rear.

4—Slide the left-hand idler pulley to the right (against the spring tension) to its limit and hold it there.

5—Slide the belt carefully between the light mask and the indicator scale and around the two idler pulleys. The belt will now have sufficient slack to allow it to slip loosely around the drive pulley.

6—Rotate the belt slightly in either direction so that the index hole will coincide exactly with the red dot on the upper surface of the drive pulley.

7—Gently release the left-hand idler pulley and guide the belt so that the pins in the drive pulley engage the sprocket holes in the belt.

8—Place the indicator in operation and observe the position of the belt on the pulleys as it rotates. The belt should ride evenly on all pulleys and remain centered with respect to the periphery of the idler pulleys.

9—Should the belt tend to ride off either or both the idler pulleys, remove the belt and turn it upside down (*not inside out*). Follow the procedure outlined above. Reinstall the belt and again observe its position on the pulleys while in operation. If the belt continues to

ride off the pulleys in the same direction (up or down) it is an indication that the idler pulleys are misaligned. Instructions on aligning pulleys follow. If the belt tends to ride off in the opposite direction (down or up) after reinstalling, it is an indication of a defective belt. Replace with another belt.

In aligning the pulleys, the procedure to be followed will differ for the various models of sonar equipment. The methods of pulley alignment are as follows:

1—*NMB 1 and QCP equipment.*—The pulley studs are undercut to permit the stud to be bent for alignment. If the indicator belt has a tendency to ride low on the pulley, *bend the stud away from the belt.* If the belt rides high, *the stud must be bent toward the belt.* Bending of the studs is accomplished by lightly tapping the hub of the pulley in the desired direction.

**CAUTION:** Use a piece of wood as a buffer between the pulley and the hammer when bending the studs. The displacement imparted to the pulley should not be greater than  $\frac{1}{1000}$  inch for each trial adjustment.

2—*WEA and WEA-1 equipments.*—The studs of the pulleys may be tilted by loosening the studs and placing shims between the base of the stud and the chassis. Paper may be used if shimming material is not available.

3—*NMC, QCC-2, QCW, X, Y, and Z and later models of WEA-1 equipments.*—In these models provision is made for alignment of the pulleys. The indicator chassis on which the pulleys are mounted is formed to provide a cup-shaped depression under the pulley stud. A cup-shaped washer is provided and fits snugly in the opposite side of the depression. To align the pulleys, loosen the  $\frac{1}{16}$ -inch nut (fastening the stud of the right-hand pulley beneath the shelf) less than one-eighth of a turn. Remove the pulley and tap the base of the stud lightly. *Important: Do not tap the bearing surface of the stud.* If the belt has a tendency to ride low on the pulley, tap the base of the stud in a direction *toward* the belt. If the belt rides high, tap the base of the stud in a direction *away* from the belt. The left-hand pulley stud is adjusted by

tightening the  $\frac{1}{16}$ -inch nut while the belt is mounted and operating. Observe the positioning of the belt while tightening the nut. If the nut is found to be dead tight, loosen it and then tighten to nearly dead tight before making the final adjustment.

**NOTE FOR ALL EQUIPMENTS.**—The adjustment of one idler pulley will affect the position of the belt on the other idler pulley. Therefore, a final adjustment may be required on the initially adjusted pulley.

### →NMB-1 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 1

#### CHANGE TO RECORDER-INDICATOR

*Equipments affected.*—NMB-1 equipments with serial Nos. 4 through 57. This Field Change is available through the nearest RCA representative. 1/1/50 ←

### NMB-1 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 2

#### C-421B DISCONNECTED

*Equipment affected.*—The indicator-recorder-amplifier CRV-55065 of all NMB-1 equipments.

*Purpose.*—To provide a darker recorder trace with the sensitivity control set to give optimum visual indication.

*Action required.*—Circuit change.

*Time required.*—Estimated at  $\frac{1}{2}$  man-hour when accomplished by an average technician.

*Material required.*—None.

*Disposition of old parts.*—None.

*General.*—The capacitor C-421B serves as a plate by-pass for the recorder output tube V-409. It provides a ground return for any r-f currents that may be present at this point. It also stabilizes the recorder output to prevent recording of erratic or random echoes of very short duration. In actual service it has been found that the by-pass effect of this capacitor causes the setting of the common sensitivity control for optimum darkness of the recorder

trace to result in multiple echoes and reverberation flashes on the visual indicator. This change by disconnecting C-421B, permits setting the sensitivity control to a point which will give a dark recorder trace and only a single visual echo indication. The most improvement will be noted in the recording of shallow depths.

As the capacitor C-421B is in the same container with C-421A, it cannot be physically removed separately. It may serve as a replacement for C-421A in case of failure to this section.

*Procedure.*—(Refer to Figure 38 in "Installation, Operation, and Maintenance Instructions for Model NMB-1 Echo Sounding Equipment.")

1—Remove the connection between terminal B of C-421 and terminal 6 of A-405.

*Changes in instruction books.*—Make the following changes in "Installation, Operation and Maintenance Instructions for Model NMB-1 Echo Sounding Equipment":

1—In paragraph 3.28, page 13, delete the sentence "The plate is by-passed to ground by capacitor C-421B".

2—On figures 31 and 28, indicate that C-421 has been disconnected.

*Miscellaneous.*—Upon completion of the change follow the instructions given under "Miscellaneous" on page NJ:1.

## →NMB-1 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 3

### KEYING CONTACT REPLACEMENTS

*Equipments affected.*—All NMB-1 equipments requires RCA kit No. 66090 available at NSY Charleston. 1/1/50 ←

### MODEL NMC EQUIPMENT

The NMC sounding equipment supplied by RCA under contracts NOs-80654 and NXss-23699 are specially designed for simplified installation without sacrifice of performance. The bridge rack where all controls are located

combines the driver-amplifier CRV-50121 and the receiver-oscillator-indicator-recorder CRV-43033 in a single cabinet identical to the QCQ-2 stack. Although the NMC driver is identical to the driver of the WEA-1, the receiver has a chassis and a keying mechanism similar to those used in the QCQ-2. The receiver unit also includes a neon lamp rotating-belt-type indicator and a built in paper recorder mechanism employing pantograph operation with two paper speeds for ranges of 100, 200, 2,000, and 4,000 fathoms. The entire unit operates at 18 kc. and has as its power requirements 115-volt, single-phase, 60-cycle AC, at 800 watts.

Two projectors are supplied and are mounted adjacent to one another. Projector CRV-78169 is used for shallow soundings and is oil filled, while projector CRV-78170 is used for deep soundings and is filled with CO<sub>2</sub> gas at 6 pounds pressure. A special 20-foot neoprene blow-out hose is supplied for use in injecting this gas.

The NMC projectors have a broad pattern and will operate satisfactorily at angles up to 10° from the horizontal in an athwartship direction and 4° from the horizontal in a fore and aft direction without compensation. Unlike the projectors of the NJ series, the NMC projectors are not provided with angular adjustments.

All parts of projectors exposed to sea water are protected by a special rubberized coating to prevent corrosion. Only one THFA-4 cable is required between the filter junction box (in hull) and the sound stack (in chart house).

### MODEL NMC KEYING CONTACT ADJUSTMENTS

The NMC instruction book, page 19, table E, lists keying lengths in terms of time and length of flash. However, the following simple method of adjusting keying lengths has proven satisfactory:

1—100 shallow.—Contact "A" should be adjusted, with driver power on, to give a pulse which will be just short of sufficient length to cause bias relay K-101 to operate. In practice this may be accomplished by adjusting contact

"A" from a maximum signal length to a point where the relay just fails to operate.

2—100 fathoms.—Contact "D" should be adjusted, with driver power on, to give a pulse which is just enough to cause the bias relay to operate positively each time. Bias relay operation can be checked by the audible "click" heard when the receiver-indicator chassis is open for contact adjustment.

**NMC SONAR SOUNDING EQUIPMENT  
FIELD CHANGE NO. 1**

**CORRECTION OF FACTORY WIRING ERROR**

*Equipment affected.*—NMC equipments with receiver - oscillator - indicator - recorder CRV-43033, ser. nos. I-301 to I-305 incl., I-307, I-309 to I-316 incl., I-318, I-319, I-322, I-330, and I-334.

*Purpose.*—To allow interchangeability of all units in NMC equipments.

*Action required.*—Rewiring of receiver receptacle and cable plug.

*Time required.*—Estimated at 1/2 man-hour when accomplished by an average technician.

*Material required.*—None.

*Disposition of old parts.*—None.

*General.*—The units which this change affects were delivered with non-standard wiring of the receptacle J-403 and its associated cable plug P-403. With these connections the units operate satisfactorily, but are not interchangeable with similar units of different serials. This change, by providing standard wiring of J-403 and P-403, permits complete interchangeability of units.

*Procedure.* 1—Change connections to cable plug P-403 as shown in Figure 1.

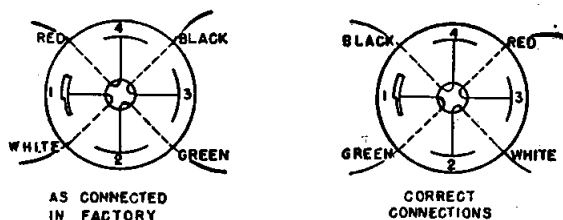


FIGURE 1.—Connections to cable plug P-403 in Model NMC equipment.

2—Change connections to receiver receptacle J-403 as shown in Figure 2.

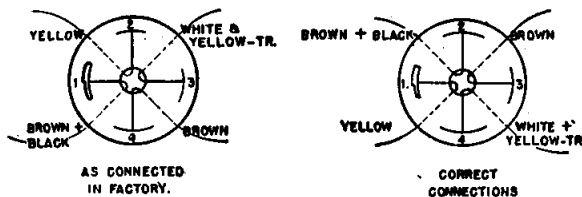


FIGURE 2.—Connections to receiver receptacle J-403 in Model NMC equipment.

*Changes in instruction book.*—None.

*Miscellaneous.*—Upon completion of the change follow the instructions given under "Miscellaneous" on page NJ: 1.

**→ NMC SONAR SOUNDING EQUIPMENT  
FIELD CHANGE NO. 2**

**C-453B REPLACED WITH 0.01 μf CAPACITORS**

*Equipment affected.*—NMC equipments with serial Nos. 1 through 300, inclusive, I-301 through I-335, inclusive (approximately), under contract NOs-80654. This Field Change is packaged with Field Change No. 6—NMC. It is available at NSD Bayonne, SSD NSC Norfolk and SSD NSC Oakland. 1/1/50

**NMC SONAR SOUNDING EQUIPMENT  
FIELD CHANGE NO. 3**

**SPRING BRAKE FOR IDLER GEAR O-422**

*Equipment affected.*—NMC receiver-oscillator-indicator-recorder CRV-43033 equipments with serial Nos. 1 through 70 (approximately) under contract NOs-80654. This Field Change is packaged with Field Change No. 4—NMC and is available at NSD Bayonne, SSD NSC Norfolk, SSD NSC Oakland, NSY Mare Island and NSY Puget Sound. 1/1/50

### NMC SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 4

#### PANTOGRAPH IDLER GEAR WITH BALL BEARING

*Equipment affected.*—All NMC receiver-oscillator-indicator-recorder CRV-43033 equipments under contract NOS-80654 and equipments with serial Nos. 1 through 70 (approximately) under contract NXss-23699. This Field Change is packaged with Field Change No. 3-NMC and is available at the same places as No. 3-NMC. 1/1/50

### NMC SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 5

#### NEW CHROMIUM STYLUS NEEDLE

This Field Change deleted. 1/1/50

### NMC SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 6

#### ADDITION OF R-491, R-492, R-493, AND CHANGE IN VALUE OF R-435

*Equipment affected.*—NMC equipment with serial Nos. 1 through 300 and I-301 through I-335 (approximately) under contract NOS-80654. This Field Change is packaged with Field Change No. 2-NMC. 1/1/50

### NMC SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 7

#### INSTALLATION OF WATERTIGHT FILTER JUNCTION BOX

*Equipment affected.*—All NMC equipments.

*Purpose.*—To protect filter junction box components from water damage in case the compartment containing this box is flooded.

*Action required.*—Replacement of filter junction box.

*Time required.*—Estimated at 4 man-hours when accomplished by an average technician.

*Material required.*—1—One rectangular watertight enclosure as shown on ➡ BuShips drawing RE 53F 2000A. (See Figure 1 on the next page.) If above enclosure is not available an equivalent type box may be supplied.

2—Three stuffing tubes for use with the watertight box.

*Disposition of old parts.*—The removed junction box should be turned in to the activity supplying the watertight box.

*General.*—The type CRV-53137 filter junction box supplied as a unit of the NMC equipment is not of a watertight construction. Flooding of the compartment in which the filter junction box is installed or excessive moisture condensation within the box will damage the capacitors and short the driver output. This change prevents the water damage by providing a watertight filter junction box.

➡ These W. T. Box assemblies will contain a lightning arrestor on a mounting plate which is to be removed and a new mounting plate cut from sheet steel. Mounting brackets are provided that should reduce the time of fabrication and assembly. ←

#### *Procedure.*—

- 1—Remove the present filter junction box.
- 2—Mount the watertight enclosure.
- 3—Remove the capacitors and the terminal board from the old box. Reinstall them in the new box.
- 4—Install the stuffing tubes. Pack to make watertight.
- 5—Reconnect former wiring.

*Changes in instruction book.*—In Table A, page 9, of "Instruction Book for Navy Model NMC Echo Sounding Equipment," NAV-SHIPS 900,251-IB, delete "Navy Type No. CRV-53137" in connection with the filter junction box. Indicate this field change number and title in the margin. Insert "9-S-5341-L-Alt. 5" under "BuShips Dwg."

*Miscellaneous.*—Upon completion of the field change follow the instructions given under "Miscellaneous" on page NJ:1. 4/1/50

### NMC SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 8

#### REPLACEMENT OF TRANSDUCER DIAPHRAGMS

*Equipment affected.*—All NMC equipments. Kits are available at NSD Bayonne, NSD Mechanicsburg, NSD Clearfield, and SSD NSC Oakland. 1/1/50

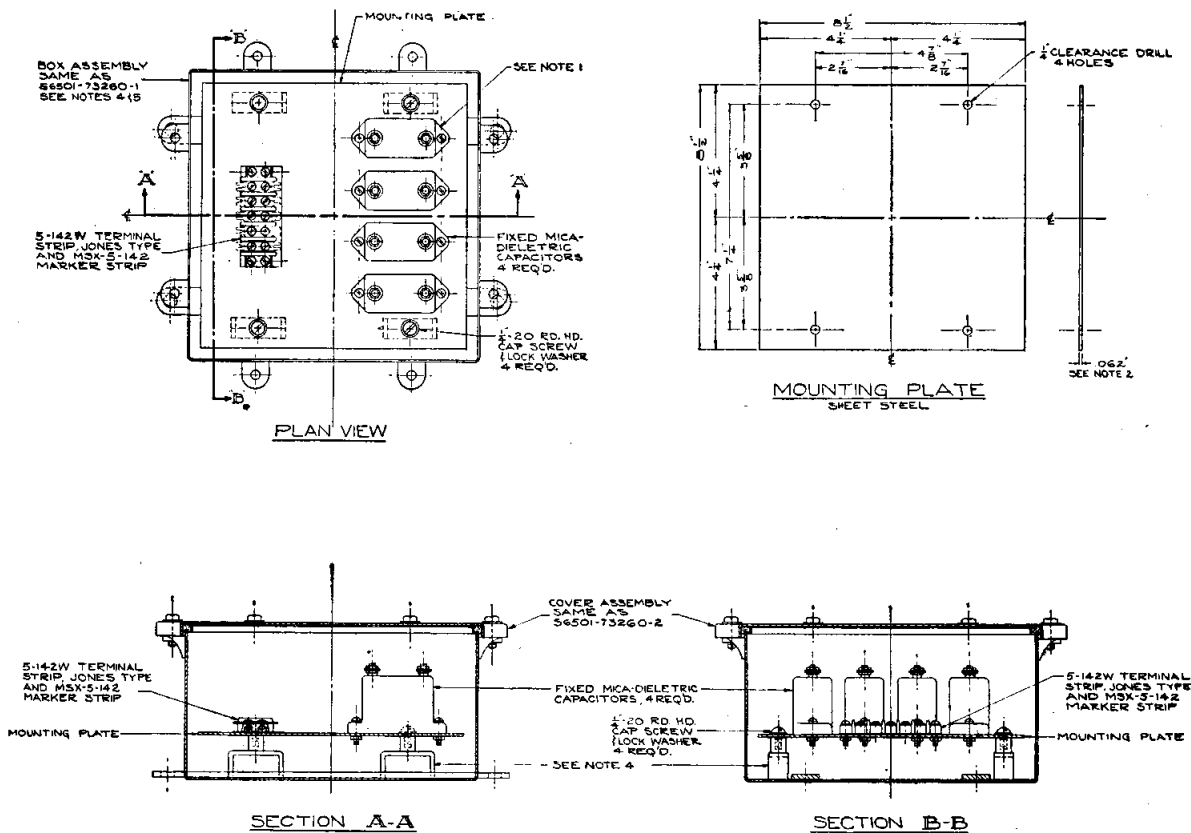


Figure 1.—Filter junction box (W. T.) NMC sonar field change No. 7 revision.

NOTES

1. Capacitors and terminal strip mounting holes to be determined by installing activity.
2. Thickness of mounting plate should be thick enough for rigidity when mounted.
3. Installing activities will provide two stuffing tubes.

4. Lightning arrestor for automatic ships service telephone equipment to be removed from box and the mounting plate to be mounted on the four mounting brackets as shown.

5. Supply of these boxes (if not in stock) can be procured from Supply Officer, Portsmouth Naval Shipyard, Portsmouth, N. H.; supply officer Norfolk Naval Shipyard, Portsmouth, Va., and Naval Supply Center, Oakland, Calif.



### ➔ REPAIR OF NMC SONAR TRANSDUCER DIAPHRAGMS

The Bureau's attention has recently been called to instances where the faces of several Model NMC transducers appeared to have been reduced in thickness. Further investigation disclosed that there were slight pin-hole leaks through the diaphragm in the bottom of the bolt holes. This condition in several transducers is shown in figures 1 and 2. In some cases approximately one-eighth of an inch has been removed from the face of the transducer and since the bottom of the bolt holes in a new transducer plate are approximately one-tenth of an inch from the face, the removal of  $\frac{1}{8}$  inch exposes the bottom of the bolt holes.



FIGURE 1.—Bottom-side view of a Model NMC transducer showing bottom of bolt holes exposed by the removal of approximately one-eighth of an inch from the face of the transducer.

### MODEL NMC-1 EQUIPMENT

The NMC-1 equipment, manufactured by Submarine Signal Company, is installed on surface vessels and is designed to automatically indicate depths up to 2,000 fathoms. A semi-automatic method is provided to extend this range. A recorder is included in the installation in order to provide a permanent record of soundings.

The attention of all activities is called to the supply of model NMC Field Change No. 8 Kits at all stock activities. In cases of excessive pitting, replacement of diaphragms should be made and in no instance should the diaphragm be reduced in thickness. 4/1/50

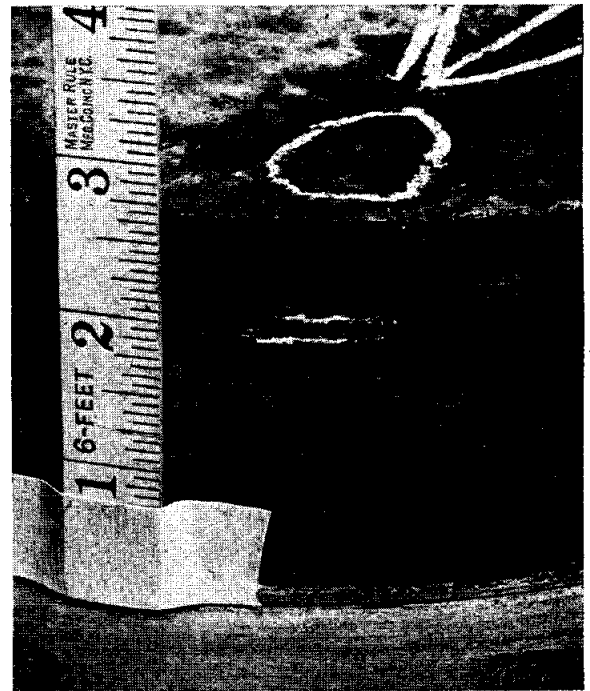


FIGURE 2.—Side view of a Model NMC transducer showing exposure of the bottom of a bolt hole by the removal of material from the transducer face.

The projector is of the permanent magnet magnetostriction type and is resonant at about 18 kc.

Both receiver-amplifier and driver-rectifier have a tuning range of 17 to 19 kc. to allow them to be aligned to the projector frequency.

The indicator has two calibrated scales marked SHOAL and DEEP. The SHOAL scale indicates depths up to 400 fathoms. The

DEEP scale indicates depths up to 2,000 fathoms. By means of a signal interval switch, these ranges may be doubled.

**MODEL NMC-1 PROJECTORS**

It is strongly recommended that the NCM-1 projector, particularly on a new installation, be mounted horizontally. This should be done regardless of the fact that permission has been given to use NJ chests with 10° maximum angle.

**MODEL NMC-1 PASS CHARACTERISTICS OF RECEIVER-AMPLIFIER CBM-46082-A**

The pass characteristics of the NMC-1 receiver-amplifier CBM-46082-A tuned to 18 kc. should be almost completely flat between 17.5 and 18.5 kc. and flat within 7 db. between 17 and 19 kc. Thus tuning is not critical.

The response is flattened to reduce the effective circuit "Q", so that the tuned circuits will not ring and obliterate shallow soundings. (A high "Q" circuit with sharp response tends to ring after the incoming signal has stopped.)

**NMC-1 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 1**

**ADDITION OF PARASITIC SUPPRESSORS**

*Equipment affected.*—The driver-rectifier CBM-52316 of NMC-1, ser. nos. 1-20 incl.

*Purpose.*—To prevent excessive plate current and the consequent overheating of driver output tubes.

*Action required.*—Addition of two capacitors.

*Time required.*—Estimated at 1 man-hour when accomplished by an average technician.

*Material required.*—Two 0.0005-mfd.  $\pm 10\%$  2500-volt d-c mica capacitors, Navy type no. 481170 B-10.

*Disposition of old parts.*—None.

*General.*—Spurious oscillations occasionally take place in the final amplifier of the driver. This field change alters the circuit constants by adding capacitors between the suppressor resistors and ground. Thus the amplifier oscillations are eliminated and the plate current becomes normal.

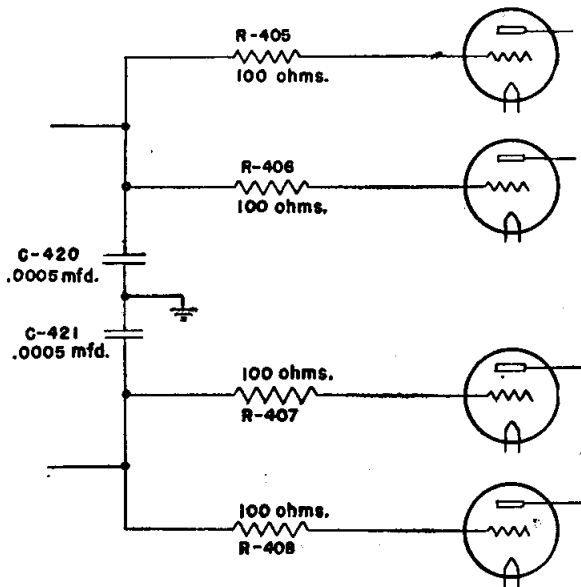


FIGURE 1.—Parasitic suppressor for the Model NMC-1 equipment.

*Procedure.*—(Refer to Fig. 1.)

(1) Place one capacitor between ground and the junction of R-405 and R-406.

(2) Place the other capacitor between ground and the junction of R-407 and R-408.

*Changes in instruction books.*—No changes are necessary as the added capacitors, labeled C-420 and C-421, are shown in schematic 60,247 alt. 8, of "Preliminary Instruction Book for NMC-1 Echo Sounding Equipment", spec. 8352B, second printing.

*Miscellaneous.*—Upon completion of the change follow the instructions given under "Miscellaneous" on page NJ: 1.

### NMC-1 SONAR SOUNDING EQUIPMENT FIELD CHANGE NO. 2

#### REPLACEMENT OF RESISTORS R-414A AND R-414B

*Equipment affected.*—NMC-1 equipments with serial Nos. 1 through 188. This field change is available at NSD Bayonne, SSD NSC Norfolk, SSD NSC Oakland, NSY Mare Island, NSY Charleston, and NSY Puget Sound. 1/1/50

#### MODEL NMC-1/-2 INTERFERENCE OF PHONE JACK WITH RECEIVER REMOVAL

The NMC-1 and NMC-2 fathometer equipments' front panel must swing thru an arc somewhat greater than 90° in order to remove the receiver-amplifier chassis for servicing. This is due to the fact that SubSigCo. used the long type phone jack (J-301) in construction. This jack extends into the area occupied by the receiver-amplifier if it were slid forward for removal or servicing.

This gear is usually bulkhead mounted in already crowded space such that some piece of equipment on the immediate right prevents the front panel from swinging far enough to remove the receiver-amplifier chassis. Accordingly, a flat-mounted phone jack, Navy type 49283 (or similar), may be substituted for the one now in the gear if the foregoing condition is encountered. Care must be taken in installation to make the correct connections and also to insulate the frame of the jack from the front panel. If the frame of the jack is grounded only half the output will be heard in either the loudspeaker or phones. It is suggested that the

old insulating grommets be saved and used on the new installation. 12/1/46

#### → AT-229/SO REPLACEMENTS FOR NMC-1 AND NMC-2 TRANSDUCERS

The Bendix AT-229/SQ Transducers are now being supplied as replacements for the NMC-1 (CBM-78203) and NMC-2 (CBM-78203A) Transducers. These transducers are mechanically and electrically interchangeable. 7/1/51 ←

#### MODEL NMC-2 EQUIPMENT

The NMC-2 equipment manufactured by Submarine Signal Company is nearly identical to NMC-1 with a few exceptions. Resistors throughout have been replaced with American War Standard resistors. Tube locks have been added and many rubber parts deleted. Other minor modifications are incorporated to improve its operating efficiency.

#### ERROR IN MODEL NMC-2 INSTRUCTION BOOK

An examination of figure 2-3 (page 2-2) of the final instruction book for the NMC-2 Sonar sounding equipment NAVSHIPS 900,595(A) will show that there are two meters marked M-402. The right-hand meter should be marked M-401. The left-hand one is now marked correctly. All instruction books should be changed accordingly. 8/1/46

### AN/BQN TOP AND BOTTOM ECHO SOUNDER

Top- and Bottom-Side Echo Sounder, Navy Model AN/BQN-1, is a permanently installed equipment designed to provide continuous and accurate top or bottom soundings between the limits of zero and 1,200 feet. Indication is accomplished by presentation on an oscilloscope screen. Ultrasonic, pulsed wave propagation and reflection are used. The operating frequency is 70 kilocycles. Primary power required is 115 volts ac. Equipment supplied consists of: Principal housing containing all electronic equipment, two transducers, transducer cable. The electronic equipment comprises three chassis: Transmitter-receiver unit, timer-sweep unit, power supply unit. Each chassis is mounted on rollers to permit withdrawal from the principal housing for servicing. 7/1/49

### AN/SQN-1 CONTOUR SCANNING SET

The purpose of Contour Scanning Set AN/SQN-1 is to provide a means for observing or for automatic photographic recording of the contour of the ocean bottom or ship channel at any depth between 6 and 500 feet from a surface vessel. The operating frequency is 85 kc.  $\pm 5$  kc. The equipment employs sonar principles and presents continuously a true contour cross section (vertical outline) of the ocean floor on a cathode-ray tube. The equipment can be considered an echo-sounder since the depth of water is measured by determining the time required for sound waves to travel, at a known velocity, from a point near the surface of the

water to the bottom and return. Calibration of the equipment is based on a velocity of sound in water of 4,800 feet per second. The equipment consists of three separate units, an electronic stack, a Sonar Transducer, and a Rotary Converter. An accessory camera can be attached to the electronic stack to provide permanent hydrographic data charts. 7/1/49

### AN/UQN-1 SONAR SOUNDING SET

The AN/UQN-1 Sounding equipment is designed for installation in either submarines or surface vessels. Recordings at three ranges are provided: 0-400 feet, 0-400 fathoms, 0-4,000 fathoms. The operating frequency is 12 kc.

Power supply—105-130 volts, 60 cycles, single phase a-c and current at 115 volts: 1.2 amperes in "STANDBY"; 2.7 Amperes, "ON".

This equipment consists essentially of two major units:

1—Receiver-Transmitter with recorder, 29" h x 23" w x 14" deep—weight 210 lbs.

2—Transducer (crystal) 10" h x 16" diameter—weight 124 lbs. 7/1/49

### → REPAIR OF DEFECTIVE TRANSDUCERS

Elaborate transducer repair facilities have been established at Pearl Harbor, Mare Island, and Boston Naval Shipyards. All transducers found defective beyond reconditioning by local repair activities are to be forwarded to the nearest Naval Transducer Repair Facility. 1/1/50 ←

## SECTION 15. SONAR SOUNDING EQUIPMENT

→ AN/BQN TOP AND BOTTOM  
ECHO SOUNDER

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quency is 70 kilocycles. Primary power required is 115 volts ac. Equipment supplied consists of: Principal housing containing all electronic equipment, two transducers, transducer cable. The electronic equipment comprises three chassis: Transmitter-receiver unit, timer-sweep unit, power supply unit. Each chassis is mounted on rollers to permit withdrawal from the principal housing for servicing. 7/1/49

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**AN/UQN-1 SONAR SOUNDING SET**

The AN/UQN-1 Sounding equipment is designed for installation in either submarines or surface vessels. Recordings at three ranges are provided: 0-400 feet, 0-400 fathoms, 0-4,000 fathoms. The operating frequency is 12 kc.

Power supply—105-130 volts, 60 cycles, single

phase a-c and current at 115 volts: 1.2 amperes in "STANDBY"; 2.7 Amperes, "ON".

This equipment consists essentially of two major units:

1—Receiver-Transmitter with recorder, 29" h x 23" w x 14" deep—weight 210 lbs.

2—Transducer (crystal) 10" h x 16" diameter—weight 124 lbs. 7/1/49