PRELIMINARY INSTRUCTION BOOK

For

NAVY MODEL DAV-2

RADIO DIRECTION FINDER EQUIPMENT

RESTRICTED

(For Official Use Only)

Manufactured For

U. S. NAVY DEPARTMENT

BUREAU OF SHIPS

By

COMMUNICATIONS COMPANY, INC.,

Coral Gables, Florida

Contract: NXsr-41037
NXsr-59061

ERRATA SHEET FOR
PRELIMINARY INSTRUCTION BOOK
MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT
ISSUED 3 OCTOBER 1944

Page 13, the 3rd and 4th paragraphs under section "2.2 (c) LOOP CIRCUITS" are amended to read as follows:

The loop, L-401, is the "single ended" type, shielded and provided with a tap for changing frequency range.

Sense voltage is applied directly to the loop circuit through resistor R-403, in the high frequency range, and through R-403 and R-402 in series, in the low frequency range. Connection between the sense circuit and the antenna is made by the "Push-Button" type switch, S-404. Change of frequency range is accomplished by moving the links on S-403 and S-404, which change the number of loop turns and the resistance in the sense circuit.

Page 24, the 6th paragraph under section "5.2 (b) 3. D. F. ALIGNMENT" is amended to read as follows:

All adjustments have now been made excepting the antenna, which is best adjusted in actual operation. With the equipment mounted on the operator, and the antenna in place and fully extended, adjust as follows: Turn on two transmitters, antenna collapsed, whose frequencies differ by a sufficient amount to give an audible beatnote. With set on and function switch at two-way position, adjust the antenna coil for maximum signal. Distance between the transmitter and the receiver

under test should be adjusted for only a moderate signal, to insure sharp tuning indications. The normal distance for this purpose will be from 25 to 50 feet. The CCI-60063 Frequency Alignment Oscillator may be substituted for the two transmitters if one is available. It should now be possible to obtain good sense indications. Turning 90 degrees to the right should cause the signal to decrease markedly. Turning 90 degrees to the left should cause a definitely noticeable increase in signal.

Page 29, the 6th and 7th paragraphs under section "5.3 (d) LOOP SECTION", delete references to L-402.

Pages 39, 42, and page 52, figure 4, delete listing of L-402.

Page 39, Resistor R-402, Description and Contr.Part No. is amended to read 30,000 ohms instead of 1000 ohms.

Page 39, Resistor R-403, Description and Contr. Part No. is amended to read 0.1 mehohm instead of 1000 ohms.

Page 43, add symbol reference R-402 to symbol listing R-102, 30,000 ohm resistor.

Page 43, add symbol reference R-403 to symbol listing R-107, 0.1 megohm resistor.

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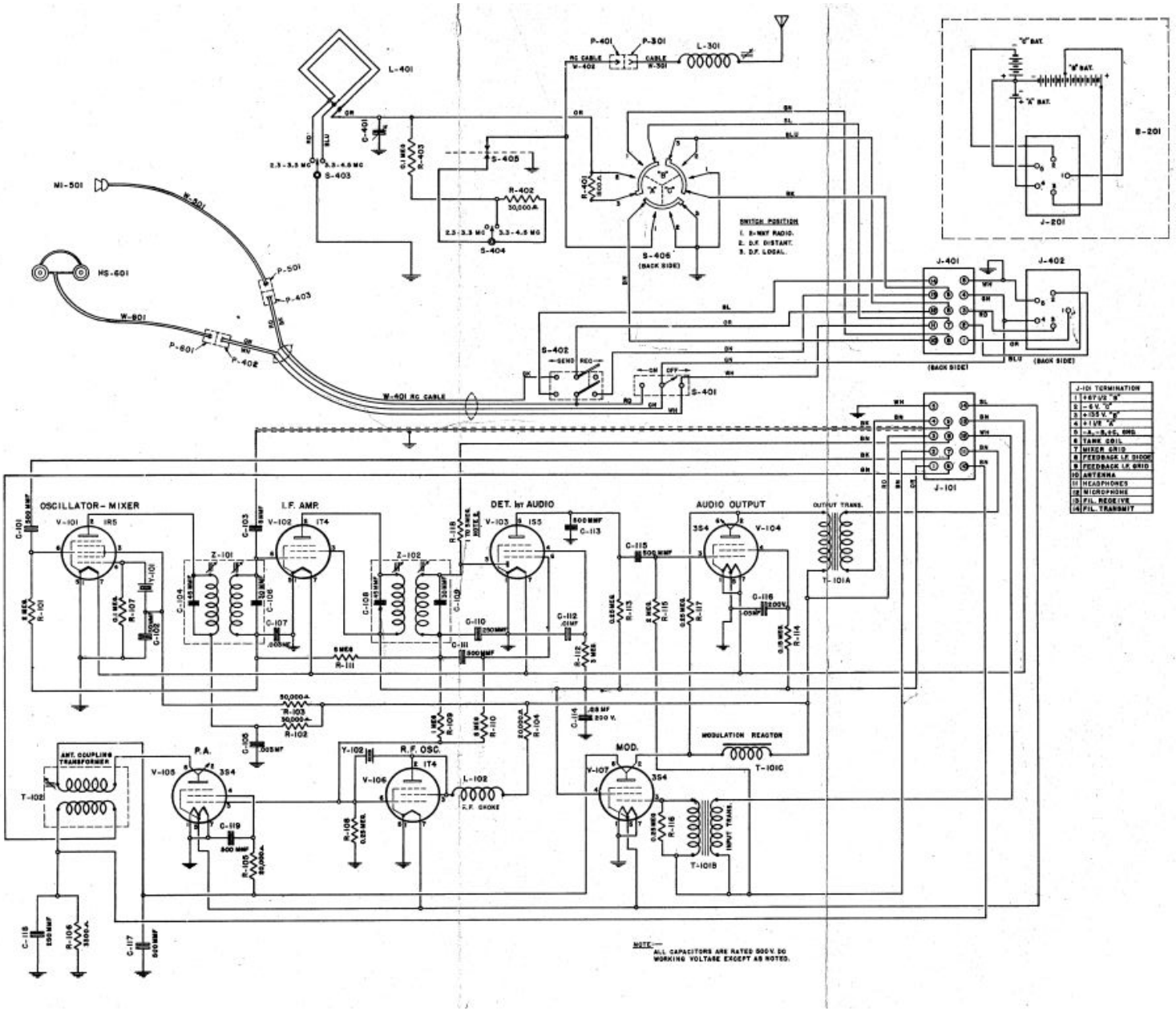
Page 43, delete symbol references R-402, R-403 from 1000 ohm resistor listing.

Page 52, Figure 5, reference position of R-402 is moved to rear end of C-401.

Page 55, Figure 10 is superseded by the attached schematic diagram.


L-401
P-401
P-301
L-301
RG CABLE W-402
CABLE W-301
C-401
R-403
S-405
S-403
2.3-3.3 MC
3.3-4.6 MC
R-402
30,000Ω
S-404
R-401
S-406
(BACK SIDE)
SWITCH POSITION
1. B-WAY RADIO.
2. D.F. DISTANT.
3. D.F. LOCAL.
"B" BAT.
"A" BAT.
B-201
J-201
MI-501
W-501
HS-601
P-501
P-403
W-601
P-601
P-402
W-401 RG CABLE
S-402
SEND
REC
S-401
ON
OFF
J-401
J-402
(BACK SIDE)
J-101
J-101 TERMINATION
1 +67.5 V "B"
2 -6 V. "C"
3 +135 V. "B"
4 +1.5 V. "A"
5 -A.-B.&C. RTN.
6 TANK COIL
7 MIXER GRID
8 FEEDBACK I.F. SIGNAL
9 FEEDBACK I.F. GRID
10 ANTENNA
11 HEADPHONES
12 MICROPHONE
13 FIL. RECEIVE
14 FIL. TRANSMIT
OSCILLATOR-MIXER
V-101
1R5
I.F. AMP.
V-102
1T4
Z-101
Z-102
DET. 1st AUDIO
V-103
1S5
AUDIO OUTPUT
V-104
354
OUTPUT TRANS.
T-101A
P.A.
V-105
354
R.F. OSC.
V-106
1T4
L-102
R.F. CHOKE
MOD.
V-107
354
MODULATION REACTOR
T-101C
ANT. COUPLING TRANSFORMER
T-102
INPUT TRANS.
T-101B
NOTE:—
ALL CAPACITORS ARE RATED 500 V. DC WORKING VOLTAGE EXCEPT AS NOTED.

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Contract: NXsr-41037
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RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

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NAVY MODEL DAV-2
RADIO DIRECTION FINDER EQUIPMENT

CONTRACTUAL GUARANTEE

The equipment, including all parts and spare parts, except vacuum tubes, is guaranteed for a service period of ONE YEAR with the understanding that, as a condition of this contract, all items found to be defective as to design, material, workmanship or manufacture will be replaced without delay and at no expense to the Government, provided that such guarantee and agreement will not obligate the contractor to make replacement of defective material unless the failure, exclusive of normal shelf life deterioration, occurs within a period of TWO YEARS from the date of delivery of the equipment to and acceptance by the Government, and provided further, that if any part or parts (except vacuum tubes) fail in service or are found defective to the extent of ten percent (10%) or more, but not less than two of the total number of equipments furnished under the contract, such part or parts, whether supplied in the equipment or as spares, will be conclusively presumed to be of defective design, and as a condition of contract subject to one hundred percent (100%) replacement of all similar units supplied on subject contract by suitable redesigned replacements. Failure due to poor workmanship while not necessarily indicating poor design, will be considered in the same category as failure due to poor design. Redesigned replacements which will assure proper operation of the equipment will be supplied promptly, upon proper receipt of notice and without cost to the Government.

CONTRACTUAL GUARANTEE

All such defective parts will be subject to ultimate return to the contractor. In view of the fact that normal activities of the Naval Service may result in the use of equipment in such remote portions of the world or under such conditions as to preclude the return of the defective item or unit prior to replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service therefore may necessitate expeditious repair of such item or unit in order to prevent extended interruption of communications. In such cases the return of a defective item or unit for examination by the contractor prior to replacement will not be required. The report of a responsible authority, including details of the conditions surrounding the failure will be acceptable for effective adjustment under the provisions of this contractual guarantee. The above period of TWO YEARS and the service period of ONE YEAR will not include any portion of the time that the equipment fails to give satisfaction due to defective items and the necessity for replacement thereof. All replacement parts will be guaranteed to give ONE YEAR of satisfactory service.

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REPORT OF FAILURES AND REPLACEMENT DATA

Report of failure of any part of this equipment, during its service life, shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures, see Chapter 31, (mimeographed form) of the Manual of Engineering Instructions, or Bureau of Ships Radio and Sound Bulletin Number 7, dated July 1, 1942, or superseding instructions.

Contract: NXsr-41037 Dated: 20 November 1943
NXsr-59061 20 April 1944
Serial Number of Equipment _____
Date of Acceptance by the Navy _____
Date of Delivery to Contract Destination _____
Date of Completion of Installation _____
Date Placed in Service _____

Blank spaces in this book shall be filled in at time of installation. Operating personnel shall also mark the "date placed in service" on the equipment, using suitable methods and care to avoid damaging the equipment.

All requests or requisitions for replacement material should include complete descriptive data covering the parts desired, in the following form:

NAVY MODEL DAV-2
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Name of Part Desired _____
Navy Type Number (if assigned) (including prefix and suffix) _____
Model Designation (including suffix) of equipment in which used _____
Navy Type Designation (including prefix and suffix where applicable) of Major Unit in which part is used _____
Symbol Designation of Part _____
Navy Drawing Number _____
Manufacturer's Drawing Number _____
Rating or Other Descriptive Data _____
Commercial Designation _____

Operation of the Equipment does not involve the use of voltages greater than 135 volts and accordingly is not considered dangerous to life.

NAVY MODEL DAV-2
RADIO DIRECTION FINDER EQUIPMENT

SECTION I. GENERAL DESCRIPTION

1.1 INTENT OF DESIGN.

The Model DAV-2 Radio Direction Finder Equipment is designed to provide two distinct services: first, a radio direction finder for homing; and second, a two-way radio-telephone communication link.

The Loop Unit, Radio Transmitter-Receiver Unit and Power Supply fit in a watertight plywood case. This case can be carried on the operator's chest or back by means of the web straps supplied.

The receiver and transmitter of this equipment are crystal controlled, and can be operated on any one channel in the frequency range of 2.3 Mc. to 4.5 Mc. Voice communication (A3 emission) is the only type of operation provided. The power output of the equipment is approximately 0.2 watt, and satisfactory communication between units over average terrain can be maintained over a range of approximately one mile. This range will increase somewhat for communication between aircraft and ground units.

1.2 LIST OF UNITS, WITH WEIGHTS AND DIMENSIONS:

The equipment consists of the following major units:

Radio Transmitter and Receiver Unit, Navy Type CCI-43063, including a complete set of

vacuum tubes consisting of:

Symbol	Type	Function
V-101	1R5	Oscillator-Mixer
V-102	1T4	I-F Amplifier
V-103	1S5	Detector-First Audio
V-104	3S4	Audio Output
V-105	3S4	Transmitter Power Amplifier
V-106	1T4	Transmitter Crystal Oscillator
V-107	3S4	Modulator

Height -- 6-7/16"
Width -- 1-7/8"
Depth -- 3-5/8"
Weight -- 1-1/4 lbs

Power Supply, consisting of Vibrator Power Unit, Navy Type CRF-20221, and Lead-Acid Storage Battery, Navy Type -19046. (Not furnished by Contractor).

Height -- 6-9/16"
Width -- 1-7/8"
Depth -- 3-11/16"
Weight -- 3-1/4 lbs.

Power Supply (Alternate), Battery Pack, Dry, Navy Type -19027A. (Not furnished by Contractor).

Height -- 6-5/16"
Width -- 1-13/16"
Depth -- 3-11/16"
Weight -- 2 lbs.

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Antenna and Load Coil Assembly, Navy Type CCI-66081.

Length (Collapsed) -- 15-1/8" (approx.)
Length (Extended) -- 85" (approx.)
Weight -- 1 lb.

Plywood Case, Navy Type CAOC-10344.

Height -- 10-3/4"
Width -- 3-3/8"
Length -- 10"
Weight -- 2.5 lbs.

Loop Unit, Navy Type CCI-69093, including:

Microphone and Headset Harness
Antenna Lead, Navy Type CTE-49212
Dimensions: 5/8" x 30-1/2" cut 13"
Microphone, Army-Navy Type T-45
Weight --

Headset Assembly, Navy Type CCI-49559 consisting of:

Headset Connector Cable
Two Headphones, Navy Type CUP-49215
Dimensions: 5/16" thick x 2" diameter

Weight of complete Headset Assembly
lbs.

Weight of an entire DAV-2 equipment unpacked and ready for use, including vibrator supply and lead-acid battery lbs.

2. DETAILED DESCRIPTION

2.1 MECHANICAL.

The Model DAV-2 Radio Direction Finder Equipment consists of a Radio Transmitter-Receiver Unit, a Loop and Switching Unit and a Power Supply Unit housed in a watertight plywood case, a collapsible whip antenna, a carbon microphone and a Headset Assembly, which can be worn under the standard metal helmet.

2.1(a) RADIO TRANSMITTER-RECEIVER UNIT.

The Navy Type CCI-43063 Radio Transmitter-Receiver Unit includes both the transmitter and receiver built in one hardened aluminum alloy chassis. On the chassis are mounted all the vacuum tubes for the receiver and transmitter, two crystals, i-f transformers, antenna coupling transformer, and audio transformers and inductors. A bakelite detail on the underside of the chassis is used to mount most of the resistors and most of the condensers of the unit. Slug tuning is used for adjustment of all tuned circuits, and spring locks are provided on all of the variable adjustments to assure that tuning will not change under vibration. Also, spring type tube locks are provided to hold the tubes in their sockets.

All audio transformers and inductors (T-101A, T-101B and L-103) are potted in wax in one metal container. Connections to these transformers are made by color-coded flexible

wire brought out through a bakelite detail on the bottom of the container.

Specification details of this transformer assembly, as well as of the r-f choke, antenna coupling transformer, antenna load coil and i-f transformer assemblies are given in Table 4.

The crystals in both transmitter and receiver sections, in Navy Type -40125 crystal holders, are the "zero temperature coefficient" type.

All voltage connections for the Radio Transmitter-Receiver Unit, as well as the antenna lead and all necessary control lines, terminate in a 14-pin female receptacle, J-101, mounted on one end of the chassis. An aluminum shield cover, fastened to the chassis by four screws, must be removed to replace any of the vacuum tubes or crystals. Holes in this cover are provided so that all tuning controls can be reached without requiring removal of the shield.

2.1 (b) POWER UNIT.

Two power units are available for operating the Model Dav-2 equipment. The primary power unit consists of a Type CRF-20221 vibrator power unit, powered by a Type -19046 non-spillable lead-acid storage battery. A clamping arrangement holds the battery and vibrator power unit together as an integral unit, and also maintains the necessary electrical contact between the two. A complete

description of this battery and vibrator power unit, as well as all necessary operation and maintenance data, is included in the Instruction Book for Navy Type CRF-20221 Power Supply Equipment.

As an alternate source of power, the Type -19027A dry battery pack may be used. This battery pack is considered satisfactory only for emergency operation when no vibrator power unit is available.

2.1 (c) LOOP UNIT AND SWITCHING UNIT.

The Loop and Switching Unit, Navy Type 69093, is assembled as an integral part on a cast aluminum top cover for the plywood carrying case. It contains the loop and loop tuning condenser, all of the switching arrangements necessary to the operation of the loop circuit, a function switch to transfer from direction finding to two-way radio, ON-OFF and Press-To-Talk switches, and accessory cables.

2.1 (d) CARRYING CASE.

The Navy Type CAOC-10344 Carrying Case, constructed of plywood, is designed to accommodate the three major units, Loop and Switching Unit, Power Supply Unit and Radio Transmitter-Receiver Unit.

The lower portion of the case is divided into two compartments which house the Transmitter-Receiver Unit and the Power Supply

Unit. The remaining upper portion accommodates the Loop and Switching Unit, which acts as a cover and is secured to the case by six captivated thumb screws engaging threaded brass inserts in the plywood case.

The top of the case has a recess fitted with a molded rubber gasket which, in conjunction with a knife edge on the loop unit, forms a watertight seal. The outside of the case is supplied with a socket for holding the whip antenna and four "D" wings for attaching the web carrying strap.

All external surfaces are finished in Marine Corps green.

2.1 (e) ANTENNA AND LOAD COIL ASSEMBLY.

The Antenna and Load Coil Assembly, Navy Type CCI-66081, consists of a seven-section collapsible antenna, in a bakelite tube, with a plastic case housing the antenna load coil cemented to this tube. All sections of the antenna must be fully extended before they are locked in position. The antenna is completely watertight in either extended or collapsed position. A rubber bumper at the end of the smallest antenna section, when pressed into the end of the bakelite housing, holds the assembly locked in the collapsed position and completes the waterproofing.

The telescoping antenna sections are covered with a lusterless green baked lacquer finish to make the surface non-reflecting.

The Antenna and Load Coil Assembly can be

tuned to any frequency in the range of the Model DAV-2 equipment by means of the slug-tuned load coil in the antenna housing. A screw at the base of this molded antenna housing must be removed to allow access to the tuning control. The connection to the radio unit from the antenna is accomplished by a rubber-covered lead which enters the molded antenna housing through a fitting and packing arrangement similar to that used on the loop unit cover. This antenna lead terminates in a concentric break-away connector.

2.1 (f) MICROPHONE, HEADSET AND CABLES.

Two cables enter the loop unit through watertight fittings. One is the Type CTE-49212 antenna lead, which terminates in a concentric break-away connector for connection to the antenna. The other is the microphone and headset harness cable, which is a four conductor rubber covered cable branching in a rubber "Y" junction into two cables of two conductors each. The two-conductor cables are terminated in jacks JK-48 and JK-26 to accommodate, respectively, the microphone and headset connector plugs.

The Type T-45 microphone is a differential type lip microphone designed to give a high degree of discrimination against all sounds other than the voice of the operator. It is terminated in the standard PL-291 plug.

The Navy Type CCI-49559 Headset Assembly consists of a rubber headphone cord connecting two Type CUP-49215 Headphone Units in

series and terminating in a PL-54 plug. The headphone units fit into pockets in a canvas skull cap worn under the standard metal helmet.

2.2 ELECTRICAL.

The circuits of the receiver section of the Model DAV-2 equipment are those of a four-tube superheterodyne, employing a tuned antenna coil, a 1R5 oscillator-mixer tube, a 1T4 i-f amplifier, a 1S5 second detector and first audio amplifier, and a 3S4 audio output stage, transformer-coupled to the headphones. The transmitter section employs a 1T4 crystal oscillator, a 3S4 modulator tube in a Class A Heising modulator circuit, and a 3S4 power amplifier stage. A single antenna coupling transformer, T-102, is utilized both as the receiver antenna coil and as the transmitter antenna coupling transformer. Low-drain miniature-type tubes are used throughout, and all tuned circuits are slug-tuned. Transfer from receiver to transmitter is made by means of the "Send-Receive" switch in the loop unit, which is arranged to switch the receiver filaments off when transmitting and the transmitter filaments off when receiving.

Due to the use of a common tuned element, T-102, in both transmitter and receiver circuits, the transmitter and receiver must always be aligned on the same frequency.

A high-impedance shielded loop, tunable throughout the receiver frequency range, pro-

vides for direction finding. Switching arrangements and coupling circuits are incorporated to obtain sense bearings, using the Navy Type CCI-66081 Antenna Assembly.

2.2 (a) RECEIVING CIRCUITS.

In the receive position, the signal from the tuned antenna is passed through the tuned antenna coupling transformer, T-102, to the grid of the oscillator-mixer tube through a coupling condenser, C-101. The oscillator-mixer tube, V-101, a Type 1R5 tube, functions in a dual capacity, one section operating as a crystal controlled local oscillator, and the other section operating as a first detector, with the signal frequency impressed on the signal grid, pin No. 6.

The crystal oscillator is of the "Pierce" type, using the screen and #1 grid (pins 3 and 4 respectively) as a triode oscillator. Condenser C-103 provides proper division of oscillator voltage between the screen and oscillator grid. The oscillator frequency, determined by the receiver crystal frequency, must always be higher than the signal frequency by 455 kc., the intermediate frequency.

The plate circuit of the first detector stage is coupled through i-f transformer Z-101 to the grid of the intermediate frequency amplifier tube, V-102, a Type 1T4. The output of this stage is passed through another i-f transformer, Z-102, to the diode plate of V-103, a Type 1S5 vacuum tube. This tube functions as a second detector, A-V-C

voltage rectifier, and first audio amplifier. Audio voltage developed in the detector portion of this stage is coupled through condenser C-111 to the signal grid (pin No. 6) of the same tube (V-103) where it is amplified. This stage is resistance coupled to the audio output stage, which employs a Type 3S4 power pentode, V-104. The plate circuit of the output stage is coupled to the 600-ohm headset through the output transformer, T-101A. The maximum audio power output which can be obtained in this headset is approximately 6.0 milliwatts.

The A-V-C voltage for this receiver is obtained from the diode section of V-103, filtered through resistor R-103 and condenser C-110, and applied to the first detector and i-f amplifier stages. In addition, in order to prevent r-f feedback from the transmitter into the receiver, grid bias voltage from the grid (Pin 6) of the transmitter oscillator tube, V-106, is applied to the receiver diode, A-V-C line and first audio stage control grid, biasing them beyond cut-off when the transmitter is in operation.

Other circuits include: C-103 and R-118, which provide for i-f regeneration, permitting the reception of A-1 signals when the unit is operated as a direction finder, and the connection of T-102 and C-101 to terminals 6 and 7 of J-101 which permits switching of the mixer tube grid (V-101) from the antenna coupling transformer (two-way radio operation) to the loop circuit (D. F. Operation).

2.2 (b) TRANSMITTER CIRCUITS.

The transmitter section of the Model DAV-2 Equipment consists of a crystal oscillator stage, an r-f amplifier stage and a modulator stage.

The oscillator circuit consists of a Type 1T4 tube, V-106, triode-connected as a Pierce crystal oscillator, with the crystal connected between plate and grid of the tube. The plate supply for the oscillator is shunt fed by means of an r-f choke, L-102, and dropping resistor, R-104.

The r-f power amplifier output stage of the transmitter employs a Type 3S4 power pentode, V-105. R-f drive for the grid of this tube is obtained by coupling directly to the grid of the r-f oscillator tube, V-106, with the same grid leak resistor, R-108, being used for both tubes. The antenna coupling transformer, T-102, of this power output stage provides inductive coupling to the antenna.

The modulator tube, V-107, is a Type 3S4 power pentode, connected in a Heising modulation circuit, with the grid driven directly by a carbon microphone through an input transformer, T-101B. The modulation reactor is L-103. Both screen and plate of the r-f power amplifier tube, V-105, are modulated.

Side-tone in the headphones during the transmission period is provided in the Model DAV-2 Equipment by coupling a small amount of the modulator tube output to the primary of the receiver output transformer,

T-101A. This is accomplished by means of a 0.25 megohm resistor, R-117, connected from the plate of the modulator tube, V-107, to the plate of the audio output tube, V-104.

2.2 (c) LOOP CIRCUITS.

Functional switching is provided by S-406, which is a part of Loop and Switching Unit. Three separate switching operations are necessary to transfer from two-way radio to direction finding. Section "A" transfers the mixer grid from the input transformer, T-102, to the loop, L-401. Section "B" makes operative the i-f regeneration circuit when in "D. F." position, permitting reception of A-1 signals.

Section "C" transfers the antenna terminal of T-102 from the antenna in "TWO-WAY" position to ground in "D. F." position. Three switch positions are provided: Number 1, "TWO-WAY" radio; Number 2, "D. F. DISTANT"; Number 3, "D. F. LOCAL". Reduction of sensitivity for local reception is obtained by inserting a resistor, R-401, in series with the mixer grid.

The loop, L-401, is the "single ended" type, shielded and provided with a tap for changing frequency range. Inductor L-402 is connected in series with the grounded side of the loop for the injection of sense voltage into the loop circuit.

Sense voltage is applied to L-402 through the sense resistors R-402 and R-403 and sense

switch S-405. Change of frequency range is accomplished by moving links on S-403 and S-404, which changes loop turns and sense resistor value.

Included in the loop unit are S-401, a toggle switch which completes the "A" circuit in the "ON" position, and S-402, which is a spring-return toggle switch, normally in "RECEIVE" position. This latter switch transfers the "A" voltage from receiver filaments to transmitter filaments, and completes the microphone circuit when in "SEND" position.

Connections between the loop unit and transmitter unit and between loop unit and power supply unit are made by J-401 and J-402 respectively.

2.3 POWER SUPPLY CURRENT DRAINS.

A tabulation of the normal voltage and current requirements of both receiver and transmitter is as follows:

Receiver Section	Voltage	Current
Plates and Screens	67.5 v.	3.0 ma.
	135.0 v.	4.0 ma.
Filaments	1.5 v.	225.0 ma.
Bias and Microphone	-6.0 v.	0.0 ma.

Transmitter Section	Voltage	Current
Plates and Screens	67.5 v.	1.5 ma.
	135.0 v.	19.0 ma.
Filaments	1.5 v.	225.0 ma.
Bias and Microphone	-6.0 v.	50.0 ma.

3. INSTALLATION

3.1 UNPACKING.

Unpack all units of the Model DAV-2 Equipment. Remove the top from the Plywood case by unscrewing the six thumb screws in the cover, loosening the center screws first. Care should be taken not to damage the rubber gasket if it tends to stick to the top.

The equipment is shipped with the radio transmitter-receiver unit in place in the plywood case. The power unit should be inserted into the case in its proper compartment, and the top replaced, inserting the power unit plug and radio unit plug into their respective sockets. All thumb screws should be tightened uniformly. Instructions for preparing the lead acid storage battery, Type -19046 for use will be found in Appendix "A".

3.2 MOUNTING.

The Equipment may now be secured to the operator's person, using the web straps provided. Place in convenient position on the operator's chest with the "D" rings nearest the Operator's body.

Check particularly the orientation of the cover with respect to the case. True bearings will only be obtained when the end containing the microphone cable is adjacent to the antenna socket.

With the skull cap containing the earphones, and the microphone in place, attach their respective plugs to the connectors provided in the cable harness. Place the antenna in the socket on the end of the plywood case and connect the antenna breakaway connectors. Extend antenna to full length.

The equipment is now ready for operation.

4. OPERATION.

4.1 OPERATION SUMMARY.

Before transmitting or receiving, the "Off-On" switch in the microphone lead must be in the "ON" position. A rush of background noise should be heard in the headset after this operation, indicating that the receiver is operative. Check the position of the function switch to be sure the proper type of service has been selected (two-way radio, direction finding distant, or direction finding local). The transmitter is effective only when the switch is on two-way radio.

Operation on two-way radio is characterized by a mild background noise in the head phones and by clear signals from a radiophone station. Operation on "d.f. distant" or "d.f. local" results in a much louder hiss in the

phones. An unmodulated carrier produces a clear tone or whistle, while a voice modulated signal sounds unintelligible.

In the dark, the switch positions may be identified as follows: full counter-clockwise, two-way radio; center, direction finding distant; full clockwise, direction finding local.

4.2 TWO-WAY RADIO.

To transmit, the send-receive switch (next to the on-off switch) must be operated. The operator should speak in a normal tone of voice, enunciating clearly. Transmissions should be as brief as possible to conserve battery life.

To receive again, after a transmission period, the "send receive" switch must be released, as no signals can be heard as long as the send receive switch is depressed.

4.3 DIRECTION FINDING-DISTANT.

To home on a transmitter of unknown location proceed as follows: Extend antenna fully. Turn the function switch to center position. If the transmitter is operating, a steady tone or whistle will be heard. Swing the body around, or if in a boat, turn the boat slowly. The signal may increase or decrease. Continue swinging until the signal becomes progressively weaker, stopping at the position where the least signal is heard.

Then turn the body back and forth. An increase in signal should be heard at opposite sides of these swings, the amount of turning necessary depending on the distance from the transmitter. When moderately close, the indication will be relatively sharp. At greater distances it will be necessary to determine the approximate center of the swings at which the signal is heard. The direction in which the operator is facing when the signal is at its weakest point is either the true direction of the transmitter, or directly away from it. Depress and hold the sense button. The signal should increase in intensity. Rotate the body slowly to the right; if the signal reduces in intensity, the operator is facing the true direction of the transmitter. Should the signal increase in intensity, the operator should execute an about face and re-check the bearing as described above.

After obtaining the correct bearing of the transmitter, the operator should proceed in the direction indicated, with only occasional checks of direction being necessary.

In operating on very weak signals, the procedure of determining sense by the direction of swing for decreasing signal may not be practical. Under these conditions, the operator should, after finding the minimum signal point, execute a left face. Depressing the sense button will then cause an increase in signal if the operator was facing the true direction of the transmitter. On extremely weak signals, a very approximate bearing may

be obtained by depressing the sense button and turning around until the maximum signal is heard. Executing a right face will then leave the operator facing the direction of the transmitter.

4.4 DIRECTION FINDING-LOCAL.

As the operator approaches the transmitter, the signal will become increasingly strong, and the directional indication increasingly sharp. However, at very close distances, the signal will be so strong as to be uncomfortable to the ears, and the directional indication difficult to obtain. When this condition exists, rotate the operational switch to the full clockwise position. This will reduce the signal strength and permit more accurate directional determination, as well protect the operator's ears.

(NOTE: Rotating the switch hard clockwise will change the pitch of the receiver signal slightly).

Should the signals become painfully strong with the switch in the full clockwise position, and directional determinations difficult to obtain, it is an indication that the operator is very close to the transmitter. In the case of a DAV-2 transmitter, this condition prevails when within 25 to 50 feet, or within hailing distance.

5. MAINTENANCE.

5.1 GENERAL.

The power supply should be maintained in a "fresh" condition at all times. For maintenance of the vibrator power and lead-acid storage battery unit, see the Instruction Book for Navy Type CRF-20221 Power Supply Equipment. If the alternate power supply, Dry Battery Pack, Type -19027A, is used, this battery should not be stored in the equipment case for more than a few days when the equipment is not in use. Batteries should always be replaced when the power supply voltages are low, as indicated by poor receiver sensitivity and reduced transmitter output.

Failure of the Model DAV-2 equipment will most often be due to rundown batteries, bad vibrator or poor vacuum tubes. Before checking for more obscure circuit faults, the power supply should be replaced, and the tubes checked by substitution. The miniature type tubes used in this equipment are fragile, and, to prevent breakage, the tubes should be carefully inserted in their respective sockets, rocking the tubes slightly if the socket holes are tight. For a list of circuit faults and possible causes, see "Trouble Shooting," paragraph 5.3.

NOTE: ALL TUBES SUPPLIED WITH THE EQUIPMENT OR AS SPARES ON THE CONTRACT SHALL BE USED IN THE EQUIPMENT PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

5.2 ALIGNMENT.

The same procedure is followed in this equipment both for realignment of receiver and transmitter, and for effecting a change of operating frequency. For the latter, a set of crystals for the new operating frequency must first be installed. Whenever a change of operating frequency is made, the correct frequency plate should be installed on the top of the Loop Unit, Navy Type CCI-69093.

5.2 (a) ALIGNMENT EQUIPMENT.

The receiver section of the Model DAV-2 may be aligned by use of any standard signal generator covering the range of 2.3 to 4.6 megacycles. A non-inductive (carbon type) resistor must be obtained for connection between the "high" side of the signal generator and the antenna connector. The value of this resistor must be such that, when added to the stated output impedance of the signal generator, the sum is equal to 150 ohms. In addition, an extension cable for the power supply will be required, to permit moving the battery or vibrator supply aside to make accessible the adjustments of T-102, Z-101 and Z-102.

All variable adjustments of the receiver section may be adjusted by using a small screw-driver and a 3/16" hex nut wrench. This latter tool is furnished as a part of the spare parts equipment of the Model DAV-2.

5.2 (b) ALIGNMENT PROCEDURE.

1. PREPARATION.

To prepare the Model DAV-2 equipment for alignment, remove the equipment from the case, plug the receiver unit onto the loop unit and connect the power supply to the loop unit by using an extension cable. Connect the ground lead of the signal generator to a convenient point on the chassis, and connect the high side, through the dummy resistor mentioned above, to the antenna connector.

2. RECEIVER ALIGNMENT.

NOTE: Refer to Figures 5, 6, and 7 for location of tuning adjustments. With the OFF-ON switch in the "ON" position, and the function switch in the "TWO-WAY RADIO" position, proceed as follows: Set generator on the desired signal frequency. This adjustment must be made very accurately, the simplest way to achieve this is to zero beat the signal from the generator and the signal of another DAV-2 transmitter of the desired frequency. Sufficient signal from the transmitter for this purpose will usually be obtained directly by radiation without any special connections. Set the generator for 30% modulation and set attenuator for a moderate signal in the headphones. Always keep the signal at a moderate level as the alignment progresses to prevent overloading and possible poor alignment. Adjust the tuning control of the antenna coupling transformer, (T-102), for maximum headphone response. Proceed next to adjust the tuning slugs on both the top and bottom of

each of the two i-f transformers (Z-101 and Z-102), individually for maximum headphone response. After the i-f stage has been aligned, the antenna adjustment should again be checked, followed by a final check on the i-f transformers.

3. D. F. ALIGNMENT.

Before attempting to align the loop unit, check the position of the link jumpers on the bakelite terminal board. For a frequency range of 2.3 to 3.3 megacycles, jumper center terminals to those nearest the end of the unit. For a frequency range of 3.3 to 4.6 megacycles jumper center terminals to those nearest the loop.

Set signal generator for unmodulated carrier. Turn function switch to mid-position (D. F. DISTANT). Inject a signal into the loop by connecting the signal generator to a single turn loop in close proximity to the loop unit. Adjust the tuning of the transformer Z-102 until an audio tone of approximately 800 cycles is obtained. Care should be exercised in tuning Z-102 not to approach too close to the point where the system stops oscillating, as this results in an unstable condition easily blocked by strong signals, and increases the possibility of failure due to declining battery voltage.

This unstable condition is characterized by roughness in the hissing noise produced by the oscillation. The correct adjustment is the one just outside the rough sounding

region that gives the desired beat note of 800 cycles. It is important that the i-f system be first aligned properly on two-way radio before making the d.f. adjustments. When the unit has been properly aligned for two-way radio, only slight adjustments are required to obtain proper d.f. alignment. These changes are usually so small as to be not noticeable when again checking on two-way radio.

Next, adjust the loop tuning capacitor for maximum output, ascertaining that there are two positions of maximum output. Rotate the function switch full clockwise and note if the change of pitch of the note is excessive, retuning Z-102 slightly if necessary.

A final check should be made by turning on the transmitter of another DAV-2 unit to be sure the set is "on frequency".

All adjustments have now been made excepting the antenna, which is best adjusted in actual operation. With the equipment mounted on the operator, and the antenna in place and fully extended, adjust as follows: turn on a transmitter in the vicinity; set function switch on "LOCAL". Orientate the equipment until minimum signal is obtained, being sure that the equipment is at sufficient distance from the transmitter to prevent overloading. Now depress "SENSE" button and adjust the antenna coil, using the special screwdriver supplied, until maximum signal is obtained. It should now be possible to obtain good sense indications. Turning 90 degrees to the

right should cause the signal to decrease markedly. Turning 90 degrees to the left should cause a definitely noticeable increase in signal.

4. TRANSMITTER ALIGNMENT.

The adjustments covered above in Receiver Alignment and Loop Tuning have covered all of the transmitter adjustments, since all transmitter tuning circuits are common to the receiver as well.

An additional check of antenna tuning, as well as transmitter performance, may be obtained by use of a Field Strength Meter (CCI-60041). The instrument is set up about six feet away and tuned for maximum meter deflection, with the DAV-2 transmitter in operation. The antenna coil may now be adjusted to give maximum field strength indication. Using this same setup, the transmitter performance may be checked. Reduce the reading of the field strength meter to about one-fifth of full scale by either detuning or moving farther away. This portion of the scale follows a square-law characteristic, and may be used for checking modulation, a fifty per cent increase in scale reading corresponding to one hundred per cent modulation. If, upon speaking into the microphone, clear side-tone is heard in the phones, and a twenty-five to fifty per cent increase in the reading of the field strength meter is obtained, the transmitter may be deemed satisfactory.

5.3 TROUBLESHOOTING.

Failure of the Model DAV-2 Equipment will most often be due to a weak power supply or to poor vacuum tubes. Before checking for more obscure circuit faults, the power supply should always be replaced, and the tubes checked by substitution.

A tabulation of some of the more common troubles which it is possible to encounter with this equipment in service use, as well as their possible causes, is given below:

5.3 (a) TRANSMITTER AND RECEIVER.

Weak reception accompanied by poor transmission. Check power supply battery and tubes. Check antenna sections for contact. (Antenna must be fully extended.) Check antenna load coil, L-301, and antenna coupling transformer, T-102, for continuity.

Weak reception, transmitter section operating satisfactorily. Check tubes in receiver. Check alignment of receiver.

Weak transmission, receiver operating satisfactorily. Check tubes in transmitter. Check Transmitter Section (sub-par. 5.3 (c)).

Intermittent operation of transmitter, receiver, or both. Check for open or short circuits. Check for loose connection. Check for moisture inside the carrying case due to condensation or leaks in case. Check for defective control cables coming from Loop

Unit cover. Check for bent or corroded plug contacts.

5.3 (b) RECEIVER SECTION.

No signals, no background noise in headset. Check tubes, power supply, headset and "OFF-ON" switch on Loop Unit cover.

Background noise in headset, but no signals. Check power supply battery and receiver tubes. Check receiver crystal, Y-101. Check receiver alignment. Check for open or short-circuited condenser, C-102.

5.3 (c) TRANSMITTER SECTION.

No carrier, no sidetone. Bad tubes or batteries. Defective "SEND-RECEIVE" switch in Loop Unit cover.

No carrier, but sidetone in phones. Bad oscillator r-f choke, L-102. Bad crystal, Y-102. Bad P. A. or oscillator tube, V-105 or V-106.

Very weak carrier (only audible nearby) and no modulation. Bad transmitter tubes. Weak batteries.

Weak carrier, but modulated. Open or short-circuited antenna load coil, L-301. Open or short-circuited antenna coupling transformer, T-102. Open P. A. screen resistor, R-105.

Carrier, but no modulation. Bad modulator tube, V-107. Open bias lead to V-107. De-

fective input transformer, T-101B. Defective microphone. Open circuit in microphone cables. Short-circuited modulation reactor, T-101C.

Carrier, but weak modulation. Bad modulator tube, V-107. Short-circuited turns in modulation reactor, L-103. Defective input transformer, T-101B. Weak battery in power supply.

Transmitted signal distorted, or decreasing antenna current with modulation. Bad transmitter tubes. Improper alignment. Weak battery in power supply. Bad crystal.

5.3 (d) LOOP SECTION.

Weak loop signals, okay on two-way. Check S-403 for proper position, and secure connection.

Check tuning of C-401. Open S-403 and check across C-401 for short circuits in loop and wiring. Close S-403 and check across C-401 to determine continuity of loop and L-402.

In general, if tuning C-401 has little or no effect on the strength of the signal, the loop circuit is either open, shorted, or on the wrong tuning range.

If tuning of C-401 is very broad, loop efficiency has been reduced due to moisture absorption. If a spare is available, the loop should be replaced; however, if no spare is available, the loop may be restored, tempo-

rarily at least, by baking at 180 to 200 degrees Fahrenheit for approximately 8 hours. Seal of the loop leads and shield gap should be checked, and repaired if necessary, using any good coil wax.

No bearings (poor minimum or none at all). Disconnect antenna. If satisfactory bearings are obtained, check for shorted antenna lead, closed sense switch or open ground lead to loop shield. If disconnecting the antenna lead gives no improvement, make checks outlined for weak loop signals and check all ground connections.

No sense indications. Check continuity of sense circuit, from P-401 through R-402, S-405, R-403, L-402 to ground. Check antenna tuning and be sure all sections of antenna extended and making contact.

Sense indications not well defined. Check position of S-404. Check L-402. Check for bad resistor R-402 or R-403. Check antenna tuning. Check that antenna sections are fully extended.

BE CAREFUL TO AVOID PROXIMITY TO LARGE TREES, METAL TOWERS, POWER OR TELEPHONE LINES, AND BUILDINGS WHEN CHECKING BEARINGS OR SENSE INDICATIONS, AS VERY POOR RESULTS WILL USUALLY BE OBTAINED DUE TO RE-RADIATION BY THESE OBJECTS.

No C. W. Oscillation. Check battery and tubes V-102 and V-103. Check tuning of C-401 (when C-401 is tuned to frequency of crystal

oscillator, oscillation may be stopped). Check continuity of S-406, section "B". This may be conveniently accomplished by checking between terminals 8 and 9 of J-401. Check same circuits for grounds: they should be clear when S-406 is at "D. F. LOCAL" or "D.F. DISTANT" positions.

5.4 CIRCUIT CHECKING DATA.

(See Diagram, Fig. 7, for Tube Socket and Pin Locations). All resistance measurements are made with vacuum tubes and batteries removed, directly from the tube socket pins to ground (chassis). All voltage measurements should be made with a "fresh" power supply, with the receiver or transmitter operating, and using a 10-megohm input vacuum tube voltmeter.

TUBE ELEMENT	PIN	DC VOLTS	OHMS
1R5 Oscillator Mixer Tube (V-101).			
Plate	2	120	∞
Screen	3	45	∞
Control Grid	6	-0.2	8.0 megohms
Filament	1	0	0
Filament	7	1.4	∞
Oscillator Grid	4	-6.0	0.1 megohm
1T4 I-F Amplifier Tube (V-102).			
Plate	2	63	∞
Screen	3	63	∞
Control Grid	6	-0.25	6 megohms
Filament	1	0	0
Filament	7	1.4	∞

TUBE ELEMENT	PIN	DC VOLTS	OHMS
1S5 Detector-1st Audio Tube (V-103).			
Diode Plate	3	-0.6	1.25 megohm
Plate	5	40	∞
Screen	4	20	∞
Control Grid	6	-0.15	6 megohms
Filament	1	0	0
Filament	7	1.4	∞
3S4 Audio Output Tube, (V-104).			
Plate	2,6	125	∞ (200M)
Screen	4	40	∞
Control Grid	3	-5.2	∞
Filament	1	0	∞
Filament C.T.	5	1.4	0
Filament	7	0	∞
3S4 Power Amplifier Tube (V-105).			
Plate	2,6	125	∞
Screen	4	80	∞
Control Grid	3	-25	250,000
Filament	1	0	0
Filament C.T.	5	1.4	∞
Filament	7	0	0
1T4 Oscillator Tube (V-106).			
Plate	2	90	∞
Screen	3	90	∞
Control Grid	6	-25	250,000
Filament	1,5	0	0
Filament	7	1.4	∞

TUBE ELEMENT	PIN	DC VOLTS	OHMS
3S4 Modulator Tube (V-107).			
Plate	2,6	125	∞
Screen	4	63	∞
Control Grid	3	-6.0	∞
Filament	1	0	0
Filament C.T.	5	1.4	∞
Filament	7	0	0

LIST OF MAJOR UNITS FOR MODEL DAV-2

RADIO DIRECTION FINDER EQUIPMENT

SYMBOL GROUP	NAVY TYPE DESIGNATION	NAME OF MAJOR UNIT	ASSEMBLY DRAWING NUMBER
101-199	CCI-43063	Radio-Transmitter-Receiver Unit	164-C-504
201-299	* -19027A	Battery Pack, Dry	43-8MXX90M4
301-399	CCI-66081	Antenna & Load Coil Assembly	145-4P-501
401-499	CCI-69093	Loop and Switching Unit	164-L-501
501-599	AN/T-45	Microphone	
601-699	CCI-49559	Headset Assembly	164-P-501
	CAOC-10344	Carrying Case	164-C-502
	*CRF-20221	Vibrator Power Unit	

* Not furnished by Contractor.

TABLE II

TRANSMITTER RECEIVER UNIT — PARTS LIST BY SYMBOL DESIGNATION

NAVY TYPE CCI-43063 — MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr.	Mfr. Desig	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
		CAPACITORS						
*C-101	V-101 Grid Coupling	Silver-Mica 0.0005 mfd. 500 v. D.C. working, toler. 5%	-48691-D5	RE 48A 148C RE 48A 154F	2	1469		81-023
*C-102	V-101 Osc. Amp. Control	Ceramic, 50 mmfd. 500 v. D.C. working, toler. 10%, neg. temp. coef. $750x10^{-6}$ per degree C	-481024-10		47	N750K		130-50 mmfd.
*C-103	V-101 I.F. Feedback	Ceramic, 5 mmfd. 500 v. D.C. working, toler. 10%, neg. temp. coef. $750x10^{-6}$ per degree C	-481622-10		47	N750K		130-5 mmfd.
C-104	I.F. Pri.(Part of Z-101	Ceramic 45 mmfd. 500 v. D.C. working, neg. temp. coef. $750x10^{-6}$ per degree C., toler. 10%			47	750K		130-45 mmfd.
*C-105	Supply Bypass (V-101)	Mica 0.003 mfd. 500 v. D.C. working, toler. 20%	-481036	RE 48A 143F RE 48A 154F	4	1W5D3		83-026
C-106	I.F. Sec. (Part of Z-101)	Ceramic, 30 mmfd. 500 v. D.C. working, neg. temp. coef. $750x10^{-6}$ per degree C., toler. 10%			47	N750K		130-30 mmfd.
*C-107	A.V.C. Bypass	Same as C-105	-481036	RE 48A 143F RE 48A 154F	4	1W5D3		83-026
C-108	I.F. Pri. (Part of Z-102)	Same as C-104			47	N750K		130-45 mmfd.
C-109	I.F. Sec. (Part of Z-102)	Same as C-106			47	N750K		130-30 mmfd.
*C-110	Diode Return Bypass V-103	Silver-Mica 0.00025 mfd. 500 v.	-48690-D5	RE 48A 148C RE 48A 154F	2	1469		81-019
*C-111	Audio Coupling	Same as C-101	-48691-D5	RE 48A 148C RE 48A 154F	2	1469		81-023
*C-112	V-103 Screen Bypass	Molded Paper .01 mfd. 600 v.			100	DP		
*C-113	V-103 Plate R. F.Bypass	Same as C-101	-48691-D5	RE 48A 148C RE 48A 154F	2	1469		81-023
*C-114	67 v. Supply Bypass	Paper, .05 mfd., 200 v. D.C.W. toler. 20%	-481621-20		4	ICS2S5A		33-001

* For quantity of spares furnished refer to Table III.

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NAVY TYPE CCI-43063 — MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr.	Mfr. Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
		CAPACITORS						
*C-115	Audio Coupling	Same as C-101	-48691-D5	RE 48A 148C RE 48A 154F	2	1469		81-023
*C-116	V-104 Screen Bypass	Same as C-114	-481321-20		4	ICS2S5A		33-001
*C-117	Amp. Plate Bypass	Same as C-101	-48691-D5	RE 48A 148C RE 48A 154F	2	1469		81-023
*C-118	Antenna Tuning	Same as C-110	-48690-D5	RE 48A 148C RE 48A 154F	2	1469		81-019
*C-119	V-105 Screen Bypass	Same as C-101	-48691-D5	RE 48A 148C RE 48A 154F	2	1469		81-023
		RECEPTACLES						
*J-101	Radio Unit	14 Contact, Bakelite			114			345-041
		INDUCTORS						
*L-102	Oscillator Plate Choke	See Table 4	-47272		3			20-012
		RESISTORS						
*R-101	V-101 Grid	2.0 megohms, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT 1/4 400-2.0
*R-102	V-101 Plate Dropping	30,000 ohms, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT 1/4 400-30M
*R-103	V-101 Screen Dropping	50,000 ohm, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT 1/4 400-50M
*R-104	V-106 Plate Dropping	20,000 ohm, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT 1/4 400-20M
*R-105	V-105 Screen Dropping	Same as R-104	-63433	RE 13A 372G	11	BT-1/4		11-BT 1/4 400-20M
*R-106	Feed-Back Suppressor	3,300 ohms, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT 1/4 400-3300

* For quantity of spares furnished refer to Table III.

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Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr.	Mfr. Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
		RESISTORS						
*R-107	V-101 Osc. Grid	0.1 megohm, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.1
*R-108	V-105 and V-106 Grid	0.25 megohm, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.25
*R-109	V-103 Diode Load	1.0 megohm 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-1.0
*R-110	V-103 Grid	5.0 megohms, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-5.0
*R-111	A.V.C. filter	Same as R-110	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-5.0
*R-112	V-103 Screen Dropping	3.0 megohms, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-3.0
*R-113	V-103 Plate	Same as R-108	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.25
*R-114	V-104 Screen Dropping	0.15 megohm, 1/4 watt, pigtail, toler. 10%	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.15
*R-115	V-104 Grid	Same as R-101	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-2.0
*R-116	Oscillation Suppressor	Same as R-108	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.25
*R-118	Feedback Dropping	Same as R-110	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-5.0
		TRANSFORMERS						
*T-101A	Audio Output	See Table 4	-30964		40 or 33	A3274A		630-011
*T-101B	Audio Input	See Table 4	-30964			A3274-A		630-011
*T-101C	Modulation Reactor (Assembled with T-101A and T-101B)	See Table 4	-30964		40	A3274-A		630-011

* For quantity of spares furnished refer to Table III.

TABLE II

TRANSMITTER RECEIVER UNIT — PARTS LIST BY SYMBOL DESIGNATION

NAVY TYPE CCI-43063 — MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr.	Mfr. Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
			TRANSFORMERS					
*T-102	Antenna Coupling	See Table 4			16	M-253617 502		16-M-253617 502 22-019
			VACUUM TUBES					
V-101	Receiver Oscillator Mixer	Pentagrid Converter	1R5	JAN-1A	16†	1R5		720-1R5
V-102	I. F. Amp.	Super-Control R. F. amplifier Pentode	1T4	JAN-1A	16†	1T4		720-1T4
V-103	Det. 1st Audio	Diode-Pentode	1S5	JAN-1A	16†	1S5		720-1S5
V-104	Audio Output	Power Amplifier Pentode	3S4	JAN-1A	16†	3S4		720-3S4
V-105	Power Amplifier	Same as V-104	3S4	JAN-1A	16†	3S4		720-3S4
V-106	Transmitter Oscillator	Same as V-102	1T4	JAN-1A	16†	1T4		720-1T4
V-107	Modulator	Same as V-104	3S4	JAN-1A	16†	3S4		720-3S4
			SOCKETS					
*X-101	Socket for V-101	7 pin Miniature Bakelite (Shielded)			28	2557 or 9820		556-012
*X-102	Socket for V-102	Same as X-101			28	2557 or 9820		556-012
*X-103	Socket for V-103	Same as X-101			28	2557 or 9820		556-012
*X-104	Socket for V-104	Same as X-101			28	2557 or 9820		556-012
*X-105	Socket for V-105	Same as X-101			28	2557 or 9820		556-012
*X-106	Socket for V-106	Same as X-101			28	2557 or 9820		556-012

* For quantity of spares furnished refer to Table III.

† or other manufacturer

TABLE II

TRANSMITTER RECEIVER UNIT — PARTS LIST BY SYMBOL DESIGNATION

NAVY TYPE CCI-43063 — MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr.	Mfr. Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
		SOCKETS						
*X-107	Socket for V-107	Same as X-101			28	2557 or 9820		556-012
*X-108	Sockets for Y-101 and Y-102	Double, Bakelite insulated	-49407		28	9800		553-004
		CRYSTALS						
Y-101	Rec. Crystal	2 prong 7/16x13/16x1-1/8 inch Bakelite holder	-40125		17 or Equiv	MC-9 or FT-243	For Re-placement	17-MC-9 or FT-243
Y-102	Trans. Crystal	Same as Y-101	-40125		17	MC-9 or FT-243	For Re-placement	17-MC-9 or FT-243
		I. F. TRANSFORMERS						
Z-101	Input I.F. Trans.	(See Table 4)	-47278		3	13202		
Z-102	Output I.F. Trans.	(See Table 4)	-47279		3	13203		
	BATTERY POWER UNIT							
	NAVY TYPE -- 19027	RECEPTACLES						
J-201	Battery connector socket	5 pin female receptacle wafer type			28	P-125		
	ANTENNA AND LOAD COIL ASSEMBLY							
	NAVY TYPE 66081	INDUCTORS						
L-301	Antenna Load Coil	See Table 4			16	M-253617 501		16-M-253617-501/D
		PLUGS						
P-301	Concentric Breakaway Connector (male)	Molded rubber insulated (Part of W-301)	-49212		13	XX-103		145-3.23

* For quantity of spares furnished refer to Table III.

TABLE II

ANTENNA AND LOAD COIL ASSEMBLY — PARTS LIST BY SYMBOL DESIGNATION

NAVY TYPE 66081 — MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr	Mfr. Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
		CABLES						
W-301	Antenna lead, Connects P-301 and L-301	Rubber-covered, single-conductor, stranded wire	-49212		13	XX-103		145-3.23
LOOP UNIT								
NAVY TYPE CCI-69063		CAPACITORS						
C-401	Loop Tuning	140 mmfd. air trimmer			113	CC140G-A		190-047
		PLUGS AND RECEPTACLES						
*J-401	Transmitter-Receiver Unit	14 contact, Bakelite			28			551-033
*J-402	Power Supply Unit	5 contact, Bakelite			28	M-50		350-007
*P-401	Concentric Breakaway connector (female)	Molded rubber, insulated, (Part of W-402)	-49212		13	XX-103		145-3.23
*P-402	Headset Connector	2 contact female (Part of W-401)		AN/JK-26		JK-26		
*P-403	Microphone Connector	2 contact female (Part of W-401)		AN/JK-48		JK-48		
		INDUCTORS						
*L-401	Loop	Directional Shielded Loop Coil			8	164-L-228x2		164-L-228x2
*L-402	Phasing Coil	Dual wound solenoid, 10 turns, 1/4" dia.			8	22-026		22-026
		RESISTORS						
*R-401	Sensitivity Dropping	1800 ohms, 1/4 watt, pigtail, carbon, 10% tolerance	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-1800
*R-402	Sense Dropping	1000 ohms, 1/4 watt, pigtail carbon, 10% tolerance	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-1000
*R-403	Sense Dropping	1000 ohms, 1/4 watt, pigtail carbon, 10% tolerance	-63433	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-1000

* For quantity of spares furnished refer to Table III.

TABLE II

LOOP UNIT — PARTS LIST BY SYMBOL DESIGNATION

NAVY TYPE CCI-69093 — MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr.	Mfr. Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
		SWITCHES						
*S-401	On-off	SPDT toggle			108	1GA3C5		520-010
*S-402	Send-receive	DPDT toggle, spring return			108	1GA4C30		520-014
S-403	Loop freq. range	SPDT jumper, link type			8	164-L-231		164-L-231
S-404	Sense freq. range	SPDT jumper, link type			8	164-L-231		164-L-231
S-405	Sense	SPST push button type			8	164-L-222x4		164-L-222x4
*S-406	2 way - D.F. Selector	3 circuit 3 position rotary			12	2507		510-019
		CABLES						
*W-401	Microphone and headphone cable assembly	"Y" cable - 4 wires to Y, 2 wires to P-402, 2 wires to P-403			109	164-C-503		164-C-503
*W-402	Antenna lead	Rubber covered single conductor cable terminating in P-401	-49212		13			262-003
	MICROPHONE ASSEMBLY NAVY TYPE AN/T - 45	MICROPHONE						
*MI-501	Microphone	Carbon type differential lip microphone		AN/T-45		T-45		325-006
*P-501	Microphone plug	2 pin miniature microphone connector (Part of AN/T-45 Assembly)		AN/PL-291		PL-291		325-006
	HEADSET ASSEMBLY NAVY TYPE CCI-49559	HEADPHONES						
*HS-601	Headset	2" dia. x 3/8" thick, 300 ohms per phone	-49215		67	US-42		265-002

* For quantity of spares furnished refer to Table III.

TABLE II

HEADSET ASSEMBLY — PARTS LIST BY SYMBOL DESIGNATION

NAVY TYPE CCI-49559 — MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Symb. Desig.	Function	Description	Navy Type Number	Navy Drawing or Spec.	Mfr.	Mfr. Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
		PLUGS						
*P-601	Headset plug	2 contact phone plug (short) (Part of W-601)		AN/PL-54		PL-54		262-011
		CABLES						
*W-601	Headset cable harness	2 conductor cables and "Y" junction providing series connection of phones to P-601						262-011

* For quantity of spares furnished refer to Table III.

TABLE III

SPARE PARTS LIST BY SYMBOL DESIGNATION

MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Quan.	Navy Type Number	Symb. Desig.	Description	Navy Drawing or Spec.	Mfr.	Mfr.Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
			ANTENNA					
2			Collapsible Whip Antenna		30	16400		
			CAPACITORS					
6	-48691-D5	C-101, C-111, C-113, C-115, C-117, C-119	Silver-Mica 0.0005 mfd. 500 v. D. C. working, toler. 5%	RE 48A 148C RE 48A 154F	2	1469		81-023
2	-48690-D5	C-110, C-118	Silver-Mica 0.00025 mfd. 500 v.	RE 48A 148C RE 48A 154F	2	1469		81-019
2	-481036	C-105, C-107	Mica 0.003 mfd. 500 v. D.C. working, toler. 20%	RE 48A 143F RE 48A 154F	4	1W5D3		83-026
5	-481621-20	C-114, C-116	Paper, .05 mfd., 200 v. D.C.W. toler. 20%		4	ICS2S5A		33-001
3		C-112	Molded Paper .01 mfd. 600 v.		100	DP		
2	-481622-10	C-103	Ceramic, 5 mmfd. 500 v. D.C. working, toler. 10%, neg. temp. coef. 750x10^{-6} per degree C		47	N 750K		130-5 mmfd.
2	-481024-10	C-102	Ceramic, 50 mmfd. 500 v. D.C. working, toler. 10%, neg. temp. coef. 750x10^{-6} per degree C		47	N750K		130-50 mmfd.
			CHOKES AND INDUCTORS					
1	-47272	L-102	See Table 4		3			20-012
1		L-401	Directional Shielded Loop Coil		8	164-L-228x2		164-L-228x2
1		L-402	Dual wound solenoid, 10 turns, 1/4" dia.		8	22-026		22-026
			CABLES					
2		W-401	"Y" cable - 4 wires to Y, 2 wires to P-402, 2 wires to P-403		109	164-C-503		164-C-503
1 set	-49215	HS-601, P-601, W-601	600 ohm Headset Assembly		67	US-42		265-002
2	-49212	W-301, W-402	Rubber-covered, single-conductor, stranded wire		13	XX-103		145-3.23

TABLE III

SPARE PARTS LIST BY SYMBOL DESIGNATION

MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Quan.	Navy Type Number	Symb. Desig.	Description	Navy Drawing or Spec.	Mfr.	Mfr.Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
			CONNECTORS & RECEPTACLES					
2		J-401	14 contact, Bakelite		28			551-033
2		J-402	5 contact, Bakelite		28	M-50		350-007
2		J-101	14 contact, Bakelite		114			345-041
			RESISTORS					
3	-63433	R-109	1.0 megohm, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-1.0
8	-63433	R-110, R-111, R-118	5.0 megohms, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-5.0
5	-63433	R-101, R-115	2.0 megohms, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-2.0
3	-63433	R-112	3.0 megohms, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-3.0
5	-63433	R-104, R-105	20,000 ohm, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-20M
3	-63433	R-102	30,000 ohms, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-30M
3	-63433	R-107	0.1 megohm, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.1
3	-63433	R-114	0.15 megohm, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.15
3	-63433	R-106	3,300 ohms, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-3300
3	-63433	R-103	50,000 ohms, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-50M
3	-63433	R-401	1800 ohms, 1/4 watt, pigtail, carbon, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-1800
5	-63433	R-402, R-403	1000 ohms, 1/4 watt, pigtail, carbon, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-1000

TABLE III

SPARE PARTS LIST BY SYMBOL DESIGNATION

MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Quan.	Navy Type Number	Symb. Desig.	Description	Navy Drawing or Spec.	Mfr.	Mfr.Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
			RESISTORS					
10	-63433	R-108, R-113, R-116, R-117	0.25 megohm, 1/4 watt, pigtail, toler. 10%	RE 13A 372G	11	BT-1/4		11-BT-1/4 400-0.25
			SWITCHES					
1		S-406	3 circuit 3 position rotary		12	2507		510-019
1		S-402	DPDT toggle, spring return		108	1GA4C30		520-014
1		S-401	SPDT toggle		108	1GA3C5		520-010
			TRANSFORMERS					
3	-30964	T-101-A/B/C	See Table 4		40	A3274-A		630-011
3	-30964	T-102	See Table 4		16	M-253617 502		16-M-253617 502 22-019
3		L-301	See Table 4		16	M-253617 501		16-M-253617 501/D
3	-47278	Z-101	See Table 4		3	13202		
3	-47279	Z-102	See Table 4		3	13203		
			TUBE CLAMPS					
4		E-109	Spring tube clamps		69	145-V-40		
			SPECIAL HARDWARE					
1			Antenna Coil Housing Cap		115	164-P-202		
1			Microphone Cord Bushing		106	164-L-212		
1			Antenna Cord Bushing		106	164-L-213		
1			Antenna Cord Bushing (Plastic)		115	164-P-203		
3			1/4" Short taper cork			000-1/2		
3			Fiber washer 1-1/8" IDx1-1/4" ODx1/16"		107			

TABLE III

SPARE PARTS LIST BY SYMBOL DESIGNATION

MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

Quan.	Navy Type Number	Symb. Desig.	Description	Navy Drawing or Spec.	Mfr.	Mfr.Desig.	Spec. Tol. or Mod.	Contr. Dwg. & Part No.
			SPECIAL HARDWARE					
2			Antenna Cord Washer		8	164-L-214		
1			Microphone Cord Washer		8	164-L-215		
6			Knurled cover screws		106	164-L-206		
6			Rubber switch boot		116	164-L-209		
1			Cloth skull cap					
1			Harness Straps					
1			Switch Shaft Bushing		106	164-L-211		
5			Rubber Gaskets					
			SOCKETS					
7		X-101, X-102, X-103, X-104, X-105, X-106, X-107	7 pin Miniature Bakelite (Shielded)		28	2557 or 9820		556-012
1	-49407	X-108	Double, Bakelite insulated		28	9800		hNN-004
			MICROPHONE					
1		MI-501	Carbon type differential lip microphone			AN/T-45		325-006
			TUNING TOOL					
2			Alignment Tool		95	145-4E-3.37		

TABLE 4

TRANSFORMER AND COIL ASSEMBLY DATA FOR

MODEL DAV-2 RADIO DIRECTION FINDER EQUIPMENT

SYMBOL	FUNCTION	DRAWING NUMBER	NAVY NUMBER	NO. OF TURNS	WIRE SIZE	INSULATION	VOLT TEST	TUNING OR CORE	DIA. COIL FORM	TEST FREQ. MC	A. C. INDUCT. MH.	Q	COIL FREQ. RANGE	IMPEDANCE	D.C. RESISTANCE OHMS	SPEC.
L-102	Osc. Plate Choke	145-3.17D	-47272	500	#38	S.S.E.		Dummy 1/4 w Resistor	1/4"	500 KC	1700	36				
*T-101A	Audio Output Trans.	145-3.17C	-30964	2500 Pri.	#40	S.E.	500v.	Iron	1/4"-#29	660 CPS	6	3.4	200 to 5000 KC	5000 Pri.	500	Metal Case
				860 Sec.	#36	S.E.	500v.	Iron	1/4"-#29	2200 CPS	0.5	2.1	100 to 10,000	600 Sec.	43	Metal Case
*T-101B	Audio Input	145-3.17C	-30964	400 Pri.	#43	S.E.	500v.	Iron	1/4"-#29	2300 CPS	0.5	0.4	200 to 5000 KC	Pri. 125	21	Metal Case
				10000 Sec.	#37	S.E.	500v.	Iron	1/4"-#29	130 CPS	150	0.2		Sec. 80000	3300	Metal Case
*T-101C	Mod. Reactor	145-3.17C	-30964	3150	#37	S.E.	500v.	Iron	1/4"-#29	575 CPS	7.6	3.5			240	Metal Case
Z-101	Input IF	145-3.17E	-47278	510 Pri.	5-44	S.S.E. Litz		Slug	.223	455 KC	1.2	58	445 to 475 KC	300 M Pri.	30	45 mmfd. Padders
				600 Sec.		S.S.E. Litz		Slug	.223		1.7	58		500 M Sec.	26	30 mmfd. Padders
Z-102	Output IF	145-3.17E	-47279	510 Pri.	5-44	S.S.E. Litz		Slug	.223	455 KC	1.2	58	445 to 475 KC	300 M Pri.	30	45 mmfd. Padders
				600 Sec.	5-44	S.S.E. Litz		Slug	.223		20.6	58		500 M Sec.	26	30 mmfd. Padders
T-102	Antenna Coupling Trans.	M-253617-501		Pri. 75 1/4	#35	En.			Top of Sec.	5 MC to	23.4 to	79 to 64	2.3 to 4.6 MC	2.3 to 4.6		Shield Can
				Sec. 99 3/4	#35	En.		Slug	.283	2.2	114.7					
L-301	Antenna Load Coil	M-253617-502/D		122	3/#41	Silk En.		Slug	.273	3.6 to 1.5	38 to 194	63 to 120				Shield Can

*Note: T-101A, T-101B and T-101C are potted in one can.

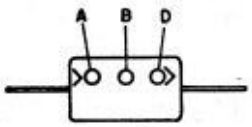
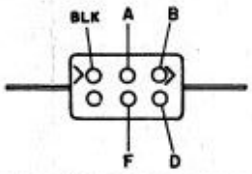
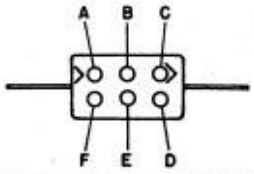
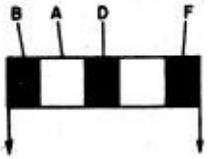
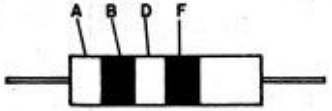
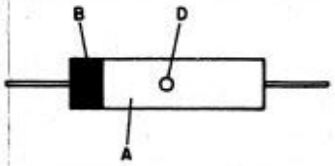
NAVY MODEL DAV-2
RADIO DIRECTION FINDER EQUIPMENT

TABLE V

LIST OF MANUFACTURERS

CODE NO.	DESIG. NO.	NAME	ADDRESS
2	CAW	Aerovox Corp.,	New Bedford, Mass.
3	CFW	F. W. Sickles Co.,	Chicopee, Mass.
4	CD	Cornell-Dubilier Electric Co.,	S. Plainfield, N. J.
8	CCI	Communications Company, Inc.,	Coral Gables, Fla.
11	CIR	International Resistance Co.,	Philadelphia, Pa.
12	CBN	Central Radio Lab.,	Milwaukee, Wisc.
13	CTE	Telephonics, Inc.,	New York, N. Y.
16	CRV	R. C. A. Mfg. Co.,	Camden, N. J.
17	CQB	Bliley Electric Co.,	Erie, Pa.
28	CMG	Cinch Mfg. Corp.,	Chicago, Ill.
30	CRF	The Radiart Corp.,	Cleveland, Ohio
33	CUT	United Transformer Corp.,	New York, N. Y.
40	CUD	Audio Development Co.,	Minneapolis, Minn.
47	CER	Erie Resistor Corp.,	Erie, Pa.
67	CUP	Carron Mfg. Co.,	Chicago, Ill.
69		Cuyahoga Spring Co.,	Cleveland, Ohio
95		Radio Essential,	New York City, N. Y.
100	CTD	Tobe-Deutschman,	Canton, Mass.
106		Southern Engineering,	Miami, Fla.
107		Auburn,	Middletown, Conn.
108	CGE	General Electric Co.,	Schenectady, N. Y.
109		Cords, Ltd.,	Newark, N. J.
113		American Steel Package Co.,	Defiance, Ohio
114		A. W. Franklin Co.,	New York City, N. Y.
115		Creative Plastics,	Brooklyn, N. Y.
116		Waterproof Electric Co.,	Los Angeles, Calif.

TABLE VI
APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

3 COLOR RMA	ASA – AWS	6 COLOR RMA
		
		

A– COLOR FOR 1ST SIGNIFICANT FIGURE.
B– COLOR FOR 2ND SIGNIFICANT FIGURE.
C– COLOR FOR 3RD SIGNIFICANT FIGURE.
D– COLOR FOR NO. OF CIPHERS OF MULTIPLIER.
E– VOLTAGE (IN 100's)
F– TOLERANCE.

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE
BLACK	0	1
BROWN	1	10
RED	2	100
ORANGE	3	1,000
YELLOW	4	10,000
GREEN	5	100,000
BLUE	6	1,000,000
VIOLET	7	10,000,000
GRAY	8	100,000,000
WHITE	9	1,000,000,000
GOLD	5% TOLERANCE	0.1
SILVER	10% TOLERANCE	0.01
NO COLOR OR BLACK	20% TOLERANCE	

EXAMPLES

43,000 OHMS	YELLOW (4)	ORANGE (3)	ORANGE (X1000)
3,000 OHMS	ORANGE (3)	BLACK (0)	RED (X100)
3.3 OHMS	ORANGE (3)	ORANGE (3)	GOLD (0.1)

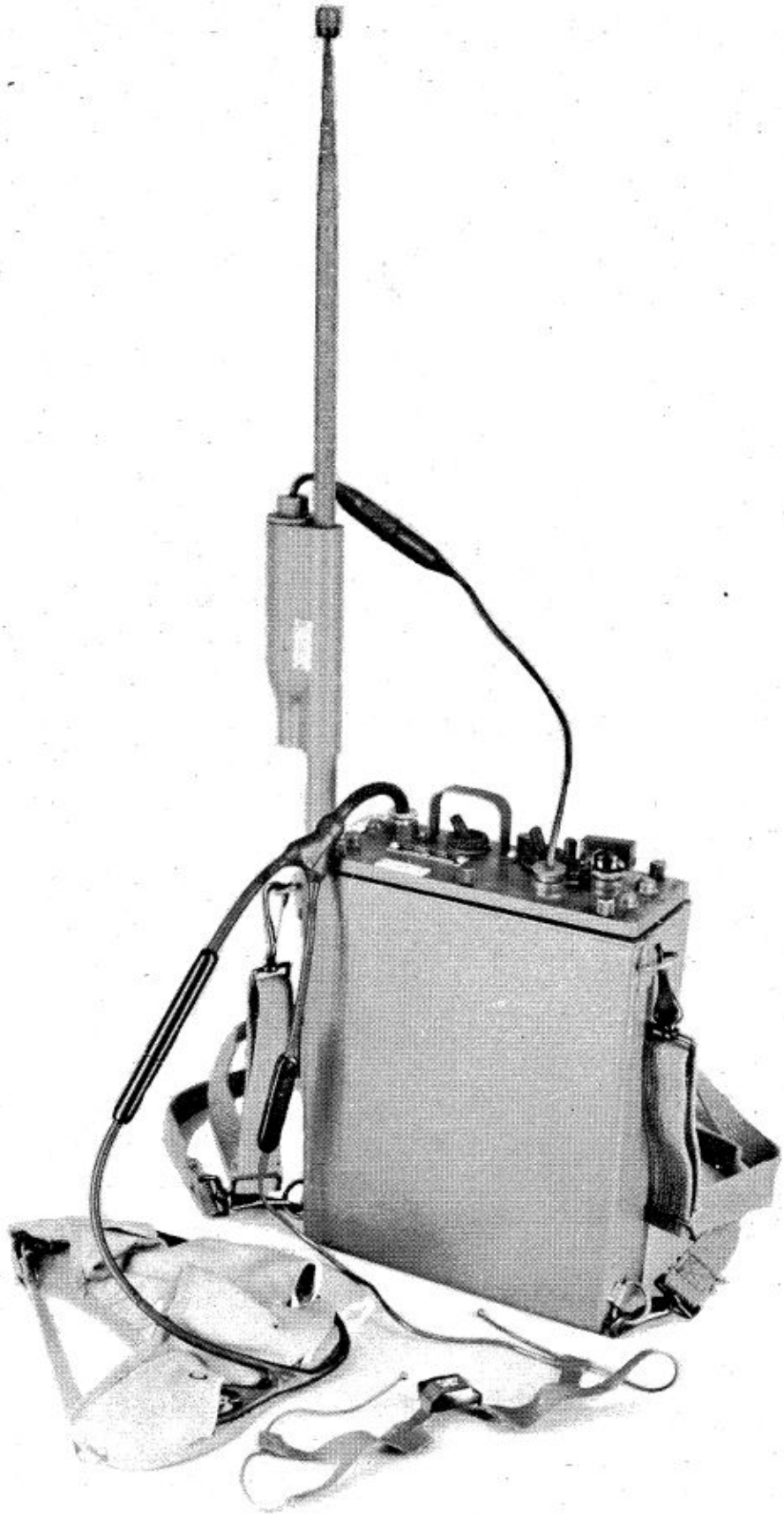


Fig. 1. Complete Assembled Equipment

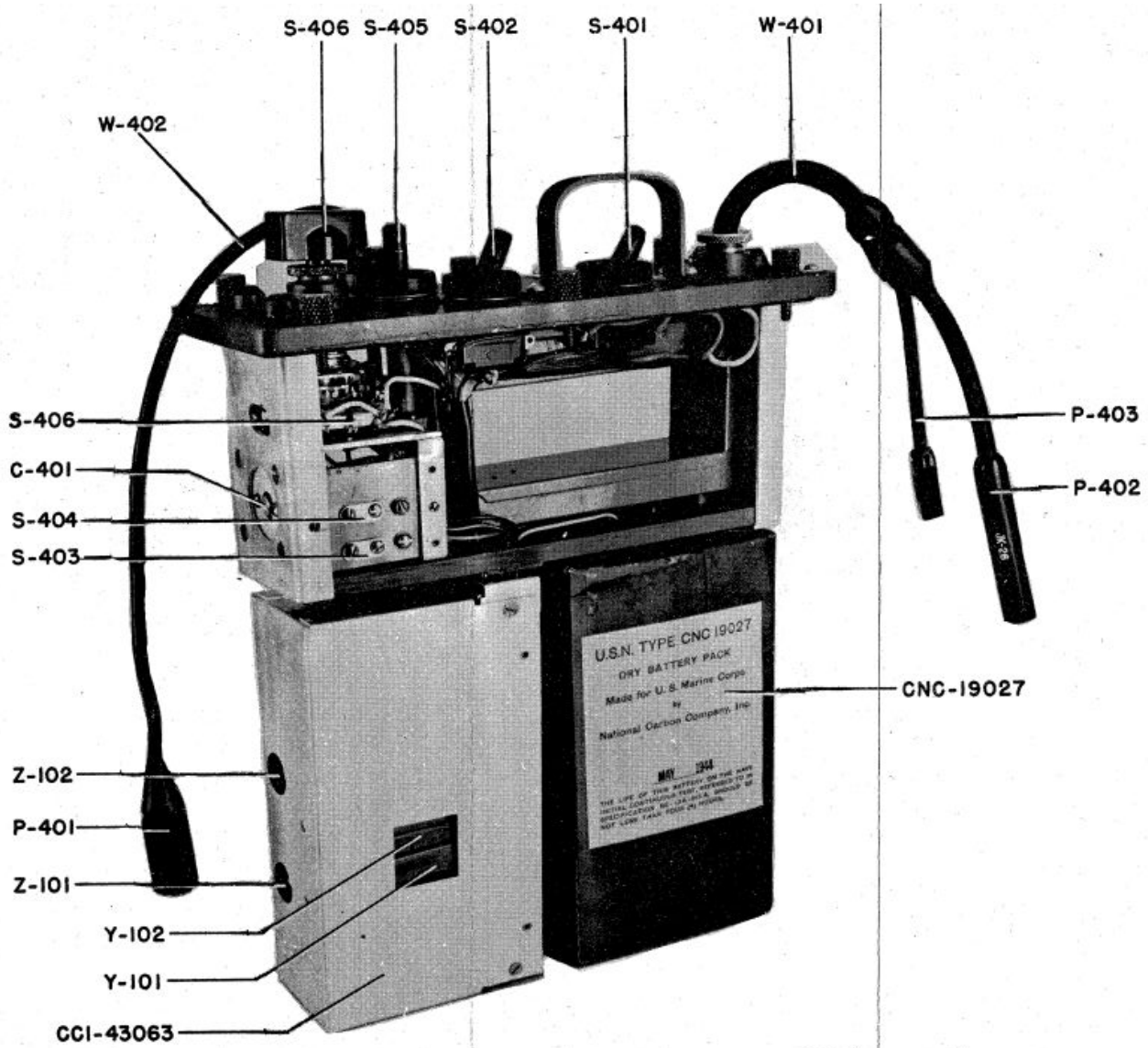


Fig. 2. Assembled Equipment, Case and Accessories Removed
164-C-801

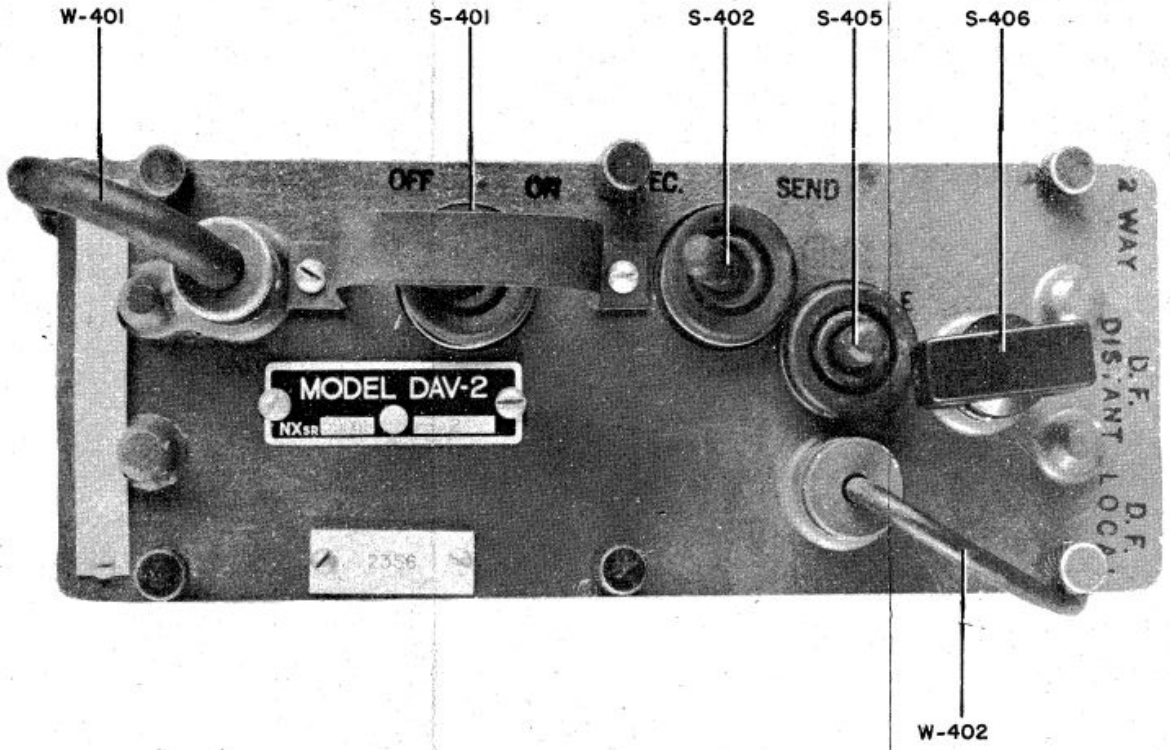


Fig. 3. Loop Unit, Top View
164-L-801

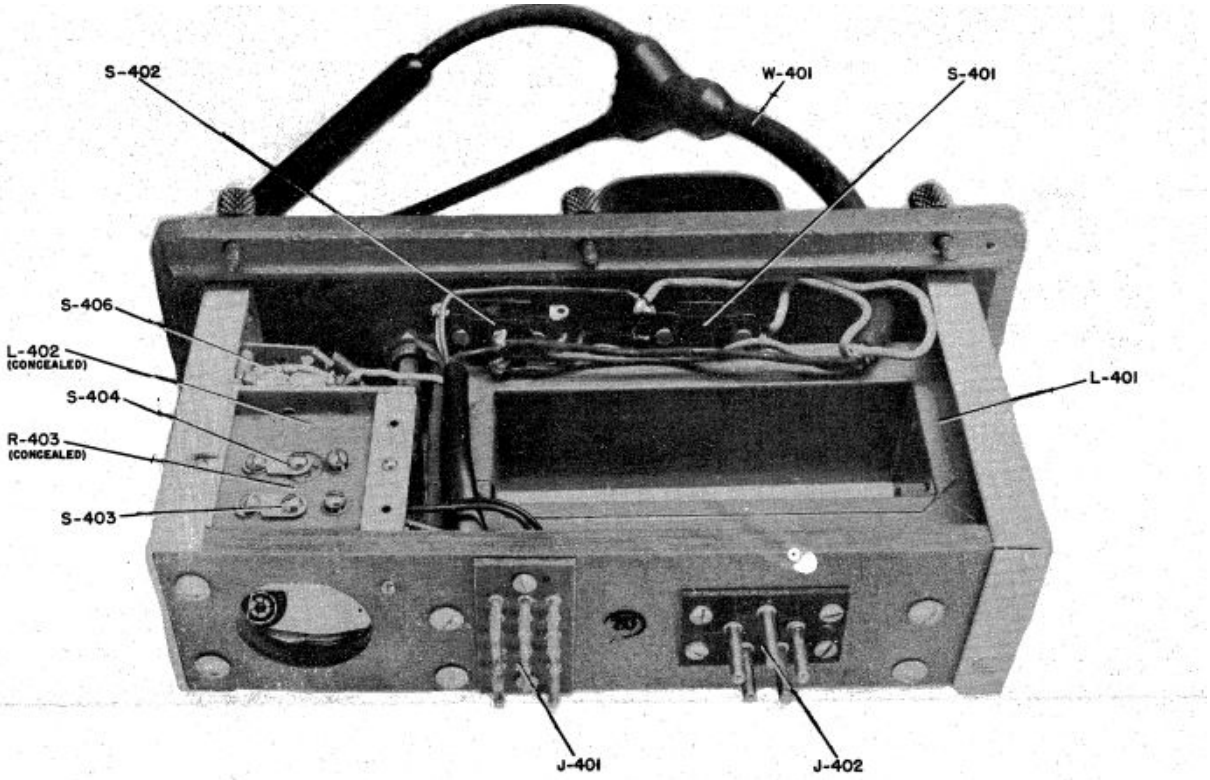


Fig. 4. Loop Unit, Front Side View
164-L-802

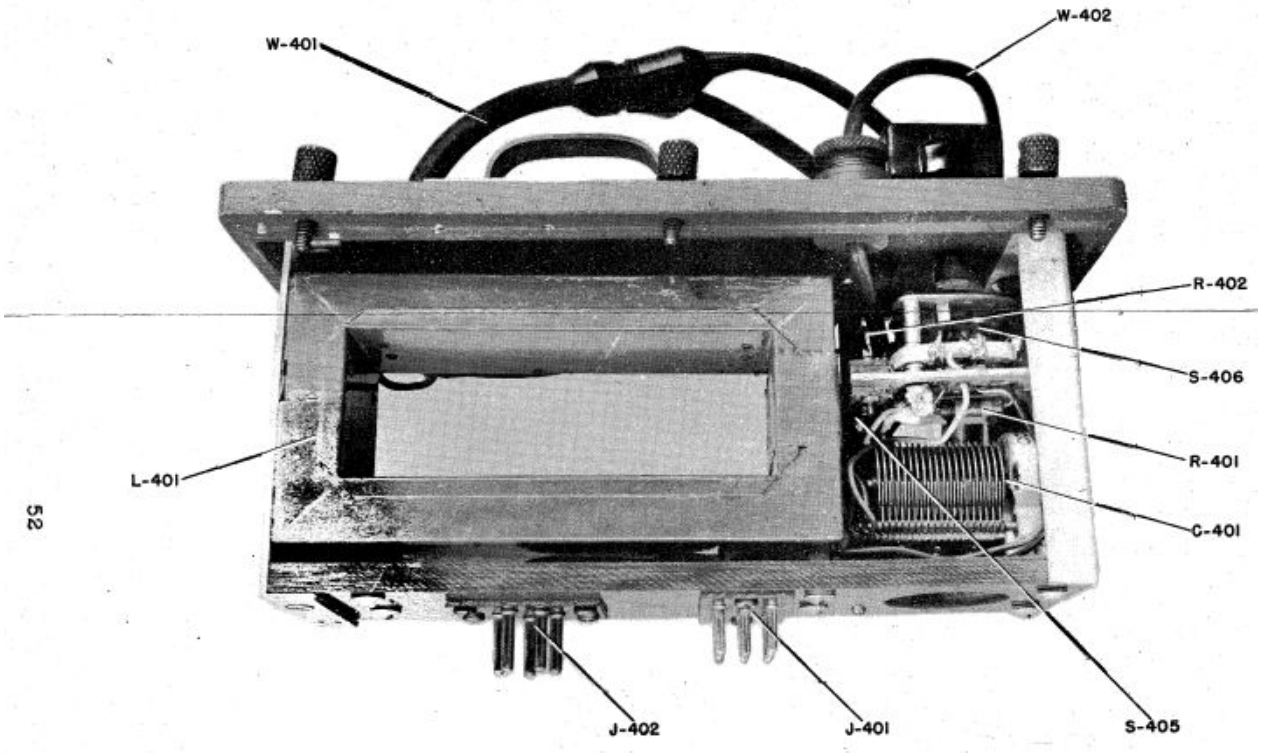


Fig. 5. Loop Unit, Rear Side View
164-L-803

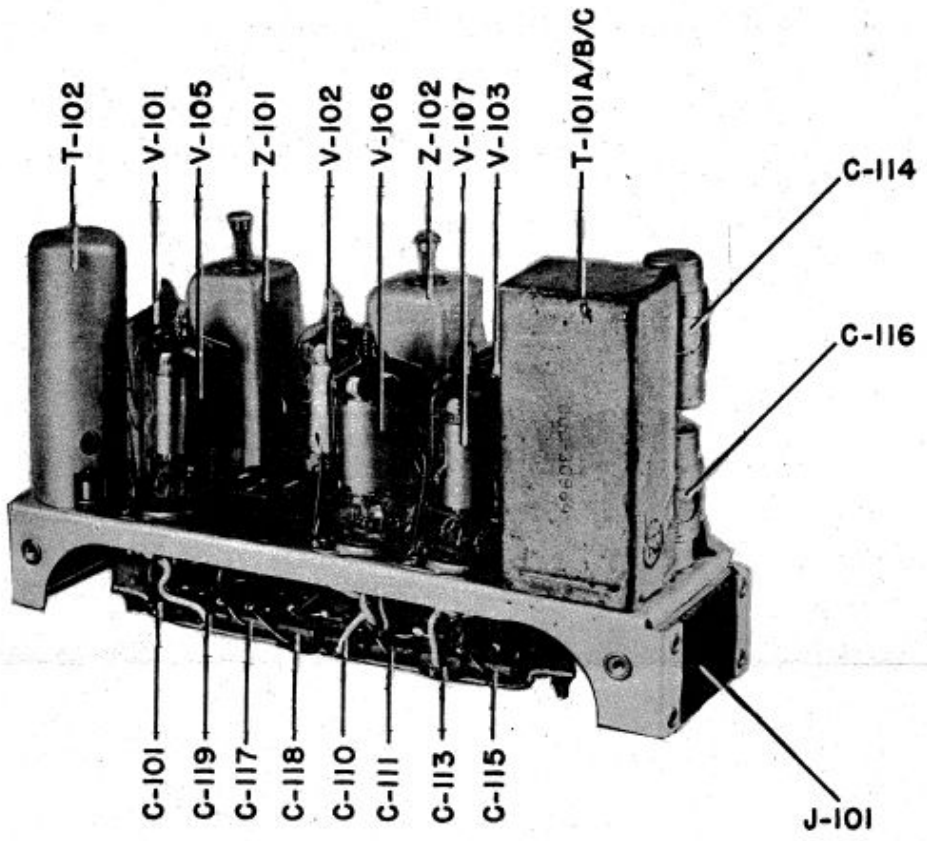


Fig. 6. Radio Unit Front View
164-C-802

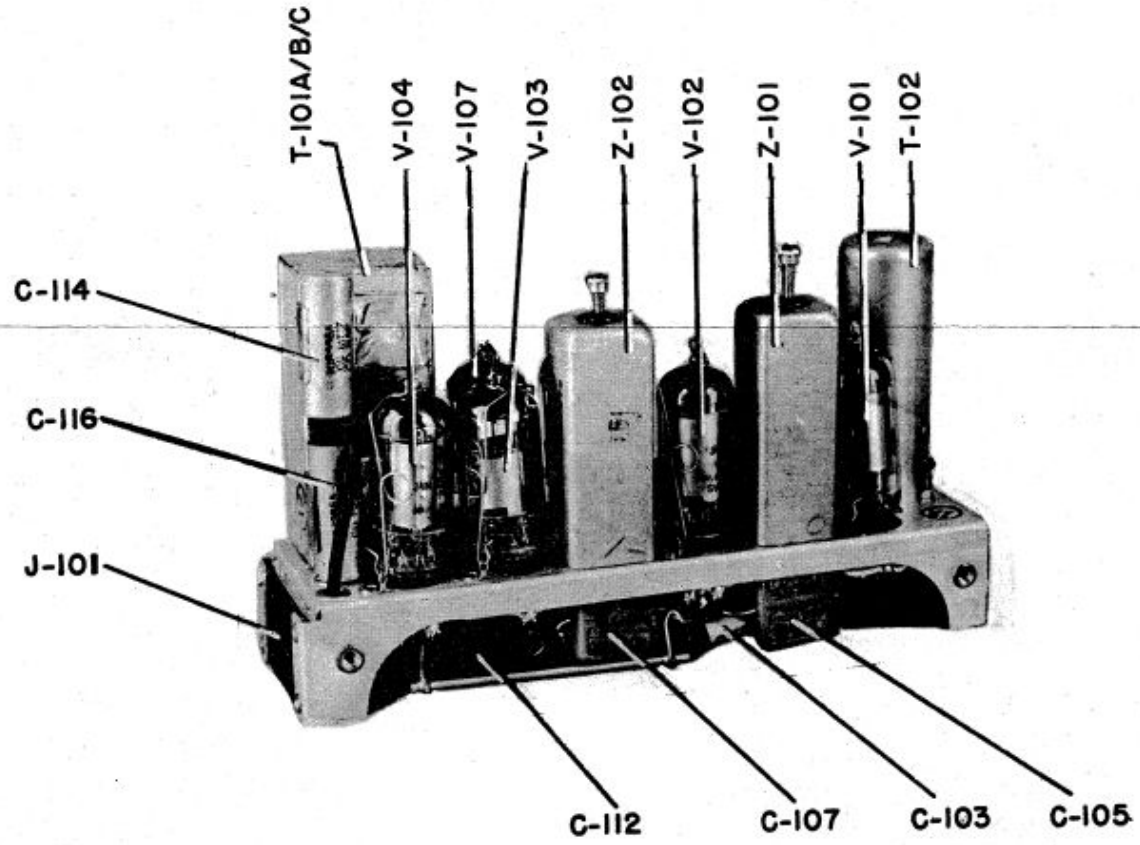


Fig. 7. Radio Unit, Rear View
164-C-803

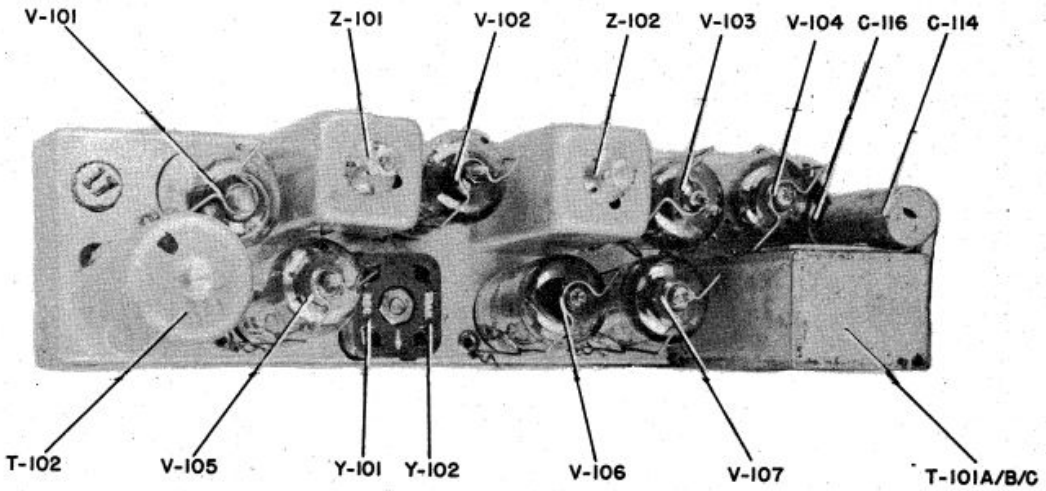


Fig. 8. Radio Unit, Top View
164-C-804

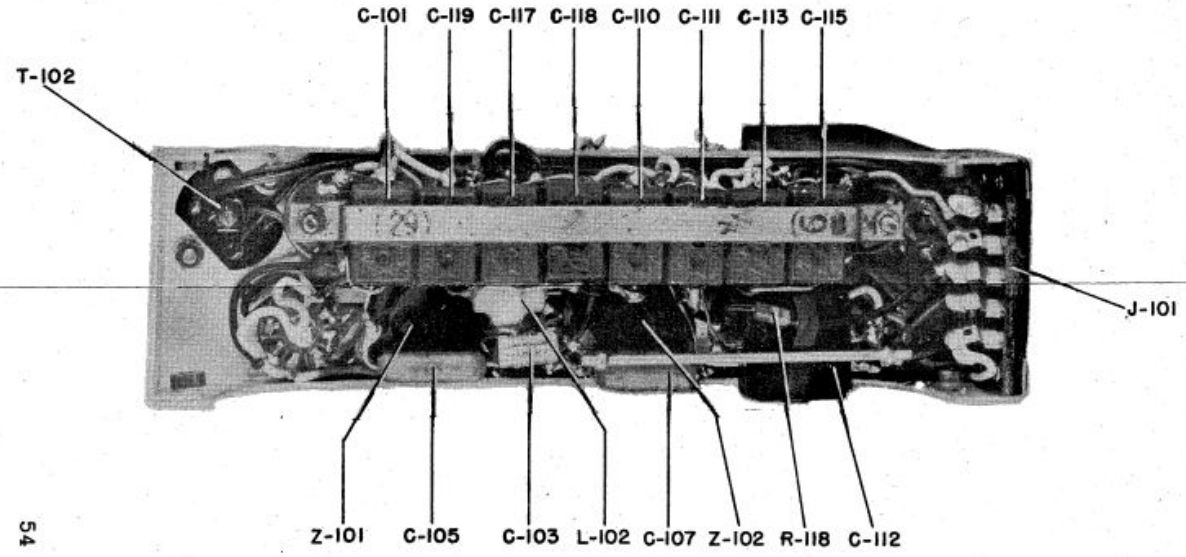


Fig. 9. Radio Unit, Bottom View
164-C-805

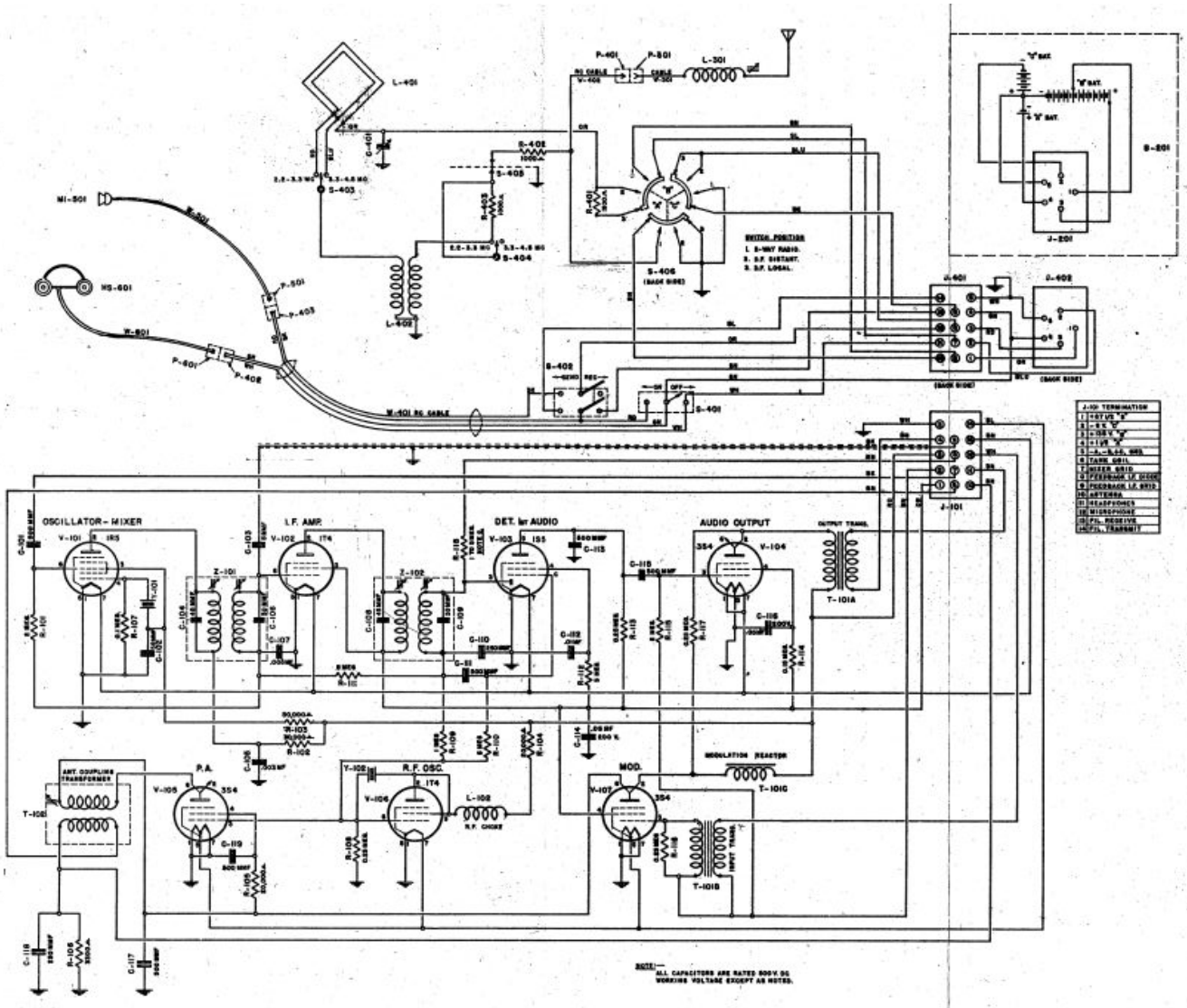


Fig. 10. Schematic Diagram
164-L-101

NAVY MODEL DAV-2
RADIO DIRECTION FINDER EQUIPMENT

APPENDIX A

INSTRUCTIONS FOR PREPARING CW-19046 LEAD ACID BATTERIES FOR SERVICE

Battery CW-19046 is shipped in the "dry charged" condition and electrolyte (sulfuric acid solution) must be added to activate it.

CAUTION: Do not allow electrolyte to come in contact with skin, clothing, or other equipment.

A. HOW TO FILL WITH ELECTROLYTE.

1. Remove and discard adhesive tape which seals vent holes.

2. Add electrolyte through vent holes with the filling device provided. (Acid should be at least 60° F. for best results.)

3. Fill slowly until liquid level reaches line marked "Initial filling level." This will require exactly 1/3 of the electrolyte supplied, in each cell. Levels will rise slightly for the first hour upon standing and may be lowered again by gently bumping or inverting the cell to release trapped gas. Any excess electrolyte above operating level line should be removed by means of the syringe to prevent pumping and acid leakage during use. Maintain at this operating level line by the

use of distilled water only, during subsequent service.

4. Use within 12 hours after filling.

B. CHARGING.

1. RECHARGE PROMPTLY after each use.

2. Charge at 1/2 ampere for 16 hours.

3. If electrolyte level has dropped during charge, add pure water to restore to "operating level." Never more than this.

4. Keep battery charged at all times. Allowing to stand in discharged condition will render it inoperative.

WILLARD STORAGE BATTERY COMPANY

Cleveland, Ohio